

FACILITATING ORGANISATIONAL ACTIVITIES USING PLANS AND AUDITS

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Abstract: This paper departs from the observation that Group Decision Support Systems (GDSS) present important limitations that constraint their usage in current organisations. An approach to widespread GDSS usage is proposed, based on: (1) supporting the facilitation of decision-making processes; and (2) supporting follow-up processes, intended to integrate decisions throughout organisations. The proposed approach leads to the specification of two software components designated Plans and Audits. Plans foster and guide the planning of group decision-making activities, while Audits support monitoring and corrective actions. A framework for simulating the functionality of Plans and Audits is also proposed.

1. INTRODUCTION

The concept of virtual organisation, understood as a computer augmented organisational system, has lead to the development of software components that increase organisational effectiveness through better management of information, improvement of communication and support to business processes. Virtual organisations encompass multiple structures, levels, units, personnel, internal and external boundaries. In organisations, business processes are executed by orchestrated individual and group activities. This orchestration is possible due to multiple mechanisms, such as norms, rules, hierarchies of power and control, or social interactions. Mintzberg (1979) defines an organisational model that highlights each one of these different mechanisms.

Group Decision Support Systems (GDSS) are a particular class of systems intended to provide computational support to collaborative decision-making processes (DeSanctis and Gallupe, 1987, Kraemer and King, 1988). In the virtual organisation, GDSS seem extremely adequate to improve strategic decisions made at the upper levels of the organisational structures, through better information acquisition, perception of different perspectives and positions, and consensus formation.

However, current GDSS show one important limitation: most times located in specialised decision rooms external to the organisational environment, no services exist to integrate and spread their usage within the organisation. In particular GDSS, as catalysts for collaboration, are typically used out of the context of the coordinated activities that justify collaboration, or are consequent to that collaboration.

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This paper addresses the above problem by proposing two different components, designated respectively Plans and Audits, which provide computational support to: (1) layout and guide the selection of appropriate strategies for the orchestration of group decision-making activities; (2) provide feedback information and support corrective actions necessary to optimise results.

We start by introducing the conceptual framework underlined in our approach, which is rooted in GDSS functionality extended with the notion of decision follow-up. Then, we describe our design approach. Finally, we describe a preliminary simulation framework that allows evaluating the use of Plans and Audits in a virtual organisation.

2. THE FACILITATION CONCEPT

Decision-making processes can be operationally characterised as arbitrary sequences of tasks. Although no pre-defined steps can be established a priori, several models identify the following main steps (Patton et al., 1989, Johansen et al., 1991): (1) search for information; (2) evaluation and proposals; (3) exploration and decisions. GDSS usage is intended to allow groups to solve problems following such a deliberate model.

Commercial and research GDSS such as GroupSystems (Nunamaker et al., 1987, 1991), Meeting Works, SAMM (Dickson et al., 1992) or Colab (Stefik et al., 1987), support decision-making processes by incorporating tools specific for each one of the above steps¹. One important element of GDSS, the human facilitator, is responsible for combining the set of tools that best fit both the problem at hand and the situated context; and also helping and guiding the group participants throughout the decision process.

¹ Some GDSS, such as Decision Explorer (Eden 1993), only support one step.

Human facilitation has been identified as the most crucial element of a GDSS (Nunamaker et al., 1997). From a virtual organisation perspective, facilitators are in a critical position monitoring efficiency, quality and commitment to solutions, and reporting results to the organisation.

From the usage of GDSS (Antunes et al., 1998), we derived significant observations concerning human facilitation. Facilitation activities evolve in two steps. The first step concerns planning the decision-making process, identifying the problem, initial issues, and laying out the steps necessary to have a group accomplish a solution. On the second step, the facilitator assesses and optimises the meeting performance, focussing the group on its task while doing any necessary corrections to the planned process according to the situated context.

Facilitation skills require special training and are not easily available in organisations (Kaner, 1996, Kinlaw, 1996, Schwarz, 1994). Consequently, consulting firms must be contracted to run expensive, though infrequent, meetings.

This is a major factor that currently limits GDSS usage. The provision of computer support to human facilitation aims at increasing GDSS usage within organisations.

