



The Power of Integrated Decision Making

Why Should You Care About Integrated Decision Making (IDM)?

More so than ever, today's enterprises are complex organizations with many interacting, interdependent parts. Without technological assistance, it's virtually impossible to anticipate the consequences any individual decision will have throughout an entire enterprise. While many metrics can be used to measure the impact of a decision, ultimately, the payoff to IDM is more profit. Studies suggest that the benefits of an IDM solution can be quantified in terms of substantial profit improvements and while this is certainly ample motivation for seeking an IDM solution, there are other benefits. These include speed of decision making, range of alternatives considered, and dramatically improved communications.

What *IS* Integrated Decision Making (IDM)?

There is a great deal of confusion in the market today regarding what constitutes a true IDM solution. Because of the enormous potential, many vendors are claiming to offer IDM products. While they may have value for other uses, none of these products can actually be used for integrated decision making. Professor Manners establishes a context for understanding integrated decision making in his paper "Levels of Financial Knowledge." IDM solutions must support all levels:

Level I Knowledge - A representation of the impact of decisions in the basic language of business; financial accounting statements and analyses. *Level II Knowledge* - A quantified representation of the impact of decisions in units of physical output and business activity. *Level III Knowledge* - An integrated representation of the operational model must tie to the financial accounting statements that enable decisions to be analyzed in terms of financial impact of operational decisions (profit drivers). *Level IV Knowledge* - A representation of the interdependencies between operational and financial input, throughput, transformation, and output efficiencies and capacities. *Level V Knowledge* - An evaluation of each decision in terms of its potential optimal consequence. While it is recognized that the optimal consequence might not be achieved, this requirement is necessary in order to evaluate alternative decisions.

A true IDM solution addresses the requirement for all five Levels of Knowledge and today there is only one product that qualifies - Enterprise Optimizer®.

How Does a True Integrated Decision Making Solution Work?

“Knowledge is Power” - Francis Bacon

A true IDM solution leverages knowledge. Any product being considered must incorporate extensive knowledge bases covering all five Levels of Knowledge. Furthermore, the solution’s knowledge bases must be extensible to include client specific knowledge and must be actionable so they are relevant and can be used throughout an enterprise including finance departments, operations / production, sales & marketing, planning and logistics.

In Enterprise Optimizer, the enterprise process flow and operational constraints (Level II & III Knowledge) are represented visually as a process flow diagram. The process flow diagram is integrated with enterprise data from multiple sources. EO uses embedded knowledge bases, supplemented with client specific knowledge bases, to interpret the process flow diagram and enterprise data to automatically create a dynamic mathematical representation of the interdependencies among and between operational and financial input, throughput, and output efficiencies and capacities (Level IV Knowledge).

Additional knowledge bases map this mathematical representation to standard financial statements including an Income Statement, Balance Sheet, and Cash Flow Statement, and to numerous analyses including Net Present Value, inventory turns, return on assets, return on equity, debt ratio, current ratio, and many more (Level I Knowledge). This information is easily accessed through customizable reports and dashboards.

EO integrates various mathematical solvers that are used in the different analyses. One is a mixed-integer linear optimization engine that identifies the financial optimal set of decisions for any scenario (Level V Knowledge).

EO is a true IDM solution. It allows users to analyze decisions associated with any aspect of a model. For example, a user can fix sales and then use EO to determine the financially optimal set of production decisions. Alternatively, the user can fix production and determine the financially optimal sales mix.

EO can be applied to operational decisions at a scheduling level of detail and it can be applied to strategic decisions such as capital expenditures, mergers and acquisitions, and growth strategies.

The Need for Speed

There are some additional characteristics that should be considered when implementing an IDM solution. One of the more important is the need for timely answers. The world is a dynamic place. Market conditions change in real-time. Any system that requires several weeks or more to create and run a single scenario is hopelessly inadequate. Viable solutions must enable the user to incorporate ongoing planning into their decision methodologies. In other words, planning and re-planning must become a daily activity and this requires speed. Not only does it require computational speed, but it also requires compositional speed to quickly create and analyze multiple scenarios. Because of the importance of speed, viable IDM solutions must reside on the decision maker's PC and they must be easy enough to use that it is possible to create and run scenarios without the need for legions of consultants and must be capable of handling enormous computational problems in seconds.

For example, the mathematical representation for a typical Enterprise Optimizer® model includes up to 1.5 MILLION equations each containing 1 MILLION or more variables. To try to create such a model and run it in an Excel spreadsheet for example, is not practical. Debugging and validating the model would take years. In Enterprise Optimizer®, models of this size are constructed and solved dynamically, often in a matter of a few minutes. Consequently, it is feasible to incorporate planning and re-planning into virtually any ongoing management process. It is no longer necessary to relegate planning to a single, annual event. Instead, plans can be updated throughout a working day.

The Need for Action

"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world." - Archimedes

Another critical characteristic for an IDM solution is that the answers generated must be actionable. Enough information must be generated so that it is possible to implement the recommended decisions. The user must view the IDM solution as a management tool they can use to leverage their knowledge and improve the enterprise's overall financial performance.

This is a problematic condition to satisfy without extensive embedded knowledge and system flexibility. Even in the case where the decisions of interest are at a strategic level, the information provided by the IDM solution must include detailed operational specifications including which resources to run, when to run, what to have them do, what inputs to provide, how to manage inventories, how to allocate distribution resources and much, much more. Products that do not allow users to drill down to arbitrary levels of operational detail will ultimately fail in their ability to provide true IDM capabilities because they will lack credibility. Enterprise Optimizer® is infinitely flexible in terms of its drill-down capability.

The Need for Optimization

“Practice doesn’t make perfect. Perfect practice makes perfect.” - Maestro Charles Schmitter

Any decision making process that involves the analysis and comparison of multiple scenarios requires the use of optimization techniques. This is true regardless of the quality or availability of data. The critical consideration in any decision is that it must be possible to compare the different scenarios on a standardized basis. The only reasonable standard basis is, “What’s the best possible outcome I can achieve in this scenario?” Therefore, in any true IDM solution, optimization is required to insure that the alternative scenarios can be compared in a valid and reasonable manner. And, yes, if an enterprise does have access to accurate, precise, and complete data, the IDM solution can be used to make actual production and other operational decisions.

A Universal Language for Unified Decision Making

Behold, they have all one language; and now nothing will be restrained from them, which they have imagined to do. - Genesis 11 v6

In summary, this white paper has explained why you should care about integrated decision making, defined what integrated decision making is and requires, and identified several other critical considerations. But these details don’t capture the real essence of what is involved in true integrated decision making. True integrated decision making is based on a simple, though extraordinarily powerful, concept – a universal language that can be used throughout an enterprise to coordinate and align all activities to the enterprise’s goal and objectives.

The approach taken in Enterprise Optimizer® provides such a universal language. A visual paradigm is used that is based on a graphical representation of the enterprise’s process flow that anyone in the organization can view and understand in seconds. Enterprise Optimizer® is a unifying tool that can be used throughout an enterprise to integrate all decision making with a single, easy to use and understand solution.