Chapter 10: Group Decision Support Systems

- Most complex decisions made by groups
- Complexity of organizational decision making implies more need for meetings and groupwork
- Complex meeting preparation and activities
- Need for computerized support
- Group Decision Support Systems (GDSS)

10.1 Opening Vignette: Quality Improvement Teams at the IRS of Manhattan

- **Internal Revenue Service (IRS), Manhattan, NY and the University of Minnesota**

- **Implemented a quality improvement program**
- **Supported by a Group Decision Support System (GDSS)**

The Problem

- **Quality team participants**
- **Different functional areas**
- **Different supervisory levels**
- **Different perspectives**
- **May induce <u>process</u> and <u>task</u> <u>losses</u>**
  - **Domination by one or a few members**
  - **Poor interpersonal communication**
  - **Fear to express innovative ideas**

The Solution: Group DSS

- **(Collaborative Computing)**
- **Technology Supports the Activities of**
  - **A Decision Making Group**
  - **Its Leader, and**
  - **Its Facilitator**
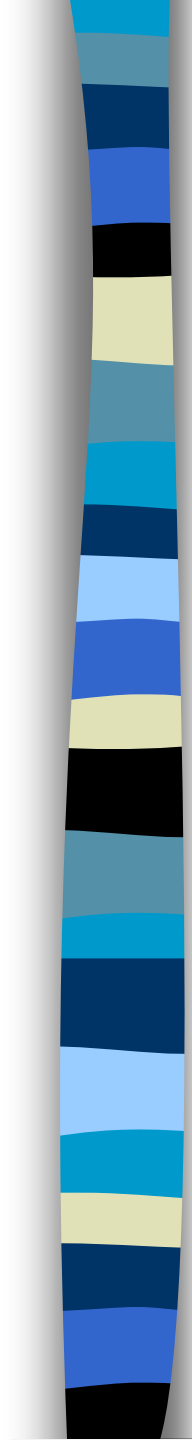
(Table 10.1)

Implementation

- **Used the GDSS facility at the University of Minnesota**
- **SAMM, for Software-Aided Meeting Management**
- **Results**
- **Several Hundred Meetings**
  - **Idea generation and evaluation**
  - **Using sophisticated decision aid tools**
  - **Creating and managing the agenda**
  - **Group writing and record keeping**

TABLE 10.1 The Decision Support Needs
of the Quality Teams

Quality Team Roles and Responsibilities	Decision Support Needs
Members: • **Identify problems** • **Generate and evaluate ideas** • **Develop and implement solutions**	**Access to group problem-solving techniques** **Methods for encouraging open participation by all members**
Leader: • **Plans meetings** • **Coordinates team activities** • **Monitors and reports team progress**	**Efficient use of team meeting time (for example, agenda management)** **Documentation of team decision-making processes and outputs**
Facilitator: • **Promotes use of problem-solving techniques** • **Encourages consensus building** • **Serves as a liaison between team and quality steering committee**	

- **High level of satisfaction**
- **Comfortable with the technology**
- **Improvement of teamwork**
- **GDSS was easy for the group to use**
- **GDSS played a major role in meetings**

- **Almost no negative effects reported**
- **Tremendous, positive impact**
- **Enhancements and the Future**
  - **Different time / different location access**
  - **Emotional aspects**

10.2 Decision Making in Groups

Some fundamentals of group decision making

1. Groups

2. The Nature of Group Decision Making
   a) Meetings are a joint activity
   b) The outcome of the meeting depends on its participants.
   c) The outcome of the meeting depends on the composition of the groups
   d) The outcome of the meeting depends on the decision-making process
   e) Differences in opinion are settled either by the leader or negotiation or arbitration
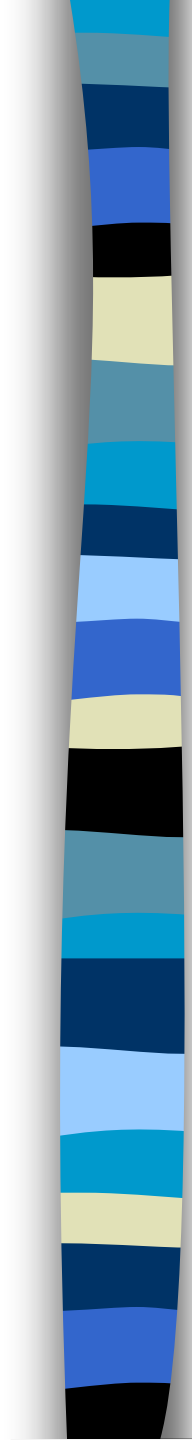
3.   The Benefits and Limitations of   Working in Groups (Table 10.2). But   **process Losses** (Table 10.3)

4.   Dispersed Groups

5.   Improving the Work of Groups

TABLE 10.2 Potential Benefits of Working in a Group

- Groups are better than individuals at understanding problems.
- People are accountable for decisions in which they participate.
- Groups are better than individuals at catching errors.
- A group has more information (knowledge) than any one member. Groups can combine that knowledge and create new knowledge. As a result, there are more alternatives for problem solving, and better solutions can be derived.
- Synergy during problem solving may be produced.
- Working in a group may stimulate the participants and the process.
- Group members will have their egos embedded in the decision, so they will be committed to the solution.
- Risk propensity is balanced. Groups moderate high-risk takers and encourage conservatives.

