Section 7. Philosophy and Methodology of Informatics

7.1. Knowledge Market

THE STAPLE COMMODITIES OF THE KNOWLEDGE MARKET

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Abstract: *In this paper, the "Information Market" is introduced as a payable information exchange and based on it information interaction. In addition, special kind of Information Markets - the Knowledge Markets are outlined. The focus of the paper is concentrated on the investigation of the staple commodities of the knowledge markets. They are introduced as kind of information objects, called "knowledge information objects". The main theirs distinctive characteristic is that they contain information models, which concern sets of information models and interconnections between them.*

Keywords*: Information Market, Knowledge Market, Knowledge Information Objects, General Information Theory*

"The speaker doesn't deliver his thought to the listener, but his sounds and performances provoke the thought of the listener. Between them performs a process like lighting the candle, where the flame of the first candle is not transmitted to another flame, but only cause it."

Pencho Slaveikov, Bulgarian poet,
the beginning of the XX-th century

Introduction

The main characteristic of the Information Markets is payable information exchange and based on it information interaction. Special kinds of Information Markets are the Knowledge Markets. The main goal of this paper is to continue the investigation of the Knowledge Markets started in [Ivanova et al, 2001], [Markov et al, 2002]. Now, our attention will be paid to the staple commodities of the Knowledge Markets. The usual talk is that at the Knowledge Market one can buy knowledge. But, from our point of view, this is not so correct.

The investigation presented in this paper is based on the *Theory of Information Interaction*, which is one of the main parts of the *General Information Theory* [Markov, 1984], [Markov, 1988], [Markov et al, 1993], [Markov et al, 2003].

Firstly, let remember some basic concepts of the Theory of Information Interaction.

At the first place, we need to remember the concept "INFOS". Its genesis started from the understanding that the concept *"Information Subject"* is perceived as a single human characteristic. It is clear that in the nature there exist many creatures, which may be classified to this category, especially groups of persons and societies.

To exclude the misunderstandings we decide to introduce new word to denote all possessors of the characteristics of the Information Subject. This word is **"*INFOS*"** [Markov et al, 2003], [Markov et al, 2004].

On given level of complexity of the entities, a new quality becomes - the possibility of self-reflection and internal activity appears. One special kind of activity is the secondary (information) one. The secondary activity need to be resolved by relevant possibilities of the entities from the environment. So, not every entity may be used for resolving the secondary activity. This way, the entity needs a special kind of (information) contacts and (information) interaction for resolving the information activity.

The entity, which has:

- ***(primary) activity*** for external interaction;
- possibility for ***reflection***, i.e. possibility for collecting the information;
- possibility for ***self-reflection***, i.e. possibility for generating secondary (information) activity;
- ***information expectation*** i.e. available (secondary) information activity for internal or external contact for resolving it

is called ***Infos***.

The resolving of the information activity is ***the goal*** of the Infos. This goal may be achieved by the establishment and providing (information) contacts and (information) interaction, which are remembered below.

Information Objects

When the Infos interact with the entities around in the environment, there exist at least two cases of reverberation:

- the contacts and interaction are casual and all reflections in the Infos as well as in the entities have casual origin;
- the contacts and interactions are determined by the information activity of the Infos.

In the both cases, the contacted entity may reflect any information model from Infos. The concept “information model” has been defined in [Markov et al, 2001]. In general, the information model is a set of reflections, which are structured by Infos and, from his point of view, represents any entity.

An entity, in which one or more information models are reflected, is called ***"information object".***

The information objects can have different properties depending on:

- the kind of influence over the entities - by ordering in space and time, by partial or full modifying, etc.,
- the way of influence over the entities - by direct or by indirect influence of the Infos on the object,
- the way of development in time - static or dynamic,

etc.

Information Operations

The information is reflected relationship, i.e. it is a kind of reflection [Markov, 1988]. Therefore, the only way Infos to operate with information is to operate with the entity that contains it. Every influence on the entity may cause any internal changes in it and this way may change the information already reflected. Another type of influence is to change the location of entity or to provoke any contact between given entity and any other.

The influence over the information object is called "***information operation***" if it is determined by any Infos information activity.

The information operations may be of two main types:

- the Infos internal operations with the sub-entities that contain information,
- external operations with the information objects that contain information.

The internal operations with the sub-entities closely depend of the Infos' possibilities for self-reflection and internal interaction of its sub-entities.

The self-reflection (self-change) of the Infos leads to the creating of new relationships (and corresponding entities) in it. These are *subjectively* defined relationships, or shortly - *subjective relationships*. When they are reflected in the memory of the Infos they may initiate any new information model on a higher level. In such case, a relation between reflected relationships appears. The high-level information models may have not real relationships and real entities that correspond to them.

For instance, the possibility for creating the information models of similarity is a basis for realising such very high level operations as "comparing elements or substructures of the information models", "searching given substructure or element pattern in the part or in the whole structure of the information model", etc.

It is clear, the Infos is built by entities some of which may be also Infoses, but on the lowest levels. For instance the society and single human who belongs to it. So, the internal operations are determined by the concrete internal level and from the point of view of these low levels, they may be assumed as external operations. Because of this, we will concentrate out attention on the second type of operations.

The external operations with information objects may be differed in two main subtypes:

– basic information operations;
– service information operations.

There are two basic information operations which are called I-operations:

- **I-reflection** (reflecting the information object by the Infos, i.e. the origination of a relevant information model in the memory of the Infos);
- **I-realisation** (creating the information object by the Infos).

In the process of its activity, the Infos S reflects (perceives) information from the environment (entities $O_{I,}$ i=1,2...) by proper sub-entities (sensitive to video, acoustic, tactile, etc. influences) called "***receptors***" R_i (i=1,2...). Consequently, the Infos may receive some information models.

The Infos subjective reflection is called "***I-reflection***".

When necessary, the Infos can realise in its environment (entities O'_j, i=1,2...) some of the information models, which are in his memory, using some sub-entities called "***effectors***" E_j (j=1,2...). Consequently, new or modified already existing entities may reflect the information, relevant to these information models.

The Infos subjective realisation is called ***"I-realisation"***.

There are several operations, which can be realised with the information objects: transfer in space and time, destroying, copying, composition, decomposition, etc. Because of the activity of the Infoses, these operations are different from other events in reality. In this case, such Infos determined operations with information objects are called "service information operations".

For example, some of the very high-level service operations are based on the external influence on the information object to change any existing reflection:

- Including and removing an element in and from the object's structure;
- Copying or moving object's substructures from one place to another;
- Building new object's structure using as a basis one or several others;
- Composing or decomposing of object's elements or substructures;

Etc.

Information Processes

Let "O" is a set of real information objects i.e. $O = \{O_{ij} \mid i= 1,..,n; j=1,..,m\}$.

Let "I_s" is a set of information models in Infos S, i.e. $I_s = \{i_p \mid p=1,..,q\}$.

If the opposite is not stated, we will consider:

- every set of information objects is an information object,
- every set of information models is an information model.

Every information operation "t" can be treated as a function between two sets of information objects, which may be coincidental, i.e. t: $O_d \rightarrow O_r$.

I-realisation can be considered as a function m: $I_s \rightarrow O$.

I-reflection - in the opposite - as a function r: $O \rightarrow I_s$.

Let t_1, t_2,..,t_n are information operations. The consequence of information operations P created by any composition, i.e.

$$P = t_1 \circ t_2 \circ \ldots \circ t_n$$

is called "***information process***".

It is possible that some of t_i, i=1,..,n may be I-realisation or I-reflection.

In particularly an information process can include only one operation.

Information Contact

If an information model from the Infos is reflected in another entity, there exist possibility, during the "a posterior" interactions of the given entity with another Infos, to transfer this reflection in it. This way an information model may be transferred from the Infos to another.

If the second Infos has already established information expectation, the incoming reflection will be perceptible for him. The information expectation will be resolved in some degree and the incoming information model and information in it will be received by the second Infos.

Let S_1 and S_2 are Infoses and O is an arbitrary entity.

The composition of two real contacts Θ_1 and Θ_2 :

$$S_1 \xrightarrow{\Theta_1} O \xrightarrow{\Theta_2} S_2$$

is called "***information contact***" between Infos S_1 and Infos S_2 iff during the contacts any information model from I_{S1} is reflected in the I_{S2} through the entity O.

The Infos S_1 is called "***information donor***", the Infos S_2 is called "***information recipient***", and, of course, the entity O is called "***information object***".

In this case, when the donor and the recipient are different Infoses the information contacts between them consist of the composition of at least two information operations - I-realisation and I-reflection. For the realisation of any direct information contact between two different Infoses is necessary the execution of the composition of these two "basic" operations. All the rest information operations are necessary for supporting the basic ones i.e. they are auxiliary (service) operations.

This way the elementary communicative action will be provided.

In general, every information process "c", having as a start domain the set I_{Sd} of information models of the Infos S_d and as a final domain the set I_{Sr} of information models of the Infos S_r, (I_{Sd} and I_{Sr} may be coincidental)I,

$$c: I_{Sd} \rightarrow I_{Sr}$$

is called ***"information contact"*** between S_d and S_r:

Note that for the realisation of one information contact at least one information object is necessary.

Information Interaction

The set "R" of all information contacts between two Infoses S_a and S_b

$$R= \{c_i \mid i=1,2..;\ c_i: I_{Sa} \rightarrow I_{Sb}\}$$

is called "***information interaction***".

When S_a and S_b are coincident, we call it Information interaction of the Infos with itself (through the space and time).

The set "B" of all information objects, used in the information interaction between given Infoses is called "***information base***".

Information Society

The **"*Information Group*"** (IG) is a set of Infoses, with common Information base of the information interactions between them.

In the small IG the service information operations may be provided by the every Infos. In the large IG this is impossible or not optimal. In such case, some Infoses became as "*information mediators*" between the others. They start to provide the service information operations. They realise **"*Information Service*"**.

The "Information Society" is an IG with internal Information Service.

Information Market

Now we are ready to continue with introducing the basic ideas of the Information Markets.

Up to this moment, the discussion about essence of the information society has not resulted in uniform definition. Everyone from his point of view defines this stage of development of a society.

It is clear, at the stage of social growth, called “information society”, for existence of the separate individuals or social teams the information and information activity get decisive value. Certainly, at earlier stages of development of mankind, the information had the important value too. But never, in all known history, the other means for the existence have been so dominated by the information means as it is in the information society.

So, the direct conclusion is the understanding that ***the information society differs from the other levels of the human been growth by the domination of the information interests above all others.***

From the origin, the human society has been the "information" one, but the levels of the information service differ in the different periods of the existence of the societies. So, it is possible to allocate the following levels:

- **Primitive information society** (people having knowledge, letters on stones etc.);
- **Paper information society** (books, libraries, post pigeons, usual mail etc.);
- **Technology information society** (telephone, telegraph, radio, TV, audio- and video-libraries etc.);
- **High-Technology information society** (automated systems of information service, local computer information networks etc.);
- **Global information society** (global systems for information service, opportunity for every body to use the information service with help of some global network etc.).

The information society does not assume compulsory usage of the information services by the part or all inhabitants of given territory. One very important feature thus is emphasized: for everyone will be necessary diverse and qualitative (from his point of view) information, but also everyone can not receive all necessary information. The enterprising experts will accumulate certain kinds of the information and will provide the existence through favourable to them information exchange with the members of the society. Thus, in one or other form, they will carry out **payable information service (granting of information services for some income)** [Ivanova et al, 2001]. This is the background of the Information Market.

The payable information exchange and services regulated by the corresponded laws and norms as well as by the government protection of the rights of the participants (members) of this kind of social interactions form the ***Information Market***.

So, at the centre of discussion, we have discovered a simple true: ***in the information society the payable information exchange and services will dominate above all other market activities.*** In other words, **the Information Market** dominates over all other type of markets of the information society.

Knowledge Information Objects

V.P. Gladun correctly remarks that the concept “knowledge” does not have common meaning, especially after beginning of it’s using in the technical lexicon in 70-ies years of the last century. Usually, when we talk about the human knowledge we envisage all information one has in his mind. Another understanding sets the “knowledge” against the “data”. We talk about data when we are solving any problem or are making logical inference. Usually the concrete values of the given quantities are used as a data as well as the descriptions of the objects and interconnections between objects, situations, events, etc. During decision making or logical inference we operate with data involving some other information like descriptions of the solving methods, rules for inference of the corollaries, models of the actions from which the decision plan is formed, strategies for creating decision plans, and general characteristics of the objects, situations, and events. In accordance with this understanding, the “knowledge” is information about processes of decision making, logical inference, regularities, etc., which applying to the data creates any new information. [Gladun, 1994].

The usual understanding of the verb "to know" is: "to have in the mind as the result of experience or of being informed, or because one has learned"; "to have personal experience of smt.” etc. The concept "knowledge" usually is connected to concepts "understanding" and "familiarity gained by experience; range of information" [Hornby et al, 1987] or "organized body of information" [Hawkins, 1982].

In other words, the knowledge is a structured or organised body of information models, i.e. the knowledge is information model, which concerns a set of information models and interconnections between them.

In accordance with this the information objects, which contain such information models are called ***“knowledge information objects”***.

This definition corresponds to everyday understanding of the concept “knowledge”. For instance, during the process of education the presented above operations **I-realization** and **I-reflection** correspond to creating and perceiving the ***“knowledge information objects”***.

Knowledge Market

The growth of the societies shows that the knowledge information objects become important and necessary articles of trade. The open social environment and the market attitudes of the society lead to arising of the knowledge customers and knowledge sellers, which step-by-step form the **"Knowledge Markets"** [Markov et al, 2002].

As the other markets, the **Knowledge Market** is the organised aggregate of participants, who operate following common rules and principles. The knowledge market structure is formed by a combination of mutually-connected elements with simultaneously shared joint resources.

The staple commodities of the knowledge market are the knowledge information objects.

The knowledge information bases and tools for processing the knowledge information objects, such as tools for collecting, storing, distributing, etc., form the **knowledge environment**.

The network information technologies enable to construct uniform ***global knowledge environment***.

It is very important, that it will be friendly for all knowledge market participants and open for all layers of the population without dependence from a nationality, social status, language of dialogue, place of residing. The decision of this task can become the important step of humanization of all world commonwealths.

In the global information society, on the basis of modern electronics, the construction of the global knowledge market**,** adapted to the purposes, tasks and individual needs of the knowledge market participants is quite feasible, but the achievement of this purpose is connected to the decision of a number of scientific, organizational and financial problems.

For more clear explanation let consider an example about the correspondence between concepts “information object” and “knowledge information object”. When an architect develops any constructive plan for future building, he creates a concrete “information object”. Of course, he will sell this plan. This is a transaction in the area of the Information Market. Another question is from where the architect has received the skills to prepare such plans.

It is easy to answer – he has studied hardly for many years and received knowledge is the base for his business. So, we see that the textbooks are not concrete information for building concrete house, but they contain the information needed for creating such plans. The textbooks written by the lecturer in the architectural academy are special kind of "information objects" which contain special generalized information models. They are "knowledge information objects" and these textbooks have been sold to the students. It is clear; here we have a kind of transactions at the "Knowledge Market".

At the end, we need to take into consideration the difference between responsibility of the architect and the lecturer. If the building collapses the first who will be responsible is the architect, but never the lecturer!

