



Expanding horizons with the Internet of Things,
Services and People (IoTSP)

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A leader in power and automation

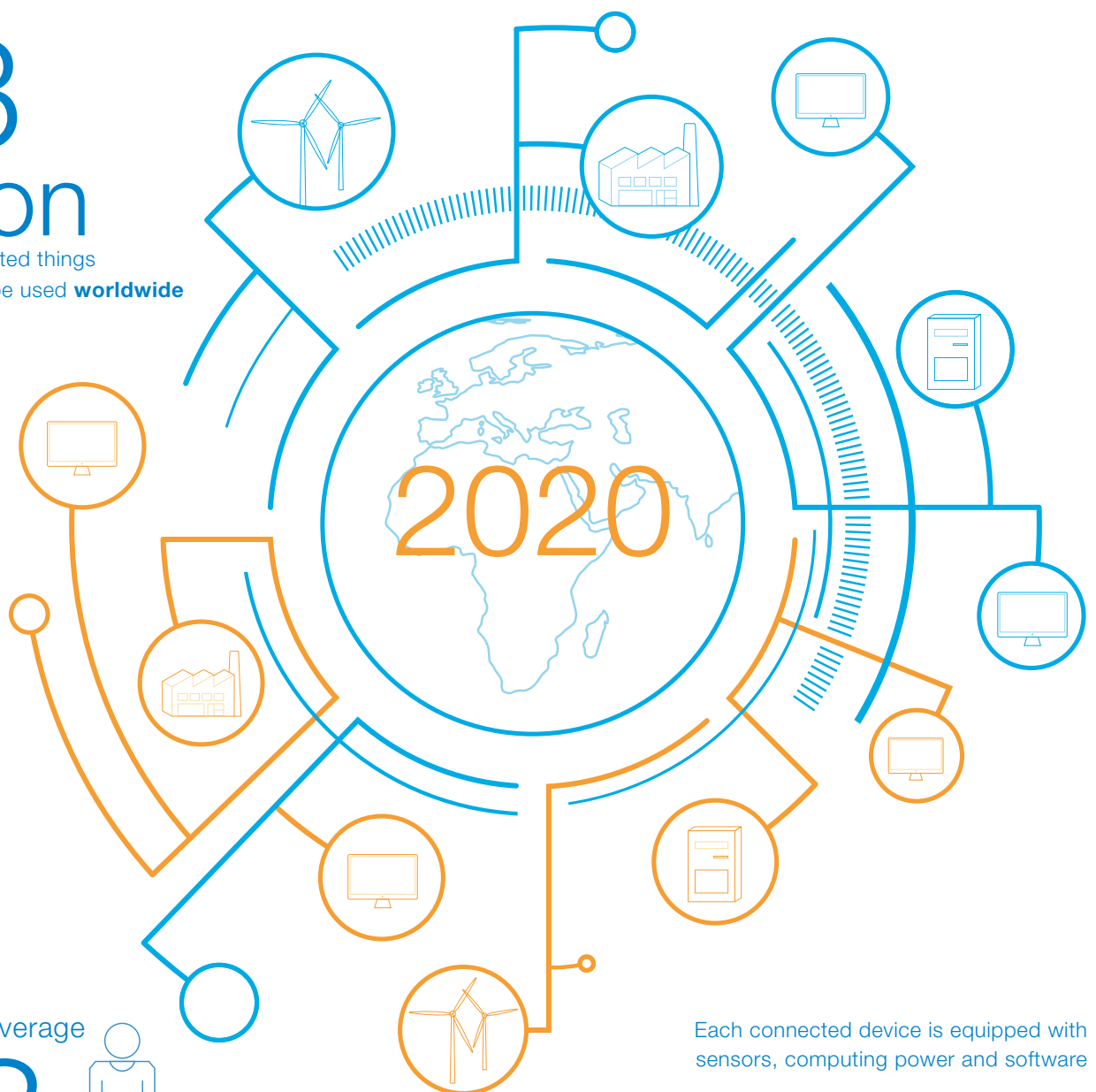
ABB is at the heart of the connected world, but what does the IoTSP mean for customers of low- and medium-voltage electrical components and solutions?

In today's rapidly evolving world, nearly all aspects of daily life are touched by smart products or devices to monitor, control, optimize and operate systems we rely upon from week to week, some of which adapt autonomously to a changing environment.

