Research Note

A framework for social well-being and skills management at the workplace

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ABSTRACT

Employees are the human capital that contributes to the success of high-performance and sustainable organizations. In the digital economy, organizations need to be competitive and differentiate them self through the knowledge they detained. This requires the adoption of innovative solutions that valorize and recognize workers who invest their time to keep up-to-date with areas of knowledge that are relevant to the organization. Indeed, organizations are investing in retaining skilled workers, in particular senior workers whose knowledge and experience are a valuable asset that should be passed to younger co-workers. One way to address these concerns is to create conditions to promote a feeling of employee's wellness in their work environment.

In this paper, the two perception of well-being at the workplace (i.e. physical and social) are combined with gamification techniques and analyzed how it might help employees to acquire the expertise ("soft and hard-skills") they need to improve their curriculum. This is particularly relevant for older adults to whom the feeling of fulfilment and recognition is much appreciated. The case study relates to the Active@Work project. The proposed solution incorporates an "intelligent behavior" to keep the user aware of their well-being status, triggering notifications to mitigate the risk of fatigue or stress at work. The solution also provides support for workers to engage in new and rewarding activities, where his/her knowledge and experience is considered as a relevant contribution, promoting in this way employee recognition and social well-being at the workplace. Team management and tutoring of younger co-workers by older adults will be, together with a Skill Development Tool, some of the innovative features within the project.

1. Introduction

The current socio-economic situation and the increasing average life expectancy of the population is forcing the European governments to raise the retirement age and rethink its social security systems. Such demographic ageing requires innovative approaches, in particular solutions to assist employees (and especially older adults) to keep active. Several studies claim that working beyond traditional retirement age may be beneficial for mental and physical health (Cahill, Giandrea, & Quinn, 2013; Dave, Rashad, & Spasojevic, 2008; Wang, Adams, Beehr, & Shultz, 2009).

In the digital economy, organizations need to be competitive and sustainable. One of their competitiveness drivers resides on their capability to retain skilled workers, in particular senior employees, whose knowledge and experience represents a valuable asset, not found in younger employees, regardless of their competence and stillness.

In rapidly changing work environments, especially those requiring intellectual production (e.g. companies operating in consultancy services), organizations need to monitor how the professional curriculum of each employee's is progressing. In some cases, it might be important to align the set of competencies held by each employee with those required by the organization. One way to improve such alignment is to analyze the user curriculum (e.g. academic and professional qualifications) and trigger recommendations for each employee to endorse into specific training actions. In this domain, the literature (Huotari and Hamari, 2012) recommends the adoption of gamification techniques to incentive employees to be proactive in endorsing the recommended training actions. Such approach besides promoting a healthy competitive environment, also upholds a feeling of recognition and well-being at the workplace. The idea is to demonstrate how relevant it is to keep employees (in particular those close to retirement age) motivated and with a feeling of usefulness, encouraging them to participate in specific programs.

According to the literature (Iverson, Olekalns, & Erwin, 1998; Schaufeli, Taris, & Van Rhenen, 2008), employee well-being at the workplace are normally analyzed from three perspectives (i.e. physical, social, and psychological), in this paper only two perception of well-being (i.e. physical and social) are addressed. While the physical well-

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being is a property of each individual, which can compromise employee's engagement and performance, the social well-being focuses on the interactions between employees. The study of social well-being perception is concerned with subjective experiences felt by employees, in particular the sense of usefulness and the feeling of fulfilment and recognition of their effort (Adler and Kwon, 2002; Gerstner and Day, 1997; Kramer, 1999). Therefore, organizations might need to provide support for team-building, cooperation and integration between co-workers. In this domain, the paper outlines the achievements accomplished in the Active@Work (A@W) project (www.activeatwork.eu) – a R & D project, funded by the Active and Assisted Living (AAL) Program, aiming to support senior employees in their workplace without risking their health condition. This paper explores in more detail the Skills Development Module (SDM), a curriculum assessment tool that provides support for the employee to engage in new and rewarding activities, where his/her knowledge and experience ("soft" and "hard-skills") are seen as a relevant asset for the organization. Team management and tutoring of younger employees by senior employees is also described as one of the innovative features within the project.

The paper presents a survey about the two predominant scientific areas that have supported the research work: Visual Analytics and Gamification. The information visualization techniques provided by the Visual Analytics, enabled to streamline the decision-making process and contributed to aware the user about events requiring his/her attention. Gamification techniques, to engage, motivate, and retain highly productive employees, by fostering a competitive working environment, where employees are encouraged to improve their skills, are also addressed.

