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Abstract

The author analyzes the fundamental properties of information and informational relationships, and the methods of their application with regard to improvement of knowledge workers' effectiveness.

Using Fundamental Properties of Information for Improvement of Knowledge Workers' Productivity

Introduction

Knowledge is becoming the main competitive advantage of an organization in today's world; it is also the basis of innovative development of economy. The percentage of active workforce, the activity of which is connected with information and knowledge, is increasing. In economically developed countries, this indicator exceeds 50 percent. Some countries (US, Western Europe, Japan, South Korea) face the formation of a knowledge economy. Other countries (e.g. China or Poland) have a task to build up such an economy. The Republic of Belarus is also aimed at implementing the economy of knowledge.

Consequently, the main element of the knowledge economy is not capital, fixed assets or technologies, but knowledge workers – employees,

whose activity is basically preconditioned by and / or results in information and knowledge.

The questions of knowledge management aimed at improving the knowledge workers' productivity become especially important under these conditions. This was the main reason for originating such direction in management sciences as Knowledge Management. It studies the activities aimed at expanding the organizations' fund of knowledge (intellectual assets) and, finally, at improving the effectiveness of knowledge workers.

The activity of knowledge workers is mainly associated with information. It can be considered effective in the case of generating (creating) high-quality - new and valuable – information. However, the theoretical principles to enhance this activity effectiveness on the basis of intrinsic properties of information have not been developed yet, which reduces the potentialities of knowledge workers. At the same time, many researchers point out that in today's competitive world, survival is possible only for the organizations that sufficiently mobilize the intellectual and creative potential of their employees.

The author's objective is to analyze the factors affecting the effectiveness of knowledge workers' (KW) activities and to identify the methods of its possible improvement, using the examined intrinsic characteristics of information.

The term "Knowledge Worker" was introduced by Peter Drucker, an outstanding management theorist of the XX century, in his book "The Age of Discontinuity: Guidelines to Our Changing Society" published in 1969 [1]. However, his work did not contain a clear definition of what a knowledge worker was. The author proceeded from the following definition worked out by him: "A knowledge worker is a worker, the basic condition and / or result of activity of whom are information and knowledge."

The group of knowledge workers may include scientists, analysts, consultants, engineers, teachers, programmers, lawyers, managers, economists, designers, architects, financiers, specialists of regulatory agencies, journalists and etc. Accordingly, there are many organizations where knowledge workers make up the majority of employees.

30 years after the above-mentioned work, Peter Drucker said in the book "Management Challenges for 21st century": "The most important contribution management needs to make in the 21st century is similarly to

increase the productivity of KNOWLEDGE WORK and the KNOWLEDGE WORKER" [2, p. 74].

KW is surrounded by an ocean of information, out of which he has to choose the necessary piece. Disregarding other things, we will proceed from the fact that KW needs information to make a decision or to generate (create) new information.

In the XX century, the principles of scientific management substantially raised the productivity of manual workers (industrial workers). A fundamental contribution to this was made by Frederick Winslow Taylor, who made a scientific analysis of industrial employee's actions done at work and of relations, into which he entered in the working process. The objects of Taylor's research were the relationship between employees (workers, foremen, managers) focused on manufacturing of tangible products. The properties of the product itself (machines, materials, etc.) in conjunction with employees' qualities (mainly physical ones) prompted the discovery of the methods, which made it possible to significantly improve the efficiency of work with tools and materials, and to increase labor productivity.

A knowledge worker deals with information; and his relationships with other employees (experts) and the management are based on information. It is logical to assume that the properties of information determine the way how KW works with it, as well as the result of such activities. The task for this very work is to explore the essential properties of information, to consider the KW relationships occurring in the course of his activity and to analyze how these new learnings can improve knowledge workers' productivity.

This task can be transformed into a search for answers to the following questions.

What are the indicators of KW productivity?

How to handle information to get high-quality information?

How to handle information to generate more new valuable information?

As mentioned above, knowledge workers' effectiveness is expressed in producing high-quality, new and valuable information (QNVI). This implies the following performance indicators:

- The quality of the created new valuable information;
- The volume of the generated high-quality new valuable information;

- The novelty of the created high-quality valuable information;
- The value of the created high-quality new information.

