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The main target of the **IEEE East-West Design & Test Symposium** (EWDTS) is to exchange experiences between scientists and technologies of Eastern and Western Europe, as well as North America and other parts of the world, in the field of design, design automation and test of electronic circuits and systems. The symposium is typically held in countries around the Black Sea, the Baltic Sea and Central Asia region. We cordially invite you to participate and submit your contributions to EWDTS'14 which covers (but is not limited to) the following topics:

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- Built-In Self Test
- Debug and Diagnosis
- Defect/Fault Tolerance and Reliability
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- Digital Satellite Television

The symposium is organized by Kharkov National University of Radio Electronics, National Pedagogical Dragomanov University and Science Academy of Applied Radio Electronics http://anpre.org.ua/ in cooperation with Tallinn University of Technology.

CONTENTS

Cyber Physical Social Systems – Future of Ukraine

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Abstract

A fundamental solution of topical problem for economic, social and technological future of Ukraine and the world is proposed. The problem lies in the elimination of corruption through the formation and implementation of the state program «Creation of Cyber Physical Space for Digital Monitoring Technological Processes and Optimal Resource Management in order to Achieve Socially Important Goals». The cyber technology for human-free managing social resources (staff and finance) includes two cloud service: 1) the distribution of government contracts and finance between the structures, undertakings and entities, based on competition of their competence matrices for a given metric; 2) allocation of staff vacancies in scalable social groups based on competition of the competence matrices of applicants for a given metric.

The competence metric is a measuring method of the distance between objects or processes based on the use of the parameter vector that defines the space or a competence matrix of a person or social group in real time. A competence matrix is a model of integrated activity and skills of a person or social group at a given metric and time interval. As an alternative solution of the problem it is considered a cyber physical system for managing human and financial resources (Cyber Social Systems - CSS), as a scalable cloud service, available to the social groups, government agencies, private companies and private individuals; it provides lifelong monitoring competencies of corresponding subjects in real time in order to carry out cyber staff management through appropriate career, moral and material incentives according to the results of their constructive activity. The cyber social system is focused on the total destruction of the corruption in the actions of managers at all levels by eliminating the subjectivity in the management of human and financial resources on the basis of the transfer of the official functions to independent cloud cyber service. The system consists of two interacting components: 1) accumulative monitoring of all kinds of human (social group) activity that generates a competence matrix in real-time; 2) the optimal management through career, moral and material incentives of individuals and social formations based on the analysis and rating of the corresponding competence matrices. A cyber system is based on the use of the following technologies: Big Data, Internet of Things, Smart Everything, parallel virtual processors and focused on serving individuals, government agencies and companies. For each subject two unique metrics of competencies are generated: 1) the gold standard of indexes for each category of professional activity; 2) the current competence matrix of the subjects filled in the process of their life, which are ranked by metrical comparison or evaluation of the results of work with standard or better values.

1. Introduction

The uniqueness of the current situation in Ukraine related to crisis of management, paradoxically, inspires confidence in the hearts and minds of scientists that is possible to create another miracle in the world – to make the state free from corruption. There are objective conditions related to the reluctance of people to have corrupt officials, the presence of some leaders of the country, sincerely seeking to put an end to the destruction of the main factor of moral and ethical relations in the society. The main argument in favor of a quick victory over corruption is the appearance in the state structures of regular green shoots of cyber cloud

technologies (Ministry of Education and Science of Ukraine: «External Independent Testing» and «Competition»), destroying in the eyes of the younger generation of corruption plague of XX century. This topic should have an extensive continuation – the introduction of scientific and technological cyber social culture in public management structure.

Every four years, the production technology of goods and services is changed in a particular market segment, which requires retraining of personnel, changing the infrastructure, improving the management and relationship systems, but the main thing - the direction of motion in the market of goods, scientific and educational services. Every 20 years the technologies of typical manufacturers in the leading industries are globally changed, which require billions of dollars of investment prohibitive even for the leaders in the market segments forming the core capital indexes on Wall Street. This means that a new technological structure is formed only on the basis of mutual co-operation of those companies and countries that have free capital, trained personnel and ideas coming into «top ten» of market fashion next 20th anniversary. Today the company and universities of Ukraine can make a technological breakthrough in the market of goods and services, including the most fashionable tetrad (bio- and nanotechnology, artificial intelligence, cyber physical space), which form an important cyber segment of the Nasdaq-market based on fashionable trends: Internet of Things, Smart Everything, cloud computing, services for business management and data analysis, mobile technologies and social media.

Here we have in mind that Cyber Physical System (CPS), shown in Fig. 1, is a set of connected real and virtual components with distinct functions of adequate physical monitoring and optimal cloud (computer) management to ensure the quality of products, processes and services within the constraints on time and resources.

Otherwise, CPS = {{Cyber (Internet or Cloud) = {Computer Engineering, Intelligence, Program Engineering}, System Engineering, Telecommunication (TC), Monitoring (Smart Everything), Control (Internet of Things), Physical = {Biological, Social, Technical subjects}}.

Laws of functioning CPS are determined by the legislative bodies of the country or the statutes of companies and organizations. Status of a cyber system is determined by a level of its intelligence, which in 2050 (globally) has to correspond to the Human Brain. The output Wishes Ship defines strategic goals, directions of development for humanity, countries, businesses and organizations, which are realized by the use of time, material and human resources (Resourse). The main difference of the proposed scalable cyber physical system is the absence of the human factor in the control unit (Cyber) that in the conditions of the constructive and humane lawmaking making it fair, efficient, optimal, secure and protected from errors of subjective clerk.

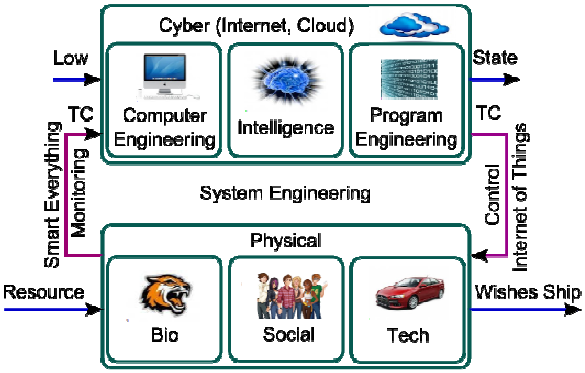

Figure 1. Cyber physical system

Ukrainian human resources should participate in the scientific and technological race of Euro-American-Asian companies to obtain in the future a high place on the podium of economic growth in Europe. The potential of the country is fantastically large (personnel – 135 000 scientists, central location on the continent – 576,604 square kilometers, scientific and educational culture – 325 universities, 1.7 million students, 66 500 IT-companies, 280 000 IT employees – 12% of the employed population). To use it in the fashionable market segment Cyber Physical direction political will is necessary – control action of Verkhovna Rada, creating conditions for forming a comprehensive scientific and technological culture as the basis for the European future of Ukraine

The basic idea of management innovation for Ukraine is creating a scalable cloud-based cyber system for management of human and financial resources, in which there should be no subjectivism, authoritarianism and corruption.