Conclusion

In this paper, we introduced the "Information Market" as a payable information exchange and based on it information interaction. In addition, special kind of Information Markets - the Knowledge Markets were outlined.

The identifying of the staple commodities of the knowledge markets was a step of the process of investigation of contemporary situation in the global knowledge environment.

The investigation of the staple commodities of the knowledge markets is very difficult but useful task. In this paper we introduced them as kind of information objects, called "knowledge information objects". The main theirs distinctive characteristic is that they contain information models, which concerns sets of information models and interconnections between them.

This way, we have seen the usual talk that at the Knowledge Market one can buy knowledge is not so correct. But in everyday language in is accepted to say "knowledge" with the meaning of the "knowledge information object". We need specially to say that there exists another meaning of knowledge, which points to the information models into the Infos memory. Usually we do not distinct these two meanings. When we say "receiving of knowledge" we assume the I-reflection operation; when we say "generating the knowledge" we assume the I-realization operation; and at the end, when we say simply "knowledge" it is context depended to understand what is the meaning – knowledge information models into the Infos memory or those which the knowledge information objects contain. However, if we remember that the Infoses are built by entities some of which may be also Infoses, but on the lowest levels, the internal memory of given level of the organisation of the Infos may be considered as external set of information objects on the lower levels.

This has important role for future research of this social and information phenomenon.

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BASIC INTERACTIONS BETWEEN MEMBERS OF THE KNOWLEDGE MARKET

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Abstract: *The interconnections and information interactions between main members of the Knowledge Market are presented in the paper.*

Keywords: *Knowledge Market, Components of the Knowledge Market, Information Interaction*

Introduction

The growth of the global information society shows that the information and, especially – knowledge, becomes important and necessary article of trade. The open environment and the market attitudes of the society lead to arising of the knowledge customers and knowledge sellers, which step-by-step form the "Knowledge Markets". As the other markets the Knowledge Market is the organised aggregate of participants, which operates in the environment of common rules and principles [Markov et al, 2002].

The Structure of the Knowledge Market was presented in [Markov et al, 2002]. Let's remember its basic elements.

Usually a person or enterprise, called **Employer (Er)**, hires **Employees (Ee)**, who have exact skills and knowledge and transform them in real products or services during the work processes. This process is served by the Manpower Market. But the Employees, even owning a high education level, need additional knowledge to solve the new tasks of the Employers. In this moment they became **customers of new knowledge**, who arouse the necessity of the Knowledge Market, which should rapidly react to the customers' requests. **In other words, the Manpower's Market causes the appearance of the Knowledge Market.** These two members of KM form one side of the market – the knowledge customers.

The continuous changing of technological and social status of the society leads to appearance of new category – **Consultants (C)** – peoples/organisations, who have two main tasks:

- to promote new technologies to Employers in convenient way to implement them in practice;
- to determine the educational methods for training the staff for using the new technologies.

The educational process is carried out by the **Lecturers (L)**, who transform new scientific knowledge into the pedagogical grounded lessons and exercises.

During the realising the concrete educational process the Lecturer is assisted by **Tutor (T)** who organises the educational process and supports the Employees to receive the new knowledge and to master theirs skills.

At the end of the educational process, a new participant of KM appears – **Examiner (E)** – who tests the result of the process and answers to the question "have the necessary knowledge and skills been received".

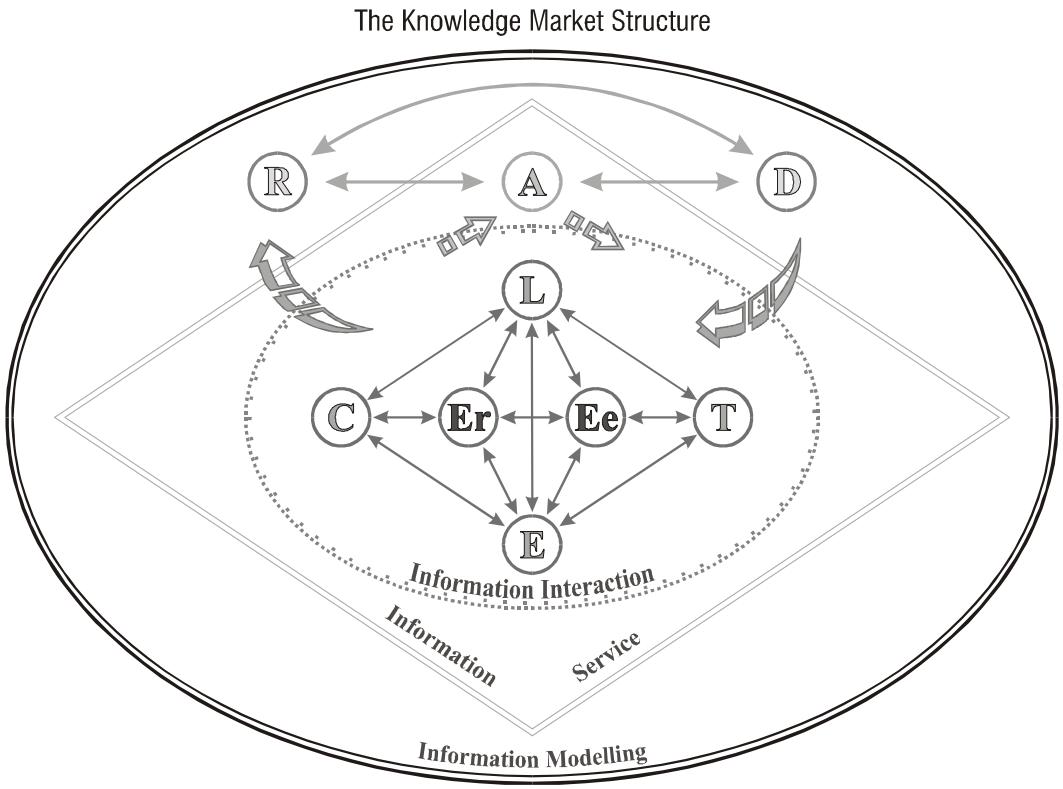
These six Components of the Knowledge Market, which contact each other via global information network, form the first level of the knowledge market, called the level of the **"information interaction"**.

As far as these components are too much and are distributed in the world space, the organisation and co-ordination of theirs information interaction needs adequate **"information service"**. It is provided by a new component called **Administrator (A)**. Usually the Administrators are Internet and/or Intranet providers or organisations.

The rising activity of the knowledge market creates the need of developing modern tools for the information service in the frame of the global information network. This causes the appearance of the high knowledge market level, which allows the observing the processes, as well as developing and implementing new systems for information service. This is the **"information modelling"** level.

It consists of two important components – the **Researchers (R)** and the **Developers (D)**.

On the figure below is presented the scheme of the basic structure of Knowledge Market.



Of course, the Knowledge Market as a kind of Market follows the rules and laws given by the social environment. The interrelation between government and social structure and Knowledge Market need to be studied in separated investigation.

In several papers we have already investigate different problems of the Knowledge Market.

Some of the results given below are received during these works. For five years we have seen that the Knowledge Market is very important scientific area and need to be investigated. The main received results are given in [Markov et al, 2000a], [Markov et al, 2000b], [Ivanova et al, 2001], [Boikatchev et al, 2001a], [Boikatchev et al, 2001b], [Markov et al, 2002], [Ivanova et al, 2003], [Markov et al, 2003].

In global information society the e-commerce becomes as fundamental way for financial support of the Knowledge Market. The advantages of e-commerce are obvious. In the same time there exist many risks for beginners at this kind of market. From this point of view the society need to provide many tasks for training the citizens to use properly opportunities of the new environment [Markov, 1999].

The Interconnections between Members

In this section, the interrelations between members of the Knowledge Market are outlined. For easy reading we will denote the Knowledge Market's members with abbreviated names as they were given in the structure above. The next convention concerns the style of description of the corresponded interconnections. We consider that in every such interconnection the both participants have equal rights and the order of writing is not important. For instance, the denotation "L – T" represents the interconnection between Lecturers and Tutors without any precedence of any of them.

Er – Er

The group of the Employers in given domain causes the growing of the Knowledge Market in this direction.

The products of some Employers develop the new technologies, which are used from other Employers. This causes the development of the Knowledge Market in these new directions.

The role of the Employer from the point of view of the Manpower market is to buy and hold more qualified and skilled workers for less money in competition with other Employers.

Er – Ee

The Employer buys the result of the work of the Employee, which is closely depended to the received knowledge and skills, in one hand, and the possibilities of the Employee to realise them in concrete results in everyday work, on other hand.

The Employee informs the Employer for already received knowledge and skills or his intention for future. He need to prove this knowledge by correspond qualification procedure.

The Employee has to realise the requested knowledge and skills during the working process, because the Employer pays for the real results of the work, but not for the possibilities.

Er – C

The Employer can take advises from the Consultant for optimisation or future expansion of his business.

The Employer may ask the Consultant about information for the other components of the Knowledge Market or for the Knowledge Market as whole.

Special Interest for the Employer may be the data about the degree of the knowledge and skills of the Examiners, because of the importance of theirs role for the employers business.

One of the main tasks of the Consultants is to advise the Employers who can be the appropriate Lecturers or Examiners for the manpower they need.

During the interaction with the Consultant the Employer defines his intentions for the future of his business. This way the Consultant receives information about the future growing of the Knowledge Market. The Consultant investigates this growing by the interaction with the two types of Employers:

- Manufacturers of new products and technologies, which production will income on the real market;
- Users of the existing products and technologies.

The first type of Employers grows up a new niche of the Knowledge Market – the knowledge about using, service, etc. of theirs new products, technologies or theories.

The second type influences over the increasing or decreasing of that niche. From other side, the investigation of this group can focus the attention to the new problem, which solving may generate a new niche in the Knowledge Market.

Er – L

The Employer may consult the Lecturer about the present' and future' needs and changes of the business, he manages. The initiative for such consulting process usually belongs to the Lecturer, or to the Consultant. The Employer becomes as the corrective of the futures Lecturers' work.

During the interaction with the Employers, the Lecturer receives theirs:

- requests for training and additional education of new skilled Employees;
- requests for consulting the specialists already appointed in the enterprises of the Employers;
- requirements for preparing adequate educational programs and courses for theirs Employees;
- In the same time, the Lecturer gives information to the Employers for the level of the skills received by the Employees during the implemented courses.

Er – T

The direct interactions between Employer and the Tutor are not so strong, i.e. the direct interaction between the Tutor and the Employer is not always present.

In one side, the Tutor organises the educational process in correspondence to the requirements of the Employers' business work environment. Usually the Consultant defines these conditions directly or through the Lecturer. The Employer defines the concrete duties, which usually are subset of the Consultant' recommendations.

Meanwhile the Tutor contacts directly with the Employer, if it's a question of consultation, check of the level of the skills and knowledge or re-education of already hired Employees.

The Tutor has to establish appropriate educational environment for training the Employees to satisfy given requirements.

In other side, the Tutor can receive the concrete information for the current Employees, which information may facilitate the learning process.

Er – E

The interaction between Employer and Examiner is aimed to define the specific characteristics, which the Employee has to satisfy. These characteristics are subset of the general requirements and rules for given business activity. Usually the Consultant in collaboration with the Employer generates the definition of the specific rules. It is possible, during the process of qualification of the Employee, the set of rules to be changed in direction to extend or to shrink in correspondence to:

- the real needs and possibilities of the Employer;
- the set of candidates for given workplace.

The Employer can ask the Examiner to examine some of the employees, which already work for the Employer in accordance with the current (or near-future) duties-rules.

The Examiner informs the Employer for the Employees results in the education course.

Er – A

It is clear that the concrete needs of the given Employer are subset of the general Employers' information model. In every concrete case as well as for every concrete event the Employer needs specialised administration support.

The Administrator interacts directly with the Employer for:

- co-ordinating and service the information interaction between him and other Employers as well as with all other Knowledge Market participants;
- advising him how to use the information service tools to establish interconnections;

- placing the tools and lines for distant information exchange at Employers' disposal;
- supporting the creation of the specialised internet and/or intranet sites and other communication possibilities for representing the Employers;
- Software and hardware support of Employers' activities.

Er – R&D

There are several sources for financing the scientific research and its implementation in the Knowledge Market.

The main sources are the Employers. They may order specialised research and developing of correspond tools, which may extend service of the Knowledge Market in the new directions.

Another source is the government or public financial support. In such case the corresponded authorised institutions became as specific Employers but the scientific results could not be implemented immediately. This possibility is very important because of the increase in the production of scientific "garbage".

As corollary we have two types of interaction between Researchers, respectively – Developers, and Employers:

- Interaction based on concrete request and corresponded scientific or practical projects;
- Interaction determined by future prognostic government, social or scientific goals, needs, expectations, etc.

Ee – Ee

The connections between Employees are mainly in two dimensions:

- collaboration with others during the educational process;
- competition with others in the Manpower market as well as during the educational process.

The collaboration is very important because of possibility to receive new knowledge from “colleagues” and the need to discuss in free style the problems arisen from the tasks given by the Lecturer and the Tutor.

Competition has significant role in growing the personal knowledge and skills.

Ee – C

The Employee receives information from the Consultant usually through the other components of the Knowledge Market and in rare case directly. This information concerns the present and future growth of the Manpower and Knowledge Markets and serves the orientation of the Employee in the social environment. This knowledge may help the Employee to make decision for his future professional and social growing.

In addition, the Consultant makes studies on the state of the Employees’ commonwealth and generates conclusions about the advance or reduction of any parts of Knowledge Market.

Ee – L

From point of view of the Employee the Lecturer is integrated set of education sources, from which he can receive general or specialized knowledge and skills.

The Lecturer transfers knowledge to the Employees, using modern methods and devices of delivering. He participates in development of the training program, study materials, study tasks and exercises that the Employees should be carried out during the training before beginning of the educational process.

During preparation of a course the Lecturer should give study materials, which can be written in appropriate formats and media and the references to the additional sources of information.

The Lecturer may be connected with each Employee directly and has access to the discussion forum and the Employees’ diaries where he can estimate the Employees’ knowledge and make the comments.

Ee – T

One very important point of the interaction between the Employee and the Lecturer is to determine the currently received knowledge and skills level of the Employee for choosing the appropriate approach and capacity of the material for education. This process needs to be supported by the Tutor.

The tutor directs and plans the education of the Employee. He also plans and organizes Employee's interaction with the Lecturer and informs the Employee about all the courses that he can get from the Lecturer.

The Employee demands from the Tutor maximal effective organization of the educational process for acceptable expenses.

Let's remark that the concept of acceptable expenses closely depends of financial status of the Employee. These expenses include not only concrete charges for education, but also the charges for existence of the Employee during the educational process.

Ee – E

The Employee must prove to the Examiner that his received knowledge and skills cover chosen qualification level. If the Employee does not cover all the requirements, the Examiner need to explain in appropriate form what the Employee have to learn in addition. These explanations need to be directed to the Tutor (respectively to the Lecturer) for future extension of the education of this Employee, his group or whole educational process.

The Examiner conducts the Employee's attestation on different levels of the education course. Within the interaction with the Employee, he gives him the terms and the conditions of the test or exam Employee's about take. The Examiner sets the tests and gets the Employee's answers.

At the end, the Examiner takes a decision for a final or level test and gives the Employee a certificate based on the tests.

Ee – A

The Employee interact with the Administrator for receiving the appropriate information service for every of given above information interactions.

