Providing Contextual Information About Stakeholders

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Abstract. The requirements specification process usually involves many contributors. In this paper I focus on the role of stakeholders—persons, who influence the contents of the requirements specification documents. I will motivate the vital importance of stakeholder analysis, emphasise the difficulties in adequately dealing with stakeholders, analyse literature from another area with similar challenges, and present a first elaboration on a scheme to represent stakeholders. I further propose some ideas for future research work that can help in analysing stakeholders.

1 Introduction

The process of requirements specification usually involves many people. As in almost any multi-person or group situation these people have different roles, where the nature of the role largely determines the contribution of the respective person to the requirements specification. In the following I will focus on the role of stakeholder—that is, persons, who influence the contents of the requirements specification documents.

The importance of stakeholders for requirements engineering is based on the fact that their activities in the requirements specification process largely determines quality and quantity of the specification itself. Detailed insight of the requirements specified can only be gathered, if it is clear where they originated from and how they evolved during the requirements engineering process. Furthermore, stakeholders are the persons to be hold responsible for the process of requirements specification.

However, the influence of stakeholders is not always obvious and easy to capture. The motivation of stakeholders for their contribution can vary considerably; for instance, they can be receiver of the artefacts that are specified, they can be indirectly affected by the artefacts, or they can be the sponsors who pays for the artefacts. They have various possibilities to influence the requirements specification; for instance, through direct articulation of their interests, or through conscious or unconscious manipulation of

others. Even if the motivation and the way, in which stakeholders try to influence the requirements specification documents, is known, it is unclear how their influence actually effects the contents of the requirements specification documents.

Therefore, thorough stakeholder analysis is necessary but difficult. Thorough stakeholder analysis firstly requires the identification of the relevant parties—that is, stakeholders have to be distinguish from less influential participants. When stakeholders are identified, they have to be characterised. In order to characterise stakeholders, they need to be described, understood, and their roles and interaction need to be elaborated. For this purpose three kinds of information are essential: information concerning each individual stakeholder with her role and profile, information concerning her interaction with the requirement specification document, and information concerning her interaction with other stakeholders. The fact that these kinds of situations—where individuals interact with both artefacts and other individuals—have been extensively studied in the field of computer-supported cooperative work (CSCW), it is a good idea to search in CSCW literature for information about both the analysis as well as support of these kinds of situations.

2 Stakeholders as Participants in a Collaborative Process

In CSCW various articles have been published for all three kinds of information mentioned above. Articles dealing with *roles and profiles of participants* in collaborative settings are the following. In CSCW literature various kinds of awareness have been identified. Gutwin and colleagues [1996] distinguish informal awareness (information about the presence of others), social awareness (information about interests, attention, and emotional state of others), group-structural awareness (information about the group itself as well as roles and responsibilities of group members), and workspace awareness (info about the workspace in general such as the interactions of others with the shared workspace and the artefacts it contains). For our purposes especially group-structural awareness needs to be elaborated on.

Articles dealing with the *interaction of individuals with the documents* produced in a collaborative setting are the following. Articles about information sharing [e.g., Bannon & Schmidt 1989; Robinson 1991a] emphasise the fact that successful support for information sharing goes far beyond concurrency, access control, or transaction scheduling. Knowledge of the perspective that led to the solution and that caused the information and decision, and that served as basis for further information production and decision making is essential. Information sharing therefore has to present the relationship between the conceptual frame, the knowledge, and the information produced or the decision taken. Furthermore, the cooperating actors should be able to correlate their share of knowledge and their points of view to a problem. This allows them to consider alternative perspectives on a task. A holistic representation of the problem sphere, of the relations among the different perspectives on the problem space and on possible solutions that can be matched to the solutions are necessary.

