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Spotlight:
DIGITAL ADDED VALUE

DIGITAL ADDED VALUE?

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THE COPA-DATA MAGAZINE

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PREFACE

Dear readers,

What does a screw have to do with digital value creation? Today, we are witnessing digitalization expanding into areas we would never have imagined even a couple of years ago. It impacts on our personal lives right the way from music to mobility, and is slowly transforming almost every aspect of our working lives, too. Of course, it is also affecting domains which have long been shaped by traditional engineering, including mechanics and metal – from steel production to the humble screw.

Digitalization has made inroads into energy distribution, production facilities, and mechanical engineering, and will continue to undergo great change in the coming years. If we use technology, it should be to create added value rather than merely as an end in itself. We must consider "classic" objectives, like increasing reliability, optimizing efficiency, and reducing our consumption of resources. However, we should also be looking to become more competitive by increasing our flexibility, and to create added value for customers and the company itself with new business models. That will be the focus of the Spotlight section in this issue of *IU* Magazine.

Also in this issue, you will find a fascinating story from Danieli Automation, who are focusing on the topic of digitalization in steel production and have already achieved a great deal in this area in conjunction with COPA-DATA and zenon (*page 52*). There are also interesting insights into customer projects from Jan Becher (*page 32*), the producer of the legendary herb liqueur Becherovka, and from EVN Hanoi in Vietnam (*page 40*), who have regained control of their infrastructure with zenon.

Get inspired!

THOMAS PUNZENBERGER, CEO

SPOTLIGHT

ADDED VALUE THROUGH
DIGITALIZATION:

WHAT'S IN IT FOR ME?

Evolution or revolution? Whichever it is, one thing is clear: digitalization is reshaping our lives. And this means much more than profound structural change – business as usual will no longer cut it. But with creativity and a will to shape events, we have a good chance of coping with the upheaval. If we are clever in the way we implement it, we can create a lot of value from digitalization. For example, we can enjoy unexpected conveniences, do interesting work, or free up time to spend on hobbies or with our family and friends.

Digitalization affects almost all areas of life: from our private lives, our work, through to society and politics. It can provide a level of convenience that would previously have been virtually unthinkable, and it helps us to preserve energy and other resources. Household appliances and devices are increasingly becoming digitalized and forming part of the Internet of Things (IoT).

Some IoT devices can detect if someone is home and automatically switch the heating and lighting on or off based on the room temperature or lighting level. Residents can stay updated on the current status of their networked home from anywhere in the world via the Internet using a smartphone app and, if necessary, can intervene manually from remote.

GREATER CONVENIENCE AT HOME AND AWAY

Thanks to digitalized water and electric meters with wireless connection, visits from meter readers are a thing of the past. Measured values are directly transmitted to a communication unit installed in, for example, the stairwell. From there, the data is passed via the mobile phone network or mobile internet connection to the back-end at the supplier's systems, where it evaluates the consumption data recorded and bills accordingly.

The smart home outlined above, with networked appliances for heating, climate control, lighting, and shutter control, represents a smaller version of what Energy Data Management Systems do on a larger scale in industrial settings.

In transport, digitalization for cars enables them to be networked with the traffic route infrastructure using intelligent traffic management systems, for example. An online parking management system can guide us to the closest free parking space to our destination via smartphone app, thus largely avoiding lengthy searches for parking and reducing emissions.

Car-to-car communication, where cars are networked with one another, is no longer just an idea; it allows vehicles to warn each other of hazards, such as black ice, traffic jams, and accidents.

In the future, we will be able to travel in autonomous vehicles which will bring us to our destination automatically.

For public transport, whether local or long-distance, digitalization also offers convenient options for getting around. With the right smartphone app, you can select your destination. The app then automatically determines what public transport you can use to get there and tells you the departure and arrival times. The app of the relevant transport operator can then be used to buy the ticket.

VOICE COMMAND FOR HANDS-FREE OPERATION OF DEVICES

But digitalization can do much more: assistants that use natural language, like Amazon's Alexa, Microsoft's Cortana, Apple's Siri, and Google Home are changing the way we use devices, how we search for information online, how we control our smart homes, how we shop online, and much more.

Voice activation makes driving more convenient and safer. One example of this, the Ford Sync navigation system, can recognize a range of voice commands. If the driver says, "I need coffee," the navigation system provides a list of the nearest cafés. The voice recognition technology it is based on is becoming increasingly powerful. 20 years ago, the Nuance speech recognition system understood around 20 words; 10 years later it was 70,000. Its vocabulary now encompasses several million[1] words in a number of different languages.

But voice command and speech recognition are not only used in cars. Although for safety reasons voice input will never entirely replace manual input via keyboard or touch screen in industrial settings, it does make sense to use voice control for activities requiring both hands, such as assembly work.

ARTIFICIAL INTELLIGENCE

AI, or artificial intelligence, is having the greatest impact of all digital technologies, with an increasing number of applications making use of it. The mere mention of artificial intelligence captures the imagination, conjuring up nightmarish dystopian visions that we all recognize from films and television. Pessimists fear mass unemployment, while some fear digital dictatorships run by algorithm and the enslavement, or even annihilation, of the human race by a super-intelligent digital being.

AI experts, on the other hand, view the topic in a somewhat more sober light. For example, Wolfgang Wahlster, Chairman of the Executive Board and Scientific Director at the German Research Center for Artificial Intelligence in Saarbrücken, recently made an interesting statement in an interview with the German magazine Computerwoche: "AI could also be understood as an abbreviation for advanced informatics."[2] According to this interpretation, artificial intelligence is the avant-garde of computer science, which is pushing the boundaries of digitalization and algorithmization. As such, AI is extremely good at identifying patterns in enormous volumes of data.

RADICAL CHANGES AT WORK

In the world of work, digitalization is sure to bring about great upheaval. For many industries and jobs, it will even mean disruption. On a positive note, people have always taken big changes in their stride. With intelligent design in digitalization – and the adjustments it entails – it will be possible to cope with this evolution. But how can this be achieved?

Sabine Bendiek, CEO of Microsoft Germany, gives an example of one possible approach: "To prevent people actually being left without jobs, we need to continue to

[1] Source: http://www.manager-magazin.de/lifestyle/auto/sprachsteuerung-im-auto-von-alexa-siri-home-und-mercedes-a-1153054.html
[2] Source: https://www.dfki.de/web/presse/pressehighlights/Computerwoche-Interview-Wahlster-2015-cw23-s-s014.pdf

promote human intelligence, rather than just artificial intelligence."[3] So simple knowledge transfer is not enough. Schools must focus more on human strengths, such as creativity, communication, social interaction, and problem-solving skills.

USING INSTEAD OF OWNING

If implemented intelligently, digitalization could save considerable resources and simultaneously increase the level of comfort humans enjoy. One example of just such a successful digitalization is the car-sharing concept offered by suppliers such as BMW and Mercedes-Benz, where digitalization makes car-sharing considerably easier. You can rent a car on demand at short notice via smartphone app.

Interestingly, with BMW's DriveNow and car2go from Mercedes-Benz, fuel costs are included in the price, with charges calculated according to time. The real benefit is that you can return the rented vehicle to almost any public car park in the service area free of charge.

The basic concept is that users only pay for the use of the vehicle. The focus here is no longer on the product itself – the car – but rather on the service, i.e. driving. This concept is known as servitization.

ADDED VALUE THROUGH DIGITALIZATION IN INDUSTRY

In industry, too, digitalization is making a decisive contribution to business success. It can make a direct

contribution to "classic" KPIs such as efficiency and effectiveness, or even help to open up new business models and sources of revenue thanks to concepts such as "batch size 1" and servitization.

With servitization, manufacturers can sell the production output itself, as opposed to a developed machine or device, and charge at a fixed price per production unit, for example. This provides the production plant with a reliable basis for calculation and passes on the risk of system downtime to the machine manufacturers providing the service. Networked evaluation of anonymous machine data from different customers allows the manufacturers to learn quickly so their service can be continuously optimized.

Another feature of digitalization in industry is interdisciplinarity. This creates added value because all aspects of a company are integrated into a consistent system. The transparency this provides with regard to operational processes means, for example, the excess energy from one area can be used in another. This increases efficiency and enables resources to be used more effectively.

In the following article, we will explore digital value creation in industry in more detail and look at what role our zenon software can play.

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[3] Source: http://www.capital.de/meinungen/jobkiller-roboter-kuenstliche-intelligenz-digitalisierung-sabine-bendiek-microsoft-9029.html

DIGITAL ADDED VALUE
IN INDUSTRY:

KNOWLEDGE IS POWER

Our society is undergoing radical change. And what is causing this change? Digitalization. But digital transformation has not come out of the blue. It is the mission statement, the vision, and, in many areas, already the reality for a new generation, for whom "business as usual" appears to have had its day. The young people of Generation Y feel at home in the digital world, free from industry's mechanistic way of thinking. As "digital natives" they see future digitalization as inevitable, but they will still have to implement and carry it forward in many areas. If they are successful in combining the best practices and experiences of established industry with the challenging demands of millennials, then digital transformation will bring added value for all concerned. Our zenon software offers the means to do just that.

Thomas Punzenberger

Founder and CEO,
COPA-DATA

"When viewed dispassionately, the Internet of Things is actually the Internet of Services. That's why we must support our customers to move to a position of servitization – the conversion of their product production to a service business – to gain access to new business models."

Phillip Werr

Chief Marketing and Operations
Officer, COPA-DATA

"In the context of digitalization, we can use the opportunities for networking and interaction in order to operate in a more efficient, agile, and customer-friendly way. This is how digitalization creates added value – whether for system and machine producers or manufacturing companies."

Stefan Reuther

Chief Sales Officer,
COPA-DATA

"Just as it was 30 years ago, the goal of all COPA-DATA's development efforts remains making the operation of users' systems safer, simpler, and more transparent. This automatically creates added value for the company."

Philipp Schmidt

Head of Innovation Management,
COPA-DATA Germany

"One of the main tasks of digitalization is to provide every individual at every hierarchical level with the right data and the opportunity to take appropriate, individual action, right where they are."

Frank Hägele

Sales Director,
COPA-DATA Germany

"The first step is creating an understanding of where the potential lies. Often, it is only after zenon has been installed that users can identify at which area to step in."

"Increasing added value for companies was an essential part of the idea upon which COPA-DATA was founded 30 years ago," declares Thomas Punzenberger, Founder and CEO of COPA-DATA. "In zenon, we have provided a digital tool that enables people to get things done more easily than could ever have been possible through conventional means. Even back then, we anticipated much of what is now known collectively as digitalization."

ADDED VALUE THROUGH INFORMATION

The diversity of what is understood by the term "digitalization" in industrial fields is as enormously wide as the range of companies.

"It's not just about digitally reproducing existing analog processes and data collection. Rather, the potential lies in extracting, consolidating, and evaluating information from existing data, and using the opportunities for networking and interaction in order to operate in a more efficient, agile, and customer-friendly way," says Phillip Werr, Chief Marketing and Operations Officer at COPA-DATA.

DIGITALIZATION FOR PEOPLE

"Just as it was 30 years ago, the goal of all COPA-DATA's development efforts remains making the operation of users' systems safer, simpler, and more transparent," adds Stefan Reuther, COPA-DATA's Chief Sales Officer. "These improvements in usability for individual production employees automatically result in an increase in added value for a company."

Not only that, but many employees will also be able to work better and more sustainably and will have access to a much better basis for decision making. Easier-to-use systems are more productive and less subject to user error or malfunction. This increases employees' affinity with the machine, manufacturing cell, or system, which, in turn, boosts their effectiveness and reduces overtime and sick days. Ultimately, the entire company benefits from the welfare of its employees.

"Instead of increasing corporate profits at the expense of employees, the philosophy behind zenon places the emphasis on people," affirms Thomas Punzenberger. "The software gave companies the ability to make a great advance

in their continuous improvement process (CIP) for the first time. In today's terms, we would call that 'disruptive'."

ADDED VALUE THROUGH EMPOWERMENT

Philipp Schmidt, Head of Innovation Management at COPA-DATA Germany, sees one of the key tasks of digitalization as being "to provide every individual at every hierarchical level with the right data and the opportunity to take appropriate, individual action, right where they are. While the IT systems used in administration already meet this requirement well, there is still quite some way to go until this offer is fully extended to manufacturing."

The enhancement of safety through, for example, clear warnings and error messages, help messages for rarely undertaken tasks, and individual customization of possible interventions via authorization levels, also has beneficial effects on the profitability of production systems. A great deal of value can be derived from the consolidation of individual production steps into overarching processes. One example of this is demonstrated by filling and packaging equipment manufacturer KHS, who used zenon to make their machines uniformly ergonomic. Their users benefited from improvements, such as a reduced error rate.

"In discrete manufacturing, users are often forced to transfer programs or data via USB stick due to a lack of networking," reveals Frank Hägele, Sales Director at COPA-DATA Germany. "The numerous possibilities offered by zenon, such as transparently connecting individual devices and third-party systems from sensors through to the ERP system, can be used as a first step towards replacing this 'Adidas network' which is, in our view, out of date." The mere fact that an employee has an overview of all parts of the system, rather than just the machine they are standing by, means plenty of unnecessary trips between machines are avoided. If the employee knows what to expect from a machine, they can better prepare themselves on the way to it, for example, by collecting the necessary tools.

ENABLING AS A BASIS FOR NEW BUSINESS MODELS

"One part of the secret of zenon's success is that the software is configurable and can therefore be easily adapted to changing operational requirements," adds Phillip Werr. "Since it requires no real programming, specialists with domain expertise can further develop the application without the need to involve programmers." This puts plant operators in a position to make changes themselves as part of their CIP. Adjustments can be made promptly, perhaps during slow periods, meaning the information gleaned from the immediately preceding operational days is directly incorporated and is fully retained within the company.

"Giving machine and plant operators greater autonomy enables them to use the existing technical resources more effectively," confirms Stefan Reuther. "And the same is true for machine and equipment manufacturers. They often discover further possibilities for using zenon, which then leads to opportunities for new business models." One simple example of this is the ability to make the functional range of a machine scalable using software. This allows the equipment to be purchased at a competitive price without large functional reserves, with additional functions added on where necessary through the purchase of retroactively installable software.

As a result of digitalization, manufacturers of production equipment can also offer their customers monitoring and preventive maintenance during operation. This business model takes the form of a maintenance contract that guarantees the customer specific equipment availability and performance levels for an additional fee. With zenon installed in the cloud, the support departments of machine manufacturers have transparent access to the machines and can react quickly and competently in the event of a fault. This helps end users to guarantee the smooth running of their increasingly complex machine pools with their existing staff and without excessive training.

"In this way, the manufacturer can also obtain usage data from their machines and collect greater volumes of more accurate information on user behavior," explains Phillip Werr, describing a further example of added value arising from this application of digitalization. "This knowledge can flow into product development for the next generations of machines, and thereby contribute to the improvement of the machines."

The evaluation of production data or the provision of a monitoring and analytics platform, through which the customers can access and evaluate this data themselves, also creates added value by reducing installation and maintenance costs for client-side IT systems.

FROM MANUFACTURERS TO SERVICE PROVIDERS

Our society is changing, and industry is changing with it. The trend in industrial capital goods is moving away from CAPEX (capital expenditure) and towards OPEX (operating expenditure). As such, machine and equipment manufacturers are no longer selling their machines, so much as their use or the production result. "A leading compressor manufacturer sells compressed air to its customers at a price per cubic meter," explains Frank Hägele. "That they have to build a compressor and install it at their customer's site is just a means to an end, as there is no app for compressed air." In this model, the customer only pays for what they

actually use, which is often easier to plan from a financial perspective and more profitable for them.

"When viewed dispassionately, the Internet of Things is actually the Internet of Services," analyzes Thomas Punzenberger. "That's why we must support our customers to move to a position where, rather than trading in their markets exclusively through the provision of products, they instead use servitization – the conversion of their product production to a service business – to gain access to new business models."

Such business models shift a significant portion of commercial risk onto suppliers, who become responsible for the operation and maintenance of the machinery and equipment they manufacture. Synergies arise that allow the equipment suppliers to operate the equipment more efficiently. Furthermore, such business models also enable a significant increase in customer loyalty. "The most important ingredient here is the customer's trust in the supplier's reliability," says Stefan Reuther. "This customer confidence will be the key currency in a digitalized economy."

Machinery and equipment manufacturers that offer such business models agree to meet defined production commitments. They must therefore ensure that they maintain their products in such a way that earns and

holds their customer's trust with a manageable amount of effort. Further, they will endeavor to develop machines and equipment that are as durable and reliable as possible.

"zenon can help here, too," notes Phillip Werr. "Thanks to the software's universal connectivity, operationally relevant information, to which there would have been no direct access in the traditional seller-customer relationship, becomes available."

CLOUD-BASED SOLUTIONS OPEN UP POSSIBILITIES

"As a software partner, COPA-DATA can pave the way for digital transformation for machine and equipment manufacturers, OEMs, and end users," states Philipp Schmidt. "Making this transformation transparent, reliable, and secure, without the risk of any loss in revenue due to piracy, is no small feat, often because most of our customers are not starting from greenfield status."

