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Spotlight:
COMPLEXITY AND SIMPLICITY



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FOUNDING PRINCIPLES:**
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PREFACE



Dear readers,

More than 30 years ago, COPA-DATA was brought into being with the aim of developing software that would make life easier for people working in industry and infrastructure environments. Today, we remain utterly dedicated to giving our customers the best possible support and straightforward solutions to complex tasks, day after day. On *page 15* onward, you can find out more about what inspired me to found COPA-DATA and why that initial concept matters more today than it ever has.

Our zenon software platform contains features that are indispensable when it comes to long-term investment assets, whether they are in an industrial environment or the energy sector. These include durability and reliability during operation, efficient maintenance capabilities over the long term, update capabilities, plus user-friendly engineering and operating approaches. To help our customers continue to benefit from these qualities in the state-of-the-art IoT networking scenarios they will encounter in the future, we have given our software platform an upgrade to an IoT-capable platform through our Service Grid. You can read more about this on *page 24*.

In version 8.20, you can look forward to a very special feature when you're creating projects with zenon. Thanks to the new Smart Objects, the familiar approach of setting parameters instead of programming takes on a whole new dimension. Find out more on *page 35*.

This issue also contains exciting success stories involving zenon. HANDL, a speck producer from Austria's Tyrol region, is using zenon to unite traditional methods with technology that's built for the future (see *page 46*). Energy provider Thüga Energienetze is also focusing on the future. Its switch to zenon will enable it to carry on looking after its customers' needs in the years to come. Read about their story on *page 53*.

This year, COPA-DATA Germany is celebrating 20 years in business. I want to take this opportunity to congratulate Jürgen Schrödel and his team on this milestone and their many achievements over the years. I hope that they will continue to see a growing number of satisfied customers from the German market! On *page 72*, you can find out more about this success story and what COPA-DATA Germany is planning for the future.

Read on and be inspired!

A handwritten signature in blue ink that reads "Thomas Punzenberger". The signature is written in a cursive, flowing style.

THOMAS PUNZENBERGER, CEO





UNCOMPLICATED

HOW TO MASTER COMPLEXITY

Over time, mankind has established mechanisms for mastering complexity. Sadly, we often create new complexities as we seek to solve others. So it is with digitalization. How can we use modern methods of data processing to reduce complexity without creating new and confusing structures? Achieving this is a vital ambition in the art of software development for the automation sector.

Whether we encounter it in branched organizational structures, dynamic market development, or in closely interlocking business and production processes – we are surrounded by complexity. It becomes a problem when people feel that their basic needs for security and predictability are threatened; shock and fear can result from a perceived loss of control. But complexity can also set creative processes in motion. It pushes people who are dissatisfied with the status quo to work on replacing laborious and time-consuming approaches with simpler solutions. Complexity per se is not a negative thing. Ultimately, technical progress means that humans have succeeded in enhancing their understanding and ability to deal with the complexity of natural connections, and have been able to use this knowledge for their own purposes.

GREATER CONNECTIVITY

Has the world grown into an unmanageable complex monster in recent years, in which individuals are at risk of being submerged by the flood of big data?

Modern big data processing methods are able to map all the information that is available, making it accessible and ready for use to an extent that would have been unimaginable a few years ago. As a result, the way we perceive the world is becoming more and more detailed and discernible.

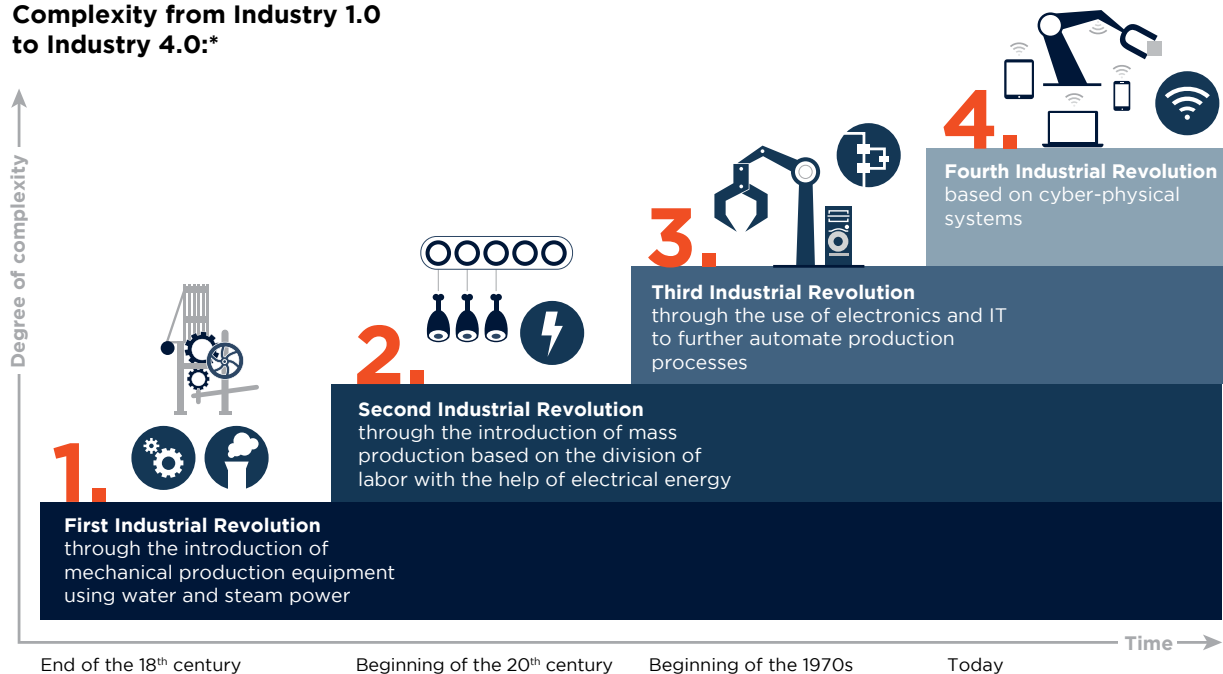
The technical possibilities of collecting mass data are limited by how much content the human mind is able to “store” and how long it takes us to process this content and to derive meaningful actions. It is therefore necessary to create the most comprehensive information management system possible in order to process data in a user-friendly manner.

Mankind has succeeded in bringing increased inherent complexity into its own technically controllable areas. As we seek to centralize data from individual data points, the number of networked devices has exploded over the past few years. While 500 million sensors and units were connected worldwide via the Internet in 2003, this figure rose to 21 billion by 2018. But the real breakthrough is still to come. Analysts at Juniper Research talk about the incipient scaling phase of the Internet of Things (IoT) and anticipate that the number of networked devices will rise to over 50 billion by 2022.

MORE DYNAMIC

The dynamics of the global economy and associated social upheavals have also changed. If the first Industrial Revolution (from 1784) describes a period of about a hundred years, the transformation of today’s global economy can be summarized in less than 20 years – but its scale and outcome remain unknown. Digital disruption

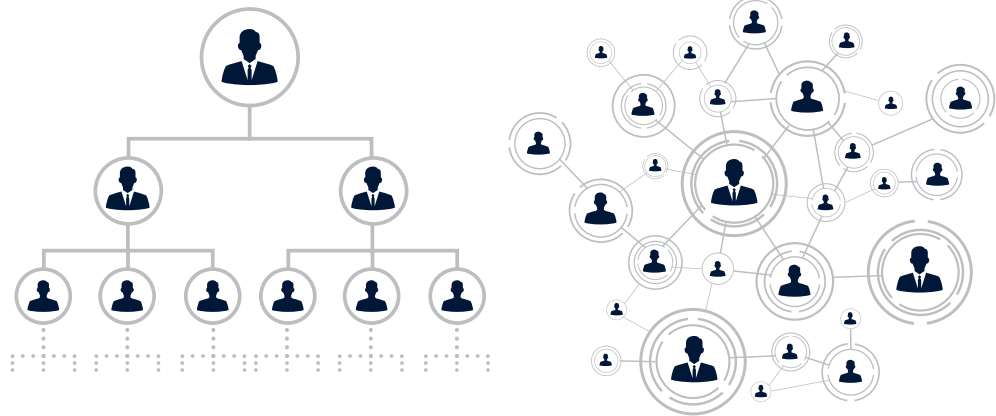
Complexity from Industry 1.0 to Industry 4.0:*



Every industrial revolution was associated with an increase in complexity.

* Source: German Research Center for Artificial Intelligence

Traditional hierarchical structures only seem simpler at first glance. For individuals, agile methods of cooperation reduce complexity.



presents companies with the challenge of adapting business models to the realities of an unknown near future. Both HR departments and employees need to determine which qualifications are needed in industry and find ways to develop them quickly enough.

PREFER THINGS TO BE SIMPLE?

It would be absurd to categorically reject the varied possibilities that have emerged in the course of digitalization in recent years and to view this new complexity as a threat. Patients who are looking for a speedy and effective recovery would not want to turn back time on medical developments or prefer to be treated in a simple field hospital instead of in a modern, high-tech clinic. Consumers have become more demanding and now expect to be able to access a wide range of products and services from which they can choose those that best meet their needs. This is as true in the B2B environment, where development is very much driven by customer requirements.

JUST LIKE AT HOME

Everyday user interfaces and apps from Google, Apple, or Uber serve as a yardstick when B2B companies aim to make business applications as simple and intuitive as possible. After all, a person's needs do not completely change when they get to work at their production hall or start their office computer in the morning. The idea behind intuitive usability is to enable users to reach their goals quickly and without further reflection. At home, those who finish their household chores quickly have more free time. At work, saving time means reducing costs and thus increasing efficiency and competitiveness.

