A CASE STUDY REGARDING THE IMPLEMENTATION OF THE GDSS IN ACADEMIC AND INDUSTRIAL ORGANISATIONS

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Rezumat: Ideea de a construi un sistem suport pentru decizii de grup (GDSS) cu scopul de a sprijini luarea deciziilor eficiente şi prompte la toate nivelele ierarhice într-o organizaţie a apărut în anii 70. Principalul avantaj al folosirii unui GDSS s-a dovedit a fi, de-a lungul anilor, o mai bună înţelegere a procesului decizional prin implicarea tuturor factorilor de decizie în toate fazele problemei de la apariţie până la rezolvare şi interpretare. Cu timpul, GDSS a transformat activităţile de colaborare într-un avantaj competitiv pentru toţi actorii implicaţi: administraţie publică, mediul academic şi companii, contribuind la creşterea competitivităţii într-o vreme când cooperarea între diferite organizaţii şi autoadministrarea joacă un rol cheie în economia globală. În această lucrare, sunt prezentate şi analizate trei sisteme GDSS dezvoltate şi implementate prin proiecte de cercetare la Universitatea "Lucian Blaga" din Sibiu (ULBS) şi la alte companii cu profil industrial; de asemenea, se vor face şi recomandări cu privire la dezvoltarea altor sisteme suport pentru decizii de grup pentru diferite nevoi.

Cuvinte cheie: GDSS, platforme online, e-learning.

Abstract: The idea to build a Group Decision Support System (GDSS) to support the decision makers at all the hierarchic levels in an organization to take the decisions efficiently and just in time appeared in the '70. The main advantage of using a GDSS proved to be, over the years, a better understanding of the decision process through the involvement of all the decision makers in all the phases of the decisional issue from statement to solving and interpretation. With time, GDSS turned the collaboration activities into a competitive advantage for all the actors involved: public administration, academic environment and enterprises, contributing to a higher competitiveness in a time when the cooperation between the various organizations and the self-administration plays a key role in a global economy. In this paper, 3 GDSS's developed in research projects and implemented in LBUS (Lucian Blaga University of Sibiu) and other industrial companies are presented and analysed; we come also with recommendations on developing further GDSS for different needs.

Keywords: GDSS, e-platforms, e-learning.

1. Introduction

The computers can create virtual spaces that are used in an innovative manner: spaces for training, information, communication, collaboration, exploration, documentation, multimedia, word processing, illustration, simulation and virtual reality spaces.

The dynamics of the economic life and the informational explosion made it a necessary to use the various GDSS. The e-platforms for management represent today the indispensable instruments for the modern manager in spite of the limitations imposed by the impossibility to use the computers to reproduce exactly the human reasoning.

The most usual decisional activities, the large amount of the information needed for the decisional process together with the search and retrieval techniques for the required information are taken by these systems

The continuous improvement of GDSS doubled by the computers performance improvement offer more options for taking over of some of the increasingly comprehensive segments of the reasoning activities of the human decider.

A GDSS is an interactive computer system that facilitates the resolution of the unstructured problems through a group of people dealing with taking of the decisions.

The components of a GDSS include the physical support (hardware), a set of applicative programs (software), participants and procedures.

These components are made to sustain the decision making process. Assisting the decisions can be realized at management levels from the operational management to the top management, both individual and workgroup. [9]

We can define in this context some aspects regarding the functional characteristics for the GDSS [9]:

- GDSS assists the decision combining knowledge and human intuition with informatics.
- GDSS can assist more interdependent and/or sequential decisions, taking into account that in practice the most decisions are interrelated;
- GDSS sustains all the decisional process phases and can be adapted to the various decisional styles;
- GDSS is adaptable in time. The decider must have a reactive behaviour in using the e-platform, to refer the variation of the conditions and to adapt accordingly the system;
- GDSS promotes the learning and accumulation of new knowledge. This aspect leads to the new requirements and to the refinement of the system;
- GDSS is based on the standard models or on the models defined by the users. The shaping capacities of the system favours the experimentations in the context of several configurations;
- GDSS includes various analysing categories going up to the elaboration and selection of the scenarios;
- GDSS is an informational system created specials to support the group dealing with decisions. Therefore, GDSS must improve the decision making process or the group results;
- GDSS is easy to learn and to use. The users have the various knowledge levels regarding the computers and the decision support;
- GDSS can be created for a sole issue or for a many decisions at the level of organization of the group;
- GDSS is created to encourage activities such as: generating ideas, conflicts solving and freedom of expression;
- GDSS contains own mechanisms to prevent the development of a negative group behaviour such as destructive conflicts, lack of communication etc.

