
DEEP KNOWLEDGE APPLICATION FOR KNOWLEDGE MANAGEMENT INSTRUMENTS PROGRESS

**Mikhail Bondarenko, Nikolay Slipchenko, Kateryna Solovyova, Andrey Danilov,
Alla EI Moutahid**

Abstract: *Knowledge management instruments are the most efficient means of organizations management to improve their competitiveness. While the number of the Internet users is boosting, the Internet is becoming more and more available, the efficiency of the Internet social networks application in the organizations working process is also growing. To improve the Internet social networks functioning quality their object domain adequacy, adaptivity, a user-oriented interface are necessary, therefore the article deals with the application of systemological classification analyses to the principal steps of social networks designing. This would result in a social network which is the most adapted to the work of the particular organization in the particular object domain. This would make the function system handy and user-friendly due to their conceptual arranging taking into account the social network functional purpose. The base for the function system of the Internet social network considered is the classification of the necessary object domain which is created by a knowledge expert after the preliminary object domain analyses. This classification would be the base for future function system in the social network menu. In the article the basic elements of the Internet social network fragments building process with the application of systemological classification analyses in the object domains "Medicines" and "Contracts" are given; the Internet social network designing process decomposition diagram created in the BPWin7.0 modelling software tool under the IDEF 0 standard with the application of systemological classification analyses. The resulting fragments of the social network menu for the object domains "Medicines" and "Contracts" based upon the developed ontology classification models are realized in «Wordpress.com» web-designer and «Taba.ru».*

Keywords: *knowledge management, ontology, the Internet social network, classification, knowledge-oriented technologies, the Internet, systemological classification analyses, systemology, model, business-process.*

Introduction

Information technologies development has resulted in the wide spread of new communications and knowledge instruments to improve organization competitiveness. There exist a wide range of knowledge management instruments which are implemented into the modern organizations working process for the organization and its personnel intellectual capital accumulation and also for competitiveness increase. One of the most prospective and up-to-date workers, customers and other like-minded persons knowledge management means is the Internet social networks.

The general society informatization through social networks requires constant increase of functions amount and improvement of the existing interface (user-oriented function system) to meet the customers' demands. Nowadays any Internet user has the opportunity to design his/her own social network web-site or his/her own group in the existing social network, and he/she has no need to learn any programming language etc.

The Purpose of the Research

The purpose of the research is the description of the new method of the Internet social networks construction to improve the social networks functioning efficiency based upon knowledge application and the noospheric system methodology – systemology. The distinctive characteristic of the method proposed is systemological classification analyses application while constructing function system in a social network menu.

The research objectives are:

- the analyses of principal steps of the new systemological cognitive ontology-oriented method of social networks designing;
- the presentation of the Internet social network designing information business-model fragment;
- the ontology classification models construction based up on systemological classification analyses;
- the social network menu elements formation with the application of systemological classification analyses for object domains “Medicines” and “Contracts”;
- the program realization of the resulting models.

The Method of the Research

Systemological classification analyses was chosen for classification construction and the further social network menu formation; it allows to evaluate each classification as a method for its reasonableness; the objects' intrinsic properties reflected; the possibility of detection, prognosis of the objects properties by their place in the classification and the new objects – by their properties [1]. The features of the method could be found in figure 1.

SYSTEMIC CLASSIFICATIONAL ANALYSIS OF AN ARBITRARY OBJECT DOMAIN

SCHEME OF THE PRINCIPAL STEPS :

