



INDUSTRY 4.0 MATURITY INDEX AT INFOSYS – A CASE STUDY

Industry 4.0 promises a lot, but most organizations are struggling to scale up the pilots they have started. A maturity index can guide business leaders to ensure that they are progressing in the correct direction and at sufficient pace. The Infosys acatech Industry 4.0 Maturity Index is a guide to organizations across industries for effective Industry 4.0 adoption.

The challenge with Industry 4.0 adoption

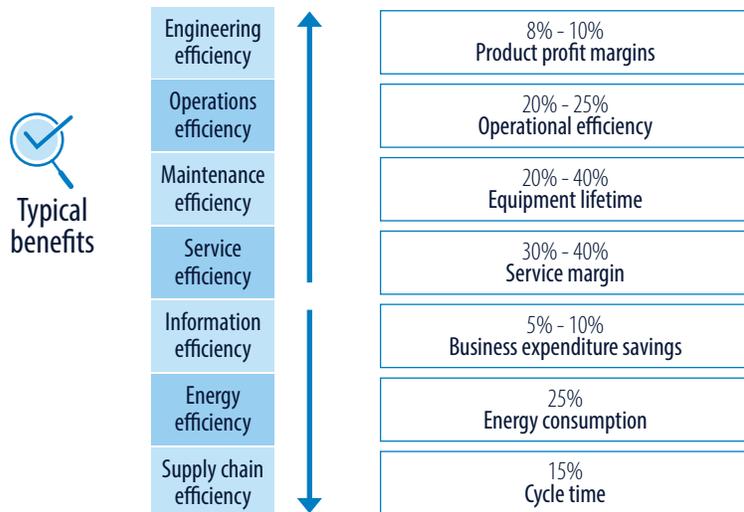
Adopting Industry 4.0 practices and technologies is a top priority for manufacturers' digital transformation. Those who get it right can expect significant efficiency and margin improvements. Yet progress is slow. More than 70% of industrial companies are stuck in what the World Economic Forum calls a "pilot purgatory" phase¹, whereby they struggle to scale up their Industry 4.0 initiatives.

The WEF's findings are mirrored by Infosys' own research² done in partnership with Aachen University in 2015. At that time, 85% of the study participants were aware of the potential of Industry 4.0, and nearly half had plans to adopt these practices by 2020 to improve asset efficiency. Despite this awareness, the study concluded that by 2020, only about 20% of respondents would have made at best a piecemeal progress. In response, the report³ recommended that organizations evaluate digital maturity with clearly defined measures, establish time-bound outcome targets, and deliver proof-of-concepts before scaling up.

To help with this, Infosys, the acatech consortium and Aachen University created an Industry 4.0 maturity index. This provides a road map and journey for the initiatives, as well as tying it to specific business outcomes to help build stakeholder support for scaling across a business.

These business outcomes can be significant, ranging from 8% to 10% uplift in profit margins, 25% reduction in energy consumption and 30% to 40% increase in margins on services (Figure 1). The index helps provide an organization with the structure and approach to help move their Industry 4.0 initiatives from pilot to full rollout across the organization.

Figure 1. The maturity index and tangible business benefits



Source: Infosys

How an index can help

It is an approach that an automotive car seat manufacturer has used successfully. Its digital team started the journey with three different Industry 4.0 pilots. The first one was a mobile app for plant employees to proactively know the status of operations and issues. It resulted in more than 20% productivity improvement for supervisors and operators.

The second is a track and trace implementation to improve inventory accuracy. It uses radio-frequency identification and bar code technologies for tracking of material usage at consumption points.

The result was an 8% productivity for material handlers and an overall improvement of 5% in productivity due to better parts availability. The third is analytics-driven business insights to track the financial health of programs such as new product launches to proactively raise alarms for schedule slippages and cost overruns.

Infosys worked closely with the seat making firm, using the techniques in the maturity index, to help the digital team articulate and amplify the value of each of these pilots so that they could be scaled further across the business.

