

MODELING INCREASINGLY COMPLEX SOCIO-TECHNICAL ENVIRONMENTS

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Abstract: The paper focuses on modeling large open information systems. These are systems composed of many activities, which include relationships between activity participants to create new knowledge and services. The systems are further complicated by the changing nature of both the activities and relationships. The paper proposes increased emphasis on modelling work and social structures and using the models to generate role based interfaces. It illustrates the application to the design of complex outsourcing systems.

1 INTRODUCTION

Greater trends to organizational agility have increased the complexity of information systems, especially where group dynamics are a key element to system operation. The complexity has increased because of the growing nature of interdependencies of knowledge workers (Davenport, 2005), organizational structure, technology and tasks in the global environment, where teams often coordinate their activities and select their work practices. This complex set of relationships, when supported by technology, is now often referred to as a “socio-technical system”. Support for such systems requires the provision of an effective infrastructure that enables knowledge workers to easily connect and interact with each other by adapting the infrastructure services to the evolution of their work.

There are few widely accepted methodologies to support the design and evolution of socio-technical systems and the connectivity and interactivity that characterize their open nature. The options available to designers are shown in Figure 1. These are;

- Adopt methods from the deterministic methodologies, in particular object modeling and often attempt to re-engineer what are predominantly open systems.
- Do nothing but give people access to tools and resources that facilitate communication, for example, e-mail, meetings and travel, and

- Adopt a systematic approach to the design of such systems to provide a balance of effective computer support combined with effective meeting.

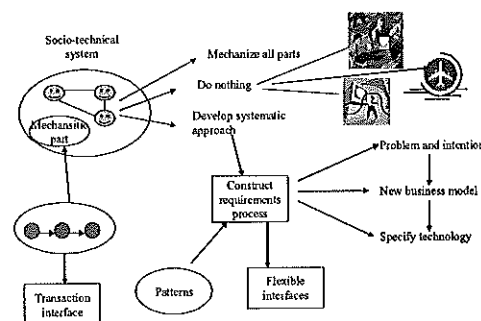


Figure 1: Design Options.

This paper addresses the third of these. It describes a systematic way of describing business activities and matching the work patterns to each activity. The work patterns are then integrated into one work diagram that is used to specify role based interfaces.

Primarily the design goal is to align social, economic and information technology structure while causing least disruption to existing relationships. This design goal is supported by many writers as for example Iqbal (2005), who proposes a set of heuristics as guidelines for analysis or Sutcliffe (2005) who stresses the importance of small group analysis. The ultimate outcome is an infrastructure and the services needed to support the complex business relationships and provide ways for

create workspaces for different roles and easily change them as needed.

The central part of the integration is to describe the business activities using a set of well defined terms and then match the descriptions to the work patterns. The parameters for describing activities are:

- The kind of work in the activity (Davenport, 2005). The categories here are transactional work, integrative work such as that found in system development, collaborative work and expert work,
- Management level based on Anthony's framework of strategic, management and operational level, and
- Process focus which may be planning, coordination or task execution.

One design goal may be to create activities which are focused on a clear set of parameters – they are made up of one work kind with one focus performed at one management level. For example the creation of an artefact can be a task execution at an operational level that requires an integrative work kind. Another example, creating a project plan is a task execution at management level and requires collaboration between a number of people. Although ideally we may wish to simplify a design by designing well defined activities this is often not possible. For example the development of a plan may need to be closely linked to actual task execution where organizations must respond to a changing situation.

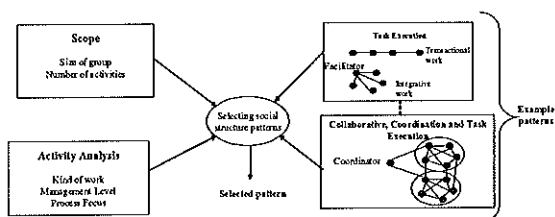


Figure 4: The guidelines framework.

For example, Figure 4 illustrates two such collaborative patterns. Here each black dot is a role. One is where work has one focus – task execution. The pattern depends on the type of work. If it is transactional then usually work passes from role to role. Here people who take the roles simply pass work between themselves, or carry out their individual tasks in accordance with a fixed plan. Where the work is integrative then usually a facilitator is needed to ensure integration. The other

pattern is where coordination and task execution are needed in the same activity. Here there can be a number of groups each working on one task, but whose work must be coordinated. Agility requires activities to be continuously monitored and organize changes to the tasks carried out by each task group. There are of course many other patterns to be used in the selection process.