3. DECISION FOLLOW-UP

What happens after a GDSS meeting? Organisations seem to work as flows of coordinated activities concerning different decision levels (Cray et al., 1991). In the one hand, meeting outcomes comprise some level of commitment from its participants. In the other hand, the implementation of such outcomes requires disseminating information and work throughout the organisational structure. Concerning both situations, the full GDSS potential can only be obtained if some monitoring and corrective actions are exerted to guarantee commitment to decisions and

accomplishment of any necessary subsequent actions.

Current GDSS, enclosed within their support to decision-making processes, do not provide necessary means to integrate group results in the global functioning of organisations.

We view GDSS integration in the virtual organisation as a continuum of different GDSS and non-GDSS activities, as illustrated in Figure 1. The link from GDSS to non-GDSS activities represents what we named *decision follow-up*.

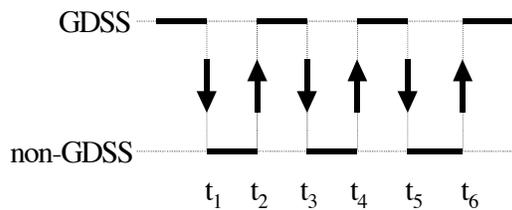


Figure 1 - A continuum of GDSS and non-GDSS activities

Decision follow-up is a trigger for such un-anticipated actions as:

- Disseminate outcomes within the organisation,
- Define norms, standards or work procedures,
- Reorganise work groups and their missions,
- Define goals and commit resources,
- Proceed more in depth with the decision-making process.

In this paper, we do not cover the nature of the non-GDSS processes that may be executed between two GDSS sessions (for instance between t_1 and t_2 in Figure 1)². What is intended is to guarantee the effectiveness of the transitions from GDSS to non-GDSS activities (i.e. what happens in t_1 , t_3 , t_5). A characterisation of the events and computer support to transitions from non-GDSS to GDSS processes have been addressed elsewhere

² Read for instance (Malone and Crowston, 1994) on that subject.

(Antunes et al., 1995, Guimarães et al., 1997, 1998).

Decision follow-up is also a kind of management process. It requires planning, to identify resources needed, commit them and schedule activities. And it also requires monitoring the plan execution and applying corrective actions.

In our approach, the human facilitator has a key role in the follow-up process. Prior considering a GDSS session terminated, the facilitator may ensure that sufficient information has been gathered to proceed successfully with non-GDSS activities. The facilitator may also mediate feedback information from the non-GDSS activities. This feedback information allows closing the GDSS session with some degree of conviction that decisions will have subsequent actions. As illustrated in Figure 2, GDSS and non-GDSS processes co-exist the time necessary to guarantee a successful transition.

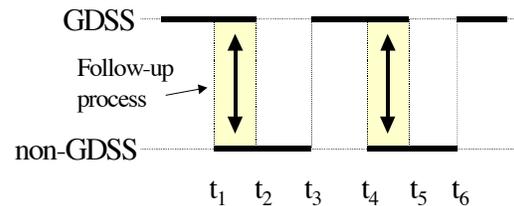


Figure 2 - Follow-up processes

Responsibility for decision follow-up requires extending computer support to human facilitation and increases the weight of such software component in the virtual organisation.

4. FACILITATION TOOL

We describe in this section the software system designated Facilitation Tool (FT).

4.1 Objectives, Requirements and Approach

The main objective of FT is to integrate GDSS in the organisational context. As previously described, we find two major impediments to the organisational integration of current GDSS: (1) GDSS require special training in facilitation; (2) GDSS are not integrated in the continuum of organisational activities. FT addresses directly the above two problems by:

- Supporting the human facilitation of GDSS processes,
- Supporting the transition from GDSS to non-GDSS processes.

The proposed approach views support to human facilitation as a management process consisting of two different services:

- **Plans** - Define all the details concerning resources allocation, work breakdown structure and scheduling,
- **Audits** - Obtain feedback information from plan execution.

