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Dortmund is the 8th largest city in Germany and a vibrant centre within the Ruhr metropolis, centrally located in North-Rhine Westphalia. In the course of its history, Dortmund has had many titles – Free Imperial City, Hanseatic City, centre of industry, football capital – but one thing has remained constant: its function as a driver of change across the region.

With its strong industrial core, Dortmund is now a city of medium-sized companies and an important reference for technology, digitisation, education and services. It has transformed from a 'city of coal, steel and beer' into a high-technology location, which people from many different cultures like to call home. Dortmund is known today for its lively multicultural community, its start-ups, and its innovative entrepreneurs.

The city has embraced its industrial heritage and made it an integral part of its attractiveness. Visitors can discover the Zeche Zollern, a model colliery, take a walk along the Skywalk above the redeveloped Phoenix West site, where the old disused blast furnace sits alongside new technology and a service location gasometer, or stop by the Borussia Dortmund, also known as the 'BVB'.

The history of Dortmund's higher education is recent, the first of its seven universities dating back to 1968, and the city is already recognised as one of the leading scientific locations in Germany with over 50,000 students enrolled in Dortmund's universities.

While keeping a strong link with its past, the city now focuses on mitigating climate change and promoting sustainability. It has been awarded the prize for Germany's most sustainable city in 2014, and with 63% of the city made up of green areas, Dortmund is one of the greenest large cities in Germany. Thanks to the participation in urban development projects such as Phoenix Lake, the city's inhabitants enjoy an attractive mix of green areas, commercial and leisure areas, and residential spaces.

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Project Management of the Information System for the Selection of Project Teams

Nataliia Kovalchuk, Oleh Zachko, Oleh Kovalchuk, Dmytro Kobylkin
Lviv State University of Life Safety, Kleparivska Street 35, Lviv, 79007, Ukraine,
ldubzh.lviv@dsns.gov.ua, https://ldubgd.edu.ua

***Abstract* — in conditions requiring demand for highly qualified specialists, it is important to have an effective system that will help select the best candidates for the growth of projects. The design of an information system for the selection of candidates in the project is of strategic importance, it provides functionality and integration with the recruitment process. The article describes the key stages of designing an information system, starting with the analysis of requirements and the definition of functionality. Aspects such as the creation of a candidate database, automated resume and candidate tracking, tools for assessing skills and abilities, and means of communicating with applicants are covered. Special attention is paid to the integration of the information system with the hiring process. The possibilities of connecting to recruiting platforms, automated notification of the status of applications and data exchange with the company's internal systems are considered. The use of an integrated system contributes to increasing efficiency and reducing the time required for the selection of candidates. In addition, the article considers the importance of compliance with the principles of confidentiality and protection of candidates' data in the process of working with the information system. The need to implement appropriate measures to ensure the security and confidentiality of personal information is emphasized. The article emphasizes the importance of training and supporting users when using an information system to select candidates for the project. Briefings, training materials and ongoing support contribute to the effective use of the system and the achievement of the best results in the selection of candidates for projects in a safety-oriented system.**

Keywords— ***safety-oriented system SOS, project team, life cycle, design information system.***

I. INTRODUCTION

New external challenges and the integration of the civil defense system of Ukraine to European standards prompt the State Emergency Service to implement innovative projects (automation of activities, process reengineering, infrastructure development), as well as to apply flexible adaptive management to improve interaction between units, effective distribution and management of resources. Analysis of existing project management methodologies (IPMA, PMI, P2M, PRINCE) showed that a characteristic feature of modern methodologies is the use of limited project life cycle models.

Since the management of human resources is one of the most important and, at the same time, poorly formalized processes, the development of new life cycle models of team development is an urgent issue.

HR (also known as human resource management) teams strive to use a variety of recruiting tools that help optimize the selection of a set of required candidates (higher education graduates) from the general pool of applicants. Critical parameters in the process of team formation are time and the quality of the candidate's competencies. Therefore, the risks during the selection process increase, and accordingly, the methods of assessment and selection of applicants for project teams, which are most optimal for the organizational structure and tasks, are important.

