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## SIMULATION OF FUNDAMENTAL PROPERTIES IN CNT- AND GRAPHENE-BASED NANOPOROUS MATERIALS: ELECTROMECHANICS AND ELECTROMAGNETICS



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### ABSTRACT

Electromechanical and electromagnetic properties of CNTs and graphene-based nanoporous materials are essential for various nanotechnology applications, e.g. for engineering new classes of ultra-light, highly conductive nanomaterials with exceptional mechanical strength, flexibility, and elasticity. We pay major attention to CNTs, graphene nanoribbons and nanofibers (GNR and GNF), CNT- and graphene-based aerogels (CNTBA, GBA), CNT- and graphene-based 3D-nanofoams and carbon-based polymer nanocomposites, as to the basis for the unique nanoelectronic devices, revolutionary membrane materials (due to their strength and atomic thickness) and nanosensors. Particular properties of carbon-based nanoporous systems in dependence on porosity extent, morphology and fractal dimension allow finding practically useful correlations between their mechanical and electrical properties

Keywords: CNT- and graphene-based aerogels (CNTBA, GBA), CNT- and graphene-based 3D-nanofoams, carbon-based polymer nanocomposites

### 1 INTRODUCTION

Technological interest in contacts of CNTs or GNRs with other conducting elements in nanocircuits [1], FET-type nanodevices, CNTBA and GBA, carbon-based nanofoams constitutes the reason for estimating their electromagnetic properties including interconnect impedances, which depend on chirality effects and electromechanical properties as some integrated effect of macroscopic structural deformations. One of the likely applications of CNTs and graphene nanofoams (see Figures 1 and 2) is in chemical sensing. These sensors are able to detect gases at room temperature, while many commercial sensors today require high temperatures to work properly. The porous CNTs and graphene are not only more effective than current commercial sensors it also can easily be reused, e.g., in order to “empty” the graphene of trapped gas molecules, all the graphene needs is an electric shock. CNTs and graphene nanofoams graphene may also be used in energy storage, such as supercapacitors and batteries, accumulators of massive amounts of

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energy, (e.g., hydrogen). The CNTs and graphene nanofoams have a high surface area thanks to its porous nature, providing their high electrochemical capacitance.

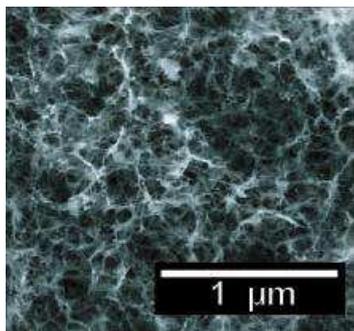


FIGURE 1 CNTS BASED NANOAEROGEL IMAGE (M B BRYNING, D E MILKIE, M F ISLAM, L A HOUGH, J M KIKKAWA, A G YODH 2007 CARBON NANOTUBE AEROGELS ADVANCED MATERIALS 19(5) 662)

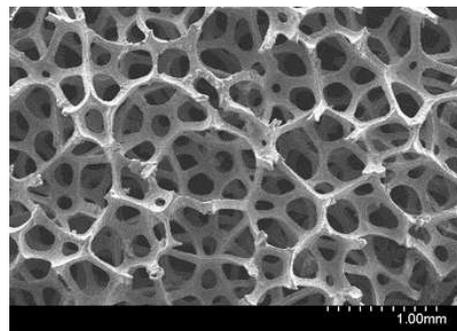


FIGURE 2 GRAPHENE BASED NANOFOAM IMAGE  
[HTTPS://GRAPHENE-SUPERMARKET.COM/3D-GRAPHENE-FOAMS](https://graphene-supermarket.com/3d-graphene-foams)

## 2 MODELS OF CARBON BASED NANOPOROUS MATERIALS

Nanoporous systems are considered as complicated ensembles of basic nanocarbon interconnected elements (e.g., CNTs or GNRs with possible defects and dangling boundary bonds) within the effective media type environment (see Figures 3 and 4). Interconnects are essentially local quantum objects and are

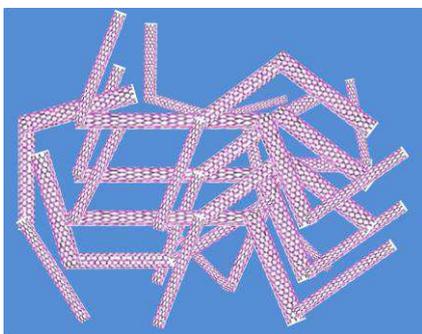


FIGURE 3 STRUCTURAL MODEL OF CNTBA: COVALENT BONDING IN INTERCONNECTS BETWEEN STATISTICALLY PARAMETRIZED CNTS AND VAN DER VAALSE TYPE SIDE BONDING OF CNTS

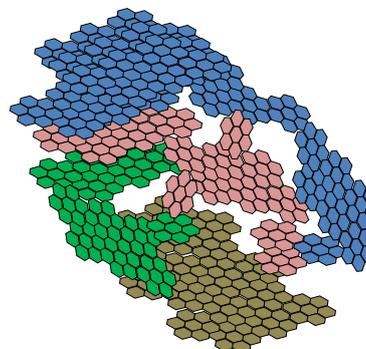


FIGURE 4 STRUCTURAL MODEL OF GBA: COVALENT BONDING IN INTERCONNECTS BETWEEN STATISTICALLY PARAMETRIZED GNRs AND VAN DER VAALSE TYPE BONDING OF GNRs LAYERS

evaluated in the framework of the developed cluster approach based on the multiple scattering theory formalism as well as effective medium approximation [1], which allows calculating the above mentioned nanosized systems' local electronic densities of states, conductivity, force interaction constants, etc. Technological interest in contacts of CNTs or GNRs with other conducting elements in nanocircuits [2], FET-type nanodevices, CNTBA and GBA, carbon-based nanofoams constitutes the reason for estimating their electromagnetic properties including interconnect impedances, which depend on chirality effects and electromechanical properties as some integrated effect of macroscopic structural deformations.

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## SIMULATION OF RADIATION-INDUCED FRENKEL PAIRS IN $\alpha$ - $\text{Al}_2\text{O}_3$ : OPTIMIZATION OF COMPUTATIONAL PROCEDURE

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### ABSTRACT

Corundum is a wide band gap (8.8 eV) insulator widely used in optical devices being an alternative dielectric for complementary metal oxide (CMOS) gate stacks. Due to high radiation-resistance,  $\alpha$ - $\text{Al}_2\text{O}_3$  is also considered as a perspective material for high-energy nuclear applications [1]. Radiation-induced changes in structural and optical properties of exposed corundum are mainly associated with oxygen vacancies and complementary Frenkel pairs of defects (O vacancy + interstitial O atom) [2].

Keywords: CRYSTAL code, ab initio modelling, corundum, defects, Frenkel pairs

### 1 MOTIVATION

Despite the technological, mineralogical, ceramic and catalytic importance of corundum crystalline structures, their fusion applications as well as prospects as a laser and dosimeter material, point (including electronic) defects have not yet well theoretically studied [2]. The main reasons for this are the following: the complicated atomic structure of  $\alpha$ - $\text{Al}_2\text{O}_3$  (Fig. 1) as well as both semi-covalent and semi-ionic chemical bonding as was experimentally observed using X-scattering [3].

### 2 COMPUTATIONAL DETAILS AND RESULTS

In this study, we have performed large-scale DFT-LCAO calculations of Frenkel pairs of radiation defects in  $\alpha$ - $\text{Al}_2\text{O}_3$  within the hybrid B3PW exchange-correlation functional using the CRYSTAL14 code [3]. The basis sets of Al and O were selected and optimized, to achieve reasonable compromise between the size of supercell and computational time.

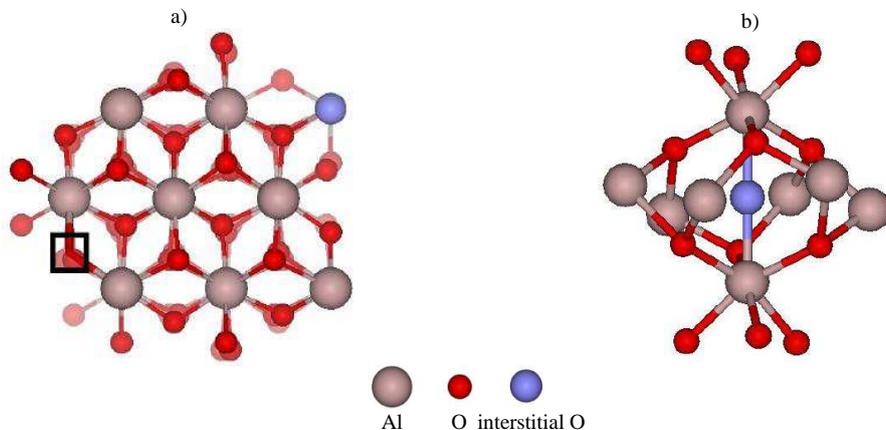


FIGURE 1 ATOP AND ACROSS IMAGES OF EITHER FRENKEL PAIR (a) OR O INTERSTITIAL IN REGARDS TO SELECTED FRAGMENTS OF  $\alpha$ - $\text{Al}_2\text{O}_3$  (0001) CRYSTALLOGRAPHIC PLANE, RESPECTIVELY. O VACANCY IS SHOWN AS A BLACK-LINE-TERMINATED SQUARE.

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As a result, good agreement has been achieved between the calculated and experimental data for the parameters of a pure corundum lattice, its elastic constants and band gap. The most stable position for interstitial O atom (Fig. 1b) has been found simultaneously with the defect formation energy and lattice distortion. Lastly, the calculations of Frenkel pairs at different mutual separations (Fig. 1a) have been performed, accompanied with the determination of the energy barrier for back recombination, in order to suggest interpretation of experimental data. As shown earlier [2], oxygen vacancy migration can involve hops within the small oxygen triangles and hops roughly parallel to Al axes along paths that link distorted octahedral in adjacent stacks. Thus, oxygen atoms in these hops deviate from the linear paths between the lattice sites if not constrained by symmetry.

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# AB INITIO CALCULATIONS OF INTERACTIONS BETWEEN Y, O IMPURITY ATOMS AND FE VACANCIES FOR ODS STEEL IMPLEMENTATION IN FUSION REACTORS

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## ABSTRACT

Large-scale first-principles calculations have been performed on the  $\gamma$ -Fe lattice containing pairs and three-atom clusters of O and Y impurities as well as Fe vacancies. Migration trajectories for both impurity atoms and vacancies have been constructed in order to estimate the corresponding energy barriers.

Keywords: VASP code, ab initio modelling of O and Y precipitates as well as Fe vacancies in steels

## 1 MOTIVATION

Oxide dispersion strengthened (ODS) structures of reduced activation ferritic-martensitic (RAFM) steels are found to be promising construction materials for fusion reactor applications. Development of the ODS steels strengthened by  $Y_2O_3$  precipitates as more suitable materials for reactors instead of non-modified RAFM steels permits to increase the operating temperatures of blanket structures by 100°C. Both size and spatial distribution of oxide particles significantly affect mechanical properties and radiation resistance of ODS steels which are produced by mechanical alloying, followed by a hot isostatic pressing (hipping) at temperature around 1000-1200°C and pressure ~100 MPa. The mechanism of the ODS particle formation is not completely understood yet.

## 2 COMPUTATIONAL DETAILS

Theoretical approach for atomistic simulations of ODS particle formation is performed in the two steps. Firstly, ab initio calculations on different complexes of Y and O impurity atoms as well as vacancies in bcc-iron lattice have been performed using VASP computer code within both  $4\times 4\times 4$  and  $5\times 5\times 5$  Fe supercell models [1,2]. The results of these calculations are used in the lattice kinetic Monte Carlo (LKMC) simulations of  $Y_2O_3$  particle growth inside Fe lattice.

## 3 MAIN RESULTS

Binding energies between the impurity atoms and vacancies as well as their diffusion barrier energies are important parameters for the LKMC modelling of the ODS particle formation. To perform diffusion barrier calculations, the nudge elastic band (NEB) method have been used (as implemented within the VASP computer code). The calculations of different Y diffusion trajectories have been performed. The lowest calculated energy of the diffusion barrier has been found to be about 1.75eV. The high values of diffusion energies prove that the increased concentration of vacancies is required for Y diffusion and the increased size of the supercell is required for this purpose.

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#### 4 SUMMARY

In this study, we have performed ab initio calculations of various complexes of O and Y atoms in bcc-Fe lattice containing vacancies as well as their diffusion trajectories to be used in LKMC simulations.

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# FIRST PRINCIPLES SIMULATIONS ON Fe-Pt NANOCCLUSERS OF VARIOUS MORPHOLOGY AND CNT GROWTH UPON THEM

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## ABSTRACT

FePt nanoparticles with L1<sub>0</sub> structure exhibit high magnetocrystalline anisotropy and high coercivities, what make them potential material for ultra-high density magnetic data storage [1]. FePt nanoclusters also are considered as a catalyst for growth of carbon nanotubes of different chiralities. Most common used catalysts for CNTs growth are Fe, Ni, and Co nanoparticles, which are magnetically isotropic. Magnetic anisotropy of Fe-Pt nanoparticles allows one to use them as a catalyst for CNTs growth with predicted chiralities. Chirality of these CNTs will depend on direction of an external magnetic field and diameter will depend on size of FePt nanoparticle [2, 3].

Keywords: CRYSTAL code, ab initio modelling, FePt nanoclusters, CNT growth on nanoclusters

## 1 MOTIVATION

Magnetic nanoclusters with sizes ranging from 2 to 20 nm represent an important class of artificial nanostructured materials [1]. Their magnetic properties change drastically with their size, as the relaxation of the magnetization orientation of each particle is determined by  $s = s_0 e^{KV/2kT}$ , in which  $s$  is the relaxation time at one orientation,  $K$  the particle's anisotropy constant,  $V$  the particle volume,  $k$  the Boltzmann's constant, and  $T$  temperature [4].  $KV$  measures the energy barrier between two orientations. As the size of the particle decreases to a level where  $KV$  becomes comparable to the thermal energy  $kT$ , its magnetization starts to fluctuate from one direction to another. As a result, at this  $T$  the overall magnetic moment of this particle is randomized to zero, and the particle is said to be superparamagnetic.

FePt nanoclusters containing a near-equal atomic percentage of Fe and Pt are an important class of magnetic nanomaterials. They were found to have a chemically disordered face-centred cubic (fcc) structure or a chemically ordered face-centred tetragonal (fct) structure [5]. Fe-Pt interactions render the FePt nanoclusters chemically more stable than the common high-moment nanoclusters of Co and Fe, as well as other high coercive materials, making them especially useful for practical applications in solid-state devices and biomedicine.

## 2 COMPUTATIONAL DETAILS

Large-scale DFT-LCAO calculations have been performed using PWGGA exchange-correlation functional as implemented in CRYSTAL09 code [6]. A number of FePt nanoclusters with different stoichiometry and atom arrangement have been set up with preserved L1<sub>0</sub> structure. There have been icosahedrons (Fig. 1) and hexagonal close-packed (hcp) configurations (Fig. 2), both with layered and „onion-like” structures. According to Wulff construction formalism, energetically most preferable configurations of FePt nanoclusters, including their faceting, correspond to those with minimum surface energy. All ab initio calculations have been performed for 0 K, although surface energy depends on temperature, i.e., configuration of nanoclusters is thermodynamically changeable. To take these changes into account, results of DFT-LCAO calculations have been correlated [7]:

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$$G_{\text{surf}}(T, p) = \frac{1}{A} [E_{\text{tot}}(T, p, N_{\text{Pt}}, N_{\text{Fe}}) - N_{\text{Pt}}\mu_{\text{Pt}}(T, p) - N_{\text{Fe}}\mu_{\text{Fe}}(T, p)], \quad (1)$$

where  $T$  and  $p$  are temperature and pressure of cluster-containing area,  $N_{\text{Pt}}$  and  $N_{\text{Fe}}$  are atomic concentrations of Pt and Fe while  $\mu_{\text{Pt}}$  and  $\mu_{\text{Fe}}$  their chemical potentials, respectively.

The next step of performed simulations has included the model of CNT growth above the FePt nanoclusters of different morphology. Primarily, the energetically most favourable sites for carbon atom adsorption above both types of clusters have been selected and then equilibrium positions of C atoms relatively clusters have been found (Fig. 3). For simulations on adsorbed C atoms and nanotubes we have performed DFT-LCAO calculations within hybrid B3LYP functional as implemented in CRYSTAL code [6]. This functional provides accurate results for electronic structure calculations. Since chiralities of growing CNTs depend on both FePt nanocluster size and orientation of the magnetic moment, the corresponding simulations have been performed as well.

### 3 MAIN RESULTS

Images of optimized FePt nanoclusters with icosahedral and hcp structures are present in Figs. 1 and 2, respectively. Surface energy calculations of all nanoparticles showed that the general minimum corresponds to nanocluster with icosahedron onion-like structure and  $\text{Fe}_{43}\text{Pt}_{104}$  stoichiometry where the outer layer consists of Pt atoms. Just this cluster has been used for further calculation of CNT growth.

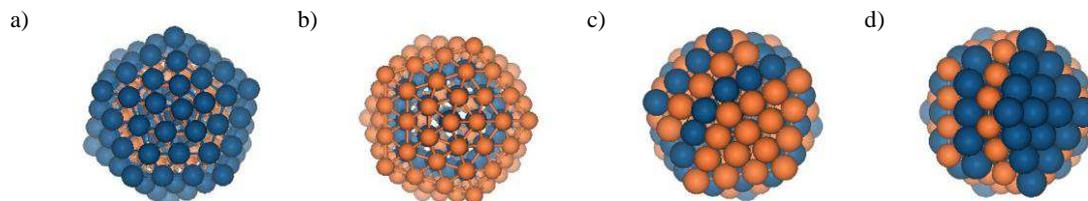


FIGURE 1 147-ATOM FePt NANOCCLUSERS WITH ICOSAHEDRAL STRUCTURE DESCRIBED BY  $C_1$  POINT GROUP: a)  $\text{Fe}_{43}\text{Pt}_{104}$  AND b)  $\text{Fe}_{104}\text{Pt}_{43}$  BELONG TO “ONION-LIKE” WHILE c)  $\text{Fe}_{76}\text{Pt}_{71}$  AND d)  $\text{Fe}_{71}\text{Pt}_{76}$  POSSESS LAYERED MORPHOLOGY. Fe AND Pt ATOMS ARE SHOWN AS LIGHT AND DARK BALLS, RESPECTIVELY

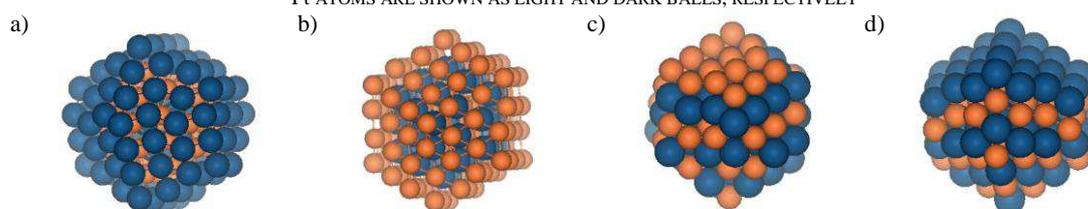


FIGURE 2 153-ATOM FePt NANOCCLUSERS WITH hcp STRUCTURE DESCRIBED BY  $C_1$  POINT GROUP: a)  $\text{Fe}_{43}\text{Pt}_{108}$  AND b)  $\text{Fe}_{108}\text{Pt}_{45}$  BELONG TO “ONION-LIKE” WHILE c)  $\text{Fe}_{82}\text{Pt}_{71}$  AND d)  $\text{Fe}_{71}\text{Pt}_{82}$  POSSESS LAYERED MORPHOLOGY. Fe AND Pt ATOMS ARE SHOWN AS LIGHT AND DARK BALLS, RESPECTIVELY

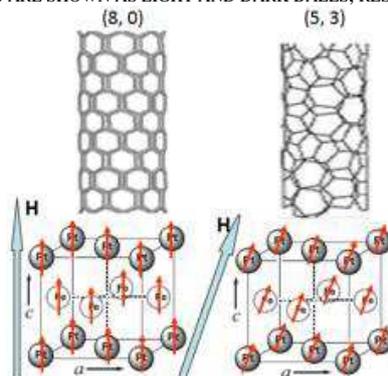


FIGURE 3 DEPENDENCE OF CNTS CHIRALITY FROM EXTERNAL MAGNETIC FIELD

The average magnetic moment of Fe and Pt atoms does not change significantly when comparing bulk FePt structure of different compositions and Fe<sub>43</sub>Pt<sub>104</sub> cluster.

The next stage of simulation has included finding of energetically favourable site on the surface of nanocluster for adsorption of single C atom. On the icosahedron facets, we have assumed 10 symmetrically-independent positions for C atom adsorption, the most advantageous of them correspond to adatom arrangement upon various hollow cluster sites. In further simulations, more than one carbon atom on nanoparticle's surface will be calculated. Depending on orientation of nanocluster magnetic moment (Fig. 3) further ab initio simulations of CNT growth upon energetically favourable Fe<sub>43</sub>Pt<sub>104</sub> particle are foreseen.

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## CURRENT PULSATIONS IN THIN TUBES

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### ABSTRACT

Last time an interest arose to the problem of ion current passing through the system of closely spaced nanotubes. The problem is linked to creation of nanoelectronic devices, solving numerous tasks of biology and medicine. In this work we investigated nanotubes as ion tracks in polymer films.

The passage of ions in the tracks has interesting features. In particular, in polymeric membranes embedded in electrolytes, the etched pore walls usually become charged up due to the breaking of polymeric bonds. This effect, in combination with the longitudinal asymmetric shape of conical tracks leads the result that currents running through electrolyte-filled conical etched tracks are rectified by such structures (“etched track diodes”). Under certain conditions it has been possible to tailor the track structures so that they transmit discontinuous, spike-like currents.

Keywords: nanoelectronic devices, closely spaced nanotubes, ion current, “etched track diodes”

### 1 GENERAL

The current through nanotracks is described by different methods (stationary Poisson Nernst Planck equations, Molecular Dynamics (MD) simulation [1, 2] and others). We used MD simulation method to study the mechanism of current pulsations in tracks. A schematic representation of such structure is shown in Figure 1.

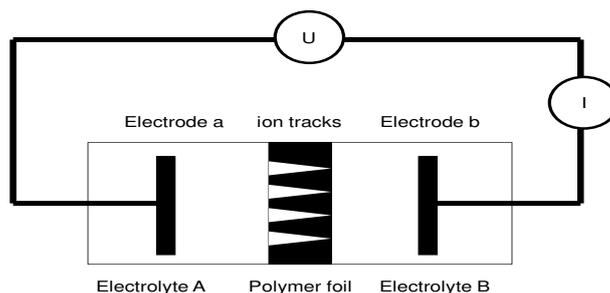


FIGURE 1 PRINCIPLE ARRANGEMENT OF EXPERIMENTAL SETUP TO STUDY CURRENT EMISSION FROM ION TRACK-CONTAINING FOILS EMBEDDED IN ELECTROLYTES VIA CURRENT/VOLTAGE MEASUREMENTS

In the equilibrium state (in the absence of the applied voltage) the tracks are filled with almost motionless electrolyte. As a result of fluctuations the number of ions in tracks slightly varies. This corresponds to very small oscillations of current. Upon application of an alternating voltage the ions are ejected from the tracks, which after some time are filled with ions again. As a result we observed small current oscillations. From time to time we observe in experiment that significant current spikes occur. In

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the model the mentioned track structure is presented as a two-dimensional system of currents. To simulate this system of currents we have chosen a two-dimensional lattice, which consists of model particles (MP).

The application of an alternative voltage is modelled by the action of external forces (EF), which at certain time intervals "nudge" the particles in the nodes of model lattice. The values of EF were chosen so that MP did not leave their nodes. The directions of EF were determined by the random function and change within the upper hemisphere. The value and the frequency of the EF can be varied thus simulating the change of the applied voltage. The MD computer program for the model is based on the Verlet algorithm. The interaction of model particles located in the nodes was described by the Lenard-Jones potential.

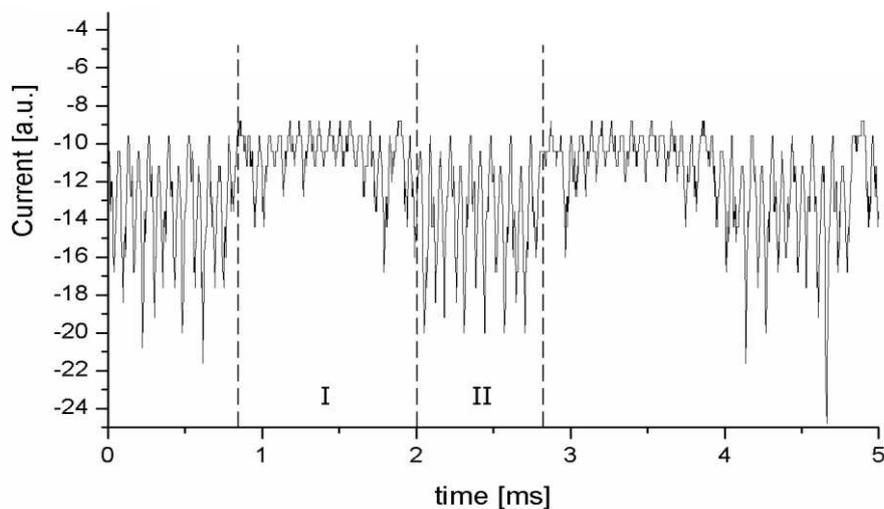


FIGURE 2 CURRENT SPIKES IN CONDITIONS OF REAL EXPERIMENT [3]. REGION I CORRESPONDS TO REGULAR OSCILLATIONS; REGION II CORRESPONDS TO CURRENT SPIKES

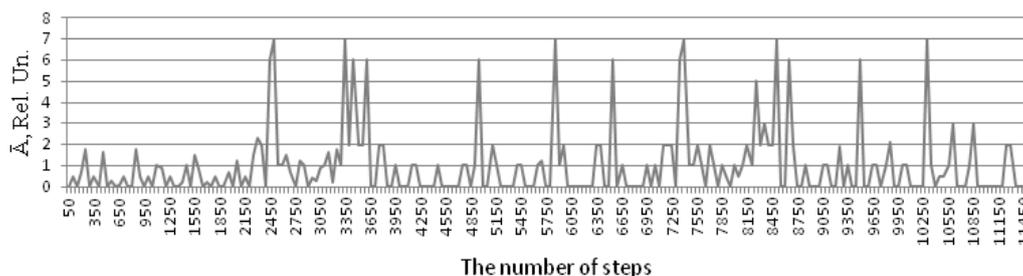


FIGURE 3 ILLUSTRATION OF MODEL SPIKES IN THE MODEL EXPERIMENT. AT THE HORIZONTAL AXIS IS THE AVERAGE AMPLITUDE OF MP OSCILLATIONS

It is found that the taking into account only one factor (the interaction of currents in the system of tracks) causes the emergence of current spikes. The mechanism of current spikes formation essentially depends on the potential of MP interaction. Current pulsations observed in the real (Figure 2) and the model (Figure 3) experiments are identical.

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# MECHANISM OF DEFORMATION OF ALUMINIUM POLYCRYSTALLINE ALLOYS

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## ABSTRACT

Two classical models for deformation processes in metallic polycrystalline alloys (MPA) are known: the accumulation of dislocations and the deformation work hardening [1, 2]. For MPA with grains of 30 nm a dislocation mechanism is typical. In the Model of dislocations accumulation the regions of grains are impenetrable barriers for dislocations, and the sliding causes an accumulation of dislocations in these regions. As a result a concentration of stresses arose, and deformation processes are activated. According to the Model of the deformation work hardening, the deformation is larger in the case of grains of larger sizes because of the greater internal stresses. In this model deformation processes are significantly determined by the size distribution of grains.

Keywords: metallic polycrystalline alloys, deformation processes, models for deformation processes

## 1 GENERAL

To choose the most suitable model we studied deformation processes in aluminium alloys D16 related to the new generation of construction materials in which the grains with high dispersion were created.

In order to receive a maximal concentration of copper in a solid solution the alloy was heated at the temperature 510 °C during 1 h. The wide dispersion of grains was achieved to get the maximal effect of the deformation work hardening. After rolling an initial coarse-grained structure was fully transformed to structures with the size 130 nm and mainly with large-angular shapes of grains. High level internal stresses were observed in these alloys.

The durability of these alloys is explained, foremost, by the selection of copper atoms from a solid solution. This results of selection of Cu atoms from a solid solution and a decreasing of lattice parameter (for the system Al-Cu it is 0, 0043 Å - 0, 0046 Å). A selection of atoms of alloying elements from a solid solution is accompanied by their segregation.

In studied alloys, the average size of grains was about 100 nm in aluminium alloys (the systems of Al-Mg-Li and Al-Zn-Mg). At the same time in technically clean aluminium the average size of grains was 800 nm. Thus, the presence of alloying elements causes a decrease of grain sizes.

We found that a high durability of studied alloys is explained by a selection of alloying elements from grains and their segregation at boundaries of grains.

The obtained results speak in favour of the mechanism of the deformation work hardening. The main features of this mechanism revealed in our research are following:

- 1 The deformation work hardening occurs due to the appropriate evolution of grain size distributions.
- 2 The appropriate average sizes of grains are necessary.
- 3 Segregation of alloying elements at the boundaries of grains promotes the deformation work hardening.

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## SIMULATIONS OF STANDARD BROWNIAN MOTION

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### ABSTRACT

In this paper we studied the accuracy and reliability of the Wiener process simulation in functional spaces -  $L_2([0,1])$ ,  $L_p([0,1])$ , Orlicz spaces  $L_U([0,1])$ .

Keywords: simulation, Brownian motion, Gaussian random processes, accuracy and reliability of model

### 1 GENERAL

For Brownian motion (Wiener process) Karhunen-Loeve expansion [1] is well known:

$\xi_1(t) = t\eta_0 + \sqrt{2} \sum_{i=1}^{\infty} \frac{\sin(i\pi t)}{i\pi} \eta_i$   $t \in [0,1]$ , where  $\{\eta_0, \eta_1, \eta_2, \dots\}$  - i.i.d. standard Gaussian random

variables. As a model for expansion of the Wiener process, consider  $S_1(t, M) = t\eta_0 + \sqrt{2} \sum_{i=1}^M \frac{\sin(i\pi t)}{i\pi} \eta_i$ .

**Theorem [2-3].** Model  $S_1(t, M)$  approximates the process  $\xi_1(t)$  accuracy  $\delta > 0$  and reliability  $1 - \alpha$ ,  $0 < \alpha < 1$  if the inequalities

$$a) \quad L_2: \quad \delta^2 > J 1_{M+1}, \quad \exp\left\{\frac{1}{2}\right\} \frac{\delta}{\sqrt{J 1_{M+1}}} \exp\left\{-\frac{\delta^2}{2J 1_{M+1}}\right\} \leq \alpha \quad \text{or} \quad \delta^2 > J 1_{M+1},$$

$$\left(\frac{\delta^2 - J 1_{M+1}}{J 2_{M+1}} + 1\right)^{\frac{1}{2}} \exp\left\{-\frac{\delta^2 - J 1_{M+1}}{2J 2_{M+1}}\right\} \leq \alpha, \quad \text{where } J 1_{M+1} = \sum_{i=M+1}^{\infty} \lambda_i^{-2} \quad \text{and } J 2_{M+1} = \left(\sum_{i=M+1}^{\infty} \lambda_i^{-4}\right)^{\frac{1}{2}}.$$

$$b) \quad L_p, \quad p > 1, \quad p \neq 2: \quad \exp\left\{\frac{1}{2}\right\} \frac{\delta}{\sigma_{M+1}} \exp\left\{-\frac{\delta^2}{2\sigma_{M+1}^2}\right\} \leq \alpha, \quad \text{where } \sigma_{M+1}^2 = \sup_{t \in [0,1]} \left(\sum_{i=M+1}^{\infty} \lambda_i^{-2} z_i^2(t)\right) \quad \text{and} \\ \delta^2 > \sigma_{M+1}^2 \quad \text{at } 1 \leq p < 2, \quad \delta^2 > \sigma_{M+1}^2 (p+1) \quad \text{at } p > 2.$$

$$c) \quad L_U([0,1]): \quad \exp\left\{\frac{1}{2}\right\} \frac{\delta U^{(-1)}(1)}{\tau} \exp\left\{-\frac{\delta^2 (U^{(-1)}(1))^2}{2\tau^2}\right\} \leq \alpha, \quad \delta^2 > \tau^2 \left(2 + (U^{(-1)}(1))^2\right), \quad \text{where}$$

$$\tau = \sup_{t \in [0,1]} \tau(W(t)).$$

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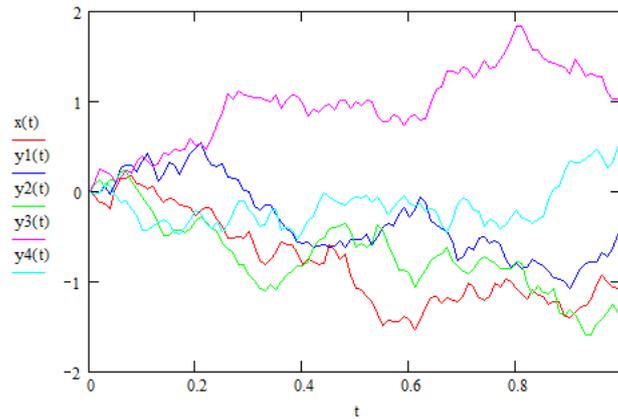


FIGURE 1 REALIZATION OF THE WIENER PROCESS

## 2 CONCLUSION

Results of the theorem can be used for estimation of model parameters for given model accuracy and reliability. For simulation of i.i.d. Gaussian random variables use standard methods. Figure 1 shows the implementation of the Wiener process for  $\delta = 0.1$  and  $\alpha = 0.05$ . In the space  $L_2$ :  $M = 95$ .

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## SIMULATIONS OF GAUSSIAN STATIONARY RANDOM PROCESSES WITH CONTINUOUS SPECTRUM

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### ABSTRACT

In this paper we continue studying algorithms with sub Gaussian models for Gaussian stationary random processes [1]. Research models using spectral representation of random processes, estimation accuracy and reliability in various function spaces are presented in [2].

Keywords: simulation, Gaussian random processes, subGaussian random process, strict subGaussian random process, accuracy and reliability of model

### 1 GENERAL

Let  $\xi(t)$  - real Gaussian stationary random processes,  $E\xi(t) = 0$ ,  $R(\tau)$  – correlation function of  $\xi(t)$ ,  $F(\lambda)$  - spectral function of the process  $\xi(t)$ ,  $R(\tau) = \int_0^\infty \cos(\lambda\tau) dF(\lambda)$ . A stochastic process expansion

$$\xi(t) = \int_0^\infty \cos(\lambda t) d\xi_1(\lambda) + \int_0^\infty \sin(\lambda t) d\xi_2(\lambda),$$
 where  $\xi_1(t)$  and  $\xi_2(t)$  cantered uncorrelated random processes with uncorrelated increments, such as  $0 \leq \lambda_1 < \lambda_2$  there is  $E(\xi_1(\lambda_2) - \xi_1(\lambda_1))^2 = E(\xi_2(\lambda_2) - \xi_2(\lambda_1))^2 = F(\lambda_2) - F(\lambda_1)$ .

Let  $D_\Lambda$  - some interval partition  $[0, \Lambda]$ ,  $D_\Lambda : 0 = \lambda_0 < \lambda_1 < \dots < \lambda_n = \Lambda$ . Random process model  $\xi(t)$  we will build as  $S_n(t, \Lambda) = \sum_{i=0}^{n-1} [\cos(\lambda_i t)(\xi_1(\lambda_{i+1}) - \xi_1(\lambda_i)) + \sin(\lambda_i t)(\xi_2(\lambda_{i+1}) - \xi_2(\lambda_i))]$ . Model of process  $\xi(t)$  can be received by modelling sum  $\sum_{i=0}^{n-1} [\cos(\lambda_i t)\eta_{1i} + \sin(\lambda_i t)\eta_{2i}]$ , where  $\{\eta_{1i}, \eta_{2i}\}$  - two independent sequences of i.i.d. Gaussian random variables with  $E(\eta_{1i})^2 = E(\eta_{2i})^2 = F(\lambda_{i+1}) - F(\lambda_i)$ . Considering accuracy of real numbers and computational algorithm errors for Gaussian random variables computation assume  $\{\eta_{1i}, \eta_{2i}\}$  - sequences of strict i.i.d. sub Gaussian random variables.

Let  $\xi(t)$  and all  $S_n(t, \Lambda)$  belong to some functional Banach space  $A(T)$  with norm  $\|\cdot\|$ . Suppose we have two numbers  $\delta > 0$  and  $0 < \alpha < 1$ . Model  $S_n(t, \Lambda)$  approximates process  $\xi(t)$  with reliability  $1 - \alpha$  and accuracy  $\delta$  on norm of space  $A(T)$ , if inequality is applicable  $P\{\|\xi(t) - S_n(t, \Lambda)\| > \delta\} \leq \alpha$ .

When constructing models of stationary random processes with given accuracy and reliability in different dimensions it assess growth  $F(\infty) - F(\Lambda)$ ,  $\Lambda > 0$ . When the stochastic process has a spectral

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density and it is known or known spectral function can estimate this growth is not difficult. A completely different situation in the case where a known correlation function and spectral explicitly cannot be found.

**Theorem 1.** Model  $S_n(t, \Lambda)$  approximates the process  $\xi(t)$  reliability  $1 - \alpha$  and accuracy  $\delta$  in norm  $L_2(T)$ , if for  $\Lambda$  and  $n$  the inequalities  $B_{n,\Lambda} < \delta^2$  and  $\exp\left\{\frac{1}{2}\right\} \frac{\delta}{\sqrt{B_{n,\Lambda}}} \exp\left\{-\frac{\delta^2}{2B_{n,\Lambda}}\right\}$ , where

$$B_{n,\Lambda} = \frac{T^3 \Lambda^2}{3n^2} F(\Lambda) + T(F(\infty) - F(\Lambda)), [0, \Lambda] - \text{a uniform partition.}$$

**Theorem 2.** Let the correlation function  $r(\tau)$  of a stationary random process  $\xi = \{\xi(t), t \in \mathbf{R}^1\}$  is analytic in some neighbourhood of zero and there are numbers  $\tau > 0$  and  $\alpha > 0$  that for all  $k \geq 1$  there is inequality  $|r^{(2k)}(0)| \leq r(0)(\tau k)^{k\alpha} = F(\infty)(\tau k)^{k\alpha}$ , while  $h > (e\tau)^{\frac{\alpha}{2}}$  in case of  $1 - F(h) \leq r(0) \exp\left\{-\alpha h^{\frac{2}{\alpha}} (2e\tau)^{-1}\right\}$ .

## 2 CONCLUSION

This paper discusses examples of simulation of random processes where the spectral function is calculated explicitly, for instance,  $R(\tau) = \exp\{-C|\tau|\}$ , or  $R(\tau) = \exp\{-C|\tau|^2\}$ ; Also, where the spectral function is calculated non-explicitly, for instance,  $R(\tau) = A \exp\{-C|\tau|^\gamma\} \cos(\beta\tau)$ , where  $A > 0$ ,  $C > 0$ ,  $\beta > 0$  and  $1 < \gamma \leq 2$ .

As the function spaces were considered spaces  $L_2(T)$ ,  $L_p(T)$  and some Orlich spaces.

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# RESILIENT FILE SYSTEM ANALYSIS WITH EMPHASIS ON EVIDENCE ACQUISITION

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## ABSTRACT

The ever-increasing need for data capacity called for revolutionary new approach of data storage. Thereby, a new proprietary resilient file system (ReFS) was introduced, which is capable of ensuring stored data integrity, high availability, and security by using specially designed processes. This gives a robust opportunity to store 1 YB (Yottabyte) of information per volume reducing the administrative burden. Challenges facing the ReFS are: file system (FS) analysis by reverse engineering; data interpretation and recording, recovery of deleted files, built-in FS proprietary processes.

Keywords: ReFS, Capacity, Integrity, Availability, Scalability, Error Identification, Scrubbing, Salvation, Metadata, B+ Tree, Security

## 1 GENERAL

The main goal of this study is to reverse engineer proprietary FS developed by Microsoft. Nowadays demand for data storage increasing exponentially, thus new proprietary FS was introduced.

Assumed scenarios of created and deleted files/folders are imitated on a volume formatted with ReFS. Employing the best practices for reverse engineering analysis, general hex editor and calculator are used for proper interpretation of hex values. The legitimate “translation” of values allows developers, consumers, business-oriented companies, and digital forensics examiners to use them according their needs.

Authors attempt to visualize findings and relationships between metadata (various tables) and actual stored data. This allows easy-to-find the sector, block, offset or actual piece of value for further use or interpretation (prove).

## 2 CONCLUSION

The appearance of new proprietary ReFS provides the basis of storing large amounts of data. Companies operating in the fields like cloud computing, big data centres will move their platforms to this FS. At this point, aforementioned members must possess extensive knowledge about it.

Thus, authors believe reverse engineering analysis is a unique step towards expanding community awareness in this particular field. This intelligence enables software developers, operating systems (OS) developers, malware investigators, digital forensics, and business-oriented representatives to apply discrete decision-making processes.

ReFS offer an exclusive way of data storage and manipulation; hence the degree of application literally is unlimited. Along these lines a throughout reverse engineering analysis must be done to alleviate the integration of this FS.

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## EFFECTIVE DIFFUSION COEFFICIENT IN DISCRETE ONE-DIMENSIONAL HETEROGENEOUS PERIODIC MEDIA

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### ABSTRACT

Connection between one dimensional effective diffusion coefficient received in a discrete model for arbitrary diffusion parameters and reaction rate model of heterogeneous periodic medium is established. Results received are in well agreement with the results of computer simulation. The boundaries of the applicability of modified effective medium theory for a discrete model are considered.

Keywords: diffusion, transition rates, jump length

### 1 GENERAL

Consider a one-dimensional model with  $N$  sites (Fig.1). The transition rate constants for the transition from site  $i$  to  $i+1$  in the matrix are denoted by  $\alpha_1$  and from  $i$  to  $i-1$  by  $\beta_1$  (in inclusion by  $\alpha_2, \beta_2$ , respectively). On the interface site reaction rates are  $\alpha$  and  $\beta$ . Generalization of Derrida's [1] formula rewritten in the special form (see eq. (19) in [2]) gives for the effective diffusion coefficient at inclusion volume fraction  $f$ .

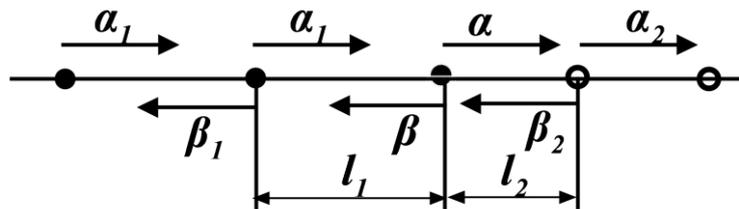


FIGURE 1 REACTION RATES IN MATRIX (1) AND INCLUSION (2),  $l_1, l_2$  - JUMP LENGTHS IN MATRIX AND INCLUSION

$$D_{\text{eff}} = \frac{l_1^2(\alpha_1 + \beta_1)}{\left(1 - f + f \frac{l_1\alpha(\alpha_1 + \beta_1)}{l_1\beta(\alpha_2 + \beta_2)}\right) \left(1 - f + f \frac{l_1\beta}{l_2\alpha}\right)} \quad (1)$$

Formula (1) assumes that the number of sites in inclusion and matrix is not small. Equation (1) clarifies the meaning of parameters used in extended effective medium model [3].

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# THEORETICAL MODELLING OF NANODEVICES USING EMBEDDED MOLECULAR CLUSTER METHOD

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## ABSTRACT

Applicability of cluster embedding method with non-orthogonal wave functions for theoretical study of processes in nanodevices is studied. Processes in nanodevices are treated in the frameworks of time-dependent DFT. We demonstrate that our cluster embedding method is compatible with DFT Kohn-Sham method and quantum transport theory based on time-dependent DFT. We conclude that quantum transport theory approach for electric current calculation may be applied for non-orthogonal wave functions. Possibilities of theoretical modelling of nanodevices from the first principles are discussed.

Keywords: embedded molecular cluster model, non-orthogonal wave functions, time-dependent DFT, quantum transport theory, current in nanodevices

## 1 GENERAL

When we theoretically describe nanodevice we have to treat the whole quantum system as two subsystems: small finite fragment of the system containing nanodevice (cluster) and the rest of the system containing electrodes. Problem "cluster in the field of the rest of system" is successfully solved in the frameworks of embedded molecular cluster (EMC) model with orthogonal wave functions. We have modified EMC model treating cluster embedding problem in the frameworks of one-electron approximation with non-orthogonal wave functions. We have proposed new cluster embedding scheme based on our approach [1].

Our present aim is application of our cluster embedding method for quantum-chemical modelling of processes in nanosystems and calculation of electrical properties of nanodevices. One of the approaches for theoretical description of nanodevices is quantum transport theory developed by Gross with co-workers [2]. We study possibility to combine our approach with approach of Gross et al [2] based on time-dependent DFT (TDDFT). We demonstrate [3] that our cluster embedding method is compatible with DFT Kohn-Sham method. We conclude that our embedding scheme may be combined with TDDFT if electron transitions are described correctly: occupied and vacant cluster states are localized in the cluster region in the same manner. To get occupied and vacant states of the same localization degree, we have modified [3] our initial cluster embedding equations [1]. We demonstrate that our cluster embedding method is compatible with electric current calculation method based on TDDFT [2] and propose approach for calculation of electric parameters of nanodevices. Possibilities of our approach for theoretical modelling of nanodevices from the first principles are discussed.

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## USING CAR VIBRATION DATA FOR ROAD PROMINENCY IDENTIFICATION



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### ABSTRACT

Research is devoted to the problem of computer recognition of vibrations that car receives while moving by the road. Roads' roughness, holes cause additional mechanical load on a car and may lead to its damage. For timely reaction of road service on roads' impairments is necessary to create geographical information system that allows gathering operative data about the condition of roads. During the era of mobile devices this data can be gathered by traffic participants. Ways of gathering data and automatic roughness type determination are considered in the research. This study is the first necessary step to creating city notification system. The main result of the research is functioning software that implements assigned task.

Keywords: Vibration, road prominence, obstacle type automatic detection

THE OBJECT OF THE RESEARCH: Sensor data processing algorithms

THE SUBJECT OF THE RESEARCH: Moving car vibration data

THE PROBLEM: Defining parameters of sensors and software for subsequent data analysis. Finding optimal analysing method and its parameters for road prominences automatic classification

THE AIM OF THE RESEARCH: Expanding knowledge about usage of kinetic sensors for road surface condition analysis. Improving data gathering and processing methods for prospective road vibration geographic information system creation.

### 1 MAIN RESULTS

Kinetic accelerometer was chosen as data gatherer. Frequency of discretization was defined - not less than 14 samples per second for maximum car travel speed 130 kph. Road surface condition data gathering experiment was conducted and 4 classes of most typical road prominences were defined. Initial training vibration templates of 18 speed-breakers, 11 bridge conjunctions, 9 rail passes and 4 stone-paved streets were created. Smartphone usage possibility for vibration data recording was evaluated and proved. Software for vibration data analysing and automatic prominence recognition was created for Python interpreter. Optimal signal data processing sequence was determined for fastest reliable prominence classification (in order of application on sample): vibration signal normalization, dynamic processing (square normalization), resolution reduction to 3 levels — lower-threshold (5%) turns signal to zero, upper-threshold (30%) sets signal to maximum value, the other signals are set to “one-half”. The sample of data processing shown at Figure 1. Car moves along a paved road at 30 kph speed; at the end of route car passed speed breaker (starting at sample N1500 at upper graph)

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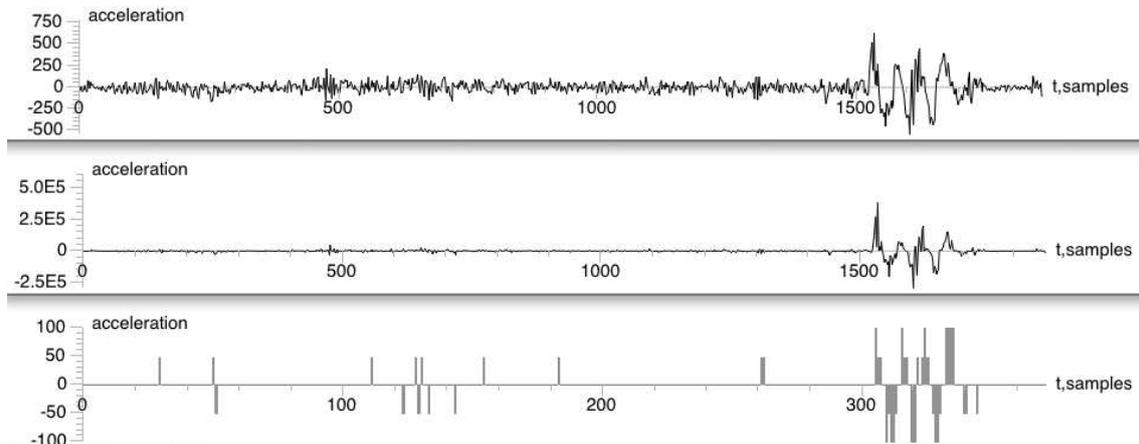


FIGURE 1 MOVING CAR VIBRATION DATA CHANGE AFTER 3-STEP PROCESSING. UPPER-NORMALIZATION; MIDDLE-DYNAMIC SQUARE FUNCTION; LOWER GRAPH: RESOLUTION AND SAMPLING REDUCTION

The final step in sequence is 5x downsampling, that allows to detect prominency type in realtime mode with using regular single-core laptop computer. After the sample processed, it is compared with pre-recorded training prominency data using fingerprinting method. If training sample matches with at least 70% accuracy with any fragment of examined sample, the prominency is considered as detected.

## 2 FURTHER STEPS

Possible practical application of described method may be realized in creating geographical information system that informs car drivers and municipal authorities about most vibration-causing roads. For that purpose an Android application was created and a number of volunteers have already installed the application onto their smartphones. After a day of driving, they upload G-sensor reading vs GPS position data onto the project server. Riga road vibration map is gradually creating. Then the described algorithm excludes prominencies that are meant to be on roads as engineering elements (i.e. speed-breakers, bridge thermal conjunctions etc.). Later, the server-side application is to be created using crowd-recorded data. Different road information may be shown using different prominency data layers. For instance, travellers could choose routes that are safer for their cars. Other option may be useful for sport car owners. These cars have very low road clearance and the presence of speed-breakers may harm the vehicle.

## IMPLEMENTATION OF MULTI-AGENT SYSTEM FOR MONITORING THE HEALTH STATUS OF PEOPLE WITH DISABILITIES



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### ABSTRACT

The main goal of this project is to design and implement a multi-agent system for monitoring the health status of people with disabilities for use in a smart home environment. Modern home control systems are not intended for use by people with disabilities. They do not have health monitoring systems in their structure. Our system is designed to overcome this. Microsoft Kinect sensor has been selected as the core part of smart-home multi-agent system.

Keywords: smart-home, multi-agent systems, Kinect, tracking, identification, monitoring, health, health-care

### 1 GENERAL

The main goal of this research is to review existing smart-home systems and develop its own smart-home system with health-state tracking feature. Smart homes became available to ordinary users with the development of information technologies. Users can control the lighting in the house, heating, light switching and other functions via the PC and other devices. But most of smart-home systems do not have a health-tracking function. Potential buyers of such systems may be people with disabilities, for whom this function is very important. Home automation controllers are usually judged upon the features they offer, the compatibility with other systems for control. Most potential buyers of systems as such are looking for a system that has the control features they need and is easily accessible from any internet-connected device that a house owner might have. Home automation hardware costs ranges from \$129 up to \$1700 [1] per controller. Home automation software usually runs on a standalone device. The system provides wireless communication between the agents or connects to an existing wired network in home. Each homeowner decides how many things and events this system controls in the house by installing the appropriate compatible controllers that can communicate with the system via supported protocols. There are some researches in field of remote health-monitoring. Researchers at the University of Missouri and TigerPlace have found new ways to use Kinect to detect early signs of illness and risk of falling in seniors. Marjorie Skubic, a professor of electrical and computer engineering, is working with students to evaluate the use of Microsoft's Kinect to monitor older adults' health. Partnered with doctoral student, Erik Stone, Professor Skubic and Stone are using Kinect to monitor behaviour and routine changes in patients at TigerPlace community living. The changes they monitor can indicate increased risks for falls

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or early symptoms of illness. Another doctoral student, Liang Liu, is working with Mihail Popescu, assistant professor in the College of Engineering & Department of Health Management and Informatics in the MU School of Medicine, to develop a fall detection system using Doppler radar to recognize changes in walking, bending, and other body motions that may indicate onset risks of falls [2]. Microsoft reported that they started a pilot program called the Exergamers Wellness Club. This program suggests playing video games with Kinect for XBOX 360 and monitoring health status with HealthVault technology can improve the health of senior citizens, increase social interaction, and enhance their quality of life [3]. Researchers from Cognizant technology alliance have created a remote health-monitoring (RHM) solution that leveraging the capabilities of Kinect. RHM gives patients the freedom to undergo physiotherapy in the comfort of their homes by virtually connecting to the physiotherapist using advanced sensors such as Microsoft Kinect, accelerometer, microphone, camera and GPS devices [4]. Researchers from University of Canberra have created a senior health monitoring system using the Kinect device to monitor elderly people and detect when they are likely to fall by measuring their gait, and analysing change in posture when they change from sitting to standing or vice versa [5].

## 2 CONCLUSION

Nowadays a lot of attention is paid to multi-agent systems in smart-home environment that facilitate people's lives. System will be upgraded to work in the concurrent mode. The software has to perform a lot of parallel tasks and some of them such as skeleton tracking, speech recognition. It means that we need a very powerful processor unit. Some parts of system will be adapted for working with the second generation of Kinect.

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## CLOUD SERVICES

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### ABSTRACT

This publications is attached the basic concepts of cloud services PaaS, SaaS, IaaS. It was considered questions of advantages and problems in the cloud services. It was given an overview of companies engaged in the cloud-based services, which are included in the rating of Cloud 100 as the most successful and competitive. It was provided the conclusions and forecasts growth of the cloud services in the countries of the world.

Keywords: cloud computing, cloud services PaaS, SaaS, IaaS, infrastructure services, network storage, 20 leading cloud platform's providers, 20 leading providers of the cloud infrastructure, the 20 top suppliers of the security in the cloud].

### 1 GENERAL

The main purpose of this publication is to analyse a level of development the cloud services IaaS, PaaS, SaaS in different countries. Also the benefits of using these cloud services were displayed and the disadvantages in applications of these technologies were shown.

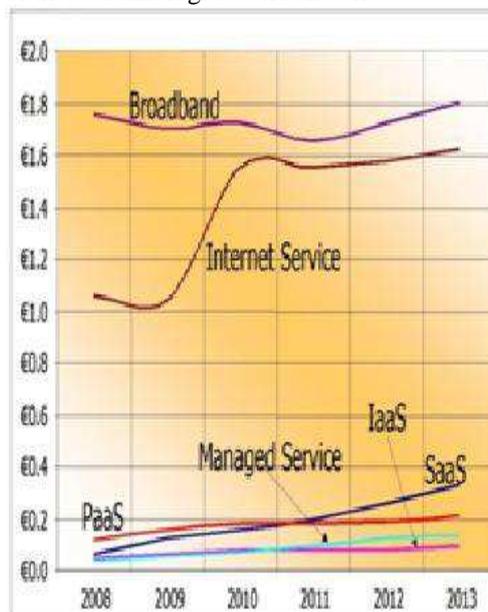


FIGURE 1

The publication describes the basic concepts of the cloud services and provides a list of the most successful and competitive companies in the world by rating of Cloud 100. In 2013 a global market of cloud services rises to 62 billion U.S. dollars. It will continue to grow to level of 26% in 2016 and will

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reach to \$125 billion. According to analytics the global market of the public cloud services (SaaS, IaaS, PaaS) would increase on average of 40% every year and at the 2015 y will be reached to \$97 billion. Forecast of Gartner in 2015 year or more, the half of the government services in the world will be provided out of the clouds and many organizations of small and medium-sized businesses are seriously considering possibility of rejection from traditional model of IT infrastructure for the benefit of public cloud services [1]. According to foreign surveys, more than 60% of respondents are developing a strategy for implementing the clouds, and a third of them is already actively exploits them. Now in the world the majority is in demanded the private cloud services - at a ratio of 60/40, but by 2015 this proportion will be reversed (look at the Figure 1). At the result a modern cloud computing is helping to decrease to 6 times a number of servers and takes up 6 times less space in data-centre, then saves up 80% electricity.

## **2 CONCLUSION**

The main attention to innovative technologies in the field of cloud services is given. In addition, these criterions such as scalability, elasticity, multitenation, fault tolerance, pay per use, self-service were considered. The scientific paper proposes a web portal, which shows diagram of rating a companies based on criteria such as scalability, security, flexibility. It provides a list of the most successful and competitive companies on the cloud services. In addition, it was attached the analysis and the forecasts of the growth and development the cloud services in the countries of the world.

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# PHOTOPHYSICAL PROCESSES OF ORGANIC INDOLO[3,2-B]CARBAZOLE COMPOUNDS

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## ABSTRACT

New class of compounds based on indolo[3,2-b]carbazole are being studied as the hole-transporting materials. These compounds can be well utilized as hole-transporting layers in organic light emitting diodes (OLEDs) because of their high thermal stability and determinable hole-injecting and transporting properties. Analysis of photophysical properties of six newly synthesized indolo[3,2-b]carbazole compounds containing different functional fragments, is presented. The aim of this work was to reveal fluorescence quenching mechanisms in mentioned materials and ascertain differences among all studied compounds caused by connected functional group.

Keywords: indolo[3,2-b]carbazole, organic semiconductors, fluorescence

## 1 INTRODUCTION

Future of low-cost and easy processing optoelectronics (organic light emitting diodes (OLEDs) [1-2], organic thin films transistors (OFETs) [3], organic solar cells [4]) are expected to be organic semiconductors which promises flexible devices and large area applications from solutions. OLED, OFET devices require high charge carrier mobility which can be achieved by increasing molecular self-organization [5]. Disordered states, lack of interconnection or crystallization in the thin films may lead to reduced charge carrier mobility [6]. To solve this problem small molecules with large side groups are well suited [7]. If crystallization does not occur in the compounds, they form so called molecular glasses. The amorphous state of molecular glasses shows their isotropic and homogenous properties.

In our work, we present investigation of five new indolo[3,2-b]carbazole (IC) molecules. The synthesis, optical and electrical properties of these derivatives as hole-transporting materials for blue light emitting diodes are reported. Experimental data were supplemented by quantum chemical calculations performed in the framework of density functional theory (DFT).

## 2 SAMPLING AND MEASUREMENTS

Films of six indolo[3,2-b]carbazole compounds were prepared in two ways: i) without protection from impact of the oxygen for absorption and fluorescence measurements; ii) with protection suitable for both mentioned measurements and moreover, for fluorescence with added electric field and transient absorption measurements. For protected films IC is deposited on the indium-tin oxide (ITO) covered glass by spin coating technique from chloroform solution. The samples were vacuum dried for two days at room temperature, followed by the vacuum evaporation of an aluminium top electrode through the mask forming cathodes. These devices were sealed with a glass lid using epoxy resin. The thickness of the IC layer was about few hundred nanometres. Also spectroscopic investigations were performed with IC solvents in chloroform using 10 mm path length quartz cuvettes.

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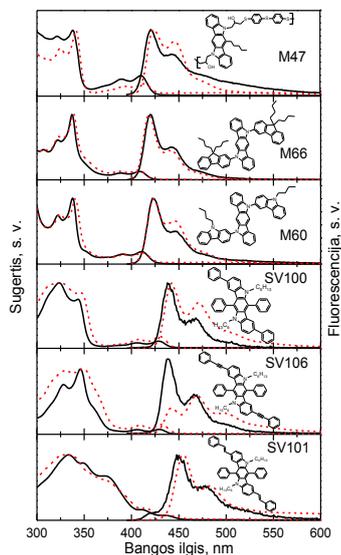


FIGURE 1 ABSORPTION AND FLUORESCENCE SPECTRA OF IC COMPOUNDS (SV100, SV101, SV106, M47, M60 AND M66) IN CHLOROFORM SOLUTIONS (BLACK SOLID LINE) AND COVERED FROM OXYGEN IMPACT THIN FILMS (RED DASHED LINE)

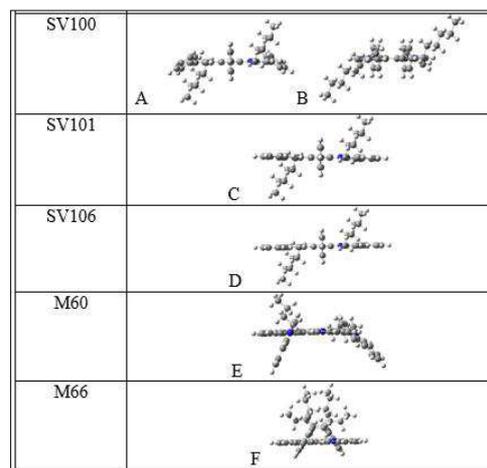


FIGURE 2 OPTIMIZED MOLECULAR STRUCTURES OF INDOLO-CARBAZOLE COMPOUNDS SHOWING OPTIMAL DIHEDRAL ANGLES BETWEEN THE PLANES OF INDOLO[3,2-B]CARBAZOLE SUBSTITUENTS AND THE CORE OF INDOLO[3,2-B]CARBAZOLE

UV-visible absorption spectra of all indolo[3,2-b]carbazole solutions in chloroform (CHF) and thin films were measured with a Jasco V-670 spectrometer (see Fig. 1). The steady state fluorescence spectra and fluorescence decay kinetics were recorded with the Edinburgh Instruments Fluorescence Spectrometer F900. The picosecond pulsed diode laser EPL-375 emitting 72 ps pulses at 375 nm with repetition rate of 5 MHz (200 ns) was used for the sample excitation.

### 3 QUANTUM CHEMISTRY SIMULATIONS

Quantum chemical calculations of the indolo[3,2-b]carbazole derivatives were performed using density functional theory (DFT) as implemented in the Gaussian 09 software package. Ground-state geometries of the molecular structures were optimized using B3LYP density functional theory with the 6-31G(d) basis set including polarization d functions. The optimized molecular structure calculated minimizing total energy revealed the optimal dihedral angles between the planes of indolo[3,2-b]carbazole substituents and the core of indolo[3,2-b]carbazole (Table 2). The energy minimum of SV100, SV101 and SV106 compounds corresponds to molecular structure with 6,12- substituents oriented perpendicular to the core of indolo[3,2-b]carbazole (Table 2; A, C, D). 2,8- substituents are in one plane with core for SV101 and SV106 compounds (Table 2; C, D) and are oriented 40° for SV100 (Table 2; B). Dihedral angles between plane of 5,11- substituents and plane of indolo[3,2-b]carbazole core are 65° for M60 (Table 2; E) and 55° for M66 (Table 2; F).

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# GEOMETRY SPLITTING OF NONLINEAR SYSTEMS OF DIFFERENTIAL EQUATIONS INTO BLOCKS

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## ABSTRACT

Both in theory and in many practical issues, a crucial role is played by the problem of solving systems of ordinary differential equations. One of these problems is the decomposition of the system of equations in blocks, i.e. in such a subsystem, each of which comprises a minimal number of unknown functions, both incoming and under the sign of the derivative and the right sides. Therefore, natural formulation of the problem of finding ways to convert these systems to splitting mind. For systems of linear equations, this problem is solved quite simply. This is tantamount to bringing the system matrix to Jordan form. Each cell corresponds to a Jordan block split system. However, the geometry of this splitting completely investigated  $A = \pi r^2$ .

Keywords: ordinary differential equations, decomposition, splitting mind, linear equations

## 1 GENERAL

For splitting system of nonlinear differential equations into blocks is proposed to use a special matrix - nonlinear projectors. System is the set of non-linear projections degenerate matrices  $P_i$ , satisfying  $P_i^2 = P_i$ ,  $P_i P_j = 0$ ,  $\sum_{i=1}^n P_i = E$ . Let a system of nonlinear differential equations  $\frac{dy^i}{dt} = f^i(y^j)$  (1). Let via non-singular transformation  $y^i = F^i(z^j)$  system leads to splitting an

$$\begin{cases} \frac{dz^{i_1}}{dt} = f_1^{i_1}(z^{j_1}), & i_1, j_1 = 1, \dots, s_1, \\ \frac{dz^{i_2}}{dt} = f_2^{i_2}(z^{j_2}), & i_2, j_2 = s_1 + 1, \dots, s_1 + s_2, \\ \dots \\ \frac{dz^{i_p}}{dt} = f_p^{i_p}(z^{j_p}), & i_p, j_p = s_1 + s_2 + \dots + s_{p-1} + 1, \dots, s_1 + \dots + s_p. \end{cases}$$

No degenerate transformation (1) split into p degenerate transformations, each of which binds a singular matrix transformation. Requirements that these matrices were projectors lead to a system of differential equations for the coefficients of the transformation (1). This system is completely enterable. Thus, the non-singular transformation, resulting in a system of differential equations to cleaved mind generates a system of projectors, and vice versa. If the unknown functions of the system of equations taken as coordinates of points in the n - dimensional projective space, the system of projectors acting on this system, forms in this space the collection of surfaces forming the projecting network. It turns out that the network is projecting net migration. Each such a network can be defined by some 2-valent tensor. In the case of projection-splitting system for the two-dimensional case is defined twice covariant tensor projecting Network Projector splitting.

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## ELEMENTARY GEOMETRY APPLICATION IN MATHEMATICAL ANALYSIS

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### ABSTRACT

From all theorems of elementary geometry in school, there are many important theorems as Pythagorean Theorem and law of sines, and there are many theorems that can evoke total ignorance e.g. 1. If in right-angled triangle is drawn an altitude to the hypotenuse, then square of cathetus is middle-proportional between hypotenuse and this cathetus projection on hypotenuse. 2. There is Ptolemy's theory about inscribed quadrilateral in circle. If we draw circle and inscribe quadrilateral in it then in inscribed quadrilateral product segments of diagonals are equal. For these theorems still have not find applications.

Keywords: cathetus, theorem, mathematical analysis

### 1 GENERAL

We offer to use both theorems in mathematical analysis. With the first theorem and a compass and ruler it is possible to construct  $y = \sqrt{f_1(x) \cdot f_2(x)}$  in which one of the function is hypotenuse and other is cathetus projection on hypotenuse. Conducting this research, we verified theorem: if in a right-angled triangle is drawn an altitude, which is equal with 1, then cathetus multiplication is equal with hypotenuse. Using Ptolemy theorem we can construct a graphic for function  $y = f_1(x) \cdot f_2(x)$ , when function graphic for both are known.

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## REDUCTION OF VARIABLES IN THE ANALYSIS OF HEI STUDENTS' KNOWLEDGE ASSIMILATION

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### ABSTRACT

Multifactor character of learning process makes researchers include as many as possible basic indicators in a mathematical model. Under these circumstances, the challenges, which arise in the process of statistical analysis and interpretation of results call for the reduction of the analysed variables' space.

Keywords: knowledge assimilation, reduction of variables, method of principal components

### 1 GENERAL

Paper [1] considers various mathematical models to describe the process of knowledge assimilation by HEI students. The source data for the model were obtained from the results of the real experiment on the group of students who were listening to the optional course of lectures.

To get more realistic mathematical models it is preferable to have measurable patterns of knowledge assimilation by a large and heterogeneous number of students. At the next stage of the research, the authors suggest to observe a group of  $N$  students of different specializations, and to use an academic year's study disciplines as the characteristics for the analysis.

Obviously, in a mathematical model the introduction of a large number of basic indicators, which are highly correlated in such tasks, will significantly complicate the analysis and interpretation of the results. Applying the method of principal components will allow to replace the original interrelated characteristics  $\mathbf{n}$  (study disciplines) by much smaller set of uncorrelated generalized parameters  $\mathbf{m}$ .

Representing the results of the experiment in the form of a matrix of observables  $\mathbf{Y}$  in the dimension  $N \times n$ , the mathematical model has the form  $\mathbf{Y} = \mathbf{A}\mathbf{F}$ , where matrix  $\mathbf{F}$  is the set of main components.

Matrix  $\mathbf{A}$ , the elements of which are the set of correlation coefficients of main components and characteristics, is the base for component analysis aimed at the reduction of variables of the analysed space.

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## USE PORTER STEMMING ALGORITHM FOR KAZAKH LANGUAGE



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### ABSTRACT

Information processing often use natural language processing. One of task is statically analyse the text by stem of text. For that purpose, we can use Porter Stemming Algorithm, which has good performance with minimal errors. This algorithm portable for Kazakh language.

Keywords: Porter, stemming, Kazakh language

### 1 SHORT DESCRIPTION OF PORTER STEMMING ALGORITHM

To implement the algorithm Porter Stemming denote consonants C and vowelV letters. In addition, the sequence of consonants CCC ... can be replaced with one C and a sequence of vowels VVV ... can be replaced with one V.

They can be represented as[C] (VC) {m} [V], where m - number of repeating sequences.

Expression of remove suffixes can be written as: (condition) S1 -> S2.

This means that if a word ends with the suffix S1 and part of the word to S1satisfies a specified condition S1 is replaced by S2.

In the condition, you can add criteria:

\*S – the stem ends with S (and similarly for the other letters).

\*V\* - the stem contains a vowel.

\*D - the stem ends with a double consonant (eg -TT, - SS).

\*O - stem ends CVC, where C is a second W, X or Y (e.g., - WIL - HOP).

