Opinion Piece

The expansion of industrial IoT data and the influences on the future of work

Version 1.0

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April 23, 2021

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Since the Middle Ages, changes have led to an ongoing increase in prosperity from which everyone has benefited. After several historic revolutions in technology, the fourth industrial revolution (4IR) has just begun. 4IR will again offer immense opportunities for efficiency gains to companies that thoughtfully adopt the new technologies. However, this puts a certain amount of pressure on all companies, especially those in the midmarket.

This opinion piece highlights some facets of the great opportunities resulting from the introduction of the Industrial IoT (IIoT). It aims to motivate companies to embrace these new approaches. The point is not to close oneself off to these changes or to look away, but to perceive these trends, to evaluate them for oneself, and to use them in such a way that there is an early sense of achievement for the entire company.

Introduction

Changes happen. Those who make good use of them win; those who negate them blind themselves and may miss important opportunities.

Since the Middle Ages, changes have led to a continuous increase in prosperity from which everyone has benefited. As soon as better solutions and processes, such as steam engines and electric motors, became available, those who were able to use them optimally benefited and grew. The rest had to adapt accordingly to make ends meet. Digitization is now also opening up new and exciting opportunities for those who can use them to their advantage. However, these can become existential threats for those who pretend to look another way. For SMEs in particular, thoughtful, selective use of the opportunities offered by digitization can be relevant. SME's need to take account of their limitations, maintain the future-proof elements of their business model, and expand them with new business model components.

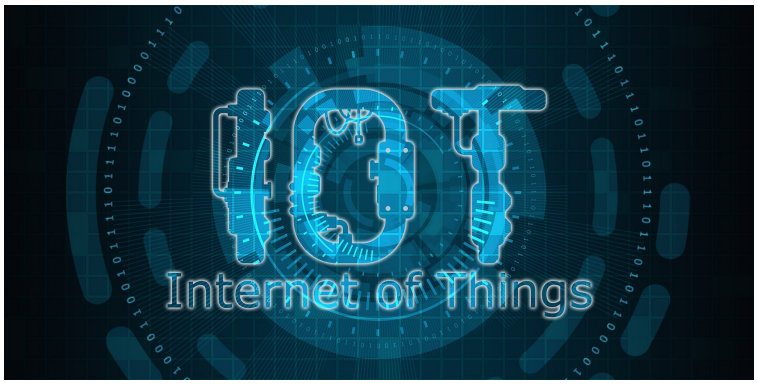

Figure 1: Picture of Pete via Pixabay

Opportunities and necessities

Some of the most challenging changes are sadly also the most important or the most decisive. The massive change through digitalization and digital transformation of industry, sometimes also referred to as Industry 4.0 or 4IR, is a prevalent example of difficult but decisive changes. These must take place to continue to maintain or expand prosperity and compete globally. Just as the Internet of Things (IoT) will severely shake up various industries with disruptive changes thanks to the increasing proliferation of cloud & edge computing and 5G, the Industrial IoT (IIoT) will also change workforce deployment and approaches to industrial production. The good news is that there is so much to gain by moving to a new way of managing the industrial work process. The changes range from saving time and money to entirely new ways of doing business (think: digital business models). The bad news: it's challenging. In some cases, it is even overwhelming. It requires strategy and the ability to think differently about how manufacturing works - and how it will continue to work in the years ahead. While we've been hearing about the shift to industrial IoT for some time, it's still in its early stages. But this shift is underway and imperative. That is especially true for small and medium-sized businesses in the German and European economies. Fortunately, there are offerings and assistance that can make the transition to new IIoT solutions much smoother.

Even if some companies have so far avoided the transition to IIoT due to fears or misunderstandings. There are many reasons to get on board now - even if you're not sure your company is (yet) fully ready for it. Below are some facets of how the adoption and growth of IIoT will be changing the future of manufacturing work. The changes ultimately improve a great deal, from operational efficiencies to improve the customer experience through shorter production times, even at batch size 1, improving employee safety, or better visibility into the production pipeline, to name a few.

Understanding the IIoT: What does it actually mean?

One of the reasons many manufacturing companies have avoided looking at IIoT issues until recently is that they assume it's just a fancy dashboard [Myth 1 from **Lauritzen** et al. 2020]. They assume it is an easier way to view the data they already collect from their machines. This view couldn't be further from the truth. The IIoT is actually a flexible platform that can help companies improve and accelerate value creation by finding new and better ways to process the data they collect. This even often in real time for the entire enterprise.

