Evaluation of Information Support Management by Using Web Applications

L. Lukas, L. Necesal and A. Paduchova

***Abstract*—** Human activities and processes are determined by using of knowledge and information. It is impossible to imagine any meaningful implementation of activities without an information support. There is an important role of information in point of view of individual person but in point of view of whole organization too. Information sharing means important synergic effect in organization. Currently the possibility of fulfilling the information needs of managers achieved a high level, thanks to the development of information technology. However, information support of their activities mostly don´t achieve possible qualities. One of the ways to effectively use modern information technology to satisfy the information needs is using of web applications to create questionnaires. The article discusses the concept of information support activities like a method of evaluation using multicriteria evaluation methods. A part of this paper is the consequent implementation of questionnaire as a tool for the evaluation of information support and analysis of available applications.

***Keywords*—** Information, Information Support, Multi-criteria Evaluation, Web Application, Questionnaire

I. Introduction

MOST of the human activities and processes are determined by using of knowledge and information. It is impossible to imagine any meaningful implementation of activities without information support.

Each position in organization requires satisfaction of information needs which are necessary for carrying out information activities. There is an important role of information in point of view of individual person but in point of view of whole organization too. Information sharing means important synergic effect in organization. Currently, the possibility of fulfilling the information needs of managers have achieved a high level, thanks to the development of information technology.

Many users of ICT accede to information needs by pragmatic way, traditionally and generally no-systematic. Information support of their activities don´t achieves possible quality. Even if there are introduced modern and high-quality information systems users' don´t use their potential. Assessment of the level of information support is one of the reasons of this situation, at both, at the individual level and at the organization level. There is discussed the concept of information support of activities and the way of the evaluation using the multicriterial method of the evaluation in this article.

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II. Possibilities of ICT and information support

Currently the possibility of fulfilling the information needs of users have achieved a high level. Many users of ICT accesses to information needs by pragmatic way, traditionally and no-systematically. Users' don´t realize the possibility of actively forming of their information system, possibility of active access to the information support and to create opportunities and their subsequent use.

Information support of management is the presumption of successful realizing of functions of planning, organizing, human resources, organization and control. Not all managers are aware of the role of information support and the consequences of their neglecting. Character of support is one of the reasons; support is the service not the goal.

Highlighting of satisfaction of information supports of user in realization of information activities aspect is one of the key views of the content of concept of information support. But what do the information needs of user mean? How are the information needs invoked and determined?

The information needs of user are specific information and information items that are necessary for the implementation of certain activities. For example: when the security guard deals with security incident in the building of customer they need to know the address, they need to know when the alarm was occurred, which detector declared violation and a route how to get into the object. Information needs are determined by the performed work. In the scope of the activity need to perform precise operations, control tools, or create an information product output.

The goal of information systems is the information support of users in the performance of their activities. They ensure the information processes and activities linked with the production

of the output product. The output product is the material or information product and service provided too. Information activities ensure the monitoring of the guarded area, an awareness of the police during the disturbances of the object or the identification of the false alarm. Informational support includes both the possibilities and the potential of information systems, as well as the ability of users to implement and create the desired result. Part of the information support is the information literacy and information behavior of users.

A. Information support of managing, decisional and cognitive processes

The term information support expresses supporting of subject by information. There is the static and dynamic conception of information support in depends on character of subject. The distinction results from the character of statics or the dynamics of the subject are in time.

Perception and evaluation of a dynamic conception of information support is important for user and for organization too. This conception is based on permission that level of information support is determined by quality of information system and by skill of the user to use information to realize performed operations. Quality information system is still at possibility and potential level when the user is not computer literate enough. If the user won´t use it then investments to information system will stay unexploited.

