

Fourth Industrial Revolution
Beacons of Technology and Innovation in Manufacturing

Inspired by a report of the

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Sites embracing the megatrends of fourth industrial revolution.

Front runners can make a radical leap forward to Fourth Industrial Revolution by the aid of topics like connectivity, intelligence and flexible automation. These are technological megatrends that are effective as principal drivers of a Fourth Industrial Revolution transformation in production. Lighthouses that embraced these trends show compelling results. Adoption of these technologies has a radical impact on organizations. Such lighthouses are the factories that have taken fourth Industrial Revolution Technology from pilot schemes to integration at scale, thus realizing significant financial and operational benefits. Qualification as a lighthouse requires meeting high standards in four categories:

- significant impact achieved
- successful integration of several use-cases
- a scalable technology platform
- strong performance on critical enablers such as managing change, building capability and collaborating with a Fourth Industrial Revolution community

Identification of lighthouses followed a comprehensive scanning of more than 1,000 leading manufacturers in all industries and geographical areas. A Fourth Industrial Revolution expert panel of members from private organizations, universities and technology pioneers selected 16 lighthouses and recognized them as the most advanced production sites operated by Bayer, BMW, Bosch, Danfoss, Fast Radius with UPS, Foxconn, Haier, Johnson & Johnson, Phoenix Contact, Procter & Gamble, Rold, Sandvik Coromant, Saudi Aramco, Schneider Electric, Siemens and Tata Steel. Within this report, we will focus on the story of Procter & Gamble and Rold. We will therefore explain how you can take a lighthouse role in fourth industrial revolution by the aid of ELCA.

Understanding lighthouses: Characteristics, differentiators and success factors

Lighthouse characteristics are:

- **Injectors of human capital:** lighthouse factories are not deploying Fourth Industrial Revolution technology to replace operators. This is not possible. A McKinsey report suggests that fewer than 5% of occupations consist of activities that are 100% automatable with today's technology, while 62% of occupations have at least 30% of automatable tasks
- **industry leaders that are resetting benchmarks:** lighthouses are resetting industry benchmarks for operational and financial key performance indicators (KPIs). They radically alter their operations and achieve a step change in performance increase
- **open innovators and collaborators:** lighthouses are part of an innovation environment that involves universities, start-ups and other technology providers
- **large and small companies:** Fourth Industrial Revolution innovation is accessible not only to large organizations but also to SMEs. The data suggests that SMEs account for the largest share of jobs. For example, 60–70% of jobs in most OECD countries are in SMEs.
- **emerging and developed economies:** Access to Fourth Industrial Revolution technologies is not the exclusive domain of developed economies
- **high impact with minimal replacement of equipment:** In contrast with the First and Third Industrial Revolutions, the Fourth Industrial Revolution will have relatively high impact with comparatively little equipment replacement

How do the lighthouses achieve impact at scale?

We observed that the lighthouses follow two distinct yet complimentary routes to scale, and that five specific value-creation differentiators and three capabilities stand out. Production system innovation and innovation in the end-to-end value chain are the two not mutually exclusive routes. In production system innovation companies expand their competitive advantage through operational excellence. Innovation in the end-to-end value chain contain creating new businesses by changing the economics of operations.

There are five value drivers for impact at scale:

- **big data decision-making:** Decisions are based on big data deciphered by pattern recognition – and not by humans
- **democratized technology:** Technology on the shop floor is transforming ways of working
- **agile working mode:** The lighthouses implement new Fourth Industrial Revolution use-cases in an agile working mode, which allows them to do proof-of-concepts in a short time period, improve the solution based on findings and go quickly from pilot to scale-up
- **minimal incremental cost to add use-cases:** They can be deployed at minimal additional cost, allowing factories to work on multiple areas at once.
- **new business models that complement and/or disrupt the traditional business and value chain**

Distinct capabilities represent 3 important success factors.

