Now, Next and Beyond: Auto factory of the future

How automotive shop floors will evolve and adopt digital technologies post Covid-19?

May 2020

Building a better working world

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Preface

The global manufacturing industry is at the cusp of a paradigm shift led by adoption of advanced technologies in running the shop-floor processes.

Firms in developed nations are increasingly focusing on becoming more digital with the deployment of hyper-intelligent technologies for production. However, in India these developments are still in their nascent stages and there is a lot to achieve. The Indian auto sector has been one of the early adopters of digitization in manufacturing, but the journey so far has been slow and uncertain due to apprehension about its benefits and ROI. The auto industry in India has been under recessionary conditions between July 2018 and January 2020 due to certain regulatory changes, need to shift to electric vehicles and changes in consumer preferences. With the COVID-19 pandemic outbreak, another crisis has hit all industries hard across the world. The auto sector in India is likely to witness further slowdown in demand, non-availability of labor, concerns on health and safety management on the shop floor. This report reflects upon the likely impact of all the above NOW, and that it is likely to result in increased pace of adoption of hyper-intelligent digital technologies in the NEXT and BEYOND phases for the auto manufacturing sector. It answers the question: what should the automotive industry do to achieve resilience and develop immunity against market uncertainties in future.

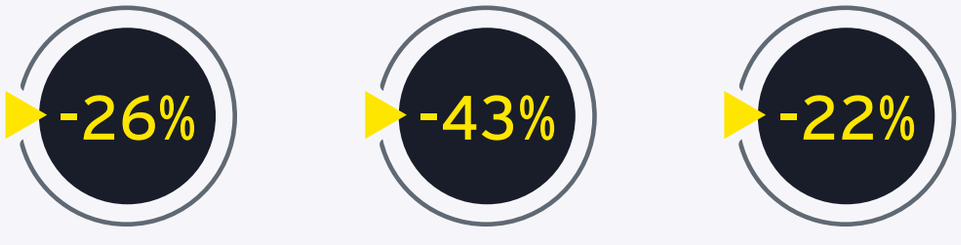
COVID- 19 outbreak creates a new set of challenges for the Indian Automotive Industry

Just before the COVID -19 pandemic broke out, the Indian economy and the auto sector were already facing significant headwinds.

But the lockdown to contain the virus has led to a significantly negative impact on both the macroeconomy and auto sector. It has amplified the sector's existing vulnerabilities by disrupting both manufacturing and supply chain. The automotive industry had an expected loss of 7.5 lakh units in production in March 2020 alone, which is ~1% of the total units produced in 2019, because of the lockdowns to combat the Covid-19 outbreak[1]. Even after the lockdown is lifted, it will take 6 to 18 months for demand to pick up. Due to the disruption, sales are likely to plunge by another ~20% as compared to 2019[2].

Due to growing apprehensions during the lockdown, workmen are refraining from attending work. Some shop floors have been left deserted. Further, due to large scale migration of labour across India, availability & redeployment of contract labour post lockdown is a major concern.

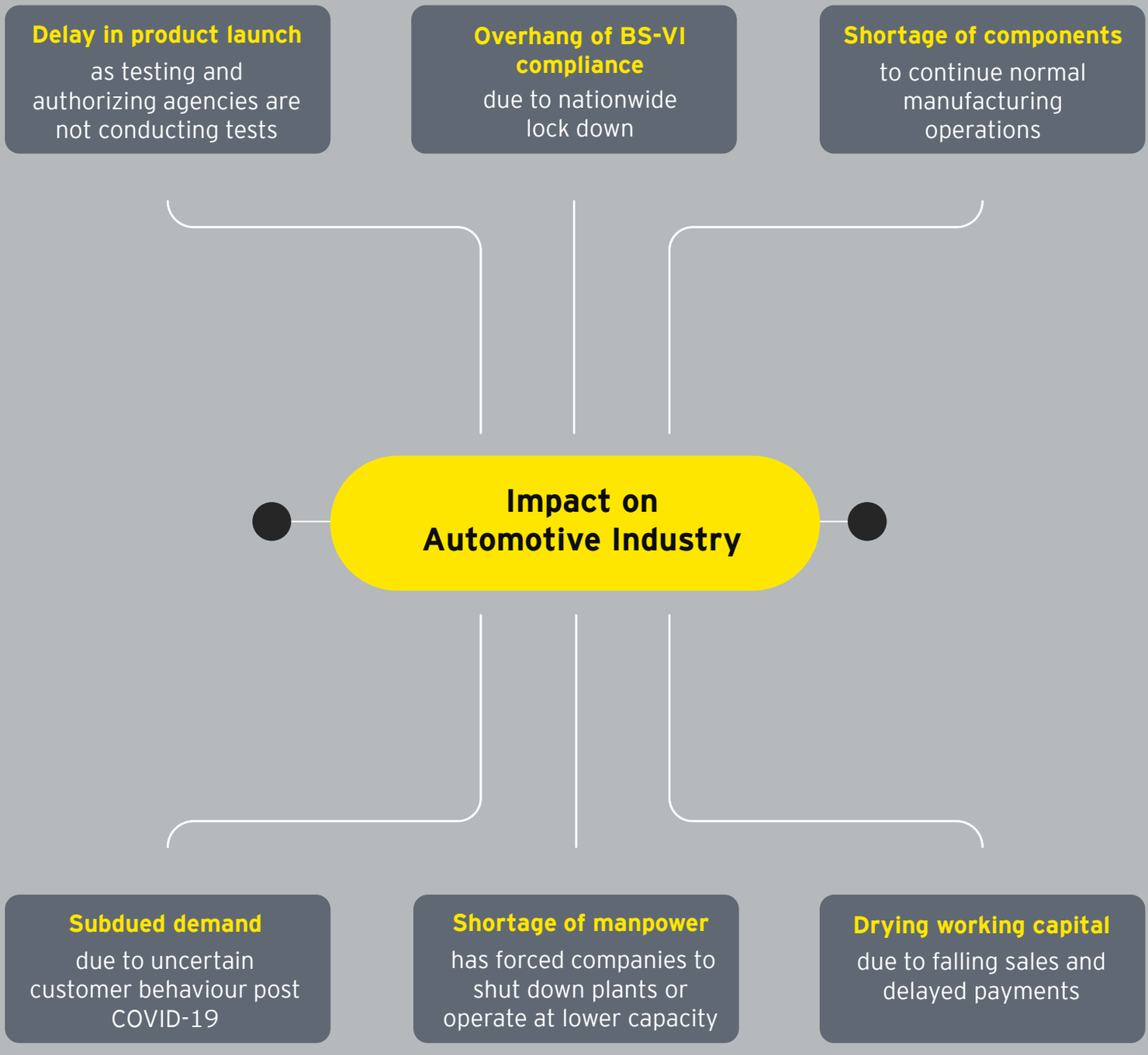
Exhibit 1: Decline in domestic sales Q4FY20



