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Spotlight:
SMART CITIES

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PREFACE

Dear readers,

This edition of our *IU* is dedicated to the topic of smart cities. Are you familiar with zenon in a production environment or in the field of energy and infrastructure? If so, you might ask what zenon has to do with the topic of smart cities?

A smart city is a networked city that offers tech-powered benefits to its citizens. This may be in areas such as education, health or public safety, but also in areas where zenon can make a targeted contribution to improving life in the city. This includes the supply of electricity and water, smart buildings and traffic infrastructure.

Against the backdrop of the global boom in urban living, the smart city is not just an exciting concept but also of very significant economic factor. In our Spotlight, you can read how the world is changing against a backdrop of urbanization and be inspired when you see how zenon can contribute to the functioning of smart cities.

Another trend in the field of smart cities is more manufacturing moving into the urban environment. This is both to reduce transport costs and so that manufacturing companies can, thanks to their proximity to customers, react more quickly and flexibly.

However, regardless of whether in a city or outside of one, manufacturing plays an important role in this edition again, of course. Find out more, for example, about standardization with OMAC, our collaboration with ABB and digitalization in the smart automotive factory.

Enjoy reading!

THOMAS PUNZENBERGER, CEO

07:00 AM

THE CHALLENGE OF THE
URBANIZING WORLD

CHANGE

The world is urbanizing. According to a UN report[1], 54 per cent of the world's population lived in an urban area in 2014 – by 2050, that will have risen to roughly two thirds. This begs the question: how can a high quality of life be ensured in these metropolises? Are we threatened with a dystopian future of cities choked by traffic or waste, with blackouts, a lack of drinking water, and millions of people without work? Or do innovative technologies have the potential to create a city worth living in?

[1] *https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf*

Leading the pack when it comes to urbanization is North America, where around 82 per cent of the population live in towns and cities. Latin America and the Caribbean follow in second place with around 80 per cent urban populations. Europe trails behind slightly in third place at 73 per cent. In contrast, Africa and Asia are still mostly rural. There, 40 to 48 per cent of the population live in urban areas, though this is changing rapidly.

MORE MEGACITIES, MORE INHABITANTS

By 2030, it is anticipated that the Earth will have 41 megacities with more than 10 million inhabitants – many of them in Asia. Anyone worried by such developments will be relieved to hear that in cities, the provision of public transport, energy, drinking water, sewage disposal, and sanitary facilities is typically cheaper than in rural areas, and it is also easier to access health and education services.

The challenges of urbanization are enormous, yet not entirely new. Even ancient town planners had to deal with these problems, and created solutions that were truly impressive in their time. Just think of the vast aqueducts that supplied Rome with fresh water more than two thousand years ago.

What is new is the sheer number of large cities, their size, and their growth rates. Energy and resource consumption is reaching completely new levels. As a result, efficiency is now the order of the day, and not only to reduce energy use in view of climate protection – rather, the cities must remain affordable and worth living in for the inhabitants. The answer to these multifarious and enormous challenges? Smart cities.

WHAT ARE SMART CITIES?

The focus is on the clever networking of a city's functions, such as energy, transport, water, food, security, living, working, and shopping. Among other things, the smart city is tasked with the preservation of resources, increasing efficiency, and improving quality of life.

The basis for the smart city is data, which is recorded in as close to real time as possible and is available for immediate processing. This includes, to name but a few examples, data on energy consumption, water consumption, and utilization of roads and public transport. The data is recorded by intelligent sensors and provided to a central platform, such as a cloud infrastructure, for archiving or analysis.

ENERGY – RENEWABLE AND CONSTANTLY AVAILABLE

The most common application for smart energy technologies is in electricity distribution. In the past, electricity distribution networks were designed based on central power plants: the power plant generates electricity that is then taken to the consumer via the distribution network. The situation has now fundamentally changed, however. Due to numerous photovoltaic systems within buildings in the city, people who were previously electricity consumers have now become, for at least part of the day, electricity generators. The distribution network must be able to autonomously adjust to these new circumstances. In the countryside, large solar plants, wind turbines and biogas facilities generate renewable energy.

The smart grid means that a high security of supply can be achieved even when faced with a number of geographically dispersed generators and consumers. The challenge is complex, but solvable. For example, in the distribution network the level of the voltage, the phasing, and the frequency should only fluctuate within set limits – if the limit values are exceeded, then there is a risk of damage to machines and devices. This challenge is overcome using a multitude of sensors and decentralized control systems. Local energy storage devices, such as home batteries, also help to balance out fluctuations in electricity generation and consumption.

WATER AND SEWERAGE – TWO SIDES OF THE SAME COIN

Water is life. In many parts of the world, primarily in southern or very dry regions, water is often a very scarce and precious resource. It is an element that needs to be economized in all situations and cycles of life. Without an effective and efficient water supply and sewerage system, a modern city cannot exist.

In major cities and vast, densely populated metropolitan regions, the work increases exponentially. One example of successful infrastructure is the Lake Constance water supply in Germany. Its administration union provides over four million people in Baden-Württemberg with drinking water, including the Stuttgart metropolitan region, on a daily basis. The utility company takes water from Lake Constance, processes it and distributes it via a pipeline network that is over 1,700 kilometers long. The constant supply of water to the citizens means that the route and flow of the water has to be precisely controlled. Smart technology enables accurate, needs-based control, and problems in the far-reaching water network are quickly localized and can be remedied immediately. In addition, extraordinary peaks in water consumption can be forecast via predictive analyses, thereby avoiding disruptions to the supply.

MOBILE IN THE CITY – OPTIMIZING PUBLIC TRANSPORT AND TRAFFIC

In large cities, in particular, there is little or no additional space available for traffic routes. Instead, the challenge for

smart cities is to use existing transport and traffic routes more efficiently. One way to do this is to manage traffic flow with traffic lights. Together with the traffic-dependent opening of lanes, this allows the circulation of vehicles to be improved.

Sensors in the asphalt of parking lots to report free parking spaces provide a smart solution to alleviate traffic caused by drivers looking for parking, with a smartphone app displaying these spaces and navigating drivers to them.

Other tools for smart mobility include the intelligent control of street lighting and traffic-dependent ventilation of tunnels to save energy.

Public transport also requires optimization. In the case of trams, subways, urban railways, and trains, optimal use must be made of tracks and the energy consumption for each method of transport minimized. Energy consumption at stations can also be reduced, without affecting comfort and convenience.

SMART BUILDINGS THINK FOR THEMSELVES

Smart buildings with high energy efficiency and a superior level of comfort and convenience are highly sought after. New public buildings and office blocks meet the requirements for more efficient lighting and air conditioning, but solutions are being sought that – with only a reasonable amount of work – can make old buildings fit for modern requirements.

With intelligent solutions, there is no need to completely modernize the infrastructure of old buildings, including the utilities of electricity, water, gas and heat distribution. The most cost-effective method, which is viable in many buildings, is to seamlessly integrate the old infrastructure into a new central building control system.

A smart Energy Data Management System, or EDMS, can reduce the energy consumption of a building in the double-digit percentage range, without decreasing comfort. If this is achieved across all public buildings in a city, the total energy requirement for the city would fall dramatically. This reduces costs for local businesses and the inhabitants and protects the environment and climate by using fewer resources.

URBAN MANUFACTURING – WORK WHERE PEOPLE LIVE

In 1930, the Athens Charter demanded a strict separation between living, working, and shopping. We are now living with the result of cities divided according to function: in the form of congested roads and crowded public transport.

This can be remedied by at least partially removing this functional separation. Thanks to technical progress in the reduction of noise and the release of harmful substances, production companies from a range of sectors could move back to residential areas near the city center. In addition to IT and communication businesses, this would also be feasible for food production, precision engineering, and fashion companies. And manufacturing, too, is experiencing something of a renaissance. New technologies such as 3D printing, for example, facilitate the cost-effective production of customized products in batches of one, to the benefit of on-site customers.

One example of how this can work was presented at the "Heimtextil" trade fair in Frankfurt in the "Digital Textile Micro Factory"[2] in January 2017. According to a report in the German newspaper Frankfurter Allgemeine Zeitung, the sports equipment manufacturer adidas is already working on the "Storefactory", which will produce sweaters, among other things, in sales outlets.[3]

When intelligently organized, the needs of the city, manufacturer and consumer form a kind of magic triangle: the city benefits from economic prosperity and the related increasing revenue. Manufacturers can do business sustainably thanks to short routes to suppliers and consumers and highly sought-after specialists come to live in the city, while consumers enjoy local products and benefit from prospering areas of the city. Thanks to the spatial proximity to other companies, cross-sector partnerships are possible, such as cooperation between production companies, IT startups, and companies in the dynamic creative sectors. In addition to this, the proximity to universities, colleges, and research centers promotes the development of innovative products and services.

New York City promotes urban manufacturing. The huge city uses the label "Made in NYC" to support small-scale manufacturing companies. Even though these companies only have a few employees, in total they add up to a considerable number of jobs. According to information from the Zukunftsinstitut, the roughly 6,000 manufacturing-esque operations in New York employ some 81,000 people[4]. The urban manufacturers are followed by further city-based production sites, producing attractive and local products.

SMART CITIES ARE FEASIBLE

Some cities are acting as pioneers of the smart city. The Spanish city of Barcelona, for example, is making significant progress in this direction. One aim is to optimize the municipal services such as garbage collection: sensors

on garbage cans record the filling level and development of odors. If set limit values are exceeded, then they signal to a central control system that the trash needs to be emptied. This means that the garbage collection service can act according to requirements and optimize routes.

In addition, it is intended that the watering of municipal parks will be made more efficient. Sensors measure moisture levels in the ground. Based on these measurements and weather data, the gardeners optimize watering.

In another initiative, to better manage traffic caused by drivers looking for parking spaces, sensors record the use of parking spaces, with a smart parking control system guiding drivers to free parking spaces.

Another idea for the city of the future is smart lighting of public paths for pedestrians. As part of the Barcelona Lighting Masterplan[5], the city converted over 1,100 street lights to energy-saving LED technology. Sensors notify the control in the lamppost when pedestrians are nearby and it increases the brightness of the LED lights. As soon as there are no longer any pedestrians nearby, the lighting is dimmed. This technology has allowed Barcelona to reduce the energy consumption of its street lighting by around 30 per cent[6].

The sensors on the lampposts also monitor air quality and transmit the data to the city administration. At the same time, they act as access points for the city's WLAN network, allowing inhabitants to use the Internet on their mobile devices free of charge when they are out and about.

Barcelona also wants to be a pioneer in terms of energy supply, and the city is striving to supply all of its energy from renewable sources such as solar, wind power and biomass. As a first step, the energy consumption of public facilities will be decreased by 10 per cent. This will be achieved using greater energy efficiency, switching 30 per cent of the city's lighting systems to economical LED technology and renovating the energy systems of public buildings[7].

Barcelona's example gives us cause for optimism. It shows a wealth of methods and technological solutions which towns and cities can use to be smarter and more energy-efficient. What's more, innovative technologies can make the city of the future a place worth living in.

[2] http://id-tex.eu/2016/12/13/heimtextil-premiere-der-digital-textile-micro-factory/ (source only available in German)
[3] http://www.faz.net/aktuell/wirtschaft/mode-der-pullover-kommt-bald-aus-dem-drucker-14641044.html (source only available in German)
[4] https://www.zukunftsinstitut.de/artikel/made-in-the-city-urban-manufacturing/ (source only available in German)
[5] http://ajuntament.barcelona.cat/ecologiaurbana/en/what-we-do-and-why/quality-public-space/lighting-Master-Plan
[6] http://datasmart.ash.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789
[7] http://ajuntament.barcelona.cat/ecologiaurbana/en/node/2350

BECAUSE IT AFFECTS EVERYONE:

SMART CITIES WITH ZENON

According to the United Nations, two thirds of the world's population will live in urban areas by 2050.[1] At COPA-DATA, we see that as a mandate to use all our resources and opportunities to make a valuable contribution to a sustainable future that is worth living – with innovative solutions based on our zenon software and the latest technologies available on the market.

The road towards the smart city is rocky. Finding the balance between modernizing existing infrastructures and creating new systems will be no small challenge. Modern technologies can process real-time and historical data from geographically dispersed infrastructures in a cost-efficient and high-performance manner and make them available both to other organizations for the development of further services and for the city's inhabitants themselves. It is exactly these requirements that COPA-DATA means to meet with its zenon software system; doing so, for example, with tailor-made solutions for the public sector based on the Microsoft Azure cloud platform. Whether it is pure cloud applications or hybrid scenarios, zenon ensures greater sustainability and efficiency in the areas of energy, water, public transport, and buildings. The focus is on the individual, meaning ergonomics play a key role in our smart city solutions.

Figure 1: Examples of a Smart City solution with zenon – for a perfect overview, even from mobile devices.

THE ROUTE TO THE SMART CITY STARTS WITH DATA

Heterogeneous hardware landscapes, obsolete systems and infrastructures, information islands isolated from one another: That's where smart cities come into play, providing seamless networking and centralization of different systems. This results in the creation of efficiencies and added value for the city's civil servants and inhabitants. The Industrial Internet of Things offers a suitable framework for this: from the sensors directly or indirectly linked to the central cloud platform and, if necessary, onwards to mobile end devices. With zenon, this can already be achieved today thanks to the horizontal and vertical integration options and its incredible performance in terms of connectivity and compatibility. More than 300 communication protocols and drivers ensure optimal flexibility and, therefore, future-proof investment.

ELECTRICITY – THE ENERGY OF LIFE

Securing an uninterrupted energy supply will prove the greatest test in the face of the increasing number of urban dwellers. In addition, decentralized infrastructures in which consumers also act as producers will pose a challenge for network stability. zenon offers functions for avoiding exceptional circumstances such as blackouts

and quickly reacting to extraordinary events, including natural disasters. Whether it is for smart grids, local plants, hydropower plants, wind farms, photovoltaic systems or substations, zenon provides an integrated environment for all applications. In addition, it supports protocols such as IEC 61850, IEC 60870, and DNP3 – perfect for seamless integration into existing control stations and systems. Paired with predictive analytics capabilities, it can also forecast bottlenecks in the energy supply and schedule necessary maintenance work.

WATER – THE ORIGIN OF EVERYTHING

How can the water processing and supply for a city, with its kilometers of pipelines, far-flung treatment plants and numerous pumping stations, be designed more intelligently? By using zenon to predict acute or otherwise unexpected peaks in consumption and introduce measures to avoid disruptions to the water supply. Various factors need to be considered, including weather data. zenon also provides maintenance personnel with all the figures and data of the water or sewerage network on a mobile device, so leakage losses are quickly detected via incoming alarm notifications. This means that the operations and security of the water supply can be continuously improved.

