Tech

Factory of the future: The IoT and data revolution

orange™ Business Services

Foreword

Industry 4.0, digital industry, the industry of the future, smart manufacturing... so many buzzwords that symbolize the emerging transformation of manufacturing companies as they move towards fully digital operations.

Germany, which created the Industry 4.0 concept, launched its industry digitalization program in 2011. In 2013, France kicked off its “Usine du futur” (Factory of the future) program later renamed “Industrie du futur” (Industry of the future). Numerous other countries are also developing independent initiatives with their own brands and objectives.

A step-by-step transformation

Industrial digitalization provides three types of support for manufacturing companies:

- developing the technology offer for the industry of the future,
- supporting production equipment modernization,
- developing the skills needed to on-board these changes.[1]

Other countries also share this vision: create a connected and flexible industry to help companies stay competitive and develop their leadership and enhance the country’s presence in the international marketplace.

[1]Bidet-Mayer T., 2016, “L’Industrie du futur à travers le monde,” Les Synthèses de La Fabrique, Issue 4.

“A worldwide race to accelerate the manufacturing industry’s transition to the connected plant model is under way[1]”

Fabrique de l’Industrie

Solution

With its Datavenue offer, which features the best of the Internet of Things (IoT) and data intelligence revolution, Orange Business Services is there to support manufacturers as they go digital.

The manufacturing industry: conquering IoT and data intelligence

What is Industry 4.0?

Industry 4.0 refers to all of the initiatives taken by manufacturing companies aiming to transform and optimize their entire value chain by digitizing their ecosystem. The adoption of IoT, Big Data and Digital Workspace technologies, as well as their adaptation for industrial environments thanks to robotics and cyber-physical systems, have created a vast ecosystem of interconnected sensors and devices. Applications, services and mobile infrastructures are being developed in response to the unique needs and features of the manufacturing industry.

Objectives
Automation, flexibility, process optimization, energy and equipment efficiency, lower costs, increased productivity and new product and service offers.

110 billion

Digital technology generates approximately 110 billion additional euros for European industry.

By 2020

- **80% of companies** will have digitized their value chains.
- **18% increase in productivity** forecast due to industrial digitalization.
- **1 billion connected objects** will be present in factories, vastly increasing the amount of data.

Geissbauer R. , Schrauf S. , Koch V., Kuge S., 2015, « Industry 4.0 – Opportunities and Challenges of the Industrial Internet », PWC

Enhancing performance with “4.0”

1.0

19th century
Mechanization, water power and steam power revolution

2.0

Early 20th century
Mass production, assembly lines, electric power revolution

3.0

Late 20th century
Programming (computer boom) and automation

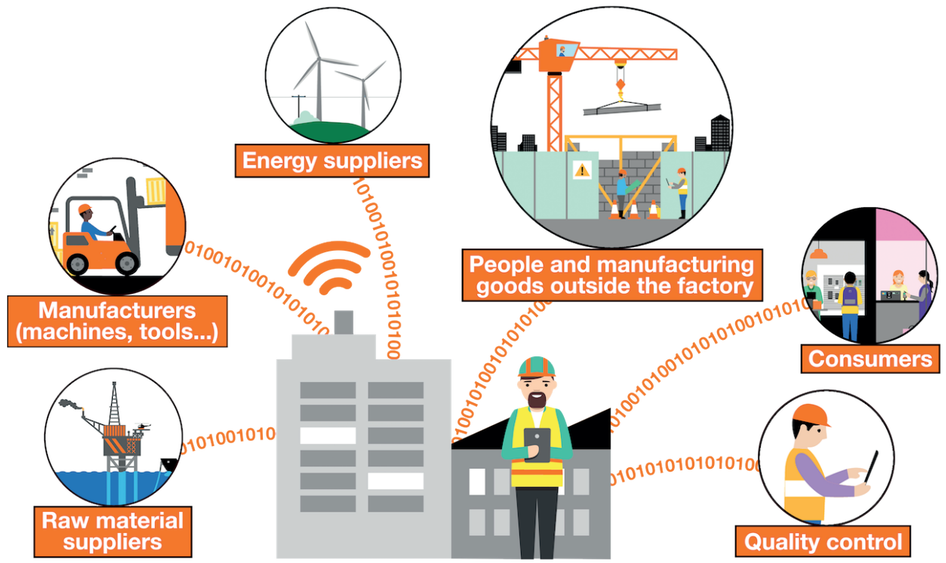
4.0

21st century
Plant digitalization –Industry 4.0, cyber-physical systems

Controlling a complex ecosystem

Industry 4.0 affects both core plant operations and the entire corporate ecosystem. In addition to internal operations, all interactions with key value chain partners, from supplier management to consumer relations, are affected by industrial digitalization. The entire structure of the product lifecycle is changing.

