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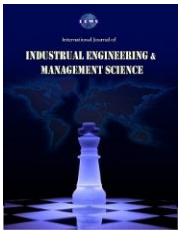

Soft systems methodology approach to IS change management

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***Keywords*:**

1 Soft system methodology
2 Change management
3 Information system

A B S T R A C T

This paper shows that how soft systems methodology was used to restrict and improve the traditional change management in the case of information system. It discusses the relationship between soft systems methodology and IS change management, examines the problems faced in using this methodology in action research and discusses how soft systems methodology could be effectively applied by management to manage changes in information system project effectively.
The change management model could be used in the case of information system changes. The changes that are complex, somehow unknown ,vague and of a social nature they can be identified through making the soft systems methodology part of the change model and through the active participation of involved parties. Lastly, the framework could be adapted to fit a specific organization's circumstances. This can be achieved by reflecting on previous change processes and learning from past experiences. If necessary, enhancements or alterations could be made to the framework.

1. Introduction

Soft Systems Methodology is a potentially powerful approach to facilitating the management of deferent aspects of Information Systems. The major 'SSM-in-IS' research streams have, however, concentrated upon the application of SSM to Information Systems Development. The application of SSM within the broader field of IS change management is relatively undeveloped by comparison. First it requires research on treating the Information System change management and its wider environment as a 'Problem-Situation-to-be-Improved' and applying the principles of SSM towards that end. Second, there needs to be an improved way of transferring the resulting set of SSM-based principles for IS change management into the practice of everyday IS change managers.

Dealing with change is one of the most fundamental challenges facing Information Systems professionals today. Despite the great need for a comprehensive solution to the problem of managing change, no such solution has yet been found. As information systems consist of both deterministic (the hardware and software) and non-deterministic subsystems (otherware) , changes of both deterministic and nondeterministic nature result from the implementation of

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information systems. Following only a mechanistic approach towards managing information system change would thus seem inappropriate.

This paper proposes a comprehensive model for managing information system change in organizations.

Changes Driven by Projects

The literature review strongly suggests that change is an inevitable consequence of implementing various projects. A project is a temporary and unique group of activities with the beginning and end in time clearly mapped out and designed to accomplish defined goals [2] Although project management (PM) and CM are derived from different terminologies and different methodologies [3], they are, nevertheless, tightly linked and co- dependent. They also emphasize different sets of skills and competencies [4].

According to the Project Management Institute (PMI), PM is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. It is accomplished through the application and integration of PM processes such as initiating, planning, executing, monitoring and controlling, and closing [2]. PM is the disciplined application of knowledge, skills, tools and techniques to project activities to meet the project requirements [2,11].

CM is the process, tools, and techniques to manage the people-side of change to achieve the required business outcome. CM incorporates the organizational tools that can be utilized to help individuals make successful personal transitions resulting in the adoption and realization of change (By 2005). CM contributes to the successful implementation of a wide variety of projects.

Not only does project success utilize the traditional measures of project performance but it is also associated with change management [4]. Both PM and CM support moving an organization from a current state through a transition state to a desired future state [5]. PM focuses on the tasks to achieve the project requirements.CM focuses on the people impacted by the change.CM in the context of PM can be examined from two perspectives. The first one describes changes occurring in the project itself, e.g., a change of a project goal or its scope. Each addition or deletion to project goals or to project scope is considered to be a change, whether it increases or decreases the project cost, schedule, or quality [6]. In PM context, CM may refer to a PM process wherein changes to the scope of a project are formally introduced and approved. In this context change management in a project is seen as a creation of procedures that enable the implementation and acceptance of changes to the project itself. The other perspective

refers to changes which have to be implemented in public organizations before or during implementation of IS projects, e.g., an introduction of a new IS will require changes to procedures or workflow. This paper focuses on CM in this very context, i.e., changes that result from the implementation of IS.

