IT SOLUTIONS SUPPORTING THE MANAGEMENT OF INFORMATION OF EMPLOYEES' COMPETENCIES

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Abstract: This paper presents the issues concerning the development and improvement of tools to streamline the information exchange between labor market and vocational training. These solutions will support the competencies management in enterprises and is closely associated with enterprises' management, IT systems and knowledge management. As an example of such tool an IT solution called "System Professionals" was described. It was created as a result of cooperation between the Wielkopolska Province Government and Poznan University of Technology. The users of the tool were defined and the needs which reflected basic functionalities were characterized. Additionally, the most important elements which were the subject of the system design process were indicated

Introduction

Information is a key factor in decision-making and is closely associated with the management functions of the enterprise, in which an important role is played by resource management. Resources management affects the implementation of company's goals, while also affecting the functioning of the entire economy Resources which largely determine the competitiveness of the enterprise include information and human capital – expressed by employees' competencies. The growing belief in the importance of employee competency management in efficient achievement of the goals elevates the competencies to a leading business resource of companies. Interpretation of competencies as resources, which have price, availability and can be exchanged enables managing of the competencies on equal terms with other resources in the enterprise. When assessing the business potential, more and more often it is associated with potential of employees. The structure of assets, basic and auxiliary processes related to the organization of work or the working conditions within the company are all factors closely associated with knowledge, skills, attitudes and experience of the employee.

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The primary purpose of this publication is to present the IT tool which has been developed to create and information bridge between labor market and education system. These are two areas of activity which have a very large impact on the economy, while also having very different needs and goals.

An important goal of this publication is also drawing attention to the necessity of precise and up to date describing of entrepreneurs needs for specific competencies and skills and possibility to declare acquired skills by people seeking employment. In order to specify the main goal of the publication, a short description was added of functionality of the tool which supports the information exchange between business and academia about employees' competencies. The IT tool "System Professionals" developed, implemented and improved within the project "Czas Zawodowców - wielkopolskie ksztalcenie zawodowe" (Professionals' time – wielkopolska vocational training) enables detailed study of the needs of Wielkopolska employers regarding employee competencies and confronts them with the skills possessed by potential employees.

Information Needs in the Area Labor Market – Vocational Training

An idea to create a tool which identifies the competency gaps and surpluses was an inspiration for the employees of Poznan University of Technology to conduct, in years 2010-2012, and innovative project called "Wielkopolski system monitorowania i prognozowania" (Wielkopolska system of monitoring and forecasting) A primary product of this project was the IT tool which enabled Wielkopolska employers to submit job, training and internship offers and the students and graduates of upper secondary vocational schools to describe their own competency profile. Employers reporting their needs describe the required skills at particular positions with a use of a glossary based on the core curriculum for vocational education. Using the tree structure of the glossary, in which a profession includes qualifications, competencies and skills, makes it possible to describe in detail the competency profile for an employee or a position. Relationships between education and labor market should be initiated and supported by local governments (Armstrong and Taylor, 2014). It is necessary to create development plans within the triad: school, business, administration. Such solutions are developed within the program Technical Knowledge Accelerator (AWT®) (Szafrański et al., 2008) and implemented in such projects as "Czas zawodowców – wielkopolskie kształcenie zawodowe".

Innovative Approach to Human Resources Management as a Current Market Requirement

Key role in the suggested systemic project is played by information. It is precisely the current and detailed information which is required and missed by all entities connected with education, business and administration.

An inspiration to undertake research, to design and implement the competencies management came from the diagnosed need of employers and the literature associated with issues of human resources management. Mismatch between employee's competencies and employer's needs are reflected in reduced competitiveness of the enterprise. Enterprise management is then supported by relying on the competencies (Sienkiewicz et al., 2013). Analysis of reports (Sustainability ..., 2016), statements (Labour ..., 2016) and the literature on the identification of the needs of employees (Dennis et al., 2013) indicates the need to focus in the human resources management on competencies, and not only professions. Employers declare no initial knowledge of the level of competencies required from potential employees (Bratton and John, 2007). Often raised in the literature is the aspect of cost-effectiveness of applied solutions in the field of personnel management (Mikulski, 2014). Such demands were taken into account in building a catalog of competencies and their description to give the management a practical solution to search, organize and compare the qualifications of employees.