Contract labour accounts for more than half of India's auto industry's workers. The lockdown could lead to several complexities around supply of contract labour forcing companies to automate and thereby reducing the reliance on contract labour.

On the other hand, the cycle of money flow from customers to dealers to OEMs and ultimately to Tier 1 and 2 suppliers has been disrupted, leaving behind an outstanding of 500 – 1000 Rs Cr[3] in this short period. An estimated INR 20,000 Cr worth of unsold inventory is currently lying with the auto manufacturers and revenue loss/day of about ~INR 2,300 Cr is estimated for the auto sector in India[4].

Exhibit 2: Impact on automotive industry due to COVID-19



COVID- 19: Impact on the Manufacturing Shop floor

This crisis will settle gradually and would leave a profound impact on people and the ways of working especially on the shop floor.

There will be several changes to existing working norms and guidelines that organizations will need to abide by in order to ensure safety at the workplace. Companies will now have to rebuild and reinvent a new ecosystem to accomodate the new normal that is liekly to emerge.

What should the organizations do to proactively prepare for post lockdown scenarios (NOW):

- Employee safety is paramount: Use of right protective gear, face shield, gloves.
- Social distancing as per new norms.
- Staggered shift schedule as per GOI guidelines.
- Developing an Infectious Disease Preparedness and Response Plan.
- Caution in use of equipment on the shop floor.
- Redefining or modifying plant layouts to reduce man to machine ratio.
- Redefine SOPs to accommodate the post-COVID working environment.

Exhibit 3: The New Normal

A pandemic like COVID-19 is not a normal disruption for businesses. It has crippled operations globally and the effects can last for a few quarters or even years. Recovery from this must be a well-thought-out process, as firms would need to work on crisis management (NEXT) and building resilience to prepare for such events in the future (BEYOND). In such scenarios, digital is emerging as a real option to enable manufacturing and supply chains attain resilience and face similar crisis in future.

The Post COVID -19 Manufacturing World

Many advanced countries today, such as Germany, Japan, the United Kingdom and the United States, accelerated their growth and development through early industrialization.

3 Three major factors

led to the adoption of industrialization in these countries:

1. Productivity gains in mature economies
2. Emerging competition
3. Risk aversity in the globalized world

Events like the current COVID-19 pandemic has really built an uncertainty in the world in terms of global trade. According to Ahirm H, N Bloom, and D Furceri, the World Uncertainty Index (WUI) increases drastically when a major 'Black Swan' event occurs. Such global events have a huge impact on world trade. WUI mapped since 1959 also show that it has remained flattish through 2000.

