

CORPORATE SIMULATION MODELS - A REVIEW AND REAPPRAISAL

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ABSTRACT

This paper examines the potential and the practice of simulation modeling for corporate financial planning. The contributions of formal models to the planning process are reviewed and appropriate design features are proposed. Comparative analysis of simulation and optimization applications in corporate planning points to substantial functional complementarity and opportunities for combined use. An actual planning system involving both simulation and optimization techniques is described to illustrate the feasibility and potential of the hybrid modeling approach.

Computer-based corporate models have generated considerable interest among management scientists and corporate planners in recent years [9,20]. Not surprisingly, the size and complexity of corporate-level planning problems have favored the development of simulation models for evaluating the implications of selected planning alternatives. Recent studies indicate that such models permit planners to consider a far greater number of alternatives in detail and with greater confidence than is possible using traditional planning methods [10,18].

The potential benefits of corporate modeling are impressive, but a review of current

applications reveals a substantial gap between the potential and the practice. In many cases, models have been judged useful in improving corporate planning and worth the costs of development and application. At the same time, there is mounting evidence that some modeling efforts have fallen far short of their potential contributions [11,12]. The reasons are many and varied, ranging from technical model design to organizational deficiencies.

The role of formal models in corporate planning and basic model design considerations are reviewed in the next section. This is followed by a discussion of the relative merits

of simulation and optimization methods and their functional complementarity in corporate modeling. The paper ends with a description of a corporate model system which incorporates both simulation and optimization capabilities. This system has demonstrated that effective analytical support of the planning process can be achieved through combined use of modeling and information system technologies.

MODELS IN CORPORATE PLANNING

In many companies, support for the development of a corporate model has generally grown out of frustration with the inherent shortcomings of manual plans preparation [4]. Corporate planning is often limited in manual systems to simple analysis of a few relevant variables and assumptions. Both time and resource requirements typically preclude detailed consideration of more than a few planning alternatives. Continuous revision of established plans and evaluation of new opportunities in changing competitive situations is virtually impossible. Too often the information available for planning decisions is inadequate and irrelevant, placing undue reliance on judgement and intuition. As a result, there has been increasing recognition of the need to improve both the planning process and its operation.

Uses of Corporate Planning Models

Corporate models are constructed and applied in order to make inferences about

future performance of the corporate system. In contrast to the system itself, a model can be manipulated easily by modifying inputs and other parameters describing the system and its planning environment to allow estimation of the impact of such modifications.

Corporate planning requires the identification, evaluation, and selection of alternative courses of action. In order to plan effectively, corporate management must understand the interactions between corporate activities and the effects of decisions on these activities and on overall corporate performance. They must examine the many alternative courses of action which are available, and they must anticipate and be able to respond quickly to changing conditions. In this context, a computer-based corporate model can serve a number of useful purposes. Those most frequently cited by corporate model builders and users include:

- (1) rapid and accurate evaluation of planning alternatives;
- (2) prediction of the effects of changing environmental conditions;
- (3) estimation of the sensitivity of corporate performance to planning assumptions;
- (4) screening and evaluation of acquisition candidates;
- (5) development of insights into the complexity of corporate activities and interactions.

These uses of a corporate model reflect its primary role as a tool to assist in the execution of the planning process. By reducing the time and resource requirements for plan

evaluation, a model can facilitate the consideration of a number of alternatives rather than just a limited few. This can be an important step toward improving the quality of corporate planning.

The development and implementation of a corporate planning model can also have important implications for improving the planning process itself. As Ackoff has noted [1]:

The principal contribution of scientists to planning may not lie in the development and use of relevant techniques, but rather in their systemization and organization of the planning process, and in the increased awareness and evaluation of this process that their presence produces.

A model can contribute significantly toward this end. It provides a systematic and explicit structure to the planning process and requires corporate planners to specify and coordinate their planning assumptions, logic, and data requirements. It can thus help to ensure internal consistency and reproducibility among the plans of diverse corporate groups. A model also formally represents the current state of knowledge about the corporation and facilitates communication in the planning process by providing a common framework for discussion and analysis.