2. Characteristics and Features of the Platforms

A - e-Research Platform

This platform includes a number of procedures performed and the specific tools of research process designed to facilitate online research management, to facilitate dialogue (between clients and professionals), to enhance teamwork, to encourage the exchange of ideas and to design prototypes of new products. [8]

The website was created using Microsoft Visual Studio 2010, a free version of the code editor and editing applications are of the HTML and ASP programming language.

The applications for managing databases are built in Access, and statistical evaluation is accomplished through Excel applications. The access to general information and to information regarding the implemented projects within the centre is free.

The main window of access to the site, which is open on the activities menu, and the centre where you can access the pages related to: Product Design, Design Services, Product Design, Process Design, Maintenance as shown in Figure 1.

These pages contain general information about products, processes and services designed by the Research Centre.

Figure 1. Access page to the Center Activities

The access to the members' personal information: professionals, associates or customers, is secure. Each specialist, customer or employee can enter the database (Figure 2) by completing an application that is generated by accessing the "Application".

Each user receives a username and initial password from the platform administrator, which can be customized after the first login. On acceptance of entry in the database, it generates a message of acceptance and the new member receives the right connection space (login).

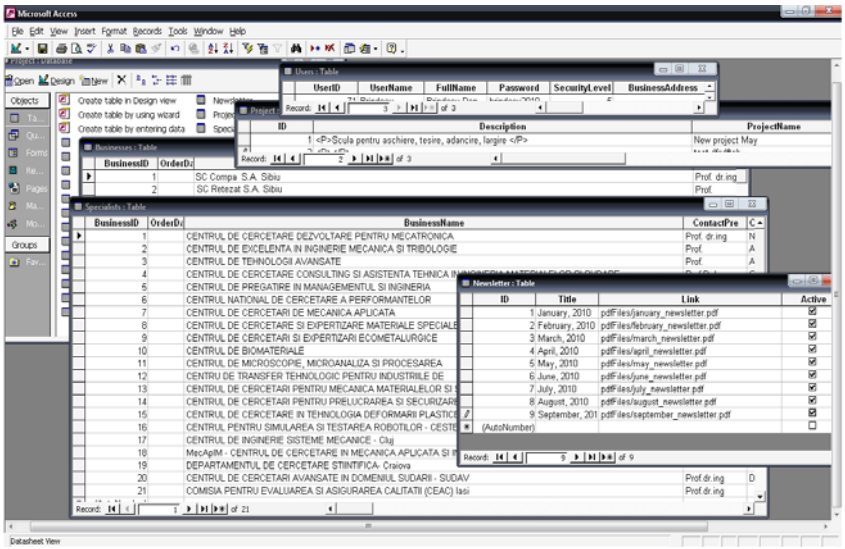

Figure 2. Tables from Access Data Base

B - eEduQuality

This e-platform puts in to practice the knowledge management paradigm and helps the organisations extend in a continuous way the knowledge database by stimulating the learning and innovating processes and by capitalising the results of these processes, to develop the capacity to transform nimbly and timely the available knowledge in successfully actions, all of these with a major impact over the quality management.