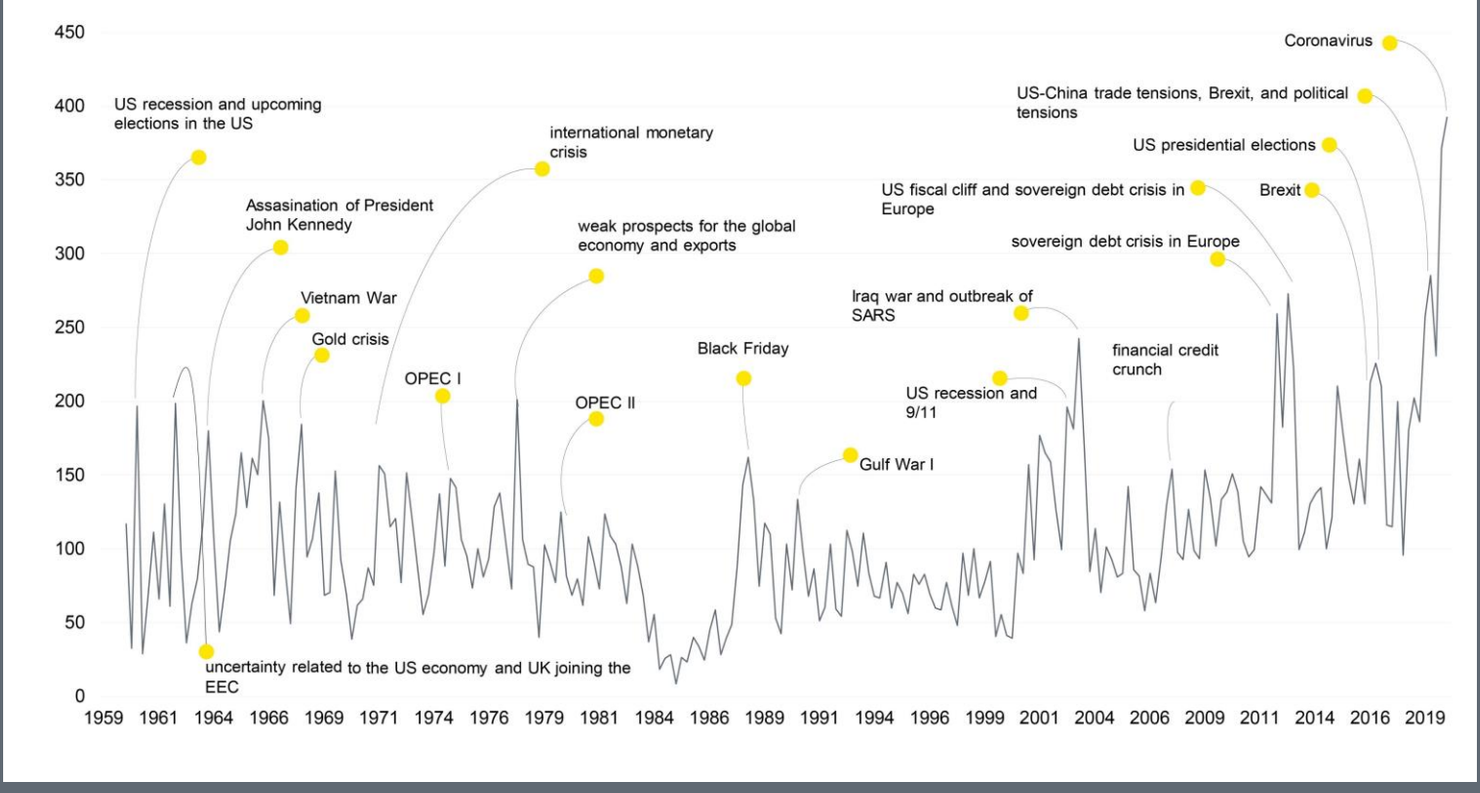


Exhibit 4: World Uncertainty Index*

The frequency of occurrence of these events has also increased the World uncertainty. The world is again thrown back to Darwinian thoughts of survival of the fittest. Fittest, in today's context means one who is secure from external challenges, agile in managing costs/cash when such events happen and is immunized to come out stronger after every such uncertain event hits the world

Slovenia is one country whose automobile manufacturing industry has shown resilience time and again to remain competitive. Slovenia has a geographical advantage and had emerged as a low-cost location for European and American automotive companies. With every Black Swan event, the country was doomed with fear of losing vital foreign exchange and investment. Slovenian industry created and executed a robust automation and digitization (A&D) initiative over a period of 15 – 20 years. The industry started making small incremental upgradation and survived many global events like SARS, 9/11 attacks, Financial crisis and Brexit. Slovenian module of Automation and Digitization becomes a live learning example for developing countries like India is evidenced by following -

- A survey by the International Federation of Robotics has ranked Slovenia at 7th place[5]
- Slovenian Manufacturing GDP (~20% contributed by Automotive) has been consistently growing for last 20 years

- Large Italian and German OEM's have set up world class facilities in Slovenia[6]
- Supporting industry like automation service, robotic companies and leading components manufacturing companies have all set up their base in Slovenia.
- Slovenia has emerged as a centre of learning and development in Automation and Advanced Robotics.

As it is clear from the above example, auto companies need to have an equivalent of 'Call Options'. In today's scenario **Automation and Digitalization (A&D) provides that equivalence** Like a Call option, you invest in small and incremental quantities that mitigates your risk in future.

Auto Manufacturing must adopt Digital Manufacturing technologies to uplift operational efficiencies in all aspects with the current constraints of manpower and resources in the automotive industry. Adopting these technologies, along with its modularity and infrastructural backbone in a gradual and phased manner has become imperative in preparation for the next "Black Swan" event

What is the "New Normal" for the Automotive Manufacturers and Component Suppliers?

Digital adoption on manufacturing shop floors in India is at a nascent stage.

Digital adoption on manufacturing shop floors in India is at a nascent stage. As per EY Digital Manufacturing India Survey 2019, only 23% of the large manufacturing firms in India have a clear digital strategy. However, unlike other industries, the Automotive shop floor still leads in the adoption of emerging technologies in India. A few factories in India are using substantial automation in their production lines – physical robots, Automated Guided Vehicles, Artificial Intelligence, Machine Learning, and Predictive maintenance.

Smart factory combines traditional manufacturing excellence approach with IT-OT integration to significantly increase performance. The exhibit below illustrates a typical journey towards digital maturity; starting from implementing manufacturing excellence frameworks to embedding it in daily processes through digital applications and finally leveraging emerging technologies to build an ecosystem that is smart and optimized in performance.

Automotive factories are mature in adoption and implementation of manufacturing excellence frameworks as compared to their peers in other sectors. They have progressed even further to automate data capture and visualize it for monitoring real time performance. Some of these firms are consciously building data as an asset to leverage intelligent technologies in the future. Hence, we understand that most Indian automotive OEMs have progressed on to the "advanced technology" step while still working on "execution excellence".

Make the people smarter..

Make smarter decisions and drive smarter actions

Make the equipment smarter..

