

ELECTRONIC MEETINGS TO SUPPORT A UNIVERSITY'S TRANSFORMATION, EDUCATION, RESEARCH AND PROFESSIONAL SERVICE

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Abstract: The University of Dar es Salaam's (UDSM's) corporate strategic plan sets the long-term plan and concepts that guide the transformation processes at the University. In this paper, we discuss a support environment UDSM can apply to facilitate the execution of the UDSM-2000 Transformation Program. This environment consists of a particular type of Information Technology that support electronic meetings, namely Group Support Systems (GSS). We will illustrate that the application of this technology and research not only supports the reshaping of the University's administrative processes and structures, but will also offer an excellent opportunity to improve the educational and professional services that it offers. It will help UDSM to build a reputation as a center of excellence in the region.

INTRODUCTION

Over the last decade, business organizations have used information technology (IT) to transform their processes. As in the industrial sector, pressure to transform higher education processes increases. Universities are under increased pressure to deliver expanded services and greater value to their students and other constituencies with reduced expenditure of capital and human resources. Faced with these major challenges many institutions of higher learning are reexamining and redeveloping their central pedagogic systems. This is equally true to The University of Dar es Salaam (UDSM).

The University of Dar es Salaam was born out of the decision taken in March 24th, 1970 by the East African governments to split the then University of East Africa into three independent universities - for Kenya, Uganda and Tanzania [MHO-DUT-UDSM 1996]. The University of Dar es Salaam consists of several faculties, institutes and two colleges, Muhimbili University College of Health Sciences (MUCHS) and University College of Land and Architectural Studies (UCLAS).

Currently, the University of Dar es Salaam (through the Departments of Mathematics and Computing Centre) is the only Institution in Tanzania that is involved in offering academic programs up to degree level in Informatics. In fact it is the only University in East Africa which is offering a B.Sc. program in Informatics.

To ensure optimal management, the University has developed a corporate strategic plan and the Institutional Transformation Programme - "UDSM-2000." Under this

program, the University aims at the expansion of programs and student enrollment from some 3,500 students in 1995 to some 8000 student in the year 2000. By the year 2008 targeted undergraduate enrollment will be approximately 13,000 students. The overall targeted enrollment for postgraduate is 2,000 students by the year 2008, with an interim level of approximately 1,300 students by the year 2000.

Regarding the expansion of the student enrollment, in accordance with the corporate strategic plan, the UDSM policy is to sustain all programs vital for the support of Tanzania's advancement into the 21st century like informatics, by planning, budgeting and redressing resource allocation on the basis of a corporate system reflecting fairly the full economic costs of the main outputs like undergraduate studies, postgraduate studies, research and publications. Furthermore, at the moment the University is already engaged in the efforts to redress the resource flow problem under the UDSM-2000 transformation program. As part of the transformation program, restructuring the administration and application of IT, supportive to the administrative functions is regarded as a pre-requisite.

GROUP SUPPORT SYSTEMS (GSS)

Groupware is a new and somewhat unshaped category of commercial products that helps groups and teams work together by sharing information and by controlling work flows within a group [Johansen 1988]. Coined in the late 1980s, the term *groupware* has attained wide recognition because of a combination of: (1) an increasing need for groups to work together more effectively; (2) technological progress in electronic networks and collaborative computing

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applications; and (3) perceived effectiveness and efficiency improvements by groups using this technology (Coleman and Khanna 1995).

Group Support Systems (GSS) represent a subset of Groupware. A GSS is a collection of computer-based meeting tools specifically designed to make creative problem solving by teams more productive (Vreede and Briggs 1996). Each tool in a GSS toolkit focuses and structures the thinking of the team in some unique way. Table 1 summarizes the tools in GroupSystems, a commercial GSS developed by researchers at the University of Arizona. A team leader, or facilitator, selects the tools for the team to use, depending where they are in the problem solving process, and what kind of group dynamics the leader wishes to create.