The concrete needs of the given Employee are subset of the general Employee' information model.

The specific characteristics of the Employee such as physiological characteristic, language specific, professional background, national and religious affiliations, the level of skills for using the information service, etc. strongly influence to the type and degree of the automated information service, provided and conducted by the Administrator.

Ee – R&D

The interaction of the Employee with the Researches and Developers mainly is based on the using of the tools and approaches for information service of the education and self-education.

In this interaction the Employee usually play passive role.

As a rule, the Researchers carry out specialized research or general investigation and developing of corresponding tools for information service. These tools are provided for the specific characteristic of given group of Employees or, respectively, for common (future) needs of the Employees' group.

C – C

The interaction between Consultants may be structured at least on three levels:

- scientific level;
- business level;
- state (government) and social level.

At the scientific level, the Consultants interact to investigate new theoretical or practical domains and to generate new common knowledge. As a rule, this interaction is based on the scientific norms for collaboration and exchange of the new ideas. Some political or socioeconomic processes as well as the business restrictions in the given field may restrict this interaction.

At the business level the main goal of interaction between Consultants is to extend already existing knowledge for decision of concrete practical problems. It is important to remark that often the experts in the same domain do not collaborate because of the concurrency between them.

At the state (government) and social level the Consultants play subordinate role to the Government or Social Institutions, such as the parliament, ministry, syndicates, associations, foundations etc. The knowledge of the consultants plays advising role for the decision making of the governing organization or institution. In such way this knowledge became active in the Knowledge Market.

C – L

The interaction between Consultants and Lecturers has significance place in the Knowledge Market. The Consultants are the sources of the new knowledge and the Lecturers need to be continuously in touch with them.

In many cases the Lecturers collect parts of knowledge from different Consultants and integrate it in educational materials. This way the Consultants may affect to the educational processes in the Knowledge Market.

Beside of this, the Consultants may influence the Knowledge Market by theirs ability to investigate the results of the previous cycle of education and to draw conclusions for eventual corrections in the educational processes.

At the end, the Consultants are the persons or organisations that can and have to test and certify the Lecturers in given knowledge domain.

C – T

At glance, the Consultants and the Tutors not interact at all. The interaction may be realised indirectly by other components of the Knowledge Market – mainly by the Lecturers.

Nevertheless, they exchange via Knowledge Environment much information for practical implementation of the Consultants recommendations for Employees training.

C – E

The main goal of the interaction between Consultants and Examiners is to clear the real needs of the Employers for high qualified and skilled workers. The Examiners need exact information what the Employees really have to know. The qualification procedure includes large scale of tests and other examination steps. For every one, the Consultant may be the source of the knowledge.

In this interaction the Consultants may influence by:

- conclusions for the results of the previous qualification cycles;
- certifying the Examiners in given knowledge domain;
- playing role of the Examiner.

The Examiner receives from the Consultant new test materials and education methods of conducting the attestation activities and informs the Tutor for the results of the use of the new attestation materials and methods.

C – A

The Consultant interact with the Administrator for receiving the appropriate information service for every of given above information interactions.

A specific characteristic of this interaction is the ability of the Consultant to interrupt any of the educational processes in the Knowledge Market via the Administrator's support. This interruption need to be done when from point of view of the Consultant:

- any new events, external for the educational process, appear and the structure of given steps of the educational process need to be changed;
- any deviations in the educational process have registered by the Consultant.

In this role the Consultant can be qualified as a regulator of the Knowledge Market. This is very important that the main way the Consultant can play this role is by the support of the Administrator.

C – R&D

The interaction of the Consultants with the Researchers and Developers usually is provided in two directions:

- the Consultants became as a source for information modelling of theirs work;
- the Consultants assist the creation and verify the implementation of the information models of the other components of the Knowledge Market. In this interaction the Consultant usually play active role.

Let's remark that the second function is very important not only of the work of the Researchers and Developers, but also for the stability and growing of the Knowledge Market.

The interaction of the Researchers and Developers with the Consultants is caused by:

- the needs of the scientific information modelling of the consultants' work as well as the activities of all connected to them Knowledge Market subjects;
- the implementation of the information models – in this case the Consultants need to play active role to assist the creation and to verify the realisations of scientific models.

The integration of the Researchers' and Developers' knowledge with the Consultants' one is very important for the making correct and appropriate solutions.

L – L

The main goal of the interaction between Lecturers is to deliver concrete material and pedagogical methods as well as to exchange theirs educational experience.

In other hand, the competition between Lecturers in one and the same subject can harm the Knowledge Market stability. In the same time, just the competition is the source of stimulus for the Lecturers advance and growth.

L – T

The Lecturer keeps in touch with the Tutor in mean to present him the information and educational materials needed for developing the curriculum during the education course as well as consults him in given application domain.

The Tutor is the Lecturer's main assistant – he has a permanent contact with the Lecturer and plans the interaction between him and the Employees. The Tutor gets the latest information about Lecturer's knowledge and education courses, and helps him to build the advertising strategy for the Knowledge Market. The Tutor also helps the Lecturer in using modern information technologies.

L – E

The Lecturer consults the Examiner about the plans for providing the tests and exams, as well as about the methodical recommendations for the contents of the tests and the educational methods for organizing and providing them.

The Examiner informs the Lecturer for the results of the attestation activities and suggests corrections to the current educational process.

L – A

Owning the basic wares of the knowledge market, namely the knowledge information objects, the Lecturer needs everyday information service for each one of the information interactions.

The Lecturer has to receive the actual knowledge and data and accumulate them, transforming in a resource for selling as a ware at the Knowledge Market.

The Lecturer always has to take into consideration all the specific characteristics of the customer of every ware (such as language specification, professional orientation, nationality and religion, information services' skill level etc.). So he has to own this kind of data as well. This type of information service of the Lecturer should be realised by the Administrator.

The interaction between the Administrator and the Lecturer consists in realization the hardware and software support as well as for all participants of the Knowledge Market, and in particular – service for realization the main function of the Lecturer – receiving new knowledge information objects and their transformation in the new articles of trade.

L – R&D

Special attention needs to be paid to the interaction of the Researchers and Developers with the Lecturers.

For some of the specific types of activity (like rapid and/or network education) the Lecturer can order special scientific research or a development accorded to the devices and the technologies, which can enlarge the service of the Knowledge Market in new direction. Such special scientific investigations and/or developments the Lecturer can order to the Researcher and the Developer, cooperating with the Employer. The Lecturer has to receive the information for the new scientific results and research-based technologies created from that participant in the Knowledge Market, and deliver it to the Employees.

The Lecturers play leading role for Employees' education and training. Because of this, the continual investigation of theirs possibilities and activities is very important.

The main goal of the interaction between Researchers and Developers and Lecturers is to enhance the effectiveness of the Lecturers work.

The achieving of this goal requires to build appropriate models of the Lecturer activities and to develop convenient subsidiary tools for receiving the new information and knowledge and creating educational courses and additional illustrative material.

T – T

The Tutors transfer to each other the educational plans, and compare the information needed for the coordination of the different courses of the whole education process.

In the same time, the competency of the Tutors is not enough to control the educational process. Because of this the collaboration between Tutors need to be provided through the Lecturers and under theirs management. Individual Tutors' initiative may cause embarrassments during the knowledge exchange.

T – E

The Examiner receives from the Tutor the plans for the expected tests and exams conducting as well as the test materials. He also informs the Tutor for the results of the attestation activities.

T – A

The Administrator supplies the Tutor with all needed hardware and software support for realisation of his activities – mainly connection with other participants, especially with the Lecturers, Employees and Examiners, for organising the education cycle.

As far as the Tutor's role is often played by the automated systems, the Administrator may perform a part of the Tutor duties – especially in the cases of the self-education.

T – R&D

The interaction between the Tutors and the Researchers and Developers is usually realised through the Lecturers. The Tutor doesn't take decisions about using new methods or technologies without Lecturer's opinion. He can get the new information from the Researchers and Developers and transfer it to the Lecturer. Only the Lecturer can decide how to use it.

The accent of the investigation of the Tutor's activities lies on the increasing the effectiveness of the organization of educational process as hole. The major element of this organization is the coordination with the other Knowledge Market participants (mainly with the Employee, Lecturer and Examiner) and external structures for optimal planning the activities of the participants in time and in place.

E – E

The Examiners transfer to each other the results of using attestation materials and methods.

At the state (government) and social level there exist similar structures, which are aimed to examine the educational organizations and to give them rights to provide the education in accordance to government and social requests.

E – A

To keep the knowledge level needed for conducting the Employee's exams, as well as all the information interactions, the Examiner needs everyday information service. It should be realised by the Administrator. The Administrator supplies the Examiner with all needed hardware and software support for realisation of his activities – mainly connection with other participants of the Knowledge Market for preparing and processing the process of the educational testing.

E – R&D

Taking into account that the main activity of the Examiner is to estimate the available knowledge and skills of the learner in the beginning, intermediate and final stage of the educational process in order:

- to evaluate the possibilities of the exanimate person (Employee);
- to guide and correct the educational process, provided by the Lecturer and the Tutor;
- to estimate the adequacy of the received possibilities in given learning cycle to the requirements of the Employer, which usually come to Examiner via Consultant,

the major tasks of the Researcher and Developer are:

- to investigate pointed Examiner's activities;
- to build theirs appropriate information models;
- to develop correspond tools for information servicing of these activities.

A – A

As a rule the single Administrator could not support and serve all information activities in the global net. Because of this he needs of participation of other Administrators in his concrete information service activity.

The Administrators of the Knowledge Market are the part of the global administrators' society for the information service and support of the business and social activities.

A – R&D

Every Administrator became as a source of information for building the Knowledge Market Administrator abstract information model by the Researchers and Developers.

The Administrator is the integrating component that is always in connection with all participants in the Knowledge Market. Because of this, he is valued helper of the Researchers' and Developers' work for investigation and modelling the components and communication processes between them.

In other hand, the implementation of the results of the Researchers' and Developers' work closely depends on Administrator's activity.

R&D – R&D

As a rule the single Researcher could not support and serve all investigation activities in the global net. Because of this, he needs of participation of other Researchers in his concrete scientific work. The same is true for Developers. So, the Researchers and Developers of the Knowledge Market need to be part of the global society of Researchers and Developers.

Special interest for us is the interaction between Researchers and Developers.

As it is remarked above, the Developers are obligated to implement new scientific knowledge for advance of the Knowledge Market information service and to abide by the scientific rules and recommendations.

Contrariwise, the Researchers need to interact with the Developers for collecting knowledge for implementation of the scientific results and theirs possibilities as well as for the new and not investigated areas of the Knowledge Market information interaction and service. Such way the Researchers may extend theirs knowledge and generate new scientific results to be implemented in the practice. So, the cycle "practice – science – practice – etc." may be complete.

Conclusion

In this paper the interconnections and information interactions between main members of the Knowledge Market have been presented. The discussion has been based on the direct interconnections between Knowledge Markets' participants. It is clear that there exist many indirect relations and influences which need to be investigated.

The Knowledge Markets are social phenomenon and, because of this, one very important task, not included in this paper, is the investigation of the relations of Knowledge Markets and other social formations. At the first place, it is obligatory for the government organizations to regulate and control the functionality of the Knowledge Markets.

Till now there not exist special lows and other normative documents aimed to regulate the interactions at the Knowledge Markets. Our expectations are turned to future research just in this area.

At the end we need to point one crucial direction for future research work. The new kind of human interconnections at the Knowledge Markets requires new pedagogical approaches. We are at the beginning of new kind of knowledge exchange based on the market principles and regulated by market lows. Many beginners will be embarrassed by the unknown environment and this may cause great social problems. The payable electronic way for exchanging the knowledge information objects will throw aside the destitute groups of people as well as nations of the world.

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7.2. Information Theories

ЦЕННОСТЬ ИНФОРМАЦИИ

Андрей Данилов

***Аннотация**: В этой статье обсуждается один из важнейших вопросов теории информации и практики ее применения, а именно, какова ценность информации и как ее можно оценить?*

***Ключевые слова**: ценность информации; количественная оценка информации; критичность информации.*

Введение

Известно, что с определенной точки зрения феномена информации, которая возникает в интеллектуальном и неинтеллектуальном мире, ее можно классифицировать как **контекстно-независимую и контекстно-зависимую.** При этом **неинтеллектуальному** миру принадлежит только контекстно-независимая информация, а **интеллектуальному** миру – контекстно-независимая и контекстно-зависимая информация.

В этой статье будет обсуждаться один из важнейших вопросов теории информации и практики ее применения, а именно, какова ценность информации и как ее можно оценить?

Понятно, что этот вопрос важен не только для экономики предприятия, организации, государства и т.д., но и для решения задачи зашиты информации.

Рассмотрим, а какой фундаментальный смысл скрывается под термином **ценность информации**?

В работе ”Синергетика и информация” [1] Д. С. Чернавский приводит следующее определение, которое объясняет смысл термина ценность информации.

*«Ценность информации зависит **от цели**, которую преследует **рецептор**. Чем в большей мере информация помогает достижению цели, тем более ценной она считается.»*

В этом определении есть два важных ключевых слова **рецептор -** получатель или приемник информации и **цель,** которую хочет реализовать рецептор с помощью полученной информации.

На основе использования объяснения термина ценность информации проведем анализ ценности информации для **неинтеллектуального** получателя информации. Ранее мы обсуждали основные отличия интеллектуального и неинтеллектуального объекта, из которых следует, что неинтеллектуальный объект **не может** сам поставить перед собой задачу и искать ее решение. Если приемник информации не может поставить для себя цели, то и информация, которую он получает, никак не может влиять на постановку или достижение какой либо цели.

Следовательно, для неинтеллектуального мира понятие ценность информации **отсутствует** и это важно для понимания смыслового значения термина «ценность информации»**.**

Покажем это на довольно простом примере. Представим себе, что необходимо определить, на сколько ценна информация, полученная с помощью поисковой системы в информационных ресурсах Интернет, непосредственно **для самой** поисковой системы. Ответ довольно очевиден - ценность информации **отсутствует.**

Процессы, в которых участвует интеллектуальный получатель информации

Ранее мы определили и показали, что интеллектуальному миру принадлежит как контекстно-зависимая, так и контекстно-независимая информация. Чтобы понять, чем определяется ценность информации для **интеллектуального получателя**, например, для Человека, рассмотрим, а какие основные процессы происходят при этом?

