Mapping Design Process into Process Design: Implementing Collaborative Design from Social Psychological Approaches

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In this paper we view the process of collaboration as a social setting, rather than a problem of communication. It involves and is impacted by social, non-technical aspects, such as lack of shared understanding, conflict, availability and motivation of the participants, and other factors that can facilitate or impede the goals of the collaborative enterprise. We propose to use a social and psychological approach. The ideal model should be a collaborative design system that can facilitate the socially constructed interactions among participants, as well as the communication of information. The proposed system should enable participants to assess the typical problems of collaboration. We build up our effort towards this goal by developing a representation system of collaborative design process. In this research we attempt to map collaborative design process into process design by using our proposed representation system. Our intention is to enable the existing system visually representing the integration of design stage to the whole construction process: since project planning until building operation.

Keywords*: Design process: process design; collaborative design; social psychology.*

Research background

We are arguing that there has been something missing between the fundamental issues of creative collaboration and the efforts of its implementation. Its ideal form, which is characterized by such abstract keywords as leadership, shared understanding, and conflict resolution, has not been fully operationalized. The graph in figure 1 shows the indication of the missing part in this framework of thought. Problems in collaborative design should be viewed as a reality of social and psychological dialogues between individuals. The social interaction could be represented as dynamic interaction between individuals that reflects the ideals of collaboration. In current approaches, the dynamics of social interaction are reduced to fit the technical limitations of information and communication systems that are employed

to facilitate the collaboration. The significant social and psychological nature of each individual has not been (able to be) represented in the system. Therefore, fundamental problems in collaboration such as conflict between individuals are not addressed to be facilitated in the system. The ideal model should be a collaborative design system that can facilitate the socially constructed interactions among participants, as well as the communication of information. The proposed system should enable participants to assess the typical problems of collaboration. The question is how feasible it is to develop such system. Our research will be built upon this question. What are the social psychological aspects of the participants that are pertinent for a creative collaboration? How do these aspects affect the participants to collaboration? How possible is it to integrate these affects into a design process system that characterizes collaborative design?

The nature of human interaction during collaborative design

The significant and unique characteristic of collaboration is the creative aspect of working together. Collaborative design requires a higher sense of working together in order to achieve a novel result. It is a far more demanding activity, more difficult to establish and sustain, than simply completing a project as a team. Consequently, it is worthwhile to find out what kind of circumstances will encourage creative collaboration. What is the nature of human interaction?

The aim of a team in a design project is to share knowledge and information in order to get the best possible result. Team members need to synchronize their activities. Working together effectively requires shared understanding of the design content within the team (Valkenburg, 1998) Creative collaboration is much more than sharing ideas and views about a joint project. Creative collaboration requires adherence to 'established' meanings. Yet the participants come from different disciplines. Who establishes meaning in the first place is not clear. Each participant

develops its own meanings to facilitate the discourse within his own sub-culture (Kalay, 2001). Meaning established by one discipline, however, may not be understood, or may be understood differently, by another discipline.

Another characteristic of creative collaboration is its leadership aspect. The leading designer knows how to switch from the person being responsible for the result to being the one who ensures that the 'process is right' (Jones, 1980). Creative collaboration requires a new conception of the self: a view of one's self, of others, of society, not as fixed entities, but as relations, able to develop.

In the previous response, it has been indicated that too much attention on improving the communication process has raised some question regarding the relevance of current research on design collaboration. Furthermore they tend to ignore the importance of resolving the underlying social problems in the human interaction during the collaborative process. The following statements are several examples of research problems described by some research groups working on collaborative design area. All of them was developed based on A/E/C design context.

In virtual environment of collaborative design, understanding distributed knowledge among participants is interpreted as part of attempts in supporting geographical, temporal and functional dispersion of human knowledge and information that is required during the collaboration process (Tormey et al., 2003). Communication looks liked something that has been paid more attention as a source of problem in collaborative design: such as a CAD system, which is proposed a so-called discourse model to bridge the communication gap among participants (Case and Lu, 1996). Simoff and Maher (2000) proposed a computer system to record communication in order to identify participation, which is viewed as a specific problem of communication. Chiu (1998) defined the main problem in collaborative design as the lack of design guidance to complete communication solution.

There has been something missing between the fundamental issues of creative collaboration and the efforts regarding its implementation within these various interpretations of problems in collaborative design. The ideal form of collaboration, which is characterized by such abstract keywords as leadership, shared understanding, and conflict resolution, has not been fully comprehended by researchers in the field of collaborative design. Yet we have already witnessed the emergence of quite a few design systems, mostly computer based ones that claim to be 'collaborative design systems.' Their credibility as a tool for solving basic problems in collaboration, such as conflict resolution, is still questionable.

