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### An instrument for measuring meeting success

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# AN INSTRUMENT FOR MEASURING MEETING SUCCESS

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## Abstract

The success of a meeting and the factors which contribute to that success are elusive. Group Support Systems (GSS) have been suggested as a suitable tool for improving meetings, but very often little justification is given for this usage. It is more useful and more appropriate to analyse the characteristics of meetings before considering using a GSS to support one. An instrument is developed for this purpose with five meeting process and outcome constructs: communication, discussion quality, status effects, teamwork, and efficiency. The instrument is validated with data collected from 383 employees of a university in Hong Kong.

## **Keywords**

Meetings, Group Support Systems (GSS), Meeting Processes and Outcomes, Communication, Status Influence, Discussion Quality, Teamwork, Participant Satisfaction.

## 1. Introduction

Meetings are a nearly ubiquitous feature of organisational life, yet they are seldom as successful or as productive as we would like. Recent years have seen growing interest in Group Support Systems (GSS) as a tool for meeting support. As Chin and Gopal [4] observe, however, "like many of the reference disciplines upon which this research is based, the GSS domain has struggled through divergent perspectives, competing explanations, and inconsistent findings". Some of the reported findings are that meetings with GSS support are more productive, generate time savings, enable greater participation, and so on, though even these are often inconsistent or unproven. Nonetheless, it is unwise to assume that all meetings will benefit from an injection of GSS support [cf. 18]. Rather, it is necessary first to understand the characteristics and processes that occur within a meeting, and then to use that information to provide more focused support, possibly through a GSS. This understanding is likely to improve the chance that GSS support will be successful. Thus, meeting support is approached from the perspective of identifying meeting processes critical to its success.

This article first discusses the objective of the research, before presenting a theoretical basis for the work and developing a research framework which establishes the principles for the construction of an instrument that measures meeting processes. A number of pilot tests were conducted to ensure face validity before the instrument was distributed to a larger population - the academic, research and administrative staff of a large university in Hong Kong. The data is used to establish the validity of the meeting constructs, as well as to measure the degree of correlation between meeting processes and outcomes. The article concludes by describing how the instrument might be enhanced.

## **2. Research Objective**

While the literature contains many accounts of how GSS have been used, both experimentally and in the field, there is a noticeable lack of information justifying why GSS were used. This lack of justification is critical, given the acknowledged inconsistencies of GSS findings. It is suggested that, in order to ascertain whether or not a meeting is likely to benefit from GSS support, one must first examine existing problems and processes in a meeting and establish empirically the relationships between meeting process constructs and meeting outcomes. Here an instrument is developed for precisely that purpose.

## **3. Research Framework**

Within the GSS literature, a number of models have been proposed to describe group interaction in meetings [6, 10, 44, 45]. These typically involve independent variables (inputs), processes, and dependent variables (outputs). In its simplest form, this generic model looks as follows:

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Insert Figure 1 about here

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This article is especially concerned with the meeting processes. The socio-psychological literature of group dynamics is reviewed first in order to explore the processes that occur in meetings and to develop appropriate constructs. These are explained in the following section, where the research model is presented (see Figure 2). The highlighted areas are those that are specifically addressed in the instrument. The lack of detail in other areas does not suggest that they are unimportant, but simply that they are not the focus of this article.

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Insert Figure 2 about here

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## **3.1 Meeting Group and Environment Characteristics**

### *3.1.1 Features of GSS and Non-GSS Technology*

As already observed, the purpose of the research is to identify meetings that may benefit from an infusion of GSS support. Although no attempt is made here to prescribe precisely how a GSS should be used, it is instructive to review the key features of a GSS briefly. A GSS incorporates tools that facilitate idea generation, discussion, and evaluation, with varying degrees of structure provided according to the needs of the group. Communications may be either identified or anonymous. Meetings that do not utilise a GSS may still use other forms of technology, such as whiteboards and flip charts. The instrument does not attempt to measure the use of any of these items, since they can be better measured by impartial observers, i.e. independent of the participants.

### *3.1.2 Social Attributes*

Social attributes includes a number of key factors that relate to how participants exert influence on one another. Influence behaviour, whether majority or minority [41], very often varies with the status of those who attempt to exert influence. Thus the influence an individual possesses depends on such factors as: social position, age, economic power and importance [32], as well as information possessed and existing norms in the group.

Although the idea of majority influence might seem to be popular, given that it corresponds to principles of democracy, it does have the drawback that valuable minority views or alternatives may not be expressed [42, 43, 48]. In GSS research, emphasis has normally been placed on producing consensus [57] - while reducing majority influence and reducing the effect of status [5, 38, 61].

However, influence does not only stem from status variables. Informational and normative influence [12] are also of relevance. The first derives from knowledge, and involves "the acceptance of information from others as evidence about reality" [29]. A person who has this may be able to use it to wield influence. When its possession contributes to status, status may also be said to be associated with informational influence.

Normative influence derives from norms and entails conformance with the expectations of others [29]. It is often associated with status influence, which may be associated with norms and the adherence to them [5, 56].

Where status influence is concerned, individuals are able to exert power by virtue of their status level. Clearly they can be perceived as having high or low status.

### *3.1.3 Individual Characteristics*

Individual characteristics involves a category that permits an examination of participants in both their individual and group membership roles. Oral competence determines much of the person's ability to communicate and participate in meetings. The ability to communicate suggests some dependence on such personal characteristics as shyness, apprehensiveness, assertiveness, and confidence. Oral competence, on the other hand, relates to knowledge of the language(s) of communication. Effective communication, then, depends, in part, on the levels of oral competence and communicative ability.

### *3.1.4 Meeting Environment*

Meeting environment refers to the actual location of a meeting (i.e., the kind of physical facility) and it may depend on GSS technology factors, since, for example, decision rooms are normally equipped with modern technology. Meeting environment also considers: whether meetings are face-to-face or dispersed;



whether they occur synchronously or asynchronously; which task types they involve [36]; and the size and composition of the groups involved. McGrath [36] describes eight different task types, six of which (planning, creativity, intellectual, decision-making, cognitive-conflict, and mixed-motive) are considered to be amenable to GSS support [47]. It must be stressed that these are task types not meeting types. While a particular genre of meeting has been identified as appropriate for research, these meetings may involve one or more task types.