NOT INTUITIVE FOR EVERYONE

If software developers want to design programs as intuitively as possible, they must consider the software

users first and foremost because the aspect of intuition depends on their degree of prior knowledge. What might be overwhelming for some users is easy and intuitive for others. In this case, the B2B sector is not directly comparable with the consumer environment, where expectations about users' prior knowledge are relatively low because companies are manufacturing products for a mass market. In a B2B environment, on the other hand, companies are usually catering to a specific niche and can assume that users will have some basic prior knowledge. Furthermore, requirements and specific prior knowledge will be significantly more heterogeneous. However, thanks to their prior knowledge, users can decrease the level of complexity in advance. This is why experts in a specific field develop a technical language that enables them to avoid having to repeatedly provide definitions for terms. Otherwise, users' lives would be made more difficult by being held up by unnecessary explanations.

Cognitive psychology and Gestalt theory examine the underlying mechanisms that enable us to perceive and classify our environment. Where do we recognize patterns, shapes, or a system? Without the ability to do this – whether we are confronted with big data or not – we would be overwhelmed by the flood of sensory data and information we receive. This idea is also to be found in the definition of "simplicity" as the ability of humans to describe an object in the fewest possible terms.

WHY GROWTH IS NOT TRIVIAL

Inevitably, growth is always associated with an increase in complexity. Growing sales can only be generated in the medium and long term by increasing the number of customers, and possibly by expanding the product range and employing more personnel. Companies looking to offer their products and services outside their own domestic market will inevitably have to deal with different

market situations, and with the cultural, technical, and legal divergence (for example, German vs. Brazilian tax legislation). In order to be successful, a company's product must offer more advantages than the alternative solutions provided by its competitors. New functions to deliver these advantages or to deal with divergence can also give rise to increased complexity, which has to be mastered once again.

WHEN COMPLEXITY IS AN OBSTACLE

Complexity becomes a problem when it is unproductive and creates no added value. Excessive regulations and decision-making loops sometimes slow things down. The original goal of creating clarity through regulation is reversed and hinders creative processes. Within an organization, it is important for managers to clearly define decision-making structures and roles in the team so that individual employees can independently shape their area of responsibility and are additionally motivated as a result.

AGILITY IS THE MAGIC WORD

Hierarchies are further breaking down due to digitalization. At first glance, traditional hierarchies represent the simplest form of structure. However, with the progressive development toward an increasingly networked global economy, hierarchical companies are quickly reaching their limits. Lacking the ability to react appropriately and quickly to market changes, such companies are left with little room for maneuver and consequently endanger their business success. The self-confidence of the younger generation of employees is another important factor. Companies looking to hire high-potential employees must also ensure that they stay with the company in the long term and are not frightened off by a strict command and control system.

As one of the driving forces behind digitalization, the software industry faced this challenge early on. On the one hand, this was because skilled and well-trained software engineers have always been in short supply. On the other, the industry has had to maintain a high pace of innovation since its inception – especially as release cycles have become ever shorter. It is, therefore, no coincidence that one of the most significant trends arose from the new approaches for organizing software development as efficiently as possible. The success of Scrum, DevOps, or Design Thinking has motivated increasing numbers of companies to organize their business processes according to agile methods.

FROM COMPLEXITY TO SIMPLICITY

At first glance, these structures seem more complex than those of traditional hierarchies or established models of cooperation. Implementing them is not an easy task; it may be trickier to manage the organizational changes than the technical changes in a digitalization project. But what agile methods have in common is a focus on the importance of

simplicity. Simplicity is one of the twelve principles of the Agile Manifesto, drafted in 2001 by 17 renowned software developers, including Scrum founders Jeff Sutherland and Ken Schwaber. The principle states: "Simplicity – the art of maximizing the amount of work not done – is essential." This means that employees should cut out needless effort wherever possible. And all the other features that are nice to have but not essential – and which will probably be excluded anyway – should be removed from their to-do list. Agile methods promote personal responsibility, speed up decisions, and also offer a way for managers to show that they value their employees. When the trust placed in the employees turns out to be well placed, managers also benefit because the final result is ultimately one of their targets, while controlling the individual steps and strategic decisions is resource-intensive and time-consuming.

KEEPING IT SIMPLE FOR CUSTOMERS

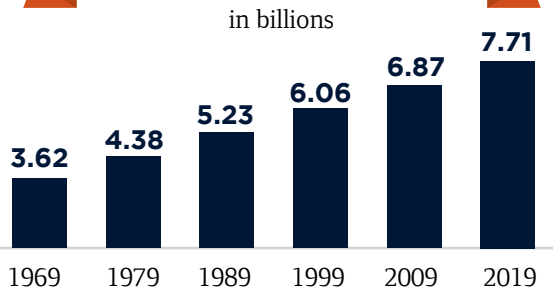
Aiming for simplicity in the business environment does not mean turning a blind eye to the complexity of today's challenges, but rather meeting the complex requirements of individual organizations and individuals. Companies achieve simplicity by creating clear structures that are easy to understand and reproduce. Simplicity also delivers efficiency when it is used to avoid repetitive loops. The goal is to establish processes that enable companies to successfully master digitalization projects. Companies in the B2B sector in particular should aim to make both support and product usability as uncomplicated as possible for their customers. This then leaves customers free to concentrate on the complexity of their own core business such as manufacturing cars, producing food, or ensuring the supply of electricity.

ROBERT KOREC,
PR & COMMUNICATIONS CONSULTANT,
COPA-DATA

COMPLEXITY IN NUMBERS

FACTS AND FIGURES FOR YOUR CONSIDERATION

GLOBAL POPULATION



The global population has doubled since the moon landing 50 years ago.

Source: UN, Department of Economic and Social Affairs

A COMPLEX WORLD

-
- The network is getting bigger
 - Interconnectedness is on the increase
 - Heterogeneity is on the rise
 - Dynamics are growing
 - Innovation and release cycles are getting shorter
 - Time to market is decreasing

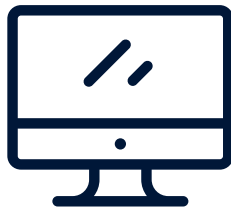
NUMBER OF NETWORKED DEVICES

2009



900 million

2020



26 billion

The IoT (excluding PCs, tablets, and smartphones) will grow to 26 billion installed units by 2020, an almost thirtyfold increase from 0.9 billion in 2009.

Source: Gartner

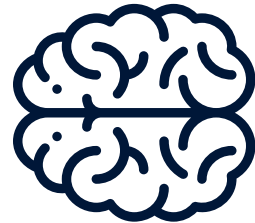
NUMBER OF CORTICAL NEURONS

DOGS



530 million

HUMANS

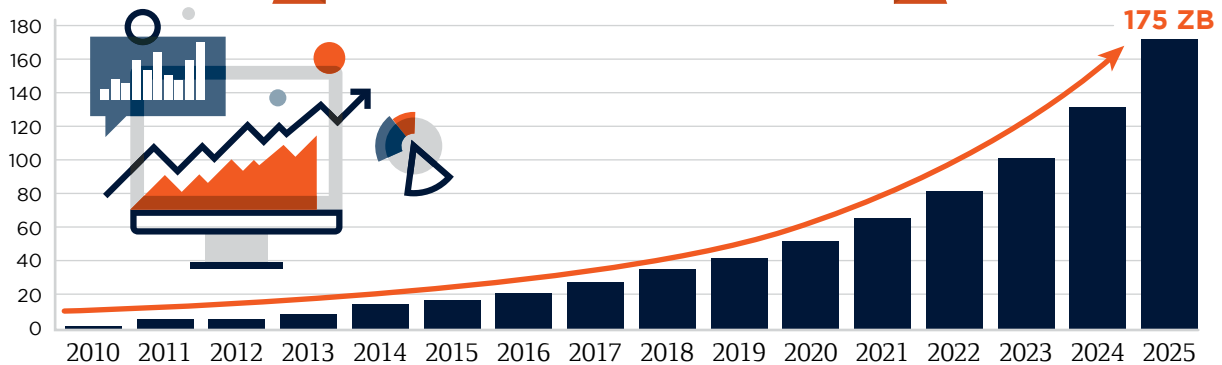


16 billion

The human cerebral cortex contains 30 times more nerve cells than that of a dog.

Source: Vanderbilt University, USA

WORLDWIDE DATA VOLUME



Analyst firm IDC expects the global data volume to increase more than fivefold, from 33 zettabytes (2018) to 175 zettabytes, by 2025 (1 zettabyte = 1 billion terabytes).

Source: IDC

THE POWER OF MINDSET

How to make individuals and organizations fit for the present and the future

TEXT:

PHILLIP WERR, CMO & COO COPA-DATA

Technological progress, global networking, and increasing complexity present us with new challenges every day. How can we meet these challenges on a long-term basis and become a proactive creator of positive change?

AI AND HI

There is no shortage of reading material on Artificial Intelligence (AI) – both in the daily press and in the specialist media of various industries. AI has long since become part of our everyday lives and many clever minds around the world are working to drive this technology forward¹.

In this article, however, we are focusing on a different type of intelligence: human intelligence. We are far less familiar with the abbreviation “HI,” but it encompasses our ability to solve problems, develop skills, generate ideas, and create new things through creativity.

If we look at the accumulated global research that concentrates on the further development of artificial intelligence, it is interesting to observe how science deals with the further development of human intelligence. Considering that there are about 7.6 billion human brains around the world, this represents a lot of potential!

