Optimizing your Business with Industrial Internet of Things

Data as driver of digital transformation in the industrial sectors

EVALAN

Summary

The Industrial Internet of Things is creating new opportunities for manufacturing companies. Connected devices offer insights that have become of great value to the sector and therefore market experts predict an increase of IIoT solutions in the manufacturing sector. The companies use IIoT data produced by sensors to digitally transform their production processes and optimize their business. These companies are also known as smart factories. Based on real-time data they are able to predict failures and maintenance and adapt to new demands easily. However, many industrial companies are not using the data adequately and have difficulties turning the data into useful information. How do you adopt smart technology in your factory? Why do you need a smart factory? What are challenges that you may face while implementing IIoT? These questions will be answered in this whitepaper.

In this whitepaper, we discuss in more depth what IIoT means and how data increasingly plays a crucial role in the optimization of production processes. We also highlight the challenges that arise when implementing IIoT devices. Following this, we discuss the opportunities such as the increase in productivity, lower costs and the boost of revenue streams after which we present four successful IIoT cases. Are you making the most out of your data? Do you consider yourself a beginner or precursor in the field of IIoT? In this whitepaper you can find out if your company is successfully using IIoT in our data champion chart. Finally, if you are interested in getting more out of your data, we provide tips to help you prepare for the implementation of IIoT.

Index

Data to improve business performance

Introduction

With the arrival of IoT devices, more and more objects are connected to the internet and communicate with each other. It can, therefore, be said that we live in a world of connectivity. Nowadays you can communicate with everything: from your printer, watch or fridge to the entire lighting system of a building or the machines in a factory. By connecting people, organizations, devices, and services previously impossible opportunities are created. Digital technologies generate and exchange vast amounts of real-time data that affect the way we shop, work, sleep, move and live. Moore's Law is increasingly applicable: Electronics are developing rapidly and their capacity is twice as large every year. As data is becoming a vital asset, industries are increasingly investing in IoT solutions. In this whitepaper we share our knowledge of implementing IoT systems in industrial environments and we will explain how to use IoT data to strengthen and improve your business.

Industrial Internet of Things

The implementation of smart technologies in industrial devices is sometimes called the Industrial Internet of Things (IIoT). This IIoT has grown significantly and now stretches to billions of machines that contain sensors that are connected wirelessly

and share data. Data of even the smallest instruments is collected and is communicated to other devices. The sensors ensure that the tasks within the company or factory are increasingly becoming an automatic process. These companies are also known as a smart or intelligent factory. In a smart factory real-time data is analyzed and operational processes are remotely monitored which may lead to changes that contribute to optimization and efficiency. Predictive maintenance is one of the techniques that is used in the smart factory as a result of remote monitoring. The technique enables manufacturers to predict equipment failures and prevents the occurrence of the failure by performing maintenance. Crucial decisions are made faster and are more effective. An example is the unmanned factory[1]. As the name already suggests, all processes in the factory are automated such that the entire factory can operate without people. If needed, the factory can be monitored remotely. In addition, the machines can use self-learning algorithms that set targets, boost productivity and reduce costs.

'In a smart factory real-time data is analyzed and operational processes are remotely monitored which may lead to changes that contribute to optimization and efficiency.'

Data is the new gold

Industrial sectors increasingly realize that data is an incredible driver for optimizing their business. Over the years, the way industries make decisions has changed dramatically. Traditional know-how and assumptions have given way to data-driven, fact-based decision making, which has caused the adoption of big data solutions.[2] Data is now used by businesses to make effective decisions and improve

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[1] *The rise of the unmanned factory*, EJ Insight
[2] *Data Driven Decision Making Fueling Big Data Adoption,* Ilker Koksal, Forbes

performance. Data contains the three Vs - volume, velocity and variety.[3] The enormous amount of real-time data that is generated by sensors, machines, devices and humans provides scores of opportunities that support industries. It is therefore not surprising that a great amount is being invested in smart technologies.