### **3.2 Meeting Process Attributes**

In this portion of the model, the meeting process variables interact. Such interactions are discussed in terms of the underlying processes, e.g. "willingness to criticise others" and "teamwork", rather than the more functional modes where those processes are seen; e.g., discussion, voting, stakeholder identification, etc. The notion of willingness is key to this discussion, since meeting members may be thoroughly competent and able to participate, yet not do so for several reasons. This reduced participation is referred to as a process loss, defined by Miner [40] after Steiner [54], as the "difference between potential and actual group performance". Process losses are primarily related to the influence that some participants are able to exert on others (influence behaviour). Assuming that participation does take place, no matter how limited, process losses can also be evident in the quality, creativity, and openness of discussions. Tan et al. [55] summarise process losses as:

the unwillingness of lower status members to criticise the opinions of a high status member, "due to a fear of negative evaluation and reprisals, resulting in evaluation apprehension" [13, 31];

the tendency of lower status members to conform to an expected standard [21, 53] or to the standard of higher status members [26];

the non or low participation of low status group members in the discussion process, resulting in "cognitive inertia" where the line of argument taken by the group will probably adhere to that which the high status members wish [27, 31].

Intimidation is a further meeting process attribute. Like influence behaviour, it too may have social attribute origins, and hence may be associated with high-status minority influence. In a meeting process, intimidation is most closely related to evaluation apprehension [13, 31] and conformance [21, 26, 53]. Intimidation results in inhibition - the reluctance of meeting members to participate as fully or effectively as they might [14, 24, 37, 63].

The extent of the influence and intimidation perceived, and inhibition exhibited, by lower status meeting members will determine, to a certain extent, how willing they are to participate. The notion of perception is important: if an individual is not perceived as high status, then he/she would not be expected to exert any related influence. One key way in which perception of status may be reduced is through making contributions anonymous in the discussion [28, 34].

Assuming that communication does take place, the quality, creativity, and openness present in that communication are still matters for concern. The generation of novel, creative solutions or ideas is vital, because it promotes a reappraisal of the situation [42]. Creative ideas do not only come from individuals. Small sub-groups or teams [1, 15] of individuals may form to suggest, or at least

support, creation of ideas. Reappraisal of a situation is necessary if there is to be as complete as possible an assessment of a problem and its solution.

### **3.3 Meeting Outcomes**

Satisfaction is one of the most frequently measured outcome variables in GSS research [2, 11]. However, the reasons why meeting participants are satisfied are not always clearly stated, though process and outcome satisfaction are frequently cited [17]. Indeed, satisfaction may depend on a large number of factors, including: task type; nature of incentive provided; and degree of vested interest in the task; (see [44] for an overview of user satisfaction results and [62] for a classification of satisfaction components).

Meeting efficiency is normally measured by analysing data that describes such elements of a meeting as: the number of (creative or unique) comments generated; its length; the number of people who participate, and for how long [cf. 45]. Participant impressions of efficiency are also important, in particular the way in which time is used - for example, on thorough and/or serious discussion, and whether or not the meeting was result oriented.

Ownership indicates to what extent participants feel that they have a responsibility for the outcome, which might be a decision, a solution, or a set of recommendations or specifications for a particular problem or project. Ownership incorporates elements of involvement in the meeting process, as well as in playing a useful role.

The fourth outcome variable, consensus, is reflected in the outcome itself. To a large extent, consensus depends on the management and resolution of conflicts. This in turn depends, to a considerable extent, on the appropriate manipulation of the technology and individual characteristics of participants. Poole et al. [49] note, for example, that the distancing of ideas from their authors, facilitated with anonymous communications, is critical, as it promotes task- rather

than people-oriented discussion. Consensus, furthermore, may be private (an individual silently agrees with a statement), public (an individual expresses the agreement) or both.

Nunamaker et al. [45] state that effectiveness refers to the actual performance of the group in generating options; thus it can be assessed either by counting the number of nonredundant options or by a more complex scheme that assesses the relative quality of ideas [13]. In field settings, it is too simplistic to attribute effectiveness to the number of good (high quality) ideas without considering their long term impacts and implementability. Quality itself has been a notoriously hard measure to pin down and it is likely to vary from situation to situation. Equally, it is likely to be difficult to locate more objective determinants [52] of effectiveness, since it may not be visible in the short term; thus schemes set up to assess quality must take into account long term developments.

## **4 Instrument Development**

### **4.1 Previous Instruments**

In the GSS literature, a small number of variables have been measured fairly frequently. These include meeting success [25], meeting process and meeting outcome satisfaction [17, 58], and meeting efficiency [45]. However, there are inconsistencies in the measurements used, almost to the extent that each research project has had an instrument devised especially for it. This view is supported by Pervan [47] who observes that "in the majority of studies, researchers have done their own thing" in terms of the measures used for each type of "success" indicator. This inconsistency, as well as the fact that most of the measures used cannot be considered comprehensive, presents a worrying trend.

Notwithstanding the above, a minority of researchers have attempted to adopt a more rigorous approach to the measurement of meeting processes. In

this respect, McCartt and Rohrbaugh [35] developed a 23-item instrument to measure the effectiveness of group decision processes in decision conferencing using the Competing Values Approach [33, 50]. Their instrument addressed four perspectives (consensual, political, empirical, and rational) incorporating eight scales (two for each perspective). This work has been influential in the design of our instrument, with similarities between many of the issues the questions have addressed; it was decided, however, that it would not be appropriate to adopt this instrument unmodified and unextended, as it did not explicitly address some pivotal issues, such as the role that status plays in interpersonal communication.

Robey et al. [51], in a study that assesses group processes during the development of an information system, developed a 13-item instrument to measure levels of participation, influence, conflict and conflict management during the systems development process. Their work is important, as it recognises the importance of status and its impact on conflict and subsequent conflict resolution. However, the instrument does not explicitly attempt to measure team work and communication and does not focus deeply on influence, therefore, while it is important, it also falls a little short in terms of measuring some meeting processes.