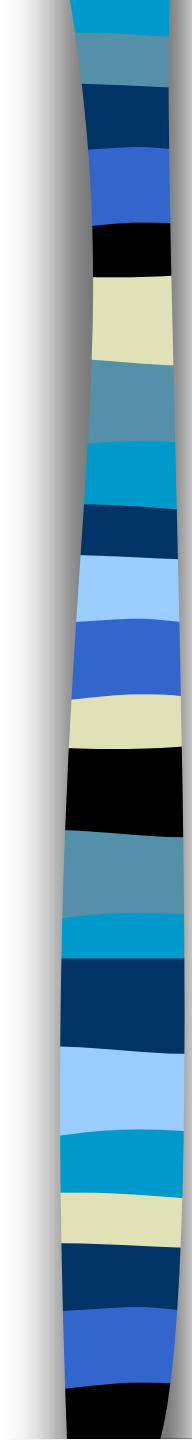# TABLE 10.3 Potential Dysfunctions of Group Process (Process Losses)

- Social pressures of conformity that may result in "groupthink" (where people begin to think alike, and where new ideas are not tolerated)
- Time-consuming, slow process (only one group member can speak at a time)
- Lack of coordination of the work done by the group and poor planning of meetings
- Inappropriate influence (e.g., domination of time, topic, or opinion by one or few individuals; fear of speaking)
- Tendency of group members to rely on others to do most of the work
- Tendency toward compromised solutions of poor quality
- Incomplete task analysis
- Nonproductive time (socializing, getting ready, waiting for people)
- Tendency to repeat what already was said
- Large cost of making decisions (many hours of participation, travel expenses, etc.)
- Tendency of groups to make riskier decisions than they should
- Incomplete or inappropriate use of information
- Inappropriate representation in the group

The Nominal Group Technique (NGT)

(Delbec and Van de Ven)

- **NGT Sequence of activities**
  1. Silent generation of ideas in writing
  2. Round-robin listing of ideas on a flip chart
  3. Serial discussion of ideas
  4. Silent listing and ranking of priorities
  5. Discussion of priorities
  6. Silent re-ranking and rating of priorities

- **Procedure is superior to conventional discussion groups in terms of generating higher quality, greater quantity, and improved distribution of information on fact-finding tasks**

- **NGT success depends on**
  - **Facilitator quality**
  - **Participants' Training**
- **NGT does not solve several process losses**
  - **Fearing to speak**
  - **Poor planning**
  - **Poor meeting organization**
  - **Compromises**
  - **Lack of appropriate analysis**

The Delphi Method

- **(RAND Corporation)**
- **Goal - To eliminate undesirable effects of interaction among group members**
- **Experts do not meet face-to-face**

Delphi Method Steps

1. **Each expert provide an individually written assignment or opinion**
2. **Delphi coordinator edits, clarifies and summarizes the raw data**
3. **Provide anonymous feedback to all experts**
4. **Second round of issues or questions**
5. **Etc. Get more specific in each iteration, leading to consensus or deadlock**
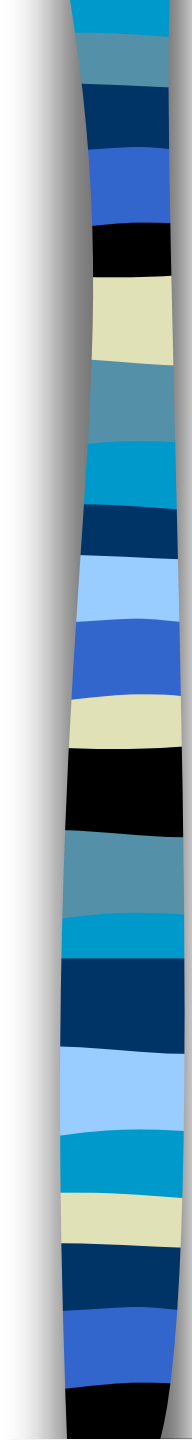
Delphi Method Benefits

- **Anonymity**
- **Multiple Opinions**
- **Group Communication**

- **Plus, Avoids**
  - **Dominant Behavior**
  - **Groupthink**
  - **Stubbornness**

Delphi Method Limitations

- **Slow**
- **Expensive**
- **Usually limited to one issue at a time**

10.3 Group Decision Support Systems (GDSS)

- **Group Support Systems (GSS)**
- **Electronic Meeting Systems**
- **Collaborative Computing**

- **Evolved as information technology researchers recognized that technology could be developed for supporting meeting activities**
  - **Idea generation**
  - **Consensus building**
  - **Anonymous ranking**
  - **Voting, etc.**

