



## Driving Digital Transformation with Industry 4.0 and Integrated Business Planning

*Powering Clients to a Future Shaped by Growth*

F R O S T & S U L L I V A N

## INTRODUCTION

As the speed of business continues to rapidly evolve, so do the technologies that help manufacturers digitize their factories, drive financial and operational impact, and improve productivity and customer satisfaction. Yet digital transformation is not simply about the deployment of digital technologies, and the introduction of new technologies alone does not necessarily ensure success. It is more important to understand what your organization must do to succeed on the crucial journey to digital transformation, and to take the right steps to enable it, including leveraging Industry 4.0 and Integrated Business Planning.

Frost & Sullivan, a growth partnership company, recently gathered thought leaders from across the manufacturing industry to participate in three Virtual Think Tank discussions about these key drivers and their importance to manufacturing today. Here we present the most important take-aways and essential insights gleaned. Smart manufacturers will use these summaries to strategize, navigate change, and improve operations.

### I. Virtual Think Tank 1: How Digital Transformation Is Driving Change for Manufacturers

*“The manufacturing industry is undergoing unprecedented transformation driven by technologies that help manufacturers to digitize their factories. The fourth industrial revolution can drive financial and operational impact while improving productivity and customer satisfaction.”*

– Dr. Jay Lee, Member, Manufacturing leadership Council Board of Governors

The thought leaders discussed a number of different aspects and dimensions of digital transformation, including the technologies and strategies they are currently using, their primary business goals, data-driven decision-making, change management and creating a collaborative culture, and the potential challenges ahead. Oracle highlighted the importance of value creation, rather than just cost savings, and also shared new ideas on a formal digital transformation strategy, including what every company should aim for as part of their digital transformation journey.

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## MEETING THE NEW CHALLENGES OF INDUSTRY 4.0

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Changes in customer demand, industry standards and public policy regulations are rapidly transforming manufacturing organizations of all sizes and types. The pace of change in manufacturing is further accelerated by Industry 4.0 and Smart Manufacturing/Smart Factories initiatives. Due to increased outsourcing to trading partners when working with a global supply chain operating model, today's manufacturers are interacting with a much broader, more diverse and complex set of partners in the value chain. Expansion into new markets and segments makes their supply chains more complicated than ever, and such complexity in supply chains often prevents a manufacturer's ability to accurately predict demand and assess the impact of supply chain disruption, often due to lack of end-to-end visibility.

Despite the challenges, continuous innovation, improved quality, and increased customer satisfaction remain the top priority. In today's competitive markets, manufacturers cannot afford to be slow in their response to adapting to emerging trends. To thrive, manufacturers must be agile, stay aligned with a rapidly evolving business environment, and exploit new growth opportunities efficiently. This calls for manufacturers to embrace digital technologies to improve business processes and corresponding business models. This will allow them to effectively compete and grow, and create real benefits for the future.

*"A big benefit of digitization comes from the ability to anticipate and adapt faster to transitions in the industry. So, when dramatic changes occur, the normal latency that a company sees is reduced and they are better able to adapt almost real-time. In addition, digitization helps manufacturing companies to innovate faster by leveraging a closed-loop feedback cycle."*  
– John Barcus, Group Vice President, Manufacturing Industries and Emerging Technologies, Oracle

## DATA DRIVES SMART BUSINESS DECISIONS

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All agreed that the future must include tying the supply chains, suppliers and contract manufacturers together in a way that allows them to be managed more tightly and allows the speed of information to flow more quickly through the organization. This will help ensure that quality, manufacturing, supply side, and sales and purchasing departments have the information much faster, allowing them to make decisions without having to rely on the rest of the organization when the situations warrants. .

Oracle underscored the need for Smart Manufacturing that leverages

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advanced technologies. There has been a significant development in the evolution of various disruptive technologies in manufacturing over the past two decades, and this development brings new opportunities, both in terms of cost savings and overall value creation. IoT, Big Data, cloud computing, industrial AI, advanced analytics, blockchain and other tools provide benefits that manufacturers can leverage either separately or by combining them into a suite of technologies. These tools allow manufacturers to digitize their factories and address specific business problems more effectively.

This can culminate in real-time data collection from anywhere, including deriving actionable data insights through advanced analytics in an easy-to-use user mobile interface that can shape and impact day-to-day operations. It can also include monitoring performance to make the right decisions at the right time, and to improve the velocity of business execution. To this end, digital transformation helps manufacturers establish a foundation for agility and flexibility.

