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AVIA AEROSPACE: PREPARING FOR TAKEOFF

Professor Robin Ritchie and Christine Vezarov prepared this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. Certain names, data, and other identifying or proprietary information may have been disguised to protect confidentiality. Copyright law prohibits reproduction, storage or transmittal of this document without the written permission of the author. Reproduction of this material is not covered under authorization by any reproduction rights organization.

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IMPORTANT NOTE:

For this case, you are to assume the role of Change Management Consultant team, part of the Professional Services group at Kinaxis Inc. You have been tasked with creating a plan to help the client, Avia Aerospace, integrate Kinaxis RapidResponse within their organization. Your broader mandate is to support Avia employees through the change and help the client draw maximum benefit from the RapidResponse platform. Your key contact at Avia is Leo Santos.

October 2023 has been a frustrating month for Leo Santos. Despite a "firm commitment" from senior management in June that the company would transition to a next-generation supply chain planning tool, the path forward now seems murky. As Supply Chain Director for Avia Aerospace, Santos spent the summer laying groundwork for the adoption of Kinaxis RapidResponse, a cloud-based software platform that promises to dramatically improve the company's supply chain management (SCM) and forecasting.[1] Things had been progressing well until the morning of September 29, when a press release announced that Gurdeep Jaswal, Avia's Chief Operating Officer, was "leaving the company to pursue other interests." Less than an hour later, Santos got a call from Laura O'Malley, Avia's CEO, asking him to pause the transition.

Prior to his departure, Jaswal had been the key champion for improving the way Avia manages its supply chain. A software engineer by training, he is a strong believer in the power of information systems to improve process efficiency, align planning with execution, foster collaboration across the organization, and enhance the quality of decision-making. Under his direction, Avia worked with Kinaxis to initiate "RapidStart," phase one of the switchover—the process that is now on hold. Despite an expedited search for Jaswal's replacement, it remains unclear who that individual will be, when they will be in place, and how this change will impact the transition to RapidResponse.

[1] *Avia is a fictitious company that represents an amalgam of actual aerospace industry clients served by Kinaxis. All issues identified in this case are grounded in real-world experience.*

Santos is convinced that a new supply chain planning system is important—possibly even essential—for Avia's long-term success. This view is shared by some, but not all, within the company. In an anonymous poll of all Avia staff with supply chain responsibilities, 94 per cent expressed interest in adopting a new supply chain management system that would enable them to conduct scenario analysis.[2] Within that group, the greatest source of frustration was their inability to trace the impact of supply chain disruptions—i.e., late shipments, natural disasters, unplanned shutdowns, etc. As Renée West, Avia's Team Lead for Network Planning, put it:

> I want my team to be able to make quick, unified decisions. If we find out that a supplier is going to be a week late with their shipment, my team needs to have a full understanding of how that impacts our business. Will we miss deadlines or fail to meet customer commitments? What options are available to mitigate risk? Our current method of operating in silos with countless Excel files means we never have a single source of truth. A planner at Mirabel may think we have ten engines in inventory, while the plant manager's file says we have five. Data is disconnected and fragmented. With RapidResponse, those problems go away.

Despite the vote of confidence from SCM staff, a group of vocal employees in the company's Canadian manufacturing facility remains skeptical. When their plant manager asked for clarification, they explained that they are unsure of the benefits, wary of the transition process, and worried about its impact on their future.

Uncertainty about the transition extends beyond the factory floor. Mahikan "Mike" Cardinal, Chief Financial Officer, has raised concerns about costs. Beyond the subscription fee for the software, an initial budget of $70,000 was allocated to train employees on how to use the new system. Cardinal is worried about the sufficiency of this training budget and wonders if there are other costs, hard or soft, that should also be considered.

COMPANY

Avia is a major North American aerospace firm headquartered in Lachine, Québec, a borough located adjacent to Montréal-Trudeau International Airport. The company produces a diverse range of offerings—helicopters, tiltrotor and fixed wing aircraft, and related technologies—used in commercial, military, and public safety applications. In addition to its head office, Avia owns manufacturing and testing facilities at YMX International Aerocity of Mirabel (a cargo and former international passenger airport) approximately 50 kilometers to the northwest of Lachine, and manufacturing facilities in three other locations: two in the United States and one in France.

The company is publicly traded on both the New York and Toronto Stock Exchanges and has long favored a conservative capital structure. Net profit was $556 million in 2022, on revenues of $7.1 billion.[3] Both profits and revenues have remained relatively stable over the past five years, with an increase in defense contracts compensating for a sharp decline in civilian aircraft sales and maintenance in 2020 and 2021. With the significant rebound in civil aviation prompted by relaxation of COVID-19 travel restrictions, Avia now anticipates 20 per cent growth in demand for its commercial aircraft offerings relative to pre-pandemic levels.

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[2] *Scenario analysis makes it possible to create "what if" scenarios and compare the impact of different decisions. This capability leads to faster, more informed decision making across the supply chain.*

[3] *All figures in U.S. dollars unless otherwise stated.*

The company is also bidding on defense contracts for three countries that are members of the North Atlantic Treaty Organization (NATO) and one additional country located in Southeast Asia.