The software system is based on a client-server architecture, consisting of the Facilitation Server and Java Applets (clients) which can be downloaded through a WWW home page. There are two types of clients: the facilitator and participants of group activities. The system allows facilitators to be, at the same time, participants. FT implements Plans and Audits separately. Specialised classes of Plans and Audits are defined to distinguish support to decision-making and follow-up processes. These different classes are noted in the next sections by D- and F- prefixes.

4.2 D-Plan and D-Audit

The facilitator uses D-Plan to define all the details related to planning decision-making processes. The functions provided by D-Plan include scheduling, creation of participants lists, notification through e-mail, and definition of issues, expected outcomes and work breakdown structure (WBS) for the process.

The WBS definition is the most important activity supported, since it specifies the sequence of tasks to be conducted during the actual meeting. The D-Plan WBS was adapted from (Kaner et al., 1996) and defines the following elements:

- A problem can be divided in several **issues**;
- An issue is handled according to a sequence of different **phases**. There are four different phases, which come in the following temporal order:
 - *Divergent* (search for information),
 - *Groan* (discuss issues),
 - *Convergent* (attempt to reduce the number of solutions),
 - And *closure* (select one solution by consensus or voting);
- Each phase can consist of one or more **strategies** (decision patterns) for handling a problem. D-Plan implements the set of strategies identified by (Kaner et. al, 1996). For instance, *exploring the territory*, *searching for alternatives* or *discussing difficult issues* are different strategies defined for the *divergent* zone;
- A strategy can consist of one or more **activities**. E.g., *who*, *what*, *when*, *where* and *how* characterise one sequence of activities in the *explore the territory* strategy;
- Each activity falls in one of the following basic **tasks**:
 - *Generate ideas*,
 - *Organise ideas*,
 - *Select/evaluate ideas*,
 - And *analysis/planning*;
- Finally, basic tasks map directly into one or more **tools**, provided by particular instances of GDSS. As an example, *generate ideas* maps into GroupSystems' brainstorming tool. Currently, D-Plan supports these mappings for GroupSystems and Meeting Works.

After the decision-making process is planned, the facilitator can save the agenda for

future use and print a report with all the details. Figure 1 presents the D-Plan window, showing issues (top left), selection of process elements (right) and WBS (bottom left).

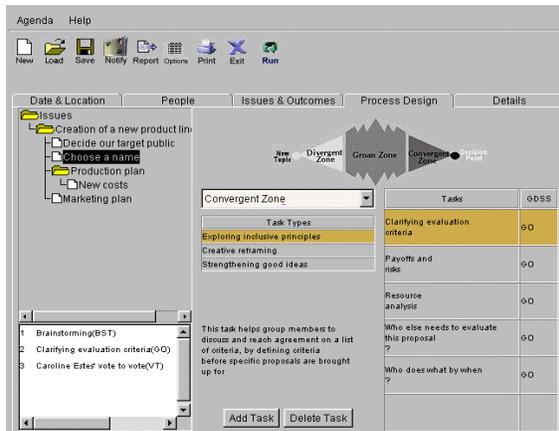


Figure 3 - D-Plan

D-Audit starts as soon as all participants log in the system. The participants must connect to the chosen GDSS and also to the FT. At this stage, D-Audit allows the facilitator to (see Figure 2):

- Identify which GDSS tool must be used, according to the WBS defined earlier (some common configuration options are also proposed to the facilitator);
- Use a set of basic facilitation techniques, which include (adapted from Kaner et al., 1997) (1) paraphrasing; (2) drawing people out; (3) stacking requests; (4) tracking topics; (5) encouraging people; (6) balancing interventions. The set of available techniques changes according to the current phase and activity;
- Get immediate feedback from participants about the meeting, through an opinion meter. The opinion meter provides the following voting methods: (1) yes/no; (2) agree/disagree; scale (from 1 to 20-points);
- Measure the degrees of conviction and agreement of the participants about a particular issue, through a criteria meter.

Note that the facilitator may always go back to D-Plan and change the process WBS during the actual meeting.

D-Audit also provides some other services to the facilitator, in particular meeting reporting.