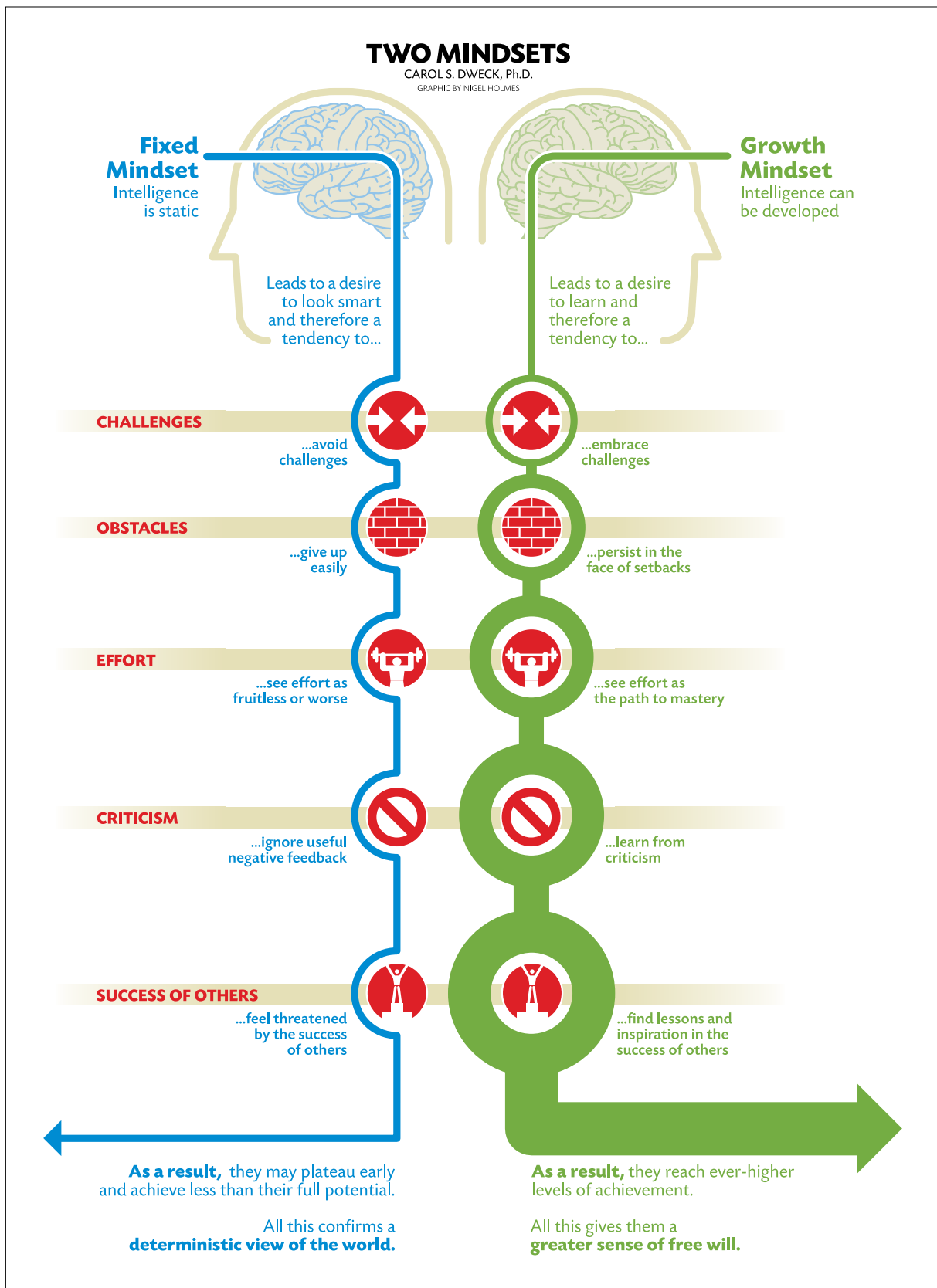
One of the researchers studying this potential is American professor Carol Dweck, who currently lectures at Stanford University. Her book “Mindset”, published in 2006, was a worldwide sensation. In it, she presents a concept in which she compares two types of mindset – the growth mindset and the fixed mindset. The fixed mindset, also known as the static self, is based on the assumption that we are born with a fixed capacity for mental performance. And it is amazing how deeply this fixed mindset is anchored

in our world. For example, a fixed mindset praises children for the results of their actions, not for the effort they made to achieve them. The notion of “talent” is also an important factor in the fixed mindset. It's interesting that the word “talent” comes from an old measuring unit that was also used as a currency. According to the fixed mindset, we either possess certain talents – like a human seed capital – or we don't.

By contrast, the growth mindset – also called the dynamic self – is based on the assumption that our abilities can develop over time and that we are not born with a fixed, predetermined maximum capacity. However, we need to clearly differentiate this mindset from the “you can do anything” mantra, which usually means “you can do anything because you are great to begin with.” The growth mindset, on the other hand, clearly emphasizes the causal relationship between effort, practice, and dedication and the further development of our skills and abilities. Nobody is born with all of humanity's abilities, but everyone can grow and develop their own personal ones.

It's also not about a pathogenic, constant striving for “higher, better, faster, further,” but about the joy of learning, one's own development, and the childlike satisfaction when we have achieved something that once seemed impossible.

¹ AI has also been on the COPA-DATA agenda for some time now. For example, we have already presented a solution for predictive maintenance in cooperation with SAP.



A comparative overview of the fixed mindset and growth mindset. Graphic reprinted with permission from Nigel Holmes.

“If parents want to give their children a gift, the best thing they can do is to teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning.”² This quote should inspire us to be guided by these values in a professional environment as well – we will not only achieve more, but also get more joy and satisfaction out of life.

GROWTH MINDSET AND DIGITALIZATION

What do technological developments in general, and digitalization in the industrial and energy sectors in particular, have to do with the growth mindset? Let’s take a look at current developments: the cycles of technological development are getting ever shorter, the number of different specialisms is growing, and technologies and interrelations are becoming increasingly complex. Today’s challenge is to solve complex problems that perhaps we weren’t even aware of yesterday.

We are convinced that such challenges can only be solved thanks to a growth mindset, in which we are always striving to learn, to develop, and to outgrow ourselves as individuals and as a team. Because the ability to work

efficiently together on issues that are too big for one person to manage is something that we also need to develop further.

This is our mission as we pursue our vision: there is always an easier way! And we can only get closer to our vision one day at a time if we are dedicated to this growth mindset, can accept our mistakes, and view effort as something desirable.

PRESENTATIONS ON THE TOPIC:

- Carol Dweck: “The Growth Mindset” | Talks at Google - www.copadata.com/video_mindset
- The power of believing that you can improve; Carol Dweck; TEDxNorrköping - www.copadata.com/power_believing



OUR VISION

**THERE IS ALWAYS AN
EASIER WAY!**

OUR MISSION

Enabling everyone who works with industrial plants or deals with infrastructure to complete their tasks easily. With great software, that eats complexity for breakfast.

² Carol Dweck in her book “Mindset”. Updated edition: *Changing the Way You Think to Fulfil Your Potential*, first published in 2006 by Random House, revised edition published in 2017 by Robinson

MY FOUNDING PRINCIPLES



What led me to start COPA-DATA?

As a young development engineer, many doors were open to me at the beginning of the 1980s. I had always been attracted by the software industry, which was just taking off at that time. However, if someone had told me that I would later become the CEO of a medium-sized, internationally successful software company, I probably would have laughed at the idea.

When I was young, I never dreamed of being self-employed, much less running my own company. That was something for other people. To be part of something; to make a difference – yes, of course! But I didn't plan to start my own company. Yet it all turned out differently. Why?

The catalyst was an experience I had in my early professional life. I was working on the automation of testing stations and, as was usual at that time, was developing software from scratch, even though the applications were very similar. It wasn't a problem for me, but as a pragmatic person I thought: there has to be an easier way!

It was exactly this idea which led me to found my own company, COPA-DATA, in 1987. My goal? To develop software that makes life easier for people in industrial and infrastructure environments. I aimed to develop a new type of software that did not yet exist but with a potential in which I firmly believed.

I wasn't sure at the time whether the idea would work and, of course, I had doubts. Life can't always be planned; often you don't know until much later whether you've made the right decisions. But when you're convinced of something and passionate about it, it's like you have a fire burning inside you. When you pursue this vision continuously and consistently, success will come – especially if you're holding good cards in your hand. And, of course, a little bit of luck doesn't hurt either.

Today, when I look back at the beginnings of COPA-DATA, it is nice to know that my vision has inspired others. The spark has been ignited, and now we are blazing a trail to make life even easier for the many people who work in industrial and infrastructure environments. Our passion and ambition continues to burn brightly, and I can assure you that we still have a lot to accomplish!

THOMAS PUNZENBERGER,
CEO

Tracing back to the founding principle

In this interview, Phillip Werr reveals why the COPA-DATA founding principle has remained a key driving force.

Today, COPA-DATA is a successful, independent software manufacturer with a global network.

The zenon Software Platform has been installed a hundred thousand times and automates numerous industries. How does Thomas Punzenberger's founding principle from 1987 (see the previous page) live on? Phillip Werr, CMO and COO at COPA-DATA, answered these questions at the Salzburg headquarters.

Hi Phillip, thanks for taking the time to talk about COPA-DATA's development. At the end of the 1980s, the dissatisfaction with the status quo at that time – the recurring programming of test beds – prompted Thomas Punzenberger to found a company in the software industry that was, until then, never intended. His guiding principle was "there must be an easier way." To what extent was this a decisive factor in the company's development?

Hi, in my opinion, this statement manifested itself very strongly in our product. zenon was developed by following a clear philosophy; one which determines how zenon should work and how it should not. The initial principle of "there must be an easier way" still applies. The range of zenon applications has grown considerably in recent years and we are still expanding it extensively. For me, the founding principle is more relevant today than ever before.

In the beginning, COPA-DATA focused on HMI applications and visualization, but the product range has gradually expanded. What are the milestones of the past ten years?

