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Mediated Competency Comparison between Job Descriptions and University Courses

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***Abstract* – In order to establish and maintain IT empowered cooperation between universities and industrial organizations; on the one hand universities should be informed about trends in the labour market, and on the other hand industrial organizations should have an insight into trends of knowledge development in universities. Furthermore, taking into consideration that a competency is becoming a kind of "currency" in the labour market, there is a need to compare competency demand from the industrial organizations and competency offer from the universities in order to see if the university can satisfy competency needs of industrial organizations. The use of competency frameworks and mappings between competency frameworks can facilitate information exchange about the competencies. The paper describes the method and the prototype for mediated competency comparison with respect to job descriptions and university courses. The prototype conforms to the architecture of collaboration support system and its services that have been designed with the purpose to maintain and exchange information between universities and industrial organizations.**

***Keywords:* Competency frameworks, study programs, job descriptions, competency information exchange**

I. INTRODUCTION

Industrial organizations (further in the text - Industry) usually maintain the so-called job description framework that consists of a list of positions and their descriptions in terms of responsibilities and competencies. On the other hand educational institutions (further – Universities) maintain course descriptions in terms of topics covered, learning outcomes, obtainable knowledge and skills. The goal for maintaining University-Industry collaboration is to provide possibility for Industry and University to exchange information about competencies [1], [2]. Likewise, taking into consideration that a competency is becoming a kind of "currency" in the labour market [3], there is a need to compare competency demand from the Industrial organizations and competency offer from the Universities in order to see if the university can satisfy competency needs of industrial organizations. The problem here is that Industry job positions and University courses are described in different concept systems. The paper proposes that standardized competency frameworks can be used to solve this problem. This means that a competency framework which suits both (1) description of study courses and (2) descriptions of job positions has to be chosen.

Several organizations have made an effort to develop the so-called competency frameworks, such as European e-Competence framework (e-CF, developed in the European Union, highlighted in Fig. 1) [4], Skills Framework for Information Age (SFIA, developed in the United Kingdom) [5], Club Informatique des Grandes Entreprises Françaises framework for job profiles (CIGREF, developed in France, a short description available in [6]), Advanced IT Training System (AITTS, developed in Germany, a short description available in [6]). Some of these frameworks can be mapped both to the descriptions of University courses and to job descriptions in a particular industrial area. Therefore these frameworks can serve as mediating conceptual structures between Industrial job and University course descriptions

The goal of the paper is to present the method and the prototype for mediated competency comparison with respect to job descriptions and University courses. "Mediated" implies that the comparison is based on the competency frameworks as the middle layer between job descriptions and University course descriptions. The prototype conforms to the architecture of collaboration support system and its services that have been designed with the purpose to maintain and exchange information between University and Industry [7], [8], [9], [10] and [11].

The paper is structured as follows. Issues on competency framework selection for mediating competency descriptions in a particular application area are discussed in the next section. Further, in Section III, the exchange of information about competencies in the context of the architecture of University-Industry collaboration support system is explained. The mediated comparison method and the developed prototype are described in Sections IV and V respectively. At the end of the paper, in Section VI, the discussion, conclusions, and directions of further research are presented.

All practical implementations described in the paper refer to engineering education in the area of computer science and information and communication technology (ICT) and ICT Industry in Latvia.

II. RELATED WORK AND SELECTION OF COMPETENCY FRAMEWORK

In the context of competency information management, exchange and interoperability the European Committee for Standardization (CEN) has defined a number of service classes that can use competency information. These classes include learning services, CV services, job services, and market & career information services (for details see [1]). Fig. 1 illustrates the interoperability of these services, defining that all of them should refer to a "unified language". This means that "transparent" competency information exchange is

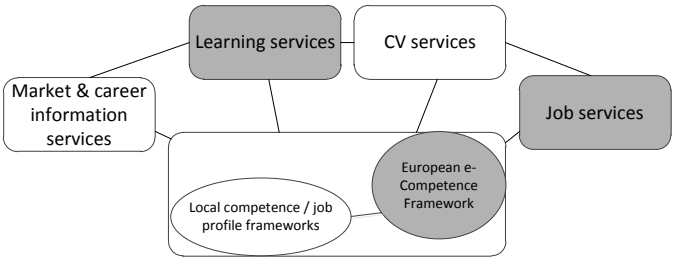

Fig. 1. The interoperability of e-career service classes defined by the

possible only using standards or frameworks approved by various professional and academic organizations and societies.

Challenges faced by the University – Industry collaboration support system include also knowledge discovery and retrieval, since the information about job descriptions and study course description should be obtained from the Web. There are several approaches dealing with course and competence information extraction. One of them is Course Outline Description Extraction [12] from HTML documents involving the use of pattern libraries and key terms. Janev et al. [13] discuss the process of building expert profiles in a form of ontology database by integrating competences from structured and unstructured sources. Success so far is automatic identification and extraction of skills from available structured and unstructured sources and semi-automatic population of the ontology database. Although there is ongoing research on knowledge discovery and retrieval, we do not address these questions in this paper.

