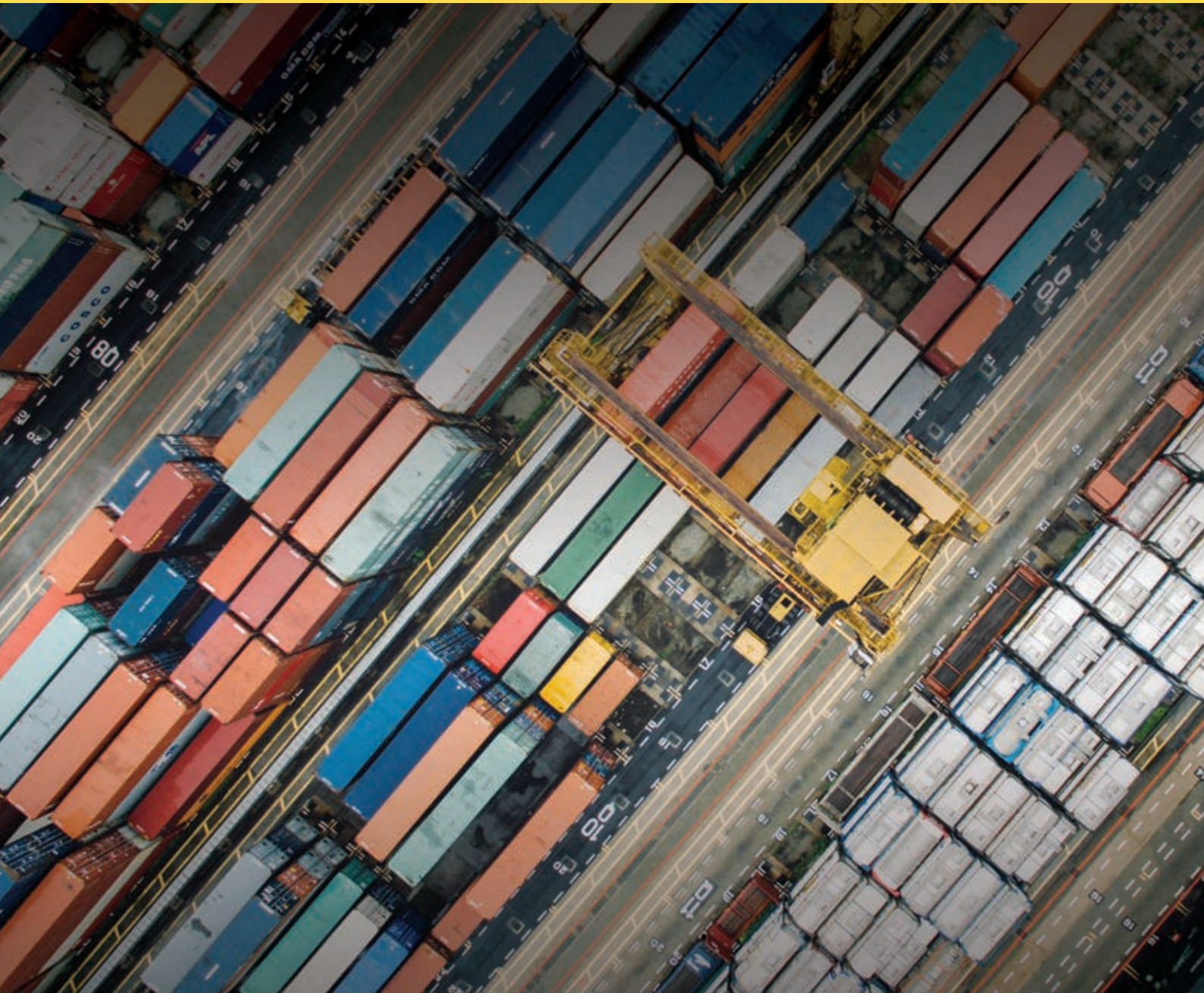
COMTRADE
DIGITAL SERVICES

WHITEPAPER

# Industry 4.0

## Is it time to get out of comfort zone with IoT?



# Introduction
# Industry 4.0, IoT, and the future of OEMs

Driven by technology advances and market demand, the stakeholders roles in the Industry 4.0 are bound to change. While this may not happen overnight, the IoT is set to empower some and diminish the power of others, as the whole industry embraces the customer-centric approach.