Table 1: A summary of tools in GroupSystems for Windows

Electronic Brainstorming: allows rapid generation of a free flow of ideas.

Topic Commenter: permits people to generate ideas and assign them to "file folders" or topics.

Categorizer: gives structured methods for generating, synthesizing, and categorizing ideas.

Group Outliner: allows a group to explore issues and develop action plans using a tree or outline structure.

Alternative Analyzer: compares a set of alternatives against a set of group-developed criteria.

Vote: helps evaluate ideas, measure consensus, and make choices using several voting methods. **Survey** allows the group to respond to a questionnaire.

Briefcase: provides a set of personal productivity tools, including Calendar, File Reader, Notepad, Calculator, Clipboard and Quick Vote.

Using the GSS tools, groups can engage in electronic communication activities. Suppose a group of department heads is involved in setting out a number of strategic directions for their company. The facilitator starts the GSS and the participants use their keyboard to enter a number of ideas they have on this issue. Each idea that is entered gets distributed over all participants and is also projected on a central screen. Using the GSS, the participants thus build a list of strategic directions that they can discuss, orally or electronically by entering supporting comments. They can also evaluate these directions by entering their votes or preferences into the system. The GSS collects all votes after they have been submitted and projects the results on a

central screen. At the end of the meeting, the facilitator uses the report function to print out a literal record of the meeting. Hence, the participants leave the meeting with the meeting minutes in their hands. In summary, the three main characteristics of GSS are:

- *Parallel communication:* By using their own keyboard, participants can enter ideas in parallel. In other words, every participant can talk at the same time.
- *Anonymous communication:* The GSS does not indicate which participant have submitted which ideas or votes. In other words, participants communicate anonymously.
- *Group memory:* During the meeting, the GSS stores all ideas and votes electronically.

These GSS characteristics have shown to bring about their added value of GSS meetings over traditional meetings. Many studies have reported that the use of GSS increases the effectiveness and efficiency of creative group processes as well as the satisfaction of the participants with such processes (Bostrom *et al.* 1992; Nunamaker *et al.* 1995). Other valuable characteristics of GSS meetings include process structuring and expanded information-processing capacity (Bostrom *et al.* 1992). Table 2 shows each of the GSS attributes and their potential benefits. It implies that when GSS is used appropriately, a number of potential benefits can occur; for example, parallel input allows for more equal participation (i.e., reducing dominance) and contributions directed to areas of expertise and interest.

Table 2 GSS characteristics and their potential benefits.

GSS's characteristics	Potential Benefits
Parallel input	Opportunity for broader, equal and more active participation and contribution at own level of ability and interest; More input in less time; Reduces communication dominance by a few.
Anonymity	Less individual inhibitions; Focus on idea rather than contributor; Enhance group ownership of ideas.
Electronic group memory	Complete, objective, and immediate meeting minutes; Enhanced group memory;

Table 2: (continued...)

Process structuring	Facilitates modification and manipulation of information. Provides framework and process structures Facilitates agenda control and completion; Improves topic focus.
Extended Information Processing Capacity	Automate complex tasks, such as voting procedures; Interfaces create easy access to other information sources and other software tools.

THE ADDED VALUE OF GSS TO UDSM

In view of the UDSM-2000 transformation program, the application and adoption of GSS has an added value to the University with respect to corporate strategic management and planning, teaching and research. A GSS is more than just an interesting object of research. In fact, it is a tool that the university can apply for a large variety of activities. The potential users of GSS cut across all levels of groups, including students, academics, researchers as well as administrative staff. For example, university committees can use GSS to distribute funding over research activities, to develop plans to encourage increasing student numbers, and to generate ideas with respect to how the university can better support research activities by its faculty. Also, GSS enables the efficient and effective participation of external practitioners in meetings with the university, in which strategies and action plans with respect to sponsored research projects can be mapped out.

