Operations Practice

The Fourth Industrial Revolution and manufacturing’s great reset

Manufacturers that are ahead in scaling advanced production technologies are successfully navigating four durable shifts that are critical to managing unprecedented disruption.

by Francisco Betti, Enno de Boer, and Yves Giraud
Since its inception in 2018, the Global Lighthouse Network (GLN) of advanced manufacturers has demonstrated how leading companies can work toward realizing the full potential of the innovations and advances at the core of the Fourth Industrial Revolution (4IR). Beginning with a select collection of leading-edge organizations, we have seen how lighthouse factories can help entire organizations navigate their modernization journeys, inspiring and catalyzing change among partner organizations along the way.

That’s why GLN now comprises 54 sites, with ten sites added in Q3 2020 (Exhibit 1). This growth reflects the accelerating adoption of core 4IR technologies, and their infusion into daily manufacturing and supply-chain operations, as organizations act on a new urgency to remain competitive—even as others have fallen behind, still stuck in pilot purgatory.

GLN includes companies that have achieved remarkable 4IR advancements within the four walls of factory sites or have effectively implemented end-to-end (E2E) digitization across the value chain. Indeed, in both cases, 4IR technology has powered the reimagination of manufacturing and supply chains across industries and sectors.

Moreover, an essential aspect of lighthouses’ success lies in a dedicated focus on workforce development and capability building through a variety of means. Indeed, these organizations have prioritized their people by transforming the nature of work through intentional upskilling and/or reskilling efforts, empowering workers to realize their potential through new ways of working.

Recent world events, most notably the COVID-19 pandemic, have led to significant disruptions on a scale unprecedented in recent times, affecting nearly every aspect of global industry and calling for a “great reset” across all sectors of the global economy: a decisive set of actions oriented toward delivering value not only to companies themselves but also to society as a whole. While supply-chain shocks have uncovered operational vulnerabilities, they also have presented transformative opportunities for manufacturing and supply-chain leaders. The advances in technology and new ways of working implemented by these trailblazing organizations have enabled them to adapt quickly during disruption, while remaining viable and operational.

Even before the massive disruptions imposed by the pandemic, the gap between 4IR frontrunners and the majority was growing rapidly. Now, four durable shifts in manufacturing and supply chains have emerged as particularly critical:

— **Improved agility and customer centricity** across E2E manufacturing and supply chains facilitates faster recognition of customer preferences. This, in turn, enables quicker adjustments to manufacturing flows at next-generation, small-scale modular plants to allow higher levels of customization.

— **Supply-chain resilience** provides a competitive advantage, requiring connected, reconfigurable n-tier supply ecosystems and regionalization.

— **Speed and productivity** are attained through increased levels of automation and workforce augmentation coupled with upskilling and reskilling efforts.

— **Eco-efficiency** is increasingly considered a must-have to remain in business and ensure compliance with an increasingly complex regulatory landscape.

The level of agility and resiliency that these shifts require sits at the core of true 4IR innovation, with valuable assets that serve as critical levers during unexpected adversity. The benchmarks and achievements heralded in previous findings about these leading companies remain impressive in their
Exhibit 1

The Global Lighthouse Network includes 54 sites as of June 17, 2020.

