# Enterprise Information Systems Change, Adaptation and Adoption:
## A Qualitative Study and Conceptualization Framework

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## ABSTRACT

*This article introduces and discusses the process and system conceptualization framework for adoption and ongoing evaluation of enterprise information systems, based on the series of recursive high and base-level conceptualizations of organization's existing (as-is) and desired (to-be) processes and systems. The motivation for the framework is provided by a qualitative study that reveals two distinct approaches to the organizations' systems adoption and change. The approaches are labeled as systems view and process view, centered on organizations' processes and systems respectively; where process oriented approach is more likely to result in better fit between the adopted systems and corporate needs. Consistent with this finding, the purpose of the introduced framework is to guide organizations toward embracing the process-centric approach to the adoption of enterprise information systems, by placing particular emphasis on processes' and supporting systems' fit with organization's strategic goals.*

*Keywords:* *business process planning; IS planning; information technology adoption; systems analysis*

## INTRODUCTION

Continuous pressures to cut costs, increase productivity and capture a competitive edge in global markets are among the main drivers of ongoing investment in change and adoption of information systems and system components in many enterprises. Nevertheless, the success rates of enterprise systems implementation have been fairly low with respect to a variety of evaluation criteria, such as on-time and on-budget completion, system match with functional

requirements, and cancellation rates (Hong & Kim, 2002; Legris, Ingham & Collerette, 2003). Reported failure-rates vary somewhat, but typically are estimated at 30-50% (Surmacz, 2003). Consequently, a great deal of research has explored the factors influencing the effectiveness of managerial decisions about information system adoption, as well as the quality of the implementation of these decisions.

This problem has been approached from many perspectives using a host of methodologies. Many different empirical models have been published, including cognitive models at an individual level such as the Technology Acceptance Model (TAM) (Davis, 1989), behavioral models such as the Theory of Planned Behavior model (Ajzen, 1991), and firm resource-based models (Srinivasan, Lilien & Rangaswamy, 2002). This large and diverse body of research has added much to our understanding of technology adoption on an organizational level, especially in the identification and classification of a variety of factors according to their source (internal vs. external to the organization), size, explanatory power, and level of managerial control in influencing their size and impact (Champy & Hammer, 1993).

Some empirical research has recognized the importance of organizational contexts in determining the success of information systems planning. A study (Hong & Kim, 2002) has concentrated on the influence of organizational fit on success of system implementation. In this study, organizational fit was defined as the degree of alignment between the existing software package and organizational needs in terms of data, processes, and users. The authors recommended that the implementation team as well as top managers should undertake this assessment of fit, ahead of the actual adoption process, with continuous measurements during the implementation phase. This, and similar, studies touch on the issue of alignment among organizational strategy, business processes, and enterprise systems.

In addition, recent published work investigated the relationships among strategic goals of an organization, its business processes and structure, and its information systems. According to Attaran (2004), the role of information technology capabilities is emphasized in process planning and redesign. Information technology is described as a critical enabling tool to advance firm performance through business process reengineering by facilitating communication across functions, improving process performance, and by helping management to model, optimize, and assess the consequences of business process change. In Attaran (2004) these processes were described as tools for organizations to achieve success.

Given the known connections among strategies, processes, and systems, why is change and adoption failure still common? Perhaps there are additional factors that have not yet been widely recognized and accepted by the industry. In particular, the importance of the conceptualization of processes and systems at multiple levels of complexity is an important, but often underappreciated, factor in system change and adoption. The conceptualization process can often be a moderating factor in success, in that other established success factors are enhanced by the organizational commitment to conceptualization of processes and systems. This article introduces a framework that outlines, in an increasing level of detail, the recommended flow of conceptualization efforts in an organizational system change and adoption process, the constituencies involved in the different stages, and appropriate methodologies. Our framework complements and extends the conceptual models of process and systems planning and implementation that exist in the research literature by binding them together in an ongoing organizational practice of continuous reexamination of processes and systems in a non-disruptive, constructive manner.

The arguments for our framework start with a brief discussion of business and systems architecture, their interdependence and the need for a comprehensive view that accounts for both. Next, the actual change planning and decision making process is delineated, and observations about corporate practices are presented based on qualitative research. Thirdly, a simple competi-

tive space matrix is presented to clearly identify the issue of fit among organizational strategies, processes and systems. We propose and address four questions that address key aspects of this fit at different stages of system planning and deployment. The conceptualization framework based on the four questions is then presented. This framework is designed to facilitate the organization-wide commitment of planning for the change of information systems. It is presented as an important component of a multi-level effort that encompasses strategic goals, business processes, and information systems planning. The presentation of conceptualization framework is followed by the discussion of different modes of conceptualization. Finally, a comparison between the conceptualization framework and the existing approaches is presented, followed by the summary and conclusion.

## BUSINESS AND SYSTEMS ARCHITECTURE AND BUSINESS PROCESSES

The architectural components of a modern enterprise are defined in the literature in many ways. An important distinction is the differentiation between *business* and *system* architectures. Architecture is defined as the fundamental organization of a system embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution (IEEE, 2004).

*Business architecture*, specifically, defines the business system in its environment of suppliers and customers, and, if applicable, taking into account the regulatory and legislative policies. According to Aerts, Goossenaerts, Hammer, and Wortmann (2004), the business architecture consists of processes, organizational rules, people, and resources, while Herman (2001) defines business architecture as consisting of processes, technology resources, governance structure and information flow. The architecture of a business captures its major components (and their responsibilities and relationships) as well as its major mechanisms and processes that enable the firm to collaborate to meet the requirements of the business enterprise (Firesmith 2005). The common thread among the various definitions of business architectures is the recognition that business processes often cut across traditional functional boundaries. This recognition of process centrality with respect to business architecture is common across organizational functions, roles, and relationships, including day-to-day operations, transactional systems infrastructure (such as production, logistics, and customer service), or managerial processes dependent on information and decision making infrastructure (such as communication, coordination and planning).

*System architecture* describes the information system in terms of its logical (e.g., functional) and physical (component) architecture. While some definitions are limited to software and hardware architecture, we argue that architecture is more complex in terms of its components and their relationships. In Aerts, Goossenaerts, Hammer, and Wortmann (2004), two types of system architecture were defined: application architecture, describing the application components and how they interact with each other, and information and communications (ICT) architecture, which was defined as a generic resource layer describing hardware (computers, networks, peripherals) and software (operating systems, DBMS) infrastructure. Another layer of system architecture, suggested by Firesmith (2005), includes the database components describing type, location, overall content, and usage. Finally, Firesmith (2005) suggests additional layers of architecture of application data components, labeling this as information architecture, as well as a distinctly defined user interface architecture, including type, technologies, structure, and navigation.

The empirical studies on individual and organizational adoption of information technology often have had a much narrower view of system architectures, dominated by only one of its components. For, example, studies concentrated on verification of TAM and similar models often focus on the user inter-

face architecture, taking into account only the components that are directly exposed to the end user, without accounting for the value of the enterprise architecture. Another narrow view of corporate information resources is centered on the hardware and communications architecture. This focus has driven an opinion, as stated by Carr (2003), that since information resources can be easily commoditized, they are devoid of strategic importance. This impression, if widespread, can lead to the view that information systems planning, implementation, and deployment efforts should be evaluated strictly on the basis of immediate cost. This impression may be one of the causes of the current trend towards standardization and/or outsourcing of systems and system capabilities.

Our view is that only a comprehensive consideration of all the elements of business and enterprise system architecture and their many complex interrelationships can reveal the true magnitude of the strategic impact of information systems and resources on an organization and its strategic goals. Such analysis must adopt a view of systems architecture that includes all of its constituent elements. Since the systems are complex and diverse, any worthwhile analysis of corporate systems architecture needs to be done at multiple levels of detail and points of focus and should provide a concrete methodology for recursive consideration of business and systems architectural elements (the framework presented later in this article adopts this approach).