In the condition may also contain expressions of AND, OR and NOT (M> 1 AND (\* S OR \* T)).

If there are several rules of removal, the removal begins with the longest [1].

The above algorithm is used for English language. The results are consistent with the requirements of performance and optimization of information retrieval. To implement this algorithm for Kazakh language we must find all suffixes and create conditions.

### 2 SUFFIXES OF KAZAKH LANGUAGE

In the Kazakh language, there are four types of suffixes: possessive suffixes, personal suffixes, declination suffixes, plural suffixes [2].

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The form of suffixes varies depending on the last syllable and the last letter. To designate the last syllable and consonants will use the following notations:

- VH—solidvowels (a, o, ұ, ы, и, у),
  - VS—softvowels (ә, ө, ү, і, е, и, у),
  - semivowels:я (й+a), е (й+o), е (й+ә), ю (й+у),
  - R—sonarconsonant (м, н, ң, л, р, й, у),
  - Z—voicedconsonant (б, г, ғ, д, ж, з),
  - G—deafconsonant (п, ф, к, қ, т, ш, с, х, һ) ю
- If the last letter is a consonant:
- H—solid syllable,
  - S—soft syllable,
  - ^ - A symbol of exclusion

The above notations used in condition for stripping suffixes. There are stripped only suffixes, which is not change the meaning of word (see Fig.1).

Адамзат тарихында мемлекет пайда болғалы бері оның әр түрлері пайда болды.  
Қазір Еуропаның бірқатар елдерінің саяси режимі демократиялық болғанымен бә  
Менің ойымша, Елбасы Н. Назарбаевтың мемлекет атауын «Қазақ елі» деп атау 1  
1 желтоқсанның Тұңғыш Президент күні деп белгілеу де монархиялық басқаруға ә  
a) — адамзат тарихын мемлекет пай болғал бер он әр түрлер пай бол.  
қазір еуропа бір елдер саяси режим демократиялық болған басқа  
мен ойымша, елба н. назарбаев мемлекет атауын «қазақ ел» деп  
b) 1 желтоқсан тұңғыш президент күн деп белгілеу де монархиялық

FIGURE 1 EXAMPLE OF STRIPPING TEXT FOR KAZAKH LANGUAGE (A – BEFORE, B – AFTER STRIPPING)

After implementing the algorithm, we can see that, if the amount of work is more, this algorithm has benefits. For example, if there are 430 unique word in text, after strip remain only 300 unique words. It reduce word count for 30%. If input text has 1500 words, remain 910 unique words. The count of words reduced for 40 percent. Therefore, if the amount of input text is huge, the algorithm has benefits. This is reduce the set of processed words, find similar meaning phrases. However, it is not always strip suffixes, there are some errors remains.

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# DEVELOPMENT OF MULTILEVEL SPEECH SEGMENTATION SYSTEM FOR CONSTRUCTING THE SPEECH DATABASES OF SPEECH RECOGNIZERS AND SYNTHESIZERS

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## ABSTRACT

The question of development of multilevel speech segmentation system for constructing the speech databases of speech recognizers and synthesizers is considered. The features of developed system are also viewed.

## 1 GENERAL

The most important qualitative indicator of synthesized speech is represented by its natural sounding properties and intelligibility. Speech naturalness is what determines the proximity of synthesized speech to the natural one. Furthermore, speech intelligibility is what determines the degree of perception of synthesized speech by humans. Synthesizer must have both high degree of naturalness and intelligibility [1]. The majority of state-of-the-art speech synthesis systems are based on usage of the following models: formant synthesis [2], concatenative synthesis [3] (phoneme synthesis, diphone synthesis, dynamic selection of the most appropriate synthesis unit or "unit-selection synthesis" [4]), synthesis based on vocal apparatus models [5]. The majority of state-of-the-art high quality speech synthesis systems for English and Japanese languages are constructed on concatenative synthesis process. In addition, Unit Selection process is utilized as one of the varieties of concatenative synthesis. It is these two approaches that have been selected as a base for implementing Kazakh speech synthesis system.

Using unit-selection approach prior to synthesis, the database searches for vocal fragments, which is followed by extracting the majority of the most suitable fragments necessary for synthesis purposes. Moreover, fragments derived from the database, may have different dimensions (half-phoneme/semi-phoneme, diphones, phonemes, syllables, words, and even entire sentences).

The process of constructing a database is very time consuming. For this purposes, specialized software commercially named STS (Speech Transcription System) has been developed as part of this Project. This software allows implementing a multi-level mark-up of speech signal followed by formation of marked-up vocal corpus. This software product has originally been developed as a language-independent system with flexible internal settings. This system fully supports Unicode encoding that allows to be used with the majority of current languages including Kazakh language. The current user interface is designed in English language. Further features to be incorporated will include shifting between interface languages to Kazakh and Russian languages, and this shall have a positive effect on commercialization phase. This software product will be of interest to the following categories of users: Speech synthesis and recognition system developers, language science researchers, law enforcement authorities, audio forensic experts, national security officers and other. The main distinction of this software product from others: Unlimited number of speech signal mark-up levels, setting of any number and types of regions to be marked-up, marked-up regions properties editor, built-in capability to create directory of meanings and other.

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## 2 CONCLUSION

Thus, an intermediary product has been obtained during the phase of Kazakh speech synthesis system development, which is fit for independent commercialization, thereof. STS software product will be used in a proactive manner at various stages of works creating Kazakh-English-Russian vocal corpus for the purpose of developing multilingual speech synthesis and recognition software.

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# RESEARCH AND DEVELOPMENT OF WEB FRAMEWORK FOR OPTIMIZING THE PROCESS OF CREATING A WEB APPLICATION

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## ABSTRACT

Global network is the largest worldwide communication medium. Website is one of the most powerful marketing tools for any entrepreneurship. Nowadays most websites are constructed using web application frameworks. Web application framework is a software framework designed for the development of dynamic websites, web applications, web services and web resources. The web application framework aims to alleviate the overhead associated with common activities performed in web development. Many frameworks provide libraries for database access, code templating, session management, web caching, web security and URL mapping.

Keywords: uniform resource locator (URL)

## 1 GENERAL

The main goal of this study is to research the most used web frameworks for their code efficiency and to develop a new web application framework based on these studies, considering all advantages and disadvantages of well-known frameworks.

TABLE 1. Results for testing web application frameworks

Property	Yii	Kohana	CI	Symfony	Zend
URL mapping	9	7	5	9	10
Web caching	8	6	7	8	9
Security	9	7	6	8	10
Database access	10	9	9	7	8
Session management	10	7	9	10	9

A small research was conducted to identify most efficient web application frameworks. A simple Blogging web application was developed with several controller, model and view classes. The results are shown in Table 1 with according to the rankings from 1 to 10, 10 being the highest mark. According to the table Yii, Symfony and Zend web application frameworks were chosen for further research works due to their good performances.

## 2 CONCLUSION

Development of new web application framework is conducted parallel. Presently authorization, registration and URL mapping parts are written for a framework in PHP language. It is planned to develop session management, web security and caching parts and to improve object model and other existing parts of web application framework.

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# DEVELOPMENT OF REAL TIME STEREO MATCHING SYSTEM USING NOVEL OPTIMIZED PRE-PROCESSING AND SEGMENTATION TECHNICS

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## ABSTRACT

Stereo matching continues to be an active research area, because it still needs optimization in accuracy and time. The goal is to determine disparities that are indicating the difference in locating corresponding pixels. Further, using disparities 3D picture can be build. The goal of provided algorithm is to optimize stereo matching in real time. Recently, segment-based methods have attracted attention due to their good performance [1]. They are based on the assumption that the scene structure can be approximated by a set of non-overlapping planes in the disparity space and that each plane is coincident with at least one homogeneous colour segment in the reference image [2].

Keywords: segmentation, disparity map, computer vision

## 1 GENERAL

The goal of this algorithm is optimization of segmentation and clustering of image data in real-time. Provided algorithm consist of following steps: first -segmentation using recursive method (labelling), second - comparing extracted segments from both images by some criteria, such as size, location of centres and etc. Calculating disparity for centres of similar segments and assigns that value to whole segment. In such way, the time for calculation is spent less.

## 2 CONCLUSION

This algorithm was created for robots that can rely on given information and can avoid obstacles. The main thing is to see objects on their path, not so far away. Other regions of image are not important for us. However, attention is paid now for more accurate comparing.

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## SPHERICAL PROBE IN PLASMA WITH NEGATIVE IONS

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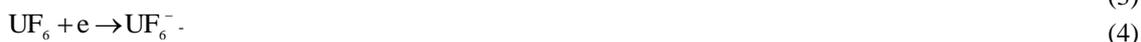
### ABSTRACT

Theory of a spherical probe in a chemically active weakly ionized plasma with negative ions is presented in this paper. The case of intense ionization rate when the parameter equals to the ratio of ionization length and the radius of the probe. Debye length is small compared with the radius of the probe, the electron energy relaxation length is much smaller than the local macroscopic scale and the electron distribution function is determined by the local values of  $n_e$  and  $T_e$ .

Keywords: plasma, neutron flux, fission fragments, electrostatic probe, Debye radius, recombination

### 1 GENERAL

Plasma, formed by nuclear reaction products, is provided by helium plasma in the neutron flux. Products of nuclear reaction  ${}^3\text{He}+n \rightarrow p+T+0.76 \text{ MeV}$  cause the formation of positive and negative ions and their subsequent recombination through the following channels:



In case of high positive potentials on probe equations (1-5) are transformed to the following:

$$\frac{\omega}{\zeta^2} \frac{\partial}{\partial \zeta} \zeta^2 \left( n N^+ \frac{\partial \psi}{\partial \zeta} \right) = 1 \quad (6)$$

$$\frac{\varepsilon}{\zeta^2} \frac{\partial}{\partial \zeta} \zeta^2 \frac{\partial \psi}{\partial \zeta} = N^+ \quad (7)$$

### 2 CONCLUSION

The length of space charged sheath and volt-ampere characteristics are defined by the following equations:

$$r_0(\phi_p, \omega, a^T) = a_p^2 \text{Lim}_{\zeta \rightarrow \zeta_0} \left( \frac{\partial}{\partial \zeta} \zeta^2 \frac{\partial \psi(\zeta, \psi_p)}{\partial \zeta} \right)^{1/2}$$

$$I_p(\phi_p) = \frac{4}{3} \pi e S (r_0^3 - r_p^3)$$

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## TOWNSEND DISCHARGE ON PROBE DIAGNOSTICS

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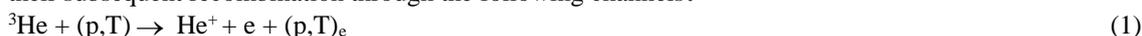
### ABSTRACT

This paper presents the theory of a spherical probe in chemical active weakly ionized helium plasma. The rate of ionization by fission fragments is large enough, so the parameter equals to the ratio of ionization length and the probe radius. Electrons formation due to Townsend ionization is also considered and its diagnostics is defined in the case of high positive potentials on the probe. It is assumed that the Debye radius is small compared to the probe radius, the length of the electrons power of relaxation is much less than local macroscopic scale and the electron distribution function is determined by local values  $n_e$  and  $T_e$ .

Keywords: plasma, neutron flux, fission fragments, electrostatic probe, Debye radius, recombination

### 1 GENERAL

Plasma, formed by nuclear reaction products, is provided by helium plasma in the neutron flux. Products of nuclear reaction  ${}^3\text{He} + n \rightarrow p + T + 0.76 \text{ Mev}$  cause the formation of positive and negative ions and their subsequent recombination through the following channels:



In case of high positive potentials on probe equations are as following:

$$\frac{\omega}{\zeta^2} \frac{\partial}{\partial \zeta} \zeta^2 \left( N^e \frac{\partial \psi}{\partial \zeta} \right) = 1 + a^T N^e \frac{\partial \psi}{\partial \zeta} \quad (4)$$

$$\frac{\varepsilon}{\zeta^2} \frac{\partial}{\partial \zeta} \zeta^2 \frac{\partial \psi}{\partial \zeta} = N^e \quad (5)$$

### 2 CONCLUSION

The length of space charged sheath and volt-ampere characteristics are defined by the following equations:

$$r_0(\phi_p, \omega, a^T) = a_p^2 \text{Lim}_{\zeta \rightarrow \zeta_0} \left( \frac{\partial}{\partial \zeta} \zeta^2 \frac{\partial \psi(\zeta, \psi_p)}{\partial \zeta} \right)^{1/2}$$

$$I_p(\phi_p) = \frac{4}{3} \pi \varepsilon S (r_0^3 - r_p^3)$$

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# PARALLEL COMPUTING IN INTELLIGENT SYSTEMS OF PREDICTION AND CONTROL BASED ON APPROACH OF ARTIFICIAL IMMUNE SYSTEMS

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## ABSTRACT

In the modern world of science, the researches in the field of intellectual systems for control of complex nonlinear dynamic objects with different types of uncertainties and development of innovative intellectual technologies and systems are relevant. The researchers are dedicated to development of algorithm of parallel computing in MATLAB parameters of quasi-split control subsystems which allow to decompose the initial complex system of management into interrelated subsystems of smaller dimension but equivalent by the dynamic characteristics to the initial complex system. Obtaining of quasi-split parameters simplifies the research of dynamic properties of complex control systems with the presence of uncertainties and is used in the construction of intelligent control systems based on the immune network modelling [1].

Keywords: parallel computing, immune systems, quasi-split subsystems, immune network modelling

## 1 GENERAL

Recently, rapid development of intellectual technologies in various application areas and their real life application in many spheres of human activity makes great demands of quality of developed intellectual systems, which are to work reliably in conditions of parameter indeterminacy, to possess adaptation opportunities and to function in real time. Due to the feature of the considered systems associated with the intellectual analysis of large data files in real time scale, parallelizing of calculations is extremely actual. This research is the continuation of studies [2, 3]. We developed the parallelization algorithm and software for finding the parameters of quasi-split subsystems that are used in the construction of formal peptides in the immune network simulation.

## 2 CONCLUSION

The developed parallel algorithm allows to quickly and efficiently calculate the parameters of quasi-split control subsystems. The advantage of this algorithm is the ability of its using on high-performance systems, computer clusters and supercomputers. Application of the proposed algorithm significantly improves the performance of intelligent system as a whole.

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## SOFTWARE DESIGN PATTERNS ON JAVA

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### ABSTRACT

This article is devoted to design patterns in Java. Design patterns are used in complex applications of contemporary life. The main purpose is to relate all the components with each other in software application, so that system will be much flexible to be changed. Nowadays there are more than 600 programming languages [1]. Not all of them can transform theory of patterns into practical appliance. All existed patterns are divided into three categories. They are creational, structural and behavioural patterns. In this article, we will consider all of them and their implementation in programming language Java. Especially, our main point is to investigate advantages and disadvantages of certain pattern and to find new model of patterns that are not observed.

Keywords: patterns, creational design, behavioural design, structural design, Java, design patterns on Java

### 1 GENERAL

As we know, nowadays it is too expensive to make changes in existing software system. There are many tools that can help make architecture of system be flexible and easy to be changed. One of them is design patterns. It is like algorithm in programming world, but the context is software architecture. There are so much information about them on the internet and books. They could be implemented in different languages. In book gang of four name of which “Design Patterns: Elements of Reusable Object-Oriented Software” where authors are Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides with a foreword by Grady Booch [1]. In this book, you can find theoretical part of design patterns. In this publication, we decided to make their implementation in Java language and find new approaches to patterns. The reason for that is related to the popularity of Java [2]. Java language is one of the popular languages for using in designing big system. Because of the modern world development there are always need to invent new patterns that could be sit in system to save money for company in making changes in structure in architecture. New more than seven patterns are discovered here in this work. For example we know popular pattern as singleton. Singleton is pattern that is needed to create just one instance in software architecture. It is so usable to maintain with resources to other services without spending memory to create new one helper object. There could be case when you have to create more singletons in context. Question is how to do that. We integrated singleton and hashmap context that let us to create as many singletons as we want. For that purpose, hashmap field is declared in Singleton class. Hashmap has key and value pair where key is the identification for our singleton instance whereas value is the instance. This is about creational design pattern. In table below, we list main types of the design patterns [3].

TABLE 1 MAIN TYPES OF THE DESIGN PATTERNS

Design Type	Design Kind
Creational Design Pattern	Abstract factory, Builder, Factory method, Prototype, Singleton
Behavioral Design Pattern	Chain of responsibility, Command, Hierarchical visitor, Interpreter, Iterator, Mediator
Structural Design Pattern	Adapter, Aggregate, Bridge, Composite, Decorator

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## **2 CONCLUSION**

In this article, practical appliance of design patterns in contemporary software systems is considered. Main aim was to investigate design patterns and implement by transferring theory into coding. All available theory about them is covered in this work. Therefore, specific parts of Java language are considered with its disadvantages and advantages. The implementation of the Java language and the work consider realization of patterns in software environment. Knowledge of structural patterns allows to the system to be more flexible to accept changes.

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## MORPHOLOGICAL PARSER MODULE FOR KAZAKH LANGUAGE

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### ABSTRACT

In this paper, we introduce the morphological parser module words of the Kazakh language. We present finite-state implementation of a morphological parser in agglutinative languages such as the Kazakh language. The main contribution of this paper is to give a thorough description of a perspective for stemming which can also be generalized to apply to other agglutinative languages like Finnish, Hungarian, Estonian, Czech and Turkic.

Keywords: linguistic processor, token, finite-state machine, morphological parser, lexical analysis, suffixes, state diagram, law synharmonism

### 1 GENERAL

This paper presents the development of the linguistic processor of texts in the Kazakh language LinProc v1.0, which is created in the Institute of Information and Control Sciences. Stemmer is used in the development of the Kazakh information retrieval system or in natural language processing applications. Stemming in the agglutinative languages like Kazakh, Turkish, Czech, Hungarian is still a hard problem since they have the capacity to generate theoretically an infinite number of possible word forms. In agglutinative languages, most words are formed by stringing morphemes roots and affixes together. In Kazakh, one can produce infinite number of words in theory by inserting some derivational suffixes like causative suffixes in a word for many times. One can produce a word like the following, using each suffix only once. For example *Қанағаттандырыл+ма+ған+дық+тар+ыңыз+бенен* 'those who are experiencing pleasure'. The module consists of two analyzers: lexical and morphological parser. Lexical parser extracts tokens and sentences. Morphological parser is based on the model of finite-state machine. As the lexicon, vocabulary words, abbreviations dictionary, gazetteer, dictionary of surnames are used. Currently, the total number of words is 140 thousand. We have developed a software module of morphological analyzer (see Fig. 1).

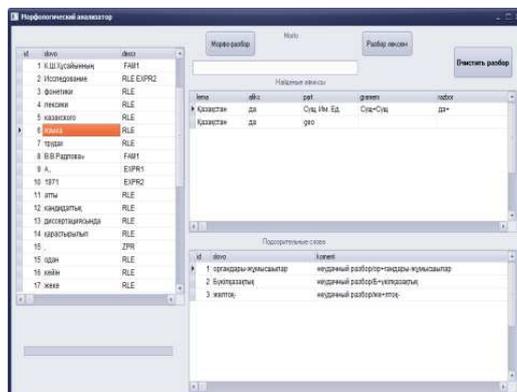


FIGURE 1 MORPHOLOGICAL PARSER

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## 2 CONCLUSION

Finite-state machines have been successfully used as models in the description of the morphological analysis. They also showed good results in the Turkic group of languages. This program module is primarily regarded as an experimental space for the creation of industrial systems parser for the Turkic group of languages. This module LinProc KZ v1.0 was created during the years 2012-2014 in the laboratory "Analysis and modeling of information processes" of the the Institute of Information and Control Sciences. LinProc v1.0 module consists of two main modules: Tokenizer, Stemmer. The parser can analyze about 5200 words per second on a 2.6 GHz Intel I5 processor. The speed of processing depends significantly on the software implementation, the techniques. Available software module can be significantly optimized for further industrial use.

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## METHODS OF DETERMINING THE SURFACE ROUGHNESS ON THE 3D MODELS

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### ABSTRACT

Roughness of the inner surface of the concrete shaft spillways of hydro technical constructions can produce a significant impact on the turbulence of the water flow in the swirler. Turbulence is a highly undesirable phenomenon, which could be the cause of the destruction of the dam. Therefore, the determination of the surface roughness at which turbulence occurs is very important. The proposed method of determination of the roughness is based on three types of measurements. This is the measurement of the geometric dimensions of the physical model of the surface roughness, 3D Laser Scanning and the use of photographic images processed in 3D Max System.

Keywords: hydro technical constructions, shaft spillway, tangential swirler, roughness surface, oblique waves, overlapping

### 1 GENERAL

The offered method of determining the roughness is based on three aspects of measurements. This is the measurement of geometric dimensions of the surface roughness of the physical model in a plaster cast, 3D laser scanning and the use of the photographic images processed in 3D Max systems.

Methods of determining the roughness using a physical model proved inaccessibility of measurements inside the shaft spillway. Measurement of surface roughness is performed on a physical model using a micrometre. As a result, the received point cloud was processed in AutoCAD, Matlab, 3D Max systems, and 3D laser scanning system.

For the processing of scanning data the multifunctional software Topcon Image Master for IS is used. Determination of surface roughness by photographic images is relatively new and little explored. The basic idea of this method is to obtain photographic images of the surface roughness, processing it in the system of three-dimensional coordinates, getting the point cloud and modelling using the known tools. For this, a program such as PhotoModeler can be used [1]. The offered method for determination of the surface roughness is based on a multifunctional software system Autodesk 3ds Max, which is used to create and edit 3D graphics and animation.

### 2 CONCLUSION

Analysing the results we draw the following conclusions:

- the surface roughness obtained by means of the geometric dimensions of the surface roughness of the physical model in a plaster cast, also 3D laser scanning using the tachymeter, and the use of photographic images processed in 3D Max System are identical;
- the discrepancy in the results of scanning and measurement of the physical model is 3-4 %;
- the discrepancy in the results of processing of photographic images in the system of three-dimensional graphics and measurements of the physical model is up to 5-6%;
- on the basis of the research data it is possible to create workstations for monitoring HTC.

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## GEOPHYSICAL RESEARCH DATA PRE-PROCESSING MODULE

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### ABSTRACT

A software module was developed for preprocessing of electric logging data of wells at uranium deposits, at which underground leaching extraction method is used. The software implements a number of preprocessing algorithms. Among implemented functions are: processing functions for arbitrary data sets, specific functions for a given set of data and tools used in the preliminary analysis of the data. Application of this package can improve recognition quality by 5-10%.

Keywords: preprocessing, learning samples, uranium deposit, recognition process, machine learning

### 1 GENERAL

To assess the suitability of the well and for justified execution of technological processes of uranium extraction, geophysical research is performed, which usually evaluates the electromagnetic properties of rocks.

Data obtained in the course of the geophysical research can be interpreted by a specialist or an intelligent system based on machine learning methods [1]. Note that systems of automatic recognition and classification are used in many spheres of human activity, including processes of solving problems of lithology. [2, 3, 4]. Machine-learning techniques have been studied in detail. In some cases it's possible to achieve results, which are close to optimal, on a given set of data. However, in the case of using the methods, it is essential to select classification features and preprocess data. In case of geophysical logging data, classification features are initially defined. These features are IK, KS, PS and depth. However, the quality of the results depends strongly on preprocessing methods [5, 6].

For solving the data preprocessing problem for electric well logging of uranium deposits with underground leaching extraction method, "Preprocessing Module" software was developed implementing a number of preprocessing algorithms, and tools for data analysis and metric recognition algorithm (K Nearest Neighbors method).

"Preprocessing Module" includes:

- 1) The functions of processing arbitrary data sets (norm(), clean\_anomalies(), clean\_noisy\_points(), window()), which are not tied to specific features of electric logging data.
- 2) Processing functions that are specific to the electric logging data of uranium wells (shift\_corr(), inverse\_PS(), align\_level()). The practical usefulness of these functions when used on other data is questionable.
- 3) Tools for preliminary data analysis (crude\_define(), for\_matlab(), count\_anomalies(), error\_percent\_per\_soil(), divide\_to\_classes() and others), which present opportunities for research, analysis, output of the data in various formats for use in other program.

The experiments on real data sets have shown the effectiveness of developed algorithms:

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Well	Result
1	0,384
2	0,587
3	0,663
4	0,549
5	0,549
6	0,631
7	0,603
Average	0,567

Table 1. Results before preprocessing

Well	Result
1	0,593
2	0,625
3	0,631
4	0,574
5	0,571
6	0,662
7	0,590
Average	0,606

Table 2. Results after preprocessing

The tables above show the results of interpretation using metric method implemented in "Preprocessing Module" before and after preprocessing. Result - the share of correctly classified objects in comparison with the interpretation of an expert geologist.

Preprocessing not only does increase the average result, but also reduces the variance: example shows that interpretation result for well 1 was significantly different from the average before preprocessing, but after preprocessing well 1 result increased to an average value.

## 2 CONCLUSION

Developed software "Preprocessing Module" implements a number of algorithms for data processing and data analysis tools. The experimental results showed the efficiency of the "Preprocessing Module" on real data sets – quality was improved and dispersion of recognition results was decreased.

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## THE ANALYSIS OF USING FORECAST METHODS IN LOGISTICS BASED ON ALGORITHMS OF NEURAL NETWORKS

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### ABSTRACT

Neural networks trained with the quick propagation algorithm are applied to predict the future values of time series that consist of the weekly and monthly demand on items in a supermarket. The influencing indicators of current sales, days of week, and holidays are taken into consideration. The design and implementation of a neural network forecasting system is described that has been developed as a prototype for the headquarters of a supermarket company to support the management in the process of determining the expected sale figures. The performance of the networks is evaluated by comparing them to the prediction techniques used in the supermarket now. The comparison shows that neural nets outperform the conventional techniques with regard to the prediction quality. Further recommendations resulting from this paper are presented.

Keywords: quick propagation, neural networks, sales management, time series, demand forecasting

### 1 GENERAL

The aim of the work presented in this paper is to forecast sales volumes as accurately as possible and as far into the future as possible. The choice of network topology was adaptive quick propagation algorithm. The networks were trained to forecast from 1 month to 6 months in advance and the performance of the network was tested after training. The test results of artificial neural networks (ANNs) are compared with the time series smoothing methods of forecasting using several measures of accuracy. The outcome of the comparison proved that the ANNs generally perform better than the time series smoothing methods of forecasting.

### 2 CONCLUSION

The value of neural networks in solving complex nondeterministic problems has been demonstrated across a broad range of applications. A promising area for neural network application is that of economic forecasting. This paper investigates the application of the ANN methodology to sales forecasting. A neural network model for the predication of sales levels was developed and the sales forecasts produced by the network were compared with the actual sales figures. These studies indicated that neural networks can be successfully applied to this problem.

One of the problems of machine learning is the case of choosing the right notional attribute. In some cases the classification attributes are convolution. The classic attribute extraction methods cannot be used for feature extraction in the convolution case. The aim of further research is the analysis of methods in order to search for significant attributes to improve the quality of prediction.

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## CUDA TECHNOLOGY FOR PARALLELIZATION PROGRAMS

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### ABSTRACT

For processing large amounts of data together with standard tools of data processing, the graphics processors were used. The frees the CPU holding calculations on the graphics device. To achieve these goals it was formed: to consider the possibility of CPU, video cards and paralleling algorithms based on CUDA technologies.

Keywords: algorithm, architecture, CPU, GPU, CUDA, paralleling

### 1 GENERAL

The most important characteristic of any computing device is its speed and accuracy. PC performance directly related to the clock frequency of CPU. In recent years, the growth frequency slowed noticeably, but there was a new trend - the creation of multi-core processors and systems with increasing number of cores in the processor.

The increasing the speed of computing devices is achieved by increasing the number of parallel cores, that is, through parallelism. According to Amdahl's law is calculated maximum acceleration, which can be obtained from the program parallelization on  $N$  processors (cores):  $S = \frac{1}{(1+p) + \frac{p}{N}}$  where  $p$  - the

execution time of the program that can be parallelized on  $N$  processes. We remark that as the number of processors  $N$  is committed to maximum gain, so  $\frac{1}{1-p}$ . So if  $\frac{3}{4}$  parallelize the entire program, the maximum gain is 4 times.

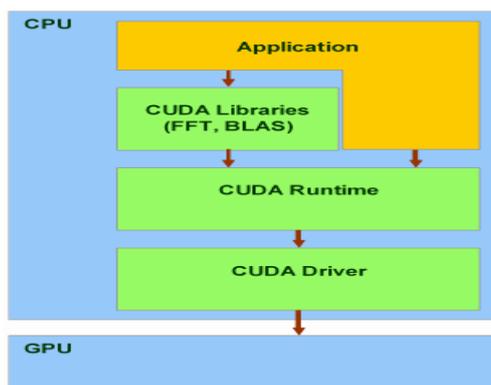


FIGURE 1 ARCHITECTURE OF TECHNOLOGY CUDA

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So, regarded the opportunities and benefits of CUDA, which allows you to successfully parallelize programs and algorithms. The Programs using this technology are written in the "advanced" C, with their parallel part (core) is performed on the GPU, and the regular - at SPU. The CUDA automatically performs the division and control parts of their launch.

## **2 CONCLUSIONS**

According to the experimental results, the use of a parallel algorithm on a video card gives considerable advantage to in time of program execution. In the case of matrices of dimension 900 \* 900 (according to the considered one matrix multiplication algorithm to another) execution speed was about 5 times higher than the CPU. And if the dimension of the matrix 2500 and higher recommended the use of specialized video cards for non-graphical calculations for general use. The using of the video cards for computing offload the CPU and use it in parallel with other tasks.

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# POLYMORPHIC TYPING OF ENTITIES IN THE MULTI-CRITERIA SYSTEM OF ACCESS CONTROL AND A TASK OF CONSTRUCTING TYPES

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## ABSTRACT

In [1] a model of a multi-criteria system of access control to protected information (MSAC) was proposed as a means of designing systems in which it is possible to implement and simultaneously apply a number of different mandatory access control security models. In this article polymorphic representation of the types of the objects of access control is developed and a task of constructing types as a set of partially ordered functions is considered. These functions implement an access control mechanism of the MSAC.

Keywords: computer security, mandatory security policy, multi-criteria access control, multilevel lattice of values, functional data model

## 1 GENERAL

To apply security models of the different kinds in the same access control system multi-criteria representation of the subjects and objects of access control is made by attributing each of them a number of categories. Each category has a corresponding security model. According to its assigned categories an entity (a subject or an object) receives a set of values of access privileges (security label). Security model is defined generally as a pair of a security domain and a security policy. The whole MCAS is defined as a set of security models assigned to all the categories to which entities of the system belong. It is shown that the possibility of the simultaneous use of various security models in the same access control system is provided by polymorphic representation of the types of the security domains as specially structured sets. The problem of implementing of the security policy in a form of a collection of partially recursive functions for performing operations over the elements of the security domains is formulated.

## 2 CONCLUSION

The article considers a possibility of parameterized representation of the security models of different kinds for their simultaneous application in the same access control system.

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# HUMAN IDENTIFICATION IN VIDEO-STREAMING BASED ON CLASSIFICATION PARAMETERS

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## ABSTRACT

Human identification is the trending feature in most software, which is used by security organizations. Most of this software is developed only to identify human by searching him from database. I propose the software that identifies human in video-streaming by some classification parameters. In this work, three classification parameters (gender, age and race) are used.

Keywords: QT, OpenCV, framework, Fisherfaces, dataset, video-stream

## 1 GENERAL

The main goal of this work is the implementation of software for human identification in video-streaming according to classification parameters like age category, gender and human race.

People can be classified into age, gender and race groups based on facial features. So for the classification of people Fisherfaces face recognition method was used. For the full information about this method see [1]. This method is much better suited for classification task. For training age, gender and race classifiers The Images of Groups Dataset was used [2]. In fact, the amount of images primarily effects on the recognition rate.



FIGURE 1 MAIN WINDOW OF DESKTOP APPLICATION

The more images, the better recognition rate. Just for experiment 1500 cropped face images with the size 70x70 were used.

Software is developed using QT and OpenCV frameworks. Software is implemented as a desktop application (see, Fig. 1). As input it takes video-stream from video file or camera connected locally. Application has the usable search engine. It can search people from video by three parameters: age

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category, gender and human race. There are 7 age categories: 0-2, 3-7, 8-12, 13-19, 20-36, 37-65, and 66+; gender: male and female; 3 main human races: mongoloid, caucasoid, and negroid. By default application searches for people by first match, i.e. if there are many people in video it will show only one human, which was found first. It can be configured to search all people in video. Search won't be finished until human is found. It can be configured to search people only in current moment of video. Search is performed by **Age OR Gender OR Race** combination, i.e. search will be ended if by any of these parameters human was found. User can configure the search by himself, so also combination can be configured. As the result of search, application shows new window with screenshot of video with rectangle around the detected face (see, Fig. 2), if human was found, window with no results otherwise.



FIGURE 2 SEARCH RESULT WINDOW OF DESKTOP APPLICATION

## 2 CONCLUSION

Basic attention is paid now for desktop application, which can search people in video according to given search parameters. This application is the base of one big security system software. All work done as a demonstration of new features, which suitable for all security systems software. In general application works well, but has low recognition rate, because only 1500 face images were used for training classifiers. In next releases this problem will be resolved and new features will be added.

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# DESIGNING THE STRUCTURE AND ALGORITHM OF THE MICROPROCESSOR CONTROL UNIT INFORMATION SYSTEM MOBILE MICRO HYDRO POWER PLANT

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## ABSTRACT

The article shows the structure and algorithm of operation of microprocessor control unit of the mobile micro HPP. In view of possibility of projected extended use of mobile micro HPPs including those based on low-speed electric generators developed in the KazNTU after K.Satpayev, micro HPPs should be provided with up-to-date soft hardware in order to ensure maximum energy efficiency. Thereby the authors offer to use the microprocessor control unit for mobile micro HPP.

Keywords: structure, algorithm, microprocessor control, mobile micro HYDRO POWER PLANT, low-speed electric generator

## 1 GENERAL

The authors offer to use the microprocessor control unit for mobile micro HPP. Its structure is shown (see, Fig. 1).

In view of possibility of projected extended use of mobile micro HPPs including those based on low-speed electric generators [1] developed in the KazNTU after K.Satpayev (Kazakhstan), micro HPPs should be provided with up-to-date soft hardware in order to ensure maximum energy efficiency.

The structure and algorithms of operation of microprocessor control unit will ensure maximum energy efficiency of mobile micro HPP with its use in no steady water flows.

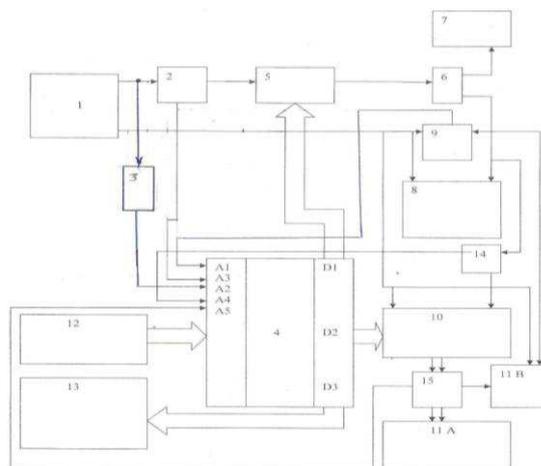


FIGURE 1 THE STRUCTURE OF MICROPROCESSOR CONTROL UNIT OF THE MOBILE MICRO HPP

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## **2 CONCLUSION**

Electrical and electro thermal accumulators incorporated into micro HPP will:

- ensure part-load energy loss;
- provide electric power supply to those consumers rated power input of which is significantly higher than rated power output of the HPP electric generator;
- allow to get heat in the form of hot water which is always necessary in the field environment and during temporary location of people in places which are far from heat sources.

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## USING NEURAL NETWORKS TO DETERMINE THE CRITERIA FOR PROTECTION OF DISTRIBUTED COMPUTER NETWORKS

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### ABSTRACT

Currently, most large corporations have at their disposal a distributed computer network. The organization of information security systems are important. Therefore, the idea of studying the main criteria protection and formulation of recommendations to strengthening or weakening the protection of the individual components of a distributed computer network is relevant.

Keywords: distributed computer network, neural networks, protection criteria

### 1 GENERAL

Using of a neural network useful for, firstly, due to parallelization processing information and, secondly, because of the ability of self-learning, i.e. create generalizations. Consider the program distributed network analyser to study vulnerabilities based on neural networks. Managing this software product is produced locally, without requiring any additional add-ins. When you open the user is given the choice of network interface (target) belonging to a working network system, and scanning profile (profile). After selecting a user starts the analysis by pressing the Scan. (Figure 1) [1].

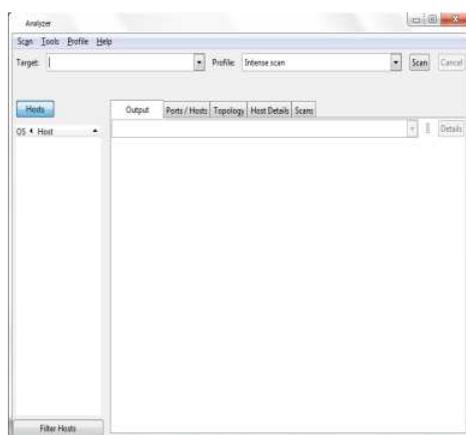


FIGURE 1 THE AUTOMATED SYSTEM WITH DISTRIBUTED DATABASES

After starting, the program identifies the configuration set for the selected interface. After receiving the IP-address and subnet mask subnet is scanned for the presence of public system components. Found components are used in the further stages of the scan. In the resulting sheet components added localhost (the machine from which the program was started). Then each element of the list is checked for

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vulnerabilities in the remaining levels of the protocol stack. The first thing the program flow scans ports for openness (the firewall does not work). The next step is an appeal by the NetBIOS protocol and a computer name, operating system, the request MAC- addresses of users available, NULL- working session. Next comes an appeal to the protocol SMB, which is used to obtain information about the available file and print resources. In case of partial success or collection of this information, the system displays the result on the logical framework. The resulting, after all of the operations, matrix relations program processes in neural networks.

## **2 CONCLUSION**

Basic attention is paid now for applications on carbon nanotubes (CNTs) of various morphology. The program processes the results, gives the percentage of resistance, and tips to enhance protection. Automatically is about the network topology.

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## DEVELOPMENT OF INFORMATION SYSTEM FOR INTERNET SHOP ELECTRICAL GOODS



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### ABSTRACT

Site in the Internet today cannot only attract potential customers, but also to provide them with full range of services, significantly reducing costs and gaining additional profit. Judging by the global (network-wide) trends, the share of services provided through the Internet is constantly growing, which means the gradual migration of traditional business into the online realm.

Keywords: Internet shop, Photoshop, PHP Designer, C++

### 1 GENERAL

The aim of this study is to develop an online store for electrical goods. In this study, I used the popular software like: Photoshop, Adobe Dreamweaver, PHP Designer. Program allows you to work quickly and intuitively.

Editing Photoshop handy program with which you can create graphics for a wide variety of sites. Among the editors for layout widely known software products such as:

- macromedia homesite
- EditPlus
- NotePad ++
- FrontPage

Some are also used for layout Zend Studio, and other editors, which are focused on programming.

All of these programs have their indisputable advantages and some disadvantages, but I think that the best tool for layout than Dreamweaver does not find.

PHP is very different from other programming languages in its simplicity, so when creating the program does not have to take into account the numerous little things that ruin the lives of programmers in Perl and C ++, - do not think about file permissions, the script is not necessary to prescribe the exact path to the different modules, no need to monitor the absence of a script file contains invalid characters, etc.

### 2 CONCLUSION

According to this work were chosen effective programs and designed online shop for electrical goods. Researched and designed cost effective design online store.

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## DEVELOPING SYSTEM OF VISUALIZATION OF APOPTOSIS

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### ABSTRACT

The main idea of bioinformatics is to simplify understanding of the biological processes. Comparing with other similar approaches, bioinformatics methods' advantage is that they use computational methods. Examples of such methods can be the following: pattern recognition, data mining, machine learning algorithms and visualization of biological data [1].

Cardiovascular diseases mechanisms visualization is highly important for investigation because such diseases are one of the top reasons of human mortality, which is why training professionals in this area is an essential step for medical care quality improvement.

Keywords: Apoptosis, bioinformatics, CellML, javascript, WebGL, 3DsMax

### 1 GENERAL

Apoptotic process visualization can be carried out in several ways. One of them is to build a program that is based on the CellML model, and after that create a complete animated video, reflecting the dynamic changes of the cell. Such system will be able to deal only with the models on the base of CellML. The structural part might consist of generation system and objects visualization, which subsequently would interact with each other according to a predefined pattern.

CellML model is stored in the database. Data from this model is handled by the parser, and is feed to a renderer. Then the user can view it through the interface and store the video in the database. The program structure may be reduced to the following scheme represented on Figure 1.

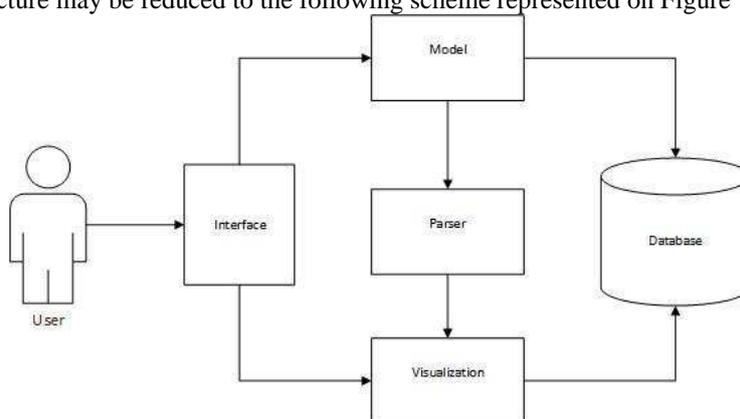


FIGURE 1 SYSTEM'S STRUCTURE

### 2 CONCLUSION

This approach implementation is possible by using 3DsMas or WebGL. Both of these technologies have their specific pros and cons, but in the context of our investigation, the important fact is that creating a JavaScript parser is much easier with the help of WebGL [2]. In addition, the rendering will be performed through a simple Internet browser. It is also possible to create a complete learning system.

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This article describes the implementation capabilities of the biological processes rendering, e.g. apoptosis, using the principles of bioinformatics and 2D, 3D graphics software. Written on the base of CellML model of apoptosis contains all the information required for rendering. This approach could improve the training material for specialists in the future, and such software will allow scientists holding test experiments with changing dosages and concentrations before expensive real-life experiments. The results gathered by the system can be considered as full-fledged experience database.

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# A STUDY ON SUPERVISED DESCENT METHOD FOR DEFORMABLE MODELS

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## ABSTRACT

Fitting parameterized deformable models of objects to images has been an important research area in computer vision and machine learning for decades, since it has numerous applications in object recognition, motion tracking, human-computer interaction, etc. In this project, we studied a new approach of matching the model of face to a facial image that utilizes Supervised Descent Method (SDM) as an optimization algorithm for minimizing an objective function of this fitting problem. It was shown in [1] that SDM together with Scale-Invariant Feature Transform (SIFT) feature descriptor applied to the problem of face alignment achieve state-of-the-art performance. In this project, we show that the same results can be achieved with Histogram of Oriented Gradients (HOG) features.

Keywords: deformable models, Descent Method, Scale-Invariant Feature Transform, Histogram of Oriented Gradients

## 1 GENERAL

The main goals of the study was implementation of facial alignment algorithm as described in [1] and substituting SIFT features with another feature descriptor that show compatible accuracy.

We conducted numerous experiments to reveal which feature descriptor suites best to the problem. HOG, LBP, combination and high dimensional variations of them, other different implementation of SIFT features were used in experiments.

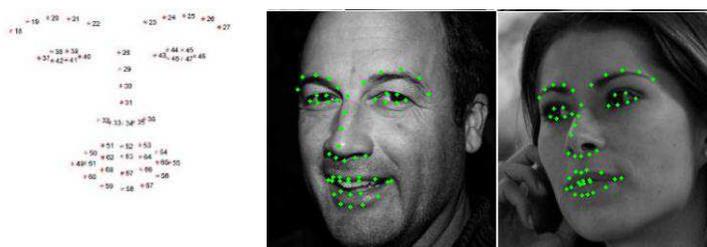


FIGURE 1 FACIAL DEFORMABLE MODEL AND FITTING EXAMPLES

Overall, we had 11 feature descriptors to examine. We used two datasets of images of faces "in the wild" in our experiments: LFPW and HELEN. Both datasets contain images downloaded from the web that capture large variations of lighting conditions, pose and facial expression. Experiments showed that performance of LBP features and its variations are unsatisfactory when applied to facial alignment problem. However, HOG feature showed almost the same results as SIFT features.

## 2 CONCLUSION

In this study, we had a deep insight into the SDM algorithm and implemented it on MATLAB, including training, testing and fitting tools. We proved that there exist another feature descriptors that are capable of

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showing the same performance as the one that were used in the original paper [1]. Particularly, we tried to outperform proprietary implementation of the SIFT features, or show at least the same results. Conducted experiments revealed that the HOG features with the certain parameters are able to compete with sophisticated SIFT features. This result is remarkable, since it gives opportunity to developers to take advantage of the fast, efficient and accurate face alignment algorithm, without worrying about copyright issues. Recall that SIFT algorithm is patented and using it for non-academic purposes must be agreed with the authors (D. Lowe).

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# A SURVEY OF TEXT CLASSIFICATION ALGORITHMS

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## ABSTRACT

Nowadays automatic text categorization play an important role in a wide variety of information management task such as real-time sorting of email into folder hierarchies; finding documents that match long-term standing interests. Text classification or document categorization is the assignment of natural language texts to predefined categories based on their content. The problem of text classification has been studied in the data-mining, machine learning in different areas of human life, such as medical diagnosis, news group filtering, document organization.

Keywords: text categorization, classification, PrTFIDF (Probabilistic term frequency/inverse document frequency), Naïve Bayes, support vector machine (SVM)

## 1 GENERAL

In the research, two algorithms were considered: support vector machine (SVM) and Naïve Bayes algorithm [1].

The experimental results show that SVMs consistently achieve good performance on text categorization tasks, outperforming existing methods substantially and significantly.

- SVMs eliminate the need for feature selection, making the application of text categorization considerably easier;
- Show good performance in many experiments;
- Do not require any parameter tuning, since they can find good parameter settings automatically.

Recently Naïve Bayes algorithm evaluated as low quality algorithm. Because conditional independence assumption is violated by real-world data, perform very poorly when features are highly correlated and it does not consider frequency of word occurrences.

SVMs are the most accurate classifier and the fastest to train algorithm [2]. However, the learning rate of SVM algorithm is low. Because algorithm requires a large memory, that reduces its scalability. Nevertheless, this algorithm can be used as a standard of text classification.

So, the requirements for the classification algorithm can be summarized as follows:

1. Text classification quality must be comparable to the quality of SVM method.
2. The algorithm should have low computational complexity and be highly scalable.

## 2 CONCLUSION

The classification problem is one of the most fundamental problems in the machine learning and data mining literature. Further study will focus on several algorithms. One of them will be modified in order to improve and increase classification performance.

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# ANALYSIS SERVICE UNCERTAINTY PROBLEMS IN CLOUD COMPUTING

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## ABSTRACT

The paper studies the behaviour of the Web Services deployed on the cloud, and investigates their performance and the instability of the underlying communication medium. Service-oriented architectures are an architectural paradigm for building software applications from a number of loosely coupled distributed services [1].

As consumers move towards adopting such a Service-Oriented Architecture, the quality and reliability of the services become important aspects. However, the demands of the service consumers vary significantly. It is not possible to full all consumer expectations from the service provider perspective and hence a balance needs to be made via a negotiation process. At the end of the negotiation process, provider and consumer commit to an agreement. In SOA terms, this agreement is referred to as a SLA. This SLA serves as the foundation for the expected level of service between the consumer and the provider. The QoS attributes that are generally part of an SLA (such as response time and throughput) however change constantly and to enforce the agreement, these parameters need to be closely monitored [2].

Keywords: Service-oriented architecture, response time, instability, web services

## 1 GENERAL

All the experiments were done in Amazon Cloud. Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. You can bundle the operating system, application software and associated configuration settings into an Amazon Machine Image (AMI). You can then use these AMIs to provision multiple virtualized instances as well as decommission them using simple web service calls to scale capacity up and down quickly, as your capacity requirement changes. You can purchase On-Demand Instances in which you pay for the instances by the hour or Reserved Instances in which you pay a low, one-time payment and receive a lower usage rate to run the instance than with an On-Demand Instance or Spot Instances where you can bid for unused capacity and further reduce your cost. Instances can be launched in one or more geographical regions. Each region has multiple Availability Zones. Availability Zones are distinct locations that are engineered to be insulated from failures in other Availability Zones and provide inexpensive, low latency network connectivity to other Availability Zones in the same Region.

## 2 CONCLUSION

The overall aim of this exploratory study was to examine uncertainly of the cloud-based web services by measuring the response time and exploring performance and network delays. The technique used relies on measuring the transmit delay and request processing time that contribute to the overall response time. In the real life, clients are not able to distinguish between these two delays when they use web services. Our ability to look into the contributing parts of the web service delays allows us to understand better the

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parameters, which can increase their performance, to estimate their availability, to find the best location for a server on a cloud and to make a decision about the use of redundant services. It has been considering new challenges with creating new service that choose optimal server depending on location of user.

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# ON THE ORGANIZATION OF PROTECTED CROSS-BORDER EXCHANGE OF INFORMATION

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## ABSTRACT

The widespread introduction and rapid development of information technology, and the increase of electronic document flow at the State level define the need for organization of the qualitative and reliable cross-border exchange of information. In this paper, the complex procedures required for information protection are analysed, to ensure protected cross-border exchange of information.

Keywords: cross-border information exchange, digital signature

## 1 GENERAL

The relevance of this research is due to the Strategy of the cooperation of the member-countries of the Commonwealth of Independent States (CIS) in the field of information security, in order to carry out the implementation of the Concept of Cooperation of CIS members in the field of information security, in which one of the items of the agreement is the need to organize a protected cross-border transfer of information.

The main purpose of this research is the study and creation of models, methods and algorithms of protected cross-border exchange of information.

Cross-border transfer of information – is the transfer of information by an operator across state borders of member countries of CIS to authorities, person or entity of the State [1].

Cryptographic methods are used for the organization of secure information exchange in the CIS countries, in accordance with a number of national legal acts. In addition, each country develops its own cryptography, has its own standards for cryptographic algorithms used to create and verify electronic digital signatures (EDS) and their own implementations of these algorithms (digital signature means and their analogues). Electronic document digitally signed on the basis of the cryptographic standards of one country cannot be verified, by digital signature means of another country, so in the general case, these solutions are not compatible with each other.

The main problem of the implementation of protected cross-border exchange of legally significant electronic documents based on cryptographic tools, should be used approaches to implement – adequate for both sides of the border – levels of cryptographic protection of information flow and sufficient legal basis for the recognition of legal validity of electronic documents, i.e. methods provided by an adequate regulatory framework.

## 2 CONCLUSION

It is planned to develop the technology of organization of the protected cross-border information exchange for restricted information. Use the practical significance of the application of the submitted research will also contribute to the development of scientific research in Kazakhstan in the field of information technology and the development of national systems of information security.

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# CONTROL OF LIFE SUPPORT WITH USING OF WIRELESS SENSOR NETWORKS

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## ABSTRACT

How do you think, what we do more effectively, get more pleasure from our favourite things? When we are calm, when all, we are concerned, under our control. Imagine, you are sitting at work, and at home you have a close person, who has, for example, heart disease. His condition must be controlled. In this case, an invention would help, which could read the status of the human body. In case of occurrence of an alarm situation, this system gave a signal to you and to the nearest medical centre. Thus, we might prevent serious and irreparable consequences that sometimes occur with the man. Wireless sensor network is the ideal solution to this problem. With the use of inexpensive and efficient equipment Arduino - sensors, scanners and controllers, transmitters and recipients, and microcomputer RaspberryPi - the solution of this problem becomes available for conversion into life. This solution can be used not only in the particular case of individual families, but also to introduce into hospitals and clinics in your area. However, the solution should be cost-effective, energy-saving, reliable and easy to use.

Keywords: Arduino, Raspberry Pi

## 1 GENERAL

Wireless sensor networks are a collection of various sensors and executive devices that interact with each other via radio channel. Coverage of such a network can vary from a few meters to several kilometres through the ability to relay signals from one element to another one.

Development of sensor networks depends from many factors, which include fault tolerance, scalability, type of operating environment, the sensor network topology, hardware limitations, the model of information transfer and the energy consumption. These factors are considered by many researchers. However, in any of these studies all factors do not fully take into account, which influences on the development of networks. They are important as serve as a guideline, protocol design or operation algorithms sensor networks. In addition, these factors can be used to compare of various models [1].

My personal goal is finding ways of effective consumption of energy of touch nodes. Thus, the fault tolerance is achieved like one of the main criteria. Each node uses the most of energy in a relationship that involves both - the transmission and reception of data. We can say that approximately the same amount of energy is required for communications over short distances with low radiation power, transmission and reception [2].

If you will design a special communication protocol that is aimed directly on ease (to some extent a truncated) signals, and also to draw attention to the fact, how these signals will be transferred, to decide what type of waves to communicate sensory systems - will be possible to achieve the golden mean in this task. Also, if you consider the problem from the other side, you will see that the energy consumption depends on the simplicity of the equipment. Therefore, the choice fell on products Arduino for construction of prototype of the controller status of life-support.

Why just Arduino? The products of the Italian firms are distinguished with their simplicity, reliability and relative cheapness. Interaction of sensors and peripherals is carried out with the Central ATmega

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microcontroller. Further, and what no less important, you do not have to know assembly for creating of any firmware management. You can use language programming C-like language only. The main thing is - the open source software. Application of the given innovation in models of wireless sensor networks will allow achieving greater heights in their reliability and fault tolerance.

## **2 CONCLUSION**

In this article we propose the creation of a monitoring device life support with the use of wireless sensor networks, taking into account the criteria of reliability and energy efficiency. Sensor networks are no longer expensive industrial constructs. We can build a simple sensor network from easily procured, low-cost hardware. All you need are some simple sensors and a microcontroller or computer with input/output capabilities [3].

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# THE DISTRIBUTED DATABASES FOR RESTAURANT BUSINESS

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## ABSTRACT

This work describes development of systems of restaurant business with using of the distributed databases [1]. Nowadays in restaurant business are presented a set of the automated systems using generally the client server architecture. To improve restaurant's work on many aspects, it needs for using of the distributed databases

Keywords: the distributed databases, automated system, menu, operation

## 1 GENERAL

The system with use of distributed databases is offered as follows: the input (for example is carried out: the administrator), then appears the menu with the full reporting under employees, logins and passwords, sales reports, reports under revenue and all orders which were made during a certain period. Indisputable advantages of automated restaurant with the distributed databases before other similar institutions are obvious: high quality of service and service rate of clients.

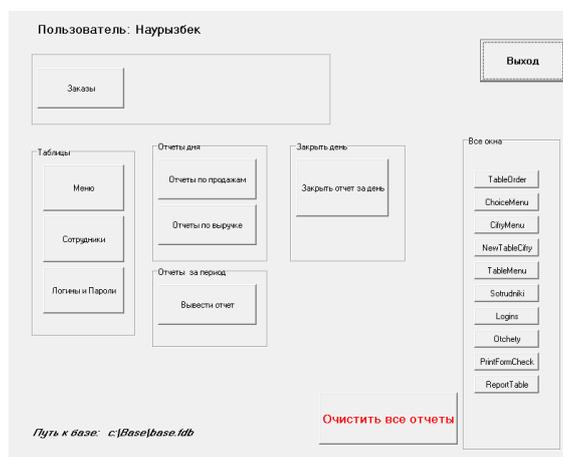


FIGURE 1 THE AUTOMATED SYSTEM WITH DISTRIBUTED DATABASES

## 2 CONCLUSION

According to results of work it is revealed that this software solution will provide association of all restaurant points in a uniform network, with possibility of their remote administration in real time from the central office. Results of this work can become rather inexpensive alternative to expensive finished software products of the Russian and foreign development which it is too expensive for averages and small institutions.

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## THE RESEARCH OF DIFFERENT PRINCIPLES OF INFORMATION'S CODING

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### ABSTRACT

This work describes coding both in hardware, and in program concept. Nowadays there is necessary to protect confidential information because of leak and information increased. The most developed way of protection is information coding. Coding of information is a submission of messages in a concrete look by means of some sequence of signs.

Keywords: information, coding, message, asymmetric, symmetric

### 1 GENERAL

Program coding – is process of writing of a program code, scripts, for the purpose of realization of a certain algorithm in a certain programming language. Any cryptographic algorithm can be realized in the form of the appropriate program. Advantages are obvious: software of enciphering is easily copied, they are simple in use, it is easy to modify them according to specific needs [1]. As for hardware coding, the majority of means of cryptographic data security is realized in the form of specialized physical devices. Advantages: higher speed, easier physically to protect the equipment from the outside, simple installation.



FIGURE 1 PROGRAM CODING

### 2 CONCLUSION

According to results of this work it is possible to draw the following conclusions: use of only one principle of coding isn't reliable information security. Now it is expedient to combine the principles together. So program protection which needs hardware confirmation of the same password will be more effective, than usual request of the password.

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## DEVELOPMENT OF ANPR SYSTEM

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### ABSTRACT

Nowadays, the automatic number plate recognition (ANPR) system is a key aspect in traffic congestion. This will help minimizing the different kind of violations in the road. Advanced systems for tracking and fixing stolen, unauthorized vehicles are based on automated number plate recognition. This paper's main objectives is to develop at the same token evaluate our proposed approach. The paper is going to be concluded with test, evaluation results and plans for future work.

Keywords: automatic number plate recognition, traffic congestion, vehicle

### 1 GENERAL

The whole problem consists of three parts which are: plate area detection, segmentation and extraction of characters from number plate, optical character recognition of extracted symbols. The image with number plate will be given as an input to the program and the number plate must be identified then cropped as output image to the next stage. In order to determine the number plate from whole image, the following sequence of actions must be performed to image: conversion to grey scale format, blurring, vertical edge detection using gradient magnitude and direction, conversion to binary image, close morphology operation, finding the contours and the last but not least verification of contour sizes. Segmentation will be implemented by finding the contours in number plate and taking into account the character sizes. The extracted letters can be recognized using INN algorithm.

The program was tested with 1469 real car photos. The cars were taken from different sides and in different climate conditions. 94.458% of number plates were detected correctly, segmentation part works for 66.23%, and the optical character recognition recognize 90% of whole symbols.



FIGURE 1 NUMBER PLATE RECOGNITION

### 2 CONCLUSION

The main parts of number plate recognition system were successfully implemented. Our proposed solution works for general cases, where there is no limit for the distance from camera to the vehicle and

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climate conditions. However, for specific problems, when the distance from camera to the vehicle will be constant the performance of our system will increase.

For the future work, we need to improve the segmentation part and gather more data for training. As well as optical character recognition can be improved using other popular algorithms like Artificial Neural Network and Markov chain.

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## MODELLING OF THE MODULAR DIGITAL SIGNATURE

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### ABSTRACT

The models of software implementation of algorithms of digital signature in the system of cryptographic protection of information (SCPI) with the specified characteristics are described. In the developed system of cryptographic protection of information, the nonconventional algorithms of encryption and digital signature developed on the basis of nonpositional polynomial notations (NPNs) are implemented. Synonyms of NPNs are notations in residual classes. Definable characteristics are the length of the message or the digital signature, as well as crypto strength of algorithms.

Keywords: cryptography, encryption, digital signature, nonpositional polynomial notations, crypto strength, residue, software implementation

### 1 GENERAL

The algorithms and methods of cryptography constructed on the basis of algebraic approach proposed by R.G. Biyashev make it possible to considerably increase strength and effectiveness of cryptographic algorithms and to reduce length of hash-values and digital signature [1].

The main goal of this study is the development and software implementation the digital signature algorithms using NPNs. Algorithm proposed for formation of a digital signature of length  $N_k$  bits for an electronic message of a given length equal to  $N$  bits in NPNs includes three stages: 1) creation of NPNs, 2) hashing (compression) of a message from length  $N$  to length  $N_k$  ( $N_k \ll N$ ) by extrapolation on the redundant (extension) base numbers and 3) encryption of the obtained hash-value. The developed algorithms differ by redundancy introduction procedures at the second stage [2].

Digital signature check. After obtaining a signed message the addressee calculates two hash-values. The first hash-value is determined from the obtained message. The second hash-value is determined as a result of deciphering the obtained digital signature. If the values of these hash-values coincide, then the signature is authentic. The complete key of this algorithm includes systems of working and redundant base numbers with consideration of their order and the complete key of hash-value encryption. The result will be the SCPI this is a complex of computer programs which will consist of three interconnected blocks: the formation of full secret keys (further - full keys), the system of encryption and the digital signature scheme.

### 2 CONCLUSION

Using NPNs in development of algorithms of symmetric encryption and digital signature formation allows to increase their crypto strength. It is possible to significantly increase the effectiveness of these algorithms at the expense of parallel performance of operations modulo base numbers of used NPNs.

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# COMPARING TEXT BASED DOCUMENTS SIMILARITY MEASURING FUNCTIONS

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## ABSTRACT

Many similarity measures are specified nowadays, but among them Jaccard, Cosine, Dice, Overlap and Euclidean distance functions are well known. However, how to know, how much their giving results are true is the challenging task? The objective of the present work is to compare results of those similarity functions with each other and give them ranks.

Keywords: TF-IDF, Cosine, Jaccard, Dice, Overlap, Euclidean distance

## 1 GENERAL

The world is changing from paper based system towards so called electronic based system.

The aim is to searching technique is the most popular technique used by the search engines such as Google or Yahoo!, to find the similar files, or documents in response to the user's queries. However, how to know, how much their giving results are true is the challenging task? The objective of the present work is to compare results of those similarity functions with each other and give them ranks. A cumulative distribution function (CDF) shows the probability that a point is less than a value. For each observed value, an empirical cumulative distribution function (ECDF) shows the fraction of points that are less than this value.

By using empirical cumulative distribution function, we compared results of all five-similarity function together.

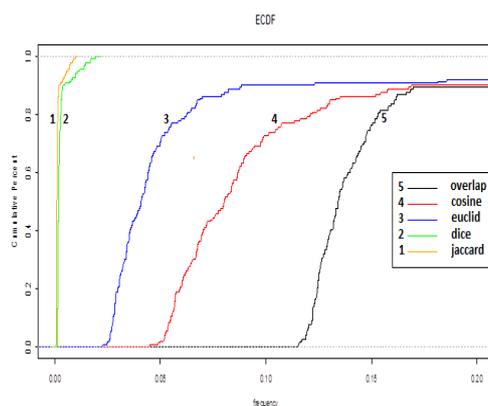


FIGURE 1 EMPIRICAL CUMULATIVE DISTRIBUTION FUNCTION

## 2 CONCLUSION

In this paper we have compared them within the same range [0, 1]. And we have concluded following statement: Overlap > Cosine > Euclidean distance > Dice > Jaccard

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# ROLLING STOCK RAILWAY REGISTRATION ON THE BASES OF GLOBAL NAVIGATION SATELLITE SYSTEM

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## ABSTRACT

This document is a feasibility study of the project: “The GLONASS system and its application to the registration of the rolling stock of the railway.” In Kazakhstan in recent years, there have been few publications devoted to the analysis of the transport sector. In this regard, the proposed project includes the results of the application of the analytical study of the current state and development prospects of Transport of Kazakhstan and its main species [3].

Keywords: CLONASS system, the analysis of the transport sector, development prospects of Transport of Kazakhstan

## 1 GENERAL

The project shall be implemented in the territory of the Republic of Kazakhstan. The main components of the project “GLONASS and its application to the registration of the railway rolling stock” and the funding needed to create them.

The practical significance of the thesis is that the state of the transport complex in Kazakhstan is in the area of special attention of domestic and foreign experts, they identified its main drawbacks. Among these questions are marked unsatisfactory organization of international transport used to transport obsolete technology and low level of service of transport services. Logistics, which provides in developed countries most of the benefits of streamlining traffic flows, their optimal interaction in Kazakhstan in the early stages of development [1, 2].

WayNet chips provides powerful information management tools, allowing you to combine all the data into a single environment for the sharing of good planning and sound decision-making.

All of the above problems can be solved with GLONASS and wireless chips WayNet. The main activity of which is the development and introduction of new technologies, both in the commercial and public sectors.

## 2 CONCLUSION

As a feasible result of the technical and economic study it can be concluded that the project is the creation and operation of the Russian-Kazakh segment of the global space communication system based on the integration of resources satellite system "GLONASS" and «WayNet» is a financially attractive investment and implemented the project and can be recommended to fruition.

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## OBJECT RECOGNITION AND TRACKING

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### ABSTRACT

Object tracking and its movement classification is interdisciplinary topic, which can be used in many domains like robotics, video surveillance, multimedia systems and etc. Even though it has been addressed in many works, it is still challenging task. Many of the existing approaches have such disadvantages like illumination dependency, calibration problems or working only in 2D space. In this paper, we propose 3D tracking, which does not have above disadvantages because of depth camera that we use here. We propose to identify objects by their HSV values of their colours. We subtract background by iterative threshold method. Then we calculate coordinates of the centre of our interested object by the principle of the centre of mass and after that transform them into real world 3D coordinates. Finally, we apply Hidden Markov Model to recognize motion shape that was performed by our object. Experiment results demonstrate the efficiency of proposed method.

Keywords: object tracking, recognition, classification, background subtraction

### 1 GENERAL

In this paper, we are going to show how to track 3D objects in real time using depth cameras. We detect objects and their geometrical motion paths (e.g. circle, triangle and etc.). Our proposed method can track object in 3D without any problems described above. The system overview is demonstrated in figure 1. Depth camera such as Microsoft Kinect captures video. Then the object that we are interested in is selected upon its colour information. The background is subtracted by using modified version of iterative method proposed by Calvard [1]. After that, we calculate the centre of the object by using image moment and converting objects coordinates on the image to world coordinates. Finally having sequence of object 3D coordinates, we apply hidden Markov model (HMM) to recognize motion shape.

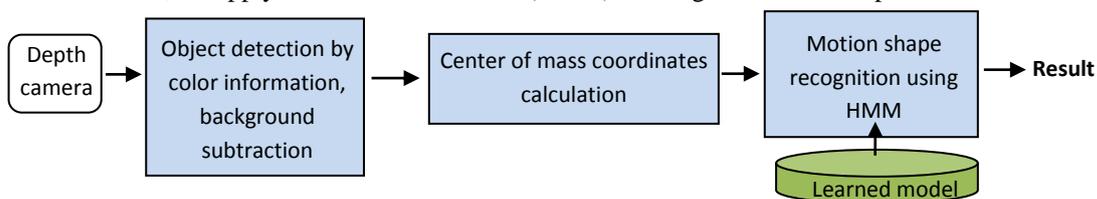


FIGURE 1 THE SYSTEM OVERVIEW

### 2 CONCLUSION

Tracking objects is important problem for nowadays. In this paper, we demonstrate not only how to perform tracking, but also we apply some recognition techniques as well. This makes our task more challenging. Moreover, we perform it in 3D space and this contributes to the accuracy and usefulness of the method. The depth camera that we used here makes our system more robust. Experiment results demonstrate the usefulness of the proposed method.

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## DEVELOPING OF A PROGRAM ON AUTOMATIC MORPHOLOGICAL ANALYSIS OF THE KAZAKH LANGUAGE

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### ABSTRACT

The article is devoted to the development of software for automatic morphological analysis of the Kazakh language. The program was written in Java using the free relational database management system MySQL on program NetBeans IDE. The rules of the Kazakh language using in the text analysis engine were analysed. Algorithms were designed with the possibility of integration into existing software solutions. These algorithms are complemented and extensible.

Keywords: automatic morphological analysis, Java, MySQL

### 1 GENERAL

In the countries, where people using 2 common languages, arise the problem with orthography. That is why the developers create the programs, which will help to typing easier [1-3]. Relevance of the development is the lack of the independent keys for the specific Kazakh language characters on the standard keyboards, such as "ә" "і" "Ғ" "Ғ" "Ү" "Ү" "Қ" "ө" "һ" difficult typing the official language, which is a consequence of using alternative keys to simplify communication in the Kazakh language.

Morphological analysis algorithm consists of two parts:

- 1) Find a word in the dictionary.
- 2) If the word is not found, an attempt is made to find an error in this word.

At the first stage uses a dictionary consisting of the basics words with prefixes and endings corresponding to this basis. The search is overkill. One word form can match many morphological interpretations.

The second step is performed, if the word is not found in the dictionary. In this case, the word contains an error, and the subsystem is trying to determine where in the words of a mistake. If the second phase could not find word form, it is considered that there is no word in the dictionary.

There were considered several analysis algorithms word on possible errors:

- 1) Levenshtein distance;
- 2) The method of complete reverse transformation;
- 3) Finding the maximum subsequence.

There are two types of random errors:

- 1) Doubling symbol;
- 2) Interchange of two adjacent characters.

There are the important grammatical errors for a successful correction of the effective diagnostic algorithms. In general, it all comes down to the definition of accessory sequences of characters to this natural language.

Thus, errata certain classes, including single letter, are practically important. Algorithms for correcting errors in the Kazakh words should consider specific features of the Kazakh language.

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## **2 CONCLUSION**

The program on automatic morphological analysis of the Kazakh language was developed. The developing of such a program could solve such problem as orthography. Moreover, the minimum system requirements, simplicity of use and high speed allow working with the program on any device. Therefore, this program can find application in various fields of activity. In addition, the algorithms were designed with the possibility of integration into existing software solutions. These algorithms are complemented and extensible.