Each of these indicators should be described separately.

The quality of the created new valuable information. This indicator means that, firstly, the created information does not contain information of poor quality (the meaning of poor-quality information will be concerned below) and, secondly, that predictive information is within the permissible range of deviation from the actual one (it can be ascertained only after forecasts can be compared with actual data).

The volume of the created high-quality new valuable information. The indicator is measured by the amount of rendered analytical materials, prepared decisions, published articles, ready presentations, etc.

The novelty of the created high-quality valuable information. This indication is characterized by the fact that the provider of the information is its author and that this information is not borrowed, in a ready-made form, from other sources.

The value of the created high-quality new information. In the author's opinion, it is the most important indication. Due to the nature of this fundamental informational property (discussed below), value is defined for every particular case – by the principal or experts (specialists), and depends from importance of the information for them at particular situation.

Having considered the question of KW performance indicators let us proceed to searching for an answer to the second question. **How should information be handled to obtain high-quality information?**

It has been already noted that searching for answers to the raised question should be based on fundamental characteristics of information. Therefore, there appear questions to be answered first - "What is information? What classes, types and kinds of information are there? What are the forms of information? What are the properties of information?"

There is a paradox that we are well aware of the quantity of information (for example, 1 bit of information) but we usually do not know its quality (what is information as such). This paradox can be explained by lack of critical practical needs. However, such needs continue to appear since the amount of information is growing like an avalanche, in line with the increasing number of knowledge workers.

The attempts to analyze the qualitative aspect of information were taken by different researchers. The most complete and thoroughly reviewed analysis of this issue were made by M. Mazur, the author of the monograph "Qualitative information theory" [3].

Basing on this study, we may come to the following definition of the "information" category.

Information is a reflection of the inverse influence of the controlling and controlled systems through control channels, which is expressed in transformation of an information chain message to another one.

This definition is highly abstract, but I found it to be important for considering the possible classification of information.

Thus, segmentation of information depends on the criteria selected for its classification.

In terms of the criterion of usefulness, information can be classified as follows:

Useful information - the information necessary for decision-making and generating new information.

Useless information - information that is not required for decision-making or generating new information.

In its turn, useless information can be further divided into two types.

Irrelevant information. When you decide on the use of a financial instrument, you obviously do not need a cooking recipe.

Excessive information – information given in excess of the information required to make a decision or generate new information (for example, excessive detailing, or restating something in a different way.

Taking the degree of aggregation of information as a classification criterion, we can divide information as:

- **Generalized information** - the information, which the sets of information is reduced to;
- **Detailed information** - the information that is not subjected to generalization.

Using the criterion of information acquisition, we may distinguish

- **Direct information** - information received from the information provider;
- **Para-information** - information which is originated under the influence of the informations received. This type can also be called associated information, a variety of which is estimated (predicted) information.

In terms of the criterion of adequate reflection of reality, useful information can be divided into two types:

- **High-quality information** - useful information that reflects the reality in an adequate way;
- **Poor-quality information** - useful information that reflects the reality inadequately.

Poor quality information can be divided into three types:

- Disinformation;
- Pseudo-information;
- Incorrect para-information.

Disinformation includes:

- Inaccurate information;
- Fictitious information;
- Incomplete information;
- Incorrectly generalized information.

Incorrectly generalized information is the case when many detailed sets of information are reduced to one material that reflects the reality inadequately. Helga Drummond, Professor of the University of Liverpool, gives the following example. During the Gulf War, someone reported on successful bombing. It was said that about 80% of the bombs reached their targets. However, it was not mentioned that a significant number of the targets were dummies and that the enemy's losses were insignificant. [4, p.136]. Here, the information "successful bombing" is incorrectly generalized information.

Pseudo-information or ambiguous information is the information that includes several images reflecting one original or one image of multiple originals. For instance, a letter from bank, where they asked the National Bank for refinancing, contained a number of 12 million rubles in one point and a number of 12 billion rubles in another point.