The argument for looking at business and systems architecture as a part of the same system has been raised by many academic and professionals. For example, an article (Davenport & Short, 1990) argued that IT should be viewed as more than an automating or mechanizing force. This article defined a recursive relationship between IT and business process design and engineering. This relationship illustrates how advancement of IT should be assessed in terms of how it supports new or redesigned business processes instead of merely supporting organizational entities or functions. Exercising this recursive relationship helps to ensure that business process redesign is applied feasibly and that IT does not generate misguided or impractical solutions. Despite these and other similar recommendations, the corporate practice of designing, purchasing or outsourcing systems or their components often does not reflect this interdependence between the business and systems architectures. The next section will illustrate this reality.

## PROCESS VS. SYSTEM DRIVEN INFORMATION SYSTEMS CHANGE

The term Enterprise Information System (EIS) refers to an information system that facilitates business processes and functionalities on an enterprise level (i.e., spanning across the enterprise). The term can include collection of systems supporting specific functions such as CRM, Supply Management, Finance, Accounting, Sales, Manufacturing, and Human Resources. These systems can work either as collections of "best of breed" units or they can be modules of a larger (single vendor) fully-integrated system. The common thread is the enterprise-wide nature. For example, if the Financial Management System encompasses financial transactions throughout the enterprise (by communicating and exchanging information with other relevant systems), we consider it a part of an EIS. Similarly if a multi-function integrated system supports its functions throughout the enterprise we consider it an EIS. In the following paragraph we will look at some of the possible ways to configure an EIS.

An EIS can be implemented as an ERP System, where suites such as SAP, Oracle Applications, or M1, provide function-specific modules integrated into a larger system. For example, Oracle Financials and Oracle Human Resource are two of many modules available in the Oracle Applications ERP suite, while SAP Financials and SAP HR are two of many modules available in SAP ERP Suite, and M1 Labor Management and M1 Inventory Management are two of many modules available in

M1 ERP suite. Typically, ERP modules can be used as-configured by the vendor or they can be partly-customized. An EIS can also be created as a collection of function-specific ("best of breed") commercial off-the-shelf software (COTS) systems, such as C2 CRM system or i2 Supply Chain Management system. And finally, an EIS may also be custom-developed as either a collection of custom-developed units that are custom-integrated or as a single fully-integrated custom-developed multi-functional system.

A general rule should hold for each component of systems architecture, whether it is custom-designed, acquired as an ERP or other semi-customizable software module, or installed as COTS adapted to organizational use. Every component should be justifiable by demonstrating a clear improvement of the process it supports, or showing that it is an enabler of new processes that have a clearly understood purpose and primary benefit to the organization. However, a closer look at the details of organizational decisions to build, acquire or redesign systems suggests that organizations often make these decisions without formal analysis of existing systems and processes or without the clear understanding of the new system's details. Decisions are often made by "gut feelings" or intuition, rather than quantifiable criteria (Mahmood & Mann, 1993). Even when quantifiable criteria are used, they are not always firmly tied to the actual details of how processes are to be performed and how systems will support those processes. One of the common themes revealed by the interviewees in our study, was that this disconnect often occurs in the case when only financial quantifiable criteria, such as return on investment (ROI) or net present value (NPV), are used as the decisive evaluation factors. Use of operational quantifiable criteria, such as order cycle time, error rates or customer satisfaction metrics is more likely to require clear understanding of the details of existing and new processes and systems. However, the understanding of actual details of how processes are to be performed and how systems will support those processes may still be absent even in this case. This absence of the unambiguous and comprehensive cognitive understanding of the processes and systems during the decision making stage is notable in a large variety of publicly available descriptions of corporate system adoption.

To further explore the nature of enterprise information system change in practice, we conducted, over the period of 17 months, a number of interviews with managers and IT professionals from midsize to large organizations who were involved in adoption of new enterprise systems (the list available at gsbdata.wt.luc.edu/~nenad/framework/appendix.pdf). The analysis of gathered narratives, combined with an analysis of published corporate cases and other academic and practitioner articles (referred to in this article), supports classification into two general approaches. We label the prevalent organizational view that guides the system change or adoption process as the System View. We will contrast this with the process-centric view of enterprise systems adoption/change that we will argue presents a better alternative. We label this approach the Process View. We use the term Process View as it refers to the approach to the change and adoption of information systems. This term has been used in the IS literature in other contexts. For example, in (Kruthcen 1995) the term Process View is used for a completely unrelated concept in software architecture that captures software engineering issues such as performance and fault-tolerance.

The System View often results in a change or adoption process that is based on indirect measures of system success rather than direct observations and understanding of how systems operate and support the processes. In many cases, our interview data suggest that the driving force and underlying motivation is fairly narrow and the changes in existing corporate systems are often initiated by a single event. The structural changes initiated by a single event are often reactive, and some of the observed examples include: a response to a regulatory change, external change in competitive land-

scape, or IT personnel attrition reaching the point where existing staff is not able to support legacy technologies.

Often the systems change is initiated by changes in corporate strategy (acquisition, international expansion, etc.), or one particular development that is the result of implementation of corporate strategy. A typical example of a system change being driven by implementation of corporate strategy is a change motivated by the strategy of growth. Our survey indicated that the resulting growth of an organization often led to a perception of inherent inadequacy of existing systems. The managers with whom we spoke often expressed this inadequacy as insufficient scalability of the systems. The scalability issue then became the central driver of the decision to redesign, change or completely upgrade a corporate system or some of its crucial elements. Yet another observed change motivator was a result of real or perceived competitive pressures. Our interviews suggested that these pressures often became apparent through perceptions that the existing software applications did not fulfill the functional needs of the processes they were supposed to serve. Managers stated that new application software was then adopted primarily because of its improved process functionalities such as "better reporting functions", "the ability to exchange data with other applications," "better process and cost tracking," "user interface ease and intuitiveness of use," and "the presence of process (industry) specific options to enter track and report relevant information."

These examples share a common thread. At a certain point in time, organizations conclude that current systems are inadequate to support their existing processes and organizational strategies. This motivation to change, dominated by the perception of systems inadequacy, is typical of the System View. It is based on the evaluation of the current organizational systems in terms of managerially observable and quantifiable measures of success, often neglecting to sufficiently analyze the core organizational processes first (day-to-day, as well as communication, coordination, and managerial decision making processes) and the ability of these processes to support organizational strategies. The conceptualization-driven progress from strategy to process to systems is not followed. As a result, single-issue drivers often trigger decisions. Consequently, the system change initiatives driven by this view have a high probability of a post-deployment experience that does not match the envisioned organizational goals. In addition, lack of complete understanding of processes and existing systems often results in ignoring the abilities of existing systems to support process changes as demanded by new strategies. For example, one of our observed scenarios of system change involved a decision at the highest level of management to change to a system that would "provide uniform service across locations (stores)", and "centralize customer service decisions" without consultation with internal IT staff about the ability of *existing* systems to support this strategic goal.

In contrast to the System View, the Process View is an idealized, benchmark approach that should start with the conceptualization at the business process level, accompanied by (1) the key organizational strategic goals and resulting business processes (2) the abilities of the current enterprise systems to support key processes, and (3) the potential of feasibly obtainable improvements to current enterprise systems or their possible replacements. The vision of potential changes to existing enterprise systems should be based on the improvement of existing processes or facilitation of new processes, consistent with organizational strategies. This thorough understanding of process requirements and system abilities should then lead to clear and unambiguous conceptualization of system and business architecture, and as a result, an effective specification of the components of the enterprise information system.

In essence, we argue for reinvigoration of the concept of Business Process Reengineering insofar as it envisions a formal and systematic approach that integrates all of the strategic, operational and information systems dimensions. In a recent evaluation of the relationship between IT and BPR (Attaran, 2004), the role of information technology in fostering process

thinking was emphasized. We extend this idea by arguing for more direct understanding of the measures of system success in terms of the clear visualization of actual process improvements. Only after that has been achieved, can truly meaningful financial and/or operational measures be derived. Also, the Process View encourages the continued evaluation of processes and systems, resulting in ongoing decisions to upgrade, modify or replace existing processes and systems. This approach requires a higher level of involvement by the internal IT staff as well as the key process owners in making the process and systems decisions.