Information support represents the processes (complex of information activities) which support managing, decisional and cognitive processes. Finding the information, its processing, presentations and archivation are basic information activities. There is depicted the information support of managing on Fig.1. The task of manager is to manage organization to meet prescribed tasks and thus reached the goal. He uses employers to do this. He uses employees mainly (object of managing). He provides the tasks by managing of object of managing. Management has got significantly informative character. Information system is usually used to determine of status of fulfilled process by manager (subject of managing). He creates a picture about processes which are fulfilled by information support which is realized by information activities. Manager formulates variants of another process based on fulfilling of the goal, he chooses the optimal one and then he issues the commands for employees to directing their activities to fulfilling the goal. Such commands may be in the form of reports or changes of data in an information system database.

Data changes are then reflected through the relations by specification of during the process. Informational support of management which is realized by number of information activities of subject and object of management will ensure that the process will complete and the fulfilling of established targets.

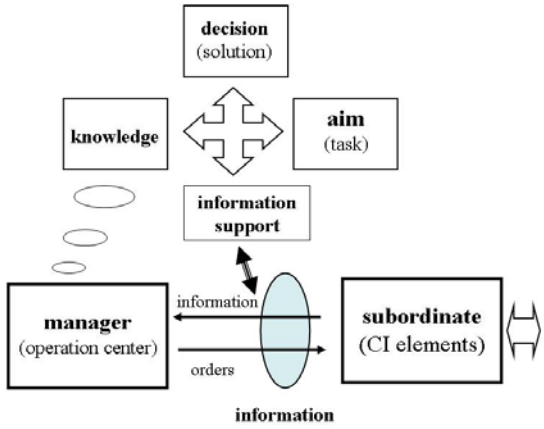

Fig.1: Concept of information support

Information support underlines processes of searching, processing and presentation of information. It is established to the thought process of the human. The level of information activities depends on skills of user, on used instruments and on information system mainly. The interface ´user-information system´ play an important role. On Fig.2 we can see information support of management by using computer-oriented information system.

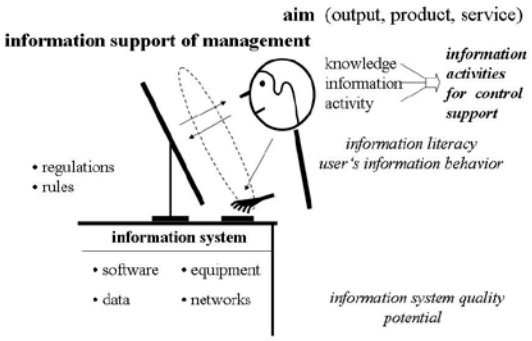

Fig.2: Interface user – computer

Information support of with using of computer - oriented information system usually indicates a two-way information flow. This flow imagines information interaction between the user and information system interface. It is very important to know how to find individual information items, how to control user interface for user, how to input data to the database and so on. He should have conceptual idea about electronic slide[1] structure, functions and about methods of controlling of information interface. His activity will be cumbersome and slow without this knowledge. The user interface should be designed so that it didn´t constitute an obstacle but an advantage in the exercise of various information activities. In a number of information systems it is used as the basic Internet browser application for the creation of the user interface.

[1] Electronic slide - means a specific frame on the screen on the monitor (display unit). The sequence of frames (electronic slides) represents the flow of information which is offered to a user to satisfy its information needs.

Using of tools which users are working normally with and they don´t need to use additional training is a positive of this solution. Most Internet browsers have similar basic functionality enabling the imposition or reverse lookup of visited web sides, keeping of links to important sources of information and pages, and so on.

Information support is an important way to contribute to the quality of most of the activities. In particular with the unprecedented development of the possibilities of modern information technology it depends on the user how he will make use the possibilities of his information environment to fulfill his activities. Managerial activities are included to the most dependent on information. There is proposing method of evaluation of information support level with the using of multi-criteria assessment in the next part of the article.

III. Multi-criteria evaluation of information support

If we are solving multicriteria evaluation tasks we have to proceed systematically. The general procedure for multi-criteria evaluation can be divided into five phases:
A) Analysis and formulation of tasks
B) Collection and processing of information
C) Choice of method
D) Calculation
E) Evaluation

A. Analysis and formulation of tasks

The first step is to map the current state of the problem. It should also clarify the purpose of the task solution and analysis of systems or subsystems which directly or indirectly relate to the solved problem. Formulation of task is then a result of this analysis.

