

# **Automation as the edge node of the Industrial Internet: the foundation for your digital journey**

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## *Summary of article*

Automation technologies have been around for many years. They were the trigger for what many call the third industrial revolution. Now that we have reached the fourth one, called Industrie 4.0, many companies are rethinking their future and trying to understand how they can realize value out of their digital transformation. In his context, what role does the automation layer play?

In this article, we will discuss why automation solutions are an intrinsic and key piece of the process, allowing for a smooth transition to a digital era. Transforming data into information, then into insights using analytics brings true value to the operations and the business.

In this context automation is the layer on which users can build their digital transformation.

## 1 Introduction

A study by Gartner, a US-based research company, published in 2017, states that more than 27% of senior executives now rate Digital Transformation as being a "matter of survival".

In this paper, we will discuss a rational approach to Digital transformation and how the automation layer can be a foundation for it and the role that automation plays in the overall digitization journey.

## 2 Automation and the Industrie 4.0

Automation technologies have been around for many years. They have not fundamentally evolved since. Looking at the software side of it, for example the HMI/SCADA, the basic capabilities are still the same. The main goal is to provide the operator with a window on his application using mimics, trend views, alarm views, etc. However, new IT technologies have made it more powerful, easier to use and more importantly more connected.

Industrie 4.0 refers to the fourth industrial revolution (see Figure 1). The first revolution is the introduction of mechanical production at the end of the 18<sup>th</sup> Century, the second is the introduction of mass production at the end of

the 19<sup>th</sup> – beginning of the 20<sup>th</sup> Century, and the use of electrical energy. The third revolution – in the late 70's – happened based on the use of electronics and IT systems to automate production using what is considered to be the very first PLC, launched in 1969.

The fourth industrial revolution is based on the use of cyber-physical systems (CPS's). A common definition of a CPS is "Any mechanism that is controlled or monitored by computer-based algorithms, tightly integrated with the Internet and its users." CPS's, the Internet of Things (IoT) and the new computing capabilities – such as cloud computing – are what make the Industrie 4.0 possible.

Many companies are rethinking their future and trying to understand how they can embark on the Industrie 4.0 or Industrial Internet journey and realize value out of their digital transformation. In this context, the automation layer has been an enabler over the past 50 years.

## 3 Why now?

Why has this revolution not happened earlier? First of all because the technology was not available until recently: cheap sensors, high speed networks, the ability to manage huge amounts of data at a reasonable cost,

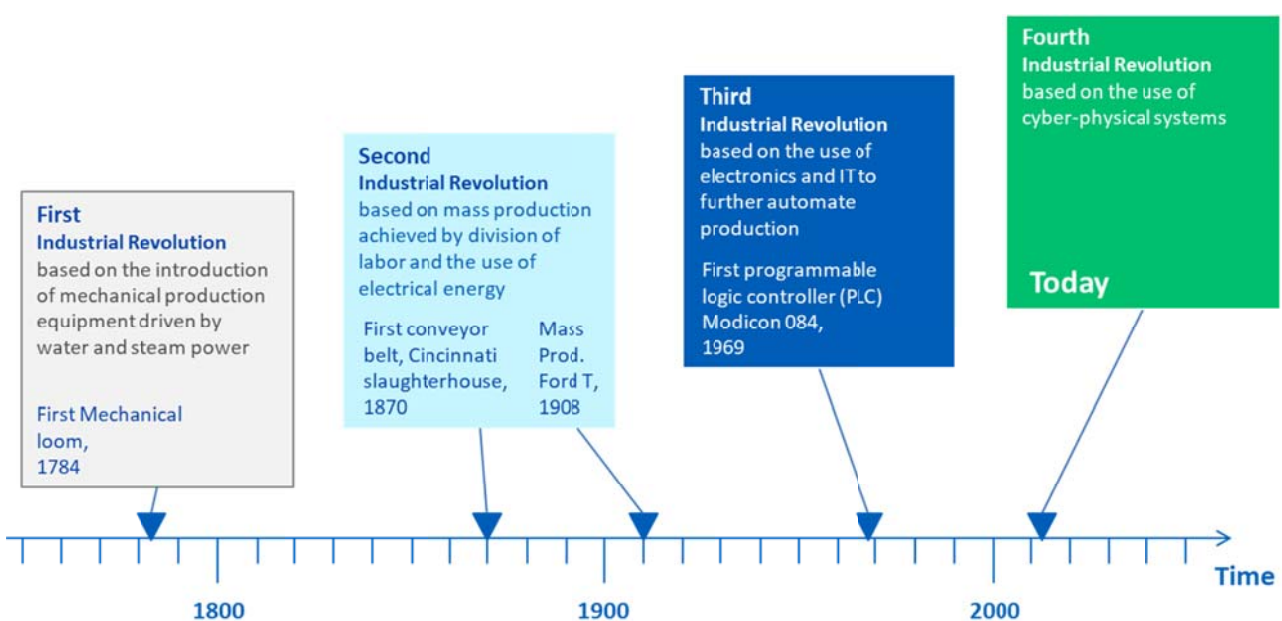


Figure 1: Industrial revolutions.

unprecedented computational power, and of course the cloud.