Table 1 compares and contrasts the two views of the information systems change: the Process View and the System View. The factor listed in the first row of the Table 1 (Current and Future Process and System Conceptualization) refers to the organizational ability to achieve a clear understanding of both existing and desired business processes and related systems. We divide the remaining observed factors into two groups; observed outcomes, that is, results of adopting the System View in contrast to the Process View; and observed indicators, that is, factors that may serve as indicators whether an organization has adopted the System View or the Process View.

As stated above, the majority of corporate situations we observed may be classified into the System View category, with low level of commitment to self-examination through deliberate and ongoing process and systems conceptualization. As a result, measures of success are often indirect: operational or financial (factor 1); and the timing of change decisions is relatively sudden (factor 2), and driven by perceived inadequacy of current systems rather than the understanding the true nature and needs of business processes (factor 3).

In contrast, the Process View approach, as a result of conceptualization efforts, uses measures of success (factor 1) that can be expressed as concrete improvements of existing processes or clear understandings of a new processes and their benefit to the organization. These improvements can then be translated into operational and financial measures that, being based on clear views of new or improved processes and systems, are justifiable and logically explainable. The ideal Process View approach should be based on ongoing routine evaluation of organizational processes and needs. These routines should result in a smoother progression towards decisions to implement changes (factor 2) based on an understanding of organizational processes as well as the current state of available system technologies (factor 3).

Our analyses of scenarios that represent the System View approach suggest that there is, at best, a moderate probability that the adopted systems and the processes they support are consistent with organizational strategic goals (factor 4). We will argue and demonstrate throughout this article that a Process View approach has a higher probability of achieving such fit.

Interestingly, our analysis also suggests that the System View leads to an increased probability of packaged software adoption (such as ERP or CRM packages) in an *indiscriminate* fashion (i.e. adjusting process to fit the package vs. the other way around). As stated in Hong and Kim (2002), there are essentially two alternative approaches to implementation of packaged software: package adaptation to organizational needs or organizational adaptation to the package. Vendors often discourage package adaptation to organizational needs (Hong & Kim, 2002), and often the latter (opposite) approach is adopted. Consequently, the adoption of highly standardized systems may in turn end up constraining and commoditizing the processes of the organization. The end result might still be positive, since packaged solutions essentially represent the established processes and rules in a given industry. And indeed, many organizations are quite happy to copy other organizations' business process designs. The adoption of a packaged solution may also be the most rational choice for organizations that do not possess strong IT leadership and/or internal technological capabilities. Unfortunately, a System View often leads to the adoption of a perceived "default package", while other options do not even get serious consideration.

*Table 1. System vs. process view of information systems change*

| | System View | Process View |
|---|---|---|
| **Current and Future Process and System Conceptualization** | Not Likely | Necessary, at varying degrees of formality |
| *Observed Outcome Factors:* | | |
| **1. Ex ante measure of success** | *Indirect*: ROI or some other explicit financial or operational metric: operating cost reduction, order cycle time, customer satisfaction metrics, sales increase, labor cost reduction. | *Direct*: Specific process improvement or process change, driven by a clear vision of the new or improved process in comparison to the existing one. Indirect measures follow, with greater degree of justification. |
| **2. Progression of the decision to change** | Single event or a sequence of events in a short span of time, sudden. | Ongoing, regular process. |
| **3. Main decision driver** | Realization that "systems are inadequate". External Event: merger, managerial fiat or "challenge" by upper-level management | Understanding of the needs of business processes and abilities of all feasibly available system technologies |
| **4. Probability of the fit between adopted systems and organizational goals** | Low to Moderate | High |
| **5. Likelihood of problematic organizational adaptation to software** | Moderate to High | Low |
| *Observed Indicators:* | | |
| **6. Level of internal IT staff involvement in the process planning stage** | Low | Moderate to High |
| **7. Internal IT excellence, strong IT leadership, and understanding of organizational structure and processes** | Not Likely | Highly Likely |
| **8. Key decision makers** | *External*: Vendors, Consultants | *Internal*: Process Owners |

This causes the possibility of problematic organizational adaptation to software (factor 5), where organizations find themselves trying to change their processes to fit the chosen software even in cases when some of their processes do not benefit from the required changes.

The Process View can, depending on circumstances of each case, lead into a number of different adoption outcomes (such as standard ERP package adoption, adoption of an ERP package with some customization of certain modules, or design and implementation of a customized system) but in each case the probability of the fit between the adopted systems and organizational goals (factor 4) is high and, subsequently, the likelihood of problematic

organizational adaptation to software (factor 5) is low. The Process View can require organizational adaptation to software, but such adaptation is much more likely to be of a smooth nature resulting in actual improvements to the processes. Note that, like a System View, a Process View can indeed lead to the adoption of the "default standard package", but Process View is much more likely to lead to this outcome in cases when such outcome is the right fit for the organization.

The process that is commoditized by the implementation of the packaged software may be an outcome that is completely acceptable to an organization, and is already a de-facto requirement in some commodity industries (Davenport, 1998). Nevertheless, each organization should go through a formal evaluation process and study the implications for its own competitive position. Therefore, we conclude that even in the cases where packaged software adoption initially appears to be the most rational decision, a formal planning and decision making process should be undertaken that involves all decision levels of an organization.

In addition to outcomes, our exploratory study identified several factors that can serve as clear indicators of organizational adoption of the System View versus the Process View. For example, in the System View, the observed level of internal IT staff involvement in the planning stages of business process modification or new process creation (factor 6) is low, as is the overall level of internal IT excellence and the strength of IT leadership (factor 7). In contrast, the Process View demands a significant level of IT staff involvement, even in the early process planning stages, and depends on a high level of IT excellence and leadership. These resources demand technical competency and detailed understanding of organizational processes and structure. Finally, organizations using the System View for the change and adoption of information systems often explicitly or implicitly relinquish the key decision making authority regarding customized design or the choice of system packages (and in many cases the decisions regarding their business process themselves) to external decision makers: consultants and/or package vendors (factor 8).

In summary, our investigation of the very diverse set of corporate motivators and mechanisms that initiate change in corporate information systems has revealed that organizations in our sample primarily used the System View. As a consequence, organizations typically do not undertake the formal conceptualization of processes and systems on multiple levels, either prior to the decision process or during the change to or adoption of the new system. This observation underlines the importance of a common framework for conceptualization of current corporate processes and systems across different architectural dimensions. The remaining sections of this article will introduce a methodology for conceptualizing organizational strategy and antecedent goals in terms of concrete outcomes and measures of success. This framework ties the managerial vision that is centered on strategic goals and specific business outcomes (such as cost reduction, market share increase, or improved customer satisfaction) with precise consideration of concrete business process goals that finally enables the framework to transform transforms itself into specifications for changes of the system and system components.

Number of authors have written about the need for conceptualization at the business process level as the essential part of developing information systems for the enterprises, which is at the core of the approach that we labeled in this article as Process View. This approach is reflected in comprehensive frameworks such as TOGAF (TOGAF, 2003) and Zachman (1987; 1997; 2000) that cover a broad spectrum of issues related to the architecture and development of information systems. The topics included in these frameworks range from the development of data and applications architectures and the development of technology architecture (including network and hardware configurations) to the guidelines about the roles, skills and experience of the staff involved. The methodology framework that we will introduce in this article is more focused in its scope, as it targets the

*change* in the corporate information systems. We are motivated by the results of our own surveys and analysis of previously published corporate cases and academic articles, which include observations such as in (Zachman, 2000) where the author calls for the academic community to expose the correlation between the inability to deal with complexity and high rates of change and the lack of proper approach to the process of planning and design of information systems.