Furthermore, work on the issue-based information system (IBIS) method [Rittel & Kunz 1970] and prototypes that were build after it seem to be interesting for our considerations. The IBIS method structures argumentation processes in issues, positions, and arguments. For each topic or each issue, which is to be discussed, several individuals

can have different positions. Individuals try to defend their point of view with supporting arguments for their own positions and rejective arguments for the positions that contradict to their own position. In IBIS issues, positions, and arguments are structured in tree-shape. For instance, the graphical issue-based information system (gIBIS) system [Conklin 1988]—a hypertext system with a relational database and a graphical user interface—is based on the IBIS method. Multiple users can access the gIBIS database via a local-area network and collaboratively create a semantic network of issues, positions, and arguments in a 'bulletin-board style interaction'. Real-time group hypertext system based on the issue-base information system (rIBIS) [Rein & Ellis 1991] is an extension of gIBIS with more groupware features where multiple users can collaborate in real-time. rIBIS users can have different views on the same rIBIS argumentation tree. Other collaborative hypermedia systems like Dolphin or SEPIA often base on similar approaches [Haake & Wilson 1992; Neuwirth 1995; Streitz *et al.* 1994].

Articles dealing with the *interaction among two or more different participants* of collaborative settings are the following. Articles on articulation work focus on verbal interactions between stakeholders and the way these verbal interactions influence the ways they interact and collaborate with each other. Successful cooperation requires two levels of activities: the cooperative work itself, and the organisation of the cooperative work process. This organisation includes task allocation to the different actors, distributing accountabilities for the execution of the tasks, and so forth. In order to organise all sub-tasks of a cooperative undertaking and to position them into a network of interrelationships, articulation work is necessary. Articulation work has to allow to talk about the sub-task done on a meta level. In the articulation process questions like who, what, where, when, how, and so forth have to be addressed [Strauss 1985]. This leads to the following primary dimensions: actors, responsibilities, tasks, activities, conceptual structures, and resources, and general infrastructure needed [Simone & Schmidt 1993].

Furthermore, the concept of double-level language help analysing stakeholders. In his paper on double-level language, Robinson [1991b] writes that 'in general, it can be said that any non-trivial collective activity requires effective communication that allows both ambiguity and clarity. These ideas of ambiguity and clarity can be developed as the cultural and formal aspects of language…'. The cultural part of language are the soft facts; 'interweaving subjectivities in which the possible and the counterfactual are as significant as the given'. The cultural part is subject to perspectives, mood, intention, and interpretation. The formal part of language reflects a shared reference point for group members, a construct that is predictable and with a rule-based behaviour [Robinson 1991a; Robinson 1991b].

With these different CSCW concepts for dealing with participants of collaborative settings—awareness, information sharing, IBIS, articulation work, double-level language—I can now try to specify a first version of a scheme for the representation of stakeholders in the requirements specification process.

3 Proposed Scheme for Representing Stakeholders in Requirements Engineering

In their work on contribution structures Gotel and Finkelstein [1995] proposed some attributes of contributors to the requirements specification which should be captured and

stored. Concerning the production of requirements they distinguish animator, author, principal; concerning the format of the contribution they distinguish principal, author, and documentor. As to granularity they distinguish individual contributors and groups contributing. Furthermore they distinguish three kinds of commitments individual, social and collective. They link the whole information to an elaborated structure of artefacts distinguishing primitive and composite as well as temporal, developmental, and auxiliary contributions.

The scheme specifies a lot of useful information about contributors. However, for the purpose of stakeholder analysis we need some additional information. As additional dimensions for analysis I introduce background of contributors, special knowledge of contributors, interests of contributors, roles and duties of contributors, as well as availability of contributors.

The background of contributors and the domain they are working in highly influences the language(s) contributors speak, but also the language(s) they understand. It furthermore shapes their way of thinking. Examples of backgrounds of contributors are requirements engineering, software engineering, the domain the software is developed for (e.g., medical doctors as participants in the requirements gathering process for medical software). Furthermore, contributors might have additional knowledge and qualifications in other areas outside the domains they are working in and have been working in in the past.

The official role largely determines the official duties of contributors and is therefore important to know. The role and duties of contributors can, of course, conflict with personal interests. This aspect seem particularly important, because it can help explain the actions and reactions of contributors and helps identify stakeholders. Also, the tension between official roles and duties and personal interests are important. Various sources of intra- and interpersonal conflicts can be identified: a single contributor can be assigned several roles with conflicting goals and duties; a single contributor can be assigned roles with goals and duties which conflict with personal interests; and a single contributor might be assigned roles with goals and duties which conflict with goals and duties of other contributors.