According to Huber (1984: 198) "a critical frequency of use that must be attained in order for GSS to survive in any given organizational environment....?" Hence, one can argue that in order to be adopted and successfully used in the university setting, a GSS has to support research, educational, and administrative tasks. In this section we will demonstrate that GSS is a very promising technology for providing this broad support. We propose that there are four areas in which the UDSM can apply and benefit from GSS: administrative activities, educational

activities, research, and services to society. Each of these areas is discussed below.

GSS as support for administrative activities

Administrative activities are tasks that the university carries out in order to create an environment in which faculty can educate students and conduct research projects. Administrative activities cover a variety of activities, including strategic planning, personnel planning, budgeting, and allocating resources. It can be argued that administrative activities such as these, often involve creative problem solving that include the following tasks:

1. Creating problem awareness;
2. Structuring problem (conceptualize problem);
3. Specifying and diagnosing the problem;
4. Identifying alternative solutions to the problem;
5. Selecting and implementing the optimal solution
6. Implementing the selected solution.

GSS has been shown to provide effective support for each of these types of problem solving tasks, (see e.g. Nunamaker *et al.* 1991, 1995; Vreede and Briggs 1996). People can use a GSS to discuss a problem situation in order to *identify, organize, and evaluate* problem symptoms and hence *create shared* awareness of the problem. Also, a GSS can be used to determine which key players or parts of the organization are involved, thereby determining the boundaries (*structure*) of the problem. Next, people can use a GSS to *collect and organize* information that describes a problem situation in more detail. *Compiling and discussing* this information allows people to *diagnose* a problem situation. The next task, *identifying alternative solutions*, can especially benefit from the capability of GSS to foster and encourage *group creativity*. For example, a team of police officers generated 200 improvement ideas and issues in less than two hours of brainstorming. GSS can subsequently be used to *select* a solution by applying a number of (multi-criteria) voting methods. These methods not only help to take decisions, but are also especially helpful in focusing discussions on issues that meeting participants have diverging opinions on. Finally, GSS can be used to plan the *implementation* of the selected solution.

At UDSM, departments/faculties have used

² See also, Salvatore (1990: 266)

GSS, for example, to identify their income generating opportunities; evaluate their strategies with respect to their strengths, weaknesses, opportunities and threats (SWOT); identify problems and solutions regarding the costing sharing exercise for students and employment procedures to graduating students in Tanzania.

At Delft University of Technology there are various experiences in which the GSS facility has been applied to support administrative tasks at both university and departmental levels. Examples include, but are not limited to:

1. *Strategy development for the university as a whole:* The GSS facility was used to discuss and explore a number of relevant issues with respect to the strategy plan 2000 of the university.
2. *Faculty career development:* Various issues at school were discussed with respect to promoting and guiding the careers of assistant professors. The results of the meeting were used as a basis to formulate a policy of career development.
3. *Merger of Schools:* Electronic meetings were conducted to enable all faculty and doctoral students to express their ideas, opinions, and suggestions with respect to a possible merger of two of the university's schools.
4. *University Critical Success Factors:* A set of critical success factors was explored for the purposeful functioning of the university. Also, indicators were determined that could be used to measure the extent to which these factors were met.
5. *Reorganization of University Support Services:* A plan of action for creating a centralized support service center was collaboratively written by a group of managing directors of various schools.

In conclusion, we observe that carrying out administrative tasks that involve creative problem solving is difficult, as there seldom are common perceptions of the problem situation or obvious solutions to solve it. Furthermore, as all the information that people need to handle these types of tasks cannot be found in individuals, participative problem solving is necessary. We argue that the main benefits of GSS to support the handling of these administrative problems lie in the technology's ability to enhance the productivity and effectiveness of meetings in which they are addressed. In particular, GSS enables increased

and equal participation, and allows for an uninhibited sharing of (sometimes sensitive) information.