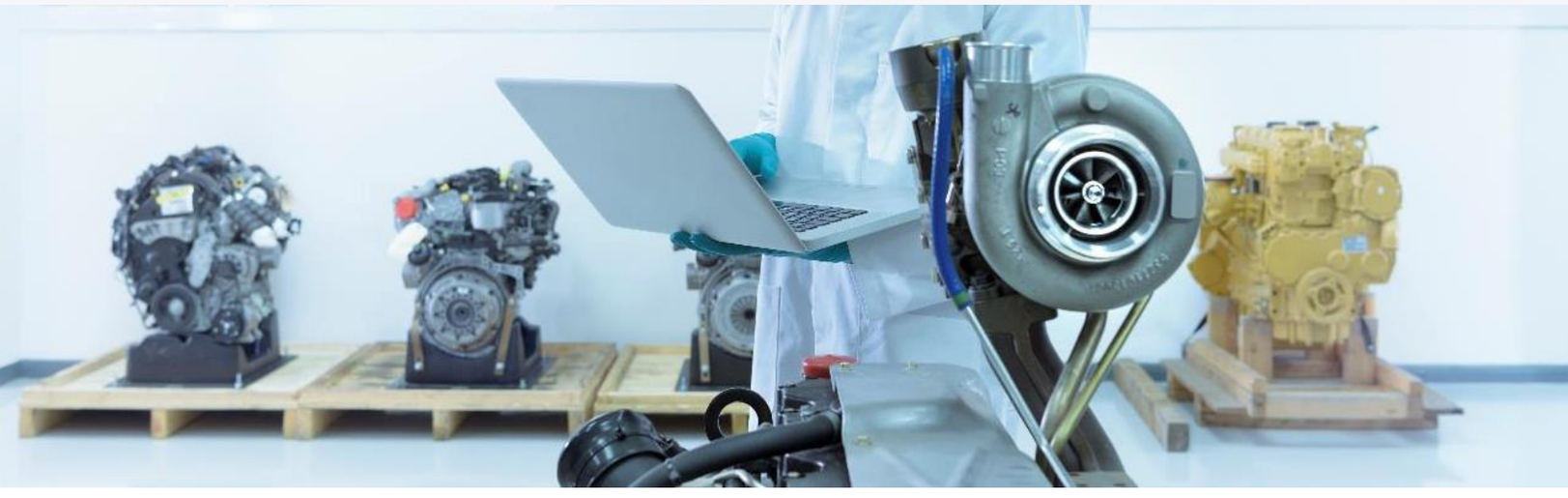
Standards	Capability progression	Execution excellence	Advanced technology
Manufacturing excellence know-how and leading practices across functions of capability to drive skills and capability building in individuals	Assess and build OpEx maturity for the production line team through a Digital OpEx coach	Digital application to embed all manufacturing excellence leading practices in daily work processes where operators execute work through the application	Digital applications that leverage IoT, sensors, predictive analytics and machine learning (AI) Real time machine performance sensing, alerts and automated responses

Exhibit 5: Journey towards Smart Factory (EY Smart factory thought capital)

The COVID outbreak would serve as a reminder and would force other automotive players to review their current maturity stages and embark on a journey to transform their operations leveraging digital technologies. New business and operating models will require close integration of both manufacturing and supply chain. Organizations would need to map key technology solutions as critical enablers to achieve their strategic goals and absorb shocks from future events of similar nature.

They should initially focus on adoption of technologies that do not rely much on historical data but start building data as a central asset. Technologies based on some historical data can be the next ones to consider and finally interventions dependent of high-quality extensive data can be adopted basis the impact and relevance to factory operations.

Please click here to see **Exhibit 6: Digital use cases**



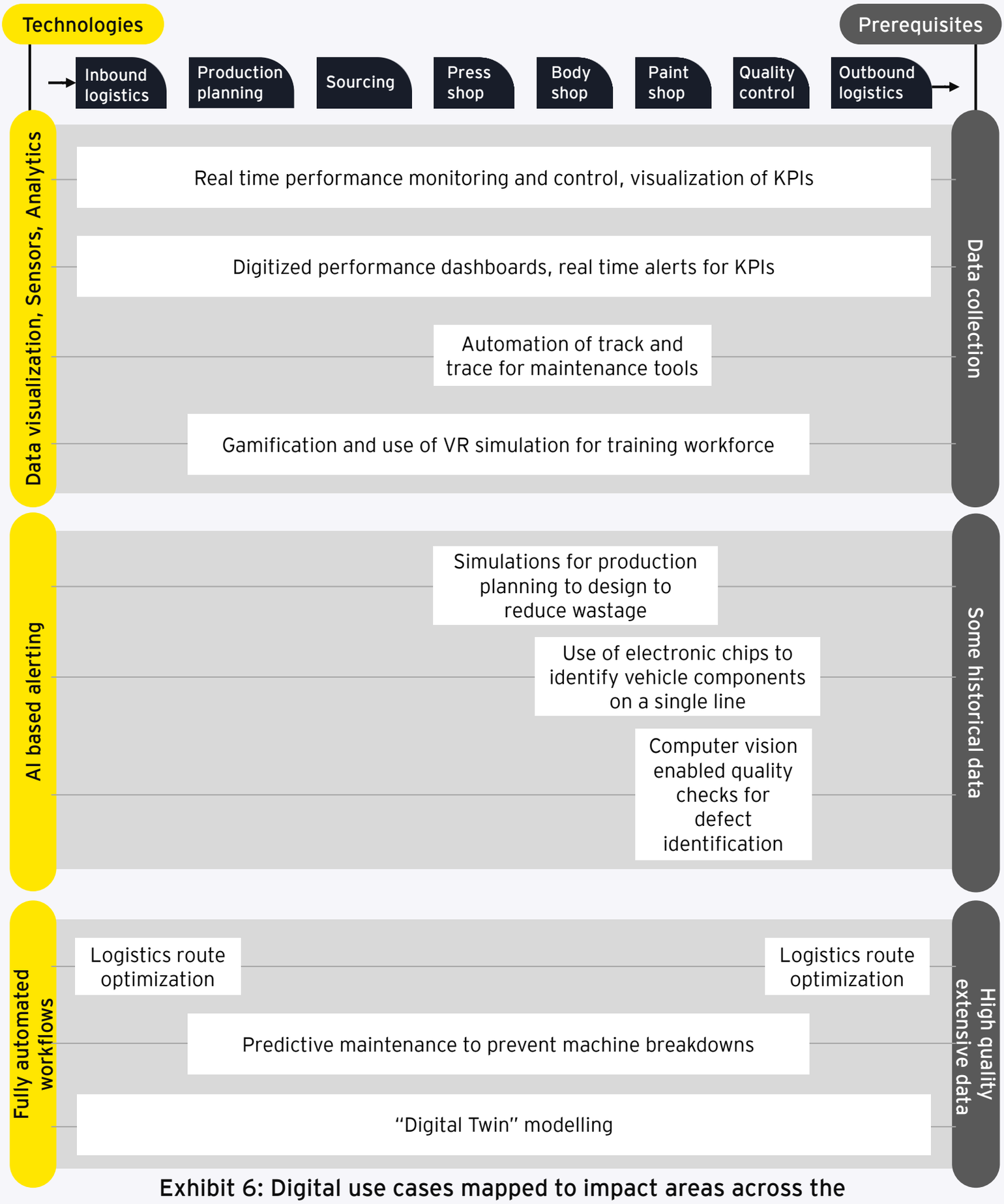


Exhibit 6: Digital use cases mapped to impact areas across the automotive value chain (EY Analysis)