Hecht [23], in a major review of the group communication satisfaction literature, identifies a number of problems that have arisen. He divides the literature into three classes: interpersonal (dyad), group, and organisational. He observes that poor operationalisation in general is a problem, and so advises that items in a construct should be developed from a wide range of sources and should relate to the communication process rather than to the attitudes and traits "existing prior to the interaction" [23]. Hecht identifies a number of group satisfaction measures, [e.g., 9, 20], as well as some studies that used factor analysis to reveal dimensions of satisfaction [60]. While these are interesting,

Hecht identifies many of them as being validationally and methodologically inadequate, and none correspond to all of the literature identified here as important.

Hecht's [22] own 19-item Interpersonal Communication Satisfaction Inventory devised for measuring communication satisfaction between dyads is another useful reference point for instrument development, yet its focus makes direct appropriation to our study inadvisable.

## **4.2 Instrument Design**

A generalised instrument that addresses the entire Research Framework would need to have not only an unfeasibly large number of questions, but also an impractically large population size to obtain significant and reliable validation of data. The questionnaire developed in this study (see Appendix) has 33 items, of which 13 may be considered as demographic. Of the remaining 20, 19 contribute to five constructs, while the last is a criterion. The items are as follows:

*Communication* - the language used in the meeting; ease of understanding and self-expression; and willingness to communicate ideas to others.

*Teamwork* - the willingness of participants to respond to questions; their ability to work together as a team; and the extent to which they had access to the information they needed so as to participate in the meeting.

*Discussion quality* - the quality of discussion in terms of its meaningfulness, appropriateness, openness, and creativity, as perceived by the participants.

*Status effects* - Status manifests itself in a number of ways and depends on a number of sources, viz. information, norms. Four components have been identified: attempts by some participants to intimidate others verbally and non-

verbally, to use influence, status or power to force issues on others, to inhibit others from participating in the meeting through their behaviour, and to pressure others to conform to a particular view.

*Efficiency* - this is considered to be a meeting outcome. As such, it is measured by determining: the extent to which the meeting is result oriented; the way in which time is used in a meeting (the time that is spent on serious discussion), and the extent to which issues raised in the meeting are thoroughly discussed.

*Satisfaction* - this is not measured explicitly here. It is a complex variable that should not be trivialised. Indeed, a separate investigation of satisfaction in the GSS context may be required. However, one item in the instrument has been designed to measure satisfaction indirectly - the extent to which members felt that they played a useful role in the meeting. This is posited as a criterion. If individuals believe they do play a useful role in the meeting, then they are likely to be satisfied and therefore to be willing to reparticipate at a later stage.

## **5. Validation of the Instrument**

### **5.1 Pilot Studies**

Before the instrument can be used as a measure of GSS suitability for meeting support, its validity must be assessed. A series of pilot tests were conducted on early versions of the instrument. In these, respondents were asked to comment on the format and appropriateness of questions, and to suggest additional material that they believed should be included in the instrument. In the final pilot test, 120 meeting participants were sampled and 50 responded (41.6%). Exploratory factor analysis conducted on this sample indicated the presence of five factors (or constructs), as well as indicating items that loaded poorly on all constructs - these have been eliminated from the final instrument.

## **5.2 University Study**

The pilot studies proved very effective in eliminating items, as well as generating a first set of constructs. Following the pilot tests, the instrument was restructured and distributed to a large population - the entire academic, research, and administrative staff of a university in Hong Kong, a total of some 1307 people. 433 of the questionnaires were returned, and 383 of these were correctly completed making a valid response rate of 29.3%. Breakdown of this data shows that 70% were male and 30% female, while 77% of the respondents were academic staff.

## **5.3 Measures of Validity and Reliability**

### *5.3.1 Content validity*

An instrument that is valid in content must draw representative questions from a universal pool [8, 30]. Several sources of data were employed during the instrument development, including: instruments developed by other researchers; a research framework developed from relevant literature but independent of earlier instruments; and feedback from pilot test respondents on the representativeness of questions.

### *5.3.2 Discriminant validity*

Discriminant validity asks if the items chosen for each construct are truly related to their construct. If constructs are valid, then one can expect that the items underlying each construct will load on different factors [cf. 59]. In addition, in factor analysis it is generally considered desirable to have a larger number of respondents than items. Opinion is divided on the extent of the ratio, with some authorities suggesting 1:2 [19] and others suggesting 1:10 [46]. In this project, a very safe ratio of over 1:20 was achieved.



### 5.3.3 Construct Validity and Reliability

To test the construct validity of items in the instrument, confirmatory factor analysis is performed; in this, previously developed theory regarding factors that are expected to exist is tested [46]. The reliability of constructs can be assessed using Cronbach's [7] alpha. The reliability levels of the five constructs vary from 0.71 to 0.83. Tables 1-5 depict the 19 items already described according to their constructs. Items are given in an abbreviated form and possess a reference number, e.g. C1 for Communication Item number 1.

- **Communication**

The ability and willingness of participants to communicate are critical to the success of that meeting. The four items here have good loadings, thus confirming the construct (see Table 1).

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Insert Table 1 about here

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- **Teamwork**

Teams (people working co-operatively together) are an essential part of participation and communication in meetings. Strongly-bound teams are more likely to experience a heightened sense of satisfaction with a meeting than poorly-bound teams, and the strongly-bound teams are more likely to contribute to a successful meeting. All three items (see Table 2) have strong loadings, confirming the construct.

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Insert Table 2 about here

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- **Discussion Quality**

As the literature has shown, high quality of discussion, with measures such as creativeness and openness, is essential in inspired problem solving. Confirmatory factor analysis indicates that item D3 (Discussions in the meeting were: free/open - closed/restricted) does not load well with the other three. It is difficult to explain this, except that the terms "free/open" and "closed/restricted" are probably not interpreted in a similar manner by all respondents. It seems advisable, in retrospect, to use single adjective anchors in order to reduce the cognitive load on the respondent and minimise chances of misinterpretation. The three remaining discussion quality measures do bind together tightly with a good alpha score (see Table 3). Although item D4 does not display the problems exhibited by D3, the possible ambiguity (of multiple adjective anchors) can be easily removed.