Origins

Founded in 1923 as Dominion General Aviation, Avia began its existence as a manufacturer of small, fixed wing aircraft. In 1995, the company added helicopters to its product portfolio with the acquisition of a French manufacturer whose various models are used for a range of military and civilian uses. Further evolution occurred through a combination of organic growth and a second strategic acquisition in 2016—the avionics unit of a large U.S.-based defense contractor with operations in Virginia and California. As a result of these moves, Avia is now widely recognized as a significant player in aerospace and defense, known for its innovative products, customer focus, and commitment to quality.

AEROSPACE SECTOR

The global aerospace industry achieved revenues of approximately $972 billion in 2022, including $272 billion from aircraft and engine manufacturing (28 per cent), $262 billion from maintenance, repair, and overhaul (27 per cent), and $253 billion from aircraft systems and component manufacturing (26 per cent). The sector is dominated by Airbus and Boeing, which together hold more than 25 per cent market share. Other significant players include Lockheed Martin, United Technologies, Northrop Grumman, GE Aviation, Raytheon, Safran, Rolls-Royce Holdings, Leonardo, and BAE Systems.

Within Canada, aerospace is an economically significant and expanding industry, contributing close to C$27 billion to the country's gross domestic product and more than 212,000 jobs to the Canadian economy.[4] In 2022, the Canadian aerospace sector was responsible for nearly C$18.7 billion in exports and was the leading spender on research and development among all Canadian manufacturing sectors, with more than C$680 million invested.[5]

Relative to other industries, supplier and manufacturing networks in the aerospace sector are more globally distributed, resulting in a complex supply chain that can be impacted by events anywhere in the world. At the same time, global supply chains have also resulted in greater resilience—even opportunities for cost savings—for aerospace firms that design products in such a way that one supplier of a given part or subassembly can be substituted for another. This requires careful tracking of lead times and material costs, along with robust risk mitigation measures.

Industry Trends

Over the past decade, the global aerospace industry has experienced two significant developments that continue to impact companies in the sector. The first of these is a sharp rise in demand for commercial aircraft—briefly disrupted in 2020 and 2021 by the COVID-19 pandemic—as innovations in materials and engine design led to major improvements in efficiency and performance. The result was increased production rates, which has been unambiguously good for aircraft manufacturers but challenging for

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[4] *1 Canadian dollar = $0.73 U.S. (October 2023).*

[5] *https://ised-isde.canada.ca/site/aerospace-defence/sites/default/files/attachments/2023/State_of_Canada_Aerospace_report2023_0.pdf*

suppliers, some of which have struggled to meet on-time delivery targets while also maintaining quality. Meanwhile, complications arising from COVID-19 have led to supply chain disruptions. Combined with global trade tensions, particularly between the United States and China, this has prompted many manufacturers to diversify their networks of suppliers as they seek to minimize business risk and avoid potential tariffs on raw materials and components.

The second major shift has been a wave of consolidation, due in part to the demand for continued innovation, the high cost of research and development (R&D) needed to compete effectively, and the benefits of scale. Mergers and acquisitions typically result in greater geographic dispersion within a company's operations, leading to increased network and product complexity and greater diversity in sources of supply. The larger size and reduced number of aircraft manufacturer has increased their market power, putting pressure on suppliers to reduce costs.

SUPPLY CHAIN MANAGEMENT AT AVIA

With an operational environment that involves both manufacturing and spare parts management, Avia faces an assortment of supply chain challenges. Many of these stem from the complexity and sophistication of the company's products. Depending on size and use, Avia's fixed-wing aircraft can be composed of anywhere from 5,000 to 12,000 unique parts. Its helicopters and tiltrotor aircraft typically consist of 7,000 to 10,000 parts. Adding to the challenge, many of these are combined in complex ways, as elements of components and subcomponents that are then assembled to produce the final product. The bill of materials (BOM) for Avia aircraft includes as many as 26 levels of sourcing, manufacture, and assembly.[6] Lead times for these parts vary considerably but can be as long as 36 months.

Also noteworthy are the many design adjustments that are made as the company's products are developed and refined. In the aerospace sector, it is not unusual for new aircraft to be launched with incomplete engineering and planning, meaning that changes are common—some essential for safety, others optional. The main consequence of this for supply chain planning relates to parts sourcing. With multiple products in its portfolio, Avia must be able to quickly analyze the impact of design decisions and engineering changes on manufacturing, especially when this results in certain parts no longer being required. Historically, Avia has found it difficult to know how much inventory would become obsolete when changing parts, as well as the true cost of these changes.

Additional issues arise from the need to customize products for individual customers. Although Avia takes considerable pride in the versatility of its aircraft, most orders must be tailored to meet specific customer needs and operational requirements. Sometimes this is driven by the product's intended use—e.g., arctic patrols under extreme temperatures and harsh climate conditions. Other times, the key concern is compatibility with the customer's existing aircraft fleet, maintenance facilities, personnel training, and flight procedures. In still other instances, product adjustments are needed to satisfy country-specific safety and regulatory standards. Such "configuration evolution" is not only common but expected in aerospace. To utilize the full capacity of their lines and plan for critical parts, Avia begins its planning based on "vanilla" or "white tail" products.[7] As products approach the time of delivery, options are then added based on

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[6] *A bill of materials is a comprehensive list of parts, items, assemblies, subassemblies, intermediate assemblies, documents, drawings, and other materials required to create a product. The BOM can be thought of as the recipe used to create a finished product, presented in a hierarchical format.*

[7] *In manufacturing, "vanilla" describes any product that has not been customized or modified from its base configuration. The term "white tail" is used specifically in aerospace and refers to an aircraft that has been produced without a firm customer in place, leaving the aircraft without a specific livery or any customer-specific modifications.*

customer requirements. In addition to manufacturing new product, Avia also buys back used aircraft, reconditions them with new configurations, and resells them. All this has important implications for parts sourcing and tracking.