## Human interaction and social construction of collaboration

The complicated nature of creative collaboration requires a comprehensive approach to put it into practice. Since collaboration is a social phenomenon, it is necessary to understand the social nature of creative collaboration. Architectural design is a process involving many practitioners and laymen with their own social backgrounds and visions about the project. Understanding the social construction of collaboration is one of the keys to understand the collaborative design process as a whole. Berger and Luckmann argue that reality is not an objective, value-less, fixed phenomenon shared by everyone. Rather, it is a product of social systems through which human knowledge is developed, transmitted and maintained. In a design process this applies to the state of mind of every actors involved with every step of the process (Berger and Luckmann, 1967).

The situation can be illustrated through the following diagram (figure 1), which indicates the missing part in this framework of thought. Problems in collaborative design should be viewed as a reality of social and psychological dialogues between individuals. The social interaction could be represented as dynamic interaction between individuals that reflects the ideals of collaboration, such as the existence of leadership, shared understanding, conflict resolution, and so on. In current approaches, the dynamics of social interaction are reduced to fit the technical limitations of information and communication systems that are employed to facilitate the collaboration. The significant social and psychological nature of each individual has not been represented by the system. Therefore, fundamental problem in collaboration, such as conflict between individuals, is usually missing.

The ideal model should be a collaborative design system that can facilitate the socially constructed interactions among participants, as well as the communication of information. The proposed system should enable participants to assess the typical problems of collaboration. This model should be built upon communicative rationality rather than merely on technical rationality. Communicative rationality is rooted in the interaction of social life. Communicative action is oriented toward

Figure 1
Current researches tend to see the problems of collaboration are merely about facilitating communication
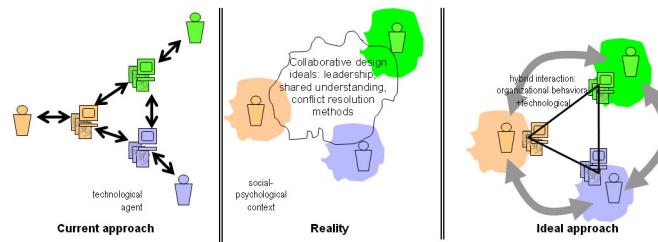
inter-subjective understanding, the coordination of actions through discussion, and the socialization of members of the community (Dryzek, 1990).

Methods of investigating collaborative process

We are investigating a possibility of developing an integrated design representation system that could be utilized to facilitate observation of a collaborative process based on the nature of social psychological aspects of the participants. This is built upon our previous research on design process representation system (Hamid et al., 2006) and on the method of visualizing collaboration through mapping the process developed by Straus (1999).

Basically the proposed representation system is an analysis tool that may help identify the nature of interaction among participants in collaboration. The graph in figure 2 simply illustrates how this representation system works. The graph represents the flow of design process in top-down direction. Each node, either in circle shape or in square shape, basically represents a moment of design activity and its product at once. In term of design process, by using this graph tool we can investigate the progress of design ideas since its very early stage. It helps to view how all of the issues (problems, ideas, concepts, solutions etc) developed in a collaborative process. At the same time we can track how the participants in a collaborative process make their contribution during the process; who contributes what; how an idea/consensus is made up; which participant dominantly influences the meeting (to identify potential of building caucus) etc.

Using this representation we could identify some important aspects regarding the social and psychological nature of the collaborative design process performed by the actors. They include:

1. The roles of participants have shifted significantly from the early scenario which is based on traditional disciplinary lines (architect, structure engineer, m/e engineer) towards managerial
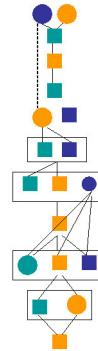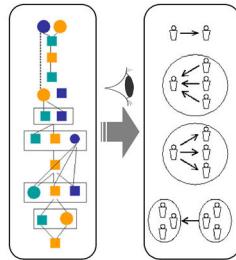

Figure 2
Our proposed design process representation system for collaborative process, ongoing (Hamid et al 2006)

roles (team leader and other two members with particular task).

2. Mutual reinforcements play a significant role in accelerating design process. At three significant points during the process, where design ideas were forming, we noticed the mutual stimulation and reinforcement among the actors.

