UNFADING DECISIONS
A Position Paper on Decision Reconstruction

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Abstract: The importance of understanding and recording past decisions increases when we realize that employees' memories are not always available, neither will they last permanently in organizations. In this paper we posit that the ability to perform decision reconstruction using a Group Support System (GSS) can provide a flexible solution to the problem, but only if the information model underlying it is able to provide bidirectional support to the phases of a decision-making process. For this, we present general characteristics for an information model to support decision-making as well as decision reconstruction processes.

1 INTRODUCTION

Probably there are many occasions when the sole review of discussion topics and resulting decisions is enough to recall the details of the decision process, especially if the people who review them are the same decision agents who were involved in it. Still, as those decision agents may no longer be in the organization, we believe that anyone should be able to retrieve that information easily. In these circumstances, the GSS, whose features (which are described in detail, for instance, in Bafoutsou & Mentzas, 2002) should allow in-depth examination whenever required. In addition, GSS constitute a technical element for organizational memory (as defined, for instance, in Ackerman, 1998; Hoffer & Valacich, 1993; Lehner & Maier, 2000; Stein & Zwass, 1995; Walsh & Ungson, 1991) and decision reconstruction (DR).

Methodologically, our research lies within the scope of design research. This option takes into consideration the creation, use, study and performance evaluation of artefacts in order to understand, explain and improve information systems (Hevner, March, Park, & Ram, 2004; March & Smith, 1995). We have adopted the process defined by Peffers (explained in Peffers, et al., 2006) because it is an eclectic approach, which combines the research steps of other authors and it emphasizes knowledge use and development, throughout the research. We tested initial ideas on decision reconstruction through laboratorial tests and case studies (published elsewhere). From the gained insights we found that most of our considerations were ratified, but there were still unaddressed issues. This paper presents the combination of all our findings, whose discussion will, hopefully, gather extended insights, before performing a second testing round (iteration).

2 DECISION RECONSTRUCTION

We define decision reconstruction as the process that allows an individual or group of individuals (the decision reviewers), whether internal or external to the organization, to understand how a GSS supported group has reached a previous decision.

As stated in the introduction, GSSs are a natural solution for distributed collaborative of work, providing structured opportunities to engage in deliberative exploration of ideas, evidence and

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Table 1: Support needs.

Decision process	Reconstruction process
Argumentation	
Cover a multiplicity of argumentation models. Express the relationships among the argumentation elements.	Maintain and evidence the linking scheme of the used argumentation model.
Structure	
Create meaningful categories. Register information evolution in time. Link information element between discussions.	Review of the in-between steps of a decision process. Turn information elements into an "inactive" state, instead of its deletion.
Decision-making	
Use computer-guided decision-making techniques Use manual convergence methods	Access the details of the performed convergence processes.

argument (Osborne, 2010).

Nevertheless, as GSSs are built upon the idea of cumulative (sequential) support for the decision-making phases (as defined by Simon, 1977, i) intelligence phase; ii) design phase; and iii) choice phase), it is not always easy to understand the earlier stages of a discussion. This is particularly evident at the end of discussions when classes, which were created to encompass the discussion elements and some of the details, are "flattened".

Understanding how the past decisions affect present ones fosters the relationships between information and facilitating the use of knowledge in mutually dependent contexts (Guerrero & Pino, 2001). We believe that by fostering the decision reconstruction ability of GSSs, we promote their capability for information retrieval, thus contributing to ease and deepen the comprehension of past decisions, while fostering knowledge acquisition. In addition, expanding GSSs capabilities from the perspective of knowledge management can significantly improve the performance and satisfaction of group meeting participants (Hung, Tang, & Shu, 2008). We also stand that decision reconstruction can enhance transparency (as stated in Danielson, Ekenberg, Grönlund, & Larsson, 2005; Stirton & Lodge, 2001), and will empower GSSs as tools for public consultation and the external scrutiny of decisions.

It is known that GSS solutions should cover a multiplicity of approaches to support different ways of building a collaborative discourse (according to Turoff, Hiltz, Bieber, Fjermstad, & Rana, 1999). These ways range from a simple question-reply pattern to more elaborate argumentation models supported by argumentation theory (as seen, for instance Bentahar, Moulin, & Bélanger, 2010; Kunz & Rittel, 1979; Maleewong, Anutariya, & Wuwongse, 2008; Toulmin, 2003). A general GSS information model for decision reconstruction needs to be able to register (document) the in-between steps of the convergence/consensus-building provided by the interconnection of the argumentation elements presented by the group, during the discussion. This type of behaviour resembles the capabilities of entity-based versioning systems, which can create versions of packages, classes, and even individual methods of a complete system over its entire lifespan (Robbes & Lanza, 2005). The fine-grained ability to version argumentation elements allows its in-depth registration and to evidence their evolution over time.

