Process Model for Diverse Stakeholders Goals

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Ip-Shing Fan, Conchin Albert
Dept Enterprise Integration, Cranfield University, Cranfield, Bedfordshire, MK43 0AL, UK

Abstract
Projects to model business process are initiated for a variety of reasons. Some organisations initiate process modelling to solve particular problems. Other organisations make process modelling as part of their continuous improvement programme. The ISO9000:2000 standard for quality management effectively mandates a process management approach for any organisations that seek the certification.

Any modelling is an abstraction of the real world. Business process modelling is the abstraction of the organisation of activities in an organisation. Abstractions are influenced by the viewpoint of the modeller. The success of the modelling project is judged by how well the model satisfies the objectives of the modelling.

From a business perspective, performance management provides the mechanism to set targets(key performance indicators, KPIs) for the different departments and individuals. Integrated approach to apply performance measures on business processes has been successfully applied in some organisations. An effective performance measurement system starts from the mission and vision of the organisation and designs the KPIs for each unit or process from this overall corporate goal.

As a means to steer the organisation, the goal and the KPIs have to be changed to respond to the business environment. The theory of business strategy provides many approaches to help senior management to analyse the competitive situation and determine the corporate goal. To continuously revise the business process and the lower level operations goals so that they are aligned with the new corporate goal is a serious test of management skill.

A number of techniques are available to model business processes. Modelling for business process re-engineering tend to investigate at a high level of abstraction. Detail activities are modelled for the improvement of operating processes. In the implementation of enterprise systems that support or automate the workflow of operations, detail process models are built.

Any process modelling project would cut across functional boundaries. The process view integrates the horizontal dimension of the organisation, aligning the goals of different departments or functions to the same process goal. People do the actual operation of the process. The stakeholders in the process include the process workers as well as the management. Experience in implementing process change using procedures or information systems highlighted the critical role of the aligning the purpose and goals of both the process owners and the process workers. Unambiguous and common goal are fundamental to drive the business process. However, whose goal is most important?

This paper briefly explores the different perspective of goals in organisation and introduces the BP TRIZ project that aims to develop an approach that may allow the modelling of diverse stakeholders' goals.

Business process goals

The goal or goals of any organisation is driven by the strategy of the organisation. Commonly accepted competitive factors include:

- Quality
- Delivery lead time
- Time to market
- Delivery reliability
- Design flexibility
- Volume flexibility
- Cost/price
- Innovation
- Trustworthiness

Each organisation would have to set its own strategy and select its preferred competitive dimension. From these organisation objectives, the goals of the business processes have to be defined. In an ideal organisation that practice process management, process level objectives are assigned to the process owners. The staff who work in the process would have their personal objectives defined correspondingly.

Simple observation of the real business world shows that no two organisations competing in the same market are equally successful. There are reference models for business process like the APQC[1] model, or the work of Scheer[2] that publishes detail operations of a 'typical' business. However, the performance of businesses is never the same. An understanding of these variations would be a useful contribution to the design of any goal-oriented process model.

Human centred systems design

The authors postulate that the most important source of these variations is people. The processes defined as the ideal way to deliver business performance tend to assume the process worker to behave in a certain fixed manner. In business process, in contrast with mechanically automated process, tasks rely on the decisions and judgement of the process worker. The interaction of people with the ideally defined process is complicated.

There has been substantial studies about the interaction of people and systems from the angle of designing mechanical or software automation systems. The following features summarise in broad terms the characteristics of human-centred systems from three perspectives[3].

Organisation

- Decentralised organisation based on relatively autonomous manufacturing units or cells. People work together in teams where possible on a defined product group with flexible task allocation.
- Access to all required information.
- Decentralisation of decision making authority to the shopfloor and autonomous units.
- The work environment must fulfil health and safety regulations.
- Organisational changes build upon previous organisational conditions so existing knowledge can easily be transferred and applied.

People

- Early, continuous and high levels of user involvement in system design and implementation.
- Accommodation of personal needs and preferences where technically and economically feasible and socially and politically desirable.
- High levels of social contact and communication through formal and informal mechanisms: teamworking and decision making activities.
- Encouraging suitable mechanisms and opportunities for personal development and self-improvement.
- High levels of autonomy and the authority to self-structure work.
- Fostering the retention and development of high and low level skills through comprehensive, continuous training and education programmes as well as through the opportunity to use a wide range of skills in the work itself.
- Training programmes reflecting existing levels of responsibility and skills requirements.