We always want to get as close as possible to our customers' requirements. The production and energy industries have changed significantly, especially in terms of speed,

networking, and flexibility. In the last ten years, we have gone beyond the field of HMI/SCADA to address additional fields with zenon. Take zenon Analyzer as an example. We deliberately developed zenon to move from SCADA functions to reporting and business intelligence functions. We saw that our customers were placing great value on data and process transparency across equipment and machines. It was therefore logical, and at the same time a signal, to expand our product portfolio beyond operating and monitoring at an HMI/SCADA level. Batch-oriented production with Batch Control also comes to mind in this context. This development helped us to open up an entirely new area of application. At the same time, our customers benefit from a completely integrated software platform.

And what are the upcoming milestones in product development?

Another major milestone, that is happening right now, is the "Service Grid" topic. This will give the software platform an upgrade towards cloud functionality and digitalization in mind. This follows in the same footsteps of functional expansion as zenon Analyzer and Batch Control. We are also investing extensively in our solid foundations. That is, the core functionalities of our software platform, such as data acquisition, handling, processing, visualization,



During the interview, Phillip Werr pondered comparisons between Lego bricks and zenon – and with COPA-DATA as an organization.

archiving, and the general robustness of machine-related processes. It is precisely this combination of proven and new technology that adds value for our customers who are looking to develop seamlessly and easily in the direction of reporting, business intelligence, IoT, and digitalization.

As a modular software platform, zenon aims to make automation playfully simple again. To illustrate my point, I have brought something to play with. I would like to compare your customers' growing digitalization demands with the desire to build a perfectly assembled Lego sculpture. In the end, you can hardly see the individual bricks anymore. You could also have built something completely different with them. zenon, too, can be seen as a set of bricks which you can use to configure relevant applications. Do zenon users increasingly require ready-made, digital solutions? And how do you ensure that they get them?

This is an important point, because zenon's configurable nature and freedom offer full flexibility for diverse digitalization tasks. But there are also many standard situations for which we offer prepared project templates. This means that specific solutions can be implemented even faster and more efficiently. This fits in with our current focus on four core industries for which we have been

building very specific features and extensions around the generic software platform for many years. And we will continue to pursue this strategy in the future.

Industry-specific expertise is also essential to enable us to offer tailor-made solutions for existing and future customer requirements, and to advise our customers effectively.

It sounds like a complicated process to produce a simple customer solution at the end. What are the challenges for COPA-DATA?

You're right. In fact, this process is first and foremost associated with complex work and large investments. This starts at the organizational level, where we need to acquire, distribute, and maintain information about our customers' requirements. And, of course, we have to focus on reflecting this information in product technology. We need to consider many eventualities and variants during the development process to ensure that the software is ultimately user-friendly. Compatibility between versions is a good example because it is crucial for maintaining a successful digitalization strategy. Software must always be able to evolve both in terms of security and content. At the same time, it must be possible to reuse functioning projects so that existing value isn't lost.



Thomas ends his founding principle with the words: “we are just getting started!” So what’s next?

Naturally, we want to forge ahead with what we have already started. This means building our internal expertise in our customers’ businesses alongside our industry focus. This should continually enhance our customers’ experiences with us and with zenon. We are also expanding our service sector. This includes our Professional Service portfolio which we use to help our customers roll out their products faster and more effectively. This service is complementary to the system integration offered by our partner companies. We are also focusing on sharing our expertise within our successful partner community. We are providing many resources to continually improve zenon projects all over the world. We will even go one step further and provide all zenon users with new training methods to help them implement their ideas and plans in engineering projects in the best possible way. In addition, we want to increase

“We grow as a result of our actions, but we are not driven by our growth. We are driven by the aim of making the user’s life easier. And since we strive to make as many users as possible happy, our growth is ‘simply’ a byproduct.”

PHILLIP WERR,
CMO & COO COPA-DATA

How does COPA-DATA decide what its next move will be?

When deciding which functionalities we want to develop into the product, we have always been guided by what is beneficial for our customers. You have to be able to reject a few good ideas if they only follow short or medium-term trends. Despite all the market and global changes, this strategy has helped us to create a consistent central theme in the further development of our product and organization. After all, it is also important to us and our customers that we pursue our own innovative paths. Our financial independence enables us to decide for ourselves which technological partners to work with, as we are not bound by any overarching group policies. Moreover, we do not have any investors behind the scenes who influence the direction of our company or product strategy in order to maximize shareholder value on a short-term basis. This is certainly a key factor in ensuring the sustainability and reliability of our development over the long term. We grow as a result of our actions, but we are not driven by our growth. We are driven by the aim of making the user’s life easier. And since we strive to make as many users as possible happy, our growth is “simply” a byproduct.

our geographical reach to serve even more users and better meet the demands of our customers who operate on a global scale.

These topics will be our driving force for the coming years. I think that very exciting times are ahead of us and I’m looking forward to seeing what happens!

Great! Thank you very much for your time and your exciting vision of the future!

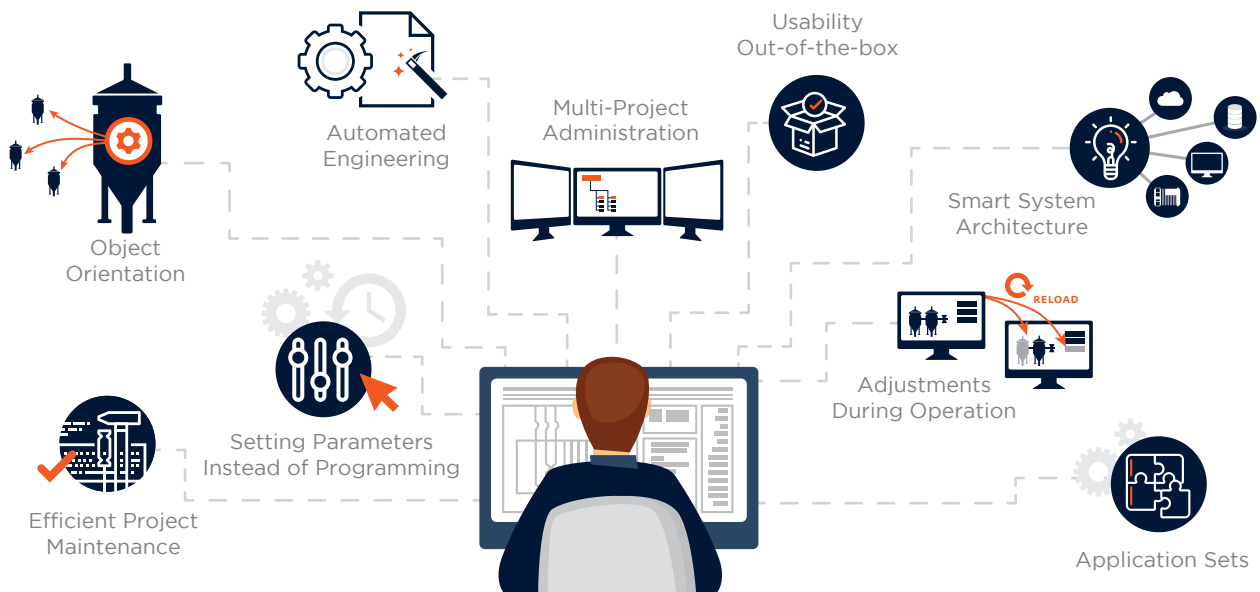
THIS INTERVIEW WAS CONDUCTED BY
SEBASTIAN BÄSKEN, PR & COMMUNICATION
CONSULTANT AT COPA-DATA.

How zenon makes life easier

CONVENIENT CONFIGURATION, USER-FRIENDLY
APPLICATIONS



At a time when so many different aspects of our lives are becoming more complex and less transparent, we long for clarity, structure, and simplicity. We crave connections that are real and easy to grasp. We want to react faster and be less hesitant in making decisions. This is especially true when we rely on process transparency. Increasingly, it feels good to have a partner at your side who can help to reduce complexity. And that's where we come in: the zenon Software Platform from COPA-DATA eats complexity for breakfast.



Working with intelligent software makes life easier.

THE NEED FOR A CLEAR OVERVIEW

Even though much of the motivation for increased digitalization is to make life easier for ourselves – be it with online shopping, ordering food via an app, or even looking for a partner on the Internet – our digital life is far from straightforward. The constant information overload to which we are exposed on a daily basis, the expansion of our digital lives into new contexts, and the changing processes that we must understand make trying to keep an overview a tremendous challenge.

Economist Ernst Friedrich Schumacher said: “Any intelligent fool can make things bigger, more complex [...]. It takes a touch of genius [...] to move in the opposite direction.” Perhaps it is not surprising that many of the most successful songs in the history of music have just a few chords and are relatively easy to play. Just think of Metallica’s “Nothing Else Matters”, Bob Dylan’s “Knockin’ on Heaven’s Door”, or “Let It Be” by The Beatles. Simple is good, simple is successful, and simple is – above all – user-friendly.

THE EFFORTLESS AUTOMATION OF PROCESSES

How does zenon turn our company founder Thomas Punzenberger’s vision “there is always an easier way” into reality? Since every user has individual challenges to master, everyone benefits from the software platform in a different way. For some users, it is the option to view all their system data centrally on a display or no longer having to travel eleven kilometers across the site every day to record values. Other users might benefit most from the zenon Process

Recorder, which records process sequences and makes them intuitive to analyze. The user gains error analysis that can be used for quality improvement. For others in the energy industry, the Command Sequencer makes day-to-day life easier. Command sequences are configured and arranged one after another, enabling a complete command sequence to be tested and executed with just a single click. And, of course, it would not be zenon if users could not easily maintain and adapt these command sequences themselves at any time. The examples of how zenon makes everyday life easier for users are as varied as zenon’s purpose itself.