"Customers with brownfield projects, on the other hand, can begin with a partial installation that grows alongside their operational needs," muses Frank Hägele. "This installation and updating can be carried out by a zenon system integrator, who can operate the resulting system or hand this over to the user." The necessary transparency and security is provided by zenon, thanks to the range

of interfaces and its deeply structured authorization management.

From an IoT Edge Gateway right through to company-wide solutions, and ranging from the control of stand-alone machines through to overall data evaluation, zenon offers multiple possibilities for cost-effective digitalization, not least through using the services of the MS Azure cloud platform. The advantages are obvious: cloud services are always up-to-date, are serviced and tested, and do not require the development of their own infrastructure.

"Since actuators and sensors have physical locations, zenon installations could never be purely cloud-based – in contrast to CRM systems, for example. Instead, they operate in a hybrid environment," explains Thomas Punzenberger. "This works because of the high level of connectivity and transparency of our software; with zenon the boundaries between local and cloud can be set at virtually any point." The larger the controlling part within production, the higher the amount of locally installed zenon parts there will be. What is more, client functionality that serves the evaluation and transfer of data to external systems is increasingly being moved to the cloud.

SOFTWARE IS ALSO BECOMING A SERVICE

"Customers who want to increase their digital added value through servitization are increasingly asking that we offer usage-based billing models, rather than selling licenses for specific functions," reveals Phillip Werr. "For this reason, and in order to make specific functionalities available to customers, who would use them only rarely, we are working towards creating opportunities to use these for a per-usage fee." These offers will include, among other things, the cloud infrastructure and will give operators security in terms of both their operation and budget.

"In the future, we will mainly offer Reporting and Analytics as a cloud-based service," adds Stefan Reuther. "In contrast to standard business intelligence applications, our offer comprises data from across the entire company: from the shop floor to the business level." This will help users find a way to overcome the system discontinuities between departments that are prevalent in many companies.

ADDED VALUE THROUGH INTERDISCIPLINARITY

The consistent use of zenon offers the possibility of integrating all aspects of operation into a single system. Far beyond the actual manufacturing areas, zenon allows all disciplines to be brought together – for example, to obtain information on energy consumption from the building technology so it can be used in the costing of the manufactured product. Even more significant is the creation of digital value through the identification of multidisciplinary optimization potential. This allows superfluous heat from one area to be utilized as process heat in another, thereby improving the overall carbon footprint of the production process.

"To achieve digital added value, subsystems in different divisions can be brought together into consistent 'value systems' by zenon thanks to its interdisciplinarity and communicative properties," says Thomas Punzenberger, describing one of the software's important USPs. "Both we and our customers benefit from our 30 years of experience in zenon installations in a wide range of different customer sectors, from discrete manufacturing and process technology right through to building, energy, and infrastructure technology."

"The first step is creating an understanding of where the potential lies," says Frank Hägele. "Often, it is only after zenon has been installed that users can identify at which area to step in." This is where both the interdisciplinarity of zenon and the ability of the software to grow with the tasks it handles come to the fore. Customers can start with small units and then gradually increase the speed and scope of expansion.

"The integration of building services, engineering, and energy supply with peak-load management and secondary systems such as compressed air, wastewater, etc., is far from the limit of the possibilities," confirms Phillip Werr. "At the production level, digital added value can also mean a company feeding excess power into the grid and thus generating additional revenue."

DIGITAL ADDED VALUE THROUGH NETWORKING

zenon is not only a suitable system for particular applications, but rather a unifying element that adds a layer of intelligence between specialized third-party software systems in production and administration. These third-party systems can be, for example, ERP systems, time registration software, or laboratory systems in quality control. As well as connectivity, zenon assumes control of the contextualization and data management, in order to make data from a wide variety of sources useful and easy to evaluate.

This extends to global facility insight, with which end customers can jointly manage separate production sites in real time. The data is transmitted via gateways from the individual plants to the platform, where it can be evaluated in the usual fashion with a separate zenon installation. This offers peace of mind, because the consistency of data and uniform methods in zenon will prevent any distortion of the information.

DIGITAL ADDED VALUE WITH ZENON

Digitalization means digitally mapping existing analog or manual processes and data collection, extracting, consolidating, and evaluating information from existing data, and using new opportunities for networking and interaction to operate in a more efficient, agile and customer-friendly way.

Digitalization requires the networking of all levels of a company: horizontally through many application areas that were previously considered totally separate, and vertically through data consistency from the shop floor to the boardroom.

Digitization is also enabling a shift from product manufacturing into service provision, known as "servitization". Machine and equipment manufacturers are therefore no longer selling their machines, so much as the production result.

Cloud-based software modules are also sometimes offered as services. Together with the possibilities of establishing universal, comprehensive digital structures and, at the same time, offering a gradual approach through its interdisciplinary strengths, zenon paves the way for digital added value.

The requirement definitions and technological capabilities of the software for digital transformation originated in cooperation with customers and strategic partners, such as Microsoft. The growing network of zenon system integrators is an essential part of the COPA-DATA success concept. "Our partners ensure that we, as a solution provider, offer precision customization of our software products," says Stefan Reuther. "Only thus can we create the added value of digitalization that our customers can achieve using zenon."

There is still much uncertainty as regards digitalization. "Technologically, digital transformation is nothing revolutionary – the innovation lies in the organizational approach," says Philipp Schmidt. "That's why it's important to recognize that striving for the complete solution is not always the most direct or successful path, and that a gradual approach may be better. And, with its impressive modularity and fine granularity, zenon is an excellent tool for this."

"We are among the few providers who possess all of the skills needed for the convergence of IT and OT, and who have a solid foundation in sector-specific expertise," concludes Thomas Punzenberger. He is certain: "This is the only way that we can talk credibly about the added value potential in digital transformation."

FIVE STEPS TO
THE DIGITAL FACTORY

In order to transform a factory into a digital factory, a wide range
of aspects need to be considered. It is often necessary to carry out
restructuring, make organizational changes, or remodel workflows. In
addition to this, however, it is essential to look at the existing technical
infrastructure and adapt the systems that are already in use. When doing
so, these five steps toward the digital factory should be considered.

1. M2M COMMUNICATION: LET THE MACHINES DO THE TALKING

M2M (machine-to-machine) communication is inextricably linked with the digital factory. Only machines that can communicate (with one another) can make the Smart Factory a reality. M2M communication provides the basis for perfectly coordinated production processes that enable high levels of efficiency, even for small batch sizes.

2. CONNECTIVITY: ESTABLISH TRANSPARENCY ACROSS ALL LEVELS

It is not only communication between machines that is important – communication across the different levels of the company is also key to the digital factory. Consistent, reliable data and transparency from field level right through to business level are vital for making sound decisions, reacting flexibly, and improving processes on an ongoing basis. Data is captured using sensors that communicate directly with the ERP system or are linked to the cloud. This links operational and business levels with one another (IT/OT convergence).

3. OBTAIN INFORMATION FROM VALID DATA

Reliable data capture requires robust and stable systems that work redundantly. Having a solid base of valid data is a prerequisite for advanced applications, yet simply recording and stockpiling data does not make a factory smart. Only when information can be obtained from data is it possible to make good use of it to improve processes on an ongoing basis and to react swiftly to any problems that arise.

4. STILL THINK ABOUT THE USER DESPITE ALL THE TECHNOLOGY

Many aspects of the digital factory revolve around information. How this information is used largely remains in the hands of those responsible for making decisions. These people, therefore, need to have easy access to the information necessary to make those decisions. It is important, however, that this does not cause a flood of data. Smart technologies provide the user with the best possible support. For example, it is possible to specify in advance what level of detail is relevant for the information or how the data should be presented.

5. SCALABILITY: LEAVE ROOM FOR FURTHER ENHANCEMENTS

A digital factory is in a state of constant development – it will grow and be faced with new challenges. Consumer expectations are becoming increasingly individualized and fast-moving, but production needs to remain efficient. An important prerequisite here is the ability to expand systems in terms of functionality – not merely maintain them. Systems that are highly scalable and can be efficiently maintained ensure flexibility and provide opportunities for growth, change, and customization over many years.

ANDREA MITTERER,
PRODUCT MARKETER
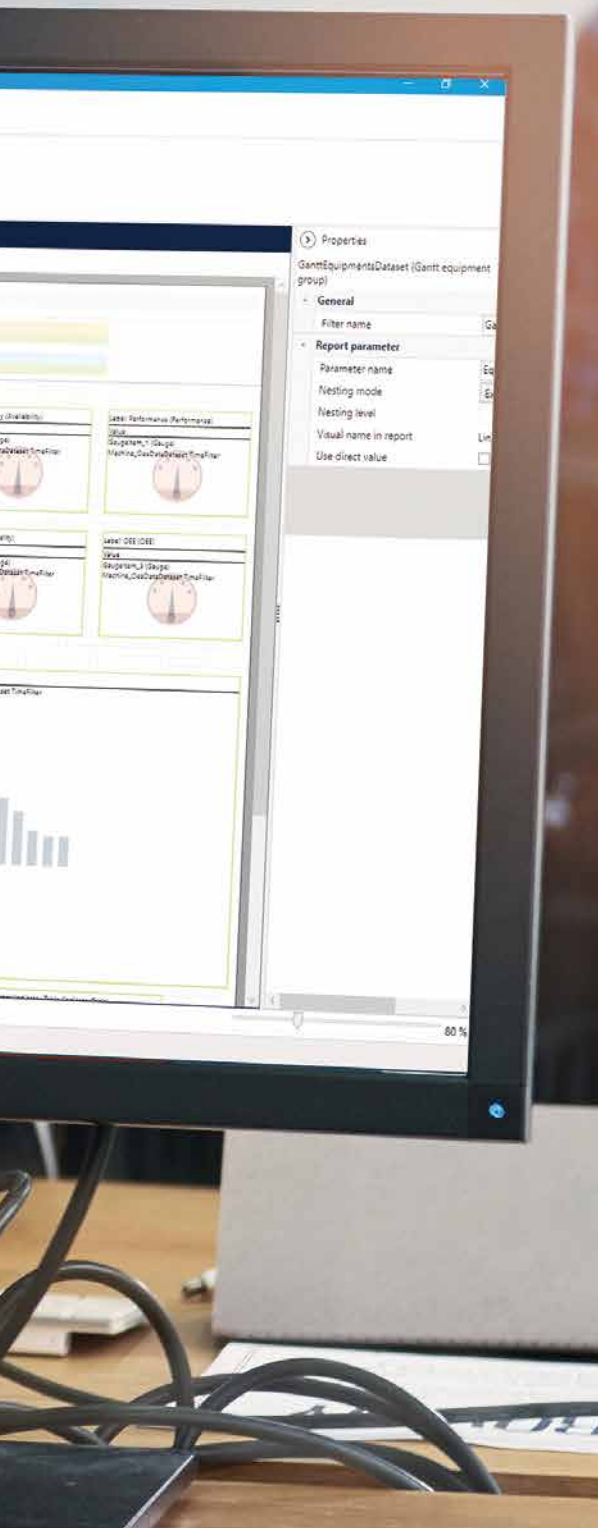
PRODUCTS
&
SERVICES

Quantum Leap – Business Intelligence in the Digital Transformation Process

TEXT: STEFAN REUTHER,
CHIEF SALES OFFICER,
COPA-DATA

Data is the oil of the 21st century. Or so say the scholars. It's true that both data and oil are crucial resources in the modern age. But even the layman can spot the substantial difference instantly: oil is finite. Once it has been burned or turned into a higher-value product, it cannot be used again. This is not the case where data is concerned. There's no need to worry about its multiple use. It can be used for many different purposes. In economic terms, this makes data an immaterial capital good or asset.

Capital goods are characterized by three key properties. First, they have the potential to generate long-term and recurrent financial benefits for their owners. Second, the owner needs sufficient skills and means to generate these economic benefits. Third, they are the product of active dealings, i.e. were previously purchased or created by the owner.[1]

So, data alone is not enough. The ability to harness the benefit from it is also required. Software must be used for this. And this is exactly where business intelligence solutions come in. Business intelligence (BI) is defined as "an integrated, business-specific, IT-based approach to supporting operational decision-making."[2]

SUPPORTING DECISIONS WITH DATA

It is important to note that the definition of BI above is only one of many interpretations; there is no universally accepted definition. But, ultimately, the overwhelming consensus is that BI provides support in decision-making processes, and that it leads to an improved insight into the business and better understanding of the relevant causation chains.[3]

The goal of business intelligence is operational decision-making support. It requires all key, relevant data to be in front of you at the right time. This is the only way to reliably make the right decision. Data must be prepared in such a way that it can ideally be understood in just a
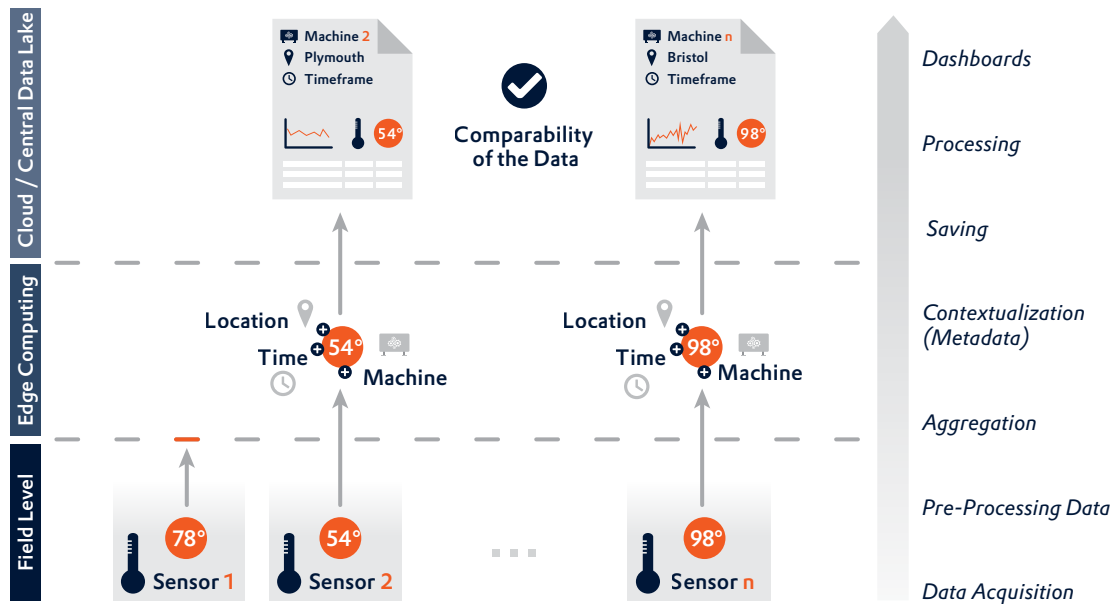
Figure 1: The key to effective benchmarking is all about the data that is presented. Only valid information contributes to the added value of a business.

few glances and does not require any time-consuming, subsequent processing. The emphasis here lies on having relevant data. A huge amount of data is generated in industrial environments due to the sheer amount of hardware involved (sensors, actuators, PLCs, etc.). Further complications arise from the fact that field interfaces are often highly heterogeneous because they have been developed over time. The data must first be prepared before it can contribute towards supporting operational decision making. This prepared data is only useful when making a contribution towards value-add for the user. Or, in short, if it contributes towards increased sales, raises the level of customer satisfaction, avoids unnecessary costs, improves internal processes, or contributes towards the sustainable future of the company.

FIRST COMES THE "WHAT?" THEN THE "HOW?" – DEFINING THE BUSINESS CASE

First, we need to take a step back. Given that expressions such as "Big Data", "Industry 4.0", and the "Internet of Things" are currently on everyone's lips, and with claims that data is the new oil, many companies are now starting to collect data. Because many of them still do not know exactly what they want to do with this data, it is simply all collated and stored in a huge collection of bits and bytes. This might

be useful but, also, might not be. Within an industrial environment, this is often not that easy, particularly when the requirement is to collate data from distributed sources or the issue of bandwidth rears its head. In the blink of an eye, a data tomb forms. Companies need to be clear on what information they are collecting and what results they want to achieve.

By being clear about their objectives, companies take a big step forward. Once the business case, or the "what?", has been defined, we can move on to answering the "how?". Putting this into practice in a business is not that easy. All too often, IT departments become too intently focused on technical details and lose sight of the overall objective. Whether MQTT, AMQP, or OPC UA is used to communicate information is something that should be clarified, but is rarely of strategic importance.

EDGE COMPUTING: IT ALL DEPENDS ON DATA QUALITY

Of much more importance are "metadata" and, in IoT scenarios with distributed data sources in particular, "data aggregation". To put it simply, metadata is a definition of where the data is derived from. Just imagine that you have collected data from identical machine types for benchmarking purposes, and later want to evaluate which machine delivers the best performance. Assuming that the

Figure 2: Less is often more. Important information is visualized in the management cockpit to support operational decision making.

semantics of variables in identical machines is the same, something is needed that denotes the country/plant/department/machine/equipment, etc., to which the variable belongs. Without this, the values cannot be compared.

Data aggregation is principally about data compression. Not every change to a value needs be transferred immediately to the central data lake. This would result in much too much data traffic – especially when bandwidth is limited. Values from electricity meters, for example, are typically taken every 15 minutes. For other values, perhaps only the maximum or minimum value from the last hour is needed. When these calculations are performed in close proximity to the sensor, it is known as edge computing. The actual process depends on which results should be attained. Once our data from a heterogeneous environment has been collected, enriched with meta information, aggregated, and refined, it can be stored at a central location – either at the company's own data center or in the cloud (using MS Azure, for example).