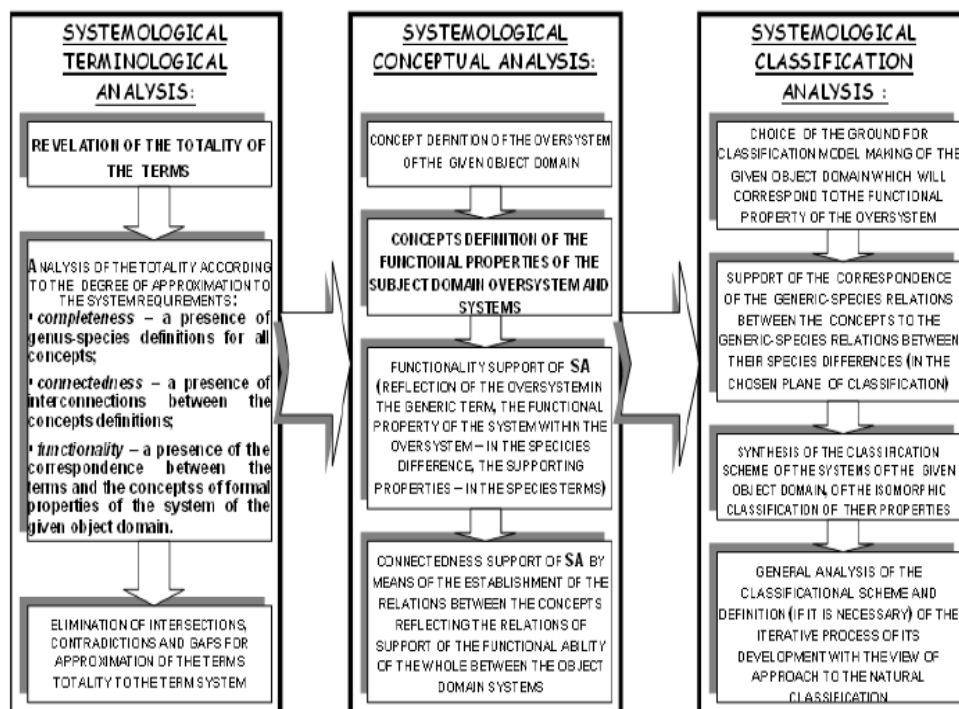


Figure 1. The scheme of the principal steps of systemological classification analyses [2]

The Construction of the Information Business-Model of the Social Networks Niche Web-Sites Designing

By using the knowledge received in the result of the object domain "The Internet Social Networks" analyses and investigation the fragment of the information business-model has been constructed; it describes the Internet social network designing process for the improvement of organizations competitiveness [3, 4]. The fragment of the model describes principal processes occurring in the organization while designing a new social network: the determination of the targets and objectives fulfilled by the social network; the selection of means and software tools for the social network designing; the brief description of the processes related to the direct putting the social network into operation. In the developed model fragment our attention has been focused on the conceptual aspect of the function system construction in the Internet social network menu.

As you can see in figure 2, the main work in the social network designing process is fulfilled by a knowledge engineer, he carries out analyses of the object domain for which this social network is being designed, forms the ontology of the object domain for the functions menu and networking construction in the web-site systematizing knowledge for this particular object domain. Having formed the ontology of the object domain with the application of systemological classification analyses (which is necessary for the social network menu categories and links system construction) the knowledge engineer forms the social network menu. At the last step the knowledge engineer carries out the program realization quality monitoring by direct social network designing and consultations.