A digital plant within a digital company



Going digital: challenges and benefits

At the heart of a digital factory

The objective of production resources is to optimize plant efficiency through digitalization. The production environment and internal processes are transformed for increased supplier and partner involvement.

Improving logistics and traceability

Sensors enable companies to locate product components in real time and track those components throughout production, even after they leave the plant. The benefits are:

- direct stock and production status management,
- better anticipation of raw material needs,
- potential improvement of customer service.

Boosting production resource performance

Connecting machines to one another, to operators and to the information system enables the company to collect and analyze the data needed to boost its operational efficiency.

A single robotic machine can be used during different stages of production with an “on the go” configuration. The end result: improved use of a tool by giving it multiple functions with no need for an operator to reset its parameters.

Optimizing company asset management

Companies can use the data issued to employees from the connected objects and digital devices to remotely supervise, control and manage all of their assets (generators, vehicles, machines, cranes, etc.). Data analytics can help to predict breakdowns, reduce downtime and anticipate maintenance. If a problem still occurs, administrators can use the received information to better prepare for the repair.

Practical example

Orange assisted a cosmetics manufacturer with the implementation of a tracking solution covering its label supplier and its plant. Adding RFID tags to each roll of labels provided a way to automatically identify the actual volumes sent and received: the supplier is only paid for pallets sent, thus avoiding manual inventories and the need to manage credit notes. Stock management is more reliable, and acceptance time is cut from four hours to 30 minutes.

Three benefits of data analytics

- Predict breakdowns
- Reduce downtime
- Anticipate maintenance

Boosting employee performance
Data analytics facilitates human-machine interactions and improves teams' productivity.

Making sites and employees safer
The data collected by onsite sensors (gas, liquids, machines, etc.) is combined with data from employees' devices to better anticipate risks and safety alerts.

Dynamic virtual safety zones help prevent the risk of collisions with people, and detect manufacturing hazards. Video scans at the entries to high-risk areas authorize access depending on operators' equipment.

Prioritizing cybersecurity
With the emergence of the Internet of Things (IoT), Industry 4.0 accumulates all of the risks that have been repeatedly demonstrated since the Stuxnet worm attacks at the beginning of this decade. GAFA (Google, Apple, Facebook and Amazon) and various institutions are starting to work on IoT security, particularly by publishing guides.

As a result, IoT security standards, which will enable manufacturers to develop predictive maintenance and behavioral analysis methods to detect attacks as early as possible, should be released soon.

Thanks to Industry 4.0, factories are changing. As they enter the age of smart manufacturing, the production chain, the associated processes and employees are all interconnected.

Practical example

We helped one of our customers digitize the workspace and the equipment it provided to its technicians who work on electrical transformers. We were able to identify weak links in the process by analyzing their itineraries. With a new mobile workspace and applications that provide updated information in real time, technicians are more efficient and can work more easily. The repeat service rate was significantly reduced, generating increased productivity and cutting costs.

Orange initiative

Our cybersecurity entity, Orange Cyberdefense, has developed an audit repository that has been used in over 50 audits since 2012. The repository highlights the ten most common vulnerabilities in industrial information systems and includes IoT security measures. Orange has drawn on these analyses to enhance its expertise and help its customers efficiently fix their security weaknesses.

Industry-wide changes

The impact of digital technology on the manufacturing industry goes beyond plants to create continuous interactions between companies and their consumers, partners and sub-contractors to deliver products and services that are increasingly high-performing and tailored to customers' needs.

Designing innovative products

Embedding sensors or connected devices in products enables manufacturers to collect and analyze data generated by use of those products. That gives the manufacturers a better understanding of the actual use and performance of their solutions. Collected data can be used in the research and design phases to constantly improve the products.

Focusing on customer experience

Thanks to the IoT, manufacturers can interact with the final product to offer customers an increasingly efficient service and an excellent user experience. That opens up the opportunity to go beyond selling products or machines by creating additional innovative services linked to equipment usage.

Practical example

Orange helped VINCI Autoroutes optimize maintenance of the Boutroux rest area on the A10 motorway by integrating sensors that use the operator's LPWAN network, which is based on LoRa® technology. Drivers receive real-time information on the availability of parking spaces for smoother traffic flows in the rest area. The sensors also enable VINCI Autoroutes to monitor roadway temperature, the stock level of lavatory consumables, the trash level of waste containers, abnormal consumption of water and energy, etc. VINCI Autoroutes uses a connected "Smiley box" to survey customer satisfaction.

