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SPOTLIGHT

IT and OT

15 | IT WITH PHYSICS

Interview with Lukas Punzenberger

20 | INDUSTRIAL CONTROL AS A SERVICE

New IT/OT integration for the process industry

38 | OT AND IT SYNERGIES IN CRITICAL INFRASTRUCTURE

An unstoppable fusion

EDITORIAL



What started out as a buzzword – IT/OT convergence – has become a practical reality when it comes to implementing modern digitalization concepts in manufacturing and the energy industry. It refers to the ability to combine the OT environment’s requirements for accessibility and operational reliability with the IT world’s capabilities in terms of networking and security. In addition to articles on general developments in the area of IT/OT convergence, this edition of IU also provides exciting insights into the technical innovations that you can use to successfully navigate the convergence of the two disciplines.

The rollout of service-oriented business models is another megatrend where you can use zenon to ensure your systems are fit for market requirements. Turn to the related article “Industrial control as a service” that starts on page 20.

However, megatrends are not the only factor contributing to operational success. We continue to invest in established areas such as recipe management to ensure that your systems run smoothly and efficiently – especially in highly regulated environments. The

article “Recipe management: challenges and solutions” starting on page 41 provides a detailed overview of this topic.

Nevertheless, technology cannot be the singular key to success. We can only achieve our ambitious objectives with qualified specialists who can meet complex challenges with experience, know-how and sensitivity. For this reason, COPA-DATA is investing through the zenon Academy in high-quality training in everything related to zenon. In other words, all of our users (and those who want to become users) can continue to train and develop professionally. How easy this is in practice is explained in an interview with a passionate zenon user that starts on page 27.

Consistent focus on users also plays a central role in monitoring the solar and wind energy systems at the South Korean company DaeMyoung Energy. In the customer story that starts on page 60, you can read about the important contribution zenon is making to ensure that systems in the field of renewable energies are operating successfully.

Be inspired!

Thomas Punzenberger

THOMAS PUNZENBERGER,
CEO

CONTENTS



SPOTLIGHT

IT AND OT

- 08** The changing look of the automation pyramid
- 12** IT & OT – goes together like a horse and carriage
- 15** IT with physics

PRODUCTS & SERVICES

- 20** Industrial control as a service
- 24** Clemens Connected: The OT in the IT
- 26** To Mars and beyond
- 29** Dashboard Service: Visualize data easily
- 32** Your go-to for help: zenon Engineering Assistant
- 34** IT and OT in harmony?



INDUSTRIES & SOLUTIONS

- 38 Energy:**
OT and IT synergies in critical infrastructure
- 41 Life Sciences & Pharmaceutical:**
Recipe management in Life Sciences: challenges and solutions
- 46 Food and Beverage:**
Using all resources to consume less
- 50 Automotive:**
Perfect automotive surfaces with zenon

AROUND THE WORLD

- 56** COPA-DATA partner community
- 57** SEP becomes first Gold Partner from Saudi Arabia
- 58** About us
- 60** Improved oversight and knowledge sharing at DaeMyoung Energy
- 64** COPA-DATA partners and distributors





SPOTLIGHT

IT AND OT

7

IU

- 08** The changing look of the automation pyramid
- 12** IT & OT – goes together like a horse and carriage
- 15** IT with physics



THE CHANGING LOOK OF THE AUTOMATION PYRAMID

From the hand axe to data modeling: throughout human history, tools and their associated spheres of knowledge have shaped our thinking and actions. This article takes a look at the fascinating evolution of spheres of knowledge – or domains – in industry, from the automation pyramid to the digital revolution.

How is data modeling in Industry 4.0 blurring the boundaries between IT, OT, ERP, MES, SCADA and HMI? What roles are innovative software companies like COPA-DATA playing? Let's dive into the world of domains, hierarchies and the challenges of data modeling in today's automation technology.

As humans, one of our unique features is the ability to use tools. Around 1.75 million years ago, Homo erectus sat in front of their cave and came up with the brilliant idea that mammoths could be butchered much more easily by using a sharp stone. I can almost imagine the scene: a small group of cave people strangled a mammoth with their bare hands at the end of a Hollywood-esque hunt. Now they stand in front of their prey to dismember it. One of them, let's call him Ukuk, gets a bigger share because he uses a tool and a better technique. Ukuk's cave neighbors notice this, of course, and want the same. They quickly realize that not every stone is equally suited to the task and not every technique equally effective. So, they turn to Ukuk to learn his craft from him. At that moment, Ukuk becomes the first expert in his domain or – for younger readers – in his bubble.

This story, told with some artistic license, suggests how important social cohesion is for progress. For Ukuk's cave neighbors, it would have made much more sense to satisfy their needs in the short term by hitting Ukuk over the head with a large stone (almost any stone would do) and simply taking away his hand axe. However, the knowledge-build-

ing approach that is better for the group in the long term requires a stable community.

We have come a long way since Ukuk. Somewhere between the hand axe and nuclear fusion, our tools became more valuable and more complex and required more skill and knowledge to make and use. At some point, people had to invest a significant part of their lives to gain the expertise needed to master the use of a tool. As a result, professions and domains of knowledge emerged. Living together in larger and stable social groups contributed to our ability to specialize. At some point, there was a role for a blacksmith, a farmer and, ultimately, a social media expert.

DOMAINS SHAPE OUR THINKING AND ACTIONS

Thousands of years of specialization and knowledge building have produced a countless number of domains. Each one of them is so complex that you could spend your entire life mastering it. These domains span how we create our food, produce modern medicine, build our homes and develop our culture. Each one is rich in knowledge, traditions, ways of thinking and its own technical language. They have substance and mass. They widely shape the thinking and actions of their members. Even our values and character traits can be predicted with quite high accuracy from the domains to which we belong.

You don't believe that? Then I challenge you to a social experiment! Go to a major train station in the nearest large city and begin a

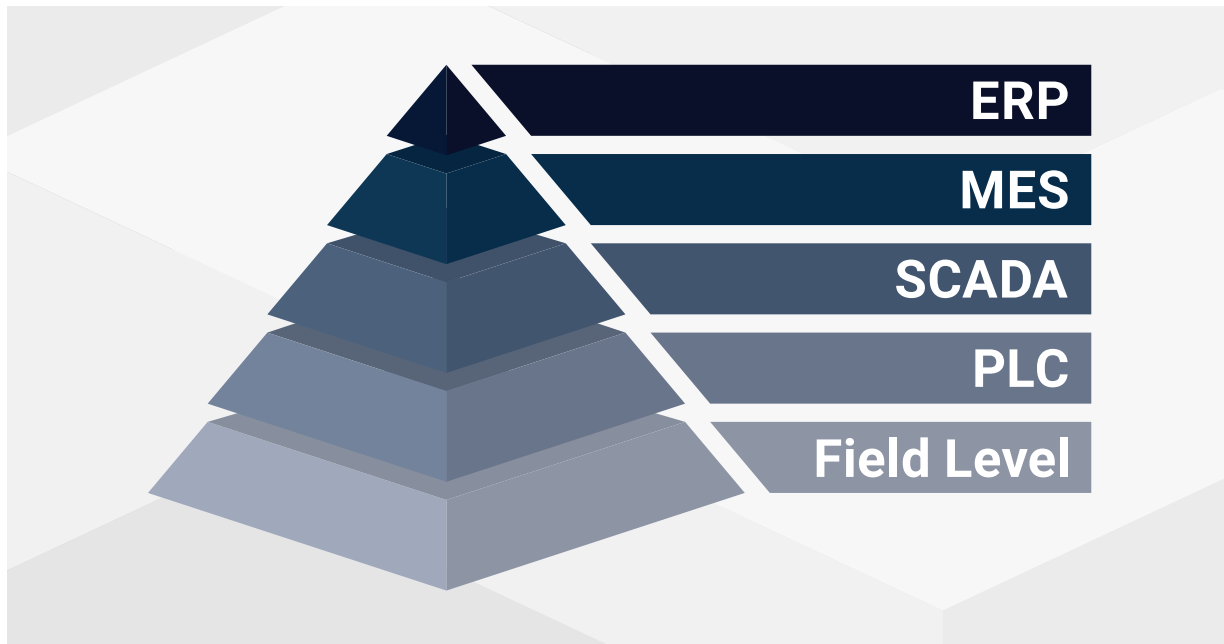
lively discussion about the meaning of personal possessions with the group of kids that regularly hang out there. Do the same with the shop workers. And the commuters who use the station. You will quickly notice how values and behaviors differ dramatically between the members of the different domains.

The extent to which disruptive changes, such as the AI revolution, will influence the importance of domains for our thinking and actions in the future is certainly worth discussing. However, the naivety of believing that the world now is changing more than it always has is a privilege of youth. And I'm not that young anymore... The world will change. It has always been so. Old knowledge becomes obsolete, new knowledge is added. This does not change the fact that, as humans, we organize our world in domains and hierarchies.

“ We shape our tools and, thereafter, our tools shape us. ”

– John Culkin (1967)

One interesting aspect of Culkin's quote is how this process takes place under the radar. Anyone studying engineering or a related STEM subject today will learn things in the first semesters of their undergraduate studies that a student 40 years ago also had to learn: advanced mathematics, physics, electrical en-



gineering, materials science, thermodynamics, etc. These basic tools of an engineer have not changed significantly in recent decades. They still provide the introduction to the education and, thus, play a key role in shaping the mindset of prospective engineers. Of course, the subsequent content differs greatly today compared to the curriculum of the 1980s. By then, however, the domain of engineering had already profoundly shaped its new members and influenced the way they think, act and even speak.

THE MYTH OF THE END OF THE AUTOMATION PYRAMID

Even in our automation technology industry, domain knowledge and hierarchies exist. Do you remember the automation pyramid? A few years ago, it was still considered the primary organizing paradigm in the world of OT software. The pyramid above shows a hierarchical organization of the different control levels for industrial production: ERP, MES, SCADA, HMI, PLC.

Just a few years ago, graphics like this one were very popular in our industry's documentation and presentations. However, they have

fallen somewhat out of favor for two reasons:

1. The graphic has been used too much and for too long and it is, therefore, considered old-fashioned and outdated.

2. The rigid and hierarchical organization does not align with modern perceptions of a digitalized industry, where dynamic services can provide virtually any functionalities at different levels of the IT infrastructure.

Yet has this hierarchy – and with it the individual domains such as ERP, MES and SCADA – become obsolete?

Why did these domains emerge in the first place? As with Ukuk's hand axe, there was a need. In this case, to efficiently manage production processes. Since such a complex problem cannot be solved in one go, we followed the “divide and conquer” principle and broke the task down into individual domains based on specific criteria. As we will see below, these criteria are:

- Abstracted vs. specific terms
- Business-oriented vs. technical perspective

At the top of the pyramid, we find the ERP system, a domain that spans beyond industrial produc-

tion. Every larger business faces the challenge of having to plan, control and manage its own resources. So the ERP domain is huge. It has evolved over decades. Its members and its tools now define the knowledge, language, processes and ways of thinking in this field.

ERP systems are abstracted from manufacturing processes. They take a bird's eye view to the value creation process in a business. Whether a contact lens or a gear shaft is produced at the end of this process makes little difference when it comes to the accounting data record in the ERP system database. In other words, the way that an ERP system models business data and processes can be applied across businesses and sectors.

Industrial digitalization has certainly not changed the importance of ERP as a domain. Otherwise, SAP would not be Germany's most valuable publicly listed company.

Let's climb down the pyramid one level to the manufacturing execution system (MES). It is already closer to the physical value creation process in a production system and it is usually able to communicate directly with the OT equipment. In our abstraction hierarchy, it is

therefore less abstracted than ERP. Nevertheless, the MES usually manages very generalized concepts:

- Orders
- Production plans
- Staffing plans
- Means of production
- etc.

These concepts remain partially relevant beyond industrial production. And, of course, the terminology and way of thinking in the MES domain work equally well for both the production of both contact lenses and of gear shafts.

TRANSFERABILITY STOPS AT SCADA AND HMI

Let's turn to the lower levels of the software stack in the automation pyramid. SCADA, HMI and PLC are not abstracted from the value creation process. In the domain of the SCADA system, generalizable concepts give way to the concrete values, such as operating, machine and sensor data from actual processes.

In this respect, these three lower levels of the pyramid differ significantly from the two above them. The reason for this lack of abstraction is easy to understand: the needs that have shaped the domains of SCADA, HMI and PLC over the decades are less about the business perspective than the technical-physical perspective of the production process. This technology is highly individual in industrial production. While some concepts for the production of contact lenses and gear shafts are transferable from an ERP and MES perspective, these production processes are so different from a technical perspective that it is hardly possible to develop standardized models.

This tells us that the original organizing paradigms used to first organize the automation pyramid are still perfectly valid. When managing companies and processes, it makes sense to separate a highly abstract and business-oriented perspective from a highly technical and tailored perspective. The fact that in the course of digitalization we are increasingly blurring the

lines between the domains of ERP, MES, SCADA and HMI does not change this.

STANDARDIZED MODELS STOP WHERE BUSINESSES ARE TOO HETEROGENEOUS: IN PRODUCTION.

However, the digitalization of industry is shaking up the status quo in one respect for which I am very grateful. For a long time, the creation of strong data models was reserved for those domains where strong abstraction makes it possible to combine the requirements of many companies. Consider the example of the accounting data record in the ERP system that works for both contact lenses and gear shafts.

Building good data models is not only a conceptual challenge, but also requires the models to be embedded in the various levels of the software stack and the processes they reproduce. This cannot be achieved without a certain amount of effort and explains why consistently used data models become rarer the more individual a domain is.

However, digitalization and the related desire to make production processes and data more accessible and easier to compare are now creating a need similar to Ukuk's mammoth. Innovative software companies such as COPA-DATA have long recognized this need and are beginning to provide the necessary tools. These tools face a challenge that should not be underestimated. On the one hand, they are intended to provide a simple way to create very individual data models for a wide variety of production processes. On the other hand, these models have to then be integrated in generic processes in the tool landscape for further processing. After all, what is the point of being able to create a "digital twin" of a production line if the meaningful structure of this data is not used to create value in the rest of the software landscape?

This is exactly why data modeling has been a fundamental part of COPA-DATA's product agenda for years. Personally, I am very excited to see the results.



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Industrial Digitalization Solution Architect and Developer

Philipp Schmidt has worked in the area of industrial digitalization for more than ten years and has helped to shape these innovative changes from the very beginning. As part of our Product Management team, he supported companies with implementing new technologies and developed the zenon software platform for the future. Today, he assists organizations as a freelancer in the creation and implementation of their digitalization strategies.

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IT & OT – GO TOGETHER LIKE A HORSE AND CARRIAGE

The merging of IT and OT poses a number of challenges. Industrial companies face the question of how to find a common denominator based on the perspectives and approaches of the two disciplines. These can be of a technical, organizational or security-related nature. For a project to be successful, it is important to take into account several aspects.

AUTOR: ROBERT KOREC, PR & COMMUNICATIONS CONSULTANT

Imagine a physicist and a mystic talking about God and the meaning of life. This might sound absurd at first because metaphysics is not included in the natural sciences. Ultimately, however, the different approaches can enrich each other and bring us one step closer to finding the truth that exists out there. This is done well in the German book “Der Quantengott” [The Quantum God] (ISBN: 9783485028790).

The situation is similar when it comes to the convergence of IT and OT, even though the parties involved are much closer due to their basic scientific training. This debate is not about explaining what holds the world together at its core, but rather about finding the most efficient solution possible to specific issues that interest both partners and where the chances of success when working together are more promising.

However, OT and IT bring together two very different disciplines with disparate traditions and requirements. This is reflected in the careers of the individuals leading the way.

SECURITY AND INTEROPERABILITY

The integration of IT and OT increases the risk of cyberattack. Traditional industrial control (OT) systems were often isolated and provided limited access, while IT systems offer greater connectivity. Convergence requires a careful security strategy to prevent both business disruption and data theft.

Another point is interoperability: IT and OT systems often use different protocols and standards. Integration requires careful planning to ensure that data can be shared efficiently between the different systems.

DATA PROTECTION AND LEGACY SYSTEMS

As devices in the industrial environment become increasingly interconnected, they generate more and more data. The way this data is handled has to comply with data protection regulations, particularly when personal or business-critical information is involved.

Many production facilities also use older, unsupported legacy systems. Integrating state-of-the-art IT technologies can be difficult because these systems may not be designed to communicate with today’s IT systems.

DIGITALIZATION = CHANGE MANAGEMENT

When we talk about the convergence of IT and OT, it is not just about aspects of technical feasibility. Ambitious digitalization projects can only succeed when they involve all the stakeholders so that they do not get derailed by resistance from the workforce. Keep in mind that the merging of IT and OT often requires an organization to change its culture. Employees have to adapt to new work methods, technologies and processes. Collaboration between IT and OT teams, which have historically operated independently, can be challenging.

CHALLENGES OF INTEGRATION

Real-time requirements:

Some industrial processes require real-time responses, especially in the manufacturing industry. The integration of IT systems that may not be designed for real-time requirements can become a hurdle.

Robustness and reliability:

In production environments, robustness and reliability are critical. IT systems are often designed for flexibility and adaptability, while OT systems aim for stability and continuity. It is important to find a balance between both sets of requirements.

BETWEEN POTENTIAL AND RISK

To meet these challenges, it is crucial to plan comprehensively, ensure close collaboration between IT and OT teams and implement cyber-security measures. It is also important to consider both technological and organizational aspects to ensure IT and OT are integrated successfully in production.

Security in conjunction with IT and OT is essential, especially in production environments. While the convergence of these two areas offers tremendous potential for improved efficiency and innovation, it also introduces considerable security risks.

The traditional separation between IT and OT, which was often based on physical barriers, is being eliminated by increased network-

ing. While this connectivity opens up new opportunities for monitoring and controlling production processes, it also creates attack vectors for cybercriminals.

For this reason, security measures must be comprehensive and take into account both IT and OT. This includes the following aspects.

Network security:

Implementation of robust security protocols, firewalls and intrusion detection systems to prevent unauthorized access to networks.

Data integrity:

Protection against tampering with data, especially in OT systems, to ensure that production processes are not impacted.

Access control:

Access to critical systems and information allowed only for authorized users on a “least privilege” basis to minimize insider threats, blast radius and lateral movement.

Identity management:

Ensuring clear identification and authentication of users and devices so that only authorized persons or systems can access critical resources.