There are also more complicated cases of ambiguous information (simultaneous combinations of the above-mentioned cases) - with several originals and several images, when a single image reflects several originals or several images reflect only one original. For example, when there are multiple reasons and multiple effects, and each of the effects may be caused by each of the reasons (like in case of the common symptoms of various diseases – fever, headache or nausea).

Incorrect para-information (probable or predicted) includes the following types:

Inaccurate para-information is the para-information, which differs from the existent para-information.

Unjustified para-information is the para-information, which does not exist (and will never exist) in reality.

Failed para-information is the para-information that has not been created, although it exists in reality.

Now, when useless and poor-quality information is described, it is quite simple to define high-quality information. We can say that high-quality information is useful information that does not contain all kinds of poor-quality information. Thus, **high-quality information** has the following eight characteristics: **it is relevant, not fictitious, accurate, plain, complete, not excessive information, in which all the informations are correctly generalized and the assumptions are correct** [5, p.2].

In order to make the structure the information complete, it is necessary to mark two more kinds of information.

Positioning information is the information relating to the information and answering the following questions:

- Where can information be found?
- When was information created?
- What is the source (author) of information?
- Whom is information delivered to?
- What is the presentation form of information?

Methodological information is the information that answers the question: “What are the methods the information was generated with?”

The overall structure of information can be represented in a chart (Figure 1).

