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# Scenarios in Strategic Information Systems Management

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## ABSTRACT

Today's CIO is faced with an increasingly complex business environment, making the strategic management of information systems (IS) a daunting task. Technological change, shifting customer needs and wants, and the trend toward globalization are just a few of the external factors that impact IS strategy during the formulation stage. Scenario planning is a technique that has been used in strategy formulation for decades in both industry and government. A review of the literature reveals a wide range of areas in which scenarios are being applied in the context of IS management. Examples involving industry trends, emerging technologies, IT project management, and systems analysis and design are presented.

This paper links the inclusion of scenario planning as an integral component IS strategy development. A case study from the telecommunication industry demonstrates its value as a means to support IS strategy.

## Keywords

IS Assessment, IS Accreditation, IS Curriculum, ABET Accreditation

## INTRODUCTION

Scenarios may be defined as coherent and credible stories that describe different paths that lead to alternative futures [3]. First conceptualized in the fifties to describe potentially catastrophic global outcomes resulting from nuclear proliferation, the notion of 'thinking the unthinkable' has become an accepted strategic planning approach. Unlike more traditional approaches, such as forecasting and simulation, scenarios do not depend on mathematical models and probabilities based on the past to predict the future. Rather, they deal with the subtleties surrounding a complex issue and provide a more intuitive and holistic way of thinking about the future. Scenarios are more concerned with challenging assumptions and asking the right questions, as opposed to making predictions or projections.

Scenario-based methodologies have gained in popularity in both government and industrial settings over the past few decades [17]. Perhaps, the most famous application of scenarios was that of the Royal/Dutch Shell Group during the early seventies. Up until this time, oil supplies appeared to be plentiful and prices were relatively stable. Shell analysts devised a number of storylines describing possible alternatives, one of which considered a sharp rise in oil prices due to a Saudi Arabian pipeline accident. Because they had, in effect, mentally rehearsed the pessimistic scenario of a world wide shortage, Shell was able to mitigate some of the negative impact of OPEC's decrease in oil shipments that occurred later in 1973. Indeed, Shell was much more prepared to respond to the impending oil crisis than its competitors since it had already started to take measures in anticipation of this eventuality [12].

Over the past few decades many have taken up the scenario-based approach to strategic planning as a rallying cry [3,17] and various scenario building methodologies have been developed. One such system, advocated by Peter Schwartz [16] of the Global Business Network includes the following steps: (1) identify focal issue or decision, (2) determine key forces in the local environment, (3) identify major trends and driving forces that influence the key forces, (4) rank the key forces and driving forces on the degree of importance and the degree of uncertainty, (5) following the ranking, take the information to define the key variables for building scenarios, (6) flesh out the scenarios, (7) look for implications, (8) select leading indicators and signposts. Newer approaches, allowing for web-based collaborative scenario building have also started to appear [18]. In spite of the popularity of scenarios and an increase in available techniques, there has been very little scholarly research in the area and a lack of theoretical development, making such practices incompletely understood and not fully validated [2].

## THE APPLICATION OF SCENARIO PLANNING TO STRATEGIC IS

The role of today's top level IS manager, has changed radically over the last decade. Environmental forces such as globalization, the rise of the Internet, and the emerging knowledge economy, have made the job of the IS manager more complex and riddled with uncertainty. Contrasted with more traditional IS management, which dealt primarily with back-office transactional systems, today's IS function is much more strategic in nature. Scenario planning is a technique that allows decision makers to take into account the discontinuities that may arise in the ever changing business landscape and which impact the selection, development, implementation and support of IT systems. [4,11]

A review of the literature reveals four primary areas in which scenario analysis is being actively applied in the IS arena: predicting IS industry trends, anticipating the impact of emerging technologies, IT project management and systems analysis and design (SAD).

### IT Industry Trends

Many of the decisions made by IS managers are based on assumptions regarding the future environment predicated on past events or on the status quo. Scenario planning can provide a useful framework to provide alternatives that can inform the decision making process. Markus [10] describes how such an approach can be used to anticipate how the in-house IS management environment might look 10 years into the future. Two primary areas of uncertainty are explored: (1) IT coordination, i.e. traditional hierarchical mechanisms vs. pooled organizational forms, and (2) content management, i.e. in-house vs. fee-charging service providers. Four scenarios are created to describe possible futures based on these dimensions. Armed with such scenarios, decision makers are able to decide how well current strategies are doing in dealing with each situation, determine if a different approach would cover more bases, and decide which factors need to be monitored.