Avia is also impacted by shifting demand for the company's products after they have been launched. Aerospace is a highly profitable business during times of strong demand, but the industry can also be fickle. Economic cycles and geopolitical considerations have a major impact on customer needs, sales opportunities, and lead times. When faced with sector growth, market downturns, and shifting national defense requirements, proper measures needed to be put in place to adapt and make the necessary adjustments to production capacity. To hedge against this risk, Avia also offers support and maintenance for aircraft fleets. However, this leads to its own kind of complexity: While overall revenues from service and maintenance are more stable than new product sales, the operational aspects of are less predictable. Spare parts management and repairs revolves around making decisions with probabilities rather than planning for certainties.

Current Software Solution

Avia currently uses an enterprise resource planning (ERP) system—multipurpose software that helps companies manage data and workflows for many different aspects of the organization (typically, human resources, finance, and order management). This was installed in the early 2010s and is specially configured for the aerospace and defense (A&D) industry. Due to Avia's acquisition of Patheon Systems—a U.S.-based avionics manufacturer—in 2016, parts of the company also use dedicated supply chain management (SCM) software that is only partly compatible with Avia's legacy system. To address specific limitations of their current solution, Avia employees have built several standalone, in-house applications. It is not unusual for different operating units to be working with different data, leading to variance in BOMs and supply/demand requirements not matching up.

In some cases, Avia employees have even resorted to tracking inbound and outbound shipments using Excel spreadsheets (see Exhibit 1). Manual work is needed to gather this data, enter it into spreadsheets, create reports, and then share those reports with everyone who is impacted. This has led to long reporting cycles—often as long as two weeks—and inconsistent data. There is a risk of orders being overlooked if a spreadsheet is not properly updated or if someone is using a version of the file that was updated but has not yet "synced" to their local machine. Problems can also arise when an employee goes on vacation or leaves the company since changes to production schedules are not always documented or shared via files that are accessible to everyone who might need them. It is also difficult to get new talent up to speed because the necessary process knowledge may not be passed from person to person.

Problems

In addition to the issues noted above, four problems have become particularly acute at Avia in recent years due to limitations of the company's supply chain management solution:

- **Inefficient Inventory Tracking.** Avia currently relies mostly on "single pegging," a system that tracks individual parts but does not relate those parts to the subassemblies and higher-order parts

they are used to manufacture.[8] Consequently, they are unable to relate component supplies to top-level aircrafts or simulate how extra inventory could be utilized across different projects.

- **Network Visibility Limitations.** Avia has had difficulty finding the right mix of inventory for its global manufacturing operations—e.g., shortages of parts for top-selling products produced in California and an excess of certain sub-assemblies for its Mirabel operations. Although the latter is less problematic than the former, it still leads to serious issues—from excess inventory carrying costs and storage expenses to consumption without accountability (i.e., shrinkage).

- **Inaccurate Production Capacity Planning.** Capacity planning gives companies the ability to ensure that adequate resources are allotted for production based on changing material availability. With a large supply chain where things change constantly, Avia's capacity plan is rarely accurate. This makes it difficult to adequately schedule production shifts, ensure that supplies of all necessary parts are available, or optimize manufacturing processes.

- **Low Responsiveness and Late Orders.** Supply chain disruptions are increasingly common, and Avia's systems makes it difficult to track their impact. Responses to disruptions often take several days and the company struggles to accurately understand the impact on production or on delivery timelines for specific customers.

NEED FOR SOLUTIONS

In a review conducted in January 2023, Avia's Operations Committee—led by Santos—determined that limitations of the company's current enterprise resource planning system were seriously undermining the company's competitive advantage. To address this, they recommended adoption of a new, state-of-the art platform to give managers real-time information about inventory levels, costs, materials sourcing, workflow optimization, and other aspects of company operations in a format that would be simple understand, easy to use, and accessible from anywhere. More specifically, the goal was for Avia to be able to:

- Review master production schedules to have a clear sense of how many orders can be built within a given lead time.

- Monitor inventory levels of various inputs and outputs in real-time in order to identify anything that is slow moving or, alternatively, in short supply.

- Improve management of warehouse inventory by measuring the size of parts and matching these against capacity thresholds for each location.

- Engage directly with suppliers to obtain up-to-the-minute information regarding parts availability and manufacturing or shipping delays.

- Model the impact of changes in order size or configuration, delivery dates, production schedules, and production and material costs (see Exhibit 2: Demand Planning Workbook).

