Technology
Evaluation Centers

How Much Supply Chain Optimization Do We Really Need? (Part 1)

by P.J. Jakovljevic (see bio)
Filed Under (Manufacturing Operations, Supply Chain Logistics)

My recent series on how to plan and manage in uncertainty and volatility (which conditions have become the "new normal" in many sectors and industries) has generated much interest and many comments. As mentioned in the series, the inspiration came from **Kinaxis** customers' case studies presented during the **Kinexions 2011** user conference.

Ottawa (Canada)-based Kinaxis has been experiencing a renaissance of sorts lately in these days of dispersed complex supply networks and outsourced and offshore manufacturing (with so-called brand owners and their vast network of suppliers). After over 25 years in existence, and some name changes for both the company and its products since the inception, it is not exactly easy to explain what Kinaxis offers (or even better, where its capabilities start and end in the realm of supply chain management [SCM]).

In a nutshell, the vendor delivers a multi-enterprise supply network planning and fast-acting "what-if" simulation solution for achieving best possible fulfillment decisions within the order-to-delivery lead time. The solution's current name is **RapidResponse Control Tower**, which can be offered either on-premise or as an on-demand subscription service. Many customers use Kinaxis to solve issues outside of the lead time, but they gain a lot of agility and flexibility by using RapidResponse within the lead time.

Kinaxis customers use this scalable in-memory (or memory-resident) solution for both longer-term and tactical (near real-time) demand and supply balancing. Based on a number of fast-acting deterministic algorithms, the RapidResponse product provides personal alerts, multi-site visibility, and collaborative analysis functions to help businesses with forecasting, planning, and supply chain performance improvement. The company primarily markets to original equipment manufacturer (OEM) clients in industries with sophisticated supply chains such as the aerospace & defense (A&D), automotive, consumer products, industrial equipment, life sciences, and high-tech sectors.

Many large discrete manufacturing companies with complex supply chain networks and volatile business environments rely on RapidResponse for collaborative planning, continuous performance management, and coordinated response to plan variances across multiple areas of the business. These functional areas include supply chain planning (SCP), demand management, sales and operations planning (S&OP), collaborative planning, forecasting and replenishment (CPFR), project management, workforce optimization, and profitability management. By transcending and replacing disparate planning and performance management tools, Kinaxis customers can realize significant operations performance breakthroughs, because from a single system (control tower,

if you will), they can make decisions quickly, collaboratively, and in line with the shared business objectives of multiple stakeholders (trading partners).

These enterprises value the ability to analyze alternative response actions before making a decision about a major trade-off. By proactively modeling and scoring different response alternatives, brand owners can communicate a well-understood and optimal action to their suppliers or contract manufacturers. Some high-profile customers of Kinaxis include **Cisco Systems**, **Honeywell**, **Toshiba**, **Avaya**, **Nikon**, **Qualcomm**, **Jabil Circuit**, and **Raytheon**.

Market Validation, at Long Last

Kinaxis is currently growing rapidly (no pun intended) in terms of international expansion, adding new customers (or its existing customers expanding their deployment of RapidResponse to new application areas and adding more sites and users in the process), aggressive hiring, rumors of going public, etc. The company's blog and related supply chain community have been replete with great discussions in the realm of general SCM themes, and not only about the Response Management niche. There is simply an air of confidence, if not cockiness, around Kinaxis, as noted in Lora Cecere's **Supply Chain Shaman** blog post on Kinexions 2011.

But it hasn't always been a smooth ride for Kinaxis, or whatever its previous name was during those difficult times in the early 2000s. The reasons for tougher times were multiple, starting with the company's difficulty in carving out an acknowledged niche in the SCM space. For a long time, Kinaxis (or **Webplan** as it was known at that time) was eclipsed by the once "all the rage" advanced planning and scheduling (APS) systems and solutions by former **Manugistics** (whose former staffers now privately admit to me that **Kinaxis** was giving a run for its money to their former **NetWORKS Planning** product line, now part of **JDA Demand Planner**) and **i2 Technologies**. Ironically, many ex-i2 and ex-Manugistics employees are now working at Kinaxis.

The difficult times in the high-tech sector in the early 2000s (after the Internet bubble) were an additional hurdle. The roots of the initial adopters of RapidResponse lie in the high-tech, consumer electronics, and contract manufacturing sectors, where forecasts are hardly ever accurate and change is a daily occurrence. Kinaxis was eventually able to successfully build on these capabilities and penetrate other industrial verticals or organizations with similar characteristics (e.g., A&D).