By 2020 an estimated

33 billion

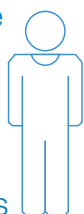
internet-connected things or devices will be used **worldwide**



That is on average

4.3

connected devices for every person on the planet



Each connected device is equipped with sensors, computing power and software

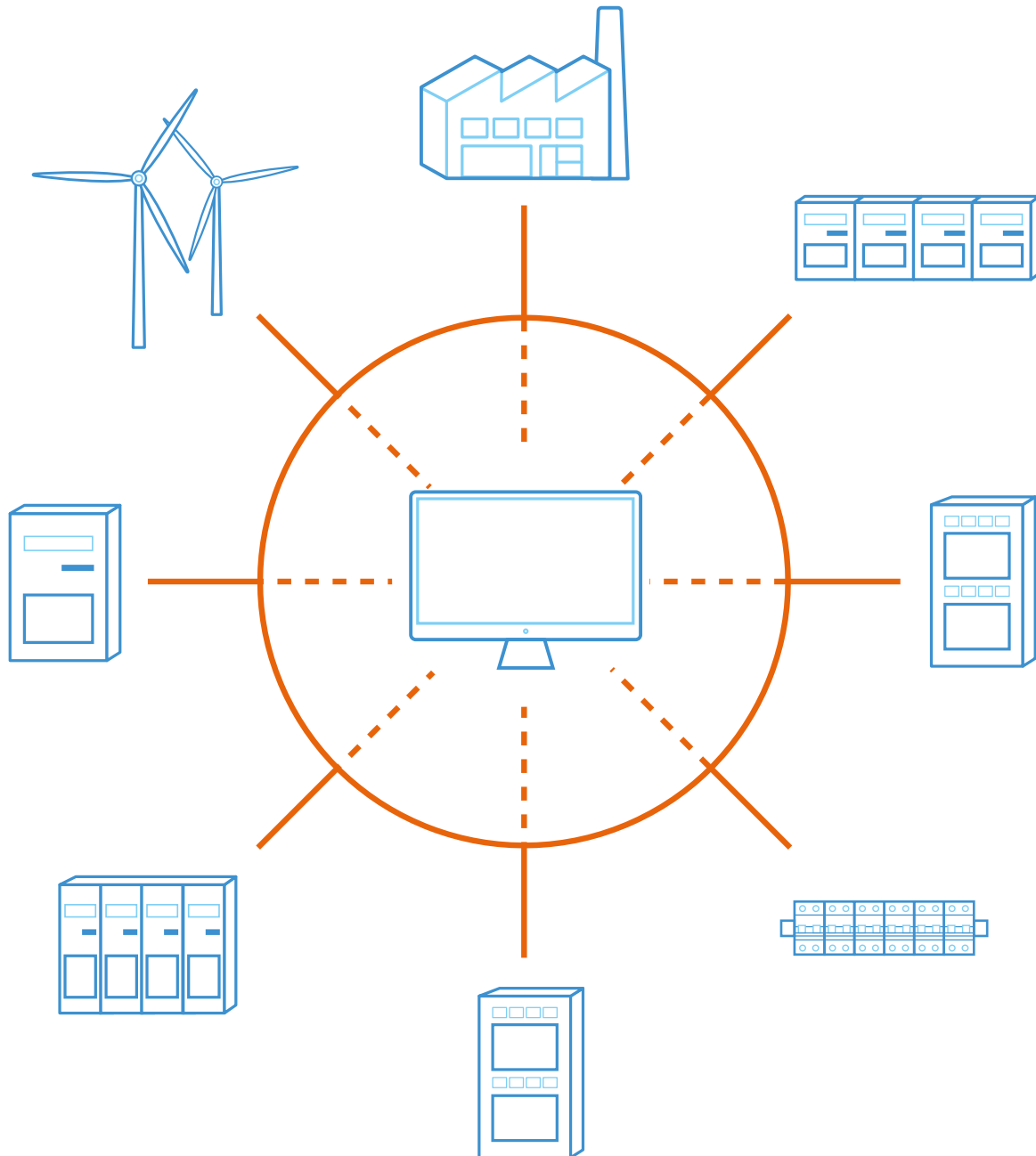
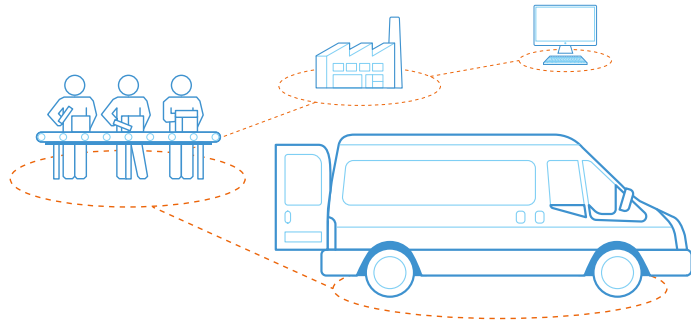


