BASIS FOR IMPROVING INFORMATION SUPPORT OF CRISIS MANAGERS' DECISION MAKING

Luděk Benda[1], Zdeněk Kopecký[2], Petr Půlpán[3]

SUMMARY:

Basis of improving information support of crisis managers' decision making is a subject of the project „Design and implementation of techniques and processes for decision support to crisis managers using methods of quantitative management and distributed data base (DIPS) – VG20102014019". The starting point for making crisis management more efficient will be especially optimization of information support and usage of quantitative management methods. The software will support design of alternative solutions for crisis situations based on setting specific criteria for searching sufficiently good variant as a decision. At the same time, a system of secured data synchronization among data nodes and system installations will be designed.

KEYWORDS: *crisis management, information support, crisis managers' decision making*

INTRODUCTION

Risks and uncertainties, which arise from turbulent environment of the current globalized world, are part of our everyday life. That's why risks and uncertainties belong to significant aspects of decision making [2], [3], [4], especially on crisis management processes which are mostly unclearly structured and their outcomes and impacts may have fatal consequences for achieving set goals or even for the existence of the managed subjects and processes itself.

Level of risk involved in the decision making depends on whether the crisis managers are risk-avoiding, risk-neutral or risk-seeking. They behave accordingly to these risk attitudes which depend on their experience, personality and preparedness [7], on the problem which is being solved and on the level of uncertainty involved in the particular risk alternative.

Because of the aforementioned reasons, the main goal of the system for improving information support of crisis managers' decision making proposed is focused not only on the process of coping with the crisis situations and their negative impact but on training of the crisis managers as well.

1. IDENTIFICATION OF DECISION MAKING PROBLEMS AND THEIR CLASSIFICATION

When identifying decision making problems in the field of crisis management, it is necessary to proceed from the current practice which in connection with legal regulations and available methodology set standards for maintaining the same and correct procedures for decision making of crisis managers [8].

That is especially the matter of organizational protocols, statutes and methodology and standardized procedures of coordination and operational units in the field of crisis management.

To identify decision making problems and their classification used in fulfilling manager functions during coping with crisis situations in

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[1] Ing. Luděk Benda, WAK System, s.r.o., Petržílkova 2564/21, 158 00 Praha 5, Czech Republic, tel.: 420 251 612 552, fax: +420 227 031 210, e-mail: benda@waksystem.cz

[2] Ing. Zdeněk Kopecký, Ph.D., University of Economics, Prague – Institute of Crisis Management, Ekonomická 957, 148 01 Praha 4, Czech Republic, +420 224094223, +4202240940251, kopecky@vse.cz

[3] Ing. Petr Půlpán, WAK System, s.r.o., Petržílkova 2564/21, 158 00 Praha 5, Czech Republic, tel.: 420 251 612 552, fax: +420 227 031 210, e-mail: pulpan@waksystem.cz

all phases, it is possible, according to the current practice, to list areas which have to be dealt with:

- analysis of accountability for particular manager functions in specific office, company, etc. from the perspective of given competences in general as well as in the sphere of emergency and crisis management,
- organization and tasks of the crisis management in the specific organization including assigning division of tasks and accountability among statutory officials, other leading management, professional crisis managers – crisis management departments, coordination units such as crisis committee, board, commission etc.,
- extent and content of required and recommended planning documentation in connection to making sure that the organization is able to carry out planned and operational management during coping with unexpected events and crisis situations – a wide range of the subject of crisis management,
- ensuring professional preparedness of all participants and exercising their capability, verifying feasibility of the prepared planning documentation and its proposed measures and procedures in form of practices, carrying out both regular and random controls of preparedness of subordinates and methodically managed subjects.

To identify decision making problems and their classification used in fulfilling manager function of planning in the phase of operational management, it is necessary, according to the current practice, to list domains in which it is needed to:

- deal with the way of operating on the level of tactical, operational and strategic management – place of intervention, operational centers, flood, emergency and other commissions, crisis committees and so forth,
- deal with securing operational functioning of the specific organization from the perspective of securing functionality in particular subjects, activation of operating and coordination units, appointing their own representatives into cooperating coordination units, ensuring safety of operating and communication centers, allowing relocation to backup operating workplaces etc. – have an operational plan,
- ensure uninterrupted flow of information about the origin and development of the

unexpected event and crisis situation including information and evaluation of success rate of the crisis measures proposed,

- carry out a running analysis of risks and losses and, in cooperation with direction and coordination subjects and specialists, propose and realize planned and operational or provisional measures,
- carry out overall evaluation of the course and progress of the unexpected event and crisis situation including execution of liquidation tasks and, in connection to this evaluation, propose relevant improvements of the crisis management system and make proposals for liquidation and compensation of losses, renewal of the area and new preventive measures.

