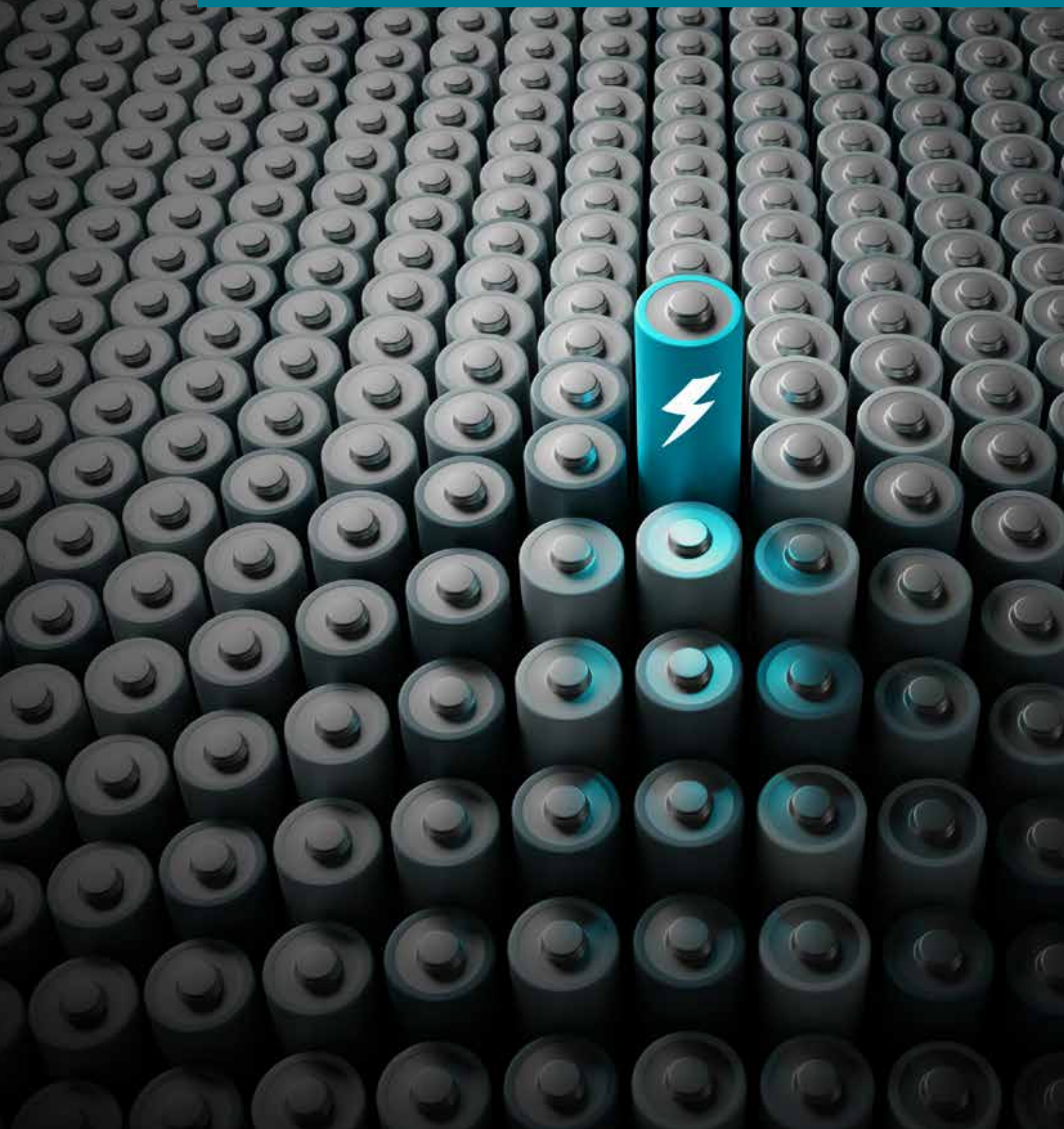
Quantum
The Story Behind the Numbers

Remote Monitoring:
When "Out of Sight" Cannot Mean "Out of Mind"



Our client is a leading provider of high-quality energy storage solutions. Their one hundred years of battery and energy innovation, combined with a company culture of German engineering and Swiss precision and quality, makes them a key player in the global energy transformation process. Providing top-of-the-range services across the globe presents its challenges, and they came to us for help with the monitoring of their products in the field.

