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Abstract - Human beings play a critical role in any collaborative business activities, including software development. People and people-derived issues such as communication and teamwork efficiency and effectiveness are critical to their success. However, managing teamwork and stakeholder involvement is a challenging work, especially when we often see that a technical job may be easily done, it requires substantial efforts for relevant stakeholders on brainstorming with people, reviewing the work, explaining and convincing the work to clients/reviewers, etc. To help resolve this human-side collaboration and communication issue, this paper focuses on software development project as an example and draws an attention on project meetings, and illustrates a meetings-flow approach. In this preliminary study, we would show you the innovative definition on meetings in order to help model and streamline the collaborative proceeding of software development.

Keywords: business collaboration, project meetings, software development

1. The Human Side of Software Development

Contemporary software development (SD) heavily requires the participation of various stakeholders and parties in accomplishing ad-hoc project tasks. Project activities such as feasibility analysis, presentation rehearsal, requirements exploration, critical artifact review and acceptance, project monitoring and control, change control, conflict resolution, etc. are performed in the form of group discussion and social presence to announce, brainstorm, negotiate, reach consensus, leverage peer pressure, and present or report works under public scrutiny. Stakeholders' involvement in software development, though not technical, contributes to the success of a project.

The importance of stakeholder involvement has been evidenced by many studies, e.g. (Faraj and Sambamurthy, 2006; Natale and Ricci, 2006; Marchewka, 2010; Standish Group, 2007). Unfortunately, managing people is not easy, and it gets more difficult in software development that particularly requires teamwork among the stakeholders (Crociitto and Youssef, 2003; Dennis and Garfieldll 2003; Faraj and Sambamurthy, 2006; Hong et al., 2004; Natale and Ricci, 2006; Probert, 1997). According to Standish Group’s chronicle reports, the stakeholder involvement problem continues to majorly cause software projects to fail (Marchewka, 2010; The Standish Group, 2007). These human-side issues of stakeholder involvement in collaborative software development should be emphasized and further integrated into mainstream methods and tools (FinstAM, 2003).

In a collaborative project that develops integrated products and processes, since it involves complex people configuration and participation, the stakeholder participation become the critical path (Chen, 2011; Roberts et al., 2002). From the process aspect, known project management and software process standards, such as the Project Integrated Management in the PMBOK and the Integrated Project Management process area in CMMI, suggest this kind of people issue be handled by proper planning and institutionalizing various group involvements throughout the development of a project (SEI, 2010; PMI, 2008). Hence, software projects ought to have a communicative venue for people to effectively distribute information and collaborate, and should sustain the communication venue throughout the development. This “people” refers to project stakeholders of the project.
team, the software organization, the suppliers, and the project customers and users.

2. Managing the Human-centered SD: A Focus on Meetings

Meetings are conceivable in serving as this communicative venue. In the integrated and cooperative software development environment, stakeholders’ participation and communication are usually done in the form of meetings (Verner and Evanco, 2005; Gallivan and Keil, 2003; Teasley et al., 2002; Rising and Janoff, 2000; Davision, 1999). According to many reports, meetings enable and facilitate participation in sharing inspiration, leveraging expertise and consolidating information (Hass, 2006; Newell, 2004; Gorse and Emmitt, 2007; Hass, 2006; Wenger et al., 2002). Meetings are also helpful in codifying and preserving substantial group or team actions (Orlikowski and Yates, 1994). The codification (i.e. meeting minutes and subsequent supporting information and documents) becomes the group memories that support the collaborative development of a project.

The study of meetings has been a major topic in project management or information technology related literature. Much literature focuses on the subject of joint application development, group support systems (GSS/GDSS). They are mostly administrative and internal behavioral studies of effectively operating group action inside a meeting, or building computerized tools for running a meeting. In other words, although many studies and tools promote the contribution of meetings to ad-hoc group actions; these isolated meetings are at the micro level in meeting management. A more holistic and collective perspective with regard to the interconnectedness of previous, current, and future meetings may be further needed in order for forming the “group flow (Csikszentmihályi and Csikszentmihályi, 1992; Martin, 2010)” that streamlines the collaborative development. In this regard, some researchers take a macro approach with an innovative treatment on project meetings for managing stakeholder involvement. Such an approach suggests treating meetings as mutual interdependent entities, and interconnecting them to form meetings flow, a macro group process that represents the collaborative proceeding of software development.