Enterprise resource planning (ERP) vendors were not much of help to Kinaxis, and were not allies either, even though RapidResponse complements their solutions nicely in the realm of operational (re)planning and execution. Most likely, these vendors did not want to admit their limited operational planning and execution capabilities, especially in a multi-enterprise setup (and Kinaxis was also partly to blame for putting down ERP systems instead of trying to build a win-win situation). In any case, RapidResponse is now able to layer on top of virtually any most commonly used ERP system and emulate its materials requirements planning (MRP) logic and re-ordering policies (to a less than two percent discrepancy), and then act as a multi-enterprise brain and produce multi-enterprise master production schedule (MPS), available to promise (ATP), capable to promise (CTP), line balancing, etc., all with incredibly fast re-planning capabilities.

SAP Relationship (NOT)

Not surprisingly, many of Kinaxis' customers are **SAP ERP** customers too, but that hasn't apparently been a good enough reason for the two vendors to have a strategic relationship. For a long time, SAP was touting its well-known **SAP Advanced Planner and Optimizer (SAP APO)** product suite as the panacea for these situations. As some background, SAP introduced APO in the late 1990s as the counterpart APS offering to then thriving i2 and Manugistics. For more information on the scope of SAP APO, see **TEC**'s article from 1999 entitled "SAP APO: Will it Fill the Gap?"

However, there have been numerous dissatisfied SAP APO customers who have had to do a lot of manual tweaking to quickly generate a feasible plan and determine order priorities, inventory allocations, and commitments. A number of these customers, who are operating in highly volatile demand arenas (and with inaccurate forecasts from the word go) and deal with many trading partners, are seriously looking at adopting response management capabilities, rather than APS.

Generally speaking, the key capabilities that are required for so-called "Response Management" offerings are the following: multi-user input and collaboration, multi-scenario creation and comparison, and high-speed analytics. These capabilities are essential for companies to quickly react to unexpected events such as a rush order from a very important customer (or, conversely, a major last minute order cancellation), a product quality issue, a supply shortage, or a production line breakdown. SAP APO does not support many of these capabilities, so SAP has had to look for a partner to satisfy these key business needs.

Since November 2010, SAP has been distributing a supply chain solution by a lesser know German vendor **ICON** as **SAP Supply Chain Response Management (SAP SCRM) by ICON**, a solution extension to its own SCM suite, **SAP SCM** (look for TEC's upcoming article entitled "SAP SCM – Stepping out of Obscurity"). SAP had investigated several options to satisfy this role, and presumably one of those options might have been Kinaxis. For its part, **Oracle** released its internally designed standalone product called **Oracle Rapid Planner** in 2009, which can be layered on top of Oracle's ERP products and other ERP products.

SAP chose ICON over Kinaxis on the grounds that is has better finite resources optimization capabilities, but I find this line of thinking hard to swallow in its entirety. Kinaxis has been a Response Management pioneer of sorts, and–not to knock ICON's benefits and capabilities–it's

tough to believe anyone could best the "plan, monitor, and respond" approach and scalability that Kinaxis has been promoting so successfully. In addition, isn't "optimization" part of the SAP APO name, and if so then why have a separate SCRM solution?

Also, given that **SAP HANA** in-memory capabilities are embedded in almost everything within SAP (see TEC's article entitled "SAP HANA - One Technology to Watch in 2012"), why not use HANA for responses management as well? Kinaxis' take here is that columnar in-memory databases (IMDBs) like HANA are not necessarily the best design for handling concurrent what-if scenarios by thousands of users. Instead, nearly three decades ago Kinaxis opted for its proprietary hierarchical IMDB, which is an imbedded component of RapidResponse Control Tower, whose presentation layer emulates a traditional relational database behavior. Reporting outputs are typically insightful end-to-end pegging and planning reports.

It seems we may be talking about different kinds of optimization. Maybe in certain situations it's more appropriate to use one kind of optimization versus the other. Part 2 will try to draw some demarcation lines between APS and Response Management by using SAP's solutions applicability (i.e., APO vs. SCRM).

How Much Supply Chain Optimization Do We Really Need? (Part 2)

by P.J. Jakovljevic (see bio)

Filed Under (Manufacturing Operations, Supply Chain Logistics)

Part 1 of this blog series introduced the concept of (Rapid) Response Management in the realm of supply chain management (SCM) via a software category pioneer, **Kinaxis**. The currently bullish Kinaxis has a number of customers that are **SAP ERP** customers too, and for a long time SAP was at first dismissive (or at least ambivalent) regarding the need for Response Management, as the company had its own well-known **SAP Advanced Planner and Optimizer (SAP APO)** product. In addition, Kinaxis has had to compete with other advanced planning and scheduling (APS) providers such as **JDA Software** (former **i2** and **Manugistics**), **Logility**, and **Oracle**.