К таким процессам, в которых участвует интеллектуальный получатель информации, целесообразно отнести следующие:

1. **Определение или постановка цели**, которую хочет реализовать интеллектуальный получатель (приемник) информации.
2. **Получение информации** интеллектуальным приемником.
3. **Преобразование** интеллектуальным приемником **смысла**, заключенного в полученной информации, в свои **знания** на основе использования собственных интеллектуальных возможностей (процесс получения знаний).
4. **Аналитическая оценка** возможности применения полученных **знаний** для достижения поставленной **цели** на основе использования интеллектуальных возможностей и ранее полученных знаний интеллектуальным приемником**.**
5. **Принятие решения** об использовании или не использовании, полученных знаний для достижения поставленной **цели**:
   - если принято решение об не использовании, полученных знаний для достижения поставленной **цели,** то полученная информация для этого интеллектуального приемника **не имеет ценности** с точки его зрения достижения поставленной **цели;**
   - если принято решение об использовании, полученных знаний для достижения поставленной **цели,** то
6. **Осуществление действий** по достижению поставленной **цели** на основе использования интеллектуальных возможностей и ранее полученных знаний интеллектуальным приемником**.**
7. **Оценка результатов** достижения поставленной **цели** на основе использования определенных критериев, которые удовлетворяют интеллектуального получателя информации:
   - если **оценка** результатов, по достижению поставленной цели, **удовлетворяет** интеллектуального получателя информации, то эта информация обладала определенной **положительной** ценностью для решения этой **задачи.**
   - если оценка результатов, по достижению поставленной цели, **не удовлетворяет** интеллектуального получателя информации, то эта информация также обладала определенной ценностью для решения этой задачи, но эта ценность может оказаться даже **отрицательной.**

Субъективность процесса определения ценности информации

Если посмотреть, как происходит процесс определения ценности информации интеллектуальным приемником для достижения поставленной цели, то становится понятно, что этот процесс всегда **субъективный**.

Субъективность этого процесса определяется:

- **индивидуальной способностью** интеллектуального приемника получить знания из поступившей информации;
- **индивидуальной способностью** интеллектуального приемника провести анализ, полученных знаний, для принятия решения об их использовании или не использовании для достижения поставленной цели;
- **индивидуальной способностью** интеллектуального приемника реализовать поставленную цель на основе использования знаний, полученных из поступившей информации.

Кроме этого, необходимо отметить, что если информация, полученная интеллектуальным приемником из внешнего мира, **всегда** является **контекстно-независимой**, то знания, полученные этим интеллектуальным приемником из поступившей информации и результаты проведения анализа возможности их использования для достижения поставленной цели, **всегда** являются **контекстно-зависимой** информацией.

Таким образом, становится понятно, что **собственная** контекстно-зависимая обработка поступившей информации интеллектуальным приемником является **первым этапом** оценки ее ценности для достижения поставленной цели. Результатом этого этапа является принципиально важное решение, а именно, принятие интеллектуальным приемником решения о **потенциальной целесообразности** использования или не использования полученных знаний из поступившей информации. При этом первый этап **принципиально** включает два процесса:

- получение интеллектуальным приемником **знаний** из поступившей информации;
- принятие интеллектуальным приемником **решения** о потенциальной целесообразности использования или не использования полученных знаний для достижения поставленной цели.

Из анализа **первого этапа** оценки интеллектуальным приемником ценности поступившей информации для достижения поставленной цели следует, что эта информация ценна только тем, что из нее **потенциально** можно получить знания и **не более.** В этом и заключается самое важное свойство контекстно-независимой информации для интеллектуального приемника. Это свойство и является **ее ценностью**, которую можно определить, как **безусловная ценность** информации, и никакой **другой** ценности для интеллектуального приемника в этой информации принципиально **нет**.

Этот вывод нам очень важен, так как на его основе становится понятно, что:

«Только знания и возможность их использования могут иметь ценность для реализации, поставленной цели»

Второй этап оценки ценности поступившей информации непосредственно связан **с реализацией** полученных знаний из этой информации **для достижения** поставленной цели интеллектуальным приемником информации. На этом этапе уже непосредственной ценностью обладают **знания**, полученные из поступившей информации, ранее полученные **знания**, а также **способности** и **возможности** интеллектуального приемника реализовать поставленную цель на их основе.

Таким образом, становится понятно, что знания, полученные из поступившей информации, сами по себе **могут и не иметь ценность**, если интеллектуальный приемник не имеет способностей, знаний и других возможностей для их дальнейшего использования при реализации поставленной цели. Следовательно, ранее полученные знания и интеллектуальные способности являются **фундаментальной базой** для использования знаний, полученных из поступившей информации.

Этот вывод является **весьма важным**, так как он показывает, что при определенных условиях **знания**, полученные интеллектуальным приемником из поступившей информации, **не могут иметь ценность** для реализации, поставленной цели.

Такая ситуация довольно часто встречается в информационно-аналитических центрах предприятий. Например, если аналитик имеет знания, которые могут быть им реализованы для подготовки управляющих решений, но он не имеет соответствующего программного обеспечения для этой реализации, то такие **знания** в этих условиях **не обладают** ценностью.

Следовательно, на ценность знаний влияют **условия их применимости** для достижения поставленной цели. При этом эти условия могут быть как внешними по отношению к интеллектуальному приемнику, так и внутренними. Например, к внутренним условиям применимости знаний для достижения определенной цели можно отнести болезнь человека или его сон и т.д.

Мы рассмотрели только основные процессы, которые возникают при определении ценности информации, поступившей интеллектуальному приемнику. Но одну и туже информацию могут получить несколько интеллектуальных приемников и в одно время. При этом у этих интеллектуальных приемников могут быть как одинаковые, так и разные цели. Но ценность полученной информации всегда будет **индивидуальна** для каждого интеллектуального приемника информации. Это можно объяснить простым примером. В мире каждый человек индивидуален и имеет свою шкалу ценности информации при реализации, поставленной цели. Однако основные процессы, которые возникают при определении ценности информации и, которые мы описали, имеют место для любого интеллектуального приемника и их объединений.

Способы определения количественной оценки информации

Обсудим следующую важную задачу, а можно ли дать количественную оценку **ценности информации**?

В настоящее время известны несколько способов количественного определения ценности информации. Все они основаны на представлении о цели, достижению которой способствует полученная информация. Чем в большей мере информация помогает достижению цели, тем **более ценной** она считается [1].

Если провести анализ процессов, возникающих при определении ценности информации, то можно выделить следующую триаду, которая в наиболее общем виде отражает эти процессы:

"(информация) – (индивидуальные знания и способности, внешние и внутренние условия) – (цель)".

Эта триада нам поможет системно подойти к вопросу количественного определения ценности информации, так как от момента получения интеллектуальным приемником информации до момента ее использования или не использования для достижения поставленной цели необходимо реализовать определенную цепочку интеллектуальных шагов.

1. Затратный способ определения ценности информации (предложен Р.Л.Стратоновичем [2])

Основной принцип этого способа состоит в следующем. Если известно, что цель наверняка может быть достигнута и притом несколькими путями, то возможно определение ценности информации **V** , например, по уменьшению материальных или временных затрат, благодаря **использованию информации.**

$$V = \min [(\$n), (Tm)] \quad n \geq 2,\ m \geq 2 \tag{1}$$

где **V-** количественная мера ценности информации, например, в денежном измерении -**$** или временном измерении **-T**; **n –** возможное число путей решений задачи по минимизации материальных затрат; **m-** возможное число путей решений задачи по минимизации временных затрат.

При этом предполагается, что временные или материальные затраты, которые возникают при получении знаний из поступившей информации **существенно** ниже получаемого эффекта от их использования. Но мы понимаем, что **безусловная** ценность структурированной информации заключается только в том, что она может быть использована для получения **знаний**.

Если учитывать материальные или временные затраты, возникающие при получении знаний из поступившей информации, то выражение (1) примет следующий вид

$$V = \max [(\$n), (Tm)] - \min [(\$n), (Tm)] - [(\$к), (Tк)] \quad n \geq 2,\ m \geq 2 \tag{2}$$

где **$к, Тк –** соответственно материальные и временные затраты, возникшие при получении знаний из поступившей информации.

Такую задачу по минимизации затрат для достижения поставленной цели на основе использования информации практически ежедневно решает каждый взрослый человек при покупке продуктов. Эта же задача является одной из важнейших при управлении предприятием или организацией. Поэтому аналитики и руководители предприятий особое внимание уделяют поиску информации, которая может позволить решить эту задачу с наименьшими затратами и наилучшим способом.

2.Вероятностный способ определения ценности информации

Необходимо заметить, что вероятностные способы количественной оценки ценности информации хороши только в том случае, если известны численные значения вероятности, в противном случае их практическое использование не имеет смысла и нужно применять другие способы, например, экспертные оценки.

Вероятностный способ определения меры ценности информации для достижения цели, предложенный М.М.Бонгартом [3] и А.А.Харкевичем [4] можно сформулировать следующим образом. Если достижение цели вероятно и известно значение этой вероятности до получения информации, а также после получения информации, то меру ценности информации можно определить следующим образом.

$$V = \log2 (P/p), \quad (3)$$

где **V-** мера ценности информации; **p** - вероятность достижения цели до получения информации; **P** - вероятность достижения цели после получения информации.

Представим себе, что до получения информации вероятность достижения цели **p** = 0 и после получения информации вероятность достижения цели **P** = 0. Если эти значения вероятностей подставить в выражение **(**3), то легко заметить, что возникает неопределенность (0/0), которую необходимо разрешать. Однако мы и так понимаем, что ценность полученной информации для достижения цели нулевая.

В.И.Корогодиным [5] было предложено следующее выражение для оценки меры ценности информации, если достижение цели вероятно и известно значение этой вероятности до и после получения информации

$$V = (P-p) / (1-p) \quad (4)$$

Если провести анализ этого выражения, то становится понятно, что оно также имеет определенный недостаток. В этом легко убедится, если представить себе, что **P = p.**

Однако все эти недостатки выражений (4 и 3) не носят принципиального характера. На наш взгляд есть более важные моменты при определении ценности информации, а именно **субъективность** оценки.

Это легко представить, так как для одного человека полученная информация может оказаться более ценной, чем для другого, даже если они хотят достигнуть одну цель. В этом проявляется индивидуальность любого человека, которую мы учли во втором элементе триады **"(информация) – (индивидуальные знания и способности, внешние и внутренние условия) – (цель)".** Ранее мы обсуждали, что эта триада определенным образом отражает процессы, которые существуют при использовании или не использовании информации для достижения цели.

Таким образом, становится понятно, что ценность информации всегда связана с ее **конкретным** получателем и с **конкретной** целью, которую он хочет реализовать. Поэтому ценность одной и той же информации **варьиротивна** по отношению к ее потребителю и этот **принципиально**. В результате нашего анализа мы пришли к выводу, что контекстно-независимая информация обладает следующими свойствами:

- **Безусловной ценностью** по отношению к **знанию**, так как она является источником получения определенного знания интеллектуальным или интеллектуальными приемниками. Поэтому безусловная ценность информации принципиально **не может иметь** количественной оценки.
- **Варьиротивной ценностью** по отношению к интеллектуальному приемнику**,** которая субъективна и может изменятся в любых пределах **количественного измерения** в зависимости от индивидуальных знаний, интеллектуальных и других способностей, внешних и внутренних условий интеллектуального приемника, а также во времени и в пространстве.

Важность этих результатов анализа заключается в том, что если даже сделать техническое устройство для измерения ценности одной и той же информации, которое подстраивается под **индивидуальные характеристики** ее получателя, то в зависимости от внешних и внутренних факторов действующих на получателя информации во времени и пространстве, результат оценки **будет разным**.

Однако это не означает, что ценность информации нельзя измерять количественно. Например, ценность информации может выражаться для потребителя в денежном эквиваленте, величина которого может формироваться рынком создания и потребления информации. Этот механизм работает весьма эффективно, и на его основе существуют целые отрасли создания и потребления информации (телевидение, печать, Интернет, ноу-хау и т.д.).

Критичность информации

Рассмотрим еще один аспект ценности информации, а именно **критичность информации**, т.е. термин, который часто используют руководители предприятий и организаций в определенной ситуации. В термине критичность информации присутствует определенное важное пороговое значение для принятия **решения** или для достижения **цели** ее **получателем**. Можно часто услышать следующую фразу, *что подтверждение достоверности этой информации нам весьма критично для принятия решения*.

Смысл этой фразы означает, что если получателю **важно** иметь определенную достоверную информацию в определенное время, в определенном месте, в определенных условиях для принятия решения или для достижения определенной цели, то такую информацию называют **критичной.**

Таким образом, критичность информации также является **субъективной** оценкой по отношению к ее получателям, т.е. одному получателю она может быть весьма важна, а для другого получателя она может означать информационный мусор. Поэтому ее величина ценности весьма индивидуальна. Этот вывод подтверждает то, что значение ценности любой информации **вариативно** по отношению к ее интеллектуальному приемнику.

Заключение

В настоящее время, во многих организациях и на предприятиях широко применяются информационные технологии, созданы корпоративные сети передачи и приема информации, базы и хранилища информации. По существу на этих предприятиях произошли определенные качественные изменения, которые означают, что без этих атрибутов информационных технологий эти предприятия и организации более работать не могут. В результате возникла задача по защите корпоративной информации предприятий и организаций. А какую информацию необходимо наиболее тщательно защищать, какую менее и т.д.?

Этот вопрос непосредственно связан с оценкой ценности корпоративной информации для предприятия или организации. Как мы сейчас понимаем, что эту оценку могут дать **только специалисты предприятия**, которые работают с соответствующей информацией. Но при условии, что они понимают, с какой целью используется или предполагается использовать конкретную информацию и, что произойдет, если эта информация **исчезнет**, **изменится** или будет **доступна конкуренту.**

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THE MAIN QUESTION OF THE INFORMATICS, 100 YEARS AFTER ITS POSEING

Stoyan Poryazov

Extended Abstract:

Paul Otlet (1905) defines term "documentation" (a predecessor of "Information Science" and "Informatics") as activity comprising **1. gathering**; **2. processing** (Handling); **3. storage**; **4. retrieval**; and **5. dissemination** (distribution) of documents. With this he posed the main question of the Informatics - what are the basic information activities?

In the long-term policy of the IFD (1937) documentation is defined as: gathering; storage; **6. classification** and selection; dissemination and **7. usage** of information of all kinds. (In this abstract, we'll numerate the new appearance only of the proposed information activities, in chronological order). Jacson (1954): Documentation is the art of **8. creation**; dissemination; and usage of documents. Mark & Taylor (1956): Documentation is a group of methods for: **9. ordered** presentation; **10. systematisation**; and **11. transmission** of recorded knowledge. Webster (1961): Documentation is gathering **12. coding** and dissemination of recorded knowledge. Thompson (1963) and Taylor (1962): Information Science includes studying of: creation; dissemination; gathering; **13. organization**; storage; retrieval; **14. interpretation**; and usage of information.

From the other hand from lehnkering (2005) we understand that: "The concept of logistics covers all activities relating to the procurement, transport, transhipment and storage of goods. Logistics as generally understood is concerned particularly with material flow (raw materials, interim and final products), but also involves providing companies with services and information". Something more: "Logistics is the art and science of managing and controlling the flow of goods, energy and information" (wikipedia (2005)). What is the difference between Informatics and Logistics? Our answer is:

The only activities, unique for Informatics are: **1. Creation of languages** (including designing of signs' material presentations and denotations); **2. Creation of information** (including creation of messages for observation models' presentation (model coding)); **3. Interpretation of information**; **4. Destroying of Information**. These very old activities are in the early stages of their scientific study in Informatics and mathematics.

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OBJECTS, FUNCTIONS AND SIGNS

Stoyan Poryazov

Extended Abstract:

The problem of sign definition is posed from the Greek Philosopher Plato (427-347 B.C.) and it is not solved yet.

