ERICSSON

ACTIONABLE INTELLIGENCE:

TRANSFORMING UTILITIES

Combining actionable information with market insights to work intelligently and reduce costs

BIG DATA AND UTILITIES

Ericsson is driving the development of actionable intelligence within all aspects of the ICT field. We are unique in being able to gain actionable insights from networks, IT environments and external sources combined. For our customers, this brings faster results, predictive power and a new depth to analytics.

Several industries benefit from big data solutions, including the subject for this paper – utilities.

What is big data?

The term big data describes large amounts of data collected from a variety of sources, analyzed with the purpose of building business advantages. It is usually characterized in terms of the three Vs[1]: volume (the amount of data), velocity (the latency/speed of data) and variety (the diversity of data types and sources).

We believe that in order to build business advantages, service providers need to be able to make decisions in an accurate and timely way. When utilized properly, big data analytics bring value to decision-making and make it more adept, accurate and actionable.

Modernizing utilities with big data

The use of big data is maturing, disconnecting itself from the IT sphere and blending with other technology areas like the Internet of Things (IoT). It is gradually turning into an important part of many industries. Big data is expected to provide huge business value to the utilities sector, both within customer experience and efficiency. This paper outlines why this is, how utility companies can benefit from big data, and how we can support the transition into a data-enhanced business.

The utilities industry is transforming. Electrical grids, water and gas pipes are examples of infrastructures that are expensive to build and maintain, and are often heavily regulated and considered 'natural monopolies'. Market conditions vary significantly between countries in terms of competitiveness and private/public ownership, but in general, the sector has particular ways of conducting business. Simply put, utility businesses have been built around energy resources and have had generation, transmission and energy retail flowing from the center in a one-way, linear build-up. Consumers have had little influence on service and pricing.

Today, there is a new situation for utilities companies: market mechanisms are changing, competition is increasing and pricing is becoming increasingly complex. There are a number of factors that contribute to the market transformation and call for big data solutions. Some of the most important drivers include:

Regulatory pressure

Governments are under pressure to improve energy efficiency, and their actions have consequences for energy companies. Regulations like the European Union's 2012 Energy Efficiency Directive and the US Energy Policy Act of 2005 put pressure on energy companies to become more efficient and reduce their environmental impact. Utilities are also incentivized to utilize their assets in more effective ways. This is done through value-based assets management, including deployment of sensors and analysis of the financial impact of outages.

[1] '3D Data Management: Controlling Data Volume, Velocity and Variety', Gartner 2001

Consumers become producers

The relationship between utility companies and consumers is becoming increasingly complex. The commoditization of green energy technology has enabled consumers to produce their own energy through solar panels and wind turbines, in effect turning them into micro-producers. When their generators produce more energy than needed, they can sell it back to the grid. With the dramatic changes in market mechanisms, energy companies need to find ways to manage distributed generation and net metering.

Increase in price volatility

The increase of intermittent energy sources like wind and solar has resulted in more fluctuations in energy access over time. The volatility is elevated further with the growing influence of power markets. By introducing smart meters, consumers can adjust their energy use in relation to the fluctuating prices. These fluctuations are now becoming normal; but handling them demands sophisticated data analysis.

Threats against the service delivery

Utilities are among the most critical infrastructures in society. Major incidents such as geopolitical events and natural disasters can cause severe damage to vital systems, in turn threatening markets, security, and people's lives. We all rely on energy infrastructure, and the increased level of these threats calls for improved resilience and intelligence.

Aging infrastructure

Around the globe, utility infrastructure is growing, and with aging technology comes increased vulnerability and a lack of interoperability with newer systems. Old infrastructure requires ongoing optimization to remain functional and cost effective.