One way to solve problems of interoperability is to use domain ontologies for representing conceptualization [14], [15]. However usually Industries do not maintain their own ontologies to formally define knowledge and skills, therefore standardized competence frameworks were used instead of ontologies to facilitate initial knowledge exchange and to obtain initial mapping between courses and job positions.

The choice of a particular framework as a mediating conceptual structure between job and course descriptions of particular institutions depends on the following issues relevant in achieving acceptability of the framework by both collaborating partners, i.e., University and Industry.

Issue 1. Participants involved in the development of the framework. For instance, developers of the e-CF and SFIA frameworks are representatives of various ICT domain Industry and University institutions. Therefore during the development process of the frameworks various opinions about the ICT competencies, which should be included in the competency framework, were considered. This makes these frameworks suitable for usage in ICT Industry and University. Since e-CF developers are from the European Union (EU) member states, this framework is relevant for Latvian Industry and University. In comparison – SFIA developers are mostly from the United Kingdom and that framework represents results only from ICT Industry and Universities of this country, which in the given application case makes SFIA less relevant than e-CF.

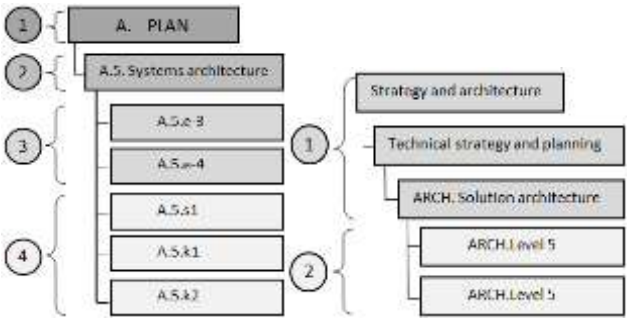

Fig. 2. Hierarchical structure of e-CF and SFIA with dimensions and codification. On the left - structure of e-CF: 1 - Competency area, 2 - Competency, 3 - Levels of competency, 4 - Knowledge and skills. On the right - structure of SFIA: 1 - Category, subcategory and competency, 2 - Levels of competency.

Issue 2. History of development. e-CF is a new competency framework, and its first and only version yet was published at the end of 2008. e-CF developers plan to publish its second version with enhancements in autumn 2010 [16], [17]. SFIA is with a longer history – its first version was published in 2000, and at the end of 2008 the fourth version was issued. The evolution of frameworks is driven by the dynamics of ICT domain and that also leads to changes in required/used competencies.

Issue 3. Conceptual structure. In general the structure of frameworks is similar – there are categories (e.g., e-CF has categories, SFIA has categories and subcategories) and competencies with levels (see Fig. 2.). e-CF competency levels are presented as general description, while in SFIA levels are described in more detail. This difference is because SFIA does not offer additional dimension for skills and knowledge description (as it is in e-CF), but they are included in the description of competency level. The e-CF has a richer conceptual structure which conforms well to the descriptions of University courses and job positions.

Issue 4. Granularity of competencies. There is a possibility to map one framework to another in order to maintain their interoperability. For example, e-CF has lower granularity than SFIA, therefore one e-CF competency can be described with (mapped to) more than one SFIA competency [6]. Interoperability is important in the case when different organizations with different competency frameworks desire to exchange competency information, for example, to organize a work group with particular competencies for the completion of an inter-organizational ICT project.

Issue 5. Codification of competencies. The codification of competencies is important when organizations using the same competency frameworks desire to exchange (using information systems) competency information. They can easily exchange the codes of competencies instead of full descriptions and hierarchy of competencies. By evaluating the e-CF and SFIA it is evident that e-CF has more detailed codes of competencies than SFIA (it has only the code of competency, which does not describe the competency position in the framework as a whole, see Fig. 2.).