## STRATEGIC FIT: STRATEGY, PROCESSES, AND SYSTEMS

Process and systems conceptualization can provide significant value to the achievement of organizational strategic goals. How? By reducing poor choices that lead to improper fit between the organization's strategic goals, business processes and supporting systems. In this section, we briefly discuss, using a competitive strategy example, the notion of strategic fit between an organization's business processes and its strategy. We use a two-dimensional matrix where one dimension is a generic dimension of process "quality," which may correspond to either a dominant quality dimension of process enabled by information systems (such as process completion time or consistency of process outcome) or a compound measure of process quality consisting of multiple dimensions (such as overall process quality score taken as a subjective measure of process perception by process stakeholders, or a weighted score encompassing individual process metrics.)

The second dimension of the two-dimensional matrix is labeled as process cost. For externally visible processes, especially those that are directly related to products or services consumed by customers, the process costs may be directly related to the price of the product/service, a more direct dimension that influences competitive position. For internal processes, the cost may be related to price less directly.

In Table 2, we divide the competitive space in four quadrants, corresponding to four possible combinations of process cost and quality. The perceptions of high/low quality and cost are subjective (especially for externally visible processes) and relative to the quality and cost of processes of other competitors. This position will change over time, meaning that a company may lose its preferred position in the matrix if it does not change the quality and/or cost of its processes. In particular, new technological generations of systems will change the definition of high and low process quality and cost. As a result, if managers fail to change processes and systems, their firms may lose their favorable positions in the competitive space. During periods of technological and architectural stability, most organizations should be able to eventually move to the upper left quadrant of high quality process at a low cost. In the short run though, while companies strive to occupy the upper right quadrant of high quality and low cost, the feasible rational choices are different high/low tradeoff combinations of quality and cost: low quality/low cost and high quality/high cost. In this period, organizations can choose their position in the two general tradeoff quadrants.

We argue that in order to provide the correct assessment of the position of their processes as well as the direction of the movement in this or any other strategic continuum, organizations need to adopt formal policies and methods of analyzing their processes and systems. An essential part of this practice should be process-and-system conceptualization through abstract modeling or other approaches. The importance of modeling was traditionally argued to have system implementation value, making sure that systems work in a manner consistent with specifications that are coming from an external source. However, we argue that modeling and abstraction create even greater value in providing a vision of the exact process that a system is supposed to support, as well as of the system itself, with a clear understanding of how the process impacts the organization's position along the relevant strategic dimensions.

Requirements engineering should be a tool to achieve an informed commitment to a certain system rather than detached consent from the

*Table 2. Process cost and quality matrix*

| | | PROCESS COST | |
|---|---|---|---|
| | | High | Low |
| PROCESS QUALITY | High | High Quality/ High Cost | High Quality/ Low Cost |
| | Low | Low Quality/ High Cost | Low Quality/ Low Cost |

management (Jerva, 2001). Our interviews suggested that managerial commitment is often based strictly on the promised outcomes without real insight as to how those outcomes are to be achieved. We postulate that four key questions should be raised during system and process planning and development. These questions signify key points in the planning and development process at which a conscious conceptualization effort should be undertaken. The questions should address the fit among strategy, processes, and systems. The questions are sequential, whereby posing of each subsequent question implies that the previous one is answered in the affirmative:

*Question 1: Are current business processes consistent with organizational strategy?* (Consider external factors and developments, including new technological trends in systems, applications, and technical infrastructure.)

*Question 2: Given that current business processes are consistent with organizational strategy; can the business processes be improved with the existing enterprise systems?* (Consider how the cost/quality mix of business processes can be moved further to the upper right quadrant of the matrix.)

*Question 3: Are business processes supported properly by current systems?* (Consider if the enterprise systems architecture is consistent with the organization's business architecture.

*Question 4: Given that the enterprise systems in general provide proper support for organization's business processes; can the enterprise systems be further improved?* (Consider if the cost/quality mix of business processes can be moved further to the upper right quadrant of the matrix by additional improvement in system components.)

In the next section we propose a conceptualization framework as an activity workflow model that is based on the constant recursive flow of conceptualization activities on different levels. We put the emphasis on differentiating between "As-Is" conceptualization with "To-Be" conceptualization (Aerts, Goossenaerts, Hammer & Wortmann, 2004; Ceronsek & Naiburg, 2004; Okrent & Vokurka, 2004). "As–Is" conceptualization facilitates the development of clear process vision and the understanding of existing processes and systems. "To-Be" conceptualization enables proper design and implementation of new processes and systems.

## A CONCEPTUALIZATION FRAMEWORK: FROM STRATEGY TO APPLICATIONS

The conceptualization framework we propose is a series of multi-level diagrams depicting organizational efforts to achieve a clear vision of business strategy, processes and systems, as captured by four questions listed in the previous section. Each level contains the set of activities centered on sequences of "As-Is" and "To-Be" abstractions, with inclusion of additional means of conceptualization in the stages focusing on the systems. The main purpose of the "As-Is" abstraction at each level is to reveal improvement opportunities, by determining whether the current processes and/or systems are aligned with corporate goals, and if not, revealing the reasons why those processes are not performing according to the corporate goals. The goal of "To-Be" conceptualization is to create an alternative vision of processes and/or systems in response to this realization.

This framework will be described at three levels of detail. Figures 1 and 2 correspond to the high and medium level of detail, while the

remaining figures (Figure 3, 4, 5 and 6) represent a more detailed view of individual set of activities as envisioned by our framework. Each figure contains solid rectangles that represent a set of activities that is centered on one or more conceptualization activity. The unidirectional lines represent the progression from one set of activities to another. They include the feedback lines representing recursion from the subsequent activity to its predecessor.

Figure 1 captures the high-level view of our conceptualization framework, where squares are used to depict three major sets of activities. The first set of activities is based on Process Conceptualization (PC), which is motivated by Question 1 (fit between processes and strategy) and Question 2 (having established general fit between business strategy and processes, how can processes be further improved). It is followed by the second set of activities that is based on System Conceptualization (SC) and motivated by Question 3 (fit between processes and systems) and Question 4 (further improvement of systems). The second set of activities is followed by the third set of activities representing the monitoring of the competitive and regulatory environment as well as the monitoring of technological developments that may influence the current and future abilities of the enterprise's information systems.

There is a feedback loop from the monitoring activities into the PC driven activities (recursion I) and SC driven activities (recursion II), as well as between the SC and PC driven activities (recursion III). Recursions I and II are driven by a reconsideration of processes and systems due to observed changes in the external environment. Recursion III represents process reconsiderations as driven by changes in underlying systems. The existence of feedback between the activities depicted in Figure 1 *does not* imply continuous (never-ending) *changes* of processes and systems, but rather ensures that no external (I and II) or internal (III) development of significance is neglected in its possible impact on organizational processes and underlying information systems.

*Figure 1. High level model*

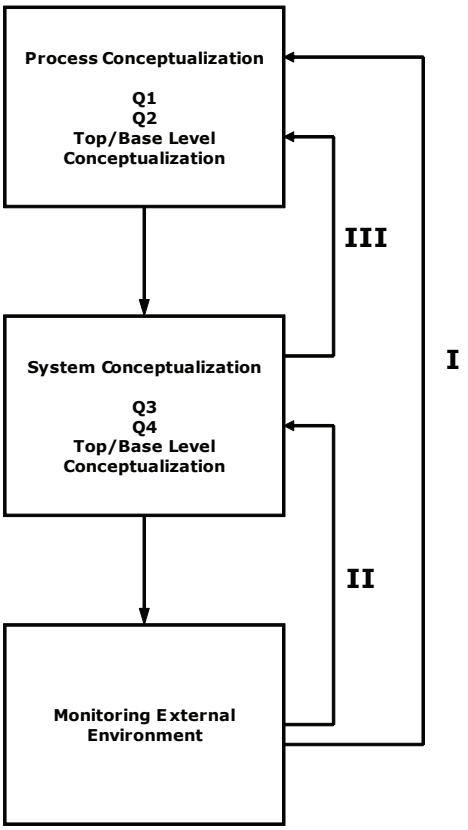
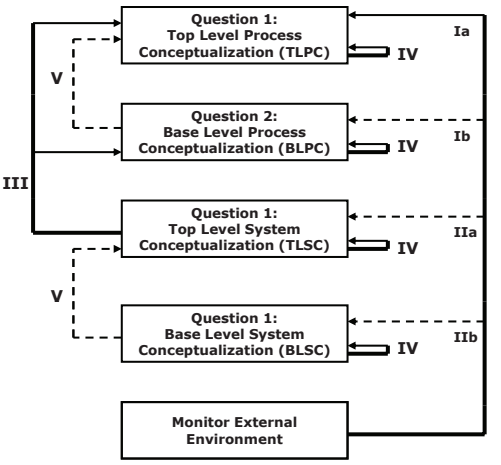



Figure 2 displays a more detailed division of conceptualization activities. The first four stages (rectangles) correspond to one of the four questions listed above. Each of the four rectangles represents a set of activities motivated by the conceptualization of business processes and/or systems. The level of conceptualization changes from high (Top Level) to low (Base Level), both in the Process Conceptualization and System Conceptualization stages.