2. SETTING FUNCTIONAL REQUIREMENTS FOR THE SYSTEM

Those are requirements marking the way in which the designed information support system should be compiled. Due to the high number of them, they were divided into logical groups and relations among them were established [1].

The basic scheme of the aggregate architecture of the proposed tool for the information support is displayed on Figure 1.
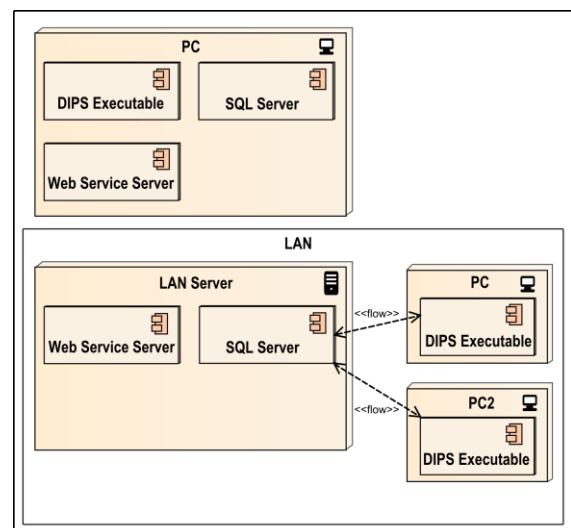

Figure 1. **Architecture model**

The main functional requirements represent entities of particular system, user and presentation characteristics and functions of the system. They are the main menu of the system options. Due to their quantity only the

basic overview is listed here. The system will contain user environment enabling:

- register of threats,
- register of crisis management subjects,
- register of coordination units of crisis management subjects,
- register of crisis managers,
- register of organizations active in crises management processes,
- files of information and instruments which are related to the support and optimization of crisis managers' decision making,
- support of searching and providing information related to the support and optimization of crisis managers' decision making,
- setting attributes of measures related to simulation of crisis managers training,
- simulation of unexpected events and crises situations for crisis managers training according to defined scenarios,
- analyses and evaluation of the training in dealing with crisis situations performed,
- register and administration of system types,
- transfer and exchange of data.

3. SUGGESTED CASES OF USAGE

Cases of usage represent their own entities. Each case of usage shows one thematic range of user operations and describes functions which will be implemented in the system designed. A case of usage can contain another more specific cases of usage which describe the functionality in more details [1].

- **Register of threats**
  The system will contain system and user environment enabling to record threats. There will be an electronic register of possible types of threats and their consequences created. These files will serve for categorizing registered information. Moreover, it will be used for defining threats in training scenarios. In this way defined threats will also constitute the content menu of requirements when searching for data.
- **Register of crisis management subjects**
  The system will contain system and user environment enabling to record crisis management subjects. The files will:
  - centralize information about types of subjects active in crisis management. Such registered subjects will be an integrating element between registered information and actual organizations active in crisis management,

- ensure creating connections "crisis management subject – coordination units of the subject",
- constitute the content menu for defining requirements when searching for data.
- **Register of coordination units of crisis management subjects**
  The system will contain system and user environment enabling record coordination units of crisis management subjects. The files will:
  - enable to create unlimited number of coordination units of a particular type of subject. Such registered coordination units will represent patterns which will be used as an instrument for creating and registering real structures of these units in actual organizations active in crisis management. It will be possible to present such registered coordination units of the particular subjects as model ones,
  - be used for defining structures of such units up to the level of particular members,
  - ensure creating relationship "coordination unit – crisis manager".
- **Register of crisis managers**
  The system will contain system and user environment enabling to record crisis managers. The files will contain both the crisis managers from the perspective of their function or job position and individuals who become crisis managers when a crisis situation occurs. As individuals who become crisis managers when a crisis situation occurs are considered especially specialists from business-administration organizations which secure and coordinate realization of supplies and services needed during a crisis situation. These files will serve as a database which will be used for defining coordination units of the crisis management subjects. The files will also constitute the content menu of requirements when searching for data.
- **Register of organizations active in crisis management processes**
  The system will contain system and user environment enabling to record organizations active in crises management processes. These files will be used for creating a register of organizations active in crisis management including individual structures of coordination units of the organization. To create operational and coordination units

it will be possible to use patterns which are comprised in the register of crisis management subjects. It will also contain the registers of contact persons including possible contact links. The files will be used for creating inter-relations "contact person – crisis manager".

