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Systems Innovation Management

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Abstract

Each year organisations spend a significant amount of money developing new products and processes in an effort to satisfy customer demands and manufacture high quality products efficiently. Both development processes - product and process, are complex, resource intensive and thrive on innovation. They demand a variety of skills and resources but in particular, participation, among all staff in generating ideas, managing projects and implementing change.

There are currently a number of software tools, and methods that facilitate change in a systems environment. These range from complex modeling tools to information management tools. The tools have been developed around paradigms such as world class manufacturing, total quality management and business process reengineering. They are often complex, requiring the efforts of skilled designers and managers. Current thinking within a systems environment reflects a more participative and less technical approach to managing innovation and change. There is a need to compromise between detailed

project engineering and good management practice.

This paper introduces a new paradigm centred on good management practice and addresses the critical issues of innovation and change. The paradigm is articulated through a series of change levers and a methodology that guides managers and designers. It is supported by a series of software tools that together bring innovation management to life within the industrial organisation.

Introduction

Over the past ten years we have closely observed the ways that organisations manage change in their operations environment. Many organisations aspire towards one or more of the management paradigms in this area, such as Total Quality Management, Business Process Reengineering, Lean Manufacturing and others. These paradigms are more often used as initiatives to reclaim employee enthusiasm for change on an annual basis. They are also often used as a desperate response to the latest corporate demand for greater efficiencies. No company ever perfects the use of such paradigms. Even organisations that have remained world leaders have adopted very different and practical approaches to change management of their own.

When observed closely the actual approaches adopted by organisations have a large amount in common. They are practical, individually complex, and surprisingly effective in helping organisations achieve their objectives. In contrast, none of the current paradigms satisfy the total requirements for change management and all have failed to provide a holistic, exclusive and practical approach. However, it has to be said that current paradigms do offer a tremendous amount of knowledge to organisations that can be adopted and used in the organisations own unique way.

The goals of this research is to gain a deeper understanding as to why, despite the availability of a number of change paradigms, most organisations still find it hard to develop innovative processes effectively. The research centres on the need for an innovation management process within organisations and a set of accompanying tools that can help managers to handle knowledge in a busy industrial environment. The research evolves around five core areas – Understanding Change, Identifying Innovation Levers, Creating an Innovation Method and finally, Developing an Innovation Toolkit.

Understanding Change

Over the past decades, a number of approaches within the domain of change management have emerged. These range from World Class Manufacturing (WCM) to Business Process Reengineering (BPR) to Total Quality Management (TQM). When these approaches are coupled with the more traditional concepts of Socio-Technical Design, Industrial Engineering and Systems Theory, they combine to produce a wealth of knowledge on best management practice relating to the management of innovation in modern organisational systems.

This broad spectrum of knowledge has been converging over time to address the expanding need for managing change within the complex environment of the modern manufacturing organisation.

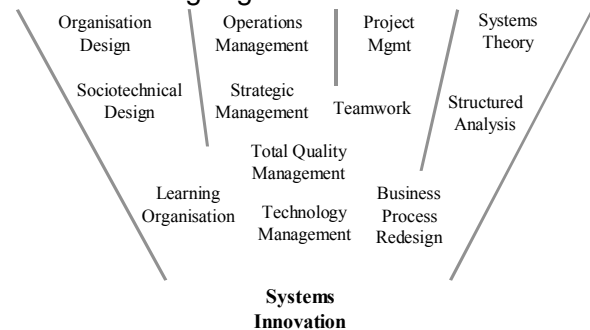


Figure 1 – Evolution of Systems Innovation

The idea of synthesising current and past approaches, contingent upon the multi-disciplinary needs of the specific organisation has been gathering support in recent years (Tyson, 1997; Tidd et al 1997; Price Waterhouse, 1996). For example, Eccles et al (1992) emphasise the associated risk of misunderstanding and neglecting the lessons learned from past approaches. Burke (1987) stresses that “there is no one single, all encompassing theory to organisational development”. He adds that a number of mini-theories can be taken together to become useful. Thus, we believe that an approach that reflects the convergence of past approaches is more appropriate to managing change in the modern organisation.