When attempting to design the system, studies were carried out, which methods and tools were closely associated with classical and modern methodology of management (Lisiński, 2014). In identifying user needs, the development of environment and the situational context of the entity was taken into consideration to a large extent. Models, which are the basis for solving practical problems of management in the enterprise, were also used. The choice of the most efficient methods was objictified by interviews with experts (Bartoszewicz, 2014); in case of the analyzed System Professionals, these were experts in the field of management. The study also included expert panels, which according to the literature accelerate the diffusion of knowledge, not only between the labor market and job seekers, but also between scientific institutions (Perechuda, 2013). Information connection between different institutions, not only commercial but also representing state and local administration is the recommended model of relationships in created IT systems (Kisielnicki, 2014). Recommendations regarding creating these relationships were also reflected in the presented IT solution.

In terms of company management – an employee is for an employer a competency resource, which will affect the realization of company objectives. Such approach to the recruitment of staff requires using adequate formulation and communication of information in IT systems connecting entrepreneurs with potential employees. In case of small and medium enterprises, which cannot afford to maintain their own HR departments, using Internet based recruitment systems is economically justified (Sok et al., 2013).

It is reasonable in this case to define the requirements concerning specific expectations toward future employees. These requirements stem directly from the scope of responsibilities and are associated with the workplace, for which a set of attributes (competencies) should be defined along with level at which they should

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be mastered. The effect of the identified needs is a description of employee's competency profile (for a position or group of positions), which can be related to the desired "quality" of a person or position. Based on the described competencies (as attributes), it is possible to go more into details and assign individuals and positions with the levels of mastery. Using such a method of valuing competencies is associated with the necessity to process information, for instance in dedicated IT systems, and to ensure appropriate attributes characterizing information about competencies. Defining and analyzing the required characteristics of information, which may affect its practical utility and increase its value, we should mention the following (Mantura, 2012):

− being up to date – compliance with the real state of the object in a given period,
− to a problem addressed by the recipient,
− completeness – all the information necessary for the given object,
− unambiguity – precisely defined terms.

In the development of the IT tool - System Professionals - in the systemic project, each functionality was designed and adjusted together with users taking into account their individual needs and mutual of information connections. The cooperation of many entities, often of a different nature, is nowadays a foundation for success of the implementation of innovations (La Rocca and Snehota, 2014).

All functionalities of the System Professionals are grouped into modules, which are dedicated to different groups of users, and are used to carry out separate tasks (Goliński, et al., 2011), are subject to evaluation and improvement in the process of creating new design and implementation versions. Combined together, the modules form a system of information exchange by using the same databases, the same system of authorization and authentication. Easy access to information is guaranteed by a consistent interface. Due to the wide range of tasks carried out in the System and many groups of users, the system has a modular structure. Each separate functionality has innovative elements. E-learning module is very important and meets the dual roles: contains courses and exercises for students but at the same time provides a platform for training for teachers. Aspect of the use of remote teaching methods at a time of globalization of the economy and education is discussed in many publications (Dima et al., 2014)

Functioning of the System Professionals is possible, among others, thanks to the great commitment of the team in studying the expectations of users. The research aspect was designed from the very beginning in the task regarding the IT tool (Goliński et al., 2011).

A Process of Development of the IT System "System Professionals"

Proper selection of employee competencies for the effective implementation of the task is the subject of effective business management, and thus the proper way of achieving its objectives. Employees' competency management most often focuses

on the inside of the company, and the factors affecting the shaping of competencies come from the environment, which nowadays has a global dimension (Motała et al., 2013). Currently acquiring and retaining the best employees with the adequate competencies for the enterprise is a key factor in building competitive strategy in the market (Tabor, 2010; Dragolea, 2015). Support in finding employees with the right skills is provided by IT solutions.

During the design phase of System Professionals was compared with other popular portals featuring job offers, presented in Table 1. The comparison took into account the needs of employees, which were indicated both in cited literatures of the subjects and in the surveys with employers.

Table 1. Identified need of System Professionals (*source: System Professionals, oferty.praca.gov.pl, olx.pl/oferta, www.pracuj.pl, praca.gratka.pl*)

Expectations from the area of management	System Professionals	Other advertising service
Lowering the costs of automatically adjusting the skills to the job position.	Key functionality	none
Possibility to use the system of posting internship/job/training offers free of charge	Key functionality	CBOP*
Acquiring students for internships and trainings	Key functionality	majority
Possibility of performing the diagnosis of competencies and skills of employees	Optional functionality	none
Access to reports describing most frequently sought jobs	Optional functionality	none
Decreasing the time of searching for employees based on their skills	Key functionality	none
Planning the development of the enterprise based on the personnel development plans	Optional functionality	none