The rapid adoption of smart technologies ensures enormous growth in the IIoT market in all aspects:

- IDC estimates that by 2025, 41.6 trillion IoT devices will be connected that generate 79.4 set-bytes of data.[4]
- According to the Millions Insight report, the amount invested in IIoT devices will reach a value of more than $ 900 trillion in 2025. The global IIoT market will have an annual growth of 27.8% between 2014 and 2025.[5]
- The Transparency Market Research on the IIoT market estimates that the sector will grow with a compound annual growth rate (CAGR) rate of 24% by 2026.[6]

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[3] *Adoption Of Big Data And Data Analytics In Logistics,* BusinessWorld
[4] *The Growth in Connected IoT Devices Is Expected to Generate 79.4ZB of Data in 2025, According to a New IDC Forecast,* IDC
[5] *Industrial Internet of Things (IIoT) Market Size & Forecast Report, 2014 – 2025,* Million Insights
[6] *IIoT Market Expected to Grow 24 Percent,* SDC Executive

What should you prepare for before you start implementing IIoT?

The challenges you face while implementing IIoT

Data has become of great value for companies. However, challenges can arise when you implement an IIoT system. These challenges have often not been thought out in advance, which results in failed implementations. Below are some of the challenges you might face and can prepare for:

Implementation takes time

Be patient. It might take some time for devices to communicate with each other and for you to extract the data and realize the results that you intended. Gartner estimated that in 2018, 75% of the IoT projects will be twice as long as planned.[7] It takes 2 to 5 years before an IIoT system is fully realized. It is usually not taken into account that implementing IIoT takes a lot of time. More so, it is thought that data will generate valuable insights upon which essential decisions can be made immediately. However, it is essential to put effort and time into the process and to

[7] *Don't let your IoT project be another connected flip flop,* Raconteur

consider that each IIoT system is not a ready-made system and needs to be adapted first.

Costs can be higher than expected

Do not underestimate the costs of implementing IIoT, especially if your project includes a substantial amount of IoT devices or if you are expanding the number of sensors. A more substantial budget may be needed than you anticipated. Sometimes the costs of IIoT systems can rise and approval is needed from business executives who do not fully understand the value of the implementation. It is therefore essential to have an overview of the costs, the value proposition and why it is crucial to use IIoT at the beginning of the project.

Uncertainty and lack of expertise

Where do you start? Although more and more is being invested in smart technology, among business leaders there is often little knowledge about the value of IIoT. In which ways can IIoT be used? How does the smart system work? Lack of expertise can be a challenge. An IoT company that has the knowledge and experience with IIoT can be of service. Their expertise ensures that you choose the right solution and that your system works as desired.

Concerns of security and privacy

Connecting devices and implementing IIoT provides enormous opportunities for companies but can also lead to security breaches.[8] Consider the security and privacy requirements of your IIoT system from the start of your project. Is the data adequately secured, or is there a chance that others can see your data? Who has control over your data? What about the private data of employees that are stored in the database? Make sure you meet the requirements of the General Data Protection Regulation (GDPR). By designing security and privacy protection into the

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[8] *Finding a Balance Between IoT Security Needs and Business Needs,* Roland Atoui, IoT for All

IIoT system from the outset, you can reduce risks of infringement. This applies to all elements of the system – security needs to be considered in the device, with mechanisms that ensure that an infringement in one device does not lead to contamination of the entire system. There must be a secure way of communication between the different parts of the system, and the data storage systems must be properly secured.

> *"An ABI Research survey showed that 68% of manufacturing professionals cited data and privacy concerns a top barrier to adopting innovative technologies. Securing and controlling IoT networks, devices, applications, and data transfer is critical for success.* **IIoT security must be integrated into solution design** *and should be treated as a priority throughout the solution lifecycle".*[9]
>
> Bill Reeves, VP Customer and Product Marketing at KORE

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[9] *4 Common Industrial IoT Challenges and Tips for Avoiding Them,* Bill Reeves, Core

Opportunities with IIoT data

IIoT offers multiple opportunities to optimize business performances

Data is a valuable asset for a manufacturing company. However, 80% of the companies are not prepared for the amount of data that is generated by IIoT systems, and have little or no idea what to do with it.[10] If a company does not use its IIoT data in a meaningful way, it could lead to inefficiencies, increased operational costs and missed business opportunities. In industrial companies, only 3% of the IIoT data that is generated is used to optimize productivity, quality, asset utilization or other business objectives.[11] What benefits do IIoT systems offer that traditional systems cannot? Below are five important reasons for industrial companies to implement IIoT.