About the author

## Sandi Horvat

Experienced Project and Engagement Manager with a proven track record of working in the information technology and services industry for more than two decades. Focused on finding good solutions for a better future.

# The Stakeholders, before and after

In general, there are three stakeholders OEMs, integrators, and end-users. Original Equipment Manufacturer (OEM), is a company that produces parts and equipment that may be marketed by another manufacturer to the end customer. Typically, OEMs rely on their ability to drive down the cost of production through economies of scale. While OEMs in certain industries started exploring the possibility of selling their product directly to end-users, most of them still reach the end customer through the middle man – integrator.

**OEM** companies are consistent with their businesses and have better financial standing than most businesses. Recognized as an approved vendors, this companies usually have a long client list, also known as integrators. Integrators act like a link between OEMs and end-users. While integrators might deal with infrequent demands and opportunistic sales that result in unsteady cash flow, they poses a very valuable asset. **Integrators** are an excellent source of information as they are in touch with market and have a better overview of their customers. Even though, **end-users** can purchase their products from OEMs that is usually not the case. As customers need more than just a product they usually turn to integrators, where they can also receive the support, service and spare parts at one place.

*OEM has no direct contact with end-users.*

This kind of linear business model lets OEMs focus on manufacturing but disconnects them from the market. As OEMs are usually not skilled in direct sales approach that entails the knowledge of marketing and supply chain, they leave the customer-related services to the integrators. While not worrying about building, storing, marketing, selling, and delivering the products has its perks, it also means lost revenue for OEMs. Can the advances in technology fill the knowledge and resource gap in the way direct sales approach would be profitable for OEMs?

*Digitalization puts OEMs in the middle with access to integrators and end-users.*

Historically, reaching the end customers has been too expensive and difficult for OEMs, but the advances in technology are reshaping the industry landscape. Digitalization for OEMs means mastering not only B2B but also B2C business model. By being directly connected to their end-users, OEMs will not be dependent solely on the integrators. Needless to say, direct contact with end-users brings many benefits and opportunities for manufacturers. But will the priceless user-data be enough for OEMs to compensate for the efforts they will have to put in?

# Leveraging the Power of IoT

Interoperability, as one of the design principles in the Industry 4.0., is the ability of machines, devices, sensors, and people to connect and communicate with each other via Internet of things (IoT). Many predict, adding IoT will further automate the process to large extent and we decided to explore it in details. On the following pages, we will take a look at how OEMs can evolve in Digitalization era with help of IoT technology, digitalizing business steps and even upscale the portfolio of it! Besides the most important activity, which is manufacturing, OEMs can expand their business into other areas, providing auxiliary services to their partners (another manufacturers or service providers) or even grasp predictive maintenance venture to take the driver seat towards the road for "owning" the customers.

# Use case
# **The modern view on OEMs**

Modern times force companies to expand their core business activities to gain more revenue and profit. In a digitalization era, data is King – who has the data is the business driver. Imagine maintenance, if you know when, what and where is needed, you can drive the activities in an active way! Therefore, the one who has the data in the activity chain, owns the customer. That is because it is able to actively collaborate with the customers, having them in constant communication loop and bring them added value by supporting them at their important core business activities.

Let's take a look at OEM for example. Producing parts for manufacturers is core business. Let's say that they are in a "passive mode"; waiting for the orders from manufacturers or by partners when some failure occurs. Modern OEMs would have an e-commerce (web-shop) solution available for partners, it can also allow opening the ordering capabilities to everyone in the world, not just to the partners – also additional parts or services could be provided via this system, not limited only to the parts produced by itself – with this, moving up the value chain by offering broader solutions/services in an easily accessible way.

OEMs could provide a solution based on SaaS to their partners, by doing this, they would became an active driver in the business. Without it, partners are the main business drivers, because they are in contact with the end customers who know which end customer needs something and when; OEMs in this case only receive orders.