THE KEY TO SIMPLICITY LIES IN THE CONFIGURATION

The basis for making the simple automated operation of production and infrastructure equipment a reality lies in its configuration. And once again, these configuration tasks should be easy to perform. Even before users benefit from zenon, the software platform makes life easier for engineers in many different ways. The principle of “setting parameters instead of programming” has always been the foundation of zenon. Thanks to object orientation and multi-project administration, projects are easy to set up. zenon enables technicians and engineers to handle projects at an increasingly faster pace thanks to continuous expansion and improvement – while ensuring a consistently high level of quality. This reduces stress and gives project engineers the time they need to perform other tasks. Ultimately, this results in less overtime and, potentially, more time for family, friends, or leisure activities.



More time for the truly important things in life.

Automated engineering is used as a tool to satisfy the increasing demand for the individualization of products in production facilities set up to achieve this. This endeavor creates complexity for machine and equipment software programs. As a solution, zenon offers high-performance automation tools. For example, the zenon automotive generator (zag) enables the automated implementation and analysis of visualization projects and PLC data – a great advantage for the automotive industry. The solution allows the sector to meet what are often very tight deadlines. Furthermore, such tools reduce the probability of errors, which is, in turn, an advantage for the integrator who could get called in during the night if the system goes down.

Maintaining the finished applications is just as simple and future-proof. If the user's requirements change, the parameters can be adjusted immediately in zenon. Does the visualization need to be modified to include additional measuring points? Does the user require a new button to display further KPIs or to change set values? In other programs, such adjustments are often saved for the next planned update, which usually involves a corresponding delay. With zenon, such changes can be implemented at any time with just a few clicks, even during shift operation. This means less downtime and no need for overtime during weekends.

OUR GOAL: TO INCREASE USER-FRIENDLINESS EVEN FURTHER IN THE FUTURE

Many zenon functions are already available out of the box. However, it is our aim to go a step further. In order to make

the software platform even simpler to use in the future, we are working on Application Sets that will be successively launched for individual applications. These will provide customers with a complete package of project components and modules that can be used directly, for example, for controlling substations or for line management in the food and beverage industry. This further reduces the engineering work required, while increasing user-friendliness.

We are continually looking at improving the software platform, but not at the expense of its well-known and popular functions. As it was expressed by Albert Einstein, long before the digital age: "Everything should be made as simple as possible, but no simpler."

ANDREAS GASTEIGER,
PRODUCT MARKETING MANAGER



Device Energy Edition

File Edit View Tools Window Help

Workstation: DEMO (Start project)

- Variables
- Screens
- Configuration
- Functions
- Serial Objects
- Language File
- History
- Process
- Time Control
- Alarm Logic (RC #11313)
- Production & Family Scheduler
- Programming Interfaces
- Interlocks
- Command Processing
- Local Management
- Message Control
- Menu
- Report Generator
- User Administration
- SAP interface
- File
- History of Changes
- Equipment Modeling
- Project Backlogs
- General symbol library

Item name	Picture	Object type	Equipment Group
My Performance 1			
CO_Performance Dash		Symbol	
CO_Comparison_Slider		Symbol	
Pump Watermeter 1			
Pump active		Symbol	
Pump inactive		Symbol	
Pump Process		Symbol	
Faceplate		Screen	

Description

Pump

Contains process symbols with two different states. A Pop-up screen for controlling. Alarm will be created.

The following elements will be created:

Symbols	Name
	Pump active
	Pump inactive
	Pump Process

Screens

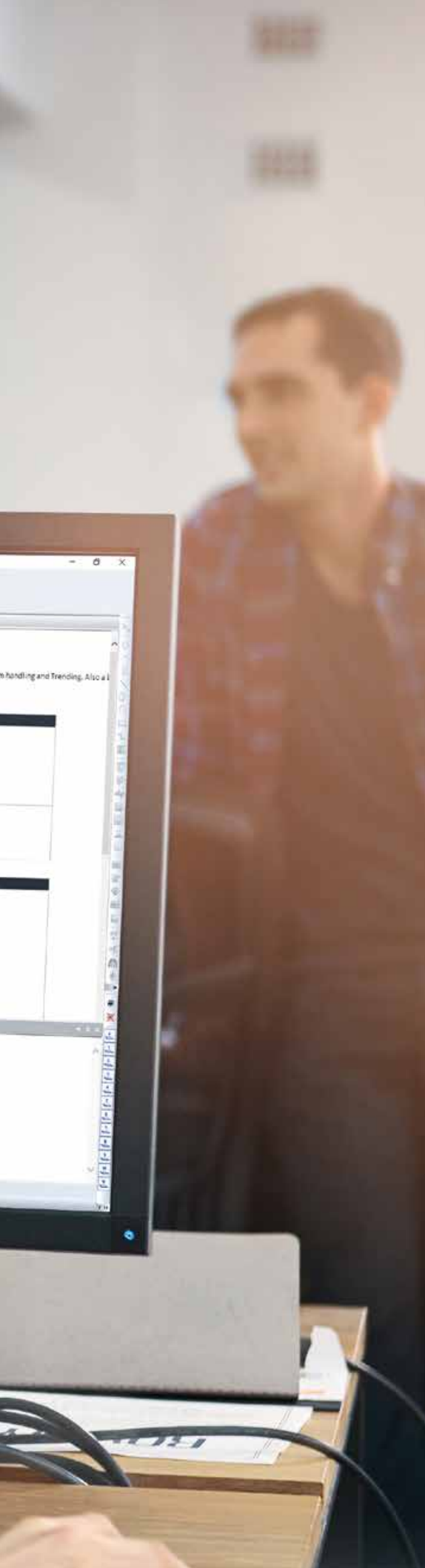
Screens	Name
	Faceplate

Pump Details

Description: Nominal flow rate

Name: Pump Watermeter 1

Alarm color: #FF0000



PRODUCTS & SERVICES

zenon Service Grid: Upgrade to IIoT platform

Right from the word go, many of our longstanding customers have relied on the flexibility, scalability, and expansion possibilities offered by zenon as core capabilities which serve the needs of project creators and users alike. Ongoing digitalization, Industry 4.0, and the new challenges constantly arising from Industrial Internet of Things (IIoT) projects have seen the advantages of zenon become basic requirements for a versatile and multi-functional industrial software. The Service Grid, a comprehensive functional expansion of the software platform, provides our customers with a future-proof solution.

VIRTUALLY UNLIMITED POTENTIAL

Integrated, seamless information flows at all business levels are critical success factors for companies within all industrial sectors. This information forms the basis for boosting efficiency in production, IT, and other disciplines. This is why it is important for companies to ensure that all the organizational measures and processes in their digitalization projects support these flows of information.

Standardizing processes opens up a whole host of new opportunities. This includes continuous improvements to existing business models or developing new business sectors. But the ever-growing number of smart machines and equipment no longer simply exchange relevant data via the Industrial Internet of Things (IIoT). In fact, components, machines, machine groups, and even entire processes are using this data to react to changing circumstances and parameters on the basis of established patterns and structures – often without any human input. This allows for distributed project engineering across multiple production lines and locations, which can now be configured and maintained more easily from a central location. The

benefits of centralized control are especially evident in systems which are geographically distributed or less easily accessible, for example in the production of renewable energies, such as photovoltaic or wind power stations.

THINKING AHEAD WITH ZENON

All components of the software platform, including zenon Editor, zenon Runtime, and zenon Analyzer, had already been developed with integrated and networked configuration and use firmly in mind. The evolving requirements our users have of zenon, and the high level of demands we place on it, drive us to continuously reassess and develop the platform and its components. Our Service Grid concept is designed to meet this very aim; bolstering the evolution of our products. Simply put, the Service Grid is a functional upgrade of zenon to a distributed software platform – facilitating the integration of zenon within the IIoT. Its components – or services – are designed to fulfill specific tasks, which can be installed and operated on different systems independently of each other. Since both physical and virtual machines can serve as the base system,

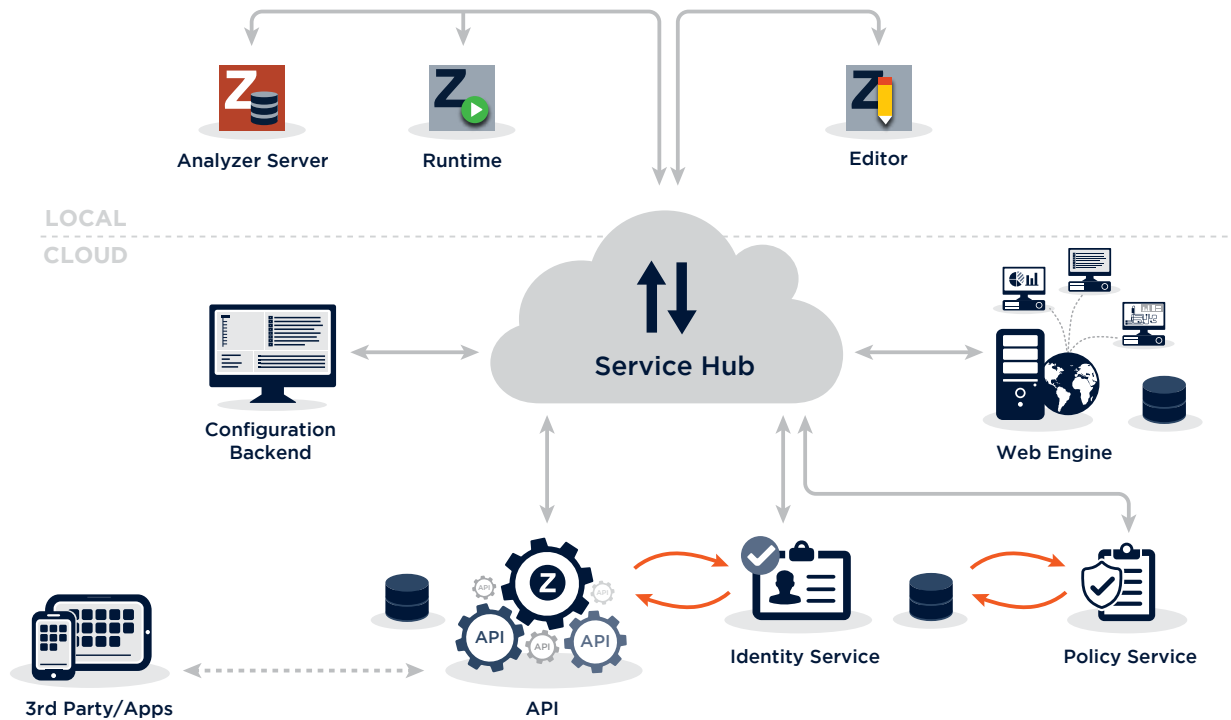


Figure 1: All components in the zenon Service Grid are connected via the central Service Hub. This also constitutes the connection between the local level and the cloud.

the Service Grid can be used on cloud platforms, giving zenon customers complete flexibility and enabling them to implement highly specialized and specific solutions. From networking systems across different locations and harmonizing processes, to simply connecting IoT equipment such as smart energy meters and wearables or integrating third-party systems – the networking possibilities are virtually limitless.