It is essential to recognize, however, that many important planning functions lie beyond the scope of even the most sophisticated formal models. Most models provide increased power to explore and evaluate planning alternatives, but the identification, selection,

and implementation of alternatives remain critical management responsibilities. The corporate plan can be no better than the set of alternatives considered, and the outcome of the planning process depends ultimately on successful implementation of the selected alternatives. Similarly, the development and evaluation of model inputs and assignment of appropriate values to judgemental factors are required before meaningful model studies can be conducted. A very real danger associated with the development and use of a corporate model is the tendency toward overemphasis on the computational aspects of the planning process at the expense of more fundamental and important considerations requiring management judgement and intuition. If properly used, however, a corporate model can enhance and encourage, rather than limit, creative management inputs to planning.

Model Characteristics

At least two important issues arise in attempting to develop a corporate model capability consistent with the uses indicated above. These relate to the intended "user" of the model and its relationship to existing manual planning practices.

Corporate planning models are typically designed for one of two potential users: executives with ultimate responsibility for planning decisions, or staff planners. Most modeling efforts to date have been directed

toward developing a tool for staff planners [4, 10], rather than one which is appropriate for use by managers [3, 5]. Although involved in the same planning process, these two groups have different requirements and are likely to use models differently. For example, the planner is more likely to be interested in detailed analyses and specialized outputs which reveal the nature of subsystem interactions, while the manager will generally prefer aggregated outputs in familiar formats. The manager is also less likely to understand detailed or sophisticated models which might be more appropriate for the planning studies conducted by his specialized planning staff. It is therefore essential that the intended user(s) be clearly identified at an early stage in model design. Current opinion seems divided as to the most appropriate user, and there is an apparent trend toward systems which permit partitioning of operating requirements and outputs to meet the needs of both potential user groups.

Opinion is also divided on the extent to which a planning model should automate existing planning procedures without imposing additional requirements or changes. Computer-based models can be designed to permit far more sophisticated analysis of a broader range of planning problems and data inputs than is possible in manual planning systems. Also, models can often make possible "top-down," iterative strategic planning in corporations

where existing manual procedures could cope only with a decentralized "bottom-up" planning process. As Hertz [15] has observed:

Business strategic planning is "top-down," long range corporate planning that challenges the basic goals and directions that have guided the enterprise in the past. More technically stated, it should be prospective decision making, done after the systematic evaluation of all reasonable alternative courses of action...

This is often best accomplished through centralized evaluation of planning alternatives facing the corporation. On the other hand, where formal planning procedures are well established, attempts to implement a model which requires altering these procedures - rather than simply automating existing inputs, calculations and outputs - may be doomed to implementation problems and ultimate failure.

The number and variety of corporate models now in use offer the opportunity to compare model characteristics and select those which seem most appropriate for future modeling efforts. Seven basic design characteristics with particular implications for planning effectiveness and efficiency were identified in the process of developing a corporate planning system [14] and are discussed briefly below:

(1) Scope Although heavily oriented toward the financial aspects of planning decisions, most corporate models reflect the full range of corporate activity over multiple time periods. This scope is essential if important subsystem interactions and long-term implica-

tions are to be adequately reflected in planning studies.

(2) Structure The structural characteristics of existing corporate models vary widely [7,20]. In some instances, the model is a single construct which incorporates desired features of the system being planned, often at a considerable level of aggregation. This approach facilitates representation of interactions between corporate subsystems and usually offers some economic advantages. However, the magnitude of the effort also presents the danger that the model will become obsolete or will be abandoned before it can be made operational and useful. Another approach is to construct separate models reflecting different corporate activities and/or planning analyses. These can be linked to each other and to a common planning data base to create a corporate model system. Component models can thus be developed over time and applied in the planning process as they become operational. Moreover, this approach generally permits use of a variety of analytical techniques which could not be accommodated in a single model structure.

(3) Realism If it is to be useful as a planning tool, a corporate model must provide a realistic representation of the system being planned. At the same time, a model is by definition an abstraction from reality. The most appropriate level of abstraction will vary with the intended purpose of the model and the desired results. This implies care-

ful selection of a subset of relevant variables and relationships in model design. Inadequate detail may result in a model with limited usefulness for evaluating plans under changing conditions; too much detail may result in excessive data requirements and development costs. Existing planning models range in abstraction from highly aggregated accounting information compilers to detailed models of corporate operations [2]. The majority of these models consider the total corporation using summary variables (usually financial in nature) rather than representing corporate operations in detail [9]. The most common model outputs are pro forma financial statements or, less frequently, aggregate production plans. Only a handful of models reflect, even in a limited fashion, the stochastic nature of corporate activities and performance. Risk and uncertainty are inherent in the planning process, but most corporate models permit only deterministic projections [9,12,20]. As these "first generation" models are accepted and implemented, however, much greater emphasis on stochastic modeling extensions can be expected. This direction will be further encouraged by continuing advances in both computer and modeling technologies.