The role of formulation is:
a) Determination of the role of goals in which are defined as main and sub objectives task. During its creation, we must ensure consistency between objectives, goals and completeness because duplicate targets could distort the results.
b) Selection criteria - specify the types of criteria such as quality or quantitative and also the range of criteria which is subsequently measured values of criteria expression. This set of criteria for evaluation is very important because they are used to measure the level of performance goals.
In order to select the appropriate criteria, we must not forget the one hand it. Thanks to them we were able to make the most comprehensively assess possible differences between individual variations.
c) Determining the set of alternatives is evaluated in determining a set of possible alternatives and exclusionary criteria through their reduction to a set of "Acceptable" alternatives. The actual exclusion of the inadmissible solutions can usually performed after the actual collection and processing of information.

B. Collection and processing of information

The main task of this phase is to collect all the necessary input data and their analysis. There can be used either pre-existing information, such as secondary data.
In this stage also should be assessed as well as the explanatory power of criteria.

The analysis of input data can confirm the suitability of the set file evaluation criteria or even the needed correction. The collection and processing information are the most commonly applied statistical methods and methods of mass processing.

C. Choice of method

The correct choice of multi-criteria evaluation method is necessary to know:
- Subject of research.
- Goals and conditions of research.
- Aspects that the evaluator must take into account and respect them.
- Time allowed for evaluation.

The first necessary step is to create a criterion matrix which includes criterions and variants of evaluation of information support as you can see on figure number 3.

Criterion/Variant	1	2	3	4
A				
β				
π				
Ω				
Evaluation				

Fig.3 Criterion matrix

There are some examples of direct and indirect methods for evaluation of normalized weight of criteria.
Direct methods include:

- Method of points,
- Method of the order,
- Metfessels allocation method.
- Indirect methods include:
- Fullers´ method of triangle
- Saatys´ method.
- Method of points

It is necessary to start with creation of evaluation point scale which starts with 0 odd numbers of members. The main goal of this method is to assign the value to each criterion which expresses an importance. This is an example of suitable scale:

0- Definitely non important criterion,
1- Non important criterion,
2- Moderately important criterion,
3- Very important criterion
4- High level of importance.

We will get normalized weights of criteria from this formula:

$$v_j = \frac{b_i}{\sum_{i=1}^{m} b_i} \qquad (1)$$

Where b_i is an importance assessment of j- criterion and m is number of criterion. It is up to the evaluator to choose right

value and we can use real number for bigger sensitivity of evaluation.

We will use Method of the order and Metfessels´ allocation method later in this article.

Method of the order

In this method criteria are sorted according to their level of importance with certain criteria can be considered as important. Values of the background function is then adjusted so that the least important criterion is assigned a value of 1 and the most important values of the background function which is equal to the number of criteria. The criteria to be equally important for evaluators must have a value that is determined as the arithmetic mean.

Metfessels allocation method

The main objective of the Metfessels´ allocation is a division of 100 points among all criteria under consideration with taking into account the distribution of the evaluation preferences. The most important criterion is assigned the most points and vice versa. Standardization of weights is done according to the formula:

$$V_j = \frac{b_i}{100} \quad (2)$$

Where b_i is a number of points for j criterion.

This method is a type of modification of Method of Points.

D. Calculation

In general, we can calculate "by hand" or with use of software. Table editors are used in simple methods. Special software is used in difficult methods. When we use unaccredited software it is necessary to try it on known example and make an analysis of results.

E. Evaluation

The obtained results are basis for quality evaluation. With these results it is also necessary to evaluate both their weaknesses and strengths. It is very important because they have possible effects on the results. And because of this it is necessary to have a sensitivity analysis. Before the evaluation is advisable to realize even other aspects which are not quantifiable.