GSS as Support for Educational Activities

Educational activities are tasks that aim to teach students the subject of the study they are involved in. It involves activities such as giving lectures and assignments, grading, doing class exercises, and supervising (groups of) students. There are various modes in which educational activities can take place, e.g. individual teaching, class room teaching, or more collaborative forms of teaching, in which the students take an active role in the learning process, instead of receiving information passively.

Collaborative learning in face-to-face settings has been shown to be a highly effective learning strategy (Alavi *et al.* 1996). Collaborative learning is a process in which students discuss and debate issues and problems, and offer explanations, suggestions, and solutions. This process helps students to conceptualize, construct, and internalize procedures and knowledge. Also, sharing information helps students to deepen understanding. It is in this learning environment that various types of electronic support, such as GSS, are emerging rapidly. In general, bringing electronic support into the classroom aims to facilitate the information flows between students and instructors, and among students (Leidner and Jarvenpaa 1995).

There are a variety of successful examples of using GSS to support learning processes. A number of areas in which studies have shown that there is an added value in the application of GSS to education are Bostrom *et al.* (1992); and Alavi *et al.* (1996):

- *Curriculum development:* GSS may be used to develop and evaluate courses.
- *Education in group planning and decision making:* During courses in collaborative system, a GSS can be used to familiarize students with system characteristics, issues in application of such systems, and research opportunities.
- *Supporting case studies in an executive programme:* GSS allows executives to interact electronically and speed the process of case discussion. Simultaneously, the executives become familiar with the use of GSS to help address their own organizational problems.

- *Executive support system analysis and design:* GSS software can be used to provide classroom support for the analysis and design of prototype executive support systems as well as to familiarize students with key implementation issues;
- *Survey and questionnaire administration:* GSS software has been used to administer questionnaires and summarize results as well as give students an opportunity to provide anonymous feedback on course procedures and contents.
- A '*virtual continuous learning space*': GSS may be used to set up a joint course, in which two sites are linked up, using video, audio, and electronic support. The environment supports both *in-class* learning activities (lectures by instructors, discussions and question/answer activities between instructors and students, and among students, electronic sessions for issue analysis and discussion) and *out-of-classes* learning.

Experiences and study results with respect to GSS support for learning are very encouraging. In a variety of settings and applications, positive aspects of using GSS in this area are reported. For example, Leidner and Jarvenpaa (1993) observed that computer supported learning invited students to do exploratory analyses of the course subjects, and stimulated the acquisition of computer skills. In another study, Briggs *et al.* (1994-1995) reported that compared to 'traditional' students, GSS supported students participated more in lecture sessions, generated significantly higher quality and quantity answers, and were more interested in the lectures. With respect to the dispersed class room setting described in Alavi *et al.* (1996), it was found that for the *in-class* activities, the students perceived that they had learned more, and they found the ability to cooperate with remote instructors and students very enriching and satisfying. For the *out-of-class* activities, the students' feedback suggested that the environment increased students' participation and satisfaction with the educational activities.

In general, there is evidence from a substantial number of studies (Reinig *et al.* 1996; Walsh *et al.* 1996) that suggests that in educational settings, GSS increases:

1. Observed learning;
2. Self-reported learning;
3. On-task participation; and
4. Satisfaction with classroom experience.

GSS can help to transform the lecture room from into a place where an instructor delivers information, to an environment in which students actively engage one another to solve problems of realistic difficulty and complexity (Walsh *et al.* 1996). This enables students to analyze, handle, and solve problems from different perspectives. As pointed out by Mitroff and Linstone (1993), this is of crucial importance. Critical thinking and creative problem solving have to be encouraged in order to prevent the "mind from becoming the prisoner of a particular way of viewing the world." Hence, it is important to bring in new environments, perspectives, and techniques to support students in their learning activities. This not only seems to motivate and stimulate them, resulting in increased participation, but also may improve their self-reported and observed quality of learning. To this end, GSS combined with technologies that facilitate distributed group work, can possibly be an instrumental technology. Finally, GSS will facilitate improvement in sustainability of development efforts in Tanzania and will form the basis for advanced and specialized training at post-graduate level.