Training and awareness:

Employee training to raise awareness of security risks and promote compliance with security policies.

Regular security checks:

Carrying out penetration tests and security audits to identify and resolve vulnerabilities in advance.

Incident response:

Developing clear protocols and actions for dealing with attacks, in order to minimize their impact.

Keeping pace with evolving threats also requires proactive investment in security measures, as well as continually reviewing and updating these measures.

In this era of digital transformation, businesses not only have to be technologically innovative but also must act in a security-conscious way. The point is not to view the integration of IT and OT as a compromise between efficiency and security, but rather as an opportunity to combine both aspects in a balance of synergies. This is the only way we can exploit the full range of ben-

efits promised by the convergence of IT and OT without putting at risk the integrity and security of our industrial infrastructure.

IT/OT: WHO SHOULD LEAD THE TEAM?

There are several factors to consider when deciding whether an IT or an OT specialist is better suited as a team leader when a business is merging IT and OT. In addition to the specific needs of the team, the type of projects and the company objectives, both options have strengths and potential challenges.

The strengths of an IT team leader certainly lie in the areas of cybersecurity and interoperability. IT specialists not only have in-depth experience in these areas, but are also familiar with new technologies and trends.

On the other hand, they may not have sufficient knowledge of operational technology, which could lead to misunderstandings and challenges with OT team members.

Meanwhile, a team leader from the OT area is a strong contender due to their experience in industrial processes and requirements, as well as their understanding of critical infrastructure in production systems and what keeps them reliable. Process optimization is another strength of OT. On the other hand, deep insight into the complexities of digital environments and cybersecurity is sometimes lacking.

LEVERAGING SYNERGIES WITH HYBRID SKILLS

In addition to the different experiences, IT and OT teams often have different ways of thinking and approaching things due to their different priorities and approaches. Pure IT or OT specialists may therefore have difficulty understanding the specific requirements and concerns of the other project participants.

Ideally, the team leader will have a hybrid skill set in both IT and OT. This enables businesses to account for specific requirements in both areas properly and effectively manage the integration. The focus of every business should, therefore,

be to create an inclusive culture, where both sides can work together and learn from each other.

According to COPA-DATA founder Thomas Punzenberger, using digital resources to create greater added value in businesses has always been part of the founding idea of COPA-DATA. In the meantime, the “digitalization” megatrend has made many companies more open and willing to innovate. Digital services and new products were considered in forward-looking projects. This fresh wind blowing through the project landscape has not only borne fruit in terms of content but has also helped to move the work of professionals away from IT-heavy software development and into OT departments. Agile development methods, high-level languages and modern software architectures were introduced. This professionalization of software development has also favored the progress of AI. It has become clear that AI projects ultimately work just like other software projects.



IT WITH PHYSICS

Lukas Punzenberger has headed product development at COPA-DATA since fall 2023. In his daily work, the different worlds of OT and IT come together. In this IU interview, he talks about the current challenges and opportunities that arise in his work.

A successful interaction between IT and OT is both one of the prerequisites and a driver of digitalization. What is this actually all about?

Lukas Punzenberger: With IT and OT, two very different worlds meet. The super fast-moving IT world comes with the promise that everything can be automated as desired. This is also happening on a large scale – starting with automatic updates of operating systems and rollouts of enterprise-wide au-

thorization levels that are managed centrally. On the other hand, there is the OT world, where the focus is on reliability, maintainability and validation. Each machine or system is tested rigorously over several stages and any changes, including to software, are subject to these validation steps.

How long has industry been dealing with these issues?

Lukas: Starting in the mid to late 1980s, the first ideas and approach-

es emerged as to how PCs could be used for automation. Since then, people have tried to make use of as many features as possible from the fast-moving IT world in the OT world, even though the latter is characterized by long lifecycles.

What is the challenge in that regard?

Lukas: On average, an industrial machine is in use for seven to ten years, and systems even longer, before it has paid for itself or is re-

furnished. So the question here is: how long can support be provided? In contrast, we experience innovations in IT every day through everyday objects such as smartphones. These IT developments also have an impact on expectations of industrial applications. For example, in user interfaces or the automatic roll out of updates. As a result, OT is frequently playing catch-up with IT in terms of its feature set. Our job is to support automation applications painlessly with the industry-specific requirements and the corresponding expertise, using tools from the IT world. There is a saying: “OT is IT with physics,” and this sums up the challenge quite accurately.

How does this look from the perspective of COPA-DATA's customers?

Lukas: Most of our customers work in the automation sphere, such as providers of energy management systems or as process engineers. An increasingly important issue in this area is security. This is also taken very seriously at the national level and beyond. In the coming years, our company and our customers will have to deal intensively with implementing and complying with directives.

Could you provide some examples?

Lukas: In the European Union, a more comprehensive cybersecurity directive, NIS2, recently came into force. The COPA-DATA security team is working intensively to meet these developments and requirements. We need to make the right decisions early on in product development in order to be in a position to support our customers professionally. COPA-DATA, for example, is IEC 62443-4-1 certified. This is an international series of standards for cybersecurity in automation systems, and it applies to equipment operators, system integrators and component manufacturers. Part 4-1 deals with secure product development lifecycles. This means the ways we develop and maintain software are certified. It also includes subjecting

our zenon software platform to regular security testing.

What is coming for us with NIS2?

Lukas: NIS2 is an extension of NIS1, which has been in force for about two years. Significantly more companies and organizations will be required to implement a range of measures to secure their equipment. NIS2 will particularly affect operators of critical infrastructure, such as energy networks, water supplies, cloud providers, the Food & Beverage industry and the pharmaceutical sector. The binding EU directive defines how both physical equipment and IT systems must be secured. The directive also provides for a reporting obligation in the event of significant incidents and threats. This early notification has to be submitted within 24 hours and must be made accessible throughout the EU. The resulting transparency is intended to help other companies better protect themselves against attack. A large number of our customers are affected by this regulation.

A big trend currently in IT is container solutions. What does this look like in industrial environments?

Lukas: This is one of the current examples of the way advancements in the IT domain can bring benefits to automation. Containers help us to provide services independently of the hardware; host system updates can be made largely independently of the containerized services. Docker, Kubernetes and other container solutions are being increasingly requested by COPA-DATA customers.

There are two very different approaches to this topic. On the one hand, you have a local machine that is connected to the OT network and is basically a stand-alone system. On the other hand, you have a solution that allows hardware to be independent and without reference to physical processes – the classic IT solution, where containers can be launched on demand. To orchestrate this, Kubernetes and OpenShift can be used. We work to bring both

approaches together, because ultimately our goal is to create a complete environment with a common objective, not to separate IT from OT.

How do COPA-DATA customers experience this? Is that work also interdisciplinary?

Lukas: Our contact partners who work with our software platform are mostly automation engineers. Our involvement in the IT and OT worlds usually depends on our customer's requirements. Basically, we want to keep systems up and running, which requires experts with domain knowledge. This expertise is usually more important than knowledge of network architectures or IT tools such as Docker.

Where will this journey lead in the years ahead?

Lukas: I see the trend where OT is becoming more like IT tools, for example, with regard to the possibilities in engineering. The classic high-level languages such as C++, C# or Python and syntax tools such as autocompleter or linters are becoming more common in OT. The benefits of virtualization and containerization are being recognized increasingly and incorporated in the planning of systems. But this is a long process. We invest a lot in product development to make this journey as easy as possible for our customers. Ultimately, it's not about using tool A or tool B. There must be an easier way! This is a huge challenge that we face as a team every day: to make the tools easier to use even with less in-depth knowledge.

Is the motto “There must be an easier way” aimed mainly at OT specialists or at IT specialists?

Lukas: Ideally, it will be easier for both experts. Project engineers can write their Service Engine files or the Soft PLC code as desired and this provides good support, making it easier to adapt to the infrastructure selected. IT specialists, on the other hand, also find things easier, because all the options they need are available for their use cases. This enables them to set up security



Lukas Punzenberger studied computer engineering at the Vienna University of Technology. After graduating, he moved to Basel, where he gained practical experience in automation projects in the pharmaceutical and life science industries. He has been responsible for product development at COPA-DATA since fall 2023.

mechanisms and decide which machines are allowed to communicate and with what.

Let's talk about standardization: there are different traditions here too. OT standards do not usually come from IT. Is this changing, for example, in terms of communication standards?

Lukas: One good example is the security standard IEC 62443. This is primarily for automation systems. It defines how to design a system or product. The equivalent in IT would be the ISO 27001 series of standards that have the common goal of making the corresponding system or installation more secure against attacks. Yet those standards have an entirely different scope. The same applies to many communication protocols. They are not going to change in the foreseeable future. I see OPC-UA becoming more and more popular – as a universal protocol between a wide variety of machines. In my

opinion, BACNet in the building sector or IEC 61850 in the energy sector will remain as protocols.

How is zenon developing in this regard?

Lukas: One of our strengths is hardware independence. This makes it easier for customers to connect their existing hardware. zenon currently supports over 300 drivers. We try to implement newly published standards in our core industries as quickly as possible. For example, a new standard for IEC 61850 was published recently. We are currently implementing these enhancements so that we can fully cover this interface.

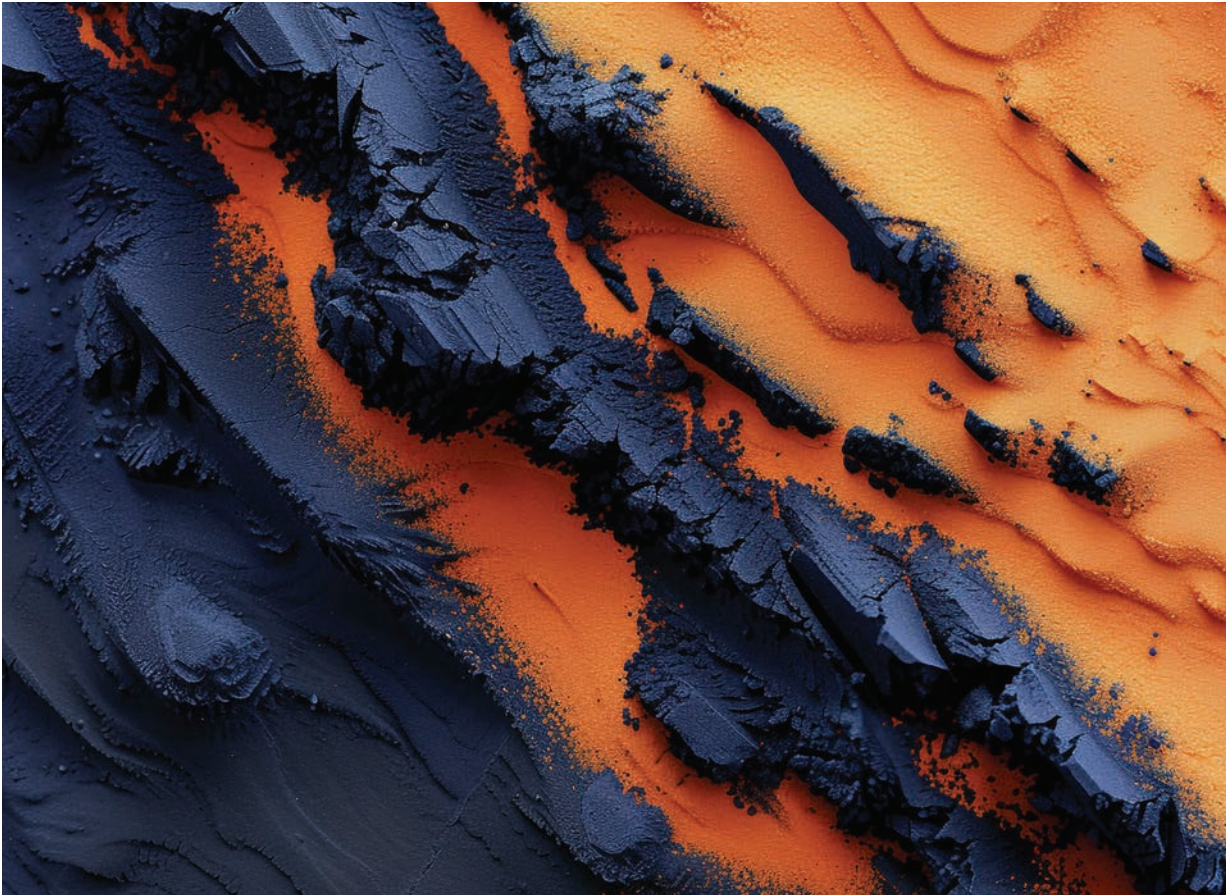
This ensures that the current version of the protocols, including the latest encryption technology, can be used for automation. In addition, we are working to provide an efficient tool for easily integrating the different production standards in the IT landscape for the relevant equip-

ment. The different protocols can also be combined conveniently with one another. For example, if a customer has a machine that communicates with IEC 61850 and another that communicates with OPC-UA, connecting the two is not a problem because everything can be imported to the zenon software platform.



PRODUCTS & SERVICES

- 20** Industrial control as a service
- 24** Clemens Connected: The OT in the IT
- 26** To Mars and beyond
- 29** Dashboard Service: Visualize data easily
- 32** Your go-to for help: zenon Engineering Assistant
- 34** IT and OT in harmony?



INDUSTRIAL CONTROL AS A SERVICE

“As a service” products and business models have become an integral part of the office and IT world. Nevertheless, the leap to the shopfloor has not yet been made, or only very incompletely. This article shows how, in terms of IT/OT integration, an industrial control as a service approach can leverage potential in terms of time-to-market, scalability and flexibility in the process industry.

Throughout the process industry, manufacturers are under pressure to shorten time to market for new products. At the same time, businesses want greater flexibility and scalability from their production equipment so they can respond to changes in the market more quickly and accurately. In another growing trend, businesses are applying IT thinking to the OT field with the aim of creating stronger IT/OT integration, which promises new ca-

pabilities and cost savings through synergies.¹ In response to these pressures, this article shows how the “Industrial Control as a Service” concept can support businesses in achieving their objectives.

The concept builds on previous modularization strategies in the process industry by incorporating modularization or containerization of software and integration of a cloud or server component (see Figure 1).

WHAT IS INDUSTRIAL CONTROL AS A SERVICE?

Industrial Control as a Service (ICaaS) replaces the conventional automation pyramid with a fully virtual containerized structure (see Figure 2). This approach revolutionizes the concept of programmable logic controller (PLC) by moving the core functions and capabilities of the PLC to a cloud or server-based environment. The core components of the PLC are fully containerized,

¹ Mirani, A., Velasco-Hernandez, G., Awasthi, A., Walsh, J. (2022). Key Challenges and Emerging Technologies in Industrial IoT Architectures: A Review. *Sensors*, 22(15), 5836. doi:10.3390/s22155836

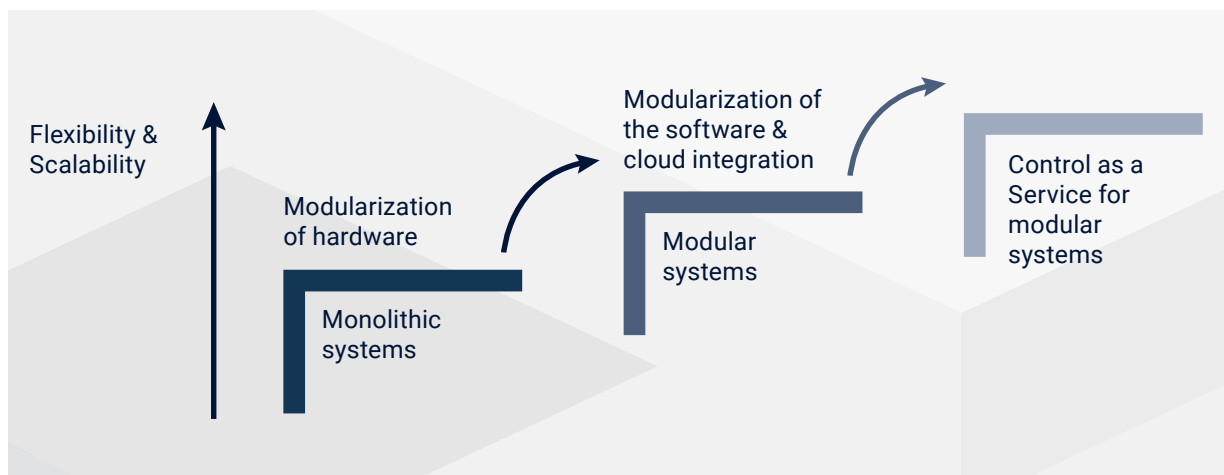


Figure 1: Increasing flexibility and scalability of process equipment through modularization and ICaaS

including an IEC 61131-3 compliant runtime, as well as software additions such as human-machine interface (HMI) systems, databases, and cloud connectors. The server infrastructure can be located either onsite at the business (on-premises) or offsite outside the business (CoLo or cloud). In this on-prem or hosted cloud environment, the automation elements do not necessarily have to be organized in the rigid layers of the pyramid. Rather, the logical order and interactions between automation components can be optimized depending on the specific application.²

HOW CAN ICaaS BE IMPLEMENTED TECHNICALLY?

Technically speaking, ICaaS works by setting up a secure virtual network. This can be implemented in the cloud, on a dedicated server, or as a hybrid model. In this network, software components are activated as needed, and they use standardized communication protocols to share data. For the end user, this results in a clear, tabular display of all active or inactive PLC instances, which can be managed individually or in groups. The biggest difference between ICaaS and conventional

controllers is the way the sensors and actuators are connected. Instead of connecting directly to a physical device, connections are made via an ethernet cable, or using the Internet, if necessary, and secure VPN connections with TAP configuration.³ Other communication channels such as 5G are also supported. The only limitation is the maximum tolerable latency, which is typically high in the process industry, where cycle times of 30 ms-500 ms are common.

ENTRY HURDLES AND SCALABILITY OF ICaaS

The ICaaS-driven switch from traditional CAPEX models (capital expenditure) to OPEX models (operational expenditure) significantly reduces barriers to entry. This provides a major upside for organizations that otherwise would not be able to afford the high upfront costs for conventional automation hardware (for PLCs, SCADA, PLS) and its configuration. In addition, the scalability of ICaaS systems allows for more efficient management and maintenance, even with large numbers of PLC, SCADA or DCS instances. More efficient handling helps to keep the higher OPEX costs in check.

