variation sources, proposal development of cause-effect variants, estimation of process indicator indexes, etc. This also embraces interdisciplinary interaction, including the staff of different departments.

The above-described examples could be of practical application, and obtained theoretical skills and abilities could be used in R&D. At the same time, these practical results could also be applied in theory acquisition.

Resources used in SIW process including information, methodological and technological resources should change the student's role in this process. Human resources in this process -highly-qualified teachers- should respond to the set targets, develop absolutely new innovative solutions and generate student autonomy and self-dependence.

Thus, apart from the integrated innovative SIW content, development of technology and methods enhancing the student activities, the following factors are necessary:

- improve interdisciplinary components not only within the discipline itself but also within profile modules of the education programs, eliminate the fragmentation between science, mathematical and professional disciplines and core disciplines;
- provide individual training and learning track diversification.

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Modern Approaches to the Assessment of Soft Skills and Professional Competences: Interdisciplinary Aspect

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This article discloses three approaches to understanding the structure of competences as an object of assessment. The key problems faced by teaching staff, when assessing competences, are underlined. The role and place of various means for diagnostics and assessment of competences are presented. The key development trends of different form, methods and means for competences assessment are determined in line with the interdisciplinary approach.

Key words: structure of competences, competences assessment, methods and means for competences assessment, aspects of competences assessment.

The execution of the competence-based approach faces a number of objective and subjective problems in spite of a vast expertise on the matter. One of the main problems is the problem of monitoring and assessment of soft skills' and professional competences' level of formation. It is this stage of the educational process, where teaching staff faces significant difficulties that, in our opinion, occur due to the contradiction between the interdisciplinary nature of competence, on the one side, and the on-going focus of the study process on formation, monitoring and assessment of disciplinary knowledge, skills and attitudes, on the other side. There is a certain level of vagueness in understanding the essence and structure of competences, and, therefore, the means and methods of their monitoring and assessment among the HEI faculty. Sociological studies indicate that 65.1% of faculty underline as a problem the lack of durable and convenient methodologies for competences assessment [1, c.25-26].

Whenever competences are deemed as the subject of an assessment, the issue of unveiling such elements of competences' structure that could be diagnosed and assessed impartially, become of the most importance. The conducted analysis allowed singling out three approaches for determining the structure of competences.

The adherents of the **first approach** (Kon E.L., Freyman V.I., Yuzhakov A.A., Kon E.M.) regard to competences as an integrative whole of knowledge, skills and attitudes. In order to formalize the understanding of each component of the monitoring, the following forms as determined: for **knowledge** – principles, models, processes, methods, algorithms, terms, definitions, etc.; for **skills** – application of methods, approaches; modeling, etc.; for **attitudes** – modeling and choosing research methods for models, processes, phenomena, etc., preparation of a set of documents (project's passport, technical and economic feasibility study, etc.) and other [2, c.37-41].

In the context of this approach another option is to put basis on the modified Bloom's Taxonomy of Objectives (developed by L.W. Anderson and D.R. Krathwohl in 2001), in which every educational objective can be described by

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means of knowledge evaluation (factual, conceptual, procedural, metacognitive) and evaluation of cognitive processes (to remember, to understand, to apply, to analyze, to evaluate, to create) [3, c. 214]. Each type of knowledge has a corresponding level (or several levels) of its acquisition. Taking this into consideration, it is possible to analyze educational objectives' state in the Federal State Education Standards (FSES) by using classification tables, where the columns indicate cognitive processes and the rows indicate knowledge categories.

The developers of the **second approach** (V.I. Blinov, O.F. Batrova, E.Yu. Esenina, A.A. Faktorovich et al.) believe that besides the knowledge, skills, and attitudes competences include the motivational (axiological) component that outlines individual's attitude towards actions. Therefore, the assessment criteria include new parameters for motivational component assessment [4].

