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Special Issue Overview

Software Tools for Strategic Management

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Theories and principles in any discipline or domain are often translated to common practice via methods and tools. People who design airplanes, for example, do not revert to Newton's laws to make every design decision. People who design computers do not base every design decision on explicit consideration of first principles such as Kirchoff's laws. Behavioral and social scientists do not begin all data analyses by first considering basic theories of probability and statistics.

Instead, people use methods and tools that embody these laws and first principles. In using these methods and tools, they are inherently employing best practices in the sense of basing their decisions on the fundamental theories and principles of their discipline or domain. Efficiency is thereby obviously enhanced. Effectiveness is also increased because the usefulness and usability of well-designed methods and tools are often far greater than the original theories and principles.

Strategic management as a domain, and perhaps nascent discipline, involves a broad range of organizational challenges for which there is a variety of available methods and tools (Rouse, 2000). Most of these methods and tools are fairly conceptual, limited often to lists of guiding rules, step-by-step procedures, or perhaps summarized in two-by-two matrices. Much of this guidance helps to manage organizational complexity by assuming it away.

Many managers, hoping strategic issues are less complex than they appear, are well-disposed to such simple prescriptions. Unfortunately, success is usually quite elusive, despite having adopted the recommended list or matrix. However, there are always new prescriptions available with which to address the next strategic challenge.

The methods and tools discussed in this special issue of **Information • Knowledge • Systems *Management*** are not simple prescriptions. These offerings are intended to help managers cope with complexity rather than avoid it. Further, as software tools intended for desktop use, they provide managers with easy access to knowledge-based frameworks and computational models. Each of these software tools evidences the results of considerable systematic thinking about the strategic management issue(s) addressed.

This special issue is somewhat unique in that authors were encouraged to describe their commercially-available software tools for supporting strategic management, but also to be sure to provide both the rationale and supporting evidence for any claims made about them in an effort to illustrate their value through appropriate backings and warrants. In this way, considerable effort was invested to assure that each article provided much more background and substance than typical product brochures.

There is a somewhat natural order to the presentation of these tools:

- ***ProcessEdge*** focuses on modeling, design, and evaluation of organizational processes
- ***OPTIMAS*** deals with design and evaluation of organizational measurement systems
- ***Technology Investment Advisor*** addresses financial assessment of technology strategies

- ***Decision Advisor*** is concerned with making decisions in complex situations involving considerable uncertainty
- ***TOP-Modeler*** focuses on change management and determining best practices most appropriate for supporting intended changes

A brief description of each software tool follows.

ProcessEdge

Madni (2000) discusses ***ProcessEdge***, a computer-based tool for supporting the planning and measurement associated with design and evaluation of organizational processes. The underlying elements of this tool include an enterprise ontology (i.e., hierarchy of enterprise concepts and relationships among concepts), an enterprise process lifecycle model, and embedded business rules. ***ProcessEdge*** provides support for process definition, verification, visualization, analysis, and composition, as well as various utilities for comparing, importing, and exporting process designs.

The value of this type of tool is the ease with which processes can be depicted, evaluated, manipulated, and presented. This enables effective movement toward process-oriented thinking and away from traditional functional thinking. Because of the knowledge-based, interactive nature of this type of tool, one can learn and become productive much more quickly than if one relies solely on more didactic treatments of this topic.

OPTIMAS

Jensen and Sage (2000) report on the development and evaluation of the Organizational Performance Tracking and Improvement Analysis System — ***OPTIMAS*** — which facilitates formulation and execution of a system of measurement involving internal, organizational metrics and external, business environmental metrics. The systematic approach embodied in ***OPTIMAS*** was evaluated using two case studies which indicated that this tool prompts a much more strategic view of performance measurement and results in metrics being much more clearly linked to organizational goals.

The process of developing a measurement system begins with specifying organizational direction and goals. This leads to a cascading procedure involving identifying goals, goal specifications, metrics for achieving goals, and metric specification. The results of this procedure are then related to the organizational structure and business processes. Overall, ***OPTIMAS*** enables viewing the organization and its business environment in a holistic manner, specifying the essential information required to help ensure that the metrics identified are useful and effective, and tying metrics to aspects of performance that are important rather than just easy to measure.

Technology Investment Advisor

Rouse, Howard, Carns, and Prendergast (2000) focus on financial analysis of technology investments. The ***Technology Investment Advisor*** integrates models for options pricing, market/technology maturity, production learning, and competitive scenarios. Applications of this tool discussed include formulation and evaluation of technology strategies for electronics and semiconductor products, aircraft manufacturing processes, and government R&D investments.

The concept of use for the ***Technology Investment Advisor*** involves support for using any or all steps of the methodology and, hence, any or all models embodied by the tool. The full set of steps include formulation of product line models, projecting pro-forma financial statements, calculating options prices for investments, and “backcasting” R&D and investment budgets. Extensive support of sensitivity analysis

and Monte Carlo analysis enable exploring risks, uncertainties, and the impacts of imprecise input information.

Decision Advisor

Creswell (2000) discusses the ***Decision Advisor***. This tool is intended to support the frameworks and methods presented by Matheson and Matheson (1998). It provides fairly comprehensive support, but also requires training for competent use. The following elements of support are provided:

Creation of influence diagrams to represent decisions
Deterministic evaluation of business outcomes, e.g., net present values
Sensitivity analysis of outcomes relative to variations of input variables
Probabilistic analysis of outcomes relative to high-sensitivity variables
Portrayal of results as cumulative probability charts which reflect overall risks

The ***Decision Advisor*** also supports portfolio analysis across projects, including dependencies among projects. Such dependencies can significantly affect outcome variances and hence risks. This tool also includes knowledge-based coaches — one for influence diagrams, one for structuring the analysis, one for modeling costs, one for modeling commercial value assuming technical success, and one for guiding evaluation.

