

A Virtual Think Tank Executive Summary

The Role of Industry 4.0 in Business Transformation



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Introduction

Frost & Sullivan recently put together a Virtual Think Tank (VTT) with leading industry visionaries to assess The Role of Industry 4.0 in Business Transformation. The discussion was led by David Brousell, Vice President and Executive Director of the Manufacturing Leadership Council, which was recently acquired and is now a division of the National Association of Manufacturers.

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 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 is generated at the edge
- <5% of data collected is actually acted upon
- The other prominent trend: Today, 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 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.

The Manufacturing Leadership Council spends considerable time researching and discussing the various facets of Industry 4.0. There are two critical foundations to successful implementation of Industry 4.0 across an existing operation. One is of technology implementation and the other is on 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, which was reflected amidst our esteemed panelists in the VTT. We brought in visionaries from ABB, a digital industry focused company across served markets such as electrification products, industrial automation, and robotics. motors and more; BAE Systems, the U.S. subsidiary of an international defense, aerospace and security company; Oracle, an enterprise software conglomerate with the ability to deliver industry specific customer-centric applications that are cloud enabled, while built to last the Industry 4.0 journey of a customer and 3M, focused on innovation and operating in the fields of industry, health care, and consumer goods.

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, whom to partner with, etc. Understanding these aspects is crucial to avoid sub-optimal market positioning and investing in the wrong technologies.

Several of the executives also shared that their organizations were very interested in exploring Industry 4.0 and utilizing it in their facilities and factories. From Frost & Sullivan's view point – the industry can be characterized into three types: Non-digitizers, Selective digitizers and Enterprise digitizers. The classification is done based on the customer's digital maturity. This is shown in the chart below:

Who: Customer Segmentation, Based on State of Digital Maturity and Buying Behavior

INDUSTRIAL MARKETS: PROCESS, DISCRETE and HYBRIDS



Upstream



Midstream



Downstream



Chemicals



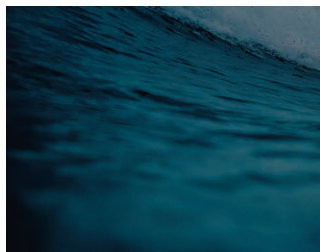
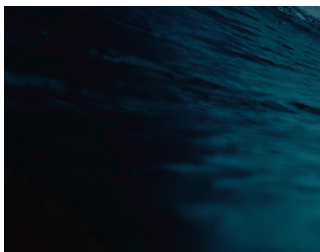
Power generation



Automotive



Lifesciences



Source: Frost & Sullivan
"We Accelerate Growth"

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The diversity in maturity makes it even more challenging from a customer standpoint. At the same time, this gives the customers a yardstick to benchmark themselves on where they are today and where they should head to in the future. As technology refresh cycles halve from 7 years (a decade earlier) to 3.5 years (today), customers who pioneer the transformation journey will clearly be well placed against non-starters in the market.

Assessing the Digital Transformation Landscape

Advanced IT technologies, converge 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: product flow, production flow and data flow. Fixing the flow issues across the value-chain will drive streamlined operations and result in reduced waste.

However, 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



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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 digital transformation maturity model that is three stages. While the majority of the industry is focused today on digitization, pioneers have already moved into the digitalization phase. This is shown in the chart below:

Digital Transformation Maturity Model

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

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

Source: Frost & Sullivan
“We Accelerate Growth”

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One of the key purposes of the VTT discussion was to benchmark where the manufacturing industry is today on the Industry 4.0 landscape. Yet, as determined in the discussion, there was a large variance among organizations on the maturity curve. Some manufacturers are already digitally linking design with production, while others were hampered by deep-rooted organizational silos, outdated equipment and processes. This disconnected state of manufacturing operations is a norm in today’s world. It is also one of the primary reasons why the Industry 4.0 journey is challenging, complex, unclear and a tough experience. Frost & Sullivan also found, in conversations with top 40 manufacturing customers (in discrete industries), that maturity not only varies between industry verticals (like automotive, A&D, hi-tech, etc.), but also varies within an organization. For example: A heavy equipment supplier in the US has a mix of new/highly automated plants on one spectrum, while a 65 year old plant with little/no connectivity or technology influence. Hence, when implementing Industry 4.0 within this organization, the challenge is how do we align the entire fleet of plants on a similar plane from a technology and culture standpoint. This also brings an interesting viewpoint: A one-size fits all approach will not work within the manufacturing environment.

Tracking the M4.0 Maturity Curve

The executives differed on the specifics of where they placed their organizations on the 4.0 maturity curve, (i.e. culturally advanced, lagging in technology or vice versa, etc.). Although most believed their organizations were somewhere in the middle. One participant mentioned that the machinery component was in place in his organization, but they needed to work on bringing in skilled operators and leveraging data and analytics more fully. Several participants stated that their companies lacked integration of overall processes and strategies, and needed better road mapping for improved ROI. This emerged as a crucial next phase for many of the participating companies.



Several indicated that they had a very good understanding of the technology behind Industry 4.0, but had only recently come to grips with the importance of organizational culture and the workforce needed to implement it.

Scott Renner of Oracle stated, “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. Ultimately, Industry 4.0 is like a Lego box. You build on top of each piece, and you should be building towards an end-goal. A strategy and vision-driven approach should provide the context for individual efforts.”