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Insert Table 3 about here

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- **Status Effects**

This construct is titled "status effects" because it deals with the process of the meeting rather than the underlying status traits. As with the other constructs, awareness of status effects is important in the effective running of a meeting. Identification of status related problems, such as those illustrated by the items in Table 4 should have a powerful impact on how a GSS is used in an operational setting, since process losses often derive from status related problems.

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Insert Table 4 about here

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- **Efficiency**

This is a meeting outcome, depending on meeting processes. Efficiency is usually taken as referring to such quantifiable items as the number of comments generated in a meeting and the length of a meeting. Notwithstanding this definition, participants themselves may have their own views of meeting efficiency. Thus, four items in the instrument attempt to measure efficiency, as seen by the participants - degree of result orientation in the meeting (E1), efficient use of time (E2), thorough discussion of issues (E3), and percentage of time spent in discussion of agenda-based items (E4). These four items clearly factor in together with a good alpha score (see Table 5).

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Insert Table 5 about here

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#### *5.3.4 Predictive Validity*

"Predictive validity is estimated by a prediction to an external measure referred to as a *criterion* and by checking a measuring instrument against some outcome. In other words, predictive validity is the correlation coefficient between the results of a given measurement and an external criterion" [16]. The criterion used in this research is the item "You feel you played a useful role [in the meeting]". Bivariate correlations between the criterion and all the other 18 items in the five constructs reveal  $p < 0.01$  in all cases.

In addition, the degree of correlation between the four meeting process construct scores (communication, discussion quality, status effects and teamwork) and the meeting outcome score (efficiency) were measured. All four meeting process constructs correlate at  $p < 0.001$  with meeting efficiency.

## 6. Limitations of the Instrument

Potential users of the instrument should be careful for a number of reasons. Firstly, while reliability scores are generally high (between .71 and .83), they fall below the .90 considered necessary for applied research [46]. Furthermore, the instrument is designed to measure meeting characteristics and processes, both before and after the implementation of GSS technology. However, the data collected relates to meetings and processes that were not supported by GSS technology. To this extent, the instrument cannot be considered fully validated. It is necessary to measure meeting members' perceptions of group processes in GSS-supported meetings, preferably in business or professional environments and on a longitudinal basis. Revalidation with this data will prove enormously beneficial to the instrument's applicability.

Furthermore, the instrument has limited scope. While meeting efficiency is measured directly and meeting participant satisfaction indirectly, there is a clear need to extend the scope to include participant consensus (both public and private) and meeting outcome ownership. Social science research teaches us that the use of single measures of a variable, for example satisfaction, is most unwise. Therefore, it is necessary to develop a more rigorous satisfaction construct for meetings than exists currently. There is certainly evidence in the GSS literature to support Hecht's [23] observations on the dangers of a poorly operationalised satisfaction construct, and poorly devised instruments.

Moreover, many meetings are not short, single-session affairs, formal groups often having non-zero histories [39]; i.e. they are formed for a long-term purpose. Such meetings will naturally incorporate a feedback mechanism that may operate over a considerable period of time. This feedback may have important implications for the way in which meeting processes operate. Useful reference can be made here to Checkland's [3] view of system processes.

Finally, the research has been carried out in a tertiary education environment in Hong Kong. Revalidation in other cultures (national and organisational) is desirable. The data presented here is useful as a baseline for educational sector employees who are not (yet) GSS users. Comparisons can be made in future between this data and data collected in a GSS facilitated environment.

## **7. Application of the Instrument**

In the process of developing and testing the instrument, a number of organisations in both the educational and business sectors have been investigated. In some cases, existing meetings have been observed to possess excellent communication processes, minimal levels of status-induced process losses, high levels of productivity and efficiency, and no obvious benefits from GSS support have appeared. On the other hand, there are also instances of organisations that involve large numbers of people across several hierarchical layers in discussion and decision making, sometimes spread over a wide geographical area.

Efficiency and satisfaction are important outcome measures for a number of reasons. If meeting efficiency is low, then problems in the meeting process should be considered. These might include: production blocking, overbearing status influence, and poor team bonding. Provision of inspired and carefully facilitated GSS support to these meetings is likely to help solve the problems - by increasing task focus, reducing the negative effects of status influence and engendering better team work. It is also likely to improve participant satisfaction, which is likely to improve their view of GSS software and GSS-supported processes and encourage them to use it on subsequent occasions [25]. Naturally there will be trade-offs between efficiency and satisfaction, as well as with other outcomes such as effectiveness, ownership of outcomes, and meeting quality.

## 8. Conclusion

The outcomes of this research include significant progress towards a fully-validated instrument that can measure meeting processes with a view to analysing the potential suitability of using GSS. Four meeting process and one meeting outcome constructs were identified as indicators of the value of the meeting and as pointers to process-related problems. Designed for environments that involve either traditional, 'manual' support or GSS support, the instrument incorporates items that are equally relevant to both. Irrespective of whether this instrument is chosen for measuring meeting processes or not, the author suggests that a problem-focused approach should be considered when deciding to implement GSS to support meetings. In this way, it should be possible to identify how GSS can best support a meeting, and to advance the field of GSS research and application.

## 9. Bibliography

- [1] Argyris, C. (1970) *Intervention Theory and Method*, Addison-Wesley: Reading, Mass.
  
- [2] Cass, K., T.J. Heintz and K.M. Kaiser (1992) An Investigation of Satisfaction When Using GDSS in Dispersed Locations, *Information and Management*, **23**, 4, 173-182.
  
- [3] Checkland, P. (1981) *Systems Thinking, Systems Practice*, John Wiley & Sons: New York.
  
- [4] Chin, W.W. and A. Gopal (1995) Adoption Intention in GSS: Relative Importance of Beliefs, *Decision Sciences*, **26**, 2-3, 42-64.