IV. Proposal of Multi-Criteria Evaluation for Assessment of Information Support

Multicriteria evaluation is one of the higher forms. Evaluation results are relative and express the level. The result of evaluation is dimensionless.

When it is needed to evaluate an object from several disparate views simultaneously we use multicriterial evaluation. The information support it is evaluated from view of users´ and information system. According to [3] the basic evaluating attributes for evaluation of level of information support are:

1) Information system (his level) – this concept involves a whole range of characteristics and linked activities. Certain specific properties are expected from them and you can choose them as the criteria, namely:

- Complexity
- Availability
- Safety
- Ease of use
- Implementation of processes (ITIL)
- Speed
- Technical support (training, solutions of technical problems)
- Interaction with other systems

2) The user and his computer and information literacy – a person as a user of the information systems, the main factor in managing activities. The quality depends on the characteristics and skills of managing activity, therefore, there are chosen abilities as criteria:

- Using of PC and file administration
- Basic knowledge of terms of information technologies
- Text processing
- Work with table processor
- Use of database
- Presentations
- Work with Internet and using of Internet communication tools
- Digital processing of images
- Web pages design
- Knowledge and using of safety principles in use of information and communication technologies
- Work with sources of information
- Basic terms from information sources area
- Work with retrieval systems

There is selected method and set the weights of each of the criteria in the next step. Method for the order is useful for criteria evaluation of the information. The basis of the method is to set the weighting of the criteria – in the order of importance of the criteria from 1 to 8 and standard weight as follows:

Table 1 The determination of weights of the criteria for information system – Method for the order

Criterion	Weight	Normalized weight
Complexity	1	0,0278
Availability	8	0,2222
Safety	4,5	0,1250
Ease of use	6	0,1667
Implementation of processes	7	0,1944
Speed	4,5	0,1250
Technical support	3	0,0833
Interaction with other systems	2	0,0556
The sum of normalized weights		1

After that follows creating of table where are evaluated examples of information systems in such a way that it will be assigned a valuation of information system range of 1 to 10 of individual criterion where 1 means the worst and 10 means the best. After that values are assigned and multiplied by the normalized weight of standard criteria for individual criteria which were calculated in the preceding table.

The coefficient for each evaluated information system calculated according to the formula is the result:

$$K = \sum_{k=1}^{n} a_k . nw_k \quad (3)$$

Where:
a_k = assessment,
nw_k = normalized weight,
n = number of criteria.

Table 2 Determination of the coefficient of the individual information systems

Criterion	Low- quality IS		Average IS		High- quality IS	
	assessment	coefficient	assessment	coefficient	assessment	coefficient
Complexity	3	0,0833	1	0,0278	9	0,2500
Availability	1	0,2222	8	1,7778	9	2,0000
Safety	3	0,3750	1	0,1250	9	1,1250
Ease of use	2	0,3333	4	0,6667	9	1,5000
Implementation of processes	1	0,1944	8	1,5556	9	1,7500
Speed	3	0,3750	1	0,1250	9	1,1250
Technical support	3	0,2500	1	0,0833	9	0,7500
Interaction with other systems	3	0,1667	1	0,0556	9	0,5000
Coefficient IS	**2**		**4,416**		**9**	

Coefficient expresses quality of information system according to the selected criteria and their assigned weights. Weights of the criteria have an important role in this case as we can see in comparison of average and low - quality information system.

The coefficient can take values from 1 to 10 where the interval <1-4> means low- quality information system, <7-10> high- quality information system and the interval <4-7> the average information system.

For the evaluation of the user and his computer literacy is designed using of the Metfessels allocation method. The first seven of requirements are corresponding to the modules for fulfilling of ECDL certificate or the European Computer Driving License and it is the basic level, three more requirements are from the extended degree.