Case study

General Electric

A successful digital transformation

Practical example

Orange supported MCI, a commercial and industrial cooling installation specialist, with the implementation of an energy performance monitoring and diagnostic solution for its equipment on its customers' sites.

Reducing environmental impact
Manufacturing companies can increase their productivity by connecting their needs and availability of resources and energy.

As a result, gas emissions, noise and waste management are better controlled, which helps reduce environmental impact and energy costs, two unavoidable challenges for industrial manufacturers.

Industry 4.0 is leading companies towards smart network operations. That means personalized production, increased flexibility and enhanced productivity. Companies' business models – and all of their interactions with consumers – are changing dramatically. The fourth industrial revolution is paving the way for increased responsiveness to market trends and decreasing costs, fostering innovation and growth.

Orange initiative

Orange is implementing an energy usage monitoring solution on its own sites. We're using our LPWAN network to develop a way to view consumption on 1,200 sites.
That will be combined with a usage management feature to ultimately move towards a network that is available only when needed.
The objective is a 5-6% reduction in sites' annual energy consumption by 2020.

5-6%

Reduction in sites' annual energy consumption by 2020.

A set of skills and solutions to transform your environment

The IoT and Big Data revolution is profoundly changing the core business of many companies. To better understand these changes and to support our customers throughout this transformation, Orange has developed vertical expertise in a variety of industries.

Orange is the partner for your digital transformation

- A global IoT leader with over 12 million connected objects.
- 700 IoT and data analytics experts who can provide end-to-end support for your digitalization.
- Proven experience in digitizing manufacturing enterprises.

Network expertise

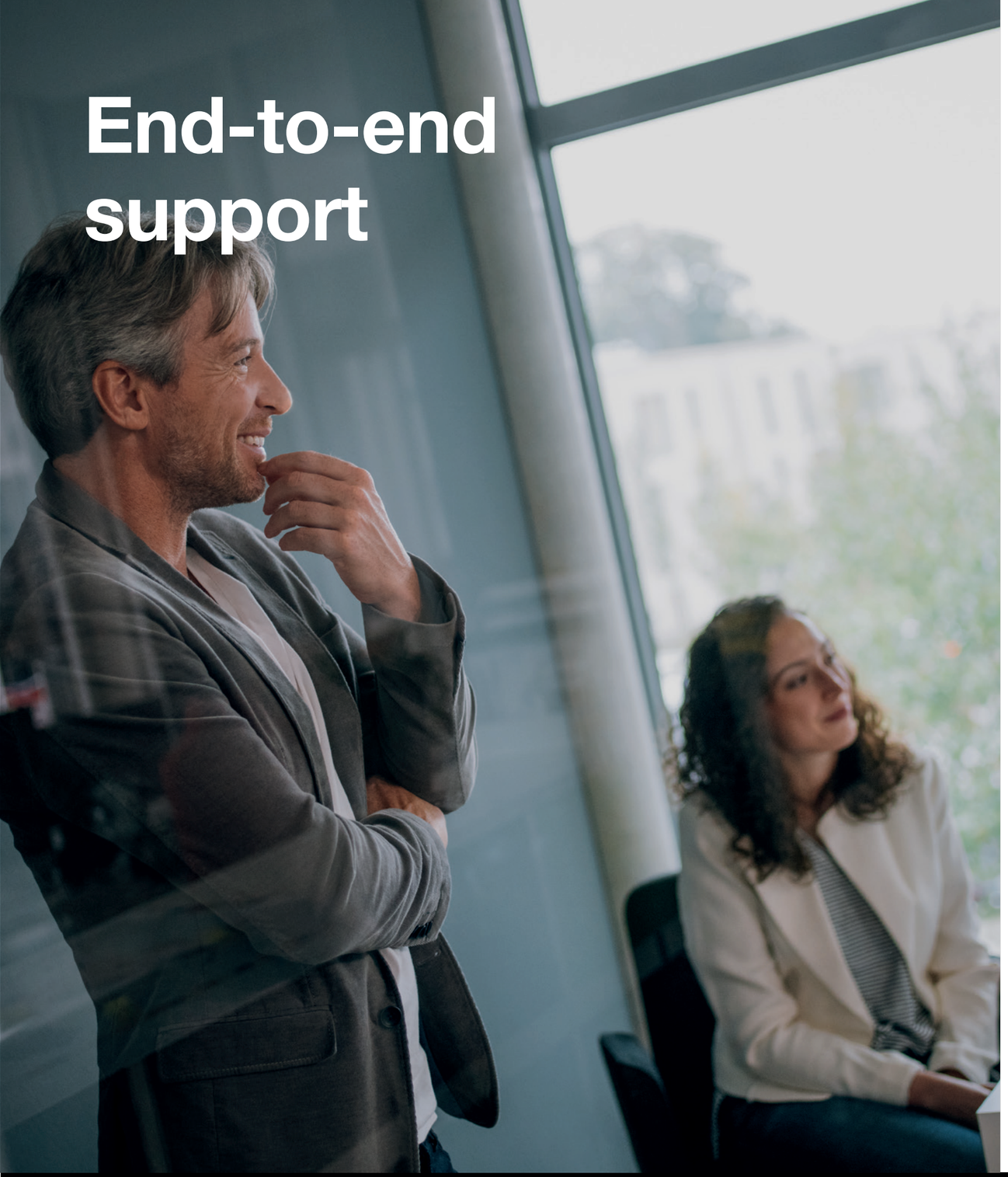
- Connectivity solutions designed for each type of use.
- Global coverage with a broad range of hybrid fixed and mobile networks.
- Over a decade of experience as an M2M operator (2G/3G/4G).
- LPWAN (LoRa®) network development to prepare for the future of the IoT.