In this regard, some successful efforts are already being made to enhance educational processes at UDSM by using GSS. For example, since the establishment of this facility in May 1997, a special course on GSS applications has been designed and is offered to undergraduate computer science students. Also some *B.Com* students in the Faculty of Commerce and Management are being introduced to this course. In addition to the undergraduates, one person has graduated at Master's level and another is undergoing training at *Ph.D.* level in GSS.

GSS as support for research activities

Research activities are activities carried out by the university's faculty that involve studying a phenomenon of interest in order to build, test, or expand a theory. GSS can provide a variety of benefits to researchers, e.g. in developing elements of a research project, electronically recording data from subjects, performing data analysis, and integrating information and data across the entire research project.

Anson *et al.* (1992) outline and illustrate the potential application of GSS during research projects, using the model for performing a research project as suggested in (Jenkins 1985).

The research activities and potential support from GSS are summarized in table 3, in terms of the three basic group activities that are supported by GSS (Generate, Organize, and Evaluate information). As Anson et al. [1992] take a predominant experimental and survey focus on research, we also included activities that concern more qualitative studies, such as case studies and action research.

Table 3: Potential GSS support for various research activities, after (Anson et al. 1992).

Research activity	Potential GSS support
1. Generate ideas for research project	Generate ideas with respect to research areas, topics, methodologies, variables, tasks, survey questions, subjects etc. Evaluate ideas by prioritizing them, using criteria such as potential contribution, feasibility, cost, and subject availability.
2. Conduct library/references literature research	Generate list of relevant sources Generate list of information sources Generate list of relevant contacts
3. Refine research topic	Organize and manipulate information from previous activities electronically to define the focus of a study, the research questions, the research objectives, and hypotheses.
4. Select appropriate research strategy	Evaluate potential research strategies and instruments using criteria such as appropriateness, feasibility, risk, and experience. Determine sources of information on selected research strategy
5. Develop study design	Generate information with respect to the unit of analysis, theories to be tested or build, measurement instruments, and methods of analysis. Generate survey questions, criteria for site selection, experimental procedures and instructions, qualitative and quantitative data sources. Generate information on limitations of the study design and how to handle these.
6. Collect data	Collect both qualitative and quantitative information from groups using the GSS, e.g. for opinion research, group feedback analysis, focus groups, Delphi groups, critical success factors, and assessment methodologies

Table 3: (continued...)

7. Analyze data	Evaluate data using the voting tools "Code:" data by organizing them into a number of categories
8. Publish results	Generate and evaluate potential publication outlets Generate an outline of a publication Generate and organize information to fill in the outline of the publication

Based on our own observations and experiences, we submit that GSS is not equally beneficial to all research activities. Though useful, GSS has limited added value in activities 4, 6, and 7, as these activities normally include a lot of activities that do not require a group meeting and/or require special applications, such as data analysis applications. However, GSS technology has proved to be especially powerful in supporting activities 1, 2, 3, 5, and 8. A few examples:

1. GSS were used to set up and carry out a study that compare electronic and paper survey instruments (Anson et al. 1992).
2. GSS were used to carry out a study that determined critical success factors for design and development of management expert systems (Anson et al. 1992).
3. GSS were used to set up, carry out, and evaluate a study in which a gaming environment was developed and applied to teach students the concept of participative design in a joint effort by Delft University of Technology and The University of Arizona.

In conclusion, after [Anson et al. 1992] and based on our own experience, we submit that the main benefits of applying GSS to support research are threefold. *First*, just as in other meetings, GSS enhances the efficiency and effectiveness of the interactions of researchers setting up and working on joint projects. *Second*, GSS supports the electronic recording of data on subjects or phenomena being studied, reducing data entry errors, data entry times, and facilitating data analysis. *Third*, GSS facilitates the analysis of qualitative data by allowing for electronic manipulation, organization, and evaluation of recorded data.