A TOOL FOR CHANGE

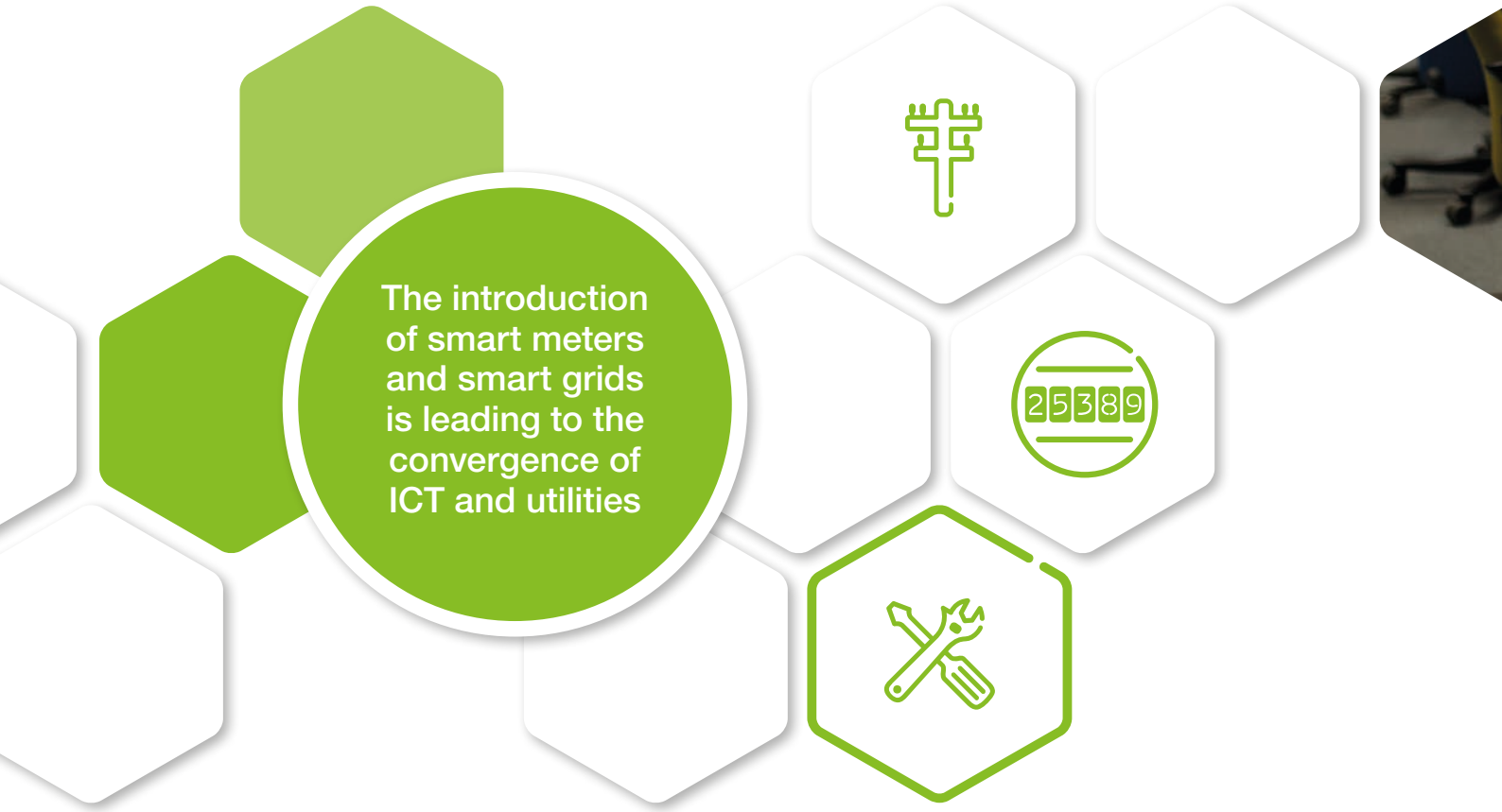
The telecom industry was an early adopter of big data, leveraging it to improve efficiency, customer experience and growth. There are several reasons for its early adoption, including the exponential growth of data traffic, the increased importance of user demands and a staggering network complexity. Big data is simply an integral component of telecoms today: there is no other way to cater for millions of users on a variety of devices, with unique needs and expectations of real-time services.