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# A THREE-DIMENSIONAL VISUALIZATION METHOD FOR COMPUTATIONAL MODELS OF MOLECULAR BIOLOGY

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## ABSTRACT

We present a method for three-dimensional visualization of molecular biology processes modelled by chemical kinetic equations. To implement this visualization, we develop software in C# and a database of three-dimensional forms that model molecular complexes. The quantitative parameters in our visualization scheme are determined from kinetic equations governing the participating components, so our visualization is not only qualitative but also quantitative. As a case study, we visualize a mathematical model for mitochondria-dependent apoptosis (programmed cell death) proposed by Bagci et al [1].

Keywords: visualization, chemical kinetics, cell biology, apoptosis

## 1 GENERAL

Visualization of biochemical processes is important for understanding various phenomena in living organisms. A large number of models have been developed that are based on differential equations of chemical kinetics, and can be expressed in a uniform notation using CellML language [2]. Software products like OpenCell [3] solve models defined in CellML. However, their output is in the form of graphs showing time dependences of component concentrations. This gives quantitative description but doesn't provide rich visual presentation.

Their relative sizes and velocities are proportional to their real parameters taken from chemistry, and their amount on screen is determined by their concentrations taken from the solutions of the kinetic equations. The software is written in C#. Unity game engine is used for 3D animations. The program works with any molecular shapes stored in COLLADA format. We also develop a database of common molecular complexes in COLLADA format. The database is open source so anyone can add other molecules into it.

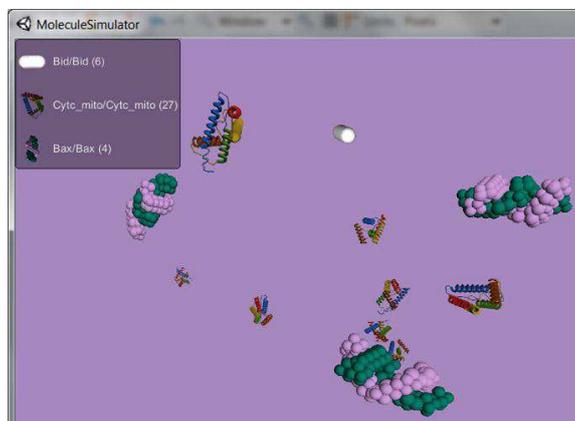


FIGURE 1 3D ANIMATION OF INTERACTING MOLECULES

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## 2 CONCLUSION

The visualization method and software we develop contains both qualitative three-dimensional rendering of reacting molecules and quantitative correspondence with their dynamics obtained from chemical kinetic equations. This software will be helpful in design of new medications as well as in medical education.

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## THE ASSESSMENT OF THE BORROWER'S CONDITION AS THE PROBLEM OF IMAGE RECOGNITION

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### ABSTRACT

Issues of the complex analysis of the borrower's credit status are considered. A computing system based on the ideas of the pattern recognition theory and allowing for the identification of a facility's credit status class is suggested.

Keywords: image recognition, pattern recognition theory

### 1 GENERAL

Management of bank operations presents the risk management, connected with a bank portfolio, the set of assets, providing the bank with income from its activity. The main part of a bank's portfolio is made up of company and individual loans, which are accompanied by the risk of total or partial loss of resources of the bank.

Therefore, the problem of operational and objective assessment of the borrower's credit status is actual.

The ultimate goal is the construction of an experimental computer system for assessing the borrower on their features. For this purpose the "Assessment of borrower's credit status" system was developed, with vector described input and broken into classes by a loan expert. For the recognizable borrower the system defines a class of his financial state. The system includes the following modules – feature normalization module, learning module, learning-checking module, and recognition module. The system is realized by the means of the object-oriented language Java.

### 2 CONCLUSION

This formalization of the problem of determining loan risks and the solution method allows us to consider the borrower's creditworthiness from a slightly different point of view and is a more flexible and accurate model for prediction of the borrower's credit status.

We note that a lot of research is devoted to the theoretical foundations of risks in the multicriterial and game problems.

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## SOME DIFFICULTIES OF 3D SOLIDWORKS SYSTEM OPERATION

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### ABSTRACT

In this article, we show some methods of solid modelling using Windows application SolidWorks system. The article shows the experience of training courses for the specialists to get skills to work with 3D Solid Works system

Keywords: 3D modelling, 3D Solid Works system

### 1 GENERAL

The basis of automated design systems are computer models to:

- define the behaviour of a design and its functional knots depending on external factors
- describe the geometry of details;
- conduct thermal and strength calculations;
- study the behaviour of structures in extreme situations;
- automate the creation documentation and use standard solutions.

Such models provide an opportunity to depart from the full-scale experiments and are often the only tools for modelling.

The first systems of geometrical modelling in mechanical engineering are specialized graphic editors with limited opportunities. These systems automate the process of creating images based on the linguistic approach.

The modern state of computer technology and the possibilities of experts have a certain effect on the type of operations used in solving design problems:

- each elementary change is made not with the object as a whole, but only with some part of it
- such changes are made sequentially: at each following step we use some information describing the current state of the design process.

The developed CAD-systems have expanded the view of the object designing process and allow you to create 3D models, consisting of several hundreds of parts, allowing to simulate the actual mechanisms, consisting of a large set of details and conduct analysis in action. However, the process of obtaining good models using CAD systems is a nontrivial creative process; it is not easily formalized, but allows you to interactively create complex assembly, simulating real objects. The inability to formalize the process of building models revealed a number of shortcomings.

Designer work in the SW environment for designing parts and assemblies of varying difficulty encounters the psychological difficulties associated with the characteristics of the system. When working with SW the user is working to resolve the conflicts arising at the design of the system environment.

### 2 CONCLUSION

In this work, we give the description of some methods of design for eliminating mistakes during the work in the SW environment, allowing to bypass psychological barriers of detail design and assemblies of any given complexity.

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## TASKS ABOUT A SYMMETRIC BEND AND STRETCHING OF HETEROGENEOUS PLATES BY USING OOP

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### ABSTRACT

Intensive development of many areas of equipment predetermines broad applying the shell structures of construct. For the present, stage the tendency of use of designs like plates and covers in the conditions of increasing intensity of external influences - the high and ultrahigh pressure, extreme temperature etc.

Keywords: shell structures, Visual C#, TChartSeries, heterogeneous

### 1 GENERAL

Tool for creating this calculation was chosen freely distributable C#. C# is a programming language that is designed to create multiple applications running in the environment. NET Framework.

Language is optimally suited for mathematical computation and output the result in chart format. Integrated development environment Visual C# is a set of development tools provided through a single user interface. Some facilities are shared with other languages Visual Studio, while others, such as compiler C#, peculiar only to Visual C#. For derive Graphic chart components was used that specifies the graph of the function (Fig. 1) [1]. Chart component allows you to build different charts and graphs. Series is a container object type TChartSeries - data series, characterized by different styles of display. Each series will correspond to a single curve in the graph.



FIGURE 1 SYMMETRIC BEND AND STRETCHING OF HETEROGENEOUS PLATES

### 2 CONCLUSION

As a result of this work has been created graph by OOP language C#. This graph was derived symmetric stretching round heterogeneous elastic plate of variable thickness exponential profile in the uneven temperature field sampling method of partial differential equations.

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## DEVELOPMENT OF THE AUTOMATED INFORMATION SYSTEM BY MEANS OF MODERN WEB TECHNOLOGIES

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### ABSTRACT

This thesis on the topic “Information system “Schedule”” describes a solution to the problem of development in the field of information systems training schedule institution of higher education with the use of modern information technologies and web programming. The theoretical and practical significance lies in the fact that the work has application in the particular school.

Keywords: system, information systems, subsystems, web applications, server - scripts, jQuery

### 1 GENERAL

In educational department of the JSC International Information Technologies University (IITU) the automated information Schedule system, by means of the Framework Yii environment, with use of components of structure of language of the server - PHP scripts was developed for fast development of large-scale web applications, JQuery, Angular, JavaScript library.

Framework Yii is a basis for utility web programming which can be used significantly to develop all web applications. The jQuery library helps easily to get access to any DOM element, to address to attributes and contents of the DOM elements, to manipulate them. AngularJS is JavaScript-Framework with the open initial code developed by Google. AIS "Schedule" consists of subsystems: Chairs, Specialties, Disciplines, Audiences, Teachers, Groups, and Streams (Fig. 1) [1].

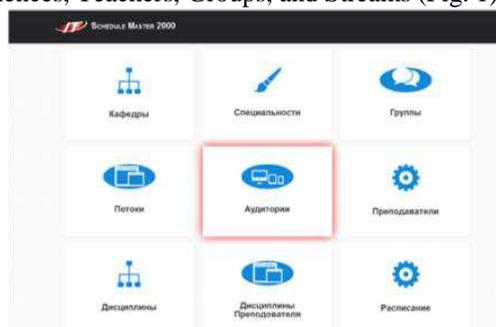


FIGURE 1 AUTOMATED INFORMATION SYSTEM "SCHEDULE"

### 2 CONCLUSION

As a result of this work has been developed automated system timetables school. The developed system is implemented by means of modern web-network technologies to automate organizational processes and enable simultaneous remote access to information resources in the process of service documentation.

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# PROTECTION OF PRIVACY IN DISTRIBUTED DATABASES USING CLUSTERING

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## ABSTRACT

Clustering is the technique which discovers groups over huge amount of data, based on similarities, regardless of their structure (multi-dimensional or two dimensional). We applied an algorithm (DSOM) to cluster distributed datasets, based on self-organizing maps (SOM) and extends this approach presenting a strategy for efficient cluster analysis in distributed databases using SOM and K-means. The proposed strategy applies SOM algorithm separately in each distributed dataset, relative to database horizontal partitions, to obtain a representative subset of each local dataset. In the sequence, these representative subsets are sent to a central site, which performs a fusion of the partial results and applies SOM and K-means algorithms to obtain a final result.

Keywords: clustering, DSOM, SOM

## 1 GENERAL

Cluster analysis algorithms groups data based on the similarities between patterns. The complexity of cluster analysis process increases with data cardinality and dimensionality. Cardinality (N, the number of objects in a database) and dimensionality (p, the number of attributes). Clustering methods range from those that are Largely heuristic method to statistic method. Several algorithms have been developed based on different strategies, including hierarchical clustering, vector quantization, graph theory, fuzzy logic, neural networks and others [1].

Some common algorithms, such as traditional agglomerative hierarchical methods, are improper to large datasets. The increase in the number of attributes of each entrance does not just influence negatively in the time of processing of the algorithm, as well as it hinders the process of identification of the clusters. An alternative approach is divide database into partitions and to perform data clustering each one separately. Some current applications have so large databases that are not possible to maintain them integrally in the main memory, even using robust machines. Kantardzic [2] points three approaches to solve that problem: a) The data are stored in secondary memory and data subsets are clustered separately. A subsequent stage is needed to merge results; b) Usage of an incremental grouping algorithm. Each element is individually stored in the main memory and associated to one of the existent groups or allocated in a new group; c) Usage of a parallel implementation. Several algorithms work simultaneously on the stored data.

## 2 CONCLUSION

Self-organizing map is neural network concept, unsupervised learning strategy, has been widely used in clustering applications. However, SOM approach is normally applied to single and local datasets. In one of the research work, they introduced partSOM, an efficient strategy SOM-based to perform distributed data clustering on geographically distributed databases. However, SOM and partSOM approaches have some limitations for presenting results. In this work we join partSOM strategy with an alternative approach for cluster detection using K-means algorithm.

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## ON THE ESTIMATION OF RAIN ATTENUATION FOR KA-BAND SATELLITE TELECOMMUNICATION RADIO-SIGNALS

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### ABSTRACT

The paper deals with questions of rain attenuation estimation of radio-signals for Ka-band satellite communication systems on base of linear attenuation obtained experimentally at one frequency. The composition of the experimental radio-link is considered and the procedure for calculating the attenuation of radio signals in real satellite channel is recommended.

Keywords: Ka-band, radio-signal, satellite communication, attenuation in rain

### 1 GENERAL

Recent years, a significant number of papers on the use of Ka - band in satellite communication systems were published [1-3]. These papers discuss a wide range of issues such as: features of multi-beam technology, the construction of satellite queuing systems, the effect of increasing the Ka – band implementation on development of VSAT systems and etc.

When designing Ka-band satellite channels, it is important to know the energy potential margin to compensate the increased attenuation of radio signals in the rain. In this connection it is necessary to determine (predict) this attenuation. The International Telecommunication Union (ITU) recommends to using the general prediction method outlined in Recommendation ITU -R P.618- 10 [4]. The proposed procedure provides estimation of long-term statistical characteristics of rain attenuation on an inclined track for a given location at frequencies up to 55 GHz.

At the same time, the Recommendation states that if there is a reliable long-term statistics of attenuation levels measured at elevation angles and frequency (or frequencies), other than those for which prediction is needed, then, it is often preferable to recalculate the data for considered elevation angle and frequency than use a common method of forecasting.

In this paper it is proposed to give preference to the recalculation of frequency on the base of reliable attenuation data rather than prediction methods based on the rain intensity data. For designing of satellite queuing system in Kazakhstan it is proposed to conduct an experiment which aims to provide reliable attenuation data for the local conditions at the frequency  $f_1$ . On the basis of these experimental data hereinafter attenuation recalculation is carried out for required Ka-band frequencies ( $f_2$ ):

$$A_2 = A_1 (\varphi_2 / \varphi_1)^{1-H(\varphi_1, \varphi_2, A_1)}, \quad \text{where:} \quad \varphi(f) = \frac{f^2}{1+10^{-4} f^2} \quad \text{and}$$

$$H(\varphi_1, \varphi_2, A_1) = 1,12 \times 10^{-3} (\varphi_2 / \varphi_1)^{0,5} (\varphi_1 A_1)^{0,55}.$$

$A_1$  and  $A_2$  - additional rain attenuation equiprobable values at frequencies  $f_1$  and  $f_2$  (GHz), respectively.

For conducting the experiment, the testing radio-link is organized, which consist of: microwave generator, transmitting antenna, reference receiving antenna, microwave signal level meter. Measurements performed under different weather conditions will provide for the testing radio-link a

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linear attenuation dependence  $A_1$  (dB / km) on rain intensity (mm / h) at a certain frequency  $f_1$  for radio-signals with horizontal and vertical polarization.

## **2 CONCLUSION**

To obtain reliable statistics on the long-term attenuation levels in the local environment it is proposed to use the results of experimental measurements. On the basis of these data attenuation recalculations for required Ka-band frequencies is carried out.

To determine the specific rain attenuation at the working frequencies the above formulas are used.

The calculation of radio signal attenuation in real satellite channel is carried out in accordance with the procedure described in Recommendation ITU -R P.618- 10 (except for step 6).

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## EVALUATION OF THE SURFACE QUALITY

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### ABSTRACT

This paper describes the evaluation of the surface quality and surface roughness measurement.

Keywords: surface roughness, microgeometry, roughness parameters, arithmetic mean profile deviation, ten-point mean roughness, maximum roughness height, mean spacing of the profile irregularities, mean spacing of local peaks of the profile, profile bearing length ratio, surface roughness measurement.

### 1 GENERAL

Roughness (microgeometry) of the machined surface is one of the most important quality characteristics of a work piece when it is being machined. The surface roughness affects wear resistance, contact stiffness, corrosion resistance, durability, and other functional specifications of machinery parts.

Therefore, when developing technological processes it is very important to know what microgeometry and which parameters can provide the necessary performance characteristics of the surface layer of a work piece.

Currently, the surface roughness is measured quantitatively by the following profile parameters [1]:

- the arithmetical mean deviation of the profile – Ra;
- the maximum roughness height of the profile – Rmax;
- the mean spacing of the profile irregularities – Sm;
- the mean spacing of the profile irregularities in crests – S;
- the reference length of the profile –  $\eta p$ ;
- the relative reference length of the profile – tp;
- the ten-point height of the profile irregularities (the sum of absolute arithmetical mean deviations of five minimum points and five maximum points) – Rz.

Currently, there are several methods for studying the surface roughness: using the stylus instruments by the contact method (applying the profile meters and profile recorders), using the reference specimens by the non-contact method, by optical non-contact method (applying microscopes, the interference microscopes, etc.).

However, application of a large number of criteria for evaluation of roughness does make it possible to clearly and adequately determine the effect of the surface microgeometry on the operational properties of materials. In fact, roughness is a spatial object, and all the operation processes take place on the surface of a work piece as a whole. In order to evaluate roughness as a spatial object the computer 3D modelling systems can be applied [2].

Parameters of roughness of the work piece surface can be determined by the non-contact digital photography method applied to the studied surface by means of a digital optical device with the resolution of at least 3 mega-pixels at the angles of illumination of 15°, 45°, and 75° with the normal location of the lens to the studied surface. The digital images are transferred to a computer; the images are processed and analysed based on calculation of statistical characteristics of each image. The mean square deviation is determined between the statistical, which is correlated with the arithmetical mean deviation Ra of the roughness comparison specimen. The recovery factor k is determined. The electronic model of the surface

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microrelief is constructed by converting pixels of the image into a three-dimensional coordinates, which are used to calculate the geometric parameters of the surface roughness. As a result of such measurement of surface roughness of the work piece the efficiency of measurements of roughness parameters increases due to process automation, which is a critical task aimed at improving the quality of products.

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## USING THE INFORMATION TECHNOLOGIES FOR THE DEVELOPMENT OF VIRTUAL PHYSICAL LABORATORY

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### ABSTRACT

The main idea of this article is using the information technologies for the development of virtual physics laboratory. The essential aspects of the structuring and presentation of the theoretical and experimental materials within the virtual computer laboratory are presented. The virtual computer laboratory developed on the base of is based on MICROSOFT. NET XNA for the Physics subject.

Keywords: MICROSOFT. NET XNA, graphic scenes, virtual physics laboratory, 3D modelling, C # (CSharp)

### 1 GENERAL

Nowadays almost all universities are well equipping universities with computers and other IT technologies, but despite this fact that all IT is already well build into university education stack there is still a lack of good tools for educational purposes [1-3].

The aim of the work is to develop the system for rendering the 3D-scenes with the expanded set of effects online for the preparing the set of the hardware and software tools on the basis of the Framework .NET XNA with the future development of the virtual physical laboratory.

While developing virtual laboratories common principles are taken and produced by ourselves principles that would lead us to creation of quality product at the end. That also can bring us to an understanding of the overall process of creating similar products in the future that can help us in further extension, easily improvement and creation new products.

In case of project development by the main concepts there will be following criteria:

1. Study of international experience in the development and implementation of computer-based training systems based on different integrated development environments.
2. Adapting of the agile development methodology software to the process of creating a specific product as virtual physics laboratory.
3. Development of a prototype of a 3D virtual scene of the Physics Laboratory.
4. Development and testing of a total interface of the Virtual Physics Laboratory.
5. Prototyping of the Virtual Physics Laboratory.
6. Development and testing of Physical Virtual Laboratory works complex on the basis of the framework. NET XNA.
7. Development, testing and implementation of the quality control system knowledge into the overall system of 3D Virtual Physics Laboratory.
8. Writing of the guidelines for the implementation of the Physical Laboratory Work and documentation to the program complex 3D Virtual Physics Laboratory.
9. Implementation of the developed Virtual Physics Laboratory in the learning process and the evaluation of the progress.

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## **2 CONCLUSION**

As a result of the work the graphic system is designed and developed on the basis of the Framework .NET XNA. The system was able to draw the 3D scenes using the main algorithms of 3D surfaces processing for the development of the virtual physical laboratory. The system satisfies all the modern requirements stated to the applications of such type. It has simple but efficient design, user-friendly interface, and ability to implement the large number of complex effects.

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# INVESTIGATION OF THE MECHANISMS OF DUST STORMS IN THE ARAL SEA ON THE BASIS OF HYDRODYNAMIC MODELS AND REMOTE SENSING DATA

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## ABSTRACT

The article is devoted to the creation of a space-based monitoring of mathematical models and algorithms for research of the causes of dust storms in the area of radioactive storage of the radioactive worked waste Kashkar-Ata.

Keywords: space-based monitoring, dust storms, mathematical models, hydrodynamics, hydrodynamic models

## 1 GENERAL

Desertification problem is of current interest for Kazakhstan. About 75% of the territory is located in the arid and semi-arid zones and is exposed to the heightened risk of desertification. [1-3]. For solution of the problems related to similar natural phenomena such as tsunamis, tornadoes and typhoons the dozens of universities are working in the world. The huge interest to this problem exists as one of the most difficult and important scientific problems of fundamental and applied hydrodynamics. The dust storms cause the enormous damage to soil fertility and exist in all regions of the world, such as Mexico, Africa, Australia. Many states are interested in solving of this problem and it is the global problems of all mankind.

Until now, the remote sensing data were used only for the analysis of local areas of desertification. In this paper, the attempt of the real trends of global climate change in the Aral region was explored. Integration of the remote sensing data and the mathematical models led to obtain more accurate and informed origin of the hydrodynamics of the dust storms in the Aral Sea.

During the work, the following tasks were prepared:

1. Developing of the mathematical models that allow to lead the numerical assessment of the amount of salts, submitted with the dried bottom of the former Kashkar-Ata lake with using of the methods of space monitoring.
2. Make recommendations for the eliminating of the dust storms occurring in the area of radioactive waste storage in Kashgar-Ata.

## 2 CONCLUSION

Thus the program for calculating of three-dimensional turbulent flow of air in the presence of suspended particles will provide the theoretical estimates of mass removal and deposition of sand-salt aerosol from the dried bottom of the Aral Sea, to explore the direction of transport of sand in the 200-mile zone of the Aral Sea and get statistically valid directions of moving sands in this region.

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# AUTOMATIC SYSTEM OF IDENTIFICATION AND REPLACEMENT SPECIFIC CHARACTERS IN THE WORDS OF THE KAZAKH LANGUAGE

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## ABSTRACT

The program which can help to type Kazakh language text on Russian keyboard with automatic replacement of specific Kazakh symbols was developed. This software was based for automatic correction of text by comparing the input data with base Kazakh words. The developed software allows to increase the speed of typing in the state language. Furthermore, the possibility of integration of the algorithm on a site allows virtual communication in the Kazakh language without resorting to alternative symbols.

Keywords: Kazakh language, Java, MySQL, NetBeans IDE

## 1 GENERAL

Full Kazakh dictionary has been used in a process of developing of this software. Widespread usage of the keyboard with number replaced for Kazakh letters is not optimal solution of this problem [1-3], because on Kazakh forums and sites Kazakh language users write in official Kazakh language, but they just ignore Kazakh letters and replace them by Russian, which can be a very bad habit for future Kazakh language to write wrong and not to follow rules of official language. Looking for the temps of extension and distribution of technologies, they had a great potential of developing in the nearest future, likewise the medium and long term.

The main purpose of this work is to build software, which can automatically replace letters for special Kazakh language symbols. The program was written in Java using the free relational database management system MySQL on program NetBeans IDE.

## 2 CONCLUSION

In reason of lack "ә" "і" "һ" "Ғ" "Ү" "Ұ" "к" "ө" "h" keyboards , so Kazakh language user should use additional programs or adapt to write using numbers. This development oriented for internet users who write in Kazakh but it is hard to them to use existing methods. There is no analogue service for changing Kazakh text written by Russian language.

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## GENERAL IMPORTANCE OF INFORMATION TECHNOLOGIES

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### ABSTRACT

Information technologies are based on not only traditional exact and natural sciences. Cybernetics plays a great role in the development of IT. As known, cybernetics is a science of general laws in managing process and transformation of information in the different systems, which are machine, live organism and human society. Cybernetics as an art of management appeared in 1940 uniting the fields of management system, theory of electric circuit, machine-building, mathematical modelling, mathematical logics, evolutionary biology, neurology, anthropology in separate interdisciplinary research.

Keywords: cybernetics, computerization, e-government, management, model

### 1 GENERAL

The founder of cybernetics as well as a theory of artificial intellect was the American mathematician and philosopher Norbert Wiener (1894-1964). His contributions were remarked in military field. During Second World War N. Wiener worked on mathematical apparatus for system of pointing of anti-aircraft fire that were determined and scholastic models for organization and management on US air defence forces. In addition, he worked out new effective probable model of air defence forces managing. Thus, cybernetics was realized for the first time in the system of armed forces.

In the USSR cybernetics was founded by famous mathematician A.A. Lyapunov (1911-1973). As mathematician he made the artillery gun squad in the war. Cybernetics contradicted existing Soviet ideology that was hazardous for him. However, since 1950s the information technologies appeared with cybernetics together as considered. At the same time, he became founder of mathematical linguistics. Jointly with M.V. Keldysh (1911-1978) who was mathematician and major theorist of cosmic space, he made a calculation of astronomic tasks in cosmic space. As result, cosmic space research, radio engineering, electricity are also impossible without information technologies.

A.A. Lyapunov also promoted the use of mathematical methods in biological science of genetics. Jointly with S.A. Lebedev (1902-1974), the creator of electronic calculative machine, he worked out the program providing. A.A. Lyapunov continued to be interested in astronomy, physical geography, geology, biology, chemistry, physics, philosophy, linguistics where the mathematical methods and cybernetic approach were being introduced taking into account the specifics of the fields above that became presage of information technologies coming in other sciences.

It should remark that only impossible not to be realized from fancy is invention of time-machine. However, the designers and IT technicians restored the past picture using new electronic information technologies. The electronic digital reproduction really displays the truthful or verisimilar picture of historic and natural past concerning the humanity and nature relatively. Thus, information technologies not only are able to define cultural layer, physical and chemical ingredients in archeological and paleontological findings.

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## 2 CONCLUSION

In social sciences like history, sociology or political science are used a theory of probability. As rule, a theory of probability is a part of mathematics for study of casualty law in events, volumes and operations on them. Moreover, in political science is possible to use arithmetical formulas or political formulas basing on arithmetical. However, here is also possible to use methods of highest mathematics like in economics. Nowadays, in political and historical sciences are possible to apply information technologies basing on Lyapunov's cybernetics. For it, the introduction of information technologies in system of education is the best guarantee in development of other fields in human society.

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# THE EPISTEMOLOGICAL BASE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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## ABSTRACT

Humankind has always faced the problem of accumulation and translation of knowledge in ways that would preserve and transmit the knowledge in its entirety, without any loss or with minimal loss of its content. The problem permeated virtually all forms of human activity, from national folklore to conduct complex statistical operations.

Keywords: green economy, electronic journalism, green advertising & PR, environmental education

## 1 GENERAL

Speaking of information, we can emphasize that the scientists are discussed information itself as one of the main elements of informative communication space. That is, to understand how information flows and mechanisms of their treatment, it was necessary to understand the nature of information as itself. At one time, Norbert Wiener, the founder of Cybernetics, understood the nature of information as a content that is obtained from the outer reality of human adaptation to the conditions of his direct reality, as well as adjustment of his feelings to it.

However, by studying information as a fundamental phenomenon, researchers have found that in the process of human reflection it is split into two main parts, which totally gives us its more complete picture.

The first is the information that actually comes from human, so-called primary information. This type of information generally comes from natural type of interactions and is presented to our bodies perception in already finished form.

The second is the context in which the information attained through human consciousness has taken. In this case, the information becomes a sign and its relationship with the subject gradually disappears.

Here the processes of information development found their basis, which later gave rise to such disciplines and interdisciplinary areas as information systems, theory of algorithms, semantics, cybernetics, some linguistic theories, etc.

## 2 CONCLUSION

Thus, with a field of information as the subject of some disciplines and theories, it was necessary to talk about the appearance of the entirely information culture. In many ways, the emergence of such an information culture have already marked the transition to modern society of civilization, which is important for determining the status of mankind to date.

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## ALGORITHMS OF ESTIMATION OF SOURCE FUNCTION IN CITY ATMOSPHERE ENVIRONMENTAL MONITORING

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### ABSTRACT

The work is devoted to the implementation and evaluation of an atmospheric pollutant source estimation algorithms to be used in the monitoring system of a city. The monitoring system consist of several automatic measurement devices providing point-wise concentration measurement data. Considered approaches to the source estimation are based on variational principle with the use of adjoint equations for the convection-diffusion models with source-term uncertainty.

Keywords: Source localization, advection-diffusion equations, variational methods, adjoint problems

### 1 GENERAL

Chemical substances emitted by a source are transported with convection-diffusion processes in the atmosphere. The problem is to estimate source parameters. The work is devoted to the implementation of different atmospheric pollutant source estimation methods to be used in the monitoring system of the city. The monitoring system consists of automatic measurement devices providing point-wise concentration measurements data. Inverse modelling is carried out with additive source-term uncertainty as the function in question. Presented approaches to the source term estimation are based on variational principle with the use of adjoint equations for the convection-diffusion models [1-3]. With lack of measurement data one has to determine a function on a spatial-temporal domain i.e. the problem is ill-posed.

### 2 CONCLUSION

Computational technologies for source localization problem has been constructed on the base of 2D convection-diffusion model. Algorithms for direct and adjoint problems solution for the model were implemented with splitting technique. We used algorithms based on the Gauss transformation and sensitivity functions levels-set intersection to localize sources. Algorithms for the emission rate reconstruction for the sources with known locations based on the fundamental solutions for direct problems has also been considered. Computational experiments has been carried out.

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# QUESTIONS FOR STORAGE AND PROCESSING OF UNSTRUCTURED DATA

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## ABSTRACT

In the modern world, there is a constant increase of the flow velocity and volumes of stored data, the information has ceased to be an isolated, every piece of knowledge is associated with the data in another storages of information. Nature of the data has changed; it became necessary to use the semi-structured and unstructured information. In such conditions, it becomes very difficult to predefine a data structure. Consequently, the storage and processing in the usual system based on relational database is ineffective, and sometimes impossible.

Keywords: SQL, NoSQL-systems, database, unstructured and semi-structured data

## 1 GENERAL

In consequence of the fact that the performance of relational databases is reduced by a large flow of information and processing semi-structured and unstructured data is reduced to zero, family of solutions which can be classified as a NoSQL-systems was born.

NoSQL-systems have the following characteristics:

- flexibility: such systems does not require any data scheme;
- integrated horizontal scaling and parallel processing capabilities;
- the ability of quickly obtaining initial results;
- have built-in protection against failure of individual cluster components.

For clarity, carry out a comparative analysis of a typical scenario with data in RDBMS (Relational Database Management System, relational DBMS) and NoSQL-system.

In case of RDBMS there is a need to develop a storage data scheme. In addition, before loading data into the database, it must be cleaned and transformed into the required formats, only then they will be available through the language of SQL-queries. Suchwise, it is necessary to pass a minimum of six stages before obtaining first results. Here you come up with the problem of duration and complexity of the processes of transformation and loading data (see, Fig. 1).

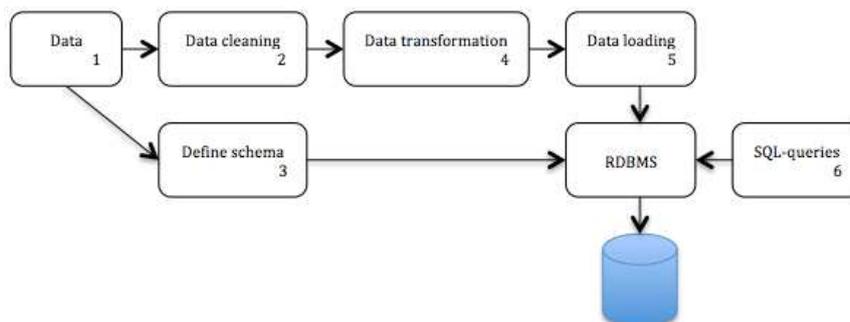


FIGURE 1 WORKING WITH DATA IN RDBMS

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In NoSQL process is simplified: there is a ready working program and as soon as data is loaded in the storage, the system is ready for operation (see, Fig. 2).

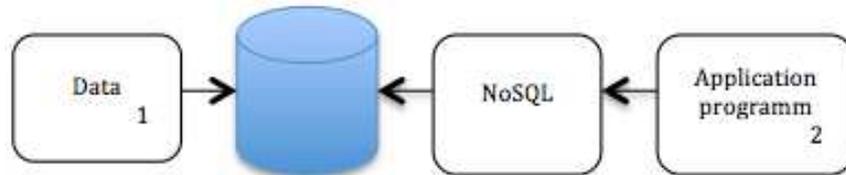


FIGURE 2 WORKING WITH DATA IN NoSQL

NoSQL-systems distinguish in several categories of data processing: storage of XML-documents, storage of "key - meaning" pairs, storage of graphs, storage of tuples of arbitrary length, Triple Storages, multidimensional data [1].

## 2 CONCLUSION

This article attempts a comparison of existing methods of data storage to handle large volumes of unstructured and semi-structured data. Comparative analysis of SQL and NoSQL showed some difficulties that come up when working with SQL in the context of large data, such as: data should be structured, it is necessary to develop the scheme of data storage, strict data consistency, and finally it takes time to obtain results.

Working with NoSQL solves these problems by abandoning relational model to account the specifics of the data being processed, there is no longer need for the availability of data schemes, integrated horizontal scaling and parallel processing capabilities, and thereby the productivity is increasing.

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## USING OLAP FOR MULTIDIMENSIONAL DATA ANALYSIS

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### ABSTRACT

This article is devoted to using OLAP for multidimensional data analysis. In computing, online analytical processing, or OLAP, is an approach to answering multi-dimensional analytical (MDA) queries swiftly [1]. OLAP tools are used to analyse large volumes of data from different perspectives. It helps your staff and management to analyse important information quickly, and then they can discover trends, see exceptions quickly and look for why things are happening in the market or your company's business processes. There are different methods and data mining models for the analysis of big data. Over recent years there have been many researches in multidimensional analysis. In this article we consider the construction of a multidimensional data cube for data processing using Microsoft technologies.

Keywords: OLAP, multidimensional data, multidimensional analysis, SSAS

### 1 GENERAL

Online analytical processing allows access to statistical data from storage in the multidimensional structure. The core of any OLAP system is an OLAP cube (also called a 'multidimensional cube' or a hypercube). It consists of numeric facts called measures, which are categorized by dimensions [2]. Currently, there are standards of building OLAP-systems based on the concept of the data warehouse. These standards are based on current research and the worldwide practice of data warehousing and analytical systems.

MS SQL Server Analysis Services (SSAS) allow you to analyse large amounts of data. SSAS can be used to design, create, and manage multidimensional structures that contain detailed statistical data from multiple data sources. SQL Server Management Studio is environment to manage and work with OLAP cubes. Business Intelligence Development Studio is used to create a new OLAP cube. The SSAS instance can contain multiple databases and there can be several OLAP and data mining objects at the same time in these databases. To create a data cube, we select the data source, and then the Cube Wizard helps determine the cube measure groups and dimensions (Fig. 1).

After adding attributes to measurements, determining the properties of a cube, we deploy the project to an instance of Analysis Services, and then process the cube and its dimensions.

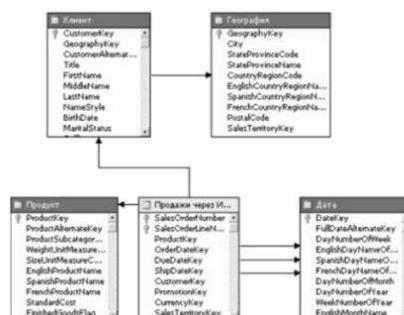


FIGURE 1 CONTENT OF THE CUBE IN CUBE DESIGNER

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## 2 CONCLUSION

Online analytical processing can significantly simplify and accelerate the process of preparation and decision-making by senior staff. It is fundamentally different from the traditional process of decision support based, mostly, on the examination of structured reports. Formal mathematical description of methods of multidimensional analysis and methods of constructing multidimensional models offer a number of benefits. First of all, this is a simplification of the design process of multidimensional models, just as the normal forms simplify the design of relational models. In addition, a mathematical description of multidimensional operation allows you to build a clear and simple request for the data analysis stage.

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# THE TEMPERATURE ADAPTATION OF PHYSICAL UNCLONABLE FUNCTIONS ON RING OSCILLATORS

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## ABSTRACT

Physical Unclonable Functions (PUF) allows creating keys for encryption systems based on the unique information contained in the complex physical structure of IC. Physical Unclonable Functions allow to represent a binary sequence of the IC uniqueness. In that case, they must satisfy one of the most important requirements of stability for the whole range of operation conditions. Ring oscillators are extractors of unique information and represent the combinational loops, the oscillation frequency of which depends on variations in manufacturing process parameters of IC.

Keywords: masking scheme, the binary sequence stability, reproducibility of unique sequence, sustainability of bit, Hamming Distance, physical unclonable function, unique sequence, ring oscillator

## 1 GENERAL

According to the theory of [1] the frequency of the oscillator depend from the environmental parameters, so if temperatures decreases - the oscillator frequency increases. In the event the temperature different from the normal values observed increase in the number of unstable bits.

The main objective of this study - the levelling of temperature factor on the reproducibility of unique sequence PUF and increasing sustainability of bits, which generated of silicon oscillators. Comparative analysis of schemes extraction of unique sequences PUF on ring oscillators was implemented. Experimental studies confirmed the hypothesis about of the maximal stability of the sequences extracted by masking scheme 1 of 6 (see, Fig. 1). On the basis of the evaluation criteria of uniqueness and of reproducibility the selection of the optimal masking scheme at ambient temperature deviation from the normal value was implemented. The recommendation on the selecting of optimal scheme, guaranteed to provide high sustainability of unique sequences was developed.

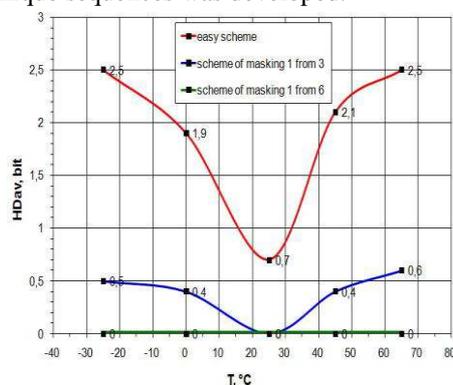


FIGURE 1 TEMPERATURE DEPENDENCE OF THE AVERAGE VALUE INSIDE CHIP HD UNIQUE SEQUENCES PUF FOR DIFFERENT SCHEME OF MASKING

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# DEVELOPMENT OF A WEB-SERVICE BASED ON SHAREPOINT 2013 PLATFORM FOR ORGANIZATION OF COLLABORATIVE SOFTWARE DEVELOPMENT

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## ABSTRACT

Agile Provider (AP) is a web-service written on SharePoint 2013 platform. Its main purpose is to organize a collaborative work of software developers according to Agile methodology. AP was written using all features of management of collaborative access to data and work on projects provided by SharePoint platform.

Keywords: SharePoint 2013, Agile Provider, web-service

## 1 GENERAL

All over the world, companies are trying to maximize the use of the Internet to improve the efficiency of work processes. Hundreds, if not thousands, of software developers pore over in order to make global network more accessible, functional and fast.

Even if most of the customers are satisfied with their work, they will never understand how much effort was needed to perform the project. It is also difficult for managers to monitor progress, track who out of the development team brings more benefits, and what stage had the biggest losses.

Sometimes members of the development team do not have enough means to communicate, share information or program codes. Communication via e-mail, flash drives eventually turns into chaos with the lost files, dozens of copies of the same version of the program and inability to comment on the disadvantages for improvement.

Microsoft SharePoint 2013 is a platform for collaborative work, which helps to unite employees and provide them with opportunities for interaction within their company. SharePoint allowed Agile Provider web-service to effectively manage corporate information of development teams throughout software project life cycle.

## 2 CONCLUSION

It has been demonstrated that Agile Provider is a web-service of current importance in our country and in the world in whole. It can solve main problems that occur in organization of collaborative work. Using Agile methodology and features of SharePoint 2013 platform were great solution for this purpose.

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# RELIABILITY PERFORMANCE OF THE CLOUD BASED WEB SERVICES

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## ABSTRACT

The paper studies the behaviour of the Web Services deployed on the cloud, and investigates their performance and the instability of the underlying communication medium. Our result shows how these two factors affect the dependability of cloud-based Service Oriented Architectures (SOA). This study is based on our experiments with the Web Services, which were deployed and run on Amazon. We deployed the same service on several Amazon locations and analysed variations in the response time and the ratio between delays and standard deviation of the average values.

Keywords: Service-oriented architecture, response time, instability, web services

## 1 GENERAL

Service-oriented architectures are an architectural paradigm for building software applications from a number of loosely coupled distributed services [6].

As consumers move towards adopting such a Service-Oriented Architecture, the quality and reliability of the services become important aspects. However, the demands of the service consumers vary significantly. It is not possible to satisfy all consumer expectations from the service provider perspective and hence a balance needs to be made via a negotiation process. At the end of the negotiation process, provider and consumer commit to an agreement. In SOA terms, this agreement is referred to as a SLA. This SLA serves as the foundation for the expected level of service between the consumer and the provider. The QoS attributes that are generally part of an SLA (such as response time and throughput) however change constantly and to enforce the agreement, these parameters need to be closely monitored [11].

## 2 CONCLUSION

The overall aim of this exploratory study was to examine the cloud-based web services by measuring the response time and exploring performance and network delays. The technique used relies on measuring the transmit delay and request processing time that contribute to the overall response time. In the real life, clients are not able to distinguish between these two delays when they use web services. Our ability to look into the contributing parts of the web service delays allows us to understand better the parameters, which can increase their performance, to estimate their availability, to find the best location for a server on a cloud and to make a decision about the use of redundant services.

Response Time delay can be caused by various factors including:

- Communication medium,
- Web Service implementation technologies,
- Congestions,
- Cloud location,
- Distance.

By exploring the response times of all location zone servers we have determined that, the little physical distance between the client and the location does not warrant high speed of web services, and to

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reach maximum efficiency and availability it might be decided to use two redundant servers. In particular, in spite of the fact that the Ireland server is the nearest to Newcastle we found out that we need to choose two servers of Ireland and Virginia servers to achieve better response time. Our experiments showed that this solution helps reducing the overall response time, increases the performance of the client and guarantees higher dependability of the service.

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## COMPUTER SIMULATION OF NONLINEAR TRANSPORT PROCESSES OF SOIL MOISTURE

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### ABSTRACT

The movement of water in soils occur mainly under the influence of a pressure gradient. Diffusion theory suggests that the flow of water is directed from wetter layers in less moist layers. In this case, the movement of moisture in the soil can be described by a nonlinear equation  $\frac{\partial W}{\partial t} = \frac{\partial}{\partial z} \left[ D(W) \frac{\partial W}{\partial z} \right]$  [1].

However, a sufficiently broad and repeatedly performed experiments show sometimes the opposite sign of the flow layers with small to layers with high moisture content. These facts are in conflict with the law of Darcy underlying diffusion theory. In order to keep the Darcy law and at the same time explain the presence of potential flows against moisture, apply the modified diffusion equation  $\frac{\partial W}{\partial t} = \frac{\partial}{\partial z} \left[ D(W) \frac{\partial W}{\partial z} + K(W) \right]$  [2].

Keywords: W-humidity expressed as a decimal, Z-depth, t-time, D (W) - the diffusion coefficient, K - coefficient of Bugengem

### 1 GENERAL

Disabled iteration method of moisture transfer in inhomogeneous medium. A mathematical model of a problem composes the nonlinear differential equation of the third order initial-boundary conditions. Compiled difference boundary value problem, the algorithm of calculation of moisture in a heterogeneous environment and a program is calculating. Numerical calculations show the stability of the solution of the approximate problem, and some results of numerical calculations.

### 2 CONCLUSIONS

1. Developed an approximate method for calculating the diffusion coefficient of soil moisture.
2. A program for solving nonlinear boundary value problems for the equation of moisture transfer.
3. The numerical calculations, taking into account evaporation and absorption of moisture in the soil.

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## ANALYSIS OF THE CLOUD DATA MANAGEMENT INTERFACE

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### ABSTRACT

This article is dedicated to the most popular research issue and the rapidly developing area of information technologies –cloud computing based on international standards.

The article is divided into three chapters:

- History of the origination and Status Quo of the Cloud Computing
- Model of deployment and provided services; their features
- Ways for creating your own cloud space. Cloud data management interface.

### 1 GENERAL

In main chapter describes the ISO / IEC standards-driven ways to create your own cloud space and the features of cloud data management interface. Also carries out analysis of cloud storage provider in the existing conditions of development of information technologies in Kazakhstan. Here are rental resources Internet providers (both foreign and domestic) as well as creating a space through the use of a home portable computer as a server and storage clouds. Here shown a comparative analysis of ways in part benefit, cost-effectiveness, portability, and elapsed time.

Also presented to the readers some of the most popular companies that offer both paid and free ready-made solutions, such as DropBox, Google Drive, OneDrive, Own Cloud, Yandex.Disk, etc., indicating the allocated storage capacity, cost, usability, supported devices, and of course the popularity rating among users.

### 2 CONCLUSION

Using this article, every reader, regardless of whether it is a simple or an advanced user, or head of the organization, can find the most suitable solution ISO / IEC standards-driven, storage, placement services and applications with universal access anytime.

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# THE INFORMATION SECURITY PROBLEMS OF TRANSLATION SERVICES PUBLIC BODY TO THE CLOUD TECHNOLOGY AND THEIR SOLUTIONS (THREAT OF LEAKAGE, DATA SECURITY)

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## ABSTRACT

Information security is one of the most important aspects of cloud computing. The importance of information security issues are two main reasons:

- the value of the accumulated information resources;
- critical dependence on information technology.

Destruction of important information, theft of confidential data, outage due to failure - all of this resulting in large financial losses, damages the reputation of the organization. Problems of control systems or medical systems threaten the health and lives of people.

Modern information systems are complex and therefore dangerous in themselves, even without malicious activity. Constantly found new vulnerabilities in software.

## 1 GENERAL

The relevance of this work is determined by the fact that at the moment almost every computer users in their work face with cloud computing. Clouds, in terms of information security have a few problems which caused by the following factors:

- poorly designed safety standards
- lack of a detailed analysis of statistics on incidents
- failure to use existing methods of protecting IT infrastructure.

From the perspective of risk for customer, the lowest risks are in the case of public clouds, because a safety issues are solved by separate organization, which organized the cloud.

More controlled approach, when the infrastructure is rented as a service. In this case, the client has the opportunity to implement these services, but also the risks in this case are large enough, since the client has to take care of the security of the entire infrastructure.

In the security field organization cloud Cloud Security Alliance (CSA) published its recommendations:

- 1. Data safety.** The best way to protect data in the store - the use of encryption.
- 2. Protect data in transit.** The transmitted data should be encrypted and only accessible after the user authentication.
- 3. Authentication.** The most common method of authentication is password protection. However, some providers to provide higher reliability, resort to means such as certificates and tokens.
- 4. User isolation.** The best option when each of the customer uses the individual virtual machine and virtual network. Separation between virtual machines and users, provides a hypervisor.
- 5. Legal and regulatory matters.** Providers are required to follow strict rules and stick to a single strategy in the legal sphere. This applies to security of user data, their exports, compliance, audit, security, and delete data, and disclosure. [1]

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## **2 CONCLUSION**

Despite the potential additional risks in the last years, interest in cloud services in Kazakhstan is growing rapidly. This is facilitated by basic two factors: convenience and benefit.

Companies do not have to spend huge amounts of money to create their own data centres, for payment of the license software on the contents of qualified personnel. You just can precede all IT processes.

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## SOLUTION OF NONLINEAR MOISTURE TRANSFER EQUATION BY APPROXIMATION METHOD

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Solid particles, that compose the soil or ground form complex three-dimensional pore system. After getting into the soil, water completely fills pores or occupies only part of them. In the case of complete filling soil pores with water a two-phase system of soil – water is formed where soil is considered as saturated. In other cases, it is considered as three-phase system of soil - water – air, where soil is considered unsaturated. When soil is incompletely saturated, equation of moisture motion is determined by Darcy's law, physical meaning of which is that the speed of the moisture is proportional to gradient pressure. A mass change of liquid flowing per unit time of an elementary volume of the soil is compensated by changing of saturation within that volume. Moisture transfer equation can be written as:

$$\frac{\partial W}{\partial t} = \frac{\partial}{\partial x} \left( D_x \times \frac{\partial W}{\partial x} \right) + \frac{\partial}{\partial y} \left( D_y \times \frac{\partial W}{\partial y} \right) \pm \frac{\partial}{\partial z} \left( D_z \times \frac{\partial W}{\partial z} \right), \quad \text{where } D_x(W), D_y(W), D_z(W) -$$

diffusion coefficients of soil moisture in the direction of axes  $x, y, z$ .

Aller suggested adding the correction term to the equation of moisture transfer and using the following model to describe the transfer of moisture in soils: 
$$\frac{\partial W}{\partial t} = \frac{\partial}{\partial z} \left( D \times \frac{\partial W}{\partial z} + A \times \frac{\partial^2 W}{\partial z \partial t} \right).$$

In this study we develop a numerical method of finding the soil moisture based on the capillary effect and did the following works:

- The nonlinear differential problem is drafted
- Iteration calculation formula of the transfer of soil moisture is developed
- Numerical calculations are done

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## INTERBANK WEB-PORTAL FOR PROVISION SCORING DATA FOR CREDIT MANAGERS

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### ABSTRACT

This article is devoted to implement protocol buffers for serializing structural scoring data in interbank Web-portal. The main purpose is to define huge data to be structured, easily write and read this structured data to and from variety of data stream. In this article, we will consider protocol buffers and its implementation using programming language Java for scoring data processing.

Keywords: interbank web-portal, protocol buffers, Java, scoring data

### 1 GENERAL

In recent years, crediting in Kazakhstan is developing rapidly, which is associated with increasing risk component. Modern banks include its strategic objectives is to increase their customer database, also feel the need to simplify the collection of scoring data on the potential borrowers. Credit score (credit score system) - a technology used by banks to identify the credit risk of a person based on certain characteristics of potential borrowers by counting statistical points. According to the results of points system gives the decision to approve or refuse the loan.

Types of credit scoring used in financial institutions:

**Application Scores** are a type of credit score used by financial institutions to define which applicants are to be taken on, based purely on the information given in the credit application form;

**Behavioural scoring** the assessment process of customers behaviour to improve its credit portfolio management;

In this publication, an implementation was decided to prepare the input parameters for credit scoring system, based on them help better handle scoring data. This requires a much larger of static scoring data from different banks. To exchange large amounts of information between banks need faster tools for its implementation. As a serialization format of the data implied technology Protocol Buffers - Google's mechanism for serializing structured data, which is an alternative to XML. Firstly, we describe the structure of some data then special protobuff's compilation generates java classes. Then scoring data writing file was developed and was followed by deserialization.

### 2 CONCLUSION

This article presents an application of technology Protocol Buffers for bank scoring data processing and convertation. The article provides an overview and analysis of the preceding methods used for interbank scoring data exchanges. According to the Google's technology, Protocol Buffers compared to XML, easier, many times faster, allows to use less amount of data.

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# MACHINE TO MACHINE APPLICATION FOR MOBILE PHONE

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## ABSTRACT

Machine to machine technology is traveling everywhere these days. M2M technology is the utilization of different types of mechanical devices to establish a communication and exchange of information. More properly known as machine to machine technology, the M2M interface allows businesses to monitor and manipulate remote equipment that is crucial to the business operation. Everybody has difficult for residents to check security of their homes when they are away or detect intrusion.

Nowadays, most people wants to control remotely robot through smartphone or tablet which send some information and check security to their homes when they are away.

Keywords: mobile device, m2m, wireless access, robot, remote control

## 1 GENERAL

The main objective of this research - building a home robot and controlling it remotely through mobile phone, which helps people to control home. All data between robot and phone will be sent though 4G router. Therefore, it gives us permission to control robot remotely in real time. For the hardware platform we have decided to use on the Arduino. This was an easy choice, as this is a platform that is widely used by hardware tinkerers all over the world, which means there is plenty of information and resources available.

The features of our robot:

- It should be a vehicle that can move forward, backwards and turn.
- It should be easy to assemble and disassemble.
- It should have a mode in which it is able to move on its own, detecting obstacles ahead and avoiding them.
- It should have a mode in which it can be fully controlled from smartphone.

## 2 CONCLUSION

There is no doubt that machine to machine technology will change the world. Remote control systems are always in demand and will be used everywhere in the future.

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## MOVEMENT RESISTANCE OF SOME CLASS OF PHASE SYSTEMS

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### ABSTRACT

In this paper we solve the problem of evaluation of the domains of attraction of stable equilibria, second order phase systems and isolated subsystems based on nonstandard Lyapunov function, which expands the area of stability of the system, in contrast to the well-known Lyapunov function of the type "kinetic energy plus potential energy".

Keywords: stability, phase system, Lyapunov function

### 1 GENERAL

To assess the attractive region of stable equilibrium positions, the second method of Lyapunov can be applied.

By virtue of the periodicity, by the angular coordinate  $\delta_i$  of the phase system diagram  $\frac{d\delta_i}{dt} = S_i$ ,  
$$\frac{dS_i}{dt} = -D_i S_i - f_i(\delta_i).$$

On the plane  $R_i^2(\delta_i, S_i)$  one can be restricted by the study of stability "in the large" only of one of the stable equilibrium points. For constructing Lyapunov functions necessary for stability studies "in the large" of the considered system, we use the Bakaev-Guj procedure. However, piecewise constant parameters here will be used for another purpose: to maximize the estimated domain of attraction, and not for obtaining on the phase plane  $R_i^2(\delta_i, S_i)$  of continuous, periodic in the angular coordinate Lyapunov function.

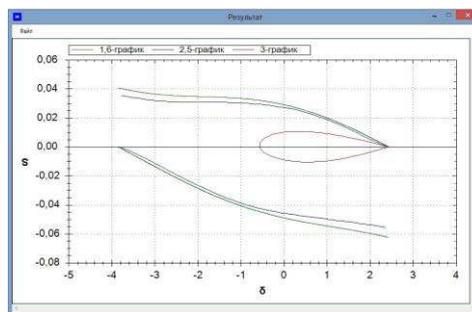


FIGURE 1 RATING ATTRACTIVE REGION OF STABLE EQUILIBRIUM

### 2 CONCLUSION

We have obtained the estimation of the domains of attraction of multidimensional stable equilibrium phase systems. We have assessed the regions of attraction of isolated subsystems of multidimensional phase system and the areas of attraction based on the Bakaev-Guj procedure.

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## MODELING OF TRITIUM RELEASE FROM IRRADIATED BERYLLIUM

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Beryllium is considered as both a neutron multiplier material and a plasma-facing component material for fusion reactors. Only limited data is available on tritium release from irradiated Be. The data show that most of the tritium generated is retained in the bulk at low temperature. For high density Be samples, a burst-type release is observed at higher temperatures. Few models have been suggested for tritium release from Be. Simple diffusion/ desorption models which are available for pure diffusion, pure desorption and diffusion/ desorption have been proposed, but lack the capability of accounting for important phenomena, such as the effects of the BeO layer and of irradiation-induced helium bubbles. Knowledge of the kinetics parameters of tritium release from irradiated beryllium is important aspect of using beryllium in future fusion reactors. Behavior of tritium in the irradiated beryllium is a complex function, which depends on the irradiation conditions (dosage, temperature, duration, etc.) and beryllium properties (density, grain size, etc., and oxide content). In order to better understand the tritium transport mechanisms in Be, a more detailed mathematical model for tritium release from Be was developed.

$$\frac{\partial C_1}{\partial t} = D \frac{\partial^2 C_2}{\partial x^2} - k_1 C_1 + k_2 C_2 \qquad \frac{\partial C_2}{\partial t} = k_1 C_1 + k_2 C_2$$

Initial conditions

$$C_1(x,0) = C_1(x)$$

$$C_2(x,0) = C_2(x)$$

Boundary conditions

$$C_1(0,t) = \varphi_1(t)$$

$$C_2(1,t) = \varphi_2(t)$$

In this study we developed mathematical model of tritium release from irradiated beryllium and did the following works:

- The linear differential problem is drafted
- Iteration calculation formula is done
- Numerical calculations are done

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## DEVELOPING ENTERPRISE VOIP SYSTEM WITH REMOTE OFFICES IN GNS3

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### ABSTRACT

Voice over Internet Protocol (VoIP) is a methodology and group of technologies for the delivery of voice communications and multimedia sessions over Internet Protocol (IP) networks, such as the Internet. The main concept is to convert voice signals into the packets of digital data. The main attraction on using VoIP is that it significantly less expensive than traditional phone services. Technically VoIP has been implemented using protocols H.323, Simple Gateway Control Protocol (SGCP), Internet Protocol Device Control (IPDC), Media Gateway Control Protocol (MGCP), and Session Initiation Protocol (SIP). To design and configure virtual networks used simulators like GNS3. GNS3 is an open source (GNU GPL) software that simulates complex networks. In this article we will create corporate VoIP system model in simulator GNS3.

Keywords: VoIP, SIP, H.323, GNS3

### 1 GENERAL

The main goal of this article is to create corporate VoIP models, how to build, which devices and protocols to use.

In model will be used 2600XM router with IP Telephony Services in IOS.

As a VoIP protocol we will use SIP.

The main work focuses on proper installing and setting routers configuration and creating topology of the future enterprise VoIP network.

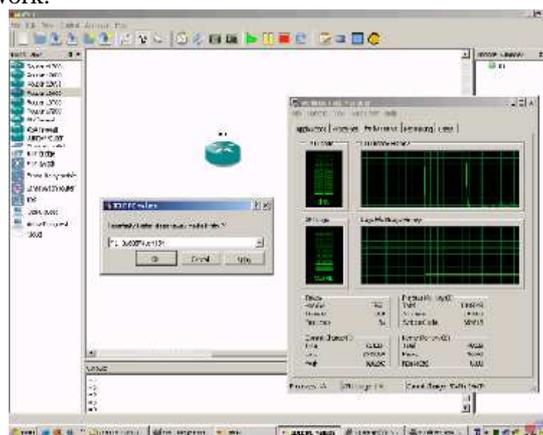


FIGURE 1 SETTING UP A ROUTER IN GNS3

### 2 CONCLUSION

During working on this article was learned VoIP protocols, their advantages. In the end was chosen SIP. Also was made topology of the enterprise VoIP system, configured routers and clouds.

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## APPLICATION OF GEOINFORMATION MODELLING IN THE DESIGN OF ENGINEERING OBJECTS

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### ABSTRACT

The paper describes the geo-information approach to modelling quarry of space and the use of graphics and geometric constructions in mining systems. The paper contains the results for the solution of important applied problems - improving the efficiency of mining mineral deposits by establishing a rational sequence of extraction of minerals based on GIS modelling quarry. Rational sequence is achieved by using the block model by optimizing the working zone quarry.

Keywords: field, GIS model quarry, wireframe model, block model, ore body, optimization of the working area, front of mining

### 1 GENERAL

The main purpose is to improve mining of mineral deposits on the basis of a modified method of geoinformation modelling of quarry. To achieve this goal in the paper focuses on the mining career in the work area using the block model. This takes into account the following parameters in the model of quarry: mineral deposits, border career, terrain contours, and the contour of the working area of quarry. Input of contours of different elements according to sampling is represented in figure 1.

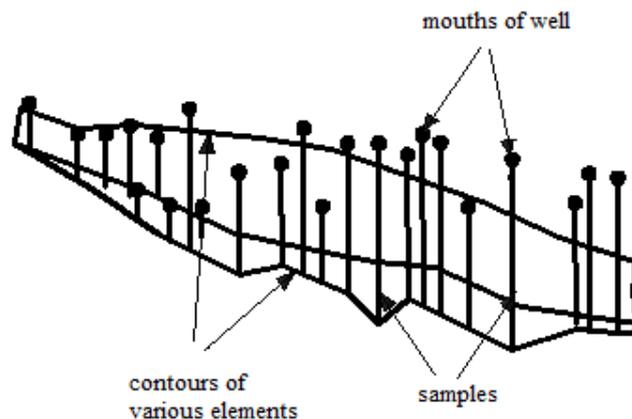


FIGURE 1 MODEL OF AN ORE BODY

A mathematical model of optimization of the working area is the determination of displacement front of mining operations in view layouts and transportation works in the zone of quarry.

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## **2 CONCLUSION**

1. Systematic classification of geo-information field models in the form of packets Unified Modelling Language UML, which allows determining the conditions under which it is advisable to use one model or another.
2. Examples of creating block models.
3. In this article, reasoned mathematical model in mining is applied, which allows to realize the rational choice movement of quarry mining in the working area.

Much attention is given to models systematization and harmonization of these models in the design process. Research results presented in this paper have been accepted for use in the educational process Kazakh National Technical University.

Geoinformation modelling is a reliable tool to further improve the technology of open cast mining and improving the technical and economic performance of the enterprise.

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Almaty, Kazakh National Technical University named after K.I.Satpayev, University of Kazakhstan
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# THE “SYNCHRONOUS GENERATOR - STEAM TURBINE” SYSTEM

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## ABSTRACT

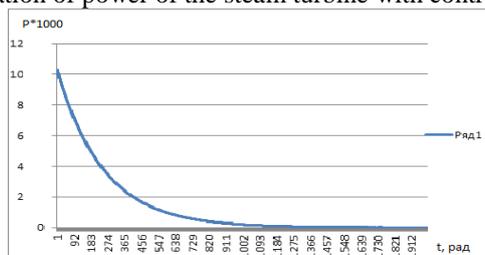
This article discusses the handling of mathematical models of phase systems. The aim is to develop a mathematical model of multi-dimensional phase systems and study its adequacy by specific complex electric power systems for stability control, controllability and optimality. To review phase systems we consider the research problems of the dynamics of pendulum systems, electric power systems, navigation systems, phase, etc. The major issue is ensuring stability during the design and operation of the studied systems. Ensuring sustainability is a critical issue in the design phase and operation of the systems.

Keywords: EMF- electromotive force

## 1 GENERAL

In this paper, a multidimensional model of the phase system is reduced to a system of nonlinear differential equations, and then we consider the task of controlling. We study a simplified model of the "synchronous generator - steam turbine", described by differential equations of the form  $\frac{d\delta}{dt} = S$ ,  $T_j \frac{dS}{dt} = P_T - KS - \left[ \frac{E^2}{z_{11}} \sin\alpha_{11} + \frac{EU}{z_{12}} \sin(\delta - \alpha_{12}) \right]$ ,  $T_P \frac{dP_T}{dt} = -P_T + \rho_o P_0 - \frac{P_0}{\sigma_0} S + u$ , where  $P_T$ -power steam turbine;  $\delta$  - angle EMF generator;  $S$ -slip generator,  $u$ - control.

The graph shows the variation of power of the steam turbine with control.



## 2 CONCLUSION

The problem of controllability and manageability equilibrium models of multidimensional phase systems is solved. Within the stated goal, we have posed and solved the problem of the implementation of optimal motion control models for multidimensional phase systems and the solution of the controllability problem. We have found control that transforms the investigated complex electric power system from a given initial state to any desired state in a finite time, based on an iterative algorithm.

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# APPLYING OF GROWING NEURAL TREE FOR ANALYSING UNSTRUCTURED TEXT INFORMATION

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## ABSTRACT

Currently, due to the exponential nature of the growth in the number of unstructured information in the network, including text, and productivity growth of computer technology, there are actual study and improvement of methods of automatic analysis, qualitative information retrieval and semantic analysis of textual information. The paper presents the results of a study of application of neural tree growing for automatic clustering of textual information.

## 1 GENERAL

The main objective of the work - explore the possibility of growing neural tree in multiparameter data space with lots of dimensions, study the conditions of convergence of growing of learning neural tree, exploring the possibility of automatic classification of unstructured text data with high accuracy.

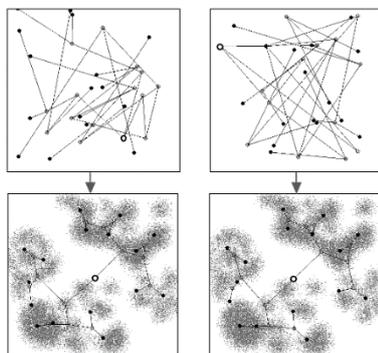


FIGURE 1 EDUCATION OF TWO NEURAL TREES WITH  
RANDOM INITIAL WEIGHTS

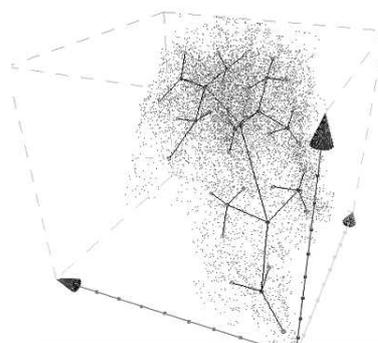


FIGURE 2 NEURAL TREE IN THE PARAMETRIC  
SPACE OF THREE-DIMENSIONAL DATA

## 2 CONCLUSION

In the work program and the neural tree growing algorithm was implemented for the analysis of unstructured text data. Recommendations were received for the fine-tuning of neural network, the possibility of classification and clustering data, revealed the dynamics of growth and convergence.

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## EXPLORING BASE STATION CHARACTERISTICS OF LTE MOBILE NETWORKS

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### ABSTRACT

Nowadays, the internet sphere takes special and a huge role in the exchanging of data, streaming video, as well as the provision of online services to all sorts of companies. In association with increasing the demand for services in the areas of communications and the Internet, which led to the rapid development of various technologies fixed and mobile communications it was born new challenge, which related with transition to new mobile technologies as 4G.

To plan LTE networks it is available expensive and complicated software, but it is likely that telecommunication companies or advanced users will be interested in a simple tool for assessing the capacity and range of the base station network LTE. In addition, telecommunication companies need a system that can give advice to choose optimal equipment, networking points, possible losses, and payback depending on count of subscribers. As well as users need a system, that can choose optimal mobile operator depending on their requirements.

For this purpose, we develop an expert system that is able to calculate the range and bandwidth expressed in megabits per second, which are based on the input parameters and the network equipment. In the first part, we consider a model that allows estimating the range and bandwidth base station LTE network and using these data to simulate different scenarios loading base station.

Keywords: 3G, 4G, LTE, MIMO, Base station, Mobile Technology

### 1 GENERAL

The main goal of this exploring is creating a new tool that can help telecommunication companies, physic and juristic users in transmitting from one mobile technology to new technology. In the result, we consider math model that can be used in simulate different scenarios loading base station, do experiments with LTE network and developed an expert system.

Research consists of three parts.

In the first part it we consider a model that allows estimating the range and bandwidth base station LTE network and using these data to simulate different scenarios loading base station.

In the second we do experiments and compare results with the mathematical model's output.

In the third part we create an expert system that created using knowledge base which received from the previous two parts.

### 2 CONCLUSION

In conclusion, we can say that the developed model allows us to estimate the range and bandwidth base station LTE network and use this data to simulate different scenarios download base station. This tool is affordable and does not require large resources of a PC, it can be used for training and educational purposes.

In the experimental part, were done several calculations as Rating allowable transmission rate in the channel network for LTE "close" and "distant" users in u, energy budget for the LTE network, maximum

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allowable losses LTE network, Margin for allowable intra-system interference, Restriction to managing power or stock up on fast fading, Calculate the maximum allowable loss.

The system can be used by companies in establishing new network points and for planning their budgets, also it can be used by end users of 4G to choose optimal service depending on their requirements.

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## DEVELOPING A SYSTEM USING "CLOUD COMPUTING"

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### ABSTRACT

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle operations. In cloud computing the word “*cloud*” is used as a metaphor for the word “*the Internet*” therefore the phrase cloud computing means “a type of Internet-based computing”, where different services – such as servers, storage and applications – are delivered to an organization's computers and devices through the Internet.

Keywords: server, storage, network, cloud, supercomputing, virtualization, open source software, Web 2.0, data center

### 1 GENERAL

The main goal of this study is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications, e.g. financial portfolios, to deliver personalized information, to provide data storage.

When talking about a cloud computing system, it is helpful to divide it into two sections: the **front end** and the **back end**. They connect to each other through a network, usually the Internet. The front end is the side the computer user, or client, sees. The back end is the "cloud" section of the system. The applications of cloud computing are practically limitless. With the right middleware, a cloud computing system could execute all the programs a normal computer could run. There are three primary cloud computing models.

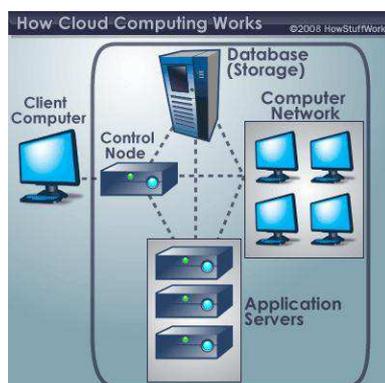


FIGURE 1 MODEL OF HOW CLOUD COMPUTING WORKS

**Infrastructure as a Service (IaaS):** The cloud provider manages and delivers the underlying infrastructure, including storage, network and computing resources. **Platform as a Service (PaaS):** The cloud provider manages and delivers programming languages, frameworks, libraries, services and tools for the end user to create and deploy applications. **Software as a Service (SaaS):** The cloud provider manages

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and controls the underlying cloud infrastructure, operating systems, application platform and even individual application capabilities, with the possible exception of limited user-specific configuration. Each of models have their advantages and disadvantages, in this study we will consider them and compare. After completing that best solution will be chosen for our system.

## **2 CONCLUSION**

A few years ago Cloud computing was term only scientist used, nowadays it is becoming more popular and more known. We see cloud computing applications everywhere. Smartphone apps use cloud computing technology to let you store and access data that normally wouldn't fit on your handheld device. Research institutions use cloud computing to house massive libraries of information. The main problem of presented research is to find optimal solution among different Cloud computing platforms, types and models and make a system that will be fast, efficient and reliable.

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# CALL ADMISSION CONTROL AND TRAFFIC ENGINEERING OF VOIP

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## ABSTRACT

This paper presents an extension of the Erlang-B model for traffic engineering of Voice over IP (VoIP). The Erlang-B model uses traffic intensity and Grade of Service (GoS) to determine the number of trunks in circuit-switched networks. VoIP traffic, however, is carried over packet-switched networks, and network capacity is measured in bits per second instead of the number of trunks. In this paper, we propose a new measurement scheme to translate network bandwidth into the maximum call load. With this new metric, the Erlang-B model is applicable to VoIP.