The main idea of this project was to develop a knowledge management system based on four knowing and learning tools, aimed at establishing a series of processes, procedures and methods with a direct impact over the quality management [2, 3]. The solution follows four stages that reveal, in essence, the complexity of the proposed methodologies and the techniques [2, 3]:

Figure 3. Main window of the eEduQuality platform

- The processes management concerns the whole cycle of activities of an academic institution and assures the automated and controlled implementation of the process, the integration of the various content management components, the definition of the events and routing indicators for the organisation and maintaining the overall policy coherence.
- The data management follows the consolidation, the organisation and the classification of the data volumes, making them in valid, consistent and up to date information.
- The impressive volume of structured and unstructured data is enriched and converted during the process, in smaller quantifiable units which correspond with documents management, data integration, knowledge management, collaboration, reports and reporting management.
- The knowledge management and the information integration technologies are essentials to manage the structured and unstructured information through whose instrumentality the good practices, the expertise and the information can be identified.
- The persons responsible with knowledge database in the organisation decide through adequate tools which are the relevant and needed elements in strategic decision making process. The Metadata management is very important. It is necessary to capture, administrate, reuse and transmit the metadata in the network in order to transport the precious information regarding the activities of the processes.

Figure 4. Main Administration window

The metadata management assures the possibility to exchange metadata, reports, impact analysis, content documents and at last, support and organize the compatibility between the general efforts and the regulatory framework (the mission and the achievable objectives).

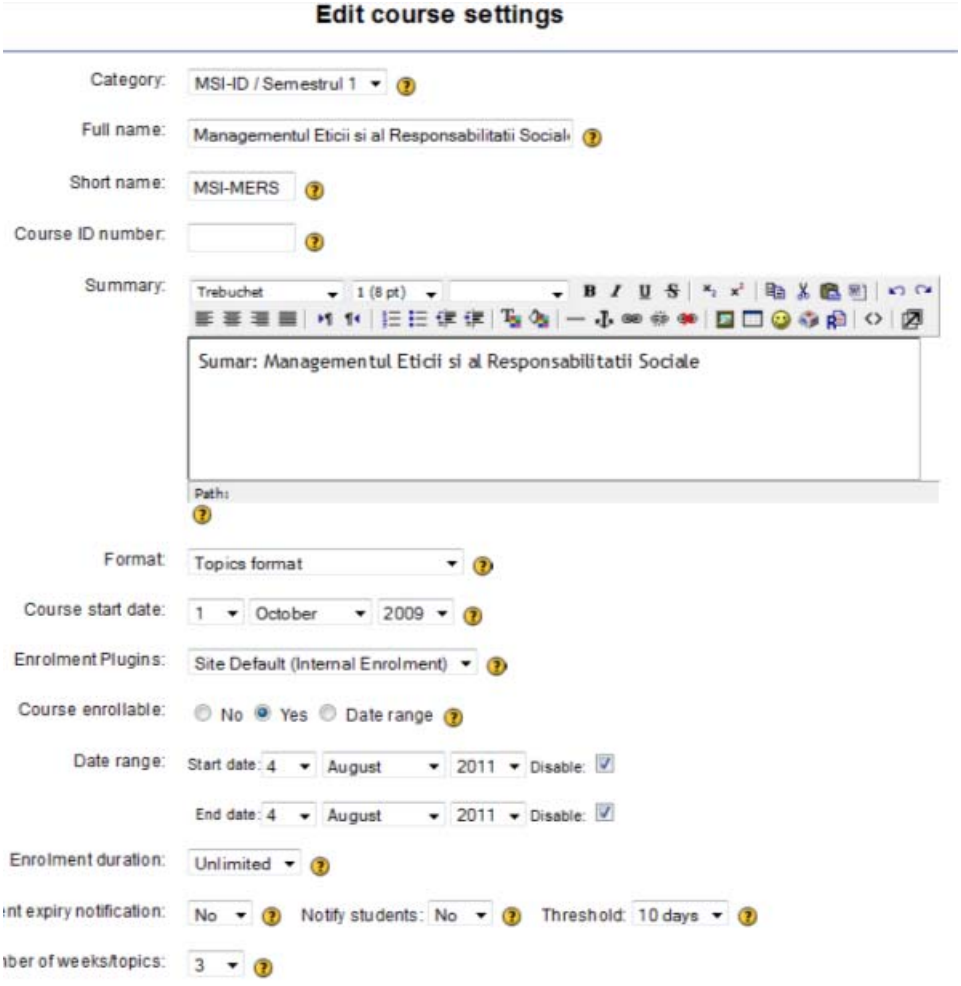

Figure 5. Courses database administration window

Figure 6. Q&A area (forum)