3. The reinforcement was enabled and encouraged by symbolic interaction among the actors. The relatively similar background of the actors made negotiating meanings something that encouraged the development of ideas, rather than source of conflict.

4. We could not identify any specific findings regarding cognitive approach to the social psychological context of the collaboration. Our presumption so far is that it is caused by the relatively similar design knowledge background of all the actors.

The primary concern within social psychology is human behavior in social context. There are four major themes regarding this concern: (1) the impact that one individual has on another; (2) the impact that a group has on its individual members; (3) the impact that individual members have on the groups to which they belong; and (4) the impact that one group has on another group (Michener et al., 2003). These themes have covered the common social problems that always happened among participants of collaborative design.

Figure 3
Using the proposed repre-
sentation system to read the
social psychological nature of
collaboration

For this stage of the research, we are still focus-
ing on developing the current representation system
to investigate the social psychological natures of
participants of collaborative design (figure 3).

As a tool for the investigation, this is an essential part
since we are optimistic that this research subject in-
volves issues that are potentially investigated in a
long-term research regarding the fact of more and
more complicated social context of design collabo-
ration. Consequently, there should be similar plat-
form of investigation tool among these researches.
Moreover we presume that contribution of the re-
search findings should be open to various collabora-
tive design systems that mostly are computer-medi-
ated. So rather than utilizing common research tool
for this kind of topic, either within quantitative or
qualitative research setting method such as conven-
tional ethnographic research, we tend to develop
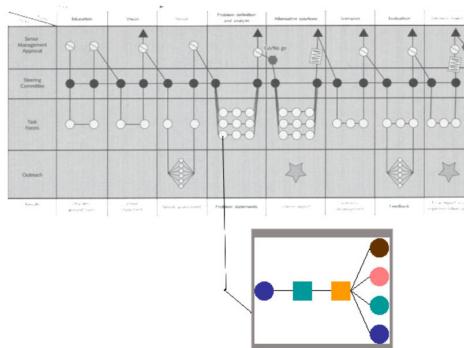
a representation system tool for investigating this
subject. We have proposed a representation system,
which is developed to support process-oriented
view of design. We are expecting this representation
system will enable us investigating the social nature
of collaborative design process.

Mapping design process into process design

It is quite different from the process design map by
Straus in term of its role for a collaborative plan-
ning process. Straus' map is a map of a plan, which
means to help people visualize a process of collab-
oration in advance and make them able to identify
any potential problems and to have a sense of as-
surance that consensus building will be managed
in an organized methodical manner (Straus, 1999).
In this research we attempt to integrate Straus' pro-
cess design map as part of an evaluation of how
the ongoing collaborative process work according
to the map. The process design map visualizes the
mapping of inter-linking between one meeting
and another that make up all series of meetings in
a collaborative planning process. Each node in the
map just represents a meeting. Our representation
system could clarify what happened in the meet-
ing. The graph in figure 4 below simply illustrates
how these two representation systems could be
integrated.

Case studies

Three case studies have been chosen as the setting
to examine the proposed collaborative process de-
sign representation system. All cases take the recon-
struction projects for the Tsunami disaster victims in
the Province of Aceh, North Sumatra Indonesia as
the context. From an academic point of view, this
devastation presents an un-precedented opportu-
nity to investigate the process of rehabilitation as a
form of large scale collaboration.

Within the scope of a large scale project as the
reconstruction in Aceh, implementing process de-
sign in a particular project does not automatically

Figure 4
Proposed design process rep-
resentation system, integrat-
ing our design process rep-
resentation system (Hamid et
al 2006) into process design
map of collaborative process
by Straus (2002)

guarantee the improvement of project performance. One project is interdependent to other project as long it is under the umbrella of Aceh rehabilitation and reconstruction program. There have been many problems emerged from the failure of participants of different organizations working on different project in same location to coordinate their works. If process design can be standardized as coordination system among projects in the reconstruction process, these problems can be reduced significantly. One of the key is the possibility to create a process design map. Mapping the process of each interrelated project will enable the attempts to coordinate the projects in a system. The three cases: housing in urban context; housing in rural context; and a fishery auction center, all of them have been finished. The design processes that had been going through the completion are mapped into the proposed process design representation system (see figure 4).

Concluding remarks

The result of this stage of research discovers the characteristics of collaborative process on each of the two different projects, with its own social psychological characteristics of the stake holders. For the time being, this proposed collaborative process design representation system has emphasized that each design project has its own characteristic of collaborative process. From social psychological perspective the collaborative process is extremely context-dependent.

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