Keywords: VoIP, Erlang B, CAC, Traffic Engineering

## 1 GENERAL

The Erlang-B model has been used by the telecom industry to determine the call capacity of circuit-switched networks for many years. We conducted experiments to measure the maximum call loads based on various voice codec schemes, including G.711, G.729A, and G.723.1. Our results show that call capacity is most likely constrained by network devices rather than physical connections. Based on this result, we recommend considering both packet throughput (pps) and bit throughput (bps) in determining the max call load. If network capacity is constrained by pps, codec schemes would have almost no effect on the maximum call load, while the sampling rate could easily double or half the call load.

We are proposing to use the max call load as a comparable measure of network trunks. With this modification, the Erlang-B model is applicable to determine the call capacity of VoIP networks. SIP call manager or softswitch can then apply the Erlang-B model to implement a Call Admission Control algorithm to accept or reject an incoming call request on the packet switched network that does not “naturally” provide a blocking concept.

## 2 CONCLUSIONS

The traditional calculation of max call load is based on network bandwidth, and our experiment shows that this approach fails to work on routed networks with high speed links. Our experiment shows that packet throughput of network devices is likely to be the constraint for VoIP traffic. When doing traffic engineering for VoIP network, network administrators should calculate not only the physical bandwidth of network interfaces but also the capacity (measured in pps) of network devices. If a network device is the limiting factor for VoIP, codec schemes would have no effect on the call capacity; instead, sampling rate could easily double or half the call load. We also acknowledge one deficiency in applying the Erlang-B for VoIP traffic. Many VoIP implementations support silence suppression. During the silence time, the VoIP end-device (an IP phone or a VoIP gateway) may not transfer any packet while the Erlang-B model assumes the same packet transmission rate as the talking state. This issue could be addressed by applying a new model for traffic intensity as presented in [9], and such a model is a direction of our future research.

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## DEVELOPMENT OF A MODEL FOR TRANSITION SERVICES USING SAAS

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### ABSTRACT

The most handy cloud model, which ensures maximal comfort is SaaS. SaaS technology is a business-model, which uses software to allow of handy web-interface and full access to an application via the Internet. The model gives an opportunity to use the latest versions of applications, not buying a license, and introducing a new functionality only when it is necessary and proposes minimal material inputs for hardware infrastructure. In our case, it is the transition of services by SaaS model of cloud computing. In its turn, creating the model, we must take into account their safety, speed, flexibility, clarity, processing power, range and etc. Model “software as a service” opens absolutely new opportunities.

Keywords: cloud computing, DBMS - Database Management Systems, PHP - Personal Home Page, MySQL - My Structured Query Language, SaaS - Software as a Service

### 1 GENERAL

The main aim of this investigation is the model building of transition of services into SaaS model. There will be considered the main advantages of SaaS model: financial advantage, reduction of costs in time, security measures. By using the SaaS technology, it is possible to achieve maximal huge prospects at a comprehensive approach to work. Expected to use of the programming language PHP, as DBMS we take MySQL, as well as a platform for cloud most optimal view of a platform for the implementation of the model Windows Azure.

### 2 CONCLUSION

At present time the following tasks are performed:

- Determination of the most optimal platform for realization;
- The model building of transition to cloud services using SaaS model;
- Ensuring the high safety of services' transition.

As a result this research we can get to know how people work with it. Therefore it is necessary to modernize the structure of the application in the course of time.

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## PERSONAL HYBRID COMPUTING SYSTEM WITH COMPUTING BLADE-MODULE

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### ABSTRACT

High performance computing systems with hybrid architecture are not much expensive in comparison with the supercomputers with traditional architecture based on CPUs. It makes possible using of parallel computing for a wide range of consumers.

Blade architecture can considerably increase the performance of hybrid computing system. Besides blade architecture makes it possible to improve the ease of control of computing system, to minimize the work place, energy consumption and heat dissipation for computing system that helps to save operating costs.

Keywords: parallel computing, high-performance computing, hybrid computing systems, GPU accelerator, CUDA technology, Blade-module

### 1 GENERAL

Research work on creation of the prototype of personal hybrid computer system (PHCS) with a computing blade- module based on GPU Nvidia Tesla [1] has been carried out. In the progress of this research work:

- it were defined the principles of engineering of PHCS with computing blade-module based on GPU;
- the generalized architecture of PHCS with computing blade-module based on GPU was developed;
- the work on selection of network equipment for computing blade-module was carried out;
- the architecture of monitoring system of main parameters consisting of the logical device, sensors and devices for indication of main parameters of PHCS was developed;
- the works on preliminary selection of an uninterruptible power supply providing continuous power was carried out;
- the 3D digital model of a PHCS with computing blade- module was developed;
- the work paper for PHCS with computing blade- module was developed;
- the general and outline drawings was developed on the base of 3D model of PHCS;
- the compact placement of components of the system using the server case was studied;

### 2 CONCLUSION

Performed work allowed to develop the detailed design of architecture of the PHCS prototype with computing blade-module based on GPU. This made it possible to achieve the maximum accuracy for creation and placement of elements of a PHCS prototype. Digital prototype of PHCS allowed to visualize the architecture of PHCS and architecture of its main units. On the base of work paper it was developed the prototype of PHCS with computing blade-module fully satisfying the requirements of specification.

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## ELECTRONIC DIGITAL SIGNATURE FOR MOBILE DEVICES

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### ABSTRACT

The development of electronic signature in mobile devices is an essential issue for the advance and expansion of the mobile electronic commerce since it provides security and trust in the system. E-signatures provide security for the transactions with authenticity and integrity characteristics that make non-repudiation of the transactions possible.

In recent years, different technologies and infrastructures have been developed with the aim of implementing mobile signature processes. Some are based on the SIM card. Others work over the middleware of the mobile device and cryptographic providers. In this case I will try to analyse most of them and choose the most suitable for our electronic government.

Keywords: electronic signature, mobile devices, electronic government, mobile signature, Android, signature services, SIM card, Apple

### 1 GENERAL

The main goal of this study is to analyse given solutions of electronic signature for mobile devices and try to fit it on our model of electronic government.

Nowadays, the use of mobile handsets is widespread. In fact, according to some information provided by operators or organizations such as the ITU, mobile handsets have reached a significant penetration rate in many countries such as Luxemburg (164%), Italy (128%), Hong Kong (117%), Spain (109%), Chile (74%), Argentina (64%), and so on. Kazakhstan is dynamically developing country, so most of available services has been redesigned for electronic service, but only for personal computers. Model of signing document is given on the picture 1.

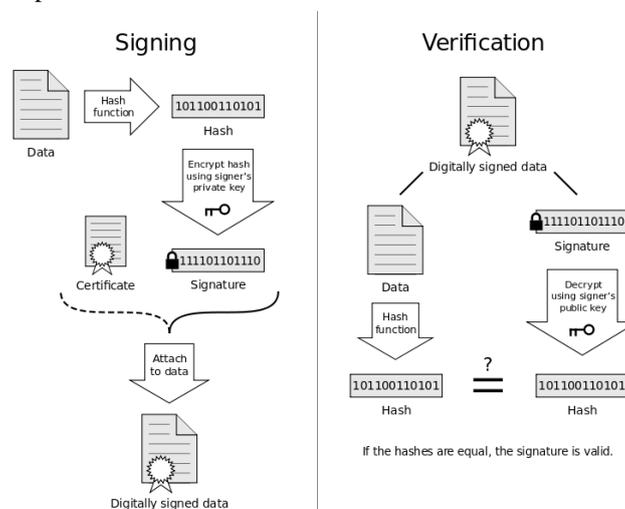


FIGURE 1

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Algorithms used for signing documents in Kazakhstan are RSA and ГОСТ P 34.10-2012. Most popular mobile operation systems are Android and iOS.

## **2 CONCLUSION**

Electronic signature is essential to provide non-repudiation services, which make secure e-government possible. At the moment, the use of e-signature in e-commerce solutions is a mature and broadly extended technology. However, when we move this e-government to the mobile world, the m-government, we discover that the provision of this technology is not mature enough, despite the fact that this technology does not only suppose important benefits for the users and application providers, but also, it could represent important revenues to operation system of mobile devices.

As I discovered adopting system of ES to Android is more realistic than iOS. Even so, there is one solution for iOS given by viafirma.

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## ON PROPERTIES OF COUNTABLY CATEGORICAL WEAKLY CIRCULARLY MINIMAL STRUCTURES

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### ABSTRACT

In recent years, there have been several approaches to generalizing the notion of o-minimality. Typically, for a structure, one imposes strong restrictions on the 1-variable definable sets. An o-minimal structure  $M$  can be viewed as an  $L$ -structure where  $L \supset L_0 = \{<\}$ ,  $<$  is a total order on  $M$ , and every definable subset of  $M$  is quantifier-free  $L_0$ -definable. This provides a template for other notions: replace  $L_0$  by some other familiar language, consider  $L$ -structures such that the  $L_0$ -reduct is of stipulated type (e.g. a total order), and require that every definable subset of  $M$  is (quantifier-free)  $L_0$ -definable.

Here we study circularly ordered structures with weak circular minimality that is also a generalization of o-minimality.

Keywords: weak circular minimality, circularly ordered structure, countable categoricity

### 1 GENERAL

The notion of circular minimality originally studied by D. Macpherson and C. Steinhorn in [1]. Here we continue studying the notion of weak circular minimality (a generalization of circular minimality) originally studied by D. Macpherson and me in [2]. A circular order relation is described by a ternary relation  $K$  satisfying the following conditions:

- (co1)  $\forall x \forall y \forall z (K(x, y, z) \rightarrow K(y, z, x))$ ;
- (co2)  $\forall x \forall y \forall z (K(x, y, z) \wedge K(y, x, z) \leftrightarrow x = y \vee y = z \vee z = x)$ ;
- (co3)  $\forall x \forall y \forall z (K(x, y, z) \rightarrow \forall t [K(x, y, t) \vee K(t, y, z)])$ ;
- (co4)  $\forall x \forall y \forall z (K(x, y, z) \vee K(y, x, z))$ .

A set  $A$  of a circularly ordered structure  $M$  is said to be convex if for any  $a, b \in A$  the following holds: for any  $c \in M$  with  $K(a, c, b)$  we have  $c \in A$  or for any  $c \in M$  with  $K(b, c, a)$  we have  $c \in A$ . A circularly ordered structure  $M = \langle M, K, \dots \rangle$  is weakly circularly minimal if any definable (with parameters) subset of  $M$  is a finite union of convex sets. Any weakly o-minimal structure is weakly circularly minimal, but the inverse is not true in general. Some of interesting examples of weakly circularly minimal structures that are not weakly o-minimal were studied in [2]-[4].

In [2]-[4] countably categorical weakly circularly minimal structures being 1-transitive have been studied. Here we study countably categorical non-1-transitive weakly circularly minimal structures.

Let  $M$  be a circularly ordered structure. We say that  $p$  is  $n$ -convex, where  $p \in S_1(\emptyset)$ , if for every elementary extension  $N$  of a structure  $M$   $p(N)$  is a disjoint union of  $n$  maximal convex sets (which are called convex components of the set  $p(N)$ ). We say that  $p$  is convex if  $p$  is 1-convex. Otherwise, we say that  $p$  is non-convex. We say that  $M$  is  $n$ -convex if every type  $p \in S_1(\emptyset)$  is  $n$ -convex, and we say that  $\text{Th}(M)$  is  $n$ -convex if this holds for all  $N \equiv M$ .

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Let  $\phi(x)$  be an  $\mathcal{L}$ -definable formula. We say that  $\phi(x)$  is convex if  $\phi(M)$  is convex. We say that a non-convex formula  $\phi(x)$  is  $n$ -convex (where  $n \geq 2$ ), if  $n$  is the least number such that  $\phi(M)$  is a disjoint union of  $n$  convex subsets of  $M$ .

**Theorem 1.** [2] Let  $M$  be a weakly circularly minimal structure. Then there is  $n < \omega$  such that  $M$  is  $n$ -convex.

As corollary we obtain in particular that if  $M$  is a weakly circularly minimal structure and  $p \in S_1(\mathcal{O})$  then  $p(M)$  is a finite union of convex sets.

The following theorem completely describes countably categorical weakly circularly minimal 2-convex theories of convexity rank 1:

**Theorem 2.** Let  $T$  be a countably categorical weakly circularly minimal 2-convex theory of convexity rank 1,  $M \models T, |M| = \aleph_0$ . Then the following holds:

1)  $C := \text{acl}(\mathcal{O})$  is finite. For this if  $C \neq \mathcal{O}$  then there is an even number  $k$  such that

$C = \{c_0, c_1, \dots, c_{k-1}\}$ ,  $K_0(c_0, c_1, \dots, c_{k-1})$  and for each  $0 \leq j \leq \frac{k}{2} - 1$  elements  $c_j$  and  $c_{j+k/2}$  satisfy the same type over  $\mathcal{O}$ , for each  $1 \leq j \leq k$  either  $M \models \neg \exists x K_0(c_{j-1}, x, c_j)$  or  $I_j = \{x \in M : M \models K_0(c_{j-1}, x, c_j)\}$  is a dense convex set without endpoints;

2) There exists  $m \geq 1$  non-algebraic 1-types over  $\mathcal{O}$   $p_1, p_2, \dots, p_m$  so that  $p_i(M) = U_{p_i}^1 \cup U_{p_i}^2$ , where each  $U_{p_i}^j$  is convex, i.e.  $p_i(M)$  consists of two convex components for every  $i \leq m$ ;

3) There are equivalence relations  $E_1, E_2 \subseteq (\{s : 1 \leq s \leq 2m\})^2$ , where  $\{U_s \mid s \leq 2m\}$  is an arbitrary enumeration of convex components of non-algebraic 1-types over  $\mathcal{O}$  with  $K_0(U_1, U_2, \dots, U_s)$  such that:

- for each  $(i, j) \in E_1$  there exists a unique  $\mathcal{O}$ -definable monotonic bijection  $f_{i,j} : U_i \rightarrow U_j$  so that  $f_{i,i} = \text{id}_{U_i}$  and  $f_{j,k} \circ f_{i,j} = f_{i,k}$  for all  $(i, j), (j, k) \in E_1$
- for each  $(i, j) \in E_2$  there exists a unique  $\mathcal{O}$ -definable formula  $R_{i,j}(x, y)$  such that for any  $a \in U_i$   $R_{i,j}(a, M) \subset U_j$ ,  $\text{lend } R_{i,j}(a, M) = \text{lend } U_j$ ,  $R_{i,j}(a, M)$  is convex and open, and  $g_{i,j}(x) := \text{rend } R_{i,j}(x, M)$  is strictly monotonic on  $U_i$
- for each  $(i, j) \in E_1$  we have  $(i, j) \in E_2$  and  $R_{i,j}(x, y) \equiv U_{p_i}(x) \wedge U_{p_j}(y) \wedge K_0(x, y, f_{i,j}(x))$  so that  $T$  admits quantifier elimination to the language  $\{=, K^3\} \cup \{c_i : i \leq k-1\} \cup \{U_{p_j}(x) : j \leq m\} \cup \{f_{i,j} : (i, j) \in E_1\} \cup \{R_{i,j}(x, y) : (i, j) \in E_2 \setminus E_1\}$ , where  $U_{p_j}(x)$  isolates the type  $p_j$  for every  $j \leq m$ .

Moreover, any circular ordering with distinguished elements as in (1) and any suitable equivalence relations  $E_1, E_2$  as in (3) is corresponded a countably categorical weakly circularly minimal 2-convex theory of convexity rank 1 as above.

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# TRANSLATION THEOREM FOR DATABASE QUERIES OVER A PARTIALLY ORDERED DOMAIN

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## ABSTRACT

In relational model of databases, the state of a database is understood as a finite set of relations between elements. Names of relations and its arities are fixed and refer to as the scheme of a database. The separate information stored in the relations of the given scheme, refers to as a state of a database. Though relational databases have been thought up for finite data sets, it is frequently convenient to assume that there is an infinite domain – for example, the integer or rational numbers – so elements of the data get out of this domain.

The signature of a relational structure  $L$  is non-empty set with the mapping assigning to each relational symbol in  $L$  the relation of the same arity over this set. Let  $M$  be an infinite structure of signature  $L$ . Here we consider partially ordered structures. This means that  $L$  includes a binary relational symbol  $<$  of which the interpretation in  $M$  satisfies to axioms of the partial order. We fix the scheme of database  $SC$  and enter the following notations:

$$L_0 = \{<\}, L' = L_0 \cup SC, L'' = L \cup SC.$$

A query of a database can be formally determined as a mapping, which is accepted by the state of a database and it makes a new relation of fixed arity over  $M$ . We consider two languages for querying. Queries of the first language are formulas of signature  $L'$  – we name them by limited. Queries of the second language are formulas of signature  $L''$  – we name them by expanded.

Here we prove the translation theorem for database queries over a partially ordered domain.

Keywords: database query, partially ordered domain, weak o-minimality

## 1 GENERAL

The notion of o-minimality have been appeared more than twenty years ago [1] and proved its usefulness and importance. Since that time many generalizations were appeared, name only some of them: weak o-minimality [2], [3], circular minimality [4], weak circular minimality [5], o-stability [6], [7]. It is naturally to try generalizing the notion of o-minimality on partially ordered structures that was originally done in [8]. A structure of the form  $\langle M, =, <, \dots \rangle$ , where  $\langle M, < \rangle$  is a partially ordered set, is called a partially ordered structure. In every partially ordered structure that is not linearly ordered the relation of non-comparability of elements  $\diamond$  is appeared, i.e.  $x \diamond y := \neg(x = y) \wedge \neg(x < y) \wedge \neg(x > y)$ .

Any family of pairwise incomparable elements of a partially ordered structure is called an antichain. We say that a partially ordered structure has the width  $\leq \lambda$  if any its antichain contains no more than  $\lambda$  elements. A set  $A \subseteq M$  is convex if for all  $a, b \in A$  and  $c \in M$  whenever  $a < c < b$  we have  $c \in A$ . In particular, points and intervals are convex sets. Obviously, antichains are also convex sets.

Our lecture concerns the notion of weak partial quasi-o-minimality originally studied by K.Zh. Kudaibergenov in [8]. A weakly p.q.o.-minimal structure is a partially ordered structure  $M = \langle M, =, <, \dots \rangle$  such that any definable (with parameters) subset of  $M$  is a finite union of convex sets and  $\emptyset$ -definable sets in  $M$ . A theory  $T$  is weakly p.q.o.-minimal if every its model is weakly p.q.o.-minimal. Here we present a criterion for connectedness of the set of realizations of every complete 1-type over  $M$  where  $M$

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is a partially ordered structure of finite width. As corollary we receive reducibility of expanded queries to limited ones over a weakly p.q.o.-minimal domain having finite width.

We say that k-ary query  $\Theta$  is locally generic over finite states if  $\bar{a} \in \Theta$  if and only if  $\varphi(\bar{a}) \in \Theta(\varphi(s))$  for any partial  $\prec$ -isomorphism  $\varphi: X \rightarrow M$ , where  $X \subseteq M$ , for any finite states over  $X$  and for any k-tuple  $\bar{a}$  in  $X$ .

We say that a complete theory  $T$  has the Isolation Property if there is a cardinal  $\lambda$  such that for any pseudo-finite set  $A$  and for any element  $\bar{a}$  of a model of the theory  $T$  there exists  $A_0 \subseteq A$  such that  $|A_0| < \lambda$  and  $\text{tp}(\bar{a} / A_0)$  isolates  $\text{tp}(\bar{a} / A)$ .

A set  $A \subseteq M$ , where  $M$  is a partially ordered structure, is called connected if  $A$  is convex and for all  $a, b \in A$   $\neg(a \diamond b)$ .

**Theorem 1.** Let  $M$  be a partially ordered structure of finite width. Then  $M$  is weakly p.q.o.-minimal iff the set of realizations of every complete 1-type over  $M$  is connected in any elementary extension of  $M$ .

**Theorem 2.** [9] Suppose that the complete theory of a structure  $M$  has the Isolation Property. Then any expanded query being locally generic over finite states is equivalent to a limited query.

**Theorem 3.** Let  $T$  be a weakly p.q.o.-minimal theory of finite width. Then  $T$  has the Isolation Property.

The following corollary is the translation theorem for queries over a partial ordered domain:

**Corollary 4.** Let  $T$  be a weakly p.q.o.-minimal theory of finite width. Then any expanded query being locally generic over finite states is equivalent to a limited query.

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## THE QUESTIONS OF CREATING RADIO MONITORING SYSTEMS WITH USING LOW-EARTH ORBIT SATELLITES

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### ABSTRACT

In this paper the system of radio monitoring is considered on low-orbit apparatus (satellite) basis which is aimed to control parameters and determining the location of ground radio electronic device. The issues of choosing the method of direction-finding and antenna equipment of radio monitoring system on satellite are examined in this study.

Keywords: radio monitoring, low-earth orbit (LEO), radio-electronic device (RED), direction-finding (DF), difference-rangefinder method, adaptive antenna arrays (AAA)

### 1 GENERAL

Nowadays ground radio monitoring stations are commonly used to monitor radio electronic device (transmitters). However, for countries with large area it is beneficial to use low-orbit satellite to control parameters and determining location of transmitters [1].

It is needed to resolve the issues of choosing radio control equipment and methods of direction-finding of ground RED for implementation of satellite radio monitoring systems.

The commonly used methods of direction-finding such as amplitude, difference-rangefinder, Doppler were considered in this work, so each of them gives a possibility to solve problem to determining coordinates of radio emission sources (RES). According to comparison, these methods it is suggested to apply the difference-rangefinder method because there is no need of a big number of airborne equipment and multichannel receivers for its implementation [2].

The chosen method of radio direction finding is offered to be converted as this method requires simultaneous registration of signals from three different satellites, which is not acceptable for case of only one satellite. Therefore, it is recommended to use algorithm of radio direction finding which makes direction-finding consistent over time of RED from different satellite position points.

To improve the accuracy of parameters control and DF of RED it is suggested to apply antenna complexes, which are based on AAA. The main feature of this antenna system is that AAA can form radiation pattern of different forms, and it could change directions of main lobe without any change in position of antenna. Radiation pattern of different form and width of beam is used for various modes of measuring parameters and DF of RED. The beam inside of sector is directed to needed side with the help of processor while smooth scanning gives significant advantage for accurate guidance on RES [3].

### 2 CONCLUSION

In order to solve the problem of radio monitoring system implementation it is suggested to use difference-rangefinder method, which is found to be effective for the application of LEO satellites.

To determine the location of REDs via a satellite it is proposed to convert the DF method as direction finding has performed sequentially at different points in time.

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AAA application allows working effectively at low signal / noise ratio (SNR), which in turn increases the immunity of system, while the formation of highly directional beams increases the accuracy of direction finding of RES.

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## RECOGNITION AND IDENTIFICATION OF HUMAN FOR SECURITY SYSTEMS

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### ABSTRACT

Face recognition is a widely spread technology of information search systems with the purpose of identification of human. The technology of identification, along with technology voice recognition, is best suited for intelligent environments of the new generation. Subsystem of identification with use of technology of facial recognition can be used in automated security systems. The objective of this study is to develop real-time face recognition system and investigate the issues and problems involved in getting such a systems working in real-world environments.

Keywords: face recognition, human identification, face tracking, face detection, facial recognition system, automated security system

### 1 GENERAL

The main goal of this study is the development of methods of recognition and building of information retrieval systems that provide automatic identification of a person in real-time image of his face.

Recognition technology allows you to scan a human face in the real-time mode. The camcorder connects to the terminal and the system determines whether a face matches with photos from the database. The facial recognition system is based on a special algorithm of digitizing images, allowing you to choose photos of the face of the person and digitize it, leaving a large number of parameters (so-called basic point - cheekbones, colour and shape of the eyes, the width of the nose, lips, etc.). Each person describes a unique set of parameters. This ensures high reliability of recognition regardless of rotation of the head, the presence of cosmetics or accessories. In general, for reliable identification of the person it is enough for the system to analyse just a few dozen basic points. Photography and digital description of the human face entered in the database, which subsequently compares for future recognition.

The developed algorithms and techniques can be used effectively in automated systems of forensic photo portrait expertise, as well as automatic checkpoints devices. They can also be applied to systems of information security. Furthermore, the proposed algorithms can be used to detect and identify the various graphical objects on digital images, for example detection of certain objects in photographs from satellites, identification and indexing of video and photographic materials in multimedia databases.

### 2 CONCLUSION

The process of image recognition is a complex and multistage procedure. Many stages due to the fact that different tasks processing in fact closely linked and quality of solution of one of them influences the choice of the method for solving the others. Therefore, the choice of method of recognition depends on the specific circumstances of any input image, including the nature of the background, other images, jamming environment. So in this research, studied the problem of constructing of information retrieval system for recognition of a human from the picture. Investigated the functional model of the system, organization, storage and search of information in specialized relational DBMS. Defined minimum data that must be stored. Developed scheme of information storage, considered in detail the functionality of each of relational tables store.

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## ON PREPROCESSING DATA IN PATTERN RECOGNITION

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### ABSTRACT

This paper deals with the problem of preparation of data for pattern recognition. The problem of binarization of the image, as the first step in preparing an image for recognition is considered in detail. The comparative analysis of methods binarization of global and local threshold processing of images is explored and the optimal for practical realization algorithm of converting of the image is defined. As optimization of method of Bersen with the help of adaptive threshold, processing the image will be considered, allowing considerably to increase speed of work of the given algorithm.

Keywords: pattern recognition, binarization, pixel

### 1 GENERAL

Recently it is observed that the source signal generated by an input device for the recognition system carries a lot of "extra" information that hides the biometric characteristics of a person. In order to get rid of unnecessary information in the signal, it can be implemented a step of pre-processing the data called binarization.

Binary image in terms of subsets of pixels ("masks") is often used in digital image processing. To study the shape and structure of certain sets of similar objects we can use binary bitmaps in mathematical morphology. Significant practical application of binary raster images is found in digital cartography, geographic information systems and spatial analysis.

Binarization of image is based on the comparison of the brightness of each pixel  $B(x, y)$  with a threshold brightness value  $B_T(x, y)$ ; if the brightness value of the pixel luminance values greater than the threshold values, then the corresponding binary image pixel is denoted as "white" and otherwise as "black",.

In binarization step we need to convert an object to binary data matrix. For example:

```
00000000000000000000000000000000
00011000000000000000000000000000
00011000000000000000000000000000
00011000000000000000000000000000
00011000000110000000000000000000
00011111111110000000000000000000
00000000000000000000000000000000
```

As a method to solve the problem we use the method of Burns. This method is based on the idea of comparing the brightness level of the converted pixel values of local averages, calculated in its environment. Image pixels are processed serially by comparing their intensities with the mean values of brightness in the windows centered at  $P_i$  ( $i= 0, 1, \dots, 7$ ).

To calculate the integral image, it is necessary to store each of the image areas by  $I(x, y)$  - the sum of all the values of  $f(x, y)$  for pixels located above and left of the pixel  $(x, y)$ . For each pixel:

$$I(x, y) = f(x, y) + I(x - 1, y) + I(x, y - 1) - I(x - 1, y - 1), \quad (1)$$

where  $I(x, y)$  - the sum of all the values of  $f(x, y)$  pixels;

$f(x, y)$  – current pixel.

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In the presence of computed integral image, the sum function  $f(x, y)$  for any rectangle with upper-left corner pixel  $(x_1, y_1)$  and lower right corner in the pixel  $(x_2, y_2)$  can be calculated in a short time using the following expression:

$$\sum_{x=x_1}^{x_2} \sum_{y=y_1}^{y_2} f(x, y) = I(x_2, y_2) - I(x_2, y_1 - 1) - I(x_1 - 1, y_2) + I(x_1 - 1, y_1 - 1). \quad (2)$$

This thresholding technique is a simple extension of Burns' method. The main idea of the method is to compare each pixel of the image with the arithmetic mean of its surrounding pixels. If the value of the current pixel less than average one for  $t$  percent, then the pixel in the corresponding binary image is set as black, otherwise as white.

## 2 CONCLUSION

The problem of Burns' method is that it depends on the order of passage pixels. In addition, the average move is not too good approximation of the surrounding pixels at each step, because the neighbouring pixels are unevenly distributed across the board. This method allows to decrease the algorithm time.

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# QUANTUM OPERATOR'S EIGENVALUE STATISTICS IN NEUTRON MONITOR DATA ANALYSIS

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## ABSTRACT

In this work, we interpret time series data in terms of objects specific to quantum computations, namely unitary transformation matrices and their eigenvalues. We analyse a case of relating two n-qubit long quantum states, constructed from a single original time series, to each other by a direct analytical computation of a single rotation in infinite-dimensional Hilbert space. Kernel smoothing is applied to estimate the density functions of the eigenvalues of the transformation matrices and of the spacing between the ordered eigenvalues.

Keywords: quantum algorithm, quantum computers, unitary transformation, rotation matrix, neutron monitor

## 1 GENERAL

There has been considerable interest in studying the Hamiltonians associated with the quantum state evolution while implementing the work of a quantum computer. We have tested the basic algorithm for the construction of the hermitian quantum operator changing the orientation of the quantum state vector in Hilbert space. Eigenvalues' spectrum of these rotation operators was compared to the original data statistics [1].

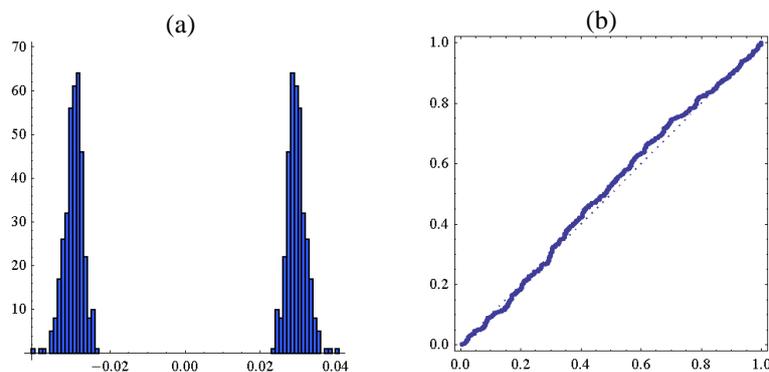


FIGURE 1 (A) EIGENVALUES ARGUMENTS DISTRIBUTION. (B) CORRESPONDING CUMULATIVE DISTRIBUTION FUNCTION PLOTTED AGAINST THE NORMAL DISTRIBUTION (STRAIGHT LINE). ONLY THE POSITIVE VALUES ARE USED FOR CDF PLOT.

## 2 CONCLUSION

It is claimed to be a useful approach for examining the variations of the eigenvalues and reflecting the properties of the original data. The proposed approach is used on the data collected over 9 months period from a single registration channel of the 18NM64 neutron monitor hosted at Tian-Shian high elevation research station, 3340 m above the sea level in Kazakhstan mountains.

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# COMPUTER SIMULATION OF PLASMA PARAMETERS OF GLOW DISCHARGE IN THE MIXTURE OF AR-H<sub>2</sub>/ HE-H<sub>2</sub> GASES

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## ABSTRACT

The software package allowing investigates kinetic and transport properties of plasma in the mixture of gases are developed. Axial and radial distribution of plasma parameters in a stratified glow discharge are calculated by solving of the Boltzmann equation for the electron energy distribution function (EEDF), not stationary continuity equation for ions, as well as the Poisson equation for the electric field. Two-dimensional axial and radial distributions of plasma parameters in the positive column of discharge tube in the mixture of gases are obtained.

Keywords: electron energy distribution function (EEDF), dusty plasma, glow discharge

## 1 GENERAL

The main goal of this work is study of the effect of gas mixtures on stratification and on plasma parameters based on the simultaneous solving of the Boltzmann equation for the EEDF and the motion equations of the ions in the drift-diffusion approximation and the Poisson equation for the electric field distribution [1]. On the basis of the described model, developed the software, which includes two packages: “Axial distributions of dusty plasma parameters” and “Radial distributions of dusty plasma parameters”. The package gives the possibility to set the parameters and to monitor the process of calculations. The results are displayed in the course of calculations, both in the form of graphs and tables and this allows the user to interrupt the program in case of any deviations.

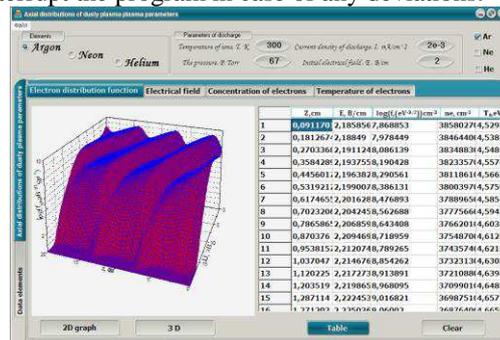


FIGURE 1 THREE-DIMENSIONAL GRAPH OF DISTRIBUTION FUNCTIONS OF ELECTRONS

## 2 CONCLUSION

The software package allowing investigates the axial and radial distributions of dusty plasma parameters in the mixture of gases using self-consistent kinetic model are developed. Kinetic and transport properties of dusty plasma are obtained. The proposed software packages can be used by engineers during construction and testing special experimental setups where the dusty plasma and some ordered structures are formed.

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## USING OPEN GL GRAPHICS LIBRARY FOR VISUALIZATION OF THE MOVEMENT OF DUST PARTICLES

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### ABSTRACT

Visualization is an essential part of the process of numerical modelling, providing analysis and correct interpretation of the results of calculations, as well as further work with the computational model [1]. We have developed the program software “3D visualization of particle motion dusty plasmas” using object-oriented programming environment Delphi7 and graphics library OpenGL.

Keywords: dusty plasma, langevin dynamics, crystalline state, information system, OpenGL, 3D and 2D visualization

### 1 GENERAL

The information systems includes the program software allowing visually track the movement of the particles and ordered structures in dusty plasma on the basis of langevin dynamics methods.

Various structures that correspond to crystalline, liquid or gaseous state can be formed in dusty plasma. The phase state of a system can be described by structure characteristics such as the radial distribution function of particles. The program package includes system, instrumental and applied software. The package gives the possibility to set the parameters and to monitor the process of calculations. The results are displayed in the course of calculations, both in the form of graphs and tables and this allows the user to interrupt the program in case of any deviations.

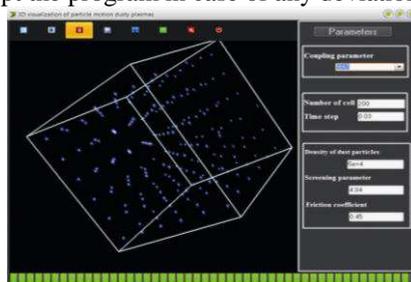


FIGURE 1 3D VISUAL OBSERVATION OF PARTICLES MOVEMENT IN A STATIONARY STATE

### 2 CONCLUSION

The computer simulation data of the radial distribution functions are in good agreement with the corresponding experimental setups. The created software is a convenient and reliable means for the investigation of dusty plasma properties. The proposed software packages can be used by engineers during construction and testing special experimental setups where the dusty plasma and some ordered structures are formed.

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## SOFTWARE PACKAGE SIMULATIONS OF TWO-COMPONENT PLASMA PROPERTIES

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### ABSTRACT

In this work, we present a software package based on modern information technologies that allows rapid analysis and visualization of the properties of two-component plasmas. We have applied the molecular dynamics simulation method, which numerically solves the equations of motions for plasma particles.

Keywords: two-component plasma, molecular dynamics, simulation, visualization

### 1 GENERAL

Now the study of the plasma properties is not only of fundamental interest, but it also has various important technological applications [1]. It is known that as a result of computer simulation we obtain many complicated graphical dependencies. In this connection, the role of visualization methods for analysis of processes in complex plasma is important.

In this work, the program application includes the program software allowing the investigation of two-component plasma on the basis of computer molecular dynamics methods and visually tracks the movement of the particles. The maximum amount of particles that can be handled by the interface can reach thousands. On the basis of the Beeman's algorithms described software in Delphi 7 was developed. For the visual observation of particles movement a graphic interface OPENGL was developed. The view of the control card of MD simulation and visualization of particles movement of the two-component plasma is shown in Fig. 1.

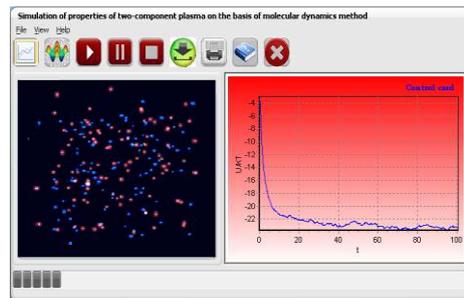


FIGURE 1 PROGRAM OF VISUAL OBSERVATION OF PARTICLES MOVEMENT

### 2 CONCLUSION

We have developed the program software allowing the investigation of two-component plasma properties and visually track the movement of the particles. Such important processes as a crystallization, phase transition and formation of ordered structures are observed by proposed software.

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# CREATION OF VIRTUAL LABORATORY TO STUDY THE PHYSICAL PROCESSES WHICH CAN CHANGE THE PROPERTIES OF MATERIALS DURING PLASMA PROCESSING

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## ABSTRACT

Creation of a virtual laboratory lets us to investigate the spraying of materials and physical processes, which can change properties of materials in plasma processing [1].

Keywords: plasma, laboratory, spraying of materials, virtual laboratories, during, materials

## 1 GENERAL

Study of the strength of steel at high temperature plasma impact is one of the nowadays topical issues. Use of plasma technology to change the operational characteristics of materials plays an important role in solving applied problems of modern material science. HTML hypertext program was used during the creation of the virtual laboratory. This laboratory consists of a title page and the main part in the title page where is shown the topics of experimental research. The main part includes additional videos, materials and virtual laboratory work. In laboratory it is possible to carry on experiments on materials processing using plasma solution and spraying of materials by plasma exposure.

## 2 CONCLUSION

This virtual laboratory is useful about the fact that you can get accurate results for the given parameters. Another advantage of virtual work is to help the students to improve working and memorial ability, because of animation to explain the work plan. The goals, visualize duration of work and the final results are also shown graphically.

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# LEGAL FOUNDATIONS OF THE KAZAKHSTAN MEDIA IN THE INTERNET SPACE

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## ABSTRACT

Regulation of the Internet space- is the problem, which has place in every state. Development of online media in Kazakhstan goes at a rapid pace. Number of Internet users in Kazakhstan at the present stage exceeded 9.4 million people.

Keywords: online media, user

## 1 GENERAL

Monitoring agencies regularly conduct studies of the Internet audience in Kazakhstan. The number of individual Internet users in Kazakhstan is growing every year. According to the JSC "Kazcontent" in 2007 Internet audience was 12.3% of the population of Kazakhstan and 26.4 % of the urban population by the end of 2010, these figures were 25.7% and 44.1 %, respectively.

Hence there is steady and stable growth media with a web presence, blogs, portals, individual and corporate websites.

Since 2001, Kazakhstan's legislation contains a provision that the websites may be deemed as the media, but the recent amendments to the Law "On Mass Media" in 2009 equated all online resources to the media. In accordance with its wording, information posted on the Internet has become a resource media product, and the process of posting information on the Internet resources has been recognized by the proliferation of media products.

## 2 CONCLUSION

Persons supporting the functioning of the media on the Internet are required to comply with the requirements of the media legislation. Primary responsibility for the content of sites rests with the owners of sites.

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## THE ELECTRONIC MANUAL DEVELOPMENT IN 'PLASMA TECHNOLOGY OF TREATMENT SURFACE' COURSE

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### ABSTRACT

The aim of the work is to develop an electronic textbook on 'plasma technology of surface treatment' course. The programming language HTML was used at the creating of a tutorial.

Keywords: electronic textbooks, plasma, plasma technology, surface, treatment

### 1 GENERAL

Electronic textbooks begin to occupy an increasingly prominent place in our lives. Today there is an active process of creation of electronic textbooks in the form of hypertext and their introduction in the educational process. Using electronic textbook provides the students with detailed information on the subject under study, increases its educational potential and provides the possibility of obtaining continuous quality education.

Now the plasma technology is widely used for purification and modification of surfaces: only changing the surface properties, they do not affect the structure of the material. Plasma processing generally increases the surface free energy of the material, which leads to improve the wettability and the adhesion of the surface.

The plasma on the surface has several effects. Firstly, as a result of the ion bombardment of the surface of the top layer is removed. Secondly, the ionized gas reacts with the surface of the material. In the third, the liberated plasma particles emit ultraviolet radiation, which breaks the molecular chains of carbon compounds. Thanks to these effects, the plasma can be used for the following purposes:

- Clean surfaces;
- Activation of surfaces;
- Etched surfaces;
- The coating on the surface [1].

### 2 CONCLUSION

Nowadays, the creation of electronic textbooks to study plasma technology of surface treatment is the new training system. Our studies and experience convinces us that the maximum effect of the introduction of new information technologies in the educational process is possible with the use of the electronic textbooks and manuals.

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# SOME ISSUES OF ONTOLOGY DEVELOPMENT FOR EXPERT SYSTEMS IN MEDICINE

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## ABSTRACT

The nowadays statistics shows a frightening picture of an increase in mortality due to cardio - vascular diseases. Therefore, the early identification, detection and prevention of disease development become very crucial task in medicine. The development of expert systems in medicine may give the good foundation for the improvement of medical diagnostics.

In this paper, we consider the issues of representation of medical knowledge and development of algorithms for inference engine. Main task is to form the ontology of the expert system for detection and prevention of cardio - vascular diseases that are based on the different methods of fuzzy mathematics.

Keywords: Expert System (ES), ontology, cardio - vascular disease (CVD)

## 1 GENERAL

Today is very difficult to imagine our life without modern technology. Every day information technologies improve the quality of our life and first of all it has direct impact to our health. More and more frequently by the media, we hear about a new invention or about use of the capabilities of new technologies, which allows fast and painless, without scars, recover health for the most complex diseases. In medicine and health care these technologies relate the mostly to special medical equipment accompanied by software applications and information systems for medical diagnostics.

Expert medical systems are designed to provide rapid and systematic assistance to medical personnel in the scope of problem situations and making decisions for the treatment of patients [3].

Cardio - vascular diseases (CVD) are the leading cause of death worldwide: for no other reason, every year more people die from CVDs than before. According to estimates in 2008-2012, 17.3 million people were died from CVDs that represent 30 % of all deaths in the world. Of this total, 7.3 million people died from coronary heart disease and 6.2 million died due to stroke [4]. Moreover, this is a problem not only for the elderly population, but unfortunately equally for young generation. In light of the above facts, we can see that there is a need to develop expert systems for identification and prevention of CVD.

The expert system is able to determine the presence or absence of symptoms of the disease, define the diagnostics, and give recommendations by presenting different experts opinions and integrating results [8].

Expert medical systems have the characteristics [6] related to the ability to provide solutions and answers in the presence of source data, formulated with varying degrees of assumptions.

Generation of not only diagnosis, recommendations or advice concerning individual cases , but also the possibility of formulating hypotheses about what happened to the object under study .

The main objective is to develop a system of medical diagnosis based on the ontology model, in which the knowledge presented in a form close to the views of experts and allow to determine not only the diagnosis of the patient , but also explain the observed phenomena [7].

Perhaps the most important advantage is the fact, which shows the ontology leading to creation of health systems able to support the integration of knowledge without replacement of data. [1]

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In this paper, we consider the ontology that can cover cardio - vascular disease (CVD), as an object, and several classes as symptoms and diagnosis of treatment methods. Each class has its own parameters and terms (Figure 1).

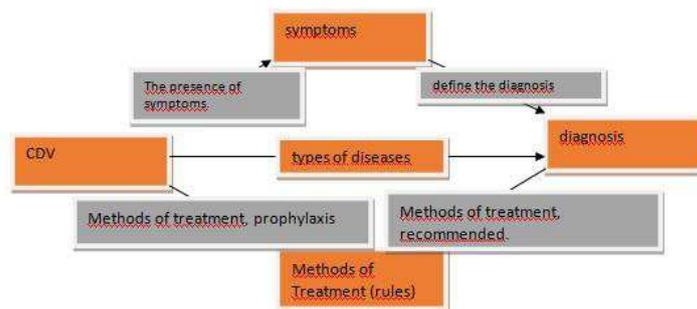


FIGURE 1 ONTOLOGY STRUCTURE

On the figure above we can see some information about the ontology structure such as basic information about Symptoms (for example, shortness of breath on slight exertion or at rest, weakness, low endurance, heartbeat), Diagnosis (for instance, arrhythmia, cardiovascular failure, angina), Treatment (as an example - Complete blood count - specify the number of red blood cells and hemoglobin, as well as other cells for subsequent detection of diseases (leukemia, anemia, etc ECG or electrocardiogram, which is recorded using electrical impulses characteristic of the heart).

In systems based on knowledge rules or heuristics) which solve the problem in a particular domain the knowledge base is stored in database.

Heuristics are rules of inference, which allow us to find solutions to the known facts [5]. In general, knowledge of such a system are divided into three types [9]:

1. Declarative knowledge (facts). This kind of knowledge is the facts about specific situations. Such facts may be described in advance and included in the knowledge base on the stage of creating Expert Systems.
2. Procedural knowledge (rules). Typically, this knowledge is collected by interviewing experts in a particular domain and then they form the core of knowledge base.
3. Control knowledge. In expert systems we should provide a set of strategies to be able to consider alternative opportunities for output in time, and if it fails to move from one strategy to another.

## 2 CONCLUSION

Based on knowledge types and types of the system structure we can build the ontology that may become the core for the medical expert system for identification, detection and prevention of CVD. The generation of recommendations and support for diagnostics is created by using the fuzzy logic rules that are the most appropriate for this type of expert systems because of different features and different diagnosis that are defined by experts. The collecting and integration of results serves as a base for optimal diagnostics and helps to make decision.

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## MANAGE DIFFERENT-STRUCTURED BIG DATA

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### ABSTRACT

This work deals with the basic ideas and approaches of parallel architectures of operational differently-structured data. Map-reduce are submitted like implementations of more general ideas. Cloud computing perfectly complements the abstraction of MapReduce, allowing to ignore the differences where operations are carried out on specific numbers. The combination of cloud computing and MapReduce is ideally suited for handling large amounts of data.

Keywords: big data, map-reduce, cloud computing

### 1 GENERAL

During the study we found that the function mapper actually selects IP-address of each string and returns it to the value 1. This phase extraction pair (key, value), what is happening in each process. As receipt of the results are collected in chain editerable to prepare for the contraction phase (reduction). This process is called decomposition (partitioning) of data.

- In the next step MapReduce all results are reduced and summarized. In our example, this function reduction is carrying out phase reduction.
- As a result, we get a huge list and display the first 25 results.

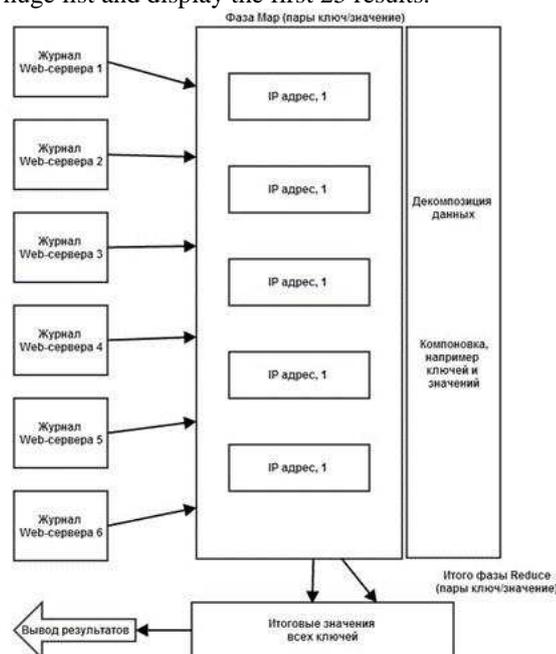


FIGURE 1 THE PROCESSING CIRCUIT

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## 2 CONCLUSION

It may be noted that the concept of cloud computing covers many applications, including simple implementation of a consistent scenario in a virtual machine in the data centre.

In general, realization MapReduce-based cloud computing have drawbacks. The paper shows how useful abstraction MapReduce in a cloud environment. This can be confirmed by the fact that we can take examples from this article and apply them to petabytes of log files; precisely this useful abstraction MapReduce, especially in the cloud.

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## NEAREST- NEIGHBOUR DISTANCE-BASED METHOD FOR PATTERN RECOGNITION VIA EMBEDDING

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### ABSTRACT

In this paper, nearest-neighbour distance-based method for pattern recognition (classification) via embedding is proposed, which allows one to classify, say, radar clutter into one of several major categories, including bird, weather, and target classes. This procedure does not require the arbitrary selection of priors as in the Bayesian classifier. The decision rule of the recognition procedure based on comparison of distances is in the form of associating the p-dimensional vector of observations on the object with one of the k specific classes. The results obtained in this paper agree with the simulation results, which confirm the validity of the theoretical predictions of performance of the presented procedure.

Keywords: pattern, embedding, procedures of recognition (classification)

### 1 INTRODUCTION

Pattern recognition uses continuous variable measurements on different groups of items to highlight aspects that distinguish the groups and to use these measurements to classify new items. Common uses of the method have been in biological classification into species and sub-species, classifying applications for loans, credit cards and insurance into low risk and high risk categories, classifying customers of new products into early adopters, early majority, late majority and laggards, classification of bonds into bond rating categories, research studies involving disputed authorship, college admissions, medical studies involving alcoholics and non-alcoholics, anthropological studies such as classifying skulls of human fossils and methods to identify human fingerprints.

The main goal of this study is to present a new nearest-neighbour distance-based procedure for pattern recognition (classification) via embedding.

### 2 FISHER'S PATTERN RECOGNITION (CLASSIFICATION) INTO TWO CLASSES

When there are two populations (classes), we can use a classification procedure due to Fisher [1]. The principal assumption for Fisher's procedure is that the two populations have the same covariance matrix ( $\Sigma_1 = \Sigma_2$ ). Normality is not required. We obtain a sample from each of the two populations and compute  $\bar{\mathbf{y}}_1, \bar{\mathbf{y}}_2$ , and  $\mathbf{S}_{12}$ . A simple procedure for classification into one of the two classes denoted by  $C_1$  and  $C_2$  can be based on the discriminant function,

$$z = \mathbf{w}'\mathbf{y} = (\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)'\mathbf{S}_{12}^{-1}\mathbf{y}, \quad (1)$$

where  $\mathbf{y}$  is the vector of measurements on a new sampling unit that we wish to classify into one of the two classes (populations),  $\mathbf{w}$  is a direction which is determined from maximization of the ratio of between-class to within-class variances proposed by Fisher,

$$J_F = \frac{[\mathbf{w}'(\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)]^2}{\mathbf{w}'\mathbf{S}_{12}\mathbf{w}}, \quad (2)$$

$\mathbf{S}_{12}$  is the pooled within-class covariance matrix, in its bias-corrected form given by

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$$\mathbf{S}_{12} = [(n_1 - 1)\mathbf{S}_1 + (n_2 - 1)\mathbf{S}_2] / (n_1 + n_2 - 2), \quad (3)$$

$\mathbf{S}_1$  and  $\mathbf{S}_2$  are the unbiased estimates of the covariance matrices of classes  $C_1$  and  $C_2$ , respectively, and there are  $n_i$  observations in class  $C_i$  ( $n_1 + n_2 = n$ ). The solution for  $\mathbf{w}$  that maximizes  $J_F$  can be obtained by differentiating  $J_F$  with respect to  $\mathbf{w}$  and equating to zero.

Then the classification rule becomes: Assign  $\mathbf{y}$  to  $C_1$  if

$$\mathbf{w}'\mathbf{y} = (\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)\mathbf{S}_{12}^{-1}\mathbf{y} > [(\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)'\mathbf{S}_{12}^{-1}(\bar{\mathbf{y}}_1 + \bar{\mathbf{y}}_2)]/2, \quad (4)$$

and assign  $\mathbf{y}$  to  $C_2$  if

$$\mathbf{w}'\mathbf{y} = (\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)\mathbf{S}_{12}^{-1}\mathbf{y} < [(\bar{\mathbf{y}}_1 - \bar{\mathbf{y}}_2)'\mathbf{S}_{12}^{-1}(\bar{\mathbf{y}}_1 + \bar{\mathbf{y}}_2)]/2. \quad (5)$$

Fisher's approach [1] using (4) and (5) is essentially nonparametric because no distributional assumptions were made. However, if the two populations are normal with equal covariance matrices, then this method is (asymptotically) optimal; that is, the probability of misclassification is minimized.

### 3 PATTERN RECOGNITION (CLASSIFICATION) INTO TWO CLASSES VIA EMBEDDING

Classification Based on Modified Euclidean Distance. Let us assume that the two populations have the same covariance matrix ( $\Sigma_1 = \Sigma_2$ ).

If  $\mathbf{y}$  has been embedded in the sample from  $C_1$ , then the modified Euclidean distance between two vectors  $\bar{\mathbf{y}}_{\cdot 1}$  and  $\bar{\mathbf{y}}_{12}$  is given by

$$\tilde{d}_{\cdot 1} = [(\bar{\mathbf{y}}_{\cdot 1} - \bar{\mathbf{y}}_{12})'(\bar{\mathbf{y}}_{\cdot 1} - \bar{\mathbf{y}}_{12})] / |\mathbf{S}_{\cdot 12}|, \quad (6)$$

where

$$\bar{\mathbf{y}}_{12} = \sum_{i=1}^2 n_i \bar{\mathbf{y}}_i / \sum_{i=1}^2 n_i. \quad (7)$$

If  $\mathbf{y}$  has been embedded in the sample from  $C_2$ , then the generalized Euclidean distance between two vectors  $\bar{\mathbf{y}}_2$  and  $\bar{\mathbf{y}}_{12}$  is given by

$$\tilde{d}_2 = [(\bar{\mathbf{y}}_2 - \bar{\mathbf{y}}_{12})'(\bar{\mathbf{y}}_2 - \bar{\mathbf{y}}_{12})] / |\mathbf{S}_{12}|. \quad (8)$$

Thus, the classification rule becomes: Assign  $\mathbf{y}$  to  $C_1$  if

$$\tilde{d}_{\cdot 1} + \tilde{d}_2 > \tilde{d}_1 + \tilde{d}_2, \quad (9)$$

and assign  $\mathbf{y}$  to  $C_2$  if

$$\tilde{d}_1 + \tilde{d}_2 > \tilde{d}_{\cdot 1} + \tilde{d}_2. \quad (10)$$

If ( $\Sigma_1 = \Sigma_2$ ) does not hold, then instead of  $\mathbf{S}_{12}$  we use  $\mathbf{S}_{12}^* = \mathbf{S}_1/n_1 + \mathbf{S}_2/n_2$ .

### 4 NEAREST- NEIGHBOUR DISTANCE-BASED METHOD FOR PATTERN RECOGNITION (CLASSIFICATION) INTO TWO CLASSES VIA EMBEDDING

To classify  $\mathbf{y}$  into one of two classes, the  $k$  points nearest to  $\mathbf{y}$  are examined. If we denote the number of points from  $C_1$  as  $k_1$ , with the remaining  $k_2$  points from  $C_2$ , where  $k = k_1 + k_2$ , then the rule can be expressed as: assign  $\mathbf{y}$  to  $C_1$  if (9) takes place and to  $C_2$  if (10) takes place, where  $\bar{\mathbf{y}}_{\cdot 1} \equiv \bar{\mathbf{y}}_{\cdot 1}(k_1, \mathbf{y})$ ,  $\bar{\mathbf{y}}_2 \equiv \bar{\mathbf{y}}_2(k_2, \mathbf{y})$ , and  $\bar{\mathbf{y}}_{12} \equiv \bar{\mathbf{y}}_{12}(k_1, k_2)$  are based on  $k_1$ ,  $k_2$  points, and  $\mathbf{y}$ .

### 5 CONCLUSION

The above approaches to pattern recognition via embedding represent the new procedures that allow one to take into account the cases, which are not adequate for Fisher's classification rule.

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## LOWER TOLERANCE LIMIT FOR NORMAL DISTRIBUTION

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### ABSTRACT

Statistical tolerance limits have many applications in quality control and in reliability problems and the determination of these limits has been extensively investigated, particularly for the normal distribution. When the characteristic of interest is measured in time, say failure or repair time, distributions other than the normal are generally more appropriate. The gamma and Weibull distributions are frequently applied in studying the properties of lifetime phenomena and there are several publications on the subject of their tolerance interval. Constructing tolerance limits for a normal distribution is one of the most basic problems in statistics. Statistical tolerance limits have been obtained from the frequentist approach, as well as from the Bayesian approach. In this paper, the frequentist approach is considered and equation that does not require specific tables is given to determine a lower tolerance limit for the  $\beta$  quantile of a normal distribution with confidence  $1-\alpha$  for any sample size  $n$ .

Keywords: normal distribution, lower tolerance limit

### 1 INTRODUCTION

One of the common methods of specifying the quality of a manufactured product is to set limits within which a certain percentage of the products produced under commercial conditions may be expected to lie. These limits known as 'tolerance limits' in literature are more appealing to the consumer than specifying the mean and range because they are easier to interpret in problems involving interchangeability of parts, etc. In quality control applications, the practitioner may wish to estimate an extreme (lower) quantile of the distribution from a sample. For example, daily samples are made from a machine's production. If the estimated  $\beta$  quantile of some characteristic is too low, the machine is adjusted. Since overestimating the  $\beta$  quantile defers needed machine adjustment, it is often desirable to be conservative and use a lower tolerance limit,  $L$ , such that the true population  $\beta$  quantile is above  $L$  with probability or confidence  $1-\alpha$ :

$$\Pr\{\Pr\{X \geq L\} \geq 1 - \beta\} = 1 - \alpha. \quad (1)$$

The main goal of this study is to find  $L$ .

### 2 LOWER TOLERANCE LIMIT

Let  $X_1, \dots, X_n$  represent a random sample from a distribution with density  $f_\theta(x)$ . A function of the observations, say  $L=L(X_1, \dots, X_n)$ , is said to be a lower  $1-\alpha$  probability tolerance limit for proportion  $1-\beta$  if

$$\Pr\left\{\int_L^\infty f_\theta(x)dx \geq 1 - \beta\right\} = 1 - \alpha. \quad (2)$$

For the Normal distribution this may be written as

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$$\Pr\left\{\frac{1}{\sigma\sqrt{2\pi}}\int_L^{\infty}\exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)dx \geq 1-\beta\right\} = 1-\alpha, \quad (3)$$

where  $\mu$  and  $\sigma$  are the location and scale parameters, respectively.

If the data come from a normal distribution,  $L$  has the form  $\bar{X} - rS$  where  $\bar{X}$  is the sample mean, and  $S$  is the sample standard deviation. Tables of  $r$  for various values of  $\beta$ ,  $\alpha$ , and  $n$  have been developed. However, when using daily samples, sample sizes may vary and it may be desirable to vary the quantile being estimated or the desired level of confidence. If the process of determining tolerance limits is to be automated, a method of determining  $r$  needs to be found that does not require the use of specific tables and is not restricted in sample size and confidence levels to tabled values.

It is known [1] that

$$\Pr\{\Pr\{X \geq L\} \geq 1-\beta\} = \Pr\{T_{n-1}^*(\sqrt{n}z_\beta) \leq \sqrt{nr}\}, \quad (4)$$

where  $L = \bar{X} - rS$ ,  $z_\beta$  is the  $\beta$  quantile of the standard normal distribution and  $T_{n-1}^*(\sqrt{n}z_\beta)$  is the noncentral Student's  $t$  distribution with  $(n-1)$  degrees of freedom and noncentrality parameter  $\sqrt{n}z_\beta$ . It is known that the noncentral  $t$  distribution may be approximated by the standard normal distribution of the random variable  $Z$  as follows:

$$\Pr\{T_{n-1}^*(\sqrt{n}z_\beta) \leq \sqrt{nr}\} \approx \Pr\left\{Z \leq \left[\sqrt{nr}\left(1 - \frac{1}{4(n-1)}\right) - \sqrt{n}z_\beta\right] / \left[1 + \frac{nr^2}{2(n-1)}\right]^{1/2}\right\} = 1-\alpha \quad (5)$$

or

$$z_\alpha = \left[\sqrt{nr}\left(1 - \frac{1}{4(n-1)}\right) - \sqrt{n}z_\beta\right] / \left[1 + \frac{nr^2}{2(n-1)}\right]^{1/2}. \quad (6)$$

It follows from (6) that

$$r = \frac{z_\beta\left(1 - \frac{1}{4(n-1)}\right) + \left[z_\beta^2\left(1 - \frac{1}{4(n-1)}\right)^2 - \left(\left(1 - \frac{1}{4(n-1)}\right)^2 - \frac{z_\alpha^2}{2(n-1)}\right)\left(z_\beta^2 - \frac{z_\alpha^2}{n}\right)\right]^{1/2}}{\left(1 - \frac{1}{4(n-1)}\right)^2 - \frac{z_\alpha^2}{2(n-1)}}. \quad (7)$$

### 3 CONCLUSION

A simplified approximation for lower tolerance limits, which are useful in life testing and reliability, is derived for a sample of size  $n$ . It should be adequate for most practical purposes.

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## AB INITIO CALCULATIONS OF ELECTRONIC STRUCTURE AND PHONONS IN CUBIC $\text{ScF}_3$

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### ABSTRACT

In the current study, the electronic structure, lattice dynamics, and phonon unharmonicity of  $\text{ScF}_3$  bulk have been simulated within the framework of two first principles approaches: (i) hybrid DFT+HF LCAO and (ii) DFT-GGA (the generalized gradient approximation) using the projector augmented-wave (PAW) formalism.

Keywords: CRYSTAL code, VASP code, quantum chemistry, phonons, scandium fluoride

### 1 MOTIVATION

$\text{ScF}_3$  is a perovskite-type material with a cubic  $\text{ReO}_3$ -type structure (space group  $\text{Pm}\bar{3}\text{m}$ ). It was found recently that  $\text{ScF}_3$  undergoes strong negative thermal expansion (NTE) over a wide range of temperatures from 10 to 1100 K [1], therefore an understanding of its electronic structure and lattice dynamics is of key importance to shed light on the NTE origin.

### 2 COMPUTATIONAL DETAILS

To perform hybrid LCAO calculations, we have used the periodic CRYSTAL09 code [2], which employs the Gaussian-type functions centered on atomic nuclei as the basis set for expansion of the crystalline orbitals. The full-electron basis sets used in this study for F and Sc atoms were taken from CRYSTAL basis set library [2]. Plane wave DFT calculations using the PAW method as implemented in the VASP code [3] have been performed for comparative analysis. We have compared the PW91 and PBE exchange-correlation potentials as well as the large-core effective core potential (LC-ECP) with three  $3d^1 4s^2$  valence electrons and small-core effective core potential (SC-ECP) with eleven  $3s^2 3p^6 3d^1 4s^2$  valence electrons for Sc atom. Fluorine atom for all calculations was described as ECP with  $2s^2 2p^5$  valence shell. Hybrid HF-DFT calculations have been also performed with the weight of the exact HF exchange part equal to 25%. The optimal cut-off energy has been equal to 1000 eV.

### 3 MAIN RESULTS

Both calculated lattice constant and band gap have been found to be in excellent agreement with those observed experimentally. The electronic structure of  $\text{ScF}_3$  (band structure, DOS, Mulliken population analysis) have been calculated as well. This study predicts that Sc-F bond has considerable covalent nature, while F(2p) and Sc(3d) states are hybridized. Sc position in the middle of regular  $\text{ScF}_6$  octahedron has been found to be stable. The Grüneisen parameters have been calculated and phonon modes' unharmonicity have been studied for  $\Gamma$ , X, M, R points of the Brillouin zone. All the modes investigated are harmonic except soft modes for R and M points. Grüneisen parameters of soft modes and coefficients describing mode's unharmonic potentials have been found to be strongly dependent on calculation

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technique used. Simple model that accounts both the static lattice energy and contribution of oscillator (R soft mode) is capable to describe adequately the negative thermal expansion at low temperatures. This suggests that NTE occurs due to R and M mode softness.

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## GRAPHENE APPLICATIONS AND COMMERCIAL STRATEGIES

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### ABSTRACT

When first discovered, graphene was weird. Now with the word weird you could not describe the material, which could win all the records a material could obtain. Graphene is a one-atom-thick sheet of carbon atoms with the hexagon structure and its popularity starts to grow up especially since the 2010.

Keywords: Graphene, graphene market, nanomarket, graphene based devices, nanotechnology investments

### 1 GENERAL: PROPERTIES OF GRAPHENE

The main properties of the graphene are thickness and strengthens what are made graphene the best material in this categories in the world. In addition, it is conductive, transparent and flexible. The inherent strength of the graphene due to the its 0.142 Nm-long carbon bonds, make it the strongest material ever discovered, with a tensile strength of 130 gigapascals, compared to 400 megapascals (325:1) for A36 structural steel, or  $\approx 376$  ( $\approx 346:1$ ) megapascals for Aramid (Kevlar). Other valuable property of the graphene is ability to absorb a rather large 2.3% of white light. This is due to its aforementioned electronic properties. The electrons acting like massless charge carriers with very high mobility.

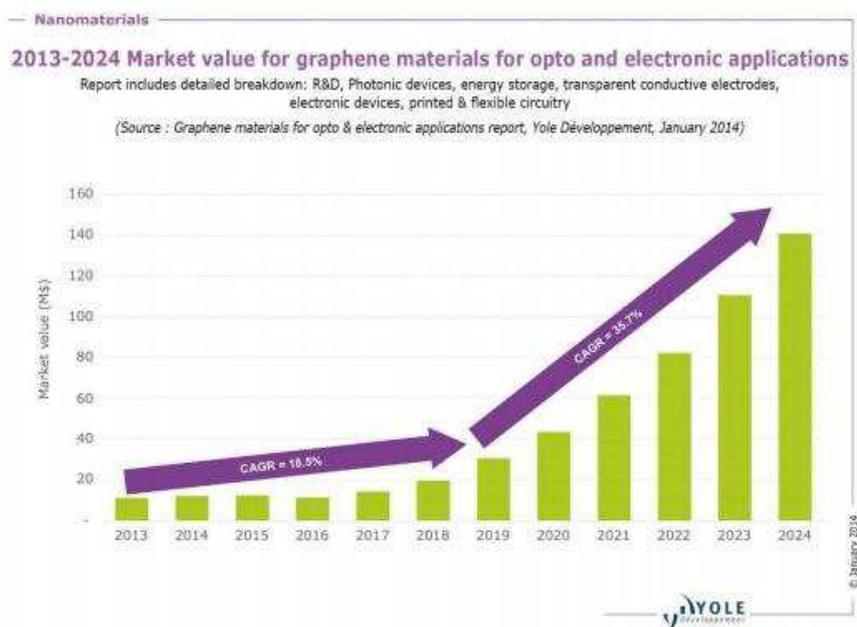


FIGURE 1 MARKET TRENDS OF GRAPHENE MATERIALS FOR OPTO AND ELECTRONIC APPLICATIONS

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## 2 MARKET OF GRAPHENE

Nowadays the value of graphene materials market is approximately \$10 b., for example it is less than a half of the Swiss watch market. But it is more than a normal situation, because to produce graphene-based devices factories and its owners need 5-6 years to implement new technology.

## 3 GRAPHENE BASED DEVICES

Graphene has different variation of applications nowadays. Due to its diverged properties, graphene could be used in various ways like (Figure 2):

- Touchscreens
- Rollable e-paper
- Foldable OLED
- Transistors
- Energy generators
- Photo detectors
- Integrated circuits
- Super capacitors and Li-Ion batteries
- Gas detectors
- Light detectors
- And many others

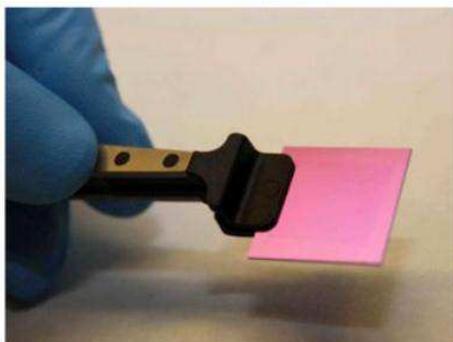


FIGURE 2 CVD GROWN GRAPHENE ON SILICON/SILICON OXIDE SUBSTRATE

According to market evaluation the most appropriate decisions is to invest in carbon resources, know-how and production methods, production lines and knowledge. For the large branch like graphene base devices 5-6 years to the first peak wave start is not too much time. Nanotechnology market gave you an ability to gain profit with various investments. The graphene perspective is undeniable and to obtain the revenue records like graphene overpowers other materials, companies should invest in expanding nanomarket.

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## NANO-SYNERGETIC TECHNOLOGIES AND CONSUMER SOCIETY



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### ABSTRACT

Consciously or unconsciously, the term ‘nanotechnologies’ is firmly entering the life of every consumer-citizen of the global community designating both relatively simple nanomaterials and goods that have already entered the market, and very complex technologies that are supposed to change radically the future of mankind. Applications based on today’s basic research are expected to form the next industrial revolution. The unique properties of nanotechnology applications suggest potential to solve some of the most pressing social and business challenges, but they come with uncertainties and risks as all new technologies.

The general lack of public knowledge about nanoproducts that are already on the market in a full swing is likely to bring irrational and erroneous, potentially harmful, results. Therefore, modern technology requires educated work-force and responsible consumers and hence imperative for educated population. **Nanosynergy** means a systemic co-interaction of modern technologies (information, energetic, electronic etc) which leads to changes of human thinking. Our mission had a focus on introducing changes into the curriculum to eliminate gaps in scientific knowledge of students (as potential consumers, managers and scientists) and to foster an active approach to developing responsible scientific consumption practices and to offer an opportunity for students from a wide range of disciplines to learn about nanoscience and nanotechnology, to explore these questions, and to reflect on the place of new technologies in the spheres of their major and in the global society.