*Typical OEM services are:*

- Produce parts for other manufacturers
- Produce parts for partners dealing with maintenance

Now let's take a look which parts of the broader solution might be appropriate for digitalization of OEM's business - provide maintenance service solution for partners and favor itself up in the value chain.

*Areas that we could explore:*

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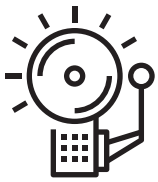
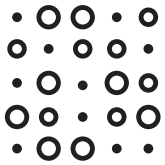
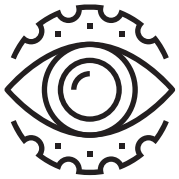
|---|---|---|
|  Identifying problems |  Alerting when problem occurs |  Provide step-by-step instructions how to eliminate them |
|  Provide equipment ordering based on findings |  Provide optimized delivery of parts based on location |  Provide advanced insights when some parts or equipment will likely fail |

*To be able to provide such services, the following issues needs to be addressed:*

- Collecting real time data about the operating equipment
- Create incident records with categorization when problem occurs
- Alerting partners/customer when problem occurs
- Dispatch maintenance team (optimized)
- Collect data about findings
- Use this findings to help with ordering correct parts
- Use feed-back data via reporting for Predictive Maintenance analysis
- Plan the maintenance accordingly to the findings

# The solution
# From collecting data to predictive maintenance

To get all required data to support all described actions we would need the following solution parts, which we like to call building blocks. Building blocks are usually predeveloped or already existing parts of solution(s) (or modules) which require minimal modifications to support a broader suited solution – of course, there will also be some additional effort to satisfy special needs and customer wishes, but building blocks strongly lover risks, costs and time to market required to introduce the prototype or solution into operation. Building blocks can be developed in-house, 3rd party or even made based on open source.

**What we would need, is to divide needs into two areas:**

**a) IoT suite to collect data about the running equipment with Infrastructure to pass this data to cloud**

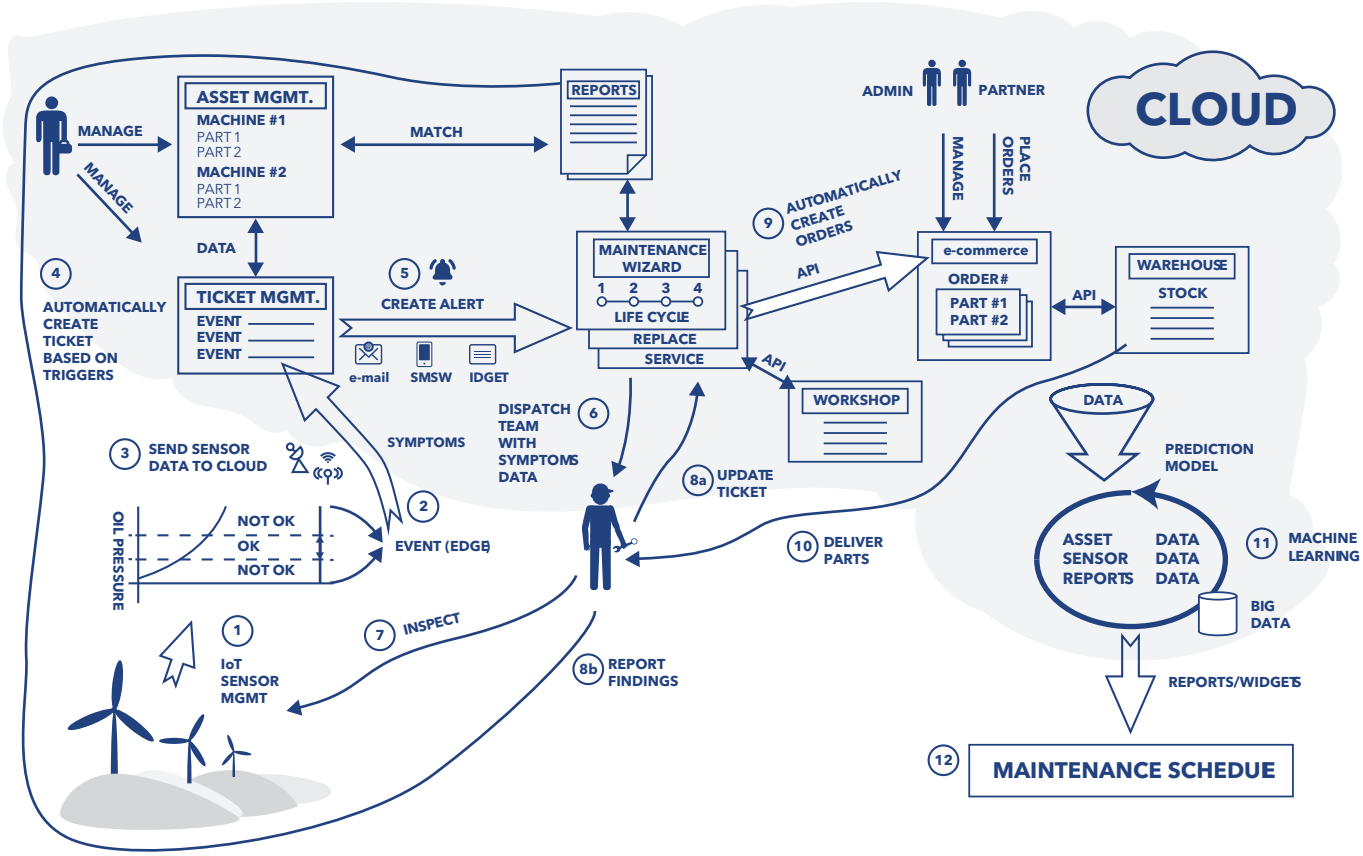
**b) Cloud based services supporting the solution**