The whole information above has to be put into a temporal frame of chronological relations and versions of different items. It is also important to have some information about the availability of contributors. Contributors could have already left the enterprise; contributors could be still employed in the enterprise, but not available for discussions (e.g., because they moved to another department, because they moved to another subsidiary); and contributors could be immediately available. These various kinds of availability have to be supported in very specific ways.

4 Proposed Further Activities

This paper constitutes a first approach towards analysing stakeholders in the requirements specification process. The importance of stakeholders and consequently their adequate treatment have been outlined above. Most of the theories from CSCW, which look interesting, could—because of temporal restrictions—only be analysed rather globally. The scheme above needs much further elaboration and focused study of the CSCW theory mentioned. I therefore suggest future research work, which should further dig into

CSCW literature and apply the knowledge gained to deeper elaborate a scheme for adequately identifying as well as characterising stakeholders in the requirements specification process.

Acknowledgements

References

Bannon, L.J. and Schmidt, K. CSCW: Four Characters in Search of a Context. In *Proceedings of the First European Conference on Computer-Supported Cooperative Work - ECSCW'89* (Sept. 13-15, Gatwick, UK). Elsevier, Dortrecht, NL, 1989. pp. 358-372.

Conklin, B. gIBIS: A Hypertext Tool for Exploratory Policy Discussion. *ACM Transactions on Office Information Systems 6*, 4 (Oct. 1988). pp. 303-331.

Gotel, O.C.Z. and Finkelstein, A.C.W. Contribution Structures. In *Proceedings of the Second International Symposium on Requirements Engineering - RE'95* .IEEE CS Press, 1995. pp. 100-107.

Gutwin, C., Greenberg, S. and Roseman, M. Workspace Awareness in Real-Time Distributed Groupware: Framework, Widgets, and Evaluation. In *Proceedings of the Conference on Human-Computer Interaction: People and Computers - HCI'96* (Aug. 20-23, London, UK). Springer-Verlag, Heidelberg, 1996. pp. 281-298.

Haake, J.M. and Wilson, B. Supporting Collaborative Writing of Hyperdocuments in SEPIA. In *Proceedings of the Conference on Computer-Supported Cooperative Work - CSCW'92* (Oct. 31-Nov. 4, Toronto, Canada). ACM, N.Y., 1992. pp. 138-146.

Neuwirth, C. *Collaborative Writing: Practical Problems and Prospective Solutions.* Presented at Tutorial #11 at the Fourth European Conference on Computer-Supported Cooperative Work - ECSCW'95 (Sept. 10-14, Stockholm, Sweden). 1995.

Rein, G.L. and Ellis, C.A. rIBIS: A Real-Time Group Hypertext System. *International Journal of Man Machine Studies 34*, 3 (Mar. 1991). pp. 349-368.

Rittel, H. and Kunz, W. *Issues as Elements of Information Systems.* Report Number: #131, Insitut fuer Grundlagen der Planung, University of Stuttgart, Stuttgart, Germany, 1970.

Robinson, M. Computer-Supported Cooperative Work: Cases and Concepts. In *Proceedings of the Conference on Groupware - Groupware'91* (Utrecht, NL). Software Engineering Research Centre (SERC), Utrecht, NL, 1991a. pp. 59-75.

Robinson, M. Double Level Language and Co-operative Working. *AI & Society 5* (1991b). pp. 34-60.

Simone, C. and Schmidt, K. *The COMIC Project - Computational Mechanisms of Interaction for CSCW.* Report Number: Esprit Basic Research Project 6225 - Deliverable D3.1, Department of Information Science, University of Milan and Cognitive Systems Group, Risoe National Laboratory, Milan, Italy, Oct. 1993.

Strauss, A. Work and the Division of Labour. *The Sociological Quarterly 26*, 1 (Feb. 1985). pp. 1-19.

Streitz, N., Geissler, J., Haake, J.M. and Hol, J. DOLPHIN: Integrated Meeting Support across Local and Remote Desktop Environments and LiveBoards. In *Proceedings of the Conference on Computer-Supported Cooperative Work - CSCW'94* (Oct. 22-26, Chapel Hill, NC). ACM, N.Y., 1994. pp. 345-358.