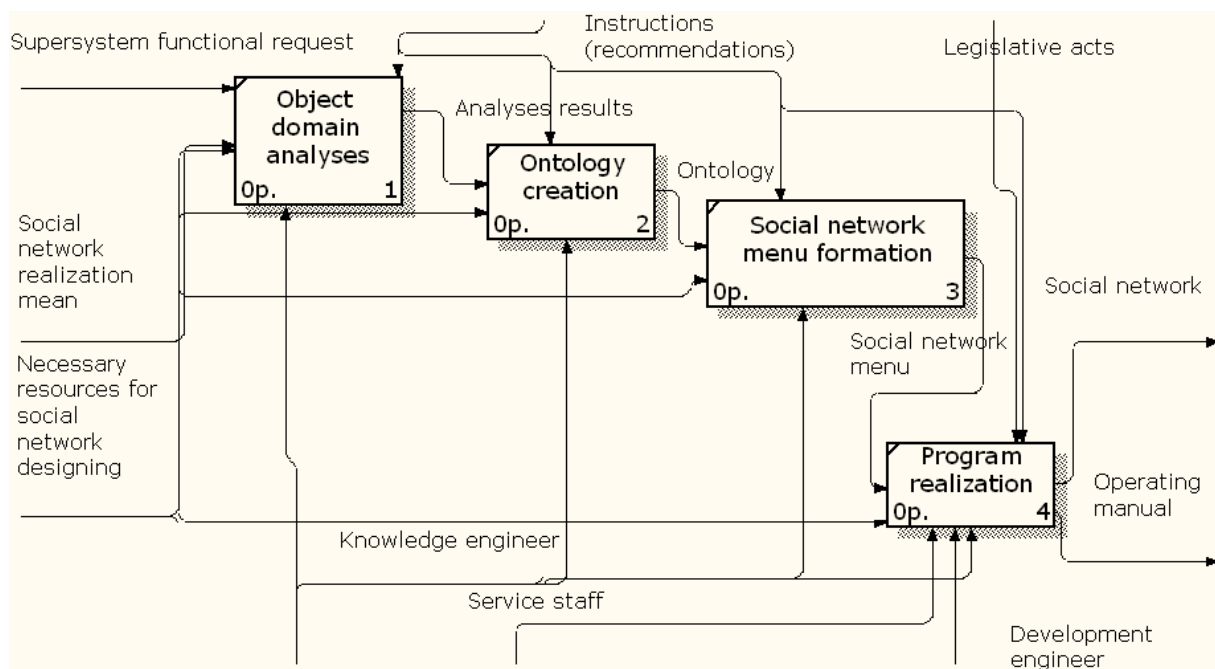


Figure 2. Decomposition of the Internet social network designing diagram

The given model fragment shows the principal processes of the Internet social networks designing. The main point is the object domain ontology construction process which is to form the social network menu categories with the application of systemological classification analyses and allows to form the user-oriented functions system which is handy for system development and its adaptation to the particular object domain. It is also helpful for users to take over the social network menu and to apply it.

The given model fragment is recommended in case of the Internet social networks designing in the organizations of varying patterns of ownership. The usage of the social network constructed with the application of systemological method will allow to form the user-oriented and user-friendly functions system therefore the company would be able to raise its competitiveness considerably due to quality and social network functioning efficiency improvement. To understand the social network designing process based upon the given method we would like to consider the examples of the Internet social network designing for two object domains "Contracts" and "Medicines".

The Niche Social Network Designing in the Object Domain "Medicines"

The development of knowledge management technologies (including the investigations in information analyses and object domains ontology modelling) with the further creation of the existing models and new knowledge about them is the first priority objective of scientific researches. Such investigations have a special priority in the object domains related to human health, for instance – pharmacy industry. The formation of medicines ontology as a knowledge model and the creation of the conditions for the further investigations in this object domain are extremely pressing and important problems as the number of the medicines is just increasing with the lapse of time.

Knowledge management and accumulation as a part of modern management functions determines the management systems formation. This is especially important when we are referring to the pharmacy industry, the progress in which often depends on the long-last investigations and clinical trials. In modern conditions when investigations are iterative the knowledgebase formation in which you can record you experience and results received at the different steps of the investigation, for instance, can raise investigation rate and efficiency considerably; and that determines economic benefits as the final result.

While analyzing the object domain "Medicines" (M) it has been found that today there exist different definitions of some concepts in different sources. Having analyzed the concept system in this object domain we have come to conclusion that the found definitions are mostly formed without taking into account formal logic rules and with the breach of the principal concepts definitions rules that complicated genus-species definitions formation considerably.

While analyzing and parametric classification formation in the object domain "Medicines" the following classifications have been examined:

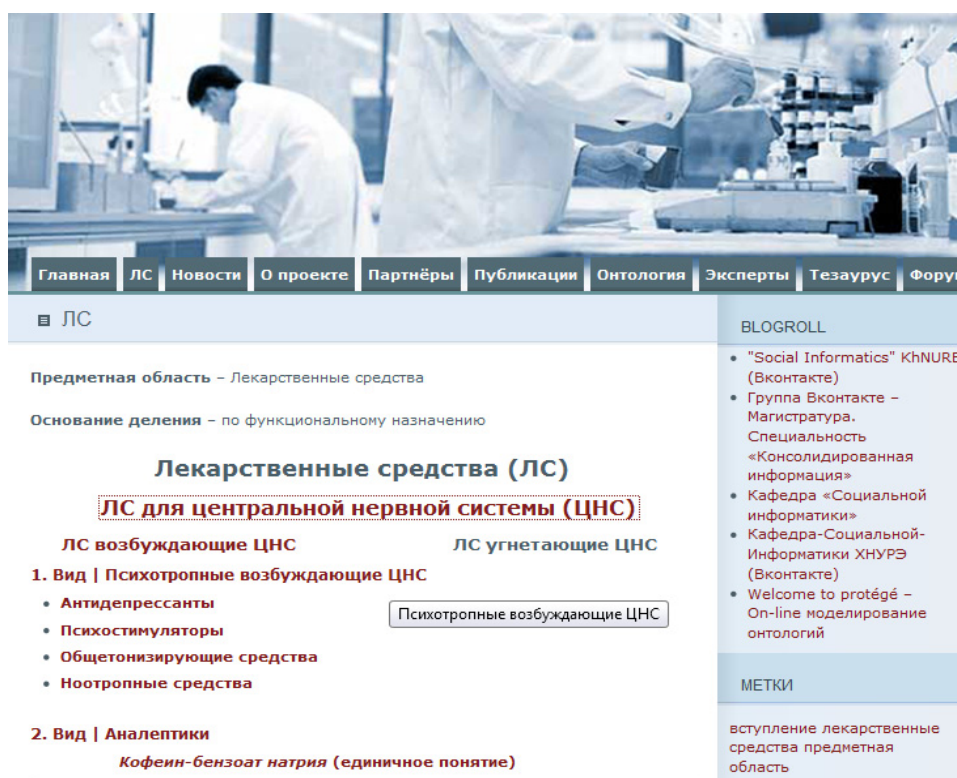
- a) medicines classification suggested by Academician Mashkovski M. D. [5];
- b) pharmacotherapeutic groups of medicines;
- c) nosological classification;
- d) anatomic therapeutic classification;
- e) anatomical therapeutic chemical classification.