The last three criterions shall cover a range of information skills and information literacy. Therefore, it is appropriate always to have the same weight in these groups as follows:

Table 3 The determination of weights of the criterion for user - Metfessels allocation

Attribute	Weight	Normalized weight
Using of PC and file administration	10	0,1
Basic knowledge of terms of information technologies	10	0,1
Text processing	10	0,1
Work with table processor	10	0,1
Use of database	10	0,1
Presentations	10	0,1
Work with Internet and using of Internet communication tools	10	0,1
Digital processing of images	3	0,03
Web pages design	3	0,03
Knowledge and using of safety principles in use of information and communication technologies	3	0,03
Work with sources of information	7	0,07
Basic terms from information sources area	7	0,07
Work with systems background research systems	7	0,07
Sum of points / normalized weights	100	1

It is good to have the same procedure in computer literacy assessment so we will assign assessment values from 1 to 10 to individual criterion and we will use the same formula for calculation of the coefficient.

Table 4 Calculation of the coefficient for individual users.

Criterion	Bad user		Average user		Good user	
	assessment	coefficient	assessment	coefficient	assessment	coefficient
Using of PC and file administration	3	0,300	4	0,400	9	0,900
Basic knowledge of terms of information technologies	1	0,100	5	0,500	9	0,900
Text processing	2	0,200	6	0,600	9	0,900
Work with table processor	2	0,200	4	0,400	9	0,900
Use of database	1	0,100	5	0,500	9	0,900
Presentations	3	0,300	6	0,600	9	0,900
Work with Internet and using of Internet communication tools	2	0,200	6	0,600	9	0,900
Digital processing of images	1	0,030	1	0,030	9	0,270
Web pages design	2	0,060	1	0,030	9	0,270
Knowledge and using of safety principles in use of information and communication technologies	3	0,090	1	0,030	9	0,270
Work with sources of information	1	0,070	6	0,420	9	0,630
Basic terms from information sources area	1	0,070	5	0,350	9	0,630
Work with systems background research systems	1	0,070	6	0,420	9	0,630
Coefficient of computer literacy of the user	1,790		4,880		9	

Coefficient expresses the level of computer literacy of the user according to the selected criterion and their weights. The coefficient can take values from 1 to 10, where the interval <1-4> means low- quality information system, <7-10> high-quality information system and therefore the interval <4-7> the average computer literacy of the user.

We can compare the interaction user- information system which is expressed in table easily because there was selected the same normalized weight and the range of assessment of individual criterion.

Table 5 The level of information support

Level of interaction user- IS	Low- quality IS <1-4>	Average IS <7-4>	High- quality IS <7-10>
Bad user <1-4>	**2-8**	5-11	**8-14**
Average user (4-7)	5-11	**8-14**	11-17
Good user <7-10>	**8-14**	11-17	**14-20**

The table shows that the level of interaction between the user and the information system or the level of information support is the same as in the case of high-quality information system but on bad level of computer literacy where instead of good quality level it is used user-level of information system and also at an average level like in the interval <8-14>. The combination of low-quality IS and bad level of user is expressed by the interval <2-8>. The combination of high-quality IS and good level of the user is expressed by an interval of <14-20>. Evaluation helps you to gain 3 levels of information support. If these levels would be necessary to smooth you can use this distribution level of information support from the table.

Table 6 Distribution of the levels of information support

Interval	Scope	Level
<2-5>	3	very bad
(5-9)	4	bad
<9-13>	4	good
(14-17)	4	very good
<17-20>	3	excellent

This assessment brings instrument for determination of level of information support of the user and organization. It enables the comparison of users. We can evaluate benefits of new information systems and training activities of organizations by using this.

V. Questionnaire as a Tool for the Evaluation of Information Support

In general, it is possible to produce a questionnaire in three ways:

1. Using HTML language - it is directly the source code of web pages, "common" enriched to text file marks (tags) of HTLM language. For advanced features and rating professional sites are used CCS styles Java script, PHP. This type of website creation requires a deep understanding of these tools the advantage is clarity and simplicity of code.

