

A GDSS AGENDA BUILDER FOR INEXPERIENCED FACILITATORS

Pedro Antunes

Tania Ho

Luis Carriço

*Department of Informatic Engineering,
IST, Technical University of Lisboa,
Av. Rovisco Pais, 1049-001 Lisboa, Portugal.
{paa,lmc}@digitais.ist.utl.pt*

Abstract

One resource playing a critical role in computer supported decision-making groups is the facilitator. Facilitation is a complex task, encompassing social abilities, pre-meeting planning of decision-making processes and supervising the technology usage during meetings. We identify one problem with current support to electronic facilitators: agenda builders do not allow inexperienced facilitators plan GDSS meetings with success. We developed an agenda builder to tackle this problem. The tool was built around a comprehensive model, which incorporates patterns of activity and guidance into the pre-meeting activities. An experiment revealed that the tool increases the logical sequence and clarity but decreases the structure and efficiency of generated agendas.

1. INTRODUCTION

The work reported in this paper occurred from a project which main goal was to set up a Group Decision Support System (GDSS) at a Portuguese higher education institution. The GDSS is now operational with the following infrastructure: seats to a maximum of eight people, eight notebook client computers, one server, one Smart Board front projection unit from Smart Technologies Inc., one video projector serving the Smart Board, and two video cameras dedicated to record meetings. Concerning software, we have adopted GroupSystems from Ventana Corp. and Meeting Works for Windows from Enterprise Solutions Inc.

One aspect we had to consider while installing the room concerned training people to assist GDSS usage, i.e. electronic facilitators. Although the institution has several experts in facilitating natural groups, none of them had experience in computer-supported meetings. A great effort has been spent understanding how meetings should be designed and actually in designing meetings.

As it became apparent to us, the meeting agenda, which serves the important role of guiding the decision-making process, plays a critical role in determining the meeting success or failure. We give two examples.

Alaska plane crash was a classical NASA problem that required the participants to prioritise a list of tools in an emergency scenario. The agenda was designed in a way that each participant could individually identify the most important items from a set of 15 and document reasons for that selection. Afterwards, the participants would discuss their rankings using the selected GDSS tool (GroupSystems' topic commenter). Finally, the 15 items would be ranked using the Smart Board. While running this agenda, at the discussion phase, one participant said loudly "this [task] is completely wrong. First, we must define a strategy and only then select the items." This event had great impact on the group, which realised that the agenda was wrongly designed, with tasks that focussed participants more on the solution than the problem. Work had to be discarded and, in the end, the group was dissatisfied with the system.

Board of directors was a risk-decision scenario concerning the launch of a new product in an industrial company. This agenda revealed another problem. During the meeting, one of the participants playing the role of industrial director complained that he had crucial information but could not stress its importance to the group while using the GDSS. The final decision gave more importance to comments made by one participant playing the role of marketing director. One possible solution to this problem could have been to set up different tasks, each one dedicated to discuss problems at different risk levels.

The situations described above showed us that the problem was not the GDSS itself, but rather the process with which it was employed. Successful GDSS meetings require expertise and experience in planning meetings and building agendas. However, our experiments with current GDSS and overview of research work in the GDSS field show limited support to planning and agenda building, especially when carried out by inexperienced

facilitators. This paper reports our efforts in the development of an agenda builder that specifically supports inexperienced facilitators. The paper is organised in the following way. First, we overview related work concerning group facilitation and agenda building. Next, we present the design, followed by implementation details. Finally, we present results of the tool evaluation.

2. OVERVIEW

Group facilitation is a process in which a person who is acceptable to all members of the group intervenes to help improving the way it identifies and solves problems and makes decision [Schwarz 1994]. Facilitation is one of the several third party processes studied in organisational behaviour [Lewicki *et al.* 1992]: mediation (support interactions among disputants), arbitration (resolve disputes while giving equal opportunities), inquisition (stronger than arbitration) and process consultation (facilitate problem solving).

The escalating complexity of problems faced by organisations, due to lack of information, resources and authority, is taking autonomy from individuals and substituting them with groups of human beings [Simon 1997]. This thread leads to an increasing presence of GDSS in organisations, and facilitation activities must accompany such movement, augmenting the interest of the electronic facilitator. Organisations are training their managers to facilitate meetings, in order to avoid prohibitively costs, but the transition from manager to facilitator is not considered easy [3M 1994] and consequently the electronic facilitator is still a scarce resource.