Change Management in Information System Projects

Change management is a process that helps organizations in the implementation of an appropriately planned change [7,8]. CM in the context of IS projects is understood as activities, processes, and methodologies that support employee understanding and organizational aspects during the IS projects [9]. CM refers to all activities associated with the interaction of technology,

processes, and people [10]. Academic research has shown that it is not the technology that provides an organization with a success, but the integration of technology into an organizational

change management process [3]. This approach takes into account the importance of people in an organization.

A successful IS project requires, among other things, a human resource strategy to improve the necessary employee skills and their engagement in the process of CM [1]. Moreover, IS project very often requires reorganization of processes in operation at this point of time. In turn, reorganization of processes is strictly connected with a need to implement the CM concept [11,12]. Some authors, who also consider

public sector changes, point at the fact that these changes may not be more difficult than those in the private sector, but for sure they are different [13]. It can even be stated that CM is a key to success of public organizations IS projects [13, 14].

The literature on project success factors has been relatively quiet about the role of change[3]. In addition, PMI, for example, which offers training on project management, does not account for changes brought along with the project. Various practical reports, e.g., The Economist (2009) and PWC (2007), and academic studies suggest that practitioners recognize projects as a structured way to implement business changes[15,16]. Nonetheless, CM has continued to have a relatively small representation in the project management literature.

Global dimension of information systems and change management

Globalization is a recent trend in the world economy. Global sourcing allows natural and human resources, and financial capital to be transited across borders. Information systems and information technology (IT) play an important role in this movement. The ever decreasing cost of computer hardware and telecommunicating devices encourage the remote work and telecommuting. The advancement and accessibility of the Internet created an efficient and economical network for the world. All of these new information systems and IT created evolutional changes within the world business and economy.

Offshore outsourcing and change management

A controversial issue caused by the global sourcing is offshore outsourcing. As western countries seek low cost labor in foreign countries to implement, support, and operate their information systems, a big portion of domestic IT jobs have been shifted to countries such as India, China, Malaysia, Philippines, Russia, etc. The movement of offshore outsourcing created dynamic organizational change; therefore, its economic, psychological, political, and managerial effects can be identified and measured. Also, there are plenty of risks caused by outsourcing, for example, political instability of the country and lack of intellectual property rights protections may be the subjects for change management research.

Innovation and change management

Innovation is a crucial competitive strategy within modern business world. Successful innovation leads the market direction and customer demand. Authentic innovation is the driving force for not only individual companies but also entire economy and society.

Companies and business managers must realign their strategies, process, resources, technological infrastructure and culture to welcome the challenge of innovation. Innovation is also an emerging research theme inbusiness and information systems disciplines. For example, process innovation involves many business and information technology changes, such as reconfiguration, relocating, reducing, reassigning, and retooling. Thus, innovation research is part of information systems and change management disciplines.

Information systems economics and change management

The process of information system change management needs to be guided and monitored. Various planning and controlling activities need to be identified before IS change management is realized. During the change management process, all related outcomes should be measured and collected for monitoring analysis. Therefore, topics such as cost analysis and economics of change management, measuring change management, business intelligence, and knowledge management become part of this research area.

Social and cultural related issues

Information system change management involves social and cultural issues. These issues are closely related to research studies generated by organizational changes. Since information technology changes that are instigated by the development of the internet, e-business, and mcommerce, its social and cultural impacts need to be observed and studies. Moreover, this group of research should include human resource management as well.

Critical Success Factors for Change Management in Information System Projects

In the literature there are several definitions of CSFs. Leidecker and Bruno(1984) described CSFs as a set of characteristics, conditions and variables which should be adequately sustained, maintained, or managed in order to affect success factors of an organization competing in a specific industry [17]. Rockart and Bullen (1981) [18] defined the CSFs as the restricted number of fields in which positive outcome will result in "successful competitive performance" for employees, organizational units, and an organization as a whole. According to Ramaprasad and Williams (1998) [18], the CSFs should be used in three crucial areas including PM, information systems implementation, and requirements.

CSFs for CM in IS projects have not been much explored in the literature. There are many authors describing CSFs for CM [19,20,21.22.23.24]. However, there are not too many describing CSFs for CM in IS projects.