ABB is no stranger to this concept, having provided industry with a broad portfolio of products to automate and control mission critical infrastructure and processes worldwide. These products have been essential components of an 'Industrial IntraNet', which with the development of mobile communication and cloud computing, has evolved into the Industrial Internet.

ABB is now advancing the technology further to extend the capabilities of the IoT (Internet of Things) for greater use in energy distribution, industry and infrastructure, like transportation and buildings. For ABB, this expansion extends the concept of IoT to include Services and People in the IoTSP. These elements are important for ABB because services make use of actionable information derived from data gathered from the IoT and enable people, through the analysis of that data, to be more productive and make better decisions.

The main dimensions of improved productivity and better decision making are:



Communicating products

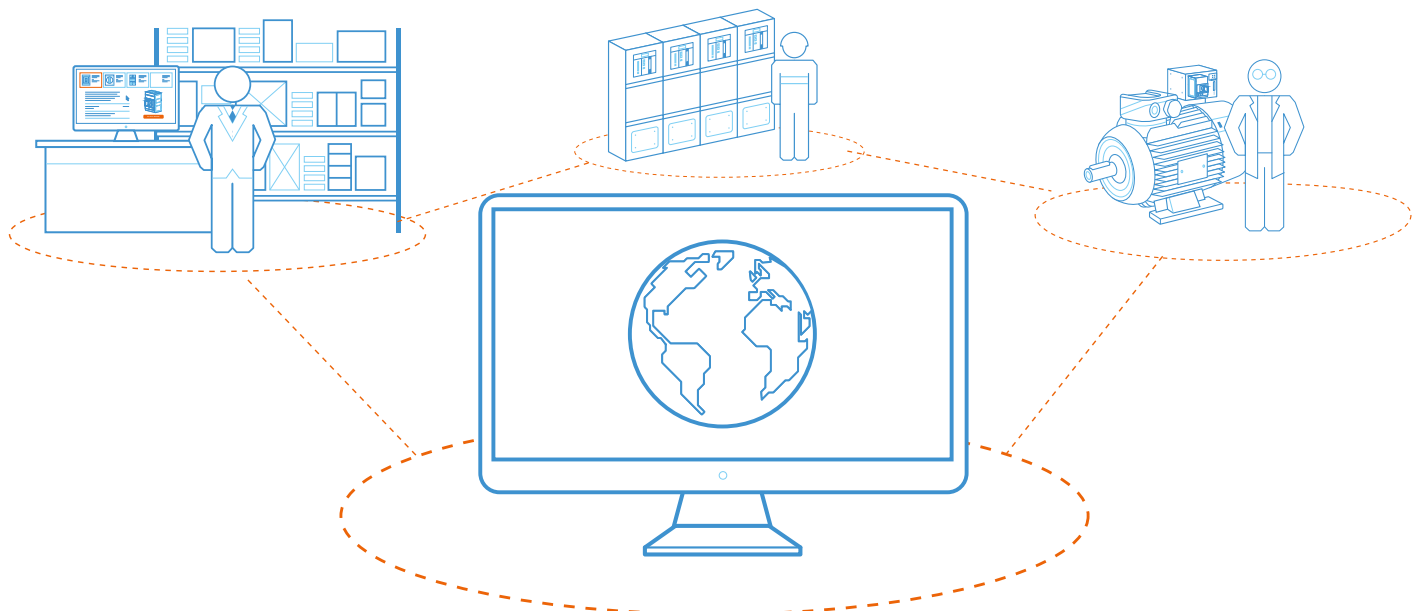
Products that enable remote monitoring and control of installations, allow for more uptime through preventive maintenance and just-in-time service. Communicating products also allow better synchronization of production steps in a factory, and higher flexibility regarding handling of product variants.