The representatives of the **third approach** (A.I. Chuchalin, A.V. Epikhin, E.A. Muratova and others) suppose that besides the components identified above the structure of competences includes one more component – the conditions, in which the competence is exercised [5].

The third approach seems to be the most correct, in authors' opinion, regarding the level of its tenability, integrality and applicability to practice. According to this approach the competence is perceived as "the readiness of a graduate (his/her motivation and personal attitudes) to perform abilities (knowledge, skills and expertise) for successful conduction of professional and other activities under certain conditions (problem, task, resources for their solution)" [5, p. 15]. It is evident from this definition that the structure of a competence includes three interconnected components: readiness, abilities and conditions, which all together serve as corresponding criteria. Each of these components, in its turn, has a number of attributes. It is the motivation for **"readiness"** component; the knowledge, skills and expertise – for **"abilities"**; and the novelty, independence and resources – for **"conditions"**. In order to conduct the quantitative evaluation of indicators the ratings of competences components' attributes, criteria and the indicators themselves are determined [5, p.16].

The authors' opinion on the **subject of competences assessment** is presented further. According to the statutory requirements the expected learning outcomes consist of two groups:

1) the results of **study program's acquisition** (i.e. students' competences both general ones required by the FSES and complimentary ones set up by an HEI);

2) the results of **learning of each course (module) and internships** (i.e. knowledge, skills, attitudes and (or) practical experience) that characterize **stages of competence formation** and **assure** the achievement of expected learning outcomes of a study program [6].

This allows for a distinct separation between the knowledge, skills and attitudes, on the one side, and the competences on the other. Competences (as results of study program's acquisition) are formed within learning of a whole study program (or a total of its structural elements). Learning outcomes of each course represent the expected and the measurable components of competences: knowledge, skills, attitudes, practical experience, that students have to have fostered and are able to present after undergoing a certain element (a certain course, module or internship) of a study program. This implies that educational diagnostics and assessment are performed over both groups of learning outcomes:

1) the results of studying a course (module) or going through an internship; these results come down to corresponding knowledge, skills, attitudes and experience;

2) the results of a study program that are represented by a total of general and professional competences determined by FSES on each major and each educational cycle.

It seems to be quite simple. And it is so, but only when it comes to the assessment of learning outcomes of a course (module) or an internship. Complications appear when solving the problem of competences' assessment. One of them relates to the fact that fostering a specific competence requires an interdisciplinary approach and, therefore, this process involves several courses and other elements of a curriculum (internships, Final State Attestation). For instance, according to the exemplary study program on training future Master graduates within the major 44.04.01 "Pedagogy" (Pedagogy of Higher Education) the formation of one competence involves from 2 (General Professional Competence No. 3) to 20 (General Competence No. 5) elements.

In this case, each professor faces a number of tasks.

First task is to determine the way to form competences set by a study program while learning a course, i.e. to find proper didactic means – contents, methods, forms, and teaching and learning methods. It is worth noting that for this reason there is a matrix connecting topics of study and competences formed within these topics developed for each course's work program. It all seems to be in the right place. However it is not, since it is not clear how a professor is supposed to correlate a certain topic with a certain competence. In order to solve this issue reasonably a professor has to have a clear understanding of the structure and contents of a certain competence – this would allow him/her to know what knowledge, skills, attitudes and personal features are needed for fostering this competence as a whole. On the other side, this would let him/her identify the opportunities given by a course and a specific topic for the formation of this competence.

The **second task** is to find mechanisms for complying activities teachers from different disciplines in order to: a) manage an equal understanding of a structure and contents of those specific competences that are formed within the study process of their course; b) have a possibility for interconnected and correspondent activity on competences formation. Otherwise, it seems that each teacher forms a system of knowledge, skills, and attitudes on a certain course, and a corresponding student's competence would be formed somehow automatically, since a student studies corresponding courses. But is a student ready for a complex interdisciplinary work on integrating subject knowledge, skills and attitudes him/herself? Does he/she know how to do it? These questions still do not have a conclusive solution and are awaiting for their researchers.

