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Future Directions in CWE Research: Interaction patterns, activity oriented CWEs and context based technologies for collaborative teams

Keynote summary by Alastair Rogers.

I will look first at the teamwork evolution. One way to analyse teams is with a matrix where one axis is the time duration for the team, long term or short term and on the other axis the team configuration which can be stable or flexible. So there are classical teams that can be found in corporations that are long term and stable, virtual teams that are short lived, and a new form of team, nomadic or nimble teams that are more mobile, highly flexible and very short lived.

Looking into the details of these teams, we find that they overlap and many of us are in more than one type of team. For instance, a nimble team might be a group set up to organise a conference. The goals would be strongly shared, the team coupling tight, the time scale short lived and the team configuration flexible. An example of a virtual team might be technical consultants working on an engineering project or a production team for a movie. The goals would be generally shared but might not be so tightly coupled and some members may have their own agendas. The time scale would depend on the project but the team configuration would be relatively stable for the duration. Nomadic teams are not so clear but they appear to work to solve a particular problem. Examples might include experts in political conflict resolution or musicians providing a composition of sound tracks.

Team Forms

It is important for us to understand the different team forms so we can understand the different requirements before we identify future research. There are already collaboration tools that are being widely used. For instance, e-mail which has evolved into a multipurpose tool. But does it help in, for instance, project management? All the members of the team have different communications, documents and contexts for their work. When a second project is started the number of meetings, documents, communications etc increases. The problem is that the various links are embedded in our heads. The challenge is to bring those links to the system making them visible and explicit to participants in the projects. Even a relatively simple process like gathering information can give rise to many ad hoc interactions. The problem is that the various actors only see part of the process so the status of the process at any given time is hard to determine.

Given this background future CWE research directions need to include:

- Context based interactions which make explicit the activities that are relevant at a certain time, the context of those activities and what is needed to work on them.
- Activity-oriented CWEs and interaction mining, so that the system can

discover the social and work practices and patterns of working of various team forms.

- Ubiquitous collaboration services providing support for composition, provisioning, discovery, binding, monitoring etc of those services
- Interactions between humans and collaborative web services

Supporting Context

It is important to support context in CWEs but the main research question is how do we model context? Intelligent mechanisms are required to determine a hierarchy of context information and to be able to transfer what is necessary for a particular interaction. The context needs to be aware of space and time to reason about what is 'good enough'; it does not need to be precise at all times.

Flexible Linkages

In considering activities in an environment there are different views we can take depending on the roles behind the interactions. These need to be visualised as the next step in understanding the implications of team work. There are linkages between the people and the software services in the environment. The people perform tasks which are embedded in a process. The tasks may use services but currently these are 'hardwired' as applications. However, there is need for greater flexibility for being able to bind services together to get our work done. So we need to link our tasks to a bunch of services which will be implemented on a set of devices, but there are a host of problems in achieving this.

Mining Social Interactions

The third concept to be considered is the idea of mining the social interactions in completing a process. The interactions need to be tracked and then reasoned about. We can discover if there is handover of work or subcontracting going on. But this can be very difficult in ad hoc communication environments. By continuous mining the interactions it is possible to discover when there are changes and provide the services to suit. Services may even be able to anticipate these changes and reconfigure to match. There is also a hierarchy or network of context information that also needs to be considered. Some of these issues are addressed in a STREP project called inContext.

In conclusion, I believe that there are a set of assumptions and a set of research areas. An assumption is that everything needs to be proactive and goal oriented. There are four research directions for CWEs; interaction models, context models, activity oriented CWEs and Service Oriented Architectures.

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Post-conference interview by Andreas Larsson.

AL: Could you describe the main differences between classic teams, virtual teams, nomadic teams, and nimble teams?

SD: The main differences are to be found in their time-span of existence (e.g., short-lived, long-lived) and in the actual team configuration (e.g., static, highly dynamic)

AL: You talked about the problem that people only see part of a larger process. How can we develop CWE which support individuals and teams in knowing the status of a document, who is working on what, etcetera?

SD: The main challenge includes bringing those relationships between artifacts, processes, and context into the CWE system and utilizing those information for service composition. Within the IST project inContext we exactly try to solve such problems.

AL: When it comes to context-based interactions, what are the main problems related to modeling and representing context?

SD: The main problem is that context is in itself context-dependent. Therefore, it is not enough to only support location-based services and think one has enough context in the system. Context has a dynamic nature and we need to make sure we capture this. Furthermore, we need to be able to manipulate a context tree depending on a context.

AL: What is an activity-oriented CWE, and why are they needed?

SD: Increasingly, we understand that CWEs need to be based on the actual activities users and teams have to fulfil. Those activities (or tasks) provide us with quite some semantics with regard to the services required to fulfil them.

AL: You mentioned automatic service adaption, where services both react to changes and anticipate changes. What research is needed to fully realize this vision?

SD: For allowing such an automatic service adaption we need - amongst other things - to provide a clear mapping between activities of users and software services provided by the systems.

AL: What major contribution will your research group make in the development of CWE?

SD: Our major contributions in this domain of CWEs can be found in two IST projects of the last call: inContext and Workpad. In both projects we contribute with our core competencies to the problems found in this research domain.

AL: What are the most crucial challenges that your own organisation faces with regard to CWE and how do you address those challenges?

SD: The main challenge is the main battle between flexibility and rigid systems. The reason why we love and hate email. If we want to provide

context-aware systems we need to be as flexible as email. On the other hand, we face many challenges being so flexible.

AL: What is the role of the EU Framework Programmes in your research activities?

SD: The EU Framework programmes provide an essential role. First they provide the needed framework for funding and establishing those links between international experts in this area. Secondly, the activities which link together many of the research activities is fruitful as well.

AL: What does your research group do to influence the forthcoming FP7 calls?

SD: We try to provide conceptual depths and technological excellence in our research and are open to cooperation.

AL: What are the most important collaboration capabilities that you envision being developed within FP7?

Conferences such as CWE Europe are an excellent vehicle to bring together people from many disciplines and interests.