* Central Database of Job Offers

At the beginning stage of designing the System Professionals a business assumption was made to create a useful tool which can be commercialized after implementation and improvement phase. Very often products achieved as a result of subsidized projects are detached from market reality. While designing the functionalities of the IT tool – System Professionals – users' requirements were defined in great detail (Szafrański and Goliński, 2015). This phase determined the next steps and contained specification of the most important requirements from the perspective of system usability (Tegarden et al., 2012). At this stage it was necessary to conduct a survey among employers, students, teachers and representatives of local governments. These surveys were conducted in form of focused group interviews (FGI) and numerous individual consultations. It was very important to understand the mechanisms and sources of information used by entrepreneurs (Kiełtyka and Jędrzejczyk, 2009) and to learn the structure of information especially in the area of demanded employees' competencies. During

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this stage a feasibility study was also written to determine the possibilities, time and cost of the project. The next step was developing an IT tool. This stage involved the analysis of functional requirements, technical and legal conditions, sensitive data protection, data loss preventing measures and protection against unauthorized access. This step concluded the process of integration and testing Due to the necessity to adjust the tool to users' expectations and short duration of the project, for testing a method of action research was chosen.

Implementation of the system, as the next stage, was initiated by implementation of users – individual conversations and information panels with employers. The last stage in the process of the IT system development was its exploitation, maintenance and implementation of modifications and improvements resulting from users' expectations.

System improvement had to take into account the requirements of users related to management of information regarding competencies of the employees. For this reason focused group interviews were conducted among entrepreneurs in order to identify their needs. Keeping up with growing expectations but also IT capacities required using new methods of integrating, activating and facilitating the use of the system, including such tools as agent's concept or Marketing Automation solution.

Basic Functionalities of the IT Tool System Professionals

This chapter describes selected, most important functionalities of the System Professionals. System Professionals is a tool used by several groups of users. The core of the system is an information connection between the student/graduate and employer. The graphical interface was built using Responsive Web Design technology that can automatically adapt to different screen sizes, including the small screens of mobile devices, because using the application on smartphones enhances the functionality of the solution among mobile users (Carree and Kronenberg, 2015). Figure 1 shows the System interface with the user's main page opened.
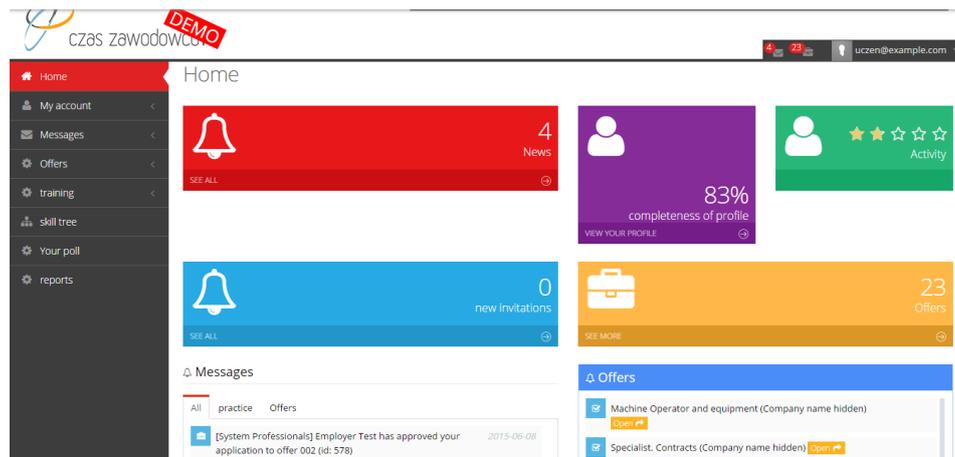
Figure 1. Graphical interface of the System Professionals *(source: System Professionals)*

The described features of interface and used technology allow to include the System Professionals on the list of design tools created according to the latest trends of web application development. This will allow for a relatively long life of a System without the need of technological modernization. Also the used solutions in regard to database and hosting parameters guarantee proper performance of the System, taking into account also the planned development of functionalities and increasing number of active users.

Apart from common functionalities however, most important are the functionalities dedicated to individual groups of users - in case of "student/graduate" these are:

− detailed description of skills based on the core curriculum,
− description of other information about the user important for the labor market,
− overview of matches made by the System of training/internship/job offers,
− possibility to apply for the offer.

Functionalities dedicated to the "Employer" include:

− submitting training/internship/job offers,
− reviewing candidates profiles matched by the System Professionals with a given offer,
− inviting selected candidates for interviews,
− responding candidates applications.