PUBLIC TRANSPORT – CONVENIENTLY FROM A TO B

The quality of life in a city rises and falls with the public transport that is available. zenon works in the background to supply everything necessary for smooth operation. Used as a central process control system, it monitors and controls the components necessary for running the services, such as the digital displays on motorways, the ventilation in tunnel systems, the light on airport runways, and much more. As an energy data management system (EDMS), it also ensures the more sustainable use of energy resources throughout the traffic network.

INTELLIGENT BUILDING – SUSTAINABILITY FOR WELL-BEING

Elevators, air-conditioning systems, heating, lighting systems, water, electricity – a building brings together numerous systems that interlink in an automated fashion. Public facilities such as universities, schools or hospitals represent a high energy-saving potential, because they often have older building infrastructures. As an energy data management system (EDMS), zenon helps the operators to identify potential savings and achieve them in the best possible way. zenon provides the basis for deciding on the correct actions by automatically collecting and analyzing energy data, while also complying with the requirements of the TÜV-Süd "Certified Energy Data Management" standard as per ISO 50001, an important standard for the implementation of sustainable consumption targets.

ZENON AS A BASIS FOR SMART CITIES

In zenon, COPA-DATA is providing a high-performance software system, which helps cities to offer their inhabitants a secure future. Its primary benefits are the reliable and efficient operation of all infrastructures, the sustainable use of valuable resources, and inclusivity for the city's inhabitants. Often working in the background, zenon ensures a wide range of solutions are available to citizens in their daily lives, such as electricity, water, heat, and smart traffic networks. The solutions and technologies are there, but now it is up to the cities to be proactive. Many years ago, Confucius fittingly said, "a man who does not think and plan in the long term will find trouble right at his door."

Microsoft Partner of the Year
2016 Winner
Public Sector: Microsoft CityNext Award

PRIZE-WINNING: SMART CITY SOLUTIONS WITH ZENON

Out of 2,500 nominations from 119 countries, a panel of specialist judges chose COPA-DATA as the winner of the 2016 Microsoft Partner of the Year Award in the international category "Public Sector: Microsoft CityNext". This distinguished award honors zenon's innovative solutions that are based on the latest technologies, such as the Microsoft Azure cloud platform. Today, numerous communities, cities, and states are already benefiting from COPA-DATA's smart city solutions, particularly in the areas of energy, water, public transport, and smart buildings. This achievement is a further incentive for us to continue tackling future challenges in the public sector, thereby making a valuable contribution to greater sustainability and a higher quality of life.

Video:
Smart Cities with zenon
Scan & Play!

http://kaywa.me/RVOE0

JOHANNES PETROWISCH,
GLOBAL PARTNER & BUSINESS
DEVELOPMENT MANAGER,
COPA–DATA HEADQUARTERS

zenon
Makes Operational Management of Critical Infrastructures Easier

TEXT: JOHANNES PETROWISCH,
GLOBAL PARTNER & BUSINESS DEVELOPMENT MANAGER,
COPA-DATA HEADQUARTERS

Smart cities use innovative technologies to make sure their residents have a reliable supply of power and water. The zenon software from COPA-DATA provides highly scalable, future-proof and sustainable solutions, which stand out with high efficiency, low consumption of valuable resources and flexible mobile operational management.

Smart cities are highly interconnected. Connection to infrastructures for supplying water and power is the highest priority. However, many systems being installed with different hardware and protocols makes communication more difficult. In addition, the systems must have a high level of availability. Even in smart cities, a failure in the supply of power and water would have fatal consequences.

zenon forms a reliable basis for this exact kind of solution. The software supports more than 300 protocols and therefore provides the most flexibility and options for integration possible. It is virtually predestined for the operational management of critical infrastructures with different hardware and software components.

One example of the smart use of zenon in supplying power is found in Bellinzona, the capital of Ticino, Switzerland. Azienda Municipalizzate Bellinzona (AMB) modernized the power supply for Bellinzona and the surrounding areas. Part of this was using the zenon software as a visualization system for operational management.

Another difficult issue in smart cities is the supply of clean drinking water, especially because the world has more and more cities with more and more residents. Constant maintenance of the distribution network is the key to a reliable water supply. zenon assists in this with remote maintenance on mobile devices, and so can make great contributions to ensuring the supply is very reliable.

One example of smooth system operation with zenon is the Leibnitzerfeld water supply, which supplies clean drinking water to around 80,000 people in 28 districts in southern Austria. The zenon-based control technology means that the system is maintained, controlled and updated without needing to be stopped. Thanks to a web-based interface, maintenance technicians can use mobile devices for remote operational management, even from home when they are on call. Through a tablet computer, they have constant access to an entire system overview when working on one of the far-flung parts of the system.

In the two following articles, you will find exciting technical details on how zenon is making power and water supply smarter and thus contributing to the smart city concept.

ZENON SUCCESS STORY

OPEN INTERFACES FOR EFFICIENT ENERGY DISTRIBUTION:

Bellinzona Secures Power Supply

For nearly 150 years, the public utility AMB has supplied Bellinzona, the capital of Ticino, with its power and communication. It was time to update the technology and to adapt it to current requirements and standards. This complex project was jointly taken on by the experts COSTRONIC SA and the zenon software from COPA-DATA.

Azienda Municipalizzate Bellinzona (AMB), has secured the power supply for Bellinzona and neighboring municipalities since 1869. AMB now supplies approximately 15,000 households with an average of 280 GWh of electricity per year, including quick telecommunication via fiber-optic cable and clean water. The power is distributed over a 50 kV/16 kV network. Around 20% of the required energy is generated from hydro-electric power and photovoltaics.

When it was a matter of switching the aged and locally-distributed operation of the 50 kV/16 kV power supply to a central control system, AMB commissioned COSTRONIC SA with the implementation. Experience with successful cooperation had already been gained through a power station project.

Figure 1: In the control room, the employees always have an overview of the complete energy grid and can zoom into the details at any time.
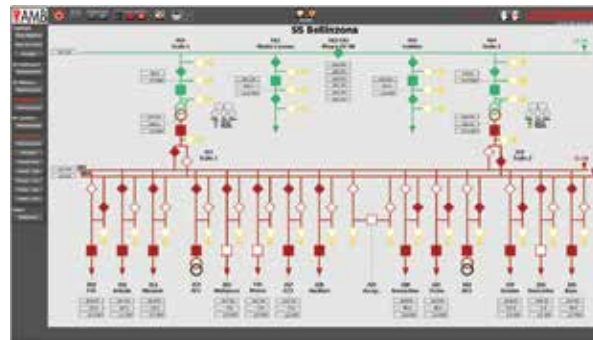

Figure 2: When distributing from 50 kV to 16 kV, the status of each line is shown exactly using ALC.

STEP BY STEP TO A SECURE POWER SUPPLY

AMB did not just want to replace aging technology, it primarily wanted to build a safe system with high availability. A central requirement in doing so was that the legal specification of keeping a complete archive for ten years would be met. In addition, it had to be ensured that the maintenance staff, on call 24 hours a day in the control center, get their information in real time. A perfect overview of all information and quick access to current and saved data was considered standard anyway.

The system integrator COSTRONIC SA designed the project with multiple layers and deployed it in a targeted manner in several steps. A simple subproject was implemented as a basis. This was then expanded to a multi-project administration which acted as a multi-client. Then, there was the step of vertical redundancy as a multi-standby server and, lastly, the connection to the higher-level load distribution plant. Afterwards, 80 transformers (16 kV) and distribution boxes (400 V) were integrated in line with IEC 61850.

For Claude Nidegger, Sales Manager at COSTRONIC SA, the decision to use zenon as a visualization system was obvious: "zenon is perfectly scalable and could therefore be adapted ideally to the growing requirements. It is primarily the simple reuse of screens and symbols, as well as the support for many energy protocols, that simplified project configuration for us. The subsequent visualization of 80 transformers and distributor boxes was implemented without problems using the indicated screen switch."

POWER SUPPLY IN BELLINZONA SECURED

In the final expansion, several servers and clients now use zenon to control the seven Schneider Modicon M340 using Open Modbus TCP/IP, as well as the 120 Schneider protection relays using IEC 61850. They are connected using the direct drivers already supplied with zenon. In Runtime, the complete network is shown as a zenon Worldview and colored using Automatic Line Coloring. The operators have an overview of the complete network at all times and can zoom into the details at the same time if necessary.

Each of the servers has an SQL connection. Furthermore, because the complete system was designed with vertical and horizontal redundancy, data loss is prevented in the event of an error and the legal obligation to keep records is fully ensured.

AMB was very satisfied with the careful implementation. Pasqualino Pansardi, Power Generation Manager at AMB: "The configuration of the project met our demands and requirements in full. During the course of the project, we learned to value the benefits of open interfaces and simple scaling."

Bellinzona can continue to rely on its power supply. The control and visualization now comply with all legal regulations and company requirements.

ABOUT COSTRONIC SA

COSTRONIC SA was founded in 1986 and has established itself as an expert in the energy field. The Swiss integrator's teams have already implemented over 2,500 automation
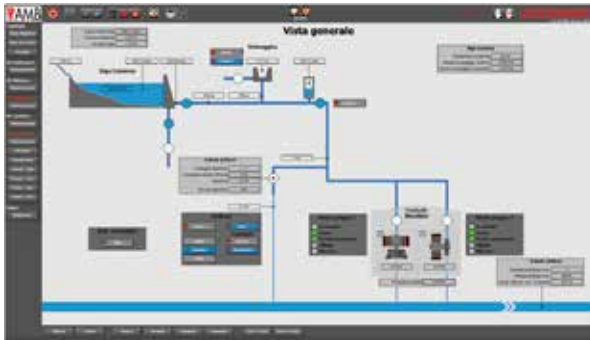
Figure 3: Processes and status of the turbines can be recorded at a glance. If required, employees can have details shown without problems.
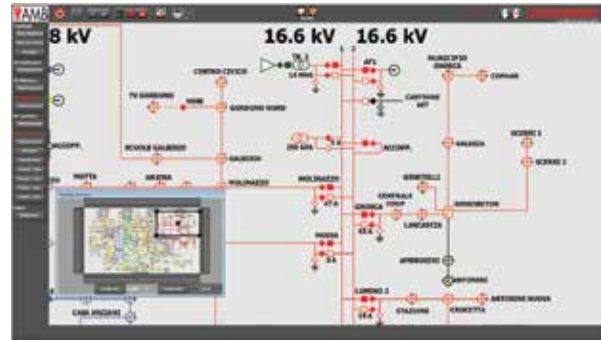
Figure 4: All lines and stations are shown in a zenon Worldview. The section can be zoomed and moved as desired.

projects: For hydro-electric power plants and transfer and distribution of high, medium and low-voltage power supplies, as well as for road and infrastructure projects. COSTRONIC has been a member of the COPA-DATA Partner Community since June 2012. Further information: www. costronic.ch.

ABOUT SATOMEC AG

SATOMEC AG is a commercial company with dealers for automation systems. The zenon distributor, based in Cham, provides its customers in Switzerland and Liechtenstein with highly-qualified support, consulting, instruction and training. Control systems, visualization, HMI, IPC and network technology are some of the areas of expertise of the Swiss company with 15 employees. SATOMEC AG was founded in 1976 and has been privately owned by the Studhalter family since 2005. Further information: www.satomec.ch.

AMB AND ZENON AT A GLANCE:

– 7x Schneider Modicon M340 via Modbus

– 4x 30 Schneider protection relays via IEC 61850

– Integrated IEC 60870 and IEC 61850 direct drivers, as well as Open Modbus with time stamp

– Server and multi-standby server under Windows Server 2012 and Windows 8.1

– Multiple-monitor solution with parallel switching of several screens

– SQL connection

– Worldview for overview and detailed display of the complete network

– Clear coloring of the power lines and their status

CONTACT:

Elger Gledhill
zenon Sales Manager, Switzerland/Liechtenstein, Satomec AG
info@satomec.ch

ZENON SUCCESS STORY

COPA-DATA'S SCADA SOLUTION ENSURES A
WATER SUPPLY FOR 80,000 PEOPLE

zenon –
and Everything Flows

Securing and protecting the quality and quantity of drinking water is the
focus of Leibnitzerfeld Wasserversorgung. It supplies 80,000 consumers
with the most important utility. It recently switched its control systems
to the zenon SCADA software from COPA-DATA to improve the efficiency
and flexibility of its operations, as well as comprehensive maintenance of
equipment and its pipeline network, in order to ensure a seamless supply of
drinking water of the highest quality.

Figure 1: With the zenon Worldview, the LFWV technicians always have access to the entire equipment – even when they are not on site.

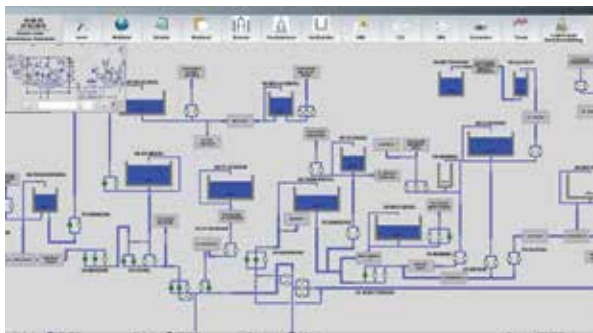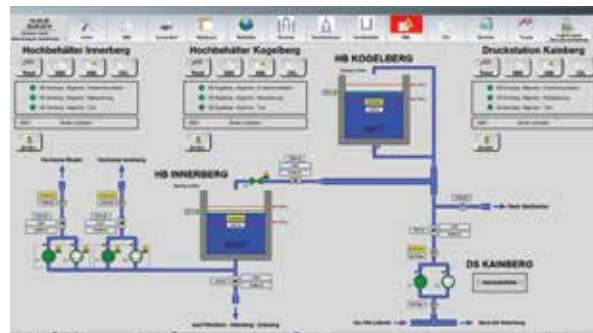*Figure 2:* The degree of detail in the station overview – whether individual parts of the equipment or larger, connected sections of equipment – can be selected freely.

Although 71% of the earth's surface is covered in water, it is by no means a given that all people have drinking water in sufficient quantity or of a sufficient quality. The main task of Leibnitzerfeld Wasserversorgung GmbH (LFWV) is to supply around 80,000 people in 28 municipalities in the south of Austria with clean drinking water.

Founded in 1910, the non-profit company with 22 employees operates eleven well systems, 60 pressure riser facilities and 41 high-level tanks with a capacity of 10,000 m³ as well as a network of pipes that covers approximately 385 km. With measures for securing and protecting ground water and for the ongoing monitoring of the quality of drinking water, LFWV sustainably guarantees the provision of around three million cubic meters of drinking water per year.

THE PREVIOUS TELECONTROL SYSTEM HAD REACHED ITS LIMITS

In order to be able to offer its end consumers a seamless supply of water 24 hours a day, 365 days a year, LFWV makes ongoing investments in the modernization of its equipment to increase efficiency. The company therefore put its first remotely-controlled equipment into operation in 1950, in order to be able to react more quickly to situational changes.

