An Exploration of the Social Web Environment for Collaborative Software Engineering Education

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ABSTRACT

The technological environment in which software engineering education (SEE) resides and thrives continues to evolve. In this paper, SW4CSE2, a methodology for collaborations in SEE based on the Social Web environment, is proposed. The impact of integrating Social Web technologies, and applications based on these technologies, in collaborative activities that commonly occur in the context of SEE are explored. In particular, teacher–student and student–student collaborations, both inside and outside the classroom, are highlighted. In doing so, the feasibility issues in selection and adoption of technologies/applications are emphasized, and the use of pedagogically-inclined patterns is made. The potential prospects of such an integration, and related concerns, are illustrated by practical examples.

Keywords: Agile Methodology, Collaboration, E-Learning, Knowledge Sharing, Pedagogical Pattern, Web

INTRODUCTION

The discipline of software engineering is considered integral to computer science and engineering education, one indication of which is its increasingly prominent role in undergraduate and graduate curricula of Universities around the world (Surakka, 2007).

The dissemination and communication of the software engineering body of knowledge is important in software engineering education (SEE), and information technology (IT) plays a crucial role in putting that into practice. However, technology, and the behaviors of people who use it, can change over time. SEE needs to be sensitive to the variations and evolution of its social and technical environment. In particular, any changes in the IT environment need to be reflected in SEE, if it leads to viable opportunities and demonstrated benefits.

The Social Web, or as it is more commonly referred to by the pseudonym Web 2.0 (O'Reilly, 2005), is the perceived evolution of the Web in a direction that is driven by 'collective intelligence,' realized by information technology, and characterized by user participation, openness, and network effects. In contrast to the conventional Web, the focus in the Social Web is on connectivity among people, rather than delivery of information to people.

It could be asserted that software engineering is to a large extent social engineering. In particular, the significance of collaboration in software engineering has been highlighted over the years (De Souza et al., 2009; Nørbjerg & Kraft, 2002; Whitehead, 2007). For the sake of this paper, collaboration is defined as collective work to achieve common goals. The aim of this paper is to assess the implications of the Social Web for teacher–student and student–student collaborations in SEE, and underscore the prospects and concerns in doing so.

The rest of the paper is organized as follows. First, the background necessary for later discussion is provided and related work is presented. This is followed by the introduction of SW4CSE2, a methodology for collaborations in SEE based on the Social Web environment, and its elements. The prospects of SW4CSE2 are illustrated using practical examples. The limitations of the underlying Social Web technologies/ applications are highlighted. Next, challenges and directions for future research are outlined. Finally, concluding remarks are given.

BACKGROUND AND RELATED WORK

In this section, motivation for collaboration in different SEE contexts is provided and related work in the area is briefly highlighted.

There are a few preliminaries in order. This paper assumes a basic background in software engineering (Ghezzi, Jazayeri, & Mandrioli, 2003) on part of the reader. The terms Social Web and Web 2.0 are used interchangeably. This paper considers Social Web technology and Social Web application to be different concepts, and considers Social Web applications to be a sub-class of social software. From the perspective of social software, a Social Web application is sensitive to the relationships among people and takes steps to cultivate those relationships. The name of a pattern is presented in uppercase so as to distinguish it from surrounding text.

Motivation for Collaboration in Software Engineering Education

There is a need to foster a collaborative environment in SEE for a number of reasons. The development of large-scale software has reached a point that it is no longer possible for any single individual to completely understand it or work on it. This has necessitated (1) carrying out a software project in teams and (2) the use of computer-aided software engineering (CASE) tools, both of which can require dedicated collaboration. Indeed, currently deployed commercial CASE tools such as Microsoft Project, IBM/Eclipse, and IBM/Rational Method Composer, and non-commercial CASE tools such as Subversion need certain degree of collaboration among their users. The need for collaboration is also relevant to the situative/ pragmatist–sociohistoric theory of learning (Bennedsen & Eriksen, 2006).

Therefore, a software engineering course is often equipped with group assignments and/ or a team project intended to prepare students for a similar environment later in their careers, including industrial software development. In these efforts, there is a need to induce collaboration among students throughout the duration of the assignment or the team project, as the case may be, to bring out the creativity necessary for any software-intensive development.

Collaborations in Software Process Environments

The software process environments with the client and user involvement have increasingly become collaborative. In particular, the movement in the past decade has been towards social flexibility of which agile methodologies and open source software (OSS) ecosystems are exemplars. Indeed, one of the principles of the agile manifesto is that "the most efficient and effective method of conveying information to and within a development team is face-to-face conversation." The implications of the Social

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