Technology

- Technology is designed to complement the abilities of people and so adopts the role of a tool to support people’s skills rather than replacing them.
- Technology is designed to allow people to apply existing knowledge.
- The tool image is facilitated through flexible function allocations between people and computer; interactive, user-led dialogue; self-explanatory, consistent and robust software; and high levels of transparency.

These provide insights into the people goals that need to be harmonised with the business goals. In the design of a better GDPM methodology, they could be useful points to consider.

Business Process Modelling

BPR(Business Process Re-engineering) has been heralded in the early 1990s as a tool to transform business enterprises[4,5]. There have been relatively few cases of radical business transformation based primarily on BPR and cynicism has grown over time. The process modelling tools and techniques of BPR has gained wide awareness and begin to be part of a tool set for many improvement projects.

Process modelling becomes a more important practice when workflow management systems are being introduced. Workflow management systems exist in its own right in applications like mortgage processing, customer billing and call centre operations. It is also an important element in many document management system implementations. Workflow is also inherent in Customer Relationship Management(CRM), Enterprise Resource Planning(ERP), Product Data Management(PDM) and many other enterprise integration systems. In the drive to gain more enterprise efficiency by supporting 'how people work' and not just 'what is done', workflow and process are inescapable elements.

Process modelling tools are not new. The modelling methods used by Harrington[4] has a direct lineage from the charting methods of work study and industrial engineering. Newer tools, like IDEF in the late 1980s, draw upon concepts like SSADM in information system design. More powerful tools are developed that have far superior user friendliness and data structure.

Modelling for Process Improvement

Process modelling projects can be typically refined in four steps[Figure 1]. The information and knowledge about the process is captured through interviews, workshops document studies and other methods. This 'AS-IS' model is then drawn into diagrammatic representation for validation and analysis. A 'TO-BE' model is developed that optimise, rationalise or improve on the 'AS-IS' model. The 'TO-BE' model forms the basis of defining the operational systems. It can be realised as procedures and handbooks, quality manuals, workflow systems and training materials.

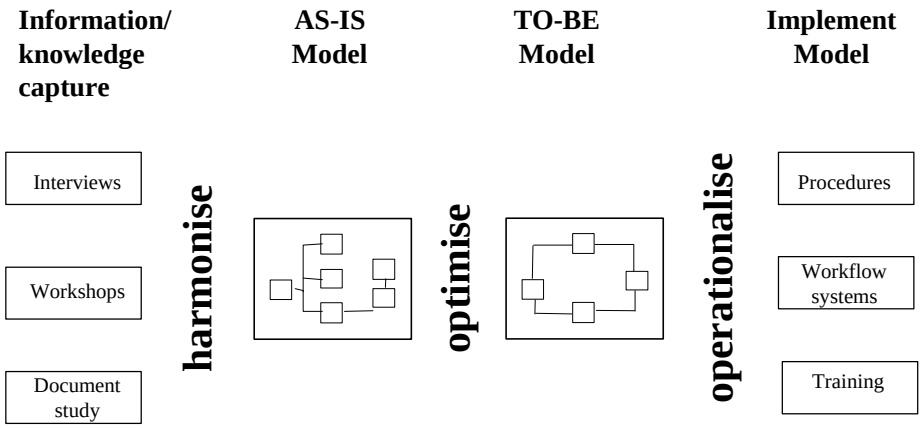

Figure 1. Steps in Process Modelling

The process modelling exercise aims at developing a **single, unique, exact** 'TO-BE' process model. It may harmonise the input of many views and sources of information and allow for a certain variety of paths in some parts of the process. However, there is an underlying assumption that there is **"a"** way of doing things that could be documented and everyone in the process will follow the defined model. Empirical experience suggests that the reality is not so[6]. We know that we do not read the owners manual of a hired car before we drive it away. We know that there is normally substantial preparation before any ISO9000 certification audit. Indeed, the preferred style of writing quality manuals is to not go into details. We know that there are always short cuts and by-passes that exist in any enterprises. In many situations, the smooth operation of the enterprise depends on these short cuts.

There has been substantial research in business process. In the UK, the Business Process Research Centres in Warwick[7] and Plymouth[8] have worked on making process modelling more usable, especially to SMEs. The EPSRC has supported the System Engineering for Business Process Change(SEBPC) programme[9] that foreruns the current System Integration programme. The European Commission has supported the Technologies for Business Processes programme within the Framework 4 Esprit programme. These programmes has been focusing on how to extend the use of business process re-engineering to a wider community of industry and organisations and making the modelling tools more effective. There has not been any systematic study on the implementation practicalities and effects of process and workflow modelling.