(4) Flexibility If it is to be of continuing usefulness, a corporate model must be flexible enough to reflect changes in corporate structure (through organization, acquisition, diversification, etc) or expansion in scope without

extensive development effort. Planning is conducted in a rapidly changing corporate environment and provision must also be made for easily updating planning relationships and data.

Another important aspect of model flexibility is its applicability to a wide range of planning problems in both the annual planning cycle and interim studies of new opportunities or changing conditions. A modular modeling approach involving a set of linked submodels is most likely to provide such flexibility.

(5) Ease of Use A corporate model has value as a planning tool only to the extent that it is actually used in the planning process.

Wherever possible, therefore, the model should be designed so that it can be easily understood by the user(s) and operated with a minimum of inconvenience. This is especially important where the user is a manager with limited time, patience, and analytical background. Only when the user understands the capabilities and limitations of the model and its data base is it likely to be used effectively or, perhaps, used at all. It is not essential, however, that the user fully understand the technical development or internal logic of the model. The ability to interpret model outputs quickly in light of explicitly stated model assumptions and to compare them with other types of planning information is generally sufficient.

A number of model operating features strongly influence its ease of use and there-

fore deserve design consideration. Provision for automatic or computer-assisted input generation, data base editing and updating, and output report preparation is essential. Some existing corporate models require days (or even weeks) for input preparation and translation of model outputs into desired formats. This not only greatly increases the time and cost associated with model operation, but also seriously limits effective use of the model as a creative planning tool. Corporate planning is inherently an interactive, investigative process in which intermediate results may indicate appropriate directions for further analysis. Therefore, access to the model and data base via remote terminals (where economically feasible) and provision for multiple input/output options can greatly facilitate model application.

(6) Resource Requirements The time and cost required for model development, updating/modification, and operation are important considerations which depend heavily upon, and often restrict, other design characteristics. For example, the sophistication and flexibility provided in an initial model version may be limited by budgetary restrictions and by pressures to demonstrate the feasibility of the corporate modeling approach in a short time period. In general, the broader the scope, the more modular the structure, the greater the realism, the greater the flexibility, and the easier the model is to use, the more costly

it will be. As is often the case in modeling efforts, however, the initial costs of design and development must be balanced against both the quality of results and the time and manpower required to generate them.

(7) Capabilities The primary purpose of corporate planning studies is to evaluate alternatives and identify those which in some sense best satisfy corporate performance objectives. This implies both the evaluation and selection of planning alternatives. Corporate models typically assist in this process in one of two ways:

- (a) by projecting the implications of pre-selected alternatives, or
- (b) by selecting the best alternative(s) from the available set.

This is not simply a play on words. Most existing corporate planning models are computer-based financial simulations which are used to test the feasibility and project the effects of proposed alternatives. The Xerox planning model described by Brown [4], for example, computes the financial implications of alternative marketing and production policies under different environmental conditions and generates projected financial statements for each set of inputs. In all but the simplest cases, there are a great many distinct planning alternatives and combinations of alternatives to be considered. This suggests the desirability of optimum-seeking capabilities to assist in the selection, rather than just the evaluation,

of alternatives. As has been noted elsewhere, a great deal more activity can be expected in the development of optimization models for corporate planning [6,7].

The design characteristics discussed above are important determinants of the extent to which corporate models are likely to achieve their potential as planning tools. Further consideration of the nature and relative merits of simulation and optimization methods in corporate modeling follows in the next section.

SIMULATION OR OPTIMIZATION ?

Simulation and optimization have generally been viewed as alternatives in the design and development of corporate models. Selection of the most appropriate approach is a significant step in model design which strongly influences both the functional role and technical structure of the model. As indicated above, the essential functional difference is between an alternative tester (simulation) and an alternative selector (optimization).