2.2 An Example

Outsourcing is an example one such system. Contemporary outsourcing situations can be quite complex in nature. Outsourcing presents one such system, which is an outsourcing arrangement that includes a number of organizations. Often such outsourcing arrangements are quite complex as for example shown in Figure 5, which is a simplified form of an ongoing practical case study. Here the process service provider maintains a service (which may include a number of applications) and subcontracts the provision of application programs for a third party, the software vendor. At the same time there is the network provider, who supports the network, operating systems required by the three alliance members. Different roles, which are shown on the business activity diagram, are associated with each of these organizations and they must collaborate to resolve any issues. In this case the initial analysis indicates a business requirement to maintain a quality of service to the client through response to queries and general maintenance of a level of client satisfaction.

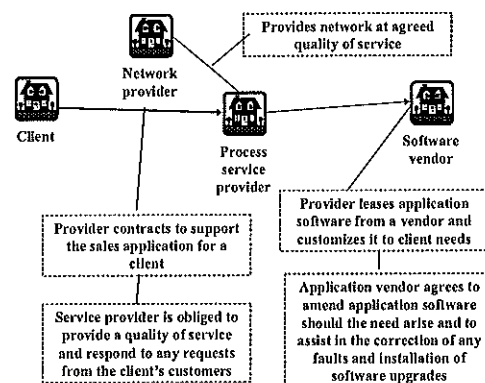


Figure 5: An outsourcing business arrangement.

2.3 Top level – Identify the Major Activities

The important concepts in this case are the high level business activities and the roles and

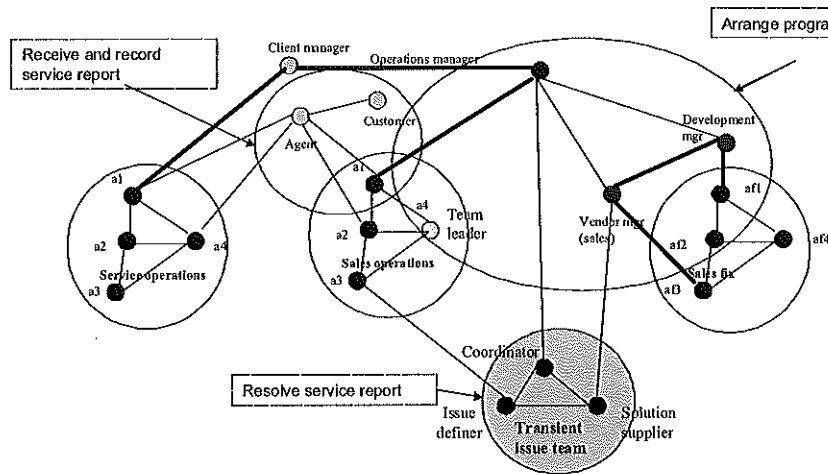


Figure 7: The Collaboration Graph.

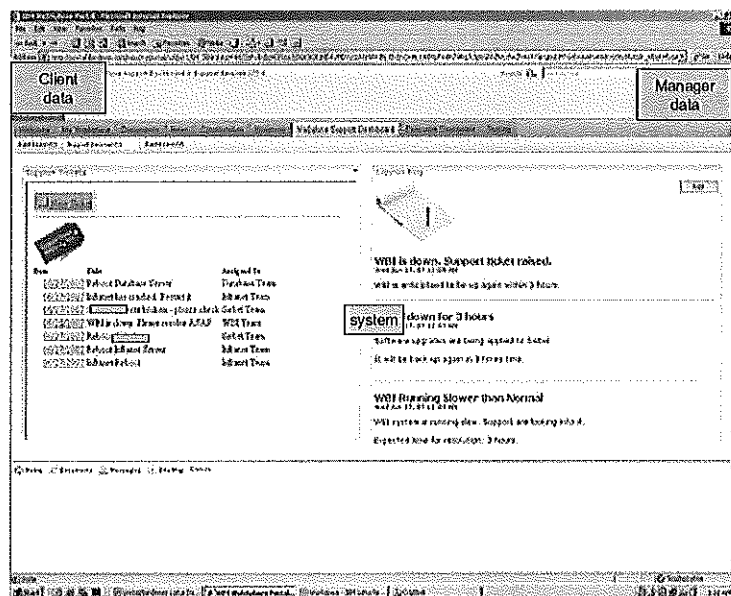


Figure 8: An interface for the network manager.

4 SUMMARY

This paper described the components that now make up many of the emerging systems, which are needed to support dynamic networked enterprises within global environments. These are characterized by closely linked activities and communication patterns between the activity participants. The paper identified the need to focus more on these communication patterns in system design and suggested ways of finding the best patterns by matching them to activity descriptions. It described a way of describing such activities and illustrated an application to an outsourcing system.

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