Improvements to efficiency and experience

Big data is an important part of solving the challenges faced by utilities. The introduction of smart meters and smart grids is leading to the convergence of ICT and utilities. Big data methods can subsequently be introduced to create major improvements in efficiency and customer experience; they can even bolster service innovations. The deployment of big data methods is a necessary move as infrastructures, particularly electric grids, are expected to transform from more or less linear energy systems into networked, distributed systems with a multitude of market participants and management models in play. The grids simply become too complex to handle without large-scale data analysis.

A data-driven approach

While it is not easy to build horizontal capabilities, some verticals still have a closer kinship than others. In these cases, data and analytics capabilities can be decoupled from their original contexts, modified and re-applied in other verticals. Telecom and utilities are two such industries, with similar physical structures (geographically dispersed networks), similar properties (regulated and sometimes public) and similar challenges (improved efficiency, better customer experience and a higher degree of innovation). It is natural for utilities to use the knowledge and solutions from the telecoms sector to leapfrog into a more data-driven approach to business.



459
SMART GRID PROJECTS

were ongoing in Europe in 2014, according to the European Commission's Institute for Energy and Transport (IET)

Rise of smart meters and smart grids

Utilities must be able to support large-scale digital networks to transmit all the vital information from smart meters and other assets in the smart grid. They will need the ability to combine big data and telecom cloud capabilities to leverage the information they gather. The time to acquire big data capabilities is now. Like in telecoms, the development of big data in utilities is intertwined with the evolution of the IoT. The number of smart grids and the installed base of smart meters are rocketing. Research institute Navigant Research expects the number of installed units to rise from USD 313 million in 2013 to USD 1.1 billion in 2022. Big data spending in the industry amounted to approximately USD 7 billion in 2014, and is forecasted to grow to over USD 21 billion, with a CAGR rate of 25 percent.

The role of sensors

Big data in the utilities sector will be dependent on a much larger number of nodes than in telecoms, demanding lots of machine power and powerful analytic models. Smart meters are not the only components of smart grids that can generate useful data for utilities companies. Data from grid sensors is essential to control the performance of smart grids. Gateways are instrumental for collecting data in the nodes. SCADA (Supervisory Control and Data Acquisition) devices help control renewable sources, condition monitoring of assets and load control. Many different elements make up the smart grid.

Big data has a role in several parts of the utilities business. Here we look more closely at the two main areas: building customer engagement and driving efficiency.

ENHANCED CUSTOMER ENGAGEMENT

36 MILLION

US smart home devices by 2017[2]

Improve your customers' experience

Historically, utility companies have fought over customers using price as their weapon of choice. Today, utilities must find other ways to stand out, taking into consideration:

- New energy production methods
- Energy markets in transformation
- More reasons for market players to compete over customers

Big data provides the ability to compete by delivering an improved customer experience – putting available and relevant data to work and ultimately limiting churn. It makes granular customer segmentations possible and can incorporate social media into the data mix to provide an understanding of how their brand is impacted by different service variables. This allows utilities companies to develop their services in alignment with customer preferences.

Utilities vendors sell a standardized and undifferentiated product, and this makes every customer touch-point important for client retention. Big data can help improve the customer experience at every interaction by providing a means of understanding customer wants and needs in better ways. The result is an improved relationship between business and client.

Big data provides the ability to compete by delivering an improved customer experience

[2] According to EPRI

Address changing customer demands

The business-to-consumer model is being challenged by forms of energy production that allow private individuals to become energy producers. Wind farming, solar energy, the unloading of surplus energy from electric vehicles into the grid, or other forms of distributed generation (the ability for consumers to sell power) all complicate the transaction of energy and payments. This in turn demands more from billing and charging systems.