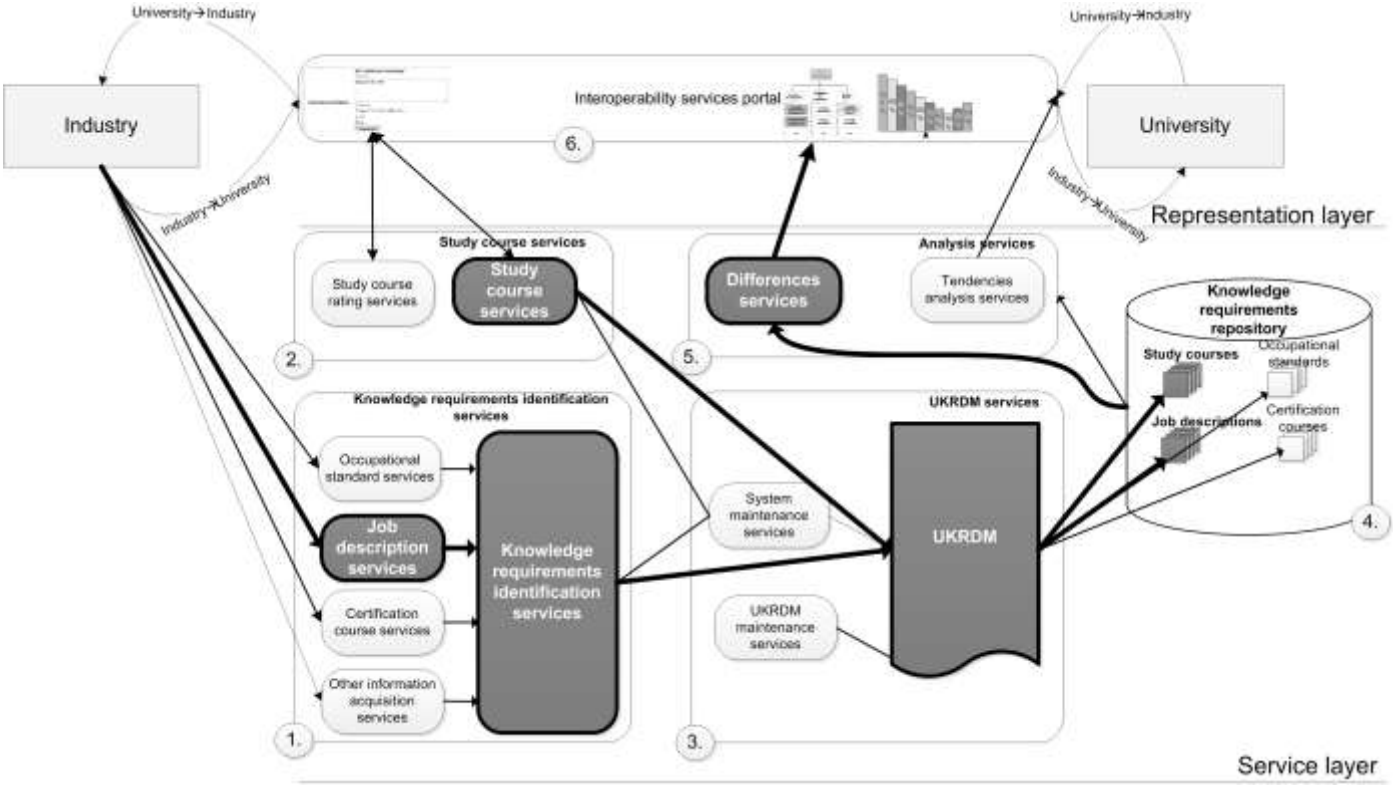

Fig. 3. The architecture of University-Industry collaboration system and its services in the context of competency information exchange. Darker lines and boxes illustrates the part of architecture of the collaboration system that deals with job description and study course description linkage to e-CF and the storage and analysis of these descriptions

After considering Issues 1-5, e-CF was chosen as a mediating framework for ICT University-Industry cooperation in Latvia. Detailed description of e-CF is given in [7].

One more reason for this choice is the assumption that the use of e-CF may provide a positive impact on international recognition of study programs [18], [19] and student mobility across universities in the EU due to clear and accepted view on University provided knowledge, skills and competencies, which are transparently related to e-CF.

III. THE ARCHITECTURE OF COLLABORATION SUPPORT SYSTEM

Several issues of the architecture of University-Industry collaboration support system and its services have already been discussed in [7], [8], [9], [10] and [11]. Here we highlight only main groups of services in order to show which of their parts and in what way are involved in mediated comparison of competencies represented in job and study course descriptions. The architecture includes the following groups of services:

- **Knowledge requirements identification services** (see Nr. 1 in Fig. 3) for information acquisition from sources, such as, job descriptions, occupational standards, certification standards [8] and for the identification of knowledge requirements in these sources.
- **Study course services** (Nr. 2 in Fig. 3) for maintaining University course evaluation by Industry and for course description with a unified knowledge requirements description model (UKRDM) based on e-CF.
- **UKRDM services** (Nr. 3 in Fig. 3) for browsing and maintaining UKRDM.
- **Repository services** (Nr. 4 in Fig. 3) for storing information source descriptions with a mapping to UKRDM.
- **Analysis services** (Nr. 5 in Fig. 3) for the representation of differences between competencies provided by University courses and competencies included in other information sources, such as job position descriptions, occupational standards and certification standards that represent actual demand of competencies in Industry.

Core services of the maintenance of information flow through the developed architecture are UKRDM services that include a core element – e-CF. UKRDM services provide the possibility to map information sources such as job descriptions and study course descriptions to e-CF and ensure the possibility to analyse and compare these sources. Mapping and comparison are implemented in the developed prototype (for details see Section V).

Service classes represented in Fig. 1 are included in the architecture of University-Industry collaboration system as follows. **Study course services** are a part of **Learning services**; **Job description services** are a part of **Job services** and **UKRDM,** as a "unified language", includes e-CF.