EXPANDING THE IT/OT LIMITS

IT and OT differ greatly in the expected lifecycle of the hardware and software used. In a conventional IT environment, people are used to periodically installing updates and regularly replacing hardware. Microsoft Windows, for example, has its well-known Patch Tuesday. Updates come every second Tuesday. These are mostly minor adjustments, such as malware definition updates, that do not require a restart.⁴ After extensive testing, these are simply rolled out to the affected IT infrastructure. For classic Office applications, in particular, efforts are made to update as quickly and frequently as possible in order to quickly close potential security gaps. In addition, resources are pooled and containerized. This ensures more centralized and, as a result, easier maintenance.

In traditional OT environments, production planning and planned downtime determine the update cycles. Virtualization and containerization are seldom used at machine level. However, to use them would have major benefits, particularly when designing the required hardware resources, such as panels and PLCs.

²Xia, Y., Zhang, Y., Dai, L., Zhan, Y., & Guo, Z. (2022). A Brief Survey on Recent Advances in Cloud Control Systems. *IEEE Transactions on Circuits and Systems II: Express Briefs*, 69(7), 3108–3114. <https://doi.org/10.1109/TCSII.2022.3178975>

³Lyu, M., Benfenatki, H., Biennier, F., & Ghodous, P. (2019). Control as a Service Architecture to Support Context-aware Control Application Development. *IFAC-PapersOnLine*, 52(13), 1085–1090. <https://doi.org/10.1016/j.ifacol.2019.11.340>

⁴Stewart M., Fleischmann A. (2023). Update release cycle for Windows clients. <https://learn.microsoft.com/en-us/windows/deployment/update/release-cycle>; Access: 24.01.2024

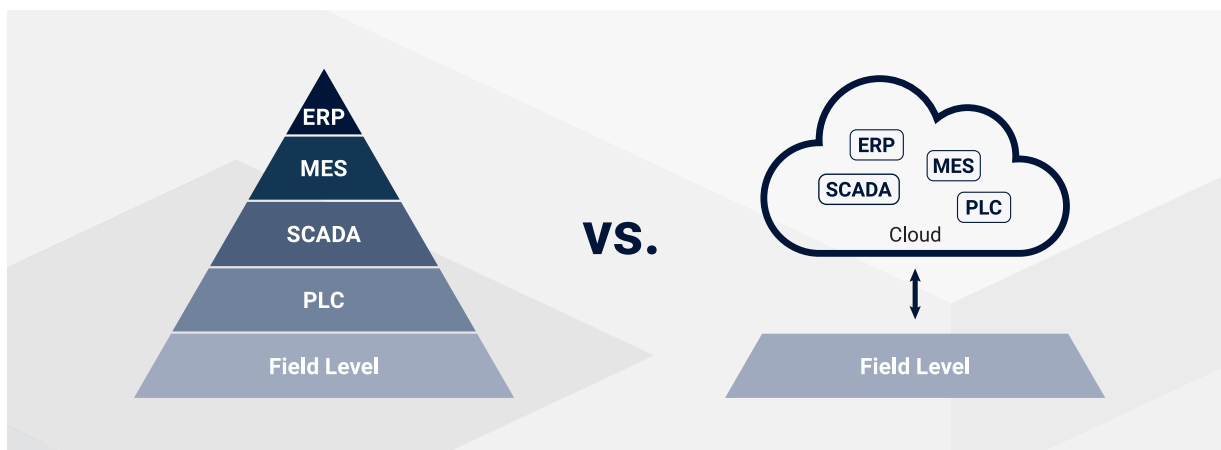


Figure 2: Comparison of conventional and as-a-service automation

It takes hardly any effort to choose a suitable PLC, as the containerized PLC can simply receive more resources from the host, as necessary.

Additionally, containerized software environments are decoupled from the lifecycle of the hardware used. This has the advantage of ensuring that software updates are not blocked by hardware that is outdated or no longer maintained. This is becoming increasingly important, especially with regard to NIS2⁵ and the Cyber Resilience Act (CRA).⁶

MTP COMPATIBILITY

ICaaS is not only suitable for monolithic systems, but it can also be combined with modular system concepts, if required. Module Type Package (MTP) is a standard described in VDI/VDE/NAMUR 2658 [7] that supports manufacturer-independent modular production. The idea is to use the description already provided by the manufacturer of their modular process equipment assemblies (PEAs) and all available services and interfaces, including visualization. These PEAs can be edited, instantiated, and linked via drag and drop, including the assignment of the corresponding I/Os and hardware.

Since MTP is manufacturer-in-

dependent, engineering using MTP does not differentiate whether the control software is loaded on a conventional hardware PLC or a containerized soft PLC. This means that the full range of functions in containerized runtime environments is also provided when using MTP-based projects.

USE CASE: EARLIER TESTING

Another use case for ICaaS is early testing of automation systems, which traditionally takes place in several stages, from development to implementation, in the production system. Through ICaaS, these stages can be fully automated and run in a containerized virtual environment, significantly reducing the need for physical infrastructure and the associated costs and time. When talking about ICaaS, the question is often asked whether the complete containerization of the virtualized controller for a system excludes the use of physical controls onsite. However, the ICaaS concept is designed to support a hybrid mode of operation. This means that both real control systems for production and partially containerized controls in the cloud can be run in parallel. This approach becomes particularly important when one considers that develop-

ment and testing environments can run entirely in a virtualized environment. The systems can then be transferred to physical controllers without moving infrastructure or making significant changes to the projects. This is especially important in situations where equipment or its components cannot be connected to an IT network for security reasons or due to their location.

TIME BENEFITS

- Accelerated implementation
- Efficient updates and maintenance
- Faster testing and quality assurance
- Agility in development

FINANCIAL BENEFITS

- Reduced initial investments (CAPEX)
- Shifting of operating costs (OPEX)
- Scalability and flexibility of costs
- Reduction of physical redundancies

⁵ European Union (2023). The NIS2 Directive A high common level of cybersecurity in the EU. [https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2021\)689333](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)689333) Access: 24.01.2024

⁶ European Commission (2023) EU Cyber Resilience Act. <https://digital-strategy.ec.europa.eu/en/policies/cyber-resilience-act> Access: 24.01.2024

⁷ Verein Deutscher Ingenieure e.V.. Automatisierungstechnisches Engineering modularer Anlagen in der Prozessindustrie - Allgemeines Konzept und Schnittstellen (2019-10). VDI/VDE/NAMUR 2658 Blatt 1

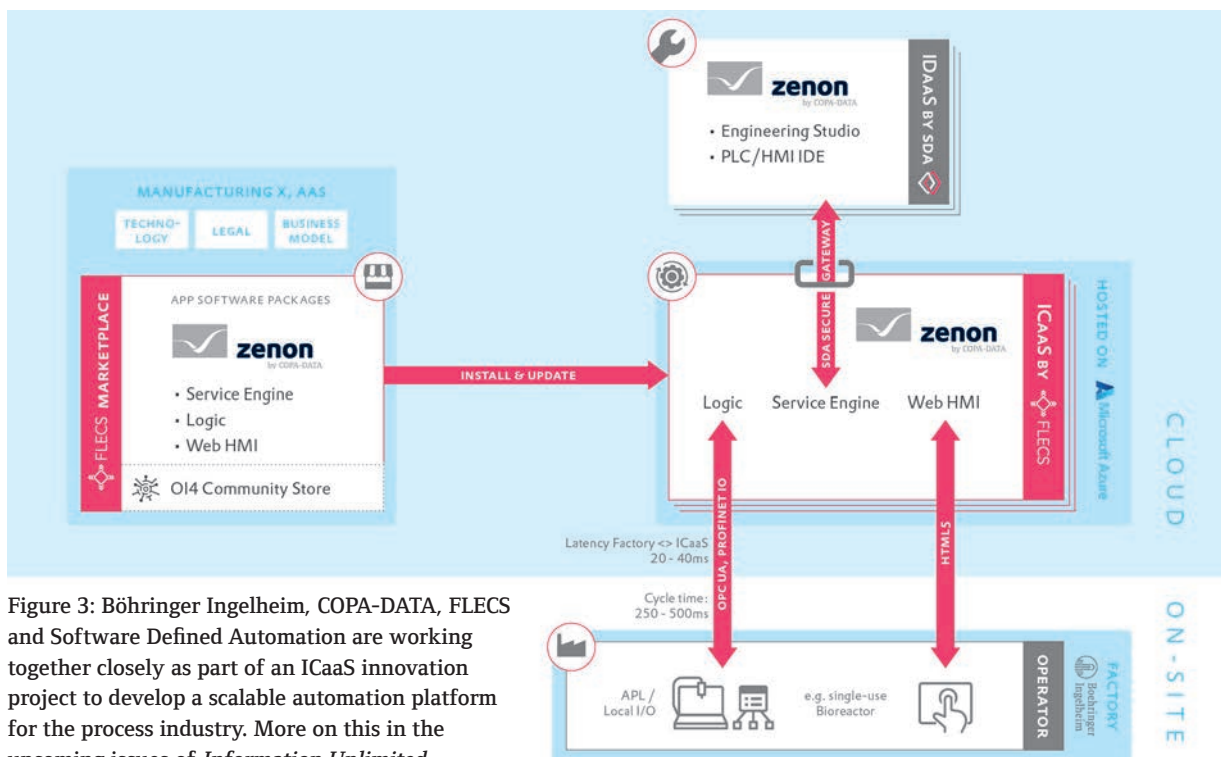


Figure 3: Böhringer Ingelheim, COPA-DATA, FLECS and Software Defined Automation are working together closely as part of an ICaaS innovation project to develop a scalable automation platform for the process industry. More on this in the upcoming issues of *Information Unlimited*.

The unabridged version of this article appears in **atp magazine 5/2024** for **ACHEMA 2024** (<https://atpinfo.de/>).

OUTLOOK

This article not only shows that ICaaS can be implemented with products available on the market today but also illustrates that this approach has a number of benefits. In particular, ICaaS enables automation engineers to focus more on optimizing equipment instead of maintaining the OT infrastructure. In a subsequent article, we will look at two practical implementations of ICaaS solutions based on proof-of-concept designs. You'll be able to read about how the features of ICaaS described here are benefiting two projects: a pump skid at the Karlsruhe Institute of Technology (KIT) and a bioreactor at the Technical University of Dresden (TUD). We acknowledge there is a need for further investigation and research regarding the impact that ICaaS can have on the machine lifecycle as well as the legal aspects of running modular process equipment.

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CLEMENS CONNECTED

THE OT IN THE IT

Did you know that the term “OT” was coined as far back as the late 1980s? At that time, OT referred to “operational transformation” rather than the “OT” most of us think of today. In the modern context of “OT”, the term “operational technology” was first used by Gartner in a 2006 report.



MARK CLEMENS
Product Manager
Connectivity

Mark Clemens has been part of COPA-DATA HQ since 2002. In his current role he is a product manager for connectivity topics. As an expert in cybersecurity, he helps connect IT, OT and IIoT while keeping security in check. As a frequent IU author, he shares his views on the buzzwords of our time.

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I was intrigued by the story of Dr. Clarence “Skip” Ellis as told in episode five of season six of the podcast “Command Line Heroes”, which puts forgotten digital inventors in the spotlight.

That episode told the story of the “OT” of 1989, back when it referred to “operational transformation”. Dr. Ellis’ research into operational transformation laid the groundwork for the collaborative editing of documents and, today, benefits millions of people. This technology enables the editing of the same document simultaneously on different sites, without the need for locking part or all of the document. Does that sound at all familiar?

OT: OPERATIONAL TRANSFORMATION

In 1958, as a high school student working as a part-time nightshift security guard at a production company to bring in money for his family, Clarence Ellis taught himself the workings of a vacuum tube mainframe computer from manuals. When the company ran out of punch cards, Ellis was able to demonstrate how old punch cards could be reused.

Dr. Ellis went on to become the first Black person to receive a Ph. D in computer science in 1969. Dr. Ellis worked at Xerox on the development of Icons and the first GUI. His pioneering research in collaborative document editing was published as operational transformation (OT).

However, Dr. Ellis’ notion of operational transformation is no longer such a widely used term. Instead, the Gartner acronym has come to predominate when it comes to our use of the term “OT”.

OT: OPERATIONAL TECHNOLOGY

I am positive that the modern-day definition of OT has done a lot of good for our industry. Before it, IT in a plant or operational context was usually sidelined under the remit of engineering.

The term OT, with its similarity to “IT”, has raised awareness about the discipline and helps in some key respects. For one, it has helped to spark an interest in OT jobs in IT graduate students. This will strengthen and secure the future OT workforce – which is at risk of thinning out due to waves of retirements.

It has also helped to put a focus on areas that desperately need attention, like ensuring cyber security in OT environments.

OT: OLD TECHNOLOGY?

I think, however, that there are also downsides to the modern-day definition of OT. In a sense, the definition has grown to be derogatory. You will often find OT snidely described as “old technology”. This definition of OT also creates a sharp distinction between IT people and OT people, even though we often have similar interests. It isn’t always helpful to split us into these two different boxes, especially when they so frequently (and increasingly) overlap.

Moreover, these boxes are used, too often, in comparison.

Type “OT” into your non-biased search engine and it will prompt you with search suggestions such as “IT vs. OT”. This will return many results which pit the two disciplines against each other. Frequently, they detail the differences from the viewpoint of people who often do not have their origin in OT.

Other search suggestions include “IT/OT” or “IT/OT convergence”, where results highlight the need to bring these domains closer together – or even to merge them and do away with one altogether (since it’s all computers anyway).

COLLABORATIVE WORK MAKES THE DREAM WORK

While the original OT in IT is fundamentally different from the 2006 OT definition, there is common ground between the two concepts – that of collaboration.

Today’s OT workers must collaborate with IT if they are to meet business goals.

This is most visible from a security perspective. IT people protect systems and infrastructure that have Internet access, the route in for most of the bad actors. OT people share the need to protect systems and physical equipment from bad actors – including the systems and infrastructure managed by IT people. While this might not be the best basis for working together, it requires the cooperation of IT and OT if both the business need for data and the business need for continuous operation are to be satisfied.

For some, an interdisciplinary team of OT people and IT people can make the dream work. For others, adding

dOPT

If you’re into geeky stuff, you can read up on the dOPT (distributed Operational Transformation) algorithm in the publication “Concurrency Control in Groupware Systems” and learn how it ensures that simultaneous, potentially conflicting, operations in one document, like inserting a character by one person, deleting a character by a second person and inserting yet another character by a third person can still result in a consistent document.

MELTING BLOG

Feel free to also have a look into our inspirational Melting Blog!
blog.copadata.com



graduate control system engineers with more IT skills to an OT team or adding IT graduates with an OT affinity to their OT team will be the best way to make the dream work.

I hope that the more we write about this type of collaboration and success, the more we can impact the existing unhelpful search engine suggestions – and transition to more constructive and positive understanding between the two worlds.





IU TO MARS AND BEYOND

What connects the red planet with the blue-and-orange zenon Academy? Why do we want to play weather gods on various planets in our Basic Training – Fundamentals course? And why did we create our own little solar system in the first place?

Those of you who have already found their way to the zenon Academy will be familiar with our zenon Basic Training – Fundamentals course. Together, we build a tiny universe and monitor the weather on three planets. But why planets and not yet another classic plant setup? Who came up with this crazy idea?

THE EDUCATION SERVICES TEAM

We, the Education Services Team of COPA-DATA, approached this project from several different angles. We didn't want to focus on just one particular industry. At the same time, we wanted to do something refreshingly new and interesting for everyone. Our goal was to create a course with a modular concept (more on that later) and give participants plenty of opportunities to experiment with zenon. We also wanted to put the focus on key features instead of overwhelming zenon newbies with everything everywhere all at once (great movie, bad training concept). And all while making sure the "fun" in fundamentals doesn't get lost.

Thus, we created our Basic Training – Fundamentals course to show how simple and intuitive engineering can be with zenon. You don't need programming skills to create fancy projects while taking advantage of virtually unlimited applicability across all industries and the high reusability of assets. Among many other things, we talk about powerful stuff like substitution. We also touch on security when we turn our focus to user administration.

HELLO MARS

"We tried walking that narrow path between showing too much or too little. zenon allows users the freedom to basically do anything they want, but for a newcomer this can be overwhelming," reflects Helene Thurnhofer, Team Lead of Education Services. "Therefore, we developed our version of a simple 'Hello World' – or rather, 'Hello Mars' – example. It may not be the peak of humor but, hey, we try our best!" Once you are down with the basics, you can dive deeper into the zenon universe

and increase your knowledge with zenon Plus courses. The portfolio of online courses is continually growing. Do you want to learn about some great zenon features like Smart Objects? We've got you covered! Report Engine? Of course! Life Sciences, MTP and Energy training? Please...

Be sure to check back again frequently to take advantage of an ever-growing number of in-depth courses as we keep producing fresh material for you, our wonderful zenoneers. The COPA-DATA Education Services Team always has a lot of new and interesting stuff in the pipeline for you.

MODULAR, JUST LIKE ZENON

The modular concept allows you to cherry pick. Are you interested in only one particular topic of our Life Sciences course? Simply jump to the module, download the provided project backup and you are ready to go. This way, you can focus on the things that are relevant to you on your learning journey.

Once you have gathered all that knowledge, why not show off your zenon expertise? With every quiz you complete in the zenon Plus courses, you collect points. With more points, your zenon certificate level will increase from Basic to Advanced and eventually to Professional. If you wish, you can share your certificates on LinkedIn with the click of a button.

MICAEL FOR MVP

Ever since launching the zenon Academy, we have received a lot of positive feedback from our customers. We were blown away by your activity levels, courses completed, points gathered and certificates collected.

But there is one particular zenoneer who caught our eye right from the start. And he kept astonishing us by collecting all available points in record time. So we invited him to speak with us so we can pick his brain for you. Here are some of the things our zenon Academy MVP shared with us.



INTERVIEW

27

IU



MICAEL NILSSON

Project Manager VA-it Skandinavien AB

Let's get to know you first. Would you please introduce yourself?

Micael Nilsson: My name is Micael Nilsson, I am 54 years old and live on the island of Öland in Sweden. My wife and I have seven grandchildren and love to travel in Europe, see the sights, eat the local delicacies and enjoy a well-aged malt whiskey.