This equipment had not, of course, remained unchanged when LFVW decided to take it out of service. "The existing telecontrol system met all requirements to our satisfaction," explained LFWV CEO Franz Krainer. "However, it contained numerous proprietary components and the lack of standardized interfaces was a significant obstacle to the further expansion of the system."

A DEMANDING RANGE OF CRITERIA

LFWV decided to carry out a tender process to pre-qualify appropriate providers. The aim was to find a modern, open system with standardized interfaces that could be adapted to the existing circumstances as far as possible. "As a result of the different ages of the equipment, there is an enormous range of locally-installed systems and different data transfer routes," explained Krainer. "A comprehensive conversion was out of the question, so we looked for a system that had very wide-ranging compatibility properties."

A significant stipulation in the tender was that the new system should make monitoring and maintenance more flexible; it was a requirement that maintenance technicians should be able to carry out their roles not just in the control room but also at any location using tablet PCs. Because one of the main priorities of LFWV was the best possible security of supply, any tendered system had to be constructed in a fail-safe manner.

The selection of a suitable system was made on the basis of a range of criteria that the LFWV project team used to evaluate live online presentations from four manufacturers. The zenon SCADA system from COPA-DATA made the running. In numerous installations, zenon has proven itself flexible and open, but it primarily scored points on technological criteria. Remote maintenance and a hot reload function allow seamless maintenance, control and updating without stopping the equipment. The high system stability and data security also went in favor of zenon, as well as the simple transfer of existing data. Furthermore, COPA-DATA already had, from many applications, well-founded expert knowledge in the energy and infrastructure sector.

SEAMLESS SYSTEM SWITCH DURING LIVE OPERATION

A particular challenge when implementing the system was the fact that the region does not have a plentiful supply of water. It is a technical challenge to guarantee a secure supply. In such a situation, any short-term failure of part of the system can lead to supply disruption. LFWV therefore selected an implementation strategy in which the existing telecontrol system would remain fully operational until there was proof that the new system works for the various sections of equipment.

The commissioning of metior Industrieanlagen Planungs- und Beratungsgesellschaft mbH (metior) ensured the implementation's success. The engineering company for electrical and automation systems, based in Graz, has 35 employees and specializes in the solution of complex automation tasks in the process industry. It has been, as a zenon system integrator, a long-term partner of COPA-DATA.

a year after LFWV placed the order with metior, 93 of the 118 parts of the equipment have been incorporated into the control system via fiber-optic cable, copper cable or radio. The cyclical treatment of 2.213 IEC variables results in 220,000 database entries every day.

FUTURE-PROOF OPERATING CONCEPT

"metior uses zenon for equipment such as that LFWV uses because this comprehensive SCADA solution is tailored for flexible, open and reliable applications," said metior CEO Martin Ableitner. "In addition, zenon can be integrated very easily into existing infrastructure with existing functions such as the simple switching of pumping stations by means of the IEC 60870 telecontrol driver and dual commands."

The fact that zenon also has very wide-ranging graphics capabilities as well as innovative Faceplate technology enabled metior to implement an operating design that is just as ergonomic as it is flexible. On two large-screen overview monitors and two screens per workspace computer in the control room, the zenon Worldview offers operators an

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"Using the Faceplate technology in zenon, metior created a superior trend solution with an even better overview."

FRANZ KRAINER,
CEO OF LEIBNITZERFELD WASSERVERSORGUNG GMBH

HOLISTIC, MODULAR SOLUTION

In close partnership and coordination with LFWV, metior used the open, modular system structures in zenon's engineering to create a tailor-made but, nevertheless, modular application . In it, the archive data from the previous system was taken on, so that access to historical information is also guaranteed. "The engineers from metior were very cautious and first carried out a comprehensive analysis of the equipment situation," remembers Krainer. "They often presented alternative possibilities for a solution before implementation."

The system portrays the water supplier's workflows and has high availability and failsafe performance. To achieve this, it is installed on two redundant servers. In addition, the workstations in the central control room in Leibnitz as well as the mobile devices for the maintenance technicians are equipped with numerous zenon Clients.

The control system includes the integrated PLC system zenon Logic. This controls all local control computers and I/O modules at the connected end points, as well as the remote end points by means of a radio master system. Half

entire overview of the equipment, displaying geographic information as well as information regarding the hydraulic infrastructure.

Users can increasingly zoom in on the overview screen by selecting an area, and can drill down to detailed views of individual stations. The capability of zenon to display graphics in very high resolutions enables the simultaneous consideration of attendant areas in the supply network to be viewed with user-friendly zooming.

The trend analysis is an important part of the operating concept. It shows LFWV employees on standby any fluctuation in the water supply within the network at a glance and forms the basis for decision-making and short-term interventions. "The trend tool in the previous system was specifically programmed for us and was very good and highly efficient," says Krainer. "But using the Faceplate technology in zenon, metior created a trend solution that exceeds the benefits of that and also guarantees an improved overview."

Figure 3: The trend solution created using the Faceplate technology in zenon increases user-friendliness.

MOBILE, FLEXIBLE OPERATIONS MANAGEMENT

Switching the control system to zenon has enabled the use of mobile end devices and resulted in a significant change to the way the maintenance technicians work. "They can now perform standby tasks at home," says Ewald Lambauer, deputy manager at LFWV, citing a significant advantage of zenon's web-based user interface. "What is almost even more important is that, for on-site deployment too, they always have an overview of the complete equipment on their tablet PC so operations are always under control."

ZENON AS A CONTROL SYSTEM AT LFWV

– Failsafe performance through server redundancy

– Simple switching of pumping stations via IEC 60870

– Overview of hydraulic and geographic information thanks to zenon Worldview

– Simple operation

– Location independence and improved capabilities to respond via mobile web clients incl. SMS messaging service

CONTACT:

Jakob Miazga
Sales Manager
COPA-DATA Central Eastern Europe / Middle East
jakob.miazga@copadata.com

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NEW VERSION – THE HIGHLIGHTS AT A GLANCE

LOOK FORWARD TO ZENON 7.60

With zenon 7.60, every year we offer new and improved functions to make work even easier and more ergonomic for project creators and users. This includes some tools based on completely new approaches. Read on to find out what highlights you can look forward to.

THE TIME MACHINE: ZENON PROCESS RECORDER

The zenon Process Recorder will be provided for the first time in zenon 7.60. It is an innovative module, which seamlessly records processes and plays them back at a later date. This is ideal for situations when, for example, irregularities in production cannot be traced precisely enough with existing zenon tools, such as with the Alarm Message List (AML) or the Chronological Event List (CEL).

Use the Process Recorder to play back processes in the past step-by-step on the process screen, like in a media player. This will allow you to identify error sources even more quickly and precisely and use them as a basis to increase effectiveness and improve quality. The zenon Process Recorder is not only suitable for energy or infrastructure management, but it is also particularly good for production companies such as food and drink manufacturers and the pharmaceutical industry.

CONTEXT LIST FOR BETTER ALARM ADMINISTRATION

The new context list screen type helps you to arrange data entered manually, for example when analyzing alarm causes. You can predefine the names of alarm causes in the context list, meaning that you avoid a situation where each user selects a different name, making it impossible to assess alarm causes retrospectively. The context lists standardize the entries so that data can be read out for quality management and used for further analyses.

ZENON STYLES MAKE THE DESIGN MORE EFFICIENT

In addition to styles for static elements, you can now also specify and maintain styles for dynamic screen elements, in which properties change depending on the status. Styles define graphic properties of screen elements, such as their line thickness, size or color. Styles are saved centrally in a global project or in a local project and can easily be transferred to all other elements. This allows you to ensure you have a consistent design throughout a project or across different projects. When changes are made, all linked elements are adjusted automatically.

SHIFT-BASED ANALYSES AND MORE

The new zenon shift management integrates personnel planning into the production environment. The shift calendar allows for planning and documentation of shift-based production processes, which means that you can conduct shift-dependent production analyses, e.g. with the zenon Analyzer. The shift management is integrated into the message control module. This ensures an efficient communication chain in the event of alarms, as only the available people on the shift in question are informed.

THREE-DIMENSIONAL MODELS PROVIDE CLARITY

With the new 3D tool, project creators can easily integrate 3D models into the visualization project. This has the advantage that the handlers are shown a production machine as an intuitive and user-friendly, three-dimensional view. In the model, you can link variables or create functions which display detailed images of a machine section. This makes it quicker to locate errors and alarms on the machine, for example.

INTEGRATED DEVELOPMENT OF ADD-INS

Visual Studio is a future-proof platform for the programming of add-ins, giving you an up-to-date programming environment for simple and professional development of individual functions for the zenon Editor and zenon Runtime. It also expands the automated engineering.

Figure: The context list allows manually-entered data to be arranged. So alarm causes, for example, can be pre-defined and thereby used for later analyses.

HIGHLIGHTS FOR ENERGY & INFRASTRUCTURE

The zenon Process Recorder described above is particularly important for the energy automation and infrastructure management sectors. It can be used to seamlessly track and analyze processes in electricity networks or substations.

It also provides a new option for linking data from geographic information systems (GIS) and the zenon visualization. With the GIS Editor and GIS Control, you can display electricity networks in the zenon visualization on geographical maps. Current statuses, such as alarms, are displayed directly on the map.

The new impedance-based fault locating is a valuable tool for energy automation in particular. The measured impedance is used to determine where precisely in the network the fault is located, allowing you to locate faults promptly, precisely and react more quickly.

ANDREA MITTERER,
PRODUCT MARKETER

The Time Machine

THE NEW PROCESS RECORDER IN ZENON
OFFERS ADVANCED AND INNOVATIVE OPTIONS FOR
ERROR DIAGNOSTICS.
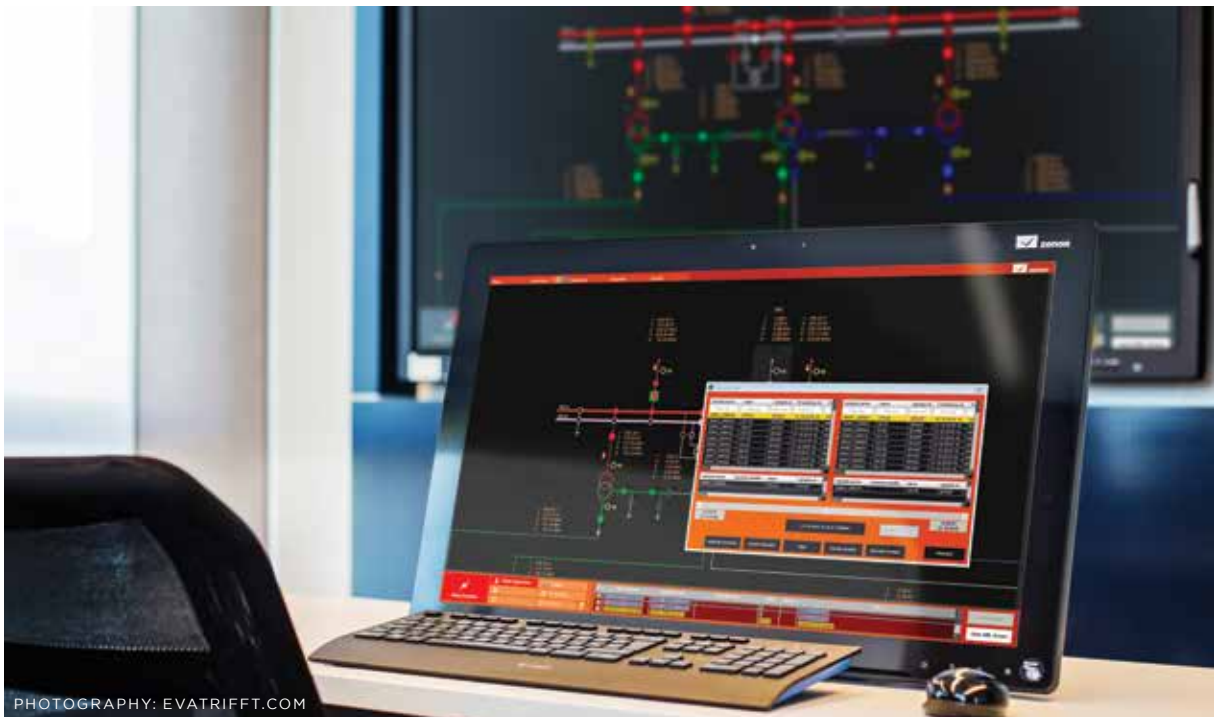
PHOTOGRAPHY: EVATRIFFT.COM

One highlight of the new zenon version 7.60 is the Process Recorder.
This brand-new module serves as a type of "time machine", allowing you to look back
on previous processes. The Process Recorder continuously records processes, which can
later be played back in detail on the process screen in a similar way to a media player.
This makes identifying and analyzing errors and bugs easier, giving even more detailed
insight than other tools such as the alarm reporting service.

Let's consider Peter's experience. Peter is a maintenance engineer in a power supply company. When he starts work one day, he finds an e-mail from his colleagues in the zenon master display. There was an anomaly in the data retrieved from the substation the night before. He needs to drive to the substation to find the problem.

Peter gets straight into his car. First, he checks the single line diagram on the screen of the local operating system – everything looks OK. The switches are in the normal position, all the data is valid. Peter then takes a look at the alarm list, but there is no alarm to be seen. Even the events list doesn't reveal anything significant. Finally, Peter opens the trend display, loads all of the available variables and analyses them. Nothing out of the ordinary there.

WHAT HAPPENED?

Peter tries another investigation technique. He reopens the events list and selects an entry with a time stamp that best coincides with that of the master display. Then, he clicks on the "Start Process Recorder Replay" button. The operating interface on the client workstation switches to the "Replay" simulation mode. The workstation is disconnected from the HMI network and now runs independently so as not to disrupt the other workstations that are running in hardware mode.

Peter opens the time navigation window and sets the system to exactly the time when the anomaly occurred. He uses the time trend bar for navigation and the forward and back buttons to find the exact time position he wants to see. The problem then becomes clear: a line branch shows invalid data for a very short period of time. The switch status and the display of the measurement values were clearly supplied with invalid data. This must have been the anomaly that his colleagues in the control room noticed last night.

THE SOLUTION IS CLEAR.

With this new information in mind, Peter realizes two things. First, there is either a problem in the communication between the HMI server and the bay controller, or a problem with the bay controller itself. Second, the configuration of the application is not flagging up invalid data.

Peter now knows exactly what he has to do. He checks the bay controller for possible log entries and determines that there was a brief voltage dip and, as a result, the device restarted. Peter immediately finds the reason for this: a loose screw in a power-cable terminal. He tightens the screw and changes the zenon configuration so that invalid data triggers an alarm in future. Problem solved!