They had no standardized, user-friendly way to remotely monitor the functioning of their products on location. In most cases, data was only available in the product's local storage, and not accessible from the outside. This increased the need to travel on-site to detect and address problems, and put the company in a weaker position to support guarantee claims, bringing additional costs. Each case was treated differently and was accompanied by the overhead of manual diagnostic tasks.

Thus, the company needed a reliable, secure, and scalable way to:

- Remotely monitor their products
- Collect battery data in a centralized location
- Stream real-time information in the necessary volume and latency when they needed it
- Store the data outside the data origin's local space (for at least as long as warranty periods defined)
- Visualize useful representations of the real-time or historical data, to be able to spot problems quickly and observe patterns
- Enable some degree of automated data processing and analysis
- Create automated reports on the battery data
- Enable sending of automated alerts to users for specific events
- Enable the potential of bi-directional communication to the products

Internet of Things (IoT) Solution

We at Quantum proposed the implementation of a fully scalable IoT battery monitoring and analysis platform that would let them keep an eye on their assets around the world in a sustainable, efficient and standardized manner.

The devices can be configured to deliver the necessary information, utilizing a network of sensors connected to the internet and able to exchange data. We set up a reliable and secure cloud-based platform to collect all the generated data, monitoring data quality and consistency around the clock. By analyzing this data, the engineers can easily see and explore trends, outliers and patterns, gain insights on the functioning of their products and spring into action when necessary. This saves the company money and time and increases the satisfaction of their customers.

Nuts and Bolts and Sharing Results

Several components went into the creation of the battery monitoring and analysis platform, including edge devices – which connect the batteries to the internet, sending measurements (think for example voltage, temperature, etc.) to the appropriate Amazon Web Services (AWS) components. Components like IoT Hub or Redshift were selected for collecting and preparing an ever-growing volume of data in near-real time and round the clock, while offering the flexibility, scalability, and reliability the company requires.

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The platform included two distinct user interfaces serving different users and purposes: AWS Console and Tableau Server Portal. The AWS Console is used by administrators to manage users, register and manage devices, access the raw data for all these devices and monitor the health of the platform technical components. It also dispatches notifications in case of anomalies or errors.

Fig. 1 Alerts dashboard for monitoring by engineers

The Tableau Server Portal makes it easy for everyone in the organization to look at reports and KPIs and, if they wish, dig deeper, connect to data and create their own dashbords and reports. It was selected for the visualization of both near real-time and historical data from individual devices or sets of devices. The Tableau visualizations provide both a full picture of all customers, projects and products, as well as the option to select and see information on individual components. The users can monitor all relevant battery data, such as cell temperature, cell voltage, available energy, capacity delivered, alerts in case of errors and so on. And thanks to Tableau Server's functionalities for user management, authorization and authentication, the company can securely share pre-defined dashboards with their clients to give them access to their own data.

Fig. 2 Temperature and voltage measurements over time

Delivering value to the customer

With the IoT solution in place, the company was able to:

- reduce the need for engineering teams on-site and thus the delay of travel and the overhead of manual data analysis and ad-hoc communication with customers.
- enable long-term, cloud-accessible storage and contribute on monitoring the warranty conditions of their products.
- share results with customers regularly and punctually and offer a subset of those benefits to them with minimal effort.
- offer a way to perform analysis of the products to extract valuable information about their performance over time.

Fig. 3 Monthly summary

About Quantum - The story behind the numbers.

Quantum is a data science and analytics company, located in the center of Zurich. We help clients to identify their most valuable customers, products, or services; determine potential risks; discover hidden potential in their markets; pinpoint and eliminate bottlenecks and inefficiencies; and provide other insights to steer their business. We do this by combining business experience and knowledge with the application, implementation and teaching of scientific methods of data analysis, data management, reporting and modern visualisation to turn data into information.

Discover what data science can do for you

To learn more about how modern data science can help you and your business, visit our website at **quantum**analytics.ch or contact us at info@qbis.ch.

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