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[8] *This contrasts with "full-level pegging" or "full pegging," whereby the inventory management system recognizes relationships between finished products, subassemblies, and individual parts, and is able to track the impact of changes in inventory levels of any element on higher-order ones.*

- Measure the impact of design changes and streamline the new part integration process.
- Account for improvements in production efficiency when forecasting hour-by-hour needs for parts and labor.
- Create 'what if' scenarios to model changes to the operating environment and quickly identify their impact (see Exhibit 2: Supply Planner Scorecard).

The committee also recommended that Avia replace its system with dedicated, purpose-built SCM software. They reasoned that this would equip the company with a "best-of-breed" solution for supply chain management—key to the success of Avia's operations—rather than the all-in-one approach of an ERP.

Following a comprehensive review of options, the committee recommended Kinaxis RapidResponse as the preferred option (see Exhibit 3). Apart from usability and ease of implementation, a key advantage of that platform over other systems is its simultaneous use of heuristics, optimization, and machine learning to provide answers that are both quick and accurate. When presented with a complex supply planning problem, the software first applies heuristics, then runs those results through an optimizer or solver. This significantly narrows the scope of what the optimizer must solve for and dramatically reduces the time it takes to get an answer while still preserving the required accuracy. For demand planning, for instance, the software leverages machine learning to gain insights from vast amounts of internal and external data and then uses additional analytical approaches as appropriate to improve sensing and forecasting across short and long-term horizons. This makes it possible to continuously balance demand and supply in real-time and run a wide range of "what-if" scenarios.

EMPLOYEE SENTIMENTS

Despite the advantages of RapidResponse, some Avia employees question whether a new supply chain management system is necessary or even beneficial (see Exhibit 4). As Santos notes:

> Part of the problem is that people are comfortable with what they know. It's scary moving to something new and it takes time to adjust. The process is not helped by the fact that we've been using our current system for longer that most of our employees have been with the company.

Jim MacLaren, a planner for Avia's Mirabel site, is concerned that RapidResponse may not live up to its billing:

> When they presented to us in March, the folks from Kinaxis made their software sound amazing. Of course they did—they're salespeople! I've worked for Avia since 1993 and we've implemented a lot of new systems: workflow and collaboration tools, inventory management, accounting. In all that time, I can't remember any that lived up to the hype. Not one.

Other Avia employees from across the organization have also been keen to share their views.

Ariel Plamondon, Operations Manager, Mirabel:

> Honestly, I don't see what's wrong with our current way of doing things. It works for us. Sure, operations can be a bit frustrating at time, but that's just how things go. I'm not keen to throw away what I know and I'm pretty sure most of my team agrees with me.

Chantal Savard, Plant Manager, Mirabel:

> I'm on board in principle, but senior management needs to understand the position I'm in. I oversee a team of 84 employees. A third of them are over 50 and a quarter are less than five years from retiring. A significant number of those have no interest in learning new things and they let me know it. We're a union shop and the local rep is close friends with two of the most vocal opponents of RapidResponse. Who's going to help me deal with that? And who's going to cover the cost of retraining all these employees? It's not just a matter of money…it's lost time and lost productivity.

Aaliyah Robinson, Procurement Manager for Avia's California and Virginia plants:

> The folks up in Montreal need to wake up. From what I hear, a lot of the "old guard" think they can get by with their current ERP and inventory management systems. If we're going to compete with the Boeings, the Sikorskys, the Raytheons, and the Lockheed Martins of the world, we need a 21st century supply chain management solution, bottom line. That's not just an opinion—our suppliers and customers expect it.

Taiwo Adeyemi, Supply Chain Analyst, France:

> I got to use an early version of RapidResponse when I was a university student and, honestly, it's what got me interested in inventory management and resource planning. I trained as an aerospace engineer and my classmates and I used to think of as supply chain as a kind of "necessary evil"—part of the process, but not something that impacted the success of a company. The moment I saw what the software could do…access to real-time data, predictive analytics, ability to do complex "what if" analysis. Well, let's just say that's the moment I figured out what I wanted to do as a career.

Renée West, Network Planning Team Lead:

> We used RapidResponse for supply planning at my previous employer and it's a game changer. If we don't empower our planning teams with the right tools, we're wasting talent. I can speak from first-hand experience: Giving our planners access to RapidResponse will lead to faster, more informed decision making and a huge boost in employee satisfaction.

Esther Cohen, Director of Manufacturing and a member of the Avia Operations Committee:

> Here's what I know: Our current solution works—we make high-quality products and we deliver those products to customers. But I've had a lot of conversations with Leo and others about the potential of RapidResponse and I've seen how much better things can be. I know people have their doubts, but Leo and I are dedicated to championing change.