HOW DOES THE NEW SYSTEM WORK?

The Process Recorder that helped Peter to trace the problem is available in zenon from version 7.60. The new tool is a type of "time machine" that can be used to navigate back through the process history. The Runtime Server creates a detailed record of the variables defined in the project. Every value change is recorded and stored permanently on the hard drive. You can recall these recordings at any time on the zenon processor screen.

TIME TRAVEL MADE SIMPLE!

Just switch the zenon client into the simulation mode to play back the data from the Process Recorder. Only the time frame that needs analyzing will be shown; the rest of the data is hidden. The data flow and dynamic elements are displayed

ONLY FOUR STEPS TO IMPLEMENTING ZENON PROCESS RECORDER

1. In the project settings, click on the checkbox to activate the Process Recorder.

2. Select which variables will be important for future analysis. These should be the variables you would like the information on the processor to display.

3. Set a zenon function for switching the view to "Replay" mode. You can either create a button in the project or simply create a button in the alarm or event screen as described above, so that the time in the list is used to refine the analysis range.

4. To navigate through time in the replay mode, you can create another screen like the Process Recorder as well as the function that opens the screen.

You can now begin your trip through time! Alternatively, you can leap straight into the past with the usual zenon alarm lists, event lists and trends.
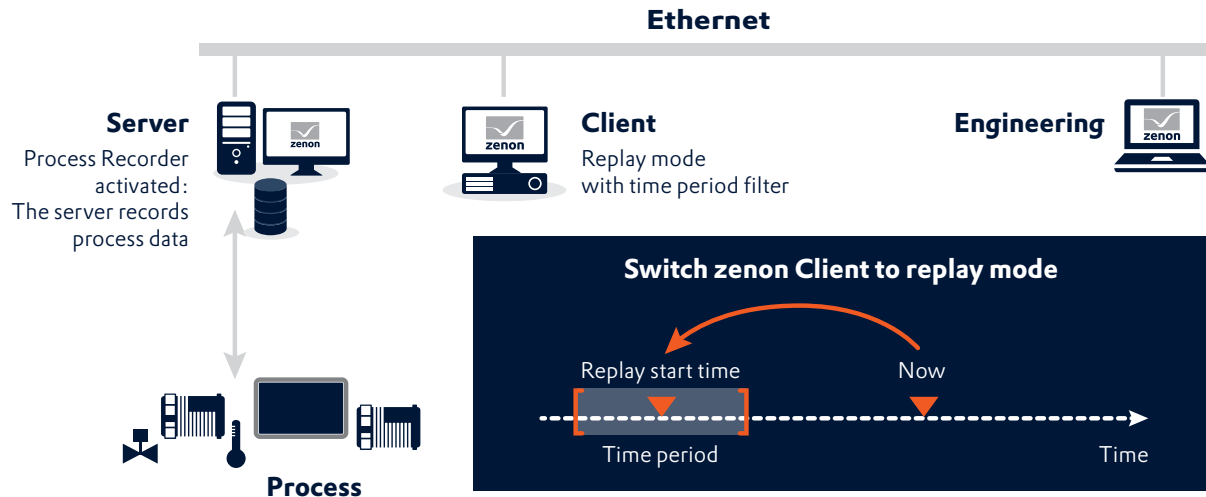
Figure 1: Functionality of the zenon Process Recorder.

on the screen exactly as they were at the time that the event occurred. This includes numeric elements with changing numeric values, graphical elements that change their form, or even ALC lines with varying colors.

BETTER ANALYSES FOR HIGHER QUALITY

The Process Recorder is not an expansion of the existing tools; it archives processes in a way that an alarm list or an events list never could. You can save the details of erroneous and successful processes, as well as create animated or 3D versions of the processes in the process screen. This makes analysis much easier and quicker compared to regular list searches.

Even with well-documented production processes, there may be quality defects to investigate. With the Process Recorder, you can determine exactly when the problem arises, allowing you to find the precise time at which the anomalous data was produced. You can also discover which areas or which customers in a power network were affected by a power failure. It is also easier to retrace misconfigurations – for example, issues arising from faulty alarm triggers.

IDEAL FOR PROCESS-ORIENTED INDUSTRIES

The Process Recorder offers new and improved approaches to error diagnostics and process analysis, and thus enhances the quality assurance of the processes controlled by zenon. The system is not only key to improving energy management; benefits extend to industries such as food and drink production, automotive, transportation, the chemical and pharmaceutical industry which stand to gain significantly from what the system offers.

JÜRGEN RESCH,
INDUSTRY MANAGER
ENERGY & INFRASTRUCTURE

WHAT A MATCH!

Take full advantage of the IIoT
with Automation Builder and ABB zenon.

PHOTOGRAPHY: MATHIAS ERNERT

At the start of 2016, the energy and automation company ABB made the decision
to add our zenon software system to its industrial automation portfolio. By doing
so, ABB aims to offer enhanced connectivity and more application solutions
for discrete manufacturing, general mechanical engineering, and the food and
beverage industry. zenon can also be connected to ABB's cloud infrastructure and
digital services. ABB is offering zenon in the form of HMI and operations data
management software that can be used as a data collector and IoT gateway for
frequency converters, soft starters, and PLCs in a heterogeneous environment.
In the following interviews, Sönke Kock from ABB and Thomas Punzenberger from
COPA-DATA offer insights into the collaboration and explain the benefits of the
companies' combined expertise.

DR. SÖNKE KOCK:

Dr. Sönke Kock studied electrical engineering at the Technische Universität Braunschweig, Germany and Georgia Tech in Atlanta, USA. After completing a postgraduate degree at the Royal Melbourne Institute of Technology in Melbourne, Australia, he gained a PhD at the Technische Universität Braunschweig. Dr. Kock has worked at ABB since 2001, where he has had various positions in ABB's research unit (mechatronics and robot automation) and at ABB Automation Products GmbH (automation solutions). He has been a driving force behind digitization as Digital Leader at ABB's Drives business unit since November 2016.

IN CONVERSATION WITH SÖNKE KOCK, DIGITAL LEADER AT ABB'S DRIVES BUSINESS UNIT:

Why has ABB decided to offer zenon as an HMI and plant data management software to its customers?
ABB is the global market leader in the process industry due to its powerful process control systems. In discrete manufacturing and mechanical engineering, zenon – used as an HMI and operational data management software – is an ideal tool for collecting, analyzing, and appropriately forwarding all data accrued in manufacturing, as well as visualization. In addition, line control can be achieved through a wide range of SCADA functions. We were looking for an open solution that is also technically sophisticated. It was important for us to be able to network with our Automation Builder along with having access to cloud functionalities for integrating new services. We did consider developing our own software, but our strategy for the Fourth Industrial Revolution focuses more on collaboration. In terms of digital applications, COPA-DATA's zenon software was the most appealing option. In addition, zenon already has a strong presence in industries such as the food and beverage sector, in which it is highly valued for its functionality. We are now marketing the system under the name "ABB zenon" and have begun tapping into new markets.

Should zenon be seen as a module of ABB's Automation Builder?
zenon is an independent product that is seamlessly and efficiently integrated into our engineering platforms via data interfaces. These platforms include Automation Builder, our engineering hub for the AC500 PLC, drives, robotics, and ECAD systems, plus our MES Enterprise Connectivity Solution, as well as our ABB Cloud, based on Microsoft Azure. As a result, zenon is becoming part of ABB Ability, our comprehensive solution for data and value added services. Ultimately, we want to use zenon to support our customers in engineering, simulation, and plant commissioning. The benefit for them is that these solutions interact perfectly. For example, if the new functions of a packaging machine are simulated with a PLC in Automation Builder, the connection to zenon makes it possible to instantly monitor how the system is interpreting and processing the new data. During engineering, our customers can already see the effects that will take place at higher levels in the manufacturing process – the impact on a factory's OEE data, for example.

Is zenon a tool for the Fourth Industrial Revolution?
zenon is definitely an ideal platform for it. Every day, we have new ideas about what we can offer in the way of apps, services, or data analyses. With zenon, we want to provide a tool that makes it easier for customers to implement new business models in the Fourth Industrial Revolution, while also being able to connect to our cloud services.

Is ABB providing full customer service and support for zenon?
Yes, in the context of our customer applications, we are treating zenon as an ABB product and will be offering full, international customer service and support in the future. We will be our customers' single point of contact for matters ranging from consulting and licensing to support for live use. However, even though the product basis is the same, COPA-DATA and ABB will remain completely independent while COPA-DATA provides product support to us.

ABB will now market our software globally under the name "ABB zenon".

IN CONVERSATION WITH THOMAS PUNZENBERGER, CEO OF COPA-DATA:

How did you have to adapt zenon so that it could be integrated with ABB's Automation Builder?
From a technical point of view, we extended our import and online interface, which we are already using successfully with straton. As a result, bidirectional data exchanges with ABB's Automation Builder are now possible. The changes made to accommodate zenon were straightforward and actually minimal. It was more a matter of getting the right configuration and settings to make the overall system operable for users.

To what extent is ABB influencing zenon's product development and cycles?
ABB will definitely have a strong influence on product development in the future. We are expecting ABB zenon to be widely used. A great deal of expertise and experience across the various applications is being fed back to us and we are incorporating it into the product during our development work. Of course, we will continue to develop zenon beyond ABB's influence, but we welcome all additional input from ABB.

What is COPA-DATA contributing to ABB's international rollout?
In particular, we are contributing a vast amount of expertise, i.e. training people in technical fields. We have already trained ABB engineers through our "Train the Trainer" program so that they can run internal training sessions themselves.

ING. THOMAS PUNZENBERGER:

Thomas Punzenberger is an electrical engineer. He started his professional career at Siemens KWU Sondermesstechnik in Erlangen and Hamburg, Germany, in 1982. He then worked for BMW AG, where he was responsible for test bench automation in the body testing department. In 1987, he decided to found his own company in the automation industry: Ing. Punzenberger COPA-DATA GmbH. Thomas Punzenberger still leads the expanding Salzburg-based company today as its CEO.

AUTOMATION BUILDER AND ABB ZENON OFFER HIGH-PERFORMANCE AUTOMATION SOLUTIONS:

– Better business decisions thanks to digital integration

– Virtual commissioning to simulate complex applications

– Enhanced communication, connectivity and control

Further information:
www.abb.com/factoryscada

Contact details:
zenon.sales@abb.com

And, of course, we are giving a lot of support to the sales division to make sure ABB zenon is publicized as widely as possible. That includes joint appearances at trade fairs and exhibitions.

In your view, where does the future of zenon lie in terms of products for ABB customers, beyond HMI and plant data collection?

For manufacturing companies, the strength of zenon most definitely lies in energy data management. IoT and Fourth Industrial Revolution applications are also on the table. I can see a lot of potential in layered reporting, KPI determination, and the analysis of this data. Fields such as predictive maintenance will also become more significant in the future. In addition, ABB's technology can be connected very effectively to Microsoft's cloud services due to the seamless compatibility of ABB zenon, which is something that will become increasingly important in the future. As a major producer of machines and equipment, ABB itself could even benefit from this technology.

In your view, how is ABB zenon positioned for the Fourth Industrial Revolution?

The basic principle of the Fourth Industrial Revolution is that communication and the symbiosis of individual, specialized components work effectively to achieve a greater overall result. This is clearly contrary to how closed systems work. With the collaboration between ABB and COPA-DATA, two very successful, high-performing worlds are coming together: ABB with its powerful hardware, for instance, which is undeniably of a very high standard, combined with our IoT software, which is well established and has already achieved a very strong market footing. Looking forward, this collaboration will definitely be more beneficial to customers than running the components separately.

The interview with Sönke Kock was originally conducted in German by CHRISTIAN VILSBECK, Managing Editor at publish-industry; it was first published in the German trade magazine A&D Vorsprung Automation, October 2016.

The interview with Thomas Punzenberger was originally conducted in German by SEBASTIAN BÄSKEN, Public Relations Consultant at COPA-DATA.

FAQs

The new Milestones in Reporting

Do you have questions about the new zenon Analyzer 3.10? Here are the answers!

Our customers value the zenon Analyzer for its informative and efficient reports. They have become indispensable in energy data management, in the optimization of production processes and for many more applications. In the new version, the zenon Analyzer 3.10 may have only taken a small step in terms of the version number, but it has been fully redesigned, not only in terms of the user interface design, but also with a range of new and extended functions. Read on to find out which new options are available for you in the zenon Analyzer.

Has operation been improved in practice?

Yes, because the zenon Analyzer Management Studio (ZAMS) has been redesigned from scratch, and the main focus was on user friendliness. Alongside the Report Launcher for displaying reports, ZAMS is the central application which you use to create reports and manage the Analyzer. For example, after logging in, you are shown a start page with the most important possible actions. If you are creating reports, you can configure the individual parameters step by step (top-down). You get comprehensive feedback and validations, and the dependencies between individual parameters are also displayed. This prevents incorrect settings, makes operation of the ZAMS much easier and gives you an easy introduction to the world of reporting.

Can I adjust the display of reports to my individual needs?

There are lots of report templates for the most wide ranging analyses. Previously, their graphic design was fixed, but now you can use an editor to design the display freely. Settings such as positioning, size, diagram or table type and more can be freely selected for all report elements. A preview shows you what the report will look like. This makes the engineering even easier and quicker.

Figure 1: Configuration and design of a report with trend diagram and OEE measurement instruments in the zenon Analyzer Management Studio. Display of a report in bar chart format, several efficiency class diagrams and a table in the Report Launcher.

I need several reports for a comprehensive analysis. Can I summarize their contents to get a better overview in one report?

Yes, in ZAMS you can now merge several report templates into one report. When doing so, you can choose which diagrams and tables from which report templates are displayed in the report. You are also free to determine size and position. This means that you design the report completely individually and get all the information you need at a glance.

How can I adjust the report terminology to fit in with my company?

The zenon Analyzer manages the texts used in the reports in a language table. You can now modify these texts, or create completely new texts. In addition, when creating the report in ZAMS you can easily replace the specified texts with your individual texts, and of course you can do this in a number of languages.

I like creating reports with the Microsoft Report Builder. Can I create pivot datasets for this purpose using the zenon Analyzer?

Yes, because the datasets generated by ZAMS can be created in two versions as desired. Flat, as used in most reports, or pivot. As the variables used must be known in a pivot dataset, you can already define them in the ZAMS, meaning that you get a dataset which can be used to create individual reports in the MS Report Builder.

Can I compare data from different periods?

You can define up to five time filters for each report, and therefore compare up to five periods. During the batch production, activate a shared pre-filter for the time periods, and select up to five batches for comparison from them.

Is it possible to compare a batch with another, optimum batch ("golden batch")?