The internal feedback lines for each activity set (labeled as IV) have specific meaning as well. Our framework allows for each of four main sets of activities to have more than one level of conceptualization complexity at each stage, if needed. In that case the terms Top Level and Base Level can represent several grades of complexity, ranging, for example, from high to

*Figure 2. Mid-level model*




medium (for Top Level) and from medium to very detailed (for Base Level). The recursive efforts at each level ensure that no external (I and II) or internal (III) development of significance that might affect the organizational processes or information systems is neglected. The intensity and number of conceptualization activities at each of the four main levels will differ from one case to another, depending on the size and complexity of an organization and its processes and systems. The general rule should hold that the next set of activities should not start until the question that motivates each stage is answered affirmatively and with a level of certainty that is acceptable by the organization.

Our framework allows for various levels of change to be dealt with in a different way and at the appropriate level. First, any significant change observed through monitoring activities should be followed by high level reconsideration of key business processes, as represented by the feedback line (Ia) between the monitoring activities and the top level process conceptualization (TLPC) driven activities. Second, any significant technological change in the abilities of elements of enterprise systems or other external developments that are disruptive enough to affect the fit between processes and strategy can initially be analyzed at the high level, while other resulting analysis and process and system changes considered can be disseminated between the remaining activity sets. Third, less comprehensive technological changes in abilities of systems and system components as well as external developments that are deemed not to be of strategic impact may initiate the reconsideration on the lower (individual) process level or the system level itself. These are depicted in Figure 2 as feedback lines between the monitoring activity and activities motivated by Questions 2, 3, and 4, labeled as Ib, IIa and IIb respectively. These dashed lines represent alternative or non-mandatory feedback paths, since an organization may (or may not) adopt a policy to account for every external and technological development by reconsideration of processes and systems at every level. This may not be practical in every case, and each organization should choose the proper level of analysis in response to each individual external event and technological change. Less comprehensive technological changes in abilities of systems and system components as well as external developments that are deemed not to be of strategic impact may initiate the reconsideration on the lower (individual) process level or the system level itself. These are depicted in Figure 2 as feedback lines between the monitoring activity and activities motivated by Questions 2, 3 and 4, labeled as Ib, IIa and IIb respectively. These dashed lines represent alternative or non-mandatory feedback paths, since an organization may (or may not) adopt a policy to account for every external and technological development by reconsideration of processes and systems at every level. This may not be practical in every case, and each organization should choose the proper level of analysis in response to each individual external event and technological change.

Figure 2 also contains optional dashed feedback lines, labeled as V between Base Level and Top Level activities if there is an indication that a change in the process or supporting system may have implications that need to be reconsidered at the preceding level. These optional feedback lines allow for the entire process to be more complex than the single pass progression

of activities motivated by Questions 1 through 4. For example, activities motivated by Question 4 may demand additional reconsideration of Question 3 and possibly other questions in return as well. If that is the case, the levels of abstraction in such an iterative process may not always follow a single descending path from the very general view of processes and systems, down to the individual organizational rules, process specifications and application elements. Again, the level of recursive reconsideration will vary greatly, depending on the size and complexity of the organization and its processes and systems.

The recursion between System Conceptualization and Process Conceptualization is captured by the feedback line III. This feedback loop ensures that the fit of the enterprise system architecture is verified by the conceptual reconsideration of the processes that the system supports.

It is important to note that the existence of multiple feedback loops in our framework does not imply that we recommend a seemingly endless cycle of analysis. Indeed, some processes and systems are so expansive that, if the impacts of every development on every feature were evaluated by multiple repetitions of conceptualization activities at each stage, the paralysis by analysis is certain to cripple the effort. Ultimately, the implementation success of this framework depends on managers and developers finding the right blend for each unique situation—one that balances analysis/conceptualization depth and its utility. On balance, however, our observations indicate that the prevailing problem is in organizations not doing enough (rather than doing too much) to understand organizational processes and systems, and in many cases a critical process or system feature may only become apparent after repeated reconsideration.

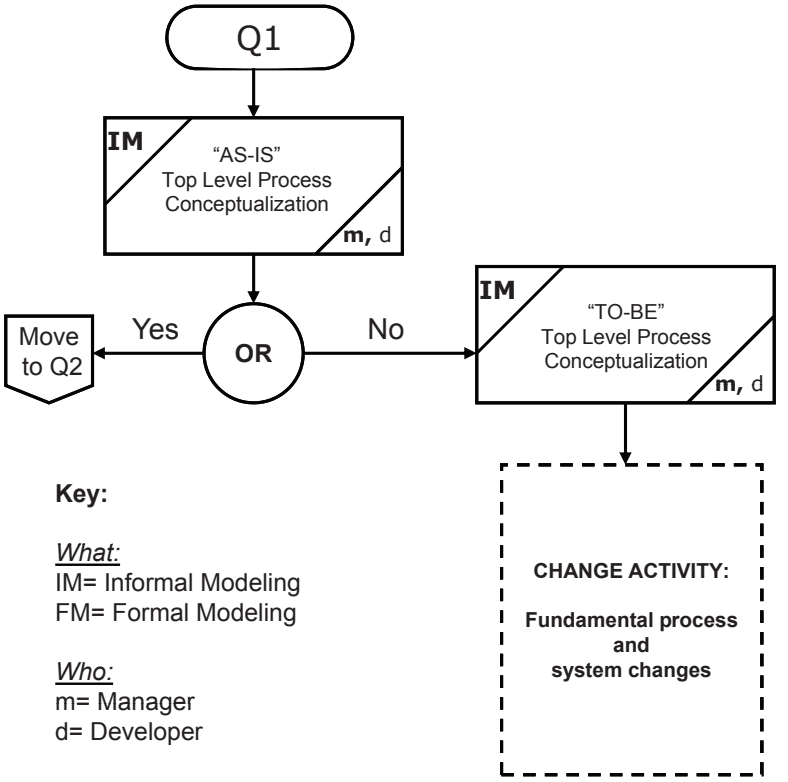
The remaining figures (Figures 3-6) represent a more detailed depiction of each conceptualization activity. In addition to the rectangles and progression and feedback lines, additional notation is used at this level of detail. We adopted a notation from EPML introduced by Dalal, Kamath, Kolarik, and Sivaraman (2004) for the purpose of Enterprise Modeling. Its versatility and ability to capture necessary detail were the main reason for our choice of this notation, even though the context and level of analysis are somewhat different from the one in which it was originally introduced. In our notation, each rectangle contains the description of the activities it contains, with the symbols representing the conceptualization method included in the upper right corner, and the symbols representing the constituents that are most likely to be involved in the effort in the lower right corner (with expected level of involvement indicated by the symbol size). The decision symbol used is a non-exclusive "OR" operator, signifying that a parallel progression of activities may occur, if the answer to the current question is part "Yes" and part "No". In the following discussion, as it relates to Figures 3-6, questions 1-4 will be repeated, for readability.

Figure 3 captures the activities motivated by Question 1, starting with the "As - Is" top level conceptualization of business processes.