I am a project manager for VA-it Skandinavien AB. We are a supplier-independent company. This means that we work with almost all currently available systems present on the Swedish market for PLC and SCADA/HMI systems. For the most part, we work in the water and wastewater industry. But we are also involved in manufacturing facilities, semiconductor epitaxial wafers and biogas plants. We also work in district heating and electricity production.

What are the key aspects of your job?

Micael: Today, my workdays consist of configuring SCADA and HMI systems, programming PLCs and designing and implementing communication solutions for connecting external PLCs and other automation products to a central SCADA or HMI. For example, this can be in the form of connecting a municipal wastewater pump station or a monitoring probe placed outside the central plant to an existing SCADA or HMI.

How did you find out about the zenon Academy?

Micael: Via the COPA-DATA newsroom. I am a frequent visitor there. I think this is a very good place to find information about new and upcoming events and discoveries regarding zenon and the company as a whole.

How do you benefit from using the zenon Academy in your daily business?

Micael: By knowing the benefits and limitations of zenon’s different components, I can present and recommend different solutions to the customer. It also helps me to be more efficient when configuring exclusive implementations and functions.

What is your motivation to do all courses and collect all available points almost instantly?

Micael: I am a man and men do not read manuals! I use the courses in two separate ways. First, I take the course to get an overview of the specific topic. This gives me inspiration and makes me think of innovative solutions for my customers.

When I then encounter a situation where I can make use of this feature, I take the course again to refresh my memory and to find the best way of implementation.

“ I am a man, and men do not read manuals... ”

You are our zenon Academy team hero! What did it feel like when we got in touch with you to tell you that you are our zenon Academy MVP?

Micael: Surprised. It has never been my goal to acquire as many points as possible, I just find that the zenon Academy gives me an easy access and useful tool to ease my work and inspire me to new solutions that benefit my customers. I am, of course, honored and a bit stunned to be named “MVP”. Happily for my coworkers, they now have something new to tease me with. Here in Sweden, three letter acronyms are “the thing”. If it can’t be converted to just three letters, it’s hardly worth mentioning.

What do you like most about the zenon Academy?

Micael: It is on my own terms. It is easy to access when and where I am at that moment. It is easy to find the specific topic or solution for my current problem or question.

What is your favorite zenon Academy course?

Micael: The update courses for zenon. Here, I get the new features in a compact and illustrated way.

What was the most surprising fact you learned during one of our zenon Academy courses?

Micael: I would say that every course lights a candle. Either by seeing new potential solutions to old problems or faster and better workflows in new projects.

What do your peers think about the zenon Academy?

Micael: I asked one of my colleagues and his first response was: It is great. It is nice that you get points

and certificates that show your progress. He also uses the course content as a manual during configuration.

Anything else you would like to say?

Micael: In this context, I would like to promote the Swedish COPA-DATA team’s sales and support. This is a group of people dedicated to us as integrators who do their utmost so that we can help our end customers in the best possible way.



The **zenon Academy** is COPA-DATA’s learning platform and can be accessed with your COPA-DATA user login. Come and learn more at www.zenon-academy.com



THE EDUCATION SERVICES TEAM

These are some of the brains and faces behind the zenon Academy and its many courses.

Our goal is to create a modular learning experience that manages to inform, educate and entertain. We like to think outside the box (or the circle we are crammed into for this picture) and lead you down some new paths that you didn’t know were there.

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DASHBOARD SERVICE: VISUALIZE DATA EASILY

The new zenon Dashboard Service provides an easy way to visualize data from the zenon software platform on the web. Create your own personalized dashboards directly in the browser using predefined widgets. Even without in-depth knowledge of project and system architecture, the zenon Dashboard Service provides you with direct access to shared variables, alarms and events.

Dashboards are a must-have for companies that want to improve their business through user-friendly data analytics. With zenon, dashboards are an easy way to monitor production and see all the important metrics (e.g. KPIs or operational data) at a glance in an easy to understand format. A dashboard tells a story through visualizations by combining cross-project data from the zenon software platform to

provide a consolidated view of the data. Dashboards are important tools for presenting data in a human-friendly way and for enabling better, more informed, data-driven decisions. They are dynamic, interactive, and display data in near real time, which can help to provide a more accurate and faster understanding of what is happening in the environment. They can help users to make the right decisions.

The new zenon Dashboard Service provides an easy way to visualize data from the zenon software platform on the web, whether on-premise or in the cloud. Create your own personalized dashboards directly in the browser using predefined widgets. No matter what industry or area, even without in-depth knowledge of project and system architecture, dashboards provide you with immediate access

to shared variables, alarms and events.

A dashboard is not only nice to look at but it is also a tool for cyclical visualization of the latest data. This helps to ensure you always keep up to date.

Complex data may be easier for process experts to connect up and understand than for employees in other departments. With the zenon Dashboard Service, data can be made easier to grasp for technical and non-technical audiences by creating target-group-specific dashboards and adapting them directly, as necessary. You, too, can benefit from data-driven decision making related to process monitoring and optimization.

Here are a few examples that illustrate how dashboards can be used.

- **IoT monitoring:** Use dashboards to easily monitor geographically distributed locations, such as wind turbines, photovoltaic systems or telecommunications stations.
- **Andon boards:** An Andon board is a visual control device in a production area, usually an illuminated display, that indicates the status of a production system. The zenon Dashboard Service can also provide dashboards for unattended stations such as an Andon board. For example, a smart TV with an integrated web browser is all you need to access the desired dashboard. As an option, dashboards can also switch automatically on a cyclical basis.
- **Bridging the gap:** Dashboards are an easy way to make data from production accessible to other parts of the company. Examples include monitoring KPIs or employees monitoring the production process in a quality assurance lab. They need access in order to review batch production data, view trends or create reports even when the equipment is offline.

- **Dashboards in service management:** Use dashboards to easily see the health status of devices in production and prevent production downtime.
- **Dashboards on the go:** Want to check the most important KPIs while on the go or when on call? No problem with the Dashboard Service. Dashboards are fully responsive and can be viewed on mobile devices without modification – ideal for monitoring utilities onsite.

CUSTOMIZING YOUR ZENON DASHBOARD

The zenon Dashboard Service can be accessed without any additional software installation being required. It is accessed using a web browser and can be used intuitively without prior knowledge.

You can create a new dashboard directly on the dashboard management page. This will automatically open in edit mode and by clicking “+” you can add a new widget to the dashboard. After selecting the widget type and linking the variable, just click “Run” and your dashboard is live. Switch back to edit mode and you can add more widgets.

Currently available widgets include a value display, a bar graph, a table (for current values, alarms, events or historical data) and a trend element. Time filters can be adjusted easily and directly by the end user without reconfiguration. In addition, simple comparison dashboards can be created using personalized time filters in the table and trend widgets.

Data from new zenon projects can be used immediately once the project is connected to zenon IIoT Services.

DESIGNING AN EFFECTIVE DASHBOARD

A dashboard is a visual display of the most important information needed to achieve one or more objectives that has been consolidated on a single computer screen so it can be monitored at a glance.

Some key features of a success-

ful dashboard include:

- Communicating information quickly
- Presenting information clearly and efficiently
- Displaying trends and changes to data over the course of time

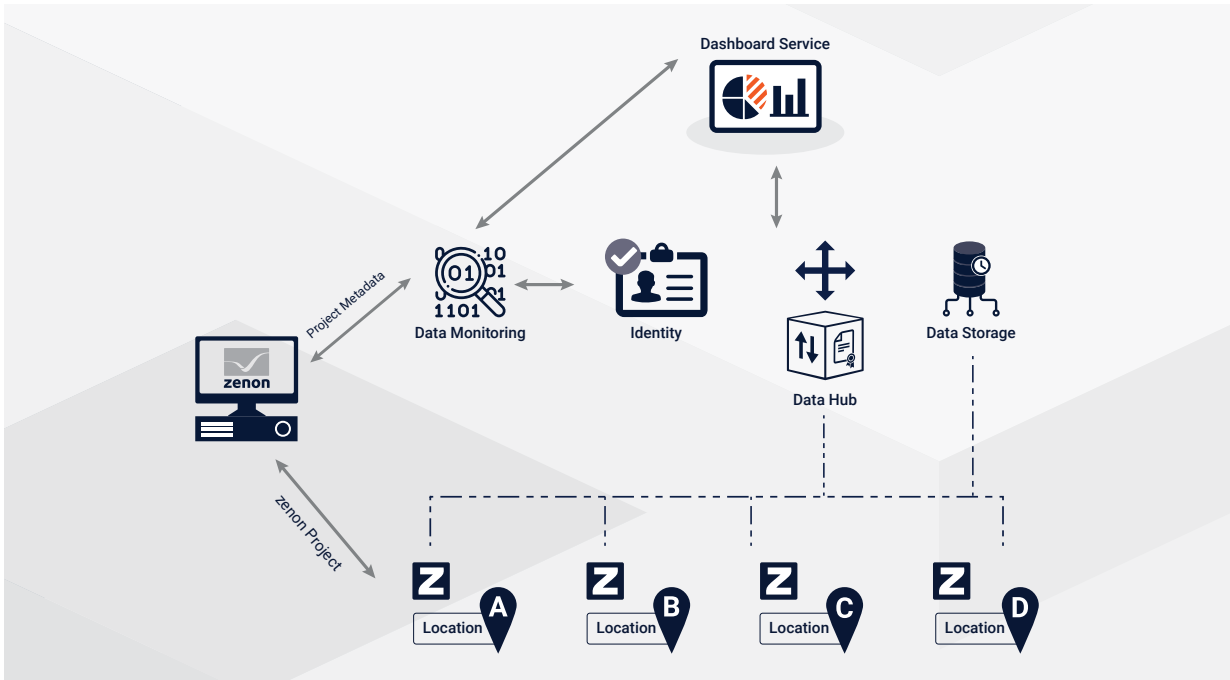
The main purpose of a dashboard is to make it easy to access and digest complex information. For this reason, the user interface in which the data is presented should also be clear and simple. This way, it minimizes the cognitive load on users and reduces the time spent searching for information. It is, therefore, helpful to ask yourself a few questions before creating a dashboard:

- Who is the dashboard being created for and what does the target group need to understand? A clear definition of the audience and the objectives of this group of people is essential when selecting the variables and the type of visualization.
- Which data from the different sources in zenon is relevant for the target group and the objective? Always make sure your data is clean and was prepared properly before creating a dashboard.
- Select the right visualization. We recommend graphical visualizations instead of tables. Too much information can quickly become overwhelming.
- Collect feedback. When you create an initial mockup of the dashboard, ask people from the target group for feedback and incorporate any relevant change suggestions in the dashboard.

PROVIDING DATA FOR DASHBOARDS

It takes only a few steps to provide data from zenon Service Engine to the zenon Dashboard Service:

1. zenon projects that are intended to provide data for dashboards must be connected to zenon IIoT Services and the desired variables must be shared. In addition, it is



recommended that you use Continuous Export as well as Archive per Export to store alarms (AML) and events (CEL) in Data Storage.

2. Project contents must be synchronized in Data Modeling using the Metadata Synchronizer.

3. User groups that will use dashboards must have the proper rights in the Identity Service for the zenon Dashboard Service and the zenon projects.

The Identity Service supports a wide range of authorization management functions. Control who can view dashboards (“Dashboard Viewer”), edit (“Dashboard Editor”), manage (“Dashboard Manager”) or administer dashboards directly in the Dashboard Service (“Dashboard Administrator”). In addition, different rights can be assigned to different projects in the zenon software platform to control who has access to which data sources via the Dashboard Service.

DASHBOARDS VS. REPORTS

Both dashboards and reports are important tools used for evaluating data. Dashboards display virtually live data that is updated continu-

ously, while reports are static. Dashboards are suitable for continuous monitoring and interaction with the data, while reports provide a static but usually much more detailed view of the data for analysis. The Report Engine in zenon provides a wide range of reporting options.

SUMMARY

Dashboards are important tools that provide employees across the organization with an up-to-date view of KPIs and other information to help them do their jobs. As a central point for monitoring key information about business performance in near real time, they make it easy to track KPIs and metrics that users need to identify problems, set goals and improve business performance. They empower employees to act based on meaningful insights rather than struggling to connect data points.

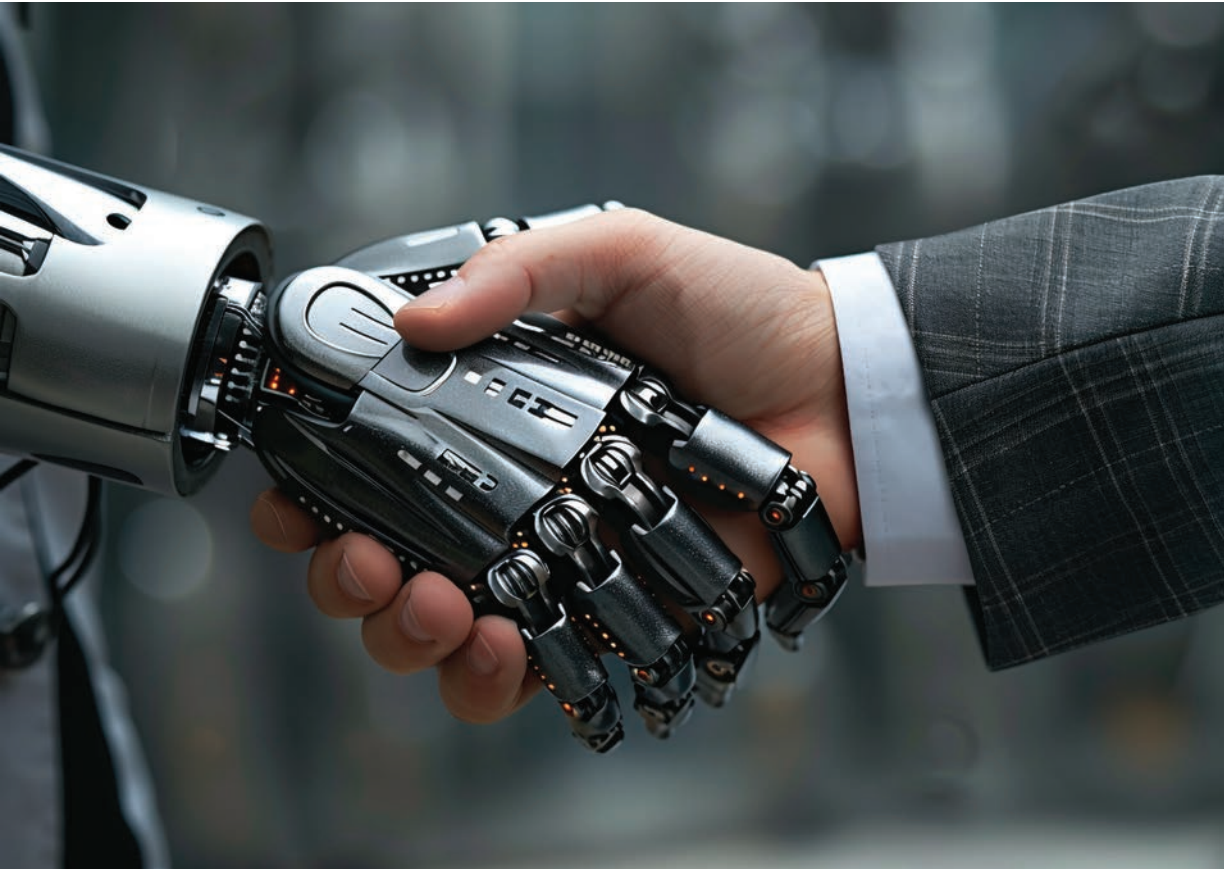
The zenon Dashboard Service provides users with easy, direct access via the web to data from the zenon software platform. Dashboards can be created and customized quickly and individually. The zenon Dashboard Service will be released later this year.



GERO GRUBER
Product Manager
Screen & Interaction Design

As a product manager and product owner for the zenon software platform, Gero focuses particularly on the user interface, user experience for the entire platform and graphical visualization in zenon Service Engine.

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32

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YOUR GO-TO FOR HELP: ZENON ENGINEERING ASSISTANT

Artificial intelligence and deep learning are hot topics. These technologies are opening new possibilities in the field of IT. What could be better than linking large amounts of data with a chatbot like ChatGPT to quickly access the information you want? In this new world, COPA-DATA steps up with its zenon Engineering Assistant.

As a general rule, the more complex the software solution, the more extensive the software documentation. So the ease of finding important information plays an ever-more central role. The zenon Engineering Assistant searches all the sources of information available to provide the content desired in the right context. In doing so, the GPT-based tool uses our specially created database to generate answers. This vector database contains official documentation, knowledge base entries and video transcripts from our online training courses. Semantic connections between the various sources are encoded as vectors.

FIND OUT FOR YOURSELF

Go to engineering-assistant.copadata.com to open the zenon Engineering Assistant. The prerequisite is a one-time sign-in as a COPA-DATA SSO user. The single sign-on technology provides access to multiple topics such as zenon Engineering Assistant, zenon Academy and the COPA-DATA Self Service Portal. The service can then be accessed easily via browser at any time.

The graphical user interface has been kept simple on purpose. In the main window, the Assistant introduces itself in a few words. After you ask a question,

it can be found listed with older questions on the right of the window.

Use Start new chat to start a conversation with the zenon Engineering Assistant. A task or question that is formulated as meaningfully as possible helps to ensure that the search for the desired information is successful.

In the lower part of the view, you have the option to submit feedback. You'll also find information about terms & conditions and privacy & cookies.

The response to the question can then be rated. Use the thumbs up or thumbs down icons for this purpose. Unrated query results are tagged as NOT RATED in the view. Rated results, whether positive or negative, go into a feedback loop and are evaluated by COPA-DATA to help us ensure it is easier to query the desired information in the future. By feeding in new data, the Engineering Assistant can continue to develop, in order to provide even more accurate results for the posed queries. Take the opportunity to contribute!

ONE SERVICE – MANY LANGUAGES

A major advantage of the zenon Engineering Assistant is that it leverages the online language translation tool DeepL to provide multilingual support. For example, when you ask a question in your preferred language, the Assistant responds in your language automatically. The English version of zenon online help serves as the basis for the translations. As mentioned already, additional content from the knowledge base and video transcripts from the zenon Academy are also available as data sources to provide as much information as possible.

Combining multiple data sources for one query increases the hit rate. While previously only the contents of zenon online help or zenon Academy were searched, all available information on the desired topic is now evaluated automatically. This simplifies searches considerably.