An open approach to co-innovation

- Full, regularly enhanced catalog of corporate solutions and services.
- Continuous innovation cycle to prepare for the challenges of the future.
- A commitment to French Tech.
- Leadership of a full ecosystem of partners, from device manufacturers to startups and software publishers.

Orange, a trusted operator: security by design

- Guaranteed end-to-end security, from devices and users to data platforms and business applications.



End-to-end support

Helping you build your strategic vision

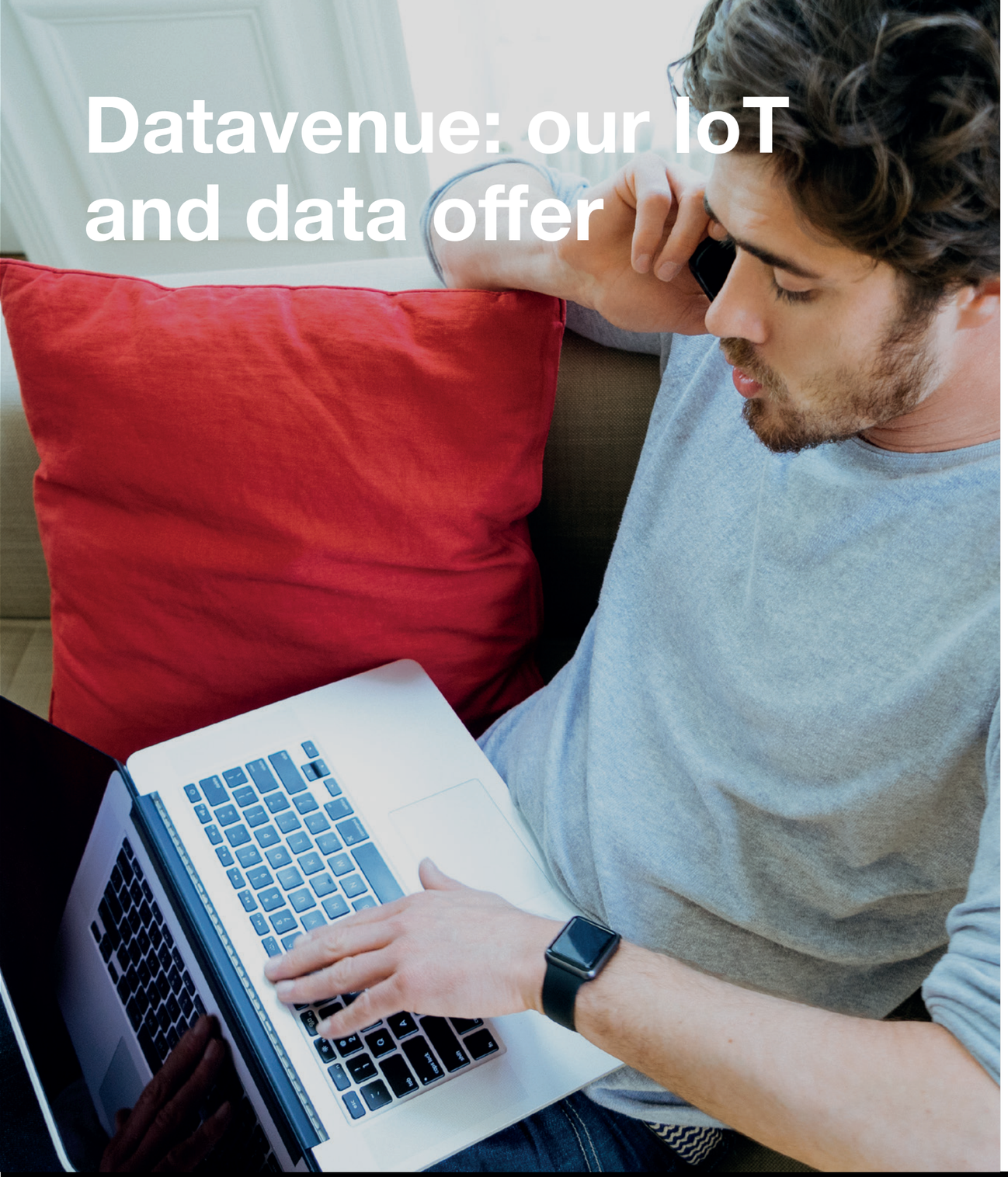
The Orange teams work with you to develop benchmarks and set up workshops for everyone involved in the value chain to help build your vision.