VERSION 1.0 AVAILABLE NOW

The individual services exclusively use web technologies such as Docker and Kubernetes, meaning that they are flexible in their application. The Service Grid functionalities are available from zenon 8.10 and zenon Analyzer 3.30 versions (zenon Release 2019). A core component is the Service Hub – the communication hub within the IIoT platform. The entire data exchange between all participants is controlled by it. Alongside seamless communication between zenon Editor, zenon Runtime, and zenon Analyzer via the Service Hub, the Service Grid API also facilitates a smooth connection with other communication participants

for the retrieval and supply of data. All communication is encrypted and requires both access data and a digital certificate, ensuring that information can be transferred securely even when using public networks such as the internet. Integrated authentication and authorization mechanisms enable users to tailor rights-management measures to each application.

SERVICE GRID COMPONENTS

Let's take a closer look at the components and architecture of the Service Grid. In general, local installations of zenon and zenon Analyzer close to the process form the basis of a project. The data exchange between zenon Runtime and zenon Analyzer can then take place directly as before. If zenon Runtime is connected to the Service Grid, variable values and entries from the Chronological Event List (CEL) or Alarm Message List (AML) can be transferred to other services. These values can be real-time data or historical data. Processing value changes or data predictions makes it possible to control the runtime, as well as the underlying processes. Within the Service Grid architecture, zenon



Figure 2: Data can easily be displayed and controlled via the open-source platform Grafana (www.grafana.com).

Editor can provide metadata for zenon Analyzer and can also configure the runtime project contents that should be made available in the Service Grid. Connecting zenon Analyzer to the Service Grid enables report results and data predictions to be made available to the Service Hub. With the assistance of third-party applications, this results in a wide variety of scenarios for the further processing and enrichment of data.

Information can be shared and made available to other participants via the Service Hub. The Service Hub comprises two coordinated parts: the Data Hub and the Hub Controller. The Data Hub ensures that news and events are communicated to the relevant recipients, while the Hub Controller is responsible for maintaining access rights for the individual services. The Hub Controller determines the degree of access that services are authorized to have and forwards this information to the Data Hub. Individual access data must be generated for each service to ensure that only authorized services are able to consume and provide data.

INTEGRATED API

Simply connecting third-party components or clients such as web applications, mobile apps, MES, or ERP systems via the Service Grid API significantly expands the software platform's current application range. By accessing the application programming interface, variable values or even entire reports can be retrieved and then processed in external clients, facilitating easy and seamless processing of third-party data in connected zenon installations. The interface currently offers a REST interface. However, the API is designed for modular processing with different protocols and interfaces. Expansions such as OPC UA and MQTT are already in the works. The available options for displaying or using data in third-party systems are therefore extremely wide-ranging. Services such as Azure Analysis Services can be used to create customized business intelligence solutions, or open-source platforms like Grafana can be used to tailor data visualization to each business purpose.

NEW WEB ENGINE POSSIBILITIES

Use of the HTML Web Engine has also been adjusted for existing zenon users. Up to and including zenon 8.00, the Web Engine had to communicate directly with the runtime via the SCADA runtime connector. Thanks to connectivity enhancements and connection to the Service Hub, this is no longer necessary. The current functions, such as logging in users, sending value changes, or displaying variable values are, of course, still available. The planned development of the Web Engine in future Service Grid versions opens up a range of possibilities for the HTML-based representation of process data and analysis and reporting applications. Use of these applications will be made much easier, even outside of classic automation networks.

FLEXIBLE AND OPEN, YET SECURE

Despite the advantages of simply connecting third-party components, it is important to bear in mind that such connections do, of course, also carry a potential security risk. The coordinated interaction of the Identity Service with the Policy Service guarantees high security standards which can be adjusted to meet the needs of each project. The Identity Service checks all connection requests from users or clients using the Service Grid API. These requests can be processed via Microsoft Active Directory, Azure Active Directory, or LDAP (Lightweight Directory Access Protocol). After successful authorization via the Identity Service, the Policy Service establishes the exact authorizations. Highly specific read, write, and even configuration rights can be granted for individual services or users, either for specific projects or for individual variables, providing a whole host of design variants. The initial configuration, maintenance, and expansion of all settings for Service Grid components can easily be carried out via a central, web-based portal which provides the functionalities for user administration, issuing authorizations, and connecting external services and clients.

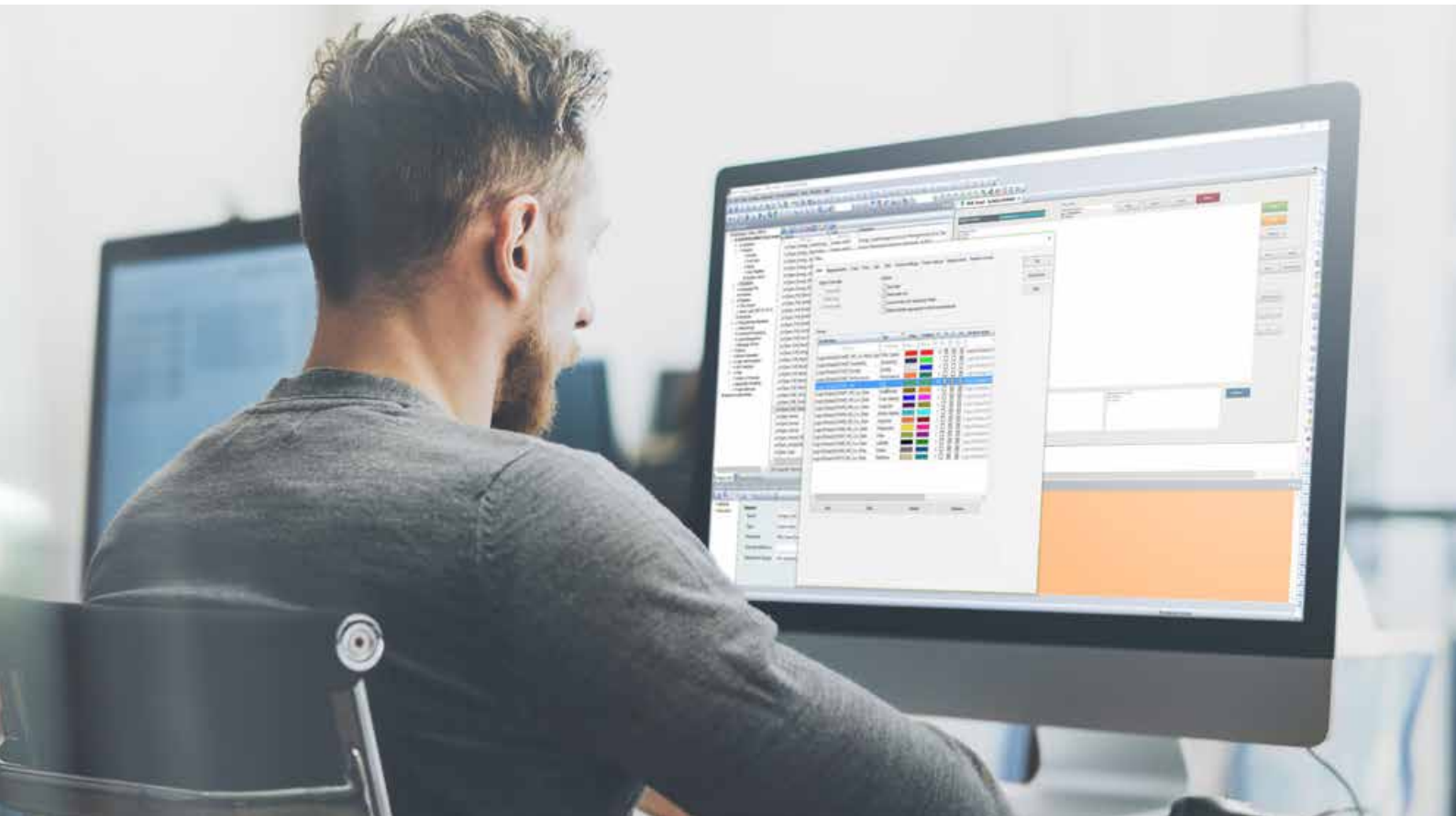
STEFAN ROBL,
HEAD OF MARKETING

HIGHLIGHTS:

- zenon as a distributed software platform
- Industrial Internet of Things connectivity
- Simplified development of new business areas
- Simple and secure connection of third-party components
- Available from zenon Release 2019 (zenon 8.10 and zenon Analyzer 3.30)

SERIES: EFFICIENT ENGINEERING WITH ZENON
PART 1

A PHILOSOPHY THAT SAVES TIME AND MONEY



In this issue, we'd like to tell you a little more about the philosophy behind zenon and give users – whether you're new to the platform or an old hand – some tips to help make your engineering work even more efficient. In later issues, we'll be exploring topics such as automatic engineering, efficient reuse, and object-oriented engineering. Once we've reached the end of the series, you'll have a whole collection of information that you can draw on in order to make your work with zenon fast and efficient – ensuring that it continues to be a joy to use in the future, too.