Two GDSS Schools of Thought

- **Social Sciences Approach**
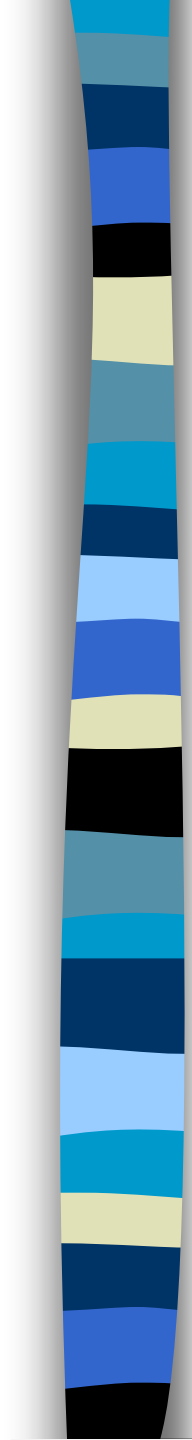- **Engineering Approach**

- **Now - Effective Merger**

GDSS Definition

- Consists of a set of software, hardware, language components, and procedures that support a group of people engaged in a decision-related meeting (Huber [1984])

- An interactive computer-based system that facilitates the solution of unstructured problems by a group of decision makers (DeSanctis and Gallupe [1987])

- Components of a GDSS include <u>hardware</u>, <u>software</u>, <u>people</u>, and <u>procedures</u>

Important Characteristics of a GDSS

- **Specially Designed IS**
- **Goal of Supporting *Groups* of Decision Makers**
- **Easy to Learn and Use**
- **May be designed for one type of problem or for many organizational decisions**
- **Designed to encourage group activities**
- **Attempts to *minimize* process losses**

GDSS: Part of GSS or Electronic Meeting Systems (EMS)

"An information technology (IT)-based environment that supports group meetings, which may be distributed geographically and temporally. The IT environment includes, but is not limited to, distributed facilities, computer hardware and software, audio and video technology, procedures, methodologies, facilitation, and applicable group data. Group tasks include, but are not limited to, communication, planning, idea generation, problem solving, issue discussion, negotiation, conflict resolution, system analysis and design, and collaborative group activities such as document preparation and sharing (p. 593, Dennis et al., 1988).

GDSS Settings

- **Single Location**
- **Multiple Locations**

- **Common Group Activities**
  - **Information Retrieval**
  - **Information Sharing**
  - **Information Use**

10.4 The Goal of GDSS and Its Technology Levels

- **Goal - to improve the productivity and effectiveness of decision-making meetings, either**
  - by speeding up the decision-making process or
  - by improving the quality of the resulting decisions

- **GDSS attempts to**
  - <u>Increase</u> the benefits of group work (Tables 10.2 and 10.4)
  - <u>Decrease</u> the losses (Table 10.3)
  - By providing <u>support</u> to the group members (center column, Figure 10.1)

TABLE 10.4 Process Gains from GDSS

GDSS

- Supports parallel processing of information and idea generation by the participants.
- Enables larger groups with more complete information, knowledge, and skills to participate in the same meeting.
- Permits the group to use structured or unstructured techniques and methods to perform the task.
- Offers rapid and easy access to external information (also via Intranets and/or the Internet).
- Allows nonsequential computer discussion (unlike verbal discussions, computer discussions do not have to be serial or sequential).
- Helps participants deal with the larger picture.
- Produces instant anonymous voting results (summaries).
- Provides structure to the planning process which keeps the group on track.
- Enables several users to interact simultaneously
- Records automatically all information that passes through the system for future analysis (develops organizational memory).

GDSS Technology Levels

- **Level 1: Process Support**
- **Level 2: Decision-Making Support**
- **Level 3: Rules of Order**

Level 1: Process Support

- **Goal - to reduce or remove communication barriers**
- **Supports**
  - **Electronic messaging**
  - **Networks (Local)**
  - **Public screen**
  - **Anonymous input of ideas and votes**
  - **Active solicitation of ideas or votes**
  - **Summary and display of ideas and opinions and votes**
  - **Agenda format**
  - **Continuous display of the agenda, etc.**

Level 2: Decision-Making Support

- **Adds modeling and decision analysis**
- **Goal - to reduce uncertainty and noise**
- **Provide task gains**
- **Features**
  - **Planning and financial models**
  - **Decision trees**
  - **Probability assessment models**
  - **Resource allocation models**
  - **Social judgment models**

Level 3: Rules of Order

- **Focus on decision making process**

- **Controls its timing, content or message patterns**

10.5 GDSS Technology

- **GDSS Technology Options**
  1. Special-purpose electronic meeting facility (decision room)
  2. General purpose computer lab
  3. Web (Internet) / Intranet or LAN-based software for any place / any time

- **Components (Figure 10.2)**
  - Hardware
  - Software
  - People
  - Procedures

GDSS Hardware

1. Single PC
2. PCs and Keypads
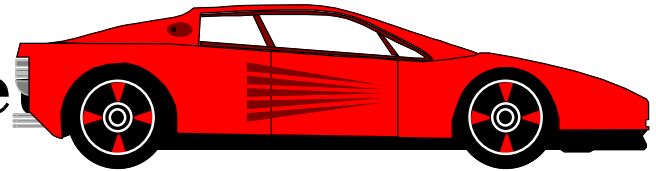3. Decision Room
4. Distributed GDSS

GDSS Software

- **Modules to support the individual, the group, the process and specific tasks**
- **Typical Group Features**
  - <u>Numerical / graphical summarization</u> of ideas, and votes
  - <u>Programs</u> calculating weights for alternatives; anonymous idea recording; selection of a group leader; progressive rounds of voting; or elimination of redundant input
  - <u>Text and data</u> transmission among the group members, between the group members and the facilitator, and between the members and a central data / document repository.