The following paragraphs present a comprehensive explanation of the CSFs :

- **Top management support**. Top management support helps formulate and establish quality policies and objectives, provides resources and training, oversees IS implementation at all levels of the organization, and evaluates and revises the policy in light of results achieved [25,26] .
- **Recognize the change**. Recognizing the change helps understand what exactly will be changed and whom the change will affect [20] . The change needs to be defined clearly. The appropriate identification of changes determines changes in organization's processes and the employee's tasks and responsibilities. As a result, it sets a direction of organization's development.

- **Shared vision for change**. Shared vision for change is important to direct the system change effort and to serve as a foundation from which specific strategies need to be developed for arriving at a future end-state[26] . The change agents must ensure that the organizational stakeholders understand the vision of how the IS will be able to transform the organization. It is very important to have a clear vision and objectives for organizational success, especially during times of increased uncertainty, such as a change process [27] . It is also very important to understand the current state of the organization that can be viewed as the platform from which the CM plan will launch [28] .

- **Planning a project**. Planning a project as a change involves managing human and other resources. A clearly documented change management process helps make a map of the tasks and resources required [28] .

- **Managerial activity**. Commitment of line managers to CM creates a situation that they identify with a change. They also manage the time of their subordinates accordingly, accounting for their involvement in change processes in their ssignments [25] .

- **Effective communication**. Effective communication is crucial for effective CM. Without proper communication, the employees involved in the change process would not know what changes were made, what changes are being made, what changes should be made. Moreover, the employees would not be aware of their tasks related to the implemented changes. Communicating the message repeatedly up, down, and across the organization is necessary to ensure that the momentum and enthusiasm for change does not diminish over time [20] . Communication by top management is seen as a powerful leverage in gaining commitment and building consensus about the required change [29] .

- **Organization readiness to deal changes**. This factor reflects employees' perceptions of the extent to which an organization is ready to make changes to improve performance [27]. Dealing with a change helps provide better understanding of forthcoming changes by employees.

- **Employees training**. Employees' training was identified as important, but it is very subjective in nature [25] . Employees' training is a clear demonstration of how to use the IS. After conducting training, employees will gain initial experience with the change, and as a result the initiative will bear an impact on them; they may demonstrate greater understanding and support for management and the planned change effort [27] .

- **Employees involvement**. Employees' involvement is very important in CM success. Employees' involvement is the degree to which employees participate in the improvement activities. By engaging employees in the change processes, they identify more with the success. Employees' participation is a degree to which employees believe they can make decisions about how they perform their tasks and work [27] .

- **Employees satisfaction.** Employees' satisfaction is the precondition for successful change implementation connected with IS projects. Satisfaction is not fully felt until the employees get used to a new IS. At the beginning, there is always a noticeable resistance to change [30] . Thanks to the training of employees, the resistance can be quickly overcome. Moreover, the enhancement of information flow on changes diminishes the resistance.

- **Information flow**. Organizations improve their ability to be informed about running a project by providing better access to data [31] . Not only should organizations provide

access to data, but the available data should be consistent, timely, and accurate. Besides there should be information sent if any changes in data occurred.

- **Performance measurement**. Performance measurement is a critical factor for the success of IS projects [32,33] . Implementation progress must be measured regularly for more efficient and effective control. Through monitoring and feedback from the users, the performance of the change process can be reviewed and evaluated to see whether it is achieving business goals and bjectives.

Types of Changes

The Change Management Procedure applies to all types of changes related to the IT environment. The following is a description of each of the types of changes that can take place and the rules that apply to each.

- **Application Changes -** Changes to any application code that is running on or linked to by any hardware or software in the IT environment. These changes are typically made to enhance the function or performance of or to fix a known error in the IT application environment. These changes cannot be implemented without approval of the owner of the application and cannot be requested by any programmer other than the one assigned to the program. Assignment of Risk Category Level of the change is to be a joint effort of both the owner and the Change Implementer.