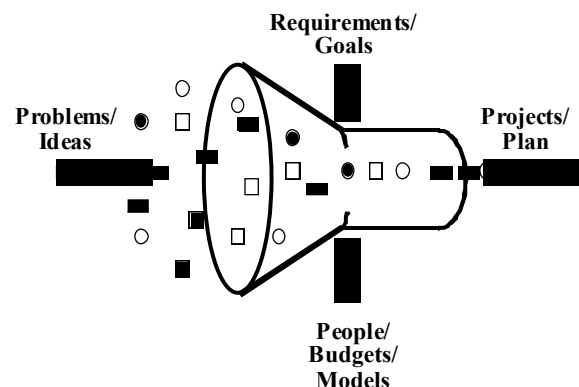


Figure 2 – The Innovation Funnel

The success or failure of the individual organisation to innovate itself is dependent upon the organisation's "own particular routines" which it has learned over time (Tidd et al, 1997). While high profile approaches such as BPR or TQM can generate ideas for process innovation, the transformation of the organisation is dependent upon the individual organisations change management process.

O'Sullivan (1994) proposes the "Development Funnel" to help manage systems innovation. This approach uses the metaphor of a funnel to represent how organisations reconcile and integrate competing projects. Tidd et al (1997) also use the metaphor of a funnel to describe their "routines underlying the process of innovation management". In this view ideas for prospective projects can come from sources such as, the organisation's employees, customer feedback, government regulations and corporate directives. Prospective innovation projects are born from these varied sources and begin to enter the development funnel through the mouth (See Figure 2). As they progress through the funnel, they are constricted by a number of factors such as "strategy", "vision", "available resources" and "corporate goals". The effect of these constrictive forces can result in prospective projects being rejected, merged together, altered in some manner, allowed to continue on through the funnel unchanged or assigned to incremental change for immediate implementation. Thus the converging walls of the funnel represent how the systems innovation process helps correlate between the direction of the organisation and the innovation projects which it has underway at any one time. The need for this correlation process is important since "many managers are faced with an undisciplined collection of change projects that together make little sense and ... don't reveal a rational pattern or

integration of objectives" (Price Waterhouse, 1996).

Management must decide whether a particular idea or problem should be implemented immediately or whether it should continue on through the systems innovation funnel to be developed further and become part of the Systems Innovation Plan. This decision is based on factors such as the project's relative importance, scope and resource requirements. Projects that make it to the systems innovation plan can be refined to take into consideration the organisations strategies and vision in order to achieve maximum contribution. These projects will be ranked in order of preference and submitted for allocation of the annual budget. The projects, which are approved and allocated resources from the budget, will be implemented in accordance with the project management routines, which the organisation has developed over time. This will involve the implementation and ongoing evaluation of the individual project relative to the goals and objectives outlined during its passage through the development funnel. The final step in the Systems Innovation process is a feedback loop that enables the organisation to learn from the experience which it has gained undertaking the project. This compiles the organisations "traumas and triumphs as a sort of corporate consciousness" and assists in the future development of the organisation (Tyson, 1997).

The process by which the organisation transforms itself varies significantly from organisation to organisation. While the routines which they will follow to affect change will be dependant upon the individual organisation, certain high level aspects of the process will be generic across all organisations. The belief that there is some commonality around which innovation can be managed is supported by Tidd et al (1997) when they discuss "the key enablers in successful innovation". As with BPR and the quality approaches such as WCM, certain "levers" exist which facilitate

the organisation in the successful adoption of the approach. Kotter (1990) describes the process of organisational change as a “systematic approach” which relies on communication, organisational vision, empowerment and reward and recognition for facilitating change. In the next section, a number of core levers are presented which will support the management of systems innovation.

Identifying Innovation Levers

We have grouped a number of common traits or enablers into what we call the five systems innovation levers. These are (1) Organisation & Group Leadership; (2) Strategy & Performance; (3) Empowerment & Groups; (4) Reengineering and Improvement and finally; (5) Learning and Communications. Each of these levers provide a synthesis of best practice in the area of change management and a distillation of ideas that are critical for assisting innovation (see Figure 1).

Leadership

The first lever addresses organisational leadership and has often proved instrumental in the success or failure of numerous organisational change efforts. It is described by Quinn et al (1997) as “the most critical single role stimulating innovation”. The leader must take ownership for transferring the rhetoric of the vision and strategies into physical initiatives that transform the organisation. Kotter (1990) views leadership as “the process that helps direct and mobilise people and/ or their ideas”. Organisational leadership often rests on the shoulders of one individual; the individual within senior management who must champion the initiative. While it is beneficial to have ultimate responsibility since it avoids “book-passing”, such an individualistic approach does not avail of any of the advantages of teamwork (Katzenbach and Smith, 1993). By adopting a group

leadership approach to systems innovation, a more holistic perspective can be adopted. In addition, the senior management team can move towards a consensus reaching effort where resistance is significantly reduced. Ideally leadership should be an amalgamation of individualistic leadership that is supported by the consensus of the senior management team.