People

- **Group Members**
- **Facilitator (Chauffe...**

- **Procedures (that enable ease of operation and effective use of the technology)**

10.6 The Decision (Electronic Meeting) Room

- **12 to 30 networked personal computers**
- **Usually recessed**
- **Server PC**
- **Large-screen projection system**
- **Breakout rooms**
  - Example (Figure 10.3)
  - See Cool Rooms at http://www.ventana.com/
- **Need a Trained Facilitator for**

Cool Rooms

US Air Force

Source: Ventana Corp., Tuscon, AZ, http://www.ventana.com

Cool Rooms

IBM Corp.

Source: Ventana Corp., Tuscon, AZ, http://www.ventana.com

Cool Rooms

Murraysville School District Bus

Source: Ventana Corp., Tuscon, AZ, http://www.ventana.com

Why Few Organizations Use Decision Rooms

- High Cost
- Need for a Trained Facilitator
- Software Support for Conflict Issues, NOT Cooperative Tasks
- Infrequent Use
- Different Place / Different Time Needs
- May Need More Than One

10.7 GDSS Software

■ **Comprehensive GDSS Software**
  – .GroupSystems for Windows (Ventana Corp.)
  – .VisionQuest (Collaborative Technologies Corp.)
  – .TeamFocus (IBM Corp.)
  – .SAMM (University of Minnesota)
  – .Lotus Domino / Notes (Lotus Development Corp.)
  – .Netscape Communicator (Netscape Communications Corp.)

■ **Emerging Web-Based GDSS**
  – .TCBWorks (The University of Georgia)
  – (http://tcbworks.cba.uga.edu:8080)

GroupSystems for Windows

- **Overview (Figure 10.4)**
- **Agenda is the Control Panel**
- **Standard Tools**
  1. Electronic Brainstorming (Figure 10.5)
  2. Group Outliner
  3. Topic Commenter
  4. Categorizer
  5. Vote

Advanced Tools

1. Alternative Analysis
2. Survey
3. Activity Modeler

Other Resources

- People
- Whiteboard
- Handouts
- Opinion Meter

Individual Resources

- **Briefcase (Commonly Used Applications)**
- **Personal Log**
- **Event Monitor**

Internet-Based GDSS

- **Many new GDSS are Web-based**
  - e.g., TCBWorks (October 10, 1995)
- **Sample of Web-based GDSS**
  - TCBWorks
  - Lotus Domino/Notes
  - Netscape Communicator
  - BrainWeb
  - InterAction: A Web-based Collaboration Tool
- **End of 1996, over 75 Web-based groupware systems**
  - See Groupware Central
- **More developments on Web-based GDSS coming**

(More) Complete List of Web-based GDSS Software

A representative sample of Web-based GDSS software is on the Book Web page (http://www.prenhall.com/) They include:

- *TCBWorks: Webware for Teams* (from Alan Dennis at The University of Georgia, Athens, GA; http://tcbworks.cba.uga.edu:8080)
- *Lotus Domino/Notes* (from Lotus Development Corp., Cambridge, MA; http://www.lotus.com)
- *Netscape Communicator* (from Netscape Communications Corp., Mountain View, CA; http://www.netscape.com/)
- *CONSENSUS @nyWARE* (from Group Decision Support Systems, Inc., Washington, DC; http://www.softbicycle.com/)
- *Beacon Interactive Systems* (from Beacon Interactive Systems, Cambridge, MA; http://www.beaconis.com/)
- *Webthing* (from Nick Kew; http://potox.com/~webthing)
- *Sound IDEAS* (from New Star Technologies, Inc., Chesterfield, MO; http://www.newstartech.com)
- *BrainWeb* (from the faculty of Systems Engineering, Policy Analysis and Management at Delft University of Technology, the Netherlands; http://www.sepa.tudelft.nl/~gdr/brainweb/bw0.html)
- *Electronic Meeting Space: College Town* (a virtual meeting space from the Association for Computing Machinery: ACM)
- *BSCW: Basic Support for Cooperative Work* on the World-Wide-Web (from the Institute for Applied Information Technology, German National Research Centre for Information Technology, Richard.Bentley@ gmd.de).
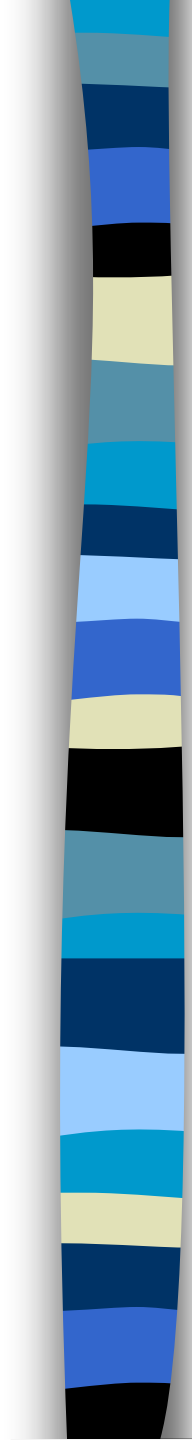- *InterAction: A Web-based Collaboration Tool* (from J. Valacich and L. Jessup, University of Indiana; http://www.indiana.edu/~iudis/).