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[10] *The Big (Unstructured) Data Problem.* Juliette Rizkallah, Forbes
[11] *Be a Smart Data-Driven Company,* Janet Ooi, Electronic Design

1. **Increase in productivity**

   Sensors track machines in real-time. They monitor how the machines are operating and identify defects. Manufacturers can process the collected data, learn about the performance of their machines, implement methods that identify weak links or critical deterioration, and prevent failures from occurring. As a result, serious downtime is avoided, and all processes keep running. As the machine's cycle time endures, productivity increases.

2. **Lower costs**

   The data that is continually collected by the IIoT devices may provide insights that result in smarter business operations and lower costs. Manufacturers can reduce downtime by analyzing data. Preventing failures allows companies to save a considerable amount of money. Sensors also show when a machine needs maintenance. Due to the information, maintenance can be scheduled only when it is needed. This also saves unnecessary costs.

3. **Boost revenue opportunities**

   IIoT data allows companies to increase productivity by automating processes. It can lead to higher revenue. Smart technologies help to create strong use cases, diminish time to market and amplify return on investments.[12] A company can use the data to see what the customers' preferences are and manage its products and services exactly to these preferences. The company can really benefit from the data and it boosts their revenue streams.

4. **Creating new business models**

   More and more companies base their business decisions on real time data. The real time data ensures them to stay one step ahead of their

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[12] *Advantages of IoT in Businesses,* TechnoStacks

competitors. With IIoT data, companies can realize a business model that fits precisely with the way the company operates. The processes, such as production, delivery time to the market and market performance can be optimized based on the available data.

5. **Enhance customer services**

   With IIoT, services can be improved. Smart technologies have enabled industries to target individuals. IIoT helps companies transform their business from simply making products and services to companies that give their consumers desired outcomes. IoT enables companies to gain insight into every piece of data, for example, what customers are actually looking at and touching[13]. In that way manufacturers can offer customers what they want. Converting their preferences into useful data ensures that customers will continue to use the services of the company.

'If a company does not use its IIoT data in a meaningful way, it could lead to inefficiencies, increased operational costs and missed business opportunities.'

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[13] *Making The Internet Of Things (IoT) More Intelligent With AI,* Ron Schmelzer, Forbes

This is how four companies use IIoT for business success

To illustrate how IIoT can offer smart solutions, four cases are exemplified. These are successful IIoT projects that meet their objectives and deliver value. The last two are from our own practice.

Monitoring fish farms in Vietnam

As one of the largest fish exporters in the world, producing almost 6 million tons of fish a year, it is important for Vietnam to control and ascertain the quality of their fish. PHA Distribution, an IoT and IT distributor in Vietnam, has deployed a wireless sensor network together with Libelium's Waspmote Plug & Sense! Sensor platform at a fish farm in Thanh Bình District. The sensors measure important parameters of the water in the farm, such as temperature and oxygen. By monitoring these parameters in real time, the water quality is controlled and diseases are prevented. As a result, the quality and quantity of the fish improves. Ultimately, the sensor network ensures that costs are saved and more revenue is generated. Real-time monitoring at the fish farm reduces the number of fish waste between 40% to 50%[14] and helps ensure the continuity of fish production in Vietnam.

"Real-time monitoring allows us to help our end clients with being aware of preventable diseases. By preventing diseases the client can save costs in disease treatment, keep the fish in good health and diminish fish loss."[15]

Tran Vinh Phong, Managing Director at Pha Distribution

[14]*Fish farm monitoring in Vietnam by controlling water quality in ponds and tanks,* Libelium
[15] Ibid.

Combining IIoT and data in the Automotive Diesel System factory

The Bosch Automotive Diesel System Co. Ltd.'s factory in Wuxi, China, is a German-Chinese joint venture that combines IIoT and data to manage their business. The company manufactures high efficiency and low emission diesel engine parts[16]. To control the production process, all machines in the factory are connected and collect data. The data gives insights into the condition and cycle time of the machines. These insights allow the manufacturer to understand and eliminate a machine's output losses and prevent machine failures. This leads to an increase of the uptime of machines. The company says that using data analysis has led to a 10% increase of the output[17]. Decisions are made faster and more efficiently. The result is an optimized factory.