Strategy and Performance

Strategy and performance is the second lever for systems innovation. The strategies of the organisation and its performance are highly interrelated. The measurement of the operational performance will reflect how successful the organisation is at achieving its strategies. Thus it is important that the correct performance measures are selected in order to achieve the desired strategies. Management must scan the organisations environment taking into account the organisation's vision and goals in order to decide on the best course of action.

Empowerment and Groups

The third lever is empowerment and groups. This lever strives to involve all layers of the organisation in the innovation process. Not only does it help to motivate the employees to support the effort but it also reduces any resistance that may be encountered to the proposed transformation. Applying empowerment and team-working requires a significant level of training to prepare the employees and managers for the transition. The organisation's support systems (e.g. reward and recognition) must also be altered to support the initiative. By such an inclusive approach to the innovation of the organisational systems, a more holistic and enlightened perspective of the effects of the proposed changes will be obtained.

Reengineering and Improvement

The fourth lever is Reengineering and Improvement. It addresses the two distinct types of change, which an organisation may undertake. This lever recognises that organisations' efforts to innovate will include

both periods of radical change and also incremental change on a more continuous basis. While certain approaches implies that these are mutually exclusive, the reality of organisational development is that there will be contribution from both types of change and that often both can be occurring at the same time. The importance of this lever with respect to systems innovation management is that it emphasises the need for both types of change for organisational development. Thus the organisations “systems innovation plan” will consist of a portfolio of radical and incremental innovation projects.

Learning and Communications

The final lever is Learning and Communications. As mentioned earlier, the importance of a “corporate consciousness” cannot be understated. It is only through employees learning from their traumas and triumphs that the organisation can ensure continued improvement. A major part of this ability to learn is in the inter-linking of the organisation’s needs analysis with its training plan. Through this interaction, the current resources of the organisation can be developed to fulfil the development needs of the organisation. Often educating and training the organisation’s employees is the only benefit, which accrues to the employees from the extra responsibilities of empowerment. Communication, the second part of this lever, is also highly important to the overall system. Here, the organisation will ensure that the channels are in place to allow for effective communication between the different layers and across the functional boundaries of the organisation. Communication will help overcome resistance to change and will support the other levers such as empowerment, leadership and group operations that rely heavily upon it. It is through communication that a holistic perspective of the organisation can be achieved and revolutionary ideas for innovation captured.

From the above, it becomes clear that these five levers, not only support the Systems Innovation Management process, but also support each other as well. The interrelationship strengthens the entire approach since it presents a consistent approach towards organisational innovation. In the next section, a methodology is presented which takes these levers into consideration.

Creating an Innovation Method

A methodology can be defined as a systematic route to achieve a desired goal. The goal of a systems innovation methodology is to identify and integrate the most valuable and successful ways to change a system or organisation. It ensures that an organisation is focused on where it wants to be in the future. Each change method consists of a set of time independent stages to be accomplished, and each stage has various considerations, based on experience that are intended to make it successful. While a methodology does not provide an organisation with all the answers, it does provide a framework on which they can develop and define their own change processes.

The Systems Innovation Methodology addresses both continuous and radical change in an integrated manner. It provides a structure, through which organisations can manage and co-ordinate their change process. The Systems Innovation Methodology takes into account the past methodologies for change and brings together a number of modeling and analysis tools. It is specifically designed to facilitate learning at every level. Furthermore, each of the change steps has its own tools and techniques to support it.

The methodology is constructed to allow links to a number of critical factors into the change process including controls and constraints, feedback, key deliverables, key inputs and outputs and management tools

that can be used during each stage. The five stages in the methodology are briefly outlined in Figure 3.

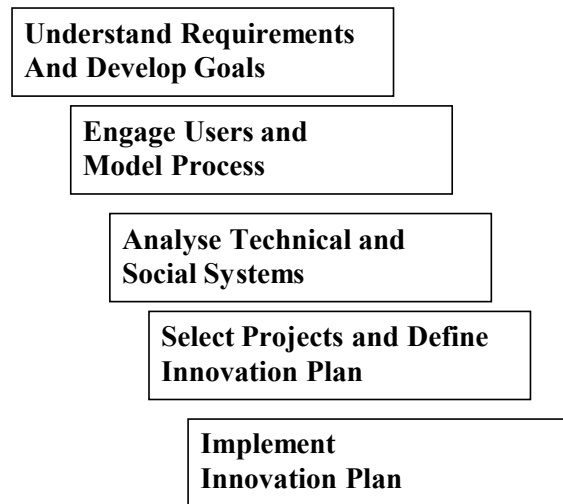


Figure 3 - Systems Innovation Method

Develop strategy and goals

This ensures that the organisation has a clear view, image or vision of where it would like to be in a future state. A strategy is a coherent or consistent stream of actions, which an organisation takes to move towards a vision. The organisation's goals should be linked to its strategy. They should be specific, well defined and clear so that people know what to accomplish.

