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PREFACE

How can we manage complexity while remaining agile and flexible at the same time? The intelligent use of standards can go a long way toward achieving this goal. It starts with using a standard software like zenon, where you can benefit from features and functionalities without having to do any programming yourself.

There are also many standards beyond the immediate zenon universe that help us to manage complexity. One nice example of this is modularization using module type package (MTP) solutions. Used with MTP, zenon enables enhanced efficiency, flexibility and a significantly faster time-to-market. Read more about MTP starting on page 14, including details of a successful rollout at Merck KGaA (page 48).

Communication is also based on standards. Standards are used, for example, in protocols, generally, at field level, in the network and in communication with higher-level systems. One recent highlight in the Life Sciences sector is the seamless integration between Werum PAS-X and the zenon software platform. This brings our customers a major step closer to paperless operations. Read more about this on page 44.

With zenon Historian 360, we would like to introduce you to another new product based on the zenon software platform. Starting on page 29, you'll learn how this process historian can help you process your data productively and, in a standards-compliant manner.

We also have news to share about COPA-DATA beyond our technology and applications. At our head office in Salzburg, we are delighted to have a new office building that will enable us to expand our capacities significantly. This means our growing team in Salzburg will be able to support our colleagues and customers worldwide even better. You'll find initial reactions and more from page 62.

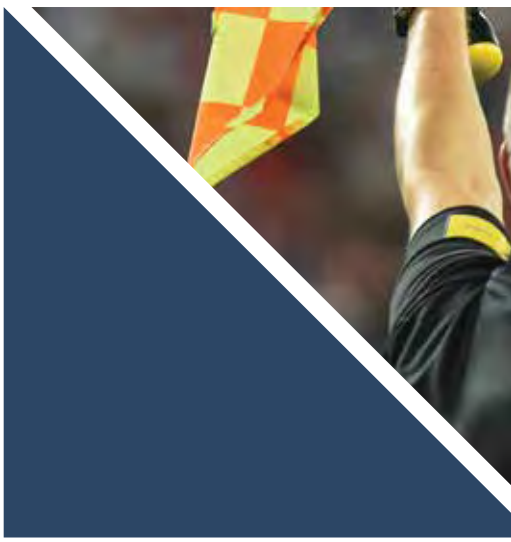
Be inspired!

Thomas Punzenberger

THOMAS PUNZENBERGER, CEO

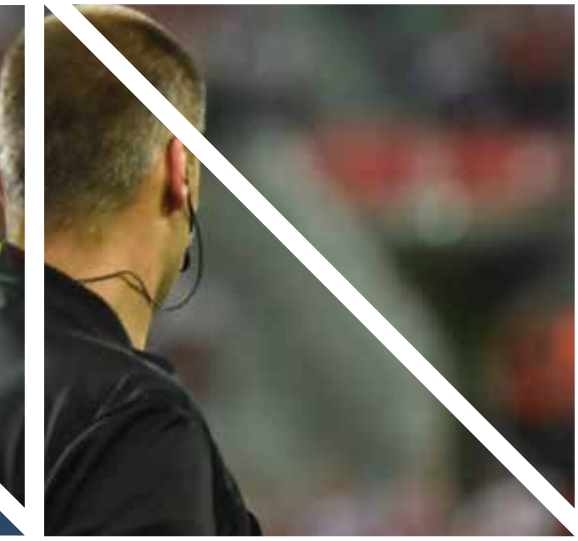










SPOTLIGHT

STANDARDIZATION ENABLES VISIONS

Offside rule: one of the Football Association's Laws of the Game from 1863. It helped modern football to grow and succeed worldwide.

MODULARIZATION: GREATER THAN THE SUM OF ITS PARTS

"Modularity is the degree to which a system's components may be separated and recombined. The concept is used to reduce complexity by breaking a system into varying degrees of interdependence and independence across and hide the complexity of each part behind an abstraction and interface," is the rather dry explanation on Wikipedia.

Washitsu: since the 14th century, Japanese rooms have been built in a modular and standardized way, based on rice mats that were used as a measure of area.

It is through interaction that the assorted building blocks become more than the sum of their parts. At the same time, this interaction between the different systems is one of the biggest challenges. Modularization is often described using the analogy of Danish building blocks, but if you take a closer look at their invention, the basic principle is quite pragmatic. Due to a lack of resources, a construction kit was created that enabled more than one idea to be implemented. If a proposed idea is no longer interesting, the object is dismantled and reassembled.

A more current topic is synthetic biology, where individual cell functions are produced as modules and can be introduced to organisms in any combination. This can produce different substances. If you look at the requirements of researchers, you'll find that flexible, modular equipment is a must-have. The process chains necessary for the synthesis of these artificial cells are created by assembling production modules. But this is just one example of the flexible design of production processes. There is high demand for new technologies – for petroleum-free plastics, personalized medicine, new materials for batteries or innovative technologies for energy production. Or, indeed, as recent events have highlighted, the need to rapidly produce specific vaccines.

FROM LAUGHING STOCK TO DECENTRALIZED PRODUCTION

The idea of bringing production back to the consumer was ridiculed only a few years ago – but today this approach has become the consensus. However, in order for decentralized production to succeed, automation is necessary. Many production processes require specialized methods. Small, scalable modules can make it easier to gradually automate processes – after a small-scale launch, production is scaled up for the turnkey module groups.

Modularization also makes it necessary to share an increased amount of information – to transfer the current status, transfer target and actual values, or to communicate key figures for process optimization.

Communication standards for uniform data exchange have proven to be very successful here. A good example of this is the Modbus protocol with its clear functionality. It enables a simple communication process, resulting in the requester gaining clear control over communication. This communication standard has established itself, in particular, in the market for decentralized energy generation.

For more complex communications, OPC UA has become very widespread in the industrial environment, and IEC 61850 is being used increasingly in the energy sector.

HOW HAS ZENON DEVELOPED IN THIS WORLD OF MODULARIZATION?

In zenon version 5.50, which was released 20 years ago, it was already important to be able to scale easily. At that time, the network technology of industrial Ethernet was just beginning. Projects could be scaled very easily by means of network configuration in the zenon project, from small CE devices to redundant pairs of servers. Even back then, modules such as data types, alarms and user administration could be configured as templates. The multi-project management used these specifications again in the individual projects in the work area.

A big step toward further modularization was taken with version 6.0. A new editor concept allowed the creation

The 5.50 editor (2001, left) in contrast to the current zenon Studio (right).

and reuse of project content. Under the name "straton" at the time, the Logic Service was combined with zenon as an integrated solution. This paved the way for today's modular concept, further developed from Smart Objects. These are application functions combined into modules, i.e. parts of the system that perform a specific function. Smart Objects can be collected as templates in a library. There are no longer any limits to modularity. With the help of these modules, our industry experts compile special application packages, also known as application sets.

PERFECT INTERPLAY OF MODULARIZATION AND STANDARDS

zenon projects are configured automatically using these modules. The IEC 61850 standard from the Energy industry defines communication in substations. Substation configuration language (SCL) files define the task of the substation, voltages, switch panels, transformers and more. A complete zenon project can be created using a wizard. This is one example where standards and modularization interact seamlessly.

Another example of modularization in the Process industry is the Module Type Package (MTP) standard. The basic requirement for consistent modularization in production is a uniform description of the information from individual modules. Which data objects are recorded? Which services should be run? The description is carried out uniformly via the cross-industry and cross-manufacturer standard MTP. All information is provided in a standardized format and can thus be integrated into a higher-level Process Orchestration Layer (zenon POL). zenon POL and zenon Engineering Studio interact automatically. All work steps are automated in the Engineering Studio and transferred to the Service Engine via the POL. In this way, a fully automatically generated process control system is created in just a few simple steps.

As you can see, we are not just at the beginning of modularization. Indeed, we are already using standards and modularization together in order to flexibly meet current and future requirements.

MORE INFORMATION

Let yourself be inspired. Modularization and standardized communication: in zenon, a strong duo. Take a look at our solutions:

MODULAR PRODUCTION: REALIZE POTENTIALS WITH ZENON

ZENON APPLICATION SET FOR SMARTER **SUBSTATION HMI**

MARKUS WINTERSTELLER
Technology Excellence Manager

Markus Wintersteller has been part of the COPA-DATA team since 2002. He has headed the Technology Excellence Team since 2020. Previously, he worked in technical support, as a consultant and a technical product manager. He also teaches at the universities of applied sciences in Salzburg and Upper Austria, where he shares his expertise with a new generation of engineers.

THERE ARE PATTERNS EVERYWHERE

"There are patterns everywhere," says the paranoid math genius Maximillian Cohen in the classic 1998 film Pi. In fact, patterns, standards and modular structures are ubiquitous in our world.

AUTHOR: ROBERT KOREC

Honeycombs are natural, modular structures. The hexagons are so precise that the astronomer Kepler credited bees with a math mind.

Even if the entire world cannot be reduced to a pattern, a global formula or fundamental particle – as sought in the film Pi – we often encounter uniform, modular elements. We can see this in nature in the exact geometric structure of honeycombs in a hive or the spirals of a nautilus shell.

Humans have always oriented themselves towards nature in their work. On the one hand, nature provides inspiration for much human invention. On the other hand, the constraints of the natural world shape the technical solutions inventors create for the good of humankind.

What can we learn from the patterns and regularities that we see so often in the natural world? Can what they tell us about the usefulness of norms and standards further inspire us? In Industry 4.0, for example, development is based on MTP standards which encapsulates the latest developments in several areas of industrial production.

BOOST FOR INNOVATION

Human-defined norms and standards have accelerated development, facilitated interaction and cooperation and made possible cross-regional trade. Think, for example, about the introduction of the metric system in 1793, which gave birth to the SI system in 1960. A life without standards seems almost unthinkable to us today. State legislation, social behavior, safety in many areas,

professional sports: practically all areas are subject to rules that can be reduced to individual elements to make greater things possible. Even human language is based on standards such as spelling and grammar. In his column on page 23, Mark Clemens describes a very clear bridge between human and machine communication.

PROVIDING A FOUNDATION IN A CHANGING WORLD

For COPA-DATA founder and CEO Thomas Punzenberger, standards are the reliable foundation for remaining flexible in a changing world: "Standards are essential for ensuring that individual components work smoothly with each other. Functionality has to be ensured across manufacturer boundaries for dynamic innovations to be marketable. Imagine if power plugs were not standardized. Before I could plug in my shaver, I would need to install a new plug suitable for my house. When traveling, I would not be able use it at all because I would never know which plug is being used by the hotel." The same applies in industry. It's a simple example of how standards can accelerate innovation and make it possible in the first place.

ENERGY: INTEROPERABILITY INSTEAD OF COOKED-UP SOLUTIONS

Standards in the energy sector have an impact on many areas of life that we end users might not notice immediately. Even if safety standards in the energy sector have been necessary since the use of electricity, as Energy Industry Manager Jürgen Resch knows, manufacturers initially tried to do their own thing and put a lot of information in so-called private areas: "Over the years and through users' intensive engagement with the topic, some have managed to turn the tables. This has forced manufacturers to use the operator's specifications. As a result, manufacturer-independent interoperability has been at least partially achieved." Read the full interview with Jürgen Resch on page 51.

F&B INDUSTRY IN TRANSITION

A digital transformation is also occurring in the Food & Beverage industry. For industry expert Andreas Grün, standards are the key to topics such as Industry 4.0 and the Industrial Internet of Things: "I would even go so far as to say that an Industrial Internet of Things could not be implemented without standardization, since every possible communication interface would have to be defined and programmed separately."

"Without standardization, an Industrial Internet of Things cannot be implemented."
Andreas Grün, Industry Specialist Food & Beverage

LIFE SCIENCES: PAPERLESS BUT NOT WITHOUT STANDARDS

For the Life Sciences & Pharmaceutical industry, the transition to paperless processes is one of the major issues in production these days. There have been some obstacles that have led to an increase in the cost of introducing EWC systems. Giuseppe Menin, Life Sciences & Process Industry Manager, sees one reason for this in the insufficient inclusion of standards: "If we want to overcome these difficulties, we have to reduce the need for tailor-made software solutions that limit flexibility. Working groups such as ISPE Pharma 4.0, Namur MTP and BioPhorum are defining new standards and guidelines to remedy the lack of standards when integrating machines and IT systems and to achieve a Plug&Produce approach." (see page 44)

AUTOMOTIVE: ROOM FOR INNOVATION

Standardization has also been an important topic in the automotive industry for some time, as Bernd Wimmer, Automotive Industry Manager at COPA-DATA, knows from his many years of experience: "Generally, there are company standards in the industry, such as the well-known VASS (or Volkswagen Audi Seat Skoda) or INTEGRA at Mercedes. These standards are often driven on the hardware side by the PLC. This means that a module is a component of a system, for example, a roller conveyor or robot, which corresponds to a function module in the PLC and standard hardware with its own order number from the manufacturer or supplier. All of these modules are usually described in the standard as a comprehensive document with libraries for the PLCs or HMIs. The orchestration is carried out by the system planner: they build the system based on the standard components. The electrical diagram, the parts list, the PLC program and the HMI are then derived from this."

The fact that certain standards are based on higher-level industrial standards is a significant advantage for Wimmer, because this saves a lot of effort, for example during commissioning, since components are already being used that correspond to common standards: "Standardization does not drive innovation as much as it optimizes the effort involved in basic tasks, or eliminates it all together, e.g. electrical inspections of components, CE mark, security provisions, etc."

"Standardization optimizes the effort involved in basic tasks."
Bernd Wimmer, Automotive Industry Manager

According to Wimmer, for antitrust reasons there is little direct sharing of information between automobile manufacturers. As a result, the trend in recent years

has been increasingly towards OPC UA: "This is not just a communication protocol. It also allows the system to be described in an information model. Since OPC UA is manufacturer-neutral, we hope to see a number of benefits."

SECURITY: 100% COMPATIBILITY IS AN ILLUSION

The importance of cross-organizational standards becomes clear when it comes to security, where the aim is to define minimum requirements and thus create trust. For Reinhard Mayr, security manager at COPA-DATA, standards are a very good way to ensure, at least, basic compatibility in, for example, communication. However, everyone should be aware that no standard can provide 100% coverage: "There is always flexibility and room for interpretation to adapt to individual requirements. So 100% compatibility is not always guaranteed."

"There is always flexibility and room for interpretation to adapt to individual requirements." Reinhard Mayr, Security Manager

From a security point of view, Mayr can only see positive aspects to the modularization of systems: "A modularization of an application can be used in order to implement security zones in a more targeted manner. For example, you can separate the engineering from the runtime environment, specifically to protect or monitor the (communication) interfaces with zenon. The same applies at application level."

STANDARDS ARE THE BASIS FOR REALIZING VISIONS

Standardization and modularization are essential for driving developments in all industrial sectors.

"You can only develop something new if you can rely on standards. Otherwise, you lose the core energies to develop and define interfaces," says CEO Thomas Punzenberger: "You can rely on standards and invest your energies in innovations. Modularization offers the possibility of dividing tasks into blocks and then further developing them separately from each other. This provides a great opportunity for parallelization and makes it possible to innovate more rapidly."

"Functionality has to be ensured across manufacturer boundaries for dynamic innovations to be marketable."
Thomas Punzenberger,
founder and CEO of COPA-DATA

Gutenberg's printing press: Modularization with movable type around 1450 spurred a global media revolution and social transformation.

BORN TO BE WILD: MTP

How are you meeting demands for flexibility and adaptability? With the new Module Type Package technology, you can respond reliably and flexibly to requirements at any time. Learn how here.

Do you remember the year 1968? The musical Hair premiered on Broadway, Daniel Craig was born, and the song "Born to Be Wild" by Steppenwolf was released. And there was something else, something invented in 1968 that was entirely unknown before then but which is taken for granted today: the PLC, or programmable logic controller.

Until that point, hard-wired controllers with relays were the standard method of automating equipment and machines, but the PLC suddenly offered completely new levels of freedom and made it possible to meet requirements for flexibility and adaptability like never before.

Now let's return to 2022. We recognize that a lot has changed in our world. Only one thing is still like 1968: an extremely high and constantly growing demand for flexibility and adaptability. In this article, you will learn how Module Type Package (MTP) can help you meet these demands elegantly and efficiently.

MTP TO PLUG & PRODUCE

You are going to like what MTP has to offer. This industry standard enables you, for the first time, to interconnect a wide variety of machines, equipment and package units from any manufacturer with just a few mouse clicks and then operate them directly – in other words, Plug & Produce at its best!

The exact designation for the MTP standard is VDI/VDE/NAMUR 2658. This industry standard is currently a German standard, but work on an IEC standard with the same content is already underway. This development is a strong indication that MTP is anything but a one-hit

wonder and that it will establish itself internationally in the future.

In a uniform format, the standard describes everything that is required to operate equipment or a machine in terms of Plug & Produce, regardless of manufacturer, including functions, services, procedures and parameters, as well as process images, reporting information and soon also alarms.

MTP: BENEFITS FOR ALL

To help you stay on top, we have integrated zenon MTP Suite from version 11 and are providing you with tomorrow's technology today. This has a wide range of benefits for you.

If you are a machinery manufacturer, our zenon MTP Suite enables you to adjust your equipment so that it complies with the MTP standards and can be integrated even more easily in existing lines and overall system concepts by your customers.

For operators, zenon MTP Suite enables you to easily connect equipment and machines from a wide variety of suppliers and with a wide variety of controllers to form an overall control system. Studies have shown that this solution can reduce time to market for new products by at least 50 percent.

As a system integrator, you benefit from the entire zenon MTP Suite. Modules can initially be designed in a standards-compliant manner. In the second step, these can be easily interconnected in the Process Orchestration Layer (POL).

POL IS THE NEW SCADA

Just as the PLC enabled completely new degrees of freedom in 1968, today with MTP there is a similarly major transformation in the field of process control systems.

MTP provides you with similarly simple integration of equipment that you are familiar with already from classic operating systems and drivers. If new equipment has an MTP file included, everything is described in it. The control room can integrate this new equipment fully automatically – in a simple, fast and, above all, manufacturer-independent manner.

While SCADA (Supervisory Control and Data Acquisition) monitors and controls technical processes in automated production, the process orchestration layer (POL) based on MTP takes on the task of integrating equipment, interconnecting it and automating it in the network. The whole orchestration process is so simple and rapid that you have to see it live to believe it.

The POL thus aligns nicely with COPA-DATA's mission – to make your life easier – but, this time, in a completely new and sympathetic way. In short, it's Plug & Produce made easy.

THE PROOF OF THE PUDDING IS IN THE EATING

COPA-DATA has a proven track record with MTP. Read the "Merck" user report online about the joint project with Merck in Darmstadt. Dozens of zenon process orchestrations are now running there, which provides Merck with maximum flexibility and a speed previously unknown to meet the challenges growing daily in process development.

WHAT'S NEXT?

Now it's your turn! Are you ready to take the next step with Module Type Package?

In the rock classic "Born to Be Wild" the singer growls: "Get your motor runnin', head out on the highway." I invite you to do the same. Start your engines and shape the future of the automation world together with us. Call us, send us an email, visit our booth at the next trade fair or sign up for a webinar. #borntobewild #zenonrocks

CHRISTOF FRANZKE
Technical Consultant

Christof Franzke has been a Senior Technical Consultant at COPA-DATA since 2017. He works with customers to develop solutions for a wide variety of automation and digitalization tasks. After a few years in the IT sector, he switched to plant construction and worked successfully as an automation specialist for the food and plastics industries.