Another issue in decision reconstruction regards the validity of the organizational memory. When information expires (whether based on administrator's decisions or determined by existing laws), a cleaning process can occur. We stand, however, that the deletion of such information might constitute an important barrier to decision reconstruction, even when earlier information is "flattened" to some condensed form. To this matter, no records could mean no memory and, consequently, the inability to retrieve past decisions.

Having in mind the intention to register all the steps in decision-making to foster decision reconstruction, instead of deleting information, contributions should be marked as "active" or "inactive" in order to be considered in the group analysis (meaning that an inactive contribution represents a "deletion" but without actual information loss). We stand that it is possible to embed the previous characteristics into an information model to support both decision-making and decision reconstruction, by incorporating three different, though implicitly intertwined, types of Table 1.

3 BUILDING THE DECISION RECONTRUCTION SUPPORT

In order to develop an information models that fits the abovementioned needs, whether in decision-making or in decision reconstructing, previous research (published elsewhere) makes us stand that

is necessary to: create a flexible support for inserting group's contributions; link the contributions; establish associations among information elements; and ensure the recording of the in-between steps of the group meeting.

A flexible model to support a wide range of argumentation models should address contributions as independent elements, without imposing any sort of pre-established associations. The connection of contributions should provide the support to establish void links, and a different support to characterize such links, as there are different types of expressed connections. These connections depend on the: argumentation model relationships (e.g. support, response to, evidence for, etc.); structuring support (as one of the most common features in GSS is their ability to separate contributions into meaningful categories or information containers, namely, discussions, topics, categories, information "buckets", documents, etc.); and time-span association (sequence, dependence, versioning, merging, etc.). The creation of a void connection network creates the possibility to develop a multiple characterization framework that does not have to impose any type of relationships, structure or argumentation scheme beforehand.

Depending on the discussion, decision-making support might benefit from the use of formatted contributions or from predefined data-types used when inserting data, especially when quantitative data is under analysis (e.g., percentage numbers, weights, etc.). Therefore, the connection support could also address the data validation rules over contributions, in order to ease or automatically support later convergence processes. As different discussions (or discussion segments/phases within discussions) may require distinct argumentation schemes, it is important to offer the support for using different argumentation models, as usual GSS embed an athwart representation for the whole discussion.

The connection among contributions requires additional characterization to define their argumentation role within the GSS, but such characterization should not be embedded within the contribution support, but using associated meta-data. In addition, different types of connections should also be expressed using meta-data. Such association types must include: argumentation model relationships; structuring support; and time-span association.

Expressing more complex argumentation models as simpler ones does not seem troublesome. The opposite, however, may not be accomplishable (at least automatically) due to the lack of associated information. Producing such information requires the establishment of new types of associations) beyond the ones established in the decision process.

We believe that two processes (or their combination) could be tried, in order to achieve the desired situation. The first one would be the reviewer's manual supply of the relationship properties as individually perceived. To support this process, the GSS should ask the reviewer to input all the necessary association attributes, according to the intended argumentation model. The second procedure could use automatic mechanisms, *i.e.* intelligent agents, to perform a semantic and syntactic analysis of the different contributions and propose the type of detected relationships to be confirmed by the decision reviewer.

The capture of the relationships between the discussion elements covered by the information model should also provide the necessary basis for its visual representation. In order to enhance its utility in decision reconstruction and especially to respond to different information needs and cognitive styles of decision reviewers, it requires, nevertheless, a combination with tools for filtering, sorting, selecting and displaying multiple relationships.

When supporting groups in achieving decisions, divergent contributions may exist. To deal with this situation a GSS should provide converging and decision-making techniques. However, as achieving the final decision might require more than one convergence process and more than just one convergence method (whether manual or computer-guided), GSS should provide a versioning capability over the used argumentation elements and convergence processes. Maintaining a record of the convergence process, as well as the used methods, contributes to ease the decision reconstruction processes by saving and linking the in-between steps of the decision process. The in-between recording should also allow the production of better reports/documents derived from the GSS decision processes, because usual reports only embed the latest result, especially when reporting is an automatic feature.

Any decision report should encompass the reasons that explain the decision outcome. However, the process that selects such reasons and its relevance is not a standard or an always-clear one.

As decision reviewers might not share the relevance pattern or judgment assessment expressed in the produced documentation, decision reconstruction might be hindered. It would be interesting if a GSS could parameterize automatic

recording procedures (coarse or fine grained), in order to produce a final document or report, for instance, based on the performed convergence processes, which recorded the decision evolution within a certain time-span.

4 FUTURE RESEARCH

This paper presented the combination of initial ideas on decision reconstruction and gained insights from earlier testing, from which we have outlined what we posit to be the set of fundamental characteristics to develop an information model to support the decision-making process, as well as the decision reconstruction process. The defined methodology dictates the need for a second testing round where we intend to embed the proposed characteristics into a GSS prototype and to submit it to further laboratorial evaluation and case study analysis.

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