- **Hardware Changes** – All IT and IT support equipment installations, discontinuances and relocations are controlled by the Change Management Procedure. This activity can be requested by anyone but must have the approval of the Operations Manager.

- **Visual Image Changes** – Changes to the "artistic" presentation of web pages are not required to make entries into the Change Management system. Changes to "Active" areas of the web page are required to use the Change Management procedure.

- **Software Changes -** The criteria for entering a software change into the Change process are based upon the effect that the changes may have on the IT support resources. If the changes affect the system, users or the support staff there is a requirement to enter it into the Change process. If the change is made for the exclusive benefit of the requester and if failure could not affect anyone else, that change would be exempt from the Change Process. For example, a change made by a programmer affecting a procedure or a program under development on a test application requires no entry. However, when stand-alone test time is required on a production system, a change request form is required.

- Typically, software changes would include changes to the Operating System, Vendor supplied Program Products, e.g., Visual Studio, Java, etc. or common application support modules. However, during the last two and first five workdays of each month changes are restricted to emergency and critical necessities as determined by the Director of Information Technology.

- **Network Changes -** All installations, discontinuances and all relocations of equipment used for IT teleprocessing communications are entered into the change process. This includes all routers, switches and telephone lines as well as Personal Computers if they are connected to the network.

- **Environmental Changes** - Environmental changes normally involve the facilities associated with the IT Installation. These facility changes include items such as air conditioning, chilled water, raised flooring, security, motor generators, electricity, plumbing and the telephony system for voice and data. For example, when there is a planned weekend power outage initiated by the local power company this information is submitted to the Change Management Process a minimum of two weeks prior to the scheduled outage and communicated to management, staff and the user community.
- **Documentation Changes** - All procedural changes to the standard operating procedures will be implemented through the Change process. Also, all permanent deviations from the published schedule time for running of production applications will be communicated through the Change Management system.

Principles of SSM

Many systems are of the type where very precisely defined information will solve particular problems. DFDs can be useful in such situations to indicate the aims of the organisation and how the information is going to be used.But many problems in organisations are not of this type, An awareness that an organisation has problems may not be enough to produce an agreed definition of what those problems are. Useful change may have as much to do with altering organisational objectives or culture as with obtaining ever more detailed information requirements.

Objectives and culture are relatively fuzzy issues which are difficult to define precisely. It has become a common worry in the fields of systems analysis, management science and operational research that there should be some way of drawing some conclusions about them, even if it is difficult to get an agreed consensus about them.SSM is one of a number of approaches which are used to give some order to these fuzzier problems, or ‘messes’. Its relevance is that it is a technique which has attracted the most academic debate and because attempts have made to link it to the creation of information systems.

Unstructured Problems and Soft Systems

SSM was developed at Lancaster University during the 1970s by research teams who had originally been trying to develop hard solutions to problem-solving in organisations. Their aim was to model human activities in such a way that problems could be taken from the social sphere and strictly defined in terms of clear, unambiguous objectives. This approach was found to be too mechanical a way of looking at human activities systems. For one thing, it was often found that single, precise problems could not be found: "... the starting point for the systems engineering process is often only a feeling of unease, an awareness that things could be better than they are." [33] . Conventional, hard systems approaches depend for their effect of clear objectives being defined so that it is possible to end up with a set of information requirements which can form the basis of a computer program. If the problem owner doesn't appear to have such a clearly bounded problem, then further investigation of the situation is needed.

The difference between hard and soft systems thinking is in their treatment of differences of opinion. A hard systems view will see the organisation as having certain interests which must be satisfied if it is to survive. The IS specialist is therefore a designer of the means of satisfying information requirements, whether by direction or consultation. Thus, the idea of systems as transforming input to output is implicit in SSADM but world views do not have a place; they are considered political

and therefore outside the remit of the analyst. A soft systems analyst will tend to be more of a facilitator than a designer, encouraging people to explore their own and other peoples' views in order to generate ideas about change. Under these circumstances it becomes extremely relevant to model different views of a situation rather than looking for a single correct version