GSS as Support for Service to Society

Over the past few years, GSS have been moving out of the laboratory settings into a variety of

real world application areas, some examples of which are listed in table 4. It is in these areas that GSS may support UDSM providing professional services to the society. GSS may be used to support such services through, for example, training on the application of well-known software, advise to the industry or the government. Also, GSS offer excellent opportunities for the expansion of professional services in many sectors such as agriculture, industries and government, which will contribute to the social and economic development of Tanzania.

Table 4: Examples of GSS application areas.

Application Areas	
Business process redesign;	Process modeling;
Case analysis;	Product development;
Process quality assessment and improvement;	Project design and evaluation;
Strategy planning and strategy creation;	Resource allocation;
Information planning, policy formulation;	Gaming and training;
Information system development;	Tourism planning;
Criminal investigation.	Financial planning and management.

Since the establishment of GSS facility at UDSM, many people have been introduced to the technology. More than 30 real sessions and demonstrations in more than 14 public and non-governmental organizations have been conducted. The Vice President, Dr. Omari Ali Juma and the Prime Minister, Hon. Frederick Sumaye were among some stakeholder who were introduced to GSS during the Dar es Salaam International Exhibition Trade Fair (DIETF'98) and the Parliamentary Budget Session in July 1998, respectively (see figure 1).

Other people who have participated in such sessions include some Ministers, Members of the Parliament, Principal Secretaries, Chief Executive Officers (CEOs), Directors, Managers, Consultants, Researchers, Students, Unemployed Youths, etc. Table 5 below gives a summary of some of the meetings.



Fig.1 Mobile and fixed facilities used at the University of Dar es salaam

Table 4: Summary of some GSS meetings in Tanzania

Organization	Topic	Participants	No. Position
UDSM	Identification of departmental income generation;		14 Academic staff;
NPF	opportunities Identification of strategies to increase investment income;		12 CEO, Directors & Managers;
BOT	Evaluation of training project portfolio;		12 Heads of Units of a Dept.
NCR	Progress Development of Information Systems for CRDB (1996) Ltd.;		8 Programers
TDL	Decision on the adoption of a Costing method;		5 Managers
World Bank (Tanzania)	Evaluation of a Capacity Building Portfolio;		14 Principal Secretaries Consultants, Directors, etc.
TBS	Improvement of Standards Preparation and Standards Quality;		15 Managers
WAMATA	Creating a good Counseling Environment;		22 Counselors

Table 4: (Continued.....)

NSWTI	Sexual Offences in Tanzania: A Search for a permanent solution	16 Tutors and Students
WAMATA	Causes for 'poor' communication or relationship between youths and parents/guardians	24 Unemployed Youths and Women (Housewives)
CBE	21 st Century CBE Vision and Corporate Planning	25 academic staff/Students
BP Tanzania	Anticipation Anxiety on Retrenchment Exercise	12 Managers
IFM	Computerization of Administrative Processes	12 Principal & Management
TSJ	Improvement of TSJ Management Leadership	8 Principal & Heads of Departments.
Ministry of Education	Causes for Shortage of Teachers in Tanzania	Permanent secretary, commissioner & Directors

The outcomes of the above meetings form part of the studies being conducted on the adoption of GSS in Africa. Though the outcomes are not yet conclusive, part of the results has already been published (Vreede *et al.* 1999).

At regional level co-operation, we anticipate that the GSS at UDSM may influence other organizations within and outside the country, particularly, in neighboring eastern and central African countries to the potential application of GSS. For example, in July 1998, the World Bank used this facility to facilitate a meeting on Nile River Basin Vision in which 10 member African countries were represented; in September 1998, the Malawi government used UDSM facility to facilitate the roundtable meeting on the national Environmental Support Programme (ESP). It is our expectation that the introduction of GSS at the University of Dar es Salaam may form a focal point for this region. We argue, therefore, that this project is not only significantly important to work groups, researchers, scholars, etc. at the University, but also to the other work groups in Tanzania, in the region and elsewhere globally. From this perspective, the project in GSS at UDSM should not be viewed as a short-term academic initiative but rather as a continuous long-term research project.