FUN AND FACTS ABOUT MODULARIZATION AND STANDARDIZATION

OFFSIDE RULE, 1863

Unlike the restriction on the number of players to eleven, the offside rule was already part of the first set of football rules, the Laws of the Game. The AI-supported "Semi-Automated Offside Technology" will be used for the first time at the upcoming FIFA World Cup in Qatar. (Page 6)

SEAT BELT LAW IN AUSTRIA, 1984

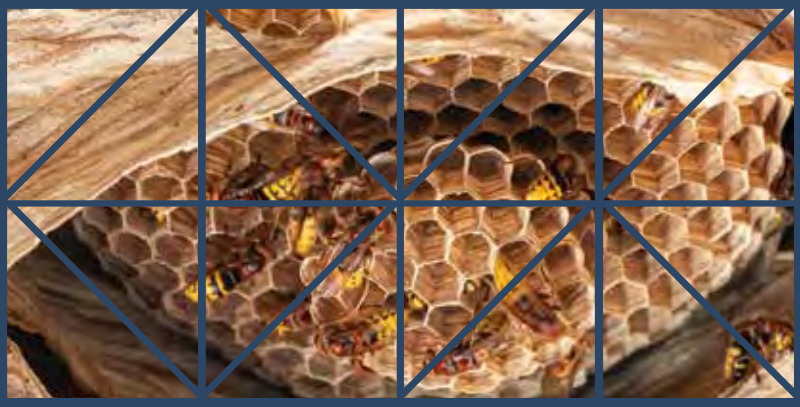
The passing of a law mandating the wearing of seat belts in Austria was preceded by a very emotional and controversial political debate. Many opponents of seat belts saw the law as an attack on their personal freedom, as embodied by the automobile. (Page 18)

PRINTING PRESS, 1450

The development of letterpress printing with movable type by Johannes Gutenberg helped to spread literacy to large portions of the population. The new means of sharing knowledge and training launched the humanist movement and the Reformation. (Page 14)

HONEYCOMBS, 90 MILLION YEARS

How the exact geometry is created has yet to be fully understood. Very little wax is needed to provide cells for the larvae. The angles are 120 degrees, the cell walls are almost the same everywhere at 0.07 mm. (Page 11)



ISS SPACE STATION, 1998

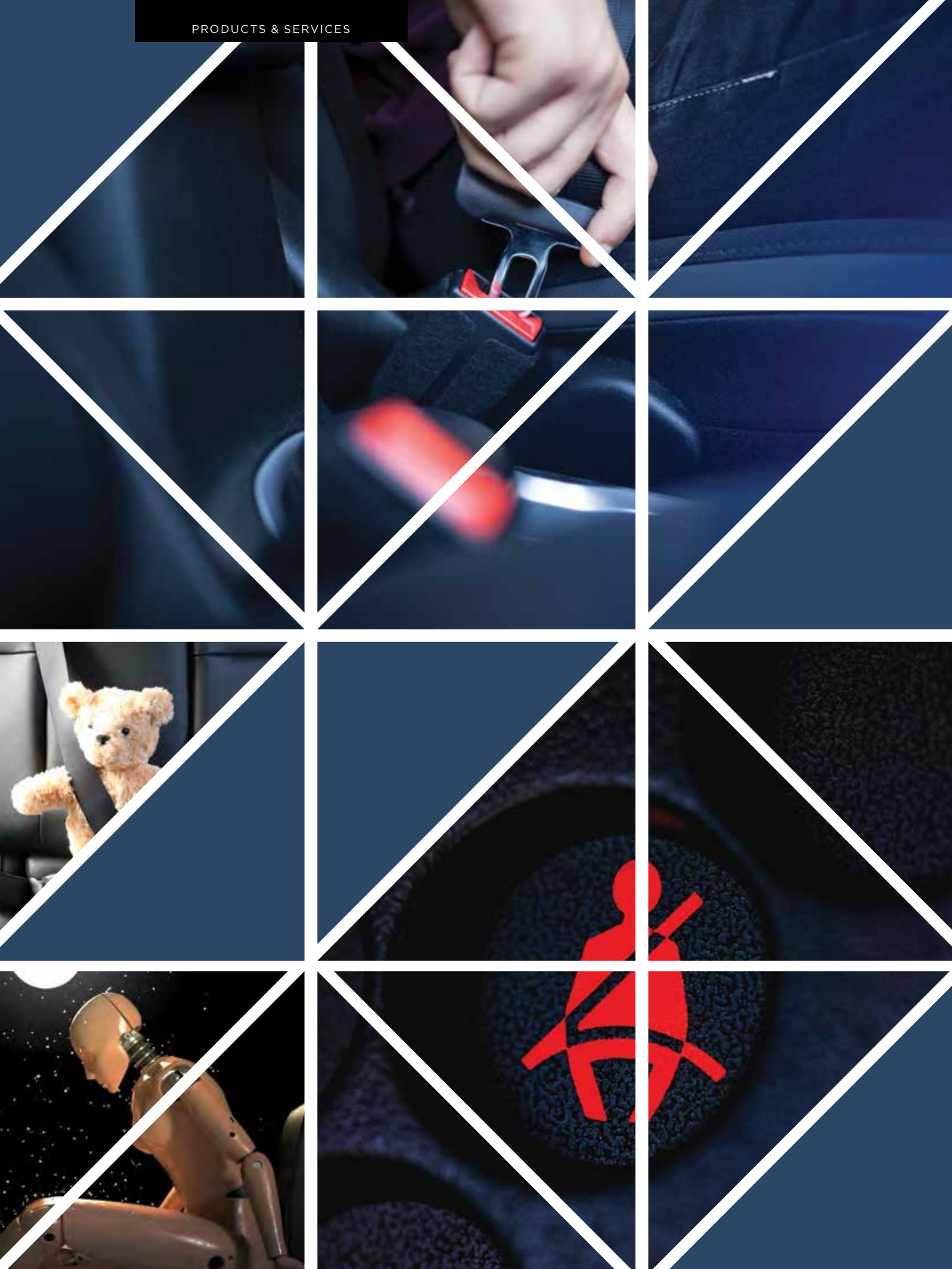
With more than 40 modules, the ISS is the largest artificial object in space. The first module was launched into orbit in 1998. The most recent module was docked with the space station in November 2021. The station is solar-powered, with energy generated from sun sails. (Page 60)

WASHITSU, 14TH CENTURY

In traditional Japanese interior design, the size of a room is indicated by the number of tatami mats used (approx. 0.9 x 1.8 m). Because the standard dimensions of rice-straw mats vary between the regions, the result is differently sized rooms. (Page 8)

SALZBURG AG

Salzburg AG, together with Salzburg Netz GmbH, supplies the federal state of Salzburg with electricity from 100 percent renewable energies. Over 88 percent of this is generated in the company's 30 hydroelectric power plants, which are gradually being standardized on zenon. (Page 42)



PRODUCTS & SERVICES

Seat belt law in Austria: This new administrative standard, passed into law in 1984, resulted in a 17.2 percent reduction in road deaths in the first year after its introduction.

TESTING WINDOWS PATCHES AT COPA-DATA

HOW YOU CAN BENEFIT FROM COMPATIBILITY TESTING

Industrial infrastructures are facing heightened challenges and, in light of current conflicts, are increasingly coming under attack. A defense-in-depth strategy relies, among other things, on a patch strategy. Learn how an independent software manufacturer like COPA-DATA can help you with such a strategy.

Virtually all security standards, regardless of industry, deal with patch management. It is considered to be a fundamental prerequisite for a defense-in-depth strategy.

WHAT THESE STANDARDS REQUIRE

In principle, all standards are concerned with closing known security gaps as quickly as possible. This generally applies to all software components used in equipment – right down to the controllers. An essential part of all standards is a risk assessment of the patches before they are applied to the systems. When there is a lack of information from the software component manufacturers or a lack of compatibility testing, you have to assess the risk as very high. This often results in patches not being applied at all. COPA-DATA has, therefore, decided to support you in patching your systems with a dedicated testing strategy and open communication.

HOW DID COPA-DATA IMPLEMENT IT ALL?

In the lead-up to being certified at our headquarters in accordance with IEC 62443-4-1, we thought that the topic of patching was of marginal concern to us. After all, we do not run the different industrial infrastructures.

It was only over the course of time and through close cooperation with several of our OEM and certification partners that we developed measures that add value for all parties involved. For the project, we are particularly

concerned with the requirements of ISO 27001 and IEC 62443 and the National Institute of Standards and Technology (NIST) guidelines.

We have invested in our own automated testing infrastructure, based on our motto, "There must be an easier way!" This enables you to make a qualitative statement about Microsoft patches very quickly. We understand that it is important to bring this information to you quickly and in a standardized way.

WHAT THE AUTOMATED TESTING ENVIRONMENT LOOKS LIKE

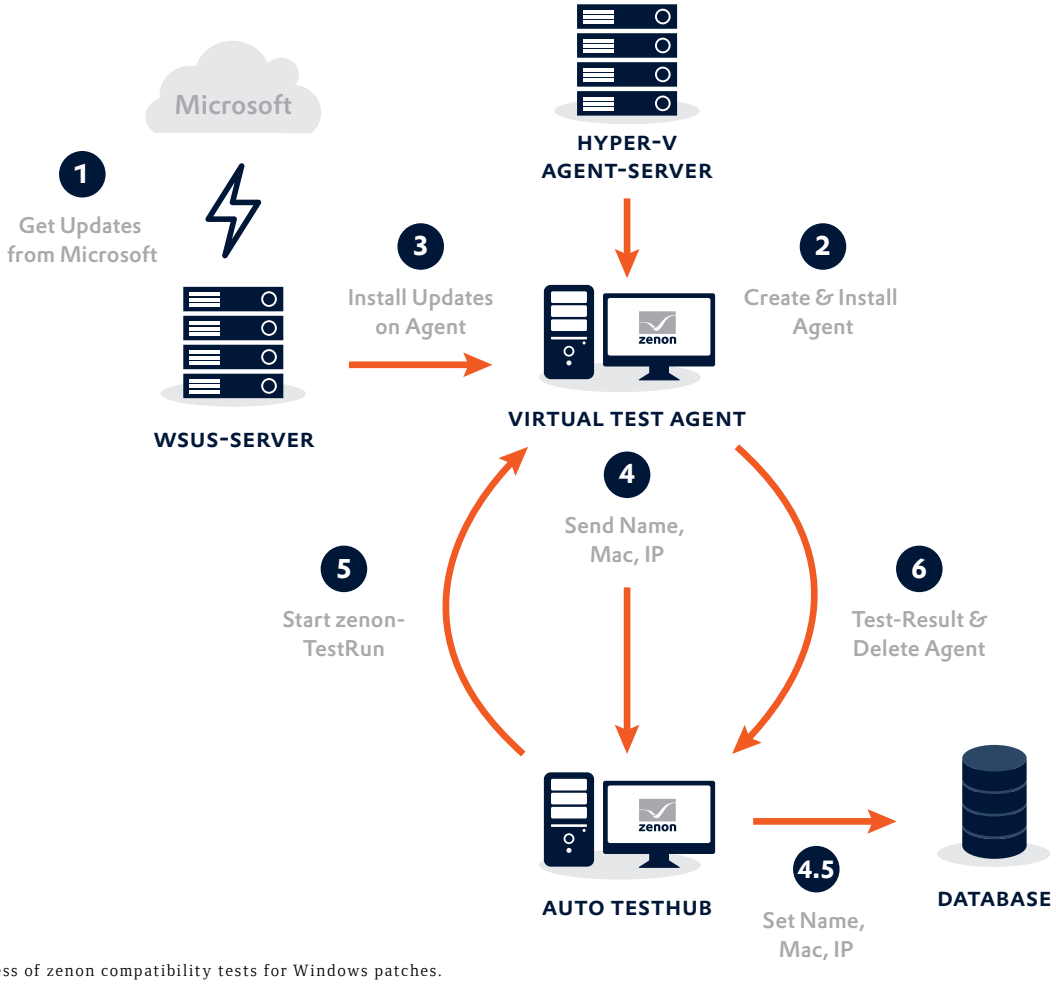
We have accrued a wealth of experience and tools for automated software testing over the years. The tools are from Microsoft, including, for example, Windows Server Update Service (WSUS), and Ranorex for the automated testing of GUIs.

The critical factor is the zenon product life cycle (www.copadata.com/plc). This defines, for example, which zenon versions can be run under which conditions and how long a version is maintained. Based on this, we have created the testing environments for Windows patch management.

Using the Hyper-V virtualization platform, a basic image has been defined for each supported version of the Windows operating systems. These are used for each compatibility test. The entire process of testing is fully automated, as shown below. The tests are carried out and documented via the Ranorex platform. The degree of automation achieved is almost 100 percent. The only testing resource needed is someone to launch the tests. Commissioning the test environment, patching the environments and performing validations, through to generating the result logs, are all carried out fully autonomously.

THREE TESTING SCENARIOS LEAD TO AT LEAST 75 TESTS

After the infrastructure strategy was implemented, we defined a suitable test strategy for the products of the zenon platform, working together with the product specialists from our Security Management Team. This focuses on what needs to be tested in order to produce a



Process of zenon compatibility tests for Windows patches.

compatibility statement for you with very high accuracy and low risk.

We have agreed on basic testing activities as a team:

- zenon software platform deployment validation (including prerequisites validation)
- zenon Engineering Studio basic functionalities
- zenon Service Engine with zenon Logic including data exchange via the zenon Logic driver

At first glance, this list seems clear. Behind this definition there are at least 75 specific individual tests, which are evaluated for each operating system and each version of zenon.

Finally, all results of the individual tests are documented automatically and sent to the Security Management Team in the format specified by IEC 62443. This triggers the newsletter we send to provide notification for you.

TIPS FOR APPLYING PATCHES

Centralized patch management is important from both an administrative and security perspective. Ideally, a central server, preferably in the perimeter network, downloads the patches from trusted sources and distributes them on the internal network. This provides the administrator with a central configuration and monitoring system. System computers do not need internet access. The patch server is located in a perimeter network isolated by a firewall for security. New patches are downloaded to this server from the Internet.

For Windows operating systems, you can use the WSUS server, as well as various third-party tools such as Ondeso (see article in IU 38).

zenon Service Engine includes several compatibility scenarios. For example, you can run clients with higher versions than the servers. However, when using zenon redundancy as a security server, you should operate both servers on the same version. More information on compatibility can be found in the zenon manual.

zenon redundancy offers your application added protection against unplanned outages and ensures system uptime. It should, therefore, be used in any security-critical application. The use of zenon redundancy also enables you to gradually update zenon Service Engines without affecting the availability of the entire system either in terms of data management or the operability of clients.

HOW YOU BENEFIT FROM TEST RESULTS

You can simply register for the zenon Security Newsletter to receive the test results. You will receive the latest white list roughly once a month. In addition, there is security information from the OT environment as well as information about current CVE tickets (known security gaps in relevant IT & OT products).

If you also have white-listing tools in your environment combined with a central patch management system, you can automate your patch processes to a very high degree with this information.

Further information about patching zenon environments can also be found in the zenon Security Guide. It is part of the zenon software platform documentation.
Patch it – and patch it good!

Are you interested in reading the latest from the zenon Security Management Team?
If so, quickly scan the QR code and register for the **zenon Security Newsletter.**

REINHARD MAYR
Head of Information Security and Research Operations, Strategic Projects

Reinhard Mayr has been part of the COPA-DATA team for approximately 20 years and has been responsible primarily for product management over the past ten years. In his current role, he is responsible for all matters relating to the company's data and information security and coordinates research-related activities together with universities and independent scientific partners

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ON STANDARDS IN COMMUNICATION

We are born into this world with the capability to comprehend and understand standards – without even understanding what a standard is. It never ceases to amaze me how a child mimics the sounds its parents make and develops an understanding of language. And they do this without the need for someone to explain vocalization or the rules of syntax to them.

I think the way human children acquire the linguistic skills necessary to be able to point at things and address them is quite a remarkable feat. Even before their words are properly formed, children come to understand the concept of conversations and taking turns in communicating.

Very quickly, children are able to form the words necessary for another human to understand what it is they want. The language of their parents is adopted by the child as the standard language. Interaction with other people using different intonation or different words for the same object poses no problem for the child. It simply enhances rules of the acquired standard language to increase its flexibility. Sometimes, as children develop, they may use their own secret language with their siblings or friends – thereby defining their own standard language.

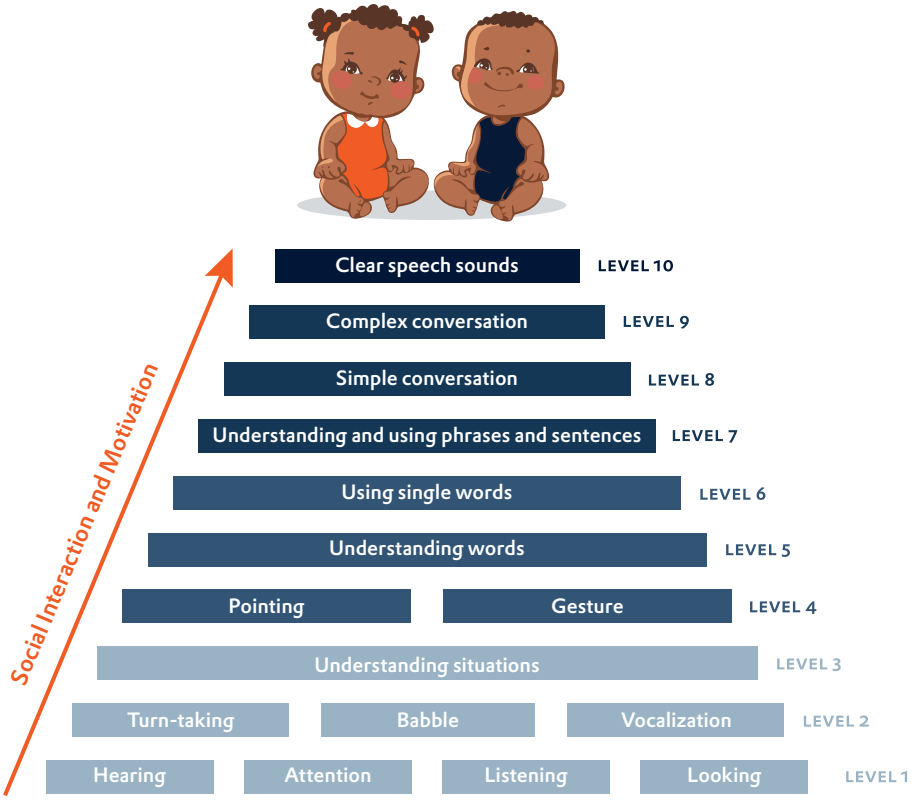
In fact, we all continue to develop our use of language over time – just as language itself evolves and develops. And we do this even without scientifically studying the nature of language acquisition or linguistics. Indeed, most of us spend very little time studying the grammatical rules of our native language.

The systems with which I work on a daily basis are fundamentally different.

CODE A STANDARD

For automation systems to communicate, they need to be programmed with interpretations of standards. We build automation systems to take over tasks to make our life easier. Typically, this involves taking in some data, processing or storing that data and providing some kind of output. Regardless of whether the system presents the data to a human user or to another system, automation systems need rules for the normalization and the interpretation of input data and rules for the presentation of output data.

Machines are very different to people. A human user has a high tolerance and flexibility for the interpretation of data. By contrast, an automation system requires data to be formatted and presented in exactly the way it has



Inspired by https://www.nhsggc.org.uk/kids/healthcare-professionals/paediatric-speech-and-language-therapy/building-blocks-of-language/

been defined if it is to succeed in the faultless operation and processing of the data.

It may sound logical for automation systems to agree upon the rules for exchanging information to best suit the requirements of the information systems and the capabilities of each system. However, things don't work this way yet.

HUMAN BIASES

Instead, rules are created for an automation system by one human user, based on their experience of language and conversation. These rules are written down in a standard language that is not necessarily the native language of this human user. Another human user – whose native language may not be the standard language in which the rules are written either – can then read and interpret the rules before programming these rules in another automation system. The ultimate hope is that different automation systems, programmed according to the same rules, can communicate and exchange information. Ambiguity, however, is quite common when writing and reading technical texts or standards. Potentially worse is information that should have been included, leading to readers creating their own definitions to fill the gaps.

