Design and Implementation of Scenario Management Systems

M. Daud Ahmed
Manukau Institute of Technology, New Zealand

David Sundaram
University of Auckland, New Zealand

INTRODUCTION

Scenarios have been defined in many ways, for example, a management tool for identifying a plausible future (Porter, 1985; Schwartz, 1991; Ringland, 1998; Tucker, 1999; Alter, 1983) and a process for forward-looking analysis. A scenario is a kind of story that is a focused description of a fundamentally different future (Schoemaker, 1993), that is plausibly based on analysis of the interaction of a number of environmental variables (Kloss, 1999), that improves cognition by organizing many different bits of information (De Geus, 1997; Wack, 1985; van der Heijden, 1996), and that is analogous to a "what if" story (Tucker, 1999). It can be a series of events that could lead the current situation to a possible or desirable future state. Scenarios are not forecasts (Schwartz, 1991), future plans (Epstein, 1998), trend analyses, or analyses of the past. Schoemaker (1993) also explains that scenarios are for strategy identification rather than strategy development. Fordham and Malafant (1997) observe that decision scenarios allow the policymaker to anticipate and understand risk, and to discover new options for action. Ritson (1997) agrees with Schoemaker (1995) and explains that scenario planning scenarios are situations planned against known facts and trends, but deliberately structured to enable a wide range of options and to track the key triggers that would precede a given situation or event within the scenario.

In this article we propose an operational definition of scenarios that enables us to manage and support scenarios in a coherent fashion. This is then followed by an in-depth analysis of the management of scenarios at the conceptual level as well as at the framework level. The article goes on to discuss the realization of such a framework through a component-based layered architecture that is suitable for implementation as an n-tiered system. We end with a discussion on current and future trends.

BACKGROUND

The basic structure and behavior of the scenario is similar to the decision support system (DSS) components *model* and *solver* respectively. In information systems literature, a use case instance irrespective of transaction or decision context is considered as a scenario. But scenarios are primarily related to complex business change management processes; they might address semi-structured and unstructured decision problems. Hence we define scenario as a complex decision situation analogous to a model that is instantiated by data and tied to solver(s). In its simplest form, scenario is a complex combination of data, model, and solver.

Decision makers have been using the concepts of scenarios for a long time, but due to their complexity, their use is still limited to strategic decision-making tasks. Scenario planning varies widely from decision maker to decision maker, mainly because of lack of a generally accepted principle for scenario management. Albert (1983) proposes three approaches for scenario planning: expert scenario approach, morphological approach, and cross-impact approach. Ringland (1998) describes three-step scenario planning: brainstorming, building scenarios, and decisions and action planning. Schoemaker (1995) outlines a 10-step scenario analysis process. Huss and Honton (1987) identify three categories of scenario planning: intuitive logics, trend-impact analysis, and cross-impact analysis. These planning processes are useful but they are not entirely supported by the available decision support systems frameworks. Either or both of the existing scenario planning processes and the DSS frameworks needs to be modified for planning scenarios within DSS.

SCENARIO MANAGEMENT SYSTEMS

Few of the decision support system frameworks emphasize a lifecycle approach based fully featured scenario planning, development, analysis, execution, and evaluation environment. DSS components such as data, model, solver, and visualization have been extensively used in many DSS framework designs, but they did not consider scenario as a component of DSS. Scenario plays such an important role in the decision-making process that it is almost impractical to develop a good decision modeling environment while leaving out this component.

Figure 1. Scenario-driven decision system framework

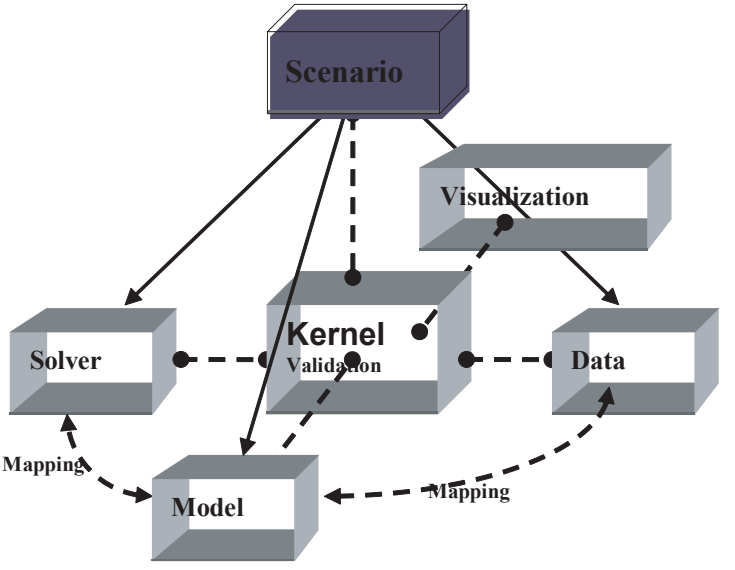

Figure 2. SDSSG system architecture