According to [Nunamaker *et al.* 1997] an electronic facilitator executes four functions: (1) provides technical support by initiating and terminating specific software tools¹; (2) chairs the meeting, maintaining and updating the agenda²; (3) assists in agenda planning; and, finally, (4) provides organisational continuity, setting rules and maintaining an organisational repository. One more complex function considered by [Schwarz 1994] concerns improving the future group performance, which requires focussing the group on the specific problem at hand and, simultaneously, on the process.

[Clawson and Bostrom 1993, Clawson *et al.* 1993] assessed the roles of the electronic facilitator and provided empirical evidence that planning the meeting is one of the most critical ones. Their studies report that 12 % of facilitators' behaviour concerns planning meetings. [Niederman *et al.* 1996] also studied the critical factors, which from the facilitators' point of view influenced more the meeting success. Although 32% of the respondents elected group attributes (such as commitment or buy-in) as the critical factor of success, a high number of high-experienced facilitators (25%) mentioned having a good agenda. This study also identified critical factors to the facilitators' individual success. Personal abilities were elected by 74%, but it is interesting to note that planning and problem-solving skills were also mentioned by 14% of the respondents. On a sequel to this study, [Niederman and Volkema 1996] report that facilitators find agendas to have impact on meeting outcomes (3.3 to 4.4 on a scale of 1 to 5), particularly on the quality of outcomes.

One must conclude that planning meetings and building agendas is one critical role with impact on meeting outcomes, which raises the question of how do facilitators perform that task. [Niederman and Volkema 1996] report that facilitators are most likely to either adapt a generic process or select one from a toolkit. Both the generic and toolkit approaches require prior experience with a large range of problems and thus are not applicable in the context of an inexperienced facilitator. As a fact, according to [Clawson and Bostrom 1993, Clawson *et al.* 1993], inexperienced facilitators seem to avoid technology use until they gain conceptual understanding of its capabilities, comfort with its use and also the ability to explain the technology to the group.

The above observations raise another question, of how can inexperienced facilitators start using GDSS, at least with a reasonable probability of success. Several authors [Niederman 1996, Aiken *et al.* 1991] suggested an expert system approach capable to develop facilitation skills. These expert systems would include the recognition and interpretation of patterns of activity, possible facilitator's interventions and also some indication of probabilities of success.

Our approach to the development of facilitation skills follows exactly this line of reasoning, and considers the support to inexperienced facilitators by incorporating the recognition and interpretation of design patterns in agenda building.

Such an approach requires extending the notion of agenda building, for which two complementary definitions have been given [Niederman and Volkema 1996]: (1) a list of topics that the group addresses; and (2) the sequence of actions undertaken by the group to deal with an issue.

We have a more broad view of agenda building, based on the notions of project [Muller 1998]. Decision-making can be viewed as a project, with a vision, mission, operational objectives, and also a process and improvement plan. The mission may be briefly specified as "to select that one of the strategies which is followed by the preferred set of consequences" [Simon 1997]. Also an integral part of the project there is a process model, which describes in generic terms how several tasks are interrelated and can be reused. The

particular interest in viewing an agenda as a project is that we explicitly account for the process model, and increase its reusability potential (most of the reusability potential of a project depends on the process model).

2.1 Design patterns

A definition of design patterns of decision-making processes may now rely upon the notion of process model. We refer here several models that we have seen related to GDSS.

[Simon 1997] describes a rational model with three steps: listing all alternative strategies; determination of all consequences that follow upon each strategy; and comparative evaluation. [McGrath 1984] defines a task typology classifying group tasks in four clusters: generate, choose, negotiate and execute. Each cluster is further subdivided according to more specific cooperation/conflict and conceptual/behavioural characteristics. [Schwarz 1994] presents a nine-step problem-solving model: define the problem; establish criteria for evaluating solutions; identify root causes; generate alternative solutions; evaluate alternative solutions; select the best solution; develop an action plan; implement the action plan; and evaluate outcomes and the process.

[Kaner 1996] proposes a more complex model, which will be briefly detailed. A problem may be divided in a set of more specific issues, each one requiring a decision-making process. Each process consists of one or more zones. There are four different zones, 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 zone can consist of one or more strategies (patterns) for handling the issue. For instance, *exploring the territory*, *searching for alternatives* or *discussing difficult issues* are different strategies defined for the divergent zone. Finally, a strategy can consist of one or more activities. As an example, we find in the *explore the territory* strategy a sequence of activities characterised as *who*, *what*, *when*, *where* and *how* (each activity identifies who is involved, what must be done and so forth).