10.8 Idea Generation
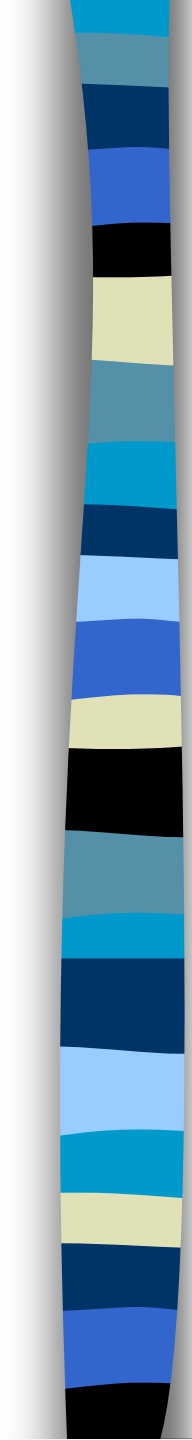
- Collaborative Effort
- Idea-chains
- More Creativity Using GDSS

10.9 Negotiation Support Systems (NSS)

- **Conflicts** among decision makers
- Negotiation - for **Conflict Resolution**
- Types of Disputes
  - Negotiators' interests are fundamentally opposed
  - Negotiators share basic objectives, differ in priorities
- GDSS Can Provide <u>Structure</u> to Negotiations

- **Conflicts** arise because of differences in interests among individuals
- **Conflicts** also arise because of differences in problem understanding (misunderstanding)
- Requirements Negotiation
  1. Conflict Detection
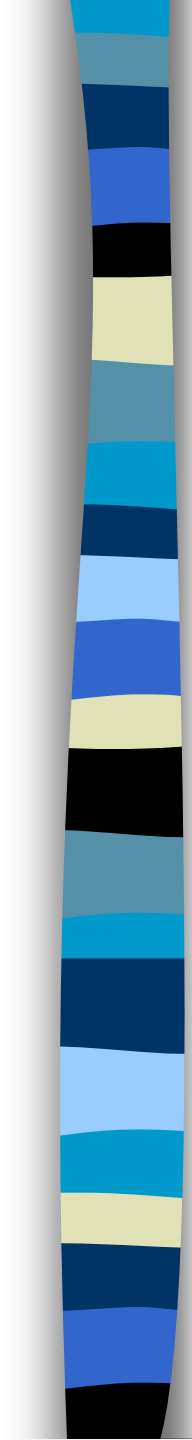 2. Resolution Generation
  3. Resolution Choice

- *Oz* - Prototype NSS Code
- *Agent model* - Electronic Brokers in Electronic Commerce

- NSS Can Provide Organizational Memory
- NSS Can be Deployed Over the Web

10.10 The GDSS Meeting Process

1. Group leader meets with facilitator to
    – Plan the meeting
    – Select the software tools
    – Develop an agenda
2. Participants are gathered in the decision room and the leader poses a question or problem to the group.
3. Participants type their ideas or comments
4. Facilitator searches for common themes, topics, and ideas and organizes them into rough categories (key ideas)
5. Leader starts a discussion and participants prioritize the ideas
6. Top 5 to 10 topics are routed to idea generation software, after discussion
7. Repeat the process

- **Major Activities of a Typical GDSS Session (Figure 10.6)**
- **Example (Appendix 10-A)**

- **Different Time/Different Place Meetings (via Intranets, the Internet/Web)**
- **Just Learning How to Do**
- **Distributed GDSS**

10.11 Constructing a GDSS and the Determinants of Its Success

- **Constructing a GDSS**
  - **1. Construct (or Rent) a Decision Room**
  - **2. Acquire Software**
  - **3. Develop Procedures**
  - **4. Train a Facilitator**
  - **5. Put It All Together**
- **Can**
  - **Use Someone Else's Facility**
  - **Rent One**
  - **Use a Dual Purpose Computer Lab**

Determinants of GDSS Success for a Decision Room Setting

- **Same Time/Same Place Meetings (DSS In Focus 10.4)**
- **Trained Facilitator**
- **Support**
- **Participants' Training**