In many cases, the most likely conceptualization method at this stage would involve use of informal modeling tools. The resulting vision may often be in the form of high-level visual depictions of main features of key organizational processes extracted from narratives and conceptualization sessions. This information is more likely to be drawn from the management rather than from the potential internal and external systems developers. The role of system experts, while not dominant, is still crucial at this stage, since they ensure that all participants have clear understanding of the current state of the relevant technologies and the potential impact of those technologies. The conceptualization at this stage, paired with the knowledge of existing technological trends and other external factors, should provide the direction of the remaining conceptualization activities.

One reason for a negative answer to the question of fit between the processes and business strategy may be a result of new technological developments that are of a revolutionary,

*Figure 3. Top level process conceptualization (TLPC)*




disruptive nature, and render existing processes obsolete simply through opening opportunities for processes to be conducted in a fashion that is clearly superior to the existing practice. The simple existence of potentially better processes in this case may render the existing processes out of alignment with organizational strategy. Other reasons for a negative answer to the question of fit between the organizational strategy and its processes may include major changes in corporate strategy or some other disruptive external development.

If this approach is adopted and it is conducted in an ongoing fashion, the state should eventually be reached where the process and subsequent systems reconsideration cycle is only initiated by external events, rather than internal systemic weaknesses (which will be eliminated). The key is to build the ongoing reconsideration of processes and systems into organizational policies and implement them so that they do not become just another meaningless part of bureaucratic tedium. Thus, this framework can become an expression of organizational culture of seeking a clear mental picture of current processes and systems as well as the readiness to envision how any significant change should affect them. If adopted in this way, it can, in turn, gradually eliminate internal sources of imbalance among organizational strategy, processes and systems. In essence, the goal of this approach is the elimination of the System View, where the emergence of single-event issues often finds organizations unprepared for change and result in systems and process redesign efforts that never seem to be adequate, solving one set of problems while causing another.

As stated above, the answer to the question of fit between processes and systems may not be a definite "Yes" or a definite "No", if the analysis reveals that the consistency between processes and organizational strategy is partial. If the answer is not categorical, in some cases progression to next activity set may be halted until all the aspects of all processes are brought into agreement with organizational strategy. More likely though, an organization may be able to proceed on both "tracks" simultaneously, addressing some processes at a high, strategic level (where the answer to Question 1 was a "No") while moving on the next level of analysis for others (where the answer to Question 1 was a "Yes").

As shown in Figure 3, this framework anticipates that top management will be responsible for the issue of the fit between key organizational processes and organizational strategy. In most cases, participation by the system development community, even at this very high level, should be welcomed, especially if emerging technologies are showing potential to affect the strategic fit. In other cases however (where the strategic fit is affected by external competitive developments of regulatory changes, for example), the process redesign at this high level will be motivated by non-technological issues.

In the early conceptualization stage level, the participants will most likely be inclined to uses informal ways of creating a conceptual vision of those processes, both as they are ("As-Is" conceptualization), and as they ought to be ("To-Be" conceptualization). More formal methods, with explicit rules and strictly defined semantics are more appropriate later in the process, when process and system details are being considered. A variety of informal techniques exist for eliciting requirements in early planning stages, such as flow charts and decision maps. These are in addition to formal and semi-formal modeling techniques such as E-R models and data flow diagrams (Giaglis, 2001).

A change activity in response to the findings of the high-level "To-Be" conceptualization effort is captured by a dashed rectangle in Figure 3. It may include significant reorganization efforts throughout the organization, such as:

- An overhaul of existing organizational processes and/or creation of new ones
- A change in governance structure through reorganization of corporate hierarchy and/or reporting practices/paths.

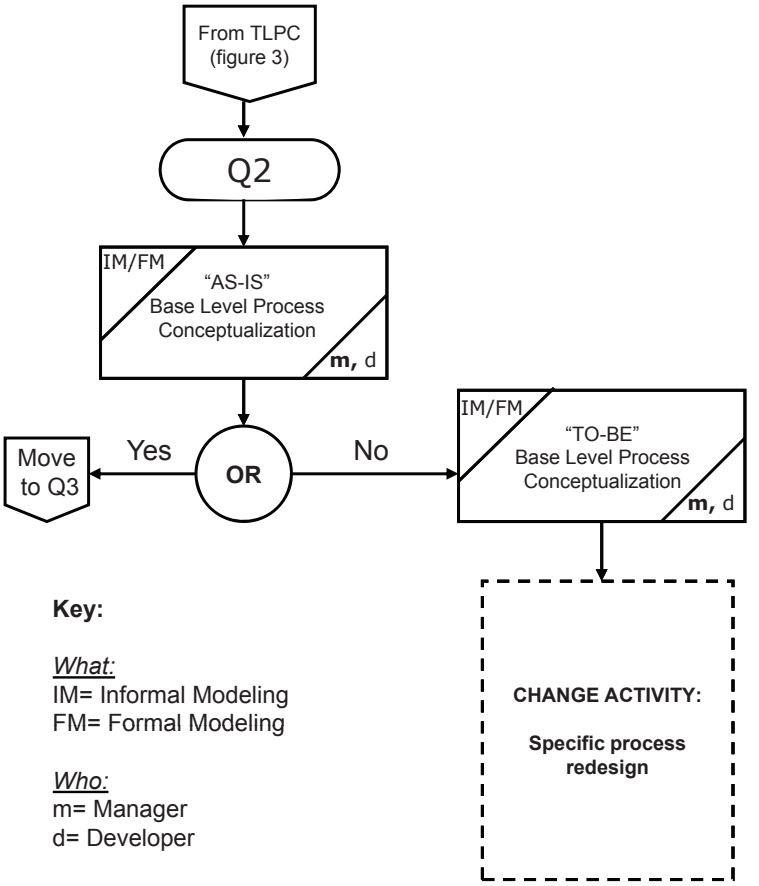
In the process of this structural reorganization, the conceptualization efforts should again be present at each stage of process and systems redesign. "As-Is" process and system conceptualization will facilitate the identification of the aspects of processes and systems that can be retained and those that require change. The sequence of conceptualization activities will create a complete list of reasons *why* the current processes and systems are inadequate and need to be overhauled. The focus of the "To-Be" conceptualization activities in this case will be on creating a clear vision of desired processes and following it with system conceptualization designed to fit the process vision. In essence, a whole new sequence of activities will be spawned, following the same progression as that shown in Figures 1 and 2.

Figure 4 depicts the activities motivated by Question 2, assuming that the question of the fit between organizational key processes and its corporate strategy has been resolved.

In this phase, the main goal is to examine processes at a greater level of detail, and look for the improvement opportunities. At this stage, either informal or formal modeling techniques, or some combination of both, may be appropriate, depending on the complexity of the process being considered, the desired level of precision, and the accepted level of modeling skill and understanding within the group involved in this stage.