[Hwang and Lin 1987] divide the decision making process in four phases: extraction, exploration, selection and execution. The authors also propose an interesting classification of problem-solving purposive methods (computational or not) to implement the above phases: creative confrontation, polling of experts/participation, systematic structuring, simulation, and implementing and controlling.

The above models should be considered in a strict sense, as contingency descriptions of sub-processes. In fact, the whole decision-making process often requires groups to cycle and move between multiple patterns, as new problems, alternatives and insights emerge. Thus, patterns should not be viewed as prescriptions but rather as resources which avoid divergent or erratic processes [Patton *et al.* 1989].

2.2 Technological support for agenda building

We will limit this overview to GDSS-related support to agenda building, avoiding other organisational planning tools such as, for instance, Gantt, PERT or CPM tools.

- **GroupSystems** [Nunamaker *et al.* 1991a, 1991b]. Provides an agenda tool, which allows the facilitator to organise multiple meetings within folders and, for each meeting, define the sequence of problem-solving methods to invoke (e.g. electronic brainstorming, categorizer, vote and so forth). The agenda also provides some additional facilitation aids, with elements such as *introduction*, *lunch* and *coffee break*. Using the agenda, the facilitator can also name and describe agenda topics, define time limits and select participants. Version 2.0 also provides a set of pre-defined agendas.
- **SAMM** [Dickson *et al.* 1992]. Provides an agenda with the possibility of defining sub-agendas, enter, view, modify and delete topics. SAMM is user-driven, i.e. any participant may assume at any moment the role of the facilitator [Gallupe *et al.* 1988, Zigurs *et al.* 1988].
- **Meeting Works**. Has an agenda planner, where topics and tasks can be organised in a list. Meeting Works separates the roles of agenda planner and meeting chauffeur. The latter is responsible for matching agenda tasks with the problem-solving methods supported by the system. Another notable characteristic of Meeting Works is that it provides a small set of pre-defined agendas: group development, checkpointing, new project, and strategic planning.
- **Graphic facilitation** [3M 1994]. A set of symbols, pictographs and ideographs that visually organise meetings.

Note that the above systems do not support means to develop the skills of inexperienced facilitators. Although GroupSystems and Meeting Works offer pre-defined agendas, they have low reuse potential and thus are mostly beneficial to expert facilitators. Furthermore, none of the above tools support the notion of design patterns.

- **Distributed Facilitation System** [Dubs and Hayne 1992]. Research prototype addressing several facilitation functions necessary before, during and after meetings. Although pre-meeting support was not the focus of research, two functions were identified as indispensable to facilitators: tool selection and handle logistics. Other functions with low level of control from facilitators (high level of control from meeting leaders) are meeting goals, review previous meetings, gather documentation, develop rooster and inform participants.
- **Expert System Planner** [Aiken *et al.* 1991]. It is a prototype expert system designed to support GDSS facilitators during pre-meeting planning. The authors refer that various models of task characteristics, nature of the problem and other characteristics such as need for consensus are included in the system. Based on these models, the system makes tool recommendations to the facilitator.

Contrary to the previous set of tools, one can find that this new set embeds in its functionality the notion of how the decision-making process should evolve. On the negative side however, we realise that the expert system approach followed by ESP does not allow facilitators to recognise and interpret the decisions made by the system.

3. CONSOLIDATING DESIGN PATTERNS IN THE AGENDA BUILDER

As previously mentioned, our approach consists in consolidating design patterns in the agenda builder. Although all of the previously presented models of the decision-making process were reasonable to use, we adopted Kaner's model considering the following reasons:

- It is the most detailed one. In particular we found compelling the separation of concerns in multiple levels: issues, zones, strategies and activities.
- The different strategies mentioned by Kaner provide very expressive and intuitive alternatives for handling a wide range of problems, giving context and conceptual understanding to the design process.
- The activities are independent from tools particular to any GDSS. This is a good design practice, well known in software development, where implementation options are delayed as much as possible in the product life cycle.