The rest of the paper is organized as follows. Section 2 presents a Literature Review, whereas Section 3 describes the architectural solution designed for the A@W project. Section 4 introduces the modeling approach used to describe the system behavior in addition to the role performed by the Virtual Assistant Tool (VAT) in orchestrating the data flow between the intervenient actors and in keeping each actor aware about existing events. Section 5 describes the SDM, in particular the implemented solution to monitor the employee's professional progress, reducing the gap between the expertise detained by each employee and the ones required by the organization and, finally, Section 6 presents the main conclusions.

2. Literature review

Employee well-being is a relevant topic, with a significant impact on the performance and competeness of the organizations (Hartwell et al., 1996). Therefore, some effort is being made to improve the work environment quality (Danna and Griffin, 1999); managerial practices ranging from work redesign to team building are often structured with the explicit goal of improving the workplace environment and hopefully the employee's well-being. Such practices affect: 1) the psychological well-being of employees by shaping their satisfaction with their jobs (Judge and Watanabe, 1993); 2) the physical well-being of employees by influencing their health, in terms of outcomes such as cardiovascular disease, blood pressure, and workplace accidents (Danna and Griffin, 1999); and 3) the social well-being of employees by providing opportunities for interpersonal relationships and by treating employees with varying degrees of fairness (Kramer and Tyler, 1996).

In this paper, social well-being at the workplace environment is also analyzed from the perspective of two additional scientific areas: **Visual Analytics** (VA) and **Gamification**. The VA process aims at tightly coupling automated analysis methods and interactive visual representations; VA is in fact an emerging research discipline that explores the combination of typical methods of Business Intelligence with the visual perception and analysis capabilities of the human user. VA corresponds to the interaction between visualization techniques, models about the data and the user's profile in order to discover knowledge (Keim, Kohlhammer, Ellis, & Mansmann, 2010). The SDM

explores the VA concepts to present information using dynamic dashboards (DD). This means that, information is displayed using different perspectives and levels of granularity, allowing users to identify, explore, and communicate their preferences to achieve one or several organizational goals. An info-structure of metadata is used to address Data Analysis and gamification techniques (e.g. Self-Awareness and Auto-Regulation) are used to address Human Interaction and Cognition. Based on the employee curriculum, the SDM is able to provide recommendations (i.e. "soft" and "hard-skills") that are relevant for the organization, providing each employees with a clear perception of their strengths and weaknesses.

The **Gamification** concepts are applied to skills managements by adopting techniques that game designers use to engage and reward individual efforts in the workplace. Introduced by the first time in 2010, one of the definitions that found widespread acceptance defines Gamification as the use of game-thinking and game mechanics in non-game contexts to engage users to address identified problems (Huotari and Hamari, 2012). In simple terms, it's a way of using "game" elements techniques to engage, reward and keep employees motivated to compare their expertise with the ones required by the organization.

The solution presented in this paper addresses these topics. The main goal is to promote knowledge sharing, exploring paradigms based on game theory and take advantage of technological advances to endorse empathy in a sustainable manner, contributing to the creation of an healthy competitive environment within the organization (with benefits in terms of social well-being of each individual). The data flows between the core modules of the A@W architecture is described using the Business Process Model and Notation (BPMN) (OMG, Business Process Model, 2011), a standard graphical notation readily understandable by all stakeholders. These include the business analysts who create and refine the processes, the technical developers responsible for implementing them, and the business managers who monitor and manage them. Consequently, BPMN serves as a common language (Jun, Ward, Morris, & Clarkson, 2009), bridging the communication gap that frequently occurs between business process design and implementation (Müller and Rogge-Solti, 2011) This was particularly relevant to describe how the A@W system should behave to accomplish the goals related to employee well-being (i.e. physical and social) within the workplace and to explain how the SDM should be implemented to help employees to improve their expertise ("soft and hard-skills").

3. Description of the project architecture and main achievements

The main achievements of the A@W project address three major goals: 1) provide a web-based solution with an innovative data integration info-structure for context-awareness surveillance (the **Cognitive Module** and the **Business Rule Module**); 2) create communities of employees interacting with each other, where senior employees can share their experiences and assist younger employees (the **Collaborative Module**) and 3) help all employees to improve their CV and expertise, according to the organization needs (the **Skills Development Module**).

As presented in Fig. 1, the orchestrator of the information workflow between the modules of the A@W architecture is performed by the VAT. The diagram shoes that data collected by mobile devices (e.g. smartphone) is passed to the Data Communication Gateway to be validated and analyzed if the incoming data are from a known (registered) device. After validation, the data can flow into different directions based on what actions are requested from the platform. The data are characterized and stored according to their business nature (e.g. data related to biosensor readings, data reporting readings from the workplace environment or data related to logged users performing spatio-temporal data analysis). The user authentication process is assured by the User Access Management Module, implemented using the OpenAM [see OpenAM Project], an open source platform specialized in creating custom authentication procedures and management of authorization