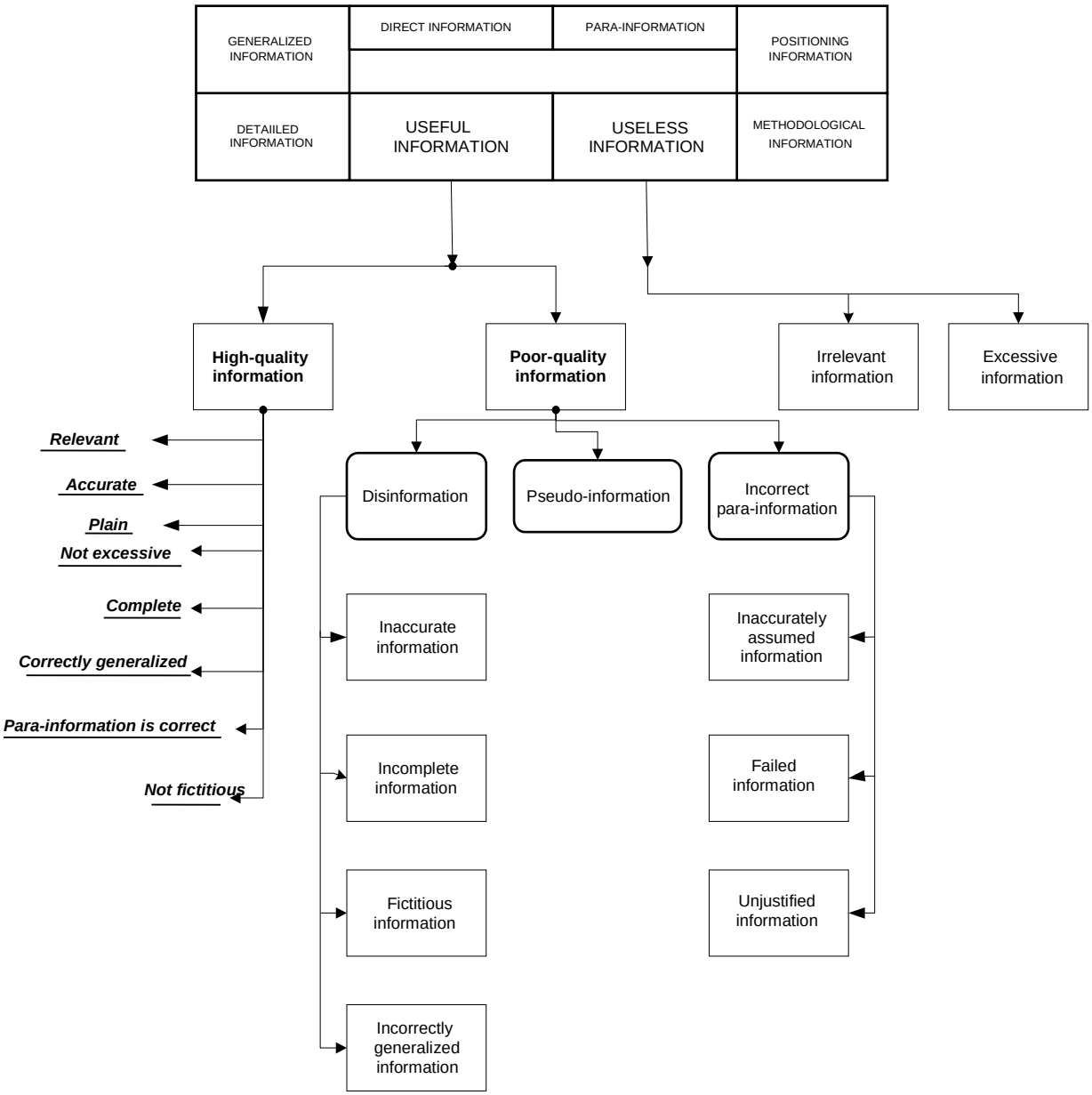

Figure 1 – The structure of information

(developed by the author)

We may start considering the forms of information with an example. Let us look at accounting reporting of an organization. It is information. However, there are circumstantial rules of how this reporting should be carried out. It is information as well. An audit company can inspect this organization and make a conclusion (report) on the accounting administration in the organization in question, having compared the actual state of affairs with the requirements. The audit conclusion (report) is an example of metainformation.

Metainformation is the information resulting from a collation of informations.

Continuing with the given example, let us assume that the audit company's employees and the management of the audited organization conspired and provided poor-quality information about the state of affairs in the organization. The possibility of such events is proved by the well-known instances with the American companies Enron, WorldCom and others. Let us assume it was uncovered after the independent audit company issued its report. A conclusion based on comparing the report of the first audit company (metainformation) with the report of another company (metainformation) will be **meta-metainformation or meta-information of the second order**.

Thus, information can take many forms depending on the depth of information comparison, i.e. on the form of information - that is information, meta-information, meta-metainformation, meta-meta-metainformation, etc. Any class, type or kind of information can take these forms. In the above example, poor-quality information appears in the form of meta-information, and high-quality one - in the form of meta-information of the second order.

The next point for discussion is methods of information search. According to the author, there are three ways to search (select) information: the method of exhaustion (with an opportunity of subsequent ranking); through generalized informations which are to set a searching range, within which required information can be found by exhaustive search); through formulation of a question.

Nowadays, the most commonly used search methods are the method of exhaustive search followed by ranking and the method of generalized informations using.

These principles form the structure of information on the Internet, where billions of web pages are indexed (recorded in immense databases for further retrieval by exhaustive search with special software) and/or cataloged (sorted by topics (generalized informations) and then subjected to exhaustion

within them). Search through hyperlinks is also built on the principle of generalized informations.

Every information can have question, the answer to which is this given information. A question (derived from the Latin *quaestio* – search for an answer) is linguistic expression that states a requirement to eliminate the unknown in knowledge. A question also bears a cognitive impulse. That means it is used not only to search for pre-existing informations but also to generate new ones.

The problem of finding information through questions is in the multiplicity of possible formulations of the question, the answer to which is one and the same information, as well as in the multiplicity of formulations of answers to one and the same question. No machine is yet capable to cope with this problem. This issue can be managed by the human brain that correlates plural informations and classifies them as identical (or different) in nature.

Let us proceed to the properties of information. Information has, in the author's opinion, two essential properties: the ability to multiplication and value.

The **ability to multiplication** is the property of information that reflects its characteristic to remain when handed over to another person. It is best to illustrate this property with the words of George Bernard Shaw: "If you have an apple and I have an apple and we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas".

The **value of information** is the property that reflects the importance of the information in comparison with other informations. The importance of the decision or new information depends on the hierarchy of individual or organizational (community) goals in a certain period of time.

It should be noted that poor-quality information also can has value, in case it serves a particular purpose of its transmitter (e.g. to mislead the enemy). In general, true is the following conclusion: not all high-quality information is valuable and not any valuable information is of high quality.

The author distinguishes two types of information value.

Direct value of information (DVI) - the property of information to be used for decision-making and generating new information at the present moment.