Our approach to sign definition is based on the Black Box paradigm - every material entity is considered as a convertor (function) of the influences to the entity (input) to its reactions (output). We consider the following possible functions of the material objects, in case of their interaction with Subjects (e.g. humans):

1. Utilitarian function. The natural properties of the entity are used directly (e.g. water is used for drinking).
2. Non-information function. The properties of the entity cause change in the emotional state of the human (e.g. beautiful landscape, music) and/or physiological status of the Subject, e.g. mantras, yantras and mandalas.
3. Phenomenological (symptom). One or more values of the properties of the entity (symptom) are used for prediction of values of other properties of the same entity (e.g. one has temperature over 39 degrees by Celsius, consecutively he is ill). The Subject must have knowledge (a model) of dependencies between the values of the symptom and its meaning. No need of conventions with other persons exists, but previous experience or education is mandatory.
4. Modeling function. One or more values of the properties of the (A) entity are used for prediction of values of other properties of the other (B) entity. The Subject is needed of knowledge of the dependencies between the two sets of properties' values, and of a witness that A-entity is a model of the B-entity.
5. Symbolic (e.g. the flag of a country, Red Cross etc.). The symbol usually means belonging of one entity to the organization, idea, political party, etc. Some knowledge of the correspondence is necessary.
6. Sign-model. (e.g. "cuckoo-bird") This is a name that can remember the named entity (a limited modelling function is used). The correspondence between the properties of the sign and its meaning is not mandatory (the concrete cuckoo-bird may be mute).
7. Sign-name. Only a convention is necessary.
8. Sign-code. Sign-code is a sign-name used for denotation of the other sign. Only a convention is necessary.
9. Sign-element. The entity hasn't meaning. Its function is to be used for creation of signs, e.g. a pixel of a computer display.

Conclusions:

- Four types of function of the material entities are enough for characterizing all known usages of the entities:
  1. natural function,
  2. non-information function,
  3. modelling correspondence and
  4. convention correspondence.
- In the case of modelling correspondence a witness is necessary. In the case of convention correspondence, the same convention must be used in creation and interpretation of the signs.
- The carrier of the sign must be a real entity, because ideal entities (e.g. the mathematical objects) can't interact.
- The ideal objects may be (and are) denoted with signs, and their properties are modeled by rules (e.g. axioms in mathematics). Even mathematically non-existing objects may be denoted, e.g. non-empty subsets of the empty set.

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7.3. The Intangible World

APPROACHING THE NOOSPHERE OF INTANGIBLE – ESOTERIC FROM MATERIALISTIC VIEWPOINT

Vitaliy Lozovskiy

***Abstract**: Exploration of intangible world is under the serious influence of esoteric. Mystics, religions, unrestrained use of metaphors, fairy tales, gossips, unverified and uncertified "facts" – all this needs accurate well-disposed, but sound scientific consideration. Our society really needs new ideas, new approaches and new paradigms. Technological civilization becomes more and more complicated, risky and ecologically critical. The current level of AI research cannot guarantee successful solution of societal control and management. Besides, the human being itself practically did not change its mental and psychological abilities for several hundred thousands years. We can lose control over our society and its technology, if we do not change cardinally ourselves. In this text, I tried to approach this problem – the problem of our noosphere from materialistic viewpoint.*

***Keywords**: philosophy, noosphere, esoteric, intangible world, beliefs, soul, God, materialism, idealism, egregors*

"Go there, don't know where, bring that, don't know what…"

Russian fairy tales folklore

"We believe that 2 * 2 = 4. Without this belief we would fail in our everyday calculations. We should be the true believers the whole yearlong. But once a year we ought to stop and think over this issue one more time…"

V.Lozovskiy, Wise Thoughts (unpublished)

Introduction

I was greatly embarrassed when decided at last to step forward with this theme. First, I am a newcomer to the field of esoteric, while this sphere of human activity is philosophized, theorized and practiced from the very beginning of humankind. Yes, the progress of human society started with the first inventions to support physical existence of prehistoric people. But no one society can exist without "ideal" world – semiotic systems which, of course, have material carriers, but whose sense is in representing some knowledge and communicating it between intellectual subjects.

It is very hard to handle existing information fund on esoteric: abundance of paradigms, approaches, term interpretations, metaphoric way of consideration (usually the authors never admit it, but go on in developing their personal viewpoints as if it was scientifically proven truth). Thus, for our current goals the idea to make substantial comparative presentation of this field was abandoned from the very beginning. And, again, it is unusually hard to make specific literature and author reference. I understand that in these circumstances one should leave the hope to pinpoint exact scientific priorities of all researchers in this field, including your obedient servant… Instead, we are aimed at much more important issue – try to find correct estimates of what is going on in our civilization, and how should we together handle all difficult problems, which life evolved around us. As a partial compensation for this liberty in approach, we shall try to give as precise definitions, as we can, for the nontrivial concepts, with which we are going to deal.

Amen!

Knowledge, Civilization, Noosphere, AI, Esoteric and the Future of the Humankind

Speaking about human beings, about society, we cannot bypass the question of human destination, goal, sense of living in this World. Of course, the answer varies among specific individuals, epochs, situations and the fundamental issue of humankind creation – was it done according to Creator's will, or was it completely natural process – including evolution, mutations, natural selection, or even extraterrestrial visitors interference. Looks like we can find the common denominator for all these variations and alternatives. I guess, it is knowledge.

Knowledge is the sound prerogative for any human deeds and actions irrelevantly to the prime cause: material, or ideal (In the beginning was the Word, and the Word was with God, and the Word was God [Bible]). Knowledge is obtained as a result of ***need, boredom, pleasure, curiosity*** and ***chance***. The universal method of obtaining knowledge is ***activity***. Life is activity. The natural frame of activity is ***adequacy***, or ***harmony***.

Of course, we cannot prove this thesis, but one can easily try to fit it over any imaginable situation – is it striving for life, scientific research, creating work of art. In any kind of human activity, we should obtain knowledge. New feelings are also new knowledge. Just imagine that due our inactivity or due completely routine activity one stops to acquire **new knowledge**. At that point life ceases its sense and we prefer to name it ***existence***.

From now, we will use the concept of Creator (God, Lord in Christianity). Even the orthodox materialist should agree, that such concept exists, and until now, science could not prove neither (His? Her? Its?) existence, nor absence. In our argumentation here we shall – not accept – but touch and from time to time refer to this concept. Assume, for the moment, existence of Creator who created World and humans. In all idealistic philosophies and religions, Creator is Omniscient and Almighty. In such case – what could be the reason for material World creation? What could be the sense for creation of humankind? The reader should agree that He created the whole World having no other way for obtaining new knowledge. Such ideal entity as Creator, by definition, could not be interested just in shuffling the matter. So, obtaining knowledge really is the sound candidate for the goal of human existence.

Humans became humans only due the creation of ***society***. Civilization is the product of social activity - communication, interaction of people, creation of crafts, engineering, science, art, religions, traditions. Civilization is the natural cradle for new knowledge creation. It became possible only because each human generation could absorb the knowledge of previous generations and, in its turn, lay its own knowledge strata for future generations to rest upon. Along this reasoning thread, we arrive at the concept of noosphere. It was formulated by V.I.Vernadsky [Vernadsky, 1943] and Père Pierre Teilhard de Chardin [Teilhard, 1947]. My own vision of noosphere in semiotic context could be found in [Lozovskiy, 2003]. The term «noosphere» (Ionian Greek "noos" = mind) is used for integrative designation of physical world realities together with the whole mankind knowledge.

One of the key milestones in the humankind development was when people tried to attack the fundamental concept of knowledge creation and handling. Information technologies (IT) and even artificial intelligence (AI) sprang into existence and were developed to the current level. Before the information age only humans (and, to some extent, higher animals) could generate, process and communicate knowledge. Now it could be done much more efficiently with the help of artificial means.

The stunning progress of IT and AI cannot conceal the problems encountered in this way of technological development of civilization. We encounter difficult problems in every step of knowledge acquisition, formalization, handling in computer systems. One of the main obstacles is a bad ergonomics of artificial systems. Many managers and applied specialists fail in efficient communication with expert systems and remain on primitive level of using technology of paper, pencil, phone, and maybe calculator. From the other side, human intelligence in its entirety and, in general, human performance, remains unreachable for current technical counterparts. We have very weak understanding of human intuition, emotions, flexibility of behavior, methods of handling imprecise, unreliable, incomplete information. The notorious human factor, intrinsic difficulties of management in organizational systems are still beyond the reach of contemporary knowledge engineers.

From the other side, our civilization is inevitably approaching its critical point. We have serious ecological problems, which have definite tendency for deterioration, we more and more depend upon technological world, created by us: the failure in power supply, communication, automated management and control systems can not only block the normal life process, but even lead to catastrophes and tragedies (Chernobyl, for example). This overcomplicated world requires much better level of understanding, interaction and management, than can

provide the human brain of contemporary people. And it is no wonder: human brain and its usage by humans practically did not change during the last hundreds of thousands years.

Of course, we cannot stop, reverse the civilization, return to caves and animal skins clothes – we ought to go on in our development, changing our ways, our mental and psychic abilities, harmonizing our interaction with Nature.

But does our brain, perceptional and psychic abilities work at their threshold? Neurophysiologists say that usually human brain works within the range of 3-6% of its potential. This phenomenon is not coincidental. It means that our life conditions until now did not stimulate its growth.

Everyone can name maybe several encounters in his/her life with persons demonstrating outstanding abilities – physical, mental, psychic. One elderly woman under the affect brought out of fire her huge trunk, which later could not lift four strong men. There are people who developed their memory to fantastic level – they memorize heaps of numbers, perform complicated calculations in mind. Some behave very soundly and efficiently under the stress situations, when others just got paralyzed. All these phenomena, though rare and frequently requiring tedious and systematic everyday training – do not seem to us marvelous: we understand, in principle, how these results could be achieved, and can give scientific explanation concerning their mechanisms.

Besides above mentioned phenomena, which can be explained by “materialistic” science, from ancient times we obtain evidences of something supernatural taking place – clairvoyance, foretelling, telepathy, telekinesis, levitation, nontraditional healing, bio-field, UFO, communication with Higher Intelligence, - all what is known as esoteric, or mystics. The number of books on this theme is overwhelming – it is hard to mark out the most fundamental ones – one usually adheres to some or other school according to personal taste or belief.

There are some specific problems with esoteric… First, “official science" calls it “pseudoscience”. Phenomena, pretending to be esoteric, rarely become objects of scientific investigation. In its turn, the number of esoteric paradigms is astonishing. As a rule, esoteric authors freely and without restraint use metaphoric presentation of their subject tacitly convincing the reader to buy it without any doubts. Personal and religious beliefs in this sphere play essential role. And again – authors usually avoid modest remarks of the type: “It seems to” or “I believe, that…”, so that the reader is left to his/her own judgment concerning the objectivity status of specific presentation.

My idea is that time is ripe for humankind to approach esoteric from the positions of scientific method. AI professionals should be among the researches in this field. And that is why. First, we should acknowledge the fact, that the modern technological society is approaching the crucial barrier of complexity, beyond which we can lose control over the civilization, we created. Our current understanding of noosphere structure, content and behavior may present only the tip of the iceberg and should be critically reconsidered. Even if majority of esoteric evidences will occur false, their remaining part may add substantially to our philosophy and practice. AIers are proficient in knowledge engineering and simulation of human behavior. Acquaintance with world of unconscious and other esoteric themes could enhance understanding of human mental and psychological characteristics and, as a result, lead to automation systems creation, which will be better adapted to the challenges of our growing and maturing society. In such research, we can expect several byproducts, for example, refining our philosophical background – handling this subtle border between material and ideal hypostases.

The proposed approach to esoteric requires refinement and elaboration of our basic definitions. Without such bureaucratic stage, we cannot attack such complicated humanitarian polyparadigmatic area.

Materialism and Idealism

Traditional approach to these paradigms is symmetric and frequently vulgar. They say that materialism does not accept in the world anything but substance and energy. Earthy materialists do not believe in good and evil, they deny the existence of soul, ethics, do not believe in God. They see only material interactions in the world and deny the existence of any higher will, intelligence governing the Universe. Contrarily to that, idealism is supposed to put forward “ideas” – abstract concepts, goals according to which sprang into existence, function and changes the physical world. That is why idealism is inevitably tied hard with the concept of God, Creator, whose goals and orders rule the Universe. Traditionally, consistent materialistic and idealistic paradigms are considered equally sound; i.e. one can adhere to any one of them, and do not be afraid of criticism from the opposite camp.

My argument is - that idealistic paradigm is weaker than materialistic one due the lack of experimental evidences. It is the routine approach to natural science theories: they all should be supported by practice. Speaking about

concepts, paradigms, ideas, language, phrases, plans, intentions, emotions, etc, we should inevitably postulate existence of the following components necessary for the success of communication act:

- subject generating and issuing these "ideal" assets (source of information);
- subject receiving, understanding and perceiving these information (reception of information);
- material data medium used for transmission and/or storage of information.

Both communicants should be intelligent enough, belong, at least, to the similar cultures, have common communication language, be involved in some common goal oriented activity – otherwise such communication act will fail. The state or activity of receiving subject should change somehow because of the communication being considered.

All three communication components are really indispensable. Thus, "information" cannot exist without some material substrate – media, bearing this information. So, material data medium should first be created, and only then, it could be used for handling "ideal" (information) entities. One of the main characteristics of an ideal entity is its semioticity.

From this trivial argumentation, one can infer the following significant corollaries.

1. The ideal entity creation should be preceded with obtaining the material bearer good for generation, storing or transmission of this ideal entity. Thus, the issue of priority is solved in the favor of matter.
2. Communication of ideal entities – information – is possible only between intellectual beings belonging to the same culture and of comparable intellectual level. So, it is impossible and senseless to give orders to inanimate objects, they cannot perceive and understand information.
3. Ideal entities exist in reality, but only within certain cultural world [Lozovskiy, 2003] and have sense and meaning only within this world – intellectual beings inhabiting it.

I feel that this is correct materialistic approach to the Nature, and one can rely upon it in the following investigations. As was shown above, our world, being materialistic in form, has means for representing ideal entities - information. One more remark here – concerning the origin of Universe, Solar system and human race. Here we, of course, cannot answer the question – whether our world is the result of natural physical and physiological processes and evolution, or it was the result of Creator's activity, or interference of some extraterrestrial civilization. All we can proclaim – it is the result of material processes.

Materialistic Approach to Exploration of Intangible World

Cognition of the World is the endless process. The whole Universe at each given moment of time can be divided into two subworlds: Tangible and Intangible.

Tangible World – is the part of the Universe, of which we are aware and have some positive knowledge about it. Adequateness of the paradigms used, theories created (and verified), their experimental confirmation varies within the broad range, though. From time to time this knowledge is changed to reflect better the new facts; sometimes old paradigms are replaced by the new ones within the course of scientific and technological revolutions. Knowledge (and folklore) about Tangible World as the part of cultural World [Lozovskiy, 2003] determine the current scope and state of the Tangible Noosphere.

Intangible World – is the collective term for all Unknown part of the Universe, of which we are unaware and have no rational verified knowledge.