SETTING UP A GSS FACILITY

Technological options and requirements

A GSS is typically based on a network of personal computers, usually one for each meeting participant. GSS are run in a Group Decision Room (GDR) that may be Mobile or Fixed (figure 2). Sometimes participants work in a fixed group decision room, a room that is especially designed for electronically supported meetings. Such a facility often has carefully arranged seating and lighting, and a large public display screen.

Other times the participants simply move laptop computers into a standard meeting room and begin their work. The basic requirements for both options are a room, personal computers, a projector and a projector screen, connecting wires, a printer, and GSS and network software. But the much easier, less expensive and flexible option is a Mobile GDR. This option is ideal for meetings conducted away from a fixed GDR. Since the establishment of the facility at UDSM, the GSS facility is operational in both fixed and mobile modes. Both facilities support 14 users. The fixed GDR has 14 workstations (PCs) and the mobile has 14 Laptops.

Each of the two options described above has both positive and negative aspects. According to Mittleman (1996) and our own experience, the following is an example list of pros and cons of mobile and fixed GDR:

Table 6: Pros and cons of mobile and immobile GDR

Fixed facility Technical/Costs	Mobile facility Technical/Costs
Hardware is less expensive;	Meeting can take place anywhere;
Hardware is less vulnerable;	Fewer constraints on meeting room;
Room is usually more presentable;	Meeting table usually less expensive;
Shorter session preparation time;	Saves travel time for participants;
Room can be a show case for the host organization.	Facility is easier to offer to external groups.
Fixed facility (Social/Behavioral)	Mobile facility (Social/Behavioral)
Having participants in different environment can help them focus;	Participants can meet in environment they are used to;
Interruptions during the session are less likely.	Oral discussions are easier (closed laptops);
	Experts from the organization can be invited during the meeting if need is felt.

4.2 Personnel requirements

In setting up a GSS facility, two people (a facilitator and a chauffeur) are usually trained. The role of a meeting/process facilitator requires the application of group facilitation skills. The chauffeur or technographer must be technically competent to ensure that technical difficulties do not interfere with the content of the meeting and the participants are properly trained in using the technology. Although two people are usually preferable to keep technical and process responsibilities separate the two roles may be performed by one person.

Despite the overwhelming potential use of GSS (as stated in sections 3.1 through 3.4), the expenses involved in setting up a GSS facility in developing countries are high, especially for smaller to medium sized enterprises; for large organizations, GSS may be affordable. For other organizations that cannot afford to set-up their own facilities, they can rent services at much more affordable costs from other institutions.

5. CONCLUSIONS

The setting up of a GSS facility for the University of Dar es Salaam was prompted by the dire need to enhance the University's transformation processes, education processes and service processes as stipulated in the corporate strategic plan and an institutional transformation program "UDSM-2000." The major issues that are to be focused in this project include planning, policy development and capacity building.

This new technology has attained wide recognition because of an increasing need for groups to work together more effectively, technological progress in electronic networks and collaborative computing applications, and perceived effectiveness and efficiency improvements by groups using this technology. In view of the UDSM-2000 transformation program, the application and adoption of GSS has an added value to the University with respect to corporate strategic management and strategic planning, teaching and research. It is a facility that the University can apply for a variety of activities.

The potential of the GSS project at UDSM is that it is a long term project that may influence the way of working and decision making in organizations within and outside the country. This may particularly be the case in neighboring eastern and central African countries to which Tanzania is accredited but which have not yet exploited the full potential of the application of

GSS. On this basis, GSS is a tool that has a potential value for the social and economic development of Tanzania. The cost for setting up such facilities must be traded for the expected benefits.

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