Improving Availability and Quality of Tank Beer Systems

A few years ago, Heineken developed a medium size tank beer system for bars and restaurants. This system introduced a number of innovations, including technology that allows for pressurizing the tanks with air instead of carbon dioxide, and a remote monitoring (telemetry) system. The system uses sensors to measure beer volume, temperature and other quality parameters. Evalan managed the development of the remote monitoring system, and also developed a control system for the automatic cleaning of the beer lines to the tap.[18]. With the data that is collected by the system, Heineken is able to take immediate action if the beer volume in a bar or restaurant is running low or if the temperature or other quality indicators deviate. This results in more efficient deliveries and reduced logistic costs and run-outs.

Fleet management system to centrally manage golf carts

Handicart owns about 750 golf carts, which are spread out over 120 golf courses throughout the Netherlands. These carts can be rented for rounds of golf, with

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[16] *Wuxi factory embraces new technologies for smarter production,* Xu Mengqi, Ding Yi, CGTN
[17] *Industry 4.0: 7 Real-World Examples of Digital Manufacturing in Action,* AMFG
[18] *Measuring beer stock a quality with remote monitoring,* Evalan

priority given to members of Handicart. To efficiently manage this fleet, Evalan developed an IoT system[19] that monitors the golf carts – it tracks the operations and conditions of the carts in real-time, identifies maintenance requirements and manages the reservation of the carts by members. The collected data is used for automatic billing and automatic replenishment of consumables and spare parts. A reminder by email or SMS is transmitted if maintenance is not performed. The system tracks battery status and energy consumption, which is used to make sure that batteries are always sufficiently charged before the start of a round, and to decide about battery replacements.

All this can be managed by Handicart through a central dashboard. Handicart has been able to save costs, increase revenue, improve services and extend the average life of the carts.

"Handicart's growth has been considerable over the last few years. In this process, Evalan has been a valuable partner to us. Not only do they maintain control over the various processes, they also provide very valuable solutions by thinking along with us in a very constructive way. We see Evalan not only as a highly skilled software developer but also as a valuable partner."

Th.D. Stenfert Kroese, CEO Stichting Handicart

[19] *Fleet management system for 700 golf carts,* Evalan

Do you grasp all the opportunities possible with your IIoT data?

Utilizing all the data to get the most out of your company

In most IIoT systems, only some of the available data is used. However, the remaining data often can deliver value as well. Are you utilizing all your data to realize maximum results? Is your company embracing all the opportunities that are possible with IIoT? In the next section, you can answer the list of statements with yes, no or neutral. When you answered the statements with yes, no or neutral, add up your points and find your position on the data champion chart.

Yes: 3 points
Neutral: 2 points
No: 1 point

15-25 points: Beginner
25-35 points: Competent
35-44 points: Expert
45 points: Data Champion

17

Statements

1. My organization has clear long-term strategic objectives

2. My organization has clear short-term strategic objectives

3. I know which data is collected

4. We have an overview of all the collected data

5. Our data is secure and easy to analyze

6. We have enough data to perform meaningful analyses

7. Different departments work together to combine various data

8. We have software to analyze the data and to draw conclusions

9. We have the capacity to convert the insights into activities

10. There is a budget for new initiatives that come from the data

11. We have set up a data process in the organization that includes collection, analysis, interpretation, prioritization and follow-up