Today, one can hardly write all the rules necessary to fully cover the information exchange between automation systems in a single standardized specification without referencing many other established standards as normative references. Take Modbus TCP, for example. The Modbus messaging on TPC/IP implementation Guide from the year 2006 is based on RFC 1122 from the year 1989. From here, a whole tree of further required references can be derived, including RFC 894 that needs RFC 791 and "The Ethernet – A Local Area Network", Version 1.0, Digital Equipment Corporation, Intel Corporation, Xerox Corporation, September 1980. This last standard, also known as DIX, later became Ethernet II. A version of it was adopted by the standardization organization IEEE and standardized as IEEE 802.3.

AND STILL IT WORKS?!

Given this complexity, it is amazing how we expect to make use of hardware and an operating system and to implement a standard, and for everything underneath it to simply work. Although it doesn't always work out that way – even when working with long-established standards – we can encounter surprises and frustrations!

Consider the example of a communication that makes use of TCP/IP that sends TCP Keepalive messages when there is no communication and works flawlessly on Windows. During our porting work for Linux, we found that the very same implementation has its TCP connection terminated on Linux

after sending a TCP Keepalive. Windows includes one octet of garbage data in the TCP Keepalive while Linux does not. This is the kind of situation in which a human user would be tolerant of different expectations and adapt accordingly. However, an automation system, which is programmed according to strict rules, cannot improvise. For the geeks among us, there is an interesting read with further details about this on page 101 of RFC 1122 in section 4.2.3.6.

Even with something as simple as applying the Modbus Application Protocol on TCP/IP, there is ambiguity in the specification that leads to interoperability issues between devices. These interoperability issues require configuration options that can make an implementation work one way or another. These options can lead to frustration with users when they don't know which configuration should be used. Considering all this, it can seem like a small miracle when two systems communicate using standard Modbus TCP!

NO "ONE SIZE FITS ALL"

In the standardization of information exchange between automation systems, there is no "one size fits all". One may think that, once a standardized ruleset is defined for automation systems to communicate and this ruleset is found to work, it would make sense to apply this standardized ruleset to every automation system. Yet, in practice, the Automation industry suffers from a huge proliferation of standards. I think it is telling that today one can buy a mobile phone and use it to communicate almost anywhere on the planet.

However, one cannot obtain an automation system and use it to communicate with any other automation system in any other industry in any other region of the planet. That's because these standards are defined by standardization organizations, industry groups, other user and interest groups, and large individual vendors. Sometimes local preferences and or political influences sneak in.

It is also worth considering that standardization is very rarely undertaken by a single person. Standards are reviewed or receive comments whenever others use them in an implementation. Standardization in the real world, especially on an international level, is a cooperative process involving different people from different backgrounds often with different native languages. They work together to define sets of rules to fulfill use cases limited to the scope of the standard. Cooperation is achieved by circulating drafts and holding meetings – whether online or face to face. Often, consensus can be reached on "how things should be" but hours can also be spent discussing the specific wording of a single paragraph. Subject matter experts can strongly disagree with each other on the finest details for all kinds of reasons ranging from single-mindedness, stubbornness, personal pride, their own hidden agendas or to aid the strategies of the organizations that employ them.

DO AIS NEED STANDARDS?

As long ago as 2017, research and experiments demonstrated that artificial intelligence systems can develop their own communication languages. This opens up the fascinating future prospect of automation systems incorporating artificial intelligence from different regions in the world. How would they develop their standards for communication and information exchange?

Would systems learn and establish a single standard or come up with a multitude of standards to talk with each other? Would systems be able to reach consensus or would there be stubborn systems that simply refuse to do things any other way than their own? Would there be systems that become teachers? Would systems vote on standards among themselves according to democratic rules? Would there be systems that would be capable of recognizing the ultimate perfection in communication standardization? If so, would further evolution stop before it could go further and make things worse again? And, if so, what would this ultimate perfection look like?

I suspect that the chances are very high that it would not look anything like the communication standards that humankind has come up with thus far!
Do you agree? I'd love to hear your thoughts. Contact me!

MARK CLEMENS
Technical Product Manager,
Technical Consulting

Since 2002, Mark Clemens has been part of the COPA-DATA HQ Technical Consulting team. As Technical Product Manager and Product Owner, Mark brings his expertise to cyber security aspects of zenon. He is a member of the IEC TC57 WG15, actively participating in the maintenance of the IEC 62351 standards series.

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WEB VISUALIZATION SERVICE

The Web Visualization Service enhances the zenon software platform with a browser-based, high-performance HMI solution. Find out how you can use a project directly with zenon Service Engine in your internet browser, starting with the familiar environment of zenon Engineering Studio.

Use your HMI on mobile devices without detours.

The new solution is an alternative to DirectX-based visualization. With the Web Visualization Service (WVS) in zenon 11, COPA-DATA is laying the foundation for a comprehensive, in-depth integration of HTML5-based visualization for zenon Service Engine. Designed as a thin client solution, the WVS enables you to view project content without additional installation on virtually any end-user devices and operating systems using an internet browser. And it does this without sacrificing the stability or reliability of zenon Service Engine.

HOW CAN YOU USE WVS?

Stated simply, project engineering takes place in the usual environment – zenon Engineering Studio. As usual, you create Service Engine files, after which you have the choice between classic DirectX visualization or WVS when starting the Service Engine. If you start the Service Engine directly from the Engineering Studio or the Startup Tool, the Service Engine is opened in the background and the visualization is opened automatically in the standard browser. This means that you can use the configuration in common browsers (Chrome, Firefox, and Safari) without any major detours. The visualization is scaled automatically to the browser window and responds, for example, if you rotate the mobile device.

THE FOLLOWING FUNCTIONALITIES ARE SUPPORTED

Already with zenon 11, WVS supports a broad portfolio of functionalities. In the first version, however, not every single property of each screen type and screen element is supported. For more information, please refer to the documentation.

For example, take a standard image. Here, you can use all static screen elements as well as the dynamic screen elements “Dynamic text”, “Numeric value”, “Combined

element" and "Button". Of course, standard functions, such as language switch, color switching and the assignment of user authorizations, are also supported.
You can also use selected special image types in WVS:

- **Alarm List (AML) –** The AML is displayed with all columns available as well as alarms with live update (both from the ring buffer and historical or shelved entries) including coloring from Alarm-/Eventclasses. Of course, you can acknowledge alarms, confirm the acknowledgment, and assign alarm causes and comments. And you can filter the alarm list with all filter options (without dialog).
- **Chronological Event Lists (CEL) –** The CEL displays all events and provides comments. You can also filter the CEL with all available filter options (without dialog).
- **Extended Trend (ETM) –** The ETM displays curves and Gantt curves with live updates including limit ranges and multiple axes. You can intervene using configurable zoom and scroll behavior.
- **Login screen for secure user login**
- **HTML screen for embedding external web pages or webcams, for example**

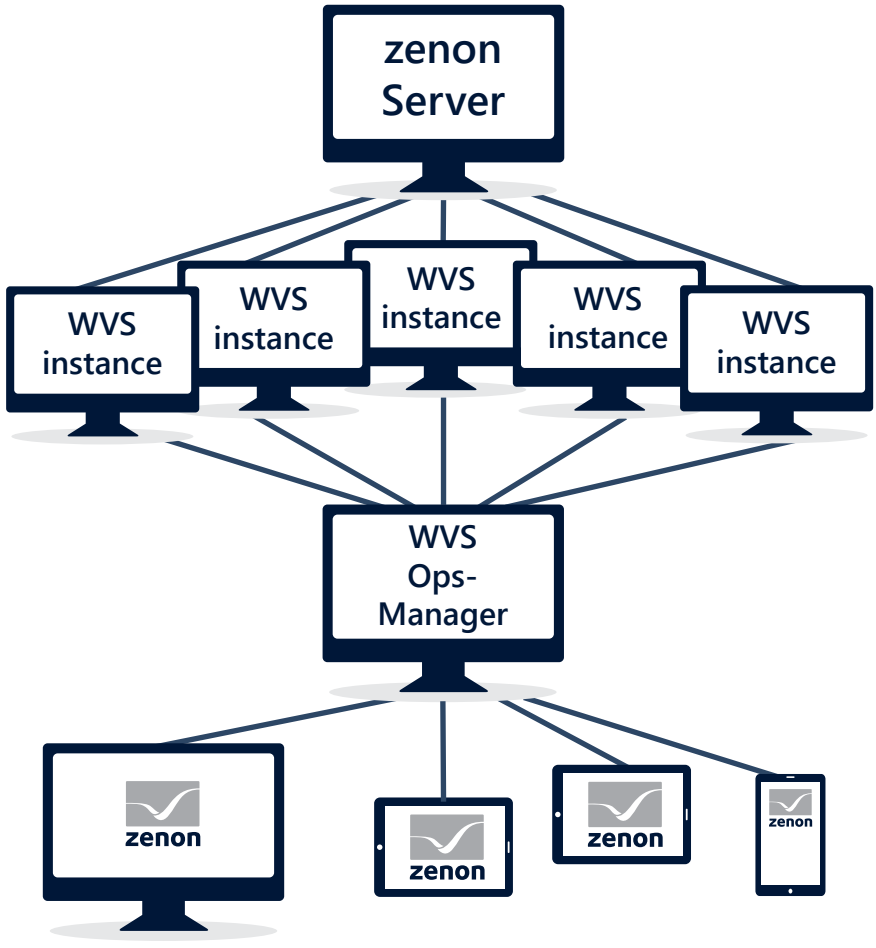
You can also use the option of a multi-hierarchical project structure. In such a case, for example, an integration project with several subprojects can be realized.

In addition, all zenon functionalities that do not require visualization are supported out of the box in WVS. And to further keep things simple, you can use the familiar "Reload" function when engineering in WVS.

As you can see, in zenon version 11, WVS already offers you extensive possibilities for implementing a state-of-the-art HMI on the web.

MULTI-USER ACCESS TO WVS

Web Visualization Service is multi-session capable and is designed as a thin client solution. This provides additional security during access and operation. In addition to the self-evident encryption of the communication between the service engine and browser, the individual sessions are completely independent of each other. This enables, for example, the use of local internal variables on the



Session management with the WVS OPS-Manager.

web. You can also optionally encrypt the communication between zenon Service Engine and the instance of the Web Visualization Service (zenon client).

The main entry point for external devices (used via browsers) is Web Visualization Ops-Manager, which handles both the administration of the individual Web Visualization Service instances and the assignment of the browser sessions to the instances.

To access WVS as a remote user, all you need to do is enter a single URL in your browser – and you can get started right away.

In addition, with increased security requirements for applications used purely for monitoring, you can operate WVS clients in read-only mode. Please note, however, that mixed operation of read/write and read-only on the same computer is not possible. In this case, you will need to install two Ops-Managers on two separate machines, each with its own license.

With the Web Visualization Service, you can implement graphically pleasing, high-quality HMI or monitoring solutions from zenon 11.

LOOKING AHEAD

At COPA-DATA, we never rest on our laurels. We are already developing WVS for zenon 12, and you can look forward to the following additional features:

- Additional supported screen elements include switches, bar display, and pointer instruments
- Functional rounding for dynamic text and numerical values
- The equipment model screen for filtering the AML and CEL for functional execution and for displaying the aggregated alarms per alarm/event class
- Recipe Group Manager for managing and writing recipes and formats
- Applications for equipment control in the energy sector supported by zenon Command Processing
- Integrated help in Engineering Studio for the easier creation of compatible projects for WVS

And you can look forward to much more!

GERO GRUBER
Product Manager

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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Historian is not a historian, rather it is a software that records, stores and evaluates data in production.

ZENON HISTORIAN 360 – KEEP YOUR DATA SAFE

Industry constantly faces new challenges. In the past, historian software had only to acquire and store local production data but today, the challenges of IoT, machine learning and the flood of data mean the demands on it are much greater. Read about the possibilities offered by the new zenon Historian 360.

zenon Historian 360 has been developed to serve you as a strong partner. You can integrate it very easily in an existing process landscape. This makes any kind of process, alarm or metadata available to you. You don't have to take care of Historian. And you can leverage the data to uncover hidden potential and optimize your value chain. That is why we call this comprehensive package zenon Historian 360.

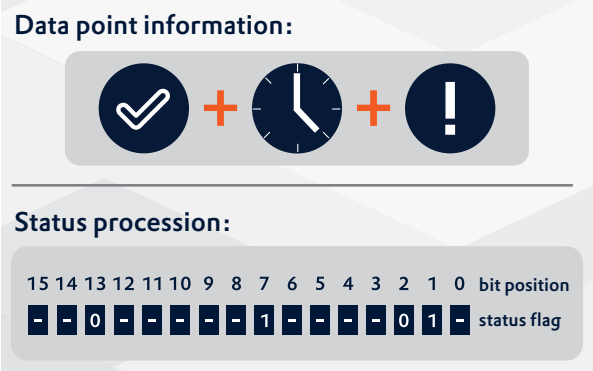
THE KEY TO SUCCESS: DATA RECORDING

Do you want to store your data securely and sustainably? This is exactly what the new Historian 360 from COPA-DATA was made for. When it comes to data, the devil is in the details. You need both the right data and the exact level of detail for your analytics. zenon Historian 360 enables even high-resolution data to be acquired in less than a tenth of a second.

When the raw data alone isn't enough, zenon Historian 360 enables you to include metadata. This makes it possible to leverage, for example, device modeling to connect and understand your data. Then use this data in your trends, reports and analytics to convert more of your data into information for improved decision making. Ultimately, there is only one credo: use and know your data.

LIKE A SPIDER IN ITS WEB

Historian has always been an application where the many threads of a company converge in one place. Since production facilities no longer operate separately, but



Various possibilities through additional status recording

are increasingly embedded in the IT infrastructure, this network of threads has become more complicated. Many machines in a production system might be directly connected to Historian so that every production step is recorded in detail. Typically, this machine landscape is completely heterogeneous. Different data formats and communication protocols exist in mature infrastructures. Uniform standards are not typically implemented, which can make it difficult to connect all the data sources. Connectivity is, therefore, key to success. This is one of the strengths of zenon Historian 360. With more than 300 drivers and communication protocols to connect virtually any PLC, machine or IoT device, Historian 360 ensures reliable networking.

STORE AND COMPRESS DATA EFFICIENTLY

Recording and storing data seems simple. But data volumes are constantly growing and terabytes can be recorded quickly. The quantity of data has a major impact on cost, as well as some other side effects.

For this reason, zenon Historian 360 offers you a variety of options for recording data. For example, data can be recorded cyclically or only when an external trigger is activated. You decide on the recording mechanisms, so you have full control over your data – and costs. Data compression can reduce storage requirements and helps to ensure vital insights don't get lost in the forest of data.

MECHANISMS FOR DATA REDUCTION

- Use a hysteresis to smooth fluctuating values.
- Cascade and sort data, for example, by hours, days, weeks, etc.
- Use the "swinging door" compression algorithm

THE SWINGING DOOR COMPRESSION ALGORITHM

This algorithm reduces the values recorded, if the slope remains the same. For example, if you have a straight line with a constant slope, the start and end values and the straight line are saved.

OPEN TO THIRD-PARTY SYSTEMS

A central element is the integration of third-party systems. A move to networking and cross-company collaboration makes it absolutely necessary to use standardized technologies. zenon Historian 360 provides countless options for this. The most important are listed below.

GRAPHQL INTERFACE: GraphQL is an http-based, standardized query language that has become widely established. You can use this interface to query metadata, alarm and process data, among other things. GraphQL makes it very easy to process and automate workflows and business processes, thus avoiding manual intervention and errors to a large extent. The GraphQL interface is particularly useful when querying complex data compared to, for example, a REST API. Using GraphQL, a single request is sufficient to obtain all the relevant data. This makes connecting your client to the interface much easier.

PROCESS GATEWAY: You can use Process Gateway to communicate with higher-level applications. Numerous protocols such as OPC UA, DNP3, SNMP etc. are available.

SPECIALIZED INTERFACES: These include an SAP interface for connecting to your ERP system. Plus, the Werum PAS-X interface enables connection to this established Pharmaceutical industry MES.

EXCEL CONNECTION: Microsoft Excel remains very common in data reporting and analysis. With an Excel add-in, you can query the data directly from zenon Historian 360 and transfer it to your spreadsheet. This enables you to quickly and easily get an overview of your data, calculate KPIs independently, check values at a certain time and much more.

HOW TO USE STATUS

Most of the data acquired is time-series data. This means that a value was recorded at a specific point in time. The value, including its time-stamp, is stored in the database. And zenon Historian 360 provides more. The current status of the value is also recorded so that an exact statement can be made about the value at the time of acquisition. Is the reading invalid because of a communication problem? Was the measurement possibly changed manually? All these and many other states are recorded automatically by zenon Historian 360.

There are a total of 64 states. User-defined states can be created. The most common are listed here.

- **INVALID:** Problem communicating with the driver or variable
- **MANUAL:** The value in the archive has been changed manually

– **REVISION:** Machine in revision, alarms are suppressed
– **ALTERNATE VALUE:** Value is decoupled from process, value is replaced

Status processing offers you a flexible way to better interpret your data.

ZERO ISSUES WITH INHOMOGENEOUS DATA

In a heterogeneous machine landscape, the data to be recorded is usually available in different formats and unstandardized. This is not a problem for data acquisition, but it is a problem when it comes to further processing by third-party systems. If you want to draw conclusions from the data, it must first be prepared in a time-consuming and cost-intensive manner. Typically, each system has to carry out this processing for itself. Not so with zenon Historian 360. It contains an integrated soft PLC, which prepares the data for you at the time of acquisition. This means that you can continue working with standardized data in third-party systems.

HIGHEST DATA SECURITY BY DESIGN

Data is a valuable asset that needs to be protected. However, as networking and communications become more pervasive, systems are more vulnerable to security threats. Vulnerabilities must be closed from the outset and monitored continuously. There are countless threat scenarios to consider, ranging from data theft to insecure storage or unauthorized manipulation.

ACQUISITION SECURITY PROVIDED BY REDUNDANT CONNECTION

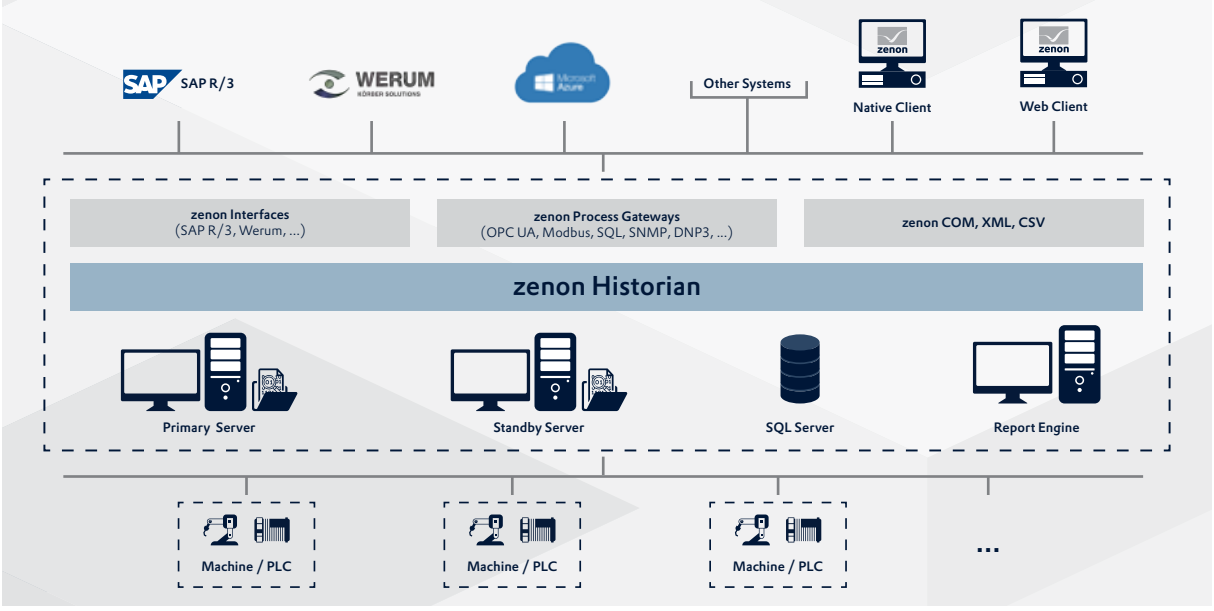
You can achieve seamless data flows by using two acquisition servers. In the event of a failure of the primary server, the secondary server immediately takes over the data recording – without any loss of coverage. This ensures that your data is not lost.