BUSINESS INTELLIGENCE: AN APPROACH TO OPERATIONAL DECISION-MAKING SUPPORT

Let's return to the definition from Kemper, Baars & Mehanna that's at the beginning of this article. The goal of business intelligence is operational decision-making support. The term implies there is a need for comprehensive and holistic analysis so that decision-makers can be supported in their decision-making processes. For this, the prepared data must now once again be formatted at a central location, ideally as key performance indicators (KPIs). At the end of the day, no executive wants to work through tables of data before being able to interpret it sensibly.

These calculated KPIs should be formatted so they can be understood in just a few glances. Typically, dashboards are created to do this as they offer a visualization of information in a condensed, usually graphical form. Results can be summarized in a management cockpit or production cockpit. At this point, there are no bounds on creativity – but this freedom can be a fly in the ointment. Rather than creating complex reports in cool colors, the focus must be on having all important and relevant data in front of you at the right time.

HOW ZENON SUPPORTS DIGITAL TRANSFORMATION – FROM DATA TO KNOWLEDGE

Most readers will already know that our zenon software is active in a wide range of sectors and continues to attract new fans the world over. What might be a surprise to one or two of our readers is the fact that zenon is also the perfect partner in digital transformation.

Data Acquisition · Pre-Processing · Aggregation · Contextualization using Metadata

Management Dashboards/KPIs · Processing · Saving · Spooling (Buffering)
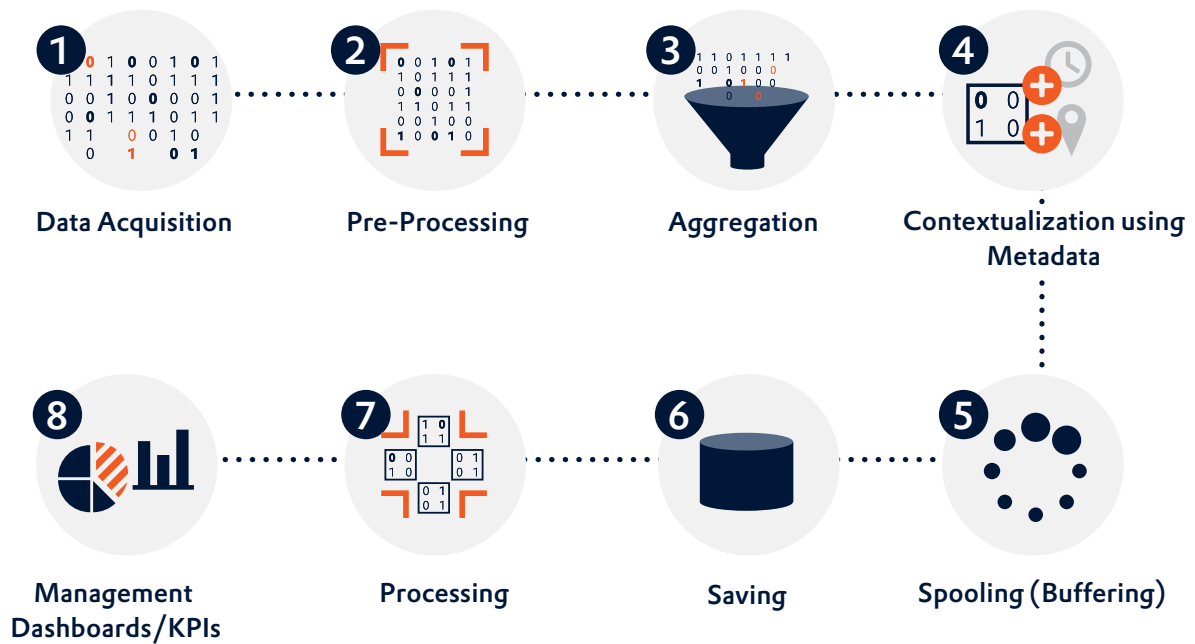
Figure 3: With its "out of the box" functionality, zenon supports the digital transformation process. The right processing enables data to be converted into valuable assets.

zenon includes all necessary technologies, such as:

– The zenon Multi-Driver Interface for the acquisition of data from a wide range of hardware, and for communicating with data centers and cloud services
– zenon Runtime to correlate and aggregate data
– zenon Logic for calculating task and company-specific KPIs in real time
– zenon Analyzer for generating user-centric reports and dashboards

This enables data to be turned into information and, in turn, information to be converted to knowledge that can support good decision making. With zenon, you will be guided along the path towards sustainable, profitable, and future-oriented corporate governance.

BIBLIOGRAPHY

Gluchowski, P., Gabriel, R., & Dittmar, C. (2008). *Management Support Systeme und Business Intelligence. Computergestützte Informationssysteme für Fach- und Führungskräfte.* Springer Verlag.
[in German only]

Kemper, H.-G., Baars, H., & Mehanna, W. (2010). B*usiness Intelligence - Grundlagen und praktische Anwendungen.* Stuttgart: Vieweg+Teubner Verlag.
[in German only]

Maicher, L. (March 16, 2016).
Von Warum Daten nicht das neue Öl sind
http://digitalpresent.tagesspiegel.de/warum-daten-nicht-das-neue-oel-sind
[in German only]

SERIES: EFFICIENT ENGINEERING WITH ZENON
PART 7

GAIN AN OVERVIEW IN STYLE

Styles in zenon create clearly structured and user-friendly interfaces which are essential for working ergonomically, giving machine operators all of the information at a glance, and enabling them to react swiftly. For plant operators in the process industry, sophisticated structuring of data is crucial. This is where faceplates can help, by offering a clear overview and making it possible to navigate to the fine details in as few steps as possible. Read on to find out how to implement these tools effectively.

TEXT: MARKUS HELBOK,
HEAD OF TECHNOLOGY SERVICES

zenon offers a wide range of engineering tools. This includes styles, for structured design and easy-to-use interfaces, and faceplates that make it easy to collect all of the important information in a single image and reliably guide users to the information they need at any given time.

BETTER ENGINEERING WITH STYLE

Automation projects often grow over a number of years – and you can normally tell when this has been the case. Each engineer has their own style and preferences, and projects often have to account for different customers and applications, too. This jumble of influences creates less informative interfaces. Machine operators, however, need information and buttons to be clearly recognizable, as they can only react quickly and correctly when they can see at a glance what needs to be done. To achieve this, clearly designed user interfaces, consistent color schemes, cleanly implemented buttons, and the unique identification of information are all helpful.

QUICK ASSIGNMENT OF PROPERTIES

Of course, all project creators would like to work in this way, but it eats up valuable time, right? Not with zenon. That's because with zenon Editor's styles, COPA-DATA has created a tool that makes it all significantly easier. Want to adapt and synchronize outdated projects? Need to customize a project for different customers? Want to use tried-and-tested design elements across multiple projects? Styles make all of this easier.

Styles enable the combination of graphical properties in logical units. The "line" style, for example, comprises the properties color, thickness, pattern, and line ends. Once created, the style can be adjusted and assigned as desired. If you change the color of the style, then all elements to which the style has been assigned will also change color. As with everything in zenon: stored centrally, changed centrally.

FROM STYLES TO STYLE GROUPS

If, as well as the lines, you want to make fills, shadows, effects, and other properties uniform, then styles can

Figure 1:
Uniform design in engineering can often be time consuming and hard to achieve manually. Styles can help you here: as the left area of the monitor shows, styles make it possible to create uniform objects quickly.

be bundled together in style groups. This enables you to independently and centrally manage all of the graphical properties of a zenon element. You are not limited to just one project here: styles can also be applied to global projects and used for a wide array of elements and projects according to the user's preference. They can also be exported and imported and are available via the API.

IT COULDN'T BE SIMPLER

In order to create styles, configure an element as it is required in your project. Then select the element "Create style group from element" from the context menu and choose whether the style group should be used in the local project or in the global project. And that's it! With just a click of a mouse you can now transfer either the entire style group, including all details – or individual styles, such as line properties – to other elements. All elements in zenon have properties for this reason; allowing you to apply styles and style groups. Plus, zenon automatically ensures that properties are only adopted from styles that make sense for the target element.

It will soon be even easier to create styles. From zenon version 8.00, in addition to using the automatically generated style groups, you will be able to create your own style groups and fill them with individual styles.

FASTER AND MORE FLEXIBLE WITH STYLES

As well as creating projects, styles are ideal when used to optimize existing projects. Projects that have become outdated normally feature a wide range of design elements. Making all buttons uniform can quickly escalate into many days of manual work. With zenon styles, however, you can design an element as a model. Then you create a style group

and apply it to all other assigned elements. If you want to later change, for example, a color, line thickness, or other property, then this can be done just as quickly. Just choose the style group from your selection and edit the relevant detail, and the changes will be automatically applied to all objects to which this style group has been assigned.

CUSTOMIZE PROJECTS

With styles, machine manufacturers can benefit from significant time savings. This is because – when combined with the color palettes – a sample project can be adapted to the corporate identity and design preferences of various customers. The basic project contains the same engineering for all customers. The design properties of all objects are defined via style groups. To adapt a project to another design, all you have to do is apply the appropriate style group and color palette, allowing you to easily customize even complex projects.

LESS EFFORT, MORE SAFETY

As well as the increased safety and performance of machinery, an often overlooked effect of a uniform design is the reduced training time. The consistent design of displays and control elements makes it easier to understand concepts and apply existing knowledge. New employees get to grips with machines faster and it takes less time before they can be fully deployed. The engineering of new projects or the optimization of existing projects may initially require a little extra time in the establishment of a uniform concept. Once this is complete, however, styles save time – for every new project, every time a project is changed, and at every customer training session.
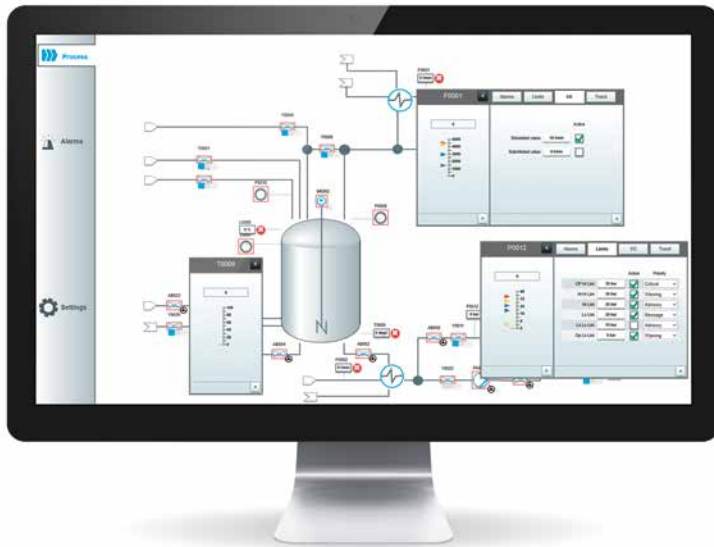
Figure 2:
With faceplates, you can give your designs a modern look and feel while maintaining a perfect overview, all with minimal effort.

CROSS-PROJECT AND AUTOMATED

In order to provide styles for all engineering elements within a workspace, all it takes is to assign them to the global project. You can, however, also share styles with projects outside of the workspace or on other computers. To do so, simply use the XML export and import.

Styles are also available via the API, allowing you to create, manage, and assign them with ease. This makes it possible to integrate styles across the entirety of your automated engineering project, but you can also use the API to quickly update older projects with the latest design.

EVERYTHING IN VIEW WITH FACEPLATES

While styles reduce engineering time and facilitate the creation of user-friendly interfaces, zenon Faceplates provide a perfect overview in the runtime. They are most commonly used in the process industry, to display values and notes and to provide users with targeted, in-depth information and instructions.

Faceplates are screens that contain other screens. From a technical perspective, a zenon Faceplate is a screen type that incorporates a container for further screens. This allows you to display, for example, an alarm message list, a chronological event list, and the extended trend on the same runtime screen. The use of faceplates ensures simplified engineering and reduces project maintenance costs.

VERSATILE APPLICATIONS

Using faceplates, you can create, for example, clearly-laid-out dashboards that display exactly the information that is needed at any given moment. Filters or the replacement of variables can be used to show only the currently required screen containers. This feature also allows configurations to be seamlessly transferred to other equipment components. Plus, you can integrate zenon Faceplates into pop-ups, to make the display of information dynamic.

The engineering is very simple: you create a new screen and select the option "faceplate." Next, decide which screens are to be displayed in it. For each of these screens, insert a container and assign the desired screen to it. Faceplates can also be a source or target for filter screens, thereby updating other screens or being updated by them. Individual screen containers can also be called up or hidden.

FROM AN OVERVIEW DOWN TO THE DETAILS

Faceplates are ideal for displaying all important information at a glance to operators and system users: instead of having to switch back and forth, the view remains on one screen and users only need to switch away from this when they need to access more details.

Screens that are embedded into faceplates also support substitution in zenon. When using substitution, universal placeholders are replaced by variables and functions when the screen is opened. The faceplate can then be connected
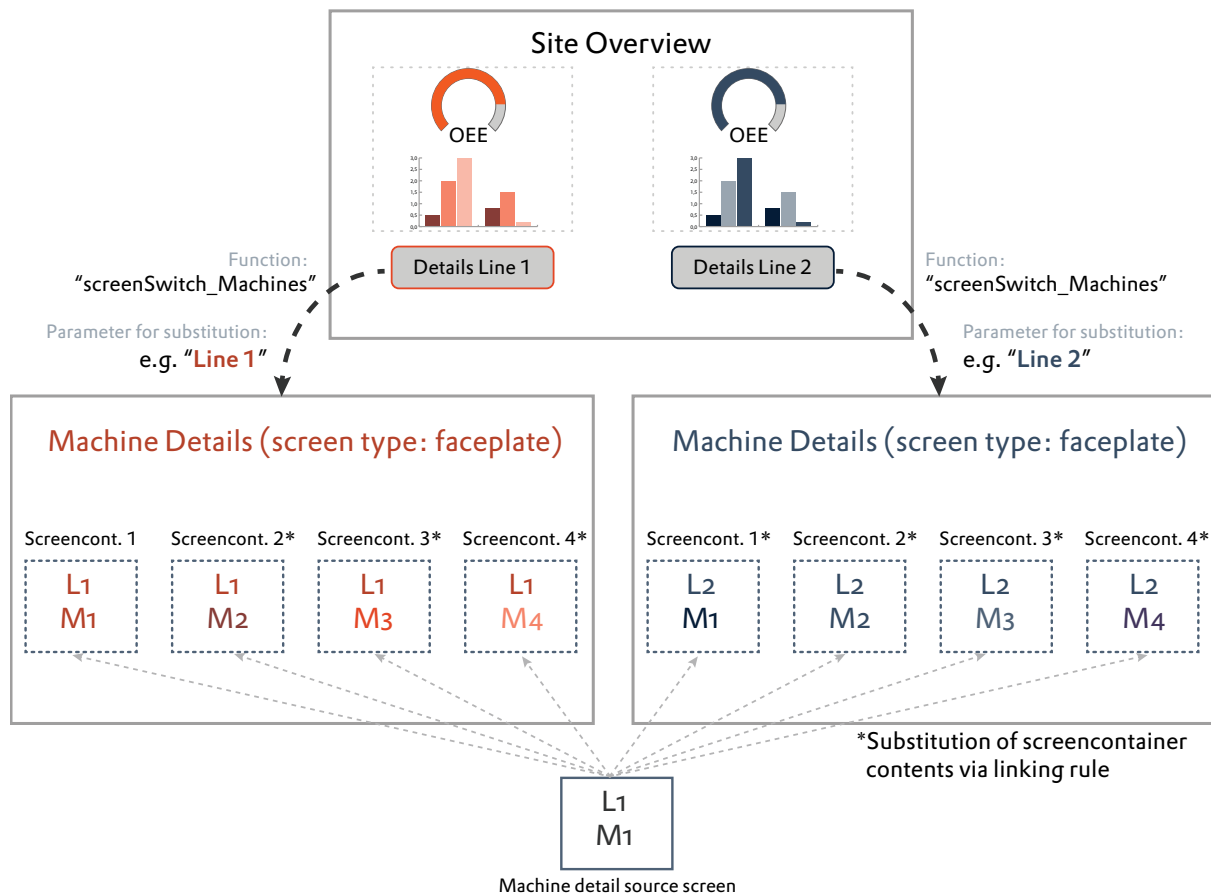
Figure 3: Smart – with simple replacement via parameters, you can use faceplates for multiple variations of your data and keep your project lean.

as often as required with a variety of different types of content in runtime – for example, the values of various units. When changing the screen, the faceplate and the embedded screens only have to be adjusted at a single point.

CONCLUSION: BENEFIT MANY TIMES OVER

Styles in zenon offers you a powerful tool for making your projects uniform, significantly reducing the effort required to create interface designs. And with faceplates, you can build users an even greater overview in runtime – with a display focused on the most important details. The bottom line: you profit from a functional design that you can effortlessly distribute across your projects.