The Kaner's model was extended in order to embrace two new levels of abstraction: task level and tool level. Both levels are intended to smoothly approximate the high level decision-making design towards the actual process instantiation. The task level borrows the [Hwang and Lin 1987] characterisation of computational methods in five categories, but excludes simulation, given that such task is not addressed by the GDSS cited in this paper. The tool level directly maps tasks into GDSS tools such as brainstorming, topic commenter, categorizer, etc. This final level is the only one dependent from the particular GDSS used, while the other levels are qualified for reuse. In Table 1 we present the model that finally was specified for the agenda builder.

4. IMPLEMENTATION

The agenda builder was developed as a Java Applet, which can be downloaded from a WWW home page using a standard browser. This approach allows future integration with other tools, for instance support to facilitation of remote meetings. At the current moment the tool allows facilitators to build agendas for sessions with GroupSystems and Meeting Works.

We only present screen dumps that illustrate how facilitators can design decision-making processes with the agenda builder. Also, we avoided describing common functions such as participant rooster, definition of a date and location for the meeting, and selection of GDSS.

Figures 1 and 2 show how the facilitator breaks down a problem hierarchically into issues. Figure 3 shows how the facilitator designs processes aided by the model. Issues are shown at the top left. At the centre of the window, the facilitator can view and select zones and corresponding strategies. To the right of the window, the facilitator finds a table for the selection of activities, tasks and tools. Finally, the bottom left window shows the process steps assembled by the facilitator, in the form of summary lines with the selected zones, tasks and tools. The facilitator may add or delete summary lines. The facilitator can also add contextual data to the summary lines. Figures 3 to 6 illustrate the whole design of a decision process for launching a new product, consisting of brainstorming, categorizer, group outliner and voting tasks.

Zone	Strategy	Activity	Task	Tool	
				GS	MW
Divergent	Explore territory	Say point of view	CC	TC	GEN
		Specify requirements	CC	TC / CAT	GEN / ORG
		Who, what, when, where, how?	CC	TC	GEN
		Facts and opinions	CC	TC	GEN
		Initial positions	CC	BST	GEN
	Search for alternatives	Perspectives not represented	CC	BST	GEN
		Brainstorming	CC	BST	GEN
		Analogies	CC	BST	GEN
		Something not said?	CC	TC / CAT	GEN
Discuss difficult issues	How does it affect me?	CC	TC / CAT	GEN	
	3 complains	CC	TC / CAT	GEN	
Groan	Create shared context	Learn others' perspectives	SS	CAT	ORG
		If I were in your place...	SS	CAT	ORG
		Solutions and needs	SS	GO	ORG
		Alternative futures	IC	GO	CROSS
Convergent	Reinforce good ideas	Clarify criteria	SS	GO	ORG
		Risks and consequences	SS	GO	ORG
		Who else needs to evaluate?	SS	GO	ORG
		Who does what when ?	SS	GO	ORG
	Explore principles	Case studies	IC	TC	CROSS
		What cannot be changed?	IC	TC	CROSS
	Creative re-contextualisation	Keywords	IC	TC	CROSS
		Revert assumptions	IC	TC	CROSS
		Remove restrictions	IC	TC	CROSS
		Catastrophising	IC	TC	CROSS
Closure	Voting	Doyle and Straus Fallback	POLL	VOT	EVAL
		Vote to Vote	POLL	VOT	EVAL
		Meta-Decision	POLL	VOT	EVAL

Key to task types: CC – Creative confrontation, SS – Systematic structuring, POLL – Polling of experts/participation, IC – Implementing and controlling.
Key to GroupSystems' tools: BST – Brainstorming, TC – Topic commenter, CAT – Categorizer, GO – Group Outliner, VOT – Vote.
Key to Meeting Works' tools: GEN – Generate, ORG – Organise, EVAL – Evaluate, CROSS – Cross impact.