1. Zymergen
   Biotechnology
2. DCP Midstream
   Oil and gas
3. Fast Radius with UPS
   Additive manufacturing
4. Schneider Electric
   Electrical components
5. Johnson & Johnson Vision
   Care Medical devices
6. Groupe Renault
   Automotive
7. MODEC
   Oil and gas
8. Johnson & Johnson Janssen
   Pharmaceuticals
9. Johnson & Johnson DePuy
   Synthes Medical devices
10. GSK
    Pharmaceuticals
11. Schneider Electric
    Electrical components
12. Groupe Renault
    Automotive
13. Tata Steel
    Steel products
14. Groupe Renault
    Automotive
15. Henkel
    Consumer goods
16. Phoenix Contact
    Industrial automation
17. AGCO
    Agricultural equipment
18. Rold
    Electrical components
19. Bayer
    Divisional pharmaceuticals
20. BMW Group
    Automotive
21. Novo Nordisk
    Pharmaceuticals
22. Procter & Gamble
    Consumer goods
23. Sandvik Coromant
    Industrial tools
24. Nokia
    Electronics
25. Arçelik
    Home appliances
26. Petkim
    Chemicals
27. Ford Otosan
    Automotive
28. Saudi Aramco
    Oil and gas
29. Saudi Aramco
    Gas treatment
30. Unilever
    Consumer goods
31. Tata Steel
    Steel products
32. Siemens Industrial
    Automation products
33. Infineon
    Semiconductors
34. Schneider Electric
    Electrical components
35. Micron
    Semiconductors
36. Petrosea
    Mining
37. Foxconn Industrial
    Internet Electronics
38. Alibaba
    Apparel
39. FOTON Cummins
    Automotive
40. Unilever
    Consumer goods
41. Danfoss
    Industrial equipment
42. Midea
    Home appliances
43. Weichai
    Industrial machinery
44. SAIC Maxus
    Automotive
45. Haier
    Home appliances
46. Micron
    Semiconductors
47. Johnson & Johnson DePuy
    Synthes Medical devices
48. Haier
    Appliances
49. Bosch
    Automotive
50. Procter & Gamble
    Consumer goods
51. Baoshan Iron & Steel
    Steel products
52. POSCO
    Steel products
53. GE Healthcare
    Medical devices
54. Hitachi
    Industrial equipment

Source: World Economic Forum, McKinsey analysis

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own right. Nevertheless, the turmoil of recent events affords us an even more sophisticated appreciation for the very qualities that have sustained them, and have further advanced the impact that lighthouses have achieved, whether within a single factory or end to end, across the organization (Exhibit 2).

Thus, it is in this context of unprecedented challenge that lighthouses serve as models of transformation and beacons of light that can guide us through the storm into a stronger, more resilient future. These organizations are leading the way by demonstrating how to reimagine and rebalance operations now and into the next normal. They are showing us how companies can provide value not only to their shareholders but also to a broader set of stakeholders including workers, consumers, and the environment—indeed, society at large.

Exhibit 2
Lighthouses use digital technology to generate impact beyond productivity to build more agile, customer-focused organizations.

Key performance indicator improvements

<table>
<thead>
<tr>
<th></th>
<th>End-to-end connected value chain lighthouses</th>
<th>4-wall factory lighthouses</th>
<th>Impact range observed, %</th>
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</thead>
<tbody>
<tr>
<td><strong>Productivity</strong></td>
<td>Factory output increase</td>
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<td></td>
<td>Productivity increase</td>
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<td></td>
<td>OEE¹ increase</td>
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<td></td>
<td>Product cost reduction</td>
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<td>Operating cost reduction</td>
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<td>Quality cost reduction</td>
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<td><strong>Sustainability</strong></td>
<td>Waste reduction</td>
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<td></td>
<td>Water consumption reduction</td>
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<td></td>
<td>Energy efficiency</td>
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<td><strong>Agility</strong></td>
<td>Inventory reduction</td>
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<td></td>
<td>Lead time reduction</td>
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<td></td>
<td>Changeover shortening</td>
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<td><strong>Speed to market</strong></td>
<td>Speed-to-market reduction</td>
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<td></td>
<td>Design iteration time reduction</td>
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<tr>
<td><strong>Customization</strong></td>
<td>Configuration accuracy increase</td>
<td></td>
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<tr>
<td></td>
<td>Lot size reduction</td>
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</tbody>
</table>

¹Overall equipment effectiveness.
Source: World Economic Forum; McKinsey analysis
While supply-chain shocks have uncovered operational vulnerabilities, they also have presented transformative opportunities for manufacturing and supply-chain leaders.

Perhaps most important, today’s challenges make clear that lighthouses are not at the end of their transformation journeys—they are only just starting to unlock the true potential of 4IR technologies. As the network of lighthouses grows, its light will shine brighter, helping even more organizations be better prepared to weather the inevitable future storms, whenever and wherever they occur.

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