- [5] Clapper, D.L., E.R. McLean and R.T. Watson (1991) An Experimental Investigation of the Effect of a Group Decision Support System on Normative Influence in Small Groups, *Proceedings of the Twelfth Annual Conference on Information Systems*, 273-282.
- [6] Connolly, T., Jessup, L.M. and Valacich, J.S. (1990) Effects of Anonymity and Evaluative Tone on Idea Generation in Computer Mediated Groups, *Management Science*, **36**, 6, 689-703.
- [7] Cronbach, L.J. (1951) Coefficient Alpha and the Internal Structure of Tests, *Psychometrika*, **16**, 297-334.
- [8] Cronbach, L.J. (1971) Test Validation, in: Thorndike, R.L. (Ed.) *Educational Measurement*, 2nd Ed., American Council on Education, Washington, D.C., 443-507.
- [9] Crowell, L. and T.M. Scheidel (1963) A Study of Discussant Satisfaction in Group Problem Solving, *Speech Monographs*, **30**, 1, 56-58.
- [10] Dennis, A.R., J.F. George, L.M. Jessup, J.F. Nunamaker and D.R. Vogel (1988) Information Technology to Support Electronic Meetings, *MIS Quarterly*, **12**, 4, 591-624.
- [11] Dennis, A.R., A.R. Heminger, J.F. Nunamaker and D.R. Vogel (1990) Bringing Automated Support to Large Groups: The Burr-Brown Experience, *Information and Management*, **18**, 3, 111-121.

- [12] Deutsch, M. and H.B. Gerard (1955) A Study of Normative and Informational Social Influences upon Individual Judgement, *Journal of Abnormal and Social Psychology*, **51**, 629-636.
- [13] Diehl, M. and W. Stroebe (1987) Productivity Loss in Brainstorming Groups: Towards the Solution of a Riddle, *Journal of Personality and Social Psychology*, **53**, 497-509.
- [14] Diener, E. (1979) Deindividuation, Self-Awareness, and Disinhibition, *Journal of Personality and Social Psychology*, **37**, 1160-1171.
- [15] Dyer, W.G. (1987) *Team Building: Issues and Alternatives*, Addison Wesley: Reading, Mass.
- [16] Frankfort-Nachmias, C. and D. Nachmias (1992) *Research Methods in the Social Sciences*, Edward Arnold: London.
- [17] George, J.F., G.K. Easton, J.F. Nunamaker and G.B. Northcraft (1990) A Study of Collaborative Group Work with and without Computer Based Support, *Information Systems Research*, **1**, 4, 394-415.
- [18] Grudin, J. (1994) Groupware and Social Dynamics: Eight Challenges for Developers, *Communications of the ACM*, **37**, 1, 93-105.
- [19] Guilford, J.P. (1954) *Psychometric Methods*, McGraw Hill: New York.



- [20] Hackman, J.R. and N. Vidmar (1970) Effects of Size and Task Type on Group Performance and Member Reactions, *Sociometry*, **33**, 1, 37-54.
- [21] Hackman, J.R. and R.E. Kaplan (1974) Interventions into Group Processes: An Approach to Improving the Effectiveness of Groups, *Decision Sciences*, **5**, 459-480.
- [22] Hecht, M.L. (1978) The Conceptualisation and Measurement of Interpersonal Communication Satisfaction, *Human Communication Research*, **4**, 3, 253-264.
- [23] Hecht, M.L. (1978) Measures of Communication Satisfaction, *Human Communication Research*, **4**, 4, 350-368.
- [24] Hiltz, S.R., M. Turoff and K. Johnson (1989) Experiments in Group Decision Making, 3: Disinhibition, Deindividuation, and Group Process in Pen Name and Real Name Conferences, *Decision Support Systems*, **5**, 2, 217-232.
- [25] Hitchcock, R., L.F. Lewis and K. Keleman (1994) Building a Business Around Group Support Technology, *Proceedings of the 27th Hawaii Annual International Conference on Systems Science*, **IV**, 63-72.
- [26] Hollander, E.P. (1964) *Leaders, Groups, and Influence*, OUP: New York.
- [27] Jablin, F.M. and D.R. Seibold (1978) Implications for Problem Solving Groups of Empirical Research on 'Brainstorming': A Critical Review of the

Literature, *The Southern States Speech Communication Journal*, **43**, 327-356.

- [28] Jessup, L.M. and D.A. Tansik (1991) Decision Making in an Automated Environment: The Effects of Anonymity and Proximity with a Group Decision Support System, *Decision Sciences*, **22**, 2, 266-279.
- [29] Kaplan, M.F. and C.E. Miller (1987) Group Decision Making and Normative versus Informational Influence Effects of Type of Issue and Assigned Decision Rule, *Journal of Personality and Social Psychology*, **53**, 306-313.
- [30] Kerlinger, F.N. (1978) Foundations of Behavioral Research, McGraw Hill: New York.
- [31] Lamm, H. and G. Trommsdorf (1973) Group versus Individual Performance on Tasks Requiring Ideational Proficiency (Brainstorming): A Review, *European Journal of Social Psychology*, **3**, 361-387.
- [32] Latané, B. (1981) Psychology of Social Impact, *American Psychologist*, **36**, 343-356.
- [33] Lewis, A.Y. and J.W. Minton (1986) Determining Organizational Effectiveness: Another Look and an Agenda for Research, *Management Science*, **32**, 514-538.
- [34] Lyttinen, K., P. Maaranen and J. Knuuttila (1993) Unusual Business or Business as Usual: An Investigation of Meeting Support Requirements in

Multilateral Diplomacy, *Accounting, Management & Information Technology*, **3**, 2, 97-117.