Hierarchy of cyber system regulation priorities should have vertical dominance: 1) Moral and ethical values of humanity, respectful combining history and culture; 2) Constitution and the laws produced by the parliaments of professional experts. 3) Cyber systems for management, functioning according to the laws, which govern human and social group activity. In this structure, there is no place for the rule of officials who subjectively interpret moral values and laws, virtually always break them when allocate time, money and personnel using corruption schemes. No official – no corruption! It should expect that humanity will come to

the triad forming algorithms of cyber domination: "Morality – Constitution – Cyber system." The proposed project is dedicated to creating a scalable cyber physical system comprising two mechanisms: 1) Management (human-free) of time, physical resources, human resources, relationships, and the direction of society motion. 2) Execution of control actions, focused on providing quality of life for humanity by the humane use and allocation of time, resources and personnel.

Global projects feasible in the market today are performed by combining physical and virtual space together. Cyber physical space (CPS) is a metric for telecommunications interacting (mutual integration) physical, biological and social objects, processes and phenomena with virtual or cloud (computing) technologies for monitoring and control through the use of Internet of Things & Smart Everything. It is intended to integrate the most advanced cyber physical technological solutions: 1) Built-in interface for direct interconnection of the human brain with a computer and/or cyberspace by replacing the consecutive language interfaces by parallel pattern relationship. 2) Creation of artificial intelligence for learning and self-improvement of cyber physical structures, programs and processes. 3) Nano technology for “growing" computers by structuring atoms. 4) The most interesting solution is related to the inevitability of refusal of humanity from the control functions of biological, social and technical objects and processes in favor of cyber physical systems!

Stages of cyberspace evolution illustrate successive periods of transition of scientific-technological fashion from passive monitoring (display) the physical, biological and social processes to their active management based on the interaction of real and virtual structures: 1) the 1980s – formation of personal computers; 2) the 1990s – the introduction of Internet technologies in production processes and people's lives; 3) the 2000s – improving the quality of life through the introduction of mobile devices and cloud services; 4) the 2010s – the creation of a digital infrastructure for monitoring, control and interaction of moving objects (air, sea, ground transportation, and robots); 5) 2015-ies – the creation of a global digital infrastructure of cyberspace, where all the processes and phenomena are identified in time and in three-dimensional space, gradually turning into smart components for monitoring and control of cyber-physical space (Internet of Things, Smart Everything, Cyber Physical Systems). In this case, quite clearly traced the process of intellectualization and integration of physical and virtual systems: Embedded Systems – Networked Embedded Systems – Cyber Physical Systems – Internet of Things, Data and Services [36] for solving scientific, technological, economic, political and social problems. Cyber physical systems can be used in the following industries: automotive, medical, energy, industrial automation, mobile communication, location and navigation, agriculture, transport logistics, creation of smart cities, buildings and homes, social networks and communities, traffic management, control of physical and virtual processes.

2. Existing world analogues of resource management (time, personnel and finance)

Analysis of recent publications in the field of the proposed project allows revealing certain regularities, which can be represented in the following conclusions. 1) The cyber physical system is the most relevant and promising technology for active improving the world in terms of accurate digital monitoring and adequate management of resources to improve the life quality of every person and make changes in the economy and ecology of the planet toward landscaping. Current Thousands of publications in priority foreign sources, primarily in the IEEE Xplore, are devoted to such technology. We can observe activity of scientists from China, Germany and the United States. Closest to the project are articles presented in the sources [1-14], which are devoted to the creation of cyber physical space of the world, but they have a common disadvantage associated with the presence of a human in the control system that always subjectively makes key decisions. 2) Russian-language publications are not different from the English ones by essence, but their number is determined by the dozens that suggests that there is a serious problem of lack of attention and monitoring of modern world results by scholars of Slavic origin. Regarding Ukrainian language publications, their number is close to zero. Nevertheless, the phrase «cyber physical system» was found in scientific publications and conferences of scientists from Kiev, Kharkov and Lvov engaged in development of embedded systems. 3) Today the European Commission (Communications Networks, Content and Technology, European Commission Directorate General) is already actively working under the mass creation of CPS, based on embedded systems and smart sensors of the Internet, which is a priority direction of almost all the leading companies in the world in order to change the economy, production and society through cyber management. 4) As for analogues of CSS, the serious market feasible results are in the following companies: EIT ICT Labs, Lynntech, Intel, Robert Bosch Centre. They consider CPS as an intelligent technological system to perform

physical operations by using smart embedded sensors for monitoring and data collection of processes. CPS allow software applications communicating directly with the processes in the physical world, such as the measurement and correction of blood pressure or peaks in electricity consumption, and in the general case – to solve all the problems of the real world. 5) The future of CPS companies is associated with their implementation: in health, public management, resources, vehicles, renewable green energy. Cyber system also is identified with the "smart" factories, houses and cities, critical infrastructure, security of information and private property, aviation and astronautics. 6) Companies collaborate with partners in the university environment to create cyber physical systems: Budapest University of Technology and Economics, DFKI, Ericsson FBK, BMW, Fortiss, Royal Institute of Technology KTH, SICS, Siemens, Technical University of Berlin, Technical University of Munich, TNO, University of Bologna, University of Trento and VTT, Kaiserslautern Illinois, West Virginia, California, Berkeley, Oslo, Texas, Carnegie Mellon, Colorado. 7) Nevertheless, it should be noted that direct developments, focused on creating cyber systems for managing human and financial resources without human intervention, are virtually absent. There are also publications of the authors of the project [15-27], which are devoted to the development of the theory and practice of cyber physical systems for active intelligent control of vehicles, based on cloud monitoring automotive gadgets.