Soft systems methodology (SSM) was proposed by Peter Checkland as a model for implementing "soft" system thinking. Although originally developed as an OR technique, SSM has long been associated with information system analysis. Generally labeled as an 'interpretive' approach, SSM views system analysis as "a process of inquiry into problem situations of human affairs" and explicitly recognizes the multidimensional nature of information system rationality. As such, this methodology does not seek to define the 'best' systems. Instead, it aims to better meet the diverse needs of various stakeholders by exploring the problem in a forum that encourages discussion and debate among all the parties. Premised on the concept of social construction and incremental organizational learning, SSM allows relevant human, social, political, and cultural factors to form structure and act as explicit entities in the system analysis process.

The basic model of SSM consists of seven steps that guide the analysis process moving from the 'real world' to the 'conceptual (systems) world' and back again, but these stages are not necessarily followed in a linear fashion. The seven steps are shown in figure 1.

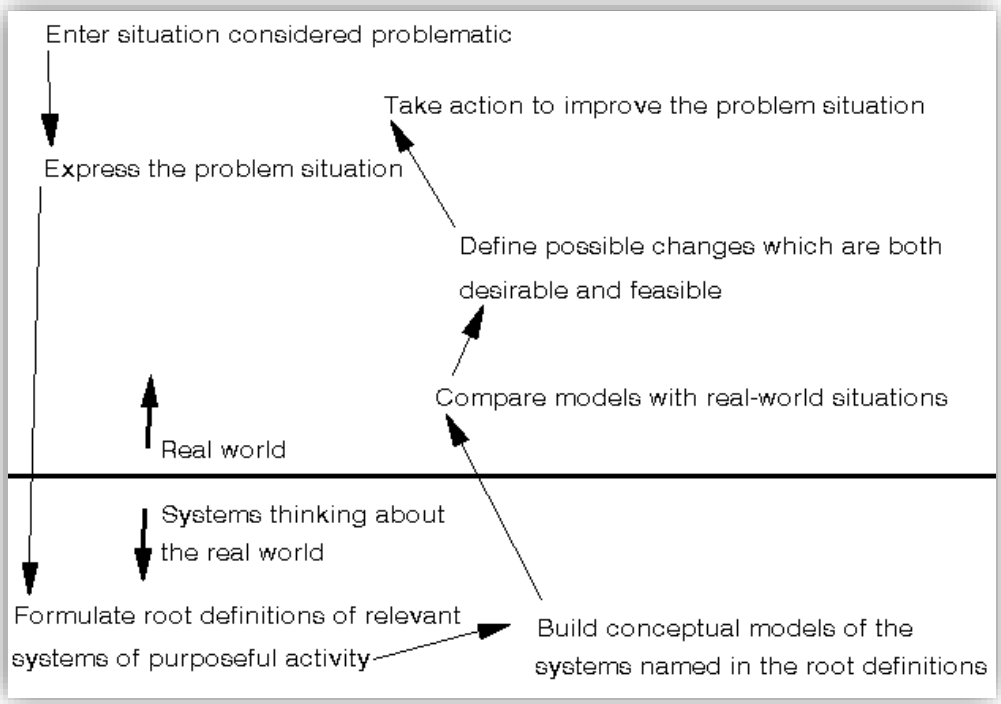

Fig. 1. Basic Model of SSM

Stages 1 and 2: Finding out

These stages create a 'rich' picture of the problem situation and identify the 'soft' elements within it:

- People - essentially all those have interest in the system or who are likely to be affected by changes to it
- Culture - social roles, norms of behavior, values
- Politics - commodities of power and how they are obtained, used, preserved and transmitted

Stage 3: Developing the root definition

At this stage, the analysis process enters the system world by developing root definitions. Root definitions are basic descriptions of the proposed system. The development of the root definition is often combined with **CATWOE** analysis to answer the following questions:

C Who are the *customers*/victims/beneficiaries of the system?
A Who are the *actors*/participants in the system?
T What is *transformed* by this system: Input --> *Transformation* --> Output?
W *Weltanschauung* /*worldview*:
What are the underlying assumptions of the system?
O Who is the *owner* of the system? Who ultimately control and pay for the system?
E What are the environmental constraints to the system?