Engage users and model processes

This stage helps to overcome any resistance to change by securing the commitment and support of all concerned. Employees can take ownership of the change initiative by modelling the process. By doing this they will understand and evaluate the existing processes and be in a position to identify potential areas for change.

Analyse systems and models

This step of the methodology requires organisations to examine best practices and industry trends in order to produce ideas and concepts for change.

Define migration plans

In this stage detailed plans are designed which take into consideration constraints such as the organisation's strategy, budget and resources.

Implement systems engineering plan

In this stage specific teams are assigned responsibility and accountability for implementing the new plan. Support systems should also be aligned to reinforce the new design and continuous learning; feedback and on-going training should be provided for all employees affected by the change in order to sustain their energy and enthusiasm.

The stages move progressively into shorter time horizons and also migrate from batch to continuous mode. The 'Create Strategies' stage for example has a long time horizon and is executed in terms of yearly periods. On the other hand the 'Implement Plan' stage is a continuous process with activities taking place each day.

The next section deals with the innovation toolkit, which supports this methodology and takes into consideration the levers discussed earlier.

Developing Innovation Toolkit

The systems innovation toolkit consist of three separate software architectures brought together to provide information systems support for the entire systems innovation process (see Figure 4). The three architectures are labelled: SI Modeling Tools, SI Applications Tools and SI Intranet.

The Systems Innovation modeling tools have been selected with a primary selection criterion based around the people who will use the tools. For example the five levers mentioned earlier promote the use of workgroups comprising different disciplines and staff seniority. The tools selected therefore in modeling must support this kind of group profile; otherwise communications between members of the group will become

inefficient. Tools identified include: Minimum Critical Specifications, Object Flowcharts, Activity Flow Charts and Matrix Organisation Charts.

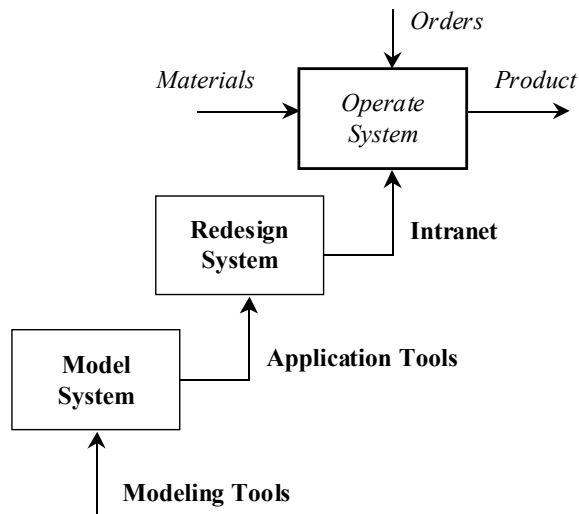


Figure 4 - Innovation Toolkit

The SI applications tools primarily support the change process itself rather than say modelling processes. Applications have been developed around the so-called development funnel with tools developed for: Gathering Innovations, Project Ranking, Project Specification, Strategy Selection, Performance Monitoring and many more. The final architecture in the systems innovation toolkit is labelled the SI Intranet.

The SI intranet is more accurately a guideline for developing innovation centred Intranets. The guideline illustrates how day to day operations based intranets can be supplemented with links to innovation tools contained in both the SI Modeling Tools suite and SI Applications suite. All of the tools combined, allow every employee the opportunity to engage in systems innovation while carrying out their other operational, day to day duties.

Conclusion

This paper introduces a new paradigm called Systems Innovation Management, which facilitates the management of change in an operations environment. It is developed with the requirements of industry in mind, while at the same time employs best management practice currently in use in high performing companies. Critically, the paradigm is also developed with a close eye on how change management is eventually implemented in companies, rather than theory alone. Systems Innovation Management is built around five key levers. It is articulated through a comprehensive methodology and is supported by a suite of software tools.

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