TEST THE ZENON ENGINEERING ASSISTANT NOW

Technical support at any time? Use the zenon Engineering Assistant as a source of information whenever you want. We encourage you to rate the response after asking your question because your ratings will be fed back into the service and used to improve the responses to future queries. Together with zenon online help and zenon Academy, you now have free sources for information available around the clock to help you complete your tasks – so your information is always up to date.



The zenon **ENGINEERING ASSISTANT** supports you with the following functions:

- Outputs a text-based response to a question or request
- Links to relevant sections in zenon online help
- Links to corresponding videos in zenon Academy

Tips for use:

- Define a prompt that is formulated as clearly as possible for the context desired. This does not have to be a question.
- If the information you seek is not part of the query result, please indicate this in the search request.
- Limit the output options if, for example, you only want to search for videos or tutorials.
- Enter the question in English to avoid translation processes.



JOSEF RIES
Senior Technical Editor

After completing electrical engineering training and working for several years in this field, Josef Ries turned to software documentation. He has been creating and expanding the online help for the zenon software platform at COPA-DATA since 2016.

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IT AND OT IN HARMONY?

When it comes to automation, our goal is to intervene as little as possible in running processes. At the same time, systems require regular updates to stay current. As a result, IT and OT present a challenging dynamic. The long-term product lifecycle of the zenon software platform can help you meet these challenges.

In the world of automation technology, we all face a large number of conflicting requirements brought by IT and OT. On the one hand, there are constantly changing technologies and the need for frequent updates to minimize cybersecurity vulnerabilities. On the other hand, there is the need for robust systems capable of running for long periods of time without any interventions.

A BALANCING ACT TO MAKE EVEN JEAN-CLAUDE VAN DAMME BREAK A SWEAT

Let's go back to the start and think about the implementation of automation projects. Years can pass from planning to commissioning. This requires a high level of coordination between different teams and technologies. If the product lifecycle of the software deployed ends, for example, shortly after the equipment is put into production, it begs the question: how do you deal with this situation?

In the case of regulated systems, the equipment has to be revalidated. In addition to very high additional costs, this also entails partly unforeseeable risks. Businesses operating in critical infrastructure environments are also interested in long-lasting and durable systems for which the software landscape does not need to be updated continually. On the other hand, legal requirements such as the Cyber Resilience Act and the NIS2 Directive are coming into effect with the aim of reducing vulnerabilities in cybersecurity. For businesses, this means that they are obligated, among other things, to use software that is kept always up to date.

TO ENSURE (PLANNING) SECURITY, BUSINESSES NEED SOFTWARE THAT MASTERS THE IT/OT DYNAMIC

At COPA-DATA, we have overhauled the product lifecycle of the zenon software platform and the Premium Support of the Service Level Agreement (SLA). As part of a long-term SLA, the native source code of a zenon Service Engine version is now maintained for 10 years (see figure). If an upgrade is needed, this is included in the service level. And, of course, zenon remains compatible across versions. What happens to a zenon installation if hardware malfunctions? In this case, COPA-DATA provides a free reactivation of the zenon license.

For customers who require additional licenses for a zenon version no longer under maintenance or who need to reactivate existing licenses without having an active long-term SLA in place, the newly introduced legacy license provides a solution. This includes reactivation

of the license, if necessary, for five years from the date of purchase.

What about other products under the zenon software platform umbrella? The lifecycle of the zenon Report Engine has been extended to five years. zenon IIoT Services remain in the three-month cycle as usual to accommodate fast-moving web technologies and keep security vulnerabilities to a minimum. To learn more, visit our website.

We are confident that the zenon software platform will help you bridge the gap and harmonize the worlds of IT and OT technology.

34

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ANITA PERCHERMEIER
Customer Experience Manager

Anita Perchermeier joined COPA-DATA in 2014 as a Screen and Interaction Designer. After five years as a project lead for the Professional Services team, she now works as Customer Services Manager and ensures that products and services from COPA-DATA not only provide impressive technology but also delight customers in their overall applications.

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zenon Service Engine Release- & Support life cycle

	Release	Product Life Cycle			Legacy license sales starting with
		Standard		Long-Term	
zenon 14	2024	03/31/2029		03/31/2034	04/01/2029
zenon 12	2023	03/31/2028		03/31/2033	04/01/2028
zenon 11	2022	03/31/2027		03/31/2032	04/01/2027
zenon 10	2021	03/31/2026		03/31/2031	04/01/2026
zenon 8.20	2020	03/31/2024	03/31/2026*	-	04/01/2025
zenon 8.10	2019	03/31/2023	03/31/2025*	-	04/01/2024

zenon Service Engine product life cycle

*Life cycle with active SLA

COPA-DATA Service Level Agreement

	LEGACY	NO SLA	SLA	LONG-TERM SLA
RESOURCES & DOWNLOADS				
Access to Self Service Portal	X	X	X	X
Manuals, white papers, fact sheets	X	X	X	X
zenon Academy online training courses	X	X	X	X
MAINTENANCE				
Extended Maintenance			5 YEARS	10 YEARS
Free zenon version upgrades for all recorded licenses			X	X
SUPPORT SERVICES				
Requests via Self Service Portal		X	X	X
Requests via telephone			X	X
Preferential ticket processing			X	X
Guaranteed professional response within two working days			X	X
Assistance via remote support and web meetings			X	X
Notifications about new zenon builds for maintained/licensed versions			X	X
Free license reactivation			X	X
DISCOUNTS				
Classroom training			X	X

The benefits of a zenon Service Level Agreement





INDUSTRIES & SOLUTIONS

37

IU

- 38 Energy:**
OT and IT synergies in critical infrastructure
- 41 Life Sciences & Pharmaceutical:**
Recipe management in Life Sciences: Challenges and solutions
- 46 Food and Beverage:**
Using all resources to consume less
- 50 Automotive:**
Perfect automotive surfaces with zenon



38

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OT AND IT SYNERGIES IN CRITICAL INFRASTRUCTURE

In the future, OT and IT systems will increasingly come together because they are dependent on each other. Redundancies are critical in order to ensure the availability of OT systems during patch activities. OT and IT systems will eventually merge and then we will refer to a single technology that makes our lives easier.

It is sometimes said that operational technology (OT) is IT with physics. In fact, OT deals with the control and automation of processes and procedures in production, energy generation and distribution that are based on physical or chemical principles.

At least in critical infrastructure,

such as a country's power generation or distribution facilities, OT is more than IT with physics. In networks with increasingly decentralized power generators, such as wind farms and PV systems, dynamic pricing on electricity exchanges and the like, it is essential to have data interfaces to higher-level IT

systems with return channels for access to power generation and the distribution network. This is the only way to implement dynamic processes, such as the automatic adjustment of energy production to consumption in real time.

However, this development has consequences for OT and IT.

OT must be available around the clock and cannot simply be restarted because it is patch day, i.e. the day when an update for an operating system is installed.

It is, therefore, understandable that people responsible for keeping critical infrastructure running ignore aspects other than whether it is running properly. As long as these systems operate independently and autonomously, issues such as data interfaces to third-party systems and protection against unauthorized access have a low priority.

In other words, OT has traditionally worked in silos and was separated from the IT infrastructure. However, the integration of OT data in IT systems represents a turning point that brings with it many advantages but also disadvantages. A major benefit is that operational efficiency, safety and decision making are improved.

One of the main benefits is the comprehensive insight gained about equipment operation. By leveraging data generated by OT systems –

from device metrics to power quality (highly detailed recorded electrical quantities) – operators can gain a comprehensive understanding of processes. This integrated perspective enables informed decisions and makes it easier to identify optimization potential as well as disruption and problems.

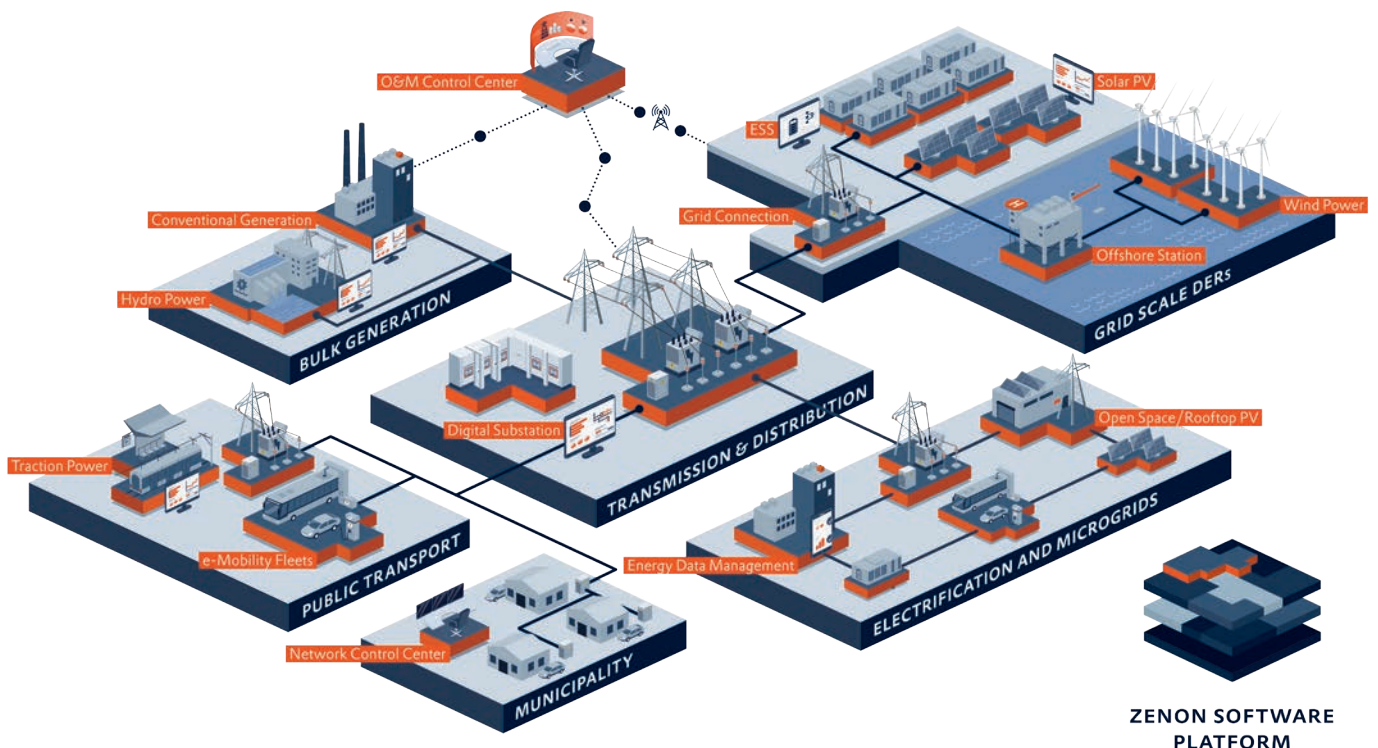
The use of OT data in conjunction with advanced analytics makes it possible to implement preventive maintenance strategies. By analyzing historical and real-time OT data, anomalies and patterns that indicate downtime potential can be identified early. This proactive approach minimizes downtime and improves maintenance costs and improves the reliability of equipment and systems.

The combination of OT and IT data makes it easier to optimize processes. By integrating OT data in IT systems, operators can identify inefficiencies, optimize processes and implement automation solutions. Real-time monitoring and analysis further enables timely adjustments

to maintenance schedules and resource allocation, increasing operational efficiency.

CYBERSECURITY IS GAINING RELEVANCE IN OT

The connection between OT and IT makes a number of areas open to the type of cyberattack to which previously only IT was exposed. Even offline, air-gapped systems without a network connection should be protected against cyber threats and monitored accordingly. Finally, the connection to devices used for maintenance, including laptops, USB sticks or programming devices, can also transmit malware. In this environment, IT systems can play a crucial role in strengthening cybersecurity measures. It is not in the DNA of OT systems to effectively detect and respond to potential security breaches, so OT data has to be monitored along with IT data. Robust access controls, encryption protocols and intrusion detection systems protect critical infrastructure from cyberattack and ensure



operational continuity and integrity. One way to protect existing OT is to use data diodes that allow data flow in only one direction. This method can be used, for example, to transfer process data to the higher-level IT system without malware entering the OT. The drawback here is the lack of a return channel. It is not possible to re-parameterize devices via IT, nor is it possible to confirm that a transmission has been carried out correctly.

Another security mechanism is provided by the rendezvous technique. At an agreed time, after authorization and activation of the session, a short-term connection is established between IT and an OT device and the desired data is exchanged. In this case, the device has to be “tempered” in OT. This means limiting the functionality of the respective device to what is absolutely necessary. Unnecessary functions and interfaces should be disabled and unnecessary software uninstalled, taking a “what is not there cannot be compromised by malware” approach.

Despite all the security measures, the biggest problem is that, unlike IT systems, OT systems can never be allowed to fail. They must be up and running 24/7. Furthermore, they should never be restarted. There can be no downtime. Changes have to be planned and tested very carefully. It makes sense, therefore, that users look for systems that do not need to be patched. This results in a demand for devices that do not fall under the PC category and are therefore exempt from the patch requirement. Typically, such devices do not have a Windows operating system. Instead, they run on an adapted Linux distribution.

Generally, these are devices with embedded Linux. The adapted Linux distribution consists of the Linux kernel and software tailored specially to the hardware for the respective device and required functions. The main benefit is stable operation. The adaptation makes the embedded Linux system virtually unique and thus reduces its vulnerability to cyber attack. Yet using

Linux does not automatically protect you from closing security gaps through patching.

What would an OT system look like that sooner or later has to be treated similar to an IT system but still needs to be available around the clock? This can probably only be achieved through redundancies, which are complex but provide more flexibility during patching processes.

OT AND IT COMBINED IN ONE SYSTEM

We believe that both areas must and will come together because they are interdependent. In other words, OT cannot be improved or optimized without IT. And without OT, IT would have no data to analyze and use for pattern recognition. Sooner or later all will be one and we will no longer distinguish between OT and IT. Instead, we'll only talk about a single technology that makes our lives easier.



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Jürgen Resch has been passionate about power plants and captivated by cables since he was a child. If you want to test out his expertise and find out just how switched on he is, simply email:

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RECIPE MANAGEMENT IN LIFE SCIENCES: CHALLENGES AND SOLUTIONS

In the world of pharmaceutical manufacturing, the management of “recipes” within production machines plays a crucial role. But what does this mean exactly? And what challenges lie behind a recipe process? In this article, we’ll consider the different approaches to recipe management and discuss a state-of-the-art solution that makes a smooth and efficient recipe management process possible.

THE POWER OF A “RECIPE”

Production machines can be adapted to produce different products or variations of a product in order to meet customer demand while ensuring that machine utilization remains high. To make it suitable for producing the different product, the production machine might be modified in a number of ways. Such modification may involve various components, including conveyors, guides, feeding mechanisms and sealing devices. This process is known as “changeover”.

But how does a changeover actually take place?

First of all, it is important to emphasize that a changeover can be manual or automatic. Traditionally, operators would manually change the necessary machine settings. However, this introduces the risk of human error.

Furthermore, the machines are necessarily not producing product while they are being manually modified. Because the machines are idle during a changeover, engineering an efficient changeover process can significantly contribute to minimizing downtime and boosting the overall efficiency of a plant.



Figure 1: Simplified recipe processing in zenon as a pharma HMI

As a result, automation is increasingly being used in these modern, automated machines, the role of the production “recipe” comes into play. Of course, we are not talking about cooking! In this context, a recipe is a set of instructions that define how the machine should operate to produce a particular item. When switching from one product to another, the machine automatically loads the corresponding recipe, reconfiguring the machine settings quickly and efficiently.

By automating the changeover process through the use of recipes, manufacturers can adapt the machines to suit production needs without a hitch. These recipes make it possible to produce a wide range of products with precision and speed.

RECIPES IN THE AREAS OF FILLING AND PACKAGING VS. FORMULATION

There are different recipe management requirements when operating formulation and compounding processes than there are when operating in the filling and packaging departments.

In the filling and packaging areas, machines normally perform operations in predetermined sequences with parameters that do not change during batch execution. This is the typical use case for a filling machine, a sterilization tunnel or a tablet press. These processes use fixed parameter recipes.

By contrast, in the formulation and compounding areas, preparation equipment typically carries out operations (or phases) that follow one another in a flexible sequence, depending on the product to be prepared.

The operation of each phase is defined by the machine manufacturer. Each phase has its own parameterization. The sequence in which the phases are carried out can be defined by the user. This is the typical scenario for a fluid bed dryer or a bioreactor. Such machines and processes use flexible recipes.

Another use case for flexible recipes might be when the user defines both the sequence in which the steps are carried out and the parameterization of the individual steps. Here, the ideal solution is to use batch control engines which meet the ISA-88 standard, such as the zenon Batch Control module.

RECIPE MANAGEMENT IN PHARMACEUTICAL MANUFACTURING

In pharmaceutical production, quality and compliance are paramount. A recipe likely contains critical process parameters (CPP) from a Good Manufacturing Practice (GMP) perspective, such as the sterilization temperature value of a tunnel and its alarm limits.

Deviation from these process parameters or any change to them will affect the efficacy, quality, compliance and safety of the manufactured product. For this reason, changes to recipe parameters must be recorded in an audit trail.

The audit trail should include the relevant metadata, such as the name of the user and the date and time of the change. Only in this way can the company guarantee data integrity and good recipe management according to GMP standards.

The lifecycle of recipes must also follow a process

that complies with the company's quality procedures. For this reason, a recipe must have a versioning and status system to enable a complete approval cycle by authorized personnel.

In this context, the Connected Machines working group of Good Automated Manufacturing Practice (GAMP) Italy has published an example of a User Requirement Specification (URS) document which indicates the minimum requirements that machines must meet in terms of recipe management.

For a complete reading of the document produced by GAMP Italia, have a look at the box at the end of this article and scan the QR CODE.

CHALLENGES FOR PHARMACEUTICAL MACHINE BUILDERS

Recipe management in pharmaceutical machines presents several challenges for machine builders. On the one hand, it is necessary to ensure flexibility in recipe configuration to meet different production requirements. At the same time, it is essential to ensure compliance with GMP and data integrity regulations, which impose high standards for quality, safety and traceability.

Conventional SCADA systems, used for the monitoring and control of processes at the machine or in line management, are not always able to provide an optimal solution for recipe management. Often, these systems lack advanced functionality for recipe creation, editing and verification.