Keywords: Nanotechnologies, responsible scientific consumption, consumer identities, nanoeducation, nanotechnology

### 1 INTRODUCTION

Modern technology requires educated work force and hence imperative for educated population. The needs of new emerging technologies and a beneficial state of society are compatible in this case. There is no monolithic thing called technology. Rather there are various technologies, which converge or compete to fit into what can be called an ecosystem of technological and societal arrangements. Societal and technological arrangements co-evolve. This co-evolution happens most favourably in an educated, intellectual, and affluent society that is tolerant of change and divergent views. By fostering an educated, intellectual society, it creates conditions that foster responsible moral and social behaviour of the individual and contributes to shaping intellectual humankind [1].

### 2 KNOWLEDGE MANAGEMENT AS A MEANS OF SOCIAL CHANGE: WHO NEEDS NANOTECHNOLOGY EDUCATION?

There are three organizational resources of knowledge management (KM) – people, processes and technologies – to use and share information more effectively. Knowledge has become the most valuable resource. Prominent technology leaders, nanotechnology boosters, scientists, policy officials, and environmental organizations have raised important questions about nanotechnology’s potential economic, social, and environmental implications. However, there is very little knowledge in wider European society about what nanotechnologies are and what impact they might have on how we live. Many experts acknowledge that uncertainties prevail about this (Figure 1).

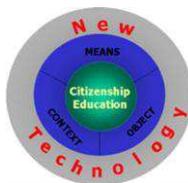


FIGURE 1 NEW TECHNOLOGY AS MEANS, OBJECT, AND CONTEXT OF CONTEMPORARY HIGHER EDUCATION

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The central question on nanotechnology education is ‘Do we need nanoeducation?’ To answer this question, we should first find out who needs nanoeducation? What is the interest in nanoeducation from those who have expressed the need? What kind of education is needed - expertise, skills, level? For what kind of jobs are skills and knowledge of nanotechnology needed?

Nanotechnology has shaken the world and the advanced countries are investing billions of dollars for its R&D and industrial applications.

For example, USA cumulative investments in nanotechnology-related research since 2001 now total over 16.5 billion dollars (environmental, health, and safety research since 2005 now total nearly \$575 million; education and research on ethical, legal, and other societal dimensions of nanotechnology since 2005 total more than \$390 million) (NNI,[2]). Similar amounts are being spent on nanotechnology by Japan, Russia, China and European Union. Nanotechnology has therefore been taken up in these countries as an important national requirement [2].

Nanoeducation challenges all students to broaden their horizons and gives them ways of acquiring knowledge of things that shape intellectual society. It fuels their interest as citizens so that they would be curious about the state of current knowledge, regardless of their major. It prepares them to follow the evolution of knowledge and technologies, to be active responsible citizens today and speak knowingly on questions dealing with quality of life within their local communities and the global society. Not only would the practice of open discussion, problem-solving, decision-making, and statements of personal growth encourage healthy introspection, it would also anchor the scientific and technical disciplines with humanities and social sciences. This is especially important because the exceptional synergy of nanotechnology with other disciplines creates significant social, legal, ethical and political issues that can be effectively resolved and outspoken only by the intellectual citizenry of an intellectual community [3-6]. Finally, a gap analysis can be implemented to provide the best way of strategic assessment and planning (see, It allows comparing two series: 1) where we are now and 2) where we want to be in some time in the future, making it easy to identify the gaps in knowledge that need to be closed. For each area giving us a complete picture of the situation, we ask two questions: 1) Where are we now? 2) Where do we need to be in 13 weeks’ time? Actually, we have to answer three questions: 1) How are we doing? 2) How should we be doing? 3) How much do we need to improve? (Figure 2) We can then quickly identify where the gaps are and whether things need to improve.

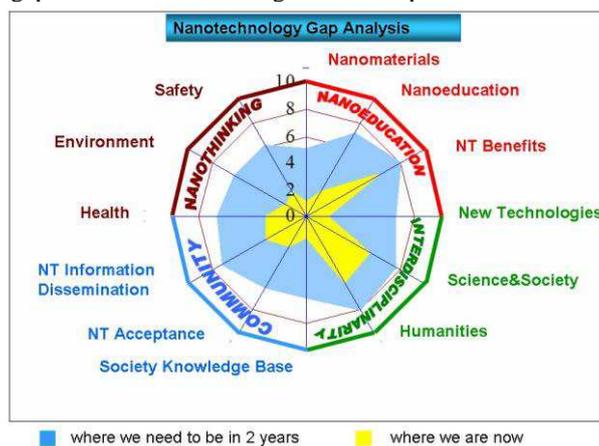


FIGURE 2 GAP ANALYSIS OF KNOWLEDGE

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## QUANTUM-CHEMICAL STUDY OF PRISTINE AND DOPED TiO<sub>2</sub> NANOTUBES FOR WATER PHOTOCATALYSIS

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### ABSTRACT

Ab initio calculations have been performed to investigate the ground state properties of monoperiodic TiO<sub>2</sub> single-walled nanotubes (SW NTs) of different chirality's with ideal pristine and defective doped structure containing extrinsic point defects. The hybrid exchange-correlation functional B3LYP within the framework of density functional theory has been applied for large-scale ab initio calculations on nanotubes with the following substitution impurities: C<sub>O</sub>, N<sub>O</sub>, S<sub>O</sub>, and Fe<sub>Ti</sub>. The variations in formation energies obtained for equilibrium defective nanostructures allow us to predict the most stable compositions, irrespectively of the changes in growth conditions. The changes in the electronic structure are analyzed to show the extent of localization of the mid-gap states induced by defect.

Keywords: CRYSTAL code, ab initio modeling, TiO<sub>2</sub> nanotubes, impurity defects

### 1 MOTIVATION

Titania (TiO<sub>2</sub>) is well-known semiconductor comprehensively studied in materials science, thanks to its widespread technological applications. Nanotubes (NTs) of different morphology obtained from titania of anatase phase was systematically synthesized and carefully studied as prospective catalysts [1]. Very recent experimental studies performed on Nb-doped TiO<sub>2</sub> nanotubes [2] demonstrate strongly enhanced photo-electrochemical water splitting. TiO<sub>2</sub> NTs are typical semiconductors with a band gap of ~3 eV and high chemical stability being inert under harsh conditions [3]. Application of titania nanotubes improves catalytic properties of TiO<sub>2</sub> by bringing in additional features, such as slower recombination of charge carriers [4] and a large specific surface area which provides good adsorption capacity. Another complimentary property is the ability to introduce artificial impurities through doping the structure with different atoms or groups of atoms. These impurities induce additional electronic states thus extending the range of energy absorption. While pristine titania is susceptible to UV light only, doped NT show catalytic properties even under visible light [5].

### 2 COMPUTATIONAL DETAILS

For computational analysis of nanotubes we have used first principles DFT-LCAO method, as implemented in CRYSTAL program developed at the University of Torino [6]. B3LYP is used as DFT functional for it provides accurate results for electronic structure calculations.

To obtain a framework for analysis of nanotubes we have considered four types of titania planar structures. First type: three-layer anatase with (101) Miller indices; second type: six-layer anatase (101); third type: nine-layer anatase (001); fourth type: six-layer anatase (001). These structures correspond to 1, 2, 3 and 2 units of TiO<sub>2</sub> per slab. Planar structures then have been folded into nanotubes and resulting

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geometries have been optimized. Specific energy of NT folding has been defined as difference between energy of the nanotube (relative to the number of its unit cells) and energy of TiO<sub>2</sub> unit in bulk anatase phase. Analysis of these energies has yielded data on possibilities of nanotube formation.

### 3 MAIN RESULTS

We have found that generally transition from titania in form of 2D nanothin layers to TiO<sub>2</sub> NT has a little effect on the margins of the band gap; extreme changes are associated with the small-diameter nanotubes and are due to their large inner strain. Analysis of the formation energies showed that nine-layer anatase-type TiO<sub>2</sub> (001) NT with (0,n) chirality indices possesses a negative strain energy, which means that formation of such nanotube is energetically more preferable as compared to the corresponding flat nanolayer structure. This information has given us a backbone for further investigations of C-, N-, S- and Fe-doped TiO<sub>2</sub> nanotubes. For that purpose we have chosen 9-layer NT (Fig. 1) with chirality indices (0,36), as it is the smallest (and thus computationally cheapest) nanotube which possesses required properties. Our recent findings [7] indicate that S- and N-doped TiO<sub>2</sub> NT may lead to more active photocatalytic species. Nanotubes co-doped with nitrogen and sulfur (O atoms are substituted with N or S, Fig. 2) have narrower band gap: the bottom of their conduction bands lies slightly above standard hydrogen electrode level. This shift allows nanotubes to remain catalytically active under visible light. Point defects (random substitutions with one type of atoms) result in formation of induced levels inside the optical region of the band gap. N-induced impurities can be close to the bottom of the CB, thus making the material conductive.

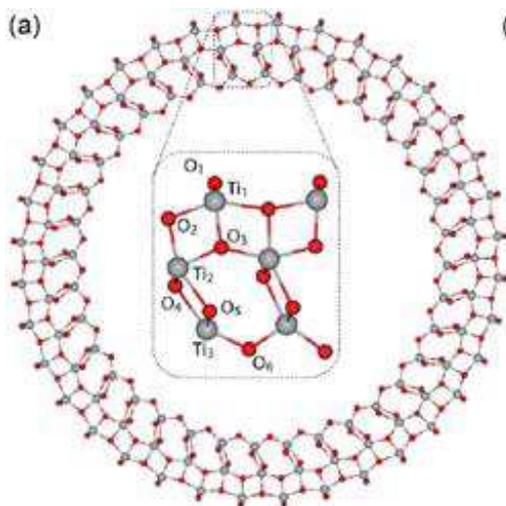


Figure 1. Monoperiodically repeated unit cell of (0,36) TiO<sub>2</sub> nanotube with external diameter of 4.81 nm containing the substitution defects: (a) across section view, (b) side view. Ti atoms are shown as large gray balls, while oxygens as small dark gray (red) balls. The inset shows the 2×2 extended "basic" unit cell of (0,36) TiO<sub>2</sub> nanotube repeated by 18 rototranslational symmetry operators. Numbered atoms of titanium and oxygen are substituted for impurity defect atoms (A<sub>n</sub>, where h stands for "host").

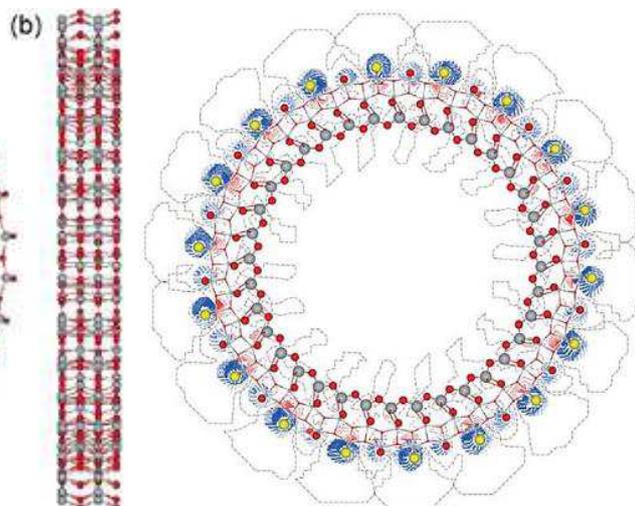


Figure 2. The electronic charge redistribution in S-doped titania nanotube (Fig. 1) across NT axis results in enhancement of its photocatalytical properties in areas of sulphur dopants (shown as yellow circles) [7]. Dash-dotted isolines correspond to the zero density level. Solid and dashed isolines describe positive and negative values of the difference electron density, respectively. Isodensity curves are drawn from -0.05 to 0.05 eÅ<sup>-3</sup> with an increment of 0.0005 eÅ<sup>-3</sup>.

#### 4 SUMMARY

In this study, we have simulated the doped TiO<sub>2</sub> nanotubes using first-principles calculations based on the hybrid density functional B3LYP [6]. The variations in formation energies obtained for equilibrium defective nanostructures have allowed us to predict the most stable morphologies, irrespectively of the changes in growth conditions. We plan to further explore effects of various dopants and their combinations on the band gap of titania NT. Mid-gap levels positioned inside the optical band gap of defective NTs makes them attractive for band gap engineering, e.g., in photocatalytic applications. Our ultimate goal is to find structures that have the potential to become effective photocatalysts. Once synthesized, these catalysts may change the course of H economy.

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## NEW STRATEGY AND POLICY TO INTEGRATE DISABLED PEOPLE INTO LABOUR MARKET

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### ABSTRACT

The paper presents the results of a research aiming to develop a support for the integration of disabled job seekers in the labour market. This process has undergone a substantial change in its strategy and policy towards people with disabilities in the past years throughout the European Union and Latvia. The morally outdated medical model of disability has been substituted gradually by a model based on social and human rights, aiming at full and equal-standing integration of the disabled persons in the society, and in particular to engage in gainful employment. The social approach based on the national mainstream employment support plans and United Nations Convention on the Rights of Persons with Disabilities Action Plan 2010 can be effectively used for a break down the discrimination barriers with respect to disability and to consider these people as an integral part of society and workforce.

Keywords: ability to work, Disability Action Plan, integration/inclusion of disabled, labour market

### 1 GENERAL

Barriers preventing access to the employment market are most of the times based on misconceptions and judgments on a person's abilities [1]. That is why, the authors work on the development of promotional mechanism to implement the new legislation in the field and to promote positive action in the labour market. In the framework of the Lisbon Strategy, the European Union has set itself the task of raising the employment rate to 70% before the year 2010 [2].

The authors seek for answers on two main research questions:

- What are the practical problems with the implementation and enforcement of national law on disability equality in employment? [4].
- What have employers in the Latvia done to support persons with disabilities to enforce their rights under national disability equality legislation because in the past have not succeeded in diminishing the gap between disabled people and non disabled people? [5].

It is important to underline that disability mainstreaming should involve both the development of specific actions targeting disabled people and aspect of mainstreaming, which is critical in order to ensure greater inclusion of people with disabilities, which can be achieved only with the active involvement of the main stakeholders in the field of employment and training, in partnership with organizations of disabled people. Also it implies the development of actions targeted at trainers, employers, job placement centres, in addition to disabled people themselves [3].

### 2 CONCLUSION

The research focuses on the integration of people with disabilities in the business sector, with a particular centre of attention on accessibility, e-Accessibility and Employment. Several empiric studies have suggested that the "mainstreaming model" reduces rather than increases employment opportunities for people with disabilities.

Discussible questions:

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- Inadequate understanding of the law, particularly of the concept of reasonable accommodation, by persons with disabilities and employers;
- Serious financial, procedural and informational barriers to seeking redress for discrimination;
- Inadequate procedures for victim support and representation;
- Fear of victimization as a paralyzing factor undermining the effectiveness of protection.

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## EXTERNAL EVALUATION OF THE LOGISTICS SECTOR OF LATVIA

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### ABSTRACT

Historically the dynamics of the major indicators related to logistics does not correlate harmoniously, thus creating conditions in which the external evaluation of performance is not flawless. One of the most significant reasons for the occurrence of these conditions is the methods and approaches applied by different assessors. The most accurate evaluation results can be received integrating the most popular techniques while eliminating their most biased parts.

Keywords: logistics performance, indicators, infrastructure, international trade, transit, Baltic region

### 1 GENERAL

Uneven and not identical evaluation results create uncertain platform for investments and development in the field of logistics in Latvia. This disproportion is based on the differences in evaluation methodology for different assessment bodies. These differences can be categorized by source positioning and index components.

Information sources in each of the four major evaluations are positioned using three dimensions:

- Primary / Secondary source dimension;
- Single / Multisource dimension;
- Insource / Outsource dimension.

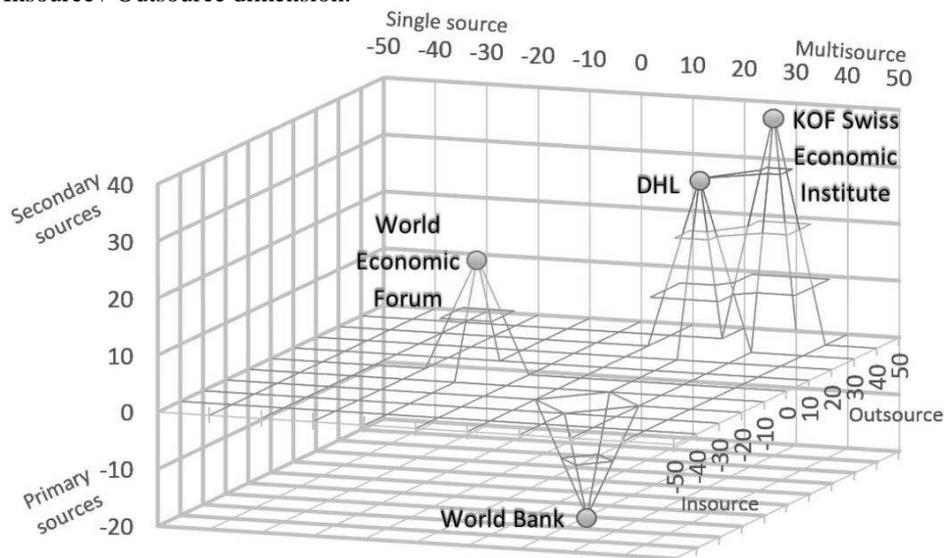


FIGURE 1 ASSESSMENT INSTITUTIONS SOURCE POSITIONING

Index components are more diverse, but their classification is less complicated, mainly due to the specifics of international logistics. Four major index component categories are the following:

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- Procedures & Governance;
- Infrastructure & Transit System;
- Quality of Logistics Services;
- Security.

••• World Bank ••• KOF Swiss Economic Institute ••• DHL ••• World Economic Forum

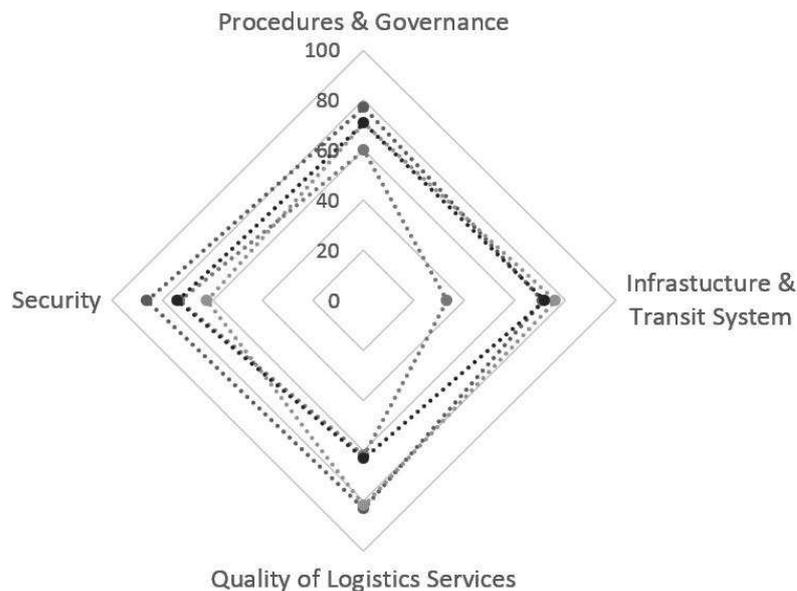


FIGURE 2 LATVIAN LOGISTICS SECTOR PERFORMANCE BY INDEX COMPONENT

External evaluation of Latvia's logistical sector in all index components shows similar results but these results are achieved using different levels of objectivity. The next universal evaluation methodology must eliminate the biased sources or enlarge the sampling to the probable confidence limit. The latest introduction of the World Bank's Domestic LPI for Latvia also adds precision to valuation, as for the economies with GDP below 50 billion USD it plays complimentary rather than independent part.

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# INFORMATION TECHNOLOGY-BASED BUSINESS PROCESS OPTIMIZATION IN CATERING SERVICE COMPANIES ON LATVIA

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## ABSTRACT

Modern information computer technology, which are designed specifically for catering service providers, allow improving the quality and management tools to increase their economic efficiency in a competitive market environment. Currently to automatizing catering service providers following automation systems are used: “R-Keeper”, “IikoChain”, “1C-Rarus”, “UNISYSTEM Restaurant”, “X- CAFÉ”, “Microinvest Warehouse Pro» and other systems. Software for automation of the restaurant should be multifunctional “systems to improve profitability and reduce costs, easy to deploy and simple to maintain.

Keywords: information technologies, automatizing catering services providers, control efficiency

## 1 GENERAL

Informatization of catering service providers, with aim to optimize business processes is a huge necessity for modern restaurants. Synergistic effect of information technology use in providing catering services is shown in Table 1.

TABLE 1 ASSESS THE BENEFITS OF INFORMATION TECHNOLOGY ON THE BASIS OF THE DEFINITION OF DIRECT, INDIRECT EFFECTS AND THE EFFECTS OF SYNERGY

Direct effect	Result	The indirect effect
Labour cost reduction	Optimization of routine operations	Minimizing the probability of making mistakes in the process of operations
No need for employees who process the information	Improving the quality of information collected and the speed of its preparation and handling	Rapid and objective taking of management decision
Reduced costs associated with unfair personnel	Increased control over the personnel.	Increased motivation through objective stimulation of workers.
The increase in revenues (due to increasing capacity and/or an increase in the average check	Improving the quality of products and services (including speed of service)	Enhanced customer satisfaction Increasing competitiveness
Reducing costs	Reducing costs	Reducing costs

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## MODERN TENDENCIES OF THE WORLD TOURISM

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### ABSTRACT

The main purpose of this abstract is to analyse up to date tendencies and upcoming trends in the development of modern tourism. Main destinations of inbound tourism were analysed altogether with trend analysis of world's top outbound tourism countries. Any development is impossible without applying certain efforts and expenses in fields as environmental, socio-cultural, technological, and economic and others. Most of those impacts on tourism development were analysed both with certain factors which were underestimated during the dissemination of modern era of tourism – these are information technologies (Internet included) with their highest impact on globalization and promotion of tourism and low cost discounters with their impact on motivation of particular tourist - direct service consumer travelling.

Keywords: tourism, environmental sustainability, trends, impacts on tourism, information technologies, low cost, development, mass market

### 1 GENERAL

Study of travel and tourism investigates following: how, why, where people travel as tourists, how travel industry representatives can effectively and profitably offer products for tourists and, finally, how destinations (countries, regions, cities) can manage tourism to their benefit.

So, why it is so attractive – to develop tourism: growing industry, disseminates wealth and prosperity, linked to local economy, uses natural free resources and infrastructure, does not face any trade barriers, promote environmental protection, provides facilities for local people as well as tourists.

The term mass tourism is briefly used for pre-scheduled tours for groups of people who travel together with similar purposes (recreation, sightseeing etc.) usually under the organization of tourism professionals.

Marketing start being customer oriented. That happened due to the new generation of tourists was born, these people were much better educated, they already had experience of travel and they got the very new tool of promotion and even propaganda – television, a new device which changed the world and led to its further globalization bringing similar services to the every household.

Main factors of technological and production development in the 20<sup>th</sup> century are: jet planes, credit cards, computers, globalization, television, Internet, CRS – computer reservation systems, GDS – global distribution systems (Amadeus, Sapre, Galileo, Worldspan), charter Flights, inclusive tour packages, wholesale economy of tour operating, mass Production for mass market customer, similar needs of average customer: similar cars, similar clothes, similar travels – mass market tourism stimuli.

In 1990s started an era of a new tourism. Many factors influenced this change. We may say that the tourists of this new era that continues till nowadays are more experienced as there are very little amount left of those who never travelled abroad; more educated as secondary education is compulsive in most of the countries; more “green” as we care about the environment more than ever; more flexible because of the world economic crisis when we care more about value we can get from money we pay nor the destination we are willing to choice; more independent as we feel safe even far away from home due to the internet, GPS, translating devices and languages we know; more quality-conscious.

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New composition of the family, far from previous standards, singles, retired seniors, lonely women - all those new groups of target customers created a need of a new supply, which should be more super segmented than any whenever. New factors of new tourism development are following: new consumers; new technologies; new forms of production; new management styles; in-depth knowledge of the market; flexibility; new prevailing circumstances; new diagonal integration.

Previous approach to vertical (client-agency- operator-hotel) and horizontal (agency-agency) was unable to predict wide dissemination of Internet when the same services become available both for consumers and providers, both for suppliers and intermediaries.

When new products are developed, impacts on tourism should be taken into attention. For less developed countries – inbound tourism is an effective (and sometimes the only) catalyst of economic growth and wider socio-economic development.

## 2 CONCLUSION

Summarizing we can say that aims and goals of tourism development could be divided into following groups:

- political factors (revenue that brings investments to other areas, keeping of national identity, clear destination profile);
- environmental factors (improvement of current situation, heritage preservation, sustainability);
- economic factors (tourism linkage to local economics, multiplier effect, employment, foreign currency earnings, total economic boost);
- socio cultural factors (building community facilities, providing cultural understanding, keeping cultural traditions and improving quality of life).

However, interests of those groups may intersect and/ or conflict.

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## INNOVATION IN THE BUSINESS ACTIVITIES OF THE “HOTEL JŪRMALA SPA”

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### ABSTRACT

Implementing of animation service in the business activities of the “Hotel Jūrmala SPA” means the ability to provide the growth of the enterprise and sales increase. The main goal of this study is to work out the mechanism of implementation of animation service at the “Hotel Jūrmala SPA” as incremental innovation. The introduction of animation service contributes to customer satisfaction and becomes a supplementary product of the hotel.

Keywords: hotel’s animation service, supplementary, customer needs, customer satisfaction

### 1 GENERAL

The definition of innovation, which is accepted in Latvia, is the following: “innovation is the process by which new scientific, technical, social, cultural or other areas ideas, developments and technologies being implemented in the market through a competitive product or service” [5]. Based on the accepted definition, it is essential to develop supplementary cluster of services in the „Hotel Jūrmala Spa” taking into account the market demand and the competition existing in the segment of hotel services [1].

The innovation process – the implementation of animation services, from preparation to industrialization – at the “Hotel Jūrmala SPA” is necessary together with the developed tourism product portfolio [2]. The aforementioned is worked out applying the “several models” sites [3] proposed by innovation researcher Uldis Cimdiņš. The model allows complex assessment of companies from the viewpoints of “economy” and “finance” [4].

### 2 CONCLUSION

The businesses which continuously innovate their products, services and/or business models, will be able to successfully compete in the market while all others will fall on the wayside.

The innovation of incremental type – providing of animation services at the “Hotel Jūrmala SPA” - will satisfy additional customer needs and ensure the increase of the hotel’s competitiveness and profit.

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## MAIN DIRECTIONS OF STATE INNOVATION POLICY



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### ABSTRACT

Today innovation development is an important objective of a state. This is related to the fact that the level of national development is currently assessed by the degree of implementing and applying of innovation, which makes a country competitive on the international market. The experience of foreign countries shows that participation of the state in innovation process grows considerably.

Keywords: state innovation policy, innovation activity

### 1 METHODS

State innovation policy is an integral part of social and economic policy of a state and aims at the development and promotion of innovation activities. It determines aims, directions, forms and methods of activities of state power bodies regarding all stages of innovation cycle. The main provisions, which currently are the basics of innovation policy, were formulated by western scientists, who started research in the field of economic growth, technological changes, and their interrelation in the middle of the 20<sup>th</sup> century. In these years major institutional forms of RTD started developing, as well as purposeful activities of companies to create innovations.

Various measures were taken to stimulate innovation enterprises. Today the state's attention is focused on the maintaining of the "environment" which encourages innovation and venture.

The experience of foreign countries shows that participation of the state in innovation process grows considerably. For example, in the USA a new term appeared – "semi-public economy", which reflects the tendency to strengthen the ties between private companies and public authorities.

Summing up the experience of other countries in the development of innovation policy, the main directions of stimulating innovative activity can be highlighted:

- Creation and development of clusters. In the world practice developing of industrial clusters is considered to be one of the factors of sustainable competitiveness and growth of knowledge-based industries in regions. An example is the experience of Finland, where cluster approach has become one of the basic analytical tools to analyse the economy structure.
- Creation and development of companies, which are established jointly by scientific research institutes and business. Also, the creation of a network of science parks, business incubators and technological development zones. Such companies provide private companies with access to innovation, which is developed with the support of state. Today there are about 40 science parks worldwide.
- Development of state programmes to financially and technically support innovation of small and medium enterprises. This is due to the fact that small business produces per one employee 2,5 more innovation than big companies (the USA).

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- Creation of a wide network of venture capital funds which are used by small and medium enterprises to implement innovation projects. Venture business is widespread in all developed countries of the world.
- Development of methods of direct stimulation, such as government contracts, grants, and crediting. Direct funding (subsidies, loans) is up to 50% for the development of a new product or technology (France, the USA and others). Granting of loans, including those without interest payments (Sweden). Non-refundable subsidies to cover the costs of innovations' implementation (Germany). Target grants for scientific research (almost all industrialized countries).

State support of innovation activity takes the forms of direct and indirect stimulation.

Direct stimulation is performed by allocation of budgetary and extra-budgetary resources (subsidies, loans), which cover up to 50% of the costs for creation of a new product or technology (France, the USA and others). Granting of loans, including those without interest payments (Sweden). Non-refundable subsidies to cover the costs of innovations' implementation (Germany). Target grants for scientific research (almost all industrialized countries). Indirect methods of stimulation are mainly associated with tax, patent and customs policies. In this case state reduces duties for individual inventors and grants them tax exemptions (Austria, Germany, the USA, Japan, etc.). In some cases state provides deferred duty payments or exemption of them if an invention is related to saving energy (Austria).

The last aspect of innovation policy is associated with the formation of innovation infrastructure. The state offers free of charge services of patent attorneys and exemption of duties for individual inventors (the Netherlands, Germany, Japan, India), as well as legal provision to protect intellectual property and copyright.

## 2 CONCLUSION

Applying the experience of other countries' innovation policy, Latvia can increase its competitiveness by stimulation of innovation activities of small and medium enterprises.

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## DEVELOPMENT AND IMPLEMENTATION OF STRATEGIC PLANNING MECHANISM TO THE BUSINESS OF KIDS EVENT ORGANIZATION COMPANY

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### ABSTRACT

The main task of this article is to define the main problems of strategic development of young company which business is event organization for kids. The main problems are : different financial opportunities of small and big companies; qualified employee deficit; short and limited terms to organize and perform the selected strategy; implementation of consolidation strategy; seasonality aspect in industry; financial planning; developing of taxes strategy. The article also represent the solution for the strategic problems mentioned above taking into consideration the business of the one certain company (further mentioned as company "N").

Keywords: events for kids, mechanism of strategic development, strategic development, strategic planning, development of strategy

### 1 GENERAL

The following article includes number of strategic planning problems, which the author has chosen as the most common:

- absence of the equivalence in resources and financial opportunities of big and small companies;
- small enterprise faces permanent situation of tactical and operative planning instead of strategic;
- market consolidation strategy development problems;
- problems of business seasonality;
- problem of unofficial accounting with some vendors;
- taxes strategy problems;
- impossibility to work out and implement regular guidelines for the common and some certain business processes and tasks.

### 2 CONCLUSION

There is no need in long term strategic planning for the company "N" due to the business amount and dynamics, meanwhile short term strategy work out and implementation is strictly recommended, but this project need investment of time resources of responsible person.

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## COMPREHENSION OF MANAGEMENT PROBLEMS FORMS UNDERSTANDING OF BUSINESS TASKS

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### ABSTRACT

The conceptual approach to the tuning of management to solve business tasks is considered. The proposed methodology improves professional awareness and competence system, which allows blocking unwanted tendencies and justify breakthrough ideas in the conditions of openness to controversial information. These ideas are implemented by raising an organisation to the next level without losing its integrity.

Key words: problematic, manageability, adaptation, education, supplement, PMDB (person, making decision in business), initialisation, development

### 1 GENERAL

Timely identification of management mistakes not only blocks their expansion to other focal areas, but also is the methodological base for the studies of complex management problems. While studying management problems, collecting, processing and analysing of business information make it possible to reveal the essence of management and expand tasking in business. Such information is used to highlight semantic constructs which help to practice the mechanisms of unique organisations' construction. Based on the constructs, key variables are determined to set the trends of organisations' development.

This study is oriented on the timely initialization of key variables of a management system, which requires solving the following tasks:

- 1) development of management constructs;
- 2) capturing the sense of management problems;
- 3) highlighting of business problems;
- 4) tuning up management to solve business tasks.

Summary of the tasks being set.

1. The first construct of management makes it possible to define the boundaries of principal problematic areas narrowed to the ability to construct problems. The second construct, which characterizes the problem of manageability, forms the skill of timely evaluation of management quality. Oppositeness of the content of the two constructs forms the common base for their benefit sharing. Such base allows maintaining the compliance of the set tasks to the estimated potential of an organization. Achieving the compliance is determined by ensuring the balance of the professional awareness of a management team and the level of its professional qualification.

2. The proposed approach determines the trajectory for the achievement of strategic goals in the conditions of exhibited limitations and changing status of quality factors. As a new strategic factor becomes primary, the previous factor is switched to secondary status. Matching of the key limitations to the changing status of quality factors is performed in the framework of the complex monitoring of the goal. Introducing new limitations excludes secondary limitations, which causes the specification of the subject area and new understanding of an organisation's system. Supporting the compliance helps to become aware of the elements which can cause fundamental change of management system. This is the

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base for the understanding of a complex problem, which enables an organisation's staff not to provide traditional resistance and deviate from standard schemes.

3. The technique of management problems construction does not detect all future events. In this relation it is necessary to prepare PMDB to work in non-standard situations. During adaptation PMDBs practice the elements of comparing circumstances with the intentions of business owners. Business is organized considering the modifications performed in the previous versions of management system. Cumulatively, the modifications, which have been conducted from version to version, represent the adaptation mechanisms revealing the nature of the accumulated mistakes, and transmit the corrected behavioural instructions in unforeseen circumstances. In the framework of the proposed conception the monitoring tools are applied to detect system errors, which are considered to be management mistakes. The source of such errors is the lack of training of management to understand business tasks. Two business problems appear to be the key ones and are related to "the destruction of adaptive capacity" and "the disruption of learning ability". Two new business constructs, which supplement the proposed management constructs, were developed to study the formulated problems. The aforementioned made it possible to consider management problems in the context of business problems solution. Problems are solved in the field of "double effect business-management education", where each new task becomes a manager's self-service application.

Any misunderstanding of business problems or unwillingness of a management system to respond to new circumstances is perceived as the result of own mistakes. This provision has valuable background and is transmitted to each new management system as a kind of cultural heritage.

4. Despite the differences in the characteristics of business and management, binding management problems with business tasks allows the selection of common object. The complement of four constructs acts as such object and is a structure-unit of a management system. The analysis of the identified system errors and the elements of a system does not allow it to deviate from the intended strategic goal. This approach assumes a new attitude to business, the specificity of which is manifested in the continuous willingness of managers to make an effort to find errors. The task is solved in accordance with the method of incentives distribution, patent promotion technique and methods of awarding rationalization work. Their use is associated with the application of new management controls, which have alternative nature of management and are oriented on the "senses" of a management object. Otherwise, the sense of integrity is lost destructing the ability of managers to navigate to the external environment, which does not let blocking the intrusion of unfavourable tendencies into the system. Organisation development shall be implemented based on the unique business-management oriented technologies, which make it possible to fully disclose an organisation's potential during the elimination of recognized errors by taking responsibility and reducing the cycle of promising ideas implementation. Such technologies form an organisation's own product and their actualisation takes place during the initialisation of the six key variables of management system. Through the awareness of the most important management problems this provides the regular growth of efficiency of the put forward business tasks. In aggregate, there is an encompassing vision of an organisation, which is able to attract capable problem-solvers, who are ready to switch an organisation to a stable state.

## 2 CONCLUSION

The presented conceptual approach is a new approach to management. Its implementation makes it possible not only to actualize the subject area of the research, but also to apply new management controls, which help to maintain the compliance of strategic goal with the potential of an organization. Supplementing the identified problems of business and management provides an opportunity to initialize six key variables, which allows timely synthesize an organisation's development trends.

## LEVELS OF INFORMATION SYSTEM OF E-COMMERCE ON TOURISTIC ENTERPRISE

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### ABSTRACT

This paper discusses multi-complex systems with different types of elements describing the content of each of the levels and elements. Based on the proposed in the article decomposition it is possible to perform both strategic and operational management systems, e-commerce and integrated management in general corporate information systems.

Keywords: e-commerce, information systems, decomposition, level of e-commerce, information, business process

### 1 GENERAL

Modern trends in e-commerce, based on innovative methods of enterprises, today are very promising, as evidenced by studies of domestic Internet audience, its development trends and opportunities rather rapid growth in terms of actively changing of economic situation. However, identifying the main challenges of e-commerce in Ukraine is necessary and urgent task to ensure the survival and development of virtual business enterprises, primarily, is to determine the components of the information system of e-commerce and their effective integration using. Research synthesis domestic and foreign authors demonstrate the diversity of levels of decomposition architecture of information systems of e-commerce, which causes difficulties in its practical use.

Combining different levels of e-commerce information system in organization based on their generalized characteristics creates the possibility of separation into: organizational level (participants of business process), functional level (function ICs), and software level (software components IS) technical level (hardware means ICs).

The first level, which connects the traditional elements of organization and information system, is organizational. It is a measure of integration of information systems in organizations and organizational structure. In general, users are divided into two major classes: business users and home users. The first group includes external entities that participate in key business processes associated with commercial activities, the participants in a particular stage of the commercial cycle. Another user group ensures compliance of business processes of the organization, or participates in the technical operation of the information system.

The second logical level of e-commerce information system is functional. This level integrates functions that implement the information system. It is most important, because of its fullness depends coverage information system e-commerce existing in the enterprise business process, software and technical component. The fulfilment of these functions is implemented using software and hardware levels. The software level is the software that is necessary for the effective functioning of the information system. The technical level includes all the hardware involved in the operation of the software elements: client jobs, Internet infrastructure, including access to the client, network devices within the network, access the company network, network infrastructure, specialized servers, and storage arrays.

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## 2 CONCLUSION

Thus, e-commerce information system is a complex software-technical system that is the basis for the functioning of the organization in the field of electronic commerce. The qualitative characteristics of the information system of e-commerce are the key to the confidence of the customers and their functionality - an undeniable competitive advantage of any business.

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## FORMATION OF ANTI CRISIS PROGRAMS OF DOMESTIC ENTERPRISES IN CONDITIONS IF INSTABILITY

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### ABSTRACT

This publication identified the successive stages of the anti-crisis program of domestic enterprises, which provide a comprehensive examination of the situation of bankruptcy and will allow management companies to ensure their subsequent development.

Keywords: crisis, bankruptcy, crisis strategy crisis program, stages of the anti-crisis program, out of the crisis.

### 1 GENERAL

Today almost every company, like all the country's economy is in crisis. The presence of the crisis in the country and the need to overcome it at the enterprise level made it necessary to implement the program of crisis management. The process exit of domestic enterprises from the crisis must not occur randomly, but must be properly organized and coordinated. Therefore, the main instrument for domestic enterprises that were in a state of crisis, should be specially formed anti-crisis program.

Studies have shown that there is no consensus about the nature, necessity and formation of anti-crisis program as a prerequisite for the release of domestic enterprises from the state of crisis. Such scientists and economists as A. P. Gradova and B.N. Cousin believe that to exit the company out of crisis is important and necessary to build an anti-crisis strategy [2]. M.Korotkov emphasizes the need to implement anti-crisis strategy and enables characterization of two stages: crisis management strategic and tactical crisis management. However, it is not identified key actions to be taken in the management of the company to get out of a crisis [1]. The most deeply approached rationale for technology development and crisis program by L.A. Lihonenko, which indicates that the anti-crisis strategy is developed based on the overall business strategy, and crisis program details the tactical management in times of crisis. That is, the anti-crisis strategy can be implemented only through tactical implementation and implementation of anti-crisis program [3].

Thus, the anti-crisis program is an internal document which systematically sets out a list of major activities planned within the company, its business units and functional services to achieve the goal - removal company out of crisis. For this purpose, detailing the stages of structural and logical process of forming an anti-crisis program of the enterprise:

Stage 1 - the formation of an information base necessary for the development of anti-crisis program and the decision on the selection of alternatives. The required information base covers the following activities: the results of the diagnostic crisis and the threat of bankruptcy and the extent of the crisis condition.

Stage 2 - Modeling the operation of the business. Carrying out this work will help to simulate the effects of various management solutions to the financial condition of the company and the targets of crisis-criteria process. It is therefore advisable to develop a specific set of interrelated tables describing various aspects of economic and financial activity and formalize the impact of changes in certain aspects of its operations to end financial results and financial condition. A necessary condition for the development of

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the corporate model is a comprehensive analysis of economic and financial activity to determine the variables that determine the performance and efficiency of the company.

Stage 3 - the generation of ideas and practices with respect to the ways of overcoming the crisis. At this stage, the formation of an anti-crisis management support program goes to the Director and professionals identify ways and methods of financial recovery of the company.

Stage 4 - Development of screening standards. As a standard screening process of forming an anti-crisis program of the enterprise it uses the following limitations: Compliance economic interests and strategic objectives, compliance with resource support and feasibility, compliance degree of crisis or time constraints, compliance issues that led to the bankruptcy of a situation (crisis situation).

Stage 5 - screening analysis. At this stage, some alternatives are compared with the criteria (screening standards) with which they must comply. Those anti-crisis measures that do not meet at least one of the standard are excluded from further consideration. Thus, at the end of the 5th phase of forming the set of acceptable alternatives, ie, a list of possible implementation for crisis responses.

Stage 6 - assessing the impact of implementations of anti-crisis measures for the owner and specialist companies. From the point of view of the owner of the company, the benefits criterion in the choice of reasonable alternatives is the set of acceptable alternatives losses arising as a result of certain anti-crisis measures. Losing business owner from the sale of certain anti-crisis solutions may include: direct economic losses in the form of additional spending of financial resources to be taken in the course of preparation and implementation of anti-crisis measures, economic or consequential loss arising from the implementation of anti-crisis measures, social and psychological losses, temperature linked to the implementation and effects of the implementation of anti-crisis measure. It determines the feasibility of using expert methods to assess their level and subsequent ranking of the set of acceptable alternatives for this criterion.

Stage 7 - ranking of acceptable alternatives to the anti-crisis losses criterion owners. That is, within a composite list first given alternatives with minimal losses, and finally - to maximum.

Stage 8 - assessing the impact of certain anti-crisis measures for the life of the enterprise and the formation of a set of reasonable alternatives. Prediction of the effects of certain anti-crisis measures for the life of the company is based on the constructed model. Each proposed anti-crisis measure can be regarded as a kind of refinement (adjusting) the constituent elements of the model or its key parameters [4].

Stage 9 - the design and planning of current anti-crisis measures of the company. After preparing a list of reasonable alternatives must develop an organizational measures for the implementation of anti-crisis measures and financial plan for the implementation of anti-crisis program of the company.

Thus, the formation of anti-crisis program of domestic enterprises is a purposeful activity to determine the optimal range of anti-crisis measures, consistent with the purpose of crisis process, resource and time constraints, and may be the basis for the use of financial techniques and methods of stabilizing economic conditions, raising additional funds for satisfactory solvency and financial condition.

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## “TACTICAL FIELD” AS PART OF THE STRATEGY TO IMPLEMENT IN THE ORGANIZATION

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### ABSTRACT

The paper presents the operating environment manager, the problem of occurrence in the position of a Manager, studied the theoretical theses on the issue, based on the writings of Shchedrovitsky. Defined and classified the barriers to his appointment, disclosed to the formal and informal parts of the process. Mechanisms have been established to achieve consistent actions during implementation. Presents the tactical field as a tool of visual perception, allowing to develop step-by-step progress in implementation, and tracking actual location in the organization. The basic outlines actions on the tactical field.

Keywords: strata, adaptation, intellectual work, creative thinking, retrospective

### 1 GENERAL

Rotation of employees in the organizations is constant, but with different time interval. At the time the adaptation of a new employee or entry into a new position already exists, there is a redistribution of the load between other members, causing some discomfort within the departments and divisions. And if the adjustment period is prolonged, it can lead to disqualification of the employee, as nonprofessional.

For appointment to the new position of the person getting started is a time of opportunity, when there is a chance to start over and the desire to contribute to the organization of the necessary changes. At the same time, in this period, they are very vulnerable because there is not yet established a working relationship and a full understanding of new duties, work technologies and internal company culture. Failure in a new position can be the beginning of the end of the most promising career or in other words - the consequences of our actions is ahead.

To successfully complete the process of taking office does not mean merely to avoid failure [1]. The process of taking office a very complex and non-trivial. In most cases, the failure of a Manager is due to the lack of activity think in the process of adaptation. The inability to analyse and make projections on the real situation caused by the pattern of ideas, without understanding and interpretation.

### 2 THE THEORETICAL FOUNDATION OF THE RESEARCH

The problem of adaptation of the person in the organization of study two subjects is organizational behaviour and personnel management. The object of the discipline of Organizational behaviour is a main resource of modern organization - people, and the subject is human behaviour in the workplace [2]. This multidiscipline uses the principles and techniques from other disciplines: the theory of organization, psychology, social psychology, personnel management [3].

Formal adaptation programs will undoubtedly accelerate the process of entering into a new role and a new team. But, unfortunately, such programs are extremely rare and only have in the large companies or it may exist, but only as proclaimed the slogan.

Building your own system adaptation, on the basis of tactical field, helps to structure the processes so that it could be confident about the desire to work and to develop together with the company or to leave it. Tactical field, as a tool of strategy, will help to ensure the most effective implementation of the organization and make the strong position of the new employee. Systematic research, analysis of formal and informal part of any organization is the key to decision making. Remember, the institution is the sum was full of employee and any

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discrepancy can be seen, but it should be able to consider. If a company has a proven adaptation program, natural program of adaptation will only accelerate the process of entry into the duties.

### **3 INTERNAL AND EXTERNAL BARRIERS**

According to the means of self G. P. Schedrovitsky, the important elements of internal analysis incoming are: culture (personal values and attitudes), education, thinking, self-awareness, self-organization, ability to communicate. They belong to internal barriers in the process of adaptation, outgoing from the personality. It is important that the Manager knew their abilities, and evaluated them adequately.

Organization's own thinking - is the presence of installation on the production and development of such features, which allow to solve problems [4]. An important definition of internal barriers of a Manager is to identify its own style and approach to work in a team, laws of its managerial behaviour.

### **4 THE COMPARISON OF THE IDEAL WORLD IS REAL**

People and organization, each working in two worlds - the world of the ideal world and the real world. The ideal world is the rules, principles, certain laws or ontological rules that are in consciousness, but the real world is a practical activity, real relationships and work. These two worlds are constantly being projected on each other, creating a true picture of what is happening. Projection gives a true knowledge of the gap between the ideal and the real world.

The ability to play real world organization for a new employee subject is the construction of structures on the basis of investigated ideal objects. Ideal objects of the organization in relation to the employee are: structure, culture, technology, communication, etc. The consistent study, the generation, analysis, comparison of schemes and structures of these objects give a real picture and the magnitude of the gap.

The employee through the subject structure builds a projection of real processes, according to his purposes concerning the organization. Projection is a psychological mechanism, the essence of which consists in attributing the resulting human feelings by calling them things and phenomena of the material world.

External barriers against the person hides and organization: layers and strata, the organization's culture, structure and internal communication, formal and informal groups, as well as due to these elements pathology. Successful adaptation of the ability to parse out all the links and relationships within the organization becomes a necessary condition.

### **5 MECHANISMS PROJECTION AND RESEARCH POTENTIAL**

Acquaintance with the ideal and the real world is happening at the time, so it needs to structure and arrange items. This is the basis for creation of the mechanism of projection.

In the process of adaptation of the new employee consistently gets acquainted with the structure, technology, culture and communications organization. In relation to the employee is the ideal world organization or path. Get real views on elements and their comparison with the ideal circuit occurs in of activity think. The transition from the ideal to the real path through the process of projection.

The projection engine built using retrospective reflection. This mechanism is the base for constructing the following mechanism and present it system error affects the following mechanism. It is extremely important to get the correct information for learning and comparison. The projection engine should reveal the real picture in the organization, i.e. the gap. The degree of discontinuity depends the further actions of the new employee. When the employee's transition to the stage "norm" launched "the mechanism of research potential".

This mechanism is based on the results of the projection engine (gap) and the involvement of the diagnostic tools the organization. The mechanism of «research opportunities» has to be based on retrospective and prospective reflection. Prospective reflection suggests that can be expected in the future incoming office, a retrospective reflection link the events of the past.

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# AN ATTEMPT AT THEORETICAL STUDY OF THE IMPLEMENTATION OF A WORKING MODEL OF SOCIAL ADAPTATION OF SERVICEMEN RELEASED FROM THE ARMY

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## ABSTRACT

This article discusses theoretical aspects associated with the systematic approach application to the implementation of a working model of the process of social adaptation of former military personnel and their families. This approach includes: studying and taking into account individual peculiarities of personality; the influence of different environments and adequate combining of individual and group awareness-raising forms of impact. The overall pattern of social adaptation will be instrumental in: the comprehensive planning of work on the basis of diagnostics and evaluation of social environment; coordination between all the subjects engaged in this process; development of modern technologies aimed at establishing social and pedagogical conditions.

Keywords: Social work, social management, social adaptation of the military

## 1 GENERAL

Organizational system of the process of adaptation of former servicemen and their family members adaptation grounds in the theoretical rationalization of human adaptation problem, systematic interdisciplinary approach to social and educational activities and social work, in determining the ex-servicemen and their families social adaptation nature, in analysing the intrinsic characteristics of this process - being sometimes planned, sometimes spontaneous, in summarizing the working practice of those, working with this population.

Systematic approach in elaborating the core components of social and pedagogical work methodology implies primarily an analysis of terms and factors relating to each element and constituting the material, socio-cultural, demographic and socio-psychological basis of the environment providing for the life of former servicemen and their family members.

The general framework of the systematic approach as a basis in the development of a comprehensive organizational technology of the social adaptation process as a starting platform for social and educational work development against the background of established conditions of the environment, could have, as an example, the following structure: mapping some set of elements pertaining to a particular environment against the object in a system, analysing the features of communications and interactions components specific for a social system (subject - environment), determining system-forming connections ensuring subject's social system stability and client's /beneficiary's/ comfortably state analysis of the basic functional parameters of the very subject within a system, studying management activities within the spheres of environment, the degree of stability and optimality of its performance relative to the nature and specifics of methodological approaches and measures used in solving social and pedagogical issues and in developing modern, practice-oriented models of social work applicable to a variety of areas within the society.

Considering the general basis of social work technology as methodological landmarks in setting methodological decisions tendency, strategy and immediate actions in choosing optimal guiding tools and methods tailored to environment-specific features and needs of former servicemen and their families, in the course of development of a comprehensive model for adaptation proved important to re-differentiate "methodological elements" of priority with respect to their specific instrumental means providing interdisciplinary approach opportunities in a variety of areas within the social environment ensuring more effective social and pedagogical results.

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Cognizance of human nature, society, individual and social development and knowledge has been fundamental to any educational system, every philosophical concept and each model of social activity, at all times.

We consider personality as a social condition of the individual, incidental only to man, finding expression in a stable set of behavioural relations and features in society, while individuality- as a specific personal profoundness, personal intellectual organization of man, that distinctiveness, intrinsic to a particular person as social being, a synthesis of his soul and body.

This approach to examining the individual is a conceptual basis of the organization of focused influence on the personality of the ex-servicemen and their families, aiming at forming in them qualities of vital concernment and providing for the optimal social support ensuring.

Such an understanding, in which the focus is on personality: its originality, uniqueness, where subjective experience is taken into account and related to educational impact tasks, we define a person-centred approach and make it stand out as a necessary social and educational condition providing for the effectiveness of the social adaptation process.

**Person-centred approach includes:**

- studying and reporting individual peculiarities of personality;
- the influence of different environments: consciousness, emotional and volitional behaviour in different types of activities- academic, professional, public; in areas- social, pedagogical, psychological and medical;
- adequate combining of individual and group educational forms of influence, where each person is given information, psychological support, career forecasting and planning, assistance in case of labour readjustment, entrepreneurial activity with reflection of results obtained.

In this context, increases the importance of socio-pedagogical activity, resting, on the one hand, on the issue concerning social education problem of an individual, the development of his ability to live in a group, in a social environment, to refer to social structures when solving individual, group and social problems, and, on the other hand, on transformation of the individual's living environment, social groups, which, of course, involves more than the activity of educational institutions.

The analysis of the theoretical problems of social adaptation, social pedagogy and practice of social work makes it possible to identify the key social and pedagogical conditions of effective social adaptation (at three levels: intrapersonal, micro and macro): person-cantered approach, social and pedagogical work organization, making use of educational opportunities of social environment, social environment pedagogical potential management. By integrating pedagogical efforts of all subjects and using educational resources of social environment, this working model of the adaptation process will enable provisioning of social adaptation to this group of people and shall assist their transition from population needing social and pedagogical services into socially up-and-coming individuals.

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## ORGANISATIONAL AND ECONOMIC CHANGES AT TRANSFER OF A COMPANY TO AN INNOVATION-BASED DEVELOPMENT

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### ABSTRACT

The Paper provides considerations on specific features of a transfer of companies to the innovation-based development. Any change or improvement of the economic environment should cause the corresponding reaction to modernisation of the production organisation system. This inevitably leads to changes in the company structure, in order to make it adaptive to the external environment parameters and appearance of new qualities of the system.

Keywords: transfer companies, innovation-based development

### 1 GENERAL

A strategy of socio-economic development of any country declares an intensive transfer of the national economy to the innovation-based development to be a key solution. In this case, improvement and change of the economic environment adequately causes a reaction to modernisation of the production organisation system, processes of creating new equipment and technologies, development of principles and methods of attracting investments, improvement of systems and methods of increasing competitiveness of enterprises and their manufactured products at economic entities of all forms of ownership.

Results of researches of leading scientists of the world confirm that in the conditions of an open economy it is not possible for an economic entity to retain its positions both on the internal and external markets without keeping continuously an innovation and investment policy.

This problem is especially pressing in the real sector of economy at enterprises of the machine-building industry, information systems, light and food industries. Therefore, a scientific task related to the development of a methodology of management of innovation and investment activities is urgent for all fields of economy. Moreover, steady operation of an enterprise provides not only simultaneous development of a social area, but also causes development of high technologies and economy growth at cooperating enterprises.

These enterprises may have different legal forms and belong to different industries, but they are united by a number of distinguishing features: progressiveness of the released products, application of modern technologies, and availability of an after-sale service system. Therefore, a more profound research of these features will allow to comprehensively characterise the target status of an enterprise and reasonably determine organisational technologies of its transfer to the innovative development.

Thus, innovation is a process focused in a certain way and directed at formation of the qualitatively new status of a system, as well as relations between the elements which increase the efficiency of its functioning.

Decisions taken at initial stages of the developments, starting with scientific research and experimental development, considerably influence on the cost and duration of introducing an innovative product. According to data of a number of foreign enterprises, up to 75% of the cost of a new (innovative) product is predetermined already by the end of the sketch project development, though general expenses for this part form up to 5%. Possibilities of saving on the cost of a newly introduced product decrease at a stage of making an industrial prototype up to about 20%, and for serial production, when general

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expenses reach the maximum, the possibility of reducing the cost decreases to 5%. This convincingly shows that saving of time and funds at the initial stage of an innovative process inevitably leads to increasing the cost of an innovative product.

Economic growth, acceleration of the scientific and technical progress, complication of economic ties and increase of the market competition, the growing role of buyers in formation of consumer properties of products – all these stimulate continuous improvement of economic systems and their development. As a result, prevailing of certain (determined) changes over the accompanying chaotic and incidental factors appears. Therefore, the development is characterised by goal-oriented changes which lead to appearance of a new qualitative status of an economic system.

Continuous changing of conditions of operational activities and the necessity of adequate adjusting of economic entities to it require understanding of tendencies and a capability of development.

Moreover, development as a process of change is characterised by appearance of new properties and new qualities of an economic system in the process of its development, which actually means transfer of the researched system from one status to another, which is accompanied by a change of its composition and structure.

## **2 CONCLUSION**

Economic growth, increase of competitiveness and continuous change of the environment require constant improvement of a company which transfers to an innovative path of development. The process of changes in an economic entity caused by these factors is characterised by appearance of new properties and qualities. This de facto means a change in the condition, composition and structure of a system.

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## ADJUSTED ON FUNDAMENTAL CHANGES AXIOLOGICAL MECHANISMS OF MONITORING ORGANIZATION DEVELOPMENT

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### ABSTRACT

A new conceptual approach allowing carrying out complex diagnostics of organization development is offered. The approach is based on ability to recover and strengthen integrity of an organization, to integrate it at the expense of readiness to produce and develop in it values of management. It is about capability of an organization to detect and block in time its destruction caused by use of backward technologies of management, slowing down enterprise development. Thereby discrepancy at which advanced bureaucratic controlling mechanisms do not allow to find out in time negative tendencies of organization development, including the bearing in corruption beginnings, is eliminated.

Keywords: readiness o, object, potential, correct, construct, bureaology, gross, rate

### 1 GENERAL

Adjustment of controlling mechanisms assumes reduction of object of management in a ready state to changes [1]. Fundamental changes conducted in the conditions of transferring a management system on a new qualitative level act as the object of management [2]. Readiness of an object for changes is expressed in disclosing of potential of the organization without infringement of loss of system integrity [3]. Measurement of the organization potential is observed all over the distance of achievement of a strategic target. Strategy implementation is checked from positions of reaction of a management system on revealing in the organization structure the elements, braking its development. During the check, any undesirable tendencies of organizational development are traced and synthesized. Such tendencies should not only be blocked, but should also serve as a basis to transformation of a weak point of the organization into its strong quality. It gives the organization reasonable movement towards the set purpose. Tracing of undesirable tendencies is conducted within the limits of the offered concept including value-assessment bases. Such bases are built on axiological positions. Axiological shade is given to the tendencies in study by realizing effectiveness of the new norms of behaviour established for potential participants of the organization in a context of their understanding of possible changes in real actions. Starting positions determine character resource capacious operations providing timely effective actualization of brought changes taking into account possible redistribution of credentials.

Thus, radical character of changes in administrative structures and personnel is focused on use of methodology of adjustment of a management system on carrying out fundamental changes. Thereupon it is required to solve the tasks aimed at application of the new conceptual approach to the organization. The approach is based on decision search constructs considering internal improvements of estimated variants of organization development, and constructs of the analysis of their practicability, used in the conditions of incompleteness of information and corrected under external environment requirements.

Application of the offered constructs demands development of objective means of the monitoring, allowing collecting, processing and analysing the business information of organization structures [9]. As such means technologies of management with supplemented estimate mechanisms are used. Thus,

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technologies of management include answering to the real needs of the organization; correlated theoretical and practical variant of diagnostics of the condition of the organization, and by means of mechanisms of its estimation, complex investigation of a current situation is carried. In the first case technology of cost management and method of distribution of stimulus at change of ex-officio full powers are used, along with mechanisms of estimation of function of the control, technique of analysis of leadership and the power crisis, bureaulogical toolkit, etc. Algorithms of responses to system of tempo indicators, indexes of management quality characterizing the rate of steady growth of the organization are applied as estimate means.

## 2 CONCLUSION

The offered methodology allows forming strategic thinking based on which sources of vulnerability of the organization are detected. Thereby it is possible to find out not only sample errors of management, but also to anticipate management system destruction. As a result in due time fixes wicked design of one of participants of the organization that is shown in imperceptible regeneration of the organizational structure, quite often having corruption roots. Such a structure capable in due time to trace accruing influence of personal interests on concrete subprocesses and elements, does not pass into an uncontrollable condition. Comprehension of the sources of rupture of the organization allows making correcting changes. As a result, decision of not a sample task is led during development and inclusion of the new technology of management in the developed organization.

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# INFLUENCE OF GLOBAL MARKETS ON FORMATION AND MOVING OF HUMAN CAPITAL

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## ABSTRACT

Moving of human capital as consequence of processes of labour and educational migration is considered within the framework of global markets.

Keywords: human capital, migration, global markets

## 1 GENERAL

Formation of the international labour market is carried out by a movement of capital and work from gradual merge of national labour markets to formation of common labour market when legal, national, ethnic, cultural and other borders between national markets are finally eliminated. The international labour migration is understood as moving a labour through borders with the purpose to enter into labour relationship with employers in other country. The international labour migration represents global moving the human capital.

Formation of the human capital occurs by investments into the person as expenses for education and human resources development [2], on health protection, migration and information search for prices and incomes. Movement of the human capital can occur as at moving to other country on other place of work, and without physical moving its carrier – with the help of information-communication technologies that is especially distributed at outsourcing in sphere of software development.

As tendencies in the field of international migration it is possible to note: growth of migration of workers from less developed countries to the developed countries owing to increase of break in wages for identical work in different countries; growth of emigration of highly skilled personnel, as consequence of advantage of purchase, instead of preparations by the employer of a labour; growth of illegal migration owing to interest of employers in a cheap labour.

Employers in the recipient countries are interested in inflow of a labour with the high level of the human capital generated in donor countries, that is in economy on investments in human capital, including human resources development [2].

## 2 CONCLUSION

Hired workers make a decision on migration under condition of reception of benefit in the future due to increase of incomes if it compensates losses from search and changes of work, and also moving. The precondition of migration is simultaneous maximization of employer benefits from acceptance for work of migrant and benefits of the hired worker from change of workplace. At a macro level to estimate moving the human capital within the framework of international migration it is possible by comparison of export of human capital from country due to migration and outsourcing and import of the country human capital due to training and accumulation of professional experience abroad, and also distance education and active using of foreign Internet-resources, including trainees.

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## REGULATORY FRAMEWORK OF INFORMATION SECURITY IN UKRAINE

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### ABSTRACT

The article analyses the legal aspects of information security as a component of national security of Ukraine. The structure of legal acts aimed at ensuring information security.

Keywords: information security, information, information resources, information infrastructure, national security

### 1 GENERAL

Information security of Ukraine, its national security interests in the information sector implies the priority of legal regulation of relations development in the sphere of combating threats to those interests and organize the relevant law-making process. Firstly, this is due to the fact that under the rule of law and civil society activities of public authorities, which are primarily responsible for national security, that should be governed by certain legal standards that ensure the constitutional rights and freedoms of citizens. Law-making in this area focused on the statutory purposes of countering threats to national security of Ukraine, the means and methods of achieving them, providing a conciliatory policy authorities. Secondly, Ukraine's integration into the international community significantly expands the possibilities for consolidation of information security through participation in the development of international law, the establishment of an international system of information security field as the world at large, and each state. Thirdly, the implementation guarantees the rights and freedoms of citizens, the protection of national interests of Ukraine provides for substantial strengthening the role of the state in the regulation of the social relations, the presence of an open and clear policy in this area.

In this regard, recent government agencies and researchers pay much attention to discussing the improvement of the legal issues of information security of Ukraine. This legal provision creates a set of legal regulation of information security and the process of formation of the system. The law is the basis of information security and determine the effectiveness of the state, society and individual citizens in protection of the national interests of Ukraine in the sphere of information. Within this, framework includes regulations and international agreements of Ukraine, laws of Ukraine, acts of the President of Ukraine, government regulations, regulations of public authorities, and governing relations in this area.

It should be noted that the requirements of information security should naturally be included in all levels of law, including constitutional law and basic common laws, laws of the State management, special laws, departmental acts like. Here is a structure of acts aimed at ensuring information security. The first unit - constitutional law. Provisions relating to issues of information, information security, etc., are included in it as an element. The second unit - general laws, codes (of property, natural resources, the land, the rights of citizens and citizenship, tax, the anti-monopoly activities, etc.) that include standards for information security. The third is the organization management, dealing with specific economic structure, economic systems, government bodies and determining their status. They include some provisions to ensure information security. Along with the general issue of information security and

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information security specific authority, these rules should establish its responsibilities in forming, updating of information security representing national interests.

The fourth - the special laws that regulate specific areas of relationship, industry sector processes. These includes the Law of Ukraine "About Information" and others. From the composition and content of this block legislation creates specific legislation as the legal basis for information security. The fifth - subordinate legislation to ensure information security. Sixth block - Ukraine legislation containing provisions on responsibility for offenses in the field of information security. Special legislation in the field of information security activities (information security) can be represented by a set of laws. Their composition is occupied by the basic law "About Information", which forms the basis of the legal definition of all major components of information operations and special laws "About Information", "About information security" concept of information security of Ukraine, laws that ensure information security in specific spheres of the individual, society and state public policy in areas of information security: political, economic, defence, public security and order, social, humanitarian, scientific, technological, environmental, information. It should also be noted that the Law of Ukraine "About National Security of Ukraine" identifies nine areas of national security: foreign policy , national security, economic, social and humanitarian, military and security of the state border of Ukraine, political, environmental, scientific, technological and informational. Thus, information security is a part of national security.

The lack of legal regulation of the legal framework for legal information complicates the occurrence of qualitative changes in the field of public relations. At present, due to the lack of related, well-developed measures and theoretical developments to ensure information security are a number of obstacles to the full realization of their duty to the state of information security, which in turn is an essential integral part of national security. Only the implementation of evidence-based public information policy can create an effective system for combating illegal in this area.

## 2 CONCLUSION

Thus, there is an urgent need to develop a single integrated system - a statute that would ensure the creation of a unified strategy for implementation of the state policy in the field of information security, development of organizational and legal mechanisms to ensure information security, the definition of the legal status of the subjects of information relations, establishing their responsibility for compliance with national legislation in this area, creating a training system that is used in the field of information security.

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# MANAGEMENT THEORY AND PRACTICE CONTRADICTION

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## ABSTRACT

The article deals with the contradictions between the theory and practice of management science in the conditions of so-called "transition model of the economy". The basic requirements and obligations imposed by the Latvian labour market for managers at all levels correlated with program managers for training. However, employers stubbornly assert low management training and knowledge about the real business environment. The authors attempt to explain the objective reasons of the gap in the paradigm of the existing socio-economic model.

Keywords: management model, scientific culture, semantics, historical development

## 1 GENERAL

The practice of management is the functional add-on to traditional activities. In itself, the management as a profession in its pure form is missing. Business needs quality management practice, but in most cases the management as science, rise scepticism experienced businessmen practitioners. This is expressed in the well-known phrases: "Who are brought these Universities?" and "They know nothing about the real business". This is the essence of the gap between the theory and practice of management, expressed in a simple formula of "theory ≠ practice".

By itself, practice of the leader does not give guaranteed success manageability. Need a link and the cementing of this success systemizing knowledge and understanding of different cultures and business models. Knowledge can be acquired in two ways: by trial and error in the process of practice and theory in the framework of the High School. We must not forget that mistakes will cause problems not only for the specific managerial practices, but also others, because every action in society, and especially of public-administrative action that affects many people. Therefore, society for transfer of the management culture from generation to generation it is better to transfer it on the basis of the theory.

When studying the demand for employees of the Latvian labour market, which are connected with the management of any level and decision making basic requirements: higher education; work experience in the field and experience in the management/control; independence and autonomy; analytical mind, mature thinking and commitment; ability to organize/plan/monitor/administer/develop; motivational skills; ability to make decisions, to take responsibility, to argue and present.

Responsibilities: strategic development and planning; research, analysis and forecasting of the market (external environment); ensuring financial performance; management, motivation and development of staff; monitoring and coordination of activities (manage connections), to increase its efficiency; delegation of authority; organization and support of internal and external relations (communications); creation of new processes, their implementation and optimization of existing processes.

The list of responsibilities consists of subjects and theory taught in the programs of High School. Some positions of the list may be provided only by personal qualities of the head, due to personal nature and life systems.

## 2 AXIOMATICALLY THEORY

Administration (Management) theory (as any other theory) is represented as a scientific deterministic process, without extremes and hidden mechanisms. Theory is one of the best views of any management functions based on rationality, logic and common sense, the system of delegation of authority, etc. It is worth remembering that theoretical is the search for the truth, for the truth's sake, not for profit. Modern practice is largely contradicts both logic and truth, in the name of benefits. A common example is the fact that in the absence of a clear organizational structure, system of delegation of authority and the production system (in the broad sense) the substitution come by personal contacts and relations, the influence of informal "personal" side of the relations of production, which undoubtedly affects handling organization. To accuse in this case the theory, at least, have nothing.

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### 3 THE PRACTICE BECAME THEORY

A number of modern quoted bestsellers in management science that tries to rely practice, written by American and European management guru. Having a solid practice behind, they are my observations and the results will be transformed into a theory, with its laws and regulations. Being a professional one facet of the business, they pull out of context of the entire business known part and describe the success of this theory (technology). Disappears holistic perception of the business, with all his contacts and component parts. In addition, as you know a simple sum of the parts of the whole, not an integer.

Second, not less important, reason for the gap is low usefulness of such a theory. This is primarily due to the fact that American and European socio-economic models have significant differences from the model of "transition economy" in Latvia. On our socio-economic basis such a theory doesn't give any significant and successful benefits of management. In transition economies, there is a search acceptable socio-economic model, also accompanied by the transformation of ways of management. Western management model based on established principles and norms. Taking unconscious foreign management practices, it is only a copy of surface processes without understanding. The slogans of changes may be very bright, but they are destructive waves in the organization, which ultimately can destroy it.

### 4 LOW SCIENTIFIC CULTURE

No filtering pseudo-scientific (scientific simulations) works and theories are in open access and the constantly increasing due to global information technologies. Because of the ignorance and low scientific culture is part of society, these theories are accepted and they subsequently referenced. Looking at the shelf of bookstores where you can buy literature on management. Headers so-called textbooks can be compressed to a few phrases: "self-management in 30 minutes", "management for dummies", etc. The appearance of these books was driven by the rise in the popularity of management science, when it began to fill with all sorts of "effective" pseudo theories that help to achieve the "good results".

