The State of Industry X in Automotive

A report by the Center for Automotive Research

Executive Summary

Introduction

With the support of a unique and powerful consortium of technology companies, the Center for Automotive Research (CAR) investigated the state of Industry X in automotive. Although the research included mostly North American participants, and thus presents a North American perspective, the participating companies are global.

Industry X acknowledges that the pace of change has become so rapid that it no longer makes sense to think of manufacturing and production as advancing in discrete stages. The digital technologies that gave rise to the concept of "Industry 4.0" have continued to improve. No organization can reasonably aspire to adopt a state-of-the-art digital enterprise architecture because "state-of-the-art" is sure to advance by some degree by the time a new enterprise architecture is deployed.

This project presents an ecosystem approach to Industry X research. Industry X is a massive, complex, and rapidly evolving sector. The CAR research team thinks it is unlikely that any entity or individual can fully comprehend the depth and breadth of Industry X. To use a well-worn phrase, *it takes a village* to implement—and research—Industry X. The CAR Industry X ecosystem team consists of Hardware (Dell and Intel), Data Management (Cloudera), Digital Automation and Analytics (Rockwell Automation and PTC), Consulting (Accenture), and Cloud Infrastructure (Microsoft Azure). These companies provided financial support—but equally important, they provided the CAR research team with unmatched technical and strategic knowledge and perspective. Throughout the project, the CAR researcher's interaction with the industry and the consortium members proved that no one participant has all the answers. A collaborative ecosystem would be a beneficial environment for all of these stakeholders.

The CAR State of Industry X in Automotive project used three main research methods: long-form interviews, industry stakeholder roundtables, and a brief, targeted technology survey of interviewees. The combined inputs enabled the research team to gather a snapshot of Industry X in the North American automotive industry and identify essential guideposts. The team conducted long-form interviews with six vehicle manufacturers and 11 automotive suppliers with operations in North America. CAR researchers also interviewed, often in iterative discussions, technology experts from the consortium member companies. The consortium member discussions allowed CAR researchers to explore interview results, test hypotheses, and seek alternative perspectives. CAR estimates nearly 50 industry stakeholders participated in the research process. CAR also hosted a session at the 2020 Management Briefings (CAR MBS) and conducted three webinars to highlight and explore the topic and findings.

Strategy is the overarching driver of Industry X, but the processes used to implement technology change and empower the workforce will determine the outcomes. The report follows this model, starting with strategy, then focusing on people and technology as elements of the implementation process. Respondents made it clear that while Industry X will struggle without a proactive strategy, efforts will also be doomed without an effective and responsive implantation plan.

The CAR State of Industry X in Automotive project focused on the digitalization of manufacturing processes—converting materials to products. However, the related data is flowing further, faster, and

in far more significant quantities than ever before. And it will continue to expand. The automotive industry is racing headlong into the world of digitalization. The respondents fully understood that there will be mistakes along the way.

Strategy

CAR researchers did not find a consistent decision-making pattern to create and implement an Industry X strategy. There was no "cookie-cutter" model. Some respondents described a specific initiative's decision process, but it was not unusual for the decision processes to vary across the enterprise. They also described their decision processes as fluid, as companies reorganize, reprioritize, and evolve their Industry X strategies. Industry X is extraordinarily complex and always evolving—few, if any, fully comprehend all aspects of the change. That uncertainty reverberated throughout to project's interviews and roundtable discussions.

The project highlighted three broad approaches to Industry X strategy: Most OEMs and a few suppliers described their Industry X strategy as a *top-down* rational planning process. These companies typically adopted an "Industry 4.0" strategy soon after German industries introduced it around 2015. Some companies are implementing Industry X from the middle-out. These companies financially support initiatives from the corporate level but delegate the strategy and development to targeted plants or facilities. Finally, some companies identified a bottom-up approach, depending on specific plants and facilities, to determine how to make technology investments. The bottom-up model was often associated with a single individual—an evangelist—or a small team of like-minded individuals.

CAR research found that all of the companies which participated in this study were committed to digital transformation. Interviewees understood that Industry X adoption is a continual learning process. They considered digital transformation as a journey instead of a singular event. Many of the companies interviewed are in the early stage of their journey. It was also apparent that most companies on the pathway need guidance. And some might not know—or at least are not willing to admit—that they need guidance.

The main reasons identified to pursue digital transformation were:

- Better serving the customer
- Keeping up with competitors
- Improving the bottom line
- Obtaining value from data
- Sustainability

CAR research revealed several challenges in prioritizing investments. Below are the common themes:

- Building partner ecosystems
- Broadening deployments and implementations
- Scaling and global platforms
- Maintaining focus while dealing with complex technologies
- Forming effective partnerships with the right companies
- Effectively connecting information technology (IT) and operational technology (OT)

Process Implementation

Successful digital transformation requires more than a good strategy and adequate funding. To successfully transition to Industry X, companies must be experts at process implementation. Industry X

process implementation involves two critical assets: the technology and the human resource/talent. Understanding the relationship between these two is essential for success in this space. Many respondents stated that an effective change manager onsite is critical to a successful Industry X implementation. The challenge of implanting change during production—or even during program launch is daunting. Having a person that understands the role technology and people play in the process can make it much more achievable.