We studied four out of the seven automotive factories in the Global Lighthouse Network[7]. These factories demonstrate adoption of Industry 4.0 technologies with various use cases on **Digitized performance management systems, Digitally enabled Quality Management System, Smart automation, Technology enabled platforms to automate E2E processes.**

These leading factories substantiate the potential of Industry 4.0 technologies. The automotive industry in today's scenario must prepare themselves so that they are ready to transition into for the "Factory of the future". We recommend that companies should invest in the following options to make themselves ready for an accelerated journey.

- Having the "Here and Now" ability to access best in class manufacturing technologies supported on a well-designed process framework
- Foundational infrastructure of appropriate operational technologies (OT) that would enable rapid response to future uncertainties coupled with simplicity in execution
- Readiness on hyper-intelligence in OT to run manufacturing processes with a reduced dependence on humans for routine actions and decisions
- Modularized framework for a Connected ecosystem of Men, Materials and Machines linked through Processes that are run on a seamless layer of digital technologies

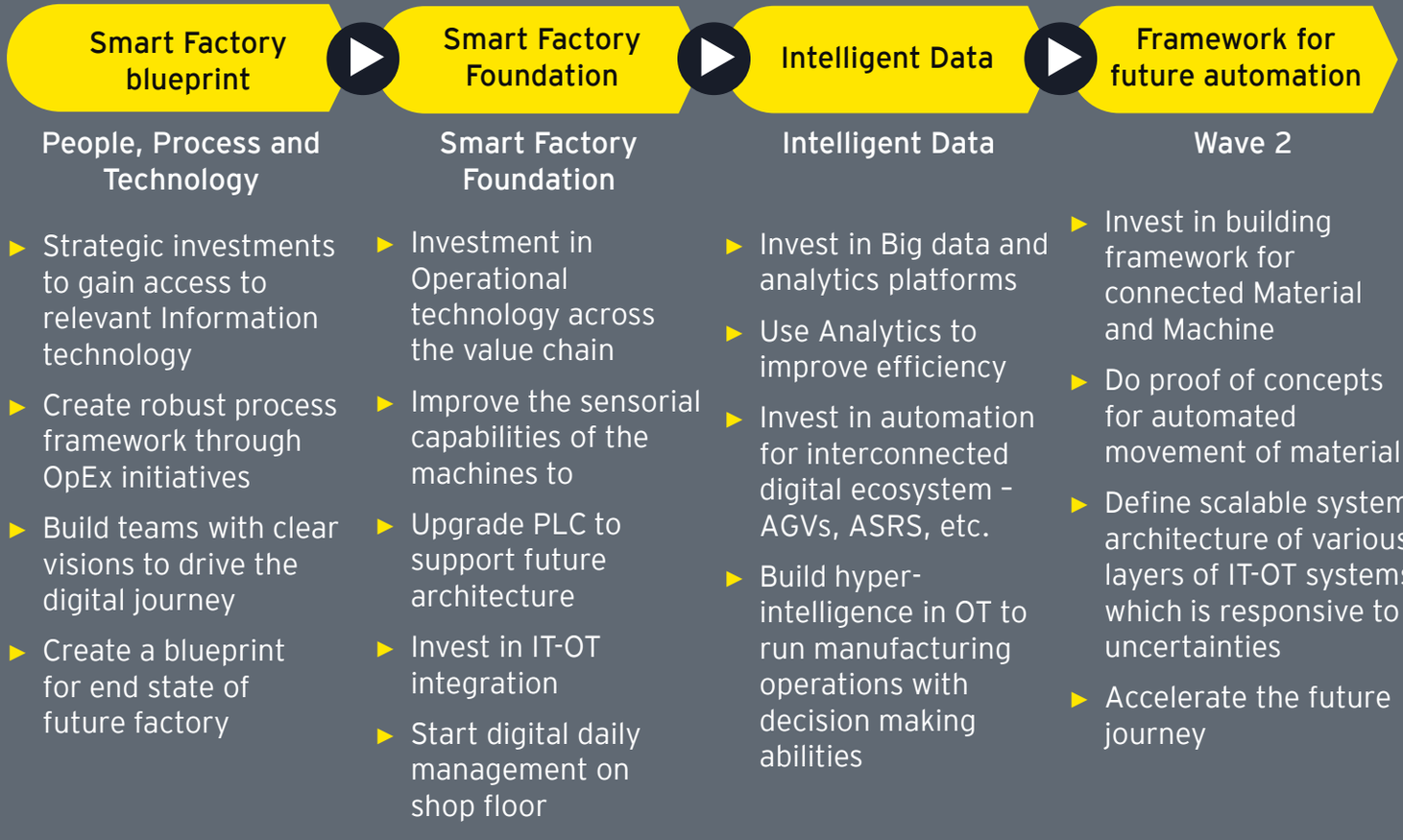


Exhibit 7: Auto industry can prepare themselves for accelerated digital journey (EY analysis)

The investments undertaken now during these turbulent times will support the auto industry to achieve the end state of a smart factory as depicted below over a period of 5 -10 years depending on the size, current digital maturity and investments.