Information of official sites of companies, which announce technology for personnel management, is interesting [28-35]. For example, IBM uses today Cognos Workforce Performance Talent Analytics – management of human resources for recruitment, training, ensuring continuity and retention. Service acquired by IBM for $ 1.3 billion, is focused on job placement of citizens, optimal usage of staff, making valid decisions about improving their skills, searching and attracting the best employees for the formation of the managerial staff and strategic plans, predict future staffing needs, material and adequate stimulation of workers according to HR-metric of each of them. The survey of 2013 year showed, 77 percent of HR-managers don't represent how the staff influence on the productivity of the company, while 44 percent of executives use the potential of talents for making the right decisions. On the market of applications for workforce management the following companies are represented: SAP, Oracle and Big Blue, which propose the platforms: Talent Management Cloud, Human Capital, HR Analytics and Peoplesoft Human Capital Management, Workday, ADP, Ultimate, Infor (Lawson), CornerstoneOnDemand, Silkroad, SumTotal, Lumesse, Halogen, PeopleFluent, Saba, Kenexa (owned by IBM). Today, more than 60 percent of companies are investing in technology Big Data and analytical products in order to provide the data-driven (cyber cloud) management of human resources. About 60 percent of companies in the world, according to Forbes magazine, are ready to buy software personnel management system. Companies are motivated by seven arguments: the products mature and become smarter, they become easy to buy, they have friendly user interface, the systems can integrate multiple software of a company, Big Data actually allows managing personnel – by playing "Moneyball" with their people's data, cloud technologies make it easy to use new services of human resource management, talent became a forever strategic commodity and the main question of every leader. Human capital, according to Forbes magazine, has an index of importance for solving the problems of a company, organization, state – 2.44; management and execution of operations – 2.10; innovations – 1.99; the remaining 7 ones have the following indices: the relationship with consumers – 1.72; global policy – 1.68; government regulation – 1.55; global expansion – 1.31; corporate brand and reputation – 0.92; resistance – 0.82 and faith in business – 0.46.

The dualism of management based on Big Data includes determinism – technologies govern us and voluntarism – we manage technologies. Both variants of its comprehensive development lead the market of cloud management technologies to the determinism, based on the use of the concept of cyber physical systems, where large volumes of not always accurate information are featured. But smart analytics of Big Data engines has to learn to generate the right decision. Leon Trotsky: "Tell me anyway – maybe I can find the truth by comparing the lies". The main conclusion from the above – humanity is so brilliant, while not perfect, that it can not objectively govern themselves! Thus, the world market invariably comes to the need for cyber cloud management of human resources without human intervention.

3. Objectives of the investigation and implementation

Fundamental scientific and technological problem is "Creation in Ukraine of cyber physical space for digital monitoring social and technological processes and optimal management of resources in order to achieve socially important goals." The technology for cyber management of resources includes two cloud services: 1) distribution of government contracts and finance

between the structures, undertakings and entities, based on the competition of their competence matrices for a given metric; 2) allocation of staff vacancies in scalable social groups by the competition of the competence matrices of applicants for a given metric. A competence metric is a method for measuring the distance between objects or processes on the basis of the parameter vector, forming the competence space (matrix) of human or social group in real time. A competence matrix is a model of integrated activities and skills of a person or social group at a given metric and time interval.

The aim of the project is the creation of cyber physical system for managing human and financial resources (Cyber Physical Social Systems – CSS) in the form of a scalable cloud service for social groups, government agencies, private companies and individuals, which provides lifelong monitoring of corresponding competencies in real-time for cyber managing personnel through its appropriate career, moral and material incentives according to the results of their constructive activity.

Objectives of the investigation are the followings:

1. Development of a model of cyber space of Ukraine, based on telecommunication interaction, digital monitoring of social and technological processes and optimal cloud resource management in order to achieve socially important purposes by using Internet of Things & Smart Everything.

2. Development of the cyber system for managing human and financial resources (CSS) as a scalable cloud service available for social groups, government agencies, private companies and private individuals, based on lifelong monitoring of competencies of corresponding subjects in real time and cyber managing personnel through its appropriate career, moral and material incentives according to the results of their constructive activity.

3. Creating the automaton structure of interacting components of the management system through the use of accumulative monitoring of all types of human or social group activity that forms a competence matrix in real-time, as well as developing a cloud service of career, moral and material management through the stimulation of individuals and social formations according to the results of rating their competence matrices.

4. Development of cyber structure for monitoring and management of personnel through the use of: Big Data, Smart Everything, Internet of Things, parallel virtual processors for service of individuals, government agencies and companies, where for every subject two unique competence metrics are generated: 1) the gold standard of indexes for each category; 2) the current matrices of subjects filled in the process of their life, which are ranked by metric comparison or evaluation of the results of work with reference values.

5. Generating scalable unique competence metrics for each social subject of two types: the gold standard of market indicators in each category; online updating the current matrices of subjects during their life, which are ranked by metric comparison or evaluation of the results of work with reference values.

6. Development of data structures and virtual parallel matrix processor for analyzing and ranking matrices of competencies while optimizing allocation of personnel of a social group in strict accordance with the market or corporate standards.

7. Creating a service for holding optimal paperless online campaign for applicants on the first year study according to the metrics: "the best applicants – the best universities," "the best universities – the state order priority."

8. Development of a service for cyber management to provide the career reachability of desired workplace for students with regard to their competence, within the constraints on time and resources: optimizing choice of university, company, speciality, scientists and courses on the results of the first test.

9. Creating a service for the cyber management of financial and human resources of the university, based on online monitoring, measurement and ranking of successful activities of employees and business units.

10. Developing of the benchmarks of technological, behavioral and emotional culture for the formation of input competence matrices of an individual or social group in order to measure their readiness and suitability to perform an executive or managerial activity.

11. Actualization of the services for cyber management and competence matrices for universities, government agencies and enterprises in Ukraine in order to quasi-optimal management of personnel and resources and eliminating the corruption in public universities, enterprises and organizations.

12. Scaling and updating cyber management of human resources at the national and international level to earn from rental services by public and private enterprises and organizations.

The object of study is the technological processes of cloud management of social groups, which are part of the companies, organizations, government agencies and countries, as well as modern cyber physical management systems free of human presence.