Of course, this classification is fuzzy and provisional; there is no clear cut border between these worlds. In the course of scientific progress human cognition attacks, tries to explore the Intangible World gradually moving its fragments to Tangible one. The main obstacles on this road are fallacies, misbeliefs, fantasies which cannot be laid in the basement of natural science theories and usually become the part of human cultural World (fairy tales, religious beliefs, superstitions). If our destination really is to gain new knowledge, as we argued in the beginning of this communication, we ought to permanently attack the World of Intangible. But how? This situation reminds the classic one from the Russian fairy tales: go there, don't know where, bring that, don't know what… Of course, we ought to be armed with the technological approach, for example, new instruments for measuring radiation while exploring new areas of the Universe, but the most subtle and mysterious areas are tied with humans themselves, their inner world and relationship with Nature environment. By the way, the basic goal of

AI researches is to better understand "ideal" processes in human mind and psychics, try to simulate them and create better instruments to help humans solve their most important problems.

Frequently information about Intangible World researcher obtains from other humans in the form of their personal unusual experience or from witnesses of some extraordinary phenomena. These evidences, as a rule, have very troublesome features:

- extremely high level of dependence on specific person, their physical, mental and psychic state, character type, suggestibility, religiosity, innate features and personal training;
- high dependency on environment conditions: season, time of the day, weather, influence (usually interfering) and even silent disbelief or skepticism of listeners;
- aforementioned peculiarities frequently result in a bad recurrence of phenomena under investigation.

Esoteric is a very intriguing potential wonderland, which in my opinion quite deserve exploration, and that is why:

- it has a long history – thousands of years; esoteric beliefs accompanied human race from the very beginning of the history, have not vanished, but broaden and flourish;
- many outstanding persons were studying and practicing esoteric mysteries, and there is abundance of literature on this subject;
- there are a lot of esoteric schools, societies and communities – one can easily find one in one's own town – according to the taste and interests;
- esoteric is full of extremely rich promises, which are quite tempting and badly needed in contemporary human society in order to better correspond to requirements of our life, society, civilization – better physical, psychical and mental health, better control over own organism – even over its organs and subsystems, diagnostics and healing the diseases, which are caused by functional disorders or improper influence of the nerve system, mastering subconscious processes, development of extrasensory perception abilities and potential nontraditional ways of interpersonal communication and interaction.

Unbiased consideration of esoteric doctrines produces ambivalent impression. The lack of sound scientific theory and reliably confirmed facts positioned esoteric from viewpoint of Academy in the domain of pseudoscience. Situation is aggravated by very strong positions, which are held in many esoteric teachings by religions and mysticism. The time has come to investigate this problem using sound scientific method. Of course, the whole issue is exceedingly complicated, and here we will try, at most, approach it shyly not loosing solid ground beneath our feet.

So, the key source of information in esoteric is human evidence.

Evidences of Level 0. These are evidences of "folklore" character. Researcher obtains oblique information from unknown, unavailable or unreachable source: somebody had said something – no details, confirmations, trust. Most evidences unfortunately belong to this category and can be dismissed with light heart. This information probably deserves only to be put into protocol as possible hint for future, if it comes sometimes to relevant issues.

Evidences of Level 1. This sort of evidences is obtained directly from trustworthy subjects on the base of their personal experience, or experience of their close friends or relatives, from direct witnesses or participants in some action. Such evidences deserve the close examination. Their valuable feature is that it becomes possible to recur to the sources requiring detailed, probably documented and/or confirmed information; in the future it is possible to return to the issue under consideration, if new questions arise or new circumstances come to light or require clarification.

Sometimes, we may obtain distorted information, if the author of the evidence was in changed mind state: under hypnotic suggestion or in meditation. The serious problem within this Level 1 is that these evidences to high degree can be subjective.

Evidences of Level 2. Here we deal with the evidences obtained by researcher himself in the course of experiment or as a witness of some action or observation of natural phenomenon. In this case, it is possible not only to create a protocol of the experiment, but also actively participate in it on the stage of planning, execution and discussion of the results. Sometimes it becomes instructive to change the course of experiment "on line". The main objective in this situation is to discern the true nature phenomenon from the magician's tricks. Of course, the researcher should be exceedingly aware, if the experiment requires changing his/her own mind state. One should exclude chances of being drawn to such states unconsciously. Sometimes, the presence of qualified psychiatrist, whose task should be checking mind state of the participants, is required.

Evidences of Level 3. To this class belong evidences obtained as a result of personal training of the researcher (increasing sensitivity, developing extrasensory perception, special breathing techniques, experiments with changed mind states, meditation, perception of aura, biofield, etc.). Of course, it is the most complicated and time-consuming approach. Besides, it relies on the belief that extrasensorial abilities are not only inherited, but also can be trained by any dedicated person. Results, which could be obtained on this level by researcher stem, in greater part, from his/her introspection.

There are two main problems with esoteric. Firstly, these phenomena are closely related with brain activity on conscious and subconscious levels. And, secondly, we are lacking understanding sound physical backgrounds of these phenomena and, consequently, - instruments for obtaining objective measurements. It would be a pity to rest this domain to magicians, religious figures, naive people and businessmen. Such is the motivation of the current research.

Esoteric and its Strata

The whole domain of esoteric could be seen as consisting of four strata.

Stratum 1 - Personal (self-control and autosuggestion). Human organism is extremely complicated system. Our orthodox sciences (medicine, neurophysiology, biochemistry, psychology, psychiatry et al.) have until now very superficial understanding of life even on the level of distinct organs, phenomena and subsystems. When we get to the depths – the cell level, and, even more, if we are interested in integrated functioning of an organism, in gestalt effects, - our sciences really fail.

One of the big white spots is human ***subconsciousness***. Neurophysiologists fail to explain its main mechanisms. They say nothing about interfering with them. On the layman level, we understand, that subconscious work, from one side, as buffer, or long term memory, where are stored much greater volumes of data, past impressions, than we are aware, relying on our conscious sphere. It is well known fact that under hypnosis patient can recollect even events of his childhood or reconstruct forgotten relations between some events. The scope of subconscious memory is suspected to include probably genetic information – memory of generations. It could explain reminiscences of some humans about their previous incarnations.

Subconscious human sphere is not only memory – looks like it can process information in nontrivial way, finding correlations, rational solutions, of which people are completely unaware being awake. Psychologists call this phenomenon insight – as if solution comes from nowhere; but this could be the effect of processing data subconsciously and then just transferring it to daytime memory. The power and potential resources of subconscious memory exceed 90% of human brain. People from esoteric [Zykova] say, that we ought only to present our problems to our subconscious sphere, and solution found will be much better, than we would obtain "thinking" over them in ordinary way. Special methods exist which open the door to our subconscious processor: trances, meditations, which help us to lower our beta rhythm of vigil brain activity (15 - 30 and more Hz) down to alpha (7.5 – 13 Hz), teta (5 – 7 Hz) or even delta (0.5 – 4 Hz). Hypnosis, auto-training and meditation usually require subject to be brought, at least, to alpha rhythm. In this state various suggestions could be done, getting rid from negative habits and stress, solving different problems.

Human ***nerve system*** is the control system for the whole organism. We all know the saying: "All deceases are from nerves". Evolution adapted us to the current life condition, our technological civilization, primitive medicine with its strong impact on separate organs, or just illness ("from cold", "from stomach", "from any pain"…). It led us to the status, where we lost control over our own body. We can discern several aspects of nerve system functioning.

- General psychic personality type and the current nerve system state. Sanguine, melancholic, phlegmatic, choleric character types; optimists and pessimists; gloomy, cheerful, shy types. All these not only determine one's current psychic state: it has a strong influence on physical state of the organism. Psychical and physical spheres tend to be in harmony: in sound body – sound spirit and vice versa.
- Distal nerve and microcapillary systems work together near the border of the organism being sort of interface between it and environment. Ancient oriental medicine brought to us the theory of meridians and tsubo – small sensitive zones on the body surface [Serigawa]. According to oriental teaching, these zones "represent" internal organs, reflect their state and, from the other side, can be used to influence, correct the state of these organs.

- Nerve system direct control over organs and functional systems of the body. Contemporary humans, in general, lost this ability – it was obsolete due achievements of our technological civilization. However, looks like it did not vanish forever, but is now in the passive state. With the help of special training, we can control our heart, blood pressure, pulse, functioning of liver, kidney and other organs. Good news is that all these effects could be achieved not only by yogis or humans with inherent abilities – everyone can achieve results on this path, but, of course, results will differ. Really, a great artist can create masterpiece, but everyone can be taught to draw a house, a tree and a dog under it…

Extrasensorial perception is the ability for humans to perceive outer world information much more efficiently, than majority of people. It can be attributed to four sources.

- Heightened sensorial sensitivity.
- Broader frequency band.
- Using some "unusual" or yet unknown fields, energies, radiations: magnetic, electromagnetic, electrostatic fields, biofield.
- Perceptions of gestalt type, sometimes, named hypersensory (HSP), or intuition. A person with HSP is very observant and perceptive. They may be adept at reading body language or simply be more attentive to details than most people picking up subtle behavioral cues unconsciously, cues that are also unconsciously given. Strictly speaking, we deal here not with just perception, but with complicated process of general combined analysis of several stimuli on the basis of pattern recognition. For example, qualified and experienced physician can diagnose many organic disorders on the fly. Sometimes, he cannot even explain, how it is done – he simply feels, or it appears to him so. It means that these processes to the great degree are done subconsciously.

Nutrition and breath. These factors are exceedingly important not only for physical human body – it is self-evident. There are evidences, that breath do not only brings oxygen to the blood, but plays exceedingly important role in energetic processes in the organism and when interacting with environment, or even, Universe. This issue should be thoroughly studied by science.

Drawing a conclusion, we can state, that this personal stratum is materialistic foundation of esoteric and should be thoroughly studied, practiced and be developed further.

Stratum 2 – Bioenergetics. The issue of "bioenergetics" can be approached from different viewpoints. From physical point of view, each living organism radiates several types of energy: heat, acoustic waves, magnetic, electrostatic field and electromagnetic waves in rather broad frequency range. Correspondingly, these fields somehow influence the organism – on subconscious or biological level. Intensity of radiation is very low and drastically falls with distance. In esoteric it is postulated that there probably exists quite different type of energy – bioenergy, which is emanating from living organisms and form specific biofield around them. Sometimes, they speak about biofields of inorganic objects. The main problem with biofield is that until now we have no reliable physical methods and/or devices for measuring it. Even worse – there is no assurance, that biofield is really field – it may be bioplasma, or some other, maybe yet unknown fine material substance or radiation. Very queer circumstance is that these biofields can usually be detected and "measured" only by humans having specific sensitivity to them. Though, there exist methods pretending of making color photographs of aura – biofield around human body.

One of the most fascinating esoteric theories is the teaching about human chacras, auras and of the whole energetic system of the human organism, which support its functioning and play the role of interface gates between the organism and the rest of the Universe. Though these theories lack rigorous scientific confirmation, practically, one can develop personal sensitivity to the level, where some emanation from human body, or from other objects could be felt [for example, Bronnikov, 2005]. I have got training in Bronnikov's First Stage, starting from the zero sensitivity to biofield, and can present my subjective feelings and impression concerning my achievements. Really, after 10-days course and several months of training, I can feel "something" between my hands when I move them one towards another. This feeling in the palms is a mixture of elasticity – like soft children's air balloon, pricking, some heat, cold or rippling. At this stage, one can say, that, as there are no ***objective*** indications (measured with some physical device), - probably, it is psychological effect, suggestion, produced with neurons in my own brain, or between brain hemispheres. But things become more complicated when I feel the fields of other people, trees and even inorganic objects. Several successful sessions were carried, during which patient's headache, cramps and shoulder neuralgia were cured. The specific method used was of

Reiki type [Reiki, 2004] and procedures known as non-contact massage. Practice here evidently goes ahead of theory, but such nontrivial phenomena should not be just ignored due the lack of sound explanations.

Even more spectacular phenomenon in this bioenergetics stratum could have been the direct effects of bioenergy, for example, telekinesis. All I have in this vein now – evidences of the zero level – as majority of us.

Stratum 3 – Bioinformatics. Here we speak about "nontraditional" information transfer between humans, i.e. such information interaction, which cannot be attributed to optical, acoustical, electromagnetic methods of information communication. The most typical example of such phenomenon is telepathy. No sound, non-equivocal, reliable and repeatable confirmations of telepathy are present up to this day. Though, parapsychologists would argue that such evidences do exist. The time is high to solve this issue on the sound basis. Either yes/no experiment conducted rigorously with participants from the natural sciences will be held, or this problem will remain on fiction level for indefinite time ahead.

Stratum 4 - General noosphere. Absolute. This stratum is fundamental from philosophical viewpoint. In [Lozovskiy, 2003] I argued in the favour of cultural layer of the Earth's noosphere, which includes all knowledge of humankind in any form or domain – from science and religions to folklore and national habits. Esoteric goes much further insisting that "knowledge" per se does exist around us, and the sources of this knowledge are many, including non-biological objects on Earth, other galaxies and extraterrestrial civilisations. This general worldwide database, according to esoteric, not only keeps information about the past, but also about the future. At this point we should be prepared to accept the idea that such knowledge base is equivalent to the conception of Absolute, God, Creator, Higher Powers and so on. All people, according to this hypothesis, participate in creation of this database. Even the people, who have gone – their souls – can remain in this fine matter World.

In esoteric we can find even the exotic idea that human memory and even thought process are located not in the brain, but in that same global bio-informational field, and our brain function as a mere interface device between ourselves and Absolute. This hypothesis can be ignored until reliable experimental data in its support will be obtained.

The breathtaking revelation about existence of Absolute quite finely explains the principles of most marvellous esoteric deeds: clairvoyance, prophecies, voyages into the living organism cells, in the depths of matter and the Universe. And, of course, here we arrive to the concept of Creator – chief systems programmer, who made all the wheels go round…

So, the main problem here is to answer the question: does this Stratum 4 exist in reality, or it is just a beautiful metaphor. Usually, they say, that neither existence, nor absence of God cannot be proved. Sometimes this issue is tied with personal beliefs. We shall try to clarify this problem.

The Concept of Absolute

Let us start from the agreement, that, generally speaking, Absolute could be imagined as having two hypostases (contrarily to Christianity, where Trinity approach is adopted): mental (or cultural) and real. First, one cannot be empty, because we already have such ***concept***. As we stated earlier, this is an ideal entity dwelling either in somebody's brain (thoughts, beliefs, imagination, fantasies, hallucinations), or in some cultural layer. The most critical question concerns the second hypostasis: ***reality***. If Absolute is, at least, partially, real – it must manifest Itself (Himself, Herself) in reality, and thus, be liable to physical measurements. For example, if we arrived at the idea of general database, or information field existence, there should be possible to find out the material substance – carrier – and then methods of encoding used. At last, if it is not just passive database, but functioning control system, we ought to disclose the language of programming used and the programs themselves. Until now, there are no confirmations along these lines of reasoning. Either, we worked not enough diligently, or this hypostasis is empty. Remains the "God" within human brains: a system of beliefs, religions. Atheists have their own ethic-behavioral rules – their own "God".

We can imagine indirect methods of proving existence of real Absolute – for example, carefully studying the results of predictions, clairvoyance. If these phenomena do take place – it means that Absolute exists in reality.

Of course, one can say, that there can exist methods of protection, preventing humans inspect and interfere with "system programming" layers – as is done in computer operational systems. Then, the last argument can be drawn: there must exist, at least, some interaction with Absolute (analogy: application, calling some system function). If nothing of this sort will be produced, we should assume that the concept of Absolute is only a myth in

human brains. Situation reminds spy story: just imagine, that some country sends its spy as a resident to other country. This person legalizes there, marries, works somewhere – nobody can guess, that he is really a spy. From the other side, he does nothing contrary to law. So to say, the perfect spy… The question is: can we call him spy, while in reality he does not function as a spy?