Since November 2010, SAP has been distributing a supply chain solution by a lesser-known German software company **ICON-SCM** as **SAP Supply Chain Response Management (SAP SCRM) by ICON-SCM**, a solution extension to its own SCM suite, **SAP SCM** (see **TEC**'s article entitled SAP SCM – Stepping out of Obscurity). SAP had investigated several options to satisfy this role, and presumably one of those options might have been Kinaxis. For its part, Oracle released its internally designed stand-alone product in 2009 called **Oracle Rapid Planner**, which can be layered on top of Oracle's enterprise resource planning (ERP) products and other ERP products.

Now, Kinaxis feels vindicated by Oracle and SAP's endorsement of the market at long last, but is slighted by the IKON-SCM partnership, plus, it is a fierce competition now. In addition, isn't "optimization" part of the SAP APO name, and why then did SAP introduce a separate SCRM solution? It seems we may be talking about different kinds of optimization. Maybe in certain situations it's more appropriate to use one kind of optimization versus the other.

Optimization Explained (in SAP Lingo)

SAP apparently draws a distinction between Capital-O "Optimization" and so-called heuristic "Search" optimization (i.e., searching for the best alternative amidst multiple possible options). Capital-O Optimization in APS is about finding a mathematical optimum, typically minimum costs or maximum profits (in a "boil the ocean" manner). On the other hand, heuristic Response Management processes attempt to provide a solution to a problem that may or may not be optimal. Often, "Search" involves criteria other than cost or profit, such as rules and priorities.

Both Capital-O Optimization and "Search" heuristics in SAP's related products can respect material or capacity scheduling constraints, unlike generic (fast) material resource planning (MRP) products or the **Supply Network Planning (SNP)** heuristic module within SAP APO, which largely run unconstrained. These rapid (or not) MRP solutions then have to do some post-processing to try to smooth out the "mountain peaks" (capacity or material peaks) into "valleys" to respect constraints, but these are not quality executable solutions. In other words, SAP believes that the unconstrained scheduling solutions are suitable for high-level planning tasks such as sales and

operations planning (S&OP), but they do not generate operating plans of high quality.

Like Kinaxis RapidResponse, ICON-SCM offers a user interface (UI) to allow users to make judgments and adjustments to the plan. According to SAP, the difference with Kinaxis is that ICON-SCM starts from a higher quality plan, since it is the result of a near optimal heuristic, while Kinaxis starts from an adjusted fast-MRP plan, which requires more adjustment before it can be operational.

On the other hand, Capital-O Optimization tends to be slow, and not suitable for never-ending what-if scenarios in highly volatile environments. Fast MRP and "Search" are fast, as their name implies, often run in-memory, and thus are more useful for evaluating what-if situations. While you sacrifice quality (perfection) of the plan, you can still get a "feasible/infeasible" or go/no-go answer quickly.

In concrete terms, Capital-O Optimization (i.e., SAP APO) is well suited for process and semi-process manufacturing, such as consumer products. It is also suited for situations where cost minimization is critical, i.e., where transportation costs take a large piece of the margin, and therefore the sourcing is based predominantly on distance travelled. For its part, "Search" (i.e., SAP SCRM) is better suited for items with more extensive *bills of materials* (BOMs), multiple capacity and/or material constraints, long supply lead times, multiple supply alternatives, and extreme customer competition, where prioritizing customers and allocating supply are key processes.

These Response Management systems start with demand priority management by applying flexible priority rules to demand planning. Then they match supply and demand by efficiently planning deliveries and planned orders, and fully pegging orders and material requirements throughout all tiers of the supply network. Finally, the what-if analysis must be transparent, easily understood, and explainable. Reporting outputs are typically insightful end-to-end pegging and planning reports.

Essentially, SAP is recommending the aforementioned SNP Optimization module within SAP APO in industries where true cost optimization is important, and is recommending SCRM where it is not. There is some overlap between SCRM and the **SAP Capable-to-Match (SAP CTM)** capability within SAP APO, but CTM is a more robust solution for complex characteristic-based "down-binning" (rules-based product substitution) situations in the semiconductor space. SAP continues to recommend CTM in those industries, but is seeing greater demand for SCRM where those exacting requirements are not present.

Kinaxis RapidResponse vs. SAP APO

Apart from their different approaches to optimization, and thus the products' varying level of appropriateness for certain audiences, another likely reason why SAP did not embed Kinaxis as a globally more established response management provider (in addition to possible ego clashes between the two companies) is because Kinaxis covers a larger scope than SAP SCRM by ICON. Kinaxis has one solution that covers S&OP, demand planning, supply planning, multi-enterprise master production schedule (MPS), new product introduction (NPI), capacity planning, inventory management, supplier collaboration, demand collaboration/collaborative planning, forecasting & replenishment (CPFR), CTP, clear to build, line of balance, expiry data analysis, alternate sourcing, yield analysis, part substitution, inventory allocation, etc.In other words, **Kinaxis RapidResponse** is closer in functional scope to SAP APO or **JDA Planner** than to SAP SCRM by ICON (and Oracle Rapid Planner for that matter). Basically, Kinaxis plays in both the APS and Response Management game.