3. The Meetings-flow Approach

The meetings-flow (abbreviated as MF) study is an emerging research. The concept was seen in conducting students’ software capstone projects and engineering projects (Chen and Teng, 2011; Chen and Chong, 2011; Chen, 2009). According to these studies, the serialized manner of meetings forms the temporal meetings-flows, indicating how the collaborative development proceeds; the interdependent information sets among the meeting entities form the contextual flows, indicating the evolving of group knowledge.

Chen and Chong (2011) pointed out that the Meeting-Flow Approach had made a step further and extended the application fields into the software engineering (SE) education field. Besides, it had successfully implemented a senior PIMIS (Project Issues Monitoring Information System) project from the CEUIM (Computing–Engineering Undergraduate Program) at NCU (National Central University) in Taiwan. In this project, an external party ESNE, a CMMI-based company, sponsored the project and played the external stake-holder’s role as well. This project implemented the MF in PPQA, VER and PMC process areas of CMMI and examined how MF encouraged team work. It formalized and streamlined stake-holder participation, and showed how to monitor students’ work as well as sustain their desired collaborative effort throughout the development. MFA have also shown the technical benefits of monitoring product quality and students’ work.

Furthermore, Chen et al., (2014) implemented MFA in an undergraduate science, technology, engineering, and mathematics (STEM) project, which emphasized team and project-based learning. The results of this study revealed that the MFA had significantly improved the team communication, coordination and balanced the contribution of the members through giving mutual support and efforts to each other. Its impact is relatively small to the student team cohesion.

In addition, Chen (2011) reported the usage of the MF in managing a multi-party large-scale engineering project. In the report, the project client used the MF to monitor and participate in the development. The MF synergizes the interconnectivity of project
functional meetings and institutionalizes a continuous method and a more natural way of intervention. Such a meeting-oriented process was also recognized in the study as a new type of project's critical path—a path of showing the people and communication bottleneck of the project. This communication critical path differs from the traditional CPM (Critical Path Methodology) that solely focuses on the technical work path. According to Chen's argument (p.12) in the report, while a technical job may be easily done, it often requires substantial efforts to brainstorm the ideas prior to the work, taking considerable time for reviewing the work, and spending much effort on convincing the clients to accept the work.

Due to there are gaps between the students’ projects and the business projects in the real-world, such as, students lack experience in, and knowledge of the complete development of long term projects. (Hassan, 2008; Chamillard and Braun, 2002). Students may not be as fully committed to the project or assume as much liability as do those in industry (Sancho-Thomas et al., 2009). Chen, et al., (2013) had out-reached the MFA and implied in a contract-based outsourced engineering projects to see how were these processes shaped in contract-driven projects, and if there was an alternative approach that could improve inter-organizational control of coordination processes (CPs) from the client perspective. The survey results showed that the CP requirements by the client to enable the integration and institutionalization of the venue through the effective management of different organizations related to the project activities. CP is the shape of the client and the contractor, and they can be improved and maintained through MFA.

Based on the aforementioned review on project meetings and current development of the MFA, we explore the applicability of the approach in software project development. Specifically, in this paper we preliminarily introduce how the approach is used in a software project and the benefits of the approach may contribute in streamlining the collaborative development of the project.

4. A Software Company Case Introduction

Founded in 1985, Environmental Science and Engineering Inc. (abbreviated as ESNE hereafter) is a system integration company in New Taipei City, Taiwan. ESNE develops ad-hoc meteorological software systems for its clients such as Central Weather Bureau, Taiwan Air Force, and other government agencies. In ESNE, the development of meteorological system projects requires various stakeholders or parties to participate in continuous and intensive validation and verification. Therefore, starting in 2008, the company conducted a research project (Liu, 2009) of using the meetings-flow approach for managing and streamlining project's critical collaboration and group communication path.