Among the given classifications the least adequate ones for the given object domain are nosological classification and medicines classification suggested by Academician Mashkovski M. D. "Nosological classification" supposes the classification of medicines as for diseases and therapeutic indications that shows the change of the classification ground already. The classification consists of 28 sections (radiation sickness, eyes diseases, infectious diseases etc). The classification of Mashkovski M. D. has 13 groups, for instance, "The other medicines of different pharmacological groups". The presence of this group in the classification and a number of changes of classification grounds clearly show its incompleteness and does not meet the criteria of natural classification. The most profound one among the given classifications could be considered "Pharmacotherapeutic groups of medicines" (PGM) based upon the pharmacotherapeutic effect and the therapeutic effect of M, where

17 principal PGM are sorted out. The other classification under study are mostly marking systems build through the alembic of jurisprudence and intellectual property targeted at medicine consumption study that shows their artificial and commercial nature.

The given research resulted in the fragment of medicines (M) classification; they represent the combination of chemical agents and elements; they cause some chemical reaction in a human body therefore having their medicamental effect. Related to that the classification ground according to the formal requirements is "as for functional purpose". The given classification is parametric (includes the properties), has functional classification ground and meets the principal criteria of natural classification that makes it more grounded, adequate for the object domain and convenient for the niche social network designing.

The fragment of the medicines classification was realized through "Wordpress.com" web-designer with the possibility of the further investigations in this object domain. The choice of the web-designer is driven by the possibility of free realization of the sufficient number of necessary functions. A concept classification due to links implementation is correlated with the properties classification that allows a participant (a scientist) to go from any ontology cross-point to the corresponding page with the additional information, fig. 4.



The screenshot shows a web page for a niche social network. At the top, there is a navigation menu with links: Главная, ЛС, Новости, О проекте, Партнёры, Публикации, Онтология, Эксперты, Тезаурус, Форум. Below the menu is a header with a blue background and the text "ЛС". The main content area has a blue background and contains the following text:

Предметная область – Лекарственные средства
 Основание деления – по функциональному назначению

Лекарственные средства (ЛС)

ЛС для центральной нервной системы (ЦНС)

ЛС возбуждающие ЦНС ЛС угнетающие ЦНС

1. Вид | Психотропные возбуждающие ЦНС

- Антидепрессанты
- Психостимуляторы
- Общетонизирующие средства
- Ноотропные средства

2. Вид | Аналептики

Кофеин-бензоат натрия (единичное понятие)

On the right side, there is a sidebar with a blue background. It contains a "BLOGROLL" section with a list of links:

- "Social Informatics" KhNURE (Вконтакте)
- Группа Вконтакте – Магистратура. Специальность «Консолидированная информация»
- Кафедра «Социальной информатики»
- Кафедра-Социальной-Информатики ХНУРЭ (Вконтакте)
- Welcome to protégé – On-line моделирование онтологий

Below the blogroll is a "МЕТКИ" section with the text: "вступление лекарственные средства предметная область".

Figure 3. The fragment of the developed niche social network "Medicines" in the «WordPress» web-designer

The results of the investigations carried out would allow to receive a handy knowledge-oriented instrument for common investigations which meets the modern tendencies and combines simplicity and efficiency with the low rate of economic investments.

The Designing of the Niche Social Network Adapted for Concluding Contracts

Recently business social networks designing for the Internet interaction between organizations and customers (for instance – for concluding the contracts on-line) has become much important. Concluding the contracts on-line has many levels of security and is widely acknowledged in business sphere. This allows companies to solve their tasks without wasting time. Therefore designing of social networks adapted for concluding contracts is necessary and plays a crucial role for business.