- [35] McCartt, A.T. and J. Rohrbaugh (1989) Evaluating Group Decision Support Effectiveness: A Performance Study on Decision Conferencing, *Decision Support Systems*, **5**, 2, 243-254.
- [36] McGrath, J.E. (1984) *Groups: Interaction and Performance*, Prentice Hall: Englewood Cliffs, NJ.
- [37] McGuire, T.W., S. Kiesler and J. Siegel (1987) Group and Computer-Mediated Discussion Effects in Risk Decision Making, *Journal of Personality and Social Psychology*, **52**, 5, 917-930.
- [38] McLeod, P.L. and J.K Liker (1992) Electronic Meeting Systems: Evidence from a Low Structure Environment, *Information Systems Research*, **3**, 3, 195-223.
- [39] Mennecke, B.E., J.A. Hoffer and B.E. Wynne (1992) The Implications of Group Development and History for Group Support System Theory and Practice, *Small Group Research*, **23**, 4, 524-572.
- [40] Miner, F.C. (1984) Group versus Individual Decision Making: An Investigation of Performance Measures, Decision Strategies, and Process Losses/Gains, *Organisational Behaviour and Human Performance*, **33**, 1, 112-124.

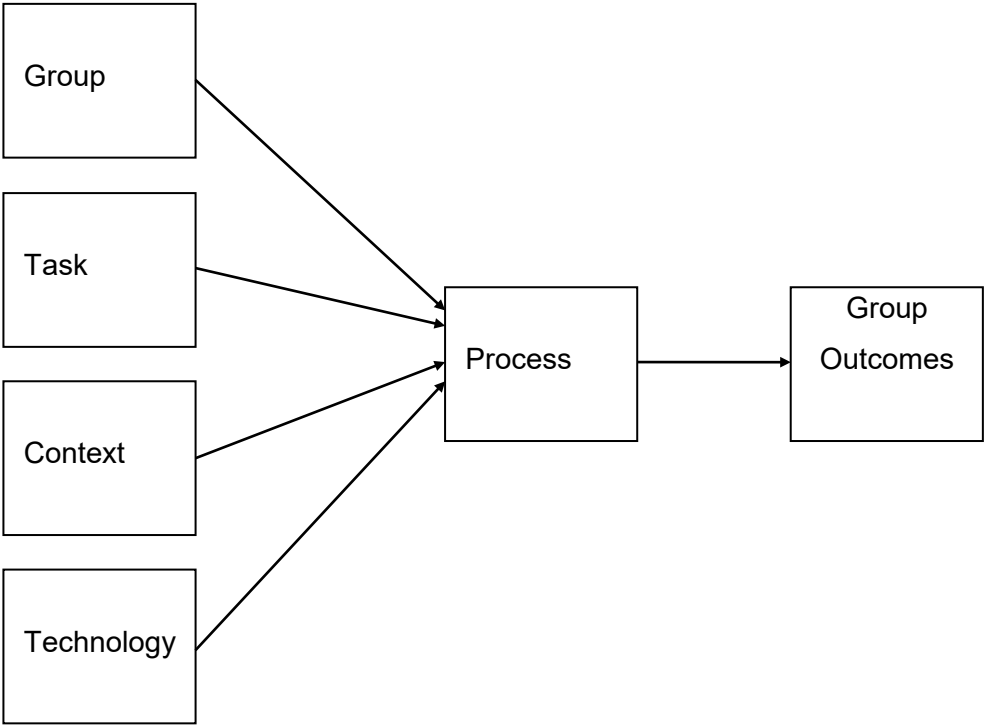
- [41] Mugny, G. and J.A. Pérez (1991) *The Social Psychology of Minority Influence*, CUP: Cambridge.
- [42] Nemeth, C.J. and J. Wachtler (1983) Creative Problem Solving as a Result of Majority vs Minority Influence, *European Journal of Social Psychology*, **13**, 45-55.
- [43] Nemeth, C.J. (1986) Differential Contributions of Majority and Minority Influence, *Psychological Review*, **93**, 1, 23-32.
- [44] Nunamaker, J.F., D.R. Vogel, A. Heminger, W.B. Martz, R. Grohowski and C. McGoff (1989) Experiences at IBM with Group Decision Support Systems: A Field Study, *Decision Support Systems*, **5**, 2, 183-196.
- [45] Nunamaker, J.F., A.R. Dennis, J.S. Valacich and D.R. Vogel (1991) Information Technology for Negotiating Groups: Generating Options for Mutual Gain, *Management Science*, **37**, 10, 1325-1346.
- [46] Nunnally, J.C. (1978) *Psychometric Theory*, 2nd Edition, McGraw Hill: New York.
- [47] Pervan, G.P. (1994) The Measurement of GSS Effectiveness: A Meta-Analysis of the Literature and Recommendations for Further GSS Research, *Proceedings of the 27th Hawaii International Conference on System Sciences*, 562-571.

- [48] Pfeffer, J. and G.R. Salancik (1978) *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row: New York.
- [49] Poole, M.S., M. Holmes and G.L. DeSanctis (1991) Conflict Management in a Computer-Supported Meeting Environment, *Management Science*, **37**, 8, 926-953.
- [50] Quinn, R.E. and J. Rohrbaugh (1983) A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis, *Management Science*, **29**, 363-377.
- [51] Robey, D., D.L. Farrow and C.R. Franz (1989) Group Process and Conflict in System Development, *Management Science*, **35**, 10, 1172-1191.
- [52] Rohrbaugh, J. (1987) Assessing the Effectiveness of Expert Teams, in: Mumpower, J.L., Philips, L.D., Renn, O. and Uppuluri, V.R.R. (Eds) *Expert Judgement and Expert Systems*, Springer-Verlag: Berlin.
- [53] Shaw, M.E. (1981) *Group Dynamics: The Psychology of Small Group Behaviour (3rd Edition)*, McGraw Hill: New York.
- [54] Steiner, I.D. (1972) *Group Process and Productivity*, Academic Press: New York.
- [55] Tan, B.C.Y., K.K. Wei and R.T. Watson (1993) Neutralising Status Influence: An Empirical Study with a Group Support System, *14th International Conference on Information Systems*, Atlanta, 77-90.