Video:
Tutorial - Faceplates
Scan & Play!

https://goo.gl/3aLzYw

FAQs

Consistent HMI Design with zenon

How you can easily and efficiently create consistent graphical designs for human-machine interfaces using zenon

An HMI's design needs to be ergonomic, offer high functionality, present information relevant to the situation in an engaging way, and provide information on the machine/system's status. With the zenon Editor, you can optimally adapt the interface to the needs of your application and to the requirements of the user. This article will show you why consistent design is important and how you can implement this conveniently.

Why are design and usability so important in an HMI?
Consider the operator standing in front of the machine: they have a range of different tasks to perform and targets to meet. Depending on the user's role, the form that these tasks and targets take can vary greatly. A production manager, for example, requires different information to a maintenance technician. An HMI must therefore be able to meet these differing information needs, and a key element in achieving this is the design.

It is not only important for design to be aesthetically pleasing. Good design is lucid, should clearly signal abnormal conditions, and relieves strain on the user. In doing so, it contributes to a reduced error rate and speeds up the process of restarting operations after a production shutdown. Ultimately, good HMI design leads to improved productivity and fewer interruptions to production.

A central aspect here is not only the correct arrangement of elements, but the consistency of the user interface – both in terms of appearance and language, as well as operation.

I want to redesign my HMI from scratch. How can zenon help me?
With zenon, you have a wide range of tools at your disposal that, through the centralized management of the "look and feel" within projects, allow you to ensure a consistent design, quick engineering, and reduced maintenance costs.

These tools can be found in the "Images" node of the zenon Editor project tree. Frames, color palettes, font lists, styles, and symbols all work hand in hand to support you in efficient engineering.

What design elements are available to me and how can I define and manage them efficiently?
zenon offers a wide range of screen elements for the graphical design of the HMI, from static basics, such as a rectangle, to interactive elements, like buttons, through to graphical value displays. You can individually configure these standard elements, providing versatility.

If an element is configured in a graphically appealing way, you can easily extract a style group and apply this

to other elements. All styles that are compatible with the element are applied, and the graphical properties of the element can then be managed centrally.

How can I define a consistent style for an HMI project using zenon?

Styles make it possible to centrally manage the graphical properties of screen elements, such as buttons. These are compiled into style groups with a button e.g. text style, fill style, etc.

How do I use color palettes, fonts, and styles? What are my options?

The zenon Editor is a very powerful tool. You can choose far more than simple fonts like "Arial 17", colors like "blue", and styles like "green button".

We recommend context-related use, e.g., one font for buttons, one for descriptions, and one color for description text, one (or two) for the background. What may seem redundant at first glance will pay off later. A black font on a light green button, for example, works fine. But if you change the background color to dark green at a later point, you will have a problem in terms of universal adjustment if the same text color is defined for all buttons.

Fonts and color palettes can be switched in the editor and in runtime. Using color palette switching, you can, for example, implement a day/night mode, or adjust the color design to a client's preferences. Font list switching can be useful, for example, when dealing with different languages (with different character sets and text lengths).

Can customer-specific fonts be used in addition to the standard fonts?

You can use any font installed on your system in zenon.

How do I incorporate graphics into the HMI project?

You can import pixel graphics into zenon Editor and access them via the project tree under the node "Files – Graphics". These can be used, for example, as a background graphic in the screen, as a fill for the element "Button", or as a status indicator in the "combined element".

What are the possibilities in terms of animation?

zenon objects can be animated using variables, such as position, size, and alignment. Plus, zenon can include GIF animations.

Can I also use defined styles for other projects?

There are several options for using styles across different projects.
– Managing styles in the global project
– XML import/export
– Copy/paste

What do I have to do in order to ensure a style change is applied within a project?

The zenon Editor automatically applies changes to styles. You can even watch the changes live if the screen in which the changed style is used is open at the time.

With zenon Runtime, you can easily generate a runtime file and then reload the project.

Video:
Engineers Kitchen
Efficient Implementation of Consistent Design
Scan & Play!

https://youtu.be/smEZjkuJMxw
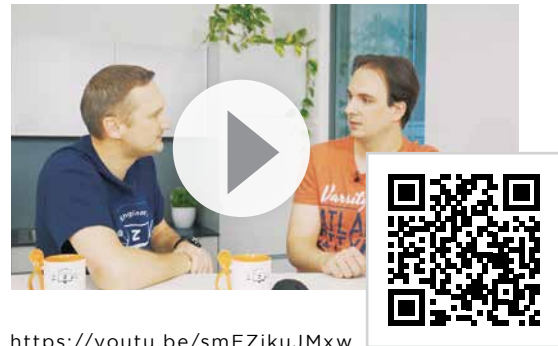
GERO GRUBER,
TECHNICAL PRODUCT MANAGER

INDUSTRIES

&

SOLUTIONS

FOOD & BEVERAGE

ENERGY & INFRASTRUCTURE

AUTOMOTIVE

PHARMACEUTICAL

ZENON SUCCESS STORY

TRANSPARENCY THANKS TO AUTOMATED DATA COLLECTION WITH ZENON

System Automation for Maximum Liqueur Enjoyment

The recipe behind the herbal liqueur Becherovka is 200 years old and top secret. It is unofficially known as the 13th mineral spring in the Czech town of Carlsbad. The effectiveness of the filling and packaging system, however, is no longer a secret since the company implemented a process control system based on the zenon software from COPA-DATA. This provides the foundation for further efficiency enhancements.

For many years, Carlsbad (Karlovy Vary) in the Czech Republic was the most famous and fashionable spa resort in the world. The healing water from its 12 springs has been used for spa baths since the 14th century, and also for drinking treatments since the 16th century. The 13th spring was created in 1807, when Josef Vitus Becher developed a herbal liqueur which was originally used as a medicine. With its lack of bitter taste, the liqueur quickly became popular among a large number of loyal fans. Under the name Becherovka, the drink is now an integral part of Bohemia's culinary traditions, and is sure to be found in any well-stocked bar.

Jan Becher has been producing the liqueur on an industrial scale and exporting it worldwide since the 19th century. Since 2001, the company has been owned by Pernod Ricard, the world's largest manufacturer of spirits. The old factory is now open to the public as a museum and production takes place in a factory that opened in 2010 on the outskirts of Carlsbad.

containers to palletizing and labeling the filled bottles, and providing them with a tax stamp."

HANDWRITTEN DOCUMENTATION AND ESTIMATES AS SOURCES OF ERRORS

Each of the 10 system sections is equipped with an individual controller. They were linked by simple hardware interfaces between the units since the filling line was first installed. "This configuration worked very well during normal operating periods," reports Bryzgal. "Difficulties were caused by the lack of centrally accessible information in the event of a problem, e.g., in the case of system downtimes."

In such situations, it was often difficult to quickly determine the cause of the downtime. This not only delayed the troubleshooting process, but also made it difficult to calculate the system efficiency later on. The production workers manually logged the information for each system downtime. "As they were logging the information while they were looking for and repairing the fault, the

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"Thanks to zenon, the engineers at Kropf Solutions were able to implement all of our specific requirements, including those that only appeared during the test phase."

TOMÁŠ BRYZGAL,
PLANT DIRECTOR AT JAN BECHER - KARLOVARSKÁ BECHEROVKA, A.S.

A LONG TIME TO MATURE, A SHORT TIME TO BOTTLE

It takes 90 to 100 days to produce a batch of Becherovka. First, a mixture of around 20 different international herbs is produced according to a top secret recipe in the so-called "drug chamber". The mixture is then packed into a kind of oversized tea bag and is kept for a week in a closed container with pure alcohol, which is initially hot and then slowly cools down. Other ingredients, primarily water and sugar, are added to the alcohol, and the liqueur is then left to mature in oak barrels for two months.

After filtering, the herbal liqueur is chilled to -5°C and then transferred to the central filling line. "We sell Becherovka in bottles of different sizes ranging from miniatures containing five centiliters to the famous flattened bottles with a capacity of up to three liters," says Tomáš Bryzgal, plant director at Jan Becher - Karlovarská Becherovka. "The entire filling process runs with a high degree of automation – from depalletizing the empty

information was not always very precise," admits Bryzgal. "The downtimes in particular were often quite inaccurate, as they were mostly retrospective estimates."

It was also inconvenient that they needed to transfer these handwritten records into spreadsheet forms for evaluation, and these forms only offered limited options for analyses. In addition, the data and evaluations were isolated from both the company IT and the automation systems, so they could not easily be used for controlling measures.

FLEXIBLE MONITORING SYSTEM REQUIRED

In order to better monitor the system's efficiency and to maintain it at a high level, the management decided to replace this isolated data system with a modern integrated overall solution. To this end, the complete filling and packaging system needed to be provided with an overarching process control system. To ensure that the company did not have to change its well-functioning subsystems, the solution
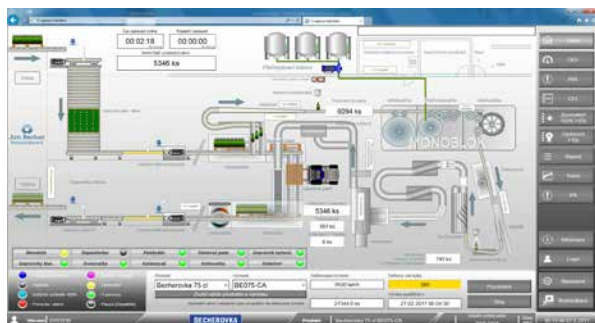
Figure 1: zenon offers a comprehensive overview of the entire system. This facilitates troubleshooting in the event of a fault and the evaluation of the system's effectiveness.

Figure 2: An up-to-date OEE overview is always available on the panel, which is access-protected via a RFID login and accessible online via web clients – without the need for manual data collection.

needed to be implemented without interfering with their PLC programming.

The requirements were extensive: The system should enable the entire filling and packaging system to be monitored centrally and the Overall Equipment Effectiveness (OEE) be evaluated. Among other information, the reports should also comprise the evaluation of downtimes and micro-downtimes (up to 10 seconds) without any significant effort, including displaying a Pareto chart. On the one hand, the system should be accessible via a web server independent of the location. On the other hand, it must be protected against unauthorized access by means of an RFID login.

OPEN SOFTWARE SOLUTION – PERFECTLY ADAPTED

Kropf Solutions, with its branch office in the Czech city of Cheb, was awarded the project order. The company specializing in industrial automation, has been working closely with COPA-DATA for more than 20 years. "The zenon software is tailored to flexible, open, and reliable applications," says Ronny Duchek, head of the technical department at Kropf Solutions, who led the project. "With this solid foundation, we can create tailor-made solutions that are highly dynamic and ergonomic for our customers."

The first part of the overall solution for Jan Becher was grouping all the subsystems within the filling and packaging system into an overarching Ethernet network via gateways. This connects the production systems to a zenon server, which also provides the connection to the company's network. An industrial Multi-Touch panel is available for

direct, machine-related interventions. The panel also has an RFID reader, which is used to log-on the user in zenon.

Customers and system integrators extensively tested the zenon project before it was released for live operation. New requirements, which no one had thought of in the definition phase, emerged again and again during this testing phase. However, due to the open structure of zenon, these requirements could easily be integrated into the implementation when it was almost finished. Kropf Solutions were therefore able to hand over a solution that was ready for practical use after a very short test phase.

COMPLETE OVERVIEW WITHOUT MANUAL LABOR

The zenon-based process control system has rendered all the manual records that were previously required unnecessary. The fully automatic system permanently records the operating states of all the system components to the second and without the possibility of human errors, such as transposed digits. It is also no longer necessary to transfer the data, as it is immediately available for all types of evaluations in the database after recording.

The Overall Equipment Effectiveness is now calculated in a standardized manner throughout the group. The application specialists from Kropf Solutions programmed the corresponding evaluations in the integrated zenon Logic PLC system on the basis of predefined formulas. These are presented in various forms as a live overview or trend diagram – on the panel in production on the one hand, and in various offices with the help of web clients on the other.

Figure 3: The trend solution created using the Faceplate technology in zenon ensures clarity.

Figure 4: All evaluations are also incorporated into an automated reporting process.

Downtimes and forced reductions of the filling line speed can be displayed as detail views, but also as a Pareto chart.

The automated creation and sending of daily and monthly reports are not only essential for the operation and control of overall production, but also provide a basis for subsequent decisions within the group.

DATABASE FOR FURTHER OPTIMIZATIONS

"Thanks to its versatility, adaptability to our specific requirements, and user-friendly design, zenon has made our production processes more transparent and has removed the need for employees to carry out documentation tasks," says Bryzgal. "The next step is to use the system to further optimize our production processes."

ZENON AS PROCESS CONTROL SYSTEM FOR JAN BECHER - KARLOVARSKÁ BECHEROVKA

– Central system monitoring

– Elimination of manual data collection and isolated evaluation systems

– Evaluation of the Overall Equipment Effectiveness (OEE)

– Evaluation of the downtimes and speed fluctuations incl. Pareto chart

– Comprehensive, automated reporting process

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zenon –
the Distribution Network Maestro

What does zenon have to do with distribution networks? What is a DMS? And is it possible to turn an HMI/SCADA system into a fully-fledged DMS? This article will answer all these questions and more.

A Distribution Management System (DMS) is required in order to manage an electrical network. In general terms, an electrical network can function completely unmanaged – as can be seen by the electrical installation within a house. However, a home network represents a very small network; virtually insignificant in the scope of a whole region. If a home network goes down, it has no effect on other households. Plus, home networks are rarely rebuilt or expanded.

NETWORK MANAGEMENT SYSTEM REQUIRED FOR COMPLEX DISTRIBUTION NETWORKS

When you scale up an electrical network to cover a city, a district, or even a whole region, this is known as a distribution network. Inevitably, this scaling results in new challenges: a fault in a section of the network could affect several households, while a total failure can affect hundreds of thousands of people. In contrast with a home

network, a distribution network is "alive". It is constantly being extended and adapted as houses are added and new businesses open up. With increased energy demand come new supply lines. In such conditions, a network simply cannot go unmanaged as this would lead to permanent blackout. This is why a network management system is required, i.e. a system with a constant overview that displays what position the high-voltage switches are in and which switching operations are required in order to integrate new lines and cables or to carry out maintenance. The network management system must prevent the interruption of energy supply or limit an interruption to as few customers as possible.
Previously, it was enough to put up a network map on a pinboard and track the switch positions with different colored pins, carefully noting all switching operations in a logbook. Communication with service technicians took place via phone or radio, while specialists conducted network calculations manually.

Today, the person responsible for the network management system (operator) needs technical support due to the sheer volume of data that accumulates in a network control center. This system is called a Distribution Management System, or DMS. Broadly classified, a DMS does two jobs. First, it maps the measured values and positions of high-voltage switches and records their operation. This part is usually referred to as SCADA (Supervisory Control and Data Acquisition). The second part involves calculating the network with regard to load flows, short circuit calculations, setting of suppression coils, step switches for transformers, etc. Both parts are necessary in order to keep the network operational. After all, the network can be influenced by a number of factors. These can include planned switching operations that are necessary to extend the network or carry out maintenance work, but much trickier are factors like variable loads, power generation, and faults. In order to be able to respond quickly to these influences and keep the network running smoothly, the operator is provided with various pieces of information. For one, they receive real-time information from the switchgear in the form of messages, alarms, and status notifications. They also use non-real-time data to gain other information, such as the location of a problem or how many customers are affected. This information can come, for example, from a geographical information system (GIS) or a business system such as SAP.

WHAT A DMS MUST BE ABLE TO DO

Now let's have a look at the DMS from a technical perspective. The first questions we should ask ourselves are where is all this data coming from and how can a DMS replace a pinboard with a network map on it? The first part of the question is easy to answer: the data is provided through interfaces. A DMS requires interfaces with all areas it is connected with. Information that was previously communicated via telephone now arrives automatically via the telecontrol technology in the DMS. Unfortunately, this is not the case for every switch required for a network management system. Depending on the configuration of the remote network or the operational necessity, there may still be switches which are not remotely controlled. In order to properly map these switches in the DMS, you need a function that matches that of the manual tracking on the pinboard. In zenon, this function is called "manual correction". The advantage of manual correction in the DMS compared to the pinboard is that the DMS simultaneously calculates the status of the network and provides the operator with additional information. The operator can find out if a line is electrified, switched off, earthed, or used for multiple supplies. At the same time, the DMS

HIGHLIGHTS AT A GLANCE:

– A Distribution Management System (DMS) is required to manage an electrical network.

– Previously, it was enough to put up a network map on a pinboard and track the switch positions with different colored pins.

– A DMS requires interfaces to all areas it is connected to – and to geographical information systems (GIS) and business systems.

– The load flow calculation is used to monitor a network and to flag up critical situations.

– The state estimator provides information about network segments that are not measured and can only be estimated.

– COPA-DATA continues to add DMS functions to zenon.

Figure 1: A number of zenon modules which can be applied to control and monitor a distribution network system for smaller to mid-sized municipal utilities.

can work out before switching whether an intervention will cause consumers to be without power or whether it will cause other network sections to be overloaded. As such, the system assists the operator and prevents them from making mistakes.

In addition to the interfaces for detecting network status and the remote control of equipment such as switches, transformers, protective devices, etc., the DMS also needs interfaces to other systems for geo-information, customer data, and storage of data collected for further use by other systems. Thus, the DMS serves as an intersection or gateway for a variety of different information types.

And the DMS is not exempt from trends, either: data required by multiple systems can be stored in the cloud.