GDSS In Focus 10.4: Critical Success Factors of Same Time/Same Place GDSS

1. Organizational commitment--a must
2. Executive sponsor who is committed and informed
3. Operating sponsor to provide quick feedback
4. Dedicated facilities with attention to aesthetics and user comfort
5. Reciprocal site visits that recognize the need for informed personnel who understand the EMS environment
6. Communication and liaison extending beyond site visits--important in maintaining responsiveness to questions arising
7. Fast iteration of software changes--critical to meet evolving needs
8. Training for site personnel at technical, facilitation and end-user levels
9. Transfer of control to site personnel
10. Cost/benefit evaluation--crucial to expansion of EMS beyond initial trials
11. Software usage flexibility--essential for meeting the evolving needs of groups
12. Appropriate planning--essential (suggestions for structured planning sessions are provided by some vendors)
13. Meeting managerial expectations--the ultimate indicator of successful EMS implementation
14. A seductive user interface (see Gray and Olfman [1989])
15. Anonymity--very important (see Jessup et al. [1990])
16. Facilitation--very important (see Anson et al. [1995])
17. Selection of an appropriate task (issue)--very important (see Benbasat and Lim [1993]).

(*Source*: Based on IBM's experience (Grohowski and McGoff [1990]) and on the University of Arizona experimentation.)

More on Critical Success Factors for GDSS

1. Design
   a) Enhance the structuredness of unstructured decisions
   b) Anonymity
   c) Organizational involvement
   d) Ergonomic considerations

2. Implementation

    a) Extensive and proper user training

    b) Support of top management

    c) Qualified facilitator.

    d) Execute trial runs

3. Management

    a) Reliable system

    b) Incrementally improve system

    c) GDSS staff keeps up with technology

User involvement and participants' behavior are also important factors

Building Decision Rooms Using Off-the-Shelf Software

10.12 GDSS Research Challenges

- **Differences in effectiveness between field studies and lab experiments**
- **Multi-methodological research programs to understand key GDSS issues**
- **Understand the effects that these differences have on the process and outcomes of group meetings**
- **Use this understanding to interpret and apply the conclusions of experiments to organizations' GDSS use**

Research Models

1. GDSS Variables (Figure 10.7)
2. GDSS Research Topics (Table 10.5)

TABLE 10.5 Research Issues in GDSS

I. GDSS DESIGN
- **Human factors design (e.g., spatial arrangement, public screens, informal communications channels)**
- **Database design**
- **User interface design**
- **Interface with DSS**
- **Design methodologies**

II. APPROPRIATENESS OF GDSS
- **When should a GDSS be used and when should it not be used?**
- **When is a GDSS preferred to a DSS?**
- **Selecting the right GDSS design**

III. GDSS SUCCESS FACTORS
- **Measures of success (e.g., reduction in group conflict, degree of consensus, group norms)**
- **Effects of hardware, software, user motivation, and top management support on GDSS's success**

IV. IMPACT OF GDSS
- **Communication patterns**
- **Confidence in decision**
- **Costs**
- **Level of consensus**
- **User satisfaction**

V. MANAGING THE GDSS
- **Responsibility for GDSS in organization**
- **Planning requirements for GDSS**
- **Training, maintenance, and other support needed**

Source: **Based on G. DeSanctis and R. B. Gallupe, " Information System Support for Group Decision Making," Unnumbered working paper, Department of Management Science, University of Minnesota (undated).**

Additional Topics (Dickson [1991])

1. Tradeoffs of advanced features versus simplicity
2. Interface studies
3. Supporting groups with difficulties
4. Research on anytime/anyplace configurations
5. GDSS benefit identification
6. Level of support required
7. Embedded knowledge bases (Intelligent GDSS)
8. Training issues
9. Individuals' characteristics

Research Direction Categories

1. What groups do
2. Effects of GDSS on group work
3. Effects of GDSS on organizations
4. Effects of hardware on GDSS performance
5. Effects of software on GDSS performance
6. Cultural effects of GDSS
7. Training people to use GDSS

8. Cost-benefit analysis for GDSS

9. Critical success factors for implementation in industry

10. Robustness of research results

11. Innovative uses of GDSS

12. Theoretical foundations of GDSS

13. Barriers to research

14. Research methodologies
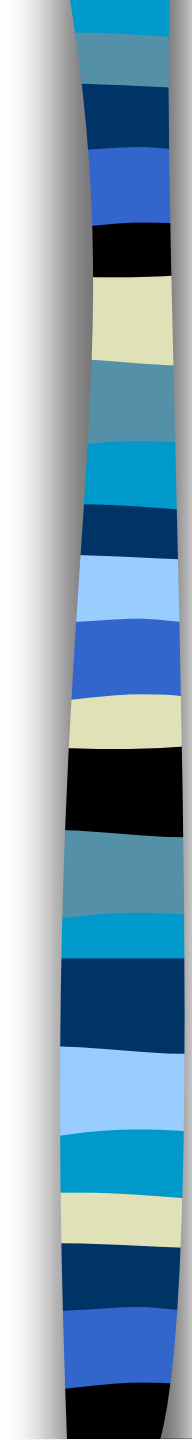
15. Anytime / anyplace meetings

16. Other ideas and research topics.

Six Major GSS Scenarios for Research

1. Anytime / Anyplace
2. Orchestrated Workflow
3. Virtual Team Rooms
4. Culture Bridging
5. Just-In-Time Learning
6. Window to Anywhere