IV. DESCRIPTION OF MEDIATED COMPARISON METHOD

Job descriptions in Industry and course descriptions in University usually contain a free form text. To structure information about competencies/knowledge/skills included in these descriptions is a difficult task [20]. The mediated comparison method (MCM) is proposed to deal with this problem. MCM is developed with a built-in flexibility to accommodate a number of competency frameworks, taking into consideration that different organizations can prefer different frameworks. Therefore MCM prescribes that Industry partners provide their job position description frameworks mapped to Industry competency framework and University provides study program representations consisting of course descriptions mapped to University competency framework. In the case described in this paper, both Industry and University have chosen one and the same framework for mapping their job descriptions and course descriptions respectively. The use of a single mediating framework can be easily incorporated in MCM by applying 1:1 mapping between Industry and University competency frameworks.

Basically, we can illustrate a job position framework (which represents systematization of job descriptions) and University study programs as hierarchical conceptual structures. Examples of these structures are presented in Fig. 4. As it was discussed in Section II competency frameworks are also represented as hierarchical structures (see Fig. 2). In MCM this structural similarity is utilized in mapping study courses and job positions to corresponding competency frameworks.

A. Linking hierarchical structures

In order to compare job descriptions and University courses the following prerequisites are defined:

- Job description framework should be mapped to Industry competency framework (Nr. 1 in Fig. 5)
- University courses should be mapped to University competency framework (Nr. 2 in Fig. 5)
- Competency frameworks of Industry and of University should be mapped (Nr. 3 in Fig. 5)

There are 4 mapping options that depend on the source

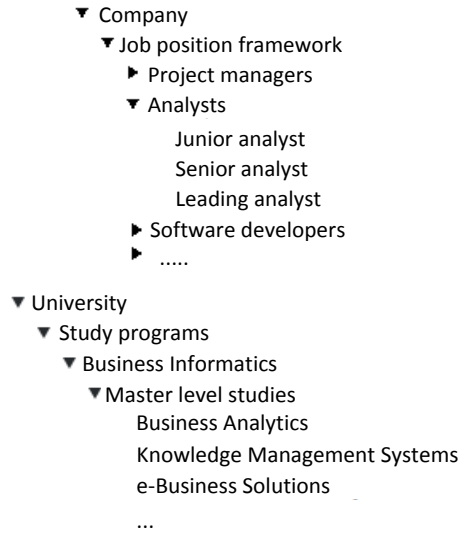

Fig. 4. Hierarchical conceptual structures of a job position framework and University study program

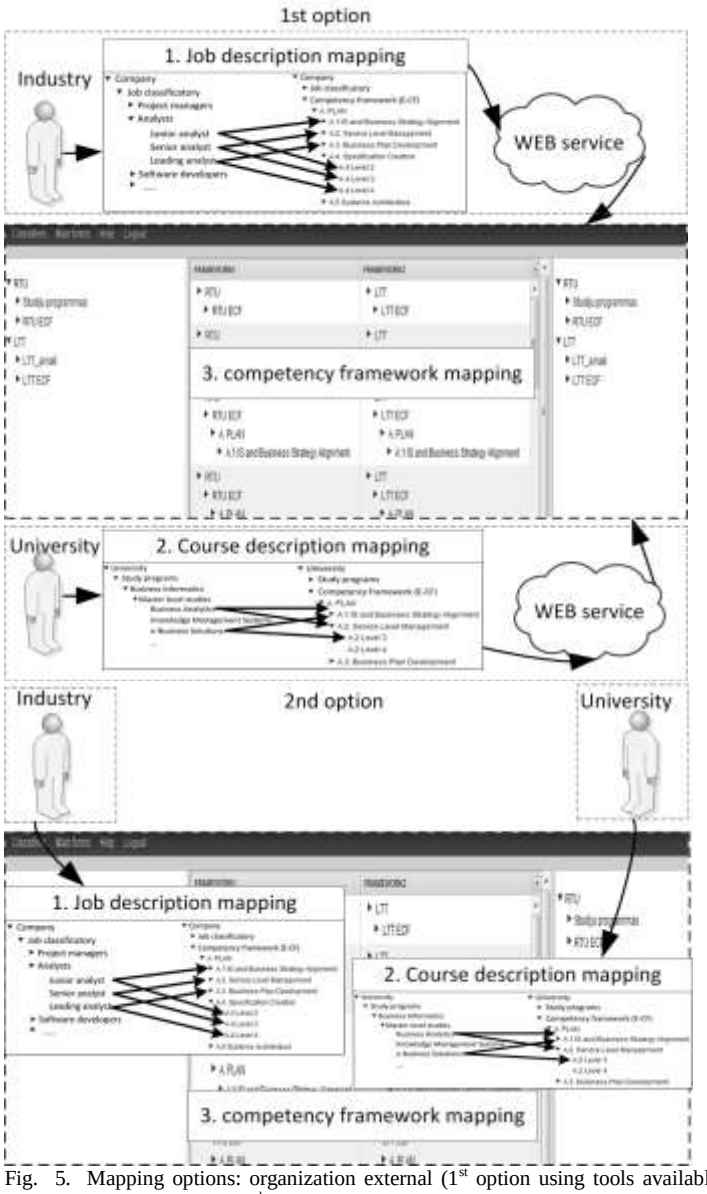

Fig. 5. Mapping options: organization external (1st option using tools available in organization) and internal (2nd option using common tool)