Understanding the maturity index

The index addresses four structural areas – resources, information systems, organization structure and culture, providing one consolidated view. It has the following four levels of maturity for Industry 4.0 adoption, each level building upon the preceding one. The model assumes that the organization has already achieved the "Industry 3.0" maturity levels of basic computerization and network connectivity of computers and processes.

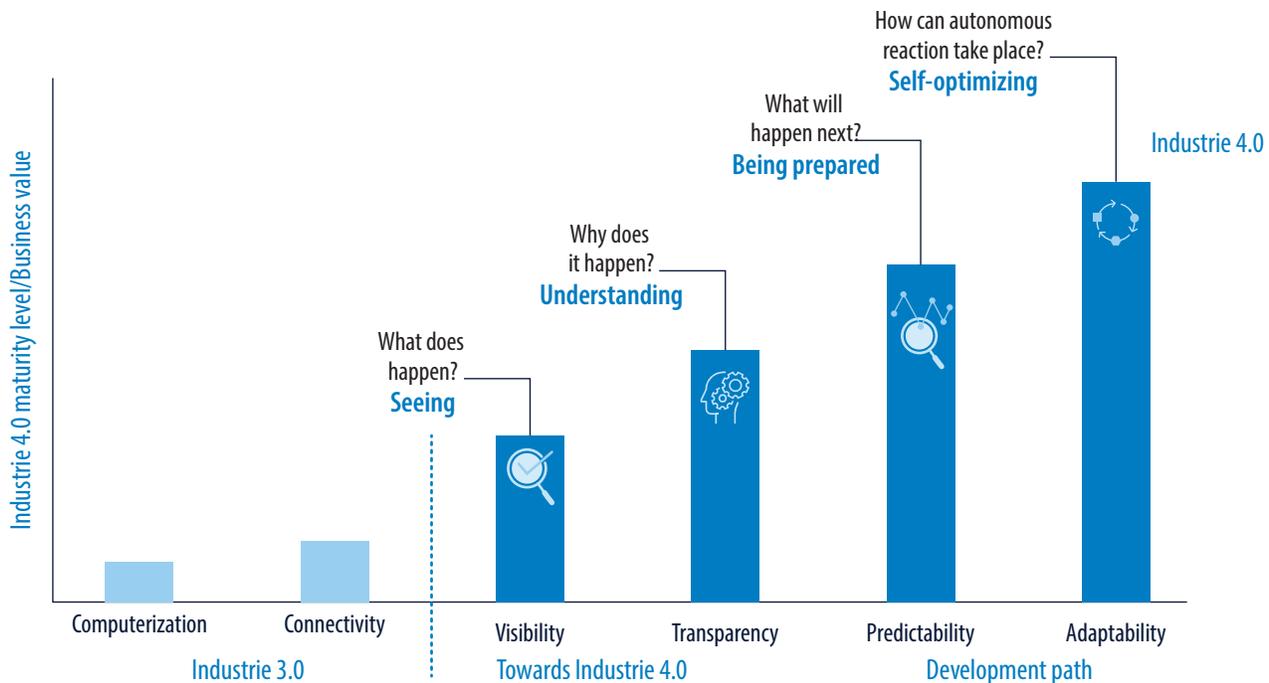
i) Visibility

This level describes when the organization has connected its assets to gather critical parameters about performance, maintenance and general activity. By assets, this can include (and is not limited to) industrial machinery, people, material handling equipment, and raw materials.

ii) Transparency

This next level involves taking the data generated above, sharing it and analyzing alongside historical data and

Figure 2. The four levels of Industry 4.0 maturity



Source: Industrie 4.0 Maturity Index. Managing the Digital Transformation of Companies³

knowledge to understand the root causes of issues and to support rapid decision-making in daily operations.

iii) Predictability

At this stage of maturity, the organization should be able to simulate different scenarios, analyze probabilities and predict outcomes to support an operator's manual decision making.

iv) Adaptability

At this final stage, the factory floor and its assets are able to optimize and autonomously make decisions based on the operational and commercial scenarios provided at the previous stages of maturity.