### 5 SEMANTICS

The difference in the description and understanding of specific management functions. Semantics is manifested in the difference in understanding of the meaning of managerial functions, on the one hand, by the company, and on the other hand - by the employee. A special case can serve as an example of how motivational management interprets the company and how this function worker understands. The "ideal" theoretical understanding motivation often simplified practice before the ordinary "social package", completely ignoring the deep psychological and ideological basis of this important function. The essence and understanding that theory is investing in the concept of functions and control processes interpreted and construed freely when handling practices. Spoon of tar and adds many theories of management, which in many notions are not developed a common operational definition. Practice management looks at the theory through the prism of their own understanding of things and personal interests, and therefore sees only what he wants to see.

As result, we have: the "ideal" of the classical theory, which largely have no relationship with the real socio-economic system (that's the real system, but not declarative); "one-sided" the success of one of the many practices that rank in theory, but in a strange system giving no fruit; the difference in the understanding and interpretation of the notions of management functions. The gap theory and practice will be reduced in the case when the control system and the socio-economic system of the state will correlate among themselves. And socio-economic system must first be built in the context of the geopolitical realities of understanding of the social and historical processes of development. Administration theory to emerge from the peculiarities of history and culture management practices, and not just from the borrowed foreign empirical theories, even if they are successful. But it doesn't eliminate the need to learn the theories, practices and model of governance that excludes "one-sidedness" knowledge.

In the process of development of each science sooner or later there is a surplus of the competing theories and trends - this is one of the many paradoxes of management science. According to system principle of multipolarity impossible to give a complete description of the behaviour of complex non-deterministic system is not beyond any single theory. To describe the structure and behaviour of a non-deterministic system must resort to multiple approaches, each of which provides a local model [1].

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## SOCIO-ECONOMIC INEQUALITY OF POPULATION AS A FACTOR OF HUMAN DEVELOPMENT: CASE OF UKRAINE

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### ABSTRACT

In the age of political, social and economic transformation of Ukrainian society, the creation of new social institutions and development of the democracy, investigation of the society structure and its impact on socio-economic development becomes very important. Socio-economic structure of the Ukrainian population is influenced by the general civilization changes and obligate stratification processes running in the world.

However, the peculiarities of the historical development and the special features of the current crisis in Ukraine caused significant changes in the stratification processes. All the aspects of the social life were affected by the transformation processes, but we believe that changes in the social sector, especially in education, health care and employment, made a significant impact on population welfare.

Keywords: socio-economic structure, inequality, differentiation, education, health, welfare

### 1 GENERAL

Transformation processes in the education in Ukraine are quit dynamic; however, we should mention that there are both positive and negative changes. Ukraine traditionally demonstrated high level of the population education, and in the last decade there were significant improvements in the educational structure of the population. According to the State Statistics Committee, in 2013 almost 25% of Ukrainians had higher education, while in 2001 - only 14%. Despite the fact that educational level does not directly determine a status of a person in the modern society, there is a clear correlation between a level of education and a level of welfare. Summarizing the results of the analysis of educational dimension of the social and economic structure, we argue that educational status has a direct impact on the living standards in Ukraine and is an important factor that determines the probability of well-being increasing. An overall improvement of the educational level of the population demonstrates a progress of our country towards post-industrial society.

Our research has shown that there is a significant differentiation in a health and mortality of the different social groups caused by living and working conditions, educational and professional status. We would like to stress that socio-economic inequality results a widening gap in the health indicators of different social groups. Our research confirms poor standards of the healthy lifestyle in Ukraine which is illustrated by the rapid age related increasing of the amount of people with the chronic diseases. Not developed culture of the healthy lifestyle results negative impact of income on people's health, as an excessive consumption is harmful for a person, as well as significant spending on medical treatment do not guarantee health retrieval. At the same time, investment in the healthy lifestyle and preventive measures demonstrates positive impact of income on people's health.

To assess the transformation of the population socio-economic structure resulted by the changes in the population well-being, we evaluated the following parameters: Giny index, a structure of the

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population of Ukraine in terms of per capita income, a structure of household income. We found that during the 1990s the level of the income differentiation in per capita more than doubled, then during the 2000s this indicator has stabilized at 28. It was estimated that in Ukraine wealth of 10% of the richest people exceeds wealth of 10 % of the poorest 12 times, while in the developed countries this ratio is much smaller. For example, in Germany it is 6.9 times, Canada and Japan it is 3.7 times, in Sweden it is only 2.7 times [1].

According to our estimates, in 2012 almost 5 % of households were living below destitution line (average income per capita did not exceed 110 \$), almost 18% were living below the poverty line. There is fairly large share of low-income groups in the population (24.5 %). Almost a third of the population (28 %) can be referred to middle income group, and it is important that in our society, almost 18 % of the population in terms of income can be determined as a group of potential middle class members. In case of economic situation improvement this group can be a “donor” for a middle class formation. Share of the wealthy people in Ukraine is about 6%, there is a significant income gap between this group and the rest of the population.

The current transformation of the socio-economic structure of Ukraine is characterized by two discordant processes and trends: a complication of socio-economic differentiation and at the same time its simplification. Complication occurs as a result of the development of new ownership types (mixed, private, stock ownership etc.) and simplification occurs due to the disappearance of the nomenclature granted with the non-institutional privileges, changes in the hierarchy of owners (entrepreneurs and labourers) based on the income size, level of economic freedom, self-regulation, self-realization etc. – this is a result of the economic classes formation.

## 2 CONCLUSION

In the transformation society the whole area of the social stratification is mainly determined by one parameter, namely material (capital, income, wealth) with a sharp decrease of the compensatory functions of other social differentiation criteria. Therefore, current stratification processes in Ukraine do not contribute to the social integration, strengthening of the solidarity, but they increase social polarization and inequality. Substantial transformation of the socio-economic structure of Ukrainian population requires a systematic transformation of the property institute and government structure.

Underestimation of inequality in access to the variety of the resources for sustainable human development reflects an immaturity of the Ukrainian society. Mostly due to this, there is a tolerance towards corruption schemes, tax evasion and existence of raw-rent economic model in Ukraine.

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## MODALITY OF MANAGING THE GENERATION OF RESULTANT IDEAS: MULTIDIMENSIONAL ORGANIZATION STRUCTURE

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### ABSTRACT

The research under consideration describes the area of methodology of scientific knowledge via the possibilities of ideas generation and their implementation in organization management. The paper investigates and describes the concept of "idea" and the process of its transformation into product; there presented the algorithm of idea construction and development, there also shown the components of proposed multidimensional model and its links with external environment. The contradictions occurred in the process of generating the idea and its further implementation in management science and practice are presented.

Keywords: mental activity, control, consciousness, cognition, dualism, epistemology, information, energy, spin effect, shape effect, vibrating series, result

### 1 GENERAL

Modality of managing the generation of resultant ideas via multidimensional organization structures is based on perfection of mental activity in terms of obtaining the obvious results. The required obviousness is admitted by the fact of transforming the generated idea into the final product. The point is that the efficiency of ideas implementation at the strategic level in management is 2-10% [1, 2]. It happens due to the bulkiness, inconvenience and complexity of management systems. For instance, the 10-step successive chain of costs management requires the millions of combinations. Insignificant improvement in one part leads to substantial loss. Moreover, the field of management does not provide the unified concept of unified subject [3].

The author puts forward the issue of study the procedures of efficient ideas generation. There is also an attempt to systematize an experience accumulated in the area of efficient organization of mental activity [4, 5]. Life experience becomes the basis for the formation of advanced thinking, allowing responding with proactive actions and determining the missing steps in the chain, rather than focusing on handling with a large number of operations. In fact, it allows creating a new reality and the ability to generate and implement new ideas [6, 7]. Then it is necessary to appeal to the laws of epistemology, dealing with decoding the conditions of transforming the living matter, consisting of ordinary atoms and molecules, in matter minded. As a result the accumulated experience is analysed from a theoretical point of view, and the preconditions for the development of procedure of comprehension, synthesis and creation are formed on this basis [8].

The approach, offered by the author, is strictly applied, since it allows not only finding the reserves of increasing the personal controllability, but also generating unexpected solutions in the process of brainstorming, negotiations, in the situations of searching the hidden benefits, etc. These factors provide opportunity to create innovative products taking into account the justified needs.

Errors recovery within the organizational structure can serve as an example of the set goal for this research (for disclosure of modality of managing the effective ideas generation). Troubles and irregularities in any system, including the organizational one, require regular monitoring and intervention in its constituent components. According to the author's opinion, the attitude towards the organizational structure as a single living organism, as well as consideration of internal and external problems of the organization as an integral aggregate and their elimination by composing the vibration series can bring a positive effect and result in the minimization of administrative costs [9].

In this investigation the author raises the issue of the multidimensionality of organizational structure. Its solution is carried out in the course of a complex study of the state of company functioning [3, 10]. As a result the identification of the problem areas takes place on the basis of the theory of multidimensional vibration series [11, 12]. Thus there created the prerequisites for the development of the procedures for achieving not only the restoration of the "holes", but also advancing the company to the next stage of development.

The research is based on the papers describing 6 levels of reality [13 - 17]: solid substance, liquid, gaseous, plasma (elementary particles), the physical vacuum, primary torsion fields.

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Moreover, any object of living and inanimate matter can be considered as a source of torsion field [17]. The positions of the new scientific paradigm based on the theory of physical vacuum will expand simultaneously with the development of torsion technologies in different industries [20, 21], and in management [20]. This process is already going on, and it is quite active. It is evidenced by the findings of the Institute of Strategic Studies of the Club of Rome [21].

The problem discussed in this paper allows thinking with completely different categories and pay attention primarily on the organization and its structure with unique inner and outer harmony [22]. The hypothesis about vibration management of organization, offered by the author, puts forward the "shape effect", allowing assuming its multipolarity occurred due to overlapping its positive and negative form and obtaining the specified effective result.

Modal analysis of management of effective ideas generating is described by the system of vibration series. This method is based on new principles of Physics and on the theory of functional systems; it provides informational resonance and brings negative impact to zero, thereby turning the organizational system to the direction specified by the company [23].

## 2 CONCLUSION

The management science is at the new stage of its advance. Despite the fact it is still the science of weak version the positive changes to its formalization are obvious. The process of forming the general system of suppositions arranges the unified system of definitions, models, laws, principles, managerial constructions and technologies. In other words the point of crystallization for forming the unified positions of management science occurs.

According to the author's opinion, the hypothesis put forward in this paper permits to have a new look on the model of management from the point of view of theory and its practical implementation within the organisation. Solution of these issues facilitates the acceptance of the management science.

The offered methods of generating the ideas via the peculiar ways of mental activity elaborated by the author give possibility to synthesize ideas and to hypothesize efficiently.

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## OPTIMISATION OF APPROVAL OF INNOVATION AND INVESTMENT PROJECTS

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### ABSTRACT

The necessity of approval of innovation and investment projects mostly occurs when they reach the required level of maturity, certainty of their final results and measurability of their characteristics. With the available plenitude of “M” innovation projects and “N” investment projects, with the existing restrictions (time, resource, cost, etc.), one must select the best options for fulfilling these projects.

Keywords: approval of innovation, investment projects

### 1 GENERAL

The continuous development of engineering tools and the increasing competition on the market of goods and services require the continuous improvement and development of innovations in different areas. This results in appearance of a plenitude of innovation projects, which, in their turn, determine the necessity of the corresponding financing and, hence, cause the formation of investment projects.

Among the compulsory conditions of these projects, there are the certainty of the final result of investment and measurability of its technical and economic characteristics. These are the certainty of the final result of investment and the measurability of its characteristics, on condition of the potential on the markets of goods and services, which form the basis for taking a decision on an investment project preparation. However, the certainty and the measurability of characteristics cannot always be reached. This depends on the maturity of exploring innovations for creating new technologies or the reliability of the analysis and summary of the accumulated experience, in the event of modernisation and replication of improved technologies. A combination of a new technology promotion and summarising of the available experience is also possible.

The necessity of approval of innovation and investment projects mostly occurs when they reach the required level of maturity, certainty of their final results and measurability of their characteristics, as well as when the characteristics of the qualitative result of an investment project need to be improved. In other words, there arises a task of the coordinated management of innovation and investment projects.

Let us assume that “M” innovation projects have been formed, each of which has a sufficient certainty of its final results and measurability of its characteristics. Moreover, “N” (MCN) investment projects have been prepared, which are either based on innovation projects or do not require additional scientific research and experimental works.

There are also time restrictions for implementing innovation and investment projects, as well as cost and resource restrictions for the possibility of financing the projects through their entire duration or at separate periods.

Let us introduce the following designations for the consecutive and parallel-consecutive fulfilment of innovation and investment projects:

$$\{X\} = x_{ik}; x_{2n}; \dots; x_{mk},$$

where  $\{X\}$  – is a majority of booleans, and  $x_{ik} = \{0,1\}$ . When  $x_{ik}=1$ , it means the selection of the “i” project of the “k” intensiveness, whereas when  $x_{ik}=0$  it does not.

The intensiveness of the project fulfilment means an option of organising it, which differs in cost, duration, expected completeness and coordination with the project performers.

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Every “i” project is characterised with a set of values, which show the final result properties of the “R<sub>i</sub>” project:  $R_i \Leftrightarrow \langle r_{1i}, r_{2i}, \dots, r_{ni} \rangle$ , where “r<sub>gf</sub>” corresponds to the “g” value for the “f” project.

“C<sub>ik</sub>” is the cost of the “i” project with the “k” intensiveness and “T<sub>ik</sub>” corresponds to its duration. To perform the project, resources are required – labour, material, production, construction ones, etc.

Let us introduce “Q<sub>ik</sub><sup>g</sup>” as a value of the “g” resource for the “i” project with the “k” option of intensiveness.

Let us introduce a set of {X} variables which corresponds to the selection of investment projects, i.e.  $Y_{je} \in \{X\}$ . When  $Y_{je} = 1$  the “j” project is selected with the “e” option of intensiveness, whereas when  $Y_{je} = 0$  it does not.

Then, with account of the introduced designations, the approved selection of innovation and investment projects can be presented as a task of the integral mathematical programming.

## 2 CONCLUSION

When substantiating a decision-taking mechanism in the event of a multi-criteria selection, one should take into account interests of the customer and the investor of the project. They will coincide in many aspects, but the customer, apart from cost values, will be interested in the quality of the technology and the products manufactured on its basis. For the investor, the preferable values are – the conditions of usage and reimbursement of the financial resources, the project payback period, its current liquidity, etc.

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## PREREQUISITES FOR THE DEVELOPMENT OF ENERGY EFFICIENT HOUSING CONSTRUCTION IN UKRAINE

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### ABSTRACT

In the paper the necessity of the development of energy-efficient housing is grounded. The status and dynamics of housing, provision of housing are analysed. The condition of the housing stock in Ukraine is an examination and preconditions for the development of energy-efficient housing is identified.

Key words: development of energy-efficient housing, housing, energy efficiency

### 1 GENERAL

The priority of each state is to provide conditions for increasing prosperity of its citizens. One of the most important components of well-being is to provide citizens with adequate housing and living conditions. Since 2000, Ukraine has been an increase of the total area of housing of 1015.0 million to 1094.2 million m<sup>2</sup> in 2012 m<sup>2</sup> in 2013 has been commissioned 11 million m<sup>2</sup> of housing areas. At the same time increases and figure of housing per capita, which in 2012 was 23.7 m<sup>2</sup>. However, despite the upward trend of these indicators, the analysis of the housing queue indicates the current demand for housing in Ukraine. At the same time, much of the existing housing stock of the country does not meet modern sanitary and thermal characteristics.

According to the Ministry of Regional Development, about 90% of the country's housing stock were built during the Soviet era, and much of it consists of "hruschovka" with lifetime less than 30 years. As of 2013 in Ukraine about 50 thousand "hruschivok" covering about 5 million m<sup>2</sup> are outdated and in disrepair. Total general area five-story building in Ukraine is about a quarter of an apartment fund (72 million m<sup>2</sup>). [1]

One of the largest energy consumers in Ukraine remains the housing sector, which uses more than 50% of the energy produced. Therefore, in terms of rational use of energy resources and perspective direction is the development of energy-efficient housing. Energy efficiency is one of the components are energy saving and rational use of energy resources in order to preserve them. Energy efficiency the national economy and the population is important for Ukraine not only in the context of maintaining the competitiveness of its export-oriented economy, but also to increase energy security and achieving sustainable socioeconomic growth [2].

Energy-efficient housing development first of all involves the development of energy efficient building design documentation, implementation of existing thermo housing, energy efficient building designs and materials. Energy-efficient housing construction will bring thermal properties of buildings to modern European level and to encourage energy conservation and to ensure comfortable living conditions.

Complex State energy-saving program Ukraine designed in the mid-'90s, noted tendencies of development and opportunities to attain energy savings of Ukraine's economy, including the building complex. A sectoral plan to improve energy efficiency in the building sector since 2010-2014 in Ukraine identified priority areas for implementation of the state policy of energy saving, ways to maximize the

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role of reserves of fuel energy resources in the industry and formed a complex of organizational, technical and economic activities aimed at increasing the energy efficiency building industry [3].

The main obstacles constraining development energy-efficient housing in Ukraine today remain a long payback period of such building, inadequate financial and credit mechanisms for the implementation of energy efficiency projects, lack of motivation to save energy.

## 2 CONCLUSIONS

Therefore, one of the biggest consumers of energy in Ukraine and is housing sector. The primary reserve of energy saving is to reduce the energy use of housing and public installations, which determines the need for the development of energy- effective housing. Energy-efficient housing development includes: design documentation of energy-efficient homes, the implementation of thermo-existing housing, the use of energy-efficient building designs and materials. Energy efficient housing will contribute energy savings and ensure comfortable living conditions.

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## DIRECTION TO ENSURE THE ECONOMIC SECURITY OF THE STATE IN CONDITIONS EUROINTEGRATION

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### ABSTRACT

At the current stage in the context of globalization is solved very important and responsible task of stabilizing the national economy. In these circumstances, becomes paramount problem of economic security due to the growth of numerous threats and dangers of the environment.

Key words: Euro integration, economic security, national economy

### 1 GENERAL

The process of ensuring economic security is only possible through the initiation of effective forms of innovation, institutional, anti-corruption, financial and energy security. Basing on the results of the analysis of economic security exactly in these areas have been identified the most dangerous threats. That protrude as catalysts of other threats to Ukraine's economic security of all components.

Proceeding from complicated condition of the real sector of the Ukrainian economy liquidation of the mentioned threats should be comprehensive and systematic. Requiring the transition of the national economy to a qualitatively new level of development, with an emphasis on innovative model with the rejection of the raw material orientation, in order to increase the competitiveness of the domestic economy. This transition should be accompanied by output a significant part of the national production from the shadows, the strongest anti-bribery and corruption, the fight against capital outflows abroad.

### 2 CONCLUSIONS

Analysis of the current mechanism for ensuring economic security in Ukraine showed the inefficiency formally established system of economic security. Therefore, the formation of an appropriate legislative framework, in particular to develop and implement a strategy of economic security will determine the priority of national economic interests, develop a system for the neutralization of the main threats and their impact on economic processes. Also allow to create an effective mechanism for providing public policy in this area.

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## ORGANIZATION'S POTENTIAL VALUATION

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### ABSTRACT

In focus the approach to assessment of readiness of team of professionals to carry out fundamental changes. The valuation mechanism is used, taking into account the synchronization of tempo performance. The tendency to slow down the development of the organization is synthesized on their base. Thus identifies problems that impede disclosure of potential. Troubleshooting is performed at the level of explained changes.

Keywords: adaptation, modification, qualification, practice, performance, feedback, pace, development

### 1 GENERAL

Development of the organization is to reveal its potential [1-3]. The level of potential depends on how good is the adaptation of resources and processes to common and attractive goals of the organization [4]. Criterion of "how good" is subjective and determined by the ability to find a match in a continuous process of goal-implementation and goal-relaying [5]. Level of proficiency in each case specified, and as valuation parameters include dimensionless growth, size and etc. [6-9] or apply universal complex quantitative methods which are not tailored to problems of specific enterprise [10-16]. All this makes it impossible to find a suitable explanation of professional qualifications. Management qualification depends on the ability of the management team to carry out a fundamental change and redistribute powers within the organization [17]. We are talking about radical changes made directly to the management system. In this regard, the problem extends developing an acceptable mechanism to capture modes change of management practices. It is in such situations the level of professionalism is determined, appropriate to qualification of organization's leader, able to prepare himself worthy successor.

L. Greiner's model is chosen as a base, including five evolutionary stages of development of the organization [18]. In particular, we stopped at the stage of characterizing the crisis of leadership that reflects trends of organization's development slowing. The synthesis of these trends allows you to find the reasons preventing the redistribution of powers in terms of fundamental changes.

Extended problem requires the following tasks:

- identify the factors of quality of studying;
- assessment of capacity constraints growth;
- comparison of quality factors studying with limited growth potential;
- develop mechanisms for assessing readiness for fundamental change;
- validation of developed mechanisms on the example of a particular organization.

As a result, it is considered the approach to management, allowing determining the readiness of the management team to make changes. Condition is valued on the basis of cost management techniques [19], supplemented by the system response to changes in tempo indicators [20, 21]. Using assessment tools, it is fixed not only a change of organization development, but clarifies that the pace of development.

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## 2 CONCLUSION

The proposed approach includes not only the practical implications for the analysis of the situation, but also contains a description of the competencies required for successful implementation of the process. Thus taken into account the circumstances that change the value system organization from the standpoint of quality, which makes the behaviour stable and certain. This is achieved through the development management product that is only used in one particular place, employed by professionals whose activities are known in advance and adapted to the specific conditions.

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# WHOLESALE FOOD MARKETS IN THE LIGHT OF RECENT ECONOMIC DEVELOPMENTS

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## ABSTRACT

The given paper is dedicated to the determination of the economic essence of wholesale food markets, which play an important role in local, national and international food distribution chains. The main functions of these markets, considered also as an essential part of any agricultural marketing system, are defined by author. The classic model of the wholesale food market is considered in the paper. The ways of the development of wholesale food markets throughout the world place are determined.

Keywords: customers, equilibrium price for produce, food distribution chains, market infrastructure, wholesale food market, wholesale market network

## 1 GENERAL

The recent international wholesale conference, held in Palma de Mallorca, Spain, from 14<sup>th</sup> until 17<sup>th</sup> September 2010 under the theme “A Global supply to meet demands of all kinds”, opened the big issues on the future of wholesale markets. The main debates between speakers and panelists at this conference focused on the need to define the essential role that wholesale markets play in the modern international economic conditions, as well as to see the possible contribution of wholesale markets to consumer healthy habits as an important challenge. Acknowledging the current trends in the wholesale market sector and opportunities present in the current global economic climate, the delegates from 30 countries recognized the need for wholesale market management to be strategically focused on ensuring the excellence, innovation and professionalism abound in the supply of market infrastructure [1].

Taking into consideration all these facts, we dedicated the given essay to the development of a better understanding of the economic essence of wholesale food markets, which play an important role in local, national and international food distribution chains.

Wholesale food market should be mentioned as a location where a large number of professional traders can regularly trade together in order to sell a wide range of goods that are similar in type to buyers who require goods of different quality, quantity and price. Through the combined efforts of the participating wholesalers, the market will act as a mechanism for taking large quantities of foods from producers, manufacturers and importers, and immediately subdividing these consignments into smaller lots, to be sold to customers requiring supplies on a regular basis sometimes daily. By the way, these markets can positively influence the eventual price paid by the consumer, as healthy competition encourages the price to fall and the quality to improve.

It goes without saying that wholesale food markets have to perform the following functions cost-effectively: physical exchange of produce; sorting of produce on the basis of standard criteria, thus facilitating sales; formation of equilibrium price for produce; exchange of information between suppliers and buyers; and hedging (or price fluctuation risks).

The recent scientific research [2] allowed us to confirm that classic model of the wholesale food market is usually characterized by the following: unlimited number of market participants and free competition among them; completely free access to certain economic activities by all members of the market; complete mobility of production factors and unlimited freedom of the capital movement;

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availability of information of the entire market for each participant; wide range of goods; each participant of free competition cannot directly impact the decision of another using noneconomic methods; prices are established based on free economic competition; the absence of a monopoly (which exists when a specific person or enterprise is the only supplier of a particular commodity), a monopsony (a market form in which only one buyer faces many sellers) and state regulation.

The characteristics and dynamism of wholesale markets are highly variable from one country to another. Some markets have become popular because of the quantities of products that they sell, the quality of the goods they sell or just historical context, which many wholesale markets are famous for.

For this reason it is important to keep in mind that the development of wholesale food markets throughout the world place in two different ways.

The first way involves the construction and creation of a wholesale food market system through the financial support of the state. In this process, the state launches the first wholesale market using state funds and conducts intensive development of the whole system. A vivid example of this method is the Mercasa state enterprise in Spain which includes an entire network of wholesale food markets (more than 20 food supply units throughout the country) [3] that not only supply goods to millions of the Spanish population but also export products everywhere on the planet. Mercasa includes more than 7 million square meters of space with a total of 23 fruit and vegetables wholesale markets, 17 fish wholesale markets, 3 flowers wholesale markets, 7 slaughterhouses and meat markets, as well, as facilities for the manipulation, treatment, storage and distribution of food products. The annual turn-over generated within this Spanish national wholesale market network is already more than 15,000 million € [3].

The second option involves attracting funds for creating wholesale food markets through both the state and interested stakeholders of wholesale market (public-private partnership). An example of this process is the creation of the Wholesale Market Munich, known as the market of many markets. It consists of a wholesale market hall, four permanent food markets, one wholesale flower market, a gardening hall, 41 street and farmers' markets and the abattoir. Occupying an area of some 435,000 m<sup>2</sup>, 400 importers and wholesalers handle some 140 different types of product from 83 countries to the value of over 2,0 billion € [4].

Generally, modern wholesale food markets provide a facility for professional sellers and buyers to meet and develop trade links on a regular and convenient basis. A market is a social and commercial interaction between suppliers and their customers, and a successful market is a busy place that generates market information and an easy comparison of product range and price.

## 2 CONCLUSION

The findings of this research indicated that in the light of recent economic developments wholesale markets are especially useful in countries where agricultural products such as produce and meat are scattered, helping to better organize producers in order to overcome logistical problems together. In essence, wholesale markets help to organize these scattered producers in countries in which groups, cooperatives or other entities are non-existent. Many representatives of small and medium business underestimate the role of wholesale markets as the way of survival for small and medium trade in the competition with supermarkets. However, these wholesale markets give small shops the ability to compete with supermarkets, potentially saving the smaller business from bankruptcy.

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# THE INTERNATIONAL EXPERIENCE OF PROVIDING THE ECONOMIC SECURITY OF THE STATE

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## ABSTRACT

In the conditions of globalization highly developed countries have a reliable system of ensuring the economic security of the state. The detailed analysis of these allowed revealing that providing the economic security is a guarantee of the stable economic growth of the state and increasing the welfare of her population. Therefore the successful experience of the institutional and normatively-legal providing must be adapted and inculcated in Ukraine.

Keywords: economic security of the state, international experience, national economic interests

## 1 GENERAL

There are different models of providing the economic security of the state in the world. The special attention is deserved by the system of protecting the national economic interests of the USA, that is based on effective normatively-legal providing of the economic security. The economic security of the USA is examined as an inalienable component of national security and as a separate issue is not stated. There are some aspects of providing the economic security of the state in the laws and National Security Strategy of the USA.

In Japan, as well as in the USA, the economic security is examined only as an important component of the national security, which was based on counteraction the external threats. However, unlike the USA in Japan attention is accented on the economic rather than military means of providing the economic security of the state. There are two principles of the Japanese approach to providing the economic security of the state: maintenance and development the economic strength of the country and forming a favourable global environment, which will contribute to the realization of the national interests.

The concept of economic security of India is identified with the economic independence, based on the principle of laying-on own forces. The informative aspect of economic security acquires in the developed countries of the world of all greater value. For example, in 2004 the economic espionage was announced one of the major threats to the economic security of the state by The Canadian Security Intelligence Service.

An effective system of providing the economic security was formed by the EU countries. It is characterized by a flexible legal framework, a clear division of ministries, agencies and organizations competence in implementation the legal provisions of economic development and the public economic control. The most efficient systems of providing the economic security are in the UK, Germany, France, Italy and Spain. The state policy of these countries is oriented to improving the efficiency of the national economy with the simultaneous maintaining a high level of economic security.

## 2 CONCLUSION

The international experience of providing the economic security confirms that the main strategic objective of the system of providing the economic security of the state is to ensure a sustainable economic growth and modernization of the economy in a competitive environment. Eventually, on the modern stage of the world economy development the successful defence of the national economic interests depends on the stability and strength of the national economy.

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## GLOBAL SHIFTS IN THE WORLD ECONOMY AND MANAGEMENT OF FOREIGN ECONOMIC ACTIVITY OF ENTERPRISES

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### ABSTRACT

The contemporary world globalization processes have a tendency to accelerate. Such processes are producing some global shifts in the global economic system that affects all areas, levels and subjects of foreign economic activity. Therefore, it requires the appropriate reaction on the part of the management of foreign economic activity.

Keywords: globalization, global shifts, foreign economic activities, management, enterprise, mondializm, informatization

### 1 GENERAL

The main goal of this study is the determination of global shifts and their influence on the management of foreign economic activity (FEA) of enterprises. The global shifts we mean as any significant changes in the structure, relationships and patterns of interaction between the structural components of the world economy and economic relations, which are influenced by globalization. These shifts are reflecting on the changing the centres of attraction and importance of the structural elements, the proportions, particles, quantitative and qualitative characteristics of the global economic system. The global shifts' emergence and deployment are producing formation of the reaction from the global economic system's components as a complex set of changes and transformations. The available basis, economic opportunities and potential of each economic system determine a nature of these changes.

The last years course of globalization processes allows to identify the global shifts' enlarged typing that inherently is expression and reflection of global processes in all areas of economic and social life of the world community: mondializm and integration; glocalization and regionalization; financialisation of the economy; informatization, intellectualization, virtualization of economy; institutionalization of the global economy; transnationalization [1].

As a driving force of changes and transformations these global shifts have a direct impact on development of national economy and reflect on specificity, directions, forms of foreign economic activity of enterprises and principles of its management. Global shifts make a such momentum - positive or negative – of the global transformations development and determine the further development of national economies. On all of its components global shifts are reflected on the directions and forms of foreign economic activity of enterprises. First of all it concerns the changing the specific of investment and innovation processes, the geo-economic paradigm formation, transition to a knowledge economy and global informatization. Accordingly, substantially increases the value of foreign economic activity of enterprises concerning exports activation, foreign investment attracting and high technology using in innovative sectors, realization of international innovation and investment projects.

### 2 CONCLUSION

The global shifts' emergence and deployment in the global economy is directly reflected on the foreign economic activity of enterprises. The complex correction and transformation of FEA enterprises management require taking into account all of the global shifts features, the international experience implementation on the level of realization and management of foreign economic activity, identification of main global shifts' symptoms and effects.

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# NATIONAL ECONOMIC INTERESTS AS AN OBJECT OF STATE ECONOMIC SECURITY

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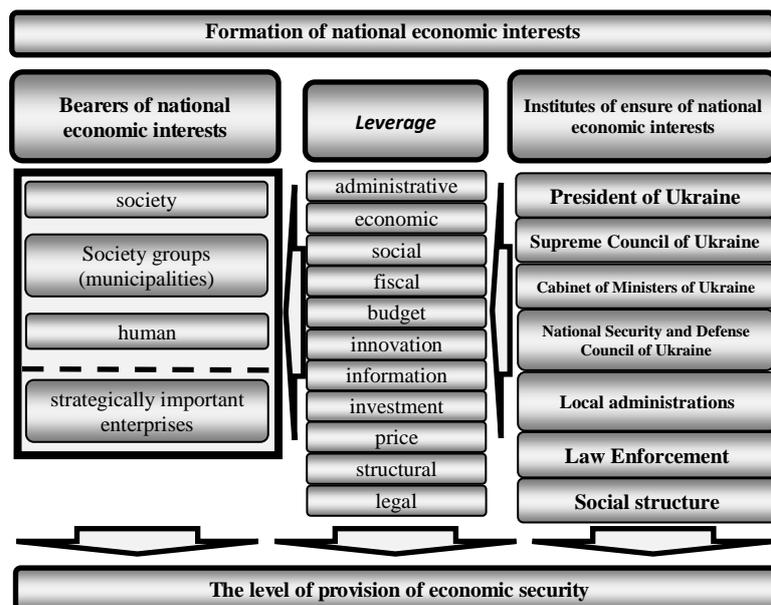
## ABSTRACT

Fundamentals of any state national security are formed during the period of its establishment as an independent subject of international relations. National security menaces are manifestation of the incompatibility of government, society and people interests with the factual situation prevailing inland and outside the country. The formation and protect mechanism of national interests define the system of policy measures. These measures cover all areas of the national economics and determine the direction of ensuring the proper level of economic security for detection and elimination of internal and external threats in time.

Keywords: national security, national economic interest

## 1 GENERAL

Globalization processes in the modern world, the growth in world industrial production, the high level of competition increase the level of menace to national economics and reduce main priority - ensuring national interests - increase the competitiveness of person, society and the state. An effective system of state economic security ensuring give the possibility to identify internal and external menace for national



Picture 1. System of formation of national economic interests.

economic interests in time and as a results prevents whole socio- and economic system from damages. Awareness of the severity and the real danger of these problems induced detailed studying and definition of national economic interests on the national level and ensuring protection of national economic interests by the state.

Formation of national economic interest occurs as a result of relations between people, grouping them into community groups, local communities based on common interests, including economic. These groups interaction leads to the

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formation of public economic interests, aimed at the social and economic of society. At the same time, the state is another category subject of NEI, that guarantees the ensuring these NEI. Naturally, that state has an own economic interests that would be an instrument for achieving economic goals of society.

According to the authors, the system of national economic interest is as follows (Picture 1).

National economic Interests aimed at improving the life quality of the largest population in terms of minimizing the loss of his other pieces. But Ukraine national economic interests are often inferior to the interests of political and economic groups, resulting in a material adverse effect on the economy of the state.

## **2 CONCLUSION**

Society, as its needs, is constantly changed which indicates the need for continued study of the economic interests of citizens, analysis of priority and urgency. Securing and protecting national interests require using of complex actions legal, institutional, organizational and economic problems that necessitate the use of the relevant policies of protectionism, which in turn will reduced the number of both internal and external threats to national economic interests.

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# THE MANAGEMENT CAUSED BY THE CHARACTERISTIC OF ENCLOSED SYSTEM

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## ABSTRACT

The methodology of effective management on the basis of a choice of productive administrative tools is considered. Using system approach, the organization is considered as the difficult system consisting of enclosed specialized systems. Integrity of the system is reached by means of hierarchical system of the purposes, each of which is a specific goal of the certain enclosed system. Independence of system is reached by various sets of administrative tools that is necessary for productive achievement of goals in each of subsystems.

Keywords: the system, the enclosed system, administrative tools, hierarchy of goals, system effectiveness of management, productivity of administrative tools

## 1 GENERAL

Various environmental conditions force to use a certain tool kit of the concrete administrative functions directed on achievement in management. For example, well predicted, poorly changing environment forces mass introduction of tools directed on the fullest execution of function of planning [1]. In due time so accounting was born, not so long ago there came an era of business technologies [2].

But not only external, but also the internal environment causes some aspects of productive management [3]. Describing the internal environment it is necessary to begin with the description of control system used at the concrete enterprise [4]. Also the internal environment treat, as well as technical characteristics of the equipment, and the characteristic of the personnel occupied in concrete system is important.

Considering organizational control systems from a position of the system analysis, the manager deals with the enclosed systems of various level [5]. Allocating concrete system, and abstracting from big and smaller systems into which it enters or of which consists, the manager chooses the tool or a tool kit for the most productive activity [6]. For example, the type of organizational structure predetermines management style of the head. From authoritative to liberal management style [7] that corresponds to transition, from rigidly hierarchical to organic type of organizational structure [8].

Thus, in system, at each level of its enclosure, there is the, effective set of administrative tools, using which manager can achieve the objective set for it [9]. To the contrary, not probably effectively to use the same set of administrative tools at any level of management or working with systems of various nature.

## 2 CONCLUSION

To conclude, the main tasks of management are: the analysis of operated system from the point of view of the enclosed subsystems of various character making it; development of the purposes and tasks, in each of the allocated subsystems; choice of a set of the administrative tools necessary for productive achievement of goals. Thus it is necessary to observe hierarchy of the purposes, each subsystem and the general system as a whole for observance of integrity of a control system.

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## FINANCING SCHEMES OF DEVELOPMENT PROJECTS IN UKRAINE

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### ABSTRACT

The theses contemplates features organization of activity of development companies in the real estate market of Ukraine. Analysed the implementation stages of the project and its financing schemes, and defined the advantages and disadvantages of each of the sources of financial support real estate development activities.

Key words: development, development project in real estate, financing, purposed bond certificates, project financing, Construction Financing Funds

### 1 GENERAL

The real estate is considered to one of the lowest risk spheres of long-term investment with enough high level of commercial viability. As far as big development projects need vast investments, their realization is back-breaking for company's own finances. So developers have to raise funds from external sources. At the same time considering multiannual West practice specifically investment from external sources correspond the core of Development. The usage of debt capital allows the company to bolster the profit margins on the owners' equity. Of course for supplying the adequate level for investment project on the part of potential investor, development company takes part in the project financing by their own sources (nearly 20-30%) [1]. Generally it refers to the initial project stage with maximum risk.

Nowadays the majority of developers use standard ways of financing such as bank crediting, internal funds, investors' funds and CFF for housing property. But with the development of economy there are new methods of fund raising. It should be noted that Construction Financing Funds allow to raise capital and to find buyers for future real estate objects at the same time. The goal of creating CFF is draft of housing accommodation in property by fund grantors. Another way of housing finance can be performed by purposed bond certificates which provide discharge of duties by housing construction project transfer (object part). Issue of purposed bonds is made on sum which can't be exceeded the value of construction object according to approved documentation and which isn't exceed the equity triple size or amount of collateral which is given with this purpose by third parties. For large-scaled development projects in the area of non-residential property is advisable to use project financing. Its main difference from other forms of loans is the fact that the source of repayment is generated project cash flows and collateral debt – assets of funding. In schemes of project financing as a financial investment project implementation participants also often act except commercial banks, investment banks, investment funds, leasing companies and other lending institutions. There is a perspective of insurance companies and pension capital funds participation in development projects financing.

### 2 CONCLUSION

Consequently, development projects financial security consists of their own, attracted and borrowed funds. In addition, according to the specific nature of development project there is various sources of funding involved at various stages of its implementation. Moreover, the greater project degree is, the greater share of external resources is in financing structure. This is due to the feature of the development project and its risky nature of the initial stages of implementation. The most promising schemes of realization of investment projects of development companies should be included bank lending, CFF, project finance and bond issues.

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## PECULIARITIES OF CONCEPTUAL DESIGN OF THE OIL PRODUCTS TERMINAL

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### ABSTRACT

Modern terminal is a complex object both in terms of organisation of smooth operation and taking into account the prospects for its development. In this study, we are talking about improving the operation of Riga Terminal that provides services in the Latvian territory for transshipment of refined oil products that do not require heating. In the course of this improvement a contradiction arises, that is, providing increased volume of transshipment of oil products in the face of fierce competition requires making additional investments in the organisation and reconstruction of production. And all this is happening against the rate of return of capital fixed by the owners.

Keywords: transshipment of oil products, contradiction, investments, risk and return, effectiveness, solution

### 1 GENERAL

The managers of the Terminal should have mechanisms allowing them to correlate the proposed improvement of operation taking into account the reasonable risks and fixed rates of return [1]. This problem is resolved with the use of the conceptual design methodology [2]. This methodology is based on the use of technology of integrated decision analysis [3] and cost management approach [4]. The technology of conceptual design is used for a more objective assessment of business.

The target of this study is to assess the effectiveness of reasonable changes in the operation of the Riga Terminal engaged in transshipment of oil products. Such an assessment is carried out over the long run.

In accordance with the target determined a number of benchmarks were identified to identify opportunities for the development of the Terminal, which could ensure the timely updating of the transition to the new strategic goal. Such a transition is formalised by the following expression:  $(ROIC-WACC) > const$ .

This problem is resolved based on the Terminal operation cost estimate to be carried out over the long run under the three scenarios of the Terminal development for the period 2014-2023.

In the paper we consider the following three options for assessing scenarios for the terminal:

1. A comprehensive assessment of the Terminal operation functioning without changes;
2. A comprehensive assessment of the Terminal optimisation-targeted operation without additional investment;
3. A comprehensive assessment of the Terminal operation in the reconstruction with additional investment attracted.

As a result, priorities are set for each of the above scenarios for improving the Terminal operation. These priorities are determined by the managers of the Terminal based on the results of assessment of the effectiveness of the proposed changes. The assessment used the cost criteria calculated in terms of growth in market value.

### 2 CONCLUSION

The transition to cost management principles would enable the managers of the Terminal not only to evaluate the return of the capital invested in its assets, but also identify timely the moments of the need to move to the organisational and technological innovations.

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## INFORMATION AND ANALYTICAL SUPPORT OF TOURISM ENTERPRISES' MANAGEMENT

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### ABSTRACT

In today's context of globalization and the transformation of the economy of information- analytical component of tourism is an important element of the management system and providing timely, reliable information, dissemination of details about the country and its tourism opportunities, as well as to determine the position of the state in international tourism and information space, identifies opportunities introduction and implementation of modern mechanisms of state regulation of information provision at the national and regional levels of government. Thus, analytical support should be considered as an effective means of improving of management efficiency and level of competitiveness in tourism, which in turn are updated by the need of finding new forms of organization and its implementation in practice in modern terms.

Keywords: analytical support, tourism and travel companies

### 1 GENERAL

The tourism industry is an intersectoral complex, which consists of a set of tourist business, providing production and sales of tourism products for the domestic and international tourism and straight (accommodation and catering facilities, spa facilities, transport) and indirectly (financial and insurance institutions, commercial enterprises, organizations entertainment and leisure) activities related to tourism. Given the characteristics of tourism and information society there is need to improve information-analytical maintenance of travel companies, involving a system of organizational, technical, technological, legal, scientific, exploratory and provide process control information and communication linkages between all components travel industry [2].

Nowadays, growing interest to travel agencies, hotels, recreational areas to global information using modern Internet technologies that broaden the range of potential customers and interested people together. At the same time, system information and analytical support should be seen as a means to process, function of tourism industry in modelling, monitoring and forecasting of economic, ecological and innovative processes [1].

Thus, information management and analytical support of tourism activities should include the introduction of modern technologies that ensure communication and information, advertising relationship between tourism enterprises, tourists and other stakeholders will optimize internal and external business processes that contribute to sustainable development and higher the competitiveness of tourism enterprises in the global and domestic tourist markets.

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# MANAGEMENT PROCESS COORDINATION AND COMMUNICATION ADJUSTMENT ON FUNDAMENTAL CHANGES MECHANISMS

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## ABSTRACT

The methodology of stabilized functioning of the organization is offered. On its basis, developed setup procedure management system to conduct fundamental changes. Changes take place in conditions of keeping a strategic objective. Achieving occurs during the implementation of a new specialized offer.

Keywords: object, restrictions, feature, change, potential, development

## 1 GENERAL

The proposal is based on the perspectives of management capacity of technologically advanced enterprises, and is implemented by the constraints of style of self-organization and system thinking principles; adjustment of controlling mechanisms assumes reduction of object of management in a ready state to changes [1]. Fundamental changes conducted in the conditions of transferring a management system on a new qualitative level act as the object of management [2]. Readiness of an object for changes is expressed in disclosing of potential of the organization without infringement of loss of system integrity [3]. Measurement of the organization potential is observed all over the distance of achievement of a strategic target. Strategy implementation is checked from positions of reaction of a management system on revealing in the organization structure the elements, braking its development. During the check, any undesirable tendencies of organizational development are traced and synthesized [11]. Such tendencies should not only be blocked, but should also serve as a basis to transformation of a weak point of the organization into its strong quality. It gives the organization reasonable movement towards the set purpose. Tracing of undesirable tendencies is conducted within the limits of the offered concept including value-assessment bases. Such bases are built on axiological positions. Axiological shade is given to the tendencies in study by realizing effectiveness of the new norms of behaviour established for potential participants of the organization in a context of their understanding of possible changes in real actions [12]. Starting positions determine character resource capacious operations providing timely effective actualization of brought changes taking into account possible redistribution of credentials.

Implementation of the offer causes timely change of structure of the organization, the events against creation of the prepared team of manager [13]. Thus, radical character of changes in administrative structures and personnel is focused on use of methodology of adjustment of a management system on carrying out fundamental changes. Thereupon it is required to solve the tasks aimed at application of the new conceptual approach to the organization. The approach is based on decision search constructs considering internal improvements of estimated variants of organization development, and constructs of the analysis of their practicability, used in the conditions of incompleteness of information and corrected under external environment requirements.

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## 2 CONCLUSION

Preparation of team happens in the conditions of the collective training, promoting strategy finishing to all participants of the organization. The offered methodology allows forming strategic thinking based on which sources of vulnerability of the organization are detected. Thereby it is possible to find out not only sample errors of management, but also to anticipate management system destruction. As a result in due time fixes wicked design of one of participants of the organization that is shown in imperceptible regeneration of the organizational structure, quite often having corruption roots. Such a structure capable in due time to trace accruing influence of personal interests on concrete subprocesses and elements, does not pass into an uncontrollable condition. Comprehension of the sources of rupture of the organization allows making correcting changes. As a result, decision of not a sample task is led during development and inclusion of the new technology of management in the developed organization. Transfer of a control system to new qualitative level occurs without resistance and without violation of its integrity

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# THE PROBLEMS OF PROVIDING THE ECONOMIC SECURITY IN THE CONDITIONS OF GROWING SHADOW ECONOMY

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## ABSTRACT

The investigation of the influence of the shadow economy on the level of economic security was conducted. It was detected a tight correlation between these parameters. The additionally gained threat to economic security of the state was determined in terms of growth of the shadow economy.

Keywords: economic security of the state, shadow economy, threat to economic security of the state

## 1 GENERAL

In domestic and foreign literature a considerable attention is paid to definition and study the threats to the national economy, their sources, power and direction, and developing the measures to ensure the economic security of the state. At the same time there are no profound studies of the influence the shadow economy on its integral index as a powerful threat to economic security of the state.

The growth of the shadow economy sector is a significant threat to the national economic system. The evidence of expansion the shadow economy is the increase in unemployment rate, which indicates the flow of labour resources. The weakening of social protection, reducing its economic activity and slowdown the macroeconomic growth as a result of financial resources outflow is a consequence of this threat.

According to the results of analytic calculations it was found a reverse link of the economic security on the level of the shadow economy. The density of correlation between these parameters indicates a high level of dependence the economic security of Ukraine from the spread of the shadow economic activity.

The theoretical analysis of formation and propagation the shadow economic activity has allowed to reveal that the shadow economy is a threat to economic security of the state, which is the catalyst of the other threats at the macroeconomic level, including financial, investment, science and technology, social and other spheres, because the threats to economic security interact with each other, influence each other with different levels of complexity and manifest themselves in all spheres of economic activity.

The shadow economy which exceeds 30% of GDP could trigger a serious macroeconomic imbalance and undermine the mechanism of providing the economic security, particularly in times of economic crisis.

## 2 CONCLUSION

The impact analysis of the shadow economy on the level of economic security of the state has allowed revealing a direct correlation between these parameters. This makes it possible to classify the shadow economic activities to the number of the real threats to economic security of Ukraine, because it negatively impacts on all aspects of life, significant effects on the amount and structure of GDP, distorts official data about the real economic situation, causes loss of tax revenue, provokes an unfair and non-transparent distribution of national income. The social insecurity and distrust of the government increase as a result of the shadow economy that destabilizes the socio-economic development of the state.

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## ECONOMIC MECHANISMS OF NATURE USAGE

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### ABSTRACT

The basic elements of the economic regulation system for nature-use and nature-protective activity are fees for special consumption of resources (mineral, water, soil, forest, biological), fees for polluting, taxation mechanisms, and fines for violating ecological legislation. State budget systems and extra-budgetary financing of environmental protection factors remain important functional elements.

Current ecological legislation establishes a direct connection between implementation of nature-protective mechanisms and their financial sources. Money paid for resource use should be directed toward financing resource restoration and preservation work.

Keywords: economic mechanism, economic regulation, taxation mechanism, resources

### 1 GENERAL

Reforming the economic system of nature usage and restoration includes four elements (see, Fig. 1).

Ukraine's natural resources are used in both a general and a specific way. In compliance with the order on the special use of natural resources, citizens, enterprises, institutions, and organizations are allowed to own, use, or rent resources on a special paid permission basis, in the form of registered licenses for conducting production activity. In cases stipulated by the law, the licenses can be granted under beneficial conditions [1].

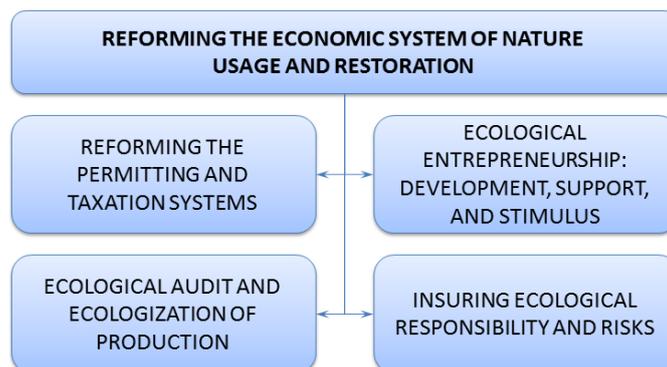


FIGURE 1 ELEMENTS OF REFORMING THE ECONOMIC SYSTEM OF NATURE USAGE

Ukraine's licensing and permit system is set up to cover use of the environment in all areas. The largest number of permits, however, is issued to companies, institutions, and organizations for handling wastes and hazardous materials.

Within the system of economic mechanisms governing nature use and restoration, ecological audit is a mechanism that increases the ecological grounding and effectiveness of economic subjects activity, as stated in the Law of Ukraine "On Ecological Audit". National and state standards are similar to relevant international standards in terms of the systemic integrity of ecological management and audit, but the Law of Ukraine "On Ecological Audit" does not foresee such integrity. In addition, some inconsistencies

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and contradictions exist that violate the principle of independence in ecological audit, along with the principle of independence in the training and certification of auditors [1].

In Europe and internationally, ecological insurance represents an effective market mechanism that guarantees that the ownership interests of citizens, companies, and the state will be protected. The sphere of ecological insurance includes insuring the risks of emissions that exceed the norm and hazardous element dumps, ecological losses that result from ecological disasters, ecological insuring of new technologies (including biotechnologies), etc. [2].

Developing ecological entrepreneurship depends on creating a public demand for ecological jobs, services, goods, equipment, technologies, and a healthy, high-quality environment. This is a task for state, civic, and entrepreneurial environmental management systems working in combination.

## **2 CONCLUSION**

Key recommendations for economic mechanisms of nature usage and restoration are reforming the system for accumulating and using funds for environmental and revising, the legal framework for the target use of environmental initiative expense articles in state and local budgets

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## MANAGING THE DEVELOPMENT OF REGIONAL INNOVATION POTENTIAL

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### ABSTRACT

In the paper considered the basic goals and objects of the managing the development of regional innovation potential. Key activating factors of the region innovation development, which would increase the competitiveness and innovation capacity of the region were identified.

Keywords: innovation, management system, innovative regional development, regional innovation potential

### 1 GENERAL

Processes of managing the development of regional innovation potential are based on a system of goals, providing its effectiveness. The strategic aim of managing the development of innovation potential is the advantageous creation of innovation environment. Which will provides transformation of scientific ideas and developments in the competitive products of international level, these product introductions in the most important sectors of the regional economy and the social sphere. Achieving the goals of managing the development of innovation potential should base on a system of principles, which ensures compliance with stable growth and equal development of all Ukrainian regions.

The leading role in this process belongs to the government, which should purposefully to organize the development of new innovative economy. However, the government needs determine the its own strategy to support innovation. Scientists identify three types of such a strategy: active intervention when the government determines the direction of scientific and technical progress and ensure their implementation; decentralized regulation, when the government creates the necessary legal, economic and other conditions for the successful implementation of innovation, improves their innovation activity stimulates the growth of demand for innovative products; mixed strategy, where the government has a policy of active intervention in regard to public enterprises and organizations and decentralized regulation to others. It is a mixed strategy, from our perspective, should adhere to Ukraine, as this strategy would better take into account peculiarities of the domestic economy.

System of management development of innovative potential includes the control object – the innovative potential of the region and the subject of management – authorities, which include those provided adoption of innovative solutions. The basis of the system of management development of innovative potential is to provide interaction between subject and object management that achieves the highest system efficiency innovations. Formation of local strategies within the system of innovation strategy provides by management solutions. Thus managing the development of regional innovation potential appropriate to consider as a set of tools and methods of regulation and economic activities. Which aims – increasing innovative potential and preparation platform to drive innovation in the region.

Effectively managing the development of regional innovation potential provides for the application scheme, implementation of which will significantly improve the competitiveness of the region and transform the region's strengths in effective competitive advantage.

Managing the development of regional innovation potential accomplish three main tasks:

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1. Forming of innovative potential – planning and acquisition of resources needed to achieve the goals of innovation;
2. Capacity of innovative potential – quantitative and qualitative improving the of innovative potential in the region;
3. Implementation of innovative potential – the process of converting of innovative potential components into the final product - innovation [1].

In general, the management tasks development of regional innovation potential is the transfer potential of region from one state to another, higher, sufficient to achieve the goal.

Development of regional innovative potential is characterized by optimal results of the new or improved products and innovative processes. It should solve the problems concerning the assessment of the degree of innovation novelty and the differences in their level – there is a new innovative product for the industry, region, country, world market, in turn, reflects:

- the share of innovative products in the total output of the company's products;
- the impact of innovation on the final technical-economic results of financial-economic activity in the region;
- the impact of innovation on the efficient use of regional productive resources.

Managing the development of regional innovative potential is based on solution of multi-management problem: how using available resources provide the maximum economic advancement and improvement of the most significant quality of life indicators in the region. Now the choice of management tools development of the innovative potential of the region enjoys a buyout both government and regional authorities, is extremely narrow. In general, it consists of a control type instrument that are left over from the previous economic system. And as sooner the authorities will use other tools (levers indirect effects), as few obstacles will arise on the path of reform. These tools will be more applicable because the region has certain independence [2].

For effective implementation of the system of management development of regional innovation potential, it should agree with the volume of real resources, have an adequate selection of regulatory action for each situation; monitor the execution of the intended actions. In this regard, the system of management development of regional innovative potential should include the generating unit, the resource block, the block implementation, the monitoring block.

## 2 CONCLUSIONS

Thus, the stability of Ukraine's economy in the future will depend on whether introduced in the country and region system of management development of regional innovative potential. Which is a detailed system-logical construction, built on regional characteristics using interrelated qualitative and quantitative parameters, motivation and efficiency of the innovative dynamism in the regions, considering the existing innovative potential. The advantage of this system is that it's complex and takes into account the existing structure of the regional economic system, the criteria of the present and the future considering the available alternatives.

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# IMPLEMENTATION OF A WORKING MODEL FOR THE PROCESS OF SOCIAL ADAPTATION OF FORMER MILITARY PERSONNEL AND THEIR FAMILIES

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## ABSTRACT

This article discusses theoretical aspects associated with the systematic approach application to the implementation of a working model of the process of social adaptation of former military personnel and their families. This approach includes studying and taking into account individual peculiarities of personality; the influence of different environments and adequate combining of individual and group awareness-raising forms of impact. The overall pattern of social adaptation will be instrumental in the comprehensive planning of work on the basis of diagnostics and evaluation of social environment; coordination between all the subjects engaged in this process; development of modern technologies aimed at establishing social and pedagogical conditions.

Keywords: Social work, social management, social adaptation of the military

## 1 GENERAL

Organizational system of the process of adaptation of former servicemen and their family members adaptation grounds in the theoretical rationalization of human adaptation problem, systematic interdisciplinary approach to social and educational activities and social work, in determining the ex-servicemen and their families social adaptation nature, in analysing the intrinsic characteristics of this process - being sometimes planned, sometimes spontaneous, in summarizing the working practice of those, working with this population.

Systematic approach has been used as a methodological basis of the innovational managerial work, whereby subjects are regarded as systems comprising of specific components aimed at revealing the wholeness, at disclosing communications type variety and their arranging in a single pedagogical system representing a relatively steady set of elements, organized to bring together people, spheres of their activities, functions performance, spatial and temporal networks, relationships, ways of interaction and their operational structure in order to achieve certain educational and rehabilitative goals and results, to fulfill certain planned tasks concerning education and training of an individual.

**Subjects of education** are two: personality and conditions directly affecting it. Moreover, these conditions can be divided into three groups:

- conditions- individuals (e.g. teachers, social workers; administrative personnel at each levels);
- conditions- quality of groups to which a particular individual belongs (family, group, school);
- conditions- economic (premises, equipment etc.), legal, administrative etc.

With an object of distinguishing various activities of the educator (pedagogue, social worker) aimed directly to education and conditions they are given different names: educational activity and work aimed at creating educational conditions.

There are further objective and subjective factors that can both facilitate the proper understanding of social relations, society and state imposed requirements, formation of habits of moral behaviour by the individual and to oppose it or just negatively affect personality.

In this model, the implementation of organization of the process of social adaptation is envisaged at three levels:

- micro-socium (family) - as an educational system, providing education and personal development, basic needs, economic and psychological support;;
- meso-socium (school) - teaching situation related peculiarities: regulatory, logistical, social, psychological, staffing;

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- macro-socium (region) - social and psychological departments work, the work of social adaptation centers, places for medical rehabilitation; the use of foreign experience, mass media, using the three sectors of economic activity: government, non-government, commercial, i.e. coordination of all financial, intellectual, technical and personnel capacity of the society to form pedagogical thinking in different subjects within the society.

Meso-level expands the opportunities for educational impact on the individual by making use of all its integrative educational opportunities.

Considering management processes for the development of this model, we determine that these processes take an important place and prominently occur in each component at each level of functioning of the educational system.

Important conditions for the effective social adaptation of former military personnel and their families shall be the use of integrative educational opportunities of the society and guiding its educational potential.

In the development and implementation of this model, we rely on the establishment of a wide system of training, retraining and qualification of social workers who, in accordance with their professional capacity, know how to find optimal ways to improve the mechanisms for social adaptation of individuals facing different conditions of life.

All this enables to introduce a common social work technology on the basis of which the system of staffing in the implementation of the process of social adaptation of former servicemen and their families to be also developed at all levels: personal, micro, meso, macro.

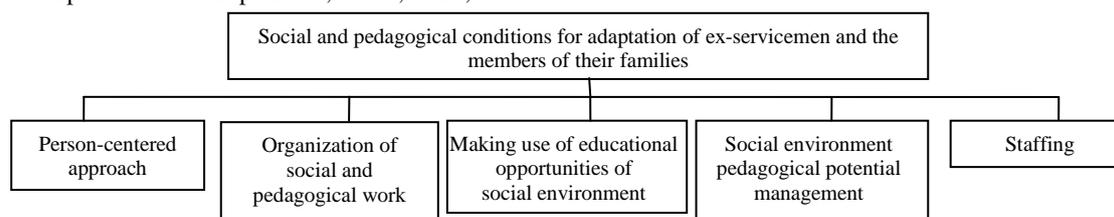


FIGURE 1 SOCIAL AND PEDAGOGICAL CONDITIONS FOR THE ADAPTATION OF EX-SERVICEMEN AND THE MEMBERS OF THEIR FAMILIES

This working model of the adaptation process of ex-servicemen and their family members suggests a dynamic educational impact: both on the personality of former military personnel and members of their families and on the subjects, providing the process, also on social environment in order to create a mutually commitment-minded, active and focused adaptive process in view of the socio-pedagogical conditions conducive to its effectiveness.

The analysis of the theoretical problems of social adaptation, social pedagogy and practice of social work makes it possible to identify the key social and pedagogical conditions of effective social adaptation (at three levels: intrapersonal, micro and macro): person-centered approach, social and pedagogical work organization, making use of educational opportunities of social environment, social environment pedagogical potential management. By integrating pedagogical efforts of all subjects and using educational resources of social environment, this working model of the adaptation process will enable provisioning of social adaptation to this group of people and shall assist their transition from population needing social and pedagogical services into socially up-and-coming individuals.

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# CONCEPTUAL FOUNDATIONS OF SOCIAL - RESPONSIBLE MARKETING

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## ABSTRACT

There are a lot of difficult conditions in modern business activities and it dictates ever higher requirements for Ukrainian companies. For every manager becomes an urgent need to consider the requirements of civilized business and above all - the introduction of the concept of social responsibility in the implementation of the development strategy of the enterprise, because in terms of integration into the world community social responsibility is an essential component of the foundation and competitiveness.

Keywords: social-responsible marketing, Ukrainian companies

## 1 GENERAL

The aim of the paper is to outline the nature and the evolution of the concept of socially responsible marketing.

Socially responsible marketing - is the process of identifying and meeting the needs of customers with the needs of the whole society. Socially responsible marketing is a practical expression of the foreign component of corporate social responsibility.

Today is most popular and developed in Ukraine tool for socially - responsible marketing is sponsorship and charity. However, in the world practice has used more effective tools for a long period of time that allow attracting end users. The social responsibility of the enterprise is not mandatory, but rather voluntary. Social functions entrusted to government agencies that provide needs for education, health, arts and sports, science and culture. The actual problem for Ukraine is the question about enhance the functioning of the social sphere. At the same time, equally important is the formation of socially responsible business. If the Ukrainian company will extend its sponsorship and charitable activities, their image, public opinion about their reputation in domestic and foreign markets will certainly increase.

Companies addressed for the concept of socially - responsible marketing recently. The concept of socially responsible marketing was intended to replace the traditional concept of marketing with a view to rationalizing consumption and environmental protection of society from unwanted production processes. The focus is on integrated marketing activities, which addresses to the needs of the target market and also takes into account the social and ethical needs of society as a whole. The concept of socially - responsible marketing company, along with the research needs of potential and actual customers, finds the public interest and the desire to satisfy them.

Today the trend is activated care about the environment in the escalation of environmental problems, related to basic human needs in quality and clean food, clean environment, which are not satisfied. Therefore, perspective direction activities of the companies advocate conducting marketing policy under the prospective customer requirements, related to the implementation of the concept of socially - responsible marketing.

The concept envisages a situation when the efforts of various manufacturers in marketing are flush and the market competition is very high. Competitive advantages will get the company which offer best meets the needs of the buyer, while in its operations, the company takes into account the interests of society and satisfy them.

The leading idea of the concept - is the production of goods that satisfaction existing needs, with the considering requirements and constraints of society. The main instrument – is the marketing mix (4R - Marketing Mix), built on the study of consumer and the study of social and environmental impacts of production and consumption of goods and services.

The main goal - to satisfy the needs and requirements of target markets, provided savings of men, energy, material and other resources, protection of the environment. An important issue in this concept is predicting trends and processes that will be relevant in the future.

## DETERMINANTS OF INTELLECTUAL LEADERSHIP

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### ABSTRACT

The work is aimed to analyse the issue of economic development due to new factors and changing priorities in current conditions. It is determined the basics of leadership and key performance indicators that taking into account the intellectual component in the structure of the economic changes.

Keywords: leadership, innovation, intellectual resources

### 1 GENERAL

With the development of the world, economy countries and companies always have identified the number of factors and assumptions, which determined their leadership or dominance in international economic relations. Leadership of the countries is often determined through the output of major products and then services. However, these figures do not identify the level of economic growth and major prospects of its development. In current conditions and definition of a new paradigm of "Homo economicus", the priorities are changing to the intellectual resources as a major prerequisite for economic growth.

Analysing the World Development Indicators and main indices that reflect the extent and quality changes of national economies and the economies of the region can be seen that they all have modified its contents according to the new economic conditions. The main indicators here are availability of human resources, their quality, intellectual component of the economy, development of high-tech products, level of commercialization of R&D, number of patents, information and communication technologies, the amount of innovation in the economy, etc. These figures confirm the thesis that the intellectual component becomes mandatory for the functioning of a successful economy in current conditions.

Now there are several economic tendencies: the world is beginning to divide to the countries that implement key innovations reaching leading positions and countries-imitators that are just based on the experience of other countries.

According to this, it is necessary to consider the question of structuring the global economic environment on the basis of the key factors and criteria of countries' development. It is also important to take into account sectorial structure of the economy, which has contributed to the formation of the panel leaders of the global economy, potential leaders and outsiders, the formation of new structures and organizations that change the format of economic activity on a global stage. It needs to be analysed the activity of centres and centres of dominance with a high concentration of capital and the delocalization of economic activities.

Increased attention needs the identification of systemic issues of leadership based on intellectual resources, which is determined not only by comparing the level of competitiveness of the national economy, but also through the estimation of prospects of development of the economy through the predictive donation.

## KEY PROBLEMS ASSOCIATED WITH INVESTMENT MANAGEMENT OF UKRAINIAN STATE-OWNED ENTERPRISES

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### ABSTRACT

Under current conditions characterized by gradually emerging of national economy from the long-term crisis the necessity of investment activity is of particular relevance. This is explained by the fact that progressive structural changes in the economy, innovative development of the real economy, as well as increase of economic competitiveness and implementation of sustainable socio-economic development of the country are impossible without investment activity of enterprises. Successful solution of these problems provides the need of raising investment funds from a wide range of domestic and foreign investors into Ukrainian economy. Special attention in this paper is paid to the important issues of investment activities of state-owned enterprises. The scientific rationale for possible solutions of the investment management problems are defined by author.

Keywords: investments, investment activities of state-owned enterprises, investment management, efficiency, investment attractiveness.

### 1 GENERAL

The investment activity of the whole country, its different regions and even economic activities primarily depends on the financial situation of enterprises. Particular attention in today's economic environment is given to the current state of investment management in the state-owned enterprises. Investment activities of these enterprises face many challenges, which, in turn, require the necessity of restructuring of the investment activities management of state-owned enterprises. Successful restructuring of these activities is impossible without practical application of modern techniques and methods, which promote continuous automated process of change of current management systems in accordance with the rapid changes in the environment. The key role of management innovation in the innovation process of state-owned enterprises is that they provide the setting for the implementation of the management system innovation of various types. It should be mentioned that administrative innovations eventually transform the way the organization itself and lead to effective results. On the basis of the results of investment management analysis in state-owned enterprises, the following solutions are offered by author: continuous improvement of public investment policy based on the implementation of best practices in the formation and functioning of public investment; the introduction of direct and indirect methods of state support for investment and control of their implementation and efficient use; integration process of formulation and implementation of investment projects that need state support in the overall budget process; improvement of the regulatory framework of investment through improved tax, land, corporate and customs legislation; the introduction of disclosure on the basis of free and rapid access of the investors to the information, necessary for effective decision-making; improvement of organizational and methodological support of preparation of investment documentation; improvement of investment protection and guarantee of rights, interests and property investment activity subjects; improvement of the investment climate, based on the harmonization of investment, tax, credit and customs policy, and, finally, reducing administrative procedures, mutual tax and accounting of business investment in Ukraine.

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## USE OF PROJECT MANAGEMENT METHODOLOGY AND TOOLS FOR START-UPS

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### ABSTRACT

Use of tools and methodology of project management can be effectively used for successful start-ups. There are similarities and differences between such notions as start-up and project. This allows choosing the appropriate tools and methodologies for successful realizations of start-ups according to high quality standards.

Keywords: Project Management Methodology, Project Management Tools, Creation of start-up, Start-up

### 1 GENERAL

The main goal of this study is the application of project management tools and methodologies for high tech start-ups.

The main common trait of project and start-up is the process chain of creations and further development. An exception is that project ends when all aims are reached, but start-up does not. Start-up persists as a self-reliant business. (Fig. 1) [1].

P2M, PRINCE2 (Projects In Controlled Environments), and "Lean Startup" have been chosen as methodologies.

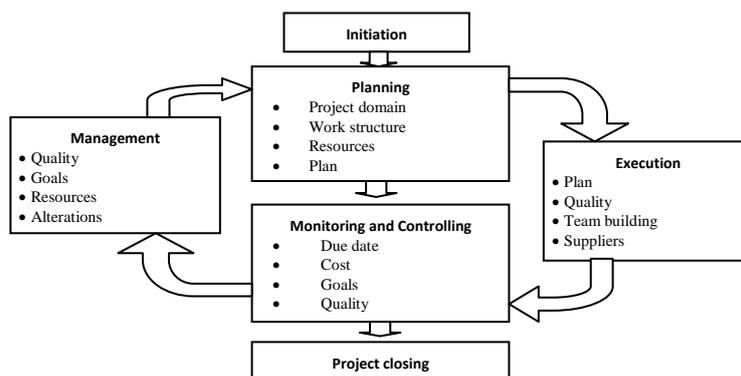


FIGURE 1 THIS DIAGRAM SHOWS HOW THE PROJECT AND START-UP IS INITIALIZED AND MANAGED

### 2 CONCLUSION

In conclusion it is worthwhile to note the importance of ability to use project management methodologies due to its high efficiency.

There are certain methodologies that correspond to the start-ups and make possible a new company to effectively manage resources, time, human capital and decrease risks.

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## SUCCESSFUL DEVELOPMENT PROJECTS IN COMMERCIAL BANKS

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### ABSTRACT

The modern world practice possesses an extensive set of methodologies and approaches of project management, such as PMBoK (Project Management Body of Knowledge), PRINCE2, MSF (Microsoft Solutions Framework). The competition in all areas of economy reached such limit when using the technologies of project management is a necessary condition of prosperity of each commercial enterprise.

Keywords: project management, bank, commercial, development, technology, implementation, tool, technique

### 1 GENERAL

The main goal of this study is to define the main factors of successful development projects in commercial banks. The bank is one of the main financial institutions in modern economy. Project management is an integral part of a control system of commercial bank and its activity as a whole. The larger and more considerable is the project, and then more professional approaches, technologies and tools are required. Hi-tech financial institutions pay close attention to development of various directions, such as implementation of information technologies and development of innovative products. The questions of effective project management in banks are very important.