When using a DMS, it's important to always have visibility of the status of the network. The calculations

necessary for this are carried out by a load flow module. The module takes into account the topology of the network and its feeds and loads and uses this information to calculate the voltages and distribution of power and currents.

These calculations can be used to derive functions that are necessary to monitor the network or to indicate the possible overloading of equipment during switching operations. In addition, the load flow calculation can be used in simulation mode.

During monitoring, "N-1 calculations" are performed in order to address the question of what would happen if a resource fails. Would this push another resource to its limits, cause it to fail, or even trigger a chain reaction? With the results of the N-1 calculation, counter-measures can be taken before the worst case ever occurs.
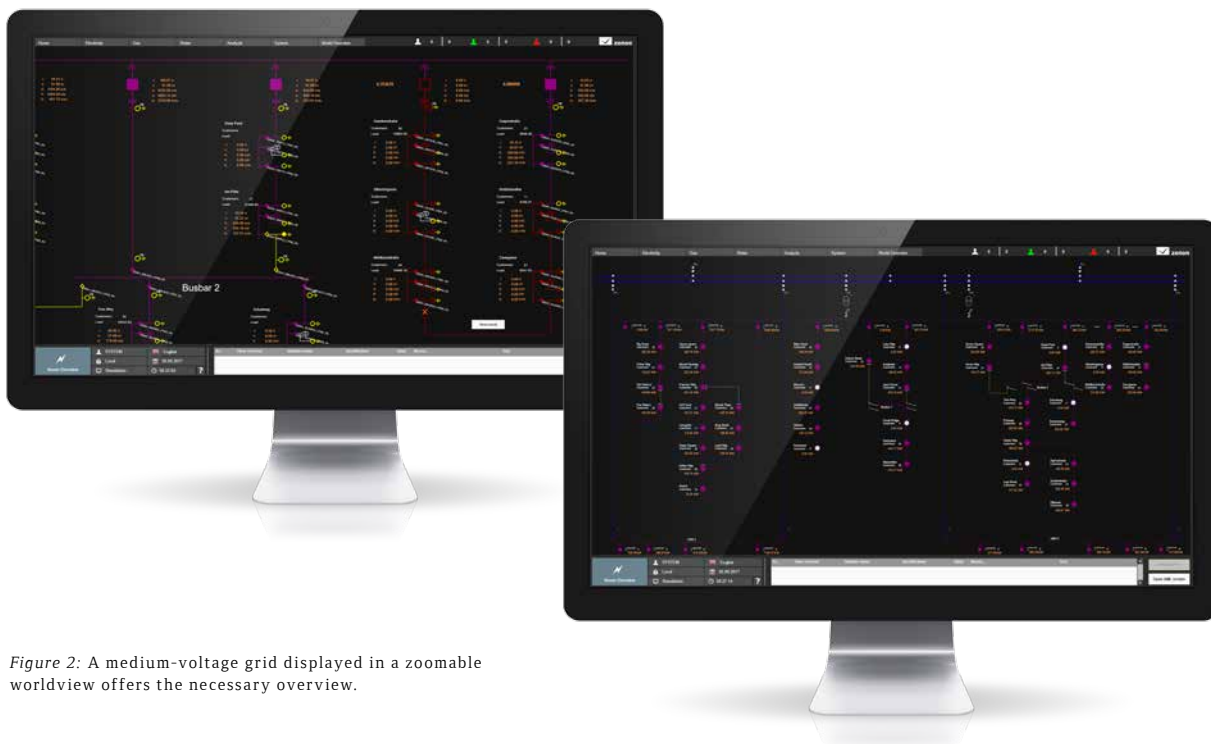
Figure 2: A medium-voltage grid displayed in a zoomable worldview offers the necessary overview.

SMART RESOURCES HELP KEEP THE GRID STABLE

The load flow calculation assumes that the network features many consistent measured values. This status is not, however, strictly necessary for the state estimator.

The state estimator calculates the current state of loads and feeds. It checks measured values, detects incorrect measured values and estimates missing measured values (hence the name "estimator"). This is based on the current measured values, from the process control system. Using this data, the state estimator for the network model can find a solution to the complex voltages that best matches the existing measured values.

The goal of state estimation is to provide a consistent and complete set of measured values, which serves as the basis for further load-flow calculations or short-circuit calculations. In addition, the calculated measured values are checked against predefined limit values.

The calculated values are usually visualized with their own identifier. Operators or system supervisors will be informed of any large deviations from existing measured values.

The load-flow calculation and state-estimator functions are among the most important network management functions and are intrinsic parts of a DMS. That is why COPA-DATA is working to implement these functions. Not only to expand its business in the direction of distribution networks, but also to consolidate its position in the field of substation automation, because here, too, there is an increased demand for algorithms for complex electricity and voltage calculations.

JÜRGEN RESCH,
INDUSTRY MANAGER
ENERGY & INFRASTRUCTURE

ZENON SUCCESS STORY

ZENON EMPOWERS LOCAL OWNERSHIP OF
ENERGY INFRASTRUCTURE IN HANOI

Building a Grid for the Future

**Local COPA-DATA distributor PETROLEC has been instrumental in helping EVN Hanoi,
the board within Vietnam's national electricity operator that serves the Hanoi region,
to implement a new control system based on zenon automation software for more than
30 of its 110kV substations.**

Developing an effective and sustainable national energy supply is a fundamental objective – and foundation – of Vietnamese national socio-economic development policy. The need for a secure, reliable power grid that can support and attract inward investment and meet growing commercial and domestic demand requires a proactive national approach to energy management.

In conjunction with the national electricity company EVN, the Vietnamese government has a 15-year investment plan in place to develop and secure a reliable and sustainable grid for electricity generation, transmission, and distribution throughout the entire country.

Effective control and monitoring systems are a key element in ensuring a reliable and sustainable supply. In Vietnam, adding substations to the grid network had historically been undertaken in a series of large turnkey projects. However, this gave the national operator very little control over the maintenance and development of its systems.
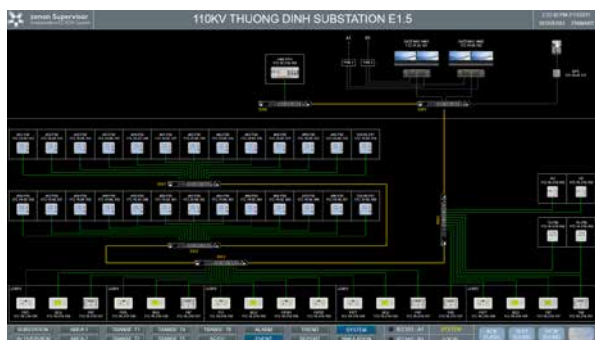
Figure 1: zenon displays the entire IEC 61850-based network architecture, including seamless redundancy, clearly and visually.

Figure 2: Everything under control: Single line diagrams convey vital information about the three different voltage levels – 110kV, 35kV, and 22kV – within the substation.

The operating company felt it was a hostage to fortune as to when repairs or maintenance work were necessary, and it believed that regaining control over its substation operations was essential to reduce both cost and inconvenience in the short term and to ensure the safe and cost-effective growth and sustainability of the grid over the long term.

WIN BACK CONTROL

In 2014, EVN Hanoi began a project to upgrade the control and monitoring systems at 23 of its 110kV substations. It was keen to find a new solution with local support that its in-house engineers could maintain easily; this would mean a move away from all of the incumbent suppliers.

To reduce the risk such a move would represent, EVN Hanoi decided that the selected system would initially need to be commissioned at one substation only for a period of testing.

Mr. Dao Hoang Quang, Director of the Hanoi Region Load Dispatch Center (HLDC), describes the process: "We looked at a number of different solutions and tested more than one. We were very attracted to the solution presented to us by PETROLEC that was based on zenon because it appeared to meet all of our performance, maintenance, and communication requirements and because we were impressed by the support PETROLEC was offering."

Because the EVN Hanoi team were new to zenon, the local COPA-DATA distributor provided a great deal of support in the initial stages, including helping with the design of the first project for the electricity company. This was then installed in parallel to the existing system at one of EVN Hanoi's 110kV substations.

Mr. Dao Hoang Quang explains: "We tested the zenon-based solution for three months and were very satisfied with its performance. This test project gave us confidence in both the energy automation software and the commitment and support we could receive from the PETROLEC team. Most importantly, we were confident that our local engineering team would be able to maintain the system and roll out zenon in further projects."

OVERSIGHT OF A DIVERSE ECOSYSTEM

Following the successful test project, the initial scope was for zenon to be installed as the HMI/SCADA solution across 23 of EVN Hanoi's 110kV substations. This spanned a diverse ecosystem of heterogeneous hardware components, and hardware and software from many different suppliers. Mr. Dao Hoang Quang: "The engineering team was hugely impressed by the connectivity the COPA-DATA solution allowed for. zenon easily solved the problems arising from the need to communicate with the products of many manufacturers, including some very specific hardware,

"In zenon, we have found a system that gives us the comprehensive overview of operations we need. It has allowed us to take back control of our own infrastructure and reduce the cost of ownership both in the short and long term."

DAO HOANG QUANG

DIRECTOR OF THE HANOI REGION LOAD DISPATCH CENTER (HLDC), EVN HANOI

Figure 3: Operators can drill down to view detailed information about substation components: here, the "health status" of one of the transformers is displayed.

such as smart meters, and the communications standards peculiar to our industry."

zenon natively supports more than 300 communication drivers and protocols – ensuring unparalleled flexibility in terms of the hardware and software with which it can communicate. In addition, zenon supports the energy industry IEC 60870 and IEC 61850 communication protocols – enabling secure, compliant, and reliable communication from IED through to the dispatch center.

EMPOWERING LOCAL CONTROL AND DELIVERING LOCAL SUPPORT

Although the initial project design was created with support from the PETROLEC team, the EVN Hanoi engineers now have complete ownership of the application and this has had significant advantages in terms of the maintenance of the systems, as Mr. Dao Hoang Quang explains: "We are now able to undertake any engineering tasks ourselves which has ensured much faster issue resolution. We are now no longer reliant on third parties based overseas, as we can handle many issues internally. This has a clear advantage in terms of the speed and cost of support."

"What's more, if we encounter any problems, we simply call PETROLEC support. Our engineering team is backed up by the comprehensive zenon help texts which were customized for our project in Vietnamese. In PETROLEC we have one great local partner."

A SECURE INVESTMENT

zenon has now been successfully rolled out to more than 30 substations within EVN Hanoi's regional power grid – going beyond the specifications of the original project, thanks to these early successes. As well as providing control and supervision locally, zenon is installed at the Hanoi Regional Load Dispatch Center where it provides an overview of the operation and maintenance of the system.

Mr. Dao Hoang Quang states: "In zenon, we have found a system that gives us the comprehensive overview of operations we need. It has allowed us to take back control of our own infrastructure and reduce the cost of ownership both in the short and long term. We are delighted to have found, in PETROLEC and COPA-DATA, partners who are able to support our plans for developing a sustainable power grid. It is enabling us to improve current performance and will form the basis of our long-term development and expansion of the electricity grid."

HIGHLIGHTS:

– Intuitive open system that allows for ownership by the end user's local engineering team

– Supportive local distributor with extensive industry knowledge

– Flexible, open connectivity with diverse hardware across multiple locations

– Support for IEC 60870 and IEC 61850 communication standards

– Seamless redundancy

– Low-cost maintenance on-site

– Ongoing support from local partner

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INTERVIEW WITH FUTURIST LARS THOMSON

How Artificial Intelligence, Disruptive Innovations, and Changes to our Mobility are Changing the Automotive Industry

Automotive Industry 4.0 – Designing the Future Today

Autonomous driving, electric vehicles, and car sharing – the automotive industry is currently facing probably the biggest changes it has experienced in its entire history. At the same time, digitalization is revolutionizing production at a breathtaking rate. For the first time, this period of change is seeing new players enter the market and put pressure on the major manufacturers with disruptive ideas and a high degree of innovation. How can automotive companies navigate the path to Industry 4.0? How can they stay competitive? And what will the mobility of tomorrow look like? We spoke to futurist Lars Thomson about Production 4.0, artificial intelligence, and the mega-trends in the automotive industry.

OUR INTERVIEW PARTNER:

LARS THOMSON

His theses and future scenarios are as accurate as they are provocative. Lars Thomsen is one of the world's leading futurologists and is one of the most influential experts on the future of energy, mobility, and smart networks. For over 20 years, he has been a self-employed consultant working with companies, corporations, institutions, and governmental agencies in Europe on the development of future strategies and business models of the future. He is the founder and chief futurist of the *future matters* think tank. Over the years, more than 800 companies have placed their trust in his expertise and nose for a trend. He uses roadmaps to predict a trend over a period of 520 weeks. His research focuses on the calculation of tipping points – disruptive developments in technologies, markets, and business models – each with a strong economic impact on industries and players. With his tried-and-tested methods, he succeeds in determining these points with an accuracy of around 18 months. Lars Thomsen is a keynote speaker at national and international congresses and meetings, giving lectures that inspire a wide range of audiences.

Digitalization has greatly transformed the manufacturing industry in recent years. What have been the biggest changes?

There are multiple phases to digitalization. In the first stage, we abolished all analog processes. Now it is about connecting all the elements involved in a process to the digital world. When we talk of digitalization as an emerging mega-trend, however, it is somewhat misleading in my opinion. After all, we have been digitalizing our communication, our way of working, and much more over the last 30 years or so. From my futurist's perspective, I would say that the real change in manufacturing has only just begun. Namely, through artificial intelligence and the next developmental stage of the Internet (the Internet of Things) we will introduce completely new and unique intelligence into production.

What benefits can this bring to manufacturing?

Over recent years, a digital nervous system has emerged that has made machines and entire production facilities intelligent. Systems use pattern recognition to learn to avert mistakes and improve processes. I like to call this development "the end of stupidity". Before, we had to make do with machines that were so "stupid" that people were always required to set them up and repair them. Thanks to artificial intelligence, machines and entire production systems can suddenly think for themselves.

According to the Digital 2016 Monitoring Report from the German Federal Ministry of Economics and Technology, we are only seeing an "average level of digitalization in companies" in the automotive industry. Why do you think that is so?

Because, to remain competitive, digitization was simply not necessary for a long time. The automotive industry has hitherto been a very protected industry. The goal of automotive manufacturers was to produce their next models more economically, more efficiently, and faster. But they were not challenged by any other industry. And there's another reason: a car was quite autonomous. Except for the fact it sometimes needed gas in the tank, it worked by itself.

And this has changed?

Yes, both things have changed. All of a sudden, newcomers from the consumer electronics and IT sectors have arrived on the scene, and are competing with the industry. These companies have a much higher rate of innovation and a different risk culture. Now, for the first time, the automobile industry is really being challenged – not from within, but from the outside. And due to digitalization, cars are no longer as autonomous. In the future, the car will be part of a networked system like a city, an energy system, or a communications structure. This increases the pressure to innovate and requires a digitalization strategy.

Which innovations do automotive companies need to stay competitive?

There are two different types of innovation – incremental and disruptive. While incremental innovation improves an existing system – for example, a model of car that is slightly lighter, faster, and more economical – disruptive innovations are much more fundamental. Does a car have to have a combustion engine? Or can a car drive itself? Until now, cars have had very long innovation cycles of 7 to 8 years. What is more, it is mainly about small-scale, incremental innovations. The new competitors from IT and consumer electronics have shorter innovation

cycles and more willingness – or expectation – to innovate. Thus, the automotive industry needs agile strategies urgently, and a readiness for disruptive innovations.

Why do you think the automotive industry is finding it so hard?

It is all about the management and innovation culture. If there is no competitive pressure from outside and the environment is known very precisely, there is not the positive kind of paranoia perhaps needed to operate in highly aggressive markets. At the same time, the automotive industry is faced with the enormous challenge of currently being confronted by three simultaneous mega-trends:

1. What will be under the hood tomorrow? i.e. combustion engines versus electrical motors.

2. Will we have to drive our own cars in future or will our cars drive themselves?

3. Does mobility for the individual in the future mean ownership of a vehicle or just access to one?

And when we realize that these three mega-trends will completely change the industry over the next decade, we will see the enormous pressure under which every decision in the production and development of automobiles will have to be made in the future.

What does this mean for manufacturing in real terms?

In manufacturing, we have to think "outside the box". How can we use more flexible machines to produce vehicles? How can we increase value-add in production simply? And how can we implement changes or improvements in the production process in an agile way? For this, automobile production has a lot to learn from other industries. Experts from other industries are certainly needed to introduce new agility and a new innovative culture to the automotive sector. Tesla does this: only a minority of its developers previously worked in the automotive industry.

What role does IT play?

With modern IT, unique intelligence is created within production systems. Previously, the production manager needed a great deal of experience and built up valuable knowledge over years. Thanks to artificial intelligence, we are now dealing with systems that are so smart that they are not necessarily dependent on this knowledge. Intelligent systems themselves make suggestions on how processes need to be converted to complete production faster. Or they

even know themselves when a service is due – the keystone for Production 4.0.

How will IT continue to change production processes in the automotive industry?

Ideally, the process – from initial design through to the vehicle rolling out the factory – is supported to a far greater extent by intelligent systems and leading-edge software. This means a designer who is designing a new car on the screen is already being supported in the background by design software and production tools. In the end, the touch of a button is all it takes to produce the car in a fully automated way. At the moment, this sounds like a science fiction story but it is where we are headed!