*“Some of the early things that we focused on were scalable methods of collecting data in a robust way, and those ways have to be maintainable so that we can then plug them into the analytics. We are using Oracle’s internet of things Asset Monitoring Cloud where we’re able to get some of the analytics and use those to benefit [our operations].”*

– **Scott Rogers, Technical Director, Noble Plastics**

## THE IMPORTANCE OF INTEGRATING TECHNOLOGY

In today’s rapidly changing manufacturing world, users of any kind should be able to look at complex data and independently unlock actionable business insights with ease, speed and agility. Real-time data analysis capabilities, predictive analytics and AI can help workers and leadership teams leverage data, interpret the results, and ultimately provide decision-making agility and performance predictability. Bringing the power of analytics into the hands of the workforce, leadership teams, decision-makers and stakeholders that are driving value for the business will be a critical component of digital transformation.

Delivering real benefits for the future is, therefore, about the integration of technologies that are better aligned with the business. This needs to be coupled with effective management of these suites of technologies. These changes will help orchestrate a digitally transformed, data-driven organization for the future. Collaboration and organizational and cultural change have to be driven from the leadership group.

In addition, companies are rapidly moving from a hierarchal organizational structure to one that is far more collaborative. Not just because employees need to work together to do things more quickly and cut down on delays between organizational silos, but also because all parties can now share information and get a common view of what needs to be done, end to end, within the organization.

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### Key discussion take-aways

- Increased need for organizational agility to be competitive
- Benefits of digital transformation to enable improvements and change
- Digital transformation strategy and what the real digital transformation objectives for companies should be
- Understanding how leaders and workers should use data to drive decision-making in real-time and for the future too
- Need for cultural change and a collaborative organizational structure
- The importance of bringing the workforce up to speed on the new technologies
- Crafting a strong organizational vision

## II. VIRTUAL THINK TANK 2: THE ROLE OF INDUSTRY 4.0 IN BUSINESS TRANSFORMATION

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We are in a time of significant change as the manufacturing industry undergoes a disrupt, collapse and transform phase, primarily led by Industry 4.0. Every aspect of the manufacturing value-chain is expected to undergo transformation, and the industry will continue to experience a creative destruction and expansion of traditional business models. Some of the key trends to consider in Industry 4.0 are:

- 75% of a factory's data will be generated at the edge
- <5% of data collected is actually acted upon
- Currently, 80% of time is spent on collecting/aggregating the data, while 20% is spent on taking action on the data captured
- Manufacturing customers are experiencing a widening technology consumption gap, due to increasing system complexity and a decreasing skilled workforce

As the aforementioned trends re-shape industry structures, it is vital to understand the impact of Industry 4.0 and how it is poised to help the industry become smarter, faster, simpler and responsive.

*"I think one of the biggest challenges [with Industry 4.0] is missing the big picture. Digital transformation is a business-thinking change, including a data-driven business model and the new connections that it presents. It's very much a cultural change - how businesses think about the business.*

**– Scott Renner, Director of Industrial Manufacturing, Oracle**

There are two critical foundations to successful implementation of Industry 4.0 across an existing operation. One is technology implementation and the other is organizational culture and change management. Often, customers embrace technology to overcome challenges, but this leads to reduced value realization. There needs to be an astute balance between the two.

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– **Scott Renner,**  
**Director of Industrial Manufacturing, Oracle**

Industry 4.0, simply stated, is a process to help organizations produce smarter products. There is much awareness and interest in embracing Industry 4.0, but the challenge is the knowhow on where to start, what the benefits are, what the roadmap will look like, and whom to partner with. Understanding these aspects is crucial to avoid sub-optimal market positioning and investing in the wrong technologies.

## IT AND OT CONVERGENCE

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Advanced IT technologies are converging with operations technologies (OT) to spur sweeping changes across the plant floor and the enterprise. In order to better capitalize on change, Frost & Sullivan believes that the manufacturing industry needs to optimize three key things:

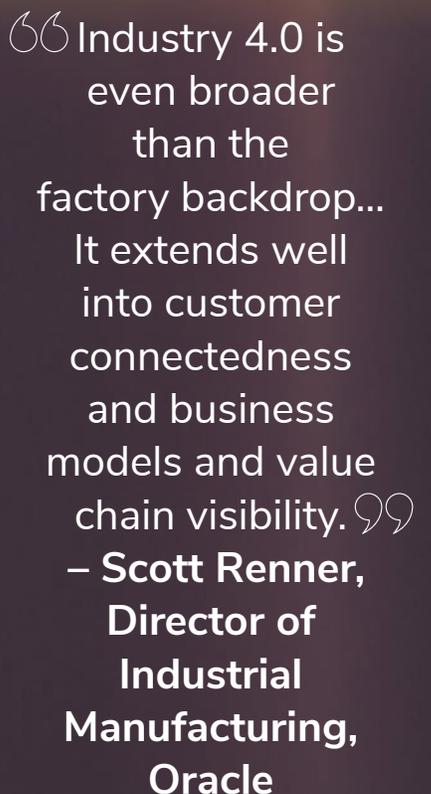
1. product flow, 2. production flow and 3. dataflow. Fixing the flow issues across the value-chain will drive streamlined operations and result in reduced waste.

