Available online at www.sciencedirect.com
SCIENCE DIRECT®
International Journal of Project Management 23 (2005) 17–24
INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT
www.elsevier.com/locate/ijproman

Voting on the agenda: the key to social efficient meetings

Ana Cristina Bicharra Garcia [a,*], John Kunz [b], Martin Fischer [b]

[a] Universidade Federal Fluminense, Rua Passos da Patria 156, sl 326, 24210-240 Niterói, RJ, Brazil
[b] Terman Engineering Center, CIFE-Stanford University, 4020 Stanford, CA 94305-4020, USA

Received 7 November 2003; received in revised form 6 February 2004; accepted 14 May 2004

Abstract

Meetings are important communication and coordination instruments for project management. Nevertheless, they are often considered a partial waste of group time and effort. We claim the agenda itself is the main reason for meetings inefficiency. We propose a new meeting technology that embeds an agenda planning method based on the VCG incentive mechanism for assigning value to public goods. A case study, applying this idea to engineering project meetings, has shown the potential improve on meeting effectiveness, efficiency and participation value. Preliminary results have shown an improvement of 30% in meeting quality.

Keywords: Teams; Individual; Change; Quality; Cost; Time; Implementing strategy

1. Introduction

During engineering construction projects, the project manager faces the weekly challenge of organizing a meeting agenda. A typical meeting agenda will contain more than 50 items to be discussed in a 3–4 h period. The project stakeholders submit items that should be discussed during the meeting. The project manager acts as the social planner on behalf of the group and the project. He includes in the agenda all items requested by each project stakeholder.

Currently, project managers work as if in an ideal world, assuming he has all relevant information, including participants' preferences, to plan the agenda for the meeting. They assume each individual is telling the truth, i.e., an item will interest the entire group, when submitting it for the agenda. However, often a participant submits an item to be discussed in the group meeting, looking only at his own interests without thinking about the extra meeting time imposed to the group. This might be the reason for crowded agendas in project meetings.

Let us take the example of the Christmas work dinner, quite familiar to everyone. A group of 10 co-workers always gets together for their annual Christmas dinner. The bill will be equally split because of the Christmas spirit. They all have dinner, and now the waiter approaches them, offering the dessert menu. Rationally analyzing the problem, each of them thinks the value to eat a crème brulée today is $ 3, because although I love it, I am on a diet; since the price is $ 10, I would never pay that much. However, since we are in a group of 10 and the bill will be equally divided, the desert will cost only $ 1 to me; consequently, I will order my crème brulée. All participants think alike. Therefore, they get the worst equilibrium, namely, of getting to pay more $ 10 each. The individual decision was taken only looking at the individual cost, neglecting the social cost, i.e., the negative externality created for the other participants. Since all group members think alike, in the absence of coordination, they globally overspend.

In the engineering project context we have a similar situation. Meeting participants always complain about the huge number of items not of personal interest added to the agenda (generally more than 50 items), and the great amount of time spent in these meetings (generally 3–4 h).

However, each participant has a share in the guilt due to his selfish behavior. The project manager receives items to be included in the agenda from each participant. An item is submitted to be included in the agenda either when it needs to be discussed by (mostly) the

* Corresponding author. Tel.: +55-21-26295675.
E-mail addresses: bicharra@dcc.ic.uff.br (A.C.B. Garcia), kunz@stanford.edu (J. Kunz), fischer@stanford.edu (M. Fischer).

0263-7863/$30.00 © 2004 Elsevier Ltd and IPMA. All rights reserved.
doi:10.1016/j.ijproman.2004.05.003

entire group, by a subgroup that will definitely attend the meeting, or simply to make sure that the group has acknowledged the information. Only the first reason actually justifies the inclusion of an item in the group's meeting agenda. However, the project manager has no access to the true value for discussing an issue in the group. The individual generally thinks as in the Christmas dinner example.

This is a no-win game since there is no way of improving the agenda without creating new problems, such as miscommunication. As a solution, we propose a meeting agenda planning, the VCG-agenda planning mechanism, based on Vickrey–Clarke–Groves (VCG) [1–3] incentive mechanism, to improve meeting effectiveness, efficiency, and participation-added value by constraining the amount of irrelevant topics that goes into a meeting. VCG was originally developed for auctions and posteriorly adjusted to determine the value of a public good, i.e., a good for which: (a) the cost of providing it does not depend on the number of consumers and (b) people cannot be excluded from using it. Meeting topics are public goods since the cost of including an item in the discussion does not depend on the number of people interested in it, and once the topic is included, there is no way to avoid having the information disclosed during the discussion of it.

