CAMELOT
Management Consultants

Race for Value
Towards the Digital Supply Chain

The digital transformation of supply chains is underway, and many initial successes have been achieved. However, existing digital technology is far from being applied at scale, and significant value is still up for grabs for supply chain managers. Beyond implementing new data lakes and AI technology, companies need to take an end-to-end approach and systematically rethink their processes, operating model, roles, skillsets, as well as the IT and data target landscape to capture the full potential of digital supply chains.

The last five to ten years have seen bustling activity in the digitization of supply chains across all sectors, triggered by a series of breakthroughs on multiple levels. The innovation in foundational technologies (like massive parallel computing and the availability of affordable hyper-scale cloud platforms) has boosted machine learning and analytics, leading to remarkable breakthroughs like those of DeepMind AlphaZero in 2017[1]. Step by step, real-time and data-driven optimization has then been integrated into planning and ERP systems and enabled companies to use digital twins of their networks or supply chains to simulate and optimize complex supply chain strategies. And we are just witnessing the start of the revolution. In 2019 alone, AI companies attracted nearly $40 billion globally in disclosed investment, led by the US, China, and Israel[2].

Digital Is Out of the Starting Blocks but Has Room for Improvement

Digital supply chain innovation has come out of the starting blocks in the last five years and helped companies drive improvements in four key areas:

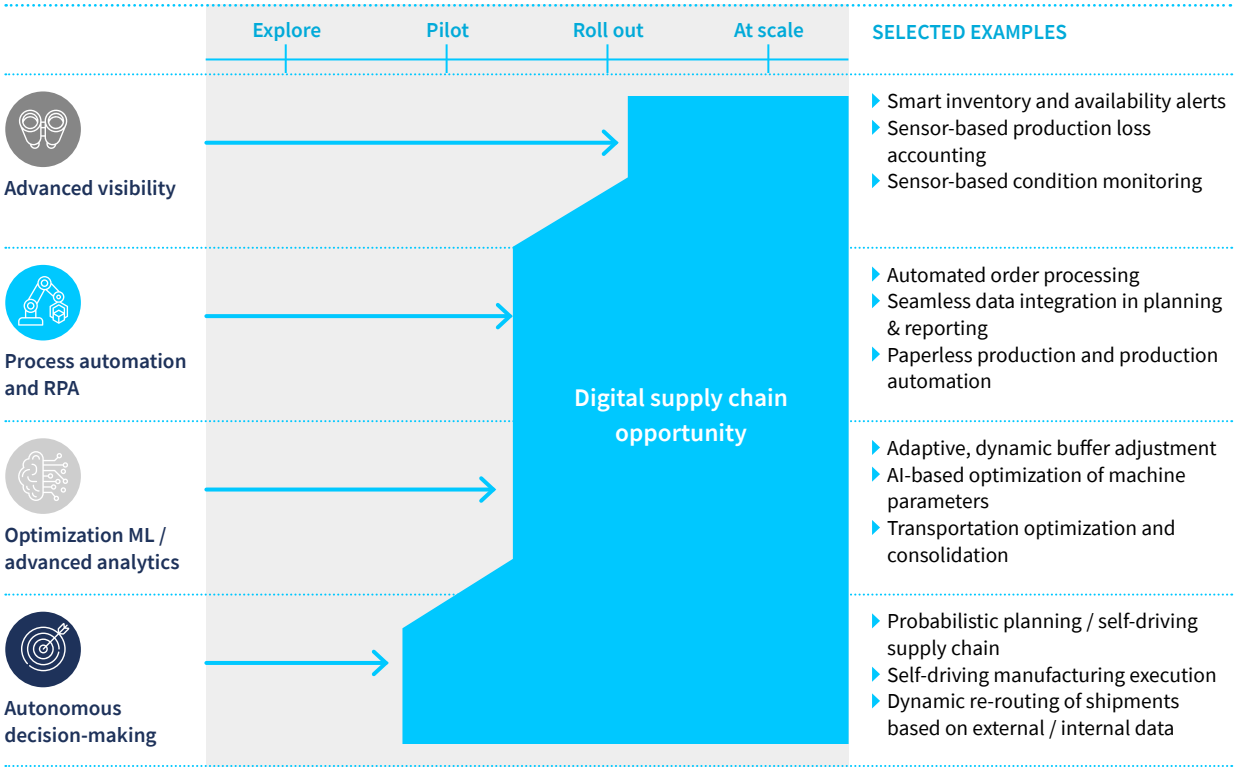
At first, we saw many digital applications in **supply chain visibility**, e.g., real-time dashboards for operational performance down to plant and production line level and new workflows for management enabling fast and data-driven decision-making. On top of visibility, companies have used **process automation and RPA** extensively to transform transactional supply chain processes such as customer order management and operational procurement. But that was only the first step. Now smart automation embeds AI algorithms in RPA and allows the partial automation of decision-making processes such as exception management, allocation, and even S&OP (RPA 2.0/ hyperautomation)[3].