SECURITY IN DATA STORAGE AND AGAINST MANIPULATION

Security measures such as password protection, preventing unauthorized access and encrypted data transfer are easy to implement and consistently integrated in zenon Historian 360. The development of zenon Historian 360 by COPA-DATA is compliant with the requirements of IEC 62443 (Industrial Communication Networks – IT Security for Networks and Systems) and is certified according to this standard.

ZENON HISTORIAN 360 GROWS WITH YOU

A business usually changes and grows. zenon Historian 360 is fully scalable and adapts to these changes. Start on a small scale – with the connection of a few machines – and expand the configuration as required. zenon Historian 360 is very flexible and grows with you to support multi-server architecture and cloud networking.



Example of a zenon Historian 360 network architecture.

IMMERSE YOURSELF IN YOUR DATA WITH REPORTS

Turn your data into insights and enable data-driven decision making. zenon Historian 360 offers you extensive options for creating trends, KPIs, statistics, alarm reports, comparison reports and much more. Use these insights to improve your facility's efficiency, optimize quality, reduce costs or compare equipment or locations. Plus, you can automate report creation and distribution via email.

WHAT MAKES ZENON HISTORIAN 360 SO SPECIAL

COPA-DATA listens closely to our customers. We implement features in response to customer requirements. We have also listened to our customers when developing zenon Historian 360, so that we can provide you with exactly the Historian you need. zenon Historian 360 is a comprehensive software that offers a wide range of interfaces, reporting options and more, including reliable recording and secure storage – because that's what you've told us you need.

THOMAS LEHRER
Product Manager

Thomas Lehrer has been with COPA-DATA since 2011. First in consulting, then in product management responsible for the development of the zenon reporting, he is currently product owner for several new development projects. In line with the motto "Don't be afraid to take a big step if one is indicated. You can't cross a chasm in two small jumps." (David Lloyd George) he likes to face these challenges.

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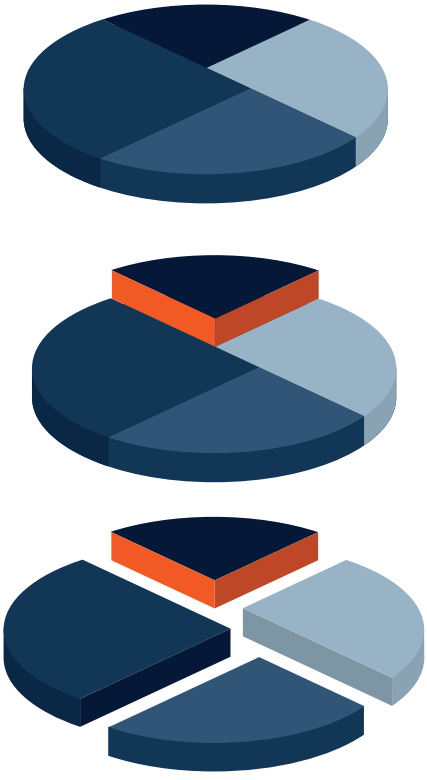

NOT ALL ALARMS ARE EQUAL

Not all alarms are critical to equipment operation. And sometimes the flood of alarms and information can hijack the attention of operating personnel. Read how to use the Alarm Shelving function in zenon to remove non-critical alarms from the Alarm Message List for a defined time period so you can focus on critical alarms.

If a high number of alarms occurs at a certain time creating an alarm overload, this can impact the attention of operating personnel. This situation becomes particularly difficult when alarms have visual or auditory effects. In the worst case, this can result in critical alarms being overlooked, which could damage equipment. This condition is called alarm fatigue and it is a high-cost risk.

ALARM SHELVING IN ZENON

To prevent alarm fatigue, current alarm standards such as ISA-18.2-2016 or IEC 62682 require the operating software to temporarily remove unwanted alarms. However, this must not affect the status of the alarm (e.g. active or acknowledged). This is exactly the purpose of Alarm Shelving in zenon.

First, it is important to distinguish between one-time and continuous Alarm Shelving. With one-time Alarm Shelving, only one alarm item is postponed (shelved). This has the benefit of enabling you to shelve individual items step by step. In return, however, you must shelve similar alarm items again as they occur. This can be critical if many of these alarms are present.

With continuous Alarm Shelving, all alarm items based on the same variable and limit index are shelved. Even those that happen later. This allows you to automatically postpone highly fluctuating alarm items without having to intervene again. However, this mode has drawbacks in terms of the granularity of the process and the time required for the operation, because alarm items from the alarm history are also shelved.

Regardless of the shelving option used, the operator must allow manual operation to remain in control of the alarm overview.

THE ALARM SHELVING DIALOG

To be able to shelve alarms, some information is required to comply with alarm standards, namely: which user performed which operator actions in the system? First, you must specify the reasons for the temporary shelving. Examples might be "Sensor malfunction" or "Service team on site". In addition, you must specify how long alarm items are to be shelved.

SHELVED ALARM DISPLAY

If you want to shelve alarms, the alarm standards require a separate, clear display for these entries so that regular and shelved alarms are not mixed. This display should contain information about the alarm item itself, such as the alarm status or the alarm text, as well as shelving-specific information, such as the reason for shelving or the associated time stamps.

You might also want to delay alarms over the shift period, for example, if the work to correct the error takes longer or if the alarm item is not important enough for immediate correction. The system calculates and manages the time when alarms are pushed back. The alarm remains shelved until this time, unless it is pushed back again by a user.

During shift changes, personnel should discuss the active and shelved alarms so that a complete overview of equipment activities is maintained. This can be done either directly on the system using the Shelved Alarm Display or via its printed lists.

HOW TO CONFIGURE ALARM SHELVING IN ENGINEERING STUDIO

Alarm Shelving in zenon is part of Alarm Administration. Alarm Shelving does not have to be activated – as soon as you configure an Alarm Message List you can also shelve alarms. For this purpose, the regular Alarm Message List has the button "Shelve selected alarms".

You must configure the necessary causes for Alarm Shelving in the Engineering Studio, using the "Alarms" node, "Alarm Shelving Causes" subnode. Since these causes are absolutely necessary, there are four causes for Alarm Shelving in a zenon project from the very beginning. You cannot delete these causes, but you can adapt them to the operating personnel.

In zenon, you also need a Shelved Alarm Display that can display the shelved alarms. You can implement this via an "Alarm Message List" screen and the associated screen switch function. In addition to any template for the Alarm Message List, the Shelved Alarm Display must include the button "Unshelve selected alarms".

The screen switch function to toggle to the Shelved Alarm Display must include the following columns: time

shelved, shelf expires and shelving cause. Otherwise, you will not be able to distinguish shelved alarms from regular alarms. In addition, you must select "View: Shelved alarms" in the display options to show only shelved alarms in Service Engine. In return, only regular alarm items will be displayed for the "Alarm Message List" display option.

HOW IT WORKS IN SERVICE ENGINE

Once you have completed the above steps, users can shelve alarm items in Service Engine. An alarm item consists of the variable and the associated limit value index, which can come either from the limit itself or from a reaction matrix.

zenon offers a hybrid solution of one-time and continuous Alarm Shelving. Users only have to select an alarm item in the regular Alarm Message List that they do not need and activate the Alarm Shelving dialog via "Shelve selected alarms".

After specifying the reason for the shelving and the desired duration, the alarm disappears from the regular Alarm Message List and appears in Shelved Alarm Display. This is part of the unique Alarm Shelving.

If the selected alarm is an error that fluctuates greatly, the continuous part of Alarm Shelving is use. This way, if an alarm item of the same type has already been shelved, all subsequent alarm items of the same type are automatically shelved.

If the duration set for shelving an alarm item expires, all associated items are restored automatically to the regular Alarm Message List. The process is the same when alarm entries are pushed back by personnel.

Entries are written to the Chronological Event List for all interventions in the shelving process. These entries contain information about the type of event (e.g. expiration of the shelf or manual restore), which user performed the intervention and the time stamps relevant to the procedure.

TIPS FOR ALARM SHELVING

If an alarm overload occurs, you should stop the Alarm Message List during operation in order to process the alarms in a step-by-step manner. Remove non-critical alarms and alarm items that are already being handled by shelving them. What then remains are the alarms that need to be dealt with immediately because they may endanger the equipment itself.

If you hear continuous alarm tones during an alarm, use "Stop Continuous Tone" to disable this feature. If the alarm item has already been shelved, functions "Start Continuous Tone" or "Play audio file" linked to the limit are not executed again. This also applies to flashing alarms. However, flashing stops immediately as soon as the first alarm item is shelved. All alarm items of the same type are prevented from flashing. This reduces the audio-visual overload for the operating personnel.

If you do not want all zenon users to be able to intervene using Alarm Shelving, you can secure this function with authorizations in zenon Service Engine. To do so, you must set the required authorization level in the "Alarm: Shelve and unshelve" function. This will prevent all unauthorized shelving attempts in Service Engine.

CONCLUSION:

Not all alarms are equal. Some critical alarms warn about conditions that can put all the equipment in operation at risk. Others are less important, however, and it is these alarms that you can safely process later when you use zenon Alarm Shelving.

KLEMENS NEUREITER
Product Specialist

Klemens Neureiter has been part of the COPA-DATA team in Salzburg since 2016. Through his work as a Quality Assurance Engineer, he has acquired extensive product knowledge and industry expertise in the energy sector. Since 2020, he has been responsible for the further development of zenon as a product specialist and product owner.

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SERIES: EFFICIENT ENGINEERING WITH ZENON – PART 5

HOW TO DESIGN AN APPEALING HMI – FAST & EASY

In this part of the series, you will learn about design in zenon. How can HMIs be implemented quickly and attractively? What must you pay attention to so that the HMI can be used efficiently, are maintainable and look great at the same time? Read about the tools that can help you make engineering easy in zenon.

Imagine that you're at the airport and are trying to catch a connecting flight with a short transfer time. Your flight has just moved to another gate. It's crowded, noisy, chaotic and stressful. You are trying to find the gate number and boarding time. Finally, you locate this information on a monitor. You check an airport map and then dash off. After a few wrong turns thanks to poor signage, you reach your gate in the nick of time.

An HMI works similarly. Through it, a user receives information, searches for further information, derives an action and receives a result – often under time pressure. If this path is not clearly visible, chaotic or very complex, valuable time can be lost in stressful situations. Good design helps to make this path clearer.

> *"A user interface should be so simple that a beginner in an emergency can understand it within ten seconds."*
>
> Ted Nelson

AS EASY AS POSSIBLE

Futurist Ted Nelson's requirement is somewhat high. However, it provides a benchmark for talking about the complexity of a user interface. The more understandable an HMI is, the lower the potential for error, training costs and user frustration.

The aim of a simple design is to keep the cognitive load on the user as low as possible. This load consists of three elements:

- Content complexity
- Knowledge of the user
- Complexity of design

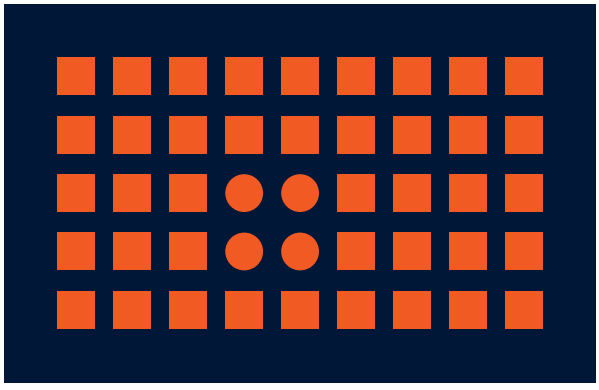
The complexity of the content is inherent to the application itself and is difficult to influence. You can change the knowledge of the user, but only with a certain amount of effort in the form of training. Only the complexity of the design is entirely in your hands. Here, you can minimize the burden through good design that supports the user in decision-making, action and response.

DESIGN LAWS THAT YOU SHOULD FOLLOW

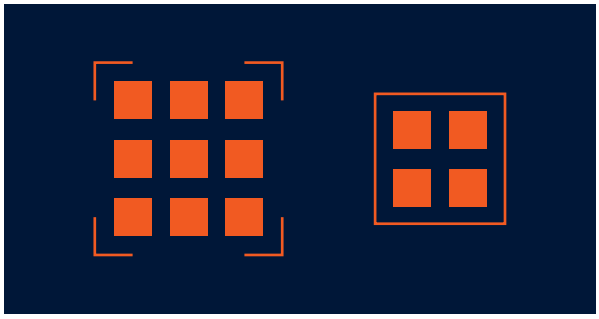
How do you achieve simplicity in design? A well-thought-out structure of the content helps you to do this. In the psychology of perception, the laws of form make it clear which objects belong together in our perception. The most important elements of these laws are as follows:

LAW OF PROXIMITY: Objects placed in proximity to each other are perceived by the brain as belonging to each other. In reverse, this means that a distance symbolizes a delimitation from other element groups. Do not be afraid to use distances generously, for example in the form of white space, to enable the observer to have a structured perception.

LAW OF SIMILARITY: A similar function is expected from optically similar objects, so objects with similar functionalities should look similar. At first glance, it should be possible to distinguish, for example, whether a displayed value can be modified or is read-only. You should also design buttons in the same way to symbolize their function.

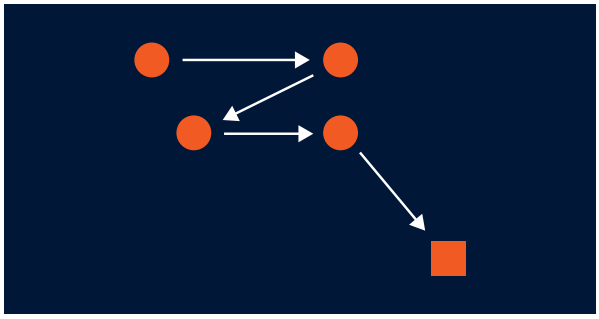


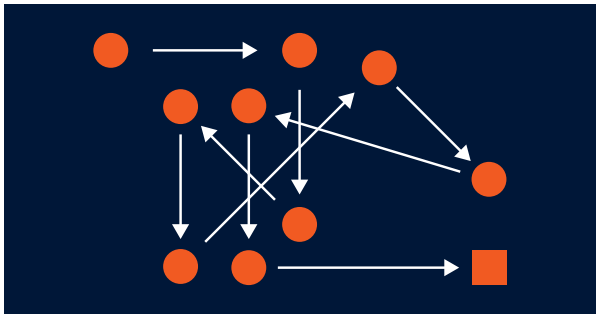
LAW OF UNITY: If several objects are located in a visually enclosed space, we perceive them as a group.



THE LAW OF COMMON DESTINY: The togetherness of objects is also recognized if they behave the same, for example, with a common movement or simultaneous flashing.

LAW OF VISUAL GUIDANCE: Another means of reducing the strain on a user is visual guidance. If the path is logical and follows a direction, it is much easier to follow than a chaotic, broken path.





HOW IT WORKS IN ZENON

Modularization and standardization in HMI design is the key to efficient screen design. This is also reflected in international standards. As already mentioned in Part 4 of this series, the creation of a design philosophy, a style guide and a toolkit are the first steps in the creation of an HMI project according to the HMI standard ISA-101.

DO THREE THINGS BEFOREHAND

A well-thought-out design philosophy forms the guiding principles and the conceptual basis for creating the HMIs – both visually and functionally. A style guide translates these basics into practical applications and examples, which you can then use to guide you in the implementation of screens. The toolkit forms the concrete objects and templates in zenon, which can be controlled centrally via various functionalities. With the appropriate preliminary work, you can concentrate on the most important thing during engineering: the content.

TOOLS IN ENGINEERING STUDIO

To make the implementation and application of the toolkit as intuitive as possible, the following tools are available in Engineering Studio.

COLOR PALETTES: Do you want to keep to a specific color scheme, such as the colors of your corporate identity, and ensure that every person working on the project is using it correctly? Colors can be managed centrally via the color palettes. Here you can define a default color for each color usage. If, for example, all buttons have the same color, a color with the name "Button" can be created here and linked in the properties of the objects. If this is changed in the color palette, all links in objects change. This simplifies the standardization of colors throughout the project.

Several color palettes can be created within a project. You can use the "Switch color palette" function to switch between the color palettes while Service Engine is running. For example, switch to a color palette with higher contrast to respond to special situations such as visually impaired users or quick-and-dirty production environments. Color palettes can be found in the project tree under "Screens".

STYLES: In a style, you can store any property that affects the appearance of an object, i.e. colors, rounding, gradients, fonts, effects, etc. These styles are organized into style groups. You can assign the style groups to objects via element properties under "Representation". Again, changes to the style are applied directly to the linked elements. The styles can also be found in the project tree under "Screens".

FONT LISTS: When it comes to typography and fonts, font lists are the tool of choice. Here you can create different fonts with font types and font sizes. These fonts are linked to text elements. Best of all, you can

manage and change the fonts centrally in the font lists. The changes are applied to all linked elements. If the font lists are created in a global project, the links in the subprojects are also adapted automatically. You can also create several font lists in parallel, and switch between them in the Service Engine. You might wish to do this, for example, when switching to Chinese or scaling font sizes in order to implement an accessible design. In the Engineering Studio, you will find the font lists in the project tree under "Screens".

GRID: Aligning objects ensures a clean layout of screens. It is used to organize content. The grid in Engineering Studio helps with this. Under "Tools" -> "Settings" you'll find the option "Use grid", which activates the magnetic grid. The spacing of the grid lines can also be set here. If you drag them with the mouse, you can only place objects at the set distance when the grid is activated. You can continue to define the distances freely using the arrow keys.

SYMBOLS: The use of symbols has already been described in detail in Part 2 of this series in IU 36. In short: symbols are objects for repeated use. By substituting variables, they can be used in a modular way. The symbol library can also be found in the project tree under "Screens", as you probably already guessed.

SMART OBJECTS: The next advance after symbols is offered by Smart Objects. Beyond symbols, they also encapsulate other components such as variables, functions and images centrally. Reaction matrices, scripts, interlockings, files and zenon Logic are also supported and can be stored as a modular unit. In this simplified way, such a template can be described as a small independent project with self-contained functionality.

This self-contained object might represent hardware such as a pump – including its data structure and calculations. A separate editor is available in the Engineering Studio with which Smart Object Templates are created. These functionalities can be found in the project tree under "Smart Objects" or in the separate "Smart Object Templates" window. The detailed use of Smart Objects has already been explained in Part 2 of this series.