Often, key contributions will be needed from management and the systems development community. Here, it is important that everyone has the same unambiguous picture of the processes being considered. A more detailed and consequently, more accurate picture

*Figure 4. Base level process conceptualization (BLPC)*




of processes may lead to a negative answer to Question 2, revealing potential areas of process improvement, without the need for a change in supporting systems. When the satisfactory answer to Question 2 is achieved, possibly after several iterations of process conceptualization and improvement activities, the next phase is entered, where the focus is shifted towards the analysis of current organizational systems, first at the higher level (motivated by Question 3) and then in more detail (motivated by Question 4)

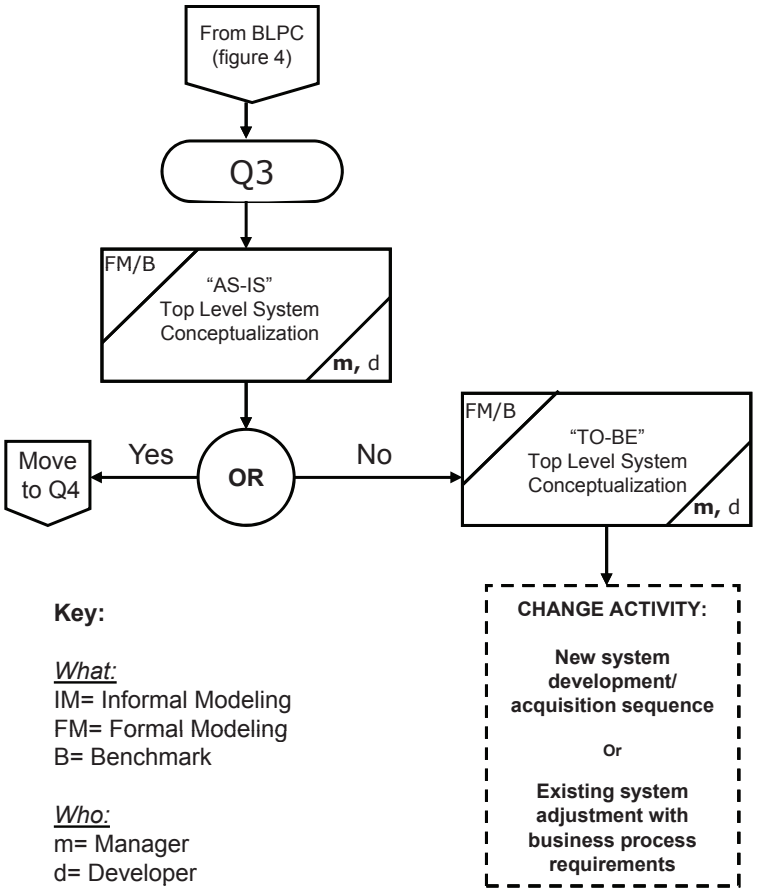
The dashed rectangle in Figure 4 represents the set of activities that are undertaken in response to the "As-Is" conceptualization at the base level model of processes. These activities reveal that processes as currently in place do not optimally support the objectives of an organization, and drive the subsequent creation of the vision of the improved processes through "To-Be" Base Level Process Conceptualization. The actions in this activity set should be centered on a specific process redesign that represents an improvement in its support of the organizational goals. In short, the actions taken in response to a negative answer to the Question 2 ensure that the organization does not waste time and resources by hastily moving on towards the design and improvement of underlying information systems that will automate and otherwise support processes that were not fully suitable in terms of optimal support for the organizational goals.

After the processes have been fully examined and redesigned in accordance with the "To-Be" vision, Question 2 should be raised again, accompanied by the examination of the new "As-Is" model of (now improved) processes. This should eventually result in a satisfactory answer and progression to the analysis of information systems in the next stage of the framework. Again, as discussed above, the number of iterations of current process consideration, conceptualization of process improvement and process redesign will vary. The goal of those involved in the effort should be to strike a proper balance. At one extreme, the goal should be to avoid an endless cycle of analysis, resulting in recommendations for concrete implementation action being generated too slowly. Another, potentially more likely extreme is an inclination to simply go through the motions, rubberstamping the current situation as satisfactory and starting the system analysis prematurely.

Figure 5 represents the view of activities motivated by the top-level system conceptualization. The main purpose of this stage is to provide an answer to the question of fit between the processes and systems, as stated in Question 3:

In this phase, the more formal modeling methods may be more appropriate conceptualization tools, with intensive participation by both the IT development staff and management. Another potential conceptualization method that may be used (in addition to, or as an alternative)

*Figure 5. Top level system conceptualization*



is benchmarking through the analysis of existing systems as applied in comparable organizations. This is possible if access to main system features and designs is available. The top level abstract model (or other way of achieving a clear vision) of existing systems is used to provide an answer to Question 3 about the adequacy of the existing system in supporting business processes that, at this stage, are aligned with organizational goals. The answer, as in previous stages, can be a full or a partial one. In the case of a fully or partially negative assessment of existing systems at the top level conceptualization, the next step is again to craft a "To-Be" vision of systems that fulfill the goal of properly supporting business processes, based on a formal model and possibly also on a benchmark of systems already in place at other organizations.

The predominantly negative evaluation of this fit may have many causes; some rooted in the way the existing system was adopted in the first place. The realization of the inadequacy of the existing system may actually start to appear during the base level conceptualization of business processes, as conducted in response to Q2, especially if the processes are very dependent on the features and abilities of the current system. For this reason, systems evaluation is followed by the process reconsideration, as shown by the feedback line III in Figures 1 and 2. The process analysis motivated by questions 1 and 2 will be repeated, this time assuming that systems in place are the redesigned systems, based on the "To-Be" top-level systems conceptualization. This approach ensures that processes and systems will not be considered in isolation from each other, but rather through a series of interrelated conceptualization efforts.

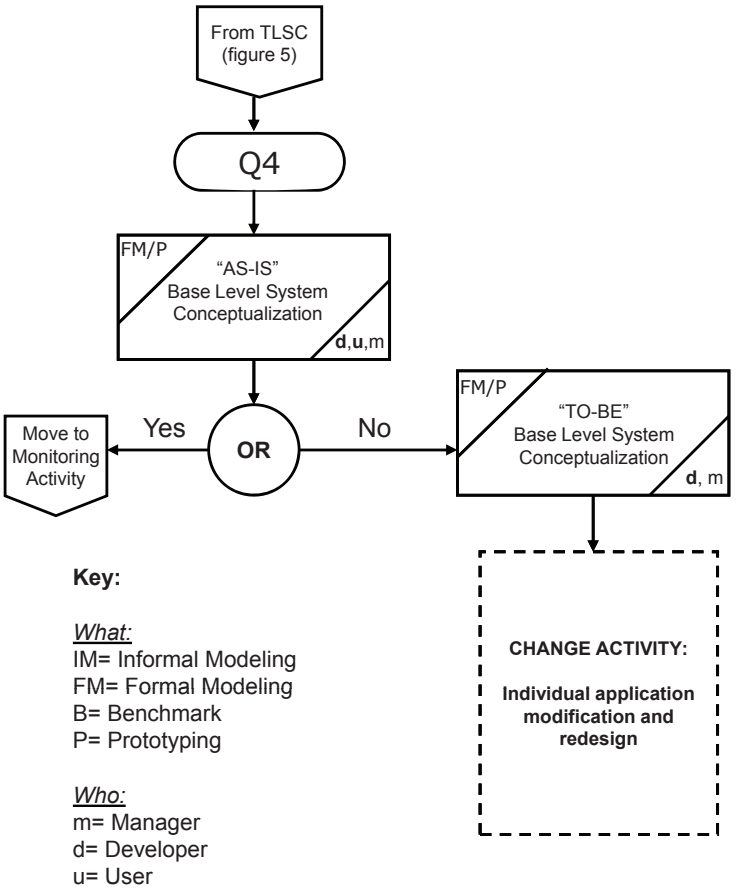
The dashed rectangle in Figure 5 represents change activities in response to the predominantly negative evaluation of existing systems as result of "As-Is" high-level system conceptualization. Causes of negative evaluation will vary widely from one case to another, and so will the actions that organizations will undertake in order to address them. In some cases systems may be found to be fundamentally inadequate, with the "To-Be" vision very different from the "As-Is" concept of the existing information systems. In such cases, a probable course of action at this level is the initiation of formal new systems development and design processes, including the evaluation of systems alternatives that exist in the appropriate packaged solutions market.

Alternatively, the detected flaws may not be related to the key functional features of existing systems, but rather to the ability to facilitate processes that are enterprise-wide and bridge single systems boundaries. In this case, a possible course of action may include the development of enterprise–wide mechanisms for the successful alignment of different components of the organizational business architecture with existing systems architecture. For example, this may start with the creation of enterprise and supply chain-wide data dictionaries and process semantics. Regardless of scope and complexity, all activities undertaken at this point need to be consistent with the established "To-Be" vision of systems that is again based on the current detailed concept of business processes created in the previous stage.