There is one question that users who are accustomed to different products bring up time and again. “Why is your approach so different from the rest? It’s unlike anything I’ve ever seen. Up to now, I’ve just been programming scripts – but you’re telling me that I don’t need to do anything like that from now on.”

It’s true that zenon follows a different philosophy when it comes to engineering – and that’s because it’s all about engineering rather than programming, and a global (or central) approach as opposed to a local one. Here’s an insight into why it follows this path and how it makes engineering so much easier, faster, and more secure as a result.

WHY ZENON IS THE WAY IT IS

There are four pillars on which the COPA-DATA philosophy rests:

1. zenon offers numerous pre-defined options that enable you to set up projects in no time at all. It gives you an at-a-glance overview of the options available to you, and doesn’t require you to learn any script language or get to grips with an programming Interface (API) before making a start.
2. You don’t have to worry about any of the details involved in programming, leaving you space to concentrate fully on your current project. That means less time spent on engineering and more time to devote to your customers.
3. The straightforward reconfiguration options allow changes to be made effortlessly further down the line. There’s no need to painstakingly comb through thousands of lines of code to find the element you need. If we consider the entire life cycle of a project – from planning and creation to commissioning, maintenance, and expansion – it is clear that the latter stages are the ones in which projects need to be especially transparent, and users need an easy way to understand how everything is working.
4. Projects are easy to adapt to different machines or plants. Machine building, in particular, often requires modifications to be made for individual machines, and zenon’s simple approach to engineering makes this a breeze.

All these factors reduce the time and effort involved in engineering and maintenance while keeping your costs in check. And that means real savings at the bottom line.

CENTRAL MANAGEMENT OF ELEMENTS

Users do not always recognize these benefits, however. As a consequence, we hear comments like: “zenon doesn’t allow me to be very flexible. Up to now, I’ve been able to simply program everything I’ve needed to.”

A blank canvas might seem like the ultimate expression of freedom, giving you the ability to custom-create everything from the ground up and get the most out of every last element. But how often do you really use this kind of freedom to its full potential? What actually happens in practice is that users create templates for repeated tasks, duplicating and modifying them as many times as they wish. If the original template contains an error, however, they then have a problem on their hands – they need to click through the project and hope that they can localize all the template copies and correct the elements in them. As we’ll see in a moment, with zenon changes are distributed automatically thanks to an extensively centralized approach.

MORE THAN JUST THE STANDARD OPTIONS

If you do come across a requirement that you just can’t fulfill using the standard options, zenon offers many useful alternatives to help you find a solution:

- **Add-in framework:** Add-ins extend zenon functions in Editor and Runtime with any .NET programming language.
- **zenon Logic:** The fully integrated soft-PLC programming environment allows you to use the five IEC 61131-3 languages, making it possible to perform calculations and logic tasks faultlessly every time.
- **ActiveX controls:** These enable you to integrate any third-party application, such as Acrobat Reader, into zenon. The interface is open, of course, so you can also integrate ActiveX controls that you have programmed yourself.
- **WPF controls:** zenon allows the use of WPF (Windows Presentation Foundation), which provides customized graphic design options and integrates complex application logic. Designers can create intricate illustrations and they can then be imported into zenon and linked to the required logic, to name just one example of how the function can be used.
- **COM interface:** The COM interface is also fully open and provides access to zenon Editor and Runtime from external locations. You can use whichever programming languages you like for communication, such as C++, C#, and VB.NET.

CHANGE EVERYTHING - OR JUST ONE THING

Another reason that people give for being wary of zenon goes: “I don’t always find it immediately clear where certain properties come from in zenon. In other applications, I can just click the element and immediately get the script, which I can then take a closer look at.” In actual fact, we have made a conscious effort to include both options in zenon. While

LOCAL	CENTRAL	GLOBAL
Element settings	Fonts	Fonts
Background colors	Frames	Frames
...	Functions	Users
	Scripts	Language tables
	Symbols	Symbols
	Styles	Styles
	Color palettes	Color palettes
	Data types	Files
	Variables - Units - Limit values/colors - Display ranges	

we have enabled users to make many settings directly in the element (the Combined Element is one example), we also believe that there are numerous cases in which it makes sense to define settings centrally – especially if those settings are going to be used in multiple locations. zenon’s central change and management features are a huge asset in this scenario.

KEEP EVERYTHING IN VIEW

As a quick and efficient way of finding a central setting, zenon Editor allows engineers to click on a property and jump directly to the linked element – and then back to the original element if they wish to. This makes it easy to investigate how elements are connected to one another, without the laborious job of analyzing scripts.

Let’s say you want to know where a variable is linked throughout a project, for example. With the project analysis feature, you can pinpoint these areas in the project and jump directly to the element in question. You can even search for variables that are not in use, for instance, to ensure your project isn’t being weighed down by things you no longer need.

LOCAL, CENTRAL, AND GLOBAL

Before we take a deeper dive into the engineering process, we’re going to have a look at the philosophy that is used for managing properties such as color and font. zenon provides three ways of managing these – here are some brief explanations:

- **Local:** Properties are defined directly at an element. The background color of a button is an example of this.
- **Central:** Properties are defined centrally in the project – in a color palette, for example. Individual elements can then use this centrally defined color.

- **Global:** Properties are defined on a cross-project basis in a global project. zenon Editor provides access to these definitions in all projects that have loaded the global project in the workspace.

The overview below shows the most important properties that can be defined in this way.

UPDATES AND CHANGES AT THE CLICK OF A MOUSE

We have designed the structure in this way because users want to maintain a consistent look and feel throughout a project in most cases. It is much less work for engineers to achieve this if they don’t have to redefine every property for each element they create. Not only that, but this approach also enables central maintenance – so if you want to change a property, you don’t have to amend every single instance of that element. Instead, you can adapt your entire project with just one change.

To take styles as an example, there’s no need to amend every property for each button and bar display if you want to change how the labeling looks. All you have to do in this case is apply the styles you have already created or just create a new one directly at the location where you need it.

If you want to change the appearance later – because the labeling is too small, the customer wants all the text to be left-justified, or the text does not contrast enough with the background, for instance – all it takes is a few clicks of the mouse. There’s no need to open hundreds of images individually or to search through and edit 200 different elements. Simply change the central style and it will be updated throughout the entire project.

THE MOTHER OF ALL PROJECTS

It is especially important to apply a consistent look and feel in cases when you are using the Multi-Project Administration feature in zenon. To do this, you could, of course, create the same style groups in each project and edit them there. Or you could copy the style groups from one template project to the other projects.

However, a much more elegant option is to use a global project. There, you can simply define global style groups that are made available in the workspace of each project. You can then choose whether you want to use the central style group for the project or a global style group for the global project.

SAVING TIME WITH REACTION MATRICES

One of zenon's most important functions is its use of reaction matrices, which centrally define limit values and control aspects such as color, visibility, and flashing in elements. In contrast to limit values, they represent a centralized approach. This is because a reaction matrix only has to be engineered once and can then be assigned to any number of variables. Any variable that is linked to this reaction matrix will respond in the same way – and that provides an easy, centralized method of performing maintenance. Making things even more central, a reaction matrix can even be linked directly to data types – which means that all the variables based on them automatically have the correct reaction matrix assigned to them.

GETTING A HANDLE ON LIMIT VALUES

Where both reaction matrices and limit values are concerned, value attributes such as limit value color, flashing, visibility, and limit value text are available throughout the entire project. It is immediately possible to see the linked limit value color in a numeric value, for example, or you can instantly show the limit value text in the dynamic text element. A preview function for limit value text, limit value color, visibility, and flashing is available in the elements, providing an even better overview.

The Combined Element is a particularly special feature – an element whose almost universal nature makes it highly complex. With the Combined Element, you can choose whether you want to adopt the attributes of the underlying variable or define your own conditions within the element. What this means is that you can opt for a local or central approach in an element.

SMART OBJECTS MAKE ZENON EVEN MORE CENTRALIZED

There is one highlight that we're very excited to introduce in the zenon version being released next spring: Smart Objects. These make it possible to encapsulate entire functional units and reuse them as many times as you require within the project, enhancing the centralized approach. Smart Objects enable you to apply a central definition to an OEE indicator screen, for example, and this screen then combines with the necessary variables and the zenon Logic program to calculate the indicators and execution function. Working on the basis of a Smart Object Template, all you have to do as the engineer is create a Smart Object and link the variables to your process – so then you can simply move on to your next job. In the next two articles, we'll be covering Smart Objects and other new features in more detail.

TIP:

Name your styles, fonts, and properties based on their function rather than their appearance. For example, "OK button" instead of "green button." This will make it easier to assign features during engineering and help you to make sure that you only amend the parts of the project you want to focus on when you are making changes later on. Maintaining a strictly arranged, semantically consistent design in this way will make it easier for operators to carry out their everyday tasks later on and prevent errors caused by misinterpretations.



GERO GRUBER
Product Manager

As Product Manager and Product Owner for the zenon Software Platform, I am particularly interested in the user interface and the interaction design of the whole platform, as well as the graphical visualization in zenon Runtime.

WHAT DO ZENON PROJECTS
HAVE TO DO WITH LEGO SPACESHIPS?

A preview of the new version: Application Sets

The new version of zenon is coming out in 2020, and the new Application Sets will be one of its highlights. This is a complete package that makes setting up an application even easier and more efficient. Solution Packages, themselves containing Smart Objects, are one element of the Application Sets. All in all, it's a bit like a model kit for kids: ready-made components and instructions make putting it all together child's play. Read on to find out why a spaceship made of Lego bricks is a lot like a zenon project.