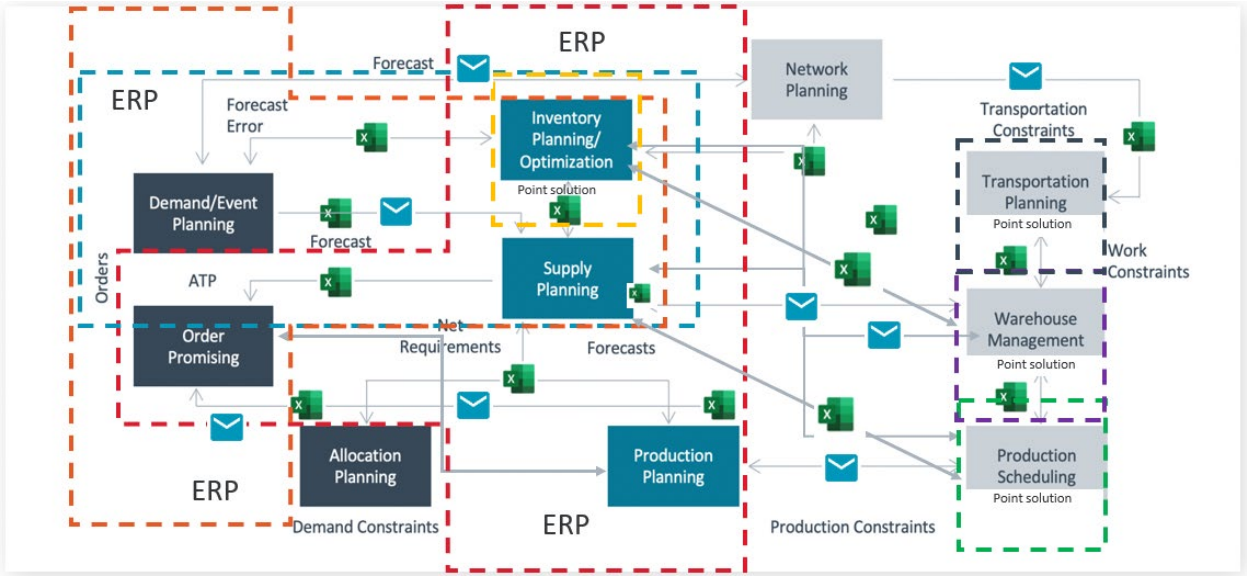
THE CHALLENGE AHEAD

If the rumblings from across the company have taught Santos anything, it's that the roll-out of RapidResponse had not been proceeding as smoothly as he and Jaswal had believed. Clearly, the advantages of the software, which were so clear to him, are less evident to others within the company. If the project is to gain traction, he will need to find a better way to explain and persuade. Ever the optimist, Santos hopes

to do more than just overcome resistance—he believes it is possible to get Avia employees to be excited about RapidResponse.

Getting people on board is only part of the challenge, however; implementation will also be critical. With four manufacturing facilities in three countries, multiple internal stakeholders impacted, and suppliers and customers located across the globe, there are plenty of moving parts. Coming from an IT background, Santos had been accustomed to thinking about software implementation purely as a technology issue. What has become clear is that it is also a human resource, organizational design, and process management challenge. People, processes, and technology all need to be aligned to achieve the best results. Changes to company structure, workflow, employee recruitment, retention strategies, and other elements may be needed to ensure that Avia employees use RapidResponse, learn how to collaborate, and leverage the software's full potential.

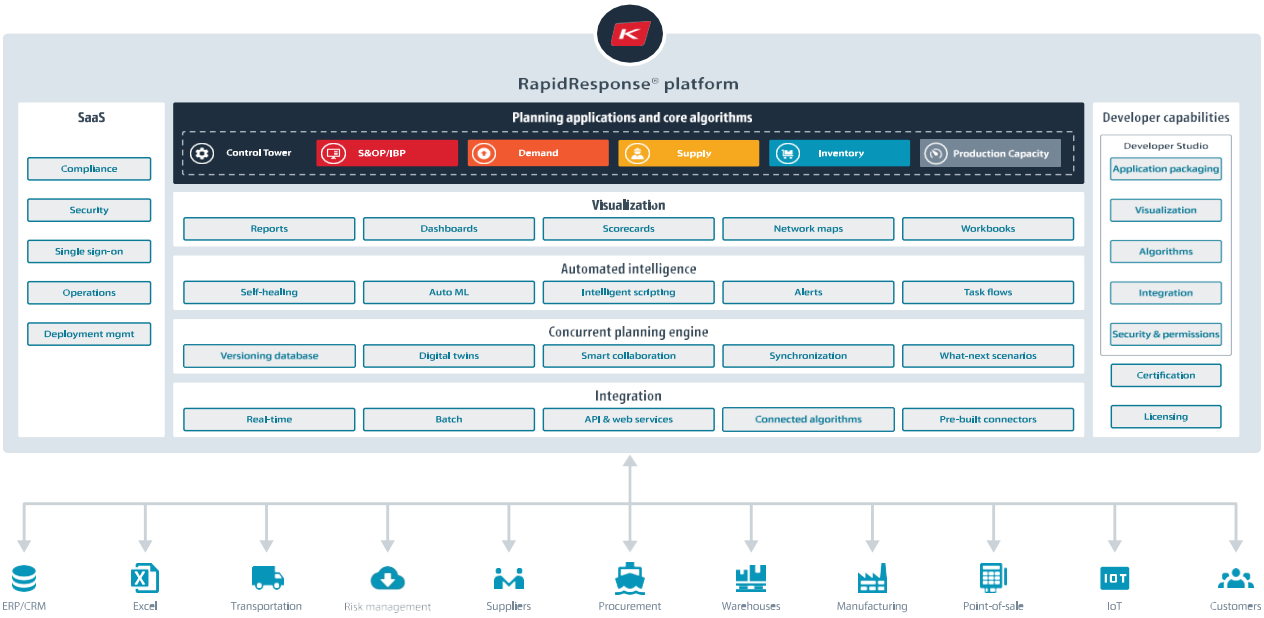
EXHIBIT 1: CURRENT STATE PROCESS DIAGRAM



This diagram illustrates the various ways that Avia uses its current ERP system to export data into Excel. Excel files containing information such as supply, demand, and inventory must then be shared via email to communicate updates. Groups must maintain, update, and share data manually leading to process latency and out-of-sync data.