TABLE I

MAPPING OPTIONS BASED ON SOURCE AND TYPE

Nr.	Source	Type	Description
1.	Internal	Manual	Manual mapping of job and course descriptions to a competency framework using arbitrary tools available in Industry and University. Mapped data via web services are sent to the system for further storage and competency framework mapping (see the 1st option Fig. 5).
2.	External	Manual	Manual mapping of job and course descriptions to competency frameworks using a common tool (see the 2nd option in Fig. 5, the prototype of this tool is discussed in Section 5).
3.	Internal	Automatic	Automatic mapping of job and course descriptions to competency frameworks using a tool available in Industry and University.
4.	External	Automatic	Automatic mapping of job and course descriptions to competency framework using a common tool.

(organizationally internal or external) and type (manual or automatic) of mapping (see Table I). Options 1 and 2 are described in Table I and illustrated in Fig. 5. Options 3 and 4 are under investigation and are not discussed in this paper in more detail.

When the mapped hierarchical structures (Industry job descriptions to competency framework and University course descriptions to competency framework) are available, the next step is to create a mapping between competency frameworks. In this paper we illustrate the case when both University and Industry are using e-CF as competency framework therefore mapping 1:1 was done using prototype of the tool that is available for Industry and University.

B. Summary of MCM

As mentioned in Sections II and IV of this paper conceptual structures of Industry job position frameworks, University study programs and competency frameworks are hierarchical. If there exist at least 2 sets of hierarchical structures (SET 1 and SET 2 in Fig. 6.), each containing 2 mapped structures (1, 2 and 3, 4 in Fig. 6.) then by mapping one hierarchical structure of the SET 1 to one structure of the SET 2 (2 and 3 in Fig. 6.) it is possible to obtain mapping between the unmapped structures from SET 1 and SET 2 (1 and 4 in Fig. 6.).

For example, SET 1 consists of a job positions mapped to e-CF (1 to 2 in Fig. 6.), SET 2 consists of a study program courses mapped to e-CF (4 to 3 in Fig. 6.), and mapping between e-CF's used in SET1 and SET2 is available (as University and Industry both use e-CF, mapping is 1:1) (2 to 3 in Fig. 6.). Now the mediated job position and study program mapping can be obtained, i.e., by selecting job position it is possible to get the corresponding courses from study program and v.v. – by selecting a university course we can get corresponding job positions based on competencies obtained/required in every particular source.

This example concerns the case when University and Industry use the same competency framework (e-CF), however, there can be situations that both parties use different competency frameworks. Then expert knowledge is needed to establish mapping between different competency frameworks. It should be noted that due to the simplicity of current version of implementation there could be problems with the quality of mapping of job and course descriptions to the competency framework if the person doing the mapping is not an expert either in the ICT domain or in-house competencies, or chosen competency framework.

V. DESCRIPTION OF THE PROTOTYPE

Based on MCM described in the previous section the prototype has been developed in cooperation with the partner from ICT Industry – Lattelecom Technology Ltd.

A. Development process and functionality

Development process started with discussions between key participants form both Industry (project manager, human resource department representative, software developers) and University (project manager and researchers). Discussions resulted in initial requirements of the prototype. Next, the architecture of the prototype was constructed in a collaborative way (involving both Industry and University representatives). Afterwards the iterative implementation of the prototype was accomplished by software developers from Industry. Small set of functionality was developed and tested in each iteration. Prototype was developed using Java programming language, Vaadin [21] as Java framework and MySQL [22] as database management system. Most of functionality is realized as reusable web services. Eclipse IDE [23] as an integrated development environment is used.

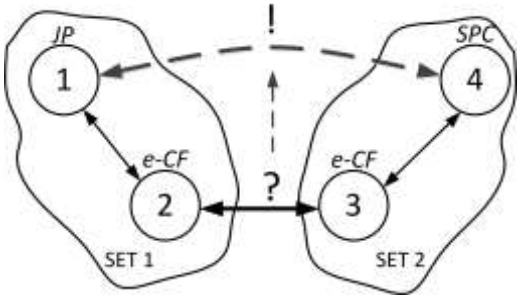

Fig. 6. Illustration of basic approach used in MCM. JP – job positions, SPC – study program courses

TABLE II

BASIC FUNCTIONALITY OF THE DEVELOPED PROTOTYPE

Functionality	Description
Management of organizations	Prototype allows managing information about various organizations that attempt to collaborate in the context of competency information exchange (for example, Universities, partners from Industry).
Management of users	Prototype allows managing prototype users belonging to available organizations.
Management of hierarchical conceptual structures	Prototype allows managing hierarchical structures such as job position frameworks, University study programs, competency frameworks.
Management of mapping	Prototype allows to define mapping between all hierarchical structures
Mediated comparison	Comparison between information sources such as job positions and study courses. This functionality is based on MC method described in section IV

Basic functionality of the developed prototype is described in Table II. *Management of hierarchical conceptual structures* and *Management of mapping* are included in the prototype and refer to Job description services, Knowledge requirements identification services, Study course services, and UKRDM services of the University-Industry collaboration support system (see darker colour boxes Fig. 3.). *Mediated comparison* functionality use hierarchical structures and mapping between them to produce the correspondence between job positions and study courses - that refers to Differences services (see Fig. 3.).