We experimented with this new meeting game in real engineering project meetings. The meeting we analyzed was reduced from 3 to 1 h, the agenda changed from an average of 60–40 topics, descriptive tasks sensibly diminished, and all participants declared that they had a better meeting. Despite these encouraging preliminary results, however, we expect that meeting culture will change slowly because the construction domain is slow to adopt new technologies.

2. Research methodology

We used an ethnographic approach and systematically observed people in their natural meeting environment. We observed the way people interact, participate, and contribute to meetings, as well as the way project evolves. We classified all utterances spoken during the meetings according to the reactions they promoted in the audience, i.e., we classified the perlocutory acts of each utterance. A perlocution is the actual effect produced by the speech (locution), opposed to the intended by the speaker (illocution). This terminology comes from speech act theory [5].

Previous work categorized the detailed tasks people perform when working together in meetings in four types, DEPE model: Descriptive, Explanative, Predictive and Evaluative [4]. They analyzed a large set of engineering meetings that took place late in the construction phase of a building project. The authors observed that most meeting time was spent with descriptive type of activities that generally should be avoided. We expanded the DEPE into the DEEPAND coding system by including three other constructs: Negotiation, Alternative Generation and Decision-making.

3. The DEEPAND coding system

During an engineering meeting, we identify seven types of activities that may occur from the perspective of the speaker: *D*escribe, *E*xplain, *E*valuate, *P*redict, formulate *A*lternative, *N*egotiate, and *D*ecide (DEEPAND). In addition, we classify each utterance as a request (?) or response (+) activity. Table 1 summarizes the definitions of each type of meeting task.

3.1. Metrics for measuring engineering meeting performance

Based on the DEEPAND taxonomy of meeting tasks, we propose three criteria to evaluate the quality of a meeting:

- Meeting effectiveness
- Meeting efficiency
- Participation value added (value index)

3.2. Meeting effectiveness

Traditional effectiveness metrics is represented by the percentage of the agenda items that were discussed in a meeting. This method may masquerade the actual effectiveness of a meeting. For instance, an agenda item can be initiated during the meeting, but people may realize they do not have enough information to discuss it. The item was addressed, but not completely discussed.

We took a slightly different approach to measure effectiveness. During each meeting we observed and coded all perlocutory events as a "request to (?)" or a "response (+)" event. A request can trigger a satisfactory response, no response or an unsatisfactory response. We define meeting effectiveness as the percentage of request events that receive satisfactory response, as described in formula (1):

$$\text{Mtg Effectiveness} = \frac{\sum_{i=1 \text{ to } n} \text{Addressed}(\text{Item}_i)}{\sum_{i=1 \text{ to } n} \text{Item}_i} \times \text{AdjustmentFactor}, \tag{1}$$

$$\begin{aligned}\text{Adjustment Factor} = {} & (\text{Event(D)} + \text{Event(A)} \\ & + \text{Event(N)} + \text{Event(Ex)} \\ & + \text{Event(Ex))}/(\text{Event(Des?)} \\ & + \text{Event(A?)} + \text{Event(P?)} \\ & + \text{Event(N?)} + 2 \times \text{Event(Ex?))},\end{aligned}$$

Table 1
DEEPAND classification of perlocutory statements in meetings

	Action	Goal	Typical question	Example
Describe	Show or display what is explicit in someone's project model	Build common ground knowledge	What, where, when, who	Display 2D alternative solution or a cost estimate
Explain	Think aloud (rationale disclosure)	Deep understanding	Why, why not	Relate solution to product requirements
Evaluate	Assess extent to which a design option meets client requirements; assess relative merits of two options	Rank alternative solutions	What is better? does it meet requirements?	Show comparative table with alternative solutions and evaluation criteria
Predict	Calculate or estimate a parameter value	Create new information	What if	Make a cost estimate given a new condition
Formulate Alternatives	Create new design alternatives	Create new information	How about	Propose to upgrade existing air conditioning unit instead of buying an additional small unit
Negotiate	People negotiate tasks and responsibilities	Task/responsibilities assignment	Who will	Define who will detail a specific alternative solution
Decide	Select design option	Commit to something	So what	Select a solution from alternatives

where n is the agenda total number of items, m is the number of tasks triggered by an agenda item, $\text{TaskEvent}_j(\text{Item}_i)$ is the request for a task event j, such as a description or an explanation, triggered by agenda item i, Successful ($\text{TaskEvent}_j(\text{Item}_i)$) is the number of requests that were successfully achieved.