- [56] Tan, B.C.Y., R.T. Watson, K.K. Wei, K.S. Raman and P.K. Kerola (1993) National Culture and Group Support Systems: Examining the Situation where some People are More Equal than Others, *Proceedings of the 26th Hawaii International Conference on System Sciences*, **IV**, 132-141.
- [57] Tan, B.C.Y., H.H. Teo and K.K. Wei (1995) Promoting Consensus in Small Decision Making Groups, *Information and Management*, **28**, 4, 251-259.
- [58] Vogel, D.R. and J.F. Nunamaker (1990) Group Decision Support System Impact: Multi-Methodological Exploration, *Information and Management*, **18**, 1, 15-28.
- [59] Weiss, D.J. (1970) Factor Analysis in Counselling Research, *Journal of Counselling Psychology*, **17**, 477-485.
- [60] Yerby, J. (1975) Attitude, Task and Sex Composition as Variables Affecting Female Leadership in Small Problem Solving Groups, *Speech Monographs*, **42**, 160-168.
- [61] Ziguers, I., M.S. Poole and G.L. DeSanctis (1988) A Study of Influence in Computer-Mediated Group Decision Making, *MIS Quarterly*, **12**, 3, 625-644.
- [62] Ziguers, I. and G.W. Dickson (1990) Computer Support for Decision Making Teams: The Issue of Outcome Quality, *Faculty Working Paper Series*, College of Business and Administration, University of Colorado.

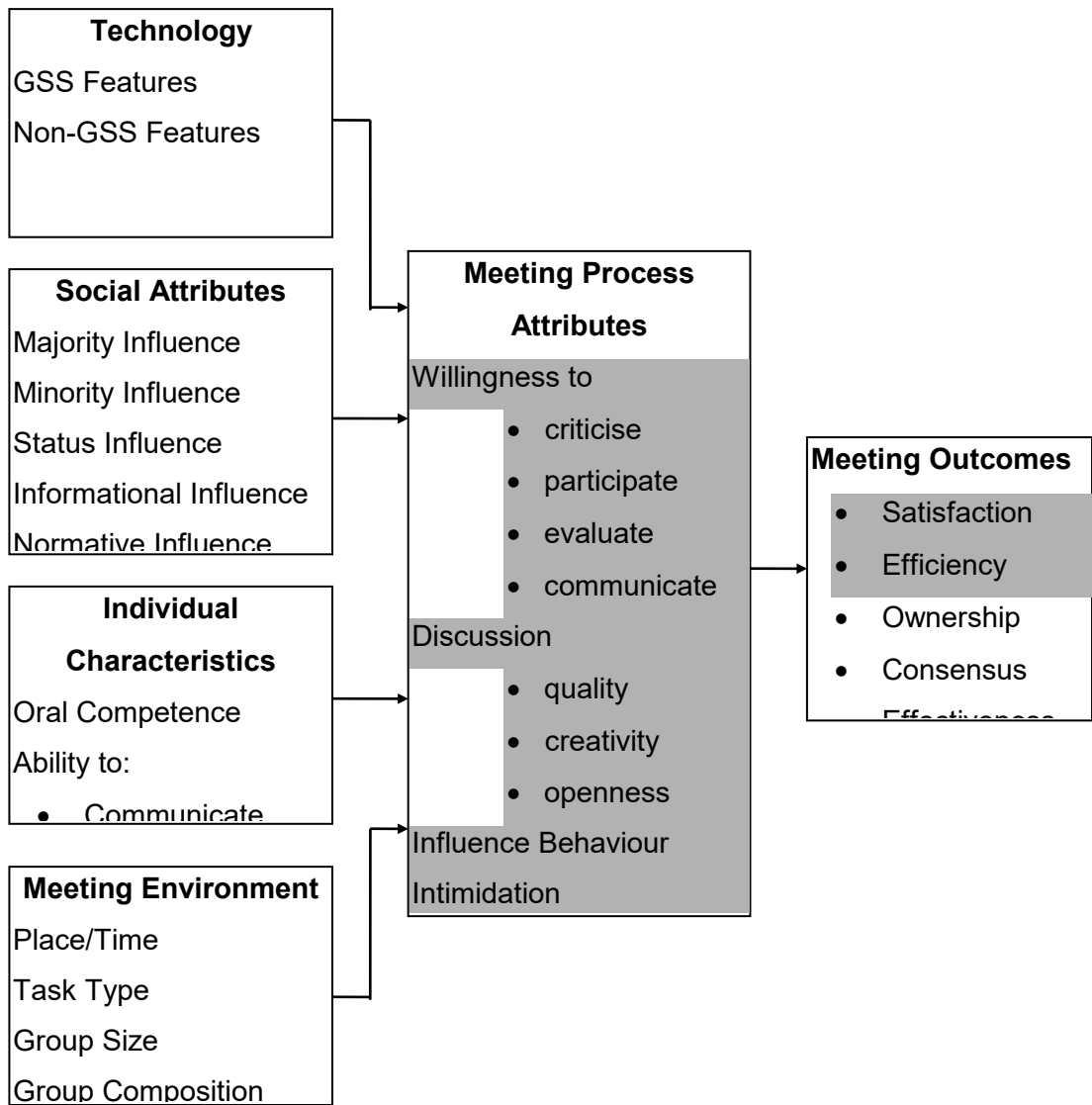
[63] Zimbardo, R.G. (1969) The Human Choice: Individuation, Reason and Order Versus Deindividuation, Impulse and Chaos, in: J. Helmer and N.A. Eddington (Ed.) *Urbanman: The Psychology of Urban Survival*, The Free Press: New York, 196-238.

**Figure 1: A Simple Model of the Meeting Environment [after 44]**





**Figure 2: Research Model for Meeting Processes and Outcomes**



**Table 1: Communication**

Abbrev.	Item Name	Factor Loading
C1	The language of the meeting prevented participation	.73
C2	It was hard to understand other participants when they talked	.67
C3	You experienced difficulty expressing yourself	.82
C4	You felt reluctant to put forward your own ideas	.72
	Eigenvalue / % of variance explained	2.16 / 54%
	Cronbach's Alpha	.71

**Table 2: Teamwork**

Abbrev.	Item Name	Factor Loading
T1	Participants appeared willing to answer questions	.80
T2	Participants worked together as a team	.85
T3	Participants had sufficient access to information to be involved in the meeting	.81
	Eigenvalue / % of variance explained	2.02 / 67.3%
	Cronbach's Alpha	.76