Smart Factories

IoT on the plant floor can exploit multiple digital technologies to address various issues to drive Cost, Agility and Quality

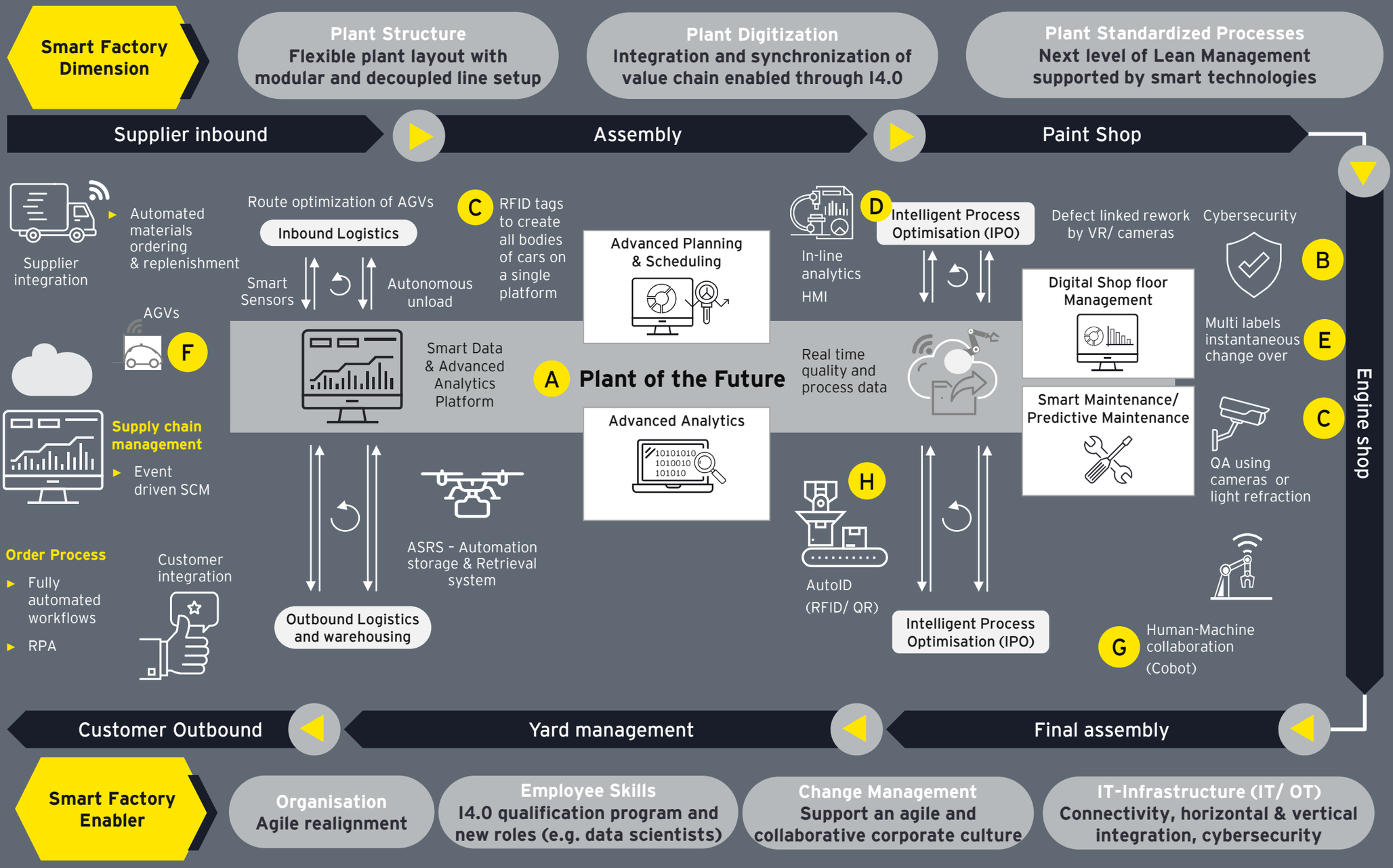
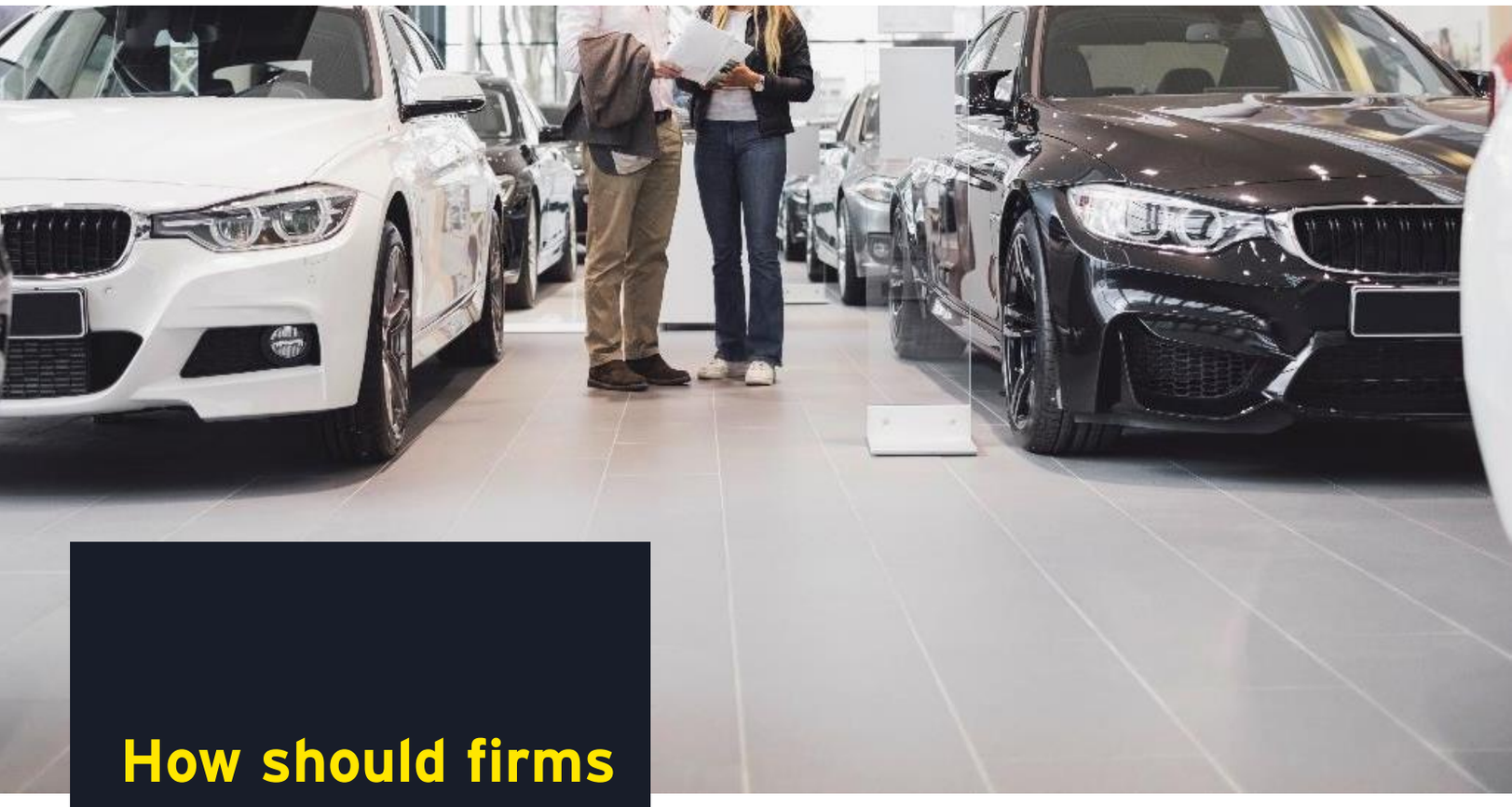