Digital integration of the product life cycle

When products are accompanied by digital models that represent different aspects of their use, customers can make a step towards the virtual integration of the products into their solutions. These models, sometimes called 'digital twins', are for example mechanical 3D models to allow CAD (computer aided design) integration, electrical models to support the electrical design, functional models that can be integrated in engineering PLC programs or thermal models that enable proper dimensioning of the cooling of a switchgear.

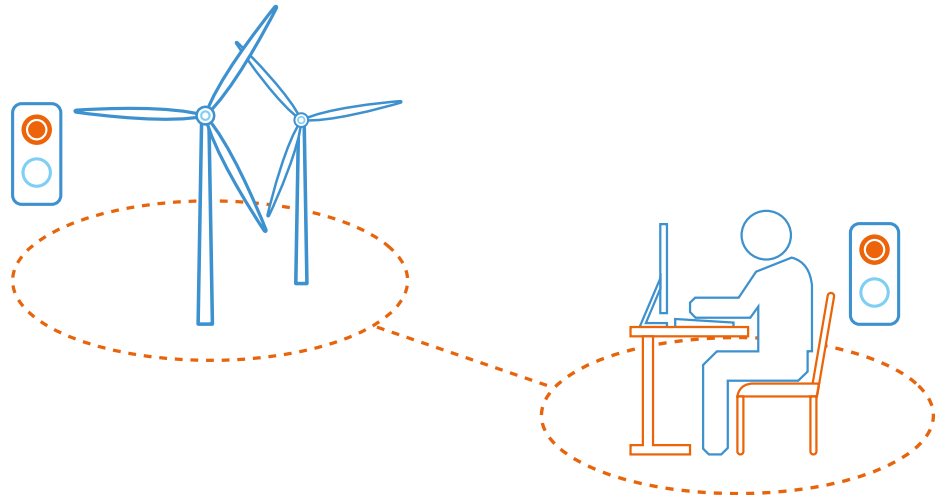
Digital integration of the value chain

Customers will synchronize their value chain more and more by exchanging demand information with customers and suppliers, through digital ordering processes and also by making smarter choices during procurement. The consequences will be reduced work-in-progress, lower inventory, faster cycle times and thus better cash flow.



How does this look in reality?

The remote monitoring of connected devices or solutions has obvious benefits regarding maintenance and service, especially for devices installed in isolated or dangerous locations.