The subject of research is a scalable cyber social system as physical infrastructure (1), in which the real personnel (2) and cloud management (3) with the legally specified structure of the relationships (4) are

represented in order to achieve socially important goals (5). A cyber physical system is a set of interrelated real and virtual components with the functions of adequate physical monitoring and cloud optimal management of personnel, resources of business and organizations, based on the legal relations for the following aims: 1) achieve a high life quality of social groups by way of the total eradication of the corruption through removing officials from management of personnel and finances; 2) ensure the quality of products, processes and services within the constraints on time and resources.

To evaluate the scientific value of the proposed project, it is necessary to determine the status of social and scientific achievements in Ukraine. World scientific and technological trend today is determined by the stage of transition from passive digital representation (monitoring) of physical objects and processes in a virtual cyberspace to active cloud management of the real social and technological processes without human intervention, which is the weakest link in the management system. Unfortunately, the machinery of the state for management of educational and scientific-technological processes doesn't attract the world famous scientists (Ukrainian and foreign) for the formation of cyber culture in this segment of social relationship. Therefore not quite fashionable aims of scientific and technological development of the Ukrainian community are declared, which lag behind the modern trends of the world market. For example, the MES of Ukraine by letter dated 22.08.2014 №16/1-61-14 recommends to develop a policy of transformation of information society in the knowledge society, focused on a passive observation of knowledge accumulation, rather than to offer the active technologies for using knowledge for cyber management of the society based on its adequate monitoring.

More topical idea today is to define the problem or the state program of Ukraine as "Creating cyber physical space for digital monitoring social and technological processes and optimal human-free management of resources in order to achieve socially important goals." Explanation: "The mutual integration of terrestrial processes and objects with their virtual models in the clouds creates cyber physical space, the active function of which is the cyber management of time, human and material resources, based on the accurate monitoring without human intervention." At that the realization of CPS-space is based on the following components: cloud computing, telecommunications, digital monitoring, intelligent control, physical objects and processes.

4. Socioeconomic importance

Solving the problem will allow: 1) Eradicate the corruption as the dominant component of the system of social relations in the country, almost invariant to the person in power. 2) At several times to reduce the administrative apparatus of the state structures while improving the quality of impartial cloud management. 3) Significantly reduce the risks of social cataclysms, man-made disasters and industrial accidents due to really objective cyber-choice and appointment of professional managers of state power and industrial structures. 4) Harmonize the life of social groups by creating mental and ethical relationships within teams, due to cyber management that combines an accurate and impartial monitoring of staff performance, adequate moral and material incentives. 5) Generate ecological culture of population through the introduction of "green" priorities in the state cyber management of cities, enterprises and organizations, aimed at energy saving, environmental friendliness and conservation. 6) Reduce by 50 percent the legalized theft of public finances by leaders and managers through eliminating the "kickbacks", illegal allowances and bonuses due to the cyber management of resources, material and moral incentives of really constructive performance of employees. 7) Reduce by 75 percent stealing the time of employees in enterprises and organizations by eliminating numerous essentially empty meetings and sessions, senseless paper work due to cyber management and generating only the minimum necessary constructive acts of operational control of productive activity. 8) Widely introduce the technologies for cyber managing resources on state-owned enterprises and organizations of Ukraine, which will allow 1.5 times increase productivity, by 33 percent to increase the production of quality scientific and technological products, by 33 percent to reduce the financial costs of personnel management.

Scientific novelty lies in the following items:

1. A new model of cyber physical space of Ukraine is proposed; it is characterized by the telecommunication interaction of digital monitoring social and technological processes and optimal cloud management of resources to achieve socially important goals.

2. A new cyber system for managing human and financial resources (CSS) is offered as a scalable cloud service available for social groups, government agencies, private companies and private individuals, which is characterized by lifelong monitoring of competencies of the corresponding subject in real time and cyber managing personnel through its appropriate

career, moral and material incentives according to the results of their constructive activity.

3. A new automaton structure of interacting components of the management system is developed, which is characterized by accumulative monitoring of all types of human or social group activity forming a competence matrix in real time, as well as career, moral and material management, stimulation of individuals and social formations based on rating of their competence matrices.

4. A new cyber structure for monitoring and management of personnel through the use of: Big Data, Smart Everything, Internet of Things, parallel virtual processors for service of individuals, government agencies and companies, where for every subject two unique competence metrics are generated: 1) the gold standard of indexes for each category; 2) the current matrices of subjects filled in the process of their life, which are ranked by metric comparison or evaluation of the results of work with reference values.

Practical and social importance is defined by the following. CSS-system is focused on: 1) the total destruction of the corruption in the actions of managers at all levels of state structures by eliminating the subjectivity in the management of human and financial resources through the transfer of these functions to an independent cloud cyber service; 2) economic, political and social transformation towards a considerable improvement in the moral and ethical relationships, improvement of the planet environment and life quality of citizens through the optimal cyber management of public resources. The economic importance of the introduction of cyber management in Ukraine is at least a two-fold increase in GDP.

5. The market feasibility of the project

Market feasibility of a cyber physical system lies in a significant reduction in time and cost per unit of output while maintaining and improving the ecological culture of the planet through adequate and optimal cyber monitoring and optimal cyber managing human resources in real-time throughout the life cycle of the individuals and social structures (enterprise, organization, city, country, and planet).

Practical implementation of the project will allow the following:

1) Elevate the social relationships between people through eliminating the corruption in the Ukraine and in the world. It is everywhere, if there are officials subjectively distributing government positions and money. Replace officials on a cyber system for equitable distributing "soft chairs" and finance means to destroy the root cause and breeding ground of corruption! We stand on the threshold of a new era in the cyber management of humanity, when for the first time in its history the state structures can match on the effectiveness of management, and hence production, with private enterprises. By and large, it does not require material and human resources – absolutely zero cost, but it is necessary the political will of an official, who must destroy itself! Is this possible? Ukraine has eliminated total multi-billion corruption in certification of school leavers and university admission through the introduction of cloud cyber systems "External testing" and "Competition". The company Echostar has created in Kharkov the American culture of scientific and technological production by one foreign manager, who has created an effective system of relationships and management of personnel, produced in KNURE. One “right” manager, armed with modern management techniques, can create European university, company, city and country! There are hundreds of good examples from the past and present. The next scientific and technological blow must be struck at the army of corrupt officials, which steal time, distribute public funds and administrative positions.