**a)** We need sensors connected to gateways which are then connected to cloud using various protocols, data carriers like ETH, wireless, mobile, etc. At first stage, fast prototyping is advised with some affordable equipment like Raspberry Pis, NodeMCUs, etc. – before developing a production version of the equipment for gathering data and getting it into cloud. Agile approach is also advised, because usually all parties needs to learn about solution through time and react to the newly gathered knowledge (from acquiring data, to analyze this data and finally trying to understand it). IoT can be a total failure if the data is not presented in adequate manner to users of the solution.

**b)** We need solution pieces residing in cloud:

- ioT HUB for collecting data from IoT gateways
- Asset management, where we have all equipment identified and documented
- Ticket management for solving identified issues on particular asset
- Wizards for step-by-step actions required to guide till the end of the incident elimination life-cycle
- E-commerce solution for ordering parts integrated with ticket mgmt./wizard or manual parts ordering
- Integration with warehouse, which one is most suitable to deliver parts based on stock, time and location
- Even integration with workshops, where the parts will be repaired and make sure that the parts are repaired in required time frames, and so on
- And at last, but not least, leverage all collected data by using Machine Learning/Artificial Intelligence for Predictive Maintenance.

Let's take a look at the picture for better understanding of the solution. This image represents the steps required to monitor, maintain and predict ship's engine failure:




**Step 1) Collecting telemetry data:** using IoT, we can collect data about the equipment. We can pass this data regularly to the cloud in real-time or we can introduce on-site data manipulation (called Edge Computing) and send only needed or aggregated data into the cloud.

**Step 2) Creating events:** based on data collected by sensors, we can introduce some logic, specific to the needs that we are after (these could be based on simple threshold values or more dynamic logic based). With edge computing we can optimize the data flow, by deciding is this occurrence fit to create an event or not. Based on that we can send the data to cloud.

**Step 3) Sending the relevant data to cloud:** based on edge computing, we know that this occurrence is valid to automatically create an issue ticket in the system. By passing the relevant date gathered from IoT together with logic, we are able to provide the information what is the nature of the problem. This way, we can easier optimize how this event should be handled in optimized way.

**Step 4) Create an issue ticket:** because of all gathered data from previous steps, we are able to categorize the issue and link it to the affected asset in our solution. Now we can, in optimized way, create various kinds of alerts, and send them to relevant people based on asset data and nature of the issue.