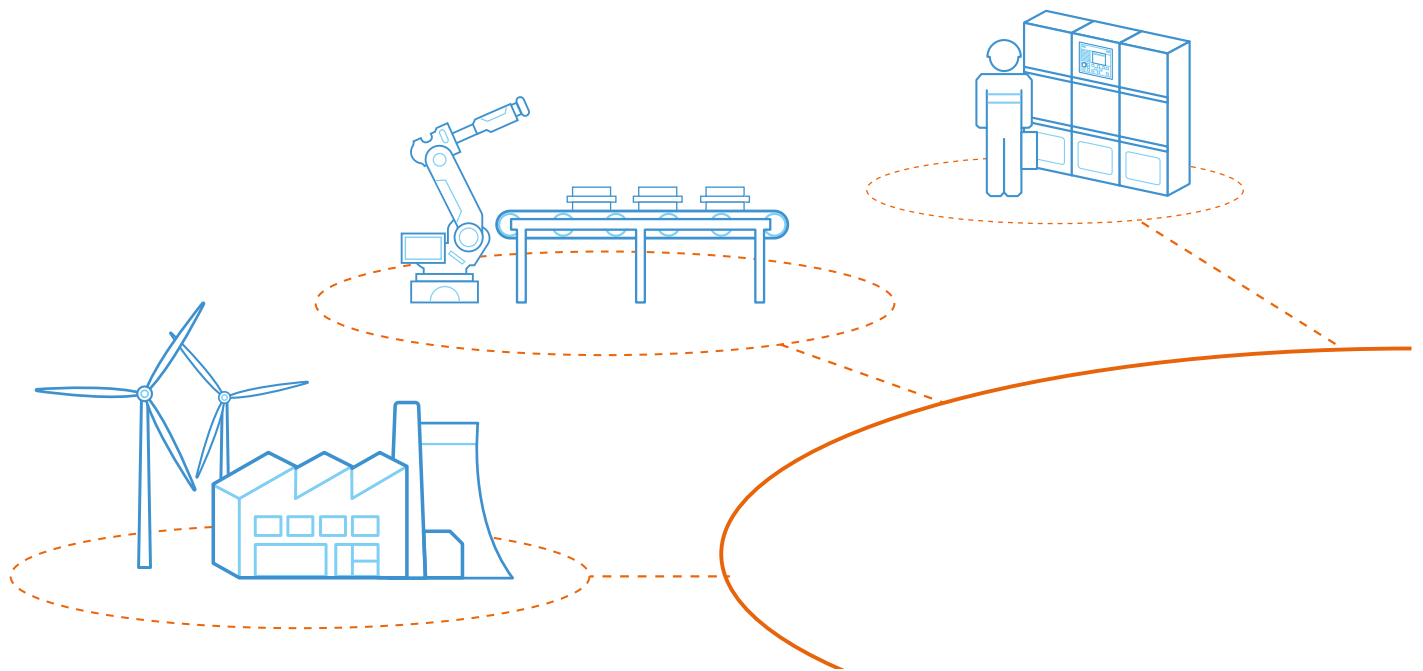
Imagine an offshore wind platform: it is obvious that by reducing maintenance and service to an optimal frequency, money and time can be saved. Products and solutions that can communicate their status of operation and their maintenance or service needs so that the right service engineer, with the right part can be dispatched just in time, extends a product's life time and prevents expensive shutdowns. This provides increased productivity gains.

Smart devices can be connected more easily today to individuals anywhere in the world, making the management of processes more effective. With the development of mobile communication devices and wireless connections, connecting devices to the internet is trivial, which is why around 5.5 million new 'things' are getting connected every day.

By connecting, controlling and monitoring many products or solutions, significant data can be gathered on each elements' performance, working alone or together with others, which will enable system optimization through the analysis of current and historic data.

Data gathered on the operating characteristics of products and solutions helps our customers to identify exactly how that product is used. This also provides vital feedback to the designers who use that data to hone a product's capabilities to a customer's needs, optimizing performances, increasing the service intervals and stripping out unnecessary functionality. This concept can be taken a step further so that specific products can be tailored to specific applications, creating more value for customers by responding to segment specific product usage patterns.

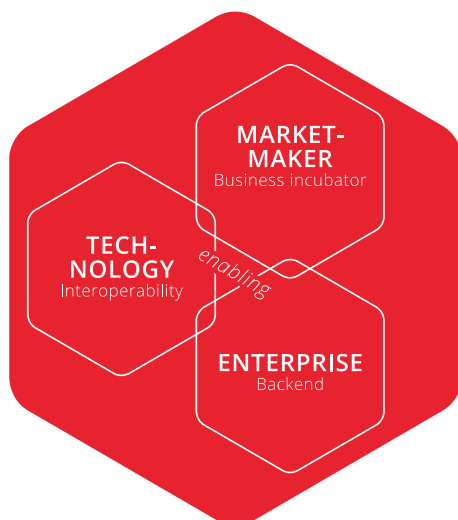
Although, each of these capabilities are revolutionary in themselves, it is not until all are combined that the full power of the IoTSP is unleashed. When products are able to monitor, control and optimize their own performance, then autonomous adaptation to their environment becomes possible so that fine adjustments in individual product behavior help to optimize the performance of an entire system. The energy efficiency of an electric grid, for example, increases with the addition of more connected smart meters. They enable a utility to respond effectively to power demands through greater awareness of demand patterns obtained from the analysis of current and historic data, which feeds back from the connected smart meters.



With every revolution comes new challenges and opportunities. This new paradigm means that value is being created not only by the individual capabilities or functionalities of a single discrete product, but also in how that product performs in a broader context, such as a smart building, smart home or smart grid.

Largely similar products will differentiate according to their ability to interact with other products, which will allow new and sometimes unexpected partnerships between companies that may once have resided in discrete markets or even between companies that have traditionally been competitors.