Potential user groups of the prototype are study program designers, teachers, industry representatives, students and experts who maintain the competence standards (both used in University and Industry) and mapping between them. Study program designers and teachers use the prototype to map courses to relevant competence and qualification standards and to evaluate the course correspondence to job positions. Industry representatives use the prototype to map job positions to competence standard and to evaluate the job position correspondence to University courses. As the prototype is in the development stage, other user groups are not yet involved in its usage. Detailed functionality of each user group and potential public usage of prototype are not discussed in this paper.

Manual mapping of course descriptions to e-CF using developed prototype (see 2nd option in Fig. 5) is presented in Fig. 7. University course "Business Analytics" (in Latvian, *Biznesa analītika*) is mapped to e-CF competencies *IS and Business Strategy Alignment Level 5*, *ICT Quality Strategy development Level 5*, *Project and Portfolio Management level 2*, *Process Improvement Level 3*, *ICT Quality management Level 2*. It means that in this course it is possible to obtain the above-listed competencies. Likewise, the prototype allows mapping job position framework to e-CF.

B. Example of MCM usage in the prototype

Using MCM implemented in the prototype, mediated competency comparison between job descriptions and University course is possible. To see the method in action, example to obtain corresponding courses for "Junior analyst" is provided.

A junior analyst job position from Lattelecom Technology Ltd. job position framework is mapped to the following e-CF competencies (see Fig. 8): *Specification creation Level 2, Application design Level, Design and development Level 2, Testing Level 1, and Process improvement Level 3.*

The list of courses that include at least one of the requested competencies is as follows: *Business Analytics; Business Process Management and Engineering; Advanced Data Technologies; Service Science, Management, and Engineering; Enterprise Architecture and Requirements Engineering; Customer Relationship Management and Social Network Technologies;* and *Artificial Intelligence in Business* (in Fig. 8 the course titles are in Latvian).

C. Evaluation of the prototype

Early evaluation of the prototype was done to obtain comments and suggestions for further development. It should be noted that quality of mapping was not evaluated, because at the early stage of development we used small set of courses and job positions just to demonstrate the potential use of the prototype. Several experts (teachers from University, Industry representatives) were asked to test the prototype. Most of them wanted to know why it is necessary to use four conceptual hierarchical structures for mediated comparison, if the mapped structures from two different sets (see Fig. 6. SET1 and SET2) are the same (in this case e-CF is used as competency framework in both sets) – why not to use just 3 hierarchies? The answer is simple: in the current situation when the partner