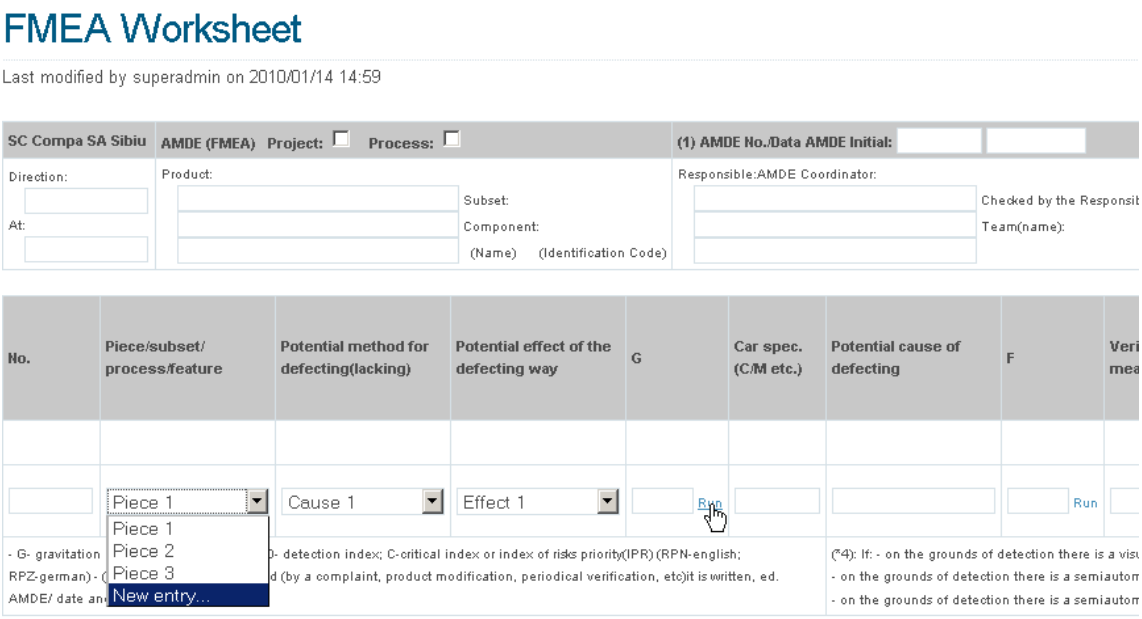

Figure 7. The FMEA window in idDesign platform

C - idDesign

The functionalities were described in the idDesign project, together with the industrial partner beginning with the FMEA (Failure Mode and Effect Analysis) procedure [1].

The project result is a software product which responds to the client requests: for each component part or subset the opportunities of failure, the cause, the gravity, the frequency, the detection probability, and the criticality is considering. (Figure 7) This flow resumes for each component part, subset, function, process but also when it is necessary to improve the criticality mark. The FMEA procedure result is to avoid the design errors before releasing a new product, a new production line or a new technological process.

The access of the users to the platform components is guaranteed through a browser and by implementing a Single Sign-On technique (SSO) – the user is recognized by the system when it will access the DSS system if it was identified in a FMEA Procedure and vice versa (Figure 7) [1].

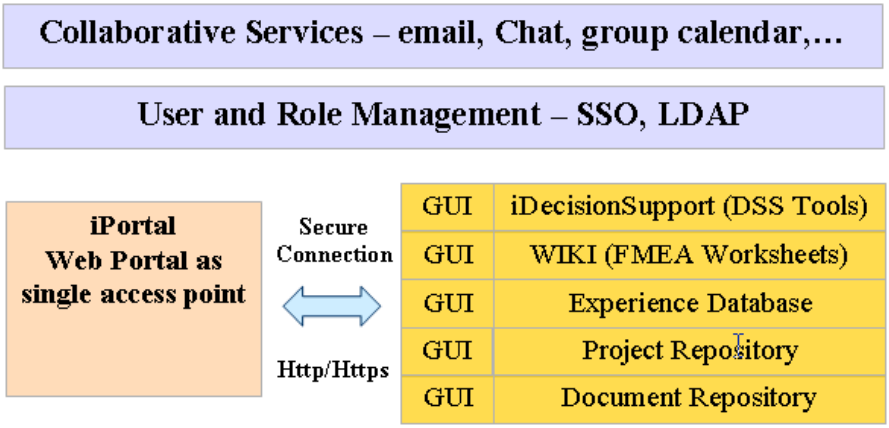

Figure 8. The components of idDesign platform

3. Organisational Impact

Using the methods and the tools inspired from the social and behavioural sciences, the users of these platforms have the opportunity to interfere directly in the decisional process and to understand the consequences of their actions, improving in this way the practices and the knowledge of the entire group.