Special attention is paid to the integration of the information system with the hiring process. The possibilities of connecting to recruiting platforms, automated notification of the status of applications and data exchange with the company's internal systems are considered. The use of an integrated system contributes to increasing efficiency and reducing the time required for the selection of candidates.

II. ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

The problems of project-oriented management in complex systems were investigated by many scientists, in particular Bushuev S. D. [1], Chumachenko I. V. [8], Zachko O. B. [11] and others .

In the work of S. D. Bushuyev [2], the processes of project knowledge management were studied. A conceptual model was developed, which contributes to the structuring of data with subsequent transformation into a knowledge base. These developments should be taken into account when developing new models of assessment and selection of higher education applicants with specific study conditions in the civil defense system. In the future, these human resource management systems in the field of safety-oriented system should be applied to present data in the information environment.

In the monograph I. V. Chumachenko [8]. multi-projects and applicants who were selected for inclusion in the team were studied. These developments are relevant in a complex socio-technical system. The complexity of candidate analysis and selection methodologies for such projects is constantly increasing. Accordingly, it requires a better solution for the selection and formation of teams in a turbulent and dynamic environment. The quality of

the interaction of system components between stakeholders and the distribution of resources is an urgent task.

In the work of Doctor of Technical Sciences D. E. Lysenko [9], methods and models for evaluating and selecting candidates for the project team were investigated, using the theory of precedents as a basis of accumulated experience for selection based on the similarity of project members. The qualitative assessment model allows for a comprehensive analysis of candidates. The database of precedents and their assessment contributes to successful selection for team building. These methods are relevant for a security-oriented system and should be considered for recruiting and selection of resources.

In the work of Professor S. D. Bushuyev [3], important questions regarding the phases and groups of periodization of project knowledge management, which significantly affects the achievement of success in projects and programs, are highlighted. However, there is no emphasis on investigating the relationships of the life cycle of stakeholders, especially with the features of SOS (also known as safety-oriented system).

Doctor of Technical Sciences I. V. Kononenko [7] in his work "Formation of a project team for the development of information and communication technologies" more meaningfully considers an important aspect of the requirements for the competencies of project members. This contributes to the level of quality of execution and satisfaction of stakeholders, and the issue of the life cycle is not fully covered. This, in turn, requires the study of a group of life cycle processes in perspective.

Professor V. V. Morozov [10] achieved significant achievements in life cycle issues in the work "Functional-role approach to the description of the life cycle of projects of project-oriented corporations." In his work, he focuses on development project corporations and highlights the key eight stages of the life cycle and their relationship with the formation of key documents, the definition of the organizational structure, functions and roles of project members as the basis for successful implementation and achievement of the set goals.

But given the specifics of the field of development projects and programs, we cannot fully use this methodology in a security-oriented system.

III. THE BULK OF RESEARCH

Harvard psychologists demonstrated that personal qualities have a directly proportional effect on success in projects (by 85%), because they are embedded in a person's character from an early age and it is almost impossible to change a person's temperament. And professional abilities, knowledge and experience come over the years, change and supplement. When selecting American companies, more than 90% of applicants are selected at the stage of in-depth interview results and interviews, and supplementing them with other assessment and selection methods allows you to make an effective decision for HR (also known as human resource management).

Below is Figure 1, which shows an analysis of staff turnover by the level of productivity of project team members. The vertical axis shows the level of employee turnover, the horizontal axis shows the time scale by year. More skilled workers are less likely to leave their jobs than non-productive ones due to a better level of relationship with project management.

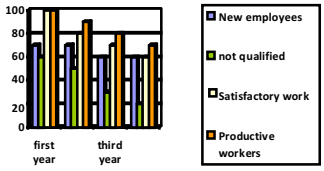

Fig.1 Analysis of staff turnover by the level of employee productivity. Source: [8]

The choice of an information system for human resources management depends on a number of criteria, such as the cost of implementing the system, the strategy and specifics of organizations, the implementation period, the number of employees, operational features and the need for additional modules, such as recruiting.