Table 1 - Design patterns consolidated in the tool

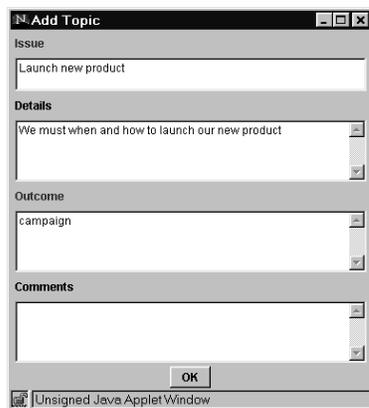


Figure 1 – Adding issues

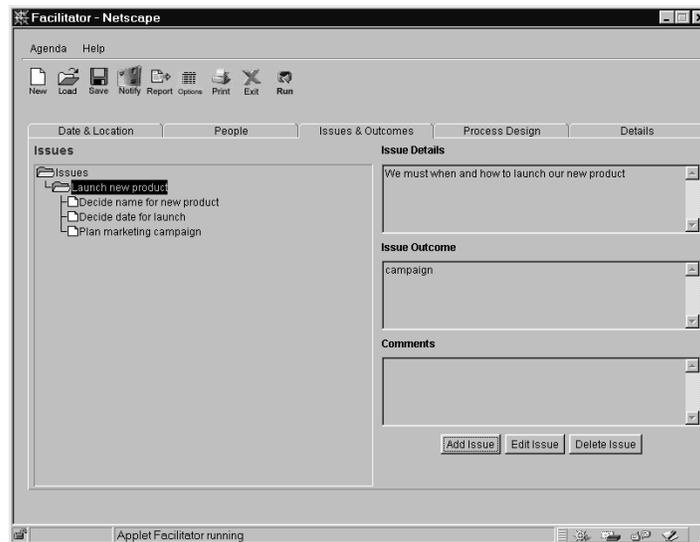


Figure 2 – List of issues

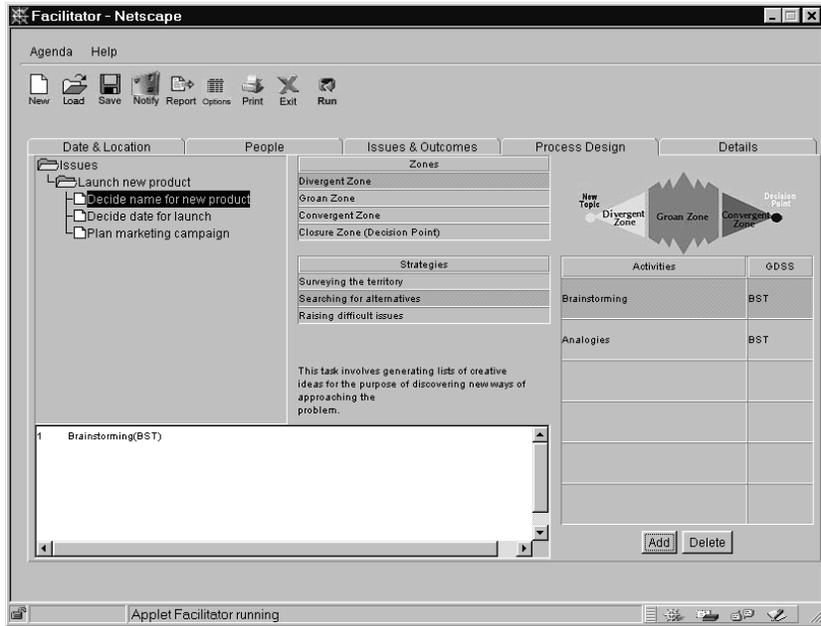


Figure 3 – Process design window, brainstorming selected as first activity

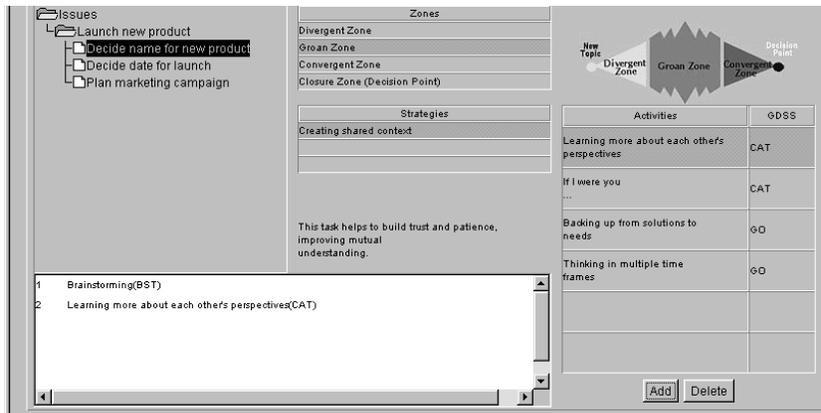


Figure 4 – Second activity selected from groan zone

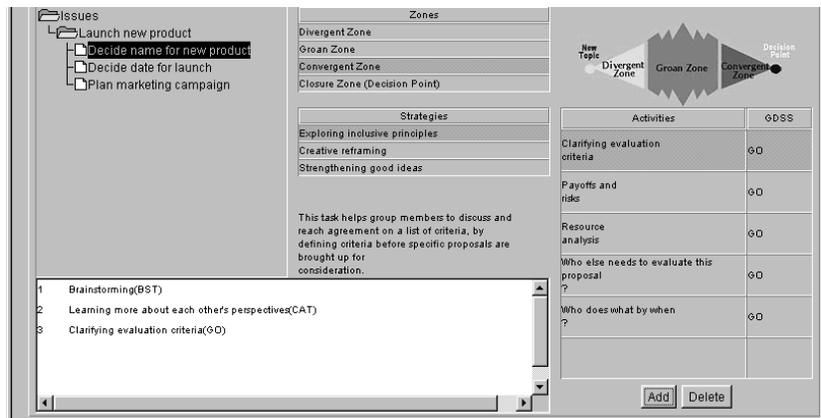


Figure 5 – Third activity selected from convergent zone

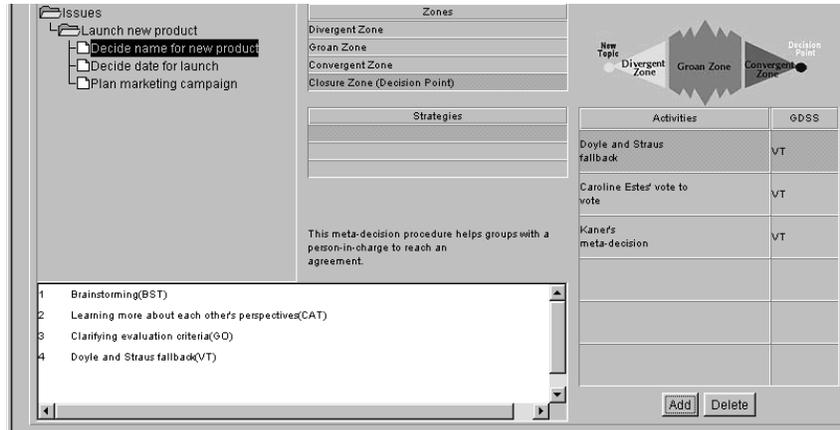


Figure 6 – Closure: voting

5. EVALUATION

We have done a preliminary evaluation of the agenda builder. The experiment was set up as follows.

Question. Are there any differences between agendas done with our tool and GroupSystems’ agenda tool?

Variables. One single dependent variable was studied, the quality of agendas specified by subjects.

Sample. Four facilitators moderately experienced with GDSS.

Procedure. Two problems were presented to the participants. Each facilitator was requested to build an agenda for the proposed problems according to a distribution shown in Table 2.

Facilitators	Problem 1	Problem 2
F1, F2	GroupSystems’ agenda	Our agenda builder
F3, F4	Our agenda builder	GroupSystems’ agenda

Table 2 - Procedure

Problem 1 – A car company must decide either to launch a new model or wait for the design team to introduce a new feature, which will make that model ahead of the market.

Problem 2 – A training course is taking more than the 9 months expected. The problem is how to avoid delays without reducing quality.