In parallel, companies have been working on deeply integrating **analytics and machine learning** into core supply chain processes and decision-making. Examples include forecasting, and nowadays end-to-end parametrization, intelligent alerts, and automated analytical root cause analysis of issues, e.g., backorders and delays.

These advances already point to the final area, **autonomous decision-making**, and **the self-driving supply chain**. With probabilistic planning and impact simulation in digital network twins, machines can increasingly handle tactical and operational trade-off decisions, strike a balance between alternative options in an automated way, and only raise alerts to the supply chain planners in case of exceptions and ambiguities.

[1] "AlphaZero: Shedding new light on chess, shogi, and Go", David Silver et. Al, December 6, 2018, https://deepmind.com/blog/article/alphazero-shedding-new-light-grand-games-chess-shogi-and-go (visited February 11, 2021)
[2] "What investment trends reveal about the global AI landscape", Zachary Arnold, September 29, 2020, https://www.brookings.edu/techstream/what-investment-trends-reveal-about-the-global-ai-landscape/ (visited February 11, 2021)
[3] "Robotic process automation i: A path of hyperautomation", Henrik Baumeier et. Al, January 15, 2021, https://blog.camelot-group.com/2021/01/robotic-process-automation-i-a-path-of-hyperautomation/ (visited February 11, 2021)

Figure 1:
Digital supply chain is out of the starting blocks, with lots of value still up for grabs



Overall, the digital supply chain is out of the starting blocks, with lots of exciting ventures and achievements to show for it. However, we have captured only a fraction of the value potential, with lots of opportunities still to be harnessed, e.g., by extending existing approaches and moving to next-generation supervised autonomous decision-making.

In the next section, we will outline the impact that the digital supply chain will have on the supply chain operating model.

Digital Fundamentally Changes the Supply Chain Operating Model

As we have experienced in a broad range of digital supply chain projects across industries, digital has proven to drive value in optimizing physical processes, such as manufacturing and logistics, and has improved information flows in data management, end-to-end supply chain planning, strategic sourcing, and operational procurement. Figure 2 (see page 3) gives an overview of the key application areas and use cases.

It is important to note that these are not just some independent use cases. Instead, digital and analytics are transforming the core operating model of supply chains step by step, resulting in five central paradigm changes:

- **From reaction to anticipation:**
  Real-time visibility and proactive sensing of issues and deviations allow fast and anticipative actions, including the systematic, fact-based balancing of alternative mitigation strategies as opposed to reactive firefighting.

- **From interface to seamless integration:**
  Not only is machine-to-machine communication transformed, but machine-to-human communication as well. Examples are chatbots and decision support systems for planning and data maintenance. This seamless integration requires stronger focus by planners on providing additional information (e.g., market knowledge) and systematic analysis of trade-offs and decision-making.

- **From administration to creative value-adding:**
  The digitization and automation of administrative work content such as order handling and data maintenance free up time and resources for creative value-adding activities, e.g., cross-functional alignment, continuous improvement, and optimization of end-to-end plans.

- **From judgment to data-informed decisions:**
  Systems of Intelligence use methods such as machine learning to drive descriptive, predictive, and prescriptive performance analyses in real-time and thus enable data-driven decision-making based on rules and algorithms, with a direct feedback loop of actions into execution systems.

- **From point to probabilistic:**
  New probabilistic planning approaches move away from single-point plans (e.g., a single forecast for a certain SKU/month/location). Instead, these approaches generate a broad range of alternative plans with distinct probabilities. This enables true synchronization along the end-to-end supply chain by picking the end-to-end decision scenario with the highest value for the company considering the implications across all supply chain nodes. This fundamental shift paves the way for self-driving supply chains with only focused planner oversight.

Figure 2:
Top use cases of digital and analytics along the value chain

Aiming High:
Digital End-to-End Supply Chain Planning

The digital supply chain is out of the starting blocks, with lots of exciting ventures and achievements to show for it. However, we have captured only a fraction of the value potential so far. Digitizing and automating end-to-end supply chain planning is the big prize, but many companies struggle to put all the pieces of the puzzle together. Digitization of end-to-end planning needs to bring many different parts together in the right way: changed processes, new roles and skillsets, clear decision rules, the proper templates and workflows, enabling data as well as supporting IT and data infrastructure. From our work with leading global companies in supply chain planning, we know that three success factors typically separate the wheat from the chaff when it comes to digitizing end-to-end supply chain planning:

- **Data – intelligence – execution:**
  Start with a focus on data quality as an enabler for a digital supply chain and establish a common data model. Based on that, disaggregate planning into distinct, manageable decision loops, which transform data into optimal planning decisions (in Systems of Intelligence) and automatically feed the results back into execution systems (Systems of Record). Each of these loops should help make a distinct supply chain decision (e.g., segmentation, allocation of scarce product, or adjustment of parameters) more precise, automated, and value-adding for the company.