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While a common platform can be deployed, application development needs to be industry specific and customer-centric. Further, the industry prefers to have computing closer to source of data, while using cloud for training algorithms is a key requirement to drive operational speed. This opens up the need for an agile computing platform that will scale up or down with the transformation journey. A platform that is versatile to manage the edge and the cloud requirements, with power, simplicity and scale.

Additionally, digital transformation drives a shift from hierarchical organizational structures to flatter, networked, more collaborative models where data is intelligently leveraged and shared -- right down to the operators on the plant floor. In turn, manufacturing organizations must be led by executives who understand these key concepts and drivers and are ready to implement them. Just as importantly, they must educate their workforce and build a corporate culture that supports and champions Industry 4.0. Even though we believe technology can fix every problem, people will still be the cynosure to drive and exercise change. New roles will be needed in the digital era and new titles and functional areas will need to be created to support deep change.

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.



Brousell asked the participants on how the transformation was happening in their respective organizations. Mainly covering two dimensions:

- Was there a formal strategy?
- Was it happening via a hybrid or ad hoc approach?

In summary of the interactions, most of the organizations were consolidating and unifying various siloes of initiatives into one streamlined effort. As mentioned earlier, the journey is complex and is reflected in the voice of the panelists, that a significant amount of time was spent in explaining the ‘why’ of the process in order to ensure alignment of corporate objectives with operations.

He stated that ABB had a comprehensive approach that included a transformation office led by a managing director who kept track of progress and financial impact. His company is currently in the process of identifying various disparate 4.0 projects and developing a more comprehensive transformation strategy. Similarly, executives from 3M stated that their company currently had different Industry 4.0 technologies and processes in place, but needed to unify them further.



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Standardizing Solutions and Predicting Issues

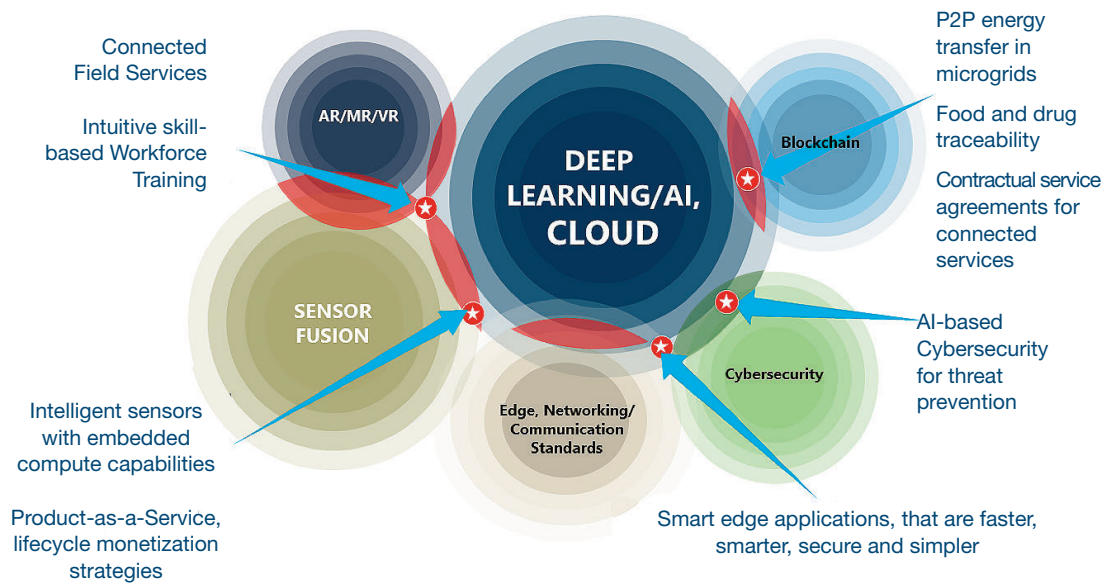
Today, the industrial network and communication landscape is an alphabet soup. As OT/IT convergence happens, Frost & Sullivan has observed the use of IoT protocols such as MQTT and AMQP making inroads into factory communication requirements. The lack of standardization of communication standards, solutions severely restrains the industry from improving the human to machine interface, and using predictive modeling to detect possible problems. Nathan Langford, Advanced Manufacturing Engineer, BAE, shared that his organization was focused on additive manufacturing, augmented reality and a smart factory approach that included learning from machines.

While many of the participants were implementing different forms of technologies (3D printing, AR/VR, etc.), the key to unlocking efficiencies is always to tie implementation to business and operational outcomes. Frost & Sullivan believes that, technology should never be looked at in siloes. The convergence of technologies is where the next wave of growth is poised to come from. The chart below summarizes some of our current thinking on how aspects like AI and the cloud will play a central role in driving lasting transformations.

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Technology Convergences Drive New Growth Platforms



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Source: Frost & Sullivan

"We Accelerate Growth"

“ 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. ”

Conclusion

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

- Rising technology consumption gaps and difficulty finding qualified personnel.
- 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. Partnering with a technology solution provider is important, as you begin your journey to manufacturing excellence. Shifting costs are significant and high. Hence, Frost & Sullivan recommends thoroughness in your supplier selection process. Some of the attributes that we recommend are: Proven track record, versatility in handling OT/IT, domain expertise, cloud capabilities, 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 one central partner who pulls together the might of other ecosystem partners. Choosing the right central partner will become a pivot point of success in your journey.

Come join us in our journey to driving manufacturing excellence. Embrace change, manage disruption and experience lasting transformation!