Figure 6 contains the Base Level System Conceptualization and its resultant activities in response to the Question 4:

The goal here is to achieve further alignment between individual processes and system components through incremental changes at an individual application or application component level. The methods of achieving a clear mental picture at this level may include both formal modeling and prototyping for the purpose of both "As-Is" and especially "To-Be" conceptualizations. In our context, the term "prototyping" means the repeated interaction with each incrementally improved version of the system for the purpose of evaluating its functionalities and support for business processes at the low level of detail. At this stage, the development personnel (or IT evaluation staff if a packaged solution is being considered) will have the highest level of involvement, with active participation by the end user community that may also include management, especially if the

*Figure 6. Base level system conceptualization*




system under consideration has a prominent decision support role.

The dashed rectangle in Figure 6 contains the activities that follow low-level base conceptualization of the systems involve modifications and redesign on an individual application level or even lower, constituent object level. This process is most likely to be recursive, with several iterations between the conceptualization activities and actual development and implementation activities. It is important to keep in mind the complementary roles of abstract modeling and prototyping at this stage. The prototyping approach, at a stage that is close to implementation, provides a very concrete vision of the system component under consideration and facilitates instant user feedback that reveals potential problems and improvement opportunities. The abstract model, on the other hand, is more capable of conveying how an individual application or other system component fits the overall system vision as well as the underlying process vision.

In summary, the diagrams above display a number of conceptualization and conceptualization-driven activities, distributed between high and low level of analysis. The flow of activities is driven by the four fundamental questions posed in the previous section. The emphasis is on considering processes first, in

a way that takes into account organizational IT capabilities, as well as other available technologies. The process consideration starts with addressing the fit with organizational goals and then considering possible redesign, followed by understanding the implications for the redesign of underlying systems. In this, our flow model is consistent with the notion voiced by Attaran (2004). While agreeing with Michael Hammer's recommendation to redefine processes first and automate second, Attaran stated that IT capabilities can and should influence all stages of process design. Our framework is consistent with the proactive approach to process and systems planning.

The main purpose of our conceptualization workflow framework is to formalize when and why conceptualization efforts should be undertaken in process and systems planning and design. Its parts are applicable within the standard framework for development of information systems: systems development life cycle, or business process redesign and change sequence, such as those proposed by Davenport (1993), or Champy and Hammer (1993). Our intention was to go a step further beyond general strategy and IT implementation recommendations, especially for the process and system design and configuration stages, encompassing all the planning and decision making stages and pointing out situations where conceptualization is a crucial activity.

Our framework recognizes unique roles of management, developers and users in ensuring the proper alignment of strategy, processes and systems. Its intention is to provide a mechanism that facilitates enterprise wide participation in conceptualization on multiple levels of complexity. This proposed framework envisions that results of conceptualization activities at each level are shared, facilitating the communication between the management, systems analysts and developers. If this is achieved, the result should be the common vision of business goals, processes and applications.

## COMPARISON WITH EXISTING APPROACHES

This section will present a comparison of the introduced framework with the existing frameworks that directly or indirectly deal with the issue of change and adoption of corporate information systems. The Open Group Architectural Framework (TOGAF, 2003) is a broad and detailed method and set of supporting tools for developing an enterprise-architecture. It includes a section on architecture change management, which, similarly to our work, recognizes both the technology and business drivers for change and advocates many of the factors (such as the understanding of key organizational strategic goals and the resulting business processes) that we summarized into the concept that we labeled as the Process View. TOGAF even list the steps, such as ongoing monitoring of technology changes and ongoing monitoring of business changes, as the key factors in the architecture-change-management process. However, TOGAF offers no actual structured and prescriptive method that outlines how to achieve the goals of the Process View during the change process or how and when to undertake the steps during the change process. Instead, the following general advice is given:

*There are many valid approaches to change management, and various management techniques and methodologies that can be used to manage change: for example, project management methods, service management methods, management consultancy methods, and many others. An enterprise that already has a change management process in place in a field other than Architecture may well be able to adapt it for use in relation to architecture.*

Therefore, organizations must still choose (and then adapt) a method on how to deal with the architecture-change management, which can potentially add to the length and complexity of the change process. On the other hand, the framework based on the four questions that we introduce in this article, presents the users a

ready-to-use method specifically designed for the architecture-change process. Our framework not only takes into account alignment between business strategy and business and information system architecture, but it makes it the recurring foundation of all changes in the architecture.

Similarly to TOGAF, Zachman presents in his papers (1987; 2000) a detailed framework for development of enterprise architecture which advocates business process modeling and conceptualization as the integral part of enterprise architecture development, which is also one of the main motivators for Process View. As in TOGAF, there is no specific methodology that details and structures steps for architecture change that would be equivalent or comparable to the detailed framework for architecture-change introduced in this article.

In other words, our framework serves to complement the general frameworks (such as TOGAF or Zachman) with the detailed and structured architecture-change-management component. Constituent parts of the Process View that we describe earlier in this article are not new. In addition to TOGAF and Zachman frameworks, we can find elements of Process View described in detail in other approaches dealing with the process of design and development of managerial information systems, such as OPEN Process Framework (Firesmith 2005). Here, we gathered these elements together under a label of Process View (taking into account our own surveys, as well as sources from various publications referred to in this article) to contrast it with the often inadequate, but quite widespread, practice of System View. What is new in this article is the introduction of the detailed and structured architecture-change framework, whose goal is to facilitate the Process View during the process of change, adaptation and adoption of corporate information systems.

## SUMMARY AND CONCLUSION

In this article, we have argued for the importance of proper planning and decision-making during the process of information system change and adoption. We have described two different approaches to information system change; the System View and the Process View, and we argued for, and demonstrated the benefits of, the Process View. We have also shown that a number of other authors have advocated the concepts that we joined in this article under the label Process View. The central part of this article is presentation of a framework that is rooted in the active and conscious usage of various methods of process and system conceptualizations at multiple levels. The framework is designed as a sequential set of activities centered on the questions of fit among organizational goals, processes, and systems. We have motivated this discussion by our classification of motivating factors and outcomes of the change and adoption of new enterprise information systems and/or their components. We have asserted the importance of conceptualization as a means of achieving proper fit between strategic goals and the resultant business processes and systems that support them.

The following question may be posed: is the framework described in this article practical and to what extent would managers and IS professionals be willing to put in the time and effort required to follow the steps of this process approach? As we outlined in this article and illustrated by Figures 1-6, our approach is highly structured and prescriptive, which in itself is practical in the sense that, if this framework is adopted, organizations do not have to spend additional effort and resources on creating their road-maps for the enterprise information system change and adoption. Our framework relies on recursive and continuous "As–Is", and "To-Be" conceptualizations at both high and low levels of process and systems detail. The recursion encourages continuous monitoring of technological and other external (market, regulatory, etc) developments, without which it would be very difficult to make the right decisions during the change and adoption process.

The framework is flexible and adjustable so it can fit a variety of situations and scenarios within enterprises. As show in by Figure 2, many of the recursive steps are optional and, as we dis-

cussed earlier in the article, are to be applied only if required by a particular scenario or company policy. Also, a closer look at Figures 3-6 reveals the straightforward and simple nature of each individual step in the framework. For each of the four questions, an "As-Is" conceptualization is recommended as the way to answer the question properly, together with recommendations on which methods (such as informal modeling or prototyping) and people (such as managers, developers or users) to involve. Organizations that adopt the framework essentially commit themselves to considering the four questions and then choosing from the recommendations given in the framework on how to do so. Therefore, any organization that recognizes the need and benefit of conceptualization and is willing to examine its organizational strategy, business processes, and its existing information systems before the actual change and adoption process takes place (i.e., consideration of questions 1 – 4) is, by default, willing to put the time and effort required to follow the steps of the proposed framework.)

Our view is that there is no single conceptualization method uniquely suited for each level, but we do envision the progression from less to more formal techniques as the level of detail and complexity increases. We believe that the first important step is for organizations to be aware of the need for process and system conceptualization at multiple levels. Subsequently, each organization needs to seek a combination of methods that fulfills its specific needs in the most feasible fashion.

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