As you can configure the time filters in various ways, you just need to set a fixed time filter for the golden batch. All batches selected for the report will be displayed and automatically compared with the golden batch.

Often alarm assessments are not in-depth enough to be able to identify the reasons for an alarm. What options do I have?

You can optionally activate the alarm cause analysis for the alarm reports. This investigates the alarm causes which were entered in the zenon Supervisor when acknowledging the alarms. In addition, you can group the alarm causes

hierarchically arranged in a tree structure according to individual levels. This provides an overview and makes it easier to analyze alarms. Alarm cause analysis is available for the alarm list, top-N alarms and the alarm compression report.

How can I compare the energy costs of several locations if there are different climatic conditions at these locations?

There is now an extension for the reports which calculates the influence of the local outdoor temperature on energy consumption. The basis for this is daily temperature figures, which precisely reflect each day's local climatic conditions. This means that not only are you able to compare different locations, you can also compare the values for a location with the long-term local climatic average values.

What options do I have for connecting the zenon Analyzer to the Cloud?

There are several solutions for Cloud integration. You can install the zenon Analyzer locally and just load the data from the Cloud. This is recommended for companies with several locations and one central reporting department. Alternatively, the Analyzer can be completely integrated into the Cloud, which is beneficial when reporting is not carried out in one specific location. In both cases, you can very easily connect a Microsoft Azure SQL database in the Cloud via the ZAMS.

How does the zenon Analyzer back up the data transfer to the Cloud in spite of its many interfaces to components and third-party products?

IT security is particularly important in the Cloud. Therefore, digital certificates and password encryption can be used to secure all interfaces and connections, depending on the type of connection and protocol. In the case of connection to third-party databases, the Analyzer automatically adopts the security settings of the relevant database, making data transmission as secure as possible.

In order to replace a server during maintenance or in the event of a migration, laborious and error-prone data transfer is usually required. How can I avoid that?

There is a special migration tool for the zenon Analyzer, which transfers the installation of the Analyzer from the old server to the new one. All relevant components are transferred without change during this process - not only reports, but also user rights, linked servers, databases, time schedules and subscriptions. The zenon Analyzer can be used again immediately. You can complete the migration in a quick, secure and cost-effective manner.

THOMAS LEHRER,
TECHNICAL PRODUCT MANAGER

INDUSTRIES
&
SOLUTIONS

FOOD & BEVERAGE

ENERGY & INFRASTRUCTURE

AUTOMOTIVE

PHARMACEUTICAL

OMAC PackML Standardization: Opportunities for
Improved Performance in Manufacturing

SHAPING THE FUTURE TOGETHER

The Organization for Machine Automation and Control (OMAC[1]) was created in 1994 to offer companies a framework to develop standardization and improve the performance of manufacturing. In recent years, OMAC's Packaging Workgroup has entered into a phase of dynamic evolution. Leading manufacturers such as Nestlé, Arla Foods, Procter & Gamble and Boeing are driving the effort for wider international acceptance. As an OMAC member since 2014, COPA-DATA directly supports this development. In this interview, Mr. Arne Svendsen, OMAC Board Member and renowned expert in MES and automation, shares his vision of fully profiting from standardization.

At the end of 2015, the ISA-88 committee approved the document ANSI/ISA-TR88.00.02-2015 Machine and Unit States: An implementation example of ANSI/ISA-88.00.01. Known as TR88 or PackML, it was developed by the OMAC Packaging Workgroup. PackML specifies unit state models and operation modes for machine control and packaging line implementation. *Figure 2* shows the PackML state model. PackML also defines a set of meaningful data tags, called PackTags. They serve for standardizing internal machine automation and communication with other machines or systems.

Let's explore what makes PackML so beneficial for industry.

What do you see as the most critical challenges in manufacturing today? Can OMAC PackML standardization help to address them?

Today's manufacturers are facing a number of challenges in their production and packaging facilities. These include fast-changing markets and increasing pressure to reduce "time to market". Many manufacturers are also dealing with complex customer requirements. For example, food manufacturers producing private-label products for retailers.

Developments in new machinery and equipment from sub-suppliers are coming in faster increments, and manufacturers need to respond to this. We are also seeing an increasing desire to build a "digital twin", to build the story around products, i.e. to make relevant traceability data of product and production available for the retailers and, eventually, for the consumer.

Open industry standards represent one of the most important answers to this whole range of volatile and increasingly complex challenges.

How would you describe PackML?

PackML is an open industry standard. In formal terms, it is a "semantic" protocol, as it structures the information to be shared between packaging units, packaging lines and even – as per Industry 4.0 – shared with cloud data storage. The best way to think of PackML is as a "USB for Manufacturing". When you buy any USB device, you can easily connect it to your computer because of the standardized specifications. In a similar way, you can easily connect a packaging machine to a line controller or SCADA system if both are adhering to the PackML standardization. And please remember, despite its name, PackML is a very useful connectivity standard for both production and packaging lines.

For example, in one of its cheese dairy plants, Arla Foods would use PackML to connect units and machines in the cheese production area and the finished goods packaging and palletising area. Only the very first part of the dairy – the milk-processing area – would be treated as pure process automation. PackML originates from the ISA-88 standard that we use in process automation, so the "language" in the standards documents is similar, and a process-automation expert would find PackML very easy to understand and adopt.

What are the main deliverables of OMAC today?

There are a number of benefits delivered by the OMAC organisation today.

First, OMAC has developed an Implementation Guide, which makes it easier for companies to adopt the standard. In addition, industry leaders such as Procter & Gamble, Nestlé and Arla Foods are sharing their documentation and even PLC source code, although you will need to be an OMAC member to access this information in full.

ARNE SVENDSEN
Arne Svendsen holds a M.Sc. EE(P) and Computer Science. He has over ten years of experience in PLC firmware and SCADA software development and another ten years as a consultant in computer-integrated manufacturing. Since 2002, Arne leads the corporate MES and automation team within the Global IT group at Arla Foods. Arne is a board member of OMAC.

Following 2016, a year rich in activities within OMAC, 2017 brings further dynamic change. OMAC will introduce PackML at PackExpo in US, Interpack in Dusseldorf. Then OMAC volunteers, end-users and automation suppliers will present PackML at numerous conferences around the world.

In addition, we want to share real implementation experiences at conferences – such as the one in March 2017 in Copenhagen. You can find more information about these events on the OMAC website.

What are the short- to middle-term plans of the OMAC PackML workgroup?

As an OMAC member company, you gain access to workgroups where the future OMAC guidelines are being developed. In autumn 2016, we released Part 1 of the PackML Unit/Machine Implementation Guide dedicated to the PackML Interface State Manager. We found it very useful to document best-practice recommendations for machine interoperability. Even different machines, which internally do not follow the standardization, can present a PackML-compatible interface. The appropriate mapping of a proprietary status model with the OMAC state model has an important place within Part 1.

We are going to develop additional specific guidance for other topics connected to PackML, from the internal machine code-structure, through to user interface and line integration. Wider participation by different companies and specialists will be key for creating valuable documents.

How will end users profit from the OMAC PackML standardization on their way to the "smart factory", Industry 4.0 and IIoT?

PackML is delivering benefits to end users in terms of: rapid integration of different machines within the complete line, more transparency of machine data for greater productivity, and flexibility at a reasonable cost. Of course, OEMs and integrators benefit as well, because standardization supports modular solution design and implementation. The engineering costs are lower, the documentation creation is faster and all related services become easier.

For Arla Foods, which is just now laying out an Industry 4.0 strategy, PackML is a strategic component for a number of reasons. First, we have a very mature MES implementation on 50 sites already today. Second, we are implementing PackML in the production and packaging areas, primarily to provide even more agility in building,

Figure 1: PackExpo exhibition in Chicago, fall 2016: the leading suppliers B&R, Bosch Rexroth, COPA-DATA, Festo and Siemens presented an initial interoperability demonstration based on OMAC PackML and OPC UA standardization.

Figure 2: OMAC PackML-based line supervision and performance analysis.

re-building or changing the lines, which can happen frequently. In addition, we also see PackML on OPC-UA or even MQTT as the natural carrier of data from the shop floor directly to the cloud. This cloud might be an Arla-specific big data cloud, but in parallel with this, it could also be a cloud operated by the machine suppliers. Machine data can thereby be used by Arla Foods for our optimisation purposes. And we can also share it with machine builders, so that our machine data feeds into our suppliers' global initiatives to improve machine performance and technology.

In this context, what is your message for the industrial technology suppliers?
For us, it is very important to have a functional eco-system around PackML. We encourage technology suppliers to keep active within this context. Initially, we'd like them to make sure their controllers are PackML-ready and even OPC UA-ready in the short term. Second, we'd like them to deliver standard PackML code blocks, tested against PackML line controllers. And, finally, to spread the message via their channels. Since OMAC is a volunteer organisation, we lack the marketing funds to reach all potential users, so technology suppliers will play an important role here.

At the start of 2017, we are seeing a significant momentum building and we are gaining support from all significant automation suppliers and MES suppliers in the market. OMAC is the place where technology suppliers meet to agree on the future direction of development, in close cooperation with industry-leading manufacturers.

PackML
an OMAC standard

How is zenon supporting the PackML standardization?
Just follow this link to our webpage:

www.copadata.com/omac

ZENON SUCCESS STORY

REMOTE MONITORING AND CONTROL FOR DISTRIBUTED
RENEWABLE ENERGY GENERATION

On the Way to Zero Downtime with zenon and Microsoft Azure

Managing remote power generation sites has its own particular challenges, not least in terms of the efficient monitoring of operations. Slovenian renewables producer Gorenjske Elektrarne has resolved these challenges using a novel and technologically advanced IoT solution, which combines COPA-DATA's software zenon with Microsoft's Azure cloud services.

Gorenjske Elektrarne is a subsidiary of Elektro Gorenjska, one of Slovenia's leading energy utility companies. It specializes in the development of power from renewable sources, including solar and hydroelectric power. Given the nature of its power sources, many of the company's power generation sites are located in remote and difficult terrain. This can present challenges in terms of the monitoring and control of remote locations.

helped us improve the power stations' output and reduce associated operational costs."

The team at Gorenjske Elektrane implemented the zenon monitoring and control solution internally. Aleš Ažman says: "The results of the team's work can be clearly demonstrated in the effects of the refurbishment – production improvements could be seen immediately after we put the project into operation at the end of 2007."

„zenon is a simple tool to deploy and extremely stable in operation. Trust and conviction in the solution are two of the many reasons we chose to standardize on zenon."

JURIJ ČADEŽ,
GORENJSKE ELEKTRARNE, PROJECT MANAGER

Gorenjske Elektrarne's use of COPA-DATA's SCADA software began in 2006 when a refurbishment project at Gorenjske Elektrarne's Soteska hydroelectric power station utilized zenon for the plant's local control and monitoring systems. The Gorenjske Elektrarne team were pleased with the improved system overview and reliability zenon delivered.

Jurij Čadež, Project Manager at Gorenjske Elektrarne, says: "zenon is a simple tool to deploy and extremely stable in operation. Trust and conviction in the solution are two of the many reasons we chose to standardize on zenon."

IMPROVED VISIBILITY HAS HELPED TO OPTIMIZE OUTPUT

The next refurbishment project was at the Sorica 125 kW Small Hydroelectric Power Plant (SHPP) in 2007. zenon was implemented as a local SCADA system to control operations, record key plant parameters, enable the visualization of the complete SHPP, alert engineers to alarm states and sub-optimal operation, and enable further operational analysis and optimization. The plant control system refurbishment with zenon resulted in an operational cost reduction of 30% and a 15% production increase through the elimination of downtime and sub-optimal operation.

Aleš Ažman, the Director at Gorenjske Elektrarne, says: "We have had a very good experience with the COPA-DATA solution. For us, it was important to optimize production costs and gain an overview of all operational parameters. zenon has helped us to achieve this and, in doing so, has

CENTRALIZED CONTROL DELIVERS COST SAVINGS

The Sorica project spawned an initiative to improve the centralized and decentralized monitoring of all HPP operations, which ran from 2010 to 2013. Then in 2014 and 2015, an additional 23 photovoltaic power plants were connected to the central SCADA. zenon was implemented across the board to enable operational parameters, alarm management and live camera feeds to be displayed at the HPP control center in Kranj. Using zenon's web server and web client, this information can also be viewed at any distant decentralized location with an internet connection.

zenon Webserver Pro allows the operators in the field to connect remotely to the central zenon SCADA to monitor and control the power plants from any location. This has enabled the main operational cost reduction. The insight that zenon delivers has enabled the team at the headquarters in Kranj to diagnose events on the power plants and prepare strategies before dispatching a team of field engineers to the location – saving valuable time and money.

Aleš Ažman outlines further benefits: "We have seen a substantial improvement with our data following the zenon integration. All our maintenance engineering has been streamlined, operational costs have been reduced and are still reducing."

Jurij Čadež confirms: "zenon's 100% reliability has been great for us. The optimization project led to a reduction in downtime and sub-optimal operation. zenon has enabled

zenon integrates live camera feeds of key locations for easy observation and analysis. Here, an augmented overview of the Soteska hydroelectric power plant and four detail views of the same plant are shown.
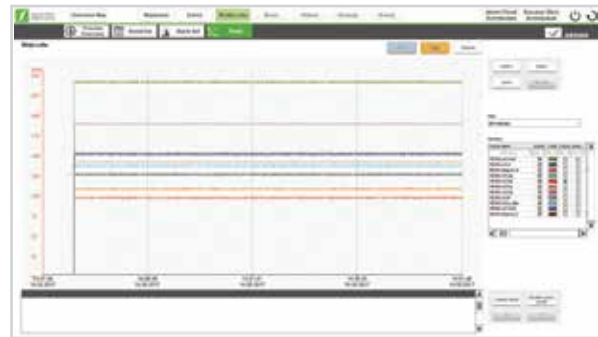
zenon's integrated reporting displays both real-time and historical key process parameters for easy analysis.

us to remotely investigate and diagnose the problems before they can have a negative influence on production. Because of the risks associated with high water levels and flood water it is important to be able to control operations remotely and zenon has proved very useful for this too."

COMMUNICATION CHALLENGES REQUIRE CREATIVE SOLUTIONS

Over recent years, Gorenjske Elektrarne has successfully developed its power generation capabilities and it now owns and operates 15 hydropower plants, 23 photovoltaic plants and three combined cycle plants across Slovenia. zenon has been implemented across all utilities in the company's HPP operations to read the process data and metrics from the PLCs and to deliver essential power plant control and protection. The next step will be to integrate smaller plants and combined cycle plants.

Given the geographical constraints of Gorenjske Elektrarne's business, the company has had to deploy a mix of communications solutions to meet its requirements for a centralized overview of its operations.