One such new partnership is the international joint venture, called mozaïq, which was set up between ABB, Bosch and Cisco to develop and operate an open-software platform for smart homes.

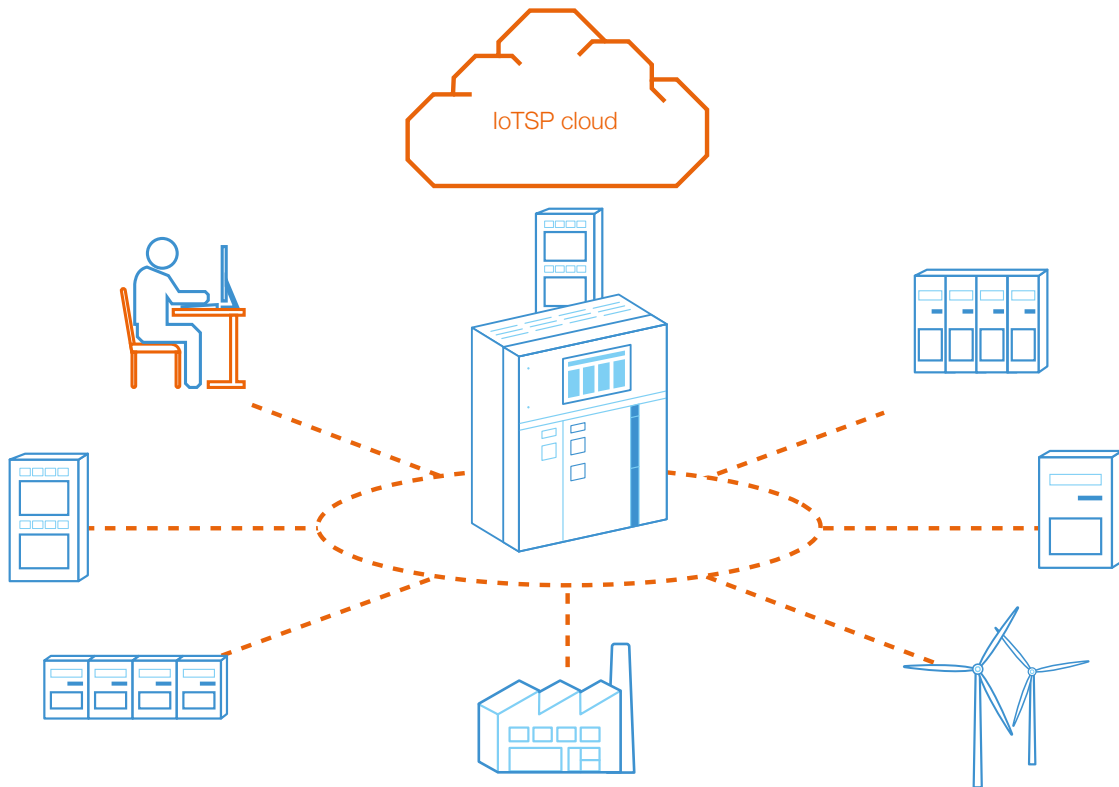


Interoperability is a major challenge for the Internet of Things, especially in the home where consumers put together collections of devices from different trades and different manufacturers. Consumers want to combine lighting, heating, household appliances and also their entertainment systems. Mozaïq aims to make that possible regardless of make or brand, to stimulate innovation and diversity in product and service offerings. An electrical installer could, for example, create a very realistic tailor-made presence simulation to be activated when you are away on holiday. The lights in your home could be turned on and off as if you were there, your television too, but all the time your alarm system would be fully armed and able to notify you, a neighbor, or a security company, if anything moved in or around your house, even taking images to help catch the perpetrators. Similarly, a service contract could offer predictive maintenance of all your home appliances, sending an appropriate engineer to renew parts before any faults develop. Such a service could even offer assistance to occupants should they need help, such as an elderly occupant who has fallen.

Beyond concept –

What does ABB have to offer in the area of low- and medium-voltage solutions?

For more than a decade ABB's Research and Development (R&D) labs have been making groundbreaking advances in enhanced control systems, communications solutions, sensors and actuators for the IoTSP.