In this manner, the group is able to assume the adequate technological solutions in terms of their approach and not only the ones imposed by the system designers. This will contribute in a significant way both to extending the acceptance and to understanding the collaborative technology.

The collaborative work is taken as part of the group activity. There is an implicit assumption that the group activity is directed to a goal shared by all the members. There are elements of social interaction of work and performance of simple tasks (to work effectively in teams requires a degree of trust between members), as with other forms of group activity.

Regarding the social impact, if we take into account the organisational culture as an ensemble of shared values and beliefs, then the collaborative culture can be something like the deep values of the "workplace", where the consensus, the ownership and alignment in all aspects of the organisations can produce trust, integrity and the discovery of important results.

The implementation of these platforms led to an increased adaptability of the organisation to the changes and the requirements of the external environment. By involving both policies makers and the various functional departments in using the GDSS, there is a growing awareness of the objectives, creating a framework for collaborative management.

The GDSSs presented here facilitate several types of collaborative activities such as:

- Understanding the problem and the scope: better understanding of the issues and a particular situations or a potential scope by elucidating in a collaborative way of the main dimensions and components.

- Strategic analyse: achievement / steering of a collaborative strategic analyse (SWOT).
- Generate alternatives and unstructured assessment: collaborative generation of alternatives for a problem or result and develop an assessment structure.
- Creating evaluation criteria: generating in a collaborative way the assessment criteria (based on the participants' requirements, values and interests) to evaluate the proposed alternatives.
- Multi-criteria analysis: collaborative assessment of the alternatives based on the criteria established during the previous phases.
- Projects planning: collaborative planning of the projects and their structure.
- Collaborative monitoring and evaluating of the projects.

To analyse the impact of using GDSS in an organisation both the advantages brought by these solutions and the boundary and chances of failure were assessed so that the decision to implement a GDSS can be transparent.

An external factor taken into account was the human factor because the GDSS implementation can influence the professional life of the users.

Also the presented GDSSs were seen as a part of the global information system existing in the organization because their implementation contributes to the entire organisation evolution.

The benefits of the GDSS implementation were:

- Improving the individual decisional capabilities by learning of the new methods and things;
- The acquisition of the knowledge from other experts who worked in the past with these systems or with similar systems.
- Increasing the confidence in the quality of their decisions for the users.
- Increasing the work productivity by extending the information processing capacity of the decider.
- Increasing the quality of the proposed solutions.
- Increasing the objectivity and impartiality in establishing the assessment criteria and implicitly in the assessment process.
- Self-controlling the system as a whole.
- System structure adaptability to the group, issue, and context.
- Complete management of all the users, the on-going projects and the various documents.
- The possibility to use the efficient mechanisms for voting and brainstorming.
- The information sharing resulted in a shared use of data, texts, knowledge that are accessible both to the individual users who fulfil their current tasks and to the members of the decision maker group.
- Build collaborative technical documentation, reports and other documents, including multimedia documents.
- Monitoring the on-going projects using the dedicated and specialized software tools. Here are included the proposed objectives, the activities required to achieve the goals and the involved resources.
- Sustaining the electronic conferences using the new opportunities offered by IT&C tools.

The beneficiaries of the presented platforms were able to participate in ideas exchanges during the virtual workshops and discussion group from the conference room or from their desks, without this affecting in any way interactivity of the actions

- The management of the messages using the systems that are an extension of the classical e-mail facilities and represent communication gates both inside and outside of the organisation.
- Assisting in setting up the workgroups with specialized software to coordinate the undertaken actions and establish the persons which can be included more efficiently in a team with a particular leader.

