# Enable Smarter, Safer Monitoring and Maintenance for Energy and Utilities with the Capgemini XIoT Platform

## World-leading energy and utility company EDF improves safety equipment inspection monitoring and maintenance at its nuclear plants with Internet of Things-enabled asset tracking

### Unique challenges inside a nuclear reactor

Uranium refueling and periodic maintenance during outages in a nuclear reactor is sensitive work. For EDF, one of the world's largest energy and utility companies, refueling takes place every 12-18 months and, depending on the outage, requires hundreds of people and several weeks to complete.

These huge operations are critical because every day behind schedule costs hundreds of thousands of euros in power generation losses. Work cannot begin without essential safety equipment in place, and EDF needed a smarter way to keep track of mandatory technician mobile air supply assets.

During maintenance routines, technicians may be required to grind metallic parts, open water pipes or perform other activities which produce contaminated dust. To protect against breathing this dust, technicians use breathing apparatus to connect to a safe air supply network, built into the reactor's infrastructure. For protection in the event of a failure of this network, each person also carries a backup mobile air supply that automatically engages and provides safe air for 30 minutes – enough time for them to exit the area.

People matter, results count.

## Discover how Capgemini's XIoT services can transform your business

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These mobile units are mandatory equipment for certain types of work. But with no way of easily tracking their location, missing or lost units become a logistical challenge for EDF with the potential to bring work to a halt.

## Asset tracking with the Internet of Things

Focused on EDF's safety and efficiency requirements, Capgemini created an Internet of Things-based (IoT) asset tracking system based on Capgemini's XIoT platform and Intel technology. During the set-up phase for scheduled maintenance outages, the reactor is taken off-line and covered by a network of radio tags that sense locations of similar tags embedded within emergency mobile air supply units. This location information, along with radio tag battery status, is transmitted via low-power radio to an Intel® IoT Gateway, which aggregates the data and triangulates the unit's location before sending it to a dashboard in the main control room. This dashboard displays the location of all mobile air supply assets on a 2D or 3D map, as well as the battery status of each device.

Each mobile air supply unit is also checked daily to ensure it is in good working order, and the solution includes a push-button that engineers can use to signal central control after a unit has been checked. For ongoing condition monitoring, the Capgemini IoT solution automatically alerts supervisors when the radio tag's battery is running low or when the pressure drops in the supply tank.

To reduce the transmission of unnecessary data and achieve a battery life of around four months for each radio tag (both fixed and mobile), the device locations are only transmitted back to the control room once a unit has come to rest after being moved, or once every six hours. This is made possible by the Intel IoT Gateways which deliver intelligence, performance and security to the edge of the network.

The solution is currently being piloted in two nuclear reactors and takes one day to set up, with each reactor building requiring 120 fixed tags. The end point hardware devices are customized by Sogeti, a Capgemini subsidiary, and the Capgemini XIoT platform is built on a reference architecture jointly developed with Intel, all fully integrated into an end-to-end solution.

## Increasing asset availability and operational efficiency

Previously EDF had no remote system for monitoring the location of these essential mobile air supply units, and regular maintenance relied on paper-based records or off-line handling systems. These manual methods led to wasted time sourcing units for work crews.

Now, EDF's maintenance teams can immediately view the location and status of every single unit in an area spanning three floors, each one measuring 1000m². EDF's crews can automatically ensure the right equipment is ready to use and in the right place at the right time, so work can start on time.

Replacing the paper-based record keeping system has increased efficiency of daily inspections, as maintenance personnel now know each unit's exact location and working status.

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## Planning for global deployment

EDF is evaluating extending the solution beyond just reactor maintenance routines to plant-wide tracking for other high value assets and tools. The project has been recognized as one of the year's 10 best innovations at one of the pilot plants.

The fully integrated combination of Intel's hardware, software and security ecosystem with Capgemini's XIoT middleware and analytics capabilities provides a unique, business-case oriented and secure end-to-end IoT platform solution, available 'as a service' and ready for industrial deployment.

The Capgemini XIoT platform promises to open a new era in industrialization and innovation, providing organizations with the ability to automatically collect, analyze and act on data from any type of connected devices, sensors, machines and people.

Capgemini IoT services include:

- IoT strategy

- Innovation Portfolio Management

- Solution design and delivery on top of wearable technologies

- Machine-to-machine solutions in manufacturing and maintenance

- Rapid concept and design prototyping

## Interested? To learn more about how Capgemini's XIoT services can transform your business, contact:

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