What sort of a time frame are we talking about here?

The speed at which the changes are coming is rapid – much faster than most people think. Artificial intelligence, Big Data, and pattern recognition are developing much faster than the Internet. If we consider how fast development of the Internet was, and then if we raise that to the power of three, we can get some idea of the rapid pace at which changes are taking place in the development of artificial intelligence.

How will Production 4.0 affect the world of work in the automotive industry?

Workers who undertake very routine tasks will be replaced by robots or artificial intelligence over the coming years. This applies not only to production, but also to administration and engineering. Clearly, there will still be a need for people. However, the new requirements will create a different generation of production specialists and call for new qualifications. Those who do not deal with artificial intelligence today run the risk of not being needed in the future.

This is not such a great outlook for employees.

Well, there is no way to sugarcoat it. The actual turning point will probably become clear in the next two to three years – when the first manufacturers that previously produced tablets or smartphones suddenly start making cars. Today, tablets are manufactured completely autonomously. Companies will also design the product "car" from the beginning in such a way that the level of automation is similarly high to that of the production of consumer electronics.

You mentioned three mega-trends in the automotive industry. Will these developments happen in parallel or is there a trend that will become dominant more quickly than the others?

All three trends are occurring in parallel. This is what is so fascinating but also risky about the future. The price of batteries is dropping faster than all projections; by 50 percent every three years. This will lead to a parity point after which an electric vehicle is cheaper than a vehicle with a combustion engine – in 4 to 5 years time. In the case of autonomous driving, we are looking at a similar period of time until self-driving vehicles only account for one-tenth of accidents compared to cars driven by people. And then we will ask ourselves the question: as a society, do we really want to have 10 times as many accidents and traffic fatalities?

And what about ownership?

This is also changing in parallel with the other trends. A comparison: previously, we had to buy an expensive encyclopedia to gain access to knowledge. Today, we access the knowledge of the world through the Internet, which is much more up to date. The issue of mobility will be similar. Why should we buy a car for a lot of money if a vehicle comes to us at the press of a button, and we do not even have to search for a parking space because the car simply keeps driving?

You discussed new competitors from other industries. How intensive is the pressure they are bringing to bear?

One comforting fact is that building such complex devices as cars will continue to be an art form. However, I believe that over the next five years we will see around 10 new competitors enter the market, some of which will come from IT and consumer electronics. There is a lot of innovation in the new competitive situation. Take Tesla for example: the complexity of the car decreases as the drive unit is electrified. Tesla plans to reduce the number of installed parts to such an extent that the speed at which a car is produced is increased by a factor of 10 – meaning 1000% faster than before. With conventional, incremental thought processes, this is not possible. It can only be achieved with disruptive innovations, using artificial intelligence, and the next stage of intelligent robotics. The fact that aggressive players in the market with agile software and artificial intelligence will shape the production of the future is a major challenge for the industry.

Will high-profile manufacturers survive this challenge?

Whether all established brands can survive in this fight remains to be seen. Nokia was once the market leader of mobile phones, until the smartphone came and brought new players to the market. Development never fails to be exciting. And just because some trends did not come as fast as some thought, it does not mean that we will not have any changes in the coming years. This would be one of the most dangerous predictions for the automotive industry.

THE INTERVIEW WAS CONDUCTED BY
BERND WIMMER,
INDUSTRY MANAGER AUTOMOTIVE

Can you Hear? Can you See? Can you Imagine?

YOUR PLANT IS TALKING, AND TALKING INCESSANTLY ABOUT EVERYTHING.
DO YOU HEAR WHAT IT IS SAYING?

zenon continues to develop, engulfing new technologies and embracing each new industrial era without hesitation. However, future success is built upon the strong pillars of history. One of those fundamental pillars is the zenon Historian. In the Life Science industries, recording process information is fundamental to any production activity; data acquisition and a historian are therefore a primary focus.

In this article, I would like to turn the tables on the traditional automation hierarchy and give the zenon Historian prime importance (*see figure 1*), and position the other zenon features as its supporting modules.

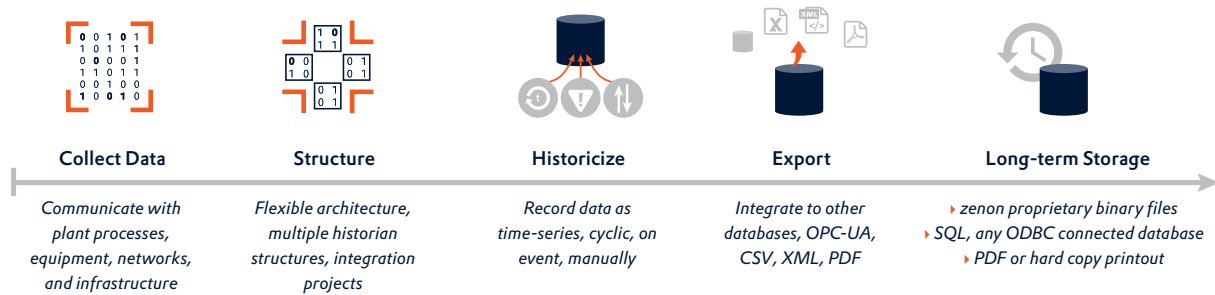| Collect Data	Structure	Historicize	Export	Long-term Storage
Communicate with plant processes, equipment, networks, and infrastructure	*Flexible architecture, multiple historian structures, integration projects*	*Record data as time-series, cyclic, on event, manually*	*Integrate to other databases, OPC-UA, CSV, XML, PDF*	▸ *zenon proprietary binary files* ▸ *SQL, any ODBC connected database* ▸ *PDF or hard copy printout*

Figure 1: Consistent integration from data collection to storage.

ZENON HISTORIAN FRONT AND CENTER

The zenon Historian is a process data highway. Data can enter the system at any point within the infrastructure from its connected PLC processes, IT-layer systems such as MES or ERP, or mid-level HMI & SCADA systems. Data can also leave the highway at any point, at the equipment level, production process level, or globally across plants.

Starting at the zenon Historian itself, flexibility and the ability to adapt to individual processes are key qualities. Historians can be placed at the top of the IT structure, capturing the entire plant's activity. Or historians can be placed at the equipment or production line level, to have stand-alone functionality. If desired, these smaller historians can then be tied into larger process historians and multi-site global historian systems.

With native communication drivers, including standard industry protocols, zenon Historian can connect with any industrial system. This powerful connectivity brings together different systems from different process equipment, including systems such as MES, ERP, and other databases. Data can enter and exit the zenon Historian freely from the different layers and systems in a bi-directional sense. No existing infrastructure needs to be changed to connect with it – native drivers connect without modification to the third party system. The big plus here is that validated processes remain unaffected.

The diagram above displays how the zenon platform connects to the different processes that collate data. The raw data entering the system is then structured with meta-data so archives can be defined with independent processes of variable scope and independent data logging.

Finally, data can be stored long-term, with the possibility of exporting it in different forms to suit the desired outcome.

FLEXIBLY COLLECT DATA

zenon is independent and flexible; connecting natively with different industrial systems, PLCs, devices, industrial networks, databases, and other IT systems. This is a powerful advantage in any industry, but its benefit is magnified in the pharmaceutical sector because connecting natively minimizes additions or changes to validated systems – leaving qualified processes untouched. This environment brings multiple systems together while reducing engineering design effort and risk to the process, and resulting in significant positive effects on quality and the level of validation a historian system needs.

The ergonomics of zenon benefit the final historian solution, allowing manual data to be entered easily alongside automated data. Using a desktop PC or workstation, mobile tablet, or smartphone, manual tasks can be requested. User events, results, and comments are then recorded in the same historian. This data has a time stamp and meta-data, which is archived like any other element of process data. Wider systems such as building management and energy systems can also be included in the scope of an application. Any data from a sensor, device, industrial network, or manual entry can be archived in a site-wide, global, or cloud-based zenon Historian.

VISUALIZE EVEN COMPLEX INFORMATION INTUITIVELY

Now the data is in the system, there is no need to keep it hidden away. We can now touch on powerful knowledge
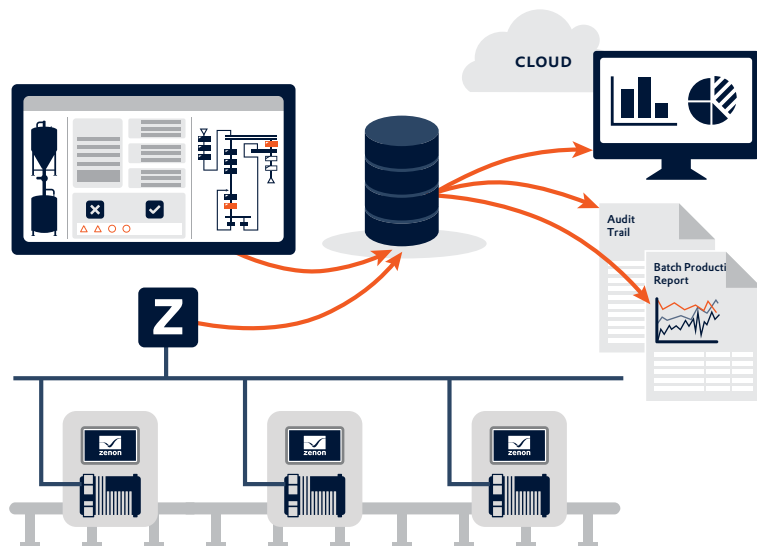
Figure 2: Flexible and intuitive visualization enables accurate and quick decision making.

generated from within the production environment; visualizing this knowledge with plant overview dashboards and detailed process screens with, for example, alarm and event information. Process variables can be displayed in trends, KPIs are generated from live or historical production runs, and equipment GANTT charts provide a detailed view of active processes and production losses. Valuable production information is close at hand. You are able to deal with complexity and abnormality, and make the right decision quickly.

AGILE STRUCTURES ENHANCE EFFICIENCY

Reading your process data and storing it requires structure. This structure needs to be agile in order to be matched to the process, then the outcome of the data is focused and a true representation of real-world events.

"Time-series data" creates a very accurate and storage-efficient way to archive processes. Reading data and only storing this data "On change" records events spontaneously – therefore you can be certain no event is missed. "Cyclic" data records processes at a certain frequency, e.g. every minute the variables will be recorded, thus recording a predicable snapshot of the process. "Event triggered" allows zenon Historian to synchronize with external systems or process events.

All data coming into zenon is structured before reaching the historian; adding richer knowledge and grouping to reflect the actual processes being recorded. Variables can be defined in an ISA 95 Equipment Modelling structure, and alarms can be defined by group, class, or area. The historian archives can be placed where the data is most relevant for the processes. For example, a traditional top-heavy structure can be applied, with a central historian system at the top of the IT tree. Alternatively, the archives can be generated and reside where the data is generated, directly at the individual piece of equipment or production line.

Historians and archives can overlap each other. For example, when process data is being logged as time-series, certain critical process values within this data can additionally be being logged cyclically at a defined frequency. Therefore, no data is lost and all representations of the data can be displayed. In a distributed

QUICK FACTS:

COLLECT DATA

– Native communication drivers

– Standard interfaces

– OPC-DA, OPC-UA, Modbus, CAN, BACnet, IEC 60870, IEC 61850, IEC 61400, IEC 61499, IEC 62056, SQL, DNP3, VDMA, M-Bus, Profibus, Profinet

– cloud, Azure driver

– Manual data input, tablet, workstation

– Process controllers, industrial networks

– Building management, energy and infrastructure

VISUALIZE

– Process screens, dashboards

– Predictive maintenance

– Alarm & event notification

– KPI, trends, GANTT

– Workstation, tablet, mobile, HTML5

HISTORICIZE

– Time-series data; store data on change

– Event trigger; synchronize data write with process event(s)

– Cyclical data; fixed-frequency data acquisition

STRUCTURE

– Flexible archive scope and location, HMI, SCADA, top-layer production IT.

– Equipment modelling: ISA 95, ISA 88

EXPORT

– SQL, any ODBC-connected database

– OPC-UA, standard industrial interface

– CSV, human readable files, Excel compatible
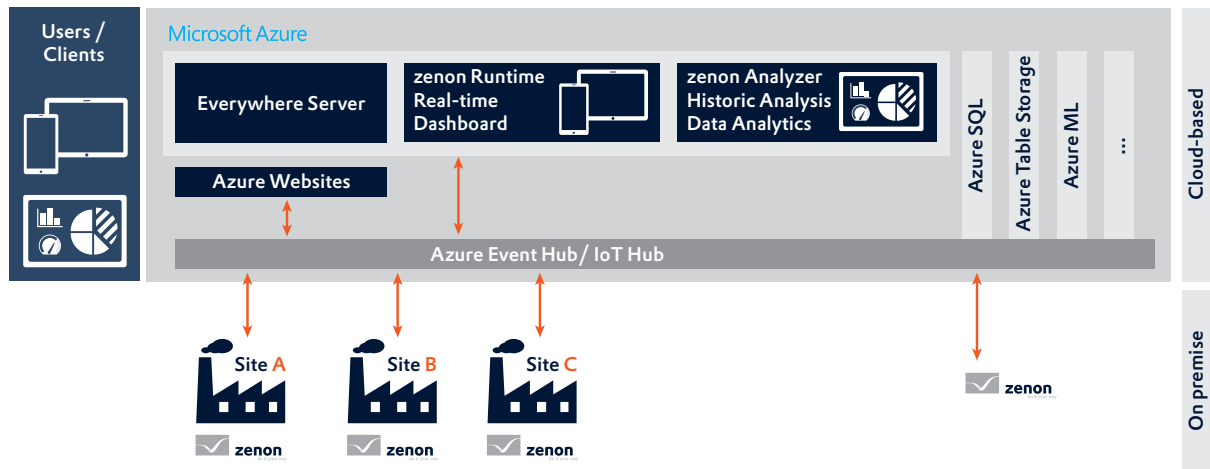
– XML, structured common file format

Figure 3: Multi-site analysis and efficient long-term storage with cloud technology.

system, local archives at the equipment or production line level can also be included with archives at the top-level IT layer.

EFFICIENT LONG-TERM DATA STORAGE

zenon's proprietary storage files have the distinct benefit of acquisition speed, especially for large volumes of data. Using proprietary binary files increases security for long-term storage. Open to have the choice of integration possibilities, you are also able to use an external SQL or any ODBC-connected database. Keeping your data over the long term may also include exporting data to other databases, or printing it to PDF or as a hard copy.

DELIVER ENHANCED ANALYSIS

Now we start to accelerate the possibilities: with strong reporting and analytical tools releasing the potential of your production data. Production reporting, such as batch reports, are a common reason for implementing a historian, proving quality and regulation compliance. Once you have this installed, we can start to release additional potential with zenon. On the same platform, it is a simple matter to provide deep analysis. Practical examples of this include: alarm analysis highlighting where losses are holding you back; KPIs such as OEE to increase efficiency; including energy consumption in your analysis; or using RBE (Review by Exception) reports to increase quality.

EXPAND SCOPE IN THE CLOUD

Adding the Microsoft Azure platform effectively places the zenon Historian into the cloud. On premise zenon systems transfer local process information with high security and fast data acquisition to the cloud. In so doing, zenon Historian becomes an ergonomic Big Data solution, using its conventional native archiving technology in a highly accessible global historian system.

The Azure cloud platform adds a different dimension to what data is available and where. The use of a global cloud solution is becoming very popular with equipment suppliers where their equipment is deployed at end-customer sites throughout the world. The cloud is used to obtain and store equipment performance, where no record is made of actual production results – only equipment performance. This helps the equipment supplier become closer to the customer – enabling it to suggest preventative maintenance based on real data and facilitating the possibility of providing different services, such as pay-per-use machines.

For end customers, the cloud offers global connectivity. Data security is a major question in this choice. Which is answered using a combination of Azure encryption, Azure security certificates, and zenon network security. From the on-premise system to the cloud, the Azure mechanism only transfers raw data. This raw data has no context until the zenon Historian operating in the cloud receives it – at which point it becomes information and knowledge.

Figure 4: Analytics and reporting.

PERFORM AT YOUR BEST WITH ZENON

zenon has the ability to connect with any industrial system, wherever it is located, and is easily scalable – from a single equipment unit to multi-site global operations.

This means you can hear what your plant is saying, wherever your plant is. zenon helps you to futureproof your processes, release your imagination, and continue to perform at your best.

ROBERT HARRISON

LONG-TERM STORAGE

–   zenon proprietary binary files

–   SQL, any ODBC-connected database

–   pdf or hardcopy printout

ANALYSIS

–   Batch report, RBE

–   OEE, KPI, GANTT, production efficiency

–   Alarm analysis, stoppages, breakdown

–   Energy efficiency, ISO 50001

–   Process analysis, trends, SPC

–   Custom formula

DELIVER

–   PDF, HTML, Excel, Word, Power Point, TIFF

–   Process event trigger, e.g. end of batch, alarm event

–   Time-scheduled event

–   Manual request

CLOUD

–   Azure native communication driver

–   Multi-site analysis

–   Industry, process and hardware independent

–   Energy efficiency, ISO 50001

–   Archive, visualization, reporting

Industry 4.0 Made in Italy:
An Award-Winning Story by Danieli Automation & COPA-DATA.