### 2 CONCLUSION

Only modern standards and technologies of project management is not enough for successful implementation of projects. The success of the project of development in bank depends on many factors, main among them – timely tracking of tasks of the project, interest and an involvement of the top management and the bank personnel, its maturity to implementation of the project and use of results in practice, readiness of bank for creation of the working groups, the solution of organizational questions and allocation of resources. It is necessary to consider uniqueness and specifics of projects of development, absence of regulations and standards of management of development projects (procedures, documents, tools). It is better to plan, organize the project from beginning, than to spend extra time and funds for overcoming of the arisen risks and mistakes.

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# DEFINITION OF CRITERIA FOR EVALUATING THE ECONOMIC EFFICIENCY OF CLOUD COMPUTING FOR SMALL AND MEDIUM BUSINESS

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## ABSTRACT

Issue of transition to cloud infrastructure is very actual for most of small and medium-sized businesses. But it is important to determine economic effectiveness of this transition before implementing of migration process.

Keywords: capital expenses (CapEx), operational expenses (OpEx) and virtual machine cost (VM), total cost ownership (TCO)

## 1 GENERAL

The main goal of this study is the definition of assessment criteria for evaluating the economic efficiency of cloud computing for small and medium business and creation of a program (efficiency calculator) based on this study.

During study the input parameters for efficiency calculator were determined. All the input parameters should be divided to six categories: inputs determined by user, inputs for server cost calculations, inputs for storage cost calculations, inputs for networking cost calculations, inputs for power cost calculations and inputs for real estate calculations.

To determine the effectiveness of the implementation of cloud computing as a percentage financial return on a technology investment is the traditional ROI formula [2] was used:

$$ROI = \frac{(\text{gain from investment} - \text{cost of investment})}{\text{cost of investment}} * 100\%$$

$$\text{Gain from investment} = \text{Current TCO} - \text{Target TCO}$$

$$\text{Cost of investment} = \text{Transformation costs}$$

The first value to determine is a value of invested capital (Transformation costs), which can be found by allocation of input parameters to three groups: CapEx, OpEx and VM cost, for each of which the formula for calculating of the total cost were developed.

CapEx = Host hardware server cost + Host networking hardware costs + Host storage costs + Virtualization software license costs + Host operating system license costs + Applicable third-party license and integration costs

OpEx = Power and cooling costs + Datacenter space costs + Virtualization software support costs + Host operating system support costs + Third-party software support costs + IT administrative time costs

VM = CapEx + OpEx = Total cost of ownership / Number of virtual machines

Further calculations led to the creation of the calculator, which provides information about the effectiveness of the implementation of cloud systems in percentage and information about the period of cost recovery. All this allows the owners of small and medium-sized businesses to imagine in what direction it is better to develop the IT infrastructure in the next 3 years.

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## **2 CONCLUSION**

The notion that the transition to cloud computing leads to significant cost reduction is not always true, but in most cases it is favourably. So, before starting of the migration process, it is required to determine what is in store for the company. Economic efficiency calculator will give managers of enterprises an opportunity to visualize how beneficial this transition is, as well as to determine the return on investment, without the help of consulting firms.

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# INCREASING THE EFFECTIVENESS OF ADVERTISING CAMPAIGNS

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## ABSTRACT

The main goal of this research is to review existing ways to improve the effectiveness of advertisement companies. Advertisement is very important part of any product company. Without the advertisement, nobody will know about it. We want to assess the value of switching from an impression-based advertising system to a time based advertising companies.

Keywords: advertising, effectiveness, web-sites, ads-company

## 1 GENERAL

Most entrepreneurs understand that advertising is the process of communicating to prospects what is unique about their business, product or service. It is your company's voice and an investment designed to improve and expand business [1]. You cannot imagine how many sales dollars are generated by each advertising dollar you spend. However, there are methods that evaluate your ads-company. Make sure you have clear advertising goals. Advertising is considered a powerful marketing tool because it reinforces consumer preferences for brands by making consumers less price sensitive through product differentiation [2]. You might want to boost business overall, but your objective should be more specific: to increase sales of a new product or service, to build awareness of your company, to spur volume during a certain time-period, or to expand your business in a particular market. Tailor your evaluation methods to your goals. To assess the effectiveness of your advertising campaign, you can monitor sales, new customers, requests for information, phone inquiries, retail store traffic, website traffic, or click-through rates. Use these tactics to see the power of your ads. Easiest way to tell if you are advertising is working to track retail. Do not forget to watch for traffic before you start advertising, so you will have a basis for comparison. Moreover, ask new customers how they heard about your business. Comparison of sales before, during and after the campaign. Keep in mind that advertising often has a cumulative or delayed action, so ad -driven sales may not materialize immediately. In print media, include a coupon that customers can redeem the discount or gift with their purchase. Code coupons so that you can determine which ads or publication generates the best results. Offer an incentive for customers to tell you that they are in response to the announcement [3]. This is a simple way to find out where the customers know about you. Use special phone lines to track phone orders. Comparison before and after advertising traffic to your site. Your web host registers hits on your site and should be able to provide you with time reports. If you maintain your own web server, invest in software that generates readable traffic reports. When advertising on the site, the old metric click advertising is not a reliable method of knowing your work ads. While ad networks that sell advertising space on the Internet to track click-through rates and can provide you with performance reports, the figures you really want to know how long people spend on your site and how many pages they view per visit. Thus, you will know whether you have really engaged your customers.

## 2 CONCLUSION

Technology has transformed today's media environment and research approaches are changing too. Advertising is increasingly a technology-driven industry, and the technologies are evolving quickly. Digital development is evolving especially fast. Agencies and its web-sites that adapt to new realities first and fastest will have a big advantage as new tools become available. Those companies that make the necessary changes now on the basis of a lean approach have the best chance of unlocking their full potential.

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# SYSTEM OF DIGITAL IDENTITY MANAGEMENT IN NATIONAL RESEARCH AND EDUCATIONAL NETWORK OF KAZAKHSTAN (KAZRENA)

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## ABSTRACT

This paper presents the results of the deploying of digital identity management system based on open source software in the national research and education network of Kazakhstan.

Keywords: National Research and Educational Network (NREN), Identity Management, Single Sign-On, RADIUS protocol, eduroam

## 1 GENERAL

Management of personal data or digital identity information technology uses real-world identities mapping to electronic identity and ensure the appropriate use of information systems. This becomes particularly important in connection with the ever-increasing importance of ICT in many aspects of life.

Using the identity management system (Identity Management) gives potential for self-organization, which facilitates many important processes that are important for organizations. Unified management system organizes digital identities protected control user access to various resources and data in accordance with their ever-changing needs. Using IdM enables control throughout the operating cycle of the user. As a result, it allows you to get real benefits: simplified administration, increased security, accelerating return on investment (ROI), cost reduction.

In this paper, we present the implementation of IdM in research and education network in Kazakhstan – KazRENA, which has been used so-called federated identity management system. In a federated identity management model various tasks associated with certain operations on the identity, distributed among the participants of this operation. This model is based on the assumption that the distribution of tasks between the parties can provide users with convenience and privacy, and applications - efficiency.

## 2 CONCLUSION

In KazRENA network, the following approach was realized – the customer database of various online services was created using hierarchical directory LDAP, used authentication protocol is RADIUS. In the concrete implementation open source software solutions were applied – OpenLDAP and FreeRADIUS. One important application of the KazRENA's IdM system is that Kazakhstan universities now can connect to the international network of educational roaming - Eduroam.

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# THE DETERMINANTS OF CASH HOLDINGS OF US FIRMS

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## ABSTRACT

The majority of studies have used three theories to emphasize that the cash is costly for the firms, there are: trade-off theory, the financing hierarchy theory, and the agency theory. The trade-off theory and the financing hierarchy theory presented the testable hypotheses in order to show the correlation between cash ratio and explanatory variables, such as: firm size, market to book, cash flow ratio, networking capital, capital expenditure, acquisition activity, leverage and dividend dummy. Additionally, three motives explain why firms should have excess cash following the trade-off model: the transaction cost motive, the precautionary motive, and the agency motive.

Keywords: Cash holdings, US firms, cash ratio, regression model

## 1 GENERAL

The aim of this paper is to test determinants of firm cash holdings. To measure the cash holding, cash ratio is taken as a dependent variable. Cash ratio is measured as cash to total assets as in the paper of Bates et al. [1]. Here we concentrate on testing the hypotheses developed before. To examine whether the variables have a negative or positive relation with cash holdings, several regression tests were conducted which are suggested by Opler et al. [3, 4], Ferreira and Vilela [2], and Bates et al. [1]. The regression models used in the paper are OLS regression, regression with changes, Fama-MacBeth regression and fixed effect regression.

## 2 CONCLUSION

This paper tests the determinants of cash holding for public US firms over the period of 2004 to 2011. Overall, all obtained results are consistent with Bates et al. [1] study. In addition, the years of financial crisis, 2008-2010, were examined. Mostly the findings show great support for trade-off theory in explaining the cash holdings of the firm. In our study, we present results in support of two motives to hold cash the transaction motive and the precautionary motive, which state that firms hold cash to decrease probability of incurring future transaction costs and as a protection against any risk.

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# SYSTEM OF RESOURCE MONITORING ON THE BASIS OF MULTILAYERED INTELLECTUAL GIS

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## ABSTRACT

Control of the status of the country's resources allows making reasonable decisions both in the field of state regulation, and for the benefit of sustainable and safe development of the territory. Construction of such system requires complex application of a number of modern concepts and information technologies (Cloud computing, Big Data, Data Mining, machine learning, etc.). The problem of constructing the resource monitoring system as parts of the following generation of e-government system is formulated.

Keywords: green energy, resource monitoring, e-government

## 1 GENERAL

Usage of renewables is a modern powerful trend in energetics development. Technologies of "green energy" (technologies of gaining energy from renewable sources) are actively developing and will allow to reduce significantly the quantity of used non-renewable resources (oil, gas, coal, peat), to improve ecological indicators of systems for gaining energy and places of residence, to reduce the costs of obtaining energy, to increase the autonomy of life support systems and energy security of the country [1, 2, 3].

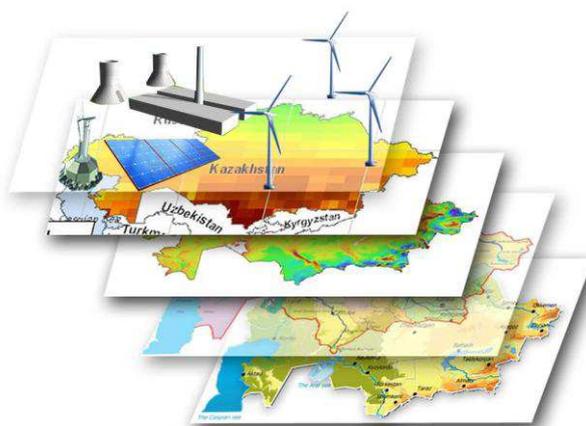


FIGURE 1 RESOURCE MONITORING USING GIS

The system of monitoring and decision-making support at different levels is necessary for decision-making on the use of various mechanisms of state regulation in the transition to renewable energy sources and taking into account other types of energy and non-energy resources (Fig1.). Modern systems of such level are constructed on application of several mutually supplementing technologies and systems: technologies of artificial intelligence and machine learning, the multi-agent systems, systems of data collecting and processing, including big data, systems of grid and cloud computing, geo information

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systems (GIS), etc. It should be noted that the processing of large amounts of data using machine learning techniques is one of leading tendencies in the field of ICT. For data analysis by person, its (data's) convenient representation is in the form of spatial system, often tied to geographic coordinates, that is the use of GIS [4, 5]. Nowadays there are no standardized methods and systems to provide representation of a set of big heterogeneous data on resource sources, its analysis and representation within multi-layered intelligent GIS (MIGIS). Such system should provide: the choice of technological platform for obtaining energy; assessment of economic feasibility of new technological schemes for obtaining energy; assessment of accompanying risks; assessment of ecological consequences during transition to new energy sources; assessment of opportunities of transition to intelligent systems of energy redistribution and storage, etc. Main layers of MIGIS:

- Geoinformation
- Energy sources
- Energy consumers
- The system of energy transmission
- Resources
- Technologies of obtaining energy
- Energy storage technologies
- Ecological state and the dangers, harm
- Economic assessments
- Legal assessments
- Data security

## 2 CONCLUSION

Development of multi-layered intelligent system of resource monitoring, beginning from methodology and data collection systems and ending with analysis algorithms and data visualization is an urgent problem, allowing solving an important social and technological problem. Such intelligent system can become a basis of the system for the next generation of electronic government (the intellectual electronic government – iE-government) where along with providing information services to the population there will be systems for the analysis and visualization of multidimensional data and decision-making support.

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# SPECTRUM SHARING PRICING WAR IN HETEROGENEOUS WIRELESS ACCESS ENVIRONMENT

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## ABSTRACT

It is expected that in future mobile users may freely access to any radio networks owned by different wireless service providers (WSPs) in a more dynamic manner. Thus, services from these WSPs may vary since WSPs deploy different radio access technologies (RAT). In this paper, we study the price war between two WSPs operating in heterogeneous coverage area, which compete for users in an open wireless market. We construct a scenario where a wide area network WSP (e.g., WiMAX) providing user data services engages in a price competition with a hotspot coverage WSP (e.g., WLAN). We analyse a dynamics of price setting in an open mobile broadband market by means of a Monte- Carlo simulation. Accounting for changes in users demand, network costs, and capacity availability, we show whether price converges (does not) under spatial competition. Using a duopoly model for a WSPs competition, we characterize user demand fluctuation on a price change in the market. The results indicate that asymmetric markets are more competitive.

Keywords: wireless access markets; competition; resource allocation; capacity; coverage

## 1 GENERAL

In this paper, we investigate the problem of a price war in a mobile broadband access market. We envision a scenario where a newcomer WSP enters to the market with a presence of an incumbent WSP.

By utilizing a system model of [1], two heterogeneous coverage area wireless service providers (WSPs) are considered (Fig.1). These WSPs would compete for users in an overlapping area providing services with attractive offers in terms of asked price and perceived QoS. The WSPs are setting a price per data packet sent so that the average price per served packet is the price weighted by user's willingness to pay. We take in to account a user mobility, since the newcomer has a relatively short-range service coverage compared with the incumbent, its users would prefer be stationary. Moreover, a congestion cost is captured by the outage probability.

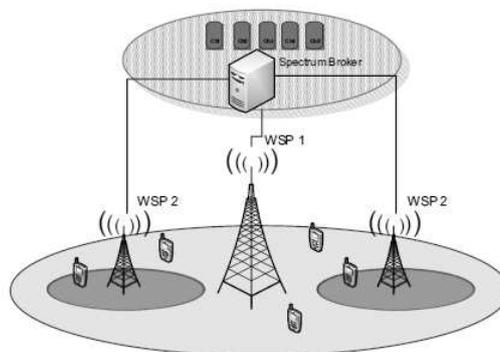


FIGURE 1 MODEL OF HETEROGENEOUS MOBILE BROADBAND MARKET

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We point out that this paper does not focus on pricing strategies [2] in general nor does it attempt to develop a complete theory of firms' pricing behaviour. We discuss how price wars can affect the users' choice (demand) and service providers' profitability in a heterogeneous competing landscape.

## 2 CONCLUSION

This paper addresses a price war between two wireless service providers (a wide area network WSP, e.g., WiMAX, and a spot coverage WSP, e.g., WLAN) with heterogeneous coverage who compete against each other in an open wireless market. We analyse a dynamics of price setting in an open mobile broadband market by means of a time varying Markov-process model. The results indicate that asymmetric markets induce more competition among WSPs and a price war affects their profits negatively. Prices do not converge and stability, under our specific assumptions, is never reached. Users do not get satisfied with too much fluctuation in prices and their satisfaction get really low. In conclusion, we observe that from price war does not benefit any of the parties involved in the market and some regulatory schemes may bring better solutions.

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## MANAGING CUSTOMER COMPLAINTS IN SECOND-TIER BANKS

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### ABSTRACT

Modern customer complaints management in second-tier banks is based on a traditional system that centres on a centralized customer support department. Most large companies that are not banks also consider this to be the best way to work with customer complaints. This leads to the problem of detaching the customer from the source of concern.

Keywords: quality management (QM), total quality management (TQM), service quality (SQ), second-tier bank (STB)

### 1 GENERAL

The main goal of this study is the implementation of advanced QM models to enable better customer relations management in a STB through resolving complaints in a more personalized way.

The main reason that people are leaving complaints is because they want to be loyal customers and they want to improve the quality of goods or services of the particular company they are addressing the complaint to. If a person no longer wants to be a customer he they will most likely never try to contact the company to announce their decision. Complaints, on the other hand, show that the customers feel that some things should be improved and when fulfilled these complaints become the tools that gain loyal customers.

Most customer service departments function as a centralized unit that acts as the only contact point with the customers. Once the complaint is received, it is processed and the resolution is presented to the customer by the same customer service department. This often leads to customers getting standard cliché answers and a wary shallow revision of the situation.

### 2 CONCLUSION

The alternative way to manage complaints is to direct them to the people responsible for the incident or those that are experts in the customer's question. This allows for an in-depth response and the client will interact with the person that is competent in the question. Customer service specialists often poses general information about the topic but only the person who is responsible for the customer's problems can have the full insight of the situation and is able to give an appropriate response.

This makes customers feel that their messages reached the right destination and were taken into account. This also allows to reduce the number of people needed in the customer service department.

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# DEFINING AND MEASURING VALUE OF INFORMATION TECHNOLOGY PROJECTS

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## ABSTRACT

Defining and measuring value of IT projects is a complex and challenging task. The project is usually considered valuable when it brings a value to the organisation. The literature suggests that delivering the project on time and within budget makes it successful and valuable to the organisation. Some sources also consider alignment of the project with organisation's business goals and objectives. This paper will consider current approaches to defining and measuring IT project value and discuss the challenges and tradeoffs involved.

Keywords: project value, IT projects, project value definition, measuring project value

## 1 GENERAL

The European Value Management Standard defines value as “a ratio describing the relationship between the satisfaction of needs and the resources needed to deliver them” [1]. There can be made a broader definition of value as the benefit received over and above the sacrifice made. In accordance with the above definitions, it can be stated that defining and managing value of the project contributes to the project's overall success. Project integration management is often considered as the key to overall project success. The project manager must take responsibility for coordinating the knowledge area groups and focus on the big picture of the project, and steer the project team toward successful completion. As that is what project integration management does, pulls everything together to guide the project toward successful completion, the project manager can meet stakeholder needs and expectations by performing good project planning, execution and change control. Knowledge areas include both above mentioned scope, time, cost, quality, and, in addition, human resources, communications, risk, procurement. And the project life cycle phases are the concept, development, implementation, and close-out. Hence, all those parts of the knowledge areas and the project life cycle phases are critical for the project success.

## 2 CONCLUSION

The project manager's task has always been to ensure that the expected results are produced in a timely and cost-effective manner. However, the project manager is also responsible for defining and measuring value of IT projects which is a complex and challenging task. Value of IT projects is not only in time and cost efficiency, but in many additional and indirect dimensions. Those dimensions include alignment with organisation's goals and objectives, satisfactions of stakeholders, meeting quality requirements, and many others. Thus, the project success and value brought to the organisation is determined by an integration of all direct and indirect, major and minor factors of the project.

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# RISK REDUCTION ON STOCK MARKET WITH HIGH SPEED OF DATA PROCESSING

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## ABSTRACT

The problem is how to reduce risk events on stock market with the optimal speed of processing data.

In particular, we will find abnormal deals with standard deviation formula using new technology of data processing protocol buffer.

Keywords: stock market, high speed, data processing, risk

## 1 GENERAL

In the previous methods, which was discovered there was a XLS or XML files. The disadvantage of them is a low speed of data processing. To determine standard deviation excel files needed to be created. Idea of our approach involves use of a new technology from Google's protocol buffer. There are a few steps to receive a high speed of data processing

- WEB application will calculate abnormal deals
- Then, WEB application serialize data into proto file
- Clients will deserialize data, and analyse results

To reduce the risk events we will use standard deviation formula. Full algorithm is described below:

Input data

- Statistics on transactions of deals on stock market:
  - Volume
  - Date
  - Number of deal
  - Buyer of security
  - Seller of security

Algorithm

- Put statistics data to standard deviation formula
- Using three sigma rule to determine abnormal deals

Output data

- Abnormal deals

For increase the speed of processing data, we will use Protocol Buffer technology. It is a method to serialize structured data. In particular, it was designed to be smaller and faster than XML.

WEB application was performed to find abnormal deals with standard deviation formula using protocol buffers. Employees from department of risk or people from financial police will receive data about abnormal deals much faster.

## 2 CONCLUSION

Using standard deviation formula, we will determine abnormal deals (suspicious transactions) on stock market. Build-in WEB application will perform the calculations and send with high speed of data to department risk or security on stock market. This application will save a lot of money on stock markets.

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# ORGANIZATIONAL DEVELOPMENT OF KAZAKHSTAN TELECOMMUNICATIONS SECTOR

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## ABSTRACT

In organizational development of the telecommunication sector of the Republic of Kazakhstan conceptual and methodical approaches ensuring organizational development and formation of model of the organizational structure focused on use of current information technologies were proposed.

Keywords: Project Management of telecommunications, Development of telecommunications

## 1 GENERAL

The basis of the development of the telecommunications sector structure is an effective ratio of large, medium and small enterprises.

The general scheme of the telecommunication sector structure providing its organizational development is shown in Figure 1. [1].

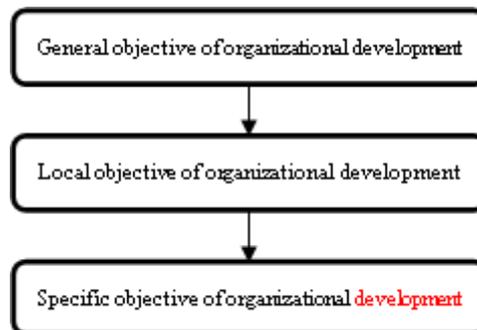


FIGURE 1 THE STRUCTURE TO ENSURE ORGANIZATIONAL DEVELOPMENT OF TELECOMMUNICATION SECTOR

## 2 CONCLUSION

In conclusion it should be noted that a key role in the development of telecommunications plays the use of high technology with successful use of project management which main objective is to increase efficiency of development of telecommunications at the level of reliability of managing national economy within a common information space.

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## ECOLOGICAL PROBLEMS OF KAZAKHSTAN

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### ABSTRACT

The ecological problems of Kazakhstan are discussed in this paper. The general classification of the ecological problems is considered and the particular problems of Kazakhstan within each group are stated.

Keywords: ecology, ecological problems, global ecological problems, national ecological problems, local ecological problems

### 1 GENERAL

According to the list of ecological problems of Kazakhstan which is made by Environmental Regulation and Control Committee of the Ministry of Environment the ecological problems of the country are divided into three groups, namely global, national and local [1]. Today, the most ecological problems throughout the world are caused by destructive human activities. The main goal of this study is to define the particular ecological problems within each group of classification that somehow has an impact on Kazakhstan and its population [2].

### 2 CONCLUSION

Since the negative influence of human activities is growing year by year around the world in general and in Kazakhstan in particular, the need for some measures to monitor, estimate and control the human impact on the environment is obvious. One of those measures the multi-layer intellectual geoinformation system can be, with the ecological monitoring of the different country regions as one of the main functionalities.

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## TO THE QUESTION ABOUT THE DECISION OF PROBLEMS OF ECONOMY MANAGEMENT

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### ABSTRACT

In this paper the mathematical model of economic growth processes and development of methods for optimal stabilization of economic systems are investigated. In modern conditions of economy transformation and transition to market relations, functioning and development of production systems are characterized by instability, non-linearity and dynamics of key indicators and parameters. Therefore, it is necessary to have the effective management and operational decision-making system.

Keywords: mathematical model, economic optimization model, optimal control theory, Krotov V.M.'s theorem, R. Lucas model

### 1 GENERAL

Problems of economic growth currently occupy a central place in economic discussions of leading countries. Many models are known, among them stands the R. Lucas model of endogenous economic growth, taking into account the factor of human capital accumulation, described by the following production function:  $Y = \bar{A}K^\beta (whL)^{1-\beta} h_a^\psi$ , where  $h$  – human capital,  $L$  – labour force,  $wL$  – amount of unskilled labour force, and  $whL$  – amount of labour in efficiency units,  $\psi$  – elasticity of  $Y$  output to the average for the whole economy level of human capital.

This production function is used in the economic optimization model and for its optimality criterion is assumed to maximize the discounted sum of a finite (non-industrial) consumption for the forecasting

(planning) duration  $[0;T]$ :  $W = \int_0^T e^{-\delta t} \frac{C}{L} dt \rightarrow \max_D$ , where  $\delta$  – discount coefficient,  $0 < \delta < 1$ . To find the

optimal  $v = (K(t), X(t), u(t))$  – process of model, Krotov V.M. theorem was used [1].

### 2 CONCLUSION

Developed the mathematical model based on the endogenous growth model of Lucas; sufficient conditions for optimality of the economy mode (with the help of Krotov's Theorem) were identified; problems for case where mainstream is the best mode of economic development were solved and the optimal control and optimal trajectory was found.

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# IT TECHNOLOGIES IN PUBLIC HEALTH OF THE REPUBLIC OF KAZAKHSTAN. BENEFITS OF USING DPS (DATA PRESENTATION SYSTEM)

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## ABSTRACT

Nowadays, it is very topical for the public health management to have high level of availability and efficiency of perception a wide range of system performance indicators. And, as a rule, these indicators are presented in several levels: country-region-district-town. Perception and analysis of these indicators require's simple and efficient information system.

Keywords: Informational Technology System, Project Management Tools, Mapping, Public Health, the Republic of Kazakhstan

## 1 GENERAL

The main idea of this study is the proposal of practical application of the system DPS in Kazakhstan (Data Presentation System), which was developed by WHO for needs of the Public Health. The program does not use any commercial products and algorithms. It uses free software code that allows modifying it for the needs of other systems. This allows adapting it for the purposes of current study. The aim of the program is displaying any statistical data associated with a geographical area (See fig.1) – well-ordered and in a user-friendly way. The program can contain a wide range of data on 10 000 indicators divided by epidemiological, demographic, socioeconomic and environmental sections (See fig. 2). It is assumed to make a selection of any given indicators, compare them, see the dynamics and make the conclusions about interconnectivity between some of these indicators (See fig.3).



FIGURE 1 STATISTICAL DATA ASSOCIATED WITH A GEOGRAPHICAL AREA

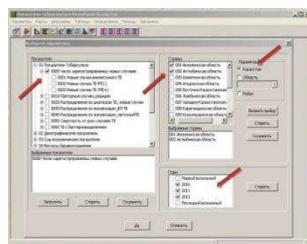


FIGURE 2 DATA ON 10 000 INDICATORS

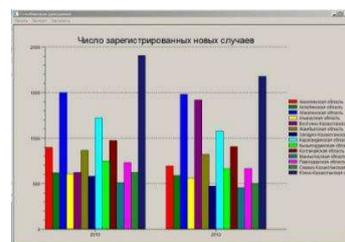


FIGURE 3 COMPARISON OF GIVEN INDICATORS

The system has a distinct advantage over other information systems: ease of implementation, free access to the resource, the minimum computer specifications needed to run the program, and the ability to work in any language environment.

## 2 CONCLUSION

System of data performance DPS is a system of collection, analysis and diffusion of aggregate data, it includes all geographical areas of the country and allows to analyze indicators at the level of administrative districts. It is recommended for the MoH, as well as for all health care organizations.

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## FAN-ENTRY METHOD IN COMMERCIAL OPERATION OF THE SAP SYSTEM

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### ABSTRACT

Development and wide spread occurrence of ICT is a global movement of scientific and technological progress of recent decades, which led to significant changes in almost all spheres of human activity. The use of ICT has a crucial importance for improving the competitiveness of the national economy, as well as individual companies.

Keywords: ICT - Information and Communication Technologies, SAP - accounting and management system

### 1 GENERAL

The purpose of study is to review the mechanism and to apply the “Fan” method in the future when implementing of SAP systems in large multi-branch companies. According to methodology of sap company the simultaneous system start method does not allow to solve some tasks, since the lack of big personnel reserves and tight deadlines of stages. "FAN" method allows to reduce calendar risks, cash costs and labour costs, improve quality of project, during industrial commissioning of company. This is achieved by gradually attracting of branches or structural units into project evenly distributing the workload for the entire term stage.

### 2 CONCLUSION

As follows from the analysis, the methodology was developed for implementation of system for multi-branch companies, with a minimum use of labour force. This method was used by "KazMunaiGas Onimderi JSC" in 2010 [1]. As a result, 20 individual structural units successfully entered into commercial operation in the set time frame.

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## PROBLEMS AND RISKS OF INVESTMENTS IN THE REPUBLIC OF KAZAKHSTAN

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### ABSTRACT

Nowadays attraction of domestic and foreign investments into the economy of The Republic of Kazakhstan is one of the main factors of economic growth of the country. The government has developed a set of actions to improve the investment climate in the country such as the creation of the State Committee of the Republic of Kazakhstan on investments, the adoption of the law on support of direct investment, the initiation of customs, tax and civil code. To maintain investor's favour for investment projects, the Institute of Government Guarantees is functioning and it has identified key areas of investment etc.

Keywords: investments, State Committee, the Republic of Kazakhstan, tax and civil code

### 1 GENERAL

In general, according to experts, investment climate of the country is favourable, but there are some shortcomings and problems of a different nature, the main of which are listed below [1]:

- Different kinds of financial risks
- High rate of inflation
- Inadequate tax legislation
- Poorly developed infrastructure of transport and communications
- Undeveloped insurance sphere
- Low attractiveness of non-commodity and industrial sectors
- Underdeveloped financial markets
- Lack of awareness of foreign investors
- Underdevelopment of highly qualified personnel
- Inadequate support and mechanism to protect investors
- Other deficiencies such as corruption, licensing conditions and etc.

In order to have efficient economy, the government should support investments, especially it's actual for developing countries and countries in transition. Therefore, creating required conditions to attract investors is an important challenge facing the government. To improve the investment climate in the country, next points can be specified:

- Regulation of the attractive rate of national currency
- Develop mechanisms to support and protect domestic investors and entrepreneurs.
- The need to provide a variety of tax facilities
- Support for the efficiency and transparency of legal and economic legislation
- Improving the business environment
- Development of social infrastructure and high-tech sectors of the economy
- Providing relevant information to potential investors

In the President's Address from 18.01.2014 the following suggestions were made [2]:

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- to cancel all inert legal norms that hinder the development of business
- introduction of a precise mechanism of bankruptcy of small and medium businesses
- need to develop a set of steps to reduce inflation to 3-4 percent in the medium term

By taking into consideration the positive developments in the stabilization of the national economy, the consequences of complex political and macroeconomic decisions cannot be ignored. Past February devaluation significantly influenced the local businessman and has a negative impact on investment in the real sector, particularly serious impacts were suffered by small and medium businesses. To reasons may be attributed insufficient development of domestic production, and the need for local producers to purchase raw materials and components from abroad, which automatically increases the cost of local products. Many entrepreneur bank loans were made out in a convertible currency, i.e. the cost of their return substantially increased in price. The creation of Customs Union is making ambiguous impact on local producers, because Russia and Belarus have high industrial and scientific-technical potential, which affects negatively the competitiveness of our domestic goods.

## **2 CONCLUSION**

Considering all that statements, it is necessary to make arrangements to support local producers by direct subsidies, tax holidays, actively controlling the judicial system governing economic relations. These kinds of steps should significantly increase the investment attractiveness of our country.

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## NOWADAYS' RELIABILITY CRITERIA OF FINANCIAL RESERVATION IN CONVERTIBLE CURRENCY

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### ABSTRACT

The central bank has been described as "the lender of last resort", which means that it is responsible for providing its economy with funds when commercial banks cannot cover a supply shortage. In other words, the central bank prevents the country's banking system from failing. However, the primary goal of central banks is to provide their countries' currencies with price stability. The work of the central bank is an important indicator of the economy of the country.

Keywords: reserve currency, central bank, devaluation, GDP, reliability criteria of financial reservation

### 1 GENERAL

Influence of a currency devaluation held on February 11, 2014 has ambiguous consequence for the national economy, both in the short and long term. If in the short term we see inflationary spike caused by low levels of industrial activity and the lack of industrial diversification, which entails serious reliance on consumption imported goods, in the long term it is reasonable to expect reduction of investment attractiveness related with forecasted financial instability due to weakening of national responsibility control for the level of the exchange rate.

National Bank of Kazakhstan announced devaluation of almost 20%. Exchange rates immediately dropped from KZT  $150 \pm 5$  to  $185 \pm 3$  per dollar.

According to official sources, the main reasons for the decision to devalue from the CMASF reporting (CENTER FOR MACROECONOMIC ANALYSIS AND SHORT-TERM FORECASTING) are as follows:

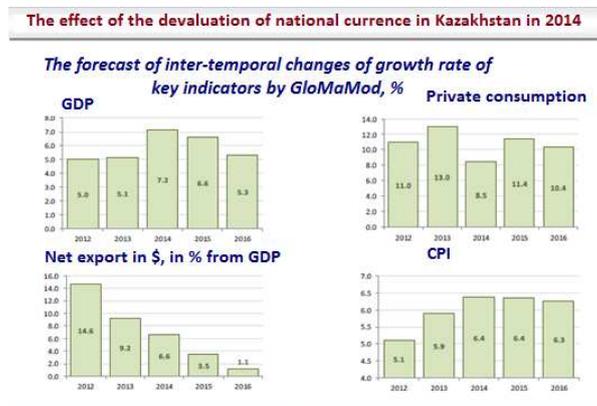
- Worldwide trends - the pressure on the currencies of developing countries (weakening of the national currency against the dollar in India - 13.2% in 2013, South Africa - 10.9% in December 2013 - January 2014, Brazil - 5.2% in December 2013 - January 2014, Turkey - by 12.4 % in December 2013 - January 2014, Argentina - 20.9 % in January 2014) and the associated uncertainty
- Possible negative impact of Russian currency devaluation on the Kazakhstan's economy through trade: the Russian ruble in 2013 weakened by 7.8 % against the dollar and 5.4% against the tenge
- The growth of imports, which began outpace the growth of exports after the transition from 1 January 2012 to the next stage of integration - SES (the ratio of net exports to GDP in % in 2011 was 21.4 % in 2012 - 14.6 %, in 2013 - 9.2 %)
- Transition plans of inflation targeting as recorded in message of the National Bank of Kazakhstan; these plans involve retreat from the strict regulation of the exchange rate

Under the study according to results of the model received as of 2014, experts predict:

- Kazakhstan's GDP will increase by 7.2% in 2014 compared with 5.1 % in 2013 due to growth of domestic production, including in the framework of import substitution. In subsequent years, the GDP growth rate will decline, but it will still grow faster than in 2012-2013.
- Private consumption growth will slow to 4.5 percentage points, but in 2015 it will begin to recover. Import volumes will only recover in 2015, net exports will continue decline, but not as fast as before the devaluation.
- Inflation in 2014 will jump by 0.5 percentage points due to rising import prices and be fixed at the level reached in 2015-2016.

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According to statistics, the volume of imports in the domestic market of Kazakhstan so far leaves behind indicators of domestic production. A change in the exchange rate, as a rule, has an immediate impact on the domestic price level because of change of imported goods prices in the national currency. This influence is primarily exerted in two ways: through direct price change of imported final goods and services, as well as through change in prices of goods and services produced within the country, if their production cost includes the cost of imported components. In addition, vendors try in advance to include their currency revaluation rates in the price, even in domestic goods. Rate is not only the price factor, but also a psychological one.

While analysing the impact of exchange rate changes on the price level in the country it is necessary to bear in mind one thing: in modern conditions, prices are much more flexible upward than downward. In addition, it is worth noting that the import substitution does not happen overnight, and it is necessary to know whether the country can in many items replace imports with its own production.

All this suggests that such elimination of imbalance in the economy with painful measures will lead to a sharp drop in credit of the national currency due to the lack of stable fundamentals that base its status.

In addition, this in turn can result in even more significant capital flight abroad.

These factors lead to an increase in foreign exchange risks. To minimize risks, economic entities make conclusions about the need to diversify their savings in different reserve currencies.

Reserve currency criteria are:

- Its stability,
- Liquidity
- The need to be the currency of the large economy actively involved in world trade and having developed financial markets

## 2 CONCLUSION

Summarizing, we arrive at the fact that the main criteria for the reliability of financial reservation in convertible currencies are:

1. Balance in the country economy
2. Central Bank's capital adequacy level. Like any reliable bank, the CB has some high-quality assets in its account, which should be in certain proportion with the liabilities. Ratio of the bank's liabilities and assets is called capital adequacy, being a safety net in case of crisis. Therefore, the "safe" currencies are those issued by the bank with a high level of capital adequacy.
3. Currency diversification
4. In addition, the following criteria can be suggested:
5. Provision of natural content of currency.
6. Strict control over issue and sound monetary policy of the State.
7. Political stability in the State of the would-be reserve currency.

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## PROBLEMS OF THE REAL ESTATE LENDING AT THE STAGE OF THE PRESENT IN KAZAKHSTAN

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### ABSTRACT

The solution of problems of real estate lending is the most important socio-economic task of modern Kazakhstan society. Currently the banks of second level offer such products as mortgage and credit under pledge of property. A mortgage is one of the forms of pledge where the mortgaged real estate remains in the property of the debtor and the creditor in case of default by the debtor of its obligations acquires the right to receive satisfaction through the implementation of the property. Credit under pledge of property - credit, which is issued to the borrower under the pledge of any property (real estate, apartments, cottages, etc).

Keywords: Real estate lending, mortgage, credit under pledge of property, debtor, creditor

### 1 GENERAL

Consider the difference between the mortgage and credit under pledge of property:

- When making of the credit under pledge of property as collateral provided previously purchased property in the possession of the borrower.
- In conditions of the credit under pledge of property unlike conditions mortgages, does not contain requirements payment of initial instalment.
- The size of the issued amount of the credit under pledge of property is determined estimated value of the collateral, as well as the size of the documented income.
- Deadlines for credit under pledge of property is much shorter than the period of payment of the mortgage. This means that a mortgage, you receive the opportunity to purchase housing at a higher price.
- The interest rate charged on the credit under pledge of property, slightly higher than the mortgage loans.
- Payment mortgages can be carried out in part by grants from the state.
- Payment of a mortgage in the amount includes rental housing
- Tax for the property when the mortgage is paid by the lender. And when the credit under pledge of property, the borrower pays tax expense.
- To dispose of the acquired property, the mortgagee will be able only after final settlement with the Bank and withdraw the apartment or house encumbrances.

### 2 CONCLUSION

After analysing the differences of these products, it may be noted that the mortgage is more risky because the property is in the possession of the creditor in case of not returning the loan by the creditor the right to collect the collateral, and when the credit under pledge of property the lender may not without the consent of the borrower to take the collateral. However, for the vast majority of ordinary citizens' mortgage lending seems to be the only possible solution to the housing issue.

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## SUCCESSFUL DEVELOPMENT PROJECTS IN COMMERCIAL BANKS

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### ABSTRACT

The modern world practice possesses is an extensive set of methodologies and approaches of project management, such as PMBoK (Project Management Body of Knowledge), PRINCE2, MSF (Microsoft Solutions Framework). [1] The competition in all areas of economy reached such limit when using the technologies of project management is a necessary condition of prosperity of each commercial enterprise.

Keywords: project management, bank, commercial, development, technology, implementation, tool, technique

### 1 GENERAL

The main goal of this study is to define the main factors of successful development projects in commercial banks. The bank is one of the main financial institutions in modern economy. Project management is an integral part of a control system of commercial bank and its activity as a whole. The larger and more considerable the project is, and then more professional approaches, technologies and tools are required. Hi-tech financial institutions pay close attention to development of various directions, such as implementation of information technologies and development of innovative products. The main factors of successful development projects in banks:

- using of successful branch techniques of implementation of projects. These techniques are to explain how to carry out stages and project tasks. For example, how to describe bank business processes and how to develop a quality manual, etc.

- using of standard decisions for receiving results of project. It will allow to imagine in advance results of the project and to reduce time for their receiving. Not to carry out from scratch development and a task, it is recommended to take standard decisions and documents as a basis, and then to finish them according to specifics of bank and project tasks.
- careful and complex assessment of a maturity of bank for implementation of the project. Not all banks are initially ready to implementation of projects of development. At low level of a maturity of bank it is necessary to execute necessary actions to prepare bank, his employees and infrastructure to start the project.
- system approach to management of the project and its performance.

In spite of the fact that this point costs is the last in the list. He should pay attention to them.

System approach in this case means: satisfaction of interests and requirements of all interested parties (the top management of bank, the personnel, clients, regulators, etc.), interrelation of the project with various control systems and bank spheres of activity, observance of the factors listed in this work when planning and during all project [2].

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## **2 CONCLUSION**

Modern standards and technologies for successful implementation of projects is not enough. The success of the project of development in bank depends on many factors, among them – timely tracking of tasks of the project, interest and an involvement of the top management and the bank personnel, its maturity to implementation of the project and use of results in practice, readiness of bank for creation of the working groups, the solution of organizational questions and allocation of resources. It is necessary to consider uniqueness and specifics of projects of development, absence of regulations and standards of management of development projects (procedures, documents, and tools). It is better to plan, organize the project from beginning, than to spend extra time and funds for overcoming of the arisen risks and mistakes.

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# OPTIMIZATION OF PROJECT MANAGEMENT PROCESS IN WEB APPLICATIONS DEVELOPMENT

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## ABSTRACT

Optimization of the process of requirements collection in web applications development will help to avoid many potential problems with customers, such as a different vision of the future product by developers and customers, as the consequence of which increases the cost of the project or increases the development time.

Keywords: web applications development, project management, IT-management

## 1 GENERAL

The main goal is the elimination of the problem of misunderstanding between the web developer and the customer through optimization of the process of requirements collection.

This process determines documents and manages stakeholder needs and requirements in order to meet the project objectives. Data flow diagram of the process is shown in Fig. 1 [1].

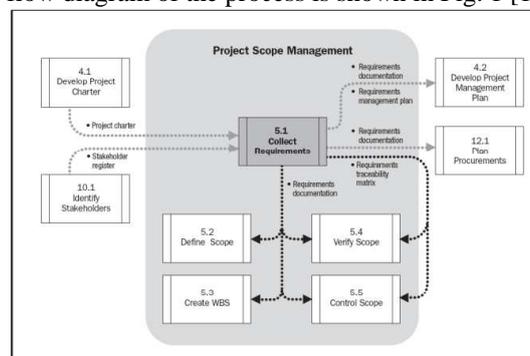


FIGURE 1 DATA FLOW DIAGRAM OF THE PROCESS OF REQUIREMENTS COLLECTION

It is usually quite hard for the customers to express their wishes clearly and for the business analysts to capture them unambiguously. However hard all parties work at this, there are bound to be areas where supplier and customer have different ideas about what is to be done and where the specification proves to be ambiguous.

In this case optimization of the process of requirements collection will be done by development of a computer program, by which visual prototypes of web applications can be created, that allow for both web developer and customer to imagine what will be the end result of the project.

## 2 CONCLUSION

The analysis of existing similar programs is done, and identified a number of shortcomings, that should be considered in our project.

The resulting software can be used in companies engaged in web development and can be modified according to the requirements of organizations.

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## SECURING PUBLIC WEB SERVERS

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### ABSTRACT

Web- sites are a powerful tool that allows commercial, governmental and public organizations, as well as citizens to share information and conduct business on the Internet. For the same reason they are continually being targeted by hackers.

In this article, we will discuss the most common methods of protection that organizations can adopt to prevent attacks on their servers or mitigation. Web servers may also face indirect attacks to gain information from their users. In these attacks, the user is persuaded or automatically directed to visit a malicious Web site that appears to be legitimate. The identifying information that is harvested may be used to access the Web site itself or form the basis for identity theft. Successful attacks can compromise confidential Web site resources or harm an organization's image. These indirect attacks occur in two forms:

- Phishing, where attackers use social engineering to trick users into logging into a fake site
- Pharming, where Domain Name System (DNS) servers or users' host files are compromised to redirect users to a malicious site in place of the legitimate site.<sup>[1]</sup>

Keywords: web-sites, web servers, security, public

### 1 GENERAL

Most incidents only cause annoyance or inconvenience; it does not mean that a hacker cannot cause serious harm to the company. Therefore, each organization must take steps to ensure the safety of their resources, while assessing the level of risk and expense. In other words, each organization is required to compare potential losses to the benefits that provide the ability to access the Internet. In the context of limited financial resources necessary to invest in the protection of the most vulnerable places of the network [2].

### 2 CONCLUSION

Level of security software can be evaluated firstly by analysing previously committed attacks on servers that were set to the same (or similar) software. Number of attacks shows how stable the software to them. In addition, the reliability of the software directly depends on its quality. Improper software does not account for all security requirements and have therefore not reliable. Second, some companies specialize in creating security systems tend to exaggerate the capabilities of their products ( in terms of lack of vulnerabilities ), so when designing a security of its servers , users must take this into account . Third, to assess the level of security software can be achieved by testing it for vulnerabilities.

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## INFORMATION ON GLOBAL COMPUTER SYSTEM INTERNET AS A NEW FIELD IN ELECTRONIC BANK SERVICES

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### ABSTRACT

Internet banking - a system remotely receive banking services via the Internet. Virtual communication with the bank is carried out in an interactive mode - through the website of the bank. To work in the system, you must connect this service at the bank and be able to access the Internet through a compatible browser. Account management possible from anywhere, from any computer connected to the Internet. Connection and maintenance of the online banking is usually free.

Keywords: electronic bank services, computer system

### 1 GENERAL

Main advantages of internet banking.

The main advantage of online banking is still the convenience of being able to forget about the pressing troubles and unnecessary paperwork. It is what makes many practical people who value their time, to get a bank account and manage it through the Internet. Settlements between the customer and the bank are conducted in real time. The customer can track all stages of payment documents in the bank on your computer screen.

Main disadvantages of Internet banking.

First, it is a relatively lower level of protection than the system "Client-Bank" and the documentary clearance transactions. Although the technology is the standard SSL and Internet security, it is because of its well-known prevalence of potential intruders can not guarantee the same level of security as the system "Client-Bank" system that works, usually in closed online networks, not having access to the Internet.

The purpose of research work:

1. The place and importance of Internet banking in the modern banking business
2. Legal regulation of electronic banking activities;
3. Modern trends in the Kazakhstan market of electronic banking services: the main challenges and development directions

### 2 CONCLUSION

Basic Banks were applied 10 critical criteria for assessing the level of banking informatization:

- Banking automation system (ABS)
- Plastic cards system
- Electronic services such as "bank-client"
- Electronic banking services: Internet banking,
- Automation systems customer relationships (CRM),
- Call-centers,
- Information-analyses systems,
- Automation systems operations in the stock and foreign exchange markets,

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- Protection of information
- IT-technology.

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## FUNDAMENTALS FOR CREATION OF DISTRIBUTED COMPUTER SYSTEMS WITH HIGH PERFORMANCE

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### ABSTRACT

In connection with the fact that all modern complex and large technical systems (hereinafter TS) are equipped with a computer system (hereinafter CS), the analysis of TS accidents shows that the reasons for these accidents are not only the failure of mechanics (mechanical engineering assemblies), short circuit or overheating of electrical devices in TS, but also 'incidents' that happen in the onboard electronic and computer system, navigation system, control, and management objects.

High sensitivity of computer and technical systems impacts incidents; unlike mechanical and electrical components or devices it causes different reactions, or various consequences. Incidents in the CS causing a breach in functioning of CS are very diverse. The consequences of incidents causing disruption of computer system include not only malfunction, failure of system components, but also reduction or loss of security of both specific elements and the whole system. It also includes protection failure of internal resources, impropriety and decrease in work and functioning speed of both specific elements and the whole system. All these factors reduce CS performance, causing accident in the technical system eventually.

Keywords: large technical systems, computer system, navigation system, objects

### 1 GENERAL

One of the main causes of CS and TS insecurity from impacts of incidents is the fact that properties of CS TS performance have not been developed during their design process. This allows, firstly execute TS mission qualitatively, and secondly, in case of function failure the TS mission can be executed with some loss of quality, or at least it allows to display the object (i.e. TS) from accidents and to exclude the occurrence of large accidents or disasters.

These factors are evidence that the weakest point of the engineering systems is not only the loss of reliability, but also the lack or loss of performance resources that guarantee the fulfillment of mission. And this, first of all, relates to CS. The presence of a large supply of performance resource allows CS or DCS to be flexible in management of technical objects.

Currently as TS structure and content become more complicated alongside with the functioning laws of specific computer systems and their environments, ensuring a sufficient level of performance of these computer systems is a complex task.

In general all modern IT-infrastructure are now becoming multi-functional, distributed, both in their coverage area, and according to the principle of computing processes, methods of storing and processing data. All these parameters increase the complexity in operation of distributed computer systems (hereinafter DCS).

All the above mentioned confirm the topicality in studying the issues of performance.

In addition, the requirements for proper DCS functioning are becoming more stringent. Current methods and means of ensuring reliability in transition to new concepts and technology of computer systems do not meet the requirements for proper DCS functioning.

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Modern DCS support the process of solving applied tasks and critical technological and financial processes. This requires assured and high-quality fulfillment of tasks given to the system.

Proper DCS functioning and performance has crucial importance to ensure the full discharge of its mission and functions. The solution of this problem or task is topical in the conditions of DCS functioning in the complex dynamic aggressive environment.

The research is devoted to the problem in study of various options to ensure DCS performance and development of DCS design and construction techniques with sufficient resource efficiency and creation of a project on system performance management during the operational period of DCS.

## 2 CONCLUSION

Currently, there are many works devoted to the problems on reliability and security of different systems. However, there is no research on the issues of ensuring the system performance as a complex attribute, phenomenon or process. Studying and solving problems of performance, as an integrated property and indicator characterizing many specific indicators corresponding to the individual properties of the object are DCS systems. High level of the system performance is achieved by simultaneous execution of several properties, in particular, such as reliability of DCS functioning, protection of internal resources, security, correctness, and DCS performance.

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## SOCIAL AND CULTURAL DIVERSITY OF MEDIA OF KAZAKHSTAN IN THE CENTRAL ASIA

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### ABSTRACT

The aim of the article "Social and cultural diversity of journalism of Kazakhstan in the Central Asia: issues of national identity" is scientifically critical discourse analysis of social manifestations and immediate prospects of entering Kazakhstan journalism in the global information space.

The relevance of the study is in the choice of subject matter and the ability to forecast the development of the industry of journalism and Kazakh media in general, in view of the growing demand in the social life of gadgets, the Internet. Accordingly, for Kazakhstan, like for any other country in the world, it is important not to lose the existing domestic experience of the so-called "old" media (books, periodicals, TV), and does not dissolve in the diverse content of "new" media (Internet blogs pages, forums, etc.)

Keywords: social and cultural diversity, media

### 1 GENERAL

Media competence should be recognized as a priority in the work of public education and public authorities and institutions.

The rapid development of the "new" media in the world, unfortunately, is not accompanied by the necessary flexibility (labiality) of high school curriculum; higher education has a shortage of training manuals, textbooks and even more, in terms of application, the problem of quality and "advanced" training of international journalists who can speak foreign language and professional skills to face all the countries of the post-Soviet space.

The methodology of the research on the project does not go beyond the generally accepted scientific methods of the social sciences. Principles of humanity, dialectics, objectivism and historicism form the basis of scientific postulates. Rather-comparative, or Comparative, method, and an interdisciplinary approach are chosen as the most appropriate. Lack of special aids and development is an objective difficulty of the project.

### 2 CONCLUSION

Expected results - complete critical discourse analysis of the problem based on the study of foreign experience of international news agencies, applied facet of the project will be the development of practical recommendations for training specialty "International Journalism", "Media Management", etc.

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# SET CLOUD SYSTEM FOR MIDDLE-SMALL BUSINESS ENVIRONMENT

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## ABSTRACT

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the common use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation

Keywords: cloud system

## 1 GENERAL

The main purpose of this study is the set cloud system for middle-small company, guide them to economic outlay, improve data security, simplify data management and etc.

In this study, we made a real case cloud system example, compared this cloud system with general network environment from outlay economic, data management and data security, to demonstrate the advantages of cloud systems, in the figure 1. You could see the general topology of cloud system which in this study.

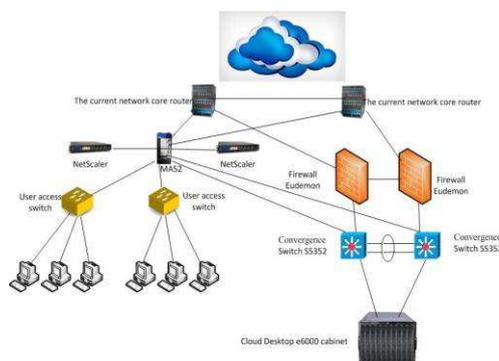


FIGURE 1 TOPOLOGY OF CLOUD SYSTEM OF XXXXX COMPANY

## 2 CONCLUSION

Today all large companies offer Cloud Computing within a secure environment. Microsoft offers Windows Azure, and Oracle and HP offers cloud computing, and is fast becoming the acceptable way to go. Gone are the days before the cloud. It is really not clear just how cloud computing came about other than to say it was a complex vision and a product of some great intelligent mind.

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# AUTOMATIC ASYNCHRONOUS EXCHANGE OF BUSINESS OBJECTS BETWEEN HETEROGENEOUS SYSTEMS

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## ABSTRACT

Nowadays exchange of business objects between heterogeneous systems in different enterprises is a fundamental tool business administration. This exchange helps to carry out the activities within the enterprise more effectively, and the enterprise conjunction with external bodies. Most of the problems related to the effectiveness of the exchange of business objects are transmission rate and data relevance. Business objects transmitted between heterogeneous systems are identical to each other, but systems comprising these objects are so different that the number of tools for data transmission and detection is limited by system functionality. However, technology trends do not stand still. Instead of old ones well-established systems, come new ones, more efficient, different by concept and principles of interaction.

Thus, automation of old and new tools of transmission of business objects identifies problems and allows you to develop mostly new direction.

Keywords: heterogeneous systems, data Integration, asynchronous method

## 1 GENERAL

The analysis was conducted comparing the synchronous and asynchronous methods of automation of the exchange of business objects between heterogeneous systems. The report offers a number of theoretical and experimental studies of the advantages and disadvantages of both methods. According to results of the analysis, based on the model chosen, the program was written which is carrying out asynchronous exchange of business objects between heterogeneous systems.

	Empty connections	asynchronous		synchronous	
		short strings	long lines	short strings	long lines
<b>CPU</b>	20%	60%	70%	80%	85%
<b>RAM</b>	25%	25%	25%	30%	30%
<b>latency</b>	14mc	16mc	16mc	5500mc	6000mc
<b>maximum number of connections</b>	20000	14000	13000	9000	8000

## 2 CONCLUSION

Asynchronous exchange method is able to handle more requests per second, without waiting for a response of the system, which increases the rate of speed of exchange of business objects between heterogeneous systems in thousands of times, unlike the synchronous method. The report presents the tables, graphs, drawings showing the complete picture of the automatic asynchronous exchange method of business objects between heterogeneous systems.

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## THE IMPROVEMENT OF MARKETING MANAGEMENT IN LATVIA

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### ABSTRACT

Taking into consideration the present economic and political situation of the Republic of Latvia, as well as its geographical position and the historical background, it is important to make use of these conditions for further improvement of the marketing management and development of the national economy. The object of the present research paper is marketing. The subject of the research paper is marketing management in Latvia and its improvement. The objective of the paper is to study the improvement process of marketing management and its problem solutions in business.

Keywords: marketing, management, improvement, problem solutions, business

### 1 GENERAL

State is involved in marketing management as an intermediary, as marketing management is carried out on the business level, i.e., companies are the main executors of marketing management activities. Thus, state has to take care about development of business environment favourable for marketing management. Since marketing management is one of business areas, it is subjected to the changing influence of business environment.

Evaluation of interaction between business microenvironment and macro environment in Latvia demonstrated that strong influence is observed between competition environment and marketing, sales and competitors, as well as between international environment and international trade. Thus, we can conclude that analysis of business environment gives the possibility to establish the main factors influencing marketing management and to evaluate marketing management effectiveness.

In the process of investigation of the business environment in Latvia it was determined that the businessmen have given the lowest estimation to those environment elements that have the strongest influence on the marketing management, consequently, effectiveness of marketing management in Latvia will not be high.

### 2 CONCLUSION

Solution of marketing management problems in business is based on the study of business environment and marketing management mechanism that has been developed as the result of this process basing on the rules of a modern economics ensuring effective solution of marketing management problems in business.

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## MECHANISMS OF EMOTIONAL CAPITAL'S ASSESSMENT

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### ABSTRACT

Comprehensive approach of emotional capital evaluation is considered against the background of the existing contradictions. The proposed methodology allows to recognize the emotional state of the enterprise under the conditions of the fundamental changes. The recognition process is carried out in the construction of the original evaluation mechanisms. Development is based on the comparison of selected components of emotional capital with elements of intangible assets. During the comparison process suggested value base is used.

Keywords: capital, structure, changes, cost, solutions

### 1 GENERAL

From the standpoint of financial management enterprise's capital characterizes the overall cost of funds in monetary, tangible and intangible forms that are invested in the formation of the assets [1]. Herewith the part of intangible component in the total cost of assets reaches 75% and more [2]. With such statement, the intangible side of the capital is defined by needs that are established under the formation of human capital [3]. Under this interpretation, the capital determines the possibility of movement on the one hand, and the quality of success on the other hand. Correlation of these two characteristics, expressed in the principles of management, is disclosed in the challenge of intellectual capital's monetary evaluation [4]. The cost serves as the preferred characteristics of quantitative evaluation [5], on which basis the efficient management mechanisms are developed [6, 7]. Through such mechanisms, the efficiency of enterprise development is defined, improvement ways are outlined, levers for fundamental changes are identified [8, 9]. Despite the variety of definitions [10, 11, 12, 13, 14, 15], in modern understanding, the intellectual capital is clear, based on bonds, structured, unambiguous, transmitted knowledge and ability with the potential for development and creation of value. [7, 16]

Intellectual capital is associated structure of its four components: human, organization, consumer and emotional capitals [15, 17].

Each of the intellectual capital's elements has certain characteristics. At this rate, human capital that is concentrated on the skills and qualification of employees grows with time. Thus, an operation of the capitalization takes place – conversion of intellectual resources in real resources of development. Thereby, emotional capital takes the feedback role, which allows to use it as a new management mechanism.

The study shows managerial interpretation of emotional capital. Under this interpretation, the understanding of entity of emotions is happening, which allows to operate with non-standard logic rules in complex solutions [12, 13, 14, 15, 16, 17, 18]. All this requires a new formulation of the so-called "emotional" task. The decision comes down to the formation of emotional skills among managers. Notably that this skill should be cultivated at all levels of management. Among mentioned studies, we should point out the collaborative work of Gouldman, Boyatzis and Makk [13]. These authors carried out the examination of more than 500 models of leadership skills development. On the basis of such an examination it was established that the higher the rank of the manager is, the more emotional skills are incorporated into the base of the achieved success. When comparing the skills of outstanding representatives of top management skills with "average" skills, holding similar positions, it appears that

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about 85 % of the differences in their effectiveness can be prescribed to the factors of emotional intelligence, 11% to the cognitive abilities, and 4 % to the specialization. These results confirm the hypothesis that the higher level of management is the more significant role plays the abilities associated with emotional capital. In this case, the differences in functional skills are not so important.

The purpose of this study is to apply the methodology of evaluation of emotional capital basing on the approach of evaluation of intangible assets. In this regard, the following operations were performed:

1. To classify the emotional capital's components in terms of intangible assets elements.
2. To describe methods for assessing emotional capital in terms of cost management. The classification of D. Andriessen and R. Thiessen was chosen [17] for disclosure of emotional capital in the overall structure of intangible assets.
3. As a result, to make a connection between groups of intangible assets and groups of emotional capital, which will allow to use the modified methods of evaluation of intangible asset's cost.
4. Mechanisms of emotional capital's assessment are considered in-line of control system with feedback. When implementing the strategic changes, emotional capital was perceived as a production factor. During the usage of the mechanism, ten basic steps must be performed.

## 2 CONCLUSION

Developed mechanisms of emotional capital's assessment allow to prepare objective recommendations based on a broader scope of activities. This makes a possibility to increase the effectiveness of estimating the emotional states of various companies and individuals. The analysis of emotional capital's components role and their comparison with the elements of intangible assets allows to enrich the theoretical foundations of research in the field of management systems.

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# MANAGING OF INNOVATIVE COMPANIES GROWTH: KEY ASPECTS

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## ABSTRACT

The article covered key aspects of management of growing innovative companies. The main features of their activity can be identified as dynamism, riskiness and the current sales and services occurring simultaneously with the development of new projects. The approaches to the development of a management system based on a financial model and linked of the three aspects: strategic management, resource management and HR management are proposed.

Keywords: financial model, growing company, innovative company, management system, strategic

## 1 GENERAL

The Theorist of management science P. Drucker defines the term “management” as a special kind of activity, for converting unorganized crowd into an efficient and productive group [1]. Modern business – this is an extremely complex system, management that includes many different spheres (for example: assets and liabilities management, inventory and supply management, production and sale management, management of human and financial resources, etc.). In addition, the management of the companies in all spheres should be carried out so as to ensure the effective functioning of the whole system at all.

Over many years of developing science of management, issues dedicated for the problems and situations of traditional enterprises are sufficiently developed. At the same time, companies engaged in the innovation sphere, especially those whose strategic objective is the fast economic growth, have some of the features, the most important of which are: dynamism, riskiness and the current output and services occurring simultaneously with the development of new projects.

**Dynamism:** Such companies are subject to constant change (development of new and abandonment of obsolete products, modernization of existing production, the development of new activities, opening and closing of branches, etc.). This requires a high-speed decision-making and coherence action at all levels of managers.

**Riskiness:** Such business combines the risks which arise from the specifics of innovations (it is known that only 5-10% of innovative ideas is finishing successfully), and the risks posed by the fast-growth (which, in case of inconsistency of company's capabilities, can lead to serious adverse effects). The decision-making process in such companies is characterized by a high-level of uncertainty and high-cost of management's error.

**Combination of current output and development of new projects:** Specificity of economic activity of growing innovative companies combines the two branches: the production and sale of current products (services), as well as the development and introduction of innovative new products (services). Thus, the aggregate evaluation of the effectiveness of company's activity should be carried out as a superposition results of production activities and results of new projects.

The research shows that, in these conditions, most companies have a typical reactive form of management – when the management decisions are generated as a reaction to the current problems [2]. Obviously, such situation cannot be considered as good situation. For the management of the innovative businesses growth it is important to identify and anticipate the maximum of incidents that may arise in the company's activity, and to develop ways and methods to block the negative trends and minimize the

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negative consequences. However, today, as Harvard Business Review estimated, companies lose up to 50% of their potential results due to low-quality management [3].

The author's research in present article, allow allocating three key aspects of innovative company's growth management: strategic management, resource management and HR management (see, Fig. 1). It should be noted that some elements of this triangle were considered in some scientific papers before (for example: strategic management – T.Mazzarol [4], resource management – J.Barney [5], HR management – E.Kirkland and A.Chandler [6]), but now it is invited to consider the combination of these three elements applying for the growing innovative companies.

Obviously, these aspects are linked. Therefore, strategy of business defines methods and ways of resourcing. In turn, profit or deficit of financial resources can influence to the possibility of HR-recruitment. And in turn the presence or absence of necessary staff may cause to strategy changes. It should be noted that for innovative companies the single of the aspect from this triangle cannot be allocated as a most significant – a successful business growth is based on keeping the triangle in equilibrium balance.

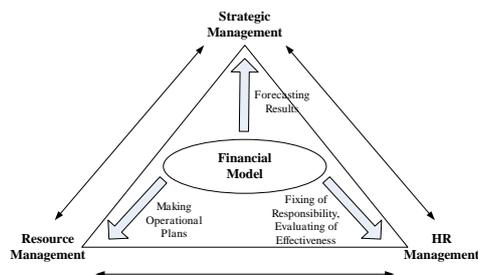


FIGURE 1 KEY ASPECTS OF INNOVATIVE COMPANY'S GROWTH MANAGEMENT

The core of such management system is a financial model, which revealing the formation of the results of financial and economic activity of a company. First of all this model is the base for making strategic decisions and a tool for forecasting results. The strategy must be translated into the "numbers language" – be expressed as a key target indicators characterizing the main direction of the companies activity. Secondly – this model is the basis for the making operational plans of economic activities. Here is the transformation of the key target indicators into personal tasks for managers and making plans for conclusion, execution and financing agreements, as well as the use of material and financial resources. And thirdly – this model is the basis for fixing of responsibility for managers and tool for monitoring the effectiveness of the actions for to make managers to follow a company's plans and achieving the results in a timely manner.

## 2 CONCLUSION

The management system that is based on allocating the three key aspects of company's activity was tested by the author of this article on some innovative companies in Russia. The practice has shown that it is sufficiently flexible and adaptive, what is reflected in the continuous monitoring of achieved results, assessing their impact on the company's long-term strategy and development of necessary corrective actions. At the same time, such system allows you to fully take into account the specific features of the fast-growing innovative enterprises and provide of business's controllability even on condition of unstable internal business-processes and uncertainty of the external business-environment.

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## STABILISATION OF FINANCIAL SYSTEMS: RISKS AND LIMITATIONS

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### ABSTRACT

The problem of the liquidity of markets and banks has extremely aggravated for Ukraine because of credit crunch (after speculative credit expansion). First and subsequent attempts to introduce anti-crisis measures have shown that the recovery did not occur while the authorities were solving the problems of the liquidity of financial sector and the funding of the real one.

Keywords: financial systems, liquidity, crisis

### 1 GENERAL

One of the conclusions that can be made of instability in the recent years - the universal model of functioning of markets and banks was not justified. The financial system of Ukraine has the settled contradiction, which is in the fact that banking sector is formed according to European continental model, but the stock market is developing in accordance with Anglo-American landmarks. Therefore, the architecture of Ukraine's market has fragmented character concerning institutions and instruments.

Credit and investment risks persist. Investments and securities are extremely risky. State credit ratings are falling. The limitations in the stabilization of financial system are regarding the volume of international reserves of central banks and the limiting boundaries of the budget deficit of countries with troubled economies.

In Ukraine the stabilization of financial system was performed in the framework of indicating changes in monetary-credit and fiscal policy, which were conditioned by the processes of the development of both external and domestic financial markets.

Proposals on markets' restoration and their post-crisis stabilization:

1. Long-term investment resource in hryvnia shall be the basis of post-crisis restoration.
2. Additional effort is required to increase trust in monetary-credit policy and understanding of currency policy.
3. The system reform of the financial sector of Ukraine is required, including banking system, non-banking institutions, and infrastructure. Focus should be on the development of the domestic market of long-term financial and other resources, in particular the securities market. To balance credit-investment cycle and to secure financial system from external threats the activities of institutional investors must obtain investment catalysing features.

Regulatory impact of the state and its institutions – central banks, governmental and other structures – was and remains crucial for the stabilization of financial systems. Maintaining the trust of depositors (for banking system) and investors (for stock market) is the significant means for the retention of stability with the increased mutual responsibility of all the participants of the markets.

Concerning general evaluations and expectations the following can be stated.

The global economic depression negatively affects the financial sector of Ukraine owing to the failure of more or less accurate assessment of the value of money and other assets, falling investment attractiveness of domestic securities on the world markets (including state). External markets are

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practically closed due to stagnation, refinancing of previous loans is suspended for indefinite terms. Today and in the nearest future, Ukraine can get resources from international financial institutions and interstate loans. In both cases these resources are beyond the borders of open markets

On the international markets, the long-term consequences of the collapse of major investment banks are not clear yet, but there are good reasons to expect consolidation of various financial segments (through mergers and acquisitions – M&A) based on the universalization of financial institutions.

## **2 CONCLUSION**

The support of the positions of state banks in the various segments of financial market shall be acknowledged as the major direction of the stabilization of the national banking system. To ensure the security of state interests it is expedient to primarily ensure the stability of state banks, including through their capitalization. Unlike refinancing, indicative capitalization of state banks by the state is unobjectionable as corporate and actually remedial action. In post-crisis conditions weighed regulatory activities of NBU together with the state is the base for the stabilization of markets.

## HIERARCHY OF FINANCIAL INSTABILITY: STRUCTURAL APPROACH

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### ABSTRACT

Maintaining financial stability is a necessary component of modern economic development. Because of this, the problem of identification of the characteristics of financial instability becomes practical and, first of all, is related to the needs of the development of economic policy. Structural approach to the research of financial instability allows highlight its qualitative characteristics and apply the existing methods of quantitative analysis of the stability of the financial system more effectively to evaluate the interim stages of financial instability.

Key words: financial development, stability of financial system, financial instability, financial imbalances, financial crisis

### GENERAL

The main aim of this research is to consider the development of financial instability through the consequent hierarchy of its states and on this base to show which of the existing methods of the evaluation of financial stability are the most reasonable to apply.

Our analysis of financial instability is based on the concept of the stability of financial system, in accordance with which in the process of financial development a) double stability manifests (functional stability and the stability which causes development and defines its direction); b) there are different states of balance and stability of financial system, which vary by quality of efficiency and character of balance (see [1, c. 533-568]). Such approach allows not only consider the degree of the stability of financial system, but also the way the financial system fulfils its main mission in the economy. The development of financial instability is studied by the authors taking into account the hierarchy of its states. The authors determine the following kinds of financial instability: turbulences in a balanced financial system, financial imbalances, systemic financial instability, systemic financial crisis. Based on the represented hierarchy of instability, we propose the structure of the evaluation of intermediate stages of instability (accumulation of imbalances and systemic instability) applying the existing methods of quantitative analysis of the stability of financial system.