The **third and the most important task**, in authors' opinion, is to identify who and when should conduct the diagnostics of the level of formation of one or another competence in line with the FSES requirements, since not all the competences are assessed within the Final State Attestation. It seems that in order to solve this task it is needed to allocate all the competences (imposed by the FSES and study programs of each major) between the forms of intermediate and final attestation among the study years. This allows receiving a clear understanding on which stage of training it is necessary to control the level of competences formation.

The following algorithm can be proposed: 1) analysis of a curriculum and development of a compliance matrix for fostered competences and study years; 2) determination of a total number and contents of courses involved in the formation of one or another competence; 3) determination of a certain course (module) or internship that is studied last for each competence. The last course is the final point, where the formation of a correspondent competence has to be controlled.

In this context, it should be mentioned that a number of researchers purposefully emphasize the factors responsible for

the quality of competences assessment: tenability, accessibility, credibility, applicability, and flexibility [7, pp. 102-103].

Further the focus is put on the **means for competences assessment.** Researchers propose various means for diagnostics and assessment of competences. In the framework of the first approach they come down to a complex of means specific for the assessment of each component: knowledge, skills, attitudes [2, p. 40]. Adherents of the second approach determine groups of competences and propose to assess them through corresponding integrated tasks. Thus, for instance, Sholokhov Moscow State University for Humanities has proposed a cluster classification of competences (mindset, statutory, instrumental). According to this classification a system of measuring instruments has been developed and includes the following: various forms of tests, simulation tasks, course projects, essays, projects (for the assessment of mindset competences); debates, discussion, roundtable discussions, expert assessments, case studies, role games (for the assessment of statutory competences); drawing up recommendations, research reports, situational analysis, brainstorming, internship reports, role games, quasiprofessional creative tasks, psychological tests (for the assessment of instrumental competences) [8, pp. 40-41; 9].

Taking into account the specifics of competences assessment process (its prolonging character), based on own experience, authors apply such diagnostic means, as **individual diagnostic maps.** These maps reflect all of stages of competence's components formation from year to year, from course to course, which allows receiving a dynamic competence model [10, pp.98-99].

It is worth noting that this research method can be efficient specifically for the purpose of assessing non-cognitive competence's components (motivational, axiological, active ones). The main difficulty in realization of such diagnostic map within the system of higher education is in the fact that the process of specialists' training is spread among several departments depending on the year of study. Therefore, the objective is to identify certain departments on each study year, which are involved in future specialists' training, and determine mechanisms for their interconnection. Based on the results of a long-standing applied and experimental research, the authors believe that one of the ways to solve this problem is to implement condensed education that implies a decrease in number of parallel courses to 3-4 courses in line with the principle of succession and interdisciplinary connections. As the experimental research has shown, the most seamless model for the implementation is the third model of condensed education that stipulates the development of 3 to 4 organization modules within a semester. Such organization of educational process decreases the number of courses and, therefore, the number of staff involved, which creates a more pleasant environment for coordinated actions, for orchestrating faculty efforts, etc. [11, 12].

Competences assessment has a number of peculiarities. The first specific feature concerns the development process for assessment means, which, in its essence, is an **iteration process** and intends work performance in parallel with a constant analysis of the results obtained and the correction of the previous work stages. The second peculiarity refers to the qualification **assessment procedure**, which, due to its professional activity, cannot be narrowed to a one-time inspection in a form of a test, a questionnaire, and other; but has to be prolonged and has to include the observation of an examinee under various profession-like conditions. Due to all these, the assessment procedure has a **stage-by-stage** nature: on the first stage an **interview** (a test or other) is run with an aim to determine the level of formation of professionally important knowledge and skills; in case of a successful passing of that stage the examinee is permitted to take

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up to the next stage – **qualification exam** [4, p.104].