A recent report from Gartner Research [1] presents a similar scenario-based analysis of IT management for the year 2015. Four possible futures are discussed, each presenting a different set of challenges and imperatives for managers in the next 10 years. Two major forces are identified: (1) the extent to which the global political economy will become more integrated or more regionalized, and (2) the extent to which IT will experience transformative and disruptive innovation or sustaining utilitarian change. From these major forces four quadrants are derived, each depicting a different scenario of the IT management context: (1) 'Clusters Lead' – regional economic clusters sustain leadership through high rates of innovation and competitiveness, (2) 'Business as Usual' – extrapolation of current trends, (3) 'Pax Technologia' – fully globalized economy with startups serving the innovation needs of service recipients and providers, and (4) 'Mass Marketization' – global political economy with a utilitarian and sustaining focus and only internalized innovation. Analysis of these scenarios leads to the identification of some common themes and a number of general recommendations that can help management adapt to the changing climate. Among the general trends resulting from this analysis are: (1) the role of the CIO will be transformed to business leader and strategist, (2) innovation and capital formation will not be restricted to a single region, (3) international skills and competencies will emerge as mission-critical in IT staffing, and (4) the IT organization will be smaller, centralized, strategic and globalized.

### Emerging Communication and Information Technologies

One area that is particularly amenable to scenario analysis is the communications industry, a volatile sector undergoing rapid transformation. Roschelle et al. [15] describe the efforts of an international group of researchers interested in the future development of wireless and mobile technologies in education (WMTE). Using a scenario-based approach the group developed a number of plausible stories that describe the development of collaborative learning through 2015 as influenced by the new technology. Among the major trends identified were (1) all students will have some form of personal learning device that will allow students and teachers to share their work, (2) sensors and agents will increasingly become part of the learning environment, and (3) content for learning will come from collections in digital libraries and online communities.

Markoulidakis et al. [9] utilize a set scenarios to study the development of third generation mobile telecommunication systems, as huge numbers of mobile subscribers stress the capacity limits of the current system. Using a scenario-planning approach, a number of different location area planning schemes are investigated in terms of their applicability and usefulness in future mobile telecommunications systems.

Kyrki [8] examines the development and diffusion of the wireless technology Bluetooth, in the European telecommunications industry five years into the future. Three scenarios were built: (1) Focused business applications – consumers lack

enthusiasm for new solutions and usefulness is the focus, (2) Entertainment for masses – active usage and eagerness toward innovations, and (3) Information for everyone – accentuating communication and ease of use.

Scenarios have also been applied to evaluate the growth potential of commercial enterprise software. Markus et al. (11) contrast two scenarios that anticipate the future of ERP package adoption. A traditional, ‘continuity’ view is based on the current issues facing ERP adopters and vendors. It would assume a high level of continuity with the current landscape, i.e. division of labor between ERP package adopting organizations and ERP package vendors, and would predict an overall expansion of ERP usage and growth in this market space. The alternative approach uses a ‘discontinuity’ view which anticipates the rise of new intermediaries that allow for more collaborative systems (e.g. vertical portals and collaboration facilitators). In this scenario, ERP will be adapted to a collaborative form of commerce versus the more traditional dyadic relationship. The two different futures have different implications in terms of in-house IS management and the skill sets required. In the continuity view, business will continue as usual and skills in systems integration will remain useful. In the discontinuity view, however, future skills will involve interaction with external service providers and understanding the need for new types of services.

### **IT Project Management**

Although not typically concerned with long term strategy issues, IT project management can also benefit from a scenario-based approach. In 1995 the Standish Group released its infamous Chaos report [www.thestandishgroup.com], claiming that only 16.2% of software projects were completed on time and within budget. While a later report showed significant improvement (a 34% success rate), it is still a strikingly low percentage and indicative of some major challenges in IT project management. Among the top reasons given for project failures are the lack of user input and incomplete and/or changing requirements and specifications.

IT project management relies to a great degree on estimates based on historical data. While such techniques are useful to analyze issues such as resource allocation and scheduling, they are less able to deal with the more unpredictable events and conditions in both the internal and external environment that may impact project completion. This is particularly true in global development projects, where factors such as cultural and language differences may seriously impede successful project completion [4].

Scenario planning can help beleaguered IT project managers avoid making hasty decisions, many of which have long reaching ramifications. Desouza [4] calls for a scenario-based approach to allow project managers to assume a more proactive stance in anticipating potential trouble spots: “Instead of tossing inexperienced managers into the IT project shark tank, an organization can have them work through complex and realistic scenarios in training sessions, learn how to deal with the issues, improve their knowledge and experience, and *then* take on a real project”.

The author suggests that scenario planning is particularly valuable to the IT project manager in assessing new situations, training employees, managing crisis preparation, and facilitating recovery. An example is the use of scenarios to simulate a distributed development process involving an outsourcing agreement. Before allowing the contractor to gain access to IT systems, a simulated drill based on scenarios was performed. This activity revealed many of the hidden costs of the outsourcing arrangement and made the stakeholders aware of issues they would face in the real distributed development environment.