**Table 3: Discussion Quality**

Abbrev.	Item Name	Factor Loading
D1	Discussions in the meeting were: meaningful - meaningless	.90
D2	Discussions in the meeting were: appropriate - inappropriate	.78
D4	Discussions in the meeting were: creative/imaginative - familiar/unimaginative	.91
	Eigenvalue / % of variance explained	2.25 / 74.9%
	Cronbach's Alpha	.83

**Table 4: Status Effects**

Abbrev.	Item Name	Factor Loading
S1	Some participants tried to intimidate others verbally, or with threatening gestures	.79
S2	Some participants tried to use status or power to force issues on others	.84
S3	You felt inhibited from participating because of the behaviour of others	.82
S4	You experienced pressure to conform to a particular viewpoint	.62
	Eigenvalue / % of variance explained	2.41 / 60.1%
	Cronbach's Alpha	.77

**Table 5: Efficiency**

Abbrev.	Item Name	Factor Loading
E1	To what extent was this meeting result oriented?	.74
E2	The time in the meeting was efficiently used	.84
E3	Issues raised in the meeting were discussed thoroughly	.81
E4	What % of meeting time was spent on serious discussion?	.66
	Eigenvalue / % of variance explained	2.34 / 58.5%
	Cronbach's Alpha	.76

## Appendix

### CONFIDENTIAL

Please can you answer the following questions. For questions 5-12, please relate your answers to any meeting that involved at least 5 members. Please tick the boxes (0) as appropriate.

Part One: A few questions about you, your personal characteristics and your attitudes towards meetings in general.

1 a. Are you an Academic/Administrative/Technical/General Staff member or a Research Student or Research Associate (Please circle as appropriate). (1)

b. Are you      Male 0 Female 0 ? (2)

2. Would you describe yourself as:

shy	Agree	0	0	0	0	0	Disagree	(3)
apprehensive	Agree	0	0	0	0	0	Disagree	(4)
assertive	Agree	0	0	0	0	0	Disagree	(5)
confident	Agree	0	0	0	0	0	Disagree	(6)

3a. How many meetings that comprise at least 5 people do you have this week? \_\_\_\_\_ (7)

b. Typically what percentage of your working time do you spend in meetings per week? (8)

0 0-20%      0 21-40%      0 41-60%      0 61-80%      0 81-100%

4a. To what extent do you like meetings? (9)

Strongly like    0      0      0      0      0      Strongly dislike

b. How important do you rate meetings to be? (10)

Very Important 0      0      0      0      0      Not at all important

Part Two: Some questions about any meeting involving at least five people which you attended, preferably within the university.

5. Was this a: Senate, Faculty Board, Staff, Course Committee, Other \_\_\_\_\_ meeting? (Please circle as applicable or specify in case of "other") (11)

6. How many people were in this meeting?

5-10 0; 11-15 0; 16-20 0; 21-25 0; 26+ 0 \_\_\_\_\_ (How many?) (12)

7. When did this meeting take place? Within the last week 0; 2 weeks 0; 1 month 0; 2 months 0; 3 months 0; 6 months 0; More than 6 months ago 0 \_\_\_\_\_ (13)

8. With regard to your own participation in the meeting, please indicate to what extent you agree with the following statements:

a) *You feel that you played a useful role.* (14, T4)

Strongly Agree      0   0   0   0   0      Strongly Disagree

b) *The language of the meeting prevented you from participating.* (15, C1)

Strongly Agree      0   0   0   0   0      Strongly Disagree

c) *You found it hard to understand other group members when they talked.*  
(16, C2)

Strongly Agree      0   0   0   0   0      Strongly Disagree

d) *You experienced problems expressing yourself.* (17, C3)

Strongly Agree      0   0   0   0   0      Strongly Disagree

e) *You felt reluctant to put forward your own ideas.* (18, C4)

Strongly Agree      0   0   0   0   0      Strongly Disagree

f) *You experienced pressure, either to conform to a particular viewpoint or not to contradict others.* (19, S4)

Strongly Agree      0   0   0   0   0      Strongly Disagree

9. With regard to all meeting members as a whole, how would you rate the discussions in the meeting in terms of the following scales?

Very meaningful0      0   0   0   0      Totally meaningless      (20, D1)

Very appropriate      0   0   0   0   0      Totally inappropriate      (21, D2)

Very free and open      0   0   0   0   0      Totally closed/restricted (22, D3)

Creative/imaginative approaches used      0   0   0   0   0      Familiar/unimaginative approaches used      (23, D4)

10. To what extent would you say that this meeting was result oriented? (24, E1)

Strongly Result Oriented      0   0   0   0   0      Weakly Result Oriented

11. Please indicate to what extent you agree with the following statements:

a) *Other members appeared willing to answer questions when asked.* (25, T1)

Strongly Agree      0   0   0   0   0      Strongly Disagree

b) *Members worked together as a team.* (26, T2)

Strongly Agree      0   0   0   0   0      Strongly Disagree



c) *Members had sufficient access to the information they needed so as to participate actively in and fully understand the meeting.* (27, T3)

Strongly Agree            0   0   0   0   0            Strongly Disagree

d) *The time spent in the meeting was efficiently used.* (28, E2)

Strongly Agree            0   0   0   0   0            Strongly Disagree

e) *Issues raised in the meeting were discussed thoroughly.* (29, E3)

Strongly Agree            0   0   0   0   0            Strongly Disagree

f) *Some group members tried to intimidate others, e.g. by talking loudly, using aggressive gestures, making threats, etc.* (30, S1)

Strongly Agree            0   0   0   0   0            Strongly Disagree

g) *Some group members tried to use their influence, status or power so as to force issues on the other group members.* (31, S2)

Strongly Agree            0   0   0   0   0            Strongly Disagree

h) *You felt inhibited from participating in the discussion because of the behaviour of other meeting members.* (32, S3)

Strongly Agree            0   0   0   0   0            Strongly Disagree

12. What percentage of meeting time do you think was spent on serious discussion? (33, E4)

0 0-20%            0 21-40%            0 41-60%            0 61-80%            0 81-100%

Please now return the questionnaire to me using the address label provided. Many thanks for your help.