## MEETING THE CHALLENGES OF INDUSTRY 4.0 IMPLEMENTATION

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Implementing Industry 4.0 encompasses much more than updating technology on the factory floor. As Scott Renner, Director of Industrial Manufacturing, Oracle, explained, “Industry 4.0 is even broader than the factory backdrop...It extends well into customer connectedness and business models and value chain visibility. There’s a maturation that companies [will] go through, a process of baselining and establishing platforms and collecting basic data, then graduating to real-time decision making. Then, integrating the data into your management systems and eventually moving to predictive capabilities.”

In line with this perspective, Frost & Sullivan created a three-stage digital transformation maturity model. While the majority of the industry is currently focused on stage one of digitization, pioneers have already moved into the stage two digitization phase. This is shown in the table on the next page.



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## Digital Transformation Maturity Model

Majority of focus is on digitization today, with very little focus on digital transformation

01 Stage 1: Data Digitization of...	02 Stage 2: Business Digitization of...	03 Stage 3: Digital Transformation of...
<ul style="list-style-type: none"> <li>• Assets, processes and measurements</li> <li>• Critical operational applications</li> <li>• Data integration and collaboration</li> <li>• Operational metrics</li> </ul> <p><b>Leads to outcomes such as...</b></p>	<ul style="list-style-type: none"> <li>• Business, work and operational processes. Data analytics using AI/ML</li> <li>• New revenue through business models</li> <li>• Value creation and delivery</li> <li>• Industry best-practices and domain knowledge</li> </ul> <p><b>Leads to outcomes such as...</b></p>	<ul style="list-style-type: none"> <li>• Enterprise operations/ business</li> <li>• Skills, competencies and culture</li> <li>• Customer interaction and responses</li> <li>• Solution delivery mediums – Products and services</li> </ul> <p><b>Leads to outcomes such as...</b></p>
<p><b>Enhanced operational efficiency, asset performance optimization and OT/IT convergence.</b></p>	<p><b>Innovation, continuous value creation, development of new business models and revenues.</b></p>	<p><b>Transformed operations, enterprise optimization, service-led monetization models, etc.</b></p>

FROST & SULLIVAN

Source: Frost & Sullivan  
 "We Accelerate Growth"

## THREE DIMENSIONS OF INDUSTRY 4.0

To succeed in Industry 4.0, manufacturers must adopt new IT and automation technologies, revamp their organizational models, and update leadership approaches, ideally in concert.

In summary, these were the main critical issues discussed by the panelists:

- Rising technology consumption gaps and difficulty finding qualified staff
- The challenge of integration, efforts consolidation and streamlined rollout of the vision
- Cybersecurity, as everything becomes hyper connected in the world of ubiquitous connectivity
- Lack of clear ROI, culture transformation and change management

Clearly, the challenge of creating a new, data-driven Industry 4.0 business model is a steep one. And, although the technologies behind it are often discussed and hyped, the more common obstacle to success is around culture and change management. A well-articulated organizational vision, supported by smart partners and a skilled and engaged workforce, will be the key drivers for success on the unconquered 4.0 horizon.

## THE IMPORTANCE OF PARTNERSHIPS



“If you have a disconnect in planning upfront, your results are just going to be all over the place because everybody is planning independently and is not unified across the board.”  
– John Anderson, Integrated Business Planning Process Leader, GE Power

As you begin your journey to manufacturing excellence, partnering with the right technology solution provider is paramount. Shifting costs are significant and high. Hence, Frost & Sullivan recommended thoroughness in the supplier selection process. Some of the recommended provider attributes include:

- Proven track record
- Versatility in handling OT/IT
- Domain expertise
- Cloud capabilities
- A clear articulated vision of the future

Industry 4.0 cannot be done with one partner, and it takes an ecosystem to pull off the journey. At the same time, Frost & Sullivan observes that there is often one central partner who pulls together the might of other ecosystem partners. Choosing the right central partner can be a pivotal point of success in your journey.