Outdated methods of personnel management lead to the deterioration of activity and efficiency of activity as a whole, due to the complexity of coordination, monitoring and control of the processes of the accumulated organizational structure, as a result: low speed of feedback, inefficient performance of tasks and lack of data analysis for management and follow-up of the selected mission, strategy, achievement of set goals. Below is a comparative table 1 of human resource management with new and standard methods.

TABLE 1. COMPARATIVE ANALYSIS OF HUMAN RESOURCE MANAGEMENT BETWEEN STANDARD AND NEW METHODS

(HR standarts): standard methods of human resources management	(HRIS): implementation of the human resources management information system
Definition of system and document flow requirements	The project management toolkit is adapted to the goals, mission and strategy of the system in the conceptual core
Human resources for managing the stages of selection, adaptation, and training are allocated to individual projects	Management of human resources, recruitment and the main stages of the life cycle of project team members is carried out in a single information environment, which allows you to free up resources, direct them to other tasks, quick feedback and more effective organization of work compared to manual administrative management of HR standarts
Salaries, staff turnover, management of control and	Management of rewards, staff turnover, monitoring and control are interconnected in the information system, which allows

monitoring depend on individual managers, whose interaction slows down the speed of information transmission	comprehensive assessment and analysis of management results and efficiency.
Risk management is difficult to operate and analyze potential consequences based on data that does not reflect reality	Thanks to a single module of reporting and analysis of the information space, it is possible to compare planned indicators with planned ones, which allows you to achieve the goals of projects in complex socio-technical systems.

Source: own elaboration [13]

One of the priority conditions for team effectiveness is the form of management. It is coordinated with each team member at the initiation stage. Project managers must combine traditional and non-standard methods of assessment and selection for successful team formation. The extension of the methods facilitates a comprehensive study of the behavior of the candidate in different conditions in order to simulate its results during the adaptation phase. Traditional selection methods include the following tools: resume, pre-selection interview, questionnaire, assessment centers, interview, professional test, test, reference check and job list. Non-standard methods of personnel selection include "shock interview", brainteaser interview.

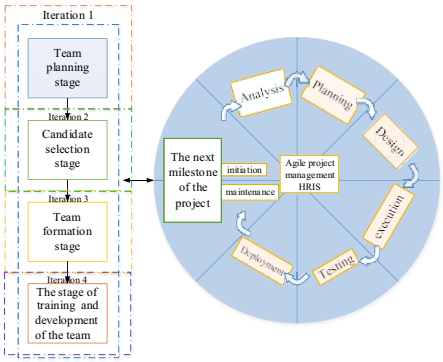

Figure 2. Scheme of Agile formation of project teams in the field of civil protection. Source: own elaboration [13]

The main purpose of the preliminary selection interview is to determine the personal qualities, beliefs and assessment of the level of education of the applicant. Candidates who have passed the preliminary interview are allowed to fill in the application data. It is during the phase of analyzing the questionnaire data that a standardized assessment of the applicant is carried out. A popular HR management method is benchmarking, which compares data and selects the best results.

The implementation of the competitive selection for study at the Central is the process of forming a team (the term of which is 4-5 years, which is the term of training). That is, selection takes place in the project team, which is disbanded upon completion, and its members implement the acquired competence in other projects (in practical units). In the process of selecting applicants, experts analyze the results of personal, business, psychological and physiological parameters for compliance with the requirements. These criteria can be summarized in soft skills ("soft" skills), hard skills ("hard" skills), physic skills (physiological skills and indicators).

The effectiveness and transformation of OBS (also known as Organizational Breakdown Structure) is determined by the influence of internal and external environmental factors on the organizational system. The process of organizational design consists of three stages: the choice of technology, the development of a management structure, and the development of management mechanisms.

In order to solve the task of finding the optimal organizational structure, it is necessary to define efficiency criteria according to which a comparative analysis of organizational structures will be carried out, for example, such a criterion can be the manager's expenses for the formation of a project team.