"Practical training manager" can manage the list of students' internships in companies, assign students to internships and generate required documentation. Implementation practices and internships is a very important part of the adaptation to future employees (Dragolea et al., 2014).

An important feature of the System Professional is a possibility to use it to manage information about employee's competencies – thanks to, among others, standardization of job descriptions and candidates applications. All groups of users

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of System Professionals use a common glossary describing the professional competencies, which is based on the Core Curriculum for vocational training.

This is both strength and a shortcoming of the System Professional. Strength is the use of a unified vocabulary of skills description appearing in the curriculum of vocational education. Drawback associated with this solution is a complicated language of skills description that does not translate directly into practical language used in business. Opportunity can be seen in the flexible connection between extensive but impractical language description of the curriculum with maximally simplified and functional description expressed by the language used by entrepreneurs. This is one of the important directions of the System Professionals development

The first group of users who use a glossary of skills are students and graduates, that is individuals seeking employment. One of the elements of the description of the skills profile of these users is the selection and assessment of possessed skills. The screen associated with this functionality is presented in Figure 2.
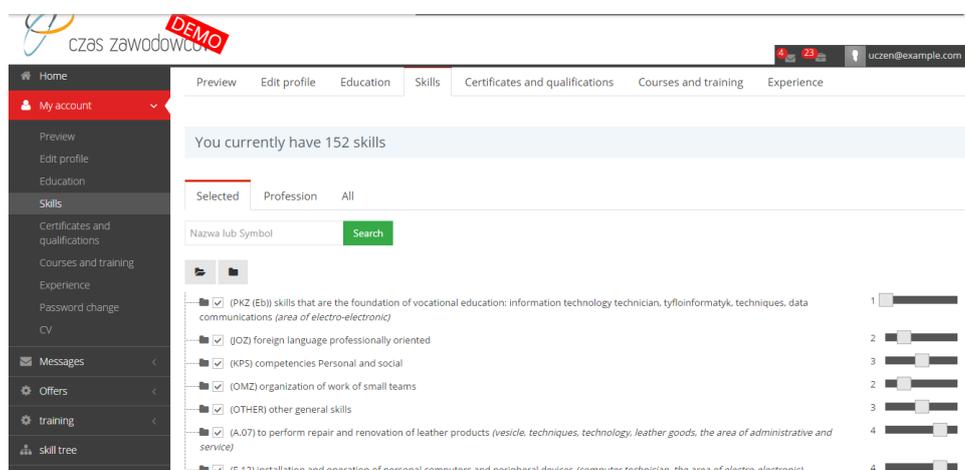

Figure 2. Skills profile of a student/graduate *(source: System Professionals)*

After describing the skills profile, a user can confront it with the demand for these skills in the labor market. This involves the review of the offers matched by the System Professionals with the skills profile of the user.

The second group of users of the skills glossary are employers. Their role is to determine their needs in terms of employing new workers. For this purpose, they submit in the System Professional training/internship/job offers. In addition to other information characterizing the offer, its important part is to specify the requirements regarding the skills of the desired candidate. Screen shot of the offer is presented in Figure 3.
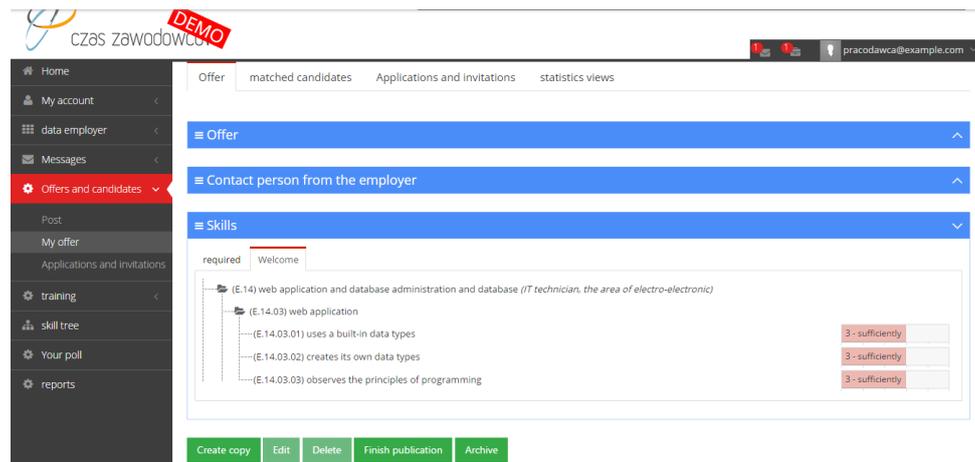
Figure 3. Candidate's competencies required in the offer *(source: System Professionals)*

Data from the offer is used to select the best matching offers for the candidate, which was described above, and by the employer to choose candidates best matching the offer.