For this reason, some machine manufacturers opt to develop customized software solutions for recipe management. However, this choice also entails risks

and difficulties, especially related to software lifecycle management and process validation.

Indeed, the machine builder must deal with the lifecycle of a category 5 software application according to GAMP 5 (custom code), with all of its implications for document management and validation. In addition, the machine builder must allow for software maintenance over time. This requires frequent updates to maintain compatibility with new operating system versions and to ensure cybersecurity resilience. In a custom solution, these activities cannot be delegated to an automation technician. Instead, they require a software development team.

ZENON RECIPE GROUP MANAGER

Modern Operational Technology (OT) software platforms offer advanced functionality for recipe management. These platforms integrate recipe configuration with process control, ensuring regulatory compliance and operational flexibility.

The Recipe Group Manager (RGM) module in zenon was conceived and developed for managing fixed-parameter recipes in connection with machines or production facilities in the context of pharmaceutical production.

RGM has been available in zenon for more than 20 years. Over this time, it has been continually developed in collaboration with major pharmaceutical customers to meet the industry's need for flexibility and regulatory compliance.

Let's take a look at some of the most relevant zenon Recipe Group Manager features.



Figure 2: Recipe group manager in zenon as Automation Integration Layer (AIL)

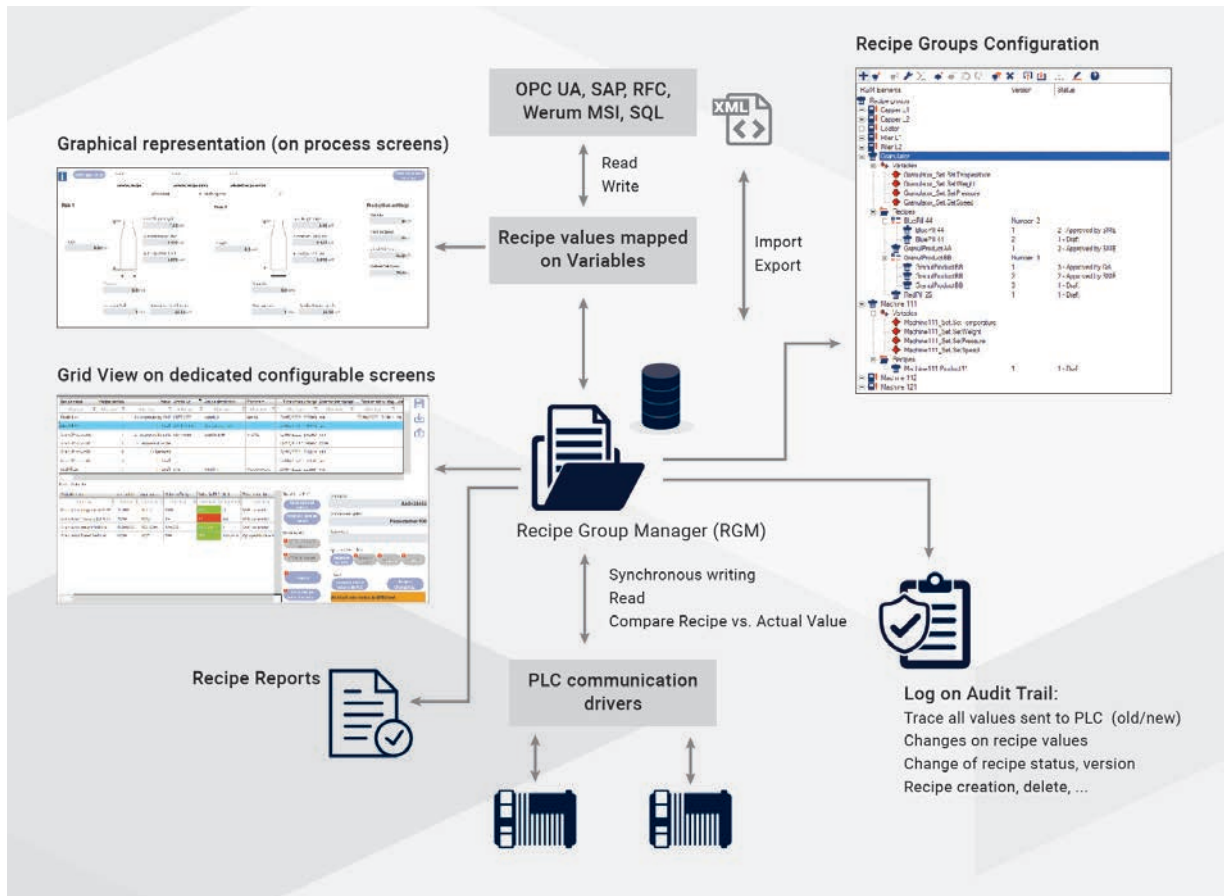


Figure 3: zenon Recipe Group Manager in a nutshell

ORGANIZATION IN GROUPS OF RECIPES

With zenon, it is possible to configure different recipe groups. For example, in a machine, one group includes machine configuration parameters and is only visible to maintenance personnel, while another group is for format parameters available to the operator (Figure 1). Alternatively, when zenon is installed as a centralized Automation Integration Layer, each connected machine will have its own recipe group (Figure 2).

RECIPE LIFECYCLE MANAGEMENT

In accordance with current GMP regulations, the recipe must have versioning and status management, so that an approval workflow can be implemented by the delegated users. We can therefore have version 1 of the recipe 'Paracetamol 500mg' in 'OUTDATED' status, version 2 in 'RELEASED' status and version 3 in 'DRAFT' status.

BI-DIRECTIONAL COMMUNICATION WITH FIELD DEVICES

The RGM module takes advantage of the native connectivity of the zenon software platform. It is therefore possible to connect it with most PLCs and process controllers. This enables the creation of recipes by reading

values from the PLC, bulk writing of recipe parameters to the PLC and comparison of recipe values with machine values.

GRAPHICAL REPRESENTATION MODALITIES

The recipe can be represented to the user as a grid of parameters which presents a complete representation of the information. Alternatively, the recipe can appear in a graphical image to offer a simplified view of the settings. Data input mode is also facilitated by defining dedicated input windows depending on the type of data being edited.

USER ACCESS CONTROL

The RGM module allows full user access management, both in changing parameters and in changing status and version.

COMPLETE LOG OF OPERATIONS ON EVENT LIST (AUDIT TRAIL)

All actions performed in the RGM module are tracked in the zenon Chronological Event List (CEL) to generate a complete audit trail in accordance with FDA 21 CFR part 11. Changes to recipe parameters, version and status, sending parameters to the controller, etc. are all tracked.

INTEGRATION WITH MES AND ERP SYSTEMS

When it comes to integrating OT systems with IT services, recipe management is an important consideration. zenon's RGM module integrates with the IT interfaces already available in zenon, including the Werum MSI Interface and the SAP Interface. Several scenarios are possible. In the simplest, the recipes are stored in zenon so the MES needs only to send the recipe name and version to zenon, then the recipe is sent to the PLC by zenon. Alternatively, the entire recipe can be exchanged between the IT service and zenon via an OPC UA or XML interface.

REPORTING

RGM integrates with zenon's Report Viewer. This makes it possible to generate reports that, for example, can include recipe contents and lists of changes made, as shown in Figure 3.

RECIPE OPTIMIZATION

The RGM module in zenon allows, in accordance with the appropriate user rights, the modification or optimization of recipes, even if the machine is running.

A HIDDEN CHAMPION

We can only explore a few features of the zenon RGM module here. zenon includes many other features that are relevant to pharmaceutical manufacturing, such as the storage of recipe data on redundant servers. For a complete description of zenon's functionalities, take a look at our online documentation.

Today, we increasingly speak of low-code/no-code platforms to define innovative software solutions that allow applications to be built with minimal code writing. Extolled benefits include reducing development time and effort and the associated costs, as well as empowering operators.

THIS HAS ALWAYS BEEN THE COPA-DATA WAY.

We are pleased to note that zenon's original idea of "parameterizing rather than programming" is now being followed by others. In this context, with its high configurability and flexibility, the zenon RGM module is for sure a hidden champion within zenon software platform.

DOWNLOAD
GAMP Italy Connected
Machines URS Template



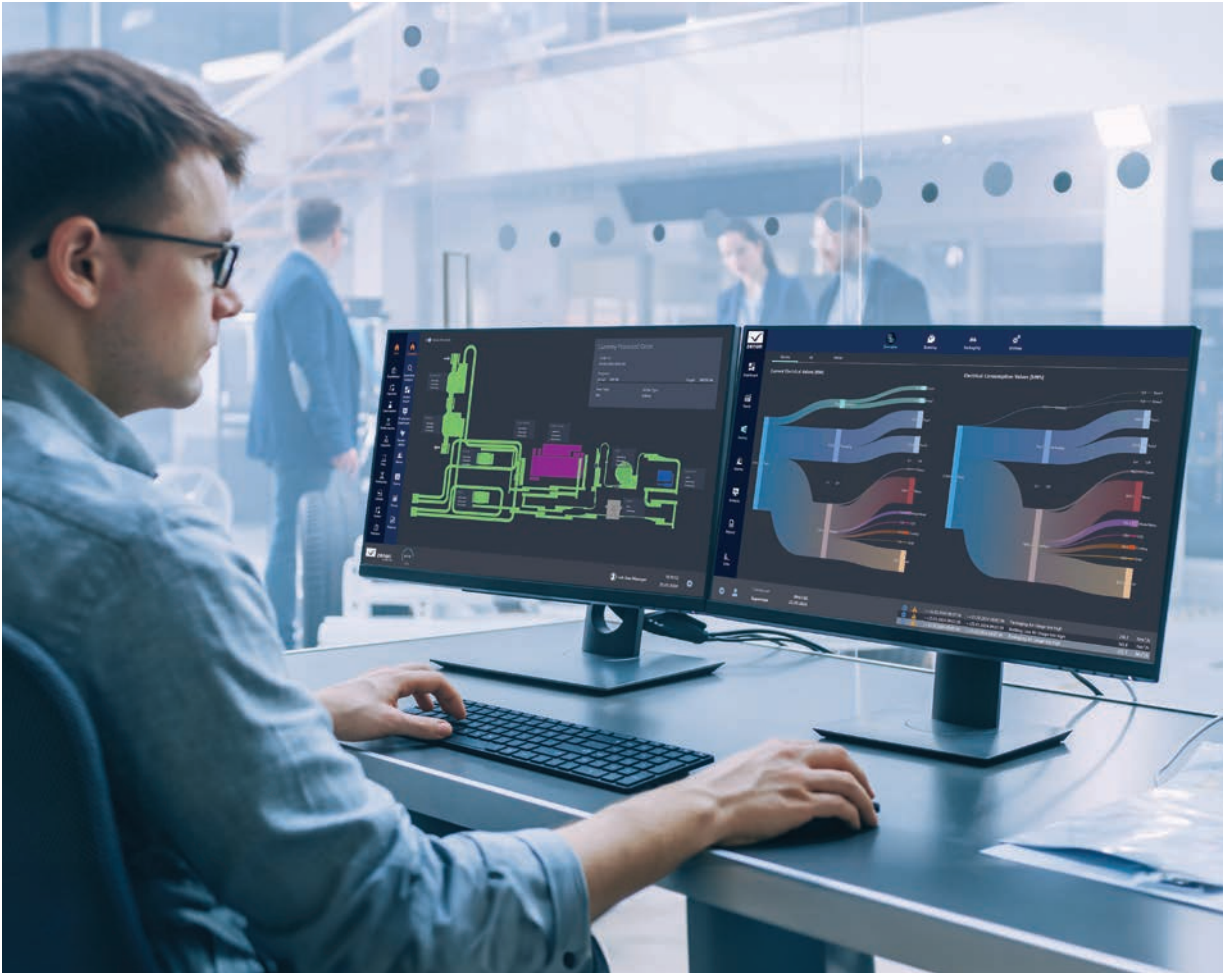
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integration in pharma
manufacturing



GIUSEPPE MENIN
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Giuseppe Menin began his career in mechatronic engineering at the end of the 1980s, as an automation engineer and software developer. As a project manager, he coordinated R&D projects for the automation, monitoring and data integration of manufacturing lines. In 2004, Giuseppe joined COPA-DATA and now works in the role of Life Sciences & Process Industry Manager at COPA-DATA HQ. He collaborates on digitalization projects in life sciences together with pharmaceutical companies and equipment vendors. Since 2014, he has been a member of the International Society for Pharmaceutical Engineering (ISPE). He is member of ISPE Pharma 4.0 "Plug & Produce" Special Interest Group and is on the steering committee of GAMP Italy CoP.

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USING ALL RESOURCES TO CONSUME LESS

Faced with increasing energy costs and heightened awareness of the global climate crisis, virtually all businesses today are looking for sustainable solutions in production that save resources and improve efficiency. At the outset, such a project might seem almost impossible to implement. However, zenon can be the ideal tool in this area – from collecting data in the initial steps to forming a larger picture of all the energy flows and developing effective measures.

TO SET GOALS YOU FIRST NEED TO KNOW WHERE YOU STAND

When a business wants to reduce energy consumption, it first has to identify where and what amount of energy is required. The more detailed the data captured, the more accurately measures can be implemented and their success monitored. In order to make informative, high-quality comparisons and study correlations, you must be able to record energy consumption continuously over time and based on its source. For this reason, the first step towards saving is to open the “black box” of

energy consumption. This makes it possible to obtain an increasingly detailed overview, based on the top-down principle, of what energy is required for which production steps and consumers.

This approach requires businesses to digitally recreate the physical world and store this information in a process image. However, this information is not always available in the form of data points. For a green-field production facility – that is planned and realized from scratch – data acquisition is not usually a problem these days. This aspect is often already taken into ac-

count during planning, either in the form of smart meters or in the new equipment units themselves. On the other hand, many brownfield plants – already existing and developed structures – also theoretically provide these data points. However, this data is not always used in a meaningful way or may only be available in analog formats. In such cases – or when necessary data is missing – there are many suppliers today who can provide meters for all types of media. These are usually easy to integrate and they provide greater transparency when it comes to the energy consumption of production equipment.

Regardless of the starting point, the zenon software platform displays its strengths from the start. Thanks to its hardware independence, zenon can be used in brownfield, recently retrofitted or newly planned production facilities. Virtually all major communication protocols and drivers are supported, and, as a result, existing data can be fed to the software platform. This means that data is not only available digitally, but is also captured centrally in one software platform. This is one benefit that is not always taken into account, even with new equipment. The fewer systems used in a company, the easier they are to manage. For example, fewer programs and their interfaces need to be maintained and fewer experts are needed to cover the various solutions.

Once all data points have been recorded, a second strength of the zenon software platform comes into play. The graphical design and processing of all data is possible with zenon, even without programming knowledge. Energy consumption values can be integrated quickly in a dashboard. They can also be processed further, archived or made available for comparison. This makes it possible, for example, to relate water, electricity or compressed air consumption to different product groups or process lines. This provides the basis for setting up an energy data management system (EDMS) which processes pure measured values in a tailored way so that the values are easy for employees to understand. This subsequently helps them to better manage the energy flows in the company. Such an understanding of the current situation serves as a basis for identifying energy-critical processes and enables users to develop suitable measures and set objectives for a more sustainable future.

KEEP AN EYE ON YOUR GOALS AND A PARTNER AT YOUR SIDE WITH ZENON

Energy management measures often involve three different categories: new equipment that reduces energy consumption; redesigned processes and procedures that improve efficiency; and changing the sources of energy to become more sustainable and save money. It is not uncommon for decisions involving multiple measures in different areas to be made at the same time. This means an EDMS has to be extremely flexible in order to respond to changes in the process, the equipment in a production chain and the scaling of a project. At

this point, another strength of zenon comes into play: its well-thought-out modular concept. In addition to the modular structure of the platform, projects can be designed modularly and combined with each other flexibly. This makes it easy to set up an EDMS project using information and data from existing zenon projects, such as line management. Plus, additional components can be added to the project at any time.

A lot of energy can be saved, for example, by using less compressed air. Newly purchased devices can be integrated easily in an existing comprehensive project. The new data can be compared to old consumption values, allowing a quick overview of energy saved and the financial impact. Expenditures can be checked for effectiveness and return on investment tracked.

The data obtained can also be used to adapt or dynamically influence processes. To save energy and, particularly, money, it makes sense to prevent peak loads. On the one hand, the zenon Load Management module can, for example, dynamically switch consumers on and off to reduce peak loads. On the other hand, processes can be coordinated using zenon Logic – a soft PLC that is a native part of the zenon software platform – to spread heat-up phases over a longer period. Depending on the situation, it can be beneficial to coordinate the timing of automatic cleaning and energy-intensive production processes to ensure a uniform energy requirement. You can also use zenon to implement locks and trigger points to ensure that no one can accidentally start processes.





Software for production and consumption data

COPA-DATA's expertise across industries helps us to look at the larger picture when considering a business's energy flows. zenon not only supports important standards for production but also supports the relevant standards for building management systems (BMS) and the energy and infrastructure industry. In addition to production, other consumers and energy sources can be included. More and more producers are taking energy production partially or entirely into their own hands. When management and control are not carried out separately from production, it enables further possibilities. Using zenon, for example, it is possible to integrate a solar power system or a battery storage system. The standards commonly used in energy and grid supply, such as IEC 60870, IEC 61850 or SunSpec, are supported natively in zenon. This means that energy from the solar power system can be taken into account in the calculations, as per consumption. This provides entirely new possibilities, for example, to adapt production to the resources currently available. Not only can energy be saved but the energy available can also be used more effectively. In times of excess energy production, it can be converted into thermal energy. Alternatively, in conjunction with a BMS, processes such as charging electric cars can be initiated or optimized.

In addition to production energy needs, an increasing number of predominantly electrical consumers need to be managed in conjunction with the BMS. These consumers include heat pumps and charging stations for electric car fleets. These loads must be taken into account when looking at the big picture. It is likewise possible to implement smart building projects

that expand the scope of potential savings. In this regard, zenon is already a partner on the side of businesses, as many successfully implemented projects demonstrate.

A SWISS ARMY KNIFE FOR YOUR OT/IT INTERFACE

In the past, the boundary between OT and IT was strictly separated. Today, it has become blurred. zenon is a good example of this trend in action. As a software platform, zenon is as at home in the OT sector as it is in the IT sector – and as an interface between the two. zenon's IIoT services help to bundle data and distribute this information across different networks for subsequent interpretation. This means that as well as individual areas or locations being evaluated, key metrics can also be determined and compared across locations. In this scenario, zenon functions not only as an OPC UA client but also as a server. This enables the values measured to be standardized and used across projects and locations.