There are two types of root definitions:

- "Primary tasks" root definitions, focusing on officially declared tasks of the system
- "Issue-based" root definitions, focusing on problem issues, which would lead to systems that are not likely to be institutionalized in the real world.

Stage 4: Building conceptual models

At this stage, the root definition is converted to a conceptual model defining how the system functions and how it achieves its objectives. These models are often stated using active words to describe what is happening within the system. It is also desirable to present the model in pictorial or flowchart form to clarify the interlinked activities.
In addition, the conceptual model should also contain a monitoring and controlling subsystem to monitor:

- The *effectiveness* of the system (Is this the *right* thing to do?)
- The *efficacy* of the system (Does it *work*?)
- The *efficiency* of the system (Does it use the minimum resources necessary?)

Stage 5: Comparing models with the real world

This stage is designed to provide structure and substance to an organised debate about improving the current situation. At this stage, the analysis process goes back into the real world by comparing the conceptual model with what happens in the real world. SSM provides a systematic way to conduct the comparison by asking a series of ordered questions for each activity depicted in the conceptual model:

- Does this happen in the real situation?
- How?
- By what criteria is it judged?
- Is it a subject of concern in the current situation?

Stage 6: Identifying changes

This stage defines the desirable and feasible changes based on the analysis in prior stages. In the ideal situation, the changes should cover all aspects of the system being analyzed and the viewpoints of all participants. However, projects in the real world are always subject to schedule and resource constraints. As a result, system analysts have to make decisions to prioritize the various requirements.

Stage 7: Taking action

This stage puts into practice the most appropriate changes identified in the previous stage. In the case of IS projects, this stage represents the development and implementation phases.

2. SSM in action: creation an IS change management system

The purpose of this paper, is to ensure that the negative impact of changes to a company's Information Technology system is minimized. It must never be the case that ad-hoc changes are made to the system or to procedures without some oversight. This idea must originate with senior management and be passed down, with no exceptions, to everyone in the company. Without backing at the highest level, the CM is a useless waste of time and money. With proper backing, this program will save your company from some very costly errors.

Root definition of the problem can be seen as below:
"A system to respond to the customer's changing business requirements while maximizing value and reducing incidents, disruption and rework due to available technology and contracts"

The CATWOE elements to such definition is:

C buyers of IS/ customers
A project manager/system analyzers/ programmer
T needs for changes → accept / deny changes→ implement / not implement changes
W there is ability to organizing to respond to the changes
O stakeholders/ business managements / Change Advisory Board (CAB)
E technological constraints/organizational structure/ contract requirements

Due to the root detention and CATWOE analyze in the previous stage , the below steps is design to have an effective information system change management:

Step 1: Develop a Request for Change (RFC): This may originate from problem management where an issue, or a series of related issues, is identified and a mitigating change is necessary to prevent (or minimize) future effects. The RFC may also originate as a result of a business decision that will require some modification (add, delete, change) to the supporting technology. An RFC may also be necessary due to outside influences (i.e. governmental regulations or changes made by business partners).

Step 2: Obtain Business Change Acceptance: The decision to make a change is typically a business decision where costs vs. benefits are weighed. Even in situations where the change is strictly infrastructure oriented (component or system failure) the decision to spend money resides with the business, not with the IT department. There are occasions when procedures are developed in advance to preauthorize changes such as emergency system maintenance, but regardless of the timing of the authorization, the decision still rests with the business management.

Step 3: Initiate the Development Project: Development of the change (including testing) is an IT-guided function. In the event of an emergency change (server is down) those functions are typically predetermined. When a new system is to be developed, there is a collaborative effort between the business users and the IT team. The systems are designed by IT, the design is approved by the business partners (users), developed by IT, tested by a combination of IT and the users, and the final product is approved by both. Careful attention must be given to ancillary effects the new change may have on existing systems.