HOW TO FIND EXAMPLES AND TEMPLATES

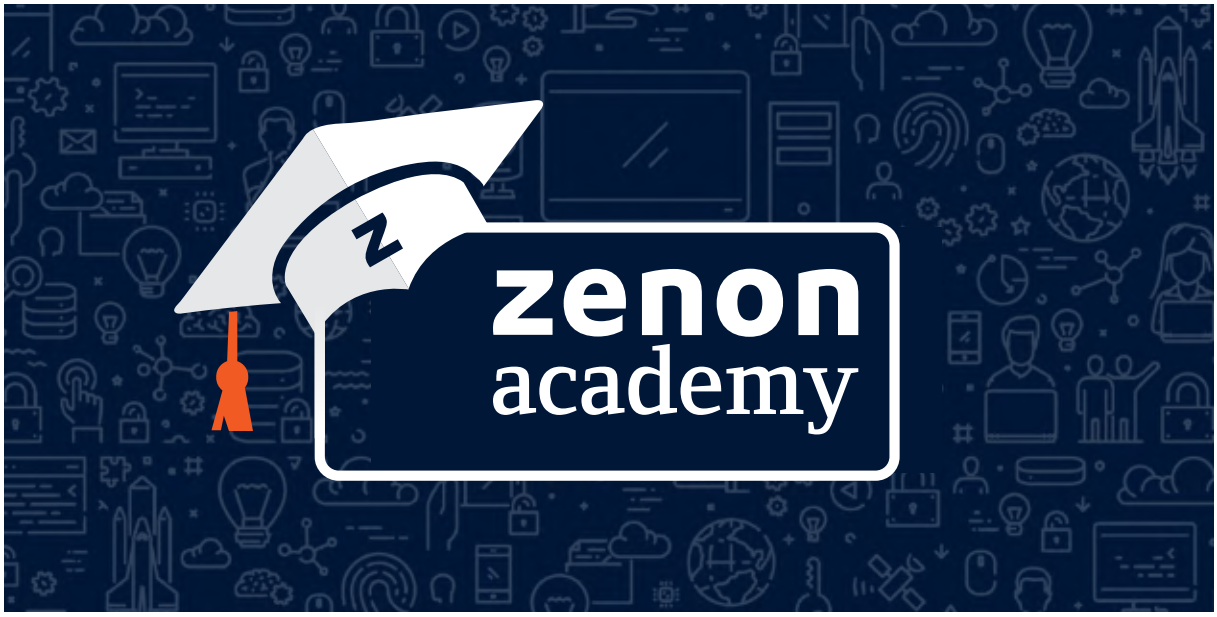
Examples and templates for the functionalities and objects listed here are available in a template project included with every zenon installation from version 11 and higher. This project contains preconfigured font lists, color palettes, styles and symbols, as well as some smart object templates. You can use such a template as the basis for your project and simply reconfigure it according to your needs. The zenon Application Sets, which are explained in more detail in IU 35, are also based on these templates.

SUMMARY:

User-friendly and graphically appealing interfaces are no problem with the tools in zenon. Maintenance, individualization and standardization using the toolkit are all easy. You save time when configuring – and users gain a pleasant environment so they are able to do their work in the best possible way. This also gives you more time, so to speak, to catch your connecting flight without the stress.

DAMIAN BONHOLZER
UI/UX Designer

Damian Bonholzer joined the COPA-DATA team in summer 2021 and he brings a fresh perspective to the possibilities of zenon. In his role as UI/UX designer in the Content & Templates team, he plans, develops, and designs HMI solutions for customers and demo projects.



HOW TO GET YOUR ZENON CERTIFICATE ONLINE

ZENON ACADEMY – RETHINKING THE WAY WE LEARN

The world of work as we know it is undergoing a transformation, and we are all facing new, unforeseen challenges. The clear separation between work and leisure time is disappearing, in large part due to home working. Digital communication plays a major role in this context, as it enables new training opportunities that can be accessed at any time and almost anywhere.

Digitalization has long since become a reality in many areas of life. It has opened new channels for learning and acquiring knowledge. The mobile phone, tablet and laptop are now an integral part of both our lives, professional and personal. The COVID-19 pandemic greatly accelerated this trend worldwide as, for the first time, our workplaces moved from businesses and companies to inside our own four walls, where possible. A decentralized workforce has required companies to provide external access to essential infrastructure and, of course, has had a lasting effect on training activities that were previously conducted on site.

EXPAND YOUR KNOWLEDGE!

The new zenon Academy takes these circumstances into account and provides you with easy access to COPA-DATA's training and continued education offerings, which are available both online and in-person as face-to-face events.

Learn about our existing courses on our homepage and watch the many tutorial videos (no login required). For more information, visit: www.zenon-academy.com

When you create a login, you'll have access to additional features. Click SIGN IN to open the login dialog. With a single login step (SSO), you'll get access to all the features of the zenon Academy:

- See an overview of the wide range of courses and tutorial videos. Online courses are generally available in English, and classroom courses are also available in other languages.
- Book the dates desired.
- Find out more about your current status and the training points you have already achieved.

– Once you have completed your chosen courses, download your certificates.

And best of all, take advantage of the opportunity to learn online when and where you want – and for free. The certificates you have earned can be viewed and printed at any time, as can confirmation of attendance for classroom courses. This makes it easy for you to demonstrate the level of knowledge you have achieved.

HOW DO I GET A CERTIFICATE?

There are two ways to gain certificates:

– Completion of online courses
– Completion of classroom courses

In both cases, the corresponding quiz must always be completed online. To achieve the desired certification levels, you can also combine online courses with classroom courses.

WHAT TO EXPECT AFTER LOGGING IN

There are six sections that provide you with more information about each topic.

GETTING STARTED

Here, you will get a brief overview of the zenon Academy. The new training concept and its most important components are presented here in a few words. You can send suggestions, ideas and questions to the following email address: zenon.academy@copadata.com
We look forward to your feedback!

TUTORIALS

Search and find training videos for the zenon software platform. Click on the desired topic area to define the filter setting. For example, do you want to display the connectivity videos available? Or search for logic tutorials? Tip: A keyword search is also available.

MY COURSES

This provides information about the courses on which you have enrolled. You can see quizzes you have already taken, as well as all completed development and training courses. This way you can always keep track of your competency levels.

ALL COURSES

This section provides you with an overview of all training options available. Predefined filters enable you to quickly find the content you want. Tags represent the languages in which the courses are offered. In the same way, the classroom course entries display information about the countries in which the course is available. This allows you to quickly focus on the content you are interested in.

MY SCORE

Here, you can see the number of points you have already earned, which is especially useful when working toward certificates. To accrue the necessary points for a certificate, you can use all courses offered without exception. As the quiz assignments for our face-to-face courses are also answered online, you can take them whenever you want.

CERTIFICATES

This area shows you the level of training you have already achieved and the validity period for your certificates. The points collected are valid for three years and are always updated in the SCORE area. Under CONFIRMATION OF PARTICIPATION, you can download confirmations of attendance at classroom courses and thus provide clear proof of attendance.

BENEFITS AT A GLANCE

The zenon Academy enables you to broaden your zenon expertise – whenever you want. Set your own pace. After a single login, you'll have access to all the course content and be able to book online or classroom courses as you wish. After you have successfully completed the online quiz for each course, you'll find the corresponding certificate ready to download under CERTIFICATES. All online courses are provided by COPA-DATA free of charge. Take advantage of this offer for your professional development.

A glance at the SCORE section is enough to find out about the number of points already achieved. This is necessary for attaining the various certification levels. The certifications are a prerequisite for inclusion in the COPA-DATA Partner Community, which brings together a wide range of user groups and institutions from all over the world. The goal of the community is to share knowledge, to network, to promote innovation and to succeed in new markets.

In addition to the course content, you can also learn about the many online tutorials at any time. Check out the new zenon Academy – there is no better time than now.












INDUSTRIES & SOLUTIONS

LIFE SCIENCES & PHARMACEUTICAL

ENERGY & INFRASTRUCTURE

AUTOMOTIVE

FOOD & BEVERAGE

Salzburg AG: zenon harmonizes data for the state's hydroelectric power plants, provides an overview in the control room and enables secure remote maintenance.

ZENON MSI INTERFACE

INTEGRATION WITH WERUM PAS-X MES IS "A LA CARTE"

When it comes to digitalization in life sciences, an important goal is the transition from paper-based batch records to electronic batch records. Within this, one of the most complex challenges is the integration between shopfloor and MES systems. A lack of standards leads to high integration and validation costs. Körber Software has designed an interface to simplify data integration between its Werum PAS-X MES system and OT systems. Thanks to their work, integration between machines and Werum PAS-X has never been so easy when using the zenon software platform.

DIGITAL INTEGRATION IN LIFE SCIENCES

Digitalization, Industry 4.0 and the IIoT are terms on everyone's lips – but these terms are sometimes misused without fully reflecting the complexities and real needs of an industry. This tells us what the priority in life sciences is: to move the batch record from paper to digital. The industry is, therefore, talking about Electronic Batch Records (EBRs). Currently, to digitalize this process, organizations typically look toward Manufacturing Execution System (MES). This is nothing new. Yet only a third of pharmaceutical companies have adopted EBR solutions. Why is this? Research suggests the issues of implementation costs, architectural and organizational complexities, and the difficulty in integrating machinery with IT systems are to blame.

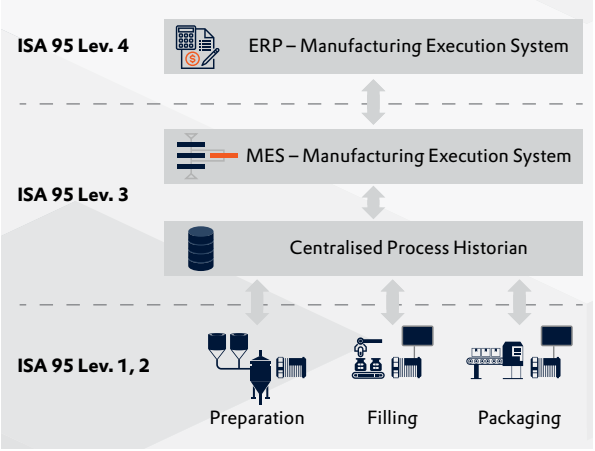


Figure 1: Classic OT – IT integration based on a hierarchical model.

THE CLASSIC APPROACH TO OT – IT INTEGRATION

A classic approach to integrating data from machinery and production lines is to deploy a centralized Process Historian system. The historian provides a connection to the field through which to read process variables (aka "TAGs"). In addition, the historian provides a connection to the MES system via proprietary interfaces. However, this hierarchical approach, as illustrated in Figure 1, has certain limitations.

By connecting to machine PLCs or SCADA, the historian is able to read process variables in real time. This is a solution that is well suited for the storing of time-series values (e.g. a temperature trend). However, when it comes to collecting alarm signals (e.g. critical GMP exceptions), the matter becomes a little more complicated. First, the alarm condition generated in the machine must be recreated in the historian. However, the historian does not record the complete alarm life-cycle. Important information, such as when the alarm was acknowledged at machine level and by whom, will be missing. That's because this metadata is not normally available as process variables. The issue becomes even more complex when dealing with the audit trail messages. How can a value change event of a critical GMP parameter, including any electronic signatures entered by operators, be captured?

Today, audit trail integration is mainly based on file import/export (CSV or XML files) or a different customized approach on a machine-by-machine basis. This increases

integration costs and complexity for pharmaceutical companies. To solve this issue, the "Plug & Produce" working group of ISPE Pharma 4.0 is currently defining a concept based on the advanced features of the OPC UA standard. Detailed guidance on this will be released in the near future.

A PARADIGM SHIFT: FROM A CENTRALIZED HISTORIAN TO DISTRIBUTED DATA STORAGE

As we have seen, the classic approach isn't ideal because it does not allow for capturing all the required information and it requires double configuration and validation of information such as alarms.

By contrast, modern software platforms and SCADA systems operating at the OT level are able to generate and store electronic records in compliance with data integrity requirements.

zenon Service Engine, for example, is able to generate and store data such as time series (e.g. a temperature trend), the complete life-cycle of a machine-generated alarm (e.g. low sterilization temperature: alarm entered at <date & time> acknowledged at < date & time > by <user name>, operator comment <…>, alarm exited at < date & time >), and audit trail records, including all required metadata.

zenon can store data in different ways, so you can choose the storage most appropriate to your use case. Options include binary databases with the possibility of redundancy, SQL databases, and MongoDB data storage. Solutions can be installed on physical or virtualized computers (Figure 2).

It is clear that a machine equipped with such a software platform can independently and reliably store data even in the long term. We can say that each machine is responsible for the historization and distribution of the real-time and historical data it generates.

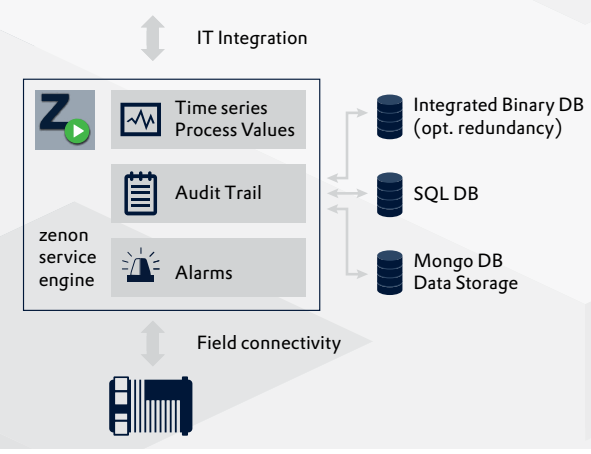


Figure 2: Different storage options using zenon Service Engine.

The approach could drastically reduce architecture complexity and the costs of engineering and validating data interfaces. So far, so good. How can we now connect the machine with the MES system responsible for producing the EBR?

WERUM MSI: A DIRECT COMMUNICATION BETWEEN THE MES AND SHOPFLOOR

MES systems, like all IT systems, are not designed to exchange values in real time with SCADA and PLC. Communication between MES and shopfloor systems usually takes place in a transactional manner, i.e. by exchanging messages at specific events or moments. For example, at the beginning of a batch the MES sends the data about the product to be produced to the machine; at the end of the batch the machine communicates to the MES the production result (e.g. how many pieces were produced) and any GMP exceptions (e.g. a critical product quality alarm).

Körber software, the manufacturer of the Werum PAS-X MES system, which is very popular in the life sciences sector, has defined a communication interface called MSI (Message-based Shopfloor Integration) to solve the limitations of current OT and IT integrations. Through MSI, PAS-X is able to communicate bidirectionally with production systems, thereby improving reliability and data integrity. Obviously, for this to work, the machinery in production must also support the same MSI interface.

HOW ZENON SUPPORTS WERUM MSI

Through our collaboration with Körber software and leading international pharmaceutical companies, COPA-DATA has developed a native Werum MSI interface in zenon. This provides direct, bidirectional communication with PAS-X MES. It is a GAMP5 SW CAT.4 configurable module that allows the definition of MSI messages and the mapping of the message content to zenon variables. The definition of these messages, called OrderParameterMessage, will then be sent to the PAS-X system, so that it can use them within its Electronic Batch Record. This message definition file (an XML file) can be created and tested offline in advance of the delivery of the machine. By bringing forward this time-consuming activity, onsite installation time can be shortened. Similarly, it is possible to define which subset of zenon alarms are to be sent to PAS-X as GMP exceptions.

Figure 3 offers a simple example of EBR communication between PAS-X (shown on the left of the diagram) and zenon acting as the machine SCADA (to the right). The simple Master Batch Record (MBR) includes three OrderParameterMessages. CreateBatch is sent from PAS-X to zenon, including information like the BatchID, the product name, the recipe to activate. At the end of batch, zenon sends CycleResult to inform PAS-X about

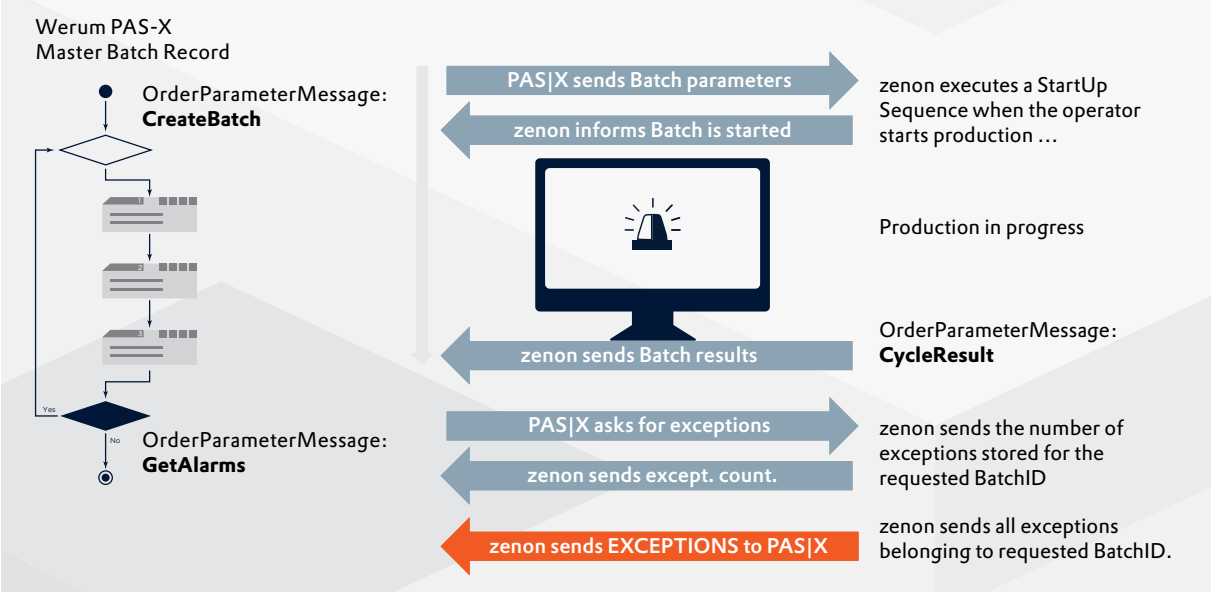


Figure 3: A simple example of communication between PAS-X and zenon for batch management.

the production results and counters. To receive the GMP exceptions, PAS-X sends GetAlarms to ask zenon to send the stored exceptions related to the specific BatchID.

GREENFIELD SCENARIO: A "WERUM MSI READY" MACHINE

A typical greenfield use case would be to use zenon as an integrated machine HMI. In this case, the machine can include a Werum MSI interface preconfigured by the manufacturer for standard batch opening and closing operations and for sharing critical GMP alarms. The messages to be exchanged with the MES can be agreed in advance with the end customer. The machine arrives at the customer site with the MSI interface preconfigured. For integration with the end customer's PAS-X system, it will be sufficient to share the MSI message definition prepared by the manufacturer. Some addresses will need to be configured to establish communication between the machine and the PAS-X system. Messages prepared by the machine manufacturer can be subsequently modified by the end customer if necessary to better adapt them to their own needs. This is done using menus that can be configured according to GAMP SW CAT.4. This offers a simplified approach that does not require costly hierarchical integration. That's why we can call such machines "Werum MSI ready".

BROWNFIELD SCENARIO: CONNECTING LEGACY EQUIPMENT VIA MODULAR MIDDLEWARE

The previous scenario outlines a Plug & Produce approach for new machinery. However, it is also necessary to think about existing machines. Machines that have been installed for some time and which are functioning correctly may not have a direct interface to Werum PAS-X nor possess integrated data storage capability. For this use case, middleware between the existing machines and the MES system should be used.

Using the zenon software platform, it is possible to implement a modular and scalable middleware solution that we call an Automation Integration Layer (AIL).

In this use case, zenon offers integration with existing machines through widespread connectivity with PLCs (including legacy PLCs like Simatic S5) and field equipment, contextualization and historicization of collected data, and integration with Werum PAS-X through the MSI interface.

Let's consider how this might work in practice. zenon receives a batch open message from PAS-X. Interpreting the message, zenon routes the received information to the recipient machine by mapping it based on the possibilities offered by the existing controller. Batch contextualization, if not present in the machine, is implemented in zenon AIL, so that the information collected – such as counters or GMP alarms – can be correctly sent to the MES system at the end of the batch. Furthermore, within zenon it is also possible to use the collected data to create dashboards or reports tailored to the needs of various company functions (as presented in figure 4).