**Step 5) Sending alerts:** now we know what asset is involved and what is the nature of the issue – this help us to leverage past experience and fine tune maintenance steps using wizards, which can lead us step by step through the complete life-cycle to resolve the issue.

**Step 6) Dispatching the team:** with the help of symptoms based on IoT data, team already has some insights what they should expect regarding the issue (take with them necessary spare parts, selecting team members with required knowledge, etc.).

**Step 7) Inspecting / solving issue on-site:** team then inspects the issue, which is much more efficient with the right tools, spare parts and required knowledge.

**Step 8) Improving service and updating the ticket status:** the team provides feed-back data via reports. This data is then used for fine tuning the wizards and Machine Learning – doing this, we are able to constantly improve the quality and efficiency of the service.

By updating the status on the issue ticket, we can provide updated data about the progress regarding issue solving and integrating the capability to order necessary spare parts to resolve the issue.

Some issues can be resolved internally, but for some equipment repair shops might be necessary to get involved to fix some specific parts of equipment – to keep track, integration to their system might be introduced (using REST APIs, etc.).

**Step 9) e-commerce:** Through the issue tracking, orders for spare parts could be generated automatically via integration with e-commerce (web-shop). Web-shop can also provide insights which parts are related, this way it is easy to identify for purchaser what is needed. Web-shop is also used by regular customers, so this is just an added bonus integration to make easier and smoother handling of the issue's life-cycle management.

**Step 10) Efficient delivery:** Web-shop is integrated with warehouses around the globe. Delivery will be dispatched from the warehouse, which is most appropriate to deliver necessary parts to the on-site team, taking in account the adequate delivery estimation timings.

**Step 11) Leveraging the data:** now we come to the point, where we want to get gain and be ahead of competition. By using all this hard collected data from various sources, we can use statistics, machine learning and other suitable techniques to leverage the richness of data..

**Step 12) Planned maintenance:** By using the results, via predictive models, we can now predict in some extent, when certain equipment might fail – we can proactively collaborate with the end customer, which wants to focus to its own core business activities and needs help to smoothly run its operations to achieve the best possible service. With this data, it is also easier to plan budget needs in advance – like what equipment will fail in the next X months?

# Digitalization, a Step by Step process

The industry experts are united: despite many advances in the past, Industry 4.0 still has a lot of room for optimization and upscaling of its business. Weather the driver for digitalization will come from technology improvements or market demands, the OEMs with swift and strategic approach will end up reaping the benefits.

We have seen it happen in other sectors as well, where at first digitalization was “nice to have” and eventually became a must. And the companies that became leaders, were the ones who paved the digital way. While it has its specifics, Industry 4.0 is no different.

## Set priorities

The process of digitalization can seem overwhelming but you don’t have to do everything at once. Start with a though analysis of your companies processes and examine the market situation. This way you will know where to start and which challenges to address first. You might start with web-shop, and continue with asset and ticket management or reverse the order completely. Technology supports the part-digitalization through building blocks- Building blocks address company specifics at their current business stage and can provide a faster and safer route to achieve your goals.

# Know your strengths and weaknesses

It is necessary to mention that, many different kinds of expertize is needed to achieve such a solution, thus it is very hard to do it all in-house. For certain, the whole IoT stack expertize is needed, then it comes SW engineering, data science with business analytics to be able to interpret the data. No one can do it alone efficiently, because besides technical knowledge and ability to realize such a solution, domain expertize is needed.

Various studies say that companies like to bridge the gaps with technology vendors and external consultancy – if it is the one with already having knowledge and building blocks in this area, it is even better. This kind of solutions always demands custom approach.

We also need to mention that introducing new solutions like these, the ones in IoT area might be even more prone to that, demand adaptation to changes across all departments in the company – staying ahead of competition, will force everyone out of comfort zone more and more each day in the future.

# Step out of the comfort zone with Comtrade Digital Services

Comtrade Digital Services is a provider of strategic software engineering services and solutions. For over 25 years we have been enabling companies across different industries to innovate faster and reinvent their business models digitally by using agile development methodologies, innovative technology and business acumen. We focus on global delivery and implementation in digital banking, mobility and travel, healthcare, logistics, public sector and telco industries.

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of development work

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