Tailorable Virtual Workgroup Support System Using Workspace Knowledge and Group Interaction

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ABSTRACT

Tailoring is an activity of modifying an existing computer system in the context of its use, rather than in the development context. We suggest tailoring method by using workspace knowledge and group interaction. Workspace template have project managing knowledge and use of technology information. This workspace template can evolve from major domain workspace to specific project workspace.

I. Introduction

Details of individuals' working contexts, which determine their requirements for system support, are so contingent on factors like individual, local and organizational knowledge, as well as tasks being supported and personal preferences, that trying to model these factors at a level suitable for system design is unlikely to be successful. This variability is more complicated in virtual teams or virtual organizations that are consisted of physically distributed team members. To fit a particular group work situation, many researchers study for flexible and tailorable groupware. Tailoring can be performed by end-users or by learning patterns of use and changing the behavior of the groupware system to better support these patterns. End user tailoring is done by customization, integration and extension [1]. Tailoring properties of single functional object and selecting information presentation types are customization. Integration is parameterized functional object set and Extension is to add new capabilities on groupware. In many researches, tailoring is usually focused on functional parameterization and selecting interface type. Also, single administrator or single user usually does this tailoring activity by his intuition. In this article, we argue that virtual workspace's tailoring can be done by past workspace knowledge to build workspace architecture and group interaction to select suitable architecture using groupware's communication facilities.

II. Literature Review

2.1 Tailoring method in groupware

Many articles proposed useful tailoring method in groupware or other application. In summarize these articles, tailoring by end user can be classified to three levels as Table 1.

Functional customization is to select properties of single functions such as selecting type of alternatives in voting. Interface customization is to set default interface type such as sorting type, maximum display line. Integration level is to select features or functions of applications. In Teamware, they can select their workspace's functionality such

Level of end user tailoring	Method
Customization	Selecting properties of single function or object Selecting or setting information presentation type
Integration	Integration of different functions or parameterization of functional building blocks
Extension	Add on new functionality

[Table 1]. Three level of end user tailoring

as calendar, E-mail, contacts, bulletin board etc. Many tailorable applications have these two levels of tailorability. ICE (Internet Collaborative Environment) [2] provides tailorability to parameterize functions and to select interface type. Orbit [3] also provides tailorability to select functions and to hide or reveal detail of functional environment. Third level of tailoring is an extension of application's functionality in using time. This tailoring method is linked to application platform and software engineering level. EVOLVE [4] tailoring platform provides tailorable application architecture by linking components for adding new button or deleting current button.

On reviewing other articles for tailorability, they usually focus on selection of given functionalities by end user's needs. It's quite difficult task for virtual team to select functionalities needed at initial time and during in use.

2.2 Knowledge of Virtual Team

Virtual team members need to possess six key competencies in addition to traditional team competencies that ensure success in collaboration and coordination and in autonomy roles [5]. The competencies are as follows:

- Project management
- Networking
- The use of Technology
- Self-management
- Boundary Management
- Interpersonal awareness

Self-management is related to personal strategies. Networking, boundary management, and interpersonal awareness are interpersonal or cultural strategies among team members. These factors cannot be directly supported by virtual workspace. Project management and use of technology are supported by virtual workspace's knowledge. Knowledge of Project management is planning of project, organizing members and coordinating project tasks. The way of using technological tools – virtual workspace – and practices associated with using technology can be stored as virtual workspace's knowledge.

In virtual work support system, virtual teams can store past experiences such as documents, project schedule, project member organizing and also their use of technology in virtual Teamware. In next part, we suggests tailoring via past workspace knowledge on use of technology, project management and work context.

III. Tailorable Virtual Workgroup Support System

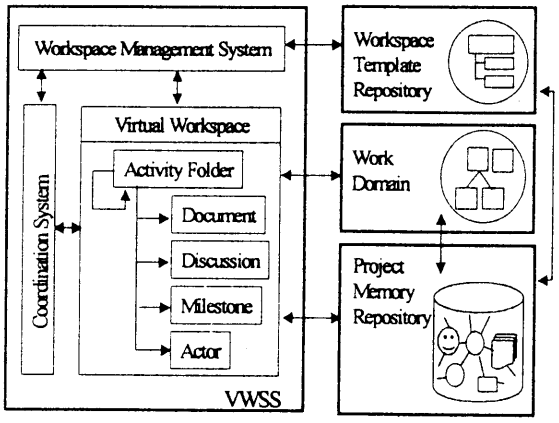
3.1 Virtual Workgroup Support System (VWSS)

VWSS project at KAIST is building virtual workspace for sharing, exchanging, and monitoring activity information focused on research and educational domain. Conceptual architecture of VWSS is presented in [Figure 1].