Research Sampler

- **Er and Ng [1995]: Value of anonymity, group dynamics, organizational settings, social contexts and behavioral aspects**

- **Valacich and Schwenk [1995]: Value of a devil's advocacy (a cognitive conflict technique) enhanced decision making performance**

- **Bryson et al. [1994]: Value of special voting approaches**

- **Anson et al.[1995]: Human facilitation impacts**

- **Miranda and Bostrom [1997]: Impacts of process and content meeting facilitation across traditional and GDSS environments on meeting processes and outcomes**

- **Lim et al. [1994]: Effect of lack of leadership in a GDSS meeting**

- **Yellen et al. [1995]: Impact of individuals' characteristics on GDSS outcome**

- **Dennis et al. [1996]: Effects of time and task decomposition on electronic brainstorming to produce more and more creative ideas**

- **Dennis et al. [1997]: Effects of multiple dialogues versus single dialogues for electronic brainstorming to reduce cognitive inertia**

- **Chidambaram [1996]: Individuals using GDSS technology over time tend to feel more cohesive as a group than groups not**

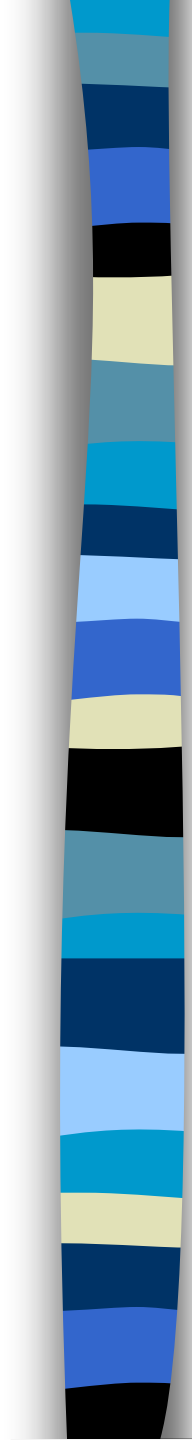 - **Groups whose members are dispersed and possibly communicate in different times**

Intranets, the Internet and Web-based GDSS

Summary

- Many benefits to work groups, but many process losses
- Delphi method and the Nominal Group Technique (NGT)
- Group Decision Support Systems (GDSS), Group Support Systems (GSS), electronic meeting systems (EMS), computer-supported cooperative work, collaborative computing, groupware, etc. - various computer support for groups
- GDSS attempts to reduce process losses and increase process gains
- GDSS over the Internet and Intranets, anytime/anyplace
- Group DSS over a LAN in a decision room environment

- **Idea generation, idea organization, stakeholder identification, topic commentator, voting, policy formulation, enterprise analysis and negotiation support system**

- **NSS can aid in resolving conflicts in groups**

- **GDSS can fail**

- **GDSS research is very diverse**

- **Web-based group-ware for anytime/anyplace collaboration**

- **The Internet and Intranets - major role in distributed GDSS**

Group Exercises

1. Prepare a list of topics that are in your opinion most suitable for a decision room. List one each in the areas of: accounting, finance, marketing, manufacturing, government, an educational institution and a hospital.

2. Describe the advantages and disadvantages of using an existing computer lab for a dual-purpose to include GDSS technology.

3. Explain in detail, why it is preferable to build a GDSS facility with vendor software rather than to develop the software from scratch.

5. Group Brainstorming Exercise 1: (with paper)
   – Standard brainstorming (standard meeting)
   – Nonverbal brainstorming 1 (single dialogue meeting)
   – Nonverbal brainstorming 2 (multiple dialogue meeting)

GROUP EXERCISE FROM THE WEB SITE

Group Brainstorming Exercise 2: **In this exercise, you will simulate time and task decomposition in a GDSS. Follow the basic instructions for the Nonverbal Brainstorming Session 1 as the previous problem. This time, line up 4 different groups of 5 members from the class. Use the pollution problem. Pose it in the following way:**

"Pollution is a major problem in our community, the state and U.S. How can we lessen the impact of pollution? Think in terms of air, water and land. Think broadly and try to generate as many ideas as you can."