Soul

Esoteric literature is full of references to human soul. Usually is postulated existence of soul independent of physical body. A lot of attention is paid to the incarnation hypothesis. All this is very interesting and exciting. But, as we already had got accustomed, we have no reliable experimental data on existence of soul as some ***separate*** entity from human body itself. Until then, I propose much more simple and natural concept of soul.

Soul is specific functionality of higher species, of their central nervous system. In humans this functionality is very rich and represents individual personality – with all spheres including intellect, emotions, ethics, social conduct, etc. The phenomenon of soul can be attributed to gestalt effect, where some complex entity show broader, or even new functionality than the sum of its parts have in common.

Take for example, car's engine. Being assembled, provided with gas, oil, water, air and electricity it demonstrates its gestalt functionality – its soul: it can rotate its output shaft. Of course, its "soul" is exceedingly primitive; human organism is much more complicated and perfect than our engine. But we are considering the fundamental principle. The engine works perfectly until some malfunction happens – its metal organism becomes ill. Eventually comes the day, when car mechanic says – alas, nothing could be done, it is impossible (or unreasonable) to recover the functionality of this engine… The engine is dead. It cannot accomplish its main functionality – rotating the output shaft. Its soul has gone. Where to? No one will be embarrassed with this question. The answer is self-evident: when parts cannot function together – functionality just vanishes. I can clap both my hands – and you will hear the sound. But with only one hand? We arrive at the same situation when dies human being. All his functionality disappears. Very frequently, it is done gradually – deteriorating short, long term memory, hearing, eyesight, coordination of movements, worsening brain's processing abilities… At last fail subsidiary systems: digestion, breath, blood circulation. Stops metabolism. Life has gone… And with it has gone human *individuality*. Knowledge, emotions, preferences, habits, beliefs… We may call all these mental and psychic abilities soul. Where does it go? Nowhere. It just disappears, ceases to exist.

Esoteric believers, who do not agree with this argumentation, should point out what soul features are missing here, certify that these features really exist and propose some candidate for their bearing media.

Beliefs

In esoteric the term "belief" is used, as a rule, in its religious sense, i.e. as belief in God. Sometimes it is said, that humans *should* believe, that those, who do not "believe" are somewhat inadequate persons. I can argue that normal human life is impossible without belief, but beliefs are many. Let us give the definition of belief.

Belief is some (model) entity in a knowledge representation system (KRS), which we consider to be in adequate correspondence with prototype entity in problem domain (PD). PD generally includes other KRS'es (reflexivity) and own KRS itself (selfreflexivity). Properly speaking, all model entities in any KRS are beliefs. Every belief should be accompanied with two indications: prototype status and adequacy of mapping.

Prototype status can be:

- real (we shall not discuss now objectiveness of reality while perceiving World through our senses);
- ideal (mental or cultural);
- indirect evidence - personal or cultural – (for example: "as my friend told me, we will reach town in two hours")

Adequacy of mapping is very delicate issue. Even when we measure physical parameters (weight, dimensions, temperature, etc), we do it with some accuracy. Our senses can mislead us. The mapping itself is not straightforward process: it includes, as a rule some processing (interpretation). That is why our beliefs could be so uncertain. Beliefs drastically vary among different people, religions, cultures.

Let us try to classify beliefs from the viewpoint of pragmatics.

- **Axiomatic beliefs.** They are assumptions taken by intellectual being without proof – on some pragmatic or aesthetic base, for example, axioms of Euclidean geometry. This belief is imaginary with absolute adequacy. Everyone agrees that axioms are purely ideal entities.
- **Beliefs-knowledge.** They can be theoretical and applied. Theoretical – predominantly mathematical – knowledge is obtained through inference from axioms in accordance with specified rules of inference. Applied knowledge is reflection of real world entities: "The Volga flows into the Caspian Sea", "Horses like oats". Of course, applied knowledge can be imprecise, unreliable, inadequate, based on the faulty paradigm or be result of senses mistake. This knowledge is frequently questionable, and it needs to be verified. If verification fails – it is a good reason to dismiss such belief as inadequate.
- **Cultural beliefs.** Ideal entities, created by humankind: sciences, arts, religions, etiquette, folklore, habits, customs, etc. Holding to specific cultural beliefs tends to consolidate people within corresponding social units.
- **"Pure" belief.** This belief usually concerns Intangible World, about which, according the definition, we have no positive knowledge. There is no use to ask pure believers foundations of their beliefs, motivations and confirmations. At most, you will receive reference to some "Holy" books or to authority of certain "known" people. Pure beliefs have nothing in common with World comprehension and can be thought of as some variety of cultural beliefs.
- **Autosuggestion beliefs.** They are beliefs in one's own mental constructions. This belief is of primary importance from the viewpoint of its influence on human personality, psychic and physical state. It correlates with cultural beliefs. We will consider these aspects closer in what follows.
- **Social beliefs**. The basic social unit is family. Members of normal family believe each other, believe their opinions. Intuitively, everyone tends to surround oneself and contact with people, which he could always count on in social aspects. These beliefs are verified and supported by mutuality. If you receive positive stimuli from your surroundings, it means that you are right in believing them. Social beliefs differ from cultural ones: here you tend to believe specific persons, and therefore – you believe to their ideas, views, advises.
- **Materializing beliefs and omens**. Esoteric people introduce these beliefs with the words: "We know that the thought is material". Heroes in fairy tales say: "According to jackfish will and to my wish…" – and requested action is performed in reality, or requested object materializes in the physical world. It should be said, that literally such effects are not confirmed rigorously. But such beliefs sometimes can have extraordinary positive material effects. But the leading factor here is psychology. In medicine is well known "placebo" effect, when some indifferent substance is given to the patient with accompanying words, that it is new very efficient remedy against his illness. The patient ***believes*** in it and mobilizes his nervous system, conscious and subconscious towards success. This effect can be obtained on the pure suggestion level – without material substance. And it supports our understanding that nerve system and psychological determination can really influence physiology of our organisms. In this aspect, such beliefs correspond to cultural, autosuggestion and social ones.

Autosuggestion and Cultural Beliefs, Egregors, Religions

The main principle, which we should, in my opinion, adhere to, is the well known philosophical maxim, Occam's razor: "Plurality should not be posited without necessity" [Occam]. It means that if we can explain some phenomenon with few simple arguments, it should be done unless we have the sound base to change our mind. In mathematics the good taste dictate choosing as simple, evident and small in number axioms, as is possible. This approach permits us filter out mysticism, metaphors, unrestricted imagination, which have no persuasive arguments in their support.

On the current level of our research, we can assert that Stratum 1 – personal – is really good entrance into the realm of bringing up superhuman race. This way is good for everyone. Only results and achievements will somewhat differ depending on genetics, psychological type, dedication to the method and trust to the teacher. Let us formulate several issues in this concern.

- You need to construct and then strictly adhere to positive psychological pattern: you are happy, healthy, optimistic, sociable, you explain your ideas freely and persuasively, you are always in good mood, smile to everybody and sincerely wish them all the best. The power of nerve system over the physical body and over your other abilities is so high, that the results are just miraculous. Besides, we can rely on the fact that in such complex system as our organism is sometimes cause and effect change places, and you can induce some situation if you really believe in its consequence. In medicine are known situations where patients cured themselves just with their "will power".
- As we argued earlier, our subconscious sphere has tremendous memory and processing power. We can apply to it with the help of special psychic practices, known as suggestion, autosuggestion, hypnosis, trance, meditations. There is abundance of literature on this theme; procedures depend on each specific person. Mastering these techniques personally is possible, but much easier success is achieved in groups and, of course, under the guidance of qualified teacher.
- Special exercises should be done to revitalize certain organism's functions - distal nerve and microcapillary systems, acuity of vision, biofield sensitivity.
- Nutrition, and especially, breathing is of vital importance not only for overall healthy state of the physical organism, but in developing extraordinary psychological abilities. We shall not accentuate importance of the general physical training and procedures of personal hygiene – it is self-evident.

Till now, we were speaking about personal psychological technique. Now we will turn to the social aspects. In the core of this issue always lies some community. It may be family, political party, ethnic, national, religious communities; sporting team, graduates of some university, etc. Such communities have certain features in common.

- Specific community is created around some idea, belief, sphere of common interests, or just on the basis of certain common features of their members.
- Frequently there is some documentation concerning the community. It may be unwritten law, ethnic traditions, statute of the party, "holy" book – in case of religion. Sometimes members of a community are formally registered and receive personal certificates confirming their membership.
- There exist special regulations concerning the membership. It may be free, or an applicant should satisfy some requirements (believe in some idea, have certain qualities, or be eager to obtain them, etc). So, there exist a procedure of initiation, enrollment into the community, and contrarily – procedure of disfellowship.
- Usually special symbolism is present. Official colors, banners, badges, carefully developed specific rituals: initiation, meeting, worshiping, special exercises, gestures, dances. Frequently community is organized as followers of some teaching, and thus there are real or imaginary persons in the past or even at present, which are greatly respected. Very popular are their portraits, exceedingly idealized, as a rule.
- Each member has a set of liabilities concerning the broad spectrum of what should and what should not be thought, said and done at proper circumstances. As a reward community's member receive sometimes material, but – what is much more important – moral, spiritual support, that wonderful feeling of participating in something great, true, even holy activity. Frequently, such community promises take a form of future happiness to come, maybe even after physical death. This issue has paramount importance and is probably determinative in the whole community–members' affair. This mechanism works on psychological level and has powerful suggestive effect.
- The "power" of the systems being considered heightens with the number of their members and with the system's age.

Community, complying to considerable extent with the issues given above, together with its members is named "***egregor***" (see, for example, [Bernstein]). Egregors could be thought as having two hypostases. First is social and psychological, and there is not a slight doubt that it is really existing ideal entity. The second hypostasis, from the current scientific point of view is mystical. Genuine esoteric considers that, besides socio-psychological foundation, egregors have some fine-material aspects, probably being the part of Stratum 4 – Absolute. This thesis today has no scientific confirmation.

Relying on the considerations just given, we can argue, that religions, Christianity, in the first place, are the typical representatives of egregors. This issue gives us the solid foundation for understanding religious activity in human societies.

Conclusion

Let us remember what was our pathos and determination when idea of creating AI sprang into existence. Yes, it was the dream about the future society, where AI, wise and helpful robots will help us in our intellectual work. Being carried away with this noble humane idea, we forgot about humans themselves. We thought that we know all principal mechanisms of brain activity, neglected sphere of unconscious and restricted our intellect simulation to known area. At the same time, already during several thousands of years flourished alternative approach to dealing with human intellect and psychics – religions, various beliefs, esoteric. Adepts of these disciplines suppose, that they possess much more general, powerful and complete knowledge about the World and humanity, but orthodox science usually avoid studying this domain, using the label: "pseudoscience". Benevolent consideration of this problem shows that, as always and as everywhere, the realm of esoteric encloses the broad spectrum of ideas, approaches, techniques, etc, with rather broad spectrum of utility. Some things look very unrealistic, even mystic, others could be positively considered if serious confirmations and verifications will be available. And still others look very rational and could be used in mental and psychological practice already today. Frankly saying, reality of esoteric experience should be carefully studied [JREF].

Besides that, until now we doing AI research used only hardware provided to us by engineers. It may happen, that "programming" human beings will give much more efficient results.

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INFORMATICS, PSYCHOLOGY, SPIRITUAL LIFE

Larissa A. Kuzemina

Extended Abstract:

Informatics as a key link of our life is directly connected to a human perception with all its sides. Everything in our life rises in perception stems from it and develops.

To live means to perceive, to perceive means to develop oneself, to develop oneself means to live more and to perceive more [1].

The process of perception is connected to a psychological self-programming for selection, comprehension, accumulation and transmission of information. This brings us into the channel of a personal freedom psychology forming (ability of a person to control his development closely connected to self-consciousness, resourcefulness, openness, readiness to changes). In the course of self-consciousness development the range of the human choice and his freedom widens.

Freedom is considered as a form of activity characterized with three indicators: perceptiveness, instrumentality of "what for" value and controllability at any point. Respectively, deficiency of freedom may be related to misunderstanding of the forces acting on a subject, absence of clear value patterns and indecision, incapability to interfere in the course of the own life.

Under favourable conditions merging of freedom as a form of activity and responsibility as a form of regulation takes place. Under adverse conditions either own activity retreats to the background giving way to external requirements, situations, factors, or responsibility as a form of regulation doesn't regulate a manifestation of freedom.

Freedom is formed in the process of gaining by a person the internal right for activity and value patterns.

The general principle is expressed in the brilliant formula presented by Hegel: "Circumstances and motives have domination over a person only to such a degree that he himself allows them to have" [2]. So, freedom consists in rising regulation to a higher level.

Lest freedom be degenerated into tyranny it should have a value-semantic substantiation.

The same algorithm is present in a self-appraisal as a flowing value. The case in point is a strong personal appraisal moment (subjectivism of perception). As every individual exists in a medium (family, affiliation, society as a whole) then his perception by his associates and his self-perception is formed on the background of the existing standards and value patterns (general cultural, collective and individual ones). In brief, self-appraisal is a personal judgement about own value expressed in aims inherent in this individual.

There is an ingenious formula derived by James (1890) indicating two ways of rising a self-appraisal:

SELF-APPRAISAL = SUCCESS / CLAIMS.

In fact an individual can perfect his own appraisal either increasing the numerator of this fraction or decreasing its denominator as only relation of these indices is important for a self-appraisal. As James noted "our self-perception in this world depends purely on what we are going to become and what we are going to do".

In the system of multi-channel information the art is one of powerful means of action on perception, psychology and, ultimately, on the spiritual life of a person [3]. In this connection

1. purposeful action of all genres and aspects of art,
2. selection of coming information,
3. accumulation of positive information, development of art taste

are essential.

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INFORMATION SUPPORT OF PASSIONARIES

Alexander Ya. Kuzemin

Introduction

Noosphere. What is ahead? Can science give us understanding of the ideal of the future?!

It should be taken into consideration that among important problems facing the living ethnos [1] it is possible to single out some problems. What for, how do we live? Where and why can't we live better or how should we find the most effective way out of unfavorable situations. The answers to these questions can be found with a high degree of certainty on the basis of information about the past period of life of this ethnos, the data concerning the current state, their analytical processing and prediction of events movement in the future.

In this connection, **the problem of developing the concept of design of the PASSIONARIES information support arises.** The results of the development can make it possible to approach the answers to the questions above formulated. First, it should more objectively represent, understand and then prepare the decision-making and predict the ultimate situations' movement.

Solution of an isolated even very complicated problem for any subsystem in the sphere of human relations is sometimes cheerful, pleasant but always with no prospect with respect to objectively existing open for interaction with the external medium or other subsystems of the real system of human activity. Generally, solutions for analysis of the similar phenomena are found in the animate and inanimate nature. There are no complete analogs of the considered problems; so, a new problem should be solved anew. In some cases it seems that a new solution in the design work or investigation will be obtained if it is sufficient **to change a standpoint (an aspect) in the already performed investigation** or to add a new material or **to change an approximation degree** (for instance, to take a telescope or microscope instead of spectacles). However, on frequent occasions new efforts are needed which promise the same incomplete results as those ones without change of aspect in considering the problem. Such is the limit of the traditional methods of investigation.