Variability of People in Process Workflow

When process implementation is paper and people based, the people adjust and fill in the gaps of the process definition. The automation of the process creates potential for difficulties. A study conducted by the Benchmarking and Process Group of the European Foundation of Quality Management has concluded that process model in an organisation should be a framework to guide people to have the common visibility of 'what' to achieve and not the 'how' to do things. With the rapid growth in workflow systems, the enforced automation will take away the flexibility of the people process. At this point in time, process modelling is the only tool available to the workflow community. Workflow systems have been working in applications that drive simple transactions. What will happen when more complex applications are attacked? Are the recent complaints about the 'sweatshop' nature of call centre work a symptom of this problem?

In most cases, the participants in the information capture stage do not deliberately withhold information from the process modeller. In many cases, the participants believe that they have articulated the way they work. It is the natural variability of the way we work that may not be fully captured. With the current generation of rule-based workflow systems, the variety of ways of work can be easily implemented in the process automation. It is the difficulty to capture the full variety that leads to the specification of potentially restrictive systems. One may argue that a key advantage of an automated workflow system to eliminate the variety and ensures that a single process is used by all concerned. This is particularly important to customer interaction processes to guarantee a consistent quality of service. There is, however, a need to distinguish between tedious, mundane tasks which are appropriate to automation from those that involve decisions and ingenuity. Restricting these tasks are detrimental to the organisations' function. There is also a practicality and cost element. The financial and time cost to involve all the staff in a process definition exercise can be prohibitively high. Modelling consultants typically cost £1000 per day and the cost of all the staff time involve would be many multiples of this.

Generating Diverse 'TO-BE' Models

A potential focus of improvement could be the method to develop the TO-BE model. Rather than optimising towards a single TO-BE process, a range of possible processes within a defined range could be generated. Work has been done by the Workflow Management Coalition(WfMC) to define standard interfaces between workflow systems. The EAI(enterprise application integration) activity also defines standards for connecting disparate applications. These works are beginning to define business objects that could be the basis for defining common workflow processes. An approach to create controlled diversity within these defined business objects could potentially lead to people friendly and robust process models.

In the domain of engineering design, TRIZ(Theory of Inventive Problem Solving) has been gaining prominence as a tool to achieve lateral thinking and create inventive design solutions[10]. TRIZ was developed by a group of Russian scientist who studied 200,000 patents and generalised the invention into five levels of innovation. The approach suggested a structured abstraction to look for alternative solutions[Figure 2].

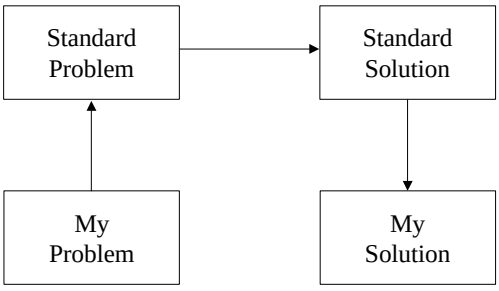

Figure 2. Organising and using general knowledge(from [10])

TRIZ provides a set of tools to formulate the design problem and a set of 39 design parameters and 40 generic principles. It is used with a large knowledge base of scientific effects and engineering examples. The concept is available in two different interpretations in software form: Invention Machine[11] and The Ideator[12]. TRIZ has claimed particular successes in engineering applications in USA.

The scale of the philosophical and practical problems in process automation is substantial. There are similarities to the Human Centred Computer Integrated Manufacturing programmes in the early 1980s. A full scale study requires the multi-disciplinary input from information technology specialists, work psychologists, management practitioners and enterprise engineers. However, the programme needs to be carefully focused and structured.

Lessons learnt from multi-disciplinary working highlights the difficulties to converge to applicable results from a diversified programme. The development of a set of example process models using the TRIZ concept can act as the stimulus to bring together the input from the multi-disciplinary group needed to address this problem. TRIZ has been explored as a tool to justify strategic investment[13]. Transfer of the TRIZ concepts to non-engineering applications is just beginning. Successful transfer of TRIZ will require substantial resources to build up the alternative design cases and databases.