3.3. Meeting efficiency

Meeting efficiency is calculated as the number of items properly addressed per minute. The higher the value the more efficient was the meeting. An efficient meeting is the one in which the agenda topics were effectively addressed in a short amount of time, as shown in formula (2).

$$\text{Meeting Efficiency} = \text{Meeting Effectiveness} \times \text{Min}\left(1, \frac{\text{Meeting Planned Agenda}}{\text{Meeting Duration}}\right). \quad (2)$$

3.4. Meeting value

The Meeting Value Index represents the value to the group for participating in the meeting. This criterion emphasizes the importance to the client of agenda topics that require synchronous meetings, i.e., that relate to reciprocal or sequentially dependent project activities.

According to Thompson [6], there is a most cost efficient coordination method for different types of interdependence among the participants' tasks in the flow of work, as shown in Table 2. That is, Thompson [6] and Mintzberg [7] relate the type of task interdependence to appropriate use of synchronous or asynchronous communication.

Thompson's theory suggests that synchronous communication should be dedicated to topics that relate to reciprocal and, in some cases, sequentially interdependent tasks, while pool related tasks should trigger only asynchronous communication; consequently they should be spared from meetings. We argue that, at least as a first approximation, reciprocal tasks are precisely

Table 2
Tasks interdependences, coordination and communication in organizations, as described by Thompson and Mintzberg

Type of task interdependence	Description	Appropriate coordination method	Appropriate type of communication
Pool-dependent	Work tasks that only depend upon a common pool of resources	Rules, standards, procedures	Asynchronous
Sequential-dependency	Work tasks that depend on tasks undertaken at preceding phases	Plans	Asynchronous and/or synchronous
Reciprocal-dependency	Work tasks that depend not only on preceding tasks, but also upon the performance of the current central tasks.	Face-to-face meetings	Synchronous

those that primarily require Explanative, Evaluative, Alternative Formulation, and Decision-making events in meetings; these are exactly the tasks that should be done concurrently in meetings; and finally that these tasks deserve meeting agenda items. These tasks may involve some Descriptive events, but the description is directly in service of the value adding Explanation, Evaluation, Alternative Formulation, Prediction, and Decision-making.

Similarly, we argue that pooled tasks are precisely those that primarily include Descriptive and Negotiative communication events in meetings, which to a first approximation can well be done asynchronously.

As described in formula (3), we define the value of a meeting as the amount of work that is appropriately synchronous done in a meeting, as a fraction of the total. Specifically, the sum of all Explanation, Evaluation, Alternative generation and Decision task events divided by all task events.

$$\text{Meeting Value} = \frac{\sum_{i=1\ to\ \text{n}} \text{Response Task}_{i\in\langle \text{Ex,Ev,A,Dec}\rangle}}{\sum_{i=1\ \text{to n}} \text{Response Task}_i}, \tag{3}$$

We argue that Meeting Value varies with the type of meeting. In our case studies, we are dealing with engineering projects during construction phase; consequently, we consider that Describe, Predict and Negotiate task events do not contribute to the value of the meeting. Value is a subjective concept that the project manager should define according to the project's context.

4. Current project agenda planning mechanism

An ideal agenda contains only items that need the attention of mostly the entire group. Any information that is not controversial can be sent to or made available for people to read when they need to or have time to assess it. Purely informative items would be better dealt with through other means of communication. In addition, issues that concern only a few people in the group should also be discussed in another forum. Consequently, an agenda without these types of topics would be social efficient.