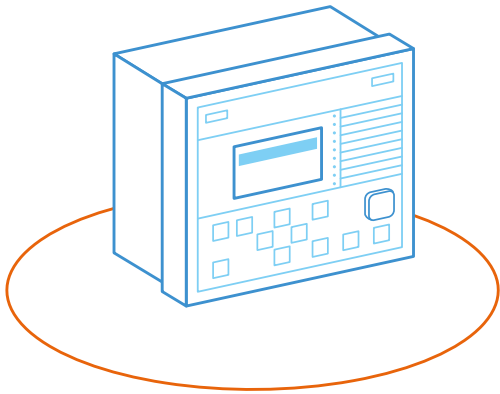
For the Electrification Products division this means research into technologies that deliver improved connectivity, protection and energy efficiency for customers of its low- and medium-voltage products, enabling them to analyze their data more intelligently, optimize their operations, boost their productivity, and their flexibility. This is happening from 'switch and socket to substation' in both power and automation. It also means a continuation of our Journey to Digital, where we are providing the necessary 'digital twins' for our products like CAD models, engineering data and configuration tools. To the right are a few examples of connected Electrification Products, which are redefining IoTSP.

Ekip SmartVision

Ekip SmartVision is a cloud-based platform that can monitor and analyze the flow of power within any facility, leveraging the intelligence and connectivity of Emax 2 air-circuit breakers. It allows the evaluation of live data and the remote control and management of industrial power systems and buildings. Ekip SmartVision enables effective planning by remotely managing the power and can deliver up to 30 percent savings on the energy bill. Its plug & play architecture enables fast integration and commissioning of devices – panels can be placed online in only 10 minutes.

Circuit Monitoring System CMS-700

ABB has expanded its circuit monitoring system (CMS) with a new generation of open-core sensors that can be easily connected to existing installations without disconnecting the power. The new CMS-700 energy monitor provides the option to evaluate the measured values of up to 96 energy meters to measure energy efficiency in buildings. The data can be displayed and processed using the built-in web server or using the LAN TCP/IP or Modbus RTU.



Extended Relion® protection with online user interface and IEC 61850 Edition 2 for enhanced interoperability

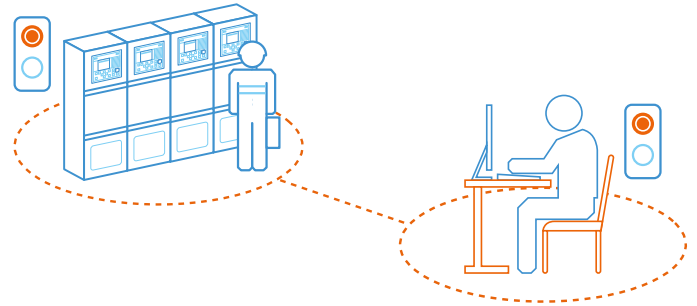
ABB's celebrated Relion medium-voltage product family offers protection, control, measurement and supervision for power systems. To ensure interoperable and future-proof solutions, the Relion products have been designed to implement the core values of the IEC 61850 communication standard. Recently released versions of the Relion product family's relay series also support Edition 2 of the standard, which brings substantial benefits in terms of extended interoperability of the substation devices. To increase safety, reduce material damage and minimize system downtime, Relion protection relays offer advanced earth-fault protection, detecting faults in any cable and overhead network.

ABB has developed its newest Relion protection relays to support distributed generation with improved power flow control and voltage regulation.

The updated 611 series features an enhanced online user interface for smooth relay engineering and commissioning. With the 611 series, engineering time is minimized, as commissioning, routine testing and fault verification is easy and fast to perform.

Arctic product family

ABB introduces the Arctic product family for secure, reliable and real-time wireless connectivity for all industrial and utility applications to enable remote, real-time grid automation. As the backbone for communication, the Arctic family utilizes operator-independent public cellular networks, to combine the products into secure, cost-effective wireless communication systems. The Arctic product family includes wireless routers and gateways as well as M2M gateways. The products allow access to geographically remote assets to support utility customers with their aim to build more intelligent distribution networks and promote an increasingly interconnected world.