Corporate Simulation Models

In his survey of corporate modeling, Gershefski [9] reported that the overwhelming majority (95 percent) of corporate models were "computer simulations which utilize case studies to determine the effect of different strategies." Other studies have confirmed this popularity [7,18,20]. There are many reasons for the widespread acceptance and use of computer simulation in corporate modeling.

Simulation techniques are applicable in situations which are too complex for analytical formulations and, in general, permit a greater degree of model realism in other cases. Moreover, the development and application of a computer simulation model requires only a minimum of mathematical knowledge, often avoiding the need for highly trained staff specialists and aiding management understanding of model capabilities and limitations.

A major disadvantage of simulation as a corporate planning tool is the "case study" process by which planning alternatives must be evaluated. Most corporate planning analyses are directed at optimization - i.e., at identifying the most desirable investment and financing alternatives. Using simulation, each computer model solution corresponds to a determination of the implications of a single proposed alternative or specified combination of alternatives. The search for improved plans proceeds via repetitive model solutions, ordered in response to previous results or other insights into potentially desirable alternatives. Sensitivity analysis of model solutions requires similar procedures. Where a large number of corporate planning alternatives and environmental conditions must be considered, the simulation approach implies evaluation of an excessive number of cases, one at a time. In practice, this usually forces a substantial reduction in the number of available alternatives which are actually

considered for detailed analysis. Even under such conditions, simulation can be expensive if adequate detail and scope are provided.

Corporate Optimization Models

In contrast to the widespread use of corporate simulation models, few practical applications of corporate optimization models have been reported [9,13]. There are at least several apparent reasons for this:

- (1) Optimization implies the existence of a defined planning goal (or goals) which can be formalized in a model. In practice, a variety of different system performance indicators are typically of interest, but these are seldom defined explicitly or in a form appropriate for optimization modeling.
- (2) Simplifying assumptions about the detailed nature of model variables and relationships are required for many optimizing algorithms, often limiting the attainable level of model realism consistent with computational feasibility.
- (3) Optimization modeling may involve different data requirements and planning procedures than those which exist in many corporations.

In addition, the relatively high degree of mathematical sophistication and related

technical problems associated with optimization have probably been limiting factors.

Experiences with several operating corporate optimization models indicate that where these problems can be dealt with effectively, the analytical power of optimizing techniques (especially mathematical programming) and available computing software offer significant benefits for corporate planning. Each optimization model solution corresponds to the evaluation of an entire set of planning alternatives and selection of those which best satisfy the defined performance criteria. Efficient sensitivity and parametric analyses of model assumptions and changing conditions are also possible using the same computational techniques. With this approach, a vast number of complex planning alternatives can be evaluated and priorities can be assigned with a fraction of the effort required for equivalent analyses using simulation.

Hybrid Models

Several observations about the simulation and optimization modeling approaches are in order at this point:

(1) Neither modeling approach is ideally suited for use as a corporate planning tool - each suffers from important deficiencies.

(2) Considerable functional complementarity exists between the two approaches. Simulation offers descriptive power and broad applicability but often requires extensive analysis; optimization, on the other hand, offers analytical

power but is weaker in descriptive accuracy and applicability. Thus, the strength of one modeling approach complements the weakness of the other.

(3) This suggests that simulation and optimization should be considered as complementary, rather than alternative, corporate modeling approaches. Where possible, it is desirable to exploit the strengths of both through some form of hybrid model or model system.

The incorporation of heuristics or other optimum-seeking routines in computer simulations is one possible avenue toward combined use of simulation and optimization methods in corporate modeling. This suggests use of computerized routines to guide the search for improved solutions, thus reducing the amount of human intervention required in favor of defined, systematic search procedures. Of course, use of an optimum-seeking routine does not guarantee that an optimum will be found, nor does it completely eliminate human judgement from the search process, but it can speed up the search significantly. Optimum-seeking search techniques and their applicability to simulation studies in a variety of contexts have been discussed by others [8,17]. Techniques with particular relevance for corporate financial simulation have also been identified [6].