The current approach to agenda planning is to include all items suggested by anyone in the group, leading to a Pareto efficient situation, because excluding any item (improving the life of somebody) would make others worse off. However, there are many different reasons a topic deserves to be addressed in a meeting, such as:

Scenario 1: the issue needs to be discussed by the group

Scenario 2: the issue needs to be discussed by a subgroup that will be at the meeting

Scenario 3: the issue needs to be formally acknowledged by the group to become common knowledge

These scenarios are not static situations. An item may be included in the agenda solely to communicate a fact. However, people may have different assumptions that may lead to disagreements, a need for negotiation, and the exclusion of commitments worth of discussion in a meeting. Being able to distinguish the reasons an issue should be included in a meeting opens other communication alternative solutions.

The group would certainly be better off excluding all items that qualify as in scenario 3 and keeping all items that qualify as in scenario 1. The challenge is to find a social efficiency that also includes scenario 2, that is, some participants need to discuss an issue, but it does not concern the entire group. Following are some possible solutions to this challenge.

Suppose 3 agents A, B and C are planning a meeting to discuss a specific issue. For agent A, discussing the topic is crucial for his job. Agents B and C do not want to waste their time with that topic, but they do not mind too much. Considering a preference scale from −10 to 10, agent A wants to discuss the item, so $v_A = 10$, but for agents B and C, $v_B = 0$ and $v_C = 0$. Voting would cause the item to be discarded from the agenda, and group utility would consequently allow the item to remain on the agenda. Therefore, if the project manager knows the real preference allocation of the group, he could get a better social efficient solution.

Unfortunately, rational agents have an incentive to lie about their preferences. The answers tend to be polarized to the extremes. If an agent wants to guarantee that an item will be in the agenda, he knows he will benefit from answering using the highest score, so he will act to maximize his individual welfare. Since all agents understand the game rules, they will act similarly; it becomes a majority voting system again. Although the agents had the chance to tell their preferences, and if they did the group would be better off, they are pushed to the extremes. How to make them act in favor of the group? Instead of studying group participant behavior, we want to design an incentive mechanism (game rules) to make them act to improve social efficiency in meetings. However, instead of money, the exchange coin is peer disapproval. An important assumption is that all individuals must agree to use the voting mechanism, i.e., consensus on appropriation (COA) [8], guaranteeing information acknowledgement.

5. The VCG-agenda planning mechanism

Since we used a simplified version of the VCG [1] mechanism to plan meetings, this session is dedicated to presenting the original ideas. Although VCG was originally implemented to improve the revenue of sellers in

auctions, it is very powerful for assigning value to public goods, such as a bridge.

5.1. Basic terminology

The general VCG mechanism setup is as follows:

- $x(\theta) = \arg\max_n \sum_{i=1 \text{ ton}} v_i(\theta_i, x)$ is the outcome, where θ_i is the type of agent i, i.e., is the set of preferences of agent i over different possible scenarios. $\theta_i \varepsilon \Theta_i$ denotes the type of agent i, from a set of possible typesΘ_i. and $v_i(\theta_i, x)$ is the value for agent i if the outcome is x considering his type θ_i.
- $u_i(x, p_i, \theta_i) = v_i(x, \theta_i) + t_i(\theta_i)$ is the utility function, where $t_i(\theta_i)$ is the incentive or taxation (positive or negative value) provided to agent i to disclose its true valuation over outcome x.
- $t_i(\theta) = \sum_{j \neq i} v_j(\theta_j, x) - \sum_{j \neq i} v_j(\theta_j, x_{-i})$ is the VCG incentive mechanism, where x_{-i} means the outcome when participant i is not present, $\sum_{j \neq i} v_i(\theta_i, x_{-i})$ is the utility for the other players if participant i was not in the game, and $\sum_{j \neq i} v_i(\theta_i, x)$ is the utility for the other players because participation i is in the game. Consequently, participant i's action just matters if it is pivotal, i.e., if it changes game outcomes. The incentive should be a function of the impact agent i's revelation has on the group's welfare. It is proven [9] that this is the right incentive for avoiding under and over reporting the value of the public good.

5.2. VCG-agenda planning description

The VCG agenda planning mechanism setup is as follows:

Players: N individuals (meeting participants)

Initial agenda: An agenda with A topics

Outcomes: For every agenda item a, the outcome function $x_a = k(w_{1a}, w_{2a}, \ldots, w_{ia}) \in X$; $X = \{1, 0\}$, where 1 means the item is included and w_{ia} means the message agent i sends about including or not including item a. From the project manager's perspective, the best message w_{ia} would be agent i's true preference on including or not topic a, i.e., $w_{ia} = v_{ia}$.