Run *4 sessions* **(only one group is allowed in the room at one time, unless you want to do this as a class demonstration) at the chalkboard as follows:**

- *No task or time decomposition* **(same as Nonverbal brainstorming 1): Everyone works at the board simultaneously for 15 minutes. Pose the question as above.**
- *Task decomposition only:* **Divide the board up into 3 sections. Label them Air, Water and Land. The group then spends 5 minutes each on air, water and land (when working on air, water and land ideas are not allowed, etc.). Allow a 1 minute break between sessions. (If the board is small, record the results and erase the ideas before starting the next session.)**
- *Time decomposition only:* **Divide the board up into 3 sections. Start everyone in the first section for 5 minutes (run this like the first session). After 5 minutes, stop, rest for 1 minute, and move to the second section. After 5 minutes, rest for 1 minute and move to the third section for 5 minutes.**
- *Task and time decomposition:* **Combine 2 and 3. Divide the board up into 3 sections. Label them Air, Water and Land. Let everyone work wherever they want, whenever they want. Run the session for 5 minutes, stop, rest for 1 minute, and run another 5 minute session. After 5 more minutes, rest for 1 minute and run a third session for 5 minutes.**

Note, have a student in the class copy the ideas down on paper for later counting, from each section of the board.
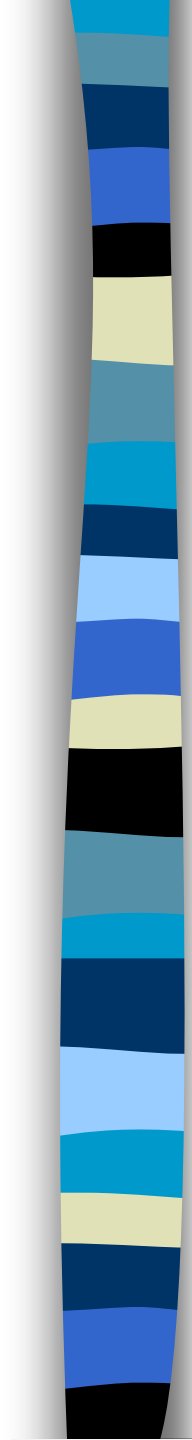
How many reasonable ideas did each group generate in all cases? Which method was most effective and why? What process gains and losses did you experience? Which method do you think is most appropriate for brainstorming to generate as many high-quality ideas as possible in a short time frame? In which method were the participants more 'satisfied' and why? Compile your results with the rest of the groups in the class. As a bonus, compare your results to the research results of Dennis et al. [1996].

Case Application 10.1:
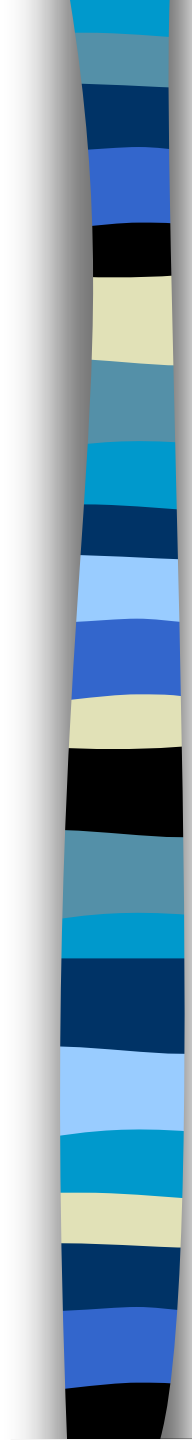# GDSS In City Government

Case Questions

1. Why is this a "limited GDSS"?

2. The decision room accommodates the participants in 4 shifts, due to the small size of the GDSS facility. What could be the impact of such a restriction? How could new technology overcome this process loss?

3. Compare the activities in this case to those of the Delphi method.

4. What are some of the major advantages of this GDSS?

5. How would a GDSS for public policy compare with one in a for-profit organization?

6. Can the Internet be used instead of the decision room in this case? How? List the benefits inherent in this type of use.

Case Application 10.2: Chevron Pipe Line Evaluates Critical Business Processes with a GDSS

Case Questions

1. What happened to the team members at the end of the first day of meetings? Why?

2. What process and task gains do you think Group-Systems provided? Why?

3. What new technologies could be used for encouraging participation of team members not on site? How and why?

APPENDIX 10-A: Example of a GDSS Meeting: The Queen Mary

The Topic: What to Do with the Queen Mary?

- March 6, 1992, Walt Disney Company Ended Its Lease of the Queen Mary

- What to Do?
- Use the Electronic Decision Support Facility
- at California State University, Long Beach
- Group-Systems Software

The Process

- **Round one: Electronic Brainstorming**

- **Round two: Ideas organized into 8 groups**

- **Round three: Groups ranked (Table 10-A.1) - very little agreement**

- **Round four: Discussion to reach consensus**

- **Reordering of key issues and increased level of agreement**

TABLE 10-A.1 The First Vote for Queen Mary Use

	Number of Votes in Each Position									
	1	2	3	4	5	6	7	8	Mean	STD
Management options	3	4	4	2	1	1	2		3.29	1.96
Promotions	4	2	4	2	3	—	—	2	3.47	2.21
Operational budget	3	2	2	4	2	2	—	2	3.94	2.22
Advertising	1	3	2	5	2	3	1	—	4.00	1.70
Alternative uses	2	4	2	1	2	4	2	—	4.00	2.12
Housing	2	—	1	2	2	3	6	1	5.35	2.12
Casino	2	—	2	—	2	4	4	3	5.53	2.27
Scrap	—	2	—	1	3	—	2	9	6.41	2.15

Coefficient of concordance (1.0 = most agreement): 0.21