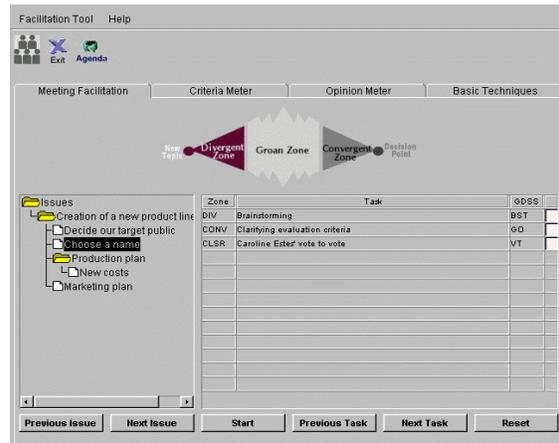


Figure 4 – D-Audit

4.3 F-Plan and F-Audit

The facilitator uses F-Plan to define all the details necessary to execute a successful transition from a GDSS to a non-GDSS process. The F-Plan functionality must be independent from the nature of the GDSS and non-GDSS processes. Nevertheless, planning must be based on several plausible alternatives, the following ones being considered:

- Forward information to people affected by GDSS outcomes;
- Specify and plan the next steps, identifying resources needed to accomplish some goal, committing resources and scheduling activities;
- Delegate new responsibilities to work groups;
- Start a new decision-making session;
- Or even negotiate the GDSS outcomes with people affected by, at an higher or lower level.

In this context, we present three different scenarios for follow-up transitions: (1) centralised; (2) delegated; and (3) negotiated.

In the centralised scenario, the GDSS session defines non-GDSS outcomes and roles and the follow-up process just delivers

instructions to people attached to the non-GDSS process and waits for an acknowledgement (acceptance is mandatory). The protocol governing this type of transition is extremely simple, as illustrated in Figure 5.

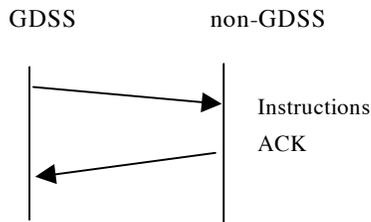


Figure 5 – Centralised transition

Contrary to the centralised scenario, the delegated one, assumes that planning other tasks is not part of the GDSS session, but a non-GDSS role. As illustrated in Figure 6, this scenario requires a more complex protocol, since people attached to the non-GDSS process may request authority. Authority must be understood in a broad sense, including for instance, requests for information, requests for clarification and requests for authorisation.

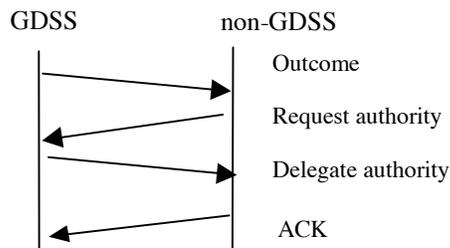


Figure 6 – Decentralised transition

In the negotiated scenario, it is assumed that non-GDSS processes can negotiate the outcomes from the GDSS session until an agreement is reached. This model can be viewed as contractual relationship between two entities. The protocol for this scenario is illustrated in Figure 7.

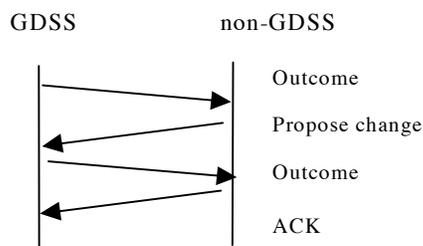


Figure 7 – Negotiated transition

F-Plan organises the follow-up process according to the following outline:

- Define **goals** (these may be uploaded from D-Plan);
- Subdivide goals;
- Attach **people** to goals;
- Assign **profiles** to goals. These can be of type
 - Centralised,
 - Delegated,
 - Negotiated;
- Attach **announcements** to goals. These announcements correspond to the types of messages delivered to people attached to goals. Two types are defined: *instructions* and *outcomes*.

After planning a follow-up process, the facilitator starts F-Audit. F-Audit allows the facilitator to go through goals and interact with people attached to them, sending announcements and monitoring acknowledgements, while tracking process status and time consumed.