Exhibit 8: Illustrative end state of an Automotive factory of the future (5 to 10 Years) (EY Analysis)



How should firms respond – Now. Next. Beyond.

Digital adoption on manufacturing shop floors in India is at a nascent stage

In this highly volatile scenario, planning actions for an immediate response assumes immense importance. Multiple departments and functions must work together to develop and execute an operations continuity and upgradation plan

There is a need to set-up a **Crisis Response team** and perform the complete assessment of the impact on critical plant functions. Mitigation strategies need to be activated for immediate response in the next 2 to 3 years.

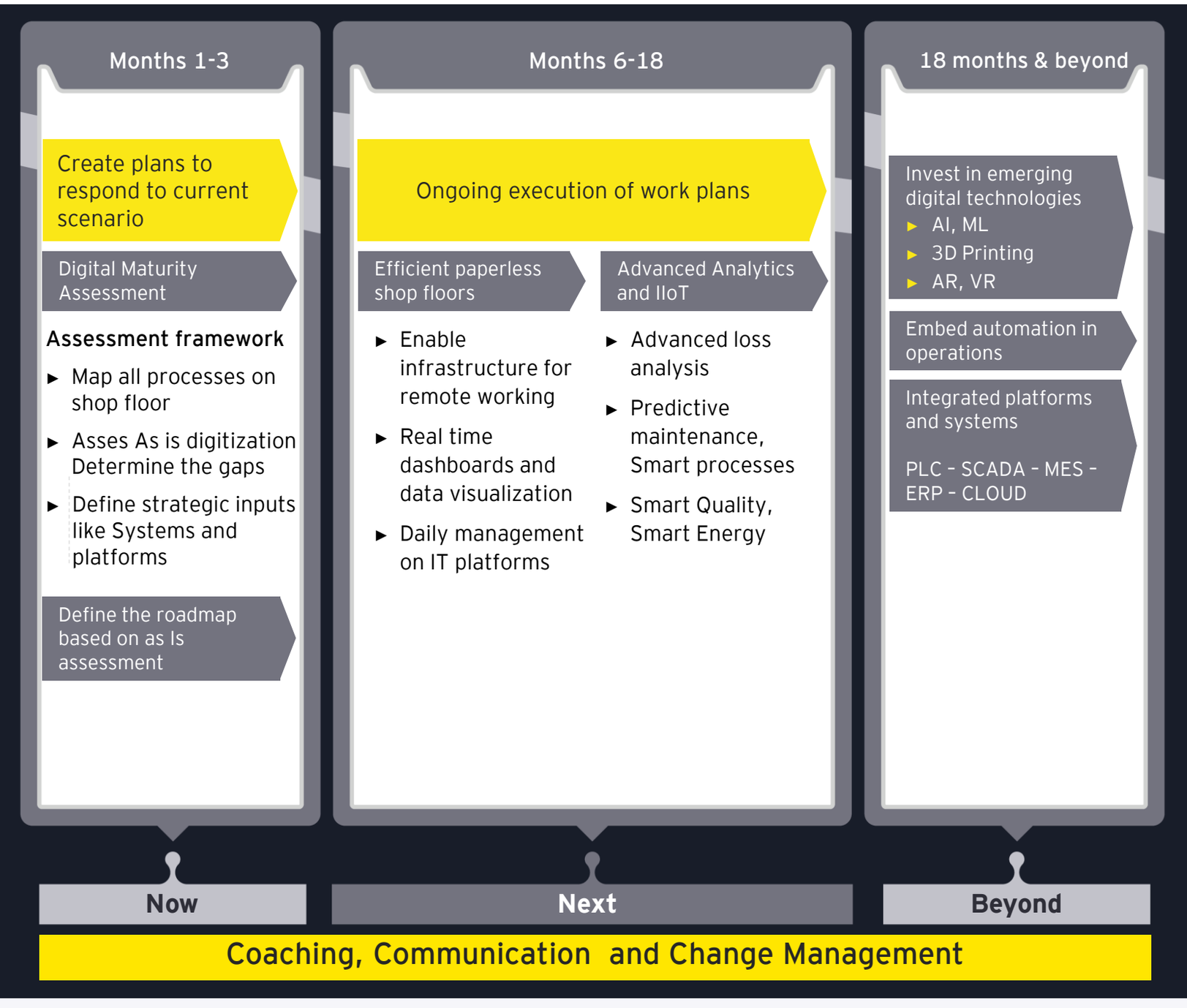
At the same time a **Digital Response Center (DRC)** may be set-up to collaborate with the **Crisis Response team** to facilitate the execution of the interventions required for immediate response through technology. The DRC will embark on a sustained digital journey to achieve stability, resilience and growth in the next 1 to 2 years.