The limits of the presented GDSS should be considered besides the benefits:

- The use of a GDSS does not imply the lack of the manager decision. The manager will be facing a potential failure.
- The lack of such qualities: creativity, intuition, sense of responsibility (very important in the decision making process at the strategic level)
- The allocated budget for the GDSS implementation.
- Relative inflexibility due to the scope for which they were designed.
- The necessity to interconnect and to interface the GDSS with other existent systems in the organisations.
- The cultural differences between the designers and the users.

With these limitations a number of factors of resistance to the implementation and use of these systems were noted.

It was found that despite the platforms give a series of technical facilities; they are used with limited and small effects.

Various staff has resisted to the introduction of systems for various reasons. We identified a series of seven reasons for resistance:

- The insufficient knowledge in using computers;
- The fear of losing the authority;
- A new approach in problems solving: before – solving based on intuition and now based on an analytical model;
- The diminishing of the importance and the frequency of the traditional meeting forms (direct reunions and verbal communication);
- The insufficient involvement of the manager in the system design;
- The impression that the GDSS is not an investment on the contrary is an expense;
- The cultural and qualification differences between the systems developers and the users (especially the professional language used).

All of these aspects are very important and must be treated because both the direct beneficiary and the invoices payer is the manager. For these reasons, the new system must be “usable”, “useful” and extensively „used”.

Two major groups of effects were observed after the implementation of GDSS: direct effects over the decisional activities and indirect general effects.

Direct positive effects:

- The automation for common and routine operations – resulting in more time dedicated to creative activities.
- Reducing the dependency on the decision makers of other experts.
- Reducing the duration and the number of the decisional meetings because of the increased mobility offered by the systems (the platform can be accessed from anywhere and anytime).
- Diminishing the importance granted to the decision makers experience – by saving the experiences and by a very well exploitation of the computer systems.

Direct negative effects:

- Dehumanization and isolation tendencies.
- The danger of excessive confidence in the information and suggestions provided by GDSS.

Indirect effects:

- Improving the quality of decisions, increase proactive decision.
- Increasing the number of knowledge based workers.
- The need to change organizational structure.

4. Conclusions

A - eResearch Platform

In order to achieve a fair and an effective planning of a project within a virtual research centre it is necessary to have the following databases:

- The database that contains general engineering knowledge (primary and specialty) and liaise with experts in the field;
- The database with information on staff (qualified people, location, contact address, scientific skills, managerial skills, labour costs);
- The data base which includes laboratories and opportunities available to investigate, research, experiment, and model in these laboratories;
- The database on equipment, licensing, precision level, input parameters, output parameters, user training required, running costs, consumables: (characteristics, quantity, unit price);
- The database which contains the existing software.

This information will be used to complete each activity needs of the research projects to be carried out based on the methodology of project management.

B - iDDesign Platform

The degree of applicability is very large because the theme addressed is seen as fundamental to the national and international level.

The main categories of beneficiaries are: industrial organisation, design companies,

manufacturers, research companies, universities, SME.

In this project taking some case studies for the applications presented and conducted in the master programs: ("Industrial Management", "Quality Management", "Manufacturing Management", "Computer Aided Design and Manufacture") is envisaged.

C - eEduQuality

Implementing e-learning systems leads to an improvement of the quality both for the academic management and academic education by:

- Reducing the technical and performance gap between the academic institutions;
- Facilitating knowledge and applying the national and international standards in quality management field for the academic organisation;
- The equal participation at the informational society for all the actors involved in the educational process;
- Dissemination and provision to the academic and scientific community of the results of the research;
- Creating a favourable environment by crystallisation of a "knowledge sharing" culture, to a tacit transfer of knowledge.

The above presented GDSS combines the advantages of adopting decisions at the organizational level with the benefits related to shortening the time necessary to take such decisions.

The applicative research conducted in order to develop and to implement the presented platforms is found at the boundary between infrastructure and services.

The use of these platforms facilitates the electronic activities such as: e-Business, e-Commerce, e-Manufacturing, e-Government, e-Health end e-Learning.

Acknowledgment

The authors would like to acknowledge the support of the project PN2 - SEARCH - 12080/2008.

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