- **Slicing the elephant:**
  Approach these decision loops one by one with a clear target roadmap in mind, step by step. Optimizing one planning challenge at a time in a decoupled approach (e.g., first focus on automated inventory buffer sizing, then on allocation and ATP) helps create tangible value early on while not overwhelming the organization and creating undue implementation risk on the business side as well as the IT side. As digital planning maturity grows, companies can then move to a more integrated approach, where different optimizations are balanced from an end-to-end perspective.

- **Focus on the machine-to-human interface:**
  Focus not only on the technical improvement potential (e.g., optimizing algorithms, using new machine learning techniques), but also zoom in on the human improvement potential. Effective decision support tools supporting planners, e.g., in the plan review or data validation step, can often have significantly higher value contributions than sophisticated new algorithms.

What are the key digital use cases in end-to-end supply chain planning which companies should consider first and foremost in their digital strategy? From our perspective, the 10 cases outlined in figure 3 (see page 5) should be top of the list. In the following section, we will explain two of the key value opportunities in more detail.

Smart inventory & availability alerts

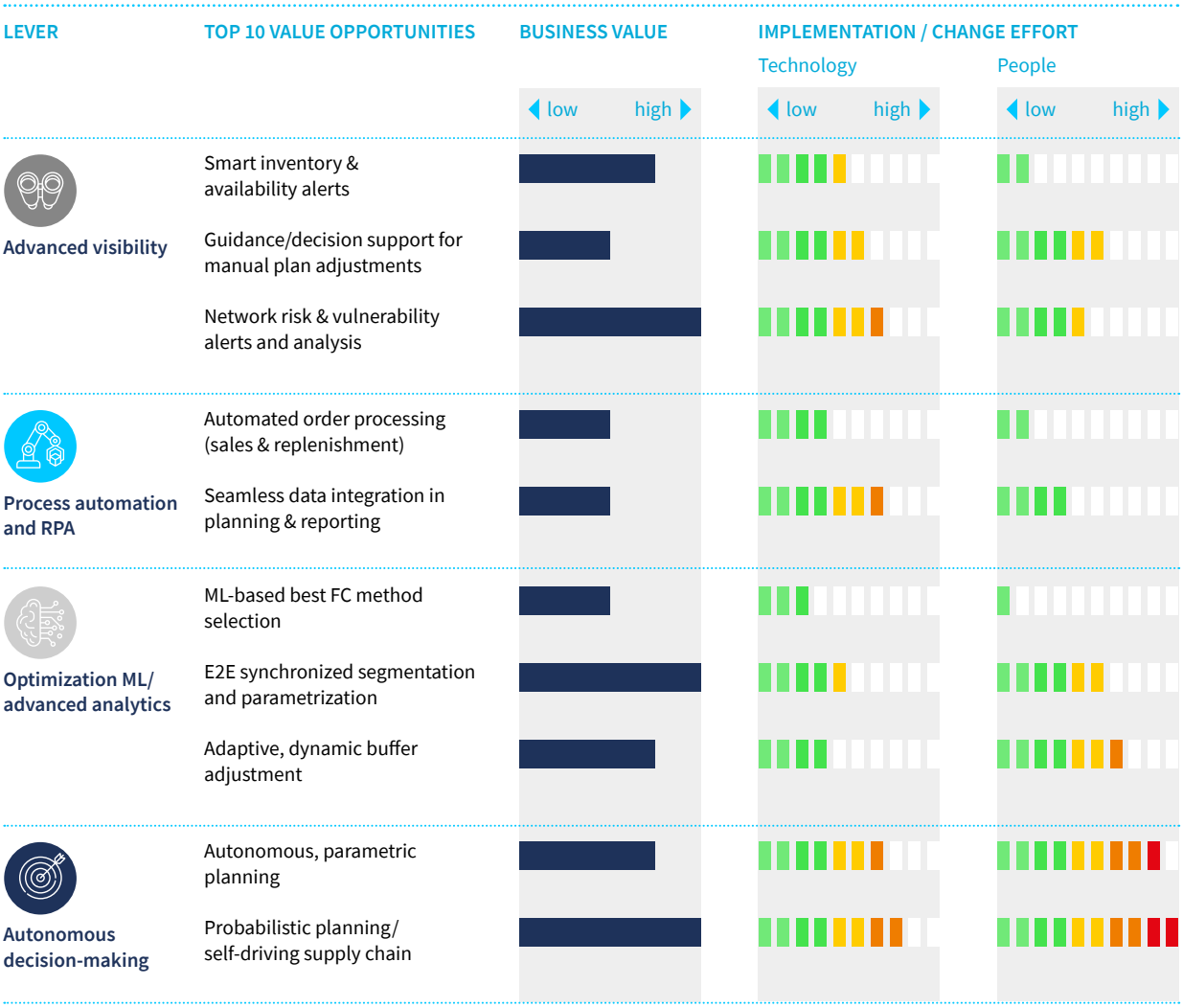
Machine learning pattern recognition has the potential to fundamentally enhance forward-looking visibility and alerts regarding shortages or excess inventory. Traditional approaches track one metric at a point in time (e.g., actual vs. target stock). Smart alerting algorithms screen multiple time series, for example, stock, orders, demand, and forecast. These algorithms correlate the time series, track their rate of change, and apply machine learning pattern recognition. By doing so, these algorithms can detect over- or under-stocks with a much higher probability, thus supporting the supply chain planners with fewer and more high-quality alerts and improving overall supply chain reliability and service level.