Potential value of information (PVI) – the property of information to be used for decision-making and generating new information by the information owner or other staff members in the future.

Based on the fact that information value is determined in each particular case, it is impossible to speak about quantitative measurement of information value. However, reasoning from the essential properties of information, we may identify the following objective laws related to information value.

Firstly, strategic information is more valuable than other information. This follows from the fact that information value is determined by a hierarchy of goals and strategic goals are superordinate within any hierarchy of goals.

Secondly, metainformation with an adequate degree of detailing is more valuable than its constituent parts, as metainformation (is simple case) includes three informations: information, collated information and resulting information.

Thirdly, the greater the number of employees (those connected with making certain decisions or generating new information) have information needed for this purpose, the higher its value. However, there is one limiting condition - this information should not be used to the detriment of the organization. This law follows from the definition of information potential value, as well as from the ability of information to multiply - in this case, the probability of generating new valuable information increases.

After the intrinsic properties of information are discussed, we can directly address the question: **"How should information be handled to obtain high-quality information?"**

To minimize the use of poor-quality information for decision-making and generation of new information, you need to know:

- The reasons for the emergence of poor-quality information;
- The circumstances of poor-quality information emergence;
- The sign of poor-quality information;
- The methods of poor-quality information identification.

The possible reasons for poor-quality information (PQI) emergence can be divided into 2 groups: deliberate and unintentional ones.

Deliberate reasons appear when the information provider's goals differ from the goals of the information recipient. A typical example was

discussed by the Nobel Prize winners for Economics Joseph Stiglitz and George Akelrof. They described the relationship arising between an employer and an employee upon hiring, when the employee tends to overestimate his skills [6].

Unintentional reasons are combined in one group due to the fact that the information provider's goals are not differ from the goals of the information recipient.

The group of unintentional reasons includes the following.

Misunderstanding of what kind of information is necessary for the recipient. It is often caused by a too general wording of information requirements made by the recipient.

Inattention.

Lack of knowledge and skills (**professionalism**). This is primarily related to the ability to transform information.

Using **inappropriate information** if the provider of information is not the source of it.

The circumstances of poor-quality information emergence are the conditions contributing to the emergence of such information. There are several circumstances found by the author (ranked by importance).

The provider's goals are different from the recipient's goals (it was already mentioned as a reason). This possibility becomes a reason upon its realization.

The facts of low-quality information supply in the past.

The lack of information verification (in the cases when it can be done).

The impossibility of information verification by the recipient.

Lack of time to perform the assigned tasks.

The existence of intermediate links in the chain of information transfer. The dependence is simple - the bigger the number of these links, the higher the possibility of poor-quality information emergence.

Inconsistencies in the provided and other information or among of the provided informations **indicate** the poor quality of the information used.

In the mentioned example of a bank letter (the bank required 12 million rubles of the National Bank's credit resources but the figure at the end of the letter was 12 billion rubles), there is such kind of PQI as pseudo-information.

Another sign of low quality information is existence of questions for which there are no answers among provided information but it needs for the complete one.

The problem of finding poor-quality information is that PQI is often detected only after the decision based on it has been already made or new information has generated, or accidentally.

To solve this problem means to find poor-quality information at the stage of preparing a decision or generating new information. To do this, any information is to be checked for the presence of poor-quality information signs. If such signs are not identified (they are not always evident), it is advisable to answer the question – *"Are there any possibilities of poor-quality information emergence?"* If the answer is positive, the information must be verified by using different methods.

The author has formulated three methods for information verification:

- The method of meta-informing;
- The method of detailing;
- The method of linking**;**
- The method of identifying questions.

The method of meta-informing is based on metainformation used to detect poor-quality information, i.e. comparison of informations received from various sources or providers. Meta-informing can be carried out by recipients (through comparing the received information with their own ones), as well as by other parties, including information providers (for example, when it is pointed out on the contradictory informations supplied by them).

If all the compared informations turn out be of equally poor quality, meta-informing will not help to find out that the received information is poor (e.g., a collusion of witnesses). Thus, verification of information by meta-informing requires at least one piece of high-quality information in the compared ones.