Let the set of candidates be given P, variants of the organizational structure $Os \in Os(P)$ and the cost function of creating an organizational structure $f(s): Os[0;+]$.

Accordingly, you should choose the structure (St) with minimal costs:

$$St' \in Arg\min_{StcOs} f(s). \qquad (1)$$

An important characteristic of the hierarchical structure, which determines optimality according to the cost criterion of team formation, is the absence of duplication, in which two managers M1, M2 manage one group of team members $Pj, j = 1,\ldots,n$:

$$(\{P1, P2,\ldots, Pn\}M1)\ (\{P2.1, P2.2,\ldots, Pn\}M2) = \varnothing \quad (2)$$

To determine the qualitative characteristics of the optimization criteria of hierarchical structures, the approach of evaluating the topological properties of the organizational structure (stability, controllability, compactness) using graph theory is used.

To increase the accuracy of the quantitative assessment of the applicants' qualitative indicators, it is advisable to formalize the criteria and their weighting factors using the theory of qualimetry. The formalization of these indicators will reduce subjectivism. Qualimetry is a scientific direction that studies the methodology and problems of complex quantitative assessment of the quality of any objects - subjects, phenomena or processes. The life cycle of team building should be flexible and adaptable to external factors and influences. From the point of view of the system approach, adaptation is the process of changing the parameters and structure of the system, in particular, controlling influences, based on current information in order to achieve a certain, usually optimal, state of the system in the face of initial uncertainty in the operating conditions.

A system that can adapt to changes in internal and external conditions is considered adaptive. Adaptive

control is control in a system with incomplete information about the controlled process, which changes as information accumulates and is used to improve the quality of the system.

An adaptive model of the object management system is considered to be a model in which, as a result of changes in the characteristics of the internal and external properties of the object, corresponding changes in the structure and parameters of the control regulator occur in order to ensure the stability of the object's functioning.

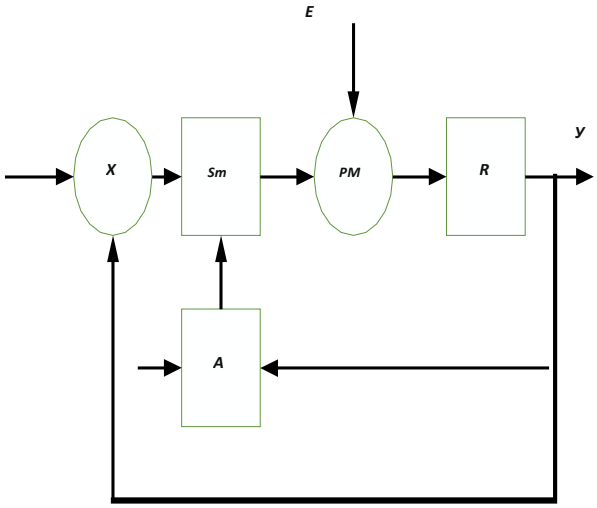

Figure 3. Structural scheme adaptive Agile. Source: own elaboration [16]

X -is an input signal. For the project, these are signals of theexternal environment and its stakeholders;
Sm - is a management system for the HR project;PM - entrance of the object (HR project);
E (environment) – external environment and project risks;R – project implementation (transfer function);
Y – output of the object (result of the life cycle of adaptation ofthe project team);
A - is an adaptation block that changes the type of team development life cycle depending on external requirements.

Acknowledgment

In this work, we analyzed information systems of human resources management and selection criteria for complex socio-technical systems. A model of information system formation «scheme of Agile formation of project teams in the field of civil protection» has been developed for its implementation in security-oriented systems for automation and optimization of human resource management personnel processes. A module for the selection of candidates for project teams of safety-oriented systems based on the index method for further formation of the project team was introduced into the information system. A model is proposed for testing new information systems, as well as system integration with databases, which improve the efficiency of process management at all levels of the life cycles of employees and the organization.

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