In natural sciences, estimations of the events current state are irrelevant. First, the classification is necessary. In this case, it is important how can one obtain the needed classification. Thus, for example, zoologists classify as the earth ones sea (whales) and air (bats) animals as mammals because there is one correctly chosen criterion uniting them.

But not every generalization is fruitful for science. The concept "**humanity**" means **contraposition of the species** Homo sapience to all **other** animals [1]. The human body has a ***rigid relation to a feeding landscape.*** It is a **native land.** It is necessary to accommodate oneself to the use of the landscape resources in this case during a considerable time. One should adopt to the use of the landscape resources and it takes a considerable period of time. **Adaptation** (plasticity) of **generations** to unusual natural conditions is needed. **Assimilation by the descendants a set of traditions** necessary for future existence results eventually in transformation of **a native land into Motherland.** Forming of the human body is not limited by **imitation of ancestors**. "Eccentric" people - such **creative persons** as artists, poets, musicians giving the specific aspect to the human body appear and exist on their own in the human body

Combination of **adaptation of generations, imitation of ancestors and existence of the creative people** are **necessary** coordinates forming “ethnos”, which are characterized by the original stereotyped behavior and unique internal structure. **Ethnos** is a form of a Homo sapiens type. It is accepted to name generalization of all individuals of this anthroposphere or “ethnosphere”.

Sometimes from depths of subconsciousness of some people with a thin nervous organization the “**genetic memory”** shows itself (N.V. Timofejev-Recovsky named this phenomenon “an emergency gene”). Vague memoirs about not endured events occur to such people. The extremely seldom emerging gene transfers fragments of the information uniting mankind, which is represented by a mosaic of ethnoses. It is precisely the presence of genetic memory that unites the anthroposphere. Otherwise mankind would have scattered on some kinds and the racial theory would have triumphed.

Besides this the **combination of elements (people, families, generations) defines the system integrity of anthroposphere**. When generalizing the global history of mankind the legitimacy of the system approach is

obvious. **The landscapes** also comprise a part of a daily life of ethnoses as **elements**. This is "**ethnology**" – a combination of ethnography and natural scientific explanation of an origin and change of ethnic integrity.

From a point of view of the system approach, **ethnos unites** its members not only according to similarity of its members (common language, common religion, uniform authority). Application of the "similarity" concept leads to absurdity. The French is the ethnos, but they speak four languages. In 1937, L. Von Bertalonphy offered to consider a concept "**species**" as "**a complex of elements which are in interaction**" and named it "**an open type system**". A family (a husband, a wife, a mother-in-law, a son, a daughter, a shed, a draw-well, a cat) living in one house represents the known example of the system. Ethnos is not determined by borders of the state but by the interaction of its elements.

Not a single ethnos is eternal. Constant variability in time and space is a law of nature. Ethnoses develop according to the laws of irreversible entropy and lose the initial pulse caused them, the same as any movement fades due to resistance to the environment.

In 1908 V.I. Vernadsky paid attention to the information appeared in the newspaper about **a power phenomenon** of mass flight of the locust in an extremely great number, exceeding the stocks of all deposits of copper, zinc and tin on the Earth, from the blossoming valleys of Ethiopia to the Arabian desert to perdition. Eventually, V.A. Vernadsky came to an ingenious conclusion that **all living organisms posses some biochemical energy of living substance of biosphere** and completely not mystical energy but an ordinary, similar to electromagnetic, thermal, gravitational and mechanical ones. And in the case with the locust, the mechanical energy manifested itself. Mostly the biochemical energy of a living substance is in homeostasis i.e. an unstable balance, but sometimes its fluctuations i.e. the sharp rises and decays are observed.

The more complicated is the organism, the more factors define complication of its system integrity of ethnic systems and the more diverse is their manifestation in the apparent history. **The urgency of the development and use of a global, self-organizing information system is obvious, it would make it possible to preserve this integrity or, at least, to decrease the risk of a complete self-destruction, or to bring to nothing an opportunity of the origin of a negative situation.** There is a need in the information support of the current control, prediction, forecasting of a negative situation onset, analysis of the course and forecasting of the consequences of the ethnogenesis outbreak culmination, its end when the outbreak decays and movement passes into homeostasis of ethnic systems. It is known that all ethnoses passed the phases of rise, overheating, wretchedness and inertia, but every ethnos did it in its own way.

Laws of Dialectics

All types of energy are perceived by a human being not directly but through an observable effect, but to gain an effect the structure consisting of many elements is needed.

PASSIONARIES (individuals of power redundant type) are the individuals possessing an inherent ability to absorb more energy from an external environment than it is required only for personal and species self-preservation and to give out this energy as a purposeful work on modification of their environment. Judging about the increased passionarity of this or that person by the characteristic of his behavior and mentality (see. *Passionarity as the characteristics of behavior and mentality*). As L.N. Gumiliov showed at the ethnic level that the mass change of people behavior in the direction of increase of their activity is an effect of *energy of the biosphere living substance* we can speak about the reasons of the increased activity of a separate individual. In this case we should proceed from the assumption that the mental and intellectual activity requires expenses of energy precisely in the same way as the physical one, but this energy is in other form and it is more difficult to register and measure it.

Another aspect of the power redundant structure is its ability influence actively behavior and mental state of the associates, it is the so-called phenomenon of the *passionary induction* and this feature is inseparably linked with a high level of the general behavior activity.

L.N. Gumiliov made the historical description of the human bodies' activity change by the *ethnogenesis phases.* The author repeatedly addressed to the characteristics of the persons among outstanding PASSIONARIES showing that the frequency of occurrence of such individuals in different epochs is naturally associated with a general activity of the ethnic system (its *passionary tension*). Having analyzed the biographies of such figures as Napoleon, Alexander the Great king of Macedon, Sulla, Jan Hus, Jeanne d'Arc, arch-priest Avvacum, Hannibal, Genghis Khan and many others L.N.Gumiliov found out that all of them were united by a steady complex of

features. The core of them was an insuperable internal aspiration to the vigorous activity changing an environment. This aspiration was dictated neither by the conditions of environment, nor material boons. On the contrary, the unreasonable activity of many PASSIONARIES caused misunderstanding and condemnation of the associates and resulted in their deprivations and destruction. Moreover, the history knows many cases when people laid down their lives for the sake of an idea or a great common cause and not under the influence of a minute but deliberately. All these facts forced the author of the theory to single out the *passionarity* as a separate behavior pulse not reduced to any known biological instincts or mental properties of a person. Having described the *passionarity* on the popularized level (as the activity of ethnic bodies) and on the individual level (as the behavior pulse) L.N. Gumiliov offered the only inconsistent explanation of this phenomenon i.e. the passionarity theory as an effect of *energy of a living substance of biosphere* described by V.I. Vernadsky. As other explanations are not offered yet, we proceed in our definitions from this theory.

PASSIONARY INDUCTION – it is variation of moods and behavior of people at the presence of more passionary persons. *Passionaries* are able to impose their associates their own behavior aims, to impart to them the increased activity and enthusiasm not inherent to these people They begin to behave as if they were passionaries but as soon as a sufficient distance separates them from the *passionaries* they assume their own natural behavior and mental aspect. The phenomenon of Pasionary induction is the most appreciable during wars when passionary commanders succeed in leading behind themselves the armies consisting generally of the *harmonious people*. Thus, Napoleon and Suvorov in Italy succeeded in gaining brilliant victories, but as soon as the armies remained without their commanders the successes were replaced by defeats. It is impossible to explain this phenomenon only by the presence of a leader's talent. During a fight, the effect of a personal presence of a passionary stirring the army to attack is very important. It should be noticed that the passionary induction does not always proceed from the commanders. Very often private soldiers but not passionaries become its source. Passionary induction underlies successes of many famous public speakers whose speeches tremendously impressed the audience or threw them into fury. But when reading the texts of these orators, they don't produce a similar impression.

The cited examples are only the brightest demonstration of the passionary induction. As a whole it penetrates into all ethnic processes being a basis of all mass movements of people, initiators of such movements are passionaries carrying away less passionary people. This is the essence of political movements, great migrations, religious heresies.

Having observed a number of examples L.N. Gumiliov came to conclusion that the passionary induction acts upon the people belonging to the same ethnic group with passionaries (the sources of this induction) much more profoundly. All this clearly demonstrates the fact that passionary induction is one of major factors due to which the ethnos acts as a single unit. To explain the passionary induction phenomenon L.N. Gumiliov offered the hypothesis of the passionary field (see *A field in ethnology*).

The passionary pulses and passionaries themselves should have enough energy potentials for performance of their mission. One of the energy components inherent to passionaries is the information component. And this component can be substantially increased qualitatively and quantitatively. The purpose of the given work consists in the information support at the expense of the correct system analysis of the passionaries' purposes. The passionaries' purposes can make the basis of development of a simulation language and system simulation as a whole at the expense of system representations.

As a result of the system analysis, the information support of passionaries and passionary pulses should be linked with the activity of special situational centers.

The situational center (SC) for information support of the passionary activity can represent a set of management bodies and hardware-software means complex intended for information support of the administrative decision-making by the passionaries and practical support of situations management in real time under various conditions of the situation development:

- **at a normal development** when SC realizes collection, analysis and accumulation of the data circulating in the uniform information space of the ethnos existence and uses historical experience;
- **at a transitive stage** when the situation leaves the condition of a normal development, but does not reach a level menacing the safety of the state or ethnos when returning the situation to a normal development SC is used as the regulating tool;

- **at a crisis stage** when SC is used by the passionaries for returning the situation to a normal development by means of the united management in real time by all state bodies and structures, down to a separate executor.

The use of advanced information technologies allows to provide duly reception and exchange of the authentic information in the state bodies, reduction of terms of the decision-making by passionaries and brining decisions to the notice of executors, qualitative control of execution and reliable protection of the information being the state secret with a limited access. Moreover, the used technologies allow to supervise visually the situation in zones of risk, including on the border and in the zone of battle actions transmitting the information directly to the persons making decisions with the minimal expenses.

The situation management is based on the following principles:
- Independence and reliability of the information sources as the basis of the administrative decision-making;
- Relating of the information arriving, processed, stored and circulating in SC to coordinates of the territory related it;
- Creation of the uniform information space with a state databank allowing to trace the stages of situations origin and development, to store parameters describing a situation at all stages of its development;
- Simulation of separately taken situations development and their sets for estimation of the administrative decisions' adequacy to the situations' development stages using the technologies making it possible to estimate the condition situations under observation, to reveal the reasons of important changes, to predict development of processes and to ensure the automated search previously unknown laws in the uniform databank.

The basic purpose of SC consists in perfection of the state management mechanism based on the uniform information space and uniform system of situations development monitoring.

According to the specified purpose, the SC basic tasks are formulated as follows:
- continuous collection, processing and storage of information;
- support of situations development management including information support to the person making the state administrative decisions and representation of information about results of these decisions realization;
- formation of the appropriate information models of the situations development, revealing, estimation and forecasting of the destabilizing factors;
- perfection of mechanisms of threats neutralization and liquidation of their realization consequences;
- perfection of organizational structure and mechanism of the control system functioning.

The SC development and functioning for passionaries support intended for solving the global tasks of the ethnos management should be primarily associated with the problems of the ethnos economic safety. The importance of introduction into consideration of the given direction is primarily connected:
- with transient nature of economic processes, it borders in some cases unpredictability and errors in the forecasts concerning the subsequent economic development;
- prevailing of the globalization tendency in forming various processes both of specifically economic nature, and various spheres of scientific and technical development;
- with the extent of the extreme situations action on all spheres of human activity and necessity of passionaries' plans realization in the complete volume;
- with the possibility to consider unforeseen economic crises and decays as specific situational aspects of management affecting the efficiency and effectiveness of the decisions made by passionaries (mainly it is associated with the possibility of financing the measures directed on liquidation of emergency situations completely and with the highest economic efficiency).

In this case the economic safety, as the component of the situational center functioning should be understood:
- in a narrow sense – in terms of functioning of the center itself,
- and in a wide sense – in terms of the analysis and estimation of the general economic situation necessary for successful activity of a passionary.

But despite of the possibility to consider the economic safety from different standpoints the decisive meaning consists in its extended treatment. In other words, the most important is consideration of economic safety from the standpoint of the analysis and estimation of an arising general economic situation. It is connected with the fact that the economic safety criterion is the economy state estimation in terms of development of the major processes presenting the essence of the economic safety. Therefore, the criterion estimation of safety includes the estimates of:

- the resource potential and possibilities of its development;
- the level of efficiency of use of the resources, capital, work and its conformity to the level in the most advanced countries, and also the level where the threats of external and internal nature are reduced to a minimum;
- competitiveness of economy;
- integrity of territory and economic space;
- stability both conditions of prevention and solution of the social conflicts.

Here the most significant thing is to single out concrete tasks which should be solved in monitoring of the developing economic situation. Primarily, the following tasks should be singled out:

- the analysis of the financial flows movement direction of the different subjects of managing and their interaction within the limits of the so-called zones of Borderland (both inside of separately taken country, and at the interstate level). In this case, the special attention in the given analysis is paid to functioning of the bank system. As a separate task, we should single out prevention of the possibility of negative effect on the economic stability of the bank system. It can be achieved by means of the analysis and forecasting of economic and political conditions in the bank system. At the same time, such analysis should include definition of influence of certain political groupings in the bank sphere, dependence of the bank system on other branches of national economy being under control of various financial and industrial groups. Moreover, the analysis of economic safety of the bank system should include also consideration of dependence of the bank system subjects on political and economic forces of other states which can carry out a number of measures directed on ruining the bank system. As one of possible versions of using the given research results we may indicate: definition of priority directions of the financial flows movement between the countries of the Borderland to minimize the accompanying economic risk and, as a consequence, to increase the economic safety of the general control system of emergency situations;
- definition of the most probable economic risks rendering the greatest influence on efficiency of the emergency management system. Consideration of the degree of the risk-forming factors' effect on the financial stability of various subjects of managing aimed for warning and development of specific situational aspects of management associated with unforeseen economic consequences. In this case it is necessary to take into account that not the indices themselves but their threshold values, their limiting size are of importance for the economic safety. Violation of these values gives rise to the problems in the normal course of development of various elements of reproduction, results in formation of the negative, destructive tendencies in the field of economic safety. As an example (in relation to internal threats), it is possible to name a rate of unemployment, breaking in the incomes between most and least supplied groups of the population, rates of inflation. The approach to their extreme allowable value testifies to the increase in threats of the social-economic stability of the society, and the excess of the limiting or threshold values indicates to the fact that the society comes into the zone of instability and social conflicts. It is a real detriment of the economic safety. From the standpoint of external threats an extreme allowable level of the state debt, preservation or loss of positions in the world market, dependence of national economy and its major sectors (including the defense industry) on the import of foreign technique, furnishing products or raw material can serve the indicators;
- Substantiation and choice of the policy of finance administration of the situational center. That should provide diversification of the sources of attracting financial funds for solving various tasks of the situational center.

The not less important question in aspect of the considered directions of research is also the choice of formalization and analysis apparatus. As such an apparatus the theory of fuzzy sets can be used as just within the framework of the given theory it is possible to describe the processes occurring in economy and the procedures of emergency situations management associated with them.

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