A more promising approach is to link corporate simulation and optimization models in a corporate model system [6,14,21]. The primary role of optimization in such a system

is to search, identify, and screen planning alternatives at an aggregate level. This preliminary evaluation may cover a wide range of possibilities over a multiperiod planning horizon using efficient search algorithms and available computer codes. The outcome is a set of preferred investment, operating and financing alternatives consistent with stated planning objectives and conditions. A simulation model can then be used to project the detailed implications of selected optimization results under specified environmental conditions. Its role in the planning system is to provide a more realistic basis for evaluation of a limited number of promising alternatives, and to test the validity of the optimization model results when more detailed considerations are incorporated into the analysis. Revised planning assumptions and parameters resulting from the simulation can be fed into subsequent optimization runs to refine the outputs. Such a recursive solution approach involving optimization and simulation models has also been found useful in other contexts [19].

This combination of simulation and optimization offers corporate planning support beyond the capabilities of either technique when used alone. In general, optimization provides an overall evaluation of available planning alternatives; simulation is employed to examine those selected in greater detail. Partitioning the overall analysis into "macro" and "micro" stages - with iterations between

the two stages - therefore permits use of each technique to its best advantage in the planning process. An operational computer-based corporate planning system which incorporates simulation, optimization, and other analytical models is described below to illustrate this approach.

A CORPORATE MODEL SYSTEM

A major diversified corporation has developed and implemented a system of planning models to improve the efficiency with which alternative combinations of corporate strategies, financing methods, and planning assumptions are evaluated. The modeling system approach was selected to give maximum flexibility in developing a planning support capability consistent with the scope and complexity of corporate-level planning problems. Experience with the system during the past two years has demonstrated both the potential and the operational feasibility of this approach.

Details of the system and its application in a variety of strategic planning studies have been presented elsewhere [13,14]. This discussion will only highlight important system features, including the respective roles of simulation and optimization techniques.

System Components

Following earlier discussions, the key to effective analytical support of the corporate planning process is not a corporate model, but an integrated planning system. The system under consideration reflects the corporate-

level focus, financial orientation, and distant planning horizon that characterize strategic planning in most corporations. It consists of five functionally distinct subsystems:

(1) The Information Management Subsystem controls the flow of information, maintenance of the planning data base, and interfaces with data sources, other system components, and users. Explicit provision is made for interactive use of the system, including on-line input preparation, run initiation, and output generation with a wide range of user options. Included in the information management subsystem are system executive routines, the system data base, and conversational input editors and output generators. The input editors organize raw planning data from multiple sources into appropriate data base files, check for arithmetic and format errors, and compare subsidiary projections with historical data and econometric projections to identify questionable estimates. The output generators provide a variety of report options to meet different needs including pro forma financial projections, corporate and planning unit performance summaries, detailed and summary optimization model results, and input error reports.

(2) The Optimization Subsystem selects an optimal set of funds sources and investments subject to a complex set of financial, legal, and operating limitations at both the corporate and planning unit levels. It also permits testing of the robustness of proposed plans and deter-

mination of optimal reallocations of corporate resources in response to changes in the planning environment. A large mixed integer mathematical programming model is the basic element of this subsystem, with operating support provided by matrix generation and postoptimal analysis routines. The most operationally effective optimization objective used thus far for planning purposes is maximization of a linear approximation of earnings per share over the planning horizon, but other performance measures can also be evaluated with the model. The major planning variables are investment and financing alternatives associated with proposed corporate and planning unit plans. Corporate activities are subject to numerous financial and operating restrictions, some imposed by management policy and others by external forces. Among those represented explicitly in the optimization model are restrictions on the pattern of earnings per share growth, return on assets and equity, corporate funds flow, common financial ratios, short-term debt and stock transactions. A current version of the model contains 700 constraints and 1000 variables, including 250 zero-one variables. Solution of the model using the Univac 1108 computer typically requires 10 cpu minutes to reach the continuous optimum and another 20 cpu minutes to find the mixed integer optimum. Subsequent mixed integer solutions using the previous optimal basis require about 5 additional cpu minutes.

(3) The Simulation Subsystem performs a deter-

ministic financial simulation for predesignated corporate and planning unit strategies. Like most corporate financial simulation models, it operates on accepted financial accounting variables and relationships. Options are provided for evaluating any desired combinations of organizational groupings, corporate and planning unit investment proposals, acquisitions, divestments, and financial strategies. The simulation converts all funds to a common currency, reflects all internal and external funds flows, finances funds deficits from a corporate pool, incorporates proposed acquisitions and divestments, and computes consolidated corporate and planning unit financial statements. The financial consolidation usually requires less than 30 cpu seconds using a Univac 1108 computer.