Step 4: Pass the Change Management Gate: The Change Advisory Board (CAB) reviews all changes before they can be put into production. Normally, the CAB will consist of a group of people with different perspectives, backgrounds and areas of expertise. Their function is to review the change from a process and governance standpoint to assure that all foreseeable risks have been identified and mitigated, and that compensatory techniques are in place for any elements of exposure (things that could go wrong). The development team and the change sponsor will present the change to the CAB. Evaluation of risk will be the focus. Implementation strategies, communication to affected stakeholders, backup plans and post-implementation monitoring are elements on which the CAB is required to focus. The CAB is not responsible for determining if the change is appropriate – that decision has already been made. The CAB is also not responsible for determining if the change is cost effective. Again, that is strictly a business decision.

Step 5: Implement the Change: If the CAB does not approve the change, the reasons are listed (this is always because certain risks have not been mitigated or communications have not been planned) and the development team will be given time to fix those issues and reschedule a meeting before the CAB. If the change is approved, the implementation is scheduled. It is not normally the case that the CAB is represented at implementation although it is possible that some members of the CAB have expertise that is necessary during the implementation, but they will not be present as official CAB representatives, but rather as subject matter experts (SME). How the change is implemented, the checklist and steps, are predefined and were presented to and approved by the CAB. The entire process must be thoroughly documented and the approved process must be precisely followed.

Step 6: Report the Results: Either the change was implemented successfully with no issues, the change was implemented with issues that were corrected during implementation, the change was implemented with issues that were deemed acceptable, issues arose that were unacceptable and the change was rolled back, or in the worst case the change was implemented with unacceptable issues and could not be rolled back. Whatever the result, that is documented and returned to the CAB. The CAB is then responsible for distributing that information to the stakeholders and for storing and maintaining those results in the Change Management system (that may either be an automated database or a paper filing system, but the documents must be maintained for audit purposes).

Step 7: Link Problem Management to Changes: Issues that arise should be compared to the CAB documentation of changes so any unanticipated adverse effects of a change can be isolated. It is often the case that undesirable effects of a change are not noticed immediately, but are identified by the emergence of problems in ancillary systems. For example, the addition of several fields to a database might not have a direct negative effect on the users but could impact network performance that would be apparent to other users who are not directly involved with the modified system.

Step 8: Periodically Audit the CM: At least once each year an audit of the CM should be conducted to assure that all change documentation is maintained and available. Every change approval document should be examined to assure that the proper signatures are in place and that the results of the implementation are properly documented.