Adaptive, dynamic buffer adjustment

Digital and analytics can also help make the supply chain more adaptive by flexibly adjusting replenishment parameters (e.g., reorder points, safety stocks, and delivery quantities) to the current demand and supply situation and its risk and variability profile. Machine learning algorithms can use data like demand, demand variance, and supply variance to automatically adjust the parameters mentioned above on a daily basis. This approach helps planners implement a parameter-driven planning approach where tactical planning adjusts flexibly with suitable risk buffers.

Consequently, this approach allows manufacturing operations on the shop-floor level to perform more stably and reliably, without avoidable rescheduling and firefighting. The below case of a global appliances company illustrates the benefits of this approach.

Figure 3:
Top 10 digital value opportunities in E2E supply chain planning



Case Study: Adaptive Buffer Management at a Global Appliances Company

The company faced strongly seasonal demand, poor forecast quality on the SKU/location level, and fragmented, decentralized planning processes. These numbers illustrate part of the complexity: Planning dealt with over 100 stocking locations and more than 50,000 SKUs in the end-to-end supply chain.

Inventory planning and execution were identified as key focus areas of the end-to-end transformation and the company implemented adaptive, dynamic buffer management which used demand and supply data like forecast variability, orders, and bottlenecks to make daily adjustments to key replenishment parameters such as relevant forecast horizons, reorder points, and safety stock levels. This helped both stabilize production planning and improve overall service and inventory levels.

In summary, the performance improvement was substantial: The customer service level increased by four percentage points, while inventory decreased by 20%, and planning efficiency rose by 20%.

Conclusion

Companies need to think strategically about digitizing their supply chains to be able to secure significant value and competitive advantage. In particular, they should begin by focusing on the following lead questions:

- Which supply chain decisions have high potential to be enhanced with digital and analytics?
- Where can we generate the highest value for the business while the change effort for people and technology is still manageable?
- Where do we find use cases that both improve supply chain performance and customer/user experience?
- How do we slice the elephant and build a logical roadmap with clear and early value cases but without overwhelming the organization and creating an excessive burden of IT implementation?

Authors
Sebastian Hild, Managing Consultant Value Chain Strategy, Camelot Management Consultants
Thomas Ebel, Partner Value Chain Strategy, Camelot Management Consultants

As a leading consulting specialist for value chain management, Camelot supports companies on their way towards a digital supply chain, helping them to rethink and redesign processes, operating model, roles and skillsets as well as the IT and data landscape. Contact us to discuss the next steps on your digital supply chain journey and how Camelot can help.

Contact

Sebastian Hild | Managing Consultant Value Chain Strategy & Transformation | sehi@camelot-mc.com
Thomas Ebel | Partner Value Chain Strategy & Transformation | tebe@camelot-mc.com
Camelot Management Consultants

Camelot Management Consultants · www.camelot-mc.com · office@camelot-mc.com

EUROPE
Global Headquarters
Theodor-Heuss-Anlage 12
68165 Mannheim
Germany

Phone +49 621 86298-0

AMERICAS
100 W. Sixth Street
Suite 103
Media · PA 19063
USA

Phone +1 267 589 9242

MIDDLE EAST
Jumeirah Lakes Towers
Cluster O · Reef Tower · 30th Floor
P.O. Box 5003333 · Dubai
United Arab Emirates

Phone +971 4 350 7441

ASIA/PACIFIC
97 Varsha · Plot no. 96/2+97
CTS no. 1132-1133 · Anand Park
Aundh · Pune · MH
India 411007

Phone +91 9987 987 385