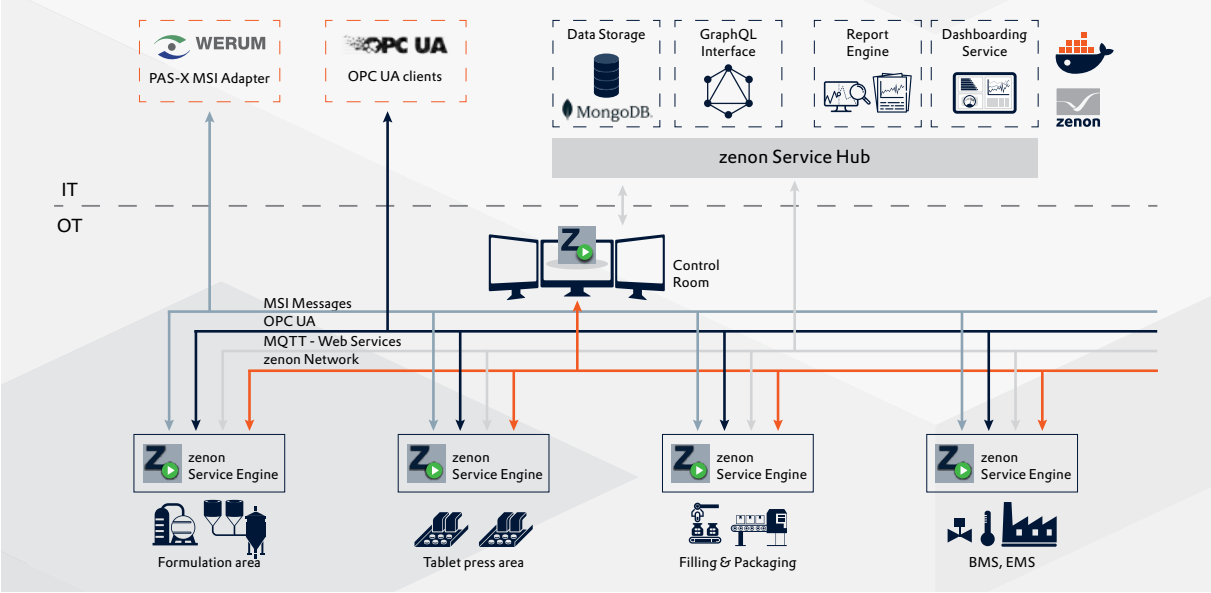


Figure 4: zenon as a modular automation integration layer, including data storage, reporting and IT integration.

CONCLUSION

In life sciences, the transition to paperless operations has encountered various obstacles which have led to an increase in the cost of implementing EBR systems. If we are to overcome these difficulties, we must reduce the need for customized software solutions that limit flexibility and add to maintenance costs and complexity over time. To address the lack of standards in the integration of machines and IT systems and move toward a Plug & Produce approach, working groups such as ISPE Pharma 4.0, Namur MTP and BioPhorum are defining new standards and guidelines.

For companies equipped with the PAS-X MES system, Werum MSI is a solution that can be easily applied today that meets the data integration needs of machines to generate a comprehensive electronic batch record including Review by Exception (RBE). The ability to define in advance the format and content of messages between the machine and the MES system reduces surprises during installation and validation. Thanks to the MSI interface integrated in zenon, new "Werum MSI ready" machines can be designed. When it comes to brownfield environments, we have seen how, by using the zenon Automation Integration Layer, it is possible to connect existing machinery in a modular, scalable and configurable architecture. With its scalability and native functions such as data storage and Werum MSI Interface, zenon is the ideal companion for your journey toward the digital plant.

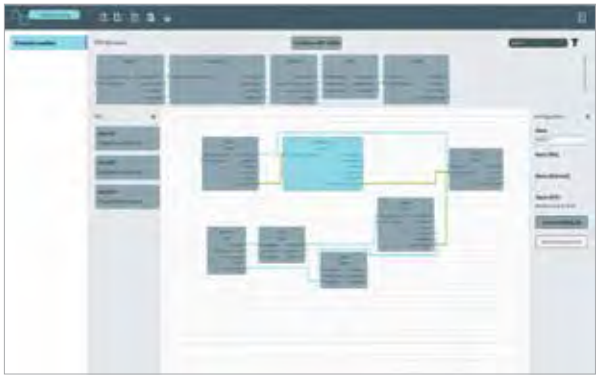
GIUSEPPE MENIN
Life Sciences & Process Industry Manager

Giuseppe Menin began his career in mechatronics engineering as an automation engineer and software developer. As project manager, he coordinated R&D projects for automating and monitoring manufacturing lines. In 2004, he joined COPA-DATA and is currently covering the role of Pharmaceutical Industry Manager at HQ. As a member of the ISPE Pharma 4.0 Special Interest Group and the Connected Machines working group within GAMP Italy, he is in regular contact with professionals of the Life Sciences industry.

BRINGING AUTOMATION TO THE LABORATORY – WITH MTP STANDARDS AND ZENON

MERCK MODULARIZES ITS PROCESS DEVELOPMENT

In the Chemical and Pharmaceutical industry, product life cycles are becoming shorter and shorter. Merck KGaA was looking for a new solution that would make it easy to create and update system configurations and rapidly upscale from the laboratory to production. With zenon, the technology company was able to roll out modularization according to MTP standards in a higher-level Process Orchestration Layer (POL). This flexible application of modules is accelerating time to market considerably.



The orchestration sheet is used to plan and visualize networks of individual machines and services.

Individual modules for recipes are orchestrated and managed by zenon Batch Control.

How can we bring new products to market as quickly as possible? This process development question is important for Merck.

The leading German science and technology company is active in the healthcare, life sciences and electronics sectors. To optimize its process development and achieve faster time to market, Merck decided on a completely new approach: modularization based on Module Type Package (MTP) standards. "At first we didn't even consider MTP because the technology was still in its infancy. COPA-DATA convinced us to test the MTP/POL standard on a pilot project. After half a year, we were won over, and we applied our initial experiences to the main project," states Manfred Eckert, Associate Director Process Development at Merck.

DYNAMIC SOLUTIONS REQUIRE GREAT FLEXIBILITY

Merck's laboratory facility contains some 120 fume hoods equipped with lab equipment such as pumps, stirrers and dosing modules. In the past, trials with the different modules were carried out either manually or using a conventional laboratory management system. The frequent reconfiguration of the lab setup called for a major investment of time and resulted in high costs. "Nowhere else is such a dynamic environment found as in the laboratory. Trials are set up there almost every day. Modular automation has tremendous potential, particularly in this sector," states Christof Franzke, Senior Technical Consultant Key Accounts at COPA-DATA.

After successfully completing the pilot project, Merck and COPA-DATA began automating 60 fume hoods with the related process modules in a new lab facility. MTP interfaces were created for the individual devices. This is a prerequisite for the subsequent automation and orchestration of the modules via POL. The module profile in process development is very small. MTP provides a major benefit here as well because a range of control systems in differing scales can be used to produce the necessary interfaces, whatever the hardware or its manufacturer. As a result, not every module has to be equipped with an expensive PLC.

PLUG & PRODUCE FOR LABORATORY PERSONNEL

The goal was to ensure that lab technicians do not need to have any programming knowledge in order to add the modules needed to their trial setup. This approach provides the greatest possible flexibility and saves considerable time. The functionality and principle of MTP can be compared to a printer driver. The driver software is included in the delivery scope with the printer. This allows it to be connected to any PC and controlled without any further programming. Services such as printing or scanning can be actioned immediately after connection thanks to the Plug & Play approach. Plug & Produce in the process industry comes directly from this idea. MTP technology enables users to assemble, orchestrate and operate a production system based on several process modules very quickly and easily. The modules have their own intelligence, so that they only need to be connected to the network to be operated from the POL. No further programming is necessary. The system configuration can be quickly changed and adapted to the appropriate process at any time. Communication is supported by the OPC UA open communication protocol.

HIGH RATE OF REPRODUCIBILITY FOR TRIAL SETUPS

In addition to ease of use, flexibility and a faster time to market, modular automation provides a further benefit for process development: high reproducibility of individual

trial setups. This is because the POL is doing more than managing and visualizing the trial setup based on the recipes. Data from the trial can be recorded and reported with the zenon Report Engine. Once a development process and a specific recipe have been defined, the manufacturing process can be reproduced again and again using the same framework parameters. This saves the lab technicians from having to manually document the defined parameters and also facilitates documentation and quality assurance.

AGILE PROJECT MANAGEMENT TO DEVELOP A POL

The rollout of modular automation and integration in the POL took place over just two years. "For a project like this, that is an exceptionally short time," states Manfred Eckert. "Our collaboration was characterized by a high degree of agility. After all, until that point, no POL had previously met Merck's requirements. We only developed this in the course of the project."

"For us, it is important that the technology supports a smart scale-up. Upscaling from the laboratory to production has to be quick and easy."

Manfred Eckert, Merck

Associate Director Process Development

It was not only the tight timeline that posed a major challenge for the project participants. In parallel to the rollout of the MTP technology, a new IT infrastructure was implemented at Merck. The aim was to set up the IT close to production. This was intended to meet the security requirements in production and guarantee round-the-clock availability. The POL was embedded directly in the new IT infrastructure. In addition, there were updates to the VDI/VDE 2658 standard at the same time, which had to be taken into account when implementing the project.

The further rollout of MTP is now planned at Merck in the US. Additionally, the newly automated processes can ensure such a high level of reliability that the processing facilities can run continuously, even overnight. This is an important advantage because, particularly when handling chemicals, safety risks have to be eliminated.

LEADING THE WAY INTO THE FUTURE

"The zenon POL is one of the first POLs on the market with virtually end-to-end POL functionalities. We are pleased that we were able to co-develop the system and that we can use it for our process development from now on. It has been a joint journey with constant adjustments, changes and optimizations. We also plan to continue optimizing the POL together with COPA-DATA in the future," states Manfred Eckert.

HOW STANDARDS SUPPORT THE ENERGY INDUSTRY OF THE FUTURE

RULES-BASED INNOVATION – AN OXYMORON?

Do you remember how it was when you were starting out and had to learn everything from scratch? Familiarizing yourself with technical topics was like entering a jungle of new terms, processes and expectations. Standards and regulations have always played an important role in our industry, but how many "standards" does the Energy industry need? When do standards potentially promote and when do they inhibit the advancement of industry or individual companies? Industry expert Stefan Hufnagl spoke with Jürgen Resch, Industry Manager at COPA-DATA, who has more than 20 years of experience in the field.

PHOTOGRAPHY: LUKAS JAHN

Stefan Hufnagl: Mr. Resch, our daily life is shaped by countless standards and conventions. What types of standards are there in the energy sector and how did they develop?

Jürgen Resch: Many facilities in the energy sector are considered critical infrastructure. To achieve a certain standardization, operators and committees, as well as national and international authorities, work together to develop standards. These facilities share the common goal of ensuring our well-being as a society. Consistent, comprehensive measures can only be achieved with documents that describe the intended purpose of the standard.

Energy standards have been necessary since the advent of electricity. In addition to safety standards, clear standards were also needed to coordinate power generators and electricity consumers.

Standards already impact many areas of our lives that we don't even notice. Power supply units do not fail because the mains voltage is reliably within standard tolerances. You can touch insulated cables freely because their insulation meets standard requirements.

Alongside all the legal standards, operators have also developed their own standards. This enables them to clearly organize their assets according to a consistent plan. Employees can easily apply this to all systems. In addition, suppliers can adapt to customer standards in order to provide services more cost-effectively.

STEFAN HUFNAGL
Industry Expert Energy

Industrial automation is the main focus of Stefan's professional career. After several years of work as an application engineer, he has also worked in innovation and product management. Stefan has been part of the COPA-DATA team since 2013. As a member of the Energy Industry Team, he deals intensively and openly with trends and challenges in this industry.

stefan.hufnagl@copadata.com

It sounds like standards can dictate everything when creating an energy solution. Is that so?

This depends largely on the application. If you want to quickly create a systematized solution or if the task is relatively simple, then you can rely on standards and use them with all their benefits. However, setting standards too early can potentially stifle new ideas. This is the case, for example, when it comes to application areas that are terra incognito or where creative solutions are needed, or when the task is highly complex. You should always be open to this, even if the optimal way to develop most solutions is by using standards.

However, I should add that introducing standards requires an initial investment, which only bears fruit later, for example, in the form of more efficient processing.

You mentioned "corporate standards" earlier; what exactly do you mean by that?

In energy automation, we see users and customers who have very specific ideas about where their data is created and which paths it should take to become information. However, these processes are often captured differently. The lowest common denominator is usually just an Excel or XML file with a specially defined formula. Nevertheless, the contents of the Excel spreadsheets and XML files form the company standard. It is up to the manufacturer to adapt to this.

To what extent does zenon support the design and implementation of such a company standard or platform solution?

zenon has been used successfully in the industry for many decades and has gradually adapted to these requirements. The software platform offers the necessary interfaces to ideally support the configuration of the data streams and their use in the monitoring and control process. At the same time, the in-house professional services team develops the add-ons needed to interpret the company standards mentioned above and efficiently feed them to these interfaces.

In addition, zenon applications can be adapted to customer standards so that, for example, it is virtually seamless to migrate from a legacy system to zenon. This results in an ideal solution: a new, state-of-the-art design template that is applied to all new projects and, moreover, ensures faster and error-free configuration.

Without a doubt, IEC 61850 is currently one of the most important standards when it comes to building state-of-the-art energy facilities and substations. How did this standard come about and how important is it today?

Long before IEC 61850, there were standardized and proprietary solutions that primarily defined communication

within and from stations. All of these communication protocols had strengths and weaknesses. Personally, I find that IEC 61850 reads as if someone around the turn of the millennium wrote down everything good in the existing communication protocols and tried to integrate it into IEC 61850. In IEC 60870-104, for example, buffering on the slave side in the event of a connection loss was not standardized. In IEC 61850, on the other hand, we find buffered reports.

Many operators and user groups have created their own standard for numerically addressed protocols. In IEC 61850 there is now a standardized, self-explanatory data model.

Manufacturer-independent interoperability of different devices and systems is also an important goal of standardization. In your opinion, has this been attained today?

In the beginning, manufacturers cooked up their own solutions and put a lot of information in so-called private areas. Over the years and through users' intensive engagement with the topic, some have managed to turn the tables. This has forced manufacturers to use the operator's specifications. As a result, manufacturer-independent interoperability has been at least partially achieved.

Staying on the topic of connectivity: OPC Unified Architecture has been treated as the standard for all communication activities in industrial environments and in the industrial IoT. Is this also true in the energy environment?

For as long as I've been in this industry – and it's been a long time – there has always been a drive to define "one true standard of communication." And that's good. However, the global requirements are too diverse, and too many markets are at different stages of development. Plus, technical progress does not end. This means that even if OPC UA is used in large parts of the world, the next, or another, even better standard is already being developed elsewhere. As a business, you always have to keep up with these developments and learn new things.

What other standards are important to learn about in the Energy industry these days?

In the future, the series of cyber security standards around IEC 62351 and IEC 62443 will play an important role. De facto standards like Sunspec should also be considered. Depending on the area of responsibility, you might deal with time synchronization (IEEE 1588 or IEC 61588) or KPIs for solar PV (IEC 62724). In addition to these standards, I could list another twenty to thirty series of standards here.

Finally, Mr. Resch, a world full of standards or one entirely free of them – if you could have either, which of the two worlds would you choose?

A world with standards. Little do we understand the degree to which standards make our lives safer.

JÜRGEN RESCH
Industry Manager Energy

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 e-mail energy@copadata.com

STEP UP TO THE "ZENON STANDARD" AND IMPROVE YOUR FLEXIBILITY

PREVENT COSTLY DOWNTIME – WITH ZENON

Automotive manufacturing requires finely choreographed production processes. Every vehicle passes countless production stations before rolling off the assembly line to the specification ordered. Thanks to the compatibility of zenon, the terminals for the different stations do not have to run the same zenon version.

Updates are unpopular, to say the least. In office environments, they can interrupt work. In factories, they can bring production to a standstill if the software update is not well planned. Nevertheless, updates have many benefits. For example, the latest version is often required to answer new security risks. Optimized programming often improves speed and performance and added features further benefit users. Such software product life cycles are widely familiar to users of Windows, Android and office software.

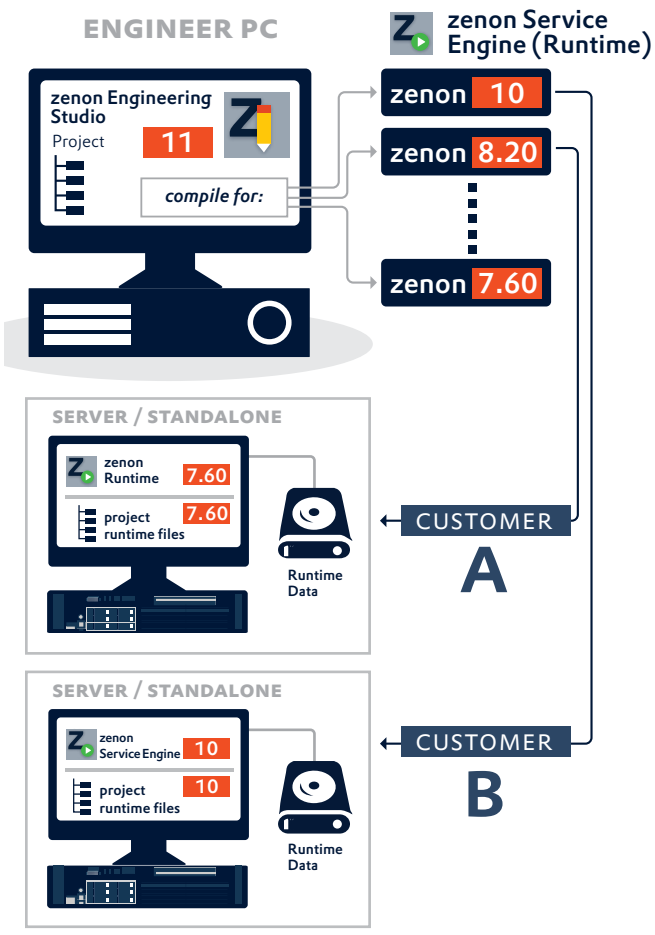
What applies to popular operating systems also applies to zenon. COPA-DATA has ensured that updates can be integrated easily in everyday production. The compatibility of zenon has the highest priority. It guarantees the integrity of the intellectual property behind these usually laboriously developed solutions. Once saved in a zenon project, the solution can be re-used in the future. It continues to run undisturbed and can be serviced conveniently as usual.

COMPATIBILITY HAS MANY FACETS

zenon features several types of compatibility. The most important are:

- Engineering Studio compatibility (formerly Editor compatibility)
- Backward compatibility (compatibility between Engineering Studio and Service Engine)
- Service Engine compatibility (formerly Runtime compatibility)
- Online compatibility (compatibility between the Service Engine client and the Service Engine server)
- Service Engine data compatibility (formerly Runtime data compatibility)

Even when project creators use the latest version of zenon Engineering Studio, they can securely maintain



Backward compatibility

older versions of zenon Service Engine thanks to downward compatibility. And with each new version, new features are available that can be used without having to worry about older projects.

ZENON IN AUTOMOTIVE MANUFACTURING

The following example involving conveyor technology for the Automotive industry clearly shows the benefits that the zenon compatibility concept provides.

A variety of technologies are used in the vehicle production process. In shell or body construction, things are different than in the paint shop or in assembly. But no matter what the technology, conveyor technology always moves a vehicle from point A to point B. It covers a large area in the production facility and has a complex structure with numerous production stations and nodes with branches, junctions, parallel sections and temporary storage points.

For safety reasons, e.g. personal protection, terminals are installed at almost every production station and node. This ensures that only the system parts and machines of the respective production station can be operated. As a rule, these terminals are unmanned but, if worst comes to worst, an operator can intervene manually. The terminals are mostly industrial PCs with touch panels, Windows and zenon.

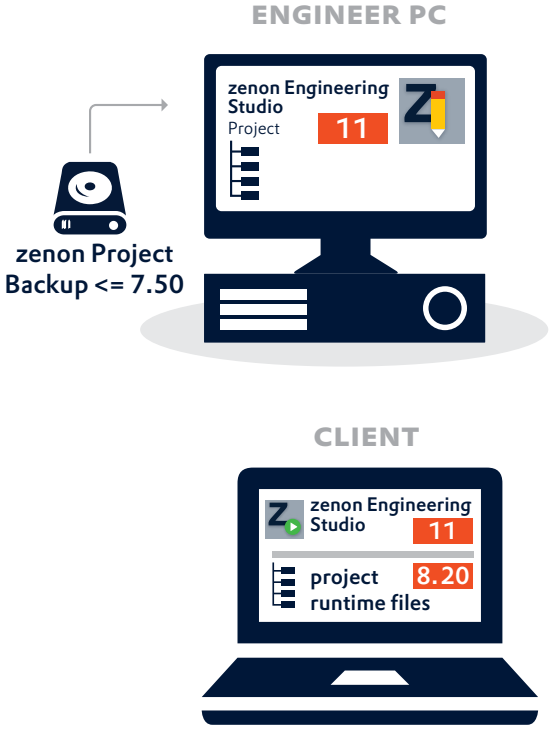
SPREAD OUT UPDATES OVER TIME

Conveyor systems remain in operation for some 15 to 20 years. At the same time, the life cycles of production facilities are adjusted to the production time of the respective vehicle models, which is between five to seven years. In addition, the running times vary for systems at the various production stations such as body shop, paint shop, assembly and component manufacturing.