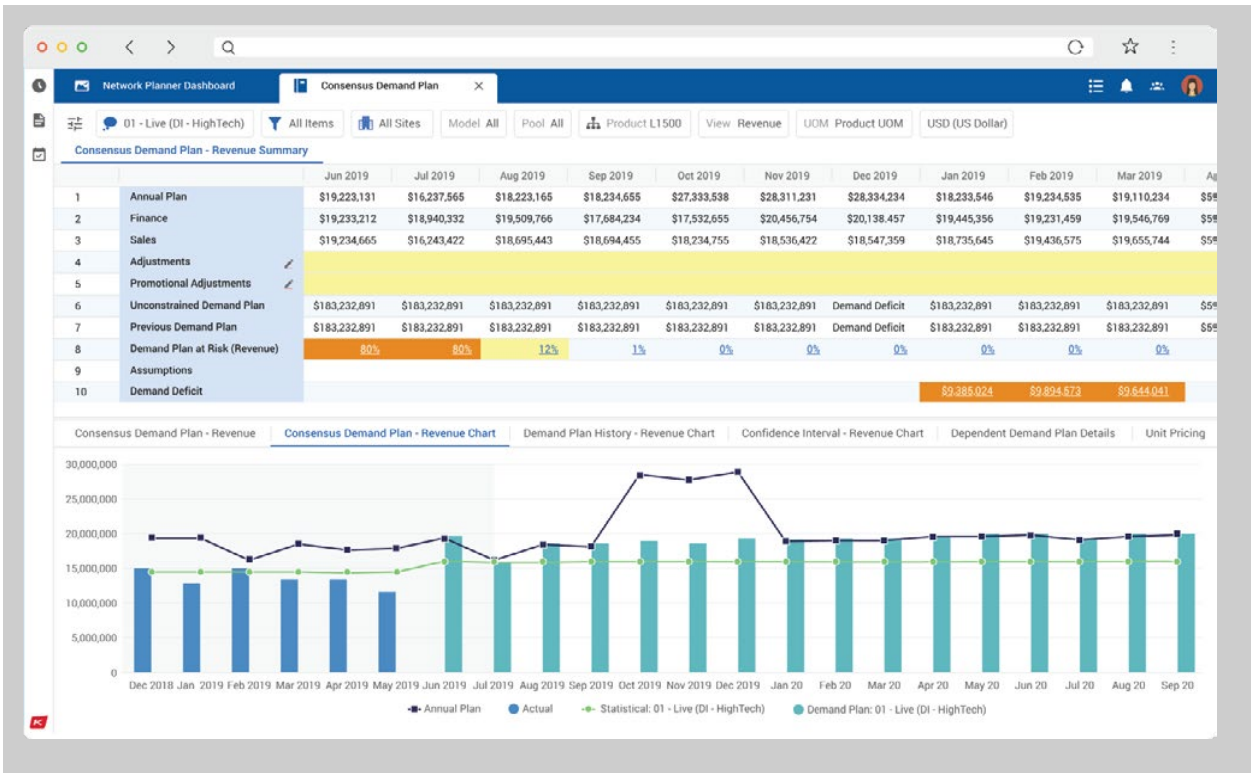
EXHIBIT 2: RAPIDRESPONSE INTERFACE

General Dashboard

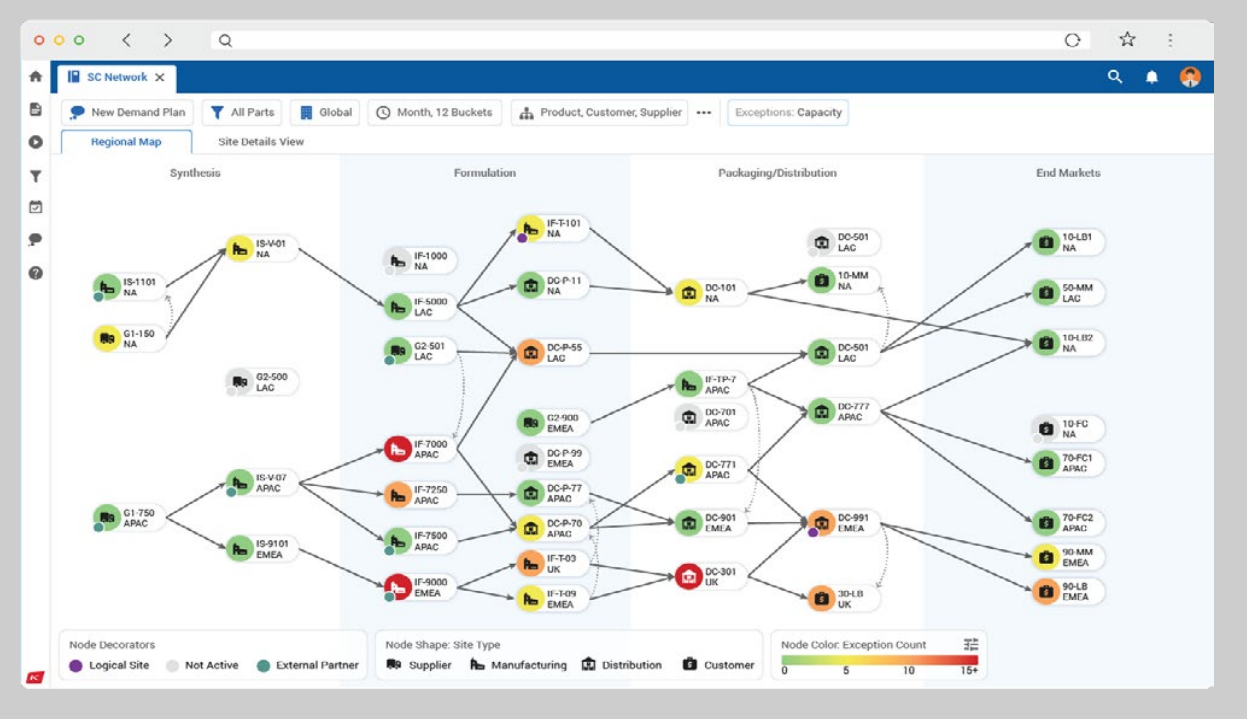


Demand Planning Workbook