Virtual workspace has five functional components. Workspace management is for structured organization of project or work. Workspace has

activity folders, sub activity folders, members and messages. Activity management organizes activities in a workspace by sub activity creation, activity progress updating, activity authorization and activity arrangement. Activity folder has activity properties, sub activity folders, discussion articles, document folder, documents and voting. Document management shares and collects documents. Document management provides document version control, document locking and annotation for reviewing documents. Discussion management supports threaded discussion, and discussion results can be exported to voting. Message management is a speech/act based structured conversation system. Message can be used for coordination and cooperation of groupwork. Message system provides activity execution request, due-date changing, activity reporting and meeting/resource scheduling.

Templates are predefined types of VWSS structure for supporting diverse using goals such as laboratory project workspace, thesis workspace, term project and SIG study. [6]



[Figure 1] Architecture of VWSS

3.2 Tailoring by workspace knowledge and group interaction

Though there can be many ways to define workspace knowledge, we define it as follows for the purpose of explanation in this paper.

"Workspace knowledge is the set of environmental entities that provide architecture of workspace and background information of workspace for performing project."

We classify workspace knowledge into two parts. One is related to project management knowledge. This part includes structure of workspace such as order of activity for executing tasks, organizing member for each activity, period of each activity or project. The other is related to use of technology. Which functions of virtual workspace are used to complete specific project or tasks?

To apply such knowledge to new project of virtual team, we suggest workspace template management system.

3.2.1 Workspace Template Management

VWSS provide two types of template. One is default workspace type that is defined by system. User can select workspace type for their needs. VWSS provide four default workspace types as follows.

Function	activity	Docu-ment	Discu-ssion	member	calendar
Normal	O	O	O	O	O
Document		O	O	O	O
Only document share		O		O	
Individual		O			

[Table 2] Default Workspace type

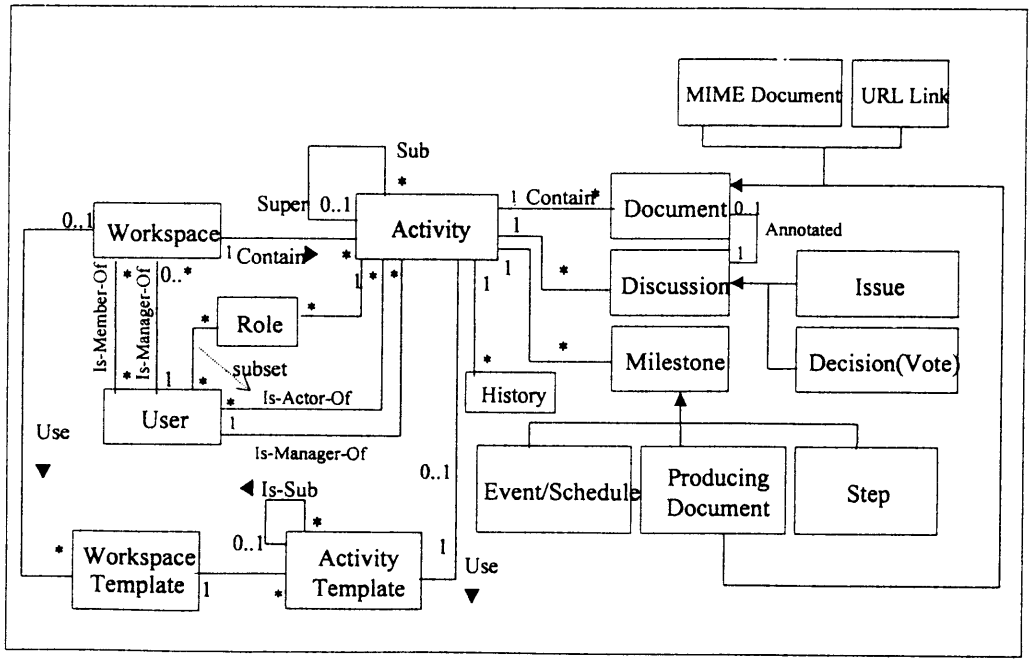
Normal workspace is used for group project using activity management, document management, communication facilities and coordination facilities. Document workspace is focused on group document management system for collaborative authoring or discussing among team members. Only document share workspace is used to sharing document for

group. Individual workspace is for personal document storing system like a file system.