Because production lines cover long distances and include many terminals, installing updates can be time-consuming. It can make more sense to split up the updates and spread them out over time.

This extends the time window for software updates. They can be easily installed during planned production downtimes, such as during scheduled maintenance activities on the corresponding equipment.

In these cases, Service Engine compatibility is a major benefit. The latest version of zenon Service Engine can run on the new terminal and the other terminals do not require an update.



Service Engine Compatibility

Another important benefit, particularly for large production equipment such as conveyors, is provided by online compatibility, which ensures that a zenon Service Engine client from a newer version can communicate with a zenon Service Engine server from an older version.

As conveyor systems never have the same Service Engine client due to their large size and many stations, mixed operation is required, and zenon masters this effortlessly thanks to its comprehensive compatibility. As a result, conveyor systems can be gradually upgraded to a new version during operation. For example, you could upgrade from Windows 10 to Windows 11 and install security patches.

MULTI-PROJECT NETWORKS

In the complex world of automotive manufacturing, a multi-project network is nothing unusual. An example of this in the sphere of paint technology might be an integration project or superordinate project called Painters. The sub-projects might be, for example, sealing, cathodic dip painting, underbody protection, top coat, dryer and body storage. Updating software in such multi-project networks requires careful planning. Most importantly, the oldest version must be running on the Service Engine server.

UPDATES IN THREE EASY STEPS

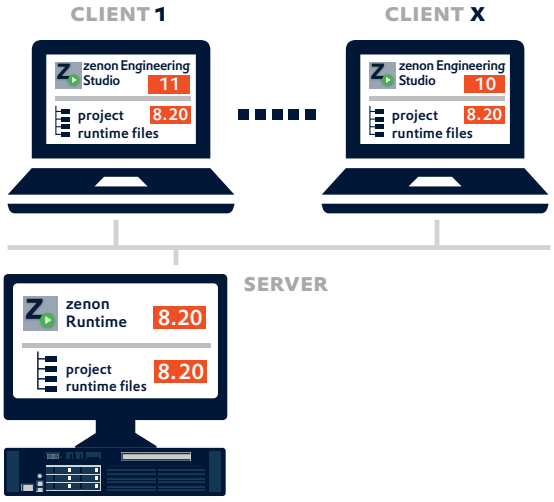
1. Install the latest version on the clients (Runtime compatibility).
2. When all clients are updated to the latest version, install the latest version on the server. You won't experience any downtime thanks to redundancy.
3. Update the project data to the latest version by configuring the proper settings in zenon Engineering Studio.

COMPATIBILITY PROVIDES SECURITY

Thanks to Engineering Studio compatibility, project creators can use a brand-new version of zenon if they wish to expand legacy systems and use existing code. The zenon Engineering Studio should be used to import and edit it. The target version for the zenon Service Engine can be selected conveniently with a mouse click. This ensures that only features that work reliably on the target Server Engine are configured.

As described above, thanks to online compatibility, different zenon Service Engine versions can be used at the same time.

This end-to-end compatibility applies not only to version upgrades, but also to small and large product updates.



Online Compatibility

BERND WIMMER
Automotive Industry Manager

Bernd Wimmer has been Automotive Industry Manager at COPA-DATA Germany since 2002. Previously, he worked as a central control technology specialist for TaurusMediaTechnik GmbH. He lives with his wife, two children and their cat in beautiful Bavaria.

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WORKING MORE EFFECTIVELY WITH STANDARDS

Modern daily life would be unimaginable without standardized interfaces and data formats. Learn how standards are playing a role in the digital transformation of the Food & Beverage industry and how they can benefit you when you use zenon.

PHOTOGRAPHY: LUKAS JAHN

The Food industry is in a state of flux. Many companies are currently working on the digitalization of production and packaging processes and standards are everywhere. But does it make sense to work with standards? And is there a benefit to ensuring compliance?

Andreas Grün and Alexander Fröhlich, industry specialists at COPA-DATA, work with standards on a daily basis. In the following interview, they describe which standards are relevant and how you can benefit from them in your zenon applications.

Andreas, zenon provides over 300 protocols for communicating with a wide variety of machines. Isn't that the exact opposite of standardization?
Andreas: Our objective with zenon is to make our users' lives easier. We can see that there are many machines on the market with different protocols. To exclude these and to refer to the exclusive support of established standard protocols would be the wrong way to go about things. Rather, we see ourselves here as a mediator. With zenon, our customers are able to connect all their machines – be it via standard or proprietary protocols – to a central system. In zenon, the data can be standardized, processed and subsequently made available to other systems via a standardized protocol.

OPC UA, for example, is becoming increasingly important in industrial data communication. Of course, we support this standard. However, there will be long-established applications with proprietary protocols. With zenon, our customers can cater to both scenarios.

What role do standards play in the current challenges in the industry?
Andreas: We are in the midst of the industry's digital transformation. The topics of the present and the future are Industry 4.0 and the Industrial Internet of Things (IIoT). Standards are the key to a successful digital transformation. I would even go so far as to say that without standardization, an Industrial Internet of Things cannot be realized. That's because every possible communication interface would have to be defined and programmed separately. This is not realistic, even with just a few participating "things".

ALEXANDER FRÖHLICH
Industry Specialist Food & Beverage
Alexander has been working at COPA-DATA since 2011 and has gained experience in various departments. Since 2020, he has been responsible for the Line Management and Process Automation applications as an industry specialist.

Alexander, you work intensively in the area of filling and packaging. How is that affected by standardization?
Alexander: There are standards for this area: the Weihenstephan standards, specifically WS Pack and OMAC PackML (ANSI/ISA-TR88.00.02-2022). They aim to standardize the control of the machines, as well as the communication between machines and the higher-level software systems. Compliant machines can be connected to a line management system much faster, for example, than machines with a proprietary interface.

How do you achieve this standard to speed up connection?
Alexander: There are several aspects. First, the technical connection is simplified by a standardized communication protocol. The technician does not have to first find out which PLC controls which machine and then configure the appropriate driver.

When the connection is complete, zenon displays all the available variables. The technician already knows exactly which variable provides which information and which variables are relevant for the application being implemented. In the case of a proprietary implementation, the PLC program often has to be analyzed in order to obtain this information.

When all the necessary variables are imported into zenon, further processing is made easier because PackML and WS Pack describe how the data is to be interpreted and how to calculate OEE with the existing variables.

So there are two standards for WS Pack and PackML ? How did this come about?
Alexander: Both standards were developed independently of each other and had different approaches to the topic. While OMAC recognized the need to standardize the programming of the machine control system, the Weihenstephan standards aimed to standardize the interface between machines and SCADA/MES systems. PackML is therefore "closer" to the machine and also describes tags for controlling the machine. WS Pack, on the other hand, focuses on the evaluation of machine data in higher-level systems. In an interview for zenonIZE21, Tobias Voigt summed up the objectives of the Weihenstephan standards.

How will the standards develop in the future?
Alexander: We expect that both standards will be supported by increasing numbers of manufacturers. In the end, everyone – machine builders and end customers

– will benefit from this. At the same time, the standards will be further developed, improved and extended. A new version of the PackML standard will soon be available in which, for example, an adapted state model will be defined. OMAC is also developing in new areas, for example, with its HMI Design Guideline.

The Weihenstephan standards are continuously being strengthened by further sub-sector-specific standards. In addition to WS Pack, there are now WS Food, WS Bake and WS Brew. A standard for machines used in candy and chocolate production (WS Sweets) will be published in the near future.

"We want to make the integration of the shop floor and the IT world easier, cheaper and faster."

Dr.-Ing. Tobias Voigt,
Technical University of Munich,
Chair of brewing and beverage technology,
Group Management AG Intelligent Production Systems about Weihenstephan standards

Andreas, are there advantages to standardized data that go beyond connectivity?

Andreas: In addition to the advantages mentioned in terms of component integration and communication, standardization also provides benefits in data analysis. Storing large amounts of data can be done today without standardization in a data lake. The nasty surprise comes when such unstructured data has to be evaluated. A data lake can quickly become a data swamp. A complicated conversion to a uniform format can require more resources compared to the pre-standardized storage of data. The evaluation of such data – via reports, KPIs or other calculations – benefits enormously from a standardized data structure.

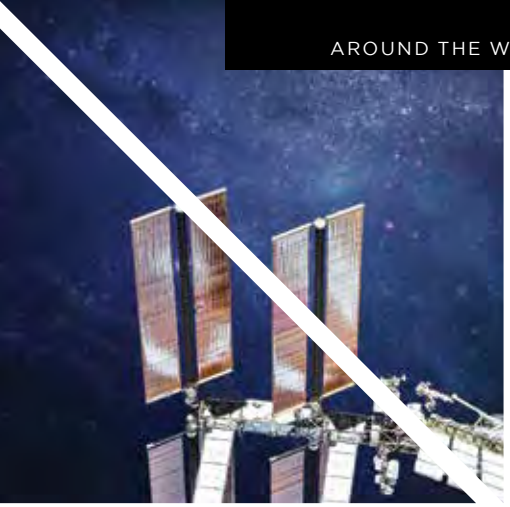
With zenon, you can enjoy these benefits during engineering. Smart objects and wizards for automated configuration ensure that applications can be created in a matter of minutes based on standardized data.

What takeaway would you like to share with readers?

Alexander: Use standards whenever possible. You, your colleagues and your customers will benefit.

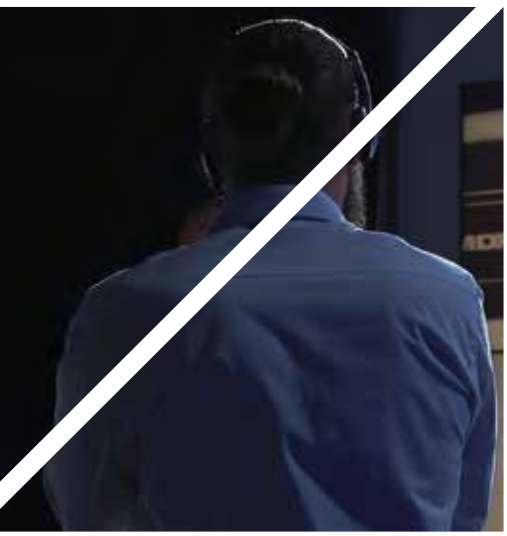
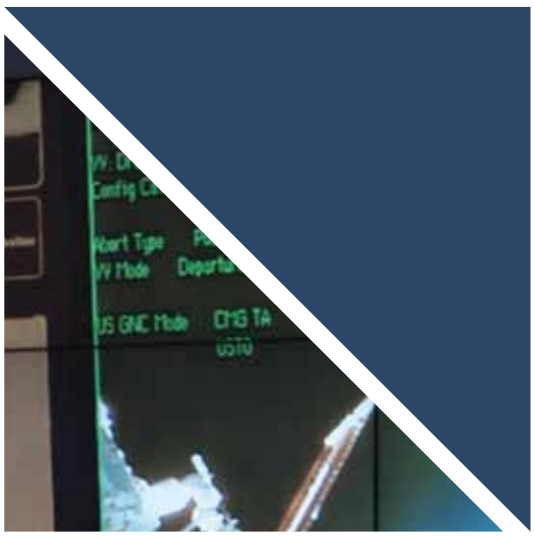
Andreas: Don't view standards as annoying or as a necessary evil, but as an opportunity to simplify everything built on them.

ANDREAS GRÜN
Industry Specialist Food & Beverage
Andreas Grün has been part of the COPA-DATA team in Salzburg since 2012. As a Special Solutions Developer, he has seen many different customer applications and requirements and supported projects worldwide. Since 2019, he has been strengthening the Industry Management Team with a focus on applications in the F&B industry.





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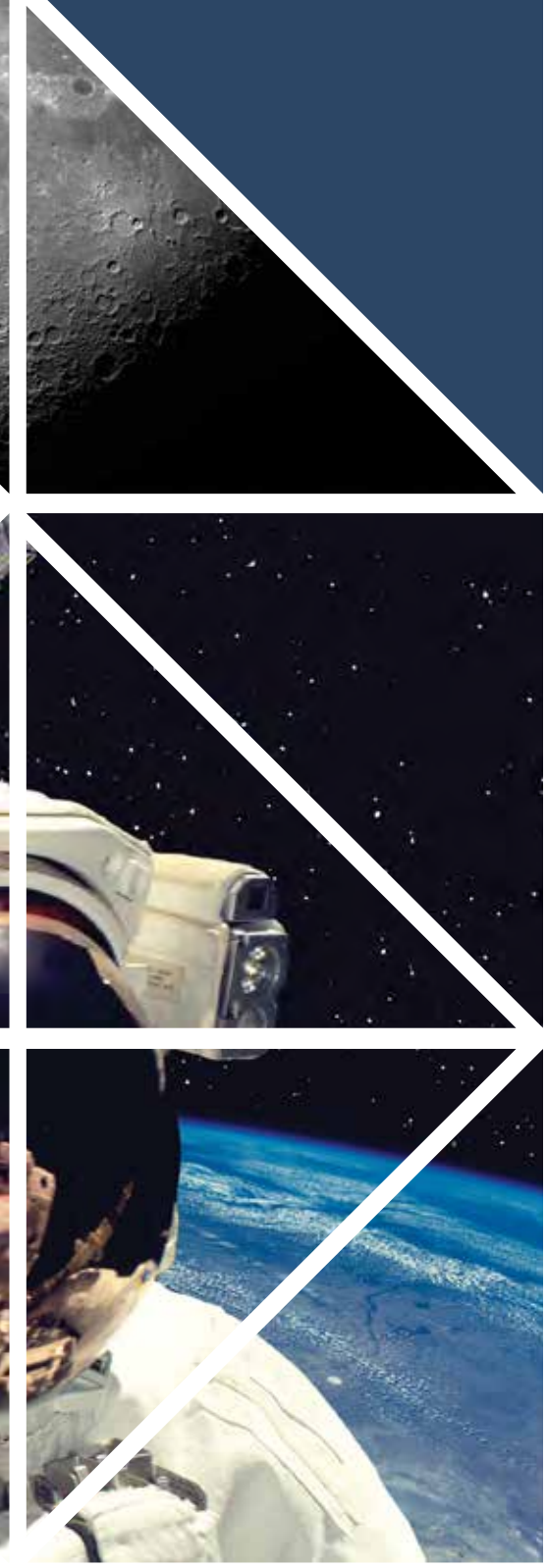

AROUND THE WORLD

ISS space station: The modular structure of the station has promoted international cooperation in space since 1998.

SMART BUILDING, SMART ENERGY, SMART WORK

COPA-DATA finds an architectural language to express its company DNA.
And it provides a best-in-class example of smart energy building management with zenon.

AUTHOR: CLAUDIA MERKEL
PHOTOGRAPHY: LUKAS JAHN AND FLORIAN MITTERER

For a new office building that carries the DNA of COPA-DATA both on the inside and the outside, the success parameters included: a clear commitment to Salzburg as a location, continued international success and a values-based corporate philosophy that focuses on sustainability. Additionally, the systematic implementation was undertaken by a small but well-known local architecture firm that grasps our philosophy and physically transformed our values into a modern architectural language.

It was not a forgone conclusion that another building would now stand near the old head office. As for so many, COVID-19 had an impact on COPA-DATA. Pre-pandemic, the old building was bursting at the seams and the decision was made to expand the head office. When the planning application for the new building was submitted in March 2020, it was a moment of big relief. "It's finally starting, we thought," recalls Phillip Werr, member of the management board. "Then came the first lockdown. From one day to the next, we had to switch to almost 100 percent working from home. The office, which was previously overcrowded, was suddenly almost empty. So we consciously reflected whether additional office space was really needed if remote working was set to continue."

A COMMON WORKPLACE: CREATE A PLACE FOR GOOD WORK

It didn't take management long to decide: "We wanted to stay the course," says Phillip Werr, summing up the mood at the time. "We believed that despite the advantages of remote working, we would still need a common workplace in the future. We believed we'd pull through – and that, when we did, innovation, creativity and knowledge sharing would need a common space. The social component, togetherness, is an essential part of our lives." Now, we are opening the doors of a four-story, low-energy building with 120 state-of-the-art workspaces. It has plenty of space to smoothly transition from focused individual work to flexible teamwork or vice versa.

Over 20 years, our small, family-run software company with 30 employees has grown into a global company with 19 branches from South Korea to the USA. Some 200 employees currently work at the Salzburg location. For innovative thinking in the interests of our customers, we need to have a thriving mix of diversity and freedom. Instead of closely defining every space, room was created for rest and concentration, for exchange and for meetings. Informal interaction no longer needs to happen by chance, like it used to around the coffee machine or water cooler.

"Every workplace is also a living space – we spend a large part of our day at work, so we should feel comfortable there," states Phillip Werr. "Our clear vision was to create a work environment where staff can interact with each other on professional and personal levels. You'll find open work and break areas as well as quiet areas for focused (team) work."

A panoramic rooftop terrace and a communal kitchen with access to the 135 sqm garden terrace, small tea kitchens and spacious lounge areas provide plenty of space for informal conversations between colleagues.

The ground floor – a co-working area with a central auditorium – serves as a social hub and meeting place and embodies COPA-DATA's philosophy of a future-oriented, digital working world.

Lighting management and shading are controlled automatically via zenon: "In a building designed for sustainability, even in our part of the world, the issue of cooling in the summer now plays just as important a role as heating in the winter," says Phillip Werr. The construction with concrete core activation contributes as much to this as ventilation, which regularly exchanges and filters air and recycles the waste heat.

ARCHITECTURAL ACHIEVEMENT: TRANSLATING THE COMPANY'S DNA INTO FORM AND SPACE

"In its external appearance, the new building conveys the objectivity, precision, value and functionality that customers of COPA-DATA also expect in software development," states architect Gerhard Sailer of HALLE 1 architects in Salzburg.

Encased in a uniform, shimmering satin-matte metal facade, the compact new office building conveys future-oriented pragmatism. Walls and ceilings are made of exposed concrete without cladding. The rooms are flooded with light and can be used in versatile ways. In addition to the spacious ground floor, open work and communication areas are distributed across the upper floors.

INDEPENDENT THROUGH ENERGY DATA MANAGEMENT

Sustainability has long been important to company founder and CEO Thomas Punzenberger. COPA-DATA has been using

100 percent green electricity for years. "Our fundamental attitude is the motor for our commitment. What we do, we do with conviction. And usually earlier than everyone else."

Not only is the energy efficiency and sustainability of the building forward-looking but, with the zenon-based application for Building Automation Smart and Easy (BASE), the generation, purchase and consumption of energy can be prioritized, distributed and monitored as required.

Accelerated by the current energy crisis, every company faces the challenge of becoming more independent from fluctuating prices and third-party energy suppliers. In addition, the sustainable development goals (SDGs) announced by the UN set further challenges. Starting in 2024 and mandatory by 2026, companies above a certain size or certain revenue, at least in the EU per the CSR directive, must show in a sustainability report how they are contributing to reaching climate goals. Dealing with this is definitely in your own interest, because the expectations of customers in terms of sustainability continue to increase.

Achieving the greatest possible energy independence and sustainability is important to COPA-DATA. The company also plans to share this knowledge with our customers. "With our smart building application based on our zenon software platform, we provide our own best-practice example for our own power generation, load management and the targeted prioritization of charging capacities for electric cars," says Thomas Punzenberger.