The confidence that at least a part of information involved in meta-informing is of high quality is based on the confidence in the methods of obtaining this information and / or in the information provider.

Confidence in the information provider can come from:

- Absence of purposes that can lead to low-quality information supply;
- Facts of high-quality information supply in the past (reputation);
- The professionalism of the information provider;
- The analysis of the information provider's opportunity to access required information.

In the latter point, access should be understood in its broadest sense – it is not only a permission to possess this or that information, but also the possibility of owning high-quality information by virtue of professional responsibilities and interests. For instance, an author of a paper in economy based his conclusions on the fact that the credit issue of the National Bank had significantly increased over the last month. At the same time, the real statistics of the National Bank for the month and one day did not show any growth of credit issue. The author could not have such information, since he did not have access to this information by virtue of his professional duties (he did not work at the National Bank).

If there is no confidence that at least one part of meta-information is of high quality, it is suitable to use double meta-informing (meta-meta-informing). The above example with the energy company Enron is double meta-informing, a comparison of reports from a contracted and an independent audit companies.

The next method to detect poor-quality information is **the method of detailing.** This method is useful for checking the provided sets of generalized information. In the case of successful bombing by the British Air Force during the operation "Desert Storm" (80% of the targets were destroyed), detailed information could be requested by asking the questions:

- What are the enemy's losses?
- What part of the destroyed targets was mock-ups?

It allows detecting poor-quality information (provided that the answers to these questions are high-quality information).

The method of linking. Its main idea is to find an information that is logically linked with the provided information - so that the reliability of the linked information (with a certain probability) can prompt on the quality of the provided information.

In order to confirm the high quality of goods or services, many companies provide related information together with the information about the characteristics of the goods. Such information includes:

- Provision of warranties;
- Availability of quality certificates;
- Trade mark (brand).

The **method of identifying questions** is based on the asking questions identifying the missing information. The asking of such questions depends from all knowledge including intuition the subject has.

Thus, we have ascertained the methods of working with information in order to deal with high-quality information. They can increase the effectiveness of KW activities, since working with poor-quality information leads to wrong decisions or generation of new poor-quality information.

Now, taking into account the intrinsic characteristics of information, we may pass to the question **"How to handle information to generate more new valuable information?"**, which means increasing KW effectiveness in terms of information volume, novelty and value.

First of all, knowledge workers need **to keep information with potential value** (or positioning information indicating where to find the same).

In order to determine whether the information is potentially valuable, KW has to get answers to the following:

- Has the problem (task), for which the information is used, been resolved partially or totally?
- Will this or a similar problem possibly repeat in the future?
- Is the information necessary for any further purposes (other problems solutions)?

People can use Personal Knowledge Bases (PKB) to store potentially valuable information. The author has created and uses a PKB, which allows organizing the structure of stored knowledge in accordance with their fundamental characteristics. The author's PKB reflects all types, kinds and forms of information. Generalized informations and questions are used as criteria for information search. The same principles can be applied for organizing a Knowledgebase for a group of people or an organization as a whole.

Using a Knowledgebase allows generating metainformation of the second order. It determines why information was not included in the knowledgebase though later it revealed a potential value; thus, it develops the ability of a knowledge worker to determine the potential value of information.

It was noted earlier that metainformation is above information on terms of value. Metainformation is obtained by comparing different informations. It is also true that for metainformation (like for any information), there is a suitable question, let us call it a meta-question. Meta-questions are very effective to generate new valuable information. Here are **some basic meta-questions** to be used by knowledge workers in creating new valuable information (NVI):

1. *How can it be done better? What lessons can be learned? What was the mistake or success?*
2. *Is the plan (prediction) different from the fact and why? What are the conclusions?*
3. *What are our/their state of affairs compared to theirs/ours?*
4. *Are there any standard documents (is there a basis for creation of new information)?*
5. *How can I make it better?*
6. *How was the problem solved? Is it possible to use this approach to solve similar problems in the future?*
7. *What is the evaluation of information (how does it agree with my own ideas and other people's ideas)?*

It is important to analyze the informational relations, in which KW enters, since mere understanding of these relations should help KW in the creation of NVI.