In the result of our investigation the classification of the object domain “Contracts” has been formed with the application of systemological classification analyses; the contracts were classified as for the type of due rights. The contracts classification we have received allows the social network participants to detect quite easily and use in their activities the intrinsic properties of the contracts, and also refer in their practice to such a contract which is the most convenient as for the given requirements. The classification gives an opportunity to detect resemblance and differences of legal regulation of any social relations, encourages the further development and legislation systematization, allows to examine the contracts faster and more efficiently. The fragment of contracts classification was realized in the «Taba.ru» social network designer and is presented in figure 3.

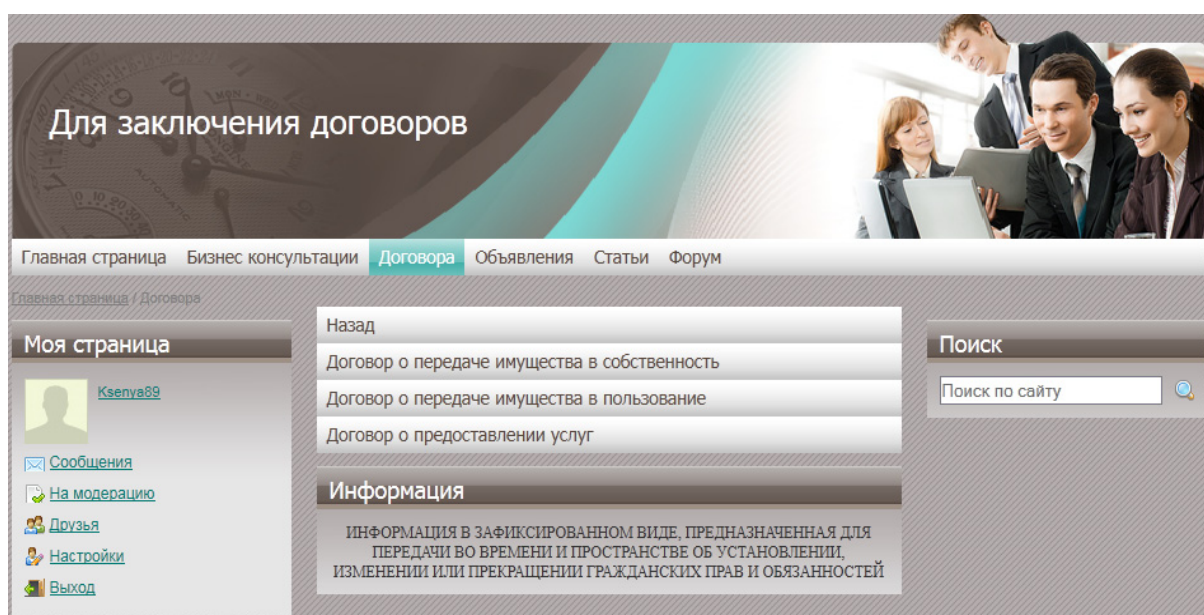


Figure 4. The social network functions menu fragment – “Contracts”

The presented contracts classification fragment allows to place the contracts in the social networks menu taking into account as for the type of due rights. It can also be used in designing the social network for concluding the contracts. Application of such business social networks in the Internet would allow the companies and public organizations to reach the new level of interaction between the social networks participants.

Conclusions

In the given investigation the following results have been received and published in this article:

- the principal steps of new systemological cognitive ontology-oriented method for social networks designing have been analyzed;

-
-
- the fragment of the information business-model of the Internet social network designing with the application of the given method;
 - the ontology classification models based on systemological classification analyses for the object domain "Medicines" and "Contracts";
 - the fragments for the social network menu have been created with the application of systemological classification analyses for the object domain "Medicines" and "Contracts";
 - the received fragments of the social network menu based on the developed ontology classification models have been realized in «Wordpress.com» web-designing software and «Taba.ru».

The further development of the received information model would allow to simplify and fasten the process of social network web-site designing in any company and to minimize the necessity of making the amendments to the efficient social network functioning; it also would allow to reduce the expenses while designing and using the Internet social network and raise the social network competitiveness due to user-oriented interface, adequacy of the social network as for the object domain and its adaptivity to the best possibilities for study. The application of systemological classification analyses while designing the social networks web-sites would allow to reduce the load for the user during his/her work and learning the principles of the social network functioning considerably, would raise the efficiency of its functioning. Of no less importance is the interest for investigation such social networks in organizing communities of practical workers, common investigations, education and knowledge share.