Agenda technology: Each item of the initial agenda is voted on: include (1), exclude (−1) and send to a small group discussion that is also considered as an exclude message (−1). The items that receive the majority of votes are included in meeting agenda. These items are entered in the agenda before the meeting starts (time = $T1$).

After discussing all items in the agenda, the meeting manager asks each participant if he wants to discuss something else, opening a chance for reviving any eliminated issue. After that, he asks again, but for the entire group, whether anyone wants to add anything else, providing a second chance for reviving any removed item.

Decision Rules:

Decision Rule 1: Law of the majority

An item is included in the meeting agenda (time = $T1$), if (Count $v_{ia} = 1) > n/2$, i.e., $\sum_{i=1 \text{ to all paticipants}} v_{ia} \geqslant 1$. This may exclude many important issues because it does not allow the importance an item may have for each individual to emerge. However, it will surely remove unimportant issues. A type I error is big, but a type II error is small, considering the hypothesis "H_0: Issue is important and should be included".

Decision Rule 2: Sequential Revival

Each participant, in a sequential order, will be asked if he wants to add something else to be discussed, including issues/topics that were eliminated.

Decision Rule 3: Random Revival

After this first round of sequential contribution, the project manager opens the floor for random contributions. Participants have a second chance to include a topic removed by the voting system.

Payoff:

$$u_{ia} = \left\{ \begin{array}{l} v_{ia} \quad \sum_{i=1 \text{ to n}} v_i \geqslant 0, \\ v_{ia} \times x(\theta_{ia}, T_2) + \left(\sum_{j \neq i} v_{ja} \times x_{-1}(\theta_j, T_2) \right) \\ + \left(\sum_{i \neq j, x(.)=1} v_{ja} \times x(\theta_j, T_1) \right) \cdots \sum_{i=1 \text{ ton}} v_i < 0 \\ \quad \text{but\_item}_\text{a} \text{ discussed}, \\ 0 \quad \text{item}_\text{a}\text{NOT discussed}, \end{array} \right\},$$

where v_{ia} is the actual value for participant i to get item a discussed in the meeting, $x(\theta_{ia}, T_2)$ is equal to 1, if item is included in discussion during meeting (time T_2), $\sum_{i \neq j} v_{ja} \times x(\theta_j, T_1)$ is the agenda voting result (time T_1), $\sum_{j \neq i \text{ and } x=1} v_{ja} \times x_{-1}(\theta_j, T_2)$ is the number of people, excluding the one that revived item a, that joined the discussion during the meeting (time T_2).

Let us assume there were 11 participants. Five participants voted to remove the item, 2 voted to send the item to a small group discussion; consequently to remove the item from main meeting agenda; and 4 voted to include in the meeting discussion. During the issue revival phase, one of the participants brought the issue back. Additionally, three other people joined the discussion on the revived issue. So, the utility for the person who brought the issue back is: $u_{ia}(\theta) = v_{ia} + (4 - 7) + (3) = v_{ia}$. It means participant i did not create any negative externality for the group; therefore he should not be penalized.

On the other hand, let us consider another scenario in which 8 voted for removing the item, 1 was indifferent (he did not vote) and 2 voted to include the item in the meeting agenda. Consequently, the item was not included in the official meeting agenda. During the revival phase, participant i brought back the removed issue, and 3 other people joined the discussion. The person who included the item in time T2 (pivotal) will have the following utility:

$u_{ia}(\theta) = v_{ia} + (2 - 8) + (3) = v_{ia+}(-3)$.

The number −3 is the payment participant i should reward the group with for bringing a negative externality into the meeting. It can be transformed into dollars or simply considered the discomfort (peer pressure) participant i will feel during the meeting for including something the group was not interested in discussing.

It is important to notice that the gain is not only about time savings. There are a great number of immeasurable benefits indirectly connected with removing items from a meeting agenda such as:

- Avoiding attention diffusion
- Capturing group's attention on polemical issues
- Saving time to be used to investigate alternative solutions to problems; consequently, a better decision-making process

On the other hand, the importance of an issue for the project and consequently for the entire group may be only perceived by a few. The costs of eliminating something important involves schedule delays and project cost increases. Consequently, the 3-step voting agenda mechanism will make people consider if they really need something to be discussed in a meeting. Bringing an issue to the attention of the group will have a social cost.