The Digital Response Team can work on an accelerated journey plan with Now (Immediate), Next (9 to 12 months) and Beyond (12 months and ahead) horizon for planning the actions.

Now: Creating an immediate response plan to restart the operations but at the same time do a quick As-is assessment of digital maturity and form a road map for implementation.

Next: Moving to paperless shop floor. Leveraging advanced analytics and IIoT to move to smart quality and smart maintenance.

Beyond: Investing in advanced technology and automation to reduce human interventions in the plant.



In Conclusion

In this highly volatile scenario, while it is urgent to respond to the current situation, there is also a need to plan for the future as the industry dynamics are likely to change significantly as the world comes out of this crisis and a new normal/paradigm is likely to emerge in each industry. For the auto industry, investment in digitization of manufacturing should be viewed as a risk mitigation technique (much like insurance).

The current stress on liquidity and factory operations due to the disruption caused by COVID-19 will most certainly accelerate the digitization of shop floors and enable auto manufacturers to become proactive, agile, flexible and adaptive. Each auto manufacturer would need to immediately undertake a stage wise approach to achieve digital maturity at a faster pace.

Companies, irrespective of their size and scale of operations, need to finalize a well thought-out strategy and a roadmap that leverages Industry 4.0 interventions to regain stability and remain competitive in the medium to long term.

How can EY help?

1.EY Smart Factory

EY's Smart Factory suite of assets is a four dimensional approach that relies on the foundation of – **i) a world-class manufacturing excellence system**, ii) Through a people-centered digital **Operational Excellence platform** and powered by iii**) execution applications.** EY Smart Factory embeds manufacturing excellence by arming the shop floor with dynamic predictive Data Analytics, Virtual Reality and Artificial Intelligence to deliver unprecedented performance Finally, our **iv) IoT-based specific solutions** can propel organizations towards a full-fledged digital journey.

Three challenges leaders need to find a solution to:

1

Sustainable operational improvement:

Build internal capability and know-how to drive sustainable performance improvements across the manufacturing network

2

Speed and scale of performance uplift:

Provide leaders and teams with the methods and resources to achieve speed and scale of performance improvement program deployment

3

Digital transformation return on Investment

Facilitate a competitive future for the organization while simultaneously delivering value

Source: EY Smart Factory thought capital

2. "ASTERISK"

Supply Chain Planning Solution

1. Supply Chain & Operation practice in EY India has a deep expertise and experience of more than a decade of running large scale Supply Chain transformation projects

2. Team Asterisk is a EY's R&D and delivery organization for supply chain transformation projects.

3. We offer a suite of solution that can help your business build better predictive capabilities, seamless market connect & rapid response capability, thereby, create an aligned, tech-enabled supply chain organization

4. Team Asterisk has a product lead organization structure with capabilities around Supply chain domain & project delivery, Predictive and prescriptive analytics, Optimization & modelling, AI & machine learning, Software development, housed under the same umbrella.

5. **With solutions development & delivery under one roof. We can help you with:**
   - Delivery of project modules and analytics
   - Development of turn-key technology enabled supply chain planning solutions
   - Rapid-fire diagnostics and dashboards
   - Running the planning cycles on managed services

Solutions consist of a suite of 14 Artificial intelligence and machine learning enabled integrated planning solutions to build lean and responsive supply chain

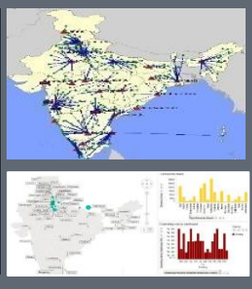
2. "ASTERISK"

Supply Chain Planning Solutions' consists of 14 integrated tech tools

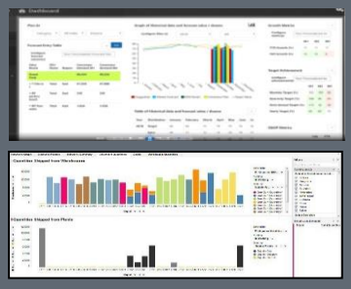
Strategic elements

Product Classifier

Network Design



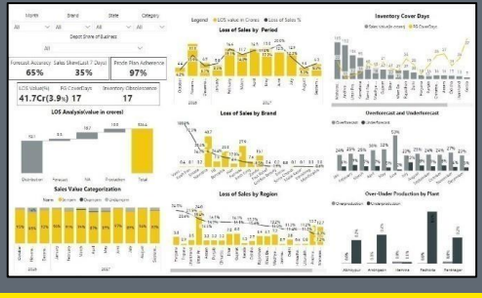
Season Management Framework



Operational elements

Build predictive capability	Build seamless market connect & rapid response capability	
ML / Statistics based forecasting & demand sensing engine	Self correcting inventory module	Constraint discovery & resolution module
		Demand driven production planning module
		Production scheduler
Consensus planning module	Rapid response distribution system & TLB	Supplier collaboration
Integrated S&OP		

Critical enablers



ASTERISK COMPASS –

Digital Bolt-On solution to help you Navigate through Covid19 disruptions and respond to market dynamics

- Set of 9-interventions to augment your systems with E2E visibility and analytics led insights
- Rapid deployment of the solution within 2-3 weeks by EY's Team ASTERISK

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Exhibit 1: SIAM Data, EY Analysis

Exhibit4: Ahir, H, N Bloom, and D Furceri (2018), "World Uncertainty Index", Stanford mimeo.

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