Big data is necessary for dealing with the complex customer relationships following from distributed generation. It can also provide the foundation for new services that address new customer needs. Smart meters and smart home appliances provide new opportunities to invent solutions that build customer engagement and grow revenue. They can track consumer behavior on different appliances, and combine that information with weather data, pricing information and other variables to create solutions that save energy and money for users. Data analysis can be used to mitigate price volatility on the consumer level, through better management of the risks associated with a portfolio of commercial and physical assets.

These types of data-driven innovations help to build new services, improve billing and charging algorithms and ultimately build engagement among customers in the long term. They can help to transform utility companies' businesses beyond distributing and selling electricity.

Solve experience issues

Like telecoms, the utilities industry is a sector where timing is vital. The intricate network of assets needs continuous monitoring and support, especially as many infrastructures are aging, and ongoing optimization becomes a way of prolonging their life. Big data methods can give companies early warning services, detecting signs of problems that may affect customer experience in advance. The aim is to optimize everyday performance and prevent issues through effective fault management.

There is also a customer care dimension to experience issues. Through big data, companies can identify the underlying issues that lead to customer complaints. It becomes possible to drill down into each customer's usage history and find the root cause of issues, making it possible to explain and resolve bad experiences.

60%

EU smart meter penetration by 2019[3]

[3] According to Berg Insight

DATA-DRIVEN EFFICIENCY

Efficiently manage your grid

Energy grids were not originally designed to cater for the volatility and complexity created by the influence of intermittent energy forms. Nor were they built to withstand the dawn of an energy marketplace, or the growing needs of a society that is increasingly dependent on digital tools. Nevertheless, they still stand, despite ongoing transformations. The development of data-driven ways of managing operations will be necessary for them to remain the backbone of infrastructure going into the future. Big data helps companies to develop more accurate forecasting models and distribute capacity and manage assets according to shifting needs.

However, utility companies are under pressure to keep up with the pace of transformation, and to improve quality of service (QoS) in the midst of this change. Big data helps them with a new generation of communication solutions where QoS can be controlled. In this setting, processes are homogenized and pricing models ensure the most cost-effective service possible.

Improve efficiency by preventing issues

The ability to anticipate issues that could interrupt the provision of service is a value that big data brings to both customer experience and operations. Like many other aspects of running a utilities operation, fault management is an area that is more difficult to handle today without big data solutions. Predictive modeling of events that cause outages can be deployed to trigger automated mitigating actions. This is an effective tool to reduce costs and improve customer experience.

A clever use of big data methods is to detect and avert issues before they occur. It enables utilities providers to focus investments where they matter the most, evaluating major KPIs and addressing the most relevant ones for performance of operations in the most cost-effective way. Big data can help identify early signals for asset disturbances and improve the maintenance of the grid by improving fault location and restoration management. Overall, it improves the reliability and stability of the grid and allows utility companies to move from cyclic to condition-based maintenance, optimizing operational expenditure.

Gain control of your resources

Big data makes it possible to collect real-time data from existing grid elements to gain better control of the infrastructural assets. Ongoing monitoring of resources improves proactive maintenance actions and operations. Data from smart meters and other smart assets helps us to understand asset usage and provides a means of asset lifecycle management.

The operator can prioritize renewal of assets based on the performance of certain components over time. By combining and analyzing information such as weather forecasts, consumer behavior and historical data from assets, it is possible to predict capacity issues and hence improve grid capacity planning, as well as asset lifetime. Data can also support utilities in managing market volatility, through better management of the risks associated with a portfolio of commercial and physical assets.

The improved ability to identify threats and fraud is another important benefit of big data. Companies will be able to identify small deviations that tell of anomalous behaviors. Data about consumption patterns can disclose abnormal behaviors which may represent illegal use of electricity. Big data solutions can harden assets against various threats and capacity losses. They enhance resilience in both the physical infrastructure and in the cyber-infrastructure. Both types of protection are important to shield infrastructure against events like natural disasters or malware attacks. Through constant self-testing and monitoring, discrepancies can be detected at an early stage.