While designing the functionality of the system, it was assumed the competencies of the employee will be assessed by various individuals, in order to achieve the effect used in a 360^0 method (Spychała, 2014).

In the course of the project realization, System Professionals users were asked their opinions about new solutions introduced to the system as well as other needs and expectations. One of the interesting tools in the system, which was scheduled for implementation and improvement during the project, is the mechanism of automatic message sending (Marketing Automation). It works in such a way that certain rules of events and the passage of time between them were defined in the System, to select a group of recipients to whom the message is later sent with a content based on fixed template and containing personalized information intended for a specific recipient. All the features presented above are designed to increase the efficiency of using the System Professionals.

The experience gained from observing the behavior of current users of the System are used to introduce improvements to the processes and information flow, allows to specify the priority trends of changes in functionality. The main direction of changes determines the practicality and utility of System modules. Developed are those that are most widely used, and the others are being reduced or modernized.

Summary

The main goal of this publication, and at the same time a conclusion of performed design works, is to highlight the need of improvement of communication between the labor market and vocational education. The solution presented in the

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publication is currently in use and can support effective management of employees' competencies in enterprises.

System Professionals fits well into practical and effective support of enterprise management. By handling competencies and skills it enables the analysis and organization of existing human resources and optimization of planned employment. Summarizing the functionalities which distinguish the developed systemic solution from other available in the market, we can present the most important issues, which had been pointed out by experts validating the System Professionals:

− Detailed knowledge of both the technical competencies, and social competencies in particular, of a potential employee is very important in the process of his or her professional adaptation;
− Taking into account in the System Professionals the needs of different interest groups: employers, organizations of employers, job/internship seekers, local governmental institutions and bodies responsible for education, is also an important element of environment integration;
− The fact that the System Professionals offers free support of management functions, by accurately determining the competence gap, facilitating recruitment and delivery of information about the labor market and its trends cannot be overestimated;
− The System Professionals can also serve as a platform for social partnership, aimed at building an integrated model of a social dialogue system, including employers, employees and the local authorities, by inviting multiple stakeholders to shape the economic and education policy.

Solutions such as the System Professionals should increase the effectiveness and efficiency of a recruitment process and staff development. The essential features of the System Professionals is its versatility, replicability, free access and systemic approach. The System Professionals is also very useful in preparing the graduates to enter the labor market and to accelerate the adaptation of young workers to new jobs. The System Professionals platform, thanks to its modular structure, can also be flexibly adjusted to needs of users depending on the technological or regional requirements.

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ROZWIĄZANIA INFORMATYCZNE WSPIERAJĄCE ZARZĄDZANIE INFORMACJĄ O KOMPETENCJACH PRACOWNICZYCH

Streszczenie: Opisane w publikacji zagadnienia dotyczą wdrożenia i doskonalenia narzędzia usprawniającego wymianę informacji pomiędzy rynkiem pracy, a kształceniem zawodowym. Rozwiązanie stanowi wsparcie w zarządzaniu kompetencjami w przedsiębiorstwie i jest ściśle związane z zarzadzaniem przedsiębiorstwem, systemami informatycznymi oraz zarządzaniem wiedzą. Jako przykład takiego narzędzia opisano rozwiązanie informatyczne „System Zawodowcy", które zostało zrealizowane, jako efekt współpracy Samorządu Województwa Wielkopolskiego z Politechniką Poznańską. W publikacji określono użytkowników narzędzia, scharakteryzowano potrzeby, które odzwierciedlały podstawowe funkcjonalności. Wskazano również najistotniejsze elementy będące przedmiotem procesu projektowania systemu.

Słowa kluczowe: narzędzie informatyczne, zarządzanie personelem, pozyskanie informacji, kompetencje pracownicze

IT解決方案並支持員工的勝任特徵信息管理

摘要：本文介紹了有關的工具來簡化勞動力市場和職業培訓之間的信息交換的發展和改進的問題。這些解決方案將支持能力管理企業，並與企業管理，IT系統和知識管理密切相關。作為這種工具的一個例子進行了說明稱為"系統專業人員"IT解決方案。它被作為大波蘭省政府和波茲南工業大學之間的合作而創建的。該工具的使用者定義並反映基本功能的需要進行了表徵。此外，分別表示這是系統設計過程的主體中最重要的元素

關鍵詞：IT工具，獲取信息，員工的人力資源管理能力