BP TRIZ

The BP TRIZ project aims to establish the potential of using TRIZ(Theory of Invention) in the modelling and re-design of business process for information systems implementation. The project is a one year feasibility study funded by the UK EPSRC(Engineering and Physical Sciences Research Council) and has started in October 2001.

BP TRIZ aims to explore the nature of the user behaviour of workflow process automation through an experiment in comparing the classical process design approach and an approach based on the concept of TRIZ. With an origin in Russia, TRIZ is being established as a revolutionary tool to achieve systematic innovation in product engineering applications. The results of BP TRIZ could lead to the development of a new way to engineer the 'TO-BE' business processes in business process re-engineering, ERP, PDM and other enterprise systems implementation. This paper presents the rationale and preliminary results of the project. The aim of BP TRIZ is to experiment with the concept of TRIZ as an approach to develop more human appropriate process models for workflow implementation.

Extensive literature research has been done to study the success and failure factors of enterprise systems implementation.

A small scale experiment involving practitioners in the workflow, process modelling and human factors community is being used within the research. The experiment is divided into five stages(Figure 3).

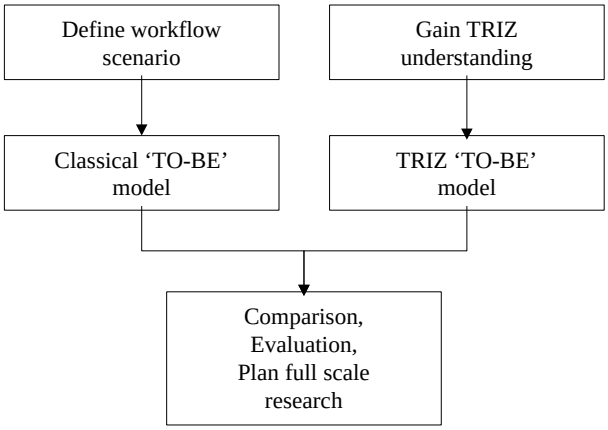

Figure 3 Research Work Packages

Two IT systems implementation projects in Cranfield University are used as the workflow scenarios. The workflow tasks require decision making rather than pure mechanistic procedures. These forms the 'AS-IS' model in a typical process modelling exercise. The human factors elements are to be drawn out in this stage. The evaluation criteria for the a good human-centred process model is also to be defined.

Tools for TRIZ have been acquired and the investigator and the researcher has been trained in both concepts and the use of TRIZ. The 'AS-IS' process is being documented. A 'TO-BE' model using the classical optimisation approach is to be developed. The goodness of the model is to be verified by the collaborators.

A TRIZ based 'TO-BE' model is then developed. The TRIZ parameters and principles for systematic exploration of alternative engineering solutions in TRIZ are to be mapped across to the business and workflow process area.

The final phase of the project is the comparison between the two 'TO-BE' models and the model generation process in the two approaches. The sufficiency evaluation of the models is to be matched to the criteria

established in the beginning of the project. The advantage of the diversity of the TRIZ 'TO-BE' process is to be evaluated by practitioners.

Potential Impact of BP TRIZ

Web enabled systems allow organisations and society to introduce large scale systems to integrate business and people in a cheap and pervasive way than in no other times before. These systems are changing the way we interact with work colleagues, friends and family. The effective design of these systems are crucial to the well being of human kind as well as economic efficiency of the organisations putting in the systems. Although software technology does not inherently limit the way people works, the specification of software systems is primarily based on the concept to define systems that work with limited choices. This leads to system implementations that are not effective as they restrict the way people works. Fundamental research into the work and activity interaction of human and information systems is urgently needed.

Interest and research in this problem exists in the disciplines of computer science, information system, operations management, work psychology, human factors, industrial engineering and many others. The novelty and uniqueness of this proposal is to experiment with a practical approach borrowed from the domain of systematic innovation in engineering design. The possibility of using the structured approach developed in engineering design and the systematic exploration of alternatives in the TRIZ approach may lead to practical usable methods within a short research time. Further understanding of human systems interaction may emerge during the project that contributes to the traditional disciplines in this area.

There are substantial risks within the proposed research and it is appropriate to invest sufficient resources to establish the feasibility of the borrowing of the TRIZ approach. There could be fundamental differences between product engineering and business process modelling that makes the transfer of approach not possible. Although discussion with collaborators does not seems to identify any fundamental problems and all concerned are very excited about the work, the possibility and appropriateness of transfer will only be known during the research.

This paper presents the work to date and act as an initiating point for further discussion by the process modelling community.

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