6. Case study

For this research, we have analyzed four consecutive engineering project meetings during the construction phase of two adjacent four-storey office buildings. One of the projects was slightly more advanced than the other. There was a group of people from 3 main companies (owner, architect and general contractor), 11 consultant companies, 9 subcontractor companies, city representatives, inspector agency representatives, and a supply vendor company. At least 1 representative for the owner, architect and general contractor companies attended all the meetings. Consultants and subcontractors appeared whenever they needed to get or provide some information from the group, when there were decisions that affected their work or by the project manager's request. The meeting group size averaged around 20 people.

The three first meetings were only observed without any intervention in order to create the baseline. The manager planned that the meeting will take 150 minutes. Meeting 1 and 2 lasted 180 minutes and cover 49 and 55 items, respectively. The 3rd meeting lasted 120 minutes and covered an agenda of 72 items. The project manager introduced the VCG agenda planning mechanism for planning the 4th meeting that lasted 75 minutes to cover an agenda of 39 items. After each meeting, participants answered a meeting evaluation survey. Below we describe the forth meeting.

6.1. Before the meeting

We used the SurveyMonkey tool [10], an online survey tool, for the voting part of the agenda planning process. Participants submitted topics to be discussed and the project manager collected them and put them together as the initial meeting agenda, as usual. This original agenda was transformed into a survey, in which each participant would access online and vote, for each item, if the item should be: (1) included in the next meeting agenda (extremely important), (2) removed (no importance at all) or (3) included in a small meeting (recognition of importance for the group, but not for the individual).

From the original agenda of 52 items, only 32 were voted as relevant to the entire group (majority vote). These 32 items became the new agenda.

6.2. During the meeting

The project manager distributed the new agenda in which all items were there, but some were marked to be skipped. The presence of the removed items in the written agenda was considered necessary for allowing people to remember to bring back items they might feel were erroneously removed.

After discussing all items indicated by the voting answers as important to the group, the project manager asked each participant in a sequential order if there was anything else this participant wanted to bring up for discussion.

During this second chance to modify the agenda, the 6 participants brought 6 new items to the attention of the group. None of the new items involved purely Descriptive events; participants requested decisions and explanations, i.e., high value activities for the group.

During the third chance to modify the agenda, the project manager opened for any new item that might have been overlooked during the meeting. Only one participant brought a new issue to be discussed.

6.3. After the meeting

We requested all participants to answer a survey to evaluate the quality of the meeting, as with the previous three meetings. In addition, we also asked participants to voice their opinion as they leave the meeting.

6.4. Meeting results

We used the DEEPAND research method for analyzing meetings, i.e., a meeting is translated as a sequence of events. When we used the VCG agenda planning mechanism, the configuration of the event distribution changed, favoring decision-making related tasks over descriptive tasks, as illustrated in Fig. 1. In

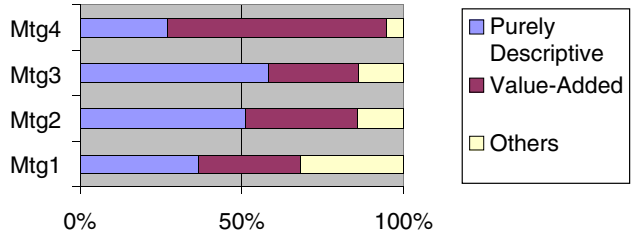

Fig. 1. Meeting Value. For late construction phase, we consider meetings should be dedicated to Explanation, Evaluation, Alternative Formulation and Decision-making tasks. Those are the most valuable tasks for this type of meeting. Agenda topics that triggered purely descriptive tasks are for sure a waste of time for the group.