2) Replace of heads of state structures by professional managers, which have a non corrupt history, by using the competence services of the cyber systems CHS; it should participate in the subsequent management of financial and human resources, as well as filter and smooth all sharp movements of the valid head. Here, first of all, it is necessary to rejuvenate aged managers (of universities), who for many years of sitting in chairs have turned many public structures (universities) in personal fiefdoms. Election of the best candidate, not from a political point of view, and taking into account the managerial and professional competencies of the candidate plus development and implementation of a cyber system CSS is the solution of the most problems related to non corrupt management of public institutions (universities).

3) Implement a cloud cyber service in the management technology of public and private enterprises, which is based on the competence distribution of moral, material incentives and career development, which will provide the younger generation of specialists the hope for the future free of corruption, where each of them will be highly appreciated by the cyber system without servile worship of the head.

4) Create a cyber service of the market or labor exchange, based on the comparison of real and ideal competence matrices. On the one hand, every person wishes to inform about his competencies all employers worldwide by entering information in a database of the cyber system in order to find a place of work that

satisfies all the needs of the individual – it is formed a market of applications. On the other hand, every company wishes to put vacant positions with the competence requirements, which correspond to the ideal applicants, for obtaining from the cyber service the best workers – thus the market of application consumers is formed. Cyber exchange operates without intervention of officials and satisfies both sides, because no sane person would be offended by a cyber service, as well as a person cannot take offense at the mirror that shows his appearance or identity.

Economic justification of market feasibility is a billion people in the world, who want to find a decent job satisfying them by salary, close to home, competencies, career development, social security, friendly relationships. Pay the rent for a cloud service can both parties: 60% – 350 million companies by $ 1000 to find an employee, and individuals ($ 10) to find a job. The effect of cloud service for shareholders is 10x1 000 000 000 + 1000 x 350 000 000 x 0,6 = $11 000 000 000. Here, perhaps more important is the social and ethical impact of conflict-free competitive solutions of the following problems: employment, dismissal and career growth, due to the elimination of the corruption when executing electronic intermediary deals between employees and employers. Moreover, 99% of a cyber service undermines "immortal" corrupt state structures. Above mentioned market-focused activities related to the implementation cyber services will be able to revive Ukraine through a competency reboot of corrupt administrative structures and replace them with power of professional top managers controlled by a cyber system. The effect of the introduction of the CSS-system is billions of dollars for all countries of the world and the new Ukraine with moral, economic and political relationships of European level. Rent only corporate cyber services for management in Ukraine potentially provides profits to the founders of the CSS-company of 120 x 000 companies $ 1,000 rents = $ 120 million.

6. Cyber Humanity Systems – secret key to success in the market

The metric is a way to measure the distance between objects, processes or phenomena by comparing their parameters. Quality is a set of properties of the object (entity, process or phenomenon), which determine its suitability to meet certain requirements in accordance with the purpose. Cyber Physical Education Quality System (CES) is a set of interrelated components: 1) online monitoring research and educational processes; and 2) management of them through the use of the material and technical, methodological and organizational infrastructure, relations of moral and material incentives of employees, which provide graduates suitable for the market.

Virtually every person brought up in a way that has a belief in a just master, a good king, and in the limit – everyone needs the God, in whose competence and kindness we don't doubt. But we should always remember the proverb: "Trust in God, and those who help themselves" – hidden thesis of decentralization of power and control! The world community is in almost three decades of creating artificial intelligence of humanity. Therefore, today we should talk about the implementation of a cyber system as an ideal virtual manager, incorruptible and impartial, tolerant and humane that manages according to moral, ethical and legal standards worked with humanity.

Management resources do not create products; they are "parasitic" part of the production-focused system together with a service infrastructure, which adversely affect the value of the final product. But without management and infrastructure the creation of products is impossible – there is chaos. Therefore, any production system should be aimed at reducing the ratio of the personnel for management and production. Private business successfully solves this problem, where the metric "time – money – quality" regulates the number of managers and support service staff at no more than 20 percent. An interesting example of Kaspersky Lab (KL), where the management is a secret formula of international success, related to the creation and implementation of cyber robot to detect new viruses, the performance of which is higher than that of several hundred professional analysts. Qualified MBA-managers provide for the organization and management of production processes in the structural units. Almost perfect management of the company, creating a green planet for every person, is based on high salary, which depends on the success of each employee, constantly searching for creative individuals in the world, and investing considerable funds in the advertisement. All this allowed LC to go out the leading position in the world, with revenue from sales of services for protecting a cyberspace in three quarters of a billion dollars. A management system of LC morally and financially stimulates an atmosphere of creativity among employees, which is seen as the main capital of IT-enterprise of high technological culture.

Another example from the life of a State University, where there are 600 scientists and teachers for creating product – 1,100 engineers a year; the number of management and support staff is 1,600 people! At one with a plough – three with a spoon! The performance of the first and last scientist (Doctor of Science) in a

rating differs by an order! The same ratio is in the achievements of the first and last department in a rating. Would tolerate such relationship head of private or foreign university? What is the structure of personnel abroad? University in Sweden (Karlskrona) has 800 teachers, 8,000 students and around 200 personnel involved in the management and maintenance. What is the secret of success? They have the highest culture of cyber management (monitoring and control), electronic document management, security and infrastructure services.

Conclusion: 1) The state structures (companies, organizations, universities) as economically super costly, corrupt and parasitic ones are history. But the change of ownership, public to private, is not a solution of the problem, because of poor quality management of humanity today requires 40 percent of the working population of the planet. 2) The transition of management to the clouds is the key decision of the problem of increasing the efficiency of the executive (production) mechanism of the planet, improving the life quality of each person and the environment. The humanity can not manage itself, thousands of years of history are proof of this – only dramas and tragedies, as well as each individual cannot be an objective manager in relation to other people and realize error-free self-administration. Humanity is an executor, which has to be controlled by a scalable cyber manager exactly functioning according to the rules and laws for the impartial, tolerant and accurate management of the person, groups of people and countries!