Each of these represent a disruption in the traditional model. For example, the rule was to only collect and store the pieces of data that were necessary, either for operational reasons or for compliance reason. Today, data collection and storage are much cheaper than they were. The trend is to collect vast amounts of data and store it without knowing what will be done with this data.

New forms of human interactions such as touch interfaces or augmented reality systems are another form of disruption. So is mobility. We all expect to be able to access our personal information anywhere any time from our smartphone; the same applies to process or manufacturing data. The plant manager on the go wants to be able to keep an eye on his plant while he is travelling, away from his office.

#### 4 Digital Transformation is a journey

Digital transformation doesn't happen overnight. It is a journey. Like every journey, it must include a clear and achievable goal, whether it is financial, operational, or else. It shall also describe the required steps.

In fact, it is recommended to ignore the IT

and OT aspects, and to take one step back to identify what the main challenges are. Some external and fresh eye might be helpful here.

A good example is the cloud. I have been in many management meetings where the cloud topic showed up fairly early in the conversation. Not that it should not be discussed but is definitely not a topic for a first discussion. The cloud is the infrastructure, so are the historical databases that have been in use for decades. It has little value in itself. The desired outcomes are what should be discussed.

For example, how to save in production losses to be more competitive? How to optimize my maintenance strategies and cut processing time? How to mitigate risk and increase productivity? Etc.

Once the goals are set, the challenge is to draw an implementation roadmap. Many industrial sites have already embarked on the journey without knowing it, like Molière's character – Monsieur Jourdain – speaking prose without even knowing it. We are mostly dealing with "brownfield" applications in Europe and most of them have some kind of automation system installed, an MES or another type of manufacturing management solution in place.

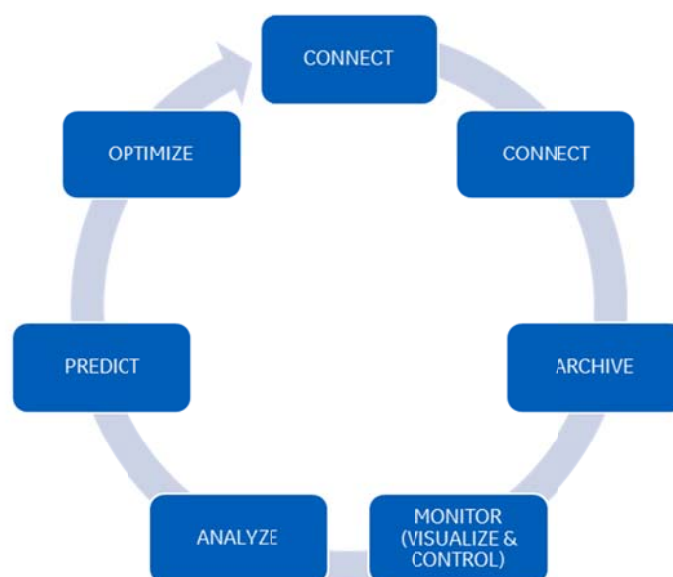


Figure 2: From connectivity to optimization.

## 5 Problems that the automation layer solves

Figure 2 gives the user a good indication of the "maturity" level of his application. The automation layer helps solve one of the key problems faced by the industry, which is the data gap – islands of data or production systems not connected.

One of the key challenges identified by the Industry 4.0 and the Industrial internet Consortium is interoperability. With the emergence of standards such as OPC UA, this is becoming less of a problem. OPC UA applied to the automation layer, not only delivers connectivity, but is also ensures security of data transfer, in a structured way.

You can't control, therefore analyze and optimize what you cannot see. The flexibility of the automation layer helps bring all the required data and can bridge the gap between disparate systems at low cost, this with the speed and accuracy required to be able to have a holistic view on someone's application.

Another topic that is often unknown by the IT engineers is the performance and (almost) real-time nature of the automation layer. You cannot replace a control system with a cloud-based solution. Control systems are down to the millisecond resolution and HMI/SCADA's deliver sub-second view and control on the processes, not the performance that a cloud-based system could deliver.