DIGITIZING THE METALS INDUSTRY

Even before the "Industry 4.0" paradigm was coined at the Hanover Fair in 2011, Danieli Automation's pioneering work in the digitalization of production processes was confirming the company's technological leadership in automation systems for the metals industry. It was an intense period of R&D which saw COPA-DATA become involved as a technological partner.

In this article, we explore the concept put forward by Danieli Automation and COPA-DATA at the "Industrial Software and Servitization" scientific conference at the SPS Italia 2017 Fair. It was here that Danieli Automation and COPA-DATA were awarded first prize for the most prestigious presentation.

Figure 1: Operator Assistant (OA): The innovative Multi-Touch operating interface by DIGI&MET, part of the HCI extended metal automation platform named 3Q.

Today, we're all talking about the "Smart Factory" and "Big Data" thanks to their repeated media coverage and the financial incentives offered by local governments. But there are those, like Danieli Automation SpA from Buttrio (UD), who for more than 10 years have been taking on these matters. For Danieli Automation, it is the key competitive force in the metals industry, an industry characterized by a gradual reduction in volumes of steel produced and by the low production efficiency of existing factories.

With the introduction of the "Industry 4.0" paradigm in 2011, Danieli's strategic vision was evident through the three pillars of its own technology platform, namely:

– Centrality of the "Human Factor"
– Increased collection of process data (Industrial IoT)
– Innovative services connected to a Big Data analytics platform

These are the foundations of DIGital platform for the METals industry (DIGI&MET), the innovative services platform created by the Danieli Automation team. Let's consider these pillars in turn.

CENTRALITY OF THE "HUMAN FACTOR"

What distinguishes DIGI&MET most from older control systems is its innovative human-machine interface: the Operator Assistant (OA). By focusing most of the necessary intelligence on the internal automation system, a new approach to controlling the process is made possible; minimizing the number of commands that the operator has to consider and reducing their involvement to a limited number of situations *(see Figure 1)*.

Extensive research into cognitive engineering was carried out by Danieli Automation with the primary aim of reducing the number of unnecessary commands and signals for the operator and to gather as much useful data as possible so it can be used to make on-the-spot decisions.

DANIELI AUTOMATION

DIGI&MET

"Simplifying Metals Complexity"

The challenge of the new globalized market and the current steel market outlook characterized by plant under-utilization are causing metal producers to seek low CapEx investments, aiming at improving the efficiency of the production facilities, the quality of the products, the health and safety of the workers as well as the environmental sustainability. In this scenario, DANIELI has created a new cross-functional business unit named DIGI&MET whose mission consists of developing and implementing new plant design concepts, based on digital innovation, and also new business models based on servitization and outcome economy principles.

http://www.danieli.com/en/innovation/automation/por-fesr-14-20_85.htm

SPS AWARD 2017

Danieli Automation and COPA-DATA won the first prize for the best presentation of the scientific conference "Industrial Software and Servitization" which took place during the SPS/IPC/DRIVES-Fair 2017 in Parma, Italy.

http://www.spsipcdrives.it/public/allegati/ometto_menin_danieliautomation_copadata.pdf
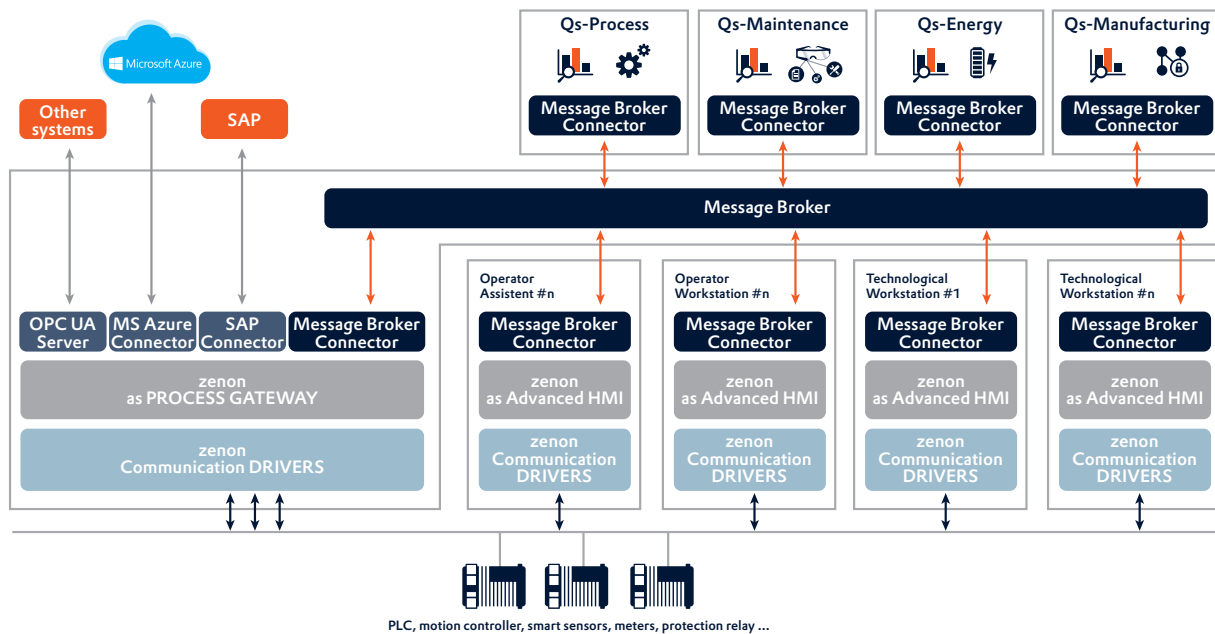
Figure 2: Communication infrastructure: a flow of reliable, secure, high-quality information.

The OA therefore becomes the cornerstone of the control center. This innovative tool is tasked with helping the operator during production by simplifying the complexity. It provides updates and requests their input when necessary through simple, easy-to-understand questions.

INCREASED COLLECTION OF PROCESS DATA (INDUSTRIAL IOT)

The communications infrastructure has a strategic role to play in DIGI&MET. Services using data act as the service providers for information processing. All providers can communicate with each other via a connection to the central message broker. In this context, the zenon Process Gateway is the main communication bus for Danieli Automation 3Q automation platform. It collects data from the field and sends them in structured messages as and when requested. It also handles connections to ERP systems, like SAP, or cloud infrastructures, such as MS Azure, to achieve OT–IT–IoT integration *(see Figure 2).*

Using zenon Process Gateway, a high number of communication drivers are available to interface with devices from different manufacturers and existing infrastructure.

Nevertheless, simply connecting is not enough. A bi-directional flow of reliable, high-quality data must be guaranteed. The data must be "atomically" legible within the field in order to coherently feed the descriptive process models. And an adequate update speed must be guaranteed, particularly for Online Analytical Processing (OLAP) applications.

CONFIGURABILITY OF THE PLATFORM

All plants are individual. Multiple technicians can work in teams on projects that require months of work. These challenges make ease of engineering key. A flexibly configurable environment backed up by automated standard procedures is necessary to guarantee a higher quality of work and reduce engineering time.

CYBER-SECURITY BY DESIGN

Information security must be an integral part of the software development phase. For this, the following factors are considered: segregation of legacy protocols, encryption of cloud-based communication, security zone separation, and a Defense in Depth strategy in accordance with IEC 62443.[1]

INNOVATIVE SERVICES CONNECTED TO A BIG DATA ANALYTICS PLATFORM

Now we come to how data gathering is managed. How can we transform data into useful information? How can we build knowledge? How can we combine this new knowledge with user experience of the device to improve overall performance?

[1] *IEC 62443 Brings Increased Security to Automation; Information Unlimited Issue #30* https://issuu.com/copa-data/docs/iu30_ en/22?e=2527195/48491672

These are the tasks performed by the DIGI&MET industrial analytics applications. The four modules now available on the platform are:

– **Qs-Manufacturing:** to coordinate and optimize the supply-chain processes which handle the life-cycle of a customer order.
– **Qs-Process:** to enhance the quality and efficiency of the technological processes.
– **Qs-Maintenance:** to increase the efficiency and reliability of the equipment using condition monitoring and predictive maintenance.
– **Qs-Energy:** to optimize energy and media usage by monitoring and controlling relative consumption.

TOWARDS AN OUTCOME ECONOMY

The technology platform is backed up by an innovative business model. Better awareness of how devices are functioning, through data collection, allows for an objective metric of performance indicators.

Thanks to this new awareness, it is possible to modify the commercial model, moving away from traditional sales towards service provision. This can be paid on the basis of services agreed (productivity, quality, energy efficiency, etc.), in line with the "outcome economy" model.[2]

This new approach benefits the end client in terms of reducing CAPEX and OPEX, as well as delivering an all-round improvement in device, machine, and, therefore, factory efficiency.

The supplier can guarantee the provision of agreed services while enjoying long-term contracts and a better understanding of the equipment – offering potential for business growth.

AN OPPORTUNITY AND A CHALLENGE

Without a doubt, the Fourth Industrial Revolution represents an opportunity for Italian businesses. Some of the concepts discussed here are already up and running, but there is still a lot to do in the field of Big Data analytics. We need people with new, specific qualifications – and this is the challenge for our universities. We need forward-thinking business people and leaders who can see beyond financial metrics and who are ready to consider a paradigm shift. We need a broadband infrastructure able to sustain the steadily increasing data traffic. Then there are the key issues of cyber-security and confidentiality of information. These are some of the challenges facing the entire Italian system – and many other systems too.

Allow us one final suggestion, a word of warning to everyone involved in this revolution: our fellow humans and our overall wellbeing should always be at the heart of our innovations.

We need a technological revolution coupled with a renewed sense of humanity.

MARCO OMETTO,
EXECUTIVE VICE PRESIDENT BU DIGI&MET AND
R&D - DANIELI AUTOMATION S.P.A.

GIUSEPPE MENIN,
INDUSTRY MANAGER

MARCO OMETTO
Executive Vice President
BU Digi&Met and R&D - Danieli Automation S.p.A.
Marco Ometto spent eight years in software programming and electrical systems for a leading manufacturer before joining Danieli Automation in 1994. At Danieli, his focus has primarily been on the metals industry – ranging from MES, process control, and the design and development of automation systems, in addition to international development roles focused on India, Thailand, and Vietnam. In 2013, he led Danieli Automation's research activities, establishing Danieli Automation Research Center (DARC), before heading up the company digitization process. Since 2016 he has been in his current role.

GIUSEPPE MENIN
Industry Manager
COPA-DATA Italy
Giuseppe Menin began his career in the mechatronic sector at the end of the 80s. He worked in different technical roles. As a project manager, he coordinated several R&D projects for the automation and monitoring of machines. In 2004, he joined COPA-DATA as an area manager. Since then he has taken on digitization projects for customers such as Terna and RFI. Currently, Giuseppe is in the position of Industry Manager for Italy, focusing on business development in the Energy & Infrastructure, Pharmaceutical and F&B sectors. He is also covering various topics related to Industry 4.0.

[2] Source: World Economic forum Report 2015
Industrial Internet of Things: Unleashing the Potential of Connected Products and Services http://reports.weforum.org/industrial-internet-of-things/3-convergence-on-the-outcome-economy/

AROUND
THE
WORLD

WHO IS WHO

Andreas Zerlett

SALES EXCELLENCE ENERGY &
INFRASTRUCTURE/SMART CITY
COPA-DATA GERMANY, OTTOBRUNN

Nadja Hinterhöller

FRONTDESK & OFFICE MANAGEMENT

COPA-DATA HEADQUARTERS

Wolfgang Gatterer

TECHNICAL CONSULTANT

COPA-DATA ITALY

AT COPA-DATA SINCE: 2016
RESPONSIBILITIES: I support the
COPA-DATA Germany sales team on
a national basis in the areas of energy
and infrastructure. My clients include
transmission system operators, power
utilities, grid operators, public utilities and
municipalities, and local and long-distance
public transport companies. My goal is
to further establish zenon as a fantastic
energy brand across the country.
I GET MY INSPIRATION FROM ...
my fiancée and my daughter. Also,
everyone has inspirational facets within
them that motivate me to continue to grow
every day.
IT IS MY DREAM TO ... look back at
my life and be pleased to have created
something lasting.

You can reach me at:
andreas.zerlett@copadata.de

AT COPA-DATA SINCE: 2008
RESPONSIBILITIES: My responsibilities
cover a range of different tasks. Among
other things, I am responsible for licensing
and order processing at our company. I
also cover reception and the processing
and forwarding of telephone inquiries.
I GET MY INSPIRATION FROM ...
being in the stable with my horse, taking
long rides in the countryside and enjoying
the peace and quiet of nature.
IT IS MY DREAM TO ... have my life set
up in a way that makes me happy and
content. As the saying goes: "Live your life
the way you want to live it, because you're
the only one who can."

You can reach me at:
nadjah@copadata.com

AT COPA-DATA SINCE: 2011
RESPONSIBILITIES: As a member of
the Italian consulting & support team
at Bolzano, first and foremost I am the
first responder on the hotline for our
customers. In addition, I cover the special
topics of reporting and zenon Analyzer for
COPA-DATA Italy.
I GET MY INSPIRATION FROM ...
archery; it helps me to stay focused and, at
the same time, relaxed.
IT IS MY DREAM TO ... live in the Alps
and enjoy nature.

You can reach me at:
wolfgang.gatterer@copadata.it

WHO IS WHO

Krzysztof Brożek

TECHNICAL CONSULTANT

COPA-DATA POLAND

AT COPA-DATA SINCE: 2016

RESPONSIBILITIES: I am a member of the consulting team for COPA-DATA Poland. I am responsible for technical support and project consultancy to help our customers create their projects in the most efficient way. I also support our sales and marketing teams on technical issues.

I GET MY INSPIRATION FROM ... smart, experienced people. Being around such people makes every day very challenging and exciting… My zest for life is powered by my family, friends and rock music.

IT IS MY DREAM TO ... see every country on Earth and constantly grow my experience and knowledge about the world.

You can reach me at: krzysztof.brozek@copadata.com

Daniela Brunner

JUNIOR SALES & PARTNER ACCOUNT MANAGER

COPA-DATA CEE/ME

AT COPA-DATA SINCE: 2016

RESPONSIBILITIES: As part of the sales team, I support our sales manager in everything from customer acquisition to customer retention. For example, I create bids, organize workshops, and support product evaluations, and am primarily responsible for looking after the members of our partner community. In my opinion, service orientation and partnership activities are the first and last word in keeping customers happy. Only when our customers are happy can we be happy too.

I GET MY INSPIRATION FROM ... my family and boyfriend. Taking walks together in the countryside gives me a chance to recharge my batteries. Taking in the mountainous surroundings in particular enables me to switch off completely. Back at my apartment, my cats Dalida and Lily keep me busy.

IT IS MY DREAM TO ... grow as a person every day. I believe that I can only live life to the fullest when I approach life's challenges with courage and an open heart.

You can reach me at: daniela.brunner@copadata.com

Gerald Lochner

PRODUCT MANAGER

COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2014

RESPONSIBILITIES: Along with my colleagues in Product Management, I am responsible for the development of our products and coordination of the various product-related divisions. As well as monitoring the market, we engage with future scenarios so that our products continue to be successful. Among other things, I also run research projects with various organizations and supervise student projects.

I GET MY INSPIRATION FROM ... traveling, skiing, archery, and conversations with friends and colleagues.

IT IS MY DREAM TO ... travel even more of the world and do the things that make most sense to me.

You can reach me at: gerald.lochner@copadata.com

From a start-up to a global player:

30 YEARS OF COPA-DATA

In 1987, zenon was created out of a young engineer's idea of replacing programming with parameterizing. Outwardly unconditionally communicative, with industry suitability at its core rather than as an add-on, and interface-free, zenon spans all levels of the automation pyramid. In the space of 30 years, COPA-DATA has grown to become the largest independent provider of software solutions for industrial automation and the energy industry. The owners of the COPA-DATA group, Thomas and Alexander Punzenberger, explain the story behind this success.

In the mid-80s, engineer Thomas Punzenberger developed test stands at BMW AG. From a programming point of view, he always started from a blank sheet of paper. This gave him the idea of developing software for the evaluation and management of operational data that always remained the same and could be adapted to various tasks by means of parameterization. This idea led to the foundation of COPA-DATA in 1987 and the development of zenon.

What could encourage a 25-year-old to leave the safe haven of a corporation to plunge into the uncertainty of self-employment?
THOMAS PUNZENBERGER: Alongside the attraction of being able to implement my idea free from the bureaucratic shackles of a corporation, I had something that gave me security: the certainty that my idea was right and that the software product, as I envisaged it, would undoubtedly appeal to many grateful buyers.

How did COPA-DATA begin?
THOMAS PUNZENBERGER: After its foundation, COPA-DATA acquired its first "headquarters", a small apartment in the Salzburg district of Lehen. Since you need to live on something, we survived initially by means of freelance programming and PC trading. Two years passed from when we first had the idea before we started programming the first lines of code by night. My brother Alexander had been on board since the start of 1988, adding a commercial-distribution way of thinking to the company to go alongside my technical perspective.