As a result of the above, it is further proposed a formal scalable automaton mathematical model of the cyber physical system "Cyber-Social System" (CSS) in the form of two engines: Cyber – monitoring and management and Human (Social) – execution (production) of wishes, which are interconnected by four signals: monitoring, control, initiation of the wishes and resources to implement them. An analytical form for defining CSS-system and its structural automaton equivalent are shown in Fig. 2.

$$A = \{C, H, M, U, X, R, Y, P\},$$
$$Y = C(X, M); \quad P = H(P, R).$$

Here there are: (C,H,M,U,X,R,Y,P) correspondingly C - management units (cyber managers) and H – executing units (infrastructure, executors and robots); signals: M – monitoring and U – management of production (scientific and educational) processes; X – inputs of management ideas (wishes); R – resources for executing wishes (time – money – material); outputs: Y – indication of the state of an algorithm (plan) for idea implementation and P – output or service – realization of wishes. Input of management ideas X is not only a collector of interesting proposals from members of the community, but also a selector, which is able to filter out destructive or impracticable ideas in the limited time and material resources. The efficiency of the whole system depends of the structure of this input, because a properly configured first filter makes it possible to collect a large number of constructive ideas through material and moral activation of the community members. The function of the second filter is a qualitative selection of productive ideas by attracting world-class experts from among scientists, economists and marketers.

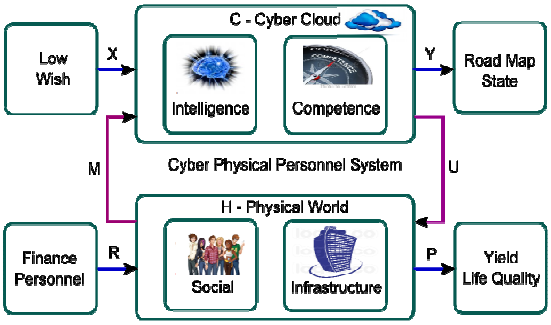

Figure 2. Structure of CSS system

It is destructive situation, when a manager wants to be the generator and/or implementer of ideas. Traditionally, he falls into temptation to put a ban on all ideas to eventually pass them off as his own. But time is the enemy of the implementation of ideas (rapid decision better then corrects); the ideas are rapidly aging, therefore, such a manager is the enemy of the system. But there exists even the worst case, when a mediocre manager has uncontrollable feelings of envy; here the following principal works – the most productive idea is dropped because it is not mine. The function of a manager is only high-quality competence management of the implementation process of productive ideas in frame of limitations on the time, human, financial and material resources.

7. "Smart Cyber University" is a future of the high school

With our wish and only, it is possible to create a university that is really an incubator for the birth and blossoming of talents through the moral and material incentives. It is not surprising that many employees do not work in full force, as far as the most productive scientist receives the same salary as a passive one. But a fact is striking – more than half of scientists and teachers practically do not make scientific production. Say that they are stupid, no, just the opposite – they are

smarter. If the salary is the same, why work harder. Such management is unacceptable for the team, having a fantastically constructive potential that is specifically supported in suspended animation. But for a certain type of management of state enterprises in that there is a reason. Any manager is difficult to manage smart people; it is hard to keep the chair of official, if he is surrounded by young and active scientists. To do this it is necessary to work very much and productively, in order to achieve high personal and management results; it is almost impossible for a long period of being in power. In addition, in the chair of the University Administrator an officer degrades as a creative person, scientist and professor. Over time, this manager begins to afraid of reprimand from a superior officer, making a wrong decision, leading to the imposition of "veto" to all ideas and suggestions. Further – more, an inferiority complex of the head is appeared: if I get fired, where I will go, I do not know how. Here begins the pathology of thirst and maintain power at any cost, a dramatic battle for the life of the doomed officer! The state bureaucracy invented universal ways to continuously retain power: 1) squeeze out young, talented scientists who have their own opinions; 2) keep at bay, on a short leash all the others through intimidation and constant monitoring their deficiencies; 3) buy key figures by promises of positions, honors, awards; 4) create around himself a circle of sycophants, not necessarily of incompetent officials, which can destroy any disobedient scientist at the command. What can be contrasted with the bureaucracy?

Few people today know, what is that the university as a system of European scientific and educational process. Some managers believe are redundant this knowledge. The system is a set of interrelated components, which reflect the processes and phenomena with a given adequacy to generate optimal control actions focused on achieving the goal. University as the cyber system includes the following components (see Fig. 3): 1) qualified personnel; 2) intelligent infrastructure; 3) cyber-management and monitoring; 4) moral and ethical relations (laws, statute, orders, business etiquette); 5) roadmap (European Smart Cyber University) with dedicated external resources (applicants, time and money) to achieve the goal – ensuring a high quality of life for employees and training valid professionals for the market. According to this definition, the optimization of scientific and educational process and structure of the university departments should be focused to ensure a decent level of staff living and high quality of graduates by using the following approaches: 1) A clear moral and material cyber stimulating based on cyber monitoring the productive activity of the scientists; 2) the widespread introduction of electronic document processing in university management processes; 3) reducing the number of non-productive units for monitoring and management through the transformation of corresponding personnel in department staff; 4) reduction of time on unproductive processes, which are not directly related to the research and educational activities of the scientists and staff through the introduction a cyber system of resource management (time, money, personnel); 5) the definition of a balanced structure of the main production units based on analysis of market trends in demand for specialists to create equal in importance faculties and departments forming equal performance of scientific and educational activities; 6) creating a friendly climate of moral and ethical relations for constructive creativity of scientists and professors. Strong faculties and departments, intelligent infrastructure and cyber management, ethical relationships are the basics of the best European cyber university.

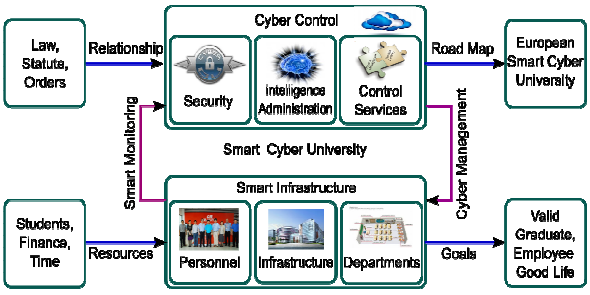

Figure 3. Cyber Physical System – Smart Cyber University

Implementation of a cyber physical system called "Smart Cyber University" for each employee means to protect themselves from the tyranny of authoritarian leaders of the first level, not always legally distributing time, money and position. Rector and vice-rectors, devoid of bureaucratic privilege of corrupt allocation of resources obtaining the average salary of a scientist will turn into normal people with representative functions of signing documents and orders generated by a cyber management system. The most important tool for the development of new fair moral relationships is an expert metric for evaluating the results of scientific and educational activities. Structurally, all the positive achievements of scientists and managers must have its socially significant coefficient in the matrix of competence or rating indexes. Then the scientists will actually do science without fear that not actual results will be prefered, but

paper reports and bogus contracts to confirm the fictitious criteria of officials' pseudo-activity.