Reports help you to evaluate data. Using the zenon Report Engine, collected data can be processed clearly and tailored to your requirements. Long-term analyses can be carried out easily using annual reports or product-group-specific reports, an essential step for monitoring targets. Relationships and interactions in the various energy flows can also be evaluated much more accurately.

Users can also transfer data to third-party systems or higher-level programs, e.g. in the scope of MES or ERP. As a result, the knowledge gained can be incorporated in production planning. Operating a biogas plant to generate electricity is one example of such a case.

When these elements are integrated in the system, materials that might have been classified previously as waste products suddenly become raw materials for energy production. The supplied amount can, in turn, impact the “auxiliary” material energy. Although it is not a real auxiliary in the business economics sense – depending on the definition – energy should play a central role in production planning in the future.

Live data can also have an impact, especially on detailed planning. Environmental factors can certainly require a reasonable adjustment to the production plan.

LIVE PROCESSES REQUIRE FLEXIBILITY

The process of bundling your data, evaluating that data, drawing conclusions and implementing measures is an agile, iterative approach. This results in impacts and adaptations throughout the entire process. And once the initial milestones are reached, new opportunities and objectives arise.

The ISO 50001 standard contains similar requirements, specifying the development, implementation and maintenance of a systematic approach to energy consumption. It does not specify any fixed targets or concrete metrics, but rather sets a standard for good implementation. This is because every business is different, with different starting conditions and different potential for improvement. If the destination and start vary, you need a software platform that can always adapt and be configured for the specific task. With zenon, this flexibility is a given. The platform supports businesses from the start of data collection in the OT area through goal setting and implementation to cross-site success monitoring. As a result, businesses can, within their immediate sphere of influence, directly address the project of energy supply and consumption – Scopes 1 & 2 of the Greenhouse Gas Protocol – to be ready for the future.

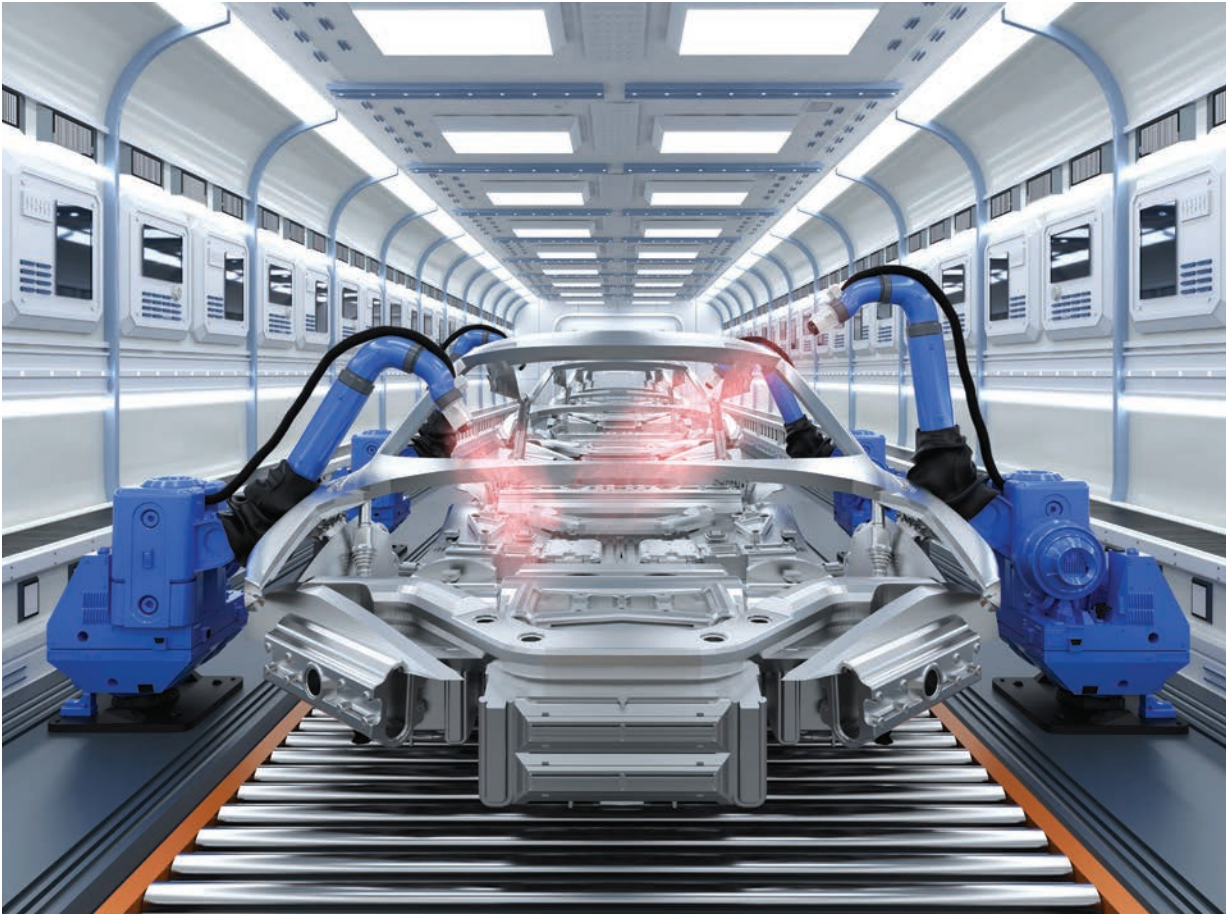


PHILIPP ZUR STRASSEN

Industry Specialist Sustainability Solutions and F&B

After completing his master's degree in Brewing and Beverage Technology in 2021, Philipp zur Strassen joined the COPA-DATA team. Initially working as a project engineer, he moved to the Sustainability Solutions and F&B industry team in 2023. In this role, he combines his industry expertise with his zenon experience.

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PERFECT AUTOMOTIVE SURFACES WITH ZENON

As much as tastes in the color of a car can vary, buyers, dealers and automakers agree on one thing: paintwork shows the quality of a vehicle and protects car bodies from the weather. When applied evenly, the paint provides a protective function for the auto body and ensures a beautiful, gleaming surface, rich with color.

Painting technology is considered one of the most sensitive processes in modern automobile manufacturing. It holds this status because of the high degree of process engineering involved. Automotive painting requires the highest precision and innovative technologies to ensure that as little material as possible is lost and emissions to the environment are kept to a minimum. In the painting process, a variety of production steps are necessary.

zenon clearly maps this complex structure of process and conveyor technology and manages the entire process from start to finish.

PRECISION CONVEYOR TECHNOLOGY SOLUTION FOR OPTIMIZED PAINTING PROCESSES

The auto body shop supplies the paint shop with car bodies via fully automated conveyor systems. The subsequent painting process in-

cludes several steps. First, the car body is cleaned to obtain a clinically clean surface. Different materials are then applied in layers to provide corrosion protection. After the undercarriage protection has been applied and hardened in the dryer, robots apply further layers of paint and a clear coat to produce the vehicle's shiny finish. For transport and to control the flow of car bodies, a reliable conveyor technology is required. Due to the high investment

costs for paintwork, these systems are designed to have a long service life. As a result, the paint shop handles a wide variety of vehicle types and models. This diversified production environment calls for complex control to manage the flow of car bodies, materials and parts. In the paint shop, vehicles are often transported through areas that are inaccessible to people for safety reasons. This requires reliable, end-to-end control of these processes.

The zenon software platform provides a wide range of functionalities suitable for use with conveyor technology. The zenon network functions enable the configuration and operation of distributed systems with the ability to manage multiple clients for on-site control. The powerful zenon Multi-Project Administration feature supports intuitive engineering and maintenance for such project structures. The zenon Worldview clearly shows the complete system layout with intuitive navigation and the option of continuous zooming.

To ensure the conveyor technology is operating properly, the positions of the car bodies at various equipment stations are captured automatically. Mobile data carriers enable automatic car body identification which, in combination with

central systems, enables car body tracking. This provides transparency over the “assembly lifecycle” in production. This data is also used for calculating the shift-related cycle times of the various production stations and for monitoring throughput times.

EFFECTIVE ANALYSIS WITH ZENON PROCESS RECORDER

Several decentralized controllers manage the conveyor technology that transports car bodies through the different areas of the paint shop. Cross-control data exchange between the individual PLCs is carried out via direct interfaces. The car bodies are identified using data carriers that travel with them. The destinations of the conveyor technology can be detected by querying the process control system. zenon monitors this system in a control room. Users can also intervene here to manage the system. For example, they can define new destinations, block transport routes or release them for certain vehicles.

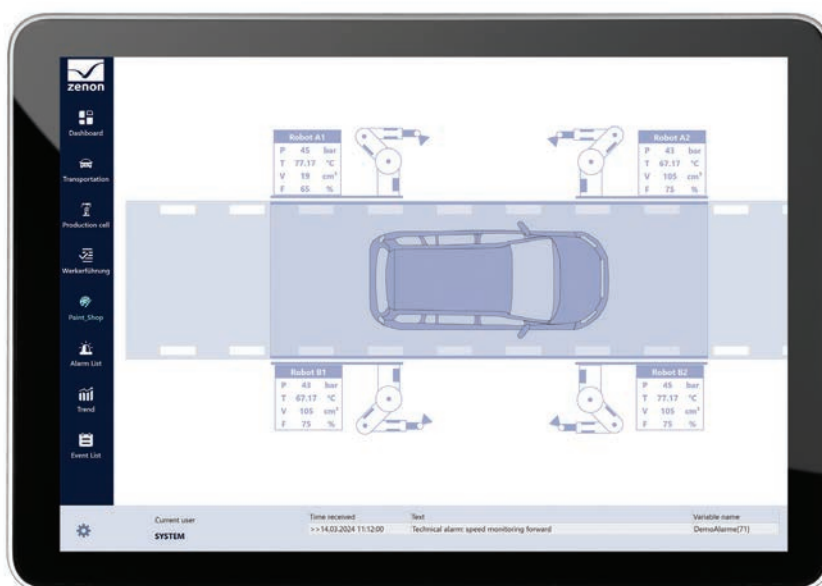
The zenon Process Recorder is a valuable add-on for subsequent targeted analysis – for example, in the event that a vehicle reaches the wrong destination. It is integrated in the existing zenon project:

the variables from the connected controllers are recorded using the integrated module. Configuration can be completed with a click of a mouse. The optimized recording by the Process Recorder also ensures that the condition data is stored on the server in a way that saves resources.

To interrogate the entire system at a later time, a zenon client can start the Process Recorder in a simulation mode. This client “decouples” itself from the online connection to the server and uses the recorded data to display the values on the screens. The Process Recorder provides a special control screen to “navigate” the timeline. It lists the time stamps of the recorded data and, at the same time, similar to a media player, offers buttons for forward, back, play or pause. This enables zenon users to bring a past situation back to the screen and study it. Using the controls, users can repeat chosen events at will or stop the display to look at the details. The screen contents are displayed exactly as they were at the time selected. In real operation, such analyses have already made it possible to identify the cause of vehicles being misdirected on several occasions and have helped to further optimize the overall control system.

INTERACTIVE, SAFE OPERATION EVEN IN DIFFICULT SITUATIONS

Some production equipment in the painting process can pose a risk to employee health. Despite a high degree of automation in production, a human has to intervene in some situations, such as changeovers, maintenance work, cleaning or downtime. Well-trained and experienced employees are an important factor here, and zenon supports them with interactive operator prompts that help to avoid stressful situations for employees and reduce potential operating errors. The operator gets clear instructions, a detailed description and safety information about the work steps that will be performed. The system prompts the



operator to carry out certain actions or enter information. The information entered is checked directly for “correctness” and “completeness”. Only when all entries are complete does the process continue. The procedure defined is followed strictly, and the operator is guided through the process. All data and work steps are recorded digitally and are available for use in quality reports.

The interactive operator prompts make it easier for users to carry out the work process, as zenon supports them with sensitive tasks. The assistant function leads to increased productivity and reduces operating errors.

SPOTLIGHT ON ENERGY CONSUMPTION

High-performance ovens are used in the drying processes for the painted car bodies. This energy-intensive equipment has to be used efficiently in a continuous production flow. The lengthy heating and cooling stages must also be optimally integrated in the production plan. Continuous monitoring of the

energy consumption of the ovens, and all other systems, serves as a basis for identifying inefficient controls or possible malfunctions.

With the help of zenon Energy Data Management (EDMS), expenses for energy and resource consumption can be reduced significantly. Legal requirements and standards, such as ISO 50001, set the environmentally oriented course. A forward-looking energy data management system not only identifies data for energy consumption, peak loads or usage, but it also establishes rules for proactive behaviors. In this way, for example, peak loads can be prevented and forecasts can be used to optimize future energy consumption.

In the painting processes, the resources being used have to be monitored and recorded continuously. All emission data is logged based on the process values of the hall ventilation system and the central supply of product. The values that require documentation are stored in the corresponding databases and are available in detailed reports.

INTERACTIVE QUALITY CONTROL

For car buyers, paintwork will always stand out as a visible sign of quality. As a result, the painting process includes continuous, comprehensive quality control measures. The painted car body is inspected by trained employees under special optical conditions. Any defects found are corrected immediately, if possible, or the body is reworked. Using a zenon screen, employees can report complaints conveniently, clearly and quickly, and these are then reported back to the central systems. The graphics displayed are used to select the corresponding auto body part, and the error type is entered. The position is indicated on the monitor. The processes necessary are then initiated for the rework control system. Employees can record rework, add comments, define times, change error types and assign rework to the proper cost centers. They use task lists to document the rework requested. By seamlessly recording all data and actions within a



cycle period, the system provides the framework for comprehensive quality assurance in the painting process. In addition to information about the quality of the paintwork on each car body, all the quality-relevant production data is recorded and is available long-term for use in quality reports.

OPTIMAL INFORMATION FLOW WITH CONSISTENT USABILITY

The various automated processes in the paint shop must be controlled and monitored at all times. This may also require switching and operating actions. The system has to be able to support both centralized and decentralized operation. Depending on the location of the interaction and the user logged on, the operating options may have to be updated. The zenon software platform supports a flexible architecture with a combination of central servers and distributed systems. zenon Multi-Project Administration can help users realize an efficient project structure. The use of clients, standalone stations and mobile devices ensures end-to-end control of the entire paint shop.

To manage the diverse range of equipment, solutions should have standardized styles and a user-friendly navigation concept. From an ergonomic perspective, it is important to provide a user-oriented interface in terms of data preparation and information visualization. This means users should see only essential and relevant information about their tasks. As a result, users get a better overview of the process and their decisions are not affected by unnecessary information. For operation and display, the screen contents, as well as underlying functionalities and calculations, are standardized centrally and used across the board. This has several benefits: by defining things in advance, systems can be put into operation more quickly. Operators can also be deployed more flexibly because the navigation and look of the production areas are identical on all the stations. zenon is

designed for universal use thanks to its consistently applied standardization methods. With Smart Objects, process experts develop encapsulated, functional software objects. These can be incorporated easily in the respective equipment projects. They contain all the information needed to ensure their functionality, such as interface variables for the process, formulas for calculations required or recipes.

FLEXIBLE APPLICATIONS IN PAINT TECHNOLOGY

The requirements for paint-shop technology are demanding and diverse. The systems used have to be flexibly configurable, but they also have to provide a stable architecture. For 25 years, zenon has successfully supported the manufacturing processes described here. Through continuous development, we have met updated security requirements and the other requirements that have developed over time. Thanks to its interdisciplinary strengths, zenon will continue to evolve to meet the demands of the future.



BERND WIMMER

Head of Professional Services

Bernd Wimmer has been Automotive Industry Manager at COPA-DATA Germany since 2002. He lives with his wife, two children and their cat in beautiful Bavaria.

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AROUND THE WORLD

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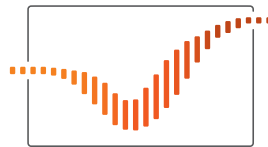
- 56** COPA-DATA Partner Community
- 57** SEP becomes first Gold Partner from Saudi Arabia
- 58** About Us
- 60** Improved oversight and knowledge sharing at DaeMyoung Energy
- 64** COPA-DATA Partners and Distributors

COPA-DATA PARTNER COMMUNITY

The mission of the COPA-DATA Partner Community (CDPC) is to establish long-term business partnerships. More than 450 specialist organizations in the field of industrial and energy automation belong to our network. What are its benefits? And who are the members of our community? The following article gives an overview.

The COPA-DATA Partner Community is open to all businesses that specialize in automation in the industrial and energy sectors. Members are mostly system integrators but also include OEMs, mechanical engineering firms and major training and research institutions. What all the members have in common is that they are driving digital transformation and they support end customers in integrating zenon in their business.

the CDPC family, SEP brings extensive experience and know-how to the community. With its focus on General Automation and Energy & Infrastructure, SEP makes a valuable contribution to the diversity and expertise of the network. The partnership with SEP is another example of the strength and diversity of members in the Central and Eastern Europe region, as well as the Middle East.



GROWING TOGETHER

We live by our motto in the COPA-DATA Partner Community (CDPC). Since 2020 alone, the global network, founded in 2011, has grown by roughly 50%. The focus of CDPC is building and maintaining sustainable, reliable and inspiring business partnerships. As the number of members in the community increases, the potential for collaboration between partner companies also increases – and that is a win-win for everyone.

COPADATA

Partner Community

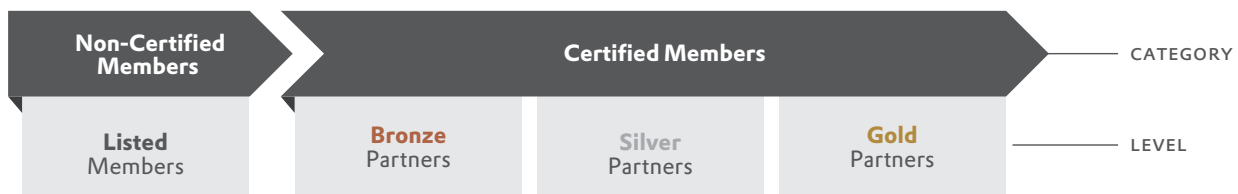
BENEFITS FROM SUPPORT TO TRAINING

In addition to direct communication and personal support from COPA-DATA, CDPC partners benefit from free online training courses, increased visibility in our various marketing channels and proactive and exclusive product information. In order to induct all partners as well as possible – whatever their level of zenon knowledge and experience – there is a multi-level membership, which is determined and developed in part through a certification process.