Industry X is often solely perceived as a collection of "shiny" new tools and methods for collecting, analyzing, and utilizing data. But obtaining value from machines and data will ultimately depend on skilled human operators and specialists. Successful implementation of Industry X should rely on the workforce's experience, intelligence, and passion.

Talent Process Implementation

The interviews and roundtable discussions illustrated differences between an experienced, knowledgeable legacy workforce and the opportunity provided by the (younger) more technologically-savvy workforce of the future. The research also highlighted how Industry X is forcing traditional roles, relationships, and responsibilities within the manufacturing sector to evolve rapidly.

The roundtable discussions with industry stakeholders highlighted the tension between Information technology, occupational technology functions, and the production worker—and the need to get each group to buy into the process plan.

While many C-suited executives may not sufficiently understand the complexities and vagaries of the OT-IT-production worker interaction, their leadership can (positively or negatively) affect Industry X implementation. Some of our respondents stated their digital transformation initiatives began at the C-level. A clear, thoughtful vision from the C-suite gave the OT and IT a "North Star" to follow. Without a "North Star," it can be challenging to get everybody moving in the right direction.

Technology Process Implementations

CAR researcher conducted long-form interviews and a brief follow-up survey with the respondents. While a small sample, the two tools provided CAR researchers with a fascinating snapshot of how a leading group of automotive stakeholders are implementing Industry X technology. The interviews and surveys explored technologies (e.g., machine learning, augmented reality, cobots) and application processes (e.g., predictive maintenance, factory energy management, supply-chain optimization).

Between the interviews and the survey's companies described various technologies and processes being considered and implemented. They also appeared to show restraint in implementing new technologies. Many had admitted to chasing technology for technology at some point but stated they had moved past that stage. Instead, technology is now more likely to be considered with a focus on the business case. Possibly the most intriguing response was the reported a lack of current interest in 5G. While it is a small sample size, the fact that only 1 of the respondents had already implemented 5G was noteworthy.

Conclusions

For this project, the CAR research team extensively examined how key industry stakeholders view Industry X. Based on interviews and roundtables with a diverse group of Industry X stakeholders, the State of Industry X in Automotive research identified several critical conclusions. Below are selected conclusions:

- **Industry X is Really Difficult**: Industry X implementation is complex, massive, and rapidly evolving. It quickly became apparent that few, if any, companies can navigate it alone. While the

research did not identify the most effective ecosystem—and many models described during the interviews—companies are exploring how best to leverage needed knowledge and technology.

- **Most companies are (mostly) "all in":** The interviewed companies are focused on digitizing manufacturing and production. Regardless of a range of strategies and approaches, digitization is a priority across the companies interviewed for this project.
- **No matter who leads, a flexible strategy is necessary:** Enterprise-wide implementation Industry X is most successful if driven by executive and board buy-in. However, whether Industry X is driven by a top-down, middle-out, or bottom-up process, a coherent, flexible strategy is paramount for success. That strategy should establish the foundation for the implementation of both technology and talent management.
- **There are dollars in the data:** Most companies are looking towards Industry X to facilitate new revenue streams that capture the value of data produced in the production or use of the manufactured goods. The general theme presented by respondents is that the data is becoming as valuable as the product. However, in most cases, that value has yet to be realized.
- **Moving from proof of concept to scale is transformative:** But that step is a journey. The process brings opportunities that were not possible before. However, the broad implementation of Industry X requires a level of system thinking that may push many companies out of their comfort zone. The CAR research team thinks it is essential to consider how companies may better adjust the reward structure to encourage a more dynamic system solution to Industry X implementation.
- **OT and IT are fusing**: Industry X's success requires the unprecedented blending of IT and OT expertise, as well as hands-on experience. Companies should take care to achieve understanding and build a reward structure that encourages collaboration.

Automotive stakeholders are moving beyond merely chasing "shiny" new technologies to something more systematic and powerful. But, they are still early on that journey—very early. Implementing Industry X presents a *paradox of perspective*. Digital transformation requires a level of coordination, cooperation, and communication that makes many companies uncomfortable. It connects people and functions in ways they have never been before. On the surface, Industry X is a technology-driven concept. However, this report illustrates it to be about transformative change. At its core, this change is about the people: From the C-level to the information technology and operational technology implementors and the production floor workers, Industry X requires a willingness to change. And change is difficult.