2. Using of special software to create Web pages - HTML editor - it is tool that is specially designed for creating pages. Especially wysiwyg editor writes straight text and html code is not addressed. In the editor, write text, insert images and the result is stored with the extension html. Editor all html tags (tags) complement alone and this creates a functional page. Examples of such editors are Dreamweaver, FrontPage 2000 (version 2002 and 2003 Czech).

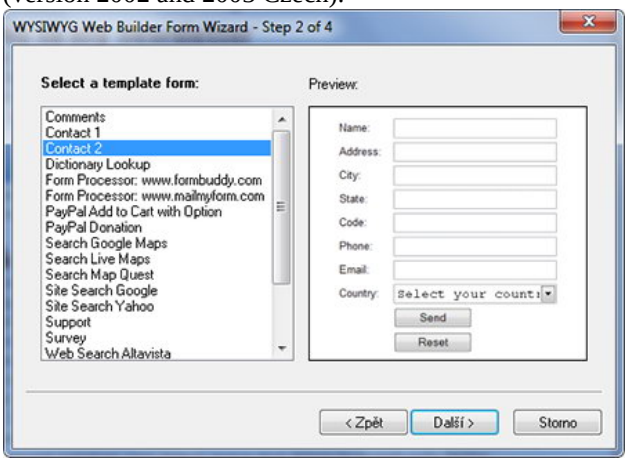

Fig. 4 Wysiwyg HTML editor

3. Using templates and special tools for creating questionnaires (web pages) - for special requirements such as the creation of questionnaires, or special application, or website design, there are lots of templates, widgets (calendar, videos, maps, etc.) that need to modify according to your own requirements. The advantage is easier editing, code robustness disadvantage and limited editing capabilities usually use these templates and tools linked to the site location application.

If we have our own server and domain we are in total data independence.

A. Analysis of the available tools

The most popular applications available on the website:

1. Survio - http://www.survio.com - advantage is a sufficient number of question types and large selection of sample questionnaires, also a user-friendly environment in developing the questionnaire, major disadvantage is of a low number of possible responses and inability to export in the free version. Another disadvantage is the impossibility of logical branching, and placing ads in the basic, free version.

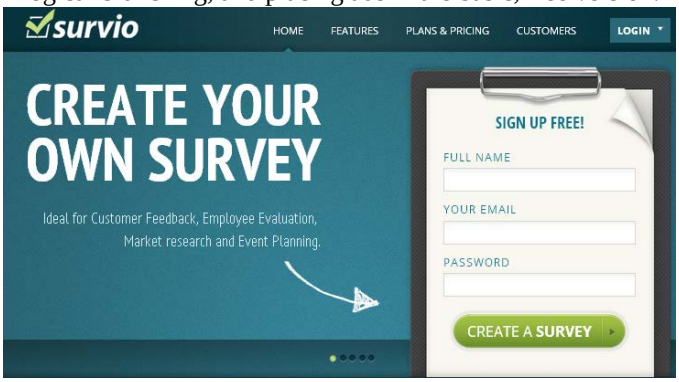

Fig. 5 An application Survio

2. I-questionnaire - http://www.i-dotaznik.cz/ - Here is severely limited length research for 14 days and number of respondents in the basic, free version. Advantage is extra number of types of questions. Another negative is the location of ads and the lack of technical support in the basic version.

3. Our Survey - http://www.oursurvey.biz/ - This service is very attractive feature that is providing totally free, without restriction and commercials. It supports logical branching questionnaire multilingualism and the ability to access the questionnaire only with a password. The fundamental drawback is little choice between the types of questions and sometimes subjective slowness server respondents and makers must ensure respondents himself. On figure number 5 are shown advantages of this application.