Physical environment. The experiment was done face-to-face at our electronic meeting room. Subjects were requested to execute the tasks individual and silently.

Analysis of results. A senior facilitator rated the quality of generated agendas, from 1 (low) to 5 (high), according to the following criteria: (1) structure; (2) logical sequence; (3) clarity; and (4) efficiency.

The agendas generated by the facilitators that participated in the experiment are summarised in Table 3 and the ratings from the senior facilitator are presented in Table 4. From these preliminary results, we are already able to draw some conclusions. First of all, the facilitators using our agenda builder generated a greater number of tasks (8) than the facilitators using GroupSystems’ agenda tool (4.25). According to the senior facilitator, a greater number of tasks reduces the efficiency of the process (GroupSystems’ agenda scores 2.75 and our agenda builder scores 2.0). As a fact, the best agenda is the simplest one, comprising brainstorming, categorising and voting (F3P2), obtained with GroupSystems. It also seems that a simpler agenda has better structure, and thus the GroupSystems’ agenda again obtains better ratings (2.75 versus 2.5).

On the other hand, our agenda builder received best scores in the logical sequence (3.25 versus 3.0) and clarity (3.0 versus 2.75) criteria. In the end, both the GroupSystems’ agenda and our agenda builder were better in two criteria.

It is also interesting to note that two facilitators had better results using the GroupSystems’ agenda (F2, F3) and two facilitators had better results using the agenda builder (F1, F4).