- **Files of information related to crisis managers' decision making**
  The system will contain system and user environment designed to record information related to and supporting crisis managers' decision making. The environment will provide unified database designed to register all available information which can be useful to a crisis manager during their decision making. The environment will provide the following tasks:
  - structured acquiring of available information. It will serve for creating connections like these:
    - information – crisis subjects,
    - information – types of threats
  - extended register of information in the form of the following connections:
    - information – electronic links to public sources,
    - information – electronic documents,
  - follow-up updating of the saved information,
  - acquiring information usable for simulation exercises for the crisis managers.

- **Searching and providing information for crisis managers' decision making**
  The system will contain system and user instruments supporting searching and providing information related to and supporting crisis managers' decision making. Information registered in Information center will ensure professional and legal support to the crisis managers. This part of the system will contain instruments enabling users to define requirements for data selection. For this purpose there will among others be implemented attributes containing restricting requirements as filters (types of information, threats, subjects, managers, roles, etc.). These menus will make it easier for the managers to orientate themselves in the registered data and at the same time they will serve as a help. Data search will always be carried out based on defined requirements for the data search. The result of the search will be data entity which will be displayed in a suitable form. Presentation form of the data will be selected according to the nature of the information displayed.

- **Register of scenarios of crisis situations simulation exercise**
  The system will contain system and user environment enabling to define scenarios of crisis situations exercises. The environment will support creating and subsequent upkeep of particular scenarios including their basic specifications. Register of threats and record of a training plan will be a part of each scenario. Register of threats will be based on expected types of threats and will enable to define impacts on protected values. Record of the training plan will play two roles. It will contain a plan of the key measures which will be tested during the training. Moreover, during the training the plan will be continuously updated with measures which will be a result of the manager's decision making.

- **Simulation of exercises for the crisis managers**
  The system will contain system and user environment enabling to simulate training for the crisis managers according to defined scenarios. Simulation of the crisis managers training will be started by selecting a scenario chosen for the training. The threats defined by the scenario will be the base for starting the processes of the simulation itself. In this phase the environment will mediate communication between the exercising manager and the system. Communication will take place on the level of menu and selections of measures which will be chosen by the manager in order to minimize risks. Recording this communication will create database of particular manager's decisions for which it will subsequently be possible to be evaluated. It will be possible for simulation of the same scenario to be repeated unlimitedly. In this way it will be possible to train particular decision options and evaluate them afterwards.

- **Searching and evaluating of exercises performed**
  The system will contain system and user instruments enabling to search and evaluate performed exercises of crisis situations. It will be possible to use this part of the system in two ways. The first one is optimization of crisis managers' decision making regarding to the particular crisis situation trained. For optimalization of decision processes [5],.[9] are available professional

optimalization systems with support of software tools [6]. The most famous and high-performance foreign professional optimization systems are for example CPLEX, GUROBI, XPRESS-MP, MOSEK, FortMP, Premium Excel Solver. The environment will enable to analyze the recorded communication between the exercising manager and the system. Especially the comparison of different ways of decision making (i.e. the level of risk rate when choosing different measures) in cases of repeated trainings of the same scenario will be an ideal instrument for optimization. The second way how to use this part of the system will be presentation of performed simulation of training. The instruments designed for this purpose will make it easier to evaluate the training and, at the same time, with the scenarios whose simulation was performed as the standardized one, the instruments will support teaching behavior and decision making of crisis managers. This part of the system will be used to set requirements for searching for the performed training, for performing its own data search and for evaluation and presentation of them to the users.

- **Register of DIPS system types**

The system will contain system and user instruments enabling to record and administer system types. The instruments will be used to structuralized administration of all possible system types. System types represent data entities and are designed to their primary classification in the system.

CONCLUSION

Optimization of decision making in crisis management depends not only on methodology, instruments and procedures of quantitative management, but also on the level of information support, because information (complete, timely, clearly understandable and with good informative value) minimizes level of risk during decision making.

Quality of information support is decisive for efficient application of administrative model of decision making which is based on the presumption that the manager:
- has a limited amount of information,
- on the basis of simplified view of the world has limited abilities to cope with decision making problems,
- due to limited knowledge does not determine all possible options leading to the desired goal,
- chooses a sufficiently good option which ensures appropriate (sufficient) utility (so called principle of satisfaction).

It is the matter of an approach which is based on time restriction, available resources (informational, factual, financial etc.), abilities and skills in decision making – all of which are limiting factors for decision making in crisis management as well.

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