### **Systems Analysis and Design**

As in IT project management, systems analysis and design requires difficult decision making in uncertain environments. Go and Carrol [5] suggest that scenarios can provide guidance through all stages of the system development lifecycle (SDLC). Scenario planning “...encourages user involvement in system design, provides shared vocabulary among the people participating in the system development project, envisions the uncertain future tasks of the system users, and enhances ease of developing instructional materials”.

An example of using scenarios in the design process is found in Rocker et al. [14], who utilized the approach to inform the design decisions relating to ambient intelligence technologies, specifically the Ambient Intelligence for Networked Home Environment (AMIGO) system, sponsored by the European Union. In this envisioned future, there is much uncertainty with respect to how users will react to such systems, which allow for the integration of information, communication and sensing

technologies into the household environment. Four scenarios, depicting a fictitious family's usage of intelligent services, were used to explain the concepts to potential users and to elicit feedback. From this, a cluster analysis revealed several key themes and a number of prioritized design guidelines. Scenario analysis has regularly been utilized in human-computer interaction (HCI) design [5], to describe the use of systems and to develop more usable computer systems.

Scenarios have also found a place in systems architecture specification. Although often overlooked, the architectural decisions for software-intensive systems are strategic in nature, and therefore it is important to consider potential changes in the business environment to guide decision making. Ionito, America and Hammer [7] describe the use of scenarios in specifying the architecture of a medical imaging system and offer a method for Strategic Scenario-based Architecting (SSBA). The approach provides a step-by-step process for evolving system architectures that are more 'future proof', i.e. more resilient to change.

Hobbs and Potts [6] introduce the concept of a hypermedia scenario document (hyperscenario), which is a computational representation for narrative to aid policy makers, systems developers and trainers in making decisions. The representation, called Scenario Markup Language (SCML), is based on XML and is being applied to simulations of battle planning by the Department of Defense.

### **SCENARIO PLANNING CASE ANALYSIS**

A major telecommunication vendor has utilized scenario planning for new product development and disaster recovery planning. Disaster recovery planning was traditionally a planning process that required a high degree of integration and was viewed from the perspective of rank ordering applications that would require recovery, based upon criticality and time required to complete a recovery. There was very little planning to take into account the intricate relationships of data across application platforms as well as the operating level software needed to affect a significant system recovery. With scenario planning, various disaster events were considered with a focus placed upon analyzing the criticality to the business operation in place of time required to recover applications. As a result changes were made to the overall disaster recovery plan to streamline the process and to improve the number of concurrent recovery step that could be simultaneously completed.

Scenario planning was also employed as a tool to assist in the selection of which emerging technologies to pursue. They recognized that they were behind the industry in new product development for cellular and wireless applications for PDA devices. There were numerous possibilities to invest in new product research and traditional financing techniques were difficult to justify. Additionally, they had neither the time nor the financial wherewithal to invest in each strategic option. Scenario planning was used to define the desired state for each of the research development options. Scenarios based upon differing market penetration results were analyzed and based upon the most likely scenarios, product development choices were made.

In both situations scenario planning was used to explore alternative strategies that had not been considered using traditional decision making analytics. Scenario planning expanded the range of strategic choices available and permitted the organization to visualize results that were not otherwise clearly identifiable.

### **CONCLUSION**

As the business environment becomes more uncertain and the job of the IS manager more complex, scenario planning becomes more valuable as a tool for guiding decision making. A review of some documented applications of scenario planning revealed a growing recognition of their value in the IT context. It is not enough to rely solely on mathematical models or formulas; today's IT environment requires a more 'whole-brained' approach that encourages intuitive and non-linear thinking. Although scenario planning can be a useful addition to the IS manager's arsenal, there are some potential pitfalls in its implementation. Wilson [19] points to the need for a deeper understanding of the cultural and psychological factors that might impede acceptance of scenario planning. Since scenarios depend on as much art as science, it is difficult to empirically quantify resulting benefits. There is also the risk that the process itself can become a divisive force, as disturbing 'worst case' scenarios are considered. In spite of these challenges, scenario planning should be considered a valuable component of strategic IS management. More empirical research is needed to solidify the theoretical foundation of scenario planning.

### **FUTURE WORK**

Greater empirical research in the use of scenario planning is needed to test the perception of its value as an IS planning and analytic tool. We intend to survey organizations that use scenario planning to determine the factors that influence scenario planning success. This quantitative approach will provide empirical results to support or refute the value of scenario planning as a tool for IS planning and analysis.

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