TOP-Modeler

Majchrzak and Gasser (2000) present ***TOP-Modeler***, a knowledge-based tool for assessing change requirements (gaps) based on knowledge compiled via an extensive consensus building process that involved experts from several leading firms. The nature of this knowledge base is such that organizations are described in terms of 14 feature sets:

Business objectives
Process variances
Organizational values
Skills
Reporting structure
Norms
General technology
Performance measures & rewards
Information resources
Production process
Empowerment
Employee values
Customer involvement

Users of ***TOP-Modeler*** describe their company's business strategy by choosing among given choices for:

Business objectives
Process variance control strategies
Organizational values

They then describe their "as-is" organization in terms of the 11 other feature sets. The tool then compares "as-is" to best practices, identifying gaps that need to be addressed. The user is then supported in deciding which gaps to close first.

Majchrzak and Gasser present a series of case examples of use of ***TOP-Modeler*** and summarize an extensive evaluation of the predictive validity of this tool. This type of evaluation effort is quite unusual, primarily because it is so difficult and labor intensive to do. Further, managers will rarely just accept what tools tell them, regardless of the validity "pedigrees" of the tools. Nevertheless, the impressive studies reported do certainly increase confidence in this particular tool.

CONCLUSIONS

The five software tools highlighted in this special issue of **Information • Knowledge • Systems *Management*** do not, by any means, represent the full spectrum of methods and tools applicable to strategic management. Burnstein (1995), Sage and Rouse (1999) and Rouse (2000) discuss many other relevant methods and tools. Nevertheless, the set presented here does provide a representative picture of contemporary thinking on how best to employ software tools to support managers in addressing the challenges of strategic management (Rouse, 2000).

Two particular considerations, that are not addressed in the articles in this issue, deserve mention in closing. First, tools such as presented here are often used by management teams rather than just individuals. The computer-based nature of these tools enables projecting computer outputs on large screens, which allows the whole team to participate in creating and manipulating models, including experimenting with various "what if" scenarios. An extensive study of managers' desires of strategic management tools found that this type of usage is one of the benefits most valued by managers (Rouse, 1998).

The second consideration concerns the validity of tools such as presented here. Certainly, the tools discussed in this special issue are based on valid theories of finance, probability, statistics, etc. Further, being commercially-available software, these tools have undoubtedly been tested to verify that calculations are performed correctly. However, how does one know that these tools provide valid ways to approach the strategic management issues for which they are intended?

An extensive study of users' criteria for selecting software tools — in the case, for designing human-machine systems — provides important insights into this question (Cody & Rouse, 1989). This study indicated that applicability and availability of tools were the two strongest determinants of tool choices. Attributes similar to the notion of validity did not have as strong an influence. Pursuit of this somewhat counter-intuitive result led to the conclusion that users of tools saw themselves as the judges of validity relative to applying tools to addressing their issues.

Thus, beyond expecting tools to be based on valid theories and principles, and expecting assurance that calculations are done correctly, users see validation as a context-specific issue. By understanding previous applications of tools, as provided by the authors in this special issue, potential users judge the applicability of tools to their problems. They do not expect — or believe — proclamations that use of a particular tool will result in X% better decisions or Y% increased profits. Ultimately, validation of tools such as presented here is an issue and responsibility of the manager who chooses to apply particular tools to his or her strategic management issues.

REFERENCES

Burnstein, D. (Ed.) (1995). *The digital MBA: software solutions to help you manage your business effectively*. New York: McGraw-Hill.

Cody, W.J., & Rouse, W.B. (1989). A test of criteria used to select human performance models. In G.R. McMillan, et al. (Eds.), *Applications of human performance models to system design.* (pp. 511–531). New York: Plenum.

Creswell, D. (2000). Decision Advisor® — A knowledge-based decision system. *Information • Knowledge • Systems Management. 2*(1), 83–94.

Jensen, A.J., & Sage, A.P. (2000). A systems management approach for improvement of organizational performance measurement systems. *Information • Knowledge • Systems Management. 2*(1), 33–61.

Madni, A. (2000). Thriving on change through process support: the evolution of the ProcessEdge™ Enterprise Suite and TeamEdge™. *Information • Knowledge • Systems Management. 2*(1), 7–32.

Majchrzak, A., & Gasser, L. (2000). TOP-MODELER: Supporting complex strategic and operational decision making. *Information • Knowledge • Systems Management. 2*(1), 95–110.

Matheson, D., & Matheson, J. (1998). *The smart organization: Creating value through strategic R&D.* Boston, MA: Harvard Business School Press.

Rouse, W.B. (1998). Computer support of collaborative planning. *Journal of the American Society for Information Science. 49*(9), 832–839.

Rouse, W.B. (2000). *Essential challenges of strategic management*. New York: Wiley.

Rouse, W.B., Howard, C.W., Carns, W.E., & Prendergast, E.J. (2000). Technology Investment Advisor: An options-based approach to technology strategy. *Information • Knowledge • Systems Management. 2*(1), 63–81.

Sage, A.P., & Rouse, W.B. (Eds.) (1999). *Handbook of systems engineering and management*. New York: Wiley.

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