Assisting Teams in Emergent Work Activities

Cláudio Sapateiro[a],Pedro Antunes[b],Gustavo Zurita[c],Rodrigo Vogt[c],Patricio Infante [c],Nelson Baloian[d]

[a] Systems and Informatics Department, Superior School of Technology, Polytechnic Institute of Setubal
Campus do IPS, Estefanilha, 2914-508 Setúbal, Portugal; email:csapateiro@est.ips.pt

[b] Informatics Department, Faculty of Sciences, University of Lisbon

[c] Management Control and Information Systems Department, Business School, Universidad de Chile

[d] Computer Science Department, Engineering School, Universidad de Chile

1. Introduction

Many common approaches to IS development focus on modeling the structure of work processes. Independently of the detail and commitment to IS development, many unknown external variables (e.g. market dynamics, natural disasters) and internal factors (e.g. undetected emergent work processes, lack of flexibility) challenges work modeling. Numerous case studies have shown that a large part of "routine" office work actually consists of handling exceptions. Organizations face many unplanned situations in their daily activities and should not depend on restrictive models concerning processes, roles, responsibilities and resources. To address such scenarios organizations depend upon flexibility, improvisation, informal relationships, tacit knowledge and opportunistic behaviors to accomplish their goals. These emergent work processes are characterized by (Markus, Majchrzak et al. 2002) as having no best structure or sequence, being typically distributed and dynamically evolving, with unpredictable actors and roles, and enfolding in unpredictable contexts. Considering that in emergent situations each involved actor may have his/her own perception of the situation, creating a shared, consistent and efficient work model may be quite difficult to accomplish. Our research work aims to develop an information management tool capable to assist organizations in emergent work processes. Our objectives are: (1) support the collaborative construction of shared situation awareness (SA) about the emergent situations, promoting the collective sense making; and (2) support flexible work modeling under such circumstances, bringing some efficiency and consistency to information management. By the time being our target organization is an IT service desk team.

2. RelatedWork

We may find in the research literature several projects addressing the gap from fully structured work activities to emergent work activities, e.g. (Dourish, Holmes et al. 1996; Bernstein 2000). These works studied how to bring IS back to model guidance after deviations caused by unpredicted events. The problem addressed by this paper goes beyond this perspective towards the support of new emergent and collaborative work structures, where models do not serve as prescriptions but rather as artifacts that may help getting the work done (Gasson 1999).

Our approach is grounded in the collaborative construction of SA, relying upon a computational support. The most popular definition of SA is from (Endsley 1995), which states that "Situation awareness is the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future.". Recently emerged the term team shared awareness, teams need to detect cues, remember, reason, plan, solve problems, acquire knowledge, make decisions as an integrated coordinated unit. The support to SA has received considerable attention in Computer Supported Cooperative Work (CSCW) research. However, the vast majority of research has focused in specific context/domain proposals in a product perspective, while in our research we emphasize SA in a process perspective, considering the resources and activities necessary to obtain, manage and use SA information. In our work we adopt the phenomenological perspective of situation context characterization, which regards contexts as relational entities relating all involved actions and objects, and evolving dynamically as actions enfold.

3. Model Formulation

The proposed collaboration model is inspired in several resilience engineering principles. In our approach we aim to enhance the individual contributions to the overall situation understanding and handling. By allowing each involved actor to contribute to situation handling we promote the externalization flow of tacit knowledge (Nonaka and Takeuchi 1995). We adopt a situation characterization framework consisting of a set of Situation Dimensions (SD). Samples of situation dimensions may be: involved actors, actions needed, resources needs, events, goals, situational attributes etc. SD may be correlated in Situation Matrixes (SM) e.g., Actions vs Actors, Actor vs Allocated Resources, Goals vs Actions, etc. Both SD and SM may also be identified and created as action unfolds. The correlations between SD are set in the SM as

circles with different sizes or different colors expressing the perceived strength of that correlation (figure 1). Several alternatives could be considered for the semantic meaning of such correlations, but in our approach we leave a concrete specification to the domain experts.
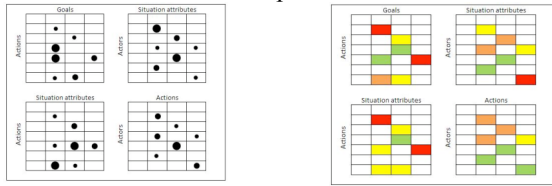

Figure 1: Situation Matrixes.

The SM are shared and accomplish several goals: provide a shared representation, support action, and also serve as a monitor/feedback mechanism.

4. Developed Prototype

Since in the support of emergent work activities mobility may constitute a requirement, the prototype is both available for Tablet PCs (see figure 2).

Figure 2: Prototype. a. Tablet PC b. PDA c. Usage screenshot

SM are created by an half rectangle drawing (figure 2a-1). Then SD to populate SM will be selected as shown in figure 2b. Figure 2c shows a user marking a relation between SD items. Inserting new columns and rows is done by hand writing their labels. Also navigation capabilities, scrolling and zooming) through SM are available.

5. Evaluation

The application domain in which the evaluation was conducted consists in assisting an IT service desk team in dealing with IT infrastructure incidents. In such situations, operators experience can dictate the set of procedures to situation recovery. But many of these could rely tacitly and distributed across team members which will constitute an additional difficulty in coordinating efficiently their actions. Our evaluation methodology consisted in two main phases. In the first phase we aimed to present the problem we're addressing and evaluate its relevance for the application domain considered. The second evaluation phase consists in evaluating the feasibility of the proposed implementation usage in a real scenario. The first evaluation phase consisted in a set of semi structured interviews followed by a questionnaire. The developed questionnaire suffered influences from several evaluation methodologies from the groupware research work: Heuristics based, Knowledge based, Performance based evaluation. Also, situation awareness evaluation techniques were also considered. The questionnaire ratings rely in a scale from 1 to 4 in which: 1 - Not perceived as important and 4 - Very important. The main findings from the interviews and questionnaire results analysis were that

despite the existence of preventive practices a number of vulnerabilities exists that may lead to emergent work activities to overcome the situation or develop temporary workarounds. The team also acknowledges that existing practices and team synchronization are highly dependent of team experience and directly related with team performance. The questionnaire ratings emphasize the relevance of communication support through shared artifacts, ongoing situation monitoring and situation context representation assistance. Also situation handling procedures documentation was perceived as a key concern from team leader as well as knowledge transfer support. Since the findings from the first evaluation phase indicate that the problem we're addressing as well has the foundations of our proposal are perceived as relevant in this application domain we pretend to proceed to the second evaluation phase in which we'll conduct a workshop with all team members aiming to present the proposed collaboration model and prototype and discussed its usage in a collaboratively constructed incident scenario. Once all participants are familiarized with prototype concepts and usage, we intend to conduct a brainstorm session to identify which SD and SM that relate them, are relevant in the considered application domain.

6. Discussion and Future Work

Our approach relies heavily in supporting individual contributions to achieve a shared SA and allow a collective sense making of emergent work activities scenarios. For now we believe that allowing users to contribute for situation handling and obtaining immediate gains (SA) associated with reduced work overhead will motivate users for the prototype adoption. Nevertheless further evaluation, namely regarding usability issues should be conducted. We pretend to improve the developed prototype by minimizing interactions and explicit user's information declaration by for instance, using a pulling strategy.

7. References

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