Overall, considering the limited number of results, we cannot conclude that one approach is better than the other. As a fact, they are extremely well balanced. However, some participants seem to take advantage from

using one or the other, which at least supports the idea that the two should be available in order to allow users to opt.

One action to consider in the future consists in identifying the profile of the participants that best use each tool: novices, moderately experienced, etc. Another action consists in fine tuning the model and its implementation to avoid generating agendas with too many tasks.

F1P1	Introduction	F3P1	Issue: launching. Discuss pros and cons.
BST	Alternatives	TC	Discuss points of view
CAT	Group alternatives in categories corresponding to the problem dimensions	TC	Specify requirements
	Identify most important categories	TC	Discuss facts and opinions
VOT	Generate alternative strategies for each category	CAT	Clarify evaluation criteria
CAT	Select one category	GO	Costs and benefits
VOT			Issue: delaying. Discuss pros and cons.
		TC	Discuss points of view
		TC	Specify requirements
		TC	Discuss facts and opinions
		CAT	Clarify evaluation criteria
		GO	Costs and benefits
			Issue: Compare pros and cons
		GO	Clarify evaluation criteria
		GO	Costs and benefits
			Issue: Make a decision
		VOT	Consensus voting
F2P1	Introduction	F4P1	Issue: launch or delay?
CAT	Pros and cons of delaying	BST	Present problem and alternatives
CAT	Pros and cons of launching	TC	Discuss costs
CAT	Costs of delaying?	TC	Discuss benefits
VOT	Delay or not?	CAT	Organise costs
		CAT	Organise benefits
		TC	Identify possible obstacles
		CAT	Reduce costs list
		CAT	Reduce benefits list
F3P2	Hypotheses to reduce time	F1P2	Identify important aspects of training
CAT	Categorise by similarity	VOT	Vote most important aspects
VOT	Select one category, according to viability		Issue: Identify which aspects can reduce time
		TC	Specify requirements
		CAT	Resource Analysis
		VOT	Consensus voting
F4P2	Introduction	F2P2	Present the problem
BST	What makes the delays?	TC	Discuss facts and opinions
CAT	Common scenarios	TC	Discuss others' perspectives
CAT	Requirements to preserve quality	BST	Brainstorm consequences of delaying
BST	How to reduce delays?	GO	Discuss costs and benefits
VOT	Select the 3 most viable ideas	CAT	Categorise topics found in brainstorming
		GO	Discuss solutions and needs

Table 3 – Tabulated results

	GroupSystems' Agenda					Our agenda builder				
	F1P1	F2P1	F3P2	F4P2	Average	F3P1	F4P1	F1P2	F2P2	Average
Structure	2	3	4	2	2.75	2	3	3	2	2.5
Logic sequence	2	4	4	2	3.0	3	4	3	3	3.25
Clarity	1	4	4	2	2.75	3	3	4	2	3.0
Efficiency	1	4	4	2	2.75	2	2	2	2	2.0

Table 4 - Ratings from the senior facilitator

6. CONCLUSIONS AND FUTURE WORK

We argued in this paper that inexperienced facilitators need better agenda builders than the ones currently offered. Our approach was to incorporate a model of the decision-making process in such a tool. The selected model provides a wide range of design patterns and detailed view of decision making processes in multiple levels: issues, zones, strategies, activities, tasks and tools.

The results obtained from the preliminary experiment do not allow saying that the agenda builder proposed in this paper is better or worse than the ones currently available. In a more optimistic vein, we should emphasise that having a model of the decision-making process built into the tool seems to slightly increase the logical sequence and clarity of the generated agendas.

Future experiments must depart from a more deeply characterisation of facilitators profiles, so that one can understand at which level facilitators take more advantage from our agenda builder. In what concerns future development, the process model should be modified so that the user is not induced to generate agendas with too many tasks. Also, as pointed out by the reviewers, the future agenda builder must consider a better articulation with GDSS tools, recommending specific tool configurations, giving instructions to the facilitator and elaborating social and psychological issues.

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ENDNOTES

1. This role is designated chauffeur [Dickson *et al.* 1993, Jarvenpaa *et al.* 1988]. The interventions from the chauffeur do not affect the decision-making process.
2. Contrary to the chauffeur, the facilitator also helps with the process, influencing decision-making with the objective of improving productivity and quality of result [Dennis *et al.* 1988, McCart and Rohrbaugh 1989].

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