Here's an example from [**Lauritzen** et al. 2020]. For example, a Microsoft plant was able to reduce inventory costs by $200 million by using the IIoT to identify inventory that would soon become obsolete. The information about inventory has always been there; it took technology via the IIoT to make and evaluate the connections between the data pots. Examples like this are why the IIoT has experienced rapid growth over the past year. In fact, McKinsey estimates that the value created by the IIoT will be between $1.2 and $3.7 trillion by 2025. This is especially important as companies around the world have had to, and continue to have to, shift quickly due to a global pandemic. An imperative is to have the perspective not to "put a paper on glass" meaning exchanging a paper process by an exact electronic copy. The business processes have to be carefully reviewed and streamlined before digitizing/automizing them. Microsoft, by the way, is not only using this technology in its facilities but is also expanding its involvement to participate in the growth of the IIoT. The recent announcement of a partnership with Honeywell [**Newman** 2020] to join forces around cloud and building solutions is a great example of how two leaders in their respective fields are coming together to take advantage of the growing capabilities of industry data. The availability of IIoT basic services via Microsoft Azure or AWS paves the way for such steps to be taken.

In addition, the IIoT approach enables bringing back the "voice of the process..." Employees who see repetitive problems or who have ideas for improvement, supported by IIoT data, can provide evidence to convince management. With bottom-up process improvement, a new culture is possible, one that does not (only) come from external consultants, but from expertise within the company.

Value creation through IIoT: Digitized maintenance

One of the most significant ways the IIoT enables manufacturing companies to become more efficient and productive is using digitized and automated predictive maintenance. How? By collecting vast amounts of data - more than humans could process - to predict when machine problems might occur and prevent them before they even happen. Leading enterprise software companies such as Siemens, SAS, SAP, Honeywell, and Oracle are just a few of the companies that have developed pre-

dictive maintenance solutions. Infrastructure companies like HPE, Dell, and Cisco have also been actively developing hardware that enables improved connectivity between operational data and IT systems.

Not sure where to start? You're not alone in this. Trying to understand the vast amounts of data that can be collected and the ways the IIoT can process it can be overwhelming. Start slow and simple and focus on early, small successes. Think about how you can capture simple things, such as production numbers, sensor malfunctions, machine health changes, energy status, average downtime, etc. Even simple statistics like these can be analyzed and evaluated by AI to show you valuable patterns. These can be, for example: when your machines are least productive, when you use large amounts of energy, how often machine breakdowns occur - and why! These analyses facilitate seeing problems directly while the product is still on the line (instead of after it rolls out of the factory) and immediately detecting equipment failures. Also, more advanced analytics can provide predictive maintenance capabilities. Based on process variations, machine behavior, or even based on data from across the industry. These new capabilities will provide your employees with very valuable information without them having to calculate it themselves. (Let's face it - given the vast amounts of data available, this could otherwise take literally years).

Figure 2: Picture of Computer vector created by pch.vector - www.freepik.com

Adding value through IIoT: improving employee safety

Just as the IIoT can provide valuable information to keep your machines running, it can also contribute to employee safety. The cost of workplace accidents in the EU was more than €476 billion in 2016 [**arbeitssicherheit.de** 2017]. These numbers are well ahead of the corona virus and the increased need to take proactive measures to protect employees from a global pandemic. With the data collected by the IIoT, companies will be better armed to make their workplaces safer. And how? E.g., by finding areas where employee training is lacking, where injuries typically occur, where clusters of machine malfunction happen, etc. Even wearable devices can help determine if team members are overexerting themselves or suffering from extreme heat, etc. Yes, it can be challenging to get employees to buy into regular workplace safety programs. But with the help of the IIoT, taking positive steps to improve employee safety has never been easier.

Value creation through IIoT: Digital twins

One of the coolest and most valuable things you can create using the IIoT is the digital twin. The digital twin is a digital representation of any number of different things. It can represent a production line, a new product, or the evolution of the product performance. Using data collected by the digital twin, such as the Siemens Mindsphere digital twin, companies can save millions of dollars by eliminating the cost of creating full-scale, real-world prototypes. And they can save time because they don't have to run these prototypes in real-time to see the long-term impact. They can instead run the algorithms to see how performance would evolve based on the data they collect. That's a game-changer for manufacturing, where machines cost so much.

Summary

Thanks to the continued development of Cloud and especially Edge technologies, cybersecurity-related to IIoT is getting better and better, and connectivity through 5G is becoming more reliable. COVID-19 has a facilitating impact on the digital transformation in making remote administration and operation an imperative and proving it to be possible. While the Third Industrial Revolution (3IR) focused on management reports and equipment automation, the 4IR focuses on the (real) experts: operators and engineers. Other extremely important results of the digital transformation lie more in the socio-technical area. These include, for example:

1. the reindustrialization of Europe and the re-shoring of jobs lost to Asia;
2. new career paths within the company open up, as opposed to the fear of losing one's job;
3. digital transformation as an enabler to focus companies and employees on their actual expertise, as opposed to repetitive tasks and troubleshooting.

There has never been a better time to consider whether your company should embark on its IIoT journey.

References

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