While working with information, a man starts communicating with other people; let us call these relationships "information-focused" or simply "information relationships". These are the classes of relationships worked out by the author:

- The relationships of creation;
- The relationships of evaluation and recognition;
- The relationships of transmission;
- The relationships of access (share).

If we look at information-based relationships from the position of their subject (not from the position of an object), each of the classes defined above has the following types of relations:

- Principal – Agent (P-A);
- Authority – Expert (A-E);
- Expert – Expert (E-E);
- Expert – Non-Expert (E-NE).

A “principal” is a subject that set tasks to the “agent”, the latter fulfills the tasks and receives remuneration for that.

An “authority” is a person having acknowledged influence and respect among experts.

Expert is a competent, knowledgeable and skilled specialist (a person educated (self-educated) in a specific field).

The relationships of creation are people’s relations emerging during creation of new information. Assigning a task to an agent by his principal is one of the most significant scenarios in the relationships of creation.

The formulation of the principal’s task to create new information can happen by means of several techniques (or their combinations):

- The agent receives a detailed description of the emerged need for information. For instance, “it is necessary to prepare a decision on interest rates reduction and reflect such-and-such points, expounding them according to a certain logic”;
- The agent receives the causes of the need for information (the problem to be solved). For example, “there is an opinion that it is necessary to reduce the interest rate, since we face certain processes in the economy; so we are preparing a decision on its reduction, reflecting the points that answer the posed questions”;
- The principal and the agent(s) jointly elaborate informational requirements and discuss the problem that causes the task. For example, “let’s ponder whether we need to reduce the interest rate immediately”;
- The agent receives a general description of the information requirements - “we are reducing the interest rate; you should prepare a decision”.

In the latter case, it is highly probable that the agent will not be able to create (prepare) the information required to the principal. It is surely the principal’s fault. One of the performance indicators (KPIs) of a manager is the ability to assign clear, plain and specific tasks to his agents.

The relationships of evaluation and recognition are the relations between the subject(s) presenting new information and other people regarding the recognition of the fact that the produced information is new and valuable and that the subject is the primary source (author, creator) of this information.

In the case where information is created on the instruction of the principal, recognition means that new information meets his needs or ideas.

Starting from the definition, recognition can have the following scenarios.

The subject is the author, but:

- the produced information is new but not valuable;
- the information is valuable but not new;
- the information is neither valuable nor new;
- the information is valuable and new.

The information may be new and valuable, but the subject is not its author.

The relationships of transmission are the relations appearing upon transmission of information by one or more persons and its receipt by others). Unlike the relationships of recognition, such relationships are based not on new information but on already recognized one. These relations always arise during learning or further training. A classic example of this type is the relationships between a teacher and a student.

The relationships of information transmission can have two forms:

- Unilateral – the subject-information recipient has no opportunity to ask questions;
- Bilateral – the subject-information recipient has an opportunity to ask questions and realizes it.

The bilateral form of information transmission is more effective from the perspective of assimilation of the information received.

The relationships of access (sharing information with others) are the relations concerning the possibilities of access to information or its sharing.

Let us consider the constraints to information access from the perspective of various subject relations based on information:

- Principal - Agent;
- Expert – Expert;
- Expert – Non-Expert.

The principal can limit access to information for the following purposes.

Circulation of information may be limited because some information can be misunderstood and / or used to cause harm to the company (or a group of companies, or society - if the company's mission is regulation of social relations), and / or the principal. The principal often uses limitations not only in order to avoid damage, but in order to benefit in a hierarchical system. This happens when the principal arranges things so that information on certain matters goes to (or from) a principal of a higher level only through him. In this case, the principal of a lower level has an opportunity to create necessary (for him) para-information using the principal of a higher level, by delivering poor-quality information (here, the most frequently used such kinds of poor-quality information like incomplete information and incorrect para-information). Of course, this problem should be addressed by the principal of a higher level, if he is aware of it as a problem and decides to identify poor-quality information with one of the above-described methods.

Contraction of the range of individuals who know how decisions are made.