Unlimited questions	✓
Unlimited respondents	✓
Unlimited surveys	✓
Your own logo in survey	✓
Easy & intuitive web interface	✓
Actual reports from surveys	✓
Actual graphs reports from surveys	✓
Insert URL to survey on your web, email etc.	✓
Conditional questions - question´s tree	✓
Multilanguage - English, French, German, Czech	✓
Possibility to password protect surveys	✓
Set surveys to be available from-to	✓
Set surveys to be available till X fills	✓
Show your text after survey end	✓
Advanced features of the statistical results	✓
Export to excel	✓
No ads/banners in survey	✓
Price	**Free of charge**

Fig.6 Advantages of Our Survey application

4. VyplnTo - http://www.vyplnto.cz/ - The advantage is the possibility of logical branching of questionnaire which depends on the respondent's answers and clear guide to creating a questionnaire with an extensive help. There are security features - ensuring uniqueness of respondents using the IP address or the e-mail and option to remember the

address. As the main negative aspect is the time limit in the free version (30days per questionnaire), the lack of technical support and advertising.

5. GoogleDrive-https://docs.google.com/-A big advantage is the absence of any limit of number of respondents, questions, questionnaires. A questionnaire can easily display and mobile device support exist logical branching questionnaire based on the selected responses. The questionnaire itself features a large control handling qualities over all the data (in a table as MS Excel). These options, however, are more difficult to control redeemed advanced features. Welcoming helper each option when you create the questionnaire is missing. A great feature is the possibility of conducting a survey on the Internet where you can allow users to edit responses require a domain logon to view forms. You can automatically obtain a user name from the domain of the respondent.

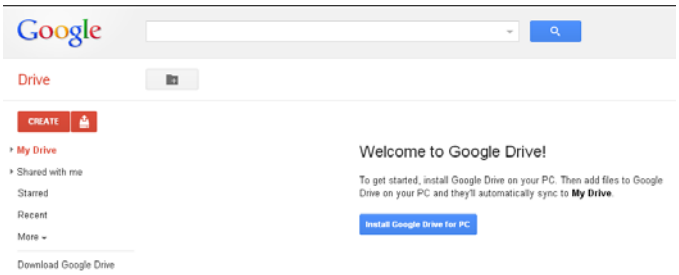

Fig.7 An application Google Drive

VI. Research with Questionnaire

After the analysis of available applications, Google Drive has been chosen and we have created the questionnaire. This questionnaire was used in our research project "Assessment of the current status and potential for development of information management support in the security forces". The main research area of this project was the information support management in security forces.

The questionnaire had these 6 types of question:

1. An information style and information habits.
2. Specifics of information environment.
3. A strategy of routine activities.
4. Specifics of information literacy.
5. An information support of security activities.
6. An information fear.

There is the most important part of results in the following paragraph:

- An information support is an interaction between person and the information system,
- The 8 most important features according to information managers include timeliness, credibility, reliability, timeliness, accuracy, completeness, orderliness and complexity.
- Managers realize that their information needs are determined by the performed work.
- The most carried information activities are searching for information and communication.
- The most difficult information activity is planning and organizing for managers.
- Most respondents defined information support as a process to support of information management, decision-making and cognitive processes.
- Presentation of information is very important part of information support.
- Only 40% of respondents backup their data regularly, this activity is very none systematically.
- Hard disc is a basic memory medium.
- The most difficult part of work with information is to create something new and information searching.

VII. Conclusion

Information and communication technologies have become phenomenon of nowadays. Quantity and range of information activities of users is rising up. Users are in stress with quantity of uncompleted tasks by information character more often. Mastering of this workload requires the change based on a proactive method of deployment and using of ICT for support of activities. Determination and elaboration of the concept of information support as a way of marking of output of activities of information technology and information system is the result of this effort. The term of information support allows to create a system view of the range of information activities with using of ICT and to describe the elements and links to ensure the creation of an information result. We have used a questionnaire for the part of our research. Very important result of our research is that there is a big importance of information support and interaction between management and the user. It is interesting that only 40% of respondents backup their data regularly. And the most difficult part of work with information is to create something new and finding of information. We could say that there is a good level of information support area but we have found some problems which have become our new challenge for another research.

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