12. There is a clear plan for following up the results from data analysis

13. Ownership of data analysis is clearly invested within the organization

14. When collecting data, we work from one central system

15. We do not suffer from legacy when it comes to new technology and data-driven innovation

Data Champion Chart

5 0

4 0

3 0

2 0

1 0

0
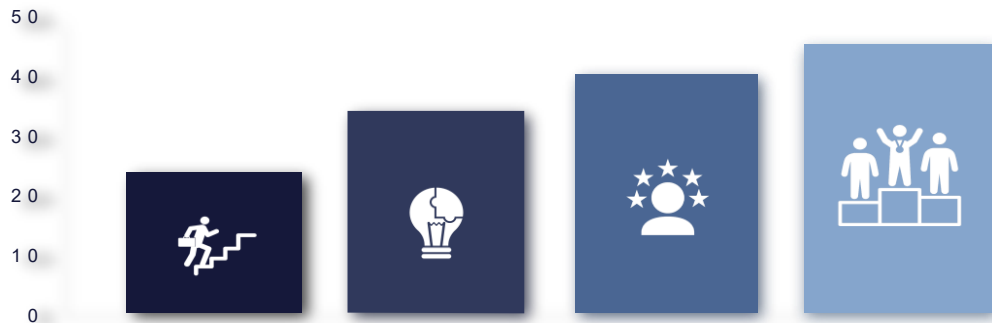
Beginner
Your organization is situated in the first phase of data collection and IIoT implementation. The objective is clear, however, the enormous amount of data can be overwhelming. It is a difficult task to convert the available data into meaningful insights. Collecting, analyzing and interpreting IIoT data is still far removed from how smart factories collect, analyze and interpret their data. However, practice makes perfect. Make sure you continue to focus on the available data because the more experienced you become with analyzing data, the more you can benefit from it.

Competent
In this phase, the long-term objective is clear and the software to analyze the data is available, however, the changes are still small. Gaining experience in the field of IIoT data is essential in leading the organization to achieve the objective. A clear data process and an assigned team will be beneficial to the growth of the organization. Keep the main objective in mind and do not get misled by other solutions made possible by the connected devices. These new solutions may intervene with the initial IIoT project.

Expert
As an expert, your manufacturing company knows how to use the collected data and benefit from the new insights. The IIoT system is secured from the start and for the remainder of the project. The system provides many insights which the organization uses to strategically work towards their main objective. Different departments work together to combine the data and results in new IIoT initiatives. The next step is to guide and secure these new initiatives properly and expand the scope of the IIoT solution.

Data champion
Your organization knows exactly how to use IIoT data optimally and achieve the highest attainable results. The IIoT system is protected from the outset and continues to be secured throughout the expansion of the system. There is a clear plan and budget for new initiatives that arise as a result from the collected data. The company has technical knowledge of the newest technologies and leads to even more data-driven innovations. The organization is seen as IIoT precursor in its sector.

How do you become a data champion?

The importance of using the available data

By using the data that is available, you can become a data champion. Sensors create insights that can support your business choices and help build a future-proof company. How do you profit from data? What do you need to prepare before implementing IIoT? When a company decides to transform their business with IIoT, it is necessary to think of a few things to ensure successful implementation. In the following section, you can find 6 tips that help you prepare for the digital transformation.

6 Tips and tricks to help you optimize your business with IIoT

1. Choose your objective and stay focused during the project

Always keep the purpose of the IIoT implementation in mind. It is easy to get caught up in the extensive amount of data that is generated. The infinite collection of data could lead to other possible solutions. However, staying focused on the main objective instead of solving various issues at a time will ultimately lead to a more

stable and secure solution. Focus and consistency are also important for enabling the other team members to successfully contribute to the project.

> *"It is critical to reassess IoT projects periodically during implementation to validate that the project will still deliver the business goals, objectives, outcomes and business value originally expected."*[20]
>
> Nathan Nuttall, Gartner Research Director

2. Assign someone to manage the data generated in the IIoT project

Analyzing and managing data takes time. Companies are often inundated with data that is generated by their devices. The amount of data that has to be monitored, checked and analyzed, should not be underestimated. From the start a team(member) should be appointed for data monitoring.

3. Make sure to share knowledge about IIoT

Sharing knowledge about IIoT with your organization is essential. Your company will improve when your employees have basic know-how of IIoT devices and how it will affect their daily activities. By making your employees familiar with the new technologies that are implemented, they will be more open for the changes that result from the IIoT implementation and they will be able to support the project's objective. This will result in processes running more smoothly and delivering the added values that are expected.

4. Choose reliable partners

Partnering with an IIoT expert can be helpful in the realization of a successful IIoT project. The IIoT expert can advise on the best possible solution and can guide the implementation process. IIoT technology is developing rapidly. Knowledge about the state-of-the-art and understanding which technology is ready for deployment

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[20] *Leading the IoT: Gartner Insights on How to Lead in a Connected World*, Mark Hung, Gartner

and which is not, is indispensable for successful IIoT projects. It is important to ensure that all stakeholders are informed and involved in the project as well, including investors and suppliers.