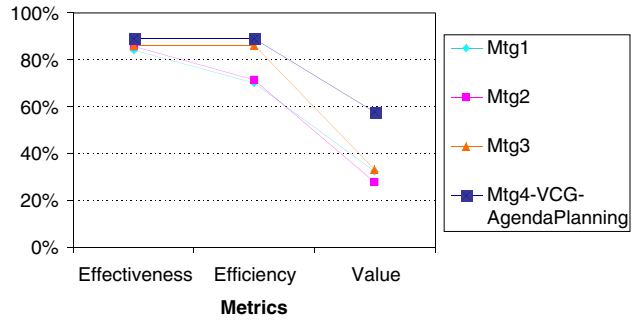

Fig. 2. Meeting Evaluation. Summary of results of introducing our Agenda Planning method into Meeting 4, in comparison with a baseline meeting planning procedure used for Meetings 1–3.

addition, group satisfaction increased, and meeting effectiveness remained in high evaluation. The meetings were all very effective, i.e., most goals set for the meeting were satisfactorily accomplished. As shown in Fig. 2, VCG-agenda planning mechanism improved meeting effectiveness, efficiency and value added to participants.

7. Discussion

Meetings are crucial communication channels that foster effective teamwork, especially in engineering projects. Despite their importance and objectiveness, meetings generally produce a bitter after-meeting taste of time wasted. Low group participation, free riders, a bad decision-making process, and failure to hold a group's attention are some symptoms of a bad meeting.

Computational support systems have proposed ways to enhance the meeting space to make it easier to carry out intellectual tasks involved in problem-solving and decision-making situations. Researchers have focused on providing means to improve the discussion on the meeting issues and tasks, but assuming a fully relevant agenda.

We took a broader view into the meeting problem and realized that little attention had been given to planning the meeting agenda. A meeting can be neither efficient nor effective when the agenda is full of low relevant issues that only steal time from needed discussions.

We designed an agenda planning mechanism that provides the right incentive for people to disclose their true valuation for discussing an item. Our VCG planning mechanism is based on economic theory used in auctions for selling a private good and also used to value public goods (as a meeting).

We successfully applied the mechanism in an actual engineering project meeting. Preliminary results have showed a beneficial impact on meeting effectiveness, efficiency and value added. Participants that impose a negative externality to the group should pay for that; this is a great incentive to behave. The money collected can be distributed among the group or given to somebody specifically.

Our research only applies to meetings that have an agenda and with medium- to large-sized groups, with no anonymous participant. We are assuming there is no communication among participants to avoid coalitions in their behavior.

The VCG-agenda planning mechanism is theoretically sound and can actually affect meeting effectiveness, efficiency, and value added to participants. We actually used it in an engineering project context to see the practical impact. In addition to measuring meeting duration and agenda size, we wanted to analyze what happens in meetings.

Acknowledgements

Our thanks to the many people who helped us to sharpen our ideas. We thank DPR, in particular Osman Chao; that allowed us not only to observe them, but also to try our agenda planning method on one of its projects. A very special thanks to Marcio Garcia who first noticed the value of our research, and suggested that we look at the Mechanism Design domain. We also want to thank Vinicius Carrasco, who generously devoted his time to teaching us about mechanism design theory, as well as providing us precious criticism about our model. Last, but not least, we want to thank Ray Levitt for his insightful suggestion that we tie our meeting mechanism to Thompson's work on group coordination.

References

[1] Vickrey W. Counterspeculation auctions and sealed tenders. J Finance 1961;16:8–37.
[2] Clarke E. Multipart pricing of public. Goods Public Choice 1971:17–31.
[3] Groves T. Incentives in teams. Econometrica 1973;41(4):617–31.
[4] Liston K, Fischer M, Winograd T. Focused sharing of information for multi-disciplinary decision making by project teams. ITcom 2001;6:69–82.

[5] Suchman L. Plans and situated actions: the problem of human–machine communication. Cambridge University Press; 1987.
[6] Thompson JD. Organizations in action. New York: McGraw-Hill; 1967.
[7] Mintzberg H. Structure in 5's: a synthesis of the research on organization design. Manage Sci 1980;26(3):322–41.
[8] DeSanctis G, Poole MS. Capturing the complexity of advanced technology use: adaptive structuration theory. Organ Sci 1994;5(2):121–47.
[9] Mas-Collel A, Whinston M, Green J. Incentive and mechanism design. In: Microeconomic theory. Oxford University Press; 1995.
[10] SurveyMonkey Available from: www.surveymonkey.com. Last accessed, May 10th, 2003.