F-Audit does not support interaction with the participants of GDSS sessions, given that such support is provided by D-Audit.

5. SIMULATION FRAMEWORK

We are currently designing a simulation framework to validate the system described in this paper. The framework is substantially complex, given that usage of Audits and Plans cover a large spectrum of organisational activities. Therefore, we pursue a divide and conquer approach with the following partial goals:

1. Validate the D-Plan functionality. Controlled experiments have already been done, using a panel of 4 experts in electronic facilitation. The experts were given two alternated different cases (for which we had optimal agendas specified by specialists) and requested to design agendas

using respectively D-Plan and GroupSystems' agenda. The experimental setting allows a qualitative comparison of agendas designed with and without D-Plan. The analysis of results is currently under way.

2. Validate the D-Audit functionality. This experimental setting confronts two sets of facilitators conducting meetings, one using and the other not using D-Audit. An ethical problem has been selected (legalise abortion or not) to increase conflicts and though intervention from the facilitator. These experiments have not started yet.
3. Validate the F-Plan functionality. In the experimental setting for this experiment we request facilitators to select profiles for different GDSS outcomes. The outcomes were specified from one generic scenario considering stocks market and, basically, transmit buying instructions with different levels of detail. A specialist will rate the profiles selected by facilitators.
4. Validate the F-Audit functionality. In the experimental setting we simulate a selling department with one senior and one junior salesman. The senior is able to request the junior salesman to: (1) sell a good at a fixed price, (2) sell the good but obtain information to confirm the price, or (3) sell at a price which is negotiable.

6. CONCLUSIONS

Our goal is to widespread computational support to group decision-making activities in virtual organisations. This goal requires addressing two important and complementary issues. First, allow non-specialised individuals to facilitate decision-making processes. Second, integrate decision-making processes with the global functioning of the organisation.

We follow an approach that does not contend either with current GDSS or other coordination systems such as group agendas, PERT tools or workflow systems. On the contrary, the system described in this paper adopts the view that new computational

services must adapt to systems already operating in virtual organisations.

The proposed solution consists of Plans and Audits. Plans foster and guide the design of decision-making and follow-up processes. Follow-up processes are necessary to ensure that outcomes from the GDSS sessions will be integrated within the continuum of activities that form a virtual organisation.

Audits support maintenance and corrective actions over decision-making and follow-up processes. The functionality of Audits is based on interaction between the facilitator and the participants in decision-making or follow-up processes.

At the moment, D-Plan and D-Audit have been implemented, D-Plan has been tested, and F-Plan and F-Audit complete the final design stage. Controlled validation of D-Audit is under way. A validation of the full system requires long-term field studies, due to the multiple components embraced and time dispersion of events. Consequently, we devised a simulation framework that allows experiment systems functionality on a laboratory.

Concerning future work, we observe that the notion of process awareness has not been sufficiently developed. Although Audits are intended to collect process information from users, such information is delivered solely to the facilitator. The other users could nevertheless benefit from process awareness, for instance, design decisions specified with Plans. Furthermore, process information can also be automatically collected from related systems, in particular workflow systems, if appropriate application interfaces are available.

We have not considered in this paper the notion of coordination, and particularly external coordination, fundamentally studied in the context of market and economic studies. (Gurbaxani et al., 1991, Malone et al., 1987, Shereuder et al., 1993) have addressed this issue.

Another perspective which was not been considered by this paper, but capable to extend further the current computational support, is associated to negotiation models, e.g. (Lewick

et al., 1985). In some sense, the functionality of Audits requires a way of negotiating process completion, and though the inclusion of explicit negotiation models could benefit the system functionality.