The application of social networks adapted to the customers' requirements could help to raise their intellectual capital without considerable investments and would allow to improve the usage of such networks for self-perfection and development.

Acknowledgements

*The paper is partially financed by the project **ITHEA XXI** of the Institute of Information Theories and Applications FOI ITHEA and the Consortium FOI Bulgaria (www.ithea.org, www.foibg.com).*

Bibliography

1. Соловьева Е.А. Естественная классификация: системологические основания - Харьков: ХНУРЕ, 1999 - 144-148 с.
2. Основы системологии / М.Ф. Бондаренко, Е.А. Соловьева, С.И. Маторин.– Харьков: Изд-во Харьк. техн. Ун-та радиоэлектр., 1998, ISBN 5-7763-92217.– 122с.
3. Mikhail Bondarenko, Nikolay Slipchenko, Kateryna Solovyova, Viktoriia Bobrovska, Andrey Danilov. Systemological Classification Analysis In Conceptual Knowledge Modeling. // Information Book Series «INFORMATION SCIENCE & COMPUTING». Supplement to the International Journal «INFORMATION TECHNOLOGIES & KNOWLEDGE» 2010. Варна, Болгария. Pp. 169-176.
4. Mikhail Bondarenko, Nikolay Slipchenko, Kateryna Solovyova, Andriy Danylov, Ruslan Kovalchuk, Shcurenko Irina Conceptual Knowledge Modeling and Systematization on the Basis of Natural Classification / International Journal "Information Theories and Applications", Vol. 18, Number 2, 2011 Варна, Болгария. Pp. 151-171.
5. Машковский, М.Д. Лекарства XX века: Очерк создания современных лекарственных средств. [Текст] / М.Д. Машковский – М. : Новая Волна, 1998. – 320с.

Authors' Information

Mikhail Bondarenko – Rector of Kharkov National University of Radio Electronics, Corresponding Member of the National Academy of Sciences of Ukraine, Lenin Ave., 14, Kharkov, 61166, Ukraine; e-mail: rector@kture.kharkov.ua

Major Fields of Scientific Research: Intelligence Technologies, Information and Knowledge Management, System Analysis, Artificial Intelligence, Decision Making, Knowledge Research and Application, Natural Language Processing, Knowledge and Natural Language Modeling, Business Intelligence, Competitive Intelligence, Modern (e-) Learning, Knowledge-Based Systems and Technologies, Systemological Analysis.

Nikolay Slipchenko – Chief of Scientific Department, Kharkov National University of Radio Electronics, Professor, Doctor of Technical Sciences, Lenin Ave., 14, Kharkov, 61166, Ukraine; e-mail: slipchenko@kture.kharkov.ua

Major Fields of Scientific Research: Informational Modeling, System Analysis, Intelligence Technologies, Information and Knowledge Management, Modern (e-) Learning, Competitive Intelligence, Artificial Intelligence, Decision Making Support.

Kateryna Solovyova - Chief of Social Informatics Department and Knowledge Management Center, Professor, Doctor of Technical Sciences, Kharkov National University of Radio Electronics, Lenin Ave., 14, Kharkov, 61166, Ukraine; e-mail: si@kture.kharkov.ua

Major Fields of Scientific Research: Knowledge Classification, Systematization, Elicitation, Acquisition and Modeling, Knowledge Management, Ontological Engineering, Systemological Analysis, Knowledge Research and Application, Decision Making, Knowledge-Based Systems and Technologies, Artificial Intelligence, Business Intelligence, Modern (e-) Learning, Competitive Intelligence, Cognitive Modeling, Intellectual Capital .

Andrey Danilov – Senior Lecturer of Social Informatics Department, Kharkov National University of Radio Electronics, Engineer, Lenin Ave., 14, Kharkov, 61166, Ukraine; e-mail: si@kture.kharkov.ua, Skil06@ukr.net.

Major Fields of Scientific Research: Social Networks, Ontological Engineering, Competitive Intelligence, Decision Making, Intelligence Technologies, Knowledge Research and Application, Knowledge Management, (e-) Learning, Artificial Intelligence, Systemological Analysis, Social Capital.

Alla El Moutahid – MA Student of Social Informatics Department, Kharkov National University of Radio Electronics, Engineer, Lenin Ave., 14, Kharkov, 61166, Ukraine; e-mail: si@kture.kharkov.ua.

Major Fields of Scientific Research: Ontological Engineering, Intelligence Technologies, Knowledge Research and Application, Knowledge Management, Systemological Analysis.