1. **First capability is IoT architecture built for scale-up:** All information flows into one central data lake and interfaces between applications are standardized
2. **capability-building:** Digital academies and smart factories allow all employees to learn the basics of new digital use-cases and a smooth, efficient way of implementing them
3. **workforce engagement:** In the lighthouses, the leaders act as role models for the change, communicating a clear change story through various channels and ensuring that all employees feel part of the journey

Successful deployment at scale: a close look at two lighthouses

Procter & Gamble (P&G) Rakona, Czech Republic: Growth through cost leadership

Procter & Gamble's Rakona plant is representative of a large multinational corporation (MNC) deploying Fourth Industrial Revolution use-cases developed at both the site and group level. It provides an example of how driving productivity through Fourth Industrial Revolution adoption secured jobs by maintaining a site's relevance in the face of shifting customer demands and increasing market pressure. It produces around 4 million cases of dish-washing liquids and powder along with fabric enhancers daily.

Market shifts from dry to liquid washing products effected a significant drop in demand between 2010 and 2013. A demand for more volume ultimately led to the need for expansion over 2014–2016. To implement such expansion successfully, anticipating and addressing the emerging needs required embracing digitization and automation and full use of Fourth Industrial Revolution capabilities. Having faced the challenges it did, Rakona aimed to secure a resilient, sustainable future despite economic uncertainties and pressures. “We Are Rakona, We Create the Future”.

Two essential enablers have supported Rakona’s successful Fourth Industrial Revolution innovations: Rakona’s leadership team recognized among internal staff a lack of the skills necessary to enable Fourth Industrial Revolution innovation. They then exploited the external digital environment. Direct connection with Prague universities, and cooperation with start-ups and student exchange programmes enabled access to knowledge. The other enabler is improving people’s skill levels with deepening affinity for new technologies such as analytics, smart robotics and additive manufacturing.

For P&G Rakona there were **top five use-cases**: Digital direction-setting is a digital performance management system, which created impacts in both technical and management systems. In-process quality control has addressed the problems of a manual sampling process that did not ensure the 100% quality of each batch, thus requiring the scrapping and reworking of an entire batch if a deviation was detected after production. A universal packing system, known as UPack, allows for recipe change propagation through the packaging line while the line is running. Previously, a complete stop of the line was required to perform changeover, which led to wait time for operators and long durations involving manual setup of machines. End-to-end supply chain synchronization has addressed several problems, including the scrapping of excess products at the end of a campaign, capital bound in inventory, slow speed to market and difficult, time-consuming manual supply chain analyses.

Rold Cerro Maggiore, Italy: Fourth Industrial Revolution implementation in SME

Italian company Elettrotecnica Rold Srl is an SME with 250 full-time employees producing door locks for washing machines. The company's Cerro Maggiore factory has applied digital manufacturing technology at scale to increase productivity and quality in the context of a small organization. It demonstrates that Fourth Industrial Revolution innovation is possible even with limited investment by using off-the-shelf technology and collaborating with technology providers and universities.

Additional problem factors included poor visibility of actual plant performance and non-centralized, paper-documented data. According to Rold President Laura Rocchitelli, "The reasons why we introduced digital manufacturing technologies are different: first of all, it was to become more efficient in our production performances.

The opportunity to monitor in real time our manufacturing processes turned out to be essential to reach better results both in terms of machine utilization and performance of each machine." Top five use-cases: Machine alarm aggregation, prioritization and analytics-enabled problem-solving has supported improvements in overall equipment effectiveness (OEE) by providing notification of specific machine and custom alarms to operators on smartwatches and interactive displays.

Digital dashboards to monitor OEE have facilitated real-time monitoring of production resources distributed in different plants. Sensor-based manufacturing reporting of KPIs has allowed for digitization of any kind of production machine along with real-time collection of production data, which is used to build dynamic, interactive dashboards.

Cost modelling to support make-versus-buy decisions, which is in ongoing development, uses granular data collection based on IoT devices on the shop floor combined with business intelligence tools to increase the accuracy of Rold's cost models. Rapid design prototyping through 3D additive manufacturing has shortened time to market for new product introductions and contributed to several innovations.

Call to action

The significant benefits of the Fourth Industrial Revolution in manufacturing are well understood by many leaders from the private and public sector: 70% of industrial organizations are either piloting Fourth Industrial Revolution technology in manufacturing or deploying these technologies at scale. Strategies, initiatives and programmes have been put in place at all levels to ensure these benefits are realized. Factories should deploy technologies that allow the human operators to focus on the most value-adding activities, where the human skills of decision-making and adaptability to new situations brings most value – and, at the same time, create a more attractive workplace. The expertise and solutions of ELCA will support you in all relevant areas of this journey. ELCA – we make it work!