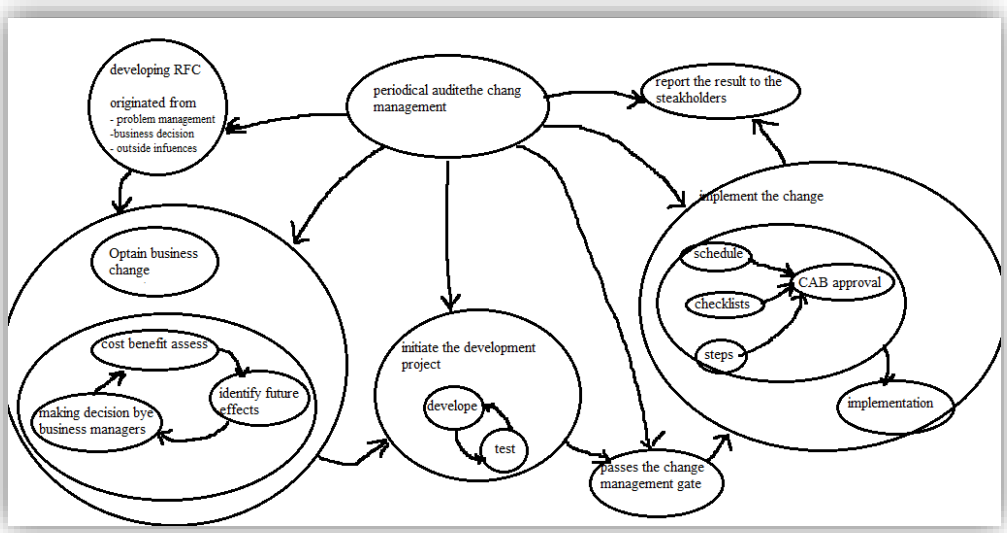

Fig. 2. CM conceptual model

As the model was developed from knowledge gained from a literature study it is further necessary to apply and evaluate it in a real situation in order to assess its value and applicability. To evaluate the model I would be required to participate in the development process of an information system from the outset and follow it even after completion. Secondly this should happen in an environment in which user involvement is valued and where people are knowledgeable in the use (or the concepts) of the SSM.

For the purpose of evaluation the model an approach similar to a thought experiment was considered a feasible and useful research device purely because of the difficulties of evaluating the model in a real case scenario by means of either a case study or action research. (I however do not debate the importance of testing the model in a real life situation and it should be included for further research).

The exploratory testing consisted of two parts. In the first part a study of an unsuccessful information system was done. This was performed while working for ARVAND free zone organization as IT manager over a period of four years. In addition, the project documentation, including minutes of meetings and user specifications, as well as interviews were investigated. The case study was then used as basis for this experiment.

The following approach was applied: firstly the system was investigated according to the conceptual model, Secondly, the change aspects that could have been planned for and managed in each phase of the conceptual model were identified. Ideal circumstances were created to see if the application of the model was worthwhile.

From the study the following conclusions, deductions and recommendations were made:

- The case study facilitated a better understanding of the research question under investigation. It was clear that the changes that resulted from this project were managed by applying a technological change model. Although the users were initially involved in

voicing business requirements for the system, the task of develop RFC, optaining business change acceptance, passes the change management gate and implementing the changes was entirely left to the development team.

Minimal attention was directed towards the influence that the system could have on the users and on the business processes of the organization. The only preparation that the users received was two brief training sessions. This was apparently not sufficient to comprehensively manage the technological and social changes that resulted from this project.

- The case study was structured according to the conceptual model. In each phase of model, the applicability of the model for managing changes was explored by means of a thought experiment.
- From this experiment it was concluded that the model is effective in identifying changes that takes place within all three areas of information technology, namely in the technology itself, in human actions and in the organization. It is also concluded that by applying the model, possible changes can be identified early. This makes it possible to effectively plan for these changes and avoid reactive change management which amounts merely to crisis management. Although one cannot claim that the application of the model would have avoided all the problem situations described in the case study, I can submit that the exploration of the model shows that it would have been applicable and useful.
- Some limitations to the model were also identified. Because participation is the main principle in the model, the model is not suitable for an environment wherein a coercive approach is followed. The success of the model depends on co-operation between the stakeholders. The model was explored in a setting where the information systems development was done internally to the organization, and where the users and the development team were housed in one building. This arrangement facilitated the application of the model. It could not be established whether the same results would be obtained if the composition were different. It is thus concluded that the model is best suited to be applied in organizations where information systems are developed internally in the organization, and where the culture of the organization supports co-operation.

3. Conclusion

This research is based around the SSM used as a management consulting approach to investigate the management of information system chang in the organization chosen by the researchers. The case study is based on the assumption that soft systems methodology is best used in a flexible and adaptable manner to suit the particular purpose of the investigation. Initial data is pictured by researcher, in the form of cartoon style diagrams of the challenging situation being considered.

By applying the change management model it will be possible to identify the effects of the changes and to create a positive attitude towards them. A positive attitude may lead to a greater acceptance of the implementation of new or changed information systems.

It is concluded and proposed that this change management model could be used in the case of information system changes. The changes that are complex, somehow unknown ,vague and of a social nature they can be identified through making the soft systems methodology part of the change model and through the active participation of involved parties. Lastly, the framework could be adapted to fit a specific organization’s circumstances. This can be achieved by reflecting on previous change processes and learning from past experiences. If necessary, enhancements or alterations could be made to the framework.

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