It is proposed weighted and normalized in the range (0-1) quality criterion Q of the integral activity of the department, which has S staff, by n activity parameters Pi, where each of them is reduced to the maximum or reference value Pi (max) in the structure of the university and has an expert coefficient ki=(0-1) of research, educational and social significance, which was unanimously approved by the reputable council of expert scientists:

$$Q = \frac{1}{S \times n} \times \sum_{i=1}^{n} \frac{k_i \times P_i}{P_{i(max)}}.$$

The quality criterion should be translated for each department and employee in the understood language of moral and material incentives. The subjective manager can easily distort the metric for measuring the activity of departments by way of authoritarian assigning the identical scores for "important" paperwork and the state prize.

If the university administration and the academic council are not independent of the head, such a university is an alien structure for the constructive staff and primarily squeezes out the best ones. As for the integral metric for evaluating the effectiveness of research and educational activities of the scientist-professor, it is difficult to offer a more intuitive and simpler one than above quality criterion, in which the first factor is modified:

$$Q = \frac{1}{n} \times \sum_{i=1}^{n} \frac{k_i \times P_i}{P_{i(max)}}.$$

In fact, the metric evaluates the effectiveness of the scientist averaged over n indicators at the scale of the department, faculty or university. In this case, in the numerator of the sum the personal achievements are indicated, and in the denominator – the best numerical values of the scientists' achievements of the department or university in each of the n nominations. In the proposed metric zero indicators does not have a fatal impact on the evaluation of the activities of an individual or department. Having a few zeros on certain types of activity, they can be compensated for the high values of the parameters in other areas of research and educational activities. On the basis of the values of the activity quality indicator of a scientist, a cyber system (not a head) assigns bonuses and allowances within the university or faculty.

Very important that such information was available to everyone in order to avoid the spread of rumors about the unfair distribution of rewards. It is advisable to generate extra special and individual ratings for the following leaders: 1) the vice-rectors, 2) deans, 3) heads of departments, 4) heads of infrastructure units, 5) heads nonproductive and general education departments, ratings of which must evaluate their performance as managers. In addition, all employees of infrastructure units should also be evaluated based on the results of their activities, in accordance with the specially developed for them competence metric. The quality of employee in hiring and in the workplace should be inspected for compliance with the reference competencies of its position, and vice versa. The head can not have friends; he must behave with everybody as the performers of the production process, and nothing personal.

5. Cyber metric for personnel management of Ukrainian market

New sufficiently constructive law of higher education in Ukraine suggests changing leadership every 10 years. Since the law is not retroactive, formally and in fact it will take effect after 10 years. Otherwise, managers, contract period of which ends in 2014, have the right to be re-elected for the next term of 2 to 5 years. This means that in the absence of an age limit for senior positions, for instance, in the universities of Ukraine, where about 70 percent of managers are retired, 10 years not quite young scientists will rule universities, whose purpose is not the quality of science and education, but to keep his body in a chair for obtaining a few salaries, which often not relevant to the results of their management.

Almost rarely senior managers train new management staff for their adequate replacement. As a result, when a head leaves work there is a problem of the choice a worthy candidate from untrained candidates "we have what we have"! Next by trial and errors, the process of becoming a new leader begins, who is forced to carry out experiments on human beings, which in 90 percent of cases lead to dramatic results. A sensible choice comes with experience, to which leads the wrong selection, as been said in the movie "The Mechanic". It is not about improving the quality of science and education it is necessary to save what is. There is another disease of some universities in Ukraine. Individual rectors who came to power for decades of rule creates a corrupt mafia fiefdom that even theoretically leaves no chance of winning the election is really a worthy constructive scientist. The results are the degradation of the University, corruption continues, creating a visibility of successful scientific activity and quality education. The Ministry quite satisfied a loyal old head of the family clan, which destroys the university, but do not have

problems in executing the "waterfall" of not always correct orders. Who needs really strong universities?

There is a way, but it is hardly seen as a guide to action by aging university scientific community, which makes up the majority of university government. Nevertheless, it should be represented in the form of usage of trivial mathematical calculations. The competency matrix $M = \left|M_{ij}\right|$, $i = \overline{1,n}$; $j = \overline{1,m}$ is a structure of personal data, focused on the use of the method for evaluating employees by comparing the actual qualifications of each employee with the parameters of its functional responsibilities regulated by normative documents. Here n is a number of parameters, which form a quality vector (tuple) of an employee, department, university; m is a number of subjects or objects subject to estimating or ranking. An example of such a matrix is shown below, where there are structural columns of the metric vector of individuals, as well as scalar values of integral evaluation of each:

$M_{ij}(G)$	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	R
P_1	1	.	1	.	.	.	.	.	1	.	.	.	1	.
P_2	1	.	.	1	.	.	.	.	.	1	.	.	.	1
P_3	1	.	.	.	1	.	.	.	.	.	1	.	1	.
P_4	.	1	.	.	.	1	.	.	.	1	.	.	.	1
P_5	.	1	.	.	.	.	1	.	.	.	1	.	1	.
P_6	.	1	.	.	.	.	.	1	.	.	.	1	.	1
$d(R,S_j)$	4	2	4	2	4	2	4	2	4	1	5	2	6	3

This type of matrix contains all of the gold standards of the total competencies for each position, for instance of a university. The last column R is the competence of the candidate entering the university. Using the evaluation metric for calculating the code (competence) distance makes it possible to determine which positions in the company are closest to the candidate:

$$S = \forall j : d(R \oplus M_j) = \min = 1 \rightarrow \{S_{10}\}$$

This problem is named as diagnosing the state by determining the membership of subject under test R to one or more reference competences of the social structure. The inverse problem of searching or choosing an employee from a set of candidates, which meet the conditions of the standard, is solved similarly. In this case, the matrix involves the competence vectors S of candidates for one position, and requirements for an ideal candidate presented by the vector R. The winner is the candidate Sj, which obtains the minimum distance to the competence vector R of a gold standard.