The other is stored Workspace Template which makes it possible to reuse the structural knowledge of past activities. Workspace template provides basic activities, their hierarchy, and important milestones for reuse in current project. The template repository stores templates that are either provided by the system as a standard or created by users. Providing templates help users to build a workspace easily, and to reuse past experiences embedded in the templates. Workspace template have project management knowledge such as order of activity, milestone of project, organizing members into each activity. This knowledge can be reused by other workspace later. Also workspace templates have suitable functions of virtual workgroup support system that can be referenced to other similar project. In the workspace preparation stage, we select a template for the new workspace and adjust the template to meet the specific needs of the workspace. For example, we select 'software development template' for Intranet software development teams. After resolving project team on developing Intranet software, an 'Intranet development template' can be registered. The structural knowledge drawn from this workspace is stored for later use. Structural knowledge about work will be evolved and tuned through workspace template management. Moreover, the relationship between real workspaces and workspace templates supply various navigation linl.s. VWSS architecture for workspace template management is rep·esented in [Figure 2].

3.2.2 Tailoring by group interaction

Researchers on tailoring believe that tailoring can only reach its full potential if done by the system's users rather than by professional developers [7]. Many virtual team support system grants rights for



[Figure 2] VWSS architecture for workspace template management

tailoring system to single administrator or super user. It will be more efficient that only one super user do tailoring activity. But in complicated situation such as virtual team, it cannot reach full potential of tailorability. So virtual work support system needed group interaction facilities for taking full potential of tailorability.

Every user suggests their needs for tailoring by workflow or discussion facility. This idea is discussed among team member by bulletin board or formal process. Discussed ideas can be alternatives to vote. In this discussion process, every user recognizes their situation and other project's experience. In VWSS, every user can invoke tailoring needs by bulletin board or speech/act-based message.

We suggest tailoring method by workspace knowledge and group interaction. We compare tailorable virtual work support system to other tailorable systems as follows:

Tailoring Method	Other Tailorable Systems	Tailorable VWSS
Functional Level	Available	Available
Interface Level	Available	Select Interface type & user setting
Tailoring Situation	In use	Initial & in Use
Tailoring by Group work	Not Available	Available
Tailoring by Knowledge	Not Available	Available

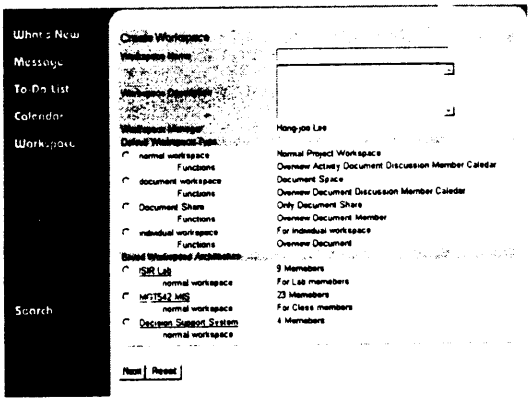
[Table 3] Comparison of Tailorability

Functional level and interface level tailoring are supported by all tailorable system. Usually other tailorable system focus on tailoring in use, but to provide similar workspace's structure can start with more informed situation for virtual team. Tailoring by workspace at initial time or during in use provides foundation of project or good reference to perform project. Tailoring by group interaction is not much considered in tailorability study. We just suggest basic way of doing this process.

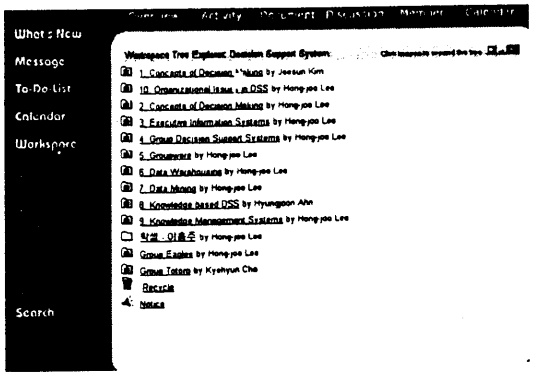
3.3 Using VWSS: An Example

At initial workspace created, users search suitable saved workspace template by work domain, number of member, workspace duration. In investigation of searched workspace template, they select suitable workspace template to apply new workspace. In this time, they can view workspace architecture and project process using Gantt chart and workspace overview. Users can copy stored workspace's architecture into new workspace.

Figure 3 shows workspace creation first page. User can select default workspace or they can select stored workspace template.



[Figure 3] Workspace creation page



[Figure 4] Workspace overview page

Also during in use, they can copy sub-project folder architecture by searching similar domain

project space. Figure 4 is workspace overview page.

IV. Conclusion

We suggest tailoring method by workspace knowledge. Workspace knowledge includes project management knowledge such as order of activity, organizing members and use of technology that which functions are used at specific work context. To reach full potential of tailoring, users have group interaction process to recognize their situation and review other's project experience.

To further research, workspace knowledge will be expanded to full work context such as document, discussion article and group interaction process needs more research.

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