STRONG PARTNER NETWORK IN THE CEE AND MIDDLE EAST REGIONS: 127 PARTNERSHIPS FOR TAILOR-MADE CUSTOMER SOLUTIONS

We have a diverse partner landscape with a total of 127 partners in the dynamic regions of Central and Eastern Europe and the Middle East. Over the past four years, 64 new partners have joined the CDPC family, focusing on various specialization areas such as General Automation, Energy & Infrastructure, Automotive, Food & Beverages, and Sciences & Pharmaceutical. As system integrators, these partners support our customers with personalized implementation projects. An excellent example is SEP, a leading system integration company with an impressive portfolio of projects in the Middle East. As part of

It's easy to sign up to the COPA-DATA Partner Community
www.copadata.com/en/partner-community
 As a **Listed Member** you do not need any certified knowledge of zenon. **Bronze Partners** already have product knowledge and initial project experience, while **Silver Partners** have extended both their training and experience. **Gold Partners** have acquired comprehensive and in-depth know-how and have implemented innovative and extensive projects with zenon..



SEP BECOMES FIRST GOLD PARTNER FROM SAUDI ARABIA



SEP, a respected solution provider based in Saudi Arabia, has achieved the esteemed Gold Partner status within the COPA-DATA Partner Community. Building on its prior Silver Partner status, SEP is now the first Gold Partner in Saudi Arabia. SEP specializes in offering comprehensive automation and smart solutions to businesses in the Energy, Oil and Gas Industries. Enjoying a strong partnership with COPA-DATA and years of experience working with the company's zenon software platform, SEP has been able to elevate its status to that of Gold Partner.

COMMITMENT TO EFFICIENCY AND RELIABILITY IN THE POWER SUPPLY SECTOR

SEP's expertise lies in the areas of system engineering in the energy sector, which enables the company to provide state-of-the-art solutions that ensure efficiency and a reliable power supply. With a team of 400 qualified professionals, SEP offers complete energy automation solutions for end users in the energy supply sector.

LEVERAGING THE POWER OF COPA-DATA'S ZENON SOFTWARE PLATFORM

Under the leadership of Dr. Bruno Stocchi, General Manager at SEP, the company has successfully delivered automation solutions to customers across Saudi Arabia. Niaz Hussain Panhwar, Business Development Manager at SEP, emphasizes the importance of zenon in creating these systems: "The software is what brings the systems to life. As a service provider, we need a platform that offers comprehensive functions and easy adaptability to different application scenarios."

SEP'S JOURNEY TO GOLD PARTNERSHIP

SEP's commitment to excellence and its proficiency in leveraging COPA-DATA's zenon software platform has earned it the coveted Gold Partner status. Having initially become a COPA-DATA Qualified Partner in 2017, SEP's promotion to Gold Partner in 2023 demonstrates its continued dedication to excellence.

COPA-DATA congratulates SEP on its achievement and looks forward to deepening the partnership. This collaboration reflects our shared commitment to delivering innovative automation solutions in Saudi Arabia.



SAUDI ELECTRICITY
COMPANY

📍 2nd Industrial
City-Riyadh, KSA

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11383-Riyadh

@ sales@sep.com.sa

☎ +966 11 4980822

General Manager:
Dr. Bruno Stocchi
bruno@sep.com.sa

300+ Team Members

15+ Years in Business



Bruno Stocchi (right), General Manager of SEP and Alexander Punzenberger, COPA-DATA CEE/ME President (left).

ABOUT US

In every issue, Information Unlimited places the spotlight on selected employees to help our readers get to know our company better. Our employees featured here talk about their professional workday and personal interests.

ALEXANDER WEGMAYR

Deputy Lead Development,
COPA-DATA Headquarters
At COPA-DATA since: 2003

I was first introduced to COPA-DATA more than 20 years ago as part of my first internship. My job includes a wide range of activities, with my focus on making sure that everything is running smoothly, and we are on the right track. In addition to serving as deputy VP for Software Engineering, I assign bug-fixing work to the relevant teams, analyze crash dumps and monitor the development mailbox. Alongside work on technical and architectural concepts, I also actively implement changes to the product and its underlying infrastructure. Outside of work, I exercise regularly. My passion is functional fitness training, and I like to share my knowledge in this area. I have a healthy lifestyle and practice this through a variety of activities.

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DAVID MIGUEL MENDES CERDEIRA

Senior Support Services Engineer,
COPA-DATA Headquarters
At COPA-DATA since: 2012

I specialize in debugging software and troubleshooting issues. Colleagues and customers turn to me for assistance on a wide range of topics, from intricate software problems to recommendations for useful tools in different scenarios. Based in Lisbon, my workplace is not quite the same as being at HQ as I share the space with only one other colleague. Despite the distance from Salzburg, I visit often to ensure a strong connection with colleagues and customers. I cherish the constant challenge and problem-solving in my job. Every day, I dive into intricate technical issues, troubleshoot and find solutions. It's the thrill of overcoming challenges and the satisfaction of helping others that keep me passionate about my work.

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ISABELLA KRALL

Learning Experience Designer,
COPA-DATA Headquarters
At COPA-DATA since: 2021

As a Learning Experience Designer, I prepare audiovisual features about our software for our customers. To make learning fun, you need to have a well-developed main thread running through the program, storytelling that motivates and a sense of humor. Rimshot, please... ba dum tss!

Our team is somewhat of a wild bunch. Because we're all free-spirited creatives, we always find a way to crack even the hardest nut. Our notorious breaks at the office foosball table – and the accompanying fits of laughter – help keep our creative juices flowing.

In addition to our unbeatable team spirit, the zenon Software Platform is the absolutely perfect playground for me: behind every new feature there is an adventure that needs to be explored and a story that wants to be told. It's always full steam ahead!

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JARKKO HOLMLUND

Sales Manager, Finland,
COPA-DATA Scandinavia
At COPA-DATA since: 2023

What I like most about my job is working together with customers to find the most well-suited solutions, serving them with ideas, value add, concepts and POCs built in smooth cooperation with the local and relevant global COPA-DATA teams. Winning customer trust and building relationships to prosper in the long term.

People can come to me with any question. Even if I don't have an answer right now, I will listen, think and return back with an answer, a tip as to whom you should contact or where to find more information. Based on my work experience, my "specialty" would be in the Energy sector, especially SCADA for infrastructure and renewables, substation automation, feeder automation and related wireless or substation automation communication topics. I am also trying hard to catch up on applications and priorities in Life Sciences and F&B. It's very interesting!

I would describe myself as an honest, passionate and experienced doer.

jarkko.holmlund@copadata.com



IMPROVED OVERSIGHT AND KNOWLEDGE SHARING AT DAEMYOUNG ENERGY

DaeMyoung Energy was founded in 2000 to address the need for renewable energy management and investment in Korea. Since then, the business has grown rapidly and was listed on KOSDAQ, the Korean stock exchange, in 2022. The company's employees operate and manage wind and solar power and energy storage systems across Korea, with the company headquartered in the Korean capital of Seoul.

THE NEED FOR CENTRAL OVERSIGHT OF DISPERSED POWER PLANTS

DaeMyoung Energy operates several dispersed wind and solar power plants across Korea in the Taebaek, Cheongsong, Pohang, Yangsan, Geochang, Hwasun and Yeongam regions. The company's management team wanted to improve the central oversight and management of these locations.

Rapid growth over two decades meant there had been little time to standardize. Each plant had unique configuration and data formats. This made it very difficult to share insights and knowledge between sites and across the company. The incumbent power monitoring system was slow to operate and lacked control functions. The data it displayed was simplistic and reports were inconveniently structured for field personnel to use.

The team at headquarters was dependent on local managers preparing and sharing reports, resulting in several days' delay when investigating problems or requesting detailed performance information.

CHOOSING ZENON FOR ITS PROVEN TRACK RECORD IN ENERGY

The team at DaeMyoung Energy began looking for a suitable overarching supervisory system in May 2022. Led by Gwang-Cheol Roh, Managing Director at DaeMyoung Energy, it sought a

solution that was easy to operate and manage and which provided the necessary connectivity to the company's diverse hardware and software systems.

Lait System Co Ltd, a Korean systems integrator with deep expertise in the energy sector, recommended the zenon software platform from the Austrian industrial and energy automation specialists COPA-DATA.

"We recognized that zenon's strengths were a great match for our requirements," explains Gwang-Cheol Roh. "zenon is user-friendly and is hardware and software agnostic. zenon simplifies the integration with our other systems and offers the customizable reporting options we need. The fact that it is

recommended by companies with extensive experience in the power and renewable energy sector was a further reason for our selection of zenon."

"With zenon, COPA-DATA offers the most complete solution for the energy sector," confirms Choe Hyeon Hui, CEO at Lait System, the appointed system integrator working alongside the DaeMyoung Energy team.

DELIVERING AN OVERARCHING VIEW WITH ZENON

One of the main reasons for selecting zenon was its unparalleled connectivity. zenon natively supports more than 300 protocols and drivers, including IEC61850, Modbus Energy, OPC UA/DA and Remote



Overview of the performance of the nine dispersed wind and solar power plants.



Detailed overview of the real-time performance metrics of a wind plant.

RT, which were essential in this project.

zenon was implemented as a gateway for nine power plants and one substation of DaeMyoung Energy, enabling data from each plant to be presented in a standard format. The project was completed across all sites over a period of six months, with monitoring and control systems for two new power plants built from scratch using zenon.

Lait System was able to customize the different functions and requirements for each power plant while providing the comprehensive central oversight which the client needed.

COMPREHENSIVE CONNECTIVITY AND SIMPLIFIED CONFIGURATION

To configure zenon, engineers need only to configure parameters – no coding is required. This simplified configuration saves time and minimizes the potential for error.

zenon Process Gateway enables easy integration with other systems. Data from a variety of wind turbine generators, including SGRE, GE, HTE, Mita Teknik and Siemens

hardware, was integrated using the OPC protocol.

“zenon’s ease of use – not only for operators but for system developers – was fundamental to our decision to standardize on zenon,” explains GwangCheol Roh. “The integrated IEC 61131-3 programming environment and soft PLC functionality made our job especially easy.”

INTEGRATED LOGIC ADDS TO ZENON’S APPEAL

zenon Logic is an IEC 61131-3 programming environment that is designed as a soft PLC for PC and CE platforms. It supports all five defined programming languages of IEC 61131-3, an essential standard in the energy industry, and enables complex logarithmic calculations to be implemented easily.

Power calculation coding was implemented in zenon Logic Studio to calculate the electricity usage and the electricity production tariff for each hour and generator. This made it possible to compensate for the errors in the cumulative generation statistics issued by the metering equipment.

Following the deployment of zenon, the difficulties reported by each power plant regarding the operation of the power grid have been eliminated.

EASIER AND FASTER WORKFLOWS FOR OPERATORS

As well as making life easier for engineers, the implementation has also created a better working environment for staff in the field. zenon’s user-friendly graphical screens make navigation easier.

With local screens now visible at headquarters, field personnel and HQ staff can now view the same control and power measurement status information.

An alarm system based on SMS messaging has also been introduced. This text messaging service is grouped by plant and facility, so that each plant representative receives information about their facility. The person at headquarters, who is responsible for all plants, receives information about every plant. This has greatly reduced the response time for restoration when a problem occurs.

ENHANCED REPORTING CREATES REAL TIME SAVINGS

Having standardized the data from each of the power plants so that it is displayed in real time in zenon, the next step was to standardize and enhance the associated reporting. Hourly power production reports were created in zenon Historian. Reports are available for each plant site and at headquarters.

“Because we share the same report, we have eliminated the delays when gathering separate reports from each plant,” states Gwang-Cheol Roh. “Furthermore, if the headquarters team wishes to investigate or respond to errors, alarms or unexpected readings, it can do so immediately without waiting on local managers to provide detailed information.”

This has freed headquarters operations staff to redirect their time to more proactive work. They now spend an average of four days per month more time on the ground.

“The seamless sharing of operational screens and data between headquarters and individual power plants has reduced unnecessary emails, reporting tasks and business travel – creating significant efficiencies for us,” reports Gwang-Cheol Roh. “Time spent on paperwork at each power plant has been reduced by an average of two days per month. In addition, we estimate that travel time for headquarters management and operations personnel has been reduced by around two days per month.”

A MODEL FOR FUTURE RENEWABLE ENERGY SYSTEMS

Choe Hyeon Hui confirms, “Through zenon Logic and zenon Process Gateway, zenon’s stable archive and easily connectible report builder, we were able to satisfy all of the customer’s requirements.”

DaeMyoung Energy is delighted by the results of its standardization on zenon as its renewable energy control, monitoring and reporting solution. The efficiencies and performance improvements it has

achieved by deploying zenon are helping it to attract and secure new investment for its ambitious renewable energy projects.

Lait System plans to leverage zenon to expand its power management system and energy management system business in the growing energy storage and offshore wind markets.

“The project serves as a valuable reference for expanding into large-scale, integrated offshore wind power systems,” advises Gwang-Cheol Roh. “With zenon, we are able to run our facilities more efficiently, which in turn improves our performance and allows us to attract more funds to invest in additional renewable energy projects. In this way, zenon is directly and indirectly contributing to the growth of our business and the creation of a sustainable energy infrastructure in the country.”

HIGHLIGHTS

Standardized control systems to enable a centralized dynamic performance overview:

- zenon Logic soft PLC
- Integrated IEC 61131-3 programming environment
- Support for 300+ communication protocols and drivers, including OPC UA
- zenon Process Gateway
- Flexible reporting with alerts to SMS
- zenon Historian for hourly power production reports



The COPA-DATA Partner Community (CDPC) is a global network of specialists in the fields of industry and energy automation. It is based on long-term and sustainable business partnerships; we take a look at two of them here:

FAST ENGINEERING

Australia



ABOUT US

FAST Engineering specializes in providing complete system integration solutions for renewable energy projects and utility-grade installations. Our experienced team includes veterans of the Australian power industry with experience in all aspects of control systems architecture, design and implementation.

OUR SOLUTIONS WITH ZENON

Renewables energy solutions and utility-grade electrical installations.

OUR CUSTOMER PROMISE

FAST Engineering’s experienced team takes ownership of our clients’ projects, delivering them with a “whole of life” asset philosophy to reduce costs and increase efficiency, reliability and profitability. Having delivered over 5GW of projects, FAST’s team specializes in technical delivery for grid-scale renewable generation projects. In an electricity network where experience counts, our team has delivered projects with all the major network service providers in the Australian market.



WWW.FASTENGINEERING.COM.AU

NEXPO

South Korea



ABOUT US

NEXPO delivers products for stable power supply and operating system protection for power plants and industrial facilities. We offer complete solutions to manage and optimize system performance, whatever the safety and environmental conditions.

Our optimized solutions at large-scale industrial sites and residential developments range from extra-high-voltage to low-voltage power supply and protection control. We aim to be a creative environmental leader, embracing the future by supporting the deployment of photovoltaic systems and electrical storage systems.

OUR SOLUTIONS WITH ZENON

NEXPO leverages zenon for remote monitoring and data collection across power sites. This advanced system allows us to oversee and regulate power plant operations, enhancing reliability, safety and overall efficiency. Our expertise extends beyond conventional power systems to encompass renewable energy solutions such as wind and solar power generation with comprehensive automation system solutions.

OUR CUSTOMER PROMISE

We are passionate in using our engineering expertise to realize our customers’ requirements right through from the design stage. We deliver cost-effective and efficient solutions throughout the world with 24-hour support. We aim to be the best global company, supporting our clients’ future growth and expansion.

NEXPO

(주) 넥스포

WWW.NEXPO.KR



COPA-DATA Partner Community
450+ members worldwide in 70+ countries

COPA-DATA DISTRIBUTORS

zenon is a globetrotter. The COPA-DATA sales network spans all continents, from North America to Australia, and consists of subsidiaries and distributors. We introduce two distributors here:

EXOR ETI

Slovenia, Croatia, Serbia

ABOUT US

EXOR ETI offers innovative software and hardware solutions for industrial digitalization. Our products from world-leading brands are customized according to our clients' demands and offer connectivity of complex systems in production plants, smart buildings, urban areas and the energy sector. Our company provide sales, training, technical support and consulting. We proudly highlight that we have gained the trust of over 20 system integrators who choose to collaborate with us and have become members of the COPA-DATA Partner Community.

OUR SOLUTIONS WITH ZENON

We focus on connecting system integrators with end customers in all industries to provide them with the best sales and technical support. Our main customers are Molson Coors, Carlsberg, Coca-Cola, Heineken, Incom Leone, water and waste water treatment plants, building automation and transmission and distribution companies with substations, renewables and powerplants automation.

OUR CUSTOMER PROMISE

Our customers receive the best possible consulting, training and technical support. Our goal is to maintain the highest level of technology and expertise to provide our customers with the latest market insights and solutions.

EXOR ETI

WWW.EXOR-ETI.COM



International sales network
14 COPA-DATA locations & 18 zenon distributors

SGE MÜHENDİSLİK

Turkey

ABOUT US

SGE Engineering has sparked innovation in electrical engineering since its founding in 2007. Our enduring partnership with COPA-DATA over more than 15 years stands as testament to our dedication to quality and efficiency in delivering cutting-edge solutions. Pioneering the use of zenon in the Turkish market, SGE Engineering is a driving force in the digitalization of transmission and distribution networks and renewable energy systems in Turkey. Our passion for progress propels us forward, shaping the future of energy technology in the region.

OUR SOLUTIONS WITH ZENON

SGE Engineering's flagship product, zenon Energy Edition, is the choice of the industry. For our diverse clientele – which spans the National Transmission Utility to powerhouse shipbuilders – our solutions have cemented themselves as the gold standard in reliability and performance. Clients love the seamless engineering experience provided by zenon. This excellent customer experience has built trust and loyalty over the years.

OUR CUSTOMER PROMISE

SGE serves customers across the nation, aided by an active network of over 25 formidable system integration partners. We arm our partners with continuous support, engineering consultancy, architectural guidance and immersive training programs. Our relentless pursuit of perfection guarantees that each zenon customer receives the best solutions and support at the right price.



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