Organizations are assessed by understanding the various Industry 4.0 initiatives that they are investing in, and also identifying the target outcome and timeframe of these initiatives. Through this, the organization can identify and align

on its key performance indicators, thereby clarifying the purpose of their initiative and the metric they are trying to achieve. The index also helps identify whether initiatives are truly contributing to the drive towards Industry 4.0, and which new initiatives should be included. Priorities for investment and improvement can also be identified. And finally a more thorough estimation of the tangible business outcomes can be generated.

The benefits of Industry 4.0

The business benefits of Industry 4.0 are far reaching for a business. They can cover product engineering, the supply chain, production processes, maintenance, the management of energy and of data, and even be used to directly interact with the end customer.

Infosys has worked on examples across all these areas. For instance, in the engineering space, thirty-four sensors

were used on the landing gear of an aircraft to monitor critical parameters. These were fed to a digital twin to predict the remaining useful life of the gear and to ensure on time flight takeoff.

In supply chain an RFID based asset tracking for an oil field service firm resulted in a 15% turnaround reduction of the cycle time.

For an automobile production facility, the cost of maintenance and production was significantly reduced when sensors were used with decision making at the edge to estimate and extend the useful life of machine tool spindles. Similarly, in maintenance 4 million failure records of an ATM maker were used to train and test a machine learning model for predicting failures. It achieved 80% accuracy and 18% cost savings in unplanned outages and repair.

Services to end customers can also utilize Industry 4.0 approaches. For example, Infosys built a cloud based big data platform to help a carmaker's

connected vehicle implementation monetize the business insights to improve vehicle performance through proactive alerts.

In the energy saving space, Infosys is its own best example. The company has reduced energy usage per-capita by 51% over an 8-year period, by using industrial internet of things to connect assets such as office spaces, chillers, generators and sewage treatment plants. A central command center is setup for remote monitoring, control and proactive steps. The result has been a cost saving of USD 100 million in the past 3 years.

Perhaps one of the best examples of effective Industry 4.0 is Procter & Gamble's washing products plant in Prague, which is one of the "Lighthouse" examples of leading Industry 4.0 deployment identified by the WEF1. Demand dropped between 2010 and 2103 for this facility, and this put cost reduction at the forefront of its strategy. A full plant saving of 20% was achieved in 3 years, thanks to the adoption of Industry 4.0.

P&G did this by analyzing the data from its factory operations, managing quality control in real-time using sensors to measure vital process parameters, rapidly changing over products on the line without stopping production, synchronizing its supply chain, and proactively modelling how new product introductions and other changes would affect operations.

Industry 4.0 maturity assessment should be a continued process involving measurement, evaluation and improvement in every phase

The journey continues

Industry 4.0 maturity assessment should not be a one-off activity. It should be an ongoing cycle of measuring, evaluating and improving at each phase. More granularity in the index is also needed – particularly at the lowest levels of maturity, where most organizations are stuck.

To further develop the index, Infosys will keep evolving it to bring out more nuances in the form of business insights for different industries, as well as within the different stages of maturity. For example, the aerospace industry has low volume of manufacturing. It has strict regulatory and safety requirements. The automotive industry has larger volume while flexibility is key. The volume is much higher in the pharma industry where traceability is important, again for regulatory needs.

Industry 4.0 is not an end point in itself. It is a new way of understanding and optimizing a business. It can inform product design as well as operational strategy. Industry 4.0 is also not just inward looking. It can support more efficient and agile "Cognitive Supply Chains"⁵ by connecting with partners. It can also support the development of a "Servitization" strategy. Ultimately it is a key element of building a "Live Enterprise"⁶, which is agile, responsive and efficient.

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