(4) The Econometric Subsystem provides projections of national and industry economic conditions for use in testing the reasonableness of planning unit projections and in preparing simulation and optimization model inputs. Current econometric support for the system is purchased from a commercially available forecasting service.

(5) The Risk Analysis Subsystem is designed to provide insights into the variability inherent in planning estimates. It currently consists of two models. The Profitability Profile Model is designed to project performance distributions for planning units based on econometric forecasts, historical data,

and subjective management evaluations of possible future conditions. These distributions are then used to estimate confidence limits for various corporate profit levels. A pessimistic estimate, called the minimum income level, is derived for every strategy and is incorporated in the optimization analysis. The Business Mix Model applies a portfolio analysis approach to evaluate the risk-return characteristics of the corporate plan and determine corporate asset allocations which maximize expected returns at different risk levels.

System Application

In essence, the subsystems described above constitute a specialized computer-based management information system with extensive analytical capabilities. Its power as a planning tool derives from the integration of diverse, but complementary, planning models with user-oriented information storage and handling features. This integration is accomplished through logical input-output linkages in system operation. Each of the subsystems and component models can be operated independently from the rest of the system, but this is not typically done.

The planning data base is the primary interface between subsystem models and is therefore the most important system link. With few exceptions, subsystem inputs and outputs flow through the data base, where they can be accessed in response to direct inquiry or for further processing within the system. Economet-

ric forecasts, for example, are stored in the data base for input editing and strategy formulation purposes.

Inputs to the Optimization Subsystem include detailed information on proposed planning strategies, available funds sources, and constraint limits. The latter are established by management or are determined through studies involving the Risk Analysis Subsystem models. The investment and financing strategies selected in the optimization analysis are stored in the data base for report preparation and further analysis using the Simulation and Risk Analysis Subsystems. In view of the approximations inherent in the corporate optimization model, of course, these results must be considered as only approximate. Nevertheless, they represent desirable, if not optimal, selections from among the vast number available for consideration. These selected strategies are obvious candidates for more careful evaluation using the Simulation Subsystem. In contrast to the optimization model, the simulation model requires few simplifying assumptions and thus provides a more realistic test of strategy implications. For example, the simulation model computes corporate earnings per share quite precisely for any selected set of strategies; the optimization model can only approximate this figure because of the non-linear effects of expansion and contraction in the common stock pool.

Applications of the corporate modeling system have included a wide variety of periodic and ad hoc planning studies. Periodic studies are conducted at regular intervals (e.g., the annual planning cycle) and typically relate to planning decisions involving the full scope of corporate activity. Ad hoc studies, on the other hand, are conducted in response to problems or opportunities (e.g., an unexpected change in international exchange rates) which require evaluation prior to the next periodic planning review. Periodic studies typically involve all system components and begin with careful input editing and preparation of the system data base. Because of the vast number of alternatives to be considered, the optimization model plays a major role in screening internal investment strategies, proposed acquisitions and divestments, and financing opportunities. Ad hoc studies typically require only minor modifications of the system data base and rely more heavily upon simulation of the implications of particular problems or opportunities.

CONCLUDING COMMENTS

Corporate simulation models will no doubt play an increasingly important role in corporate planning during the 1970's. Applications to date have demonstrated that models can assist in improving both the process and practice of planning in a wide variety of contexts, and the number of models in use or under development is increasing rapidly. However, the vast majority of corporate models in use today are

limited to deterministic "case study" simulations of selected planning alternatives. This approach offers advantages in model development and initial implementation, but it can involve extensive computation and effort in the search for improved corporate plans where a large number of alternatives exist. This, in turn, may limit the potential usefulness of simulation models as creative planning tools. Other model characteristics are also important determinants of planning effectiveness and efficiency and must be carefully considered in model design.

The continuing advance of computer and modeling technologies, combined with increasing formalization of corporate planning efforts and growing acceptance of formal planning models, has set the stage for a "second generation" of corporate planning models. One promising direction for evolution is suggested by the combination of simulation and optimization capabilities in a corporate modeling system. A system of models can provide a degree of flexibility and analytical sophistication consistent with corporate planning problems while still preserving the advantages of simulation as a planning tool. Experience with a prototype corporate model system has demonstrated both the feasibility and potential of this approach.

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