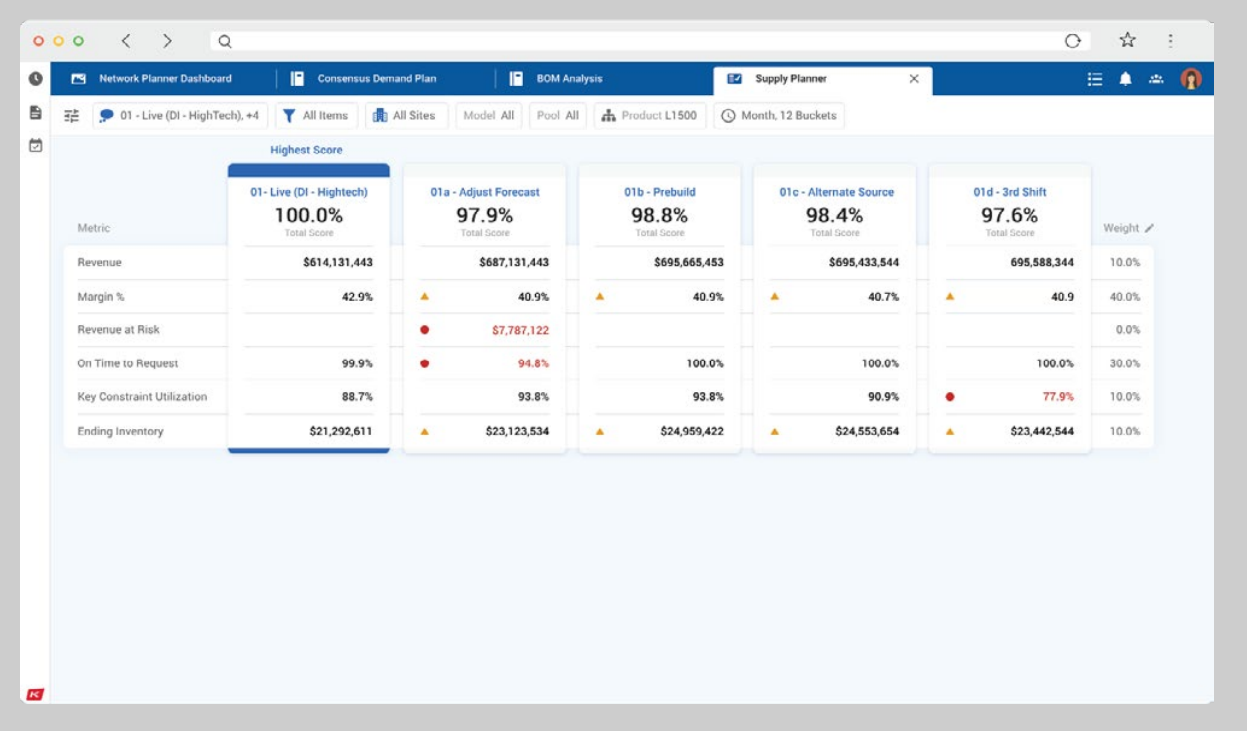
(Includes live data, scenario planning, and filtering capability to quickly see the impact of changes.)