It would be cost-prohibitive for Gorenjske Elektrarne to build its own communication network over such a wide geographic area, so the company has had to rely on IP-VPN over leased lines and, in some very remote locations, satellite connectivity. Satellite communications in particular are

unreliable, and zenon has had a key role to play in network monitoring and the security of communication equipment.

These challenges have forced the company to think creatively about how to achieve a reliable and flexible overview of its operations from any location. This led Gorenjske Elektrarne to explore the possibilities of using zenon in combination with Microsoft's Cloud platform Azure, including the Azure IoT Suite. Microsoft Azure offers a highly scalable platform to deliver corporate applications simply and cost-effectively from the cloud.

zenon is fully integrated with Microsoft's Azure cloud services. It provides a scalable platform which has been designed to help organizations to benefit from the scalability, agility and cost-effectiveness of the cloud without the need to rewrite applications. Users can deliver corporate applications "as is" on any device without re-writing them, eliminating the need for major up-front expenditure and reducing the time it takes to get cloud solutions into production.

CLOUD DELIVERS INSIGHTS FAST

Gorenjske Elektrarne now uses zenon in combination with Microsoft Azure for fast and easy access to its control center. Now, the information from Gorenjske Elektrarne's control center can be visualized without delay on mobile clients.
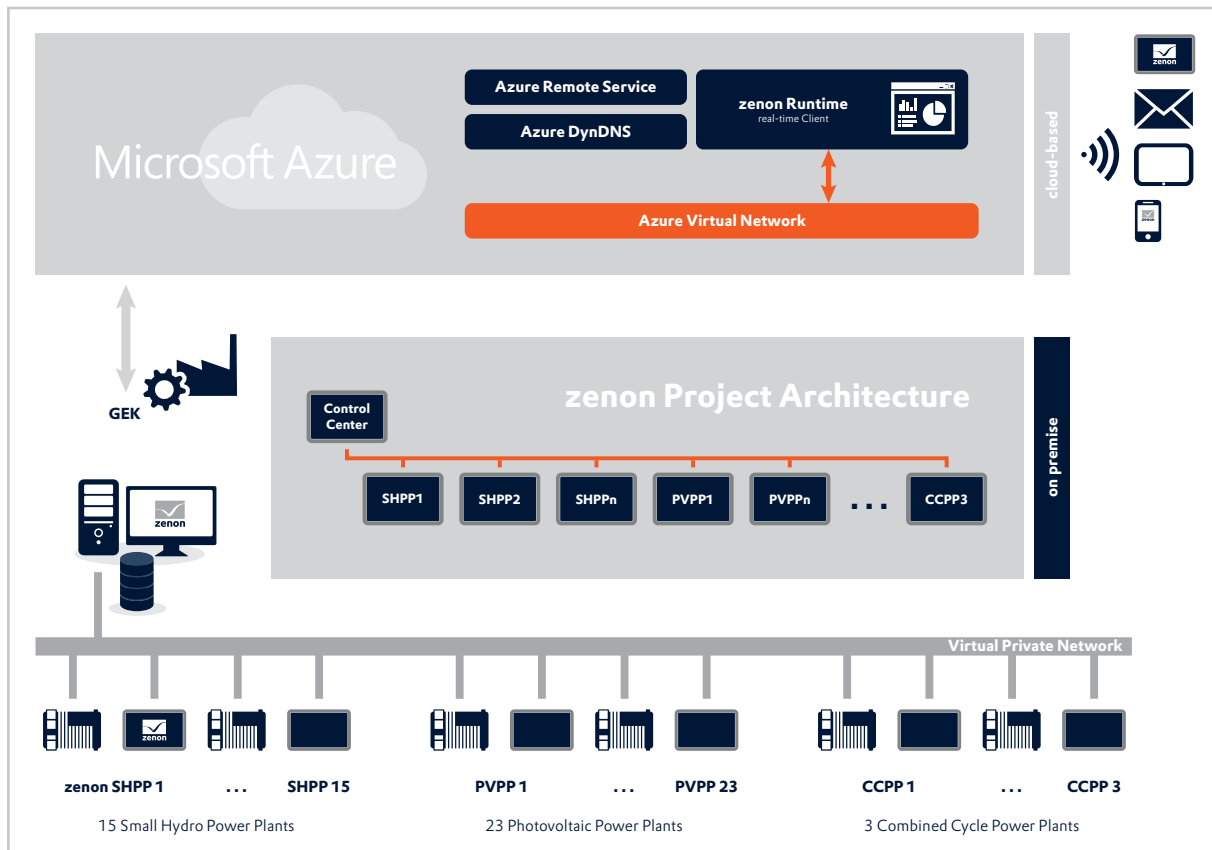
Gorenjske Elektrarne now operates 15 hydropower plants, 23 photovoltaic plants and three combined-cycle plants across Slovenia. zenon has been implemented to read data from the PLCs and to deliver essential power plant control and protection. zenon is now fully integrated with Microsoft's Azure cloud services.
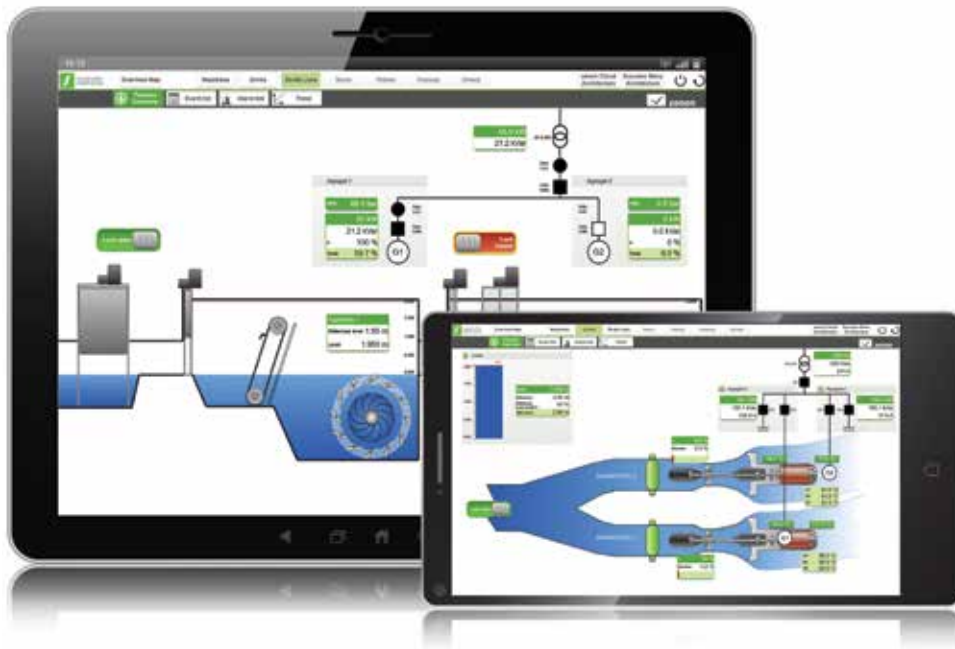
Employees simply install remote clients on their internet-connected PCs, tablets or phones and are then able to securely access the zenon application. With little up-front investment and no specialized hardware, Gorenjske Elektrarne can ensure every member of the team who needs it has an operational overview. This overview consists of a real-time dashboard of the company's entire infrastructure across 36 distributed power generation sites.

Engineers and supervisors can access the information they need using their Android smartphones. The zenon application, running on Azure, delivers the right information they need in real time. This allows the team to react as quickly as possible and to take the best decisions based on reliable and high quality data.

Jurij Čadež says: "The application is extremely fast and responsive. I am very happy with the outcome of our latest zenon project using Microsoft Azure as a platform. It is very useful for our company."

Users can view alarms, events, trends and reports as and when they need to with minimum fuss. Azure automatically flexes with demand – so that occasional bursts of activity in response to an incident or alarm condition are fully supported with no loss of performance.

Jurij Čadež continues: "One of the reasons we chose to standardize on COPA-DATA's software is the excellent technical knowledge of the COPA-DATA team. This know-how underpins everything they do and we have complete

The zenon application, running on Azure, delivers the right information they need in real time. Employees simply install remote clients on their internet-connected PCs, tablets or phones and are then able to have secure access via Microsoft's Azure Remote Services.

faith in their solutions and their development path. We know that the COPA-DATA team will leverage the most promising new technologies early and, what's more, they don't do this for the sake of it, only where it delivers real tangible benefits for customers. This is what ensures that zenon solutions are reliable, efficient and easy to use."

CONTACT:

Jakob Miazga
Sales Manager
COPA-DATA Central Eastern Europe / Middle East
jakob.miazga@copadata.com

REMOTE MONITORING AND CONTROL WITH ZENON AND MICROSOFT AZURE

– Local monitoring and control with reliable data

– Centralized control center with real-time integration of process data, live video and network monitoring information

– Integration with Microsoft Azure for fast, simple access to company-wide information

– Remote user access on the zenon application on Android smartphones

– Simple, rapid access to alarms, events, trends and reports wherever and whenever it is needed.

Digitization in the Smart Automotive Factory

To satisfy the requirements of the Smart Factory, automobile manufacturing must be able to exchange data easily between different divisions and at all levels. Open engineering tools provide a flexible, scalable solution that integrates seamlessly with system enhancements. Bernd Wimmer, Automotive Industry Manager at COPA-DATA, describes how zenon can support the smart automotive factory.

For many years, automobile manufacturing has been a driving force behind innovation in production technology. Because there are so many options available to consumers, the industry is getting closer and closer to producing "batches of one". However, continuous improvement in production processes creates new system requirements for everything from communications between different manufacturing components to safety standards and highly ergonomic user interfaces. Using the same systems and data across all disciplines is the key to "smart" automobile manufacturing.

SEAMLESS FLOW OF DATA IMPROVES PRODUCTION KNOWLEDGE

To increase the "value add" of existing plants, more detailed information about the manufacturing process must be gathered. In the Smart Factory, data is brought together from systems that were previously organized by separate units.

A key system requirement is a facility for open, independent communication with other systems – one of the strengths of zenon. In many cases, as well as standard protocols such as OPC UA, protocols specific to the
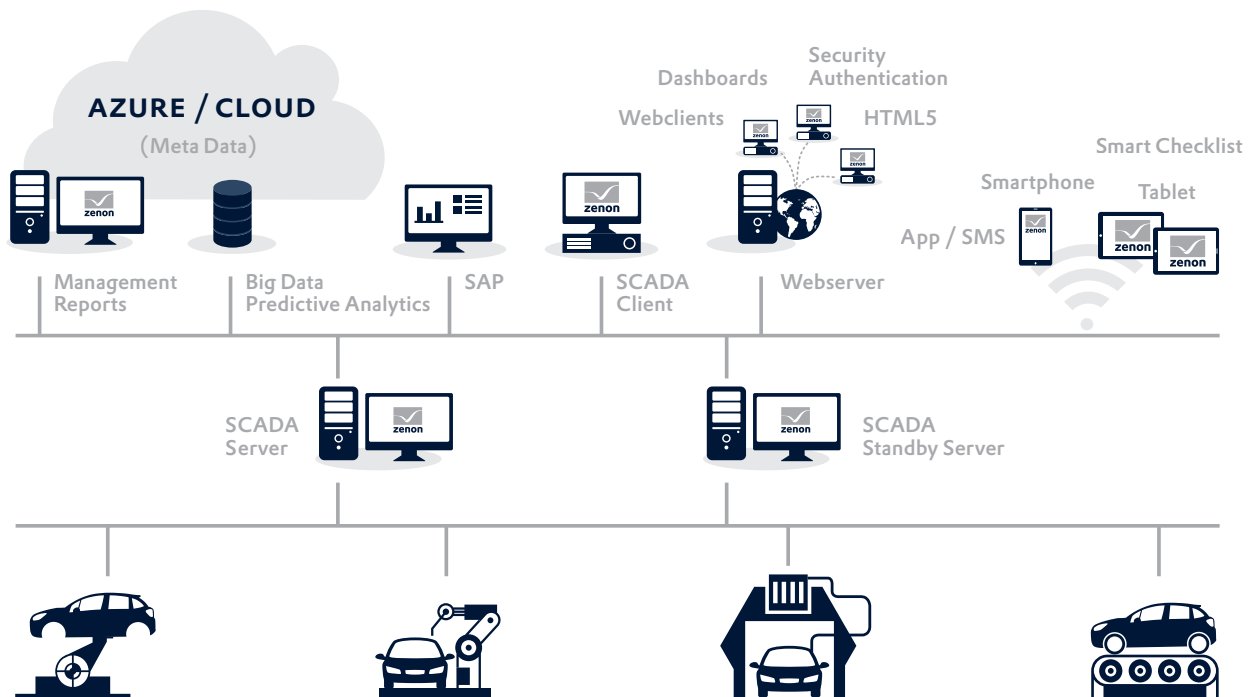
Figure: Interdisciplinary data flow in the Smart Factory.

manufacturer also have to be supported – for example, for connecting existing equipment. Networking the different production units creates a digital model of the information, which enables the user to monitor production closely.

Once process data has been gathered, the system must manage it consistently over the whole data flow – "from the sensor up to the cloud". zenon will process, transmit, store, and display the data without any misrepresentation. Consistent data flow allows information to be used where it is needed and where it can improve production flexibility.

EFFICIENT ENGINEERING WITH THE ZENON TOOLBOX

To retrieve information from data, the user needs a powerful tool with a good engineering interface. With zenon, even complex engineering tasks are quick and easy to carry out.

In routine use, zenon helps with standardization of objects and project components.

The graphical zenon development environment supplies a comprehensive portfolio of options for working on the project. The "setting parameters instead of programming" philosophy, which has been a consistent feature of zenon, supports the user in carrying out tasks. Even fairly inexperienced staff can confidently make additions and amendments quickly and without error. Libraries and templates provide a large selection of use cases that can be adapted and extended for the task at hand.

Another strength of zenon is its option to create distributed systems with different stations, each with specific tasks, which helps project engineers generate cascaded project structures. zenon projects can be developed, as required, by central editors or distributed

stations. The associated databases hold the project data and are connected to a change management system.

FLOW OF INFORMATION: THE CRUCIAL FACTOR FOR SUCCESS

Smart Factories are rarely built from scratch – they are developed from existing production structures. This means it must be easy to embed any system in the existing infrastructure. Scalable systems like zenon provide valuable support. zenon adds the new functions to individual areas of the plant or sections of production, as well as networking them with one another. Existing hardware is reused. zenon has integrated redundancy to increase availability across the whole system. Data copied from the subsystems is processed by overlaid routines to enable machine learning, predictive analytics, and big data. zenon's communication strengths enable information to be transmitted from the sensor up to the cloud.

Using a variety of target systems enhances flexibility for the user. Processing the same data for big screens as for mobile clients ensures consistency in distributed data. In addition, zenon facilitates tamper-proof data exchange between authorized users.