In particular, it is the formalized system of indicators of two types: the first one – structural indicators of financial pressure (evaluation of separate financial segments), the other one – the indicators of systemic stability (consolidated assessment of financial risks).

### CONCLUSION

The diagnostics of financial instability on early pre-crisis stages of development allows eliminate the degree of its negative impact on the financial system and the real sector of economy. Not all crises can be

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prevented, but the intensity of a potential crisis can be reduced by introducing corrective measures of discretionary nature, which are aimed at the elimination or restriction of the revealed instability (for example, increasing the capitalization of the financial system). Since the measures of economic policy must meet the specific situation, their previous determination is impossible. However, taking into account the close and interrelated character of the types of instability, it is hardly possible to clearly demarcate these measures.

The evaluation of financial instability is an evolving process. The proposed approach, which is based on the hierarchy of financial instability, is only partially developed. The objective of the further development of the methodology of financial instability research, analytical models and procedures for quantitative evaluation of various forms of instability remains topical in the future.

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## SPECIFIC FEATURES OF MODELLING THE PROCESS OF HEI STUDENTS' KNOWLEDGE ASSIMILATION

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### ABSTRACT

The problem of acquisition of subjects under study by trainees is usually given for analysis to psychologists and educators, who have developed numerous approaches to this problem as well as various recommendations. Let us consider the approach to the problem from a different perspective. This review shows an attempt to find the desired patterns, using general principles characteristic to stochastic processes.

It is obvious that this parameter shall be different for each student; however this difference is unlikely to be that significant, and thus, it can be considered equal for each student in the first approximation. The next group of questions, which are considered in this article, related to the analysis of the reverse situation of how the study material was acquired within self-studies.

Keywords: knowledge assimilation, optimization of teaching methodology

### 1 GENERAL

For this purpose, three control groups of 60 students were formed; students were selected into each group according to preceding test results, the purpose of which was to select students having an "equal" level of knowledge.

Students selected into the first group had an "equal" level of the background knowledge in humanities; students selected into the second group – in mathematics; the third group – in general management.

Students from each group were asked to study a large section of a new non-complicated material, corresponding to the group profile, after which students had to answer 20 questions.

Each of the figures shows experimental histograms of the number of students according to the "level of knowledge" in each group after conduction of self-studies of a new material and approximating densities of probability distribution, which represent exponential law with different values of the determining parameter  $\eta$ .

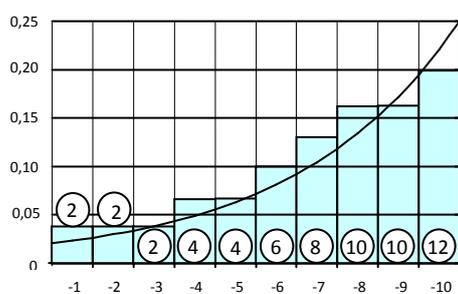


FIGURE 1 BEFORE THE EXPERIMENT

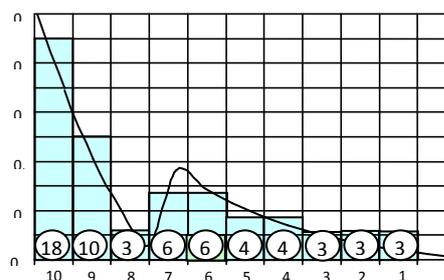


FIGURE 2 AFTER „SELF STUDIES”

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The experimental histogram of the number of students according to the “knowledge level” before the beginning of the experiment (Fig.1) and its approximating density of probability distribution – exponential law, can be interpreted as a law of knowledge “loss”.

Basing on the results from the previous experiment, there was another experiment conducted with the same groups of people. The aim of the experiment was following: A new discipline was studied. The audience was a group of students with different background knowledge.

After some time, during which the students were “listening to new information” and doing self-studies, their knowledge had been tested.

Testing the “knowledge level” of these students leads to the density of probability distribution in terms of the Erlang law of the first order  $W(z) = z \cdot \exp\{-z\}$ ; and after a while within the studies of the discipline, the experiment led to the Erlang law of the second order  $w(z) = \frac{z^2}{2} \cdot \exp\{-z\}$ .

Upon completion of the first stage, the students were transferred to the “mode of self-studies and work on materials”, after which they were tested again, and on the basis of those corresponding histograms were drawn.

Experimental histograms, which display the division of students into groups according to the knowledge level after self-studies (Fig.2), show a clear division into two groups – students with a good and bad level of acquisition.

It can be concluded that in spite of an approximately equal level of background knowledge of the most students, the presence of such dichotomy suggests that not all students can effectively study material on their own.

## 2 CONCLUSIONS

1. The model of “knowledge acquisition” and “knowledge loss” can be seen as the density of probability distribution of knowledge level in terms of the exponential law.
2. In order to construct the model of the “listening mode” with a periodic shift to the “self-study mode” it is possible to use a synthetic model based on the combination of the exponential law and the Erlang law.
3. It is necessary to take into consideration the division of students according to their level of ability to conduct self-studies in the beginning of the studies, when it comes to division of students into groups, in order to achieve the equal level of utilization of students’ capabilities and effectively plan the study process.

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## FORMATION OF LEARNING SAMPLES BASED ON GROUPING OF WELLS ON CORRELATION COEFFICIENT OF APPARENT RESISTANCE

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### ABSTRACT

Data interpretation of electric logging can be performed using machine learning systems such as artificial neural network. A good learning samples are very important for such systems. Increasing quality of the samples we can noticeably improve result of classification. The approach to formation of learning samples is proposed here. It is based on grouping of wells on correlation coefficient of apparent resistance. By using this approach we can improve quality of recognition by 2% - 7%.

Keywords: correlation coefficient, learning samples, uranium well, recognition process, apparent resistivity

### 1 GENERAL

There are several parameters describing uranium well litho logical structure which are taken for some fixed interval, for example 10 centimetres [1]. Some of them play special role in recognition process and usually are chosen as basic parameters, like apparent resistance. However, uranium wells recognition process lies not in dot, but in curve analysis [2, 3]. Therefore, the more curves of the same parameter in different wells matches each other, the more quality of recognition can be achieved, by forming train set from such wells. In order, similarity of curves can be described by correlation coefficient. Thus, grouping wells on the basis of correlation coefficient of one of the basic parameters can reduce volume of training set, time to train and increase quality of recognition.

The major purpose of the study is an experimental evidence of the suggestion that grouping of wells based on correlation coefficient of one of the basic parameters can increase quality of recognition.

Actually, the study was based on 38 wells, which contained approximately 37000 dots and 7 classes (Table 1.) 3 wells had been chosen, and 5 the most similar wells according to Pearson correlation coefficient had been provided for each of it. Apparent resistance was used for correlation coefficient calculations. Apart from apparent resistance, spontaneous potential, induction log and depth were used as parameters. Also, ‘flowing window’ (radius=5, i.e. 5 dots before and 5 dots after current dot) and range normalization [-1; 1] were applied to each parameter. Multilayer Neural Network was used as classifier.

TABLE 1 CLASS DISTRIBUTION OF DATA

Class(Lithotype)	Number of dots	% of whole number of dots
1	13596	36.56
3	13583	36.52
4	4518	12.15
7	2738	7.36
6	2557	6.88
5	187	0.50
9	5	0.013
<b>Sum</b>	<b>37184</b>	<b>100</b>

TABLE 2 RESULTS OF RECOGNITION OF WELLS LITHO LOGICAL STRUCTURE BY NEURAL NETWORK WITHOUT/WITH GROUPING

Well code	Without grouping (%)	With grouping (%)
2257	34.82	41.93
2357	18.64	20.34
5130	54.13	60.49

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## 2 CONCLUSION

According to the results (Table 2.), there is an upright trend in each of 3 chosen wells i.e. using training set formed on the basis of grouping of wells on correlation coefficient gives more quality of recognition, than using training set formed by 37 wells (all wells in deposit without well to check). Actually, 2 – 7% growth can be seen, so the suggestion is right, at least, for this data.

Additional study should be conducted to check trend on all of 38 wells and on different uranium deposit.

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## DISTANCE INTELLECTUAL LEARNING TECHNOLOGY FOR PEOPLE WITH DISABILITIES

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### ABSTRACT

In the educational sphere the intellectual technologies for distance learning are rapidly developing. Particularly these technologies are demanded by people with disabilities. A lot of studies devoted to the creation of effective intellectual educational technology [1]. There are applied methods of artificial intellect as neural networks, genetic algorithms, artificial immune system [2], and others, contributed to increase the quality of learning and to development of logical thinking, which allow carrying out an individual treatment to people with disabilities.

Keywords: distance learning, intellectual educational technology, information system

### 1 GENERAL

Distance learning focused on the development of creative abilities of the person and their cognitive activity includes two ways. The first method consists in regular distance communication with qualified teachers. In this case, the main object of the process is becoming a person of teacher with his expert and consultant roles. The second way is using the recent advances of artificial intelligence. Implementation of educational technology through intelligent system should include: knowledge about the teaching methodology, knowledge about the studied subject domain (which already included in the ready software shell), knowledge about the psychological and physiological characteristics of the learner and his academic achievements acquired during training. This technique is based on a model of adaptive intellectual training, which consists of interactive multimedia dialogue on the Internet, and has an access to WWW-resource. The advantage of the proposed intelligent technology is the possibility of distance access to laboratories of collective use for people with disabilities, operational management training process in real time, an individual treatment to each student with all the features of information perception and prediction of learning outcomes.

### 2 CONCLUSION

Using the recent advances of artificial intelligence in the development of education technology for people with disabilities opens new ways to improve the quality of education and provides an individual treatment to each learner allows providing the operational management of the learning process in real time and contributes to social adaptation in society.

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## CENTRAL ASIA & INDIA D-LEARNING NETWORK ON THE PARAM SUPERCOMPUTER BASIS DESIGN PROBLEMS

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### ABSTRACT

Problems of the design of the International Central Asia & India D-learning network using LMS e-Mentor working under HPS on Indian PARAM supercomputers in HPS computing centres of above countries are studied.

Keywords: PARAM, D-learning network, e-Mentor

### 1 GENERAL

Distance learning network of Central Asia and India countries (DLNCA&I) is designing now with great support of Indian Government and it should provide access to learning, when the source of information and the learners are separated by time and distance, or both [1]. DLNCA&I is being based on Massive Open Online Courses (MOOC) ideology as a recent development on D-learning.

Realization of an effective online learning environment from all aspects of educational network system is being addressed with various development efforts in advanced collaborative and interactive solutions, standardization and interoperability in e-Learning applications.

Multilingual Learning Management System (LMS) “e-Mentor” is a product developed using component based architecture. The software supports course delivery, online assessment and collaborative environment through email, chat, discussion forum, query handler etc. The tool also supports several web 2.0 related components like blog, RSS feeds, wiki etc., for the benefit of online students. LMS “e-Mentor” is working under high performance solution (HPS) on Indian PARAM supercomputers in HPS computing centres in India, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan.

This project will have significant R&D component for formulating a new pedagogical approach by exploiting the potential of ICT to support a personalized, flexible and learner centric approach. This pedagogical approach strives to facilitate empowerment of both learners and teachers, while producing personalized learning experiences. Based on this, project aims to establish a framework to deliver personalized, adaptable and adaptive learning experiences in a collaborative environment for learners. The e-Learning system will have personalized views/interface to present an online learning environment, which covers the heterogeneous needs of a student group with different cognitive traits, intelligence, intellectual level, background etc.

### 2 EXPECTATIONS

A Learning Environment with

- Increased capacities of personalization
- Pedagogical requirements of online learning
- Flexible and learner centric approach
- Collaborative workspace for learner
- Creation of learning objects and its metadata

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- Content reusability, Content packaging and portability, Content restructuring & sequencing
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## ANALYSIS OF STUDENTS' EVALUATIONS OF UNIVERSITY TEACHING IN TURKEY



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### ABSTRACT

Student evaluation has been used for years in higher education to supply feedback to both the instructors and the department administration. To estimate the situation in Turkey, we analyse a dataset collected in Gazi University, Turkey via a Likert scale based questionnaire. The questionnaire includes items to evaluate the course and the instructor. Our investigation on the outcomes of this questionnaire has two distinct issues. The first is finding out what is important for Turkish students while judging a course and its instructor as mentioned. Along with this consequence, we also try to use clustering – a data mining technique – on the dataset to try evaluating a questionnaire in some other way than using the traditional statistical techniques. Correspondingly, it is seen that the attribute attendance that is correlated with both the other attributes – difficulty and retaking the course – and most of the questionnaire items has significance also in clustering. Therefore, the data is clustered into two and three groups according to the questionnaire items and attendance using k-means clustering. The correlation results show that the students emphasize the importance of attendance; the instructor's being prepared for course, being open and respectful to the students. On the other hand, clustering can only be done by taking attendance into consideration. Since the difficulty and being a repeat student does not have significant difference, the cluster developed using these are not well defined.

Keywords: student evaluation, Likert scale, correlation, clustering

### 1 GENERAL

The two main activities of faculty members are teaching and research. There are easy and objective ways to measure the research performance of faculty members by referring their papers, which are evaluated by independent organizations. However, it is relatively hard to measure the teaching performance. Student evaluations of courses are the most common evaluation tools in higher education today. Scores on course evaluation forms are used by management of many universities as a measure of a course performance [1]. Students are considered to be important stakeholders when considering the quality of teaching in a course [2] and Clayson [3] reviewed the issue from the area to address the question if the evaluations on courses and instructors that students make are related to student learning. Student evaluations of teaching (SET) are not only the primary measure of the teaching performance of college and universities but also play a role in decisions regarding faculty members including pay, promotion and status [4].

The common way to conduct this evaluation is online or manual surveys. According to Khorsandi et al. [5] the majority of evaluations are conducted in a classroom setting with paper surveys. However, the

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online method of gathering faculty evaluations has numerous advantages over the traditional in class method. It provides many benefits including time and cost savings, less susceptibility to influences, and faster reporting of results. Also Khorsandi et al. [5] compared the two methods of student evaluations of faculty, the paper-based or online method, by questionnaire instrument. They found that students prefer the online method for evaluating the quality of teaching over the traditional paper based method. Even though using online methods are preferred by the students, save time and increase the data reliability, some studies showed that online evaluations of the instructor and course were poorer. This result may affect the performance measure of SET. In that manner, Fogarty et al. [6] found a systematic difference between web-based and paper-and-pencil evaluation data in their study conducted at one private university in the Midwest USA. They concluded that student evaluation of teaching is related to how it is collected, and therefore is not reliable.

Usually the results of student evaluation questionnaires based on Likert scales are analysed by basic statistical techniques [7] since Likert scale makes it possible to explain the results with these. Beleche et al. [1] state that many researchers have viewed a positive correlation between student grades and scores on student course evaluations. They tested the relationship between SETs and an objective measure of student learning. The results of their analysis tell positive and statistically significant relationship between student learning and SET scores.

## 2 CONCLUSION

It is an important issue to get feedback from students in higher education for course management. With this feedback, while the instructor can edit the course content, the way to deliver the course content and instruction skills, the department administration can assign the instructors to proper courses and decide on the promotions. Consequently, we analyse a student evaluation dataset collected in Gazi University that is composed of items to evaluate the course and the instructor along with additional attributes like attendance, difficulty and students' retaking the course. During the analysis of this dataset both traditional statistical techniques – determining the correlation between the items and the attributes – and data mining techniques – clustering – are used. Consistent results that prove the importance of attendance to a course with both techniques are obtained.

Based on these results, it is shown that data mining techniques are also suitable for investigating the outcomes of student evaluation questionnaires. For that reason other data mining techniques can also be applied to these kinds of datasets. Moreover, a separate research area can be developing a brand new questionnaire for student evaluation in Turkey with taking these results into consideration. Last but not least this brand new dataset can be established in a manner that it is both suitable for Turkish students and using data mining techniques. Up to now, outcomes of most of the student evaluation questionnaires are determined by statistical techniques as shown in literature. Development of a questionnaire whose outcomes are applicable to various data mining techniques can bring a new perspective to student evaluation.

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## INNOVATIVE TECHNOLOGIES IN HIGHER EDUCATION: CASE OF KAZAKHSTAN

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### ABSTRACT

The new paradigm of education called by the new technological modes is in agenda. Innovative educational centre at economics and business chair of the International IT University runs multiple research and academic activity targeted on facilitating of the educational process both for students and faculty members based on principles of openness, interactivity, and effectiveness. Also they should be enjoyable and fun.

Keywords: innovative technologies, the higher education, the highest multi disciplinary education, ICT in education, innovative educational centre

### 1 GENERAL

The main goal of this study is to develop recommendations on development of innovative technologies in the higher education by preparation of economic programmes in IT management and IT finance and requirements to their use in IITU.

Research has shown that a global challenge to new technological ways is introduction and development of the highest multi disciplinary education. The scientific and methodological seminars have been organized on a regular base to bring together academic teachers and find answers for questions: how to reach the high quality of our product and process? What sorts of students we have and we would have? What sorts of academic teachers we have and we would have? What role methodology, teaching and learning techniques have? What place ICT has in teaching and learning?



FIGURE 1 PRINT SCREEN OF INNOVATIVE EDUCATIONAL CENTRE AT ECONOMICS AND BUSINESS CHAIR "ZHANA BILIM - INNOVA"

### 2 CONCLUSION

Preliminary findings reveal three types of students based on learning motivation; three types of academic teachers based on teaching motivation; three types of innovative educational technologies based on blending ICT and traditional techniques; development of distance and online learning. Taking into account the role of ICT it is stressed that they are only tools.

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## INFORMATIZATION OF HUMANITARIAN EDUCATION

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### ABSTRACT

Today it is obvious that the process of society informatization promotes awareness of the possibilities of distance learning technologies as a cost-effective solution of problems related to the training of citizens, especially adults; ensure an effective transition of the principle of "education through life", as the latter thesis is socially - caused modern problem, based on changing requirements for the quality and content of vocational education. Obviously, only informatization allows to react and meet divergent educational needs of different categories of consumers.

Keywords: informatization, consumers, vocational education, distance learning, technologies, cost-effective solutions

### 1 GENERAL

One of the key and the most attractive characteristics of information and telecommunication technologies is the opportunity provided by these systems to each learner to build his own model or educational path that best fits his educational and professional abilities and ideas. As for the application range of distance education technologies, unfortunately, it has not been studied across the spectrum of its capabilities, but it is clear that distance education technology is integrated into all existing forms of education, especially part-time education, which, according to modern didacticians, leads to the convergence of various forms of education.

Informatization of humanitarian vocational education - it's not the external signs of humanity's transition to the information society and not a tribute of humanitarians to young but rapidly developing field of science and technology. These processes are seen as the transition to a fundamentally new type of knowledge where convergence, and more often the synthesis of the humanity and natural parts of it are provided. Consequently, in the new information environment, knowledge appears as a single dynamic system, which aims to outline industry, integrating them into the system. Access to modern databases allow humanitarians to build their individual humanitarian space, remove the existing borders between the two countries, to create a single intercultural communication system which allow to develop their original concepts and models of the studied phenomena and processes. Thus, freedom of information is becoming both the condition and form of creative and professional freedom and development. So, there is a reciprocal transformation and interaction of information technology and the humanities. If informatization allows you to create, store, distribute huge amounts of information of human knowledge, which leads to increased technological components in the structure of human knowledge, the use of technology in arts education in turn leads to a certain humanization of modern technology, introduces a new cultural studies and broaden the sphere of technologies use.

### 2 CONCLUSION

Recognizing that the peculiar feature of the new stage in the development of education informatization is in the fact that the priorities are not instrumental but substantive aspects of the creation and development of information and communication technologies, Kazakh Abylai khan University of International Relations and World Languages outlined as a priority in vocational education the transition to an innovative professional education with IT technologies through radical rethinking of objectives, content, forms and methods of training in the university's profile.

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# DEVELOPMENT OF A VIRTUAL PHYSICS LABORATORY "STUDYING THE PHENOMENON OF PHOTOCONDUCTIVITY" USING ELEMENTS OF 3D COMPUTER MODELING

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## ABSTRACT

The main idea of this article is creation of the virtual physics laboratory using elements of 3D computer modelling. The essential aspects of the structuring and presentation of the theoretical and experimental materials within the virtual computer laboratory are presented. The developed virtual computer laboratory is based on Microsoft .NET XNA platform and on studying the phenomenon of photoconductivity.

Keywords: virtual physics laboratory, Microsoft .NET XNA, 3D computer modelling

## 1 GENERAL

Currently in the field of science and education has been a sharp increase in the development and implementation of computer-based training systems. Computer training systems have characteristics such as flexibility, modularity, parallelism, coverage, economy, technology and innovation [1-3]. One such example is the virtual laboratory work that a computer program or a related set of programs performing computer simulations of some of the processes.

Many virtual laboratories, which have been developed in the universities of our country, as well as the world does not provide opportunities to work with the virtual laboratory by a total or closest to reality simulation experiment. It was also observed that none of the virtual laboratory work was developed using 3D scenes, provided the opportunity for the majority of the experiment only in 2D or just limited to the demonstration of a "similarity" of the real physical world.

For each experiment a separate 3D model has been developed and physics engine has been implemented which computes the interaction between the objects of the model. All this has shown quite good performance of the simulation of the real world objects. The models has been created using Blender and Maya 3D, and the main code has been written in C# (.NET) using the XNA 4.0 framework.

The reasons why XNA and C# had been chosen as the main tools for implementing virtual lab software are coming from the comparison of different 3D-scenes-creation-frameworks. Three different 3D-scenes framework like OpenGL, Direct3D and XNA were chosen as the main one to be compared against each other. The main qualities according to which analysis is performed are: (a) complexity of the mastering, (b) supported languages, (c) popularity, (d) support and (e) future potential.

## 2 CONCLUSION

Thus, modern information technologies allow developing any forms of experiments and open the wide perspectives in creation of different and sometimes innovative laboratory sessions on physics. We suppose that the virtual laboratory sessions on physics developed for the students of higher institutions of technical experience are the modern computerized guidelines of the new generation.

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# THE ROLE OF ELECTRONIC JOURNALISM IN PROMOTING THE PRINCIPLES OF GREEN ECONOMY IN EDUCATION PROGRAMS IN KAZAKHSTAN UNIVERSITIES

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## ABSTRACT

The role of electronic journalism in promoting the principles of green economy in higher education programs in Kazakhstan is to enhance the professional and creative potential of students by introducing them to disciplines of Ecological e-Journalism and Green Advertising & PR and enabling them to communicate environmentally friendly practices and corporate social responsibility to the public.

Keywords: green economy, electronic journalism, green advertising & PR, environmental education

## 1 GENERAL

Kazakhstan's Green Economy Concept policy adopted in May 2013 requires mainstreaming the green economy agenda into national development and aims to diversify the local economy with clean energy sources, advanced technologies and scientific innovations. Stimulation of economic drivers of green development requires a range of enabling conditions, such as sustained political commitment and, most importantly, raising public awareness of existing environmental issues and effective communication of ecological information to target audiences.

This study aims to explore perspectives on developing and implementing academic curricula for courses in ecological e-journalism and green advertising & PR in Kazakhstan universities. Journalism and PR, being among the most dynamic areas in our current digital age, are effective tools to promote the principles of green economy and influence the socio-political life of the country. Today it is particularly important to increase the role of national online media in communication and objective interpretation of environmental issues and to examine their involvement in the process of creation and implementation of environmental policies. Thus, there is a great need to prepare highly qualified specialists in areas of ecological e-journalism, advertising and PR to encourage an objective coverage of environmental issues in national media and drawing public attention to the importance of conservation of natural and cultural heritage in Kazakhstan and making a transition to sustainable development.

## 2 CONCLUSION

Strong endorsement of Kazakhstan government to promote principles of green economy requires the transition of the whole Kazakhstan society to sustainable development and raising public awareness of existing environmental issues both locally and globally. As a result, "green" national development places responsibility for the quality of news and objective reporting of ecological topics in the news media. This study draws attention to the importance of developing education programs for university students to introduce them to ecological journalism and green advertising & PR, and enable them to develop professional skills and become effective communicators of ecological information to the audience.

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## VARIABILITY OF AN ASSESSMENT OF KNOWLEDGE IN DISTANCE LEARNING

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### ABSTRACT

One of the options of the correspondence education system perfection is introduction of the system of distance learning (DL).

Keywords: distance learning, traditional control, modern standards, individual work, the model of absolute quality school, the model of accumulative mark.

### 1 GENERAL

Distant education is understood as a complex of the educational services provided to a general population by means of the specialized informational and educational environment at any distance from educational institutions.

We believe the main characteristics of DL are:

- 1) flexibility = an elastance of DL in terms of an individual triad of time, a place and tutoring speed;
- 2) modularity = a discretization of DL in terms of possibility to form the training program consisting of separate independent courses modules;
- 3) communicativeness = the DL special interface in terms of execution of new social roles in educational process (to teach + the student = a tuter + the client);
- 4) processibility = use of specialized technologies and DL tutorials in terms of emphasis on student individual work;
- 5) efficiency = specialized quality control of DL in terms of execution of systematic monitoring of comprehension of the particular amount of knowledge.

The evaluation of student's work during the term is constantly carried out. However, a more or less universal system of measurement has not been worked out/ created yet [3]. That's why the final mark on the subject is rather subjective and sometimes disputed by students.

Modern requirements to the organization and realization of the study process lead to a disbalance between the lecture time and the time allocated for practical classes, i.e. a number of contact hours is not enough to consolidate theoretical knowledge.

Therefore, traditional control (interrogation, testing, oral responses) is becoming burdensome and doesn't fit into the format of contact hours. Thus, following modern standards, the role of student independent work during the whole period of studies increases[1].

Individual work for students is a shift in quality in relation to studies comparing to the secondary school. At school student groups are constant which allows to control student current performance in electronic journal and mykoob.lv system widely used nowadays in secondary schools of Latvia.

One of the greatest advantages of these new resources is an availability for the parents of the students.

In the higher educational institution the above mentioned system can't be fully realized due to the flexible composition of the student groups and the fact that most students are financially independent of their parents. That is why the role of motivation in knowledge acquisition increases.

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The system offered lets optimize time and forms of control of acquired knowledge.

In modern pedagogical practice the two polar models of mark formation are used:

1. classical – the model of absolute quality school (AQS),
2. new – the model of accumulative mark (AM).

The latter one takes into consideration students' efforts during the whole term and is the measure of their personal competence development [2]. As a rule either a static AM model or a dynamic AM model is used. The authors suggest a progressive flexible model, namely a combined AM model based on both approaches.

The paper offers an algorithm of the combined AM model implementation in distance learning system.

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## DEVELOPING KAZAKHSTAN'S MINISTRY OF EDUCATION AND SCIENCE WEB SITE

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### ABSTRACT

We propose a new version of Kazakhstan's Ministry of Education and Science web-site. The development of the site is based on the previous version considering the consequent expansion. We highlight the main tasks of the current version of the site and define new requirements for its development.

Keywords: Kazakhsatn's Ministry, WEB site, education, science

### 1 GENERAL

The primary goals of Kazakhstan's Ministry of Education and Science (MES) web-site – is creating conducive conditions to familiarize the people of Kazakhstan with the materials of the ministry, preparing young experts and researchers, developing creative collaborations between specialists. The MES web-site was initially oriented at raising the efficiency of ministry's educational and research scientific management.

One of the most important conditions affecting the positive perspectives of web-site browsing is its usability. It should be user-friendly for both the user interested in the published material, and the MES employees. Usability lies in simplicity and the intuitive interface design, which allows not to distract oneself from, for example, studying the complex search tools or the possibilities of publishing web page materials. Such obstacles can push away users from collaborating with the MES administration. That is why the web page publication tools should be simple and clear – displaying the articles and illustrations in the way they were meant to be.

The web site development is made considering its further growth. The creation process is broken into several steps, each one complementing previous work. The current version of the site is managing one of the most important tasks of Kazakhstan's MES – informational support. The next step of the development is supporting the “user-Ministry” feedback, evaluating this link and adding an array of applications to the web-site. Thus, we should make a gradual advancement to our main target – creating a user-friendly environment for the citizens of Kazakhstan – making ministry materials accessible, helping specialists grow, developing research partnerships and spreading information among the country's population.

### 2 CONCLUSION

Internet site of MES unites educational and research areas where the population will be able not only to receive information (as on the majority of educational sites), but also to place the remarks, responses and results of the supervision, and researchers – to acquaint, discuss and improve the achievements.

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## ADAPTING ERP SYSTEMS IN HIGHER EDUCATION



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### ABSTRACT

Today many organizations of all sizes run their business processes via an Enterprise Resource Planning (ERP) system which is a complex and powerful information system with a central database. These systems integrate different functions and departments, and create value across organization with the real-time information exchange. ERP systems are crucial in order to survive and become successful in the competitive global market. If these systems can be implemented correctly, in the long run, organization's overall performance increases while total operational cost decreases. ERP systems have different modules. This opens opportunity to companies of all sizes to purchase required parts instead of the rigid system. Increasing importance of ERP systems and demand for trained ERP professionals cause universities to offer ERP courses and adapt ERP systems in their programs. Universities join alliances programs of ERP software vendors such as SAP so that they have an access to state of the art ERP system. This brings benefits not only to students but also to university, professors, ERP partners and employers. Students show high interest to the offered courses. Adapting ERP systems in education is an example of Computer Assisted Learning (CAL) which is utilized by many programs of intuitions today. This paper attempts to address the importance and benefits of ERP system adaptation to higher education along with the years of teaching experience and observations.

Keywords: ERP, Alliances Program, Computer Assisted Learning

### 1 GENERAL

Enterprise Resource Planning (ERP) or Enterprise Systems are one of the most complex and powerful information systems in use today [1]. Companies use ERP systems to run their company and satisfy all different business needs by single software with a common database. It provides an integrated business environment to companies with its modules. It integrates all departments and functions of a company like finance & accounting, human resources, sales & marketing, and operations management (see figure 1). Olson [2] states that ERP systems create value through integrating activities across organization. It provides better way of doing things (implementation of best practices), standardization of processes, one source data, and online access to information. According to Vlachopoulou and Manthou [3] an important characteristic of ERP systems is being the first approach that combines business and information technologies concepts in an integrated system. Especially, with increased global competition and importance of customer satisfaction with difficulties in predicting customer needs, usage of ERP systems is becoming widespread among organizations in order to survive and become successful in competitive markets. Rienzo and Han [4] state that real-time data exchange is essential, and successful businesses ensure people have real-time data for decision making. In 1992 SAP Company named its first integrated ERP system "SAP R/3" in which "R" stands for real-time.

According to Olson [2] ERP systems in concept cover all functions of an organization. The idea is to centralize data to be entered in a clean form, and then used by everyone in the organization as valid information. However, in practice ERP vendors sell their software in modules. The common modules in SAP ERP system are: Sales & Distribution (SD), Materials Management (MM), Production Planning (PP), Financial Accounting (FI), Controlling (CO), Human resources (HR), Business Intelligence (BI), Quality Management (QM), Project Systems (PS), and Plant Maintenance (PM). Implementing ERP systems in modules brings advantages of: (1) purchasing modules with specific functionality needed, (2) opportunity to mix modules from different vendors, (3) less initial implementing cost, and (4) reducing overall risk.

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ERP systems are usually adopted with the expectation of better organizational performance with lower operational cost in the long run. ERP Report of Panorama Consulting Solutions [6] includes expected benefits of organizations from ERP systems that were implemented during January 2013 to February 2014 (See figure 2). Implementing ERP systems successfully requires strong leadership, clear implementation plan, and constant inspection of the budget [8]. Additionally, implementing ERP system is a complex process which involves many activities. Each single activity is directly related with organizational change factors that are critical for a successful implementation [6]. ERP systems can be customized to adapt an organization's business processes. Organizations are also supposed to develop an implementation strategy. The two extremes are "big-bang" and "phased rollout". In "big-bang" the old system is replaced with the new one at a time, whereas in "phased rollout" replacement is done step by step.

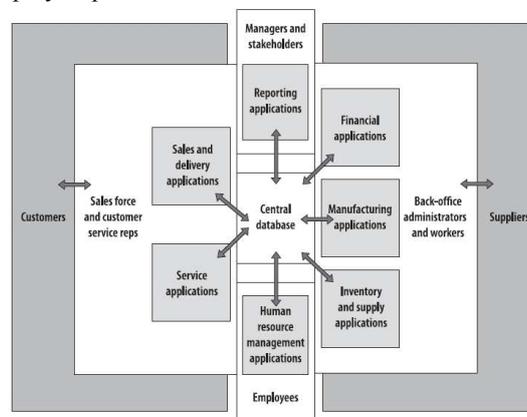


FIGURE 1 ERP SYSTEM FUNCTIONS [5]

In this study, we address the importance and benefits of ERP courses and adapting state of the art software along with the years of teaching experience and observations. The paper is organized as follows. In section 2 Computer Assisted Learning (CAL) concept is explained. In section 3 benefits of ERP software adaptation is discussed. In section 4 the paper concludes with final remarks.

## 2 CONCLUSION

Importance of ERP systems are recognized by the professional organizations and academia. Many companies run their company via ERP systems. It is vital to offer higher education considering this fact. Different parties like universities, professors, students, ERP partners, and employers benefit from the UA program of the ERP vendors. Universities gain a competitive advantage by satisfying the demand of ERP system learning. Students perceive the ERP system concept by heart and have a hand on experience with a commercial ERP system. This may open different doors to them in their professional life. Professors, on the other hand, practice their knowledge on a real ERP system. Additionally, they may have research and publication opportunities as a result of information sharing between UAC members. ERP partners and employers save money and time due to having already trained and educated candidate employees.

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# EXPLANATION OF A NEW APPROACH TO DESIGN OF ACADEMIC COURSES IN COMPLIANCE TO THE MARKET MODERN REQUIREMENTS

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## ABSTRACT

According to the current state of business and job market, the requirements for graduates are changing rapidly. There is a great citation from Dr. Marie Norman about teaching: “Without high-quality teaching, even the most carefully crafted courses, delivered in the state-of-the-art classrooms, using the most current technologies fail to achieve their full educational potential”. Using the new strategy of designing academic courses which is composed of four parts (project-based courses, students must be engaged in problem-solving and learn by doing real stuff, and materials definitely should be context-rich), we can definitely improve the educational processes in all fields while covering the development of pedagogy and improving the core competencies of students. The teaching programs, courses, and pedagogy must go together in order to reach the teaching excellence and proficiency. Moreover, the main goal of these improvements is learning outcome. Any instructors desire to provide the students with all required skills and knowledge. Thus, using the new approaches the author of this article proposes some techniques of designing academic courses in compliance to the new market requirements which will lead to great achievements of students with the help of well-qualified instructors.

Keywords: academic course, project-based course, problem-solving, context-rich courses

## 1 GENERAL

Any well-designed course with a great bunch of prepared materials cannot convey the necessary level of knowledge the students must get. Here the pedagogy comes to the scene. Three attributes of a new type of pedagogy must be considered: the courses should be context-rich, project-based, and students must learn by doing real stuff [4]. The context-richness attribute means that any course has to possess the “back story”. The students should work on assignments while keeping the real scenarios and use cases in their minds. The attribute of making course project-based means that teacher with students should work a lot on projects which can be met in the real working environment. The last attribute (learn-by-doing) means that the class time is spent doing individual and hands-on activities, where students apply knowledge from readings and get feedback from instructors.

## 2 CONCLUSION

It can be guaranteed that the design combination of core competencies, course threads and pedagogy skills can provide a great efficiency in teaching and excellent students’ achievements. As the time changes, the educational system must comply to the new requirements of business. It means that the business must lead the implementation of new standards in education. The whole system should be outcome-oriented. Using the techniques described in this article by the author, the students will be able to get the appropriate level of professionalism and feeling of readiness to “fight” on the job market.

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## PERSPECTIVES OF STUDYING “INTERNET EFFECTS” AND EXTENSION OF COMPUTER SCIENCE CURRICULUM

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### ABSTRACT

The Internet provides tremendous opportunities for communication and socializing activities. Internet communities are beginning to play a significant role in the life of society, especially for the young generation.

The factors contributed to the emergence and development of a large number of online communities (web forums, blogs and blog platforms, wikis, chat rooms, mailing lists) are easy to install and use, and today everyone can organize the “own” community. This phenomenon needs to be analysed through the special discipline that may be included into the Curriculum core for the students of Computer science schools.

Keywords: social media network, Internet effects, social informatics

### 1 GENERAL

Social networking is a tool makes life easier and helps to solve certain tasks assigned to a person, though this form of communication in some cases might be more complicated and requires a virtual person more effort, it is possible to point out the most common ones:

First, possibility of simultaneous communication of a large number of the people being in different parts of the world, and, therefore, living in different cultures; secondly, impossibility of use of the most part of nonverbal means of communication and self-presentation; thirdly, pauperization of an emotional component of communication; and, fourthly, anonymity and decrease in psychological risk in the course of communication [1]. Above that there is one more challenge. Earlier, before the Internet, people got information by means of TV, radio and newspapers. All the media had their editors who choose what information to submit. People received only the information that was censored. Now, with the Internet, we don't have any censorship and we get tons of different information. For instance, in social networks, we can enter into interest groups or in Twitter we can receive news that we care about [2]. But in this situation we faced with another problem: we don't have any censor now, content of the Internet formed by users and it is a challenge to determine what information is true and what is false [3].

Sometimes the absence of the censorship may be even socially dangerous – when the young users may become the object of extremist propaganda “covered” by the “innocent” chats on religious subjects.

That is why one of the preventing option that may be offered is to elaborate an interdisciplinary course that consider, for example, the most important issues of Eurasian secular and religious sensibility.

### 2 CONCLUSION

While the same issues face all modern societies, and indeed the course aims to develop approaches to analysis that can apply to all such societies, we may focus primarily on the post-Soviet situation and the legacies of religious tradition and state policy that are present here [4]. Whereas most scholarship on secularism considers it from the point of view of state-centered politics and processes of modernization leading to broad social transformation, this discipline sets for itself the goal of developing methods of analysis for examining how this forms their ideas and secular sensibilities - particularly how the religious and the non-religious aspects of social life should be properly ordered in relation to one another.

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## USING PORTER STEMMING ALGORITHM FOR KAZAKH LANGUAGE

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### ABSTRACT

Information processing often uses natural language processing. One of the tasks in language processing is to statically analyse the text by stem of text. For this purpose, we can use Porter Stemming Algorithm, which has a good performance with minimal errors. This algorithm is compatible with Kazakh language.

Keywords: Porter, stemming, Kazakh language

### 1 GENERAL

To implement the Porter Stemming algorithm we denote consonants as C and vowels as V letters. In addition, the sequence of consonants CCC ... can be replaced with one C and the sequence of vowels VVV ... can be replaced with one V.

They can be represented as[C] (VC) {m} [V], where m - number of repeating sequences.

Expression of remove suffixes can be written as: (condition) S1 -> S2

This means that if a word ends with the suffix S1 and part of the word to S1 satisfies a specified condition S1 is replaced by S2.

In the condition, you can add criteria :

\*S – the stem ends with S (and similarly for the other letters).

\*V\* - the stem contains a vowel.

\*D - the stem ends with a double consonant (e.g., -TT, -SS).

\*O - stem ends CVC, where C is a second W, X or Y (e.g., - WIL,- HOP).

In the condition may also contain expressions of AND, OR and NOT

(M> 1 AND (\* S OR \* T))

If there are several rules of removal, the removal begins with the longest [1].

The above algorithm is used for English language. The results are consistent with the requirements of performance and optimization of information retrieval. To implement this algorithm for Kazakh language we must find all suffixes and create conditions.

In the Kazakh language, there are four types of suffixes: possessive suffixes, personal suffixes, declination suffixes, plural suffixes [2].

The form of suffixes varies depending on the last syllable and the last letter. To designate the last syllable and consonants will use the following notations:

VH—solid vowels (а, о, ұ, ы, и, у),

VS—soft vowels (ә, ө, ү, і, е, и, у),

semivowels:я (й+а), е (й+о), е (й+ә), ю (й+у),

R—sonar consonant (м, н, ң, л, р, й, у),

Z—voiced consonant (б, г, ф, д, ж, з),

G- deaf consonant (п, ф, к, қ, т, ш, с, х, һ)ю

If the last letter is a consonant:

H-solid syllable,

S-soft syllable,

^ - A symbol of exclusion

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The above notations used in condition for stripping suffixes. There are stripped only suffixes, which does not change the meaning of words (see Fig.1).

Адамзат тарихында мемлекет пайда болғалы бері оның әр түрлері пайда болды.  
Қазір Еуропаның бірқатар елдерінің саяси режимі демократиялық болғанымен бә  
Менің ойымша, Елбасы Н. Назарбаевтың мемлекет атауын «Қазақ елі» деп атау  
1 желтоқсанның Тұңғыш Президент күні деп белгілеу де монархиялық басқаруға ә  
a) – адамзат тарихын мемлекет пай болғал бер он әр түрлер пай бол.  
қазір еуропа бір елдер саяси режим демократиялық болған басқа  
мен ойымша, елба н. назарбаев мемлекет атауын «қазақ ел» деп  
b) 1 желтоқсан тұңғыш президент күн деп белгілеу де монархиялық

FIGURE 1 EXAMPLE OF STRIPPING TEXT FOR KAZAKH LANGUAGE (A – BEFORE, B – AFTER STRIPPING)

## 2 CONCLUSION

By implementing this algorithm we can see that, if the amount of word is huge, this algorithm becomes beneficial. For example, if there are 430 unique words in text, only 300 unique words will remain after stripping. It reduces word count by 30%. If input text has 1500 words, 910 unique words remain. The count of words reduced by 40 %. So, if the size of input text is huge, the algorithm has benefits. In the output we get reduced set of words. But the algorithm is not always strip suffixes, there are remains some errors.

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## FORESIGHT AS AN ELEMENT OF SCIENTIFIC AND TECHNICAL ACTIVITIES OF HIGHER EDUCATION INSTITUTION

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### ABSTRACT

Examined the role of Forsythe at the Universities' Management System. Considered options for foresight activities at the university. The necessity of building the leading universities in the first place, national research universities, forecasting activity to achieve the leading position in the global research and development.

Keywords: foresight, forecasting, information activities, scientific and technical activities, higher education, research

### 1 GENERAL

One of the major problems, which is still not understood and has not been solved by the majority of higher education institutions is that the development of high-tech projects going on, on the available scientific and technical basis, excluding actual market trends and information technology trends. Due to underdevelopment of the integration processes in the information technology sector there is a very poor orientation of universities for the implementation of scientific achievements in the field of production, as well as underestimation of research.

In modern conditions effective way to develop the university assumes correctly selected promising scientific and technical areas are implemented, on the one hand, as a portfolio of research and development work, and on the other hand - as a promising development projects.

In this regard, there is a problem in the university system to ensure continuous monitoring and forecasting of current scientific and technical areas. In the absence of the forecasting system inevitably takes college or catching up position in relation to other players, or acts on the object field that they represent, and in any case we are talking about the latest positions in the rankings. In this university is forced to focus on primary and secondary market research conducted by some individual researchers, research teams in the framework of their projects or marketing departments of innovation infrastructure, if these are established and functioning effectively.

Modern scientific and technological development of the university and the development of innovative technology solutions, products and services required to support predictive along with timely conduct marketing research markets. In this regard, there is need for a mechanism for coordinating particular interests of individual citizens' groups: consumer and community organizations, scientists, politicians and business, which in modern terms means using technology foresight.

Content analysis of domestic and foreign authors, the modern system of scientific and technological forecasting trends and foresight activities within the university is in fact one of the post-industrial management techniques. Forecasting as a management activity is a unity of thought (research), communication (coordination) and activities.

Purpose of foresight and forecast scientific and technological activities - providing scientific and technological forecasting internal and external environments, the development of technology and

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innovation environment and innovation priority areas of the university. Based on this, the problem of forecasting should include:

- Project work with technological trends (add-pool research and project ideas to a logical development of existing trends), search trends and contradictions in their integration into project ideas;
- The search for promising until indicate the possibility of development of technologies and applications;
- Search for lost and forgotten technological and product ideas that can be implemented effectively;
- Risk analysis for technology development or risks due to technology development.

Analysing contemporary forms of foresight on the domestic and world market there are several scenarios organization foresight activities at the university.

Scenario one: "The University is a teaching centre with predictive knowledge." This scenario is realized understanding of the development of the university as an educational and research centre in the sense of planning needed in the near future of educational competencies, qualifications, planning and implementation of development and technological directions. Results foresight used entities within the university. Marketing activities related to: advertising the university as a provider of quality, contemporary and timely education for students, promoting the market specific technical developments and products. Predominantly regional market. In college, there is training course of foresight and intelligence. Model of the university is not scaled.

Scenario Two: "The University as a consultant in the future in its priority areas of science and technology." In addition to the internal needs of the university are spot consulting services in the field of forecasting in selected scientific and technological developments for the individual customers as at the regional and country levels. There is a separate marketing direction to promote this type of service on the market and finding the appropriate consumers. The university operates its own think tank focused on the needs of the internal and external customers.

Scenario Three: "The University as a source of visions of the future or the university as a generator of the future." The university conducts research generalists in their areas of specialization and organizes free provision of prognostic information, as well as an information system that allows to collect, manage and coordinate the positions of experts and relevant players in the field of work with trends, technological forks, alternative scenarios, wild cards. Marketing focuses on the management of public opinion awareness of technological trends, fashion creation, including in the area of future competences and qualifications. University a provider in the basic understanding of the development and application of scientific and technological areas.

## 2 CONCLUSION

In conclusion, it is important to note the need to build the leading universities in the first place, national research universities, forecasting and scenario management activities to achieve the leading position in the global research and development.

Problems associated with the management of higher education institutions in the new system of economical and politically relations requires adequate solutions in the organization of higher education. Established in previous years, the system of higher education was predominantly authoritarian and proved ineffective. In this connection, it is useful to consider the organizational principles of democratic management of the university, which, as practice shows, are based on the accumulated foreign and domestic experience.

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## SYNCHRONOUS DEVELOPMENT OF MORAL, INTELLECTUAL AND PHYSICAL QUALITIES OF THREE-YEAR-OLD CHILDREN IN THE PROCESS OF TRAINING

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### ABSTRACT

The work investigates the new approach to the complete use of the physical and intellectual potentialities of children. The peculiarity of such approach is expressed in the combination of intellectual and physical loads under which the intellectual component usually lies beyond the context of the training process itself. As concerns morality, it plays the role of the environment of communication. The main instruments supporting the children's motivation mechanisms in the training process are: interest, possibility of the instantaneous practical implementation of their solutions, unlimited and diverse physical loads.

Keywords: children, controlling, motivation, development, potentialities, training process

### 1 GENERAL

There exist several reasons explaining the necessity to carry on the wide experimental investigation of the physical and intellectual potentialities of children, starting from the 3-years-old age:

- real underestimation of children's potentialities, laid in the normative documents of paediatrics, pedagogics and in the traditions of the upbringing activities of the children's parents; the observation of our own children's behaviour as the analysis of the opinions and actions of paediatricians and nursery pedagogues stimulated this research work,
- the regime of the children's existence in the average statistical family, not corresponding to their interests: The acute lack of substantial communication (especially with fathers) and strong limitations, bracing children's cognition of surrounding. This is so-called "the line of the least resistance", providing the convenient position of parents – the child is provided with meals, clothes, toys, TV-set and, certainly, with computer. The child is busy and, at the same time doesn't disturb parents.

Unfortunately, the results are obvious: physically undeveloped, unhealthy, bad mannered and uneducated children, spoiled and split nature of our planet, unjustified aggression and the money being at the head.

To achieve positive changes in children's development it was necessary to study, and analyse the intellectual and physical capabilities of children as well as to reveal the practical possibility of the efficient positive influence on children's thinking and consciousness in combination with the main tasks of the research were as follows:

- searching for the means of achieving the permanent children's motivation in the process of training,
- revealing the possibility of transferring the control of the physical loads from the coach directly to the child in the conditions of the motivated training process,
- checking up the ways of realizing the intellectual component, depending on the children's interest to the process of training.

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- checking up the hypothesis on such the children's successful mastering self-defense soft technique skills on the base of the combat Sambo and the elements of Ushu system (Choy style) with the simultaneous mastering the laws of morality,
- solving current everyday problems – correct and adequate expressing thoughts, ethics of behaviour, ability to lace up acquiring independently, the fundamentals of the spiritual development through the training process.

The experimental studies were conducted in the combat training gym of the private sport club “Alfa Gor”. The gym was equipped with the physical and political maps of the World, “axis of time” (from 2.5·10<sup>9</sup> years (B.C.) till nowadays), collection of the volumes of children's encyclopedia, water- color dyes, brushes etc. The group consisted of no more than 20 children (10 pairs). Every summer children went to the training camps, for one month. The group consisted only of the coach with the children.

It necessary to list the principles without which the successful results could not be achieved:

- respectful attitude to each child; attentive and patient listening to each child, substantial communication with the children;
- oriented to their age group, interests, wishes and peculiarities; moderate use of school didactics; adaptation of the Basis Programme of Self – Defense to physical and age peculiarities of children;
- teaching children to master soft technique of self-defense and sports fight of Sambo;
- use of sports games, general physical training exercises, acrobatics, elements of tango, role plays for acquiring the ethical norms of behaviour; use of the intellectual component as a “switch” of the child's attention from the physical side to the informative one;
- the fact that two children suffering from cerebral paralysis were included into the group and tried to do exercises, overcoming pain and obstacles, served the bright example for the other children and made them delicate and compassionate.

The analysis of the works of M. Mantessory [1], L.S. Vygotsky [2], J. Locke, K. Ushinsky and some authors allows to state that the chosen approach to the process of training does not contradict the principles. At the same time, the synthesis of the methodic used by the author has not analogies at present. Perhaps, it had some prototype in the past and was expressed in the “prehistorically” live experience of people, when children were accustomed to physical labour and active help to their parents from the very early age, simultaneously acquiring the laws of environment and the rules of safe existence in it.

## 2 CONCLUSION

The method of motivation controlling occurred to be efficient and useful as well as the method of the “instantaneous response” justified itself; the absence of the rigid planning of the themes of lessons created the training situation, completely differing from the academic atmosphere of schools. According to the preliminary data, the underestimation of the intellectual and physical potentialities (capacities) of children is near 500%. Unfortunately, the children's parents are bracing strongly their development, as their vector of interests does not coincide with the one of parents. Grandparents often influence negatively the children's development too. The children who continued their training in the other clubs were the best in their age group and occupied the 2-nd and 3-rd places in the next age group. At the same time, they differed from their contemporaries by their higher level of politeness, literacy, by the wider outlook and readiness to help. Some children even tried to correct the native language of parents and advised them how wash dishes and to clean rooms. The children with the cerebral paralysis improved their mobile activity and lost the complexes connected with their disease.

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## THE PECULIARITY OF THE COACHING CONCEPT CREATING EDUCATIONAL ORGANIZATION



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### ABSTRACT

The article gives an idea about the concept of coaching, the approaches and techniques that affect the effective achievement of results within the educational organization. Defined and the methods used for the provision of support and development in professional activity of educational process participants.

Keywords: coaching, emotional intelligence, education organization, management, subject

### 1 GENERAL

The area of modern education forms the creation of new conceptions of actual forms of education, which has gained urgency, with the purpose of ensuring requirements of the functioning and development of the modern education system that will allow you to change the approaches to the formation of the innovation economy, using the modernization of the education system, which is the basis for dynamic growth and social society development [1].

Given the importance of the changes in the educational environment, the aim of the work is definition of the key tools that enable a new kind of concept of coaching, both within educational organizations, and beyond, to develop with maximum efficiency, using modern developments and experience.

Using the concept of coaching in the modern approach to management is a management method, the method of interaction with people, the way of thinking.

Studies show that a high emotional intelligence quotient - known as EQ - has a positive impact on the career success, entrepreneurial capacity, leadership talent, health, satisfaction with the relationship, and the feeling of emotional comfort. It is also important in any occupation, because any work includes communicating with other people and with those who have a high EQ [2].

Application of coaching is not only technique, which applies in certain circumstances, effective coaching is a management method, the method of interaction with people, the way of thinking. Coaching is an art to enhance the productivity, training and development of another person. It is not based on knowledge, experience, wisdom, or foresight of the coach, and on a person's ability to study and action is not only technique, which applies in certain circumstances, effective coaching is a management method, the method of interaction with people, the way of thinking. Coaching is an art to enhance the productivity, training and development of another person [3].

Technologies and tools coaching allow clearly see the goal, and to determine individual ways of its achievement, inspiring and reveal potential of a person. Contact with human values, to create the vision

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allow to achieve the highest results, contribute to personal growth, increase of the level of awareness, responsibility for decisions, confidence, conscious of looking at life and much more [1].

Using a coaching approach and methods the basic principles of coaching as part of the educational process, as well as a lesson in “coaching”, are the main tasks of modern education is not only transfer students with knowledge, but also the formation of skills and acquire knowledge, to work in a team, ability to self-dependent and self-realization. As the result of the contacts between scientific disciplines control suceuse certain functions of management: planning, accounting and decision making, information processing and so on, summarizing practical experience and developing better forms and methods in order to improve management efficiency.

It is expected to implement the transition from the system of mass education, characteristic for the industrial economy, it is necessary to create an innovative socially oriented economy continuous individualized education for all, the development of education, is inextricably linked with the world in fundamental science, oriented towards creative social responsible person [2].

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## NFC-BASED ACCESS CONTROL SYSTEM FOR UNIVERSITIES

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### ABSTRACT

Most of the modern mobile devices (smartphones, tablets, smart watches, etc.) are equipped with NFC module, and by using such devices, it is possible to get rid of carrying heavy, metal keys, pass-cards and etc. People often forget keys at home and they are relatively small and easy to lose. Moreover, because different keys are used for different doors consequently, this brings to increased amount of keys required to be in the pockets. Instead of carrying all these keys, authors of this research paper presents an NFC-enabled Access Control System, which by the help of mobile devices, makes possible for people to use only one single key.

Keywords: mobile device, NFC-technology, wireless access, NFC module, metal keys, pass-cards

### 1 GENERAL

The main objective of this research - getting people away from bulky, heavy, and metal keys (as well as magnetic switches and cards, which will by the time eventually tend to be demagnetized) and use an NFC-module integrated smartphone as one, unique key. NFC is a short-range high frequency wireless communication technology which enables the exchange of data between devices over about a 10 centimeter distance. The technology is a simple extension of the ISO/IEC 14443 proximity-card standard that combines the interface of a smartcard and a reader into a single device [1].

The system will allow opening locked doors just by bringing smartphone to the reader, thereby eliminating the need to carry multiple physical metal/magnetic keys.

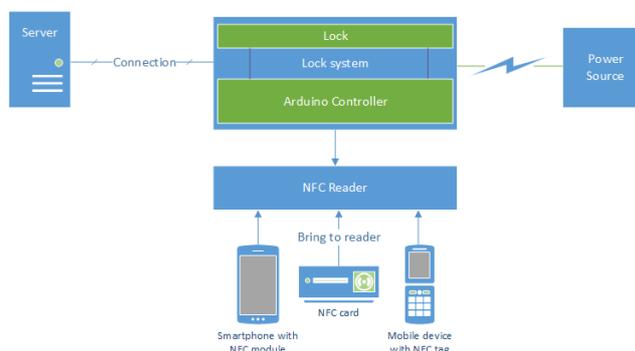


FIGURE 1 THE SYSTEM ARCHITECTURE

This system can be applied as:

- Independent and complete ACMS (Access Control and Management System);
- The system for checking attendance of students in educational institutions, as well as observation of student location within the institution;
- Small home ACMS, as an addition to "smart house" system.

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- The system consists of several modules:
- The server (average home computer or laptop connected to the local network can act as server)
- NFC / RFID reader
- Controller (contains the Arduino microcontroller connected to the network)
- Lock (electromechanical, electronic, magnetic)
- Smartphone application, emulating NFC cards.

## **2 CONCLUSION**

Access control systems are always in demand and are used everywhere. Reducing the number of physical keys and cards people need to carry, and using smartphone as a single device to access to multiple locations is a good choice against lost, left at home or work keys. And even if smartphone is lost, no need to change the lock at door, just disable lost NFC key with server application.

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## STUDY OF USING COGNITIVE RADIO SYSTEM IN RURAL SETTLEMENTS IN REPUBLIC OF KAZAKHSTAN

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### ABSTRACT

Nowadays development of telecommunication services in remote rural areas becoming particular problem for network operators around the world. This study covers outlook of cognitive radio technology and its usage for broadband Internet in rural settlements in Republic of Kazakhstan.

Keywords: Cognitive radio (CR), radio spectrum (RS), dynamic spectrum allocation (DSA), rural settlements

### 1 GENERAL

In 2013, in the Republic of Kazakhstan there were about 7000 rural settlements, where approximately lives 7.5 million people (about 44% of the whole population of republic). People in these rural settlements have no access to high speed Internet, which affects the overall rating of the country in terms of «Number of broadband subscribers per 100 people», which is equal to 7.5 (70 in the world out of 144 countries) [1].

The rapid growth of wireless devices and applications leads to the severe increase in the load of limited resource of RS. Therefore, implementation of cognitive radio technology can be a possible solution for more efficient spectrum utilization by using dynamic and flexible spectrum management in order to provision of telecommunication services in rural settlements.

CR is a self-organizing radio system designed to optimize spectrum usage and automation of secondary resource utilization. This technology is based on the IEEE 802.22 standard, which implies the use of unlicensed TV band frequencies (54-862 MHz) [2].

Figure 1 shows a block diagram of DSA without interfering primary users. Intelligent control module dynamically selects wavebands focusing on the availability of the free channels, minimum interference, emission power of the transmitting antenna, transmission parameters at the data link and physical level, etc. Information for analysis comes from the base station. One of the main advantages of CR is the ability of base station to operate within a radius of 100 km, which will be able to cover remote rural settlements. Information about the network status is stored in the database. As the result, by gathering all the necessary information, CR system configures the data transfer parameters, improves spectrum utilization and entirely increases the communication quality.

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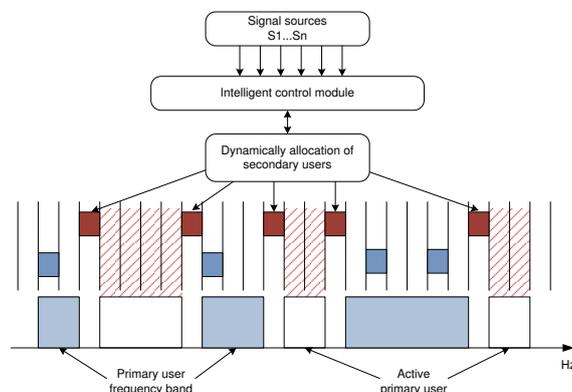


FIGURE 1 SPECTRUM ALLOCATION SCHEME

## 2 CONCLUSION

CR has great potential to improve the quality in the provisioning of telecommunication services in the territory of the Republic of Kazakhstan, especially in remote rural settlements. However, to determine the perspectives of using CR system in the republic, it is necessary to conduct research, including:

- Research of RS allocation systems to determine the spectrum band of unused primary users;
- Possibility of RS allocation on the basis of machine learning algorithms;
- Implementation options, including all aspects of government regulation;
- Coverage calculation in Republic of Kazakhstan, the maximum load within the network, the main economic indicators and development of recommendations for the implementation of CR in rural settlements taking into account the local context.

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# TRADITIONAL AND MODERN FUNCTIONS OF UNIVERSITIES

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## ABSTRACT

Scientists investigating the economics of education determined the following key tendencies of modern higher education system and higher educational institutions development:

- increase of the role of education in formation of knowledge economy (quantitative indicators: increasing the total number of students; increasing the duration of education; increasing the share of the population (age groups: 18-25, 25-64) in higher education system);
- diversification of funding sources (quantitative indicators: increasing the funding of higher education institutions; increasing the efficiency of use of financial resources; the ratio of funding of universities from state, business, foreign and non-profit sectors);
- transformation of organizational forms of higher educational institutions' activities (integration of higher educational institutions with the aim of strengthening and expanding their activities; main reasons of transformations: massovization of higher education, diversification of universities functions, competition on the educational services market);
- internationalization of higher education (variants of development: formation of European educational area; harmonization of educational standards; nostrification of diplomas, etc.);
- globalization of higher education (parameters: number of foreign students, development of transnational and distance education, positions in the world universities rankings, etc.).

Keywords: higher education system, educational services market, diversification, internationalization

## 1 GENERAL

The competition on the international and national educational services markets requires higher educational institutions to be operatively adaptable to changeable conditions of exogenous economic environment. Analysed above tendencies of higher education system development are the fundament of transformation and diversification of modern universities' tasks and functions. The function of educational institutions can be classified on traditional (basic) and modern (additional). The traditional functions of universities are:

- teaching (training) function – teaching of highly qualified specialists to answer the demand of national and international labour markets;
- methodical function - development and improvement of educational-methodical materials;
- educational function - promoting socialization and adaptation of students and graduates of higher educational institutions at the labour market;
- scientific function - joint research activities of teachers and students of universities.

In modern conditions the important functions of higher education institutions are:

- international function - academic mobility, research-education international projects, grants of international educational programmes, foreign students, nostrification of diplomas, double diplomas, etc.;
- innovative function - development of innovations by scientists of universities, patenting inventions, transfer of innovation, developing students' abilities to innovations;
- entrepreneurial function - scientific researches on commercial conditions, commercialization of innovations, approbation of scientific research results on manufacture; training, retraining and enhancement of staff qualifications, lifelong learning programs, MBA-programs, etc.

## 2 CONCLUSIONS

In the conditions of market economy the special attention must be paid to entrepreneurial functions of higher educational institutions, aimed at the integration of higher education, science and business. The development of cooperation between universities and business-sector further the increasing of efficiency of higher education institutions' research activities, activation of students and graduates employment, improving the universities image, diversification of financing sources of higher educational institutions.

## THE BUSINESS AND EDUCATION: IMPROVING COMPETENCE OF STUDENTS IN THE FIELD OF IT

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### ABSTRACT

Including line courses of leading IT companies into the curriculum, working closely with other universities and organizations allows students of IT professions to improve their competence in the field of information technology. For example, the International University of Information Technology shows that this model of cooperation enables graduates to find jobs with dignity and to be in the market demand of information technology.

Keywords: higher education, information technology, the interaction of organizations and universities, competence in the field of IT

### 1 GENERAL

Constant changes and innovation in the field of information technology make employers carefully treat recruitment. According to this background, a graduate of the university in the field of information technology must constantly improve his or her competence to fit to demands of the market. Effective solution in improving the quality of graduate's training is possible only in the case of the interaction of all participants in the process of education of graduate: the student, the university, the Ministry of Education and Science, businesses and non-governmental organizations [1].

Student participation in these organizations can range from educational opportunities to obtaining certification internships and fellowships for training and employment.

IITU has entered in the curricula of the university the academic programs of Carnegie Mellon University (USA), the leading national IT organizations. The programs of Carnegie Mellon University (USA) is closely woven into the core IITU curriculum. The Modular learning allows students to select one of the proposed lines and study it deeply. During several semesters students study one of the elective courses: Cisco Administrator or MS Administrator or MS Developer.

After the end of study each student can optionally pass exams in certified centres and award a full certificate. Most students have already received certificates of Cisco Academy, MS Administrator and MS Developer, actually 100 % of the students enrolled into the program of iCarnegie (approved by CarnegieMellon University) and got certificates.

Moreover some external organizations as SAP, Apple, University Tenaga Nasional (Malaysia) and many others including research centres and institutes are IITU partners. All of these organizations are able to provide valuable resources to enhance competencies of future IT professionals.

### 2 CONCLUSION

The strategy of the university is the formation of such a model of education, in which the graduate will be in demand of the labour market. IITU experience shows that changes in the curriculum and the development of closer cooperation with other universities and leading organizations in the field of IT enables students of IT professions to improve their competence, to become in demand of the labour market.

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## CURRENT APPROACHES TO THE PROCESS OF MOTIVATION

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### ABSTRACT

Being aware of motivation basic concepts means that you know the total combinations of all reasons, having psychological character can explain the person's behaviour, his start and goal in the direction of his activity, revealing the reasons of leader's optimal choice of identical tactic of his behaviour in deciding management tasks. This knowledge gives us clear understanding why one leader prefers moral stimuli in his management and the other one promotes his stuff by rewarding, encouraging personnel to constructive work.

The aim of this research is the development of motivational process inside the company with setting up firm ground for creation the possibilities to inspire the subordinates and the management staff as well to take the effective actions under hard economic conditions.

Keywords: motivational process, management, self-development, leader

### 1 GENERAL

Economic crisis has stipulated the changes in monetary relations of both levels, macro and micro one so the former methods of motivation are not so effective as they have been before.

Therefore, the priority should be given to searching perfect forms, approaches new technology of management training, formation and managerial personnel development.

This factor, being neglected in former conditions, is becoming one of the best motivational impacts for creative, mental and physical activities. As for the leaders, they should involve their subordinates in sharing ideas and goals of their plans.

Leaders needs dictate the character of managerial influence on the personnel.

The main features of this influence are

- indicator of their success and authority,
- understanding and feeling that you are a distinguished person in the society ,
- feeling of significance,
- ability of taking part in the discussions,
- of the important problems and making decisions,
- understanding and proving your iron significance,
- self-conformation through reaching success,
- possibility for your constant growth and self-development.

The need for self-development is one of the most important demands for the leaders. It is important to understand that the leader's interests in managerial activity are the great motivational tools of realization plans and goals.

Providing adaptable competences such as self-confidence, self-control, emotional authority and the ability to hear the subordinates. The leaders confidence and the integrity of management give the model that is being imitated by the command. Meeting this need can enrich the leader's work and be a starting point of constructing system of motivation as well, exactly saying not only instructing the motivation.

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In creating this model it is necessary to take into account the fact that unsatisfied requirements of the managerial activity with the combination of high self-estimation give a positive effect it'd also enrich work, forming the demand in the leader development. But this demand is being influenced by a number of factors such as mutual interests of a company and an employee requirements of the surroundings.

The individual features of the personality determine the links of the leaders needs and his demands. The leaders experience in management, his age and the way of satisfaction of his needs are also taken into consideration.

The further direction of our research is building approach is a multilevel spiral of motivational mechanism company. The parallel spirals are referred to the needs and motivating factors of owners the management personnel and the general staff.

The development of motivating needs will depend on reaching basic point after which there comes further development transfer to the next bend of the spiral.

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## FORMATION OF COMPETITIVE ADVANTAGES OF UNIVERSITIES IN THE CONTEXT OF GLOBALISATION

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### ABSTRACT

Globalisation and internationalization of higher education activate international activity in all countries. Mainly, this is implemented through universities' entering the international market of educational services. In this case, the efficiency of operations calls for constant search for universities' own competitive advantages.

Keywords: competitive advantages, globalisation, educational services

### 1 GENERAL

A competitive advantage on the educational market means availability and effective use of a HEI's unique characteristics, features, and parameters, which characterize scientific, research, international, and educational activities of a HEI and ensure its obtaining and retaining of competitive position on the market of educational services. Doubtlessly, the characteristic, which forms a competitive advantage, shall be directly related to the key vectors of functioning and development both of a HEI itself and the system of higher education as a whole.

The quantification of indicators which characterise the competitive advantages of a HEI is promising. In the recent decades active expansion of the world universities' rankings has become a manifestation of growing competition on the market of educational services both nationally and globally. These rankings have clearly determined the directions and parameters, which identify the leading positions of universities: the big number of students, strong funding of educational and research activities, diversification of activities and financial flows, active international activities and attraction of international students, etc.

Competitive advantages are characterized by four main features: comparative (relative) character, dependence on the specific conditions, ambiguity of several factors' influence; dynamism. The formation and retaining of competitive advantages are influenced by the range of internal and external factors: political, legal, institutional, economic, demographic, social – cultural, global (together – exogenous); organisational – managerial, personnel, financial-economic, technical-technological, informational, marketing and innovation (together – endogenous).

To consider a unique characteristic of a university's activity as a competitive advantage the following criteria are chosen: significance from the viewpoint of main activities on the national and international markets of educational services; relative stability in the conditions of dynamic external economic environment; complexity from the viewpoint of possible operative reproduction by competitors.

## EDUCATION AS THE FACTOR OF SOCIAL MOBILITY IN MODERN CONDITIONS

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### ABSTRACT

In the system of the functions of education (educational, cognitive, economic) social function takes important position, which is in its impact on the social structure of the society, on the reduction of inequality and stratification of the population. Represented by the state, society has opportunities to influence the organisation of the system of education, which can be based on different principles of access, coverage, and selection.

Keyword: education, social mobility, HEI

### 1 GENERAL

The institutional organisation of the system of education, forms and methods of the study process, and financial mechanisms significantly influence the social structure of the society and the trends of its development. Therefore, the objective of the state is to develop such a system of education, which will make it possible to overcome the social segmentation of the society.

The formation of citizenship requires the universal coverage of the population by the formal system of education, the free access to culture, information, patriotic education and the development of the ability to be independent, having one's own opinion and being able to exercise constructive criticism. The formation of high professionalism and competitiveness of workers is possible provided on the basis of the following selection criteria: personal skills and the level of knowledge on the stage of secondary education. While secondary education covers all the population of school age, higher education, which is not general, assumes selection. The high quality of education can be ensured only on the base of high educational standards, which must be fully met by students.

The processes, which are gradually destructing elitism of higher education, are taking place in the modern world, including Ukraine. The growing demand for higher education is expressed in the diversification of HEIs, forms and methods of training, and in the growing number of students. The number of state and private higher educational institutions, universities and HEIs of other types is growing.

In many countries of the world the common development trend is in the increase in the average level of education. The age of students and the duration of general secondary education are growing. The indispensable precondition for entering the labour market and effective employment are not only full general secondary education and professional preparation, but also basic higher education or college education. Namely, universities with their history and a long tradition of work are the leading centres of education and science. The fundamental scientific base and highly qualified academic staff are the foundation of the fact that universities must be the focus of the formation of the society's intellectual elite. This elite role of national universities must be confirmed by the provision of high standards of the quality of "educational services".

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