In the "expert-expert" relationship, limitations of access to information takes the form of refusal to share information with other experts because of the fear:

- to provide a foundation, on which a rival colleague can create new valuable information and win recognition;
- to reduce or lose significance to the organization and / or the principal because of the loss of monopoly on information;
- to take additional work or face other negative consequences from the point of view of the information owner (e.g. loss of customers, etc.).

Experts may limit non-expert's access to the information that they possess reasoning from the assumption that distribution of information among non-experts may lead to:

- wrong (harmful) use of the obtained information by non-experts, due to misunderstanding this information or deliberate use of information to bring harm;

- the loss of any benefits to the experts.

Thus, we have examined the information relationships of knowledge workers, which will be useful for further analysis of NVI generation means.

To generate **new valuable information (NVI)**, it is necessary to support the continuous process of meta-informing. Let us consider meta-informing at various stages of KW work with information.

Meta-informing at the stage of receiving tasks. KW must get a most specific, detailed information about the task from the principal. If the problem is posed in a general way, it is necessary to ensure an understanding of information recipient's purpose and requirements, i.e. information about the problem. In the process of receiving a task, KW should carry out meta-informing, questioning his manager and stimulating him to create meta-information: "Am I right supposing that I have to do…?"

Basing on the general pattern of KW activities, the author singles out two fields of meta-informing: the field of NVI creation and the field of created NVI valuation.

In the field of NVI creation, an expert starts relationships with other experts to get useful metainformation. In practice, this means that an expert is not afraid to share the obtained information with those who can generate information useful for meta-informing (for example, by asking the question *"What do you think about...?").* He (or she) should use reliable sources for meta-informing.

In the field of created NVI valuation, an expert is to use double meta-informing (meta-meta-informing), since valuation of transmitted information is meta-informing in itself (the recipient of information compares it with his own information needs or ideals). Double meta-informing can be accomplished by the author of new information after its valuation (meta-questions *"Was it possible to do it better and avoid the mistakes made? Is this valuation correct?"*), as well as by other knowledge workers (meta-question "*Is the valuation of new information correct in the recipient's point of view?"*).

Today's commercial leaders use meta-informing-based incentives aimed at new information generation. Here are some examples.

Boeing has founded the group "Project Home Work", setting a task to compare the processes of manufacturing and marketing of Boeing 707 and 727 – the most successful aircrafts of the company. The team was to collect

materials on the “lessons learned” for successful production and marketing of future airliners [7, p.65].

Boeing’s project was aimed at obtaining meta-information giving an answer the meta-question “What lessons can be learned from the experience?”

Xerox studied the process of creating their unsuccessful products to understand why some business initiatives had not brought the expected results [7, p.67]. The study of Xerox answers the meta-question “How could this be done better?”

Many companies utilize studies of their leading competitors experience, the so-called benchmarking. Benchmarking answers the meta-question *“What is our state of affairs compared to others?”*

Summing up, it is possible to say that it would be wrong to draw an analogy between Taylor’s research, which led to an exponential increase in the productivity of manual labor worker, and studies aimed at improving the effectiveness of knowledge workers, due to the different nature of associated objects participating in relationships - material products and information. Besides, an important role in the creation of new information is played by such difficult-to-study categories as abilities and talent, which cannot be noted in the activity of industrial workers.

Nevertheless, like the knowledge of energy and nutritional properties of food products allows a person to improve the effectiveness of his nutrition in everyday life, the knowledge regarding information and the stated information relationships should improve the productivity of a knowledge worker; though, as it has been said, the role of abilities and talent is not less significant in this process.

Making a conclusion, it is possible to say that the productivity of knowledge workers can be improved by their knowledge of fundamental characteristics of information:

- classes, types, and kinds of information;
- forms of information;
- properties of information;
- methods to find information.

Knowledge of reasons, possible cases of emergence, sings of poor-quality information, as well as methods to detect it and minimize its use,

allows a knowledge worker to have a bigger volume of high-quality information at his disposal.

Detection of information with potential value and keeping it (best of all in Knowledge Base) allows using this information in future for decision making and generation of more new valuable information. Active using of meta-questions serves the same purpose.

KW's knowledge of the information relationships, in which he enters, contributes to the effective use of such methods of new valuable information generation intensification as using meta-informing.

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