Service of personnel management is based on the existence and competition of the competence matrix vectors and the metric of the gold standard that represents ideal requirements for the position containing technical, technological, behavioral, emotional, moral and ethical parameters of the competence.

Each vector of a matrix contains real numerical parameters for evaluating the competencies of candidates for the position, resulting from independent expertise, external testing, and/or internal self-assessment. Consider a situation when there are perfect and formalized models of the head, as well as competence metrics (matrices) of ten applicants. The result of the comparison of competencies each of them and the gold standard allows ranking all candidates, which significantly reduces the risk of choosing the invalid head occupying the last position in the ordered list of applicants.

A more difficult problem is creating a cyber system of labor market, where two matrices compete with each other. They are: 1) a matrix of reference market competencies of applicants provided by the companies for the vacant position; 2) a matrix of real competencies in the knowledge, skills, and personal characteristics, provided by individuals. The result of joint analysis of two matrix structures is competitive satisfaction of all parties: the companies get employees, which are as close to the ideal employee by the criterion of minimum competence distance, and the individuals get a list of vacancies in companies, which best satisfy their needs. A comparison of two competence matrices is performed by using mathematically trivial procedure based on the use of xor-operation:

$$M_j^G \underset{j=\overline{1,n}}{\overset{t=\overline{1,m}}{\oplus}} M_t^R = \{0 \vee \min\} \rightarrow S = (M_j^G, M_t^R).$$

When obtaining minimum or zero code distance this expression determines the solution - a binary relation of two column vectors of different matrices satisfying both the individual and the company regarding the proposed position.

All of the above, is used in practice in the selection of applicants to universities around the world and for admission to work in the private (public) companies, where the aftereffects of a wrong decision are negligible. The paradox is that in the appointment of senior management positions, where the risk of a wrong decision is related to global or social dramas and disasters the competence model and competitive procedure for appointing the head according professional, moral, ethical and medical parameters are almost always replaced by political will, a precise definition of which is voluntarism, subjectivism and corruption. The cost of failure is the deaths of millions

of people, the disappearance of the countries and peoples, plant closures and fall of universities, degradation of the population, science and education. Unlikely that candidate for the highest positions of the country is tested for professional and mental fitness, while the person who wants to drive a car must pass a psychiatric examination. The logic of the matter is that if candidates for head positions passed competence and medical examination, there would be no Hitlers, Stalins and the thousands of others, who should not manage the state, enterprises and organizations even by the formal parameters.

Conclusion: impartial cyber personnel management for choosing the head corresponding to a cyber metric of its competencies allows avoiding man-made disasters, social tragedies and dramatic collisions and, therefore, to extend the existence of the planet and countries, the destruction of which in 70% of cases is the result of human factors of incompetent management. The proposal is to create a universal, scalable cyber metric for evaluating the competencies of all participants of management and execution (production) processes at the level of the country, city, company or organization. A metric (like a bank history) should have additive nature regarding the positive and negative competencies acquired by each person throughout life. The accumulative nature of negative competencies refers to the legally proved corrupt actions of each individual, as well as all functional, official and legal violations, which resulted in irreversible destructive social and technological implications. Furthermore, it should be taken into account personal lifestyle factors such as drug addiction, smoking and alcohol, which have a negative impact on the quality of management actions and performance of work. As well as sports, volunteer and socially meaningful activities should be included in the competence metric with a plus sign.

The appointment to a senior position suggests at least formal testing occupational suitability or fitness for a particular position by publishing comparative parameters of a competence matrix for each applicant in a single metric of evaluation, as well as publishing the program of priority management actions and the development plan of the structural unit or enterprise.

In other words, when choosing the head the society must assess the following: 1) personal history of the candidate's competencies in the pros and cons by the integral metric; 2) a tactics of management as the ability to use power without any sudden movements; 3) a management strategy as knowledge of navigation on the market ocean of right technological currents and icebergs of stupid management for laying the correct course of the ship to the European or American coast of the scientific and educational success!

6. Conclusion

The basic idea presented in the project is the creation of a cyber system for humane, precise, digital management of human and material resources, which is able to replace the destructive management of state officials and completely eliminate the corruption as a system of relationships between people, destroying the moral and ethical values of humanity.

The cyber system structure includes two scalable components: 1) precise observation of staff productive activity to form a competence matrix, and 2) optimal human-free management of resources, which is able to rank all employees and departments according to the results of their activities for the development of adequate moral and material incentives.

A cyber physical system for monitoring and management is effectively and advantageously scaled to virtually all fields of human activity related to economics, politics, sociology, science, education, energy, health, management, society, resources, and vehicles. Cyber physical systems are identified with the creation of "smart" factories, universities, houses and cities, critical infrastructures, information security and private property, aviation and astronautics control. All of the above is a partial list of the topical problems of cyber management of physical objects and processes in the market, leading companies and universities around the world.

A new model of the university «Cyber Physical System – Smart Cyber University» is proposed. It includes the following components: 1) qualified personnel; 2) intelligent infrastructure; 3) cyber-management and monitoring; 4) moral and ethical relations (laws, statute, orders, business etiquette); 5) roadmap (European Smart Cyber University) with dedicated external resources (applicants, time and money) to achieve the goal – ensuring a high quality of life for employees and training valid professionals for the market.

The practical value of creating "Smart Cyber University" for each employee means to protect themselves from the tyranny of authoritarian leaders of the first level, not always legally distributing time, money and position. Rector and vice-rectors, devoid of bureaucratic privilege of corrupt allocation of resources obtaining the average salary of a scientist will turn into normal people with representative functions of signing documents and orders generated by a cyber management system. Thus it is not too difficult to do away with the university corruption

through intensifying 135,000 scientists and teachers in Ukraine for productive activity and increasing in 2-3 times their standard of living. As a result, three years later, we get a new European scientific and technological cultural Smart Cyber Ukraine! The cost issue is the desire of the first-person or 51% of personnel of each university!

Market feasibility of a cyber system is important for government agencies and private companies around the world, which are interested to eliminate the corruption and optimally manage time, human and financial resources in strict accordance with the state laws.

Prospects for further development of cyber physical systems are associated with the widespread introduction of accurate digital monitoring and active (without human intervention) optimal management of all physical, biological, social, economic, technological, financial, scientific and educational processes on the planet, countries, cities, organizations, enterprises, social groups and homes.

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