An ecosystem of experts with additional input is available to share their innovative skills and experience.

Supporting the implementation of your project
Orange uses the empirical and agile “learn fast” approach to implement your project: simple, easily adjustable tests to support the technical integration of the created solution. A single, dedicated contact is there to help you every step of the way.

Controlling the impact on your company
We help reorganize your value chain to integrate the new roles and activities that result from your digital transformation. We guide your employees through the changes to the company and manage their upskilling process in the new organization.

Datavenue: our IoT and data offer



Select

Select your objects and your data sources

Connect

Connect your objects securely, based on your needs

Manage

Manage the lifecycle of your objects and data

Control

Control your project's key success factors

Select

Select your objects and data sources

- Orange helps you select your connected objects from a comprehensive catalog developed with our partners. These robust, durable objects are designed for industrial use and meet your safety requirements.
- We work with you to select the right sensors for the type of data that you need and ensure that they are compatible with your production environment.

Connect

Connect your objects securely, based on your needs

- We help you select a network solution that matches your performance, quality and cost requirements.
- Our teams guarantee all of the key network parameters: optimal availability and security, adequate speed, robust technology and controlled energy consumption.
- As a long-term, multi-technology partner, we can roll out our own network infrastructure on your sites and recommend which technologies to use (RFID, Wi-Fi, 2G/3G/4G, LPWAN, etc.).

Manage

Manage the lifecycle of your objects and data

- Orange integrates and stores collected data on a platform. You receive secure messages and incident notifications from your connected objects. The platform dynamically updates your objects and allows you to manage your fleet in real time. You can generate performance indicators that match your needs and implement follow-up actions to optimize your business.

Control

Control your project's key success factors

We have 700 Orange experts available to support you throughout your project and help you control your solution:

- Security
  We provide support to secure your IoT and data chain, with security audits and the creation of IT infrastructure that protects your employees' privacy. We also offer certified hosting infrastructure.

- User interface
  We help you roll out the human-machine interface for your solution and connect it to your employees' various electronic devices.

- Data analytics
  Depending on how it is interpreted, a single piece of data can be used in a wide range of analyses and decision-making processes. Thanks to our APIs, you can use this information on a very detailed level in your predictive analysis system.

- Change management
  We work with you to integrate the new IoT-related roles and activities, implement new processes and handle change management within your teams.

- Maintenance
  We provide maintenance for your applications and support upgrades through our service centers.

Manitowoc, full support for the digitalization process

1,000 cranes

Orange is currently installing devices on approximately 1,000 cranes at a rate of 30 per month.

Manitowoc wanted to equip its cranes with connected devices to supervise their usage cycles.

Orange helped Manitowoc select the right tracking devices, which had to be weather resistant (cold, rain, high heat, etc.), to collect the data needed for its project (number of hours of use, loads lifted, etc.).

The devices were equipped with SIM cards and were installed on the cranes. The devices were then connected to the 3G network, which covers all of the cranes.

We developed a platform for information exchange between the devices on the cranes and the customer's system. Our teams are also working on adding software features and developing a mobile version.

Manitowoc can now easily and efficiently supervise its cranes worldwide: the SIM cards and subscriptions are managed by the end users, and the response times are short enough to detect extremely brief incidents (1/4 s).

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