### III. INTEGRATED BUSINESS PLANNING AND ITS ROLE IN MANUFACTURING TRANSFORMATION

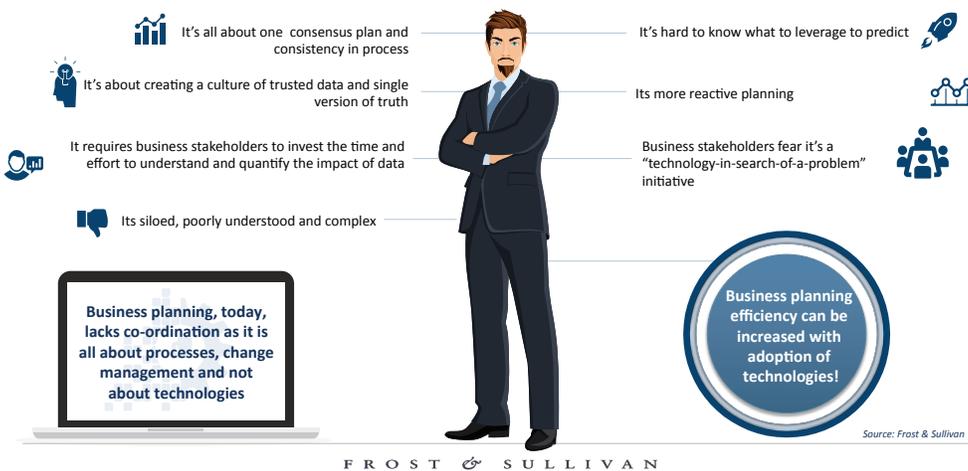
Manufacturing value networks are becoming incredibly complex as pricing pressures and the cost of doing more with less place stress on operational leaders. Across large, mid-sized and small organizations, aligning supply and accurately predicting demand is a common challenge. In fact, industry estimates suggest that manufacturing organizations typically overproduce by 20% to manage market volatility and demand spikes. Often this is done on an ad-hoc basis. More precise planning, quality management, reduced inventory holding costs, and responsive fulfillment to customer needs as well as more agile enterprises are needed. Therefore it is important to understand what organizations must do to better prepare for the future. To enhance understanding of the emerging complexities in the business environment, we commissioned a Virtual Think Tank (VTT) on the topic.

*“Most people don’t have an integrated way of planning to make sure that those key relationships actually work out...it’s not just one department, second department, third and fourth department to meet their goal of making their numbers through their plan, which is really a disconnected plan. So, if you have a disconnect in planning upfront, your results are just going to be all over the place because everybody is planning independently and is not unified across the board.”*

– John Anderson, Integrated Business Planning Process Leader, GE Power

Business planning is complex, in part due to significant challenges associated with its process inconsistencies and lack of one common data source. The following outlines some of the common issues experienced by customers as a result of this reality:

## Challenges: Business Planning is Siloed, Unclear and Complex



The top four critical issues outlined below can be solved once the customer embraces a proven best-practice approach of Integrated Business Planning and Execution (IBPX). IBPX brings greater consistency to planning processes and drives integration and alignment across all lines of business (LOBs). By incorporating integrated end-to-end planning with operations execution and leveraging real-time monitoring, advanced analytics, and what-if analysis, this single platform helps customers solve a multitude of business planning and execution challenges.

### Critical issue 1: Volume of data and the inability to make sense of it effectively

Thirty percent of a manufacturing organization's data volume is generated from the enterprise layer. The remaining 70% is generated from its plant and value networks. As a case in point, a refinery generates about 1 TB/day in raw data. Near-similar volumes of data are generated by other manufacturing industries. However, most of this data resides in siloes and is not often displayed together nor seen through a "single pane of glass." The industry needs to move away from "status-quo" and embrace technology to drive more effective decision making. Managing today's business with obsolete and tools that cannot be scaled further undermines business performance.

### Critical issue 2: Need for higher customization in new products and hyper speed in fulfillment

Today's manufacturing operations were not designed with customization in mind. As customer-driven economies become main stream, the entire planning process and infrastructure need to change to better suit the new requirements. With technology refresh cycles happening every four years, customers are expecting newer products in rapid fashion.

### Critical issue 3: Siloed planning infrastructure and significant

“For us, the benefit has come that we've been able to reduce our inventory costs fairly substantially.”  
– Mitch Haynes,  
Senior Director,  
Supply Planning and  
Operations, Juniper

### **KPI disconnects between various operational functions**

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There are a phenomenal number of organizational siloes that already exist due to historical operations. Converging these islands of information into one single data view is an important initiative organizations need to take in order to view their businesses holistically and better balance the risks and trade-offs. Further, multiple lines of business (LOBs) bring in data that is verified and measured (via KPIs) in different ways.