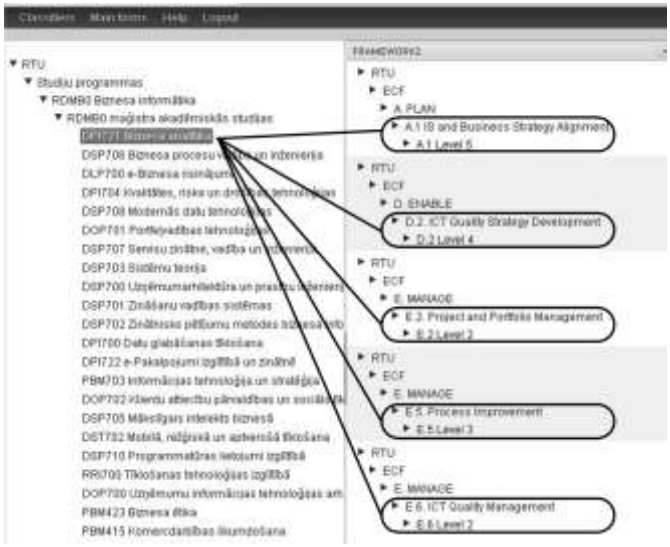

Fig. 7. University study program course mapping to e-CF

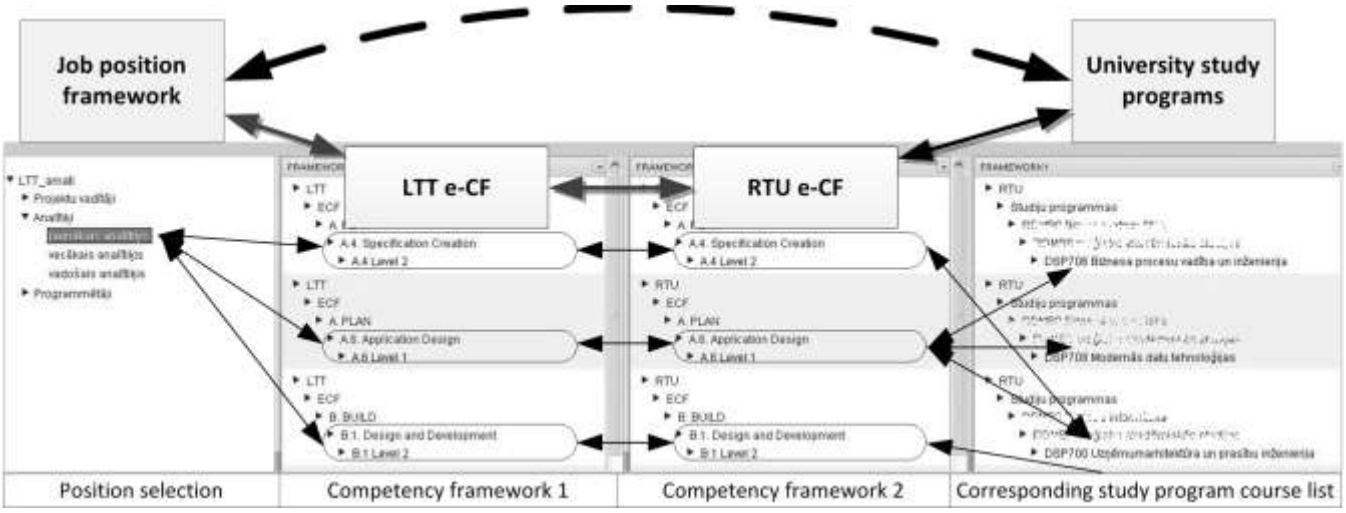

Fig. 8. Prototype of mediated competency comparison between job descriptions and University courses

Fig. 9. Preferred layout of the resulting hierarchical structures

from Industry and University uses the same competency framework mapping between these frameworks is 1:1, yet the method and prototype were developed to support also the case when both University and Industry can use different competency frameworks. Therefore it is possible to define mapping N:N, i.e., one or many competencies from one framework can be mapped to one or many competencies from another framework. For example, mapping could be defined between e-CF and SFIA competency frameworks.

From the functional perspective it was suggested that in the section of comparison results (see Fig. 8. "Corresponding study course list") it could be useful to have a link to a full course description at the University web page. This linkage could be used when partners from Industry are interested in University course details.

For usability improvement experts suggested that the left side in the mediated competency comparison form (Fig. 8. "Position selection") could be organized as a tree, but other three parts: (1) corresponding competencies to job position from the competency framework used in Lattelecom Technology (Fig. 8. "Competency framework 1"); (2) mapped competencies to the competency framework (Fig. 8. "Competency framework 2") used in University and (3) the corresponding study course list (Fig. 8. "Corresponding study program course list"), should be organized as a two level list.

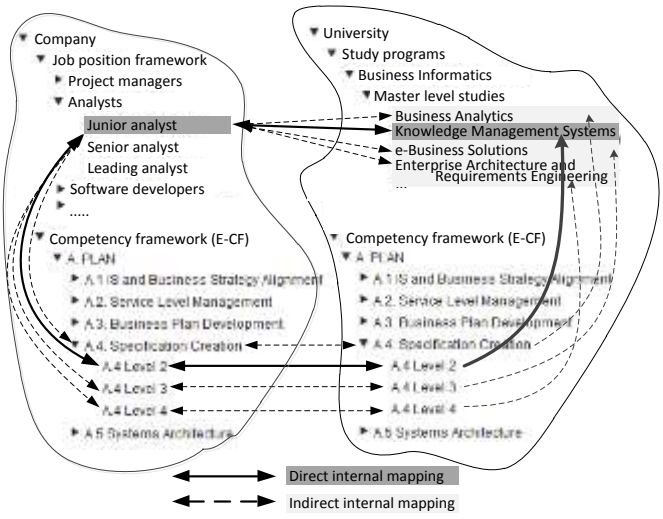

Fig. 10. Indirect internal mapping (artificial example)

For example, the organization and used framework as the first level of the list and the framework details at the second level of the list (see Fig. 9).

VI. Discussion, conclusions and further research

After the first evaluations of MCM and the developed prototype, the following problems and possible solutions can be pointed out:

Need for weighted mapping. Mapping between hierarchical structures should be weighted, for example, in one particular course it is almost impossible to obtain one particular competency. The competency usually is obtained by taking several courses. Developing weighting algorithm would allow defining the weighted mapping between hierarchical structures and illustrating impact on each course on the competency.