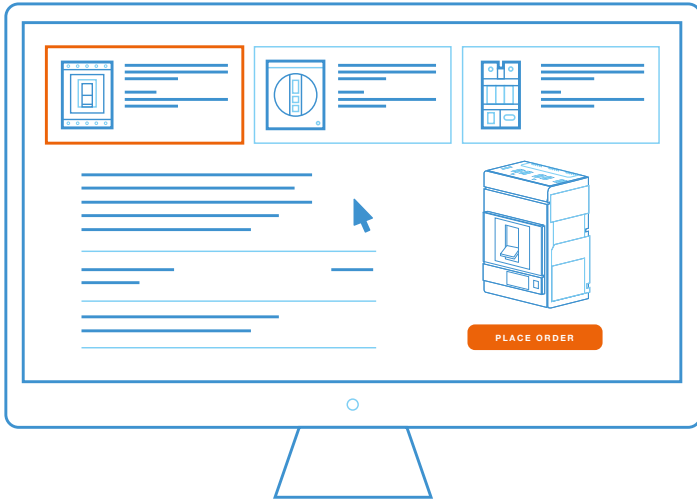
Smart asset management – for low- and medium-voltage switchgear

ABB monitoring solutions implement the whole on-site condition monitoring concept in low- and medium-voltage switchgear – from collecting real-time field data to performing assessment algorithms and keeping users up-to-date on the current maintenance requirements. The on-site condition monitoring solution MService for low-voltage and MySiteCare for medium-voltage can be included into the installation during the design phase, but also at the time of operation.

The service team can perform either periodic or continuous monitoring to optimize their operations. MyRemoteCare deploys a unique remote platform for low- and medium-voltage assets to support asset management to identify the critical assets and keep them available, reliable and safe.

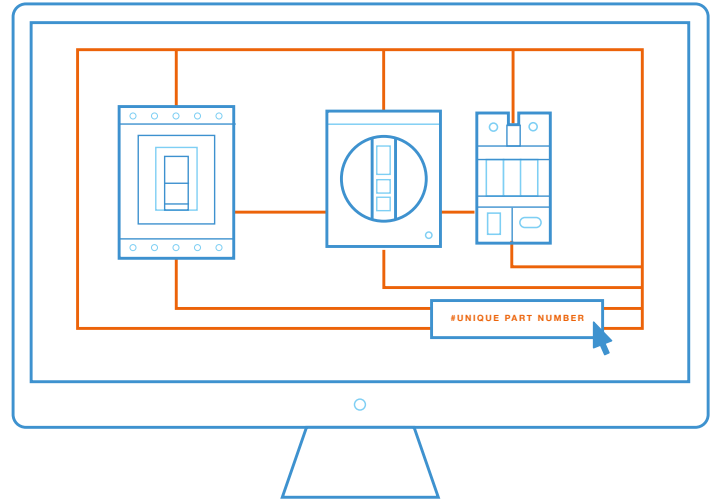
e-Design

ABB has developed e-Design engineering and planning software to make it easier for customers to plan the electrical distribution in buildings. Starting from the energy demands of the building, e-Design makes it possible to select products and configure the design of the electrical system. Users can develop predefined product lists for future projects and manage quotations. Power distribution and control circuits can be designed simply, including all the complex calculations needed to ensure adequate account is taken for loads, voltage and currents and the co-ordination of protection devices.



e-Configure

ABB has launched a new configuration tool for enclosures and products, with e-Configure. For a low-voltage electrical system, product configuration is a key step in the purchase process. ABB has developed an easy-to-use online solution to support customers.



World-class innovations for the future

These examples and a number of other world-class innovations have been developed by the business in recent years. As with all ABB products, these innovations have been developed while keeping sight of our enduring commitment to safety, reliability, cyber security and data privacy.

Our customers are looking for partners to help them exploit the opportunities and meet the challenges of this new era of connectivity. The concept of personalized technologies to put the customer at the center of a connected world aims to boost productivity, enhance reliability, increase flexibility, reduce costs, improve energy efficiency and enhance working conditions. ABB has many exciting new products in the pipeline that will contribute to the steadily growing global value of the IoTSP to support productivity, and ultimately, increase the customer's success. ABB is confident that we have the right range of connected products and services to keep pace with future predicted challenges and with our track record in technology innovation we are confident that we can offer solutions to challenges not yet even imagined.

To find out more, about ABB's full capabilities in this area go to abb.com/about/technology/iotsp or contact your local sales office.