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REFERENCES

- Antunes P., N. Guimaraes, J. Segovia and J. Cardenosa, 1995. Beyond Formal Processes: Augmenting Workflow with Group Interaction Techniques. *Conference on Organizational Computing Systems (COOCS '95)*. ACM Press. San Jose, California. August.
- Antunes, P., C. Costa, M. Duque, N. Guimaraes, T. Ho, J. Jesuino and H. Stadler, 1998. On the design of group decision processes for electronic meeting rooms. *Proceedings of the Fourth International Workshop on Groupware, CRIWG '98*. Buzios, Brazil. September.
- Cray, D., G. Mallory, R. Butler, D. Hickson, and D. Wilson. 1991. Explaining decision processes. *Journal of Management Studies*, 28(3), May.
- DeSanctis, G. and R. Gallupe, 1987. A foundation for the study of group decision support systems. *Management Science*, 33(5), May.
- Dickson, G., M. Poole and G. DeSanctis, 1992. An overview of the GDSS research project and the SAMM system. In R. Bostrom, R. Watson and S. Kinney (Editors), *Computer Augmented Teamwork*, Van Nostrand Reinhold.
- Eden, C, 1993. Strategy development and implementation: Cognitive mapping for group support. In *Strategic Thinking: Leadership and the Management of Change*, chapter 5, John Wiley & Sons, Ltd.
- Dickson, G., M. Poole and G. DeSanctis, 1992. An overview of the GDSS research project and the SAMM system. In R. Bostrom, R. Watson, and S. Kinney, (editors), *Computer Augmented Teamwork*. Van Nostrand Reinhold.
- Guimarães, N., A. Pereira and P. Antunes, 1997. Bridging Workflow and Collaboration Tools. *8th EuroGDSS Workshop*, held as part of the nine stream 7th Mini EURO Conference. Bruges. March.
- Guimaraes, N., P. Antunes and A. Pereira, 1998. The Integration of Workflow Systems and Collaboration Tools. In A. Dogac, L. Kalinichenko, M. Ozsu and A. Sheth (Editors), *Workflow Management Systems and Interoperability*. Springer Verlag.
- Gurbaxani, V. and S. Whang, 1991. The Impact of Information Systems on Organizations and Markets. *Communications of the ACM*, 34(1).
- Johansen, R., D. Sibbet, S. Benson, A. Martin, R. Mittman and P. Saffo, 1991. *Leading Business Teams*. Addison-Wesley.
- Kaner, S., L. Lind, C. Toldi, S. Fisk and D. Berger, 1996. *Facilitator's guide to participatory decision-making*. New Society Publishers.
- Kinlaw, D., 1996. *The ASTD trainer's sourcebook*. McGraw-Hill.
- Kraemer, K., J. King, 1988. Computer-Based Systems for Cooperative Work and Group Decision Making. *ACM Computing Surveys*. V. 20, N. 2, June.
- Lewick, R. and B. Sheppard, 1985. Choosing how to intervene: factors affecting the use of process and outcome central in third party dispute resolution. *Journal of Occupational Behavior*, 6.
- Malone, T. and K. Crowston, 1994. The Interdisciplinary Study of Coordination. *ACM Computing Surveys*, 26(1), March.
- Malone, T., J. Yates and R. Benjamin, 1987. Electronic markets and electronic hierarchies. *Communications of the ACM*, 30.
- McGrath, J., 1984. *Groups: Interaction and Performance*. Prentice-Hall.
- Mintzberg, H, 1979. *The Structuring of Organizations*. Prentice-Hall.
- Nunamaker, J., A. Dennis, J. Valacich, D. Vogel and J. George, 1991. Electronic meeting systems to support group work. *Communications of the ACM*, 34(7), July.
- Nunamaker, J., L. Applegate and B. Konsynski, 1987. Facilitating group creativity: Experience with a group decision support system. *Journal of Management Information Systems*, 3(4).
- Nunamaker, J., R. Briggs, D. Mittleman, D. Vogel and P. Balthazard, 1997. Lessons from a dozen years of group support systems research: A discussion of lab and field findings. *Journal of Management Information Systems*, 13(3).
- Patton, B., K. Giffin and E. Patton, 1989. *Decision Making Group Interaction*. Harper Collins Publishers.
- Schreuder, H., 1993. Coase, Hayek and Hierarchy. In S. Limberg and H. Shreuder (Editors), *Interdisciplinary Perspective on Organization Studies*. Pergamon Press.
- Schwarz, R., 1994. *The skilled facilitator*. Jossey-Bass Publishers.