ESNE’s projects are managed in waterfall-like phases: presale (i.e. preparation), development, and transition and maintenance. Therefore, this paper summarizes the company’s MF framework as Figure 1. For simplifying the presentation due to the page limitation, in the following MF report we use only a phase (the “presale” phase) of a project example.

In TKE, meeting entities are identified from any work item on a project’s WBS that requires group participation. TKE further
defines the participation as group behaviors of brainstorming, review, announcement, reporting, presentation, and negotiation. The meetings are then characterized into various meeting types (classes) with the generic agenda, attending roles, participating roles, degrees of participation, etc. Once identified, the meeting classes are further linked up, according to their corresponding positions on the WBS. The upper part in Figure 2 below demonstrates such a temporal flow.

As the lower part of Figure 2 shows, the project uses DSM (design structure matrix) and a simple DFD-like diagramming tool to frame the information context for the planned meeting entities. The underlying multi-layered communication channel, visualizes the relationship and linkage between meetings (thus participants too) and levels of management. Such meeting-oriented collaborative proceeding, in both the temporal and contextual representations, is regarded as a macro-level group process of the project’s development, and the generic content of the meeting types in the flow becomes a reusable group process model for similar projects to follow.

(b) A DFD like contextual presentation of the meetings-flow model

Figure 2: The meeting-oriented group processes in the case company

5. Discussion

Streamlining the collaborative software development: Due to a functional organization structure, employees of ESNE work on technical tasks of individual domains. Previously they argued about the lack of a whole picture regarding the shared vision of the project. The meetings-flow was found to fit in this gap. In a follow-up interview, participants replied that the project’s meetings-flow enabled a shared track for people to join in together, streamlining the collaborative development by bringing the right information to the right people at the right time and venue.

One practical issue pertinent to such a collective planning manner was raised in the case company. Participants recalled that in the beginning, the planning of meetings-flow was challenging, because they tended to regard meetings as unpredictable and nondeterministic events, e.g., how can the MF determine all the unexpected meetings and handle the change of previously concluded agenda in a meeting? But
later they realized that the MF was not to cover all the meetings that happen or pop up during the development of a project. In TKE, meetings were defined based on the project’s WBS, highlighting a collaborative path through the development. They are different from the communication events on demand.

Increasing meeting effectiveness: According to the company, project members felt that, by modeling collaboration into meetings, the MFA helped reduce the number of meetings overall. We further questioned whether project’s communication was hindered due to the reduction of meetings. The responses were positive in two. The first benefit referred to the increased control inside a meeting. Because of the understanding of the contextual relationships (Figure (b)), participants in current meeting were able to track the information from previous meetings. Secondly, they became more careful in producing the meeting’s outputs, which would be fed to other meetings.

Handling the dynamics of software development: a future study: As far as this paper presents, the MF approach was used to model the critical group path of the reported project. However, software development is inherently unique due to the characteristics e.g. different lifecycle modes, durations, participants, etc. The MF model in Figure 2 may not entirely fit into other projects. Moreover, due to the dynamic nature and the people factor, collaboration in software development may not go as planned. Although the members in the reported project expressed positive responses as mentioned above, they also concerned the effort devoted to follow the planned flow model as the project deployed. In this regard, the planning of project’s meetings-flow should also consider the flexibility of dynamically adjust the flow to meet a project’s specific dynamic needs. This echoes to the software process tailoring needs recommended in CMMI (SEI, 2010). This becomes one of our studies in the future development of the MF approach.

6. Conclusion

This paper is preliminary and conceptual in nature; it introduces an innovative treatment on project meetings and describes the concept of the MF approach to address the stakeholder involvement issue in software development. While the existing PM methods and software tools mostly present a discrete way to manage project development process, here suggests a new concept, a focus on meetings and meeting flows, to manage and streamline the stakeholder involvement in collaborative software development. In the future, the MF would be continually introduced to the society. This would include the methodological development of applying the MF in software development. Specifically, we would focus on how to align and tailor the flow model to meet individual project’s needs.

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References