SAP APO offers a variety of methods including fast-MRP, rules-based heuristics, and optimization. These algorithms browse through all of the available resources (machines, labor, suppliers, available time, etc.) and match

them with the demand in order to generate replenishment orders. The core APO modules include demand planning, SNP, production planning and detailed scheduling, supply network collaboration, *global available* to *promise* (ATP), and common interface function (to provide a common data structure across all the modules).

One could create a similar list of modules and capabilities for the APS offerings by JDA Software, Logility, **Infor** (the **Infor Advanced Planner** and **Infor Advanced Scheduler** products), **Adexa**, Oracle, **AspenTech**, **Preactor**, **WAM Systems**, etc. The traditional problem for users has been to understand the business logic of each rule (algorithm), and how it affects the other functions in the enterprise, not to mention the correlation between all of these modules and their rules when they are implemented concurrently. Thus, the system is typically unable to alert users in other functions that there is an issue that is important to them or to solicit their input.

How Much Human Intervention?

More importantly, any optimized plan is based upon assumptions, in many cases about the relative importance of different metrics such as inventory levels vs. customer service levels that can't even be represented in the same units of measure (UOM). Moreover, these assumptions change over time, but the changes are all too often not reflected in the optimization model because of the major effort required to make the changes.

Fundamentally, though, Kinaxis believes that human judgment is just as important as machine intelligence. Humans are far better at understanding nuance and ambiguity and using this to reach a compromise. Nearly all decisions, but especially cross-functional decisions, are about competing objectives and therefore can only be resolved through compromise. Kinaxis' approach is to provide humans with very fast analytics that allow them to quickly achieve a very good understanding of the likely consequences of their actions.

Kinaxis feels that making the right choice from among a set of possible actions is best left to humans. In contrast, optimization-based APS solutions give the human *the* answer, when in truth it is just *one* answer of many. In other words, they don't present a set of alternatives. But because machines have a restricted "span of experience" and can only investigate alternatives within their span of experience, choosing between alternatives is exactly where humans always outperform machines.

In addition, Kinaxis RapidResponse can do a full "as planned" cost analysis, including the ability to model time-phased costs, whereas most other vendors can only support unit-level planning, with perhaps some past analysis for the financials. Kinaxis heuristics are designed to minimize lateness, but demand can be prioritized. For example, if demand is prioritized by margin contribution, the supply plan generated will result in the greatest margin with the least lateness.

Contrary to SAP's claims, Kinaxis also has finite materials and capacity capabilities, as it could not survive in the high-tech contract manufacturers' space without finite material capability, or in the auto suppliers space without finite capacity. Admittedly, Kinaxis does not do detailed capacity scheduling and sequencing, but most of its customers are trying to solve the problem of what happens between rather than within facilities. Other areas that Kinaxis does not cover are transportation management and warehousing.

It appears that the biggest conceptual difference between the Kinaxis approach and that of the other vendors in this space is that the latter believe that a perfect/optimal plan can be created if only one tries hard enough. And that once the (im)perfect plan has been generated, the organization just needs to execute according to the plan, even to the point of promoting the use of Plan Conformance as a key metric for measuring supply chain performance.

In contrast, Kinaxis believes that everyone has to plan, but that planning is only the starting point because the plan is never perfect. Since the plan is never perfect it is those other capabilities of monitoring and responding that provide breakthrough performance.

Time Alone Will Tell…

It will be interesting to watch how currently upbeat Kinaxis will compete with SAP, Oracle, Logility, and JDA down the track. The strength of RapidResponse lies in supply chain environments that undergo constant change. As mentioned in Part 1, the roots of the initial deployments of the application lie in the high tech, consumer electronics, and contract manufacturing sectors where forecasts are hardly ever accurate and change is a daily occurrence.

As also mentioned in Part 1, Kinaxis has been able to successfully build on these capabilities and penetrate other industrial verticals or organizations with similar characteristics. In addition, the solution has expanded into some horizontal areas such as S&OP, profit and loss (P&L) scenario simulations, workforce management (WFM) scenarios, project management (as to avoid costly contractual penalties), etc.

RapidResponse is currently more flexible than its APS competitors in user interaction with the user interface (UI) and in utilizing the various decision-support functionalities. When one speaks with multiple Kinaxis users, they all indicate that the application is easy to use and grasp, and provides lots of flexibility in methods to accomplish more rapid sequential and scenario-based planning.