CATERING FOR TRANSFORMATION

Act on analytics

Data-enhanced services are futile unless properly implemented in the everyday operations of the company. It is vital that a plan is developed on how and where to implement big data solutions, in order to be the most beneficial to the company. To build engagement in the organization, use cases and applications are necessary tools to take 'data-driven' from a buzzword to a tangible reality. Consider how big data will influence your processes. Getting the most out of it across the whole organization will require work across internal silos.

It is virtually impossible to improve a utilities business using smart metering and big data solutions without good communications. The vast and complex infrastructure networks demand communications technology that can be trusted in any situation. This goes for both sensors in the grids and for the communications network as a whole.

Enhance data collection and analysis

The telecom cloud provides a way to collect, aggregate and analyze data in real-time, allowing utilities companies to prevent issues and manage the customer experience.

Big data can help detect issues and find solutions, but acting on these discoveries still takes courage and decisiveness. Be ready to take action on the insights.

Utilities modernization is not a case of one size fits all. The type of solution required is determined by the following factors.

- Level of market competitiveness
- Age of existing grid infrastructure
- Rate of existing smart meter deployment
- Rate of intermittent energy sources

THE PERFECT PARTNER

We provide the full picture

At Ericsson, we have a history of working with huge amounts of data, combined from various devices, networks and support systems. We have the knowledge, experience and tools in place to build big data solutions. To manage a distribution grid properly, it is critical to know what data to use and when. It is also necessary to create efficient connection points between the electric grid and the communications grid. Utility-specific protocol support and embedded power quality monitoring capabilities add to the versatility of the devices.

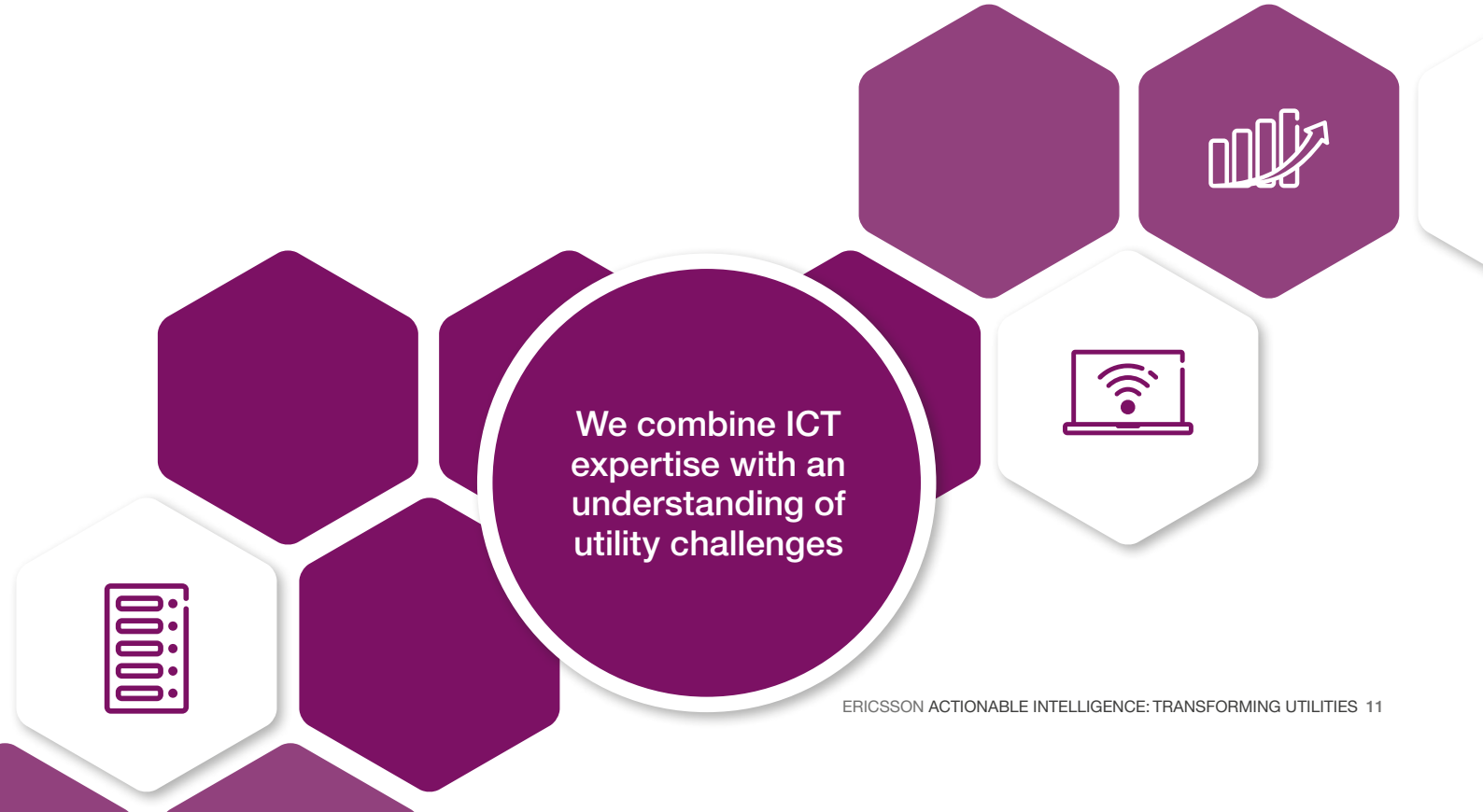
We are an end-to-end system integrator and one of only a few actors who combines expertise on business and technology challenges. This is an important skill, as big data analytics should be a holistic solution, covering all aspects of operations and customer management.