TRANSPARENCY FOR BETTER DECISION MAKING

The zenon multi-project structure with multi-servers allows distributed systems to be created. The tasks for the Smart Factory system are distributed over different machines. The "data servers" within the zenon network carry out their specific information processing tasks autonomously. Clustering the data on the separate machines also increases processing speed. At the same time, the preprocessed data is transmitted to central databases, increasing transparency for the user and improving decision-making.

USABILITY REDUCES LIFECYCLE COSTS

Ergonomics and usability have an important role, especially in systems that supply the user with lots of information. A modern, task-based interface shows the user the right information at the right time, while integrated assistance systems minimize the risk of error.

When working with alarms, embedded documents such as instruction manuals or links to wiring diagrams optimize the search for the cause of the alarm.

Production information is presented in standardized overview windows, giving management a good basis for decision-making. Integrated reports from the zenon Analyzer also provide information on the data recorded. The system automatically generates predefined reports and distributes them by email or publishes them on the intranet.

The user can also change reports and display them with individual filter settings to make specific analyses.

SMART AUTOMOTIVE FACTORY WITH ZENON

The requirements of a Smart Factory are fully satisfied with zenon: its communications features complement the use of resources across disciplines perfectly. Using zenon as an ergonomic engineering tool, engineers can generate displays, reports, and user interfaces with optimum usability. Seamless integration into the existing infrastructure allows safe, efficient data processing and distribution in smart production.

BERND WIMMER,
INDUSTRY MANAGER AUTOMOTIVE

THE FABRIC OF COMPLIANCE

Data Integrity –
the FDA Makes its Move

As automation engineers, we often focus on speed, with fast control and resolution being paramount. After all, mechanical and chemical processes do operate in real time and so highly available automation is required to gain instantaneous control. Global regulations demand that pharmaceutical manufacturers prove their methods and while the drug is in circulation, a history of this proof is needed. For example, under cGMP (current Good Manufacturing Practices), production batch records are generally stored for at least seven years, with records of adverse events being stored for 10 years. This adds the dimension of a lifecycle to good data management and data integrity. Effective architectures and algorithms ensure that data is captured and controlled at a frequency determined by process risk. For historical data, however, it doesn't matter whether an inspection looks at processes which were executed this morning or at production records from years ago; GMP records need to be available and to stand robustly on their own.

The FDA released a new guidance document on "Data Integrity" in April of last year, which describes data integrity as the completeness, consistency, and accuracy of data. It is currently reported that the number one enforcement priority of the FDA is Data Integrity, indicating the FDA see it as an important component of the industry's responsibility to ensure the safety and the quality of drugs and, with that, the FDA's ability to protect public health.

The FDA's Part 11 regulation emerged in the 1990s because increasing levels of automation were being deployed into pharmaceutical production environments. Its focus was to embrace the new technology and set out rules for its acceptance in line with the established paper methods and paper recording procedures. Part 11 facilitates the use of electronic systems if they are capable of creating the same – or better – levels of quality and validation than the paper equivalent. The automation and computing power available today stands in sharp contrast to what was possible when Part 11 was released in 1997. The smartphone in your pocket has more power than the most advanced supercomputers of the early 1990s. Introducing or amending regulations can be a long and arduous process, and to facilitate their correct adoption, guidance documents are created. The FDA's Data Integrity guidance is essential to the Part 11 regulation, widening the focus of Part 11 to include the current thinking of the FDA in response to a large number of recently cited violations.

After the event, the facts do come very easily. Today, twenty years on, we can see that the FDA Part 11 regulation not only demonstrates that electronic systems are equivalent to or better than paper-based systems, but that the essence of Part 11 is data integrity. The new guidance focuses the attention from the technology to the secure, long-term accuracy and management of data. Data integrity is critical to compliance and managing data holds centre stage in pharma's most high-profile challenges.

Building on the Part 11 regulation, the Data Integrity guidance document is formed as a question-and-answer format, which aims to clarify the fundamental role data integrity has in good manufacturing practices (cGMP). Thus, it provides valuable insight for the manufacturer as to what the FDA inspector is looking for during a plant inspection. Of course, not every issue that might be faced by a company is answered. However, as we noted earlier, this topic is currently the top enforcement priority of the FDA.

The MHRA (Medicines & Healthcare products Regulatory Agency) in the UK has released its own guidance and definition of data integrity. Moving along the same lines as the FDA, the MHRA is allowing paper-based and hybrid systems to be acceptable until an automated integral audit-trail system is available, with a clause stipulating that GMP facilities should upgrade to an automated system by the end of 2017.
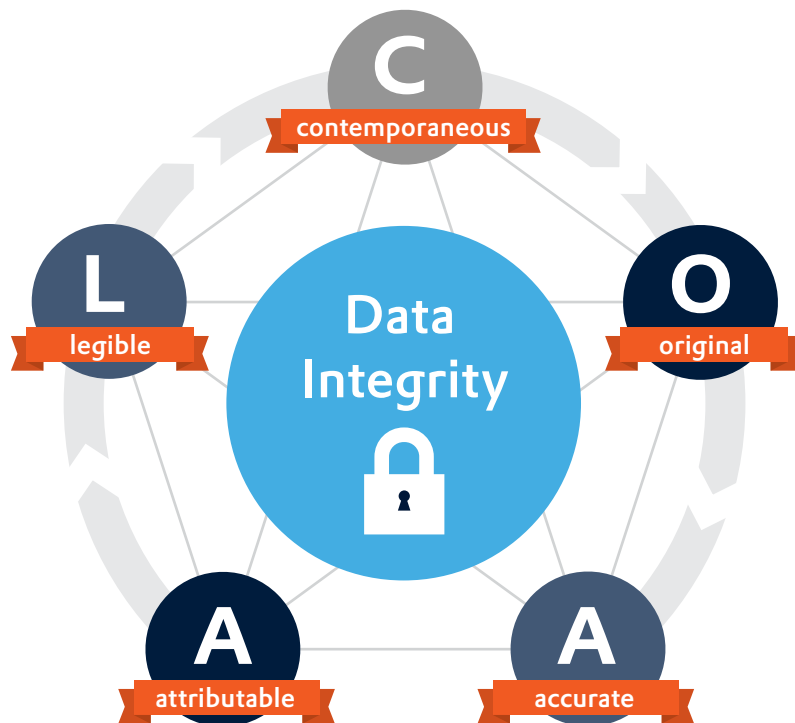
The FDA expectations for electronic data can be distilled into the acronym ALCOA:

A Attributable, the person and process is intrinsically linked to the record.
L Legible, the event details are clearly readable and permanent.
C Contemporaneous, time-stamped and recorded immediately as the event occurred.
O Original, a true representation of the process.
A Accurate, in measurement, time, and context of the process, equipment and person.

SOME KEY FACTS

– Metadata is the context of the data required to understand the event, e.g. date/time, user ID, variable, units, location.
– Data should be maintained throughout the lifecycle retention period with all the associated metadata required to reconstruct the process activity.

– The audit trail is the chronological list of the who/what/where/when/why of the process, with the aim to track the record creation, modification or deletion with date/time, user ID, parameters, values, and location, etc.
– Appropriate user access controls must be in force to comply with the Part 11 regulations. The Data Integrity guideline goes further to address how the authorizations are used. For example, the rights to change settings (system administrator rights) should be assigned to personnel who are independent from the individuals responsible for recording the event (production users). These additions support best practice, which aims to limit the range of fraudulent activities.
– Electronic copies can be used as true copies of paper copies, provided the electronic copy preserves the content and meaning of the original data, including the associated metadata.

Simply having Part 11 compliance is not enough to ensure that good levels of quality are in place. Good Manufacturing Practice covers many aspects of production

and, in this context, data integrity is key to maintaining accurate and complete records which lead to superior production processes. The outcome of data integrity relies on the company's organization as much as the technology capabilities. Organizational transparency is required: with flowcharts, workflows and organigrams to track the process and its data and record the knowledge of who is accountable for it. Effective strategies to manage data and process control lead the manufacturer through different iterations of process understanding and knowledge management. Based on their own processes, risk is assessed and technology can be understood in the context of their own business culture.

For an engineer using zenon, these requirements are of little challenge. Part 11 requirements are a base feature in zenon. It has integral user authorization, access restriction, audit trail, alarm management, and a high-performance historian enabling you to take the requirements in your stride. All activity from the process, system and user are recorded in the audit trail. Adverse events are additionally recorded in the alarm management, and stored long-term in the historian structure, either as proprietary zenon formats, or in SQL. Any data change, addition, or deletion is recorded in the audit trail, and is seen in the historian's event log. When all the data is housed in a central zenon system, the resulting validated solution ensures the records are original and a permanent archive is in place, and the original record keeps the raw data intact with its associated metadata. No matter the duration of the data lifecycle, regulated reports and analysis are easily accessible.

Thus, zenon welcomes the new FDA guidance. Through configurable functionality, zenon can implement these guidelines on brownfield or greenfield installations, connecting to processes, even when running, without the need to make changes to the validated equipment, bringing data out of the process and on board zenon. Tie together the historian, audit trail, alarms and the Report Viewer, and you have an out-of-the-box configurable solution that fits to your individual GMP production environment.

ROBERT HARRISON,
INDUSTRY MANAGER PHARMACEUTICAL

AROUND THE WORLD

INTRODUCING

The New COPA-DATA Management Team

TEXT: JULIA ANGERER,
PUBLIC RELATIONS MANAGER

With effect from January 1, 2017, COPA-DATA CEO Thomas Punzenberger appointed
the long-standing employees Stefan Reuther and Phillip Werr as additional members
of the management team. He has done so to ensure COPA-DATA is optimally equipped
for the opportunities and challenges of the future. The three-man executive team is
now working together to further the stable growth of COPA-DATA as an independent,
flexible software producer.

THOMAS PUNZENBERGER (54), as Chief Executive Officer (CEO), will focus on work around "Product and Innovation". In the context of Industry 4.0 and the industrial IoT in particular, he believes that there is huge potential for applications based on COPA-DATA software systems.

STEFAN REUTHER (37), as Chief Sales Officer (CSO), will take on the sales and business development of COPA-DATA. Reuther has been employed at the company since July 2002, starting his career as a Technical Consultant at the company's headquarters in Salzburg before holding various positions in sales – from International Key Account Manager through to Head of Business Intelligence at the COPA-DATA subsidiary in Germany. As a new member of the management team, Reuther is now once again working at the headquarters in Salzburg.

PHILLIP WERR (36), as Chief Marketing and Operations Officer (CMO/COO), will be responsible for "Marketing and Organization" in the company. Werr started his career at COPA-DATA in December 2010, initially as a Product Marketer. From December 2012 to December 2016 he served as the company's Head of Marketing.

QUESTIONS
THREE QUESTIONS TO THE NEW MANAGEMENT TEAM

THOMAS PUNZENBERGER, CEO

1. What is your favorite feature of zenon?

THOMAS PUNZENBERGER: Whichever feature is making life easier for me at any particular moment. There are so many possibilities in zenon. Choosing a specific function is very hard for me.
STEFAN REUTHER: There are a few real stunners. My personal highlight is the Multi-Project Administration. It is extremely easy to configure, but allows for numerous applications. Combined with zenon's networking concept, this feature is unbeatable.
PHILLIP WERR: The "feature" of being able to bring an excited smile to the face of the user.

STEFAN REUTHER, CSO

2. I like to spend my free time with …

THOMAS PUNZENBERGER: … friends on the water.
STEFAN REUTHER: … my friends and my family. Now and then I also need a bit of time on my own, which is when you will find me doing exercise, particularly running "Spartan Races".
PHILLIP WERR: … my adorable wife and my two sons, who always make me smile and help me to broaden my horizon.

3. Three "things" that I do not like:

THOMAS PUNZENBERGER: Bad food, moaning, and know-it-alls.
STEFAN REUTHER: Dishonesty, a lack of willingness, and when someone thinks they are too good for something.
PHILLIP WERR: Moodiness, overcooked pasta, and winter without snow.

PHILLIP WERR, CMO/COO

WHO IS WHO

Adrian Kimberley

REGIONAL SALES MANAGER

COPA-DATA UK

Lionel Abric

SALES MANAGER

COPA-DATA FRANCE

Walter Tasselli

AREA MANAGER

COPA-DATA ITALY

AT COPA-DATA SINCE: 2016
RESPONSIBILITIES: My role involves the management of open accounts and development of new business - producing proposals and holding negotiations for these. I am also responsible for creating a dynamic regional plan along with implementing new strategies and campaigns.
I GET MY INSPIRATION FROM … competition. I am at my best when I am being challenged and pushed - I always like to win.
IT IS MY DREAM TO … be an innovator. I would love to be an entrepreneur, solving everyday problems in people's lives using technology.

You can reach me at:
adrian.kimberley@copadata.co.uk

AT COPA-DATA SINCE: 2016
RESPONSIBILITIES: I am responsible for sales in France and French-speaking countries. My main goal is to develop our partner community, as well as to network and create awareness for zenon and COPA-DATA in France.
I GET MY INSPIRATION FROM … my family, my little boy, and an ideal environment in my home town, Grenoble, where I can enjoy a lot of activities (snowboarding, hiking,…).
IT IS MY DREAM TO … travel around the world, mainly in South America.

You can reach me at:
lionel.abric @copadata.com

AT COPA-DATA SINCE: 2014
RESPONSIBILITIES: I am part of the sales team in Italy, taking care of the three regions Emilia-Romagna, Marche and Tuscany. My activities are focused on machine builders and system integrators. I am based in the new office of Bologna. In Emilia-Romagna, there are a lot of big companies; every day is a challenge. I try to make every person I contact fall in love with COPA-DATA.
I GET MY INSPIRATION FROM … Daniela, Andrea, Alice, in order of appearance! My wife and my children. Every day, they are my engine, the motivation to improve my spirit and our life.
IT IS MY DREAM TO … go back in time, to the year 2000. With my family and with the knowledge I've reached today. I'd be a better person, I think.

You can reach me at:
walter.tasselli@copadata.it

WHO IS WHO

Johannes Foidl
TECHNICAL SUPPORT MANAGER

COPA-DATA HEADQUARTERS

Alessandro Mariani
TECHNICAL CONSULTANT

COPA-DATA ITALY

YuKyoung Kim
TECHNICAL CONSULTING/MANAGER

COPA-DATA KOREA

AT COPA-DATA SINCE: 2011
RESPONSIBILITIES: As Technical Support Manager, I coordinate customer services at headquarters and ensure that my colleagues have all of the necessary resources available in order to look after our customers in the best way possible. In addition to administrative tasks and concept optimization for new services, I sometimes have time to deal with a customer ticket personally to find the best possible solution for a customer.
I GET MY INSPIRATION FROM …
off-piste skiing, kite surfing, motorbike riding, playing beach volleyball, and other sports. To relax, I like to escape to my home in Tyrol and work on my farm.
IT IS MY DREAM TO … to travel from one deserted island to the next and to explore beautiful places that are untouched by other tourists.