5. Be careful with scaling up too soon

Start small and ensure that your smart IIoT system delivers what is intended. Test to make sure your IIoT devices work as they are supposed to and deliver what is necessary before deploying at a large scale. Only start thinking about broadening the scope when the first objectives are realized.

6. Keep your focus on security

Always ensure that your IIoT system is adequately secured to minimize risks for infringement. This starts with keeping your software and devices up to date, by identifying risks, installing patches, periodic testing, logging and making sure that all work procedures that relate to system security are diligently followed. Privacy must be encompassed in the entire design. Privacy by Design means that by default, privacy is integrated in the IIoT system.

'Sensors create insights that can support your business choices and help build a future-proof company.'

Wrapping it up

The prospects for IIoT and Data

In the future, data and IIoT will be utilized more and more. Data is an increasingly significant asset value. Especially the collaboration between IIoT and Artificial Intelligence (AI) will become an important factor in the industrial sector. In the area of IIoT and AI, improvements are made which will intensify the production process, automation, organization and security. There is great potential in the vast amounts of data with which you can change entire business models, such as the automation of all processes. AI will play a vital role in the automation of the smart factory. Instead of manually adjusting a formula that requires human action, the system will adjust itself by recognizing patterns. This digital future is closer than you think. By implementing IIoT you make your business run more effectively and your company will be prepared for the digital changes that are coming. With the expectation that more than 75 billion devices are connected to the internet by 2025, companies can no longer afford a future without IIoT.

About us

Evalan is a fast-growing and innovative development and application partner in the field of the Internet of Things. We work in close collaboration with our customers to achieve the best results possible. Evalan focuses primarily on remote monitoring, biometric measurements, and telemetric solutions for the healthcare, industry, and government sectors. We develop mobile devices, sensors, data management systems, data processing algorithms, and user interfaces for different platforms. We serve around 100 clients, ranging from large multinationals like Heineken and Unilever to government departments like the Ministry of Defense to hospitals and small technology companies. In 2010 and 2014, Evalan was ranked by the Chamber of Commerce among the 100 most innovative Dutch small to medium-sized enterprises. The company was founded in 2005. From our offices in Amsterdam, we operate in over 50 countries. Find out more at https://evalan.com/. Or follow us on Twitter or LinkedIn.

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Reference list

1. *The rise of the unmanned factory*, EJ Insight

2. *Data Driven Decision Making Fueling Big Data Adoption,* Ilker Koksal, Forbes

3. *Adoption Of Big Data And Data Analytics In Logistics,* BusinessWorld

4. *The Growth in Connected IoT Devices Is Expected to Generate 79.4ZB of Data in 2025, According to a New IDC Forecast,* IDC

5. *Industrial Internet of Things (IIoT) Market Size & Forecast Report, 2014 – 2025,* Million Insights

6. *IIoT Market Expected to Grow 24 Percent,* SDC Executive

7. *Don't let your IoT project be another connected flip flop,* Raconteur

8. *Finding a Balance Between IoT Security Needs and Business Needs,* Roland Atoui, IoT for All

9. *4 Common Industrial IoT Challenges and Tips for Avoiding Them,* Bill Reeves, Core
   The Big (Unstructured) Data Problem. Juliette Rizkallah, Forbes

10. *Be a Smart Data-Driven Company,* Janet Ooi, Electronic Design

11. *Advantages of IoT in Businesses,* TechnoStacks

12. *Making The Internet Of Things (IoT) More Intelligent With AI,* Ron Schmelzer, Forbes

13. *Fish farm monitoring in Vietnam by controlling water quality in ponds and tanks,* Libelium

14. Ibid.
    Wuxi factory embraces new technologies for smarter production, Xu Mengqi, Ding Yi, CGTN

15. *Industry 4.0: 7 Real-World Examples of Digital Manufacturing in Action,* AMFG

16. *Measuring beer stock a quality with remote monitoring,* Evalan

17. *Fleet management system for 700 golf carts,* Evalan

18. *Leading the IoT: Gartner Insights on How to Lead in a Connected World,* Mark Hung, Gartner