We have critical infrastructure management and maintenance experience, with over 100 years in telecoms. 40 percent of global mobile traffic and over 1 billion subscribers come through networks that we manage. Big data analytics projects are extremely complex and need to have clear use case definitions to deliver concrete results. They must adhere to a specific data management methodology that we have been carrying for many years, primarily in the telecom industry.

A true ICT player for the utilities industry

More than 42 million smart meters are enabled by platforms which are developed, operated or maintained by us across 4 continents. In addition to Elektrilevi in Estonia, we are partnering with recognized leaders in smart metering such as Enel, E.ON, Hydro-Québec, and Acea. We are currently responsible for managing the smart metering infrastructure in 10 different utilities across the world, as a service.

We have the capabilities to bridge IT and communications, delivering outstanding value and performance. Most of the real ground benefits, especially the ones related to ensuring reliable meter readings and controls, are achieved thanks to our ability to plan, deploy and fine tune the communications infrastructure. We were then able to integrate the latter with a new smart metering platform (head-end, implemented by us) as well as existing systems such as SCADA and workforce management (WFM).



Ericsson is the driving force behind the Networked Society – a world leader in communications technology and services. Our long-term relationships with every major telecom operator in the world allow people, business and society to fulfill their potential and create a more sustainable future.

Our services, software and infrastructure – especially in mobility, broadband and the cloud – are enabling the telecom industry and other sectors to do better business, increase efficiency, improve the user experience and capture new opportunities.

With approximately 115,000 professionals and customers in 180 countries, we combine global scale with technology and services leadership. We support networks that connect more than 2.5 billion subscribers. Forty percent of the world's mobile traffic is carried over Ericsson networks. And our investments in research and development ensure that our solutions – and our customers – stay in front.

Founded in 1876, Ericsson has its headquarters in Stockholm, Sweden. Net sales in 2014 were SEK 228.0 billion (USD 33.1 billion). Ericsson is listed on NASDAQ OMX stock exchange in Stockholm and the NASDAQ in New York.

Ericsson
SE-126 25 Stockholm, Sweden
Telephone +46 10 719 00 00
www.ericsson.com

EAB 14:039001 Uen