You can reach me at:
johannes.foidl@copadata.com

AT COPA-DATA SINCE: 2015
RESPONSIBILITIES: I am a member of the Consulting team for COPA-DATA Italy, in the new office located in Bologna. I am involved in technical support and project consultancy activities, in close contact with our customers in Italy, mainly OEM. I run workshops and help my colleagues with pre-sales activities. I also do product trainings for the zenon family.
I GET MY INSPIRATION FROM …
experiences, friends around the world, books and music. Sitting on top of giants of the past, looking into the future. I only need a good internet connection. But my main inspiration is rooted in the past – I was a nerdy child.
IT IS MY DREAM TO … travel the world, sailing, diving and kitesurfing, walking barefoot on a small island, playing rock-blues guitar, reading books and programming. Oops … It is not a dream, I already did all that. I usually realize my dreams.

You can reach me at:
alessandro.mariani@copadata.it

AT COPA-DATA SINCE: 2010
RESPONSIBILITIES: I am responsible for Technical Support at COPA-DATA Korea. I mainly support customers and partners in Korea/China and deliver zenon trainings. I also assist customers to build their zenon projects as well as support our sales team regarding technical issues.
I GET MY INSPIRATION FROM …
the people around me. Especially my family and friends. They make me happy. And learning new stuff always thrills me.
IT IS MY DREAM TO … take a trip around the world with my family and my little dog. And to make as many memories as possible!

You can reach me at:
yukyoung.kim@copadata.com

Saluti da Bologna

The Emilia Romagna region has established a good reputation thanks to world-famous names like Lamborghini, Maserati, Ferrari, Ducati, and culinary delights such as Parma ham, mortadella, and ragù alla bolognese. Industry in the region is truly dynamic. The area has even come to be known as Italy's Packaging Valley. In the thick of it all, COPA-DATA opened a new office in Bologna in March 2016.

For COPA-DATA, a customer-oriented approach is the key to sustained growth. Customers are provided with on-site guidance and support during complex projects from ten different international branches, offices and via countless contractors.

For some time now, COPA-DATA has been represented in Italy by an office in Bozen. With the addition of this new office, clients from all over Bologna and the surrounding regions will receive local support when it comes to technical or sales advice.

TRAINING AND SUPPORT

Area Manager, Walter Tasselli, and Senior Technical Consultant, Alessandro Mariani, are the main contacts for the region.

"We can support our one hundred plus clients in Italy even better now that we have the second office," explains Walter Tasselli. "The deciding factor when it came to the location was the high potential for growth in the Bologna region." The office, which covers an area of approx. 80 square meters, has a training room that can seat up to six people. "We carry out workshops, training sessions, and consultations in the office. This, in combination with the shorter distance between our technicians and our clients throughout the region, has enabled us to offer more intensive local support."

CONTACT DETAILS:

Ing. Punzenberger Copa-Data Srl

Via Pi l lhof 107
39057 Frangarto, Bozen, Italy
tel: +39 (0)471 674134 | fax: +39 (0)471 674133

www.copadata.com | sales@copadata.it

COPA–DATA
Partner Community

COPA-DATA PARTNERS HAVE THEIR SAY

INDUSTRIAL IOT WITH ZENON: AN INTERVIEW

Industrial Internet of Things (IIoT) – just one of many buzzwords or a promising opportunity? Just a hype or indeed a future trend? From the very beginning, COPA-DATA has been providing innovative customer solutions. Now, its specializations also include the Industrial IoT, which delivers various opportunities to develop new business areas and offer more services not only to our customers, but particularly to the COPA-DATA Partner Community.

Industrial IoT is of strategic importance to COPA-DATA. This, of course, has implications for our partner ecosystem. Examples are the deep knowledge exchange our existing partners can take advantage of to make optimal use of the newest zenon functionalities, but also the development of our new partners who can benefit from an increase in IT competence. In short: an exciting time for all existing and potential members of the COPA-DATA Partner Community. One example is ADD, the Slovenian IT company that counts on zenon for its Industrial IoT solutions. Together with Andrej Hudoklin, Business Solutions Director at ADD, we take a look at the Industrial IoT from a partner company's perspective.

ANDREJ HUDOKLIN

Andrej Hudoklin is Business Solutions Director and has been with ADD since 2000. He has more than 16 years of experience in data analytics and other information systems such as CRM and mobile applications. At the beginning of his career, he specialised in business analysis and the development of data analytics solutions. Today, his focus lies on successfully leading ADD's business solutions department and business development. He is responsible for developing new and innovative solutions in order to expand ADD's business to new markets.

There are many definitions and interpretations of Industrial IoT and how it is leading the way to smarter factories and cities. How do you personally see the term "Industrial Internet of Things" – the IIoT?

I have been focusing on business intelligence for the last 16 years, and my understanding of IIoT is probably a little bit different compared to theoretical descriptions. IIoT obviously focuses on manufacturing and overall device connectivity, M2M, data collection, Big Data, machine learning and more, but I see the importance more in combining it with business strategy and target achievement. At ADD, we see a growing need to combine typical IIoT solutions with business intelligence solutions in order to provide a sophisticated view of how the operational level ultimately impacts the overall financial results of an organization.

Industrial IoT is a major market trend receiving a lot of attention. How did this affect ADD as an IT company and what opportunities do you see?

The hype about the fourth industrial revolution and the related topic of IIoT are definitely changing the perception and understanding of manufacturers, cities, utilities and other industries. Alongside this, we see a bigger need for operational data and its integration into business entities and systems. This requires ADD to focus more on technologies for data collection and processing in real time. This development also requires us as an IT company to engage with and better understand the automation world, which enables us to connect to devices more effectively and build up knowledge about the process on the shop floor. We are in a phase when two worlds, business and operational, collide. Traditionally, they did not overlap, but their integration can bring tremendous added value to the entire future organization.

What do you regard as the most interesting use of the Industrial Internet of Things?

IIoT focuses heavily on the use of Big Data tools, real-time analytics and more, which can result in many different solutions and use cases such as remote monitoring & control, energy data management, quality control or asset management. These solutions can be enhanced with predictive analytics capabilities in order to provide preventative maintenance, life-time optimization, self-healing devices or advanced real-time calculations. With technologies such as COPA-DATA's software system zenon and Microsoft Azure as a cloud platform, we can start with small ideas, evolve them, check them and gradually create more added value for the customers over time, while keeping start up investments low.

What were your customer experiences around Industrial IoT so far?

The experiences differ quite a lot. We see connectivity issues where customers want real-time analytics across different factories with many different hardware systems in place, but also simple data collection in the cloud or specific data streaming for real-time monitoring and alerting. The most common challenge is connecting to the required infrastructure and to get data in real-time, unify it and manage the metadata.

Given your IT background, why did you choose to partner with COPA-DATA to provide complete end-to-end Industrial IoT solutions?

Simply, because COPA-DATA provides the best combination of end-to-end solutions for our customers. We understand the business side and COPA-DATA

understands the operational side of manufacturing and the public sector. Together we can easily cover a complete organization – from devices, up to operational and business analytics. We both have industry-verified solutions and experience, but together, we are even better.

What convinced you to work with zenon and join the COPA-DATA Partner Community?
zenon has a comprehensive set of features, a user-centric product philosophy with parameterizing instead of programming, as well as its hardware independence with more than 300 drivers. One of the strongest points was also the overall company and team philosophy. In addition, the level of R&D investment, professional cooperation and the leading regional position we both hold in the eyes of Microsoft just proves that there is an inspiring atmosphere.

Video:
COPA-DATA Partner Community
Scan & Play!

http://kaywa.me/jaSOD

"We both have industry-verified solutions and experience, but together, we are even better."

ANDREJ HUDOKLIN, ADD
BUSINESS SOLUTIONS DIRECTOR

Industrial IoT was one of the buzzwords during recent years. How, do you think, will this trend develop?
I would say that IoE – Internet of Everything – is the next big thing. Like with many buzz words, the question is: will it meet the high expectations or not? But we also have the Consumer Internet of Things. And IoE will be the next step in integrating IIoT and CIoT.

What's your one piece of advice for a business leader interested in the Industrial IoT?
Having a good partner and team members who can develop a strategy, which should be executed in smaller steps, so-called "quick wins". They allow you to evolve gradually, implementing the culture of IoT within the organization while having the flexibility to adopt it at any point in time, as required by your business. Always have in mind – technology on its own does not bring results.

Thank you, Mr. Hudoklin for sharing your thoughts with us!

JOHANNES PETROWISCH,
GLOBAL PARTNER &
BUSINESS DEVELOPMENT MANAGER

CHRISTINA ANDEXER,
PARTNER PROGRAM MANAGER

COPA-DATA AT TRADE FAIRS AROUND THE GLOBE

In 2016, COPA-DATA employees spent thousands of hours at trade fairs and events. In doing so, they gave our products a friendly face and presented our technologies in person.

TEXT:
BIRGIT PLAINER, MARKETING COORDINATOR
SEBASTIAN BÄSKEN, PUBLIC RELATIONS CONSULTANT

In 2016, COPA-DATA employees spent over 20,000 hours at trade fairs and events – and that's not even counting travel time! In doing so, they gave our products a friendly face and presented our technologies in person.

This direct exchange with existing and potential customers, partner companies, cooperative partners, and research institutions is very important to COPA-DATA. That's why we host our international employee events throughout the year. The busiest period of the event year is usually the second half of the year, when events take place weekly and can occasionally even overlap! This can create logistical challenges behind the scenes of a trade fair appearance. Our software and the demo versions are easily scalable, but the employees and the hardware components must be timed to the minute.

In addition to the events we host ourselves, we often have the opportunity to work with our technology partners such as Microsoft or ABB and demonstrate our products at their stands. In the Industrial IoT, Smart Factory and Smart Cities sectors, zenon solutions are becoming increasingly integrated into the workflows of larger technology providers.

You can see what some of the attendees thought of the 2016 events here. We have already hit the road this year and all event information can be viewed at any time on our website. We look forward to meeting you again in person. Do drop by and see us!

Where in the world we are exhibiting right now? Use this QR code to go right to our event website.

ELECRAMA	**AIMEX**	**HANNOVER MESSE**
February 13-17, 2016 COPA-DATA India	March 9-11, 2016 COPA-DATA Korea	April 25-29, 2016 COPA-DATA Headquarters
Bengaluru, India	Seoul, South Korea	Hanover, Germany
Energy & Infrastructure	Automation Solutions	Automation Solutions
120,000 visitors from 120 countries	22,000 visitors	190,000 visitors
1,000 exhibitors	298 exhibitors	1,500 presentations
84.000 m² floor space	18.378 m² floor space	5,200 exhibitors from 75 countries

SPS/IPC/DRIVES ITALY

📅 May 24-26, 2016
COPA-DATA Italia

📍 Parma,
Italy

🔍 Automation
Solutions

👥 28,614
visitors

🏢 674 exhibitors

WPC
MICROSOFT WORLD PARTNER CONFERENCE

📅 July 10-14, 2016
COPA-DATA Headquarters

📍 Toronto,
Canada

🔍 Award win with
zenon

👥 12,000 visitors from over
100 countries

CIGRE TECHNICAL EXHIBITION

📅 21-26 August, 2016
COPA-DATA Headquarters

📍 Paris,
France

🔍 Energy &
Infrastructure

👥 8,500
visitors

🏢 249 exhibitors

📊 3,290 congress participants
from 93 countries

ENERGETAB	INNOTRANS	SCANAUTOMATIC PROCESSTEKNIK
September 13-15, 2016 COPA-DATA Polska	September 20-23, 2016 COPA-DATA Headquarters	October 4-6, 2016 COPA-DATA Scandinavia
Bielsko-Biała, Poland	Berlin, Germany	Gothenburg, Sweden
Energy & Infrastructure	Energy & Infrastructure	Automation Solutions
20,000 visitors	137,391 visitors	10,372 visitors
750 exhibitors	2,995 exhibitors	300 exhibitors
40.000 m² floor space	200,000 m² floor space	
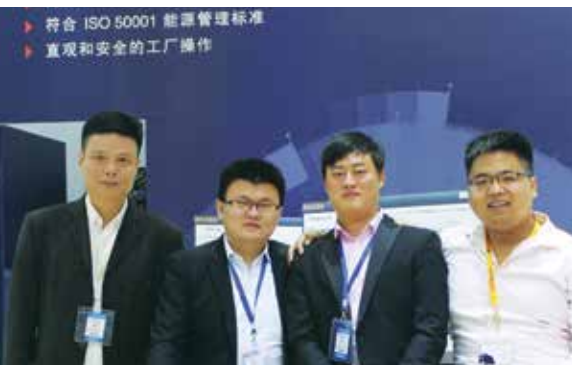
INDUSTRIAL AUTOMATION SHOW

📅 November 1-5, 2016
COPA-DATA Distributor
Shanghai Dimension

📍 Shanghai, China

🔍 Automation
Solutions

👥 25,000
visitors

🏛 120 exhibitors

📏 9,300 m²
floor space

BRAUBEVIALE

📅 November 8-10, 2016
Headquarters

📍 Nuremberg,
Germany

🔍 Food &
Beverage

👥 37,923
visitors

🏛 1,117 exhibitors

📏 44,183 m²
floor space

SMART CITY EXPO WORLD CONGRESS

📅 November 15-17, 2016
COPA-DATA Headquarters

📍 Barcelona,
Spain

🔍 Smart Cities,
IIoT

👥 16,688
visitors

🏛 591 exhibitors and

👨‍🏫 420 speakers from
600 cities

THE EVENT YEAR 2016 IN NUMBERS

6,000
cups of coffee

15,000
glasses of
mineral water

2,000
zenon bags

1,500
display cleaners

5,000
pens

184
fair days

Participation at **75**
trade fairs and congresses
in **25 countries**

1 coffee machine
covered
9,154 km

4 27" monitors
covered
12,302 km

SPS/IPC/DRIVES GERMANY

November 22-24, 2016
COPA-DATA Germany

Nuremberg,
Germany

Automation
Solutions

63,291
visitors

1,605 exhibitors

122,200 m²
floor space

Want to know where in the world we
are exhibiting right now?
Our website will tell you all:

http://www.copadata.com/events

With zenon software, COPA-DATA offers a valuable contribution to smart cities and the people who live in them. Day and night, zenon provides a high availability of energy and water supplies for the city, seamless public transportation operations, and the sustainable management of buildings. zenon thereby accompanies city inhabitants at various locations throughout their entire day. Whether it be for fresh water on a daily basis, the journey to work, cooking, or going to sleep at the end of an eventful day – zenon ensures that smart cities can withstand current and future challenges and allows inhabitants to enjoy maximum quality of life.