What is behind the names COPA-DATA and zenon?
ALEXANDER PUNZENBERGER: COPA-DATA stands for **co**mputer-aided **p**rocess **a**utomation and **data** processing. At the time, I came across the paradoxes of the Greek philosopher Zenon of Elea. He claimed that existence in itself is indivisible, eternal, and unchangeable, although perception suggests something else. This accurately describes the development goals of a comprehensive software product for the management of all production processes, whether discrete or continuous, and for its visualization using devices from a large screen to a smartphone.

What setbacks were there in the early days?
THOMAS PUNZENBERGER: Software such as zenon cannot be developed overnight; in fact, it took two years until version 1 appeared at the end of 1991. Six months later, the customer for whom we'd been freelancing went bankrupt. We had been planning on it marketing zenon in Germany for us, and – worse – its subsequent payment defaults prevented the regular repayment of loans we'd taken out to finance the development of zenon. The same banks that today deal with us in such a friendly manner

From the start, COPA-DATA has consistently relied on PC architecture and Windows.

Engineer Thomas Punzenberger, Founder and Managing Director, Ing. Punzenberger COPA-DATA GmbH: "COPA-DATA belongs entirely to our families. In this way we can act quickly and independently in product development and market cultivation to stay ahead of the competition and further safeguard our growth."

Alexander Punzenberger, Managing Director, COPA-DATA CEE/ME: "zenon's development continues to fall under the motto 'simpler – faster – safer'. So far we have frequently anticipated developments, and we will continue to do so."

Windows software can be long-lasting: this zenon installation was in use at a Bavarian beverage manufacturer for 20 years.

Today's zenon versions are operable, consistent, and compatible on many platforms.

took a great deal of persuading at that time before we prevented ourselves from being brought in front of a bankruptcy judge.

How did COPA-DATA make the breakthrough?

ALEXANDER PUNZENBERGER: We knew that moving forward was the only option. At the time of the customer bankruptcy, we had two customers – an aluminum smelter and a mill supplier – with demonstrable efficiency gains from zenon installations. The concept of easy-to-use software with open architecture, simple interfaces, and well-thought-out ergonomics in the engineering and runtime system impressed engineers like Werner Kropf, whose company, Prozesstechnik Kropf, is still an important implementation partner for COPA-DATA today.

THOMAS PUNZENBERGER: Kropf brought us our first bulk purchaser in the shape of beverage plant manufacturer KRONES. It integrated zenon into its filling line equipment. The visualization was carried out on a 21″ plasma display, which was gigantic in those days. We first had to develop a Windows touch driver as well as a driver for the protocol 3964R for the connection of two PLCs. We very quickly built up a small pool of regular customers. Some of these included BMW for building technology applications and VA Tech SAT in the energy industry.

How did you grow that small pool?

THOMAS PUNZENBERGER: zenon grew despite the contradictory requirements of these customers from varying industries, fundamentally in contrast to many other software products. This demonstrates clearly how zenon can be the comprehensive solution for many fields.

ALEXANDER PUNZENBERGER: When SAT became involved with COPA-DATA in 1995, this contributed

significantly to the stabilization and safeguarding of the future of the company. If you want to put it in context: at the time we felt we were out of the woods.

Nevertheless, does COPA-DATA have more than one product today?

ALEXANDER PUNZENBERGER: Retaining all important functionalities in a single, comprehensive product with zenon has always differentiated us from the competition and has, in fact, contributed considerably to our success. Yet, in some cases it was better to group certain functionalities independent of product. However, we always did this by safeguarding full compatibility and consistency; everything in one product, in one editor.

THOMAS PUNZENBERGER: An example was zenon for Windows CE during the late 1990s, for which we imported the handhelds ourselves from the USA. Today, the Everywhere App by zenon functions on customer-owned devices with Android, iOS, and Windows Phone. In 2002, we collaborated with the French start-up COPALP, which today is COPA-DATA France, and as a result obtained the Soft PLC straton, which today is an open standard product called zenon Logic. Finally, in 2008 we decided to create our own Business Intelligence System called zenon Analyzer to independently analyze processes from the data-generating systems.

As regards being independent: COPA-DATA appears to be the only provider that does not belong to a corporation. Is that the case?

THOMAS PUNZENBERGER: Yes, that's right. Since we bought back all external shareholdings in 2006, COPA-DATA belongs entirely to the two of us and our families. This includes COPA-DATA France, which has been entirely taken over in the meantime. In this way we can act quickly and independently in product development and market cultivation to stay ahead of the competition and further safeguard our growth.

ALEXANDER PUNZENBERGER: Although a group can provide stability to its member companies, I consider security in groups to be overvalued. If financial controllers in corporate headquarters are not keen on something then it can be scrapped very quickly. If we had acted like most groups today with respect to the setbacks in the beginning, we would still be in employment and neither COPA-DATA nor zenon would exist.

Despite this independence is COPA-DATA tied to partners?

THOMAS PUNZENBERGER: In 2003, we moved into our current company building with 27 employees; today over 140 people work here. In addition there are many colleagues in our foreign subsidiaries. Such growth cannot be achieved alone. COPA-DATA has an extensive partner community and has been a Microsoft partner since 2005. As such, we receive swift access to all information and current developments. We can pass this leading edge directly on to our customers, e.g. using the MS Azure cloud platform.

ALEXANDER PUNZENBERGER: In addition to the openness of our software, many of our partners value the openness of COPA-DATA, the last remaining independent "bulk" provider of such software. This is shown in our many partnerships with companies that integrate our products in their solutions, like Sprecher Automation, as well as those that have incorporated zenon in their solutions portfolios under their own designation, such as Siemens with SICAM 230 or, since 2016, ABB with ABB zenon.

What can we look forward to from COPA-DATA in the future?

THOMAS PUNZENBERGER: Despite the emergence of OPC UA, which I very much welcome, the importance of a system like zenon – which governs universal, open, yet secure communication with and at all levels of industrial automation – will not change so quickly. Some of the challenges are already on the table but are not yet fully understood or appreciated by the broader public, such as a gigantic flood of data or the security issue that shows new facets every day.

ALEXANDER PUNZENBERGER: zenon's development continues to fall under the motto "simpler – faster – safer". So far we have frequently anticipated developments, and we will continue to do so. Always in the interests of even more effective, efficient, and convenient operation. You can count on us to come up with a lot of things.

Industry meets Makers

© ROLAND VORABERGER/LINSE 2

SMART ELECTRONIC FACTORY OF THE FUTURE COOPERATION PROJECT

DISRUPTION THROUGH COLLABORATION

The purpose of the Industry meets Makers project is to combine the best practices and experiences of established industry with unconventional approaches from the Maker scene. In 2017, we will be involved for the second year running, and have invited Makers to work with us and our project partners TELE Haase, ABB, and IKARUS Security Software to fine-tune "Smart Electronic Factory of the Future" solutions. Following the presentation of the initial results on September 20, 2017, at the Best of Industry meets Makers event at this year's Digital Days, the outcome of the project is still open. One thing is for sure: it's a win-win situation for all involved.

"SMART ELECTRONIC FACTORY OF THE FUTURE" CONCEPT

Project partners:

– COPA-DATA
– TELE Haase
– ABB
– IKARUS Security Software

Topics:

– Customer proposal and USP
– Machinery, tools, modules, components, and materials
– Software, digital tools
– Spatial planning, configuration
– Geographical location, environmental conditions
– Working, team and cooperation models, responsibilities, task distribution, communication, decision-making, network set-up/expansion, etc.
– Data management, documentation, data security
– Procedures and processes from concept and prototype development through to volume production
– Budget allocation, operational planning

Eligible to participate:

– Anyone and everyone

Perspectives/benefits

– Specialist knowledge from experts in the industries involved and selected representatives from the IMM community
– If desired, a workplace at Factory Hub Vienna (www.factoryhub.at)
– Network with industry
– Opportunity for follow-up orders/cooperation
– TELE-Joker voucher worth €5,000
– Industrial IoT package from COPA-DATA
– and more...

Using leading-edge methods, Makers are sort of high-tech DIY enthusiasts creating compact solutions for mid-sized problems. They approach problem-solving with plenty of creativity, and use networks for the production and marketing of their ideas and projects. Established companies can really benefit from the diverse input of these "product guerrillas".

"As an innovative start-up, COPA-DATA has developed new disruptive ideas thanks to its extremely open corporate culture ever since its founding," says Hans-Peter Ziegler, Sales Manager at COPA-DATA. "The involvement of independent technology thinkers is a logical continuation of this successful tradition."

BRINGING THE ESTABLISHMENT AND REAL MAVERICKS TOGETHER

Building a growing network that creates new collaboration models between industry and the Maker scene is the purpose of the Industry meets Makers project. Initiated and implemented by entrepreneur Sandra Stromberger, it sees itself as, among other things, a vital part of the DigitalCity.Wien initiative's program, which has set itself the goal of making the digital power inherent in our circles visible – and to support it through communicative activities. "New forms of collaboration are to be explored, jointly developed, and tried out in fair cooperation, and the resulting innovation and business potential is to be harnessed to the benefit of both sides," says project initiator Sandra Stromberger.

In 2017, as part of Industry meets Makers, COPA-DATA has, for the second time running, invited innovative Makers to participate in a larger project. They will work with us and our project partners TELE Haase, ABB, and IKARUS Security Software to fine-tune "Smart Electronic Factory of the Future" solutions. The shared goal is to develop a concept that will form the basis for building a model digital factory.

ELECTRONICS MANUFACTURING AS A HOLISTIC APPROACH

The proposed task is to build a production unit for an automated electronic production unit with batch size 1 and a budget of €1 m. The concept should not only answer technical questions, but also deal with topics such as the customer proposal and the factory's special USP. Essential considerations include the optimal geographical location, required employees or cooperation partners, and distribution of tasks and collaboration. The concept should also include proposals for equipment with internal infrastructure, machinery, tools, and materials, as well as software, data management, and security. The overall task also includes processes and procedures – from the idea and prototype development to volume production – as well as a phased plan for the factory set-up.

The participating Makers will not be working for profit on this project. However, the industrial project partners will provide participants with numerous benefits. In addition to the establishment of a network of important contacts and the possibility of follow-up orders and jobs, there are also the services provided by the companies, which range from support in the development/production of a product through to the provision of infrastructure, technology, and expertise in the transacting of administrative tasks. COPA-DATA produced an industrial IoT package with Raspberry Pi and zenon that also includes training and workshops.

Mag. Sandra Stromberger

Managing Partner of In2Make GmbH

"Through Industry meets Makers, new forms of cooperation between established industry and the creative young Maker scene will be initiated and the resulting innovation and business potential will be exploited to the benefit of both sides."

Mag. Ulrike Huemer

CIO of the City of Vienna

"This project by DigitalCity.Wien demonstrates impressively that we have tremendous creativity and potential for digital transformation in both industry and the Maker scene, which will ensure that as a technology hub we can survive among the global competition."
Photo: Bohmann

Hans-Peter Ziegler

Sales Manager, COPA-DATA GmbH

"Since its foundation as an innovative start-up 30 years ago, COPA-DATA has been developing new, disruptive ideas in its extremely open corporate culture. The involvement of independent technology thinkers through Industry meets Makers is the logical continuation of this successful tradition."

INITIAL RESULTS IN FALL 2017

At the kick-off event at the end of April, COPA-DATA Sales Manager Hans-Peter Ziegler and our partner companies introduced the task. From the beginning of June 2017, the Makers were able to go deeper into the project in small group meetings with us step-by-step. The first concrete results were presented at the Best of Industry meets Makers event at the Digital Days of DigitalCity.Wien on September 20, 2017. This event included a panel of judges who selected the best contributions. The judges were looking for visionary thinking, innovative character, and ease of implementation, as well as professional qualities and well-functioning communication with the industrial partners. But this is by no means the end of the project.

**iMM
INDUSTRY MEETS MAKERS**

CONTACT:
www.industrymeetsmakers.com

COPA-DATA
Partner Community

IOT: NETWORKING COMPANIES, AS WELL AS THINGS

Partnerships are Fundamental to Digital Added Value

The IoT age and ongoing digitalization are not only connecting things but, increasingly, companies too. Partnerships are the order of the day when it comes to overcoming complex, holistic challenges and providing industrial customers with the highest level of added value. Above all, it comes down to generating added value throughout the entire value chain, thereby optimizing pre-existing infrastructure, and designing working processes to be faster and more efficient in order to reduce costs and increase competitiveness. To deliver this, COPA-DATA relies on both tried-and-tested and new partnerships to actively shape developments in the market.

ISV4INDUSTRY:
AN ALLIANCE FOR THE SMART FACTORY

Industry 4.0 and the Internet of Things (IoT) have already started to change the way we manufacture and work together. However, many decision-makers remain unsure of the best way to arrive at the Smart Factory. For this reason, in 2015 we joined up with Austrian software manufacturers icomedias and PROLOGICS to support future-orientated companies in the development of innovative solutions. This software alliance, named isv4industry – "isv" stands for "Independent Software Vendors" – has been a success story from the start: in its first year, it was already awarded the "Country Partner of the Year Award" in Austria by Microsoft.

COMPREHENSIVE SOLUTIONS FOR THE FACTORY OF THE FUTURE

The goal of the isv4industry software alliance is to show industrial corporations the concrete value of the latest technological developments and to implement these in practice using existing infrastructures. Each company brings its own particular expertise to the table: industrial automation solutions (COPA-DATA), digital forms (icomedias), and process and workflow management (PROLOGICS). The three systems can operate independently of one another or in perfect harmony as a complete solution, allowing for the implementation of entirely new, holistic solutions – particularly in fields such as maintenance, commissioning, and energy data management for Smart Factories.

ISV4INDUSTRY
SOFTWARE ALLIANCE FOR YOUR SMART FACTORY

ISV4INDUSTRY

The isv4industry software alliance was founded by the independent, global software manufacturers COPA-DATA, icomedias, and PROLOGICS in 2015. It provides cross-system applications for the Industry 4.0 environment, particularly in the fields of maintenance, quality management, and energy data management. Its holistic approach allows existing infrastructures to be qualitatively optimized, work processes to be quickly and more efficiently designed, costs reduced, and competitive edge to be increased.

www.isv4industry.com

"The isv4industry software alliance combines the solutions of three providers, each with different approaches in different fields. This combination harnesses the optimal benefit to the customer – better than each could achieve alone."

CHRISTIAN EKHART,
CEO OF ICOMEDIAS

resolto

RESOLTO

Resolto Informatik GmbH has developed and applied mathematical algorithms for industrial use since 2003. Today, the company is a leader in the real-time application of artificial intelligence for predictive monitoring and optimization. Through its platform PROGNOS, Resolto offers powerful intelligence which interprets data in the field in a machine-orientated manner. Highly qualified data scientists, IT technicians, and mathematicians work to ensure that more and more industrial companies can set out on the path towards digitalization.

www.resolto.com

A GLIMPSE INTO THE FUTURE, TODAY

New technological developments allow industrial companies a glimpse into the future, today. In order to ensure our zenon software meets the market's demand for predictive analytics and solutions, we have been collaborating with specialists in the fields of data science, artificial intelligence, and machine learning for a number of years. Resolto is one of our most important partners in this sector: thanks to its generic algorithms, its platform PROGNOS can be used in conjunction with zenon either locally, in the cloud, or in hybrid scenarios.

ARTIFICIAL INTELLIGENCE FOR INCREASED EFFICIENCY

Resolto's algorithms can be learnt and developed both on the basis of historical data and real-time data streams for a wide range of scenarios. In order to achieve this, algorithms from the field of machine learning are used during real-time monitoring to interpret a variety of readings from the sensors and actuators and detect correlating patterns, before reporting trends and forecasts to the machine operator. For manufacturing companies, this means increased product quality, the development of new business areas, a reduction in costs, and increased efficiency – thanks, among other things, to predictive maintenance.

GROWING TOGETHER

We are committed to the vision that digital added value is created through strong and stable partnerships; this reaffirms our strategy as a partner-oriented company once again. It is a strategy that has been in place since our inception in 1987. Over 200 partners worldwide are a testament to our adherence to the official motto of the COPA-DATA Partner Community: "Growing Together".

JOHANNES PETROWISCH,
GLOBAL PARTNER & BUSINESS DEVELOPMENT MANAGER

GLOBAL
×
Partner
Academy
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COPA-DATA

Save the Date!
June 13–14, 2018, Vienna, Austria
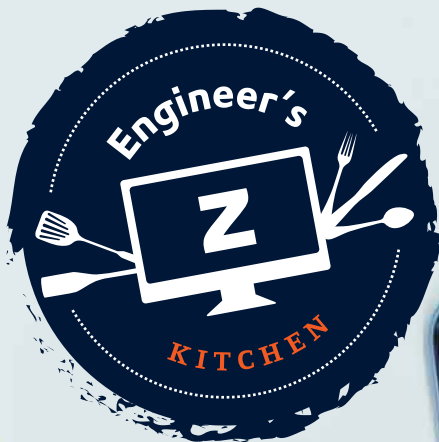
Oops, we did it again!

Having won two Microsoft awards in the previous year, we have now received our third global Microsoft Partner of the Year Award, this time in the "Internet of Things" category.

Microsoft Partner

2017 Partner of the Year Winner
Internet of Things (IoT) Award

Johannes Petrowisch, Global Partner & Business Development Manager at COPA-DATA (right), receives the 2017 Microsoft Internet of Things (IoT) Award from Ron Huddleston, Corporate Vice President, One Commercial Partner, Microsoft Corp. in Washington D.C., USA (left).