Need for indirect internal mapping. The problem arises in mapping a job position/study course to a particular competency level in the competency framework. For example, if the previously described job position "Junior analyst" is mapped to *A4. Specification creation Level 2*, then the prototype can return corresponding courses where the same competency with the same level is defined. This is the so-called *direct internal mapping* (see Fig. 10.) But in order to avoid potentially corresponding course loss in the case when in the course mapping the same competency is defined but with the different level, *indirect internal mapping* should also be considered. In the mediated competency comparison the corresponding courses should be returned based both on direct and indirect mapping. In the prototype the hierarchical structures (job position framework, University study program courses and competency frameworks) are represented as child elements of corresponding organizations (see Fig. 10). Therefore direct and indirect internal mapping of a job position framework/study course to a competency framework can be defined (illustrated in Fig. 10). If there is a mapping, for example, between job position and competency framework then indirect internal mapping is considered to the parent element of the mapped element (if the parent is not the title of competency framework or the name of the competency category) and to all its children except the directly mapped element itself. If "Junior analyst" is mapped to competency *A4. Specification creation Level 2*, then it is also internally indirectly mapped to the following levels of the competency (Fig. 10):

- *A4. Specification creation* (because it is a parent element and is not the name of competency framework or the name of competency category)
- *A4. Specification creation Level 3* and *A4. Specification creation Level 4* (because these elements are children of a parent element of the mapped element)

By obtaining indirect internal mapping it is possible to find more courses corresponding to a particular job position that might be significant for partners from Industry searching for study opportunities of their employees. Indirect internal mapping should be automated and integrated in a prototype so that no manual work is required.

Early evaluation of the proposed method and prototype showed that MCM and the prototype can be used for facilitating and extending competency framework usage in the context of University course description and competency information exchange between University and Industry. By facilitating a clear view on obtainable competencies in University study program courses (1) industry partners can obtain clear view on University capabilities with respect to particular domains and (2) transparent mapping of study courses to a competency framework allows better understanding of the position of the study programs and study courses in their potential to meet internationally recognized competency needs.

In this paper we illustrated only the case where University and Industry use the same competency framework. However, the method and the prototype are also applicable in cases where different frameworks are used and then more complex mapping between frameworks is required.

Currently mapping requires manual work. Further research draws the field of text analysis that can potentially make easier and automate manual work of extracting and mapping the competencies to a particular competency framework.

VII. Acknowledgements

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Pēteris Rudzājs, Mārīte Kirikova. Darba aprakstos un universitātes kursos ietverto kompetenču pastarpināta salīdzināšana
Lai veicinātu informācijas tehnoloģijā sakņotu sadarbību starp universitātēm un industrijas organizācijām, šim tehnoloģijām ir jāpalīdz nodrošināt informācijas apmaiņu gan par darba tirgus tendencēm, gan par zināšanu attīstības tendencēm universitātē. Šajā kontekstā, ņemot vērā to, ka darba tirgū kompetences kļūst par tādu kā "vienotu valūtu", ir nepieciešams salīdzināt industrijas organizāciju kompetenču pieprasījumu ar universitātes kompetenču piedāvājumu. Salīdzinot pieprasījumu un piedāvājumu, ir iespējams noteikt, vai universitāte var apmierināt industrijas organizāciju pieprasījumu. Gan universitātē, gan industrijā kompetences tiek aprakstītas brīvā formā, tādēļ kompetenču informācijas apmaiņa starp abām iesaistītajām pusēm ir apgrūtināta – universitātei ir grūti saprast kompetenču aprakstus industrijas organizācijā, savukārt industrijas organizācijām – universitātē. Kompetenču informācijas apmaiņas veicināšanai starp

universitāti un industriju var lietot kompetenču ietvarus. Ja universitātē un industrijas organizācijā tiek lietoti atšķirīgi ietvari, tad nepieciešama šo ietvaru sasaiste. Šajā rakstā ir aprakstīta metode un programmatūras prototips, kas nodrošina darba aprakstos un universitātes kursos ietverto kompetenču ietvarpastarpinātu salīdzināšanu. Izstrādātais prototips iekļaujas Universitātes-Industrijas sadarbības atbalsta sistēmas arhitektūrā un servisos, kas izstrādāti ar mērķi nodrošināt informācijas apmaiņu starp universitāti un industrijas organizācijām.

Петерис Рудзайс, Марите Кирикова. Промежуточное сравнение компетенций, определенных в курсах университета и описаниях должностей
Чтобы способствовать развитию сотрудничества между университетами и организациями индустрии, информационные технологии должны обеспечивать обмен информацией о тенденциях рынка труда и о тенденциях развития знаний в университете. В этом контексте, учитывая то, что на рынке труда компетенция становится так называемой «единой валютой», необходимо сравнить требования к компетенции от организаций индустрии с предложением компетенции от университета. Сравнивая требования с предложением, можно определить, может ли университет удовлетворить требования организаций индустрии. И в университете, и в индустрии компетенции описываются в свободной форме, поэтому обмен информацией о компетенции между этими заинтересованными сторонами осложнен – университету трудно понять описания компетенции в организациях индустрии, в свою очередь, организациям индустрии - в университете. Для улучшения обмена информацией между университетами и организациями индустрии можно использовать каркасы компетенции. Если в университете и в организации индустрии используются разные каркасы, необходима связь между этими каркасами. В этой статье описаны метод и прототип программы, который обеспечивает промежуточное сравнение компетенций, определенных в курсах университета и описаниях должностей. Разработанный прототип укладывается в сервисы и архитектуру системы поддержки сотрудничества Университет-Индустрия, которые разработаны с целью обеспечения обмена информацией между ними.