The inflows and the consumption of energy are clearly visualized and give the user an overview. In addition, in the background there is a comparison between our own generation, the grid purchase and any feed-ins into the grid – depending on current generation and self-consumption.

STATE-OF-THE-ART LOAD MANAGEMENT

The power supply, especially for existing buildings, is often no longer sufficient for today's requirements, especially when it comes to charging electric vehicles. The capacity limits of existing grid connections can be reached very quickly. A PV system can supply additional electricity, but its output is not constant – it depends on the weather, season, etc. As a result, the charging capacities of the cars have to be adjusted automatically depending on the amount of electricity available – if there is enough electricity, the charging station can be operated with a charging capacity of 11kW – if this is not the case, the charging capacity is throttled to reflect the available residual electricity from in-house production and the mains supply.

INTELLIGENT BUILDING MANAGEMENT WITH ZENON

COPA-DATA uses the in-house software platform zenon to operate its own building intelligently and in an energy-efficient way. Of course, these options are available to every zenon user. With simple measures, such as automated shade

control depending on the amount of light, a lot of efficiency can be gained when cooling the building, for example.

In addition, there are all the options described above for connecting the individual components such as a PV system, charging stations for electric vehicles and other consumers to form an intelligently coordinated whole. zenon can be integrated in existing infrastructures regardless of hardware and can also functionally expand existing building management solutions.

Are you interested in zenon for energy and building management at your own company? Contact your customer service representative. We will be happy to advise you on implementation options.

Facts & Figures

- 5-story, low-energy building (total office area 2,412 m²) with recessed top floor, plus basement including underground car park (1,170 m²)
- Focused on sustainability and energy efficiency

HARDWARE: The building

- Ventilated metal facade
- Brine-water heat pump system (geothermal heat) for both heating and cooling the building; deep drilling with 15 depth probes at a depth of 120 meters each
- Concrete core activation aka "thermal component activation"
- 110 kWp PV system, currently approx. 70% self-consumption calculated
- Eliminated emergency power diesel unit
- In the event of a power failure, the building can be operated independently in island mode
- Temperature-controlled and filtered; allergy-friendly air exchange for fresh, oxygen-rich air
- Heat exchange and energy recovery during air exchange

SOFTWARE: Smart Building and Energy Data Management

- Building Automation Smart & Easy (BASE): energy and load management for the building and infrastructure with zenon

Building automation smart and easy – with zenon

- Exclusive B2B software solution for smart matching of in-house production, purchase and prioritized consumption using zenon.
- Easy to customize: each customer gives zenon the parameters and priorities that are relevant for their own operation.
- Building data overview centrally accessible on various end-devices (tablet, laptop, mobile, etc.) for all employees to view, for example, "Is my electric car charged already?"
- Flexible integration of building services equipment thanks to the large number of drivers as well as the option to program connections specially for customers

WHO IS WHO

Christian Feitler

TECHNOLOGY EXPERT

COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2015
RESPONSIBILITIES:
In the Technology Excellence team, I am responsible for licensing, the zenon API and, more recently, Batch and MTP. If, for example, a complex error message appears when updating a license, I look for the cause and offer a solution. I document these solutions and file them where they can be easily found.
I GET INSPIRATION FROM...
… very simple everyday observations. I find good ideas when seeing where other people have issues. Most of the time I also read (non-fiction and technical) books on topics that interest me at the moment.
IT IS MY DREAM:
In my interpretation, a "dream" lies somewhere between desires and goals. A core of my dreams is for the world to be a little smarter tomorrow than it was yesterday. I raise my children, teach my work colleagues about our technologies and run a microcontroller laboratory at the Salzburg University of Applied Sciences.

You can reach me:
christian.feitler@copadata.com

Barbara Rameseder

MARKETING OPERATIONS MANAGER

COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2019
RESPONSIBILITIES:
I coordinate marketing operations and manage the marketing operations team at the head office. My team is responsible for the company's online presence (website, social media), email marketing, online campaigns and all industry events and trade shows. We also support and ensure that all the basics are in place for online marketing for marketing colleagues in our offices worldwide.
I GET INSPIRATION FROM...
... my team: it inspires and motivates me every day to work with a team that has such a strong bond, that creates and drives so much together, and that rises to the challenge of every difficult project together – all without ever losing their sense of humor.
IT IS MY DREAM...
...to be able to develop and realize myself professionally in the future while never losing my sense of fun at work. Above all, I dream that my true elixir of life (family and friends) do well so that I can continue to spend a lot of time and enjoy beautiful things with them.

You can reach me:
barbara.rameseder@copadata.com

Herbert Oberauer

DEVELOPER / PROFESSIONAL SERVICES

COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2007
RESPONSIBILITIES:
After several years working in technical customer support at the head office and for the CEE region, as well as an excursion into development (HTML5 WebEngine and zenon Add-In Framework), I am currently on the MTP Task Force team where I am responsible for integrating Module Type Package in zenon. I also provide zenon project concepts. Creating zenon special solutions is one of my hobbies.
I GET INSPIRATION FROM...
...when I spend time with my family, e.g. on hikes with overnight stays in mountain lodges, cycling and much more. Music also plays an important role in my life, I play the guitar and compose electronic music.
IT IS MY DREAM...
...that all people are happy.

You can reach me:
herbert.oberauer@copadata.com

WHO IS WHO

Pascal Girerd

INTERNATIONAL SALES MANAGER

STRATON AUTOMATION FRANCE

AT COPA-DATA SINCE: 2019
RESPONSIBILITIES:
My role is to manage straton sales business worldwide.
I GET MY INSPIRATION FROM…
my customers, they learn me so much! Very exciting because each project is different. And also get inspiration from the mountains where I can hike and bike.
IT IS MY DREAM …
… to bring straton as the reference for flexible Soft-PLCs and make it grow to become "the first". Have fun, learn and find the best way to develop the business efficiently while achieving a good balance with my private life. Because fuel for life is not only given by the pleasure we get at work, but also outside.

You can reach me:
pascal.girerd@straton-plc.com

MiSo Kwak

TECHNICAL SALES MANAGER

COPA-DATA KOREA

AT COPA-DATA SINCE: 2021
RESPONSIBILITIES:
As part of the technical sales team, I help our customers to optimize their solutions. In addition, I am in regular contact with our CDPC Partners and new customers in a variety of industries.
I GET MY INSPIRATION FROM…
… my family and friends and my future. I'd like to spend more time with my family and friends and that inspires me to work for a stable future.
IT IS MY DREAM …
… to have a healthy life in body and mind. I aim for a positive life that is full of activity and self-improvement. And I'd like to travel the world. Ultimately, complete freedom is my dream!

You can reach me:
miso.kwak@copadata.com

Christof Franzke

SENIOR TECHNICAL CONSULTANT
KEY ACCOUNTS

COPA-DATA GERMANY

AT COPA-DATA SINCE: 2017
RESPONSIBILITIES:
In recent years I have driven the development of MTP features in zenon. As a result, I often talk to customers about co-developing solution scenarios with zenon in the area of modular automation. I work primarily with customers in the process and pharmaceutical industries, usually for large and long-term projects or partnerships.
I GET INSPIRATION FROM…
…many places. I like to read and listen to books about the industry and I like to exchange ideas with colleagues and customers from different fields. This gives me wide-ranging inspiration. I find moments to pause and reflect in the Palmengarten in Frankfurt.
IT IS MY DREAM…
… to develop forward-looking solutions together with our customers and colleagues for many years to come. In about 20 years, I will probably leave all this behind and get involved in social projects for disadvantaged youth.

You can reach me:
christof.franzke@copadata.com

THERE MUST BE AN EASIER WAY!

INTUITIVE OPERATION FOR COMPLEX SYSTEMS

The leading provider of packaging solutions SIG and COPA-DATA have been working together for 15 years. The partnership has set new benchmarks for intuitive operating concepts – based on the zenon software platform. The current HMI project SIG CRUISER was recently awarded both the coveted iF DESIGN AWARD Gold and the Red Dot 2022 Award for interface design.

With the SIG CRUISER HMI, SIG is setting a new standard in the Food & Beverage industry.

Technical systems as easy to use as a coffee-maker, as reliable as a Swiss timepiece and as flexible as a modular system. This is the vision that connects the packaging solutions provider SIG and the automation experts at COPA-DATA. For 15 years, the equipment manufacturer has counted on the know-how of COPA-DATA and the innovative power of its industrial automation software zenon to manage, visualize and secure its facility processes. SIG is one of the leading manufacturers of innovative food packaging and high-tech systems for filling of liquid food products. Its systems not only have to ensure the highest standards of hygiene and process reliability, but must also take into account dynamic developments in the industry with regard to flexibility and ever-smaller batch sizes. The HMI plays a central role as the interface between man and machine.

IN THE BEGINNING WAS STANDARDIZATION

When SIG and COPA-DATA first began working together in 2007, operating concepts as we know them today were unimaginable. User interfaces were typically detailed replicas of the former hardware interface, with little thought given to guiding users through the system application in a solution-oriented manner. Technical expertise was essential for operating the complex equipment, although this was not a problem at the time because trained machine operators worked at the production sites. SIG already had the vision of HMIs that were less oriented toward the inner workings of the systems and more toward their functionalities: these new interfaces would focus on users and make it as easy as possible to operate the equipment through graphical

elements which their internally developed SIG-HMI could not implement. "In addition, the constantly changing requirements and the high maintenance and development effort of our own software were reasons why we were looking for a partner with a standardized solution," says Michael Schaaf, Team Leader for HMI & Transformation Engineering at SIG.

With COPA-DATA and zenon, the ideas of a user-centric HMI became reality step by step. It was, above all, the openness of zenon and its flexibility that convinced SIG right from the start. The very first joint project, the HMI c/touch, received a Red Dot Award in 2008. In the years that followed, it was gradually rolled out across the entire SIG portfolio and was further developed in partnership.

Today, SIG uses zenon in almost all its equipment series. The company uses several different modules for this, including zenon Runtime, Archive Server, Recipe Group Manager and Process Gateway. The systems are managed via a Codesys-compatible PLC, in interaction with several other components, mostly connected via bus system. These include, for example, ultrasonic welding technology and, increasingly, servo motors and intelligent sensors. The partnership has also grown on a personal level over the years. "Right from the start it was an extremely cooperative and constructive partnership," states Michael Schaaf. In the same spirit, the product developers from COPA-DATA were involved right from the start in the latest project to develop the HMI for the new SIG NEO filling technology, and they contributed their expertise, particularly in the feasibility and implementation of the visualizations.

SIG CRUISER: AS EASY TO USE AS A COFFEEMAKER

The SIG CRUISER HMI visualizes all the relevant filling and packaging processes at a glance and clearly guides the operator through difficult application processes. This means that highly complex systems can be managed by unskilled employees after a short training period – an essential USP for many customers in the Food industry. In addition, the interface creates an unmistakable user experience, for example, through integration of shadows, highlighting of clickable buttons and the use of informative icons. For the first time, the design also extends to all elements of the equipment line, which also results in important improvements in terms of process reliability, usability and reporting.

AWARD-WINNING!

It was worth it, too: with SIG CRUISER, the development and design team has once again set a new benchmark in the Food industry. The interface was awarded two renowned design awards in 2022: the iF DESIGN AWARD Gold and the Red Dot Award for interface design – that's both a big success and a rare thing for a UI from the high-tech B2B sector.

The line overview offers users the possibility of tracing filling and plant utilization processes in detail and making optimizations.

The zenon-based HMI was awarded the coveted iF Award 2022 in gold.

INTERVIEW WITH MICHAEL SCHAAF

15 years of SIG and COPA-DATA: The editors had the opportunity to speak with Michael Schaaf, Team Leader HMI & Transformation Engineering at SIG, about the long-standing partnership with COPA-DATA and zenon.

What role does zenon play in your systems and development strategy?
Michael Schaaf: Today we use zenon in almost all of our packaging and filling systems – for process control, data backup and visualization. High-tech equipment like ours cannot be built without the use of automation. Monitoring some 70 integral servo motors would be unthinkable. You need standardized solutions to automate processes. In that regard, zenon plays a central role for us.

Why did you choose COPA-DATA and zenon?
For us, the system is an all-rounder, our jack of all trades. As a standardized solution, it offers us all the options for automation and process efficiency. At the same time, it is open and connective, so we don't have to compromise on flexibility, creative freedom and connection to third-party systems. Of course, partnering also plays a crucial role. In addition to the software, we also relied on the technical expertise of COPA-DATA right from the start in order to always get the most out of the respective software systems. Our success speaks for itself: over the past few years we have tried out many things together, we have broken new ground and we have learned from each other.

"zenon is our jack of all trades."
Michael Schaaf

The Food industry is a very dynamic sector. What were the big changes over the past 15 years?
In our industry, there are always new requirements regarding hygiene, process safety and documentation. You have to stay informed because our customers rely on our machines to meet current standards. And we rely on COPA-DATA when it comes to further development and compatibility, for example, with new operating systems. In addition, we see two divergent trends: on the one hand, there are increasing requirements for hygiene and process reliability, but also for the flexibility of systems. Because with different products and recipes, they must cover different packaging sizes, limited editions and seasonal specials – with just a few clicks. On the other hand, the industry is struggling with a major shortage of skilled workers. The machines must therefore always be easier to operate – because most of their users today are unskilled workers who, after a short training and familiarization period, must be able to operate highly complex systems independently and error-free.

How has the partnership supported you in these developments?
In development, we have all the options for securely transferring data, linking a large number of systems regardless of manufacturer and integrating our own add-ins via interfaces. Here's one example: due to the high level of complexity, there are over 4,000 possible error messages on a filling machine. We have already developed an automated import for c/touch and were able to easily integrate it via API. This is a big relief and is key to ensuring process reliability.

Your latest development project, the HMI SIG CRUISER, was awarded two coveted design prizes. What does this mean to you?
That's true, we were awarded the IF DESIGN AWARD 2022 Gold and also, together with our design partner HMI Project, the Red Dot Award 2022 in the Interface Design category. Both awards validate our work and strengthen our belief that highly complex industrial machines deserve visually appealing operating concepts. The fact that this is being honored increasingly – even outside of our purely professional world – is a valuable development for the entire industry. Being recognized as an equipment manufacturer in the ranks of major brands in the Consumer Goods industry is also a special experience.

Is such a complex development project worthwhile in a dynamic industry like yours?
Standardization is always expensive. So it is important to get something out of it over the long run. Especially when you consider that our equipment is often in use for many years. The long support cycle of COPA-DATA and the openness and connectivity of zenon help us in that regard. COPA-DATA ensures that the systems are kept compatible and developed further for years to come. This cannot be taken for granted, and we value it.

Speaking of dynamic industry, what major trends do you see in the near future?
I think web technology is an important topic alongside further automation and digitalization steps. The development of a consistent web interface for all our products is the next major milestone that we are currently working toward. On the basis of zenon, this is quite conceivable – and an important prerequisite for everything that goes in the direction of responsive design and mobile application of system controls.

MICHAEL SCHAAF
has been part of the development department at SIG Combibloc for 10 years. SIG Combibloc is a leading system provider for packaging solutions with 8,000 employees worldwide. As team leader HMI & Transformation Engineering, he and his teams are responsible for the development and implementation of the HMI system, integration of data interfaces and virtual commissioning of equipment, with particular focus on bringing state-of-the-art IT tools to industrial automation.

PARTNER COMMUNITY WORLD CAFE

CERTIFIED PARTNERS LETTING THEIR PROJECTS SHINE WITH ZENON

ematric

AUSTRIA

2011 GOLD

ABOUT US:
ematric gmbh is an interdisciplinary operational engineering service provider. Automation and digitalization are the challenges of the future and the core competences of our team. With 75 employees, we have the expertise and capabilities to create solutions for the world of tomorrow. We implement customer requirements determinedly and economically. Our motto: automation next.

OUR SOLUTIONS WITH ZENON:
We have been working closely with COPA-DATA on the implementation of automation projects since 2001. Over numerous large international projects, we have continuously extended our expertise as a zenon system integrator. Customers from the automotive and machinery industries appreciate our effective and efficient solutions based on the universal industrial software from COPA-DATA.

OUR CUSTOMER PROMISE:
In automation and digitalization projects we consult and deliver for our customers – from concept to acceptance. We never forget we are a service provider. With our process control stations, energy and operational data collection, customized MES modules and IIOT solutions, we continue to delight new customers in new sectors. From local heroes to global players: our solutions optimize our customers' working environments from the shop floor to management.

www.ematric.com

SCADA-Automation

GERMANY

2017 SILVER

ABOUT US:
SCADA Automation specializes in control systems, controllers and smart grid solutions in the energy sector. We supply EZA controllers and parking controls for battery storage. With 10 years of experience in battery systems and their control and monitoring, we provide consulting and development for the corresponding control systems. In addition, we also support industrial customers with their zenon solutions.

OUR SOLUTIONS WITH ZENON:
Control systems for smart grids, energy facilities dispatchers and battery power station control centers. Whenever something has to be visualized, we count on zenon because of its ergonomics and flexibility. It just saves us so much time and our customers appreciate real control system functionalities.

OUR CUSTOMER PROMISE:
With flexibility, competence and security, we can always help and support our customers to meet their changing requirements and goals.

www.scada-automation.de

COLAS RAIL

ITALY

2013 SILVER

ABOUT US:
Colas Rail is an Italian engineering expert with the proven experience to deliver transport electrification projects. We provide design and construction expertise in all rail-based transport systems: metro, tramway, mainline and high-speed rail and work on new systems as well as the renewal and modernization of existing installations. We develop systems and technology solutions according to our customers' needs.

OUR SOLUTIONS WITH ZENON:
The innovative approach to sustainable mobility and the reliability of the solutions offered are the elements that define our solid collaboration with COPA-DATA. As a member of the CDPC in Italy, we successfully use the zenon software platform in the development of remote control and automation systems for electrical substations, both for railways and urban transport, as well as supervision systems for safety systems and integrated central station supervision systems.

OUR CUSTOMER PROMISE:
Through the combination of our engineering and construction expertise in transport systems and COPA-DATA's know-how in automation solutions for the energy and infrastructure industries, we are able to provide our customers with effective and secure operation of substations – locally or remotely.

www.colasrail.it

PARTNER COMMUNITY WORLD CAFE

CERTIFIED PARTNERS LETTING THEIR PROJECTS SHINE WITH ZENON

UNBRO

UNBRO

KOREA

2019 | BRONZE

ABOUT US:
Customized solution IT company Unbro Co. Ltd. UNBRO specializes in system design, manufacturing and batch test operation to empower our customers to efficiently and systematically manage and operate their facilities. We provide monitoring, control and optimization solutions for a wide variety of industrial facilities.

OUR SOLUTIONS WITH ZENON:
We aim to grow together in the corporate and public fields. We provide integrated monitoring, control and trial operation solutions for zenon and PLC systems for the monitoring and control of industrial facilities and power plants, as well as for packaging facilities. In addition, we have the technical know-how to design and build Energy Management Systems (EMS), Battery Monitoring Systems (BMS) and Energy Storage Systems (ESS). We have many achievements in applying our solutions for the efficient use of electrical energy in a wide variety of projects. We have also launched solutions based on differentiated technology to meet the demands of the Smart Factory and Factory Energy Management System (FEMS) with zenon.

OUR CUSTOMER PROMISE:
We create to change lives and meet challenges through constant R&D. In addition to the company's existing technology, we are continuously expanding our R&D activities for source and applied technologies to make a better world. Based on these technologies, we tirelessly work to reshape our company's technological competitiveness.

www.unbro.co.kr

COPA-DATA
Partner Community

FAST FACTS

350+ Members Worldwide in 60+ Countries

9 Gold Partners
49 Silver Partners
203 Bronze Partners
98 Listed Members

Partner Categories
Systems Integrators, OEMs, Machine Builders, Educational Institutions and Research Facilities

Figures as of September 2022

Entry Year | **Partner Level**

Cross-Industry | Automotive | Food & Beverage | Life Sciences & Pharmaceutical | Energy & Infrastructure | Educational Insts. & Research Facilities

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