These factors severely undermine planning function efficiency. To overcome the aforementioned challenges, there needs to be coordination between LOBs, organizational functions, a single database and a single view of the plan across the organization. This is where solutions like Integrated Business Planning and Execution (IBPX) come into play. IBPX brings in consistency in planning processes and drives integration and alignment across LOBs.

### **Critical issue 4: Building organization process execution with zero latency**

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The traditional manufacturing value chain is a linear process that lacks flexibility and has been a primary cause of lower business efficiencies. The lack of standardization in processes across the various manufacturing functions (materials planning, supply-chain planning, expense planning, resource planning, quality management, etc.) has led to delays in time to market for many organizations.

## **THE IMPERATIVE FOR INTEGRATED BUSINESS PLANNING (IBP)**

IBP assists in aligning financial and operational goals on one common platform and helps organization functions meet corporate objectives. The objectives may sound simple, but the true reality of where many are is far from this ideal state. The potential of using advanced analytics in business planning is immense. It could be used in areas like safe tracking of food, pharmaceuticals, etc. The cloud also offers a strong foundation to run a scalable solution for the enterprise. The cloud will:

- Allow single-window view of data and shared processes
- Drive orchestration of plans by LOB aggregation
- Create role-based and function-based diagnostic dashboards so that everyone has a single version of the truth
- Provide real-time analysis of what-if analysis and massively orchestrated scenario planning

## LEVERAGING BIG DATA, THE CLOUD AND ADVANCED ANALYTICS TO REDUCE COSTS

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The combination of Big Data, cloud, and advanced analytics will help reduce deployment costs and improve operational flexibility. Also, cloud is one of the fastest ways to scale with standardized processes.

Using IBP, an organization's data silos should be integrated to help achieve superior visibility and access to the interesting outcomes that lie within these data sets. The next generation of IBP architectures must scale to reach every person and organization relevant to the plan and enable speed and processing capabilities that can be scaled across multi-sites.

Today, planning often occurs site to site and there is weak or zero integration between different sites of the same organization. There is tremendous synergy that organizations can achieve by driving a connected view of planning, manufacturing operations and demand fulfillment functions. A critical aspect of future IBP architecture is seamless planning execution integration. For example, if IBP was deployed across a manufacturing entity that owns 100 plants, it could better optimize on supplier costs, intelligently route production targets based on plant capacity utilization, reduce time to market, minimize quality issues, etc. It can essentially help organizations out-compete, out-thwart and out-innovate their peers by bringing in synergies in execution functions across the enterprise.

*"For us, the benefit has come that we've been able to reduce our inventory costs fairly substantially. At the same time, we've been able to improve our version of the customer service metric; we look at the lead time attainment. We've been able to raise that about 10%."*

– Mitch Haynes, Senior Director, Supply Planning and Operations, Juniper

## TRANSFORMING THE ORGANIZATIONAL PLANNING PROCESS

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IBP has the potential to transform organizational planning processes. The main outcomes experienced by customers include:

- Reduced inventory costs
- Responsive customer service and demand fulfillment
- Integration and alignment of people across functions, LOBs, and third-party organizations
- Soft pegging capabilities linked to more resources to focus on value
- Improvement in leveraging working capital
- Shorter time to market for customized new products
- Improved accuracy between demand planning and fulfillment

## CONCLUSION<sup>1</sup>

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Digitization is changing the game for manufacturers. Smart, connected products and automated operations have the potential for improving productivity, quality, cost efficiency, and revenue. Advances in technology have accelerated and unlocked numerous opportunities for manufacturers, empowering both people and ecosystems.

The benefits of new digital manufacturing processes are immense. Not only does it enable a comprehensive approach to product and assembly design, it also executes the production processes in real time and reduces costs through automation programs. This in turn simulates the total production systems and improves productivity in the planning and production processes.

In the discrete industrial milieu, the scope of implementing these technologies goes beyond merely improving efficiency. The use of these technologies helps manufacturers not only differentiate their product offerings, but also provide better end-to-end operations, which in turn generate new streams of business revenue. The value addition enabled by digitization is immense, and manufacturers can rise to a new paradigm with digital transformation.

<sup>1</sup> Source for conclusion: <https://ww2.frost.com/frost-perspectives/digital-manufacturing/>