## 6 Digital transformation and the cloud

Digital transformation doesn't always mean cloud. A lot of tools can be deployed on premises, as part of the automation solutions, in order to make the operations personnel more efficient, reduce the risk of errors and make their work more consistent, positively impacting the compliance of their process if applicable, and ultimately the bottom line.

Digital work process management software delivers huge outcomes and can be seamless deployed on top of an existing automation layer, enabling the (almost) "paperless plant". Typical applications range from e-SOPs (Standard

Operating Procedures), to maintenance procedures, or operator rounds.

## 7 Automation as a way to mitigate the risk of disruption

It is key for existing plants or infrastructures to ensure that there will be no disruption in the production process or operation itself during digitization. Users who have been through the implementation of an ERP system are often reluctant to change. They fear a disruption in their process, involving unexepeted downtimes and tools that will confuse the workforce, or will require extensive training. Quite the opposite of an ERP, we recommend to start small and deploy at your own pace. As we have seen earlier, the first step is to modernize what exists, look at the gaps and build on top of it.

Automation technologies can help mitigate the risk of disruption. They are mature and proven technologies and can deliver new capabilities while making sure that the application remains safe, available and compliant.

Also, the Digital Transformation process must take the user into account and make sure that he is only affected by the changes in a positive way. The aim is to make the life of the people easier: operators, engineers, production managers, etc... Nowadays, industry users expect the tools they have at their disposal in their everyday life to be available at work. Modern HMI/SCADA's can deliver content on any connected device – PC, smartphone, tablet – giving them the tools that fit their needs, and most of deliver the same user experience a their own device. Mobile devices have demonstrated to be able to increase their efficiency. A recent study from Canada shows that mobile operators are 30% more efficient than the ones using a fixed device.

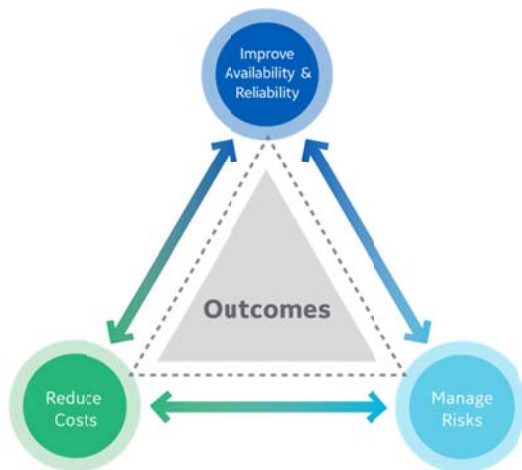
## 8 Going the extra mile

Once the foundations are strong, you can build the rest of the house. 85% of the data used by analysis and analytical tools such as Asset Performance Management (APM) software or

Operations Management Software (OPM) come from the field (OT data). They represent the second part of the journey.

Gartner defines the APM as "[a range of solutions that] encompasses the capabilities of data capture, integration, visualization and analytics tied together for the explicit purpose of improving the reliability and availability of physical assets".

There are three big drivers that have plagued infrastructure owners and operators since the commissioning of their operations: "How to simultaneously improve availability, manage risk, and reduce costs?". The ultimate goal is to insure optimal asset performance to maximize your desired outcomes.



Many users begin at the risk stage of this scenario. This involves a process of assessing the criticality of all the asset within their business such as high, medium and low. The APM will deliver an optimized plan to reduce costs while appropriately mitigating the risk of failure based on consequences and probability.

The user is encouraged to develop asset strategies, which are targeted holistic and optimized activities which specifically mitigate potential risk for the asset failure through preventive and predictive maintenance, inspection, monitoring, engineering and analytical methodologies.

Pieces of equipment age, business and compliance requirements change, process conditions alter and asset health can deteriorate over time. The APM can dynamically monitor emerging threats and automatically take actions whether that will be a notification that the strategy should be adjusted to or automatically creating a recommendation for corrective repair work to be done.

Recommendations issued by the analytics are then fed back to the process, via the automation layer; whether it is through an HMI/SCADA, in which case the operator will be able to check the recommended parameters before they are sent to the actual process, or directly to a PLC.

Transforming data into information, then into insights using analytics brings true value to the operations and the business. This is the core of the APM applications. It is all about making more informed decisions, being proactive and optimizing processes.

## 9 Conclusion

Your digital transformation starts with the automation layer.

- It delivers easy connectivity, complete visibility & control
- It enables digitization of the plant floor without any disruption.
- It is the trusted source of the majority of data used for analytics & optimization.
- It is a an on ramp to the cloud and the analytics

This is definitely the layer on which users can build their digital transformation.

## 10 References

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