Supply Chain Network Map (highlighting "exceptions" such as misaligned supply and demand)



Supply Planner Scorecard (used to compare scenarios based on key metrics)



Source: Kinaxis Company Files

EXHIBIT 3: SUPPLY CHAIN SOFTWARE PROVIDERS

Magic Quadrant for Supply Chain Planning Solutions

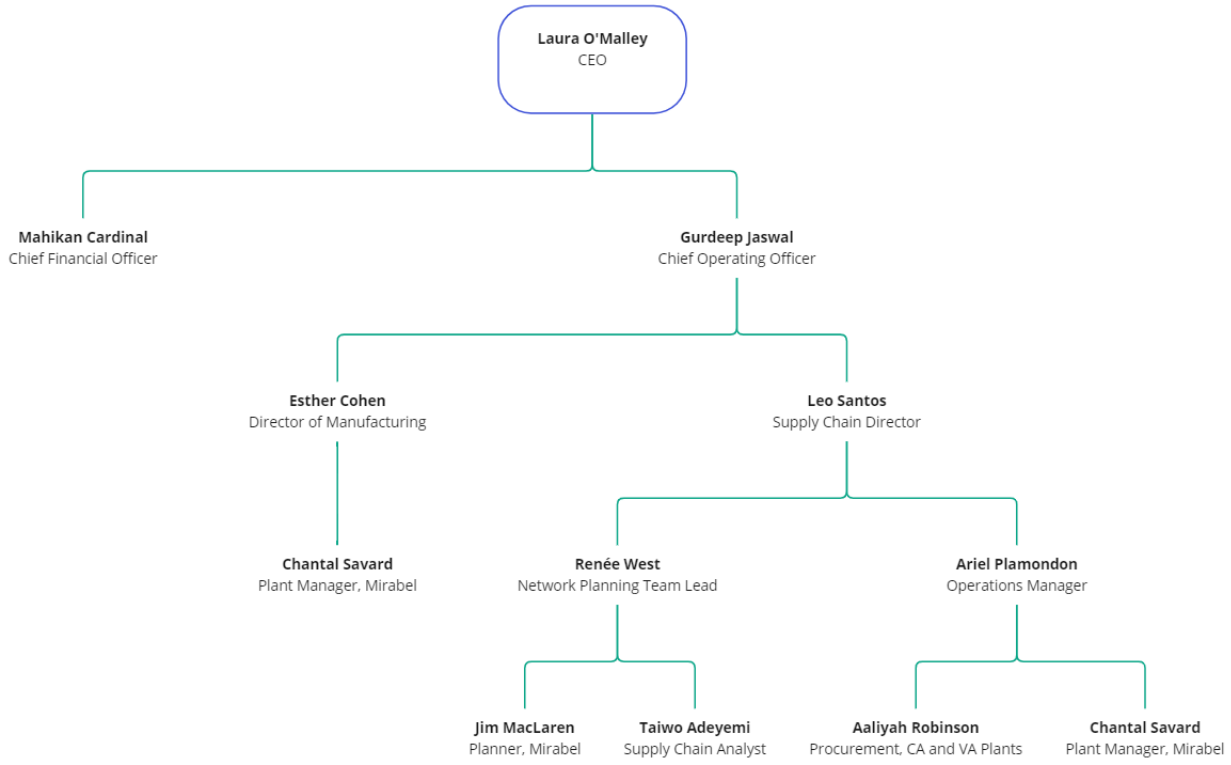
Source: Gartner, Inc.

Company	Headquarters	Founded	Revenues (2022)	Market Cap	Employees
Adexa adexa.com	Los Angeles, California, USA	1994	$12.5 million	Privately held	53
Anaplan anaplan.com	San Francisco, California, USA	2006	$592.2 million	Privately held (owned by Thoma Bravo)	2,200
Arkieva arkieva.com	Wilmington, Delaware, USA	1993	$16.5 million	Privately held	100
Blue Yonder blueyonder.com	Scottsdale, Arizona, USA	1985	$1.1 billion	Privately held (owned by Panasonic)	6,000
Coupa coupa.com	San Mateo, California, USA	2006	$725 million	Privately held (owned by Thoma Bravo)	3,000
Dassault Systèmes 3ds.com	Vélizy-Villacoublay, France	1981	€4.5 billion	Privately held (owned by Dassault Group)	22,500
e2open e2open.com	Austin, Texas, USA	2000	$426 million	$1.3 billion	4,000
FuturMaster futurmaster.com	Boulogne-Billancourt, France	1994	$26.6 million	Privately held	100
GAINSystems gainsystems.com	Chicago, Illinois, USA	1971	$5.4 million	Privately held (owned by Francisco Partners)	67
ICRON icrontech.com	Amsterdam, Netherlands	1992	unknown	Privately held	120
John Galt Solutions johngalt.com	Dallas, Texas, USA	1996	unknown	Privately held	unknown
Kinaxis Inc.	Ottawa, Ontario, Canada	1984	$367 million	$4.1 billion	1,500
Logility logility.com	Atlanta, Georgia, USA	1996	unknown	Privately held (owned by American Software, Inc.)	unknown
Oracle oracle.com	Austin, Texas, USA	1977	$50.0 billion	$300 billion	164,000
OMP omp.com	Antwerp, Belgium	1985	unknown	unknown	1,250
o9 Solutions o9solutions.com	Dallas, Texas, USA	2009	$300 million	Privately held	2,000
QAD qad.com	Santa Barbara, California, USA	1979	$311 million	Privately held (owned by Thoma Bravo)	2,000
SAP sap.com	Walldorf, Germany	1972	€31 billion	€153 billion	105,000
RELEX Solutions relexsolutions.com	Helsinki, Finland	2005	€100 million	Privately held	1,800
Slimstock slimstock.com	Deventer, Netherlands	1993	$84 million	Privately held	400

Source: Publicly available data

EXHIBIT 4: AVIA AEROSPACE ORGANIZATION CHART

September 2023



Source: Company Files