To **conclude** it should be underlined that the competence paradigm brings to the attention the issue of unbiased assessment. It is not only about the attraction of external partners of a higher education institution to the process of graduates' competences assessment that is conducted at the final stage of educational process (as usual, it is the participation of employers in the State Attestation Board). The assessment has to be independent and continue during the whole educational process. In order to achieve this, it is worth separating educational function and function of assessing its learning outcomes both on the level of one professor and on the level of a whole study program [13].

One of the mechanisms for solving this issue could be the transfer of the control function and the competences formation assessment function to the Educational Quality Unit, which exists in most universities. It is not the evaluation of current academic performance that is meant here, but specific assessment procedures for competences of students from all study years that are run regularly by an HEI quality control unit (preferably – at the end of each study year). This would require the development of a system of competence-oriented interdisciplinary knowledge for each major and for each year of study. Such an approach would solve at least two issues:

1) provide a competence-oriented nature to the real educational process of each course;

2) assure a valid unbiased and independent assessment of competences formation.

This approach is already being implemented in a number of countries. For instance, in the Netherlands educational organizations create cognitive laboratories that are considered indispensable when transmitting to the competence-based educational model. It is recommended to invite specialists from different fields of knowledge to these labs – educationalists, psychologists, methodologists, etc. These professionals are supposed to conduct audio recording and analysis of students' real-time execution of competence-based tasks, develop optimum evaluation scales for particular tasks, interpret results of undertaken tests, conduct monitoring of individual's progress growth on particular competences during the whole study process of each student [14].

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Adaptation of Bachelor and Master Degree Programs to Meet Modern Standards (Information Systems and Technologies)

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The paper considers different approaches to the use of models, which are applied in the sphere of information technologies and specified in modern standards and guidelines, for the development of Bachelor and Master degree programs, the specialty of Information Systems and Technologies. The authors give examples of educational process management based on Unified Modeling Language (UML).

Key words: education program, object-oriented approach, product life cycle, business model, the object of professional activity, information resource.

Providing Bachelor's and Master's degree courses in Information systems and technologies, one faces the following specific challenges:

1. Constant extension of IT application scope. Instead of studying different spheres of IT application, it is necessary to master IT analysis applicable in any sphere of activities.
2. Steady and intensive development and improvement of IT. Growing variety of IT models, methods and tools to design information systems (IS). It is necessary to use higher level of abstraction while describing both existing and newly designed methods of IS design in a uniform way.
3. Considerable diversity of classes of information resources. It is necessary to determine an appropriate level of abstraction while studying classes of information resources, which would prevent duplication and simplify study via inheritance mechanism.
4. Considerable gap between a problem domain and solution domain. It is necessary to use technologies of IS design focused on high-level domain-specific languages that allow reducing the gap between problem and solution domain.

All these challenges are quite well formalized by means of unified modeling language (UML), and CASE tools allow using modern informational technology to full extent.

The specific feature of the professional activity trained in the course is that the main part of information processed at the stages of analysis and design is presented as metadata, where classes of objects, processes, events, as well as various associations, relations and limits between them are formally described [1, pp.10-20]. Fig. 1 shows a diagram describing a gap between the income data for information system development and implementation. This gap can be overcome by obtaining intermediate data called a metamodel for problem frames and metamodel design patterns. One of the main aims of the course is to provide students with skills and knowledge that would allow them to identify and decompose a problem to obtain a metamodel of the analysis followed by a metamodel of a design solution and then system implementation. A variety of methods and tools can be applied at each stage of the system development and implementation [1, pp. 88-98].

There are goals of adaptation as follows:

1. To adjust the content of the education

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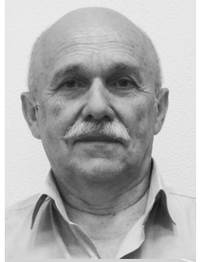

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