The beginning of a project is often like looking at a big pile of Lego. You don't have a clear idea of what's needed – and there are no instructions. You have a play around and, eventually, construct the spaceship. You're sure that you've included all the important functions, but your five-year-old boss demands some alterations. The door needs to be made bigger so her favorite doll can climb on board! So you demolish the spaceship and start all over again.

You might have experienced similar things in your professional life. After you've spent time carefully designing every last detail of a project, you're told you need to make changes or that there are additional requirements that will entail significant alterations. In the worst-case scenario, you might have to start from scratch here too.

QUICK RESULTS, LABORIOUS MAINTENANCE

If you've already completed several projects with similar requirements, then you will have a wealth of experience that you can draw upon. Components that you've used

previously can be adapted to the new project in just a few steps. The components change with each project. If they need maintenance, then every version has to be checked and adjusted manually, which can be pretty arduous.

WHY NOT APPLY THE MODEL KIT PRINCIPLE?

That's why the zenon Software Platform will be offering Application Sets in the new version. You can picture this as a model kit full of building blocks that are waiting for you in a library, all packaged up. The model kit makes configuration, expansion, and maintenance quicker. It contains objects that are tailored to the requirement in question and provide a specific solution, including documentation. In addition, using a basic project template further speeds up configuration – just like a set for a Lego spaceship that includes the right bricks and a construction manual. It makes sense for building bricks – why not zenon too?



Application Sets include preconfigured components to enable individual solutions to be achieved quickly and easily.

A LIBRARY FULL OF LOGIC AND GRAPHICS

Application Sets contain the software license for your specific solution, configuration instructions, and Solution Packages. These are project templates featuring what are known as Smart Objects. Smart Objects make building a project simpler and reduce development time. This means that even inexperienced zenon users can arrive at a tailored solution in next to no time.

Experts may think, “but I already have that kind of object – I can generate and use complex symbols.” It’s true that judicious use of symbols saves time and ensures a maintenance-friendly project. However, they have to be developed first. The new Smart Objects, on the other hand, are ready out of the box and cover many more predefined functionalities.

MANY POSSIBLE APPLICATIONS

Along with symbols, Smart Objects also contain screens, functions, and variables. In addition, it will be possible to

access preconfigured zenon Logic components, commands, and interlocking. Object-oriented engineering means that updates, expansions, and maintenance no longer involve extensive modifications. Instead, you can carry out the work centrally in just a few steps. There are numerous possible applications, and you will find a few examples on the following page.

NOT LONG TO WAIT!

Initially, Application Sets will be available for HMI solutions in the food and beverage, pharmaceutical, and energy (substation automation) industries. However, we are working hard to produce solutions for other industries and applications, and the range will grow with every zenon release.

As you will discover, with the right construction manual and suitable bricks it’s not just the Lego spaceship that is child’s play – even complex projects can be configured just as easily! You can find further details about Smart Objects in the next article.

FAQs

Everything you need to know about the new Smart Objects

With the next version of zenon, you can create your projects even more efficiently and faster

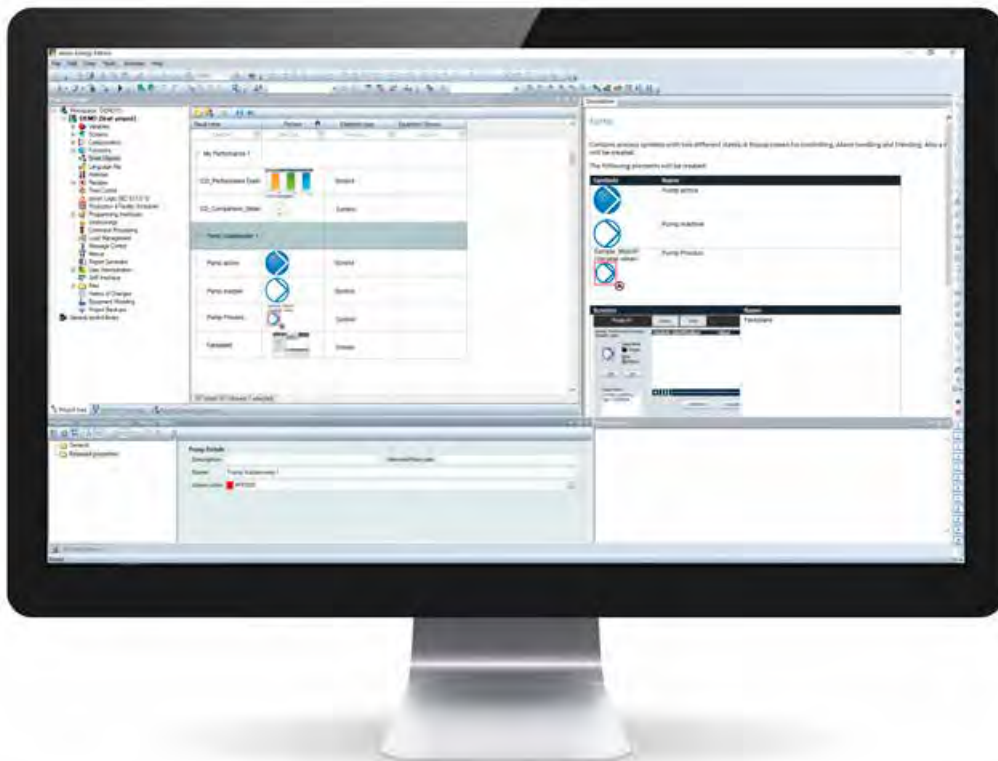
What can you expect from the new zenon version 8.20? The answer is: Smart Objects. More than just an extension of the Editor – which already offers many options for quick and easy configuration – Smart Objects are the next logical step toward continuously improving ergonomics in engineering and further minimizing the barriers to entry for engineers who are new to zenon. In other words, they make daily work even more efficient and, thus, more profitable. Below, we answer some of the most important questions on this new topic.

What are Smart Objects and what are Smart Object Templates?

Let's start with the Smart Object Template. This is a component in the zenon Editor that combines known objects such as symbols, screens, or functions. Using these templates, you can create one object or several independent objects known as Smart Objects. The concept is the same as in zenon Logic, where a function block (User Defined Function Block, UDFB) serves as a template and can be used several times. Various object-oriented programming languages are also based on a similar concept; these are referred to as classes, which are used to create instances.

That is a lot of theory, but can you give us a practical example?

Take a pump, for example. It requires a symbol, detail screen, screen switch function, several variables for operation and monitoring, as well as alarm definitions via a reaction matrix. The individual objects and their connections are configured in the Smart Object Template. If several pumps of this type are required later in the project, the only thing you have to do is create a Smart Object, based on the Smart Object Template pump, and set a unique name. Accordingly, all zenon components are automatically created in the project.



zenon Editor with an open Smart Object list including the available symbols and the released properties.

How do Smart Objects help me during the configuration?

Let's stay with the pump example. To use a pump in a project, simply create a Smart Object with a meaningful name, e.g. "FlowPump," and zenon will do the rest. All the objects defined in the Smart Object Template are created in the project. If, for example, a variable with the name "State" is defined in the template, your project will now contain the variable "FlowPump_State."

The same also applies to screens, functions, symbols, etc. Naturally, all the properties are also adopted. But the concept goes beyond that – because all required substitution rules are created automatically with the necessary links. This eliminates the project configuration time required for complex substitutions. As a Smart Object user, you do not have to worry about how the individual components will interact in detail.

The objects generated from each smart object are associated with it. Therefore, if you want to delete the "FlowPump" pump, you only have to delete the Smart Object. All associated objects are removed from the zenon project and no unnecessary components are left behind.

In the zenon project, I can simply drag a symbol from the symbol library into a screen and use it. If I want to use a symbol from a Smart Object Template, I have to create a Smart Object first. Isn't that more complicated?

Symbols and Smart Objects are two very different things. Essentially, a symbol is a group of graphical objects. A Smart Object, on the other hand, is an object with different zenon components as well as a logic to create substitution rules, for example. These processes are executed when the Smart Object is created. A symbol depends on variables which must be present in the project, while a Smart Object includes all the components and objects it requires. This may seem complicated to some users at first glance, but it has a decisive advantage: the Editor contains a list of Smart Objects that shows all the derived objects of a Smart Object Template. This gives you an overview of the different pumps that are used in the project (*Figure 1*). You can manage the settings for the individual pumps directly in this list.

The Smart Object library is a nice idea but, as usual with libraries, the objects are not entirely suitable for my project. How can I change this?

With zenon, you can maintain and reuse project content centrally. This philosophy has been continued with Smart Objects. Features like color palettes, styles, and language tables – to list only the most important ones – can also be used in connection with Smart Objects, making it easy to adapt them to your design guidelines.

As it may be the case, for example, that only one of several pumps is to be assigned a special color, the principle of “released properties for symbols” has been adapted for Smart Objects. With just a few exceptions, you can release symbol properties in the template as well as all properties of the configured objects. For example, you can release a button color for the pump, the limit value color for alarms, or a threshold value for the alarm. These properties can also be grouped and renamed. For example, you can combine the button color and the alarm color and define them as a property with the name “AlarmColor.” This alarm color can then be set individually for each Smart Object under the “FlowPump” Smart Object.

How do I create a Smart Object Template?

As it does with the symbol Editor, the zenon Editor will contain a Smart Object Template Editor. This window offers a tree view similar to the project tree. The tree view is filtered and shows the components that are available for Smart Objects. In the Smart Object Template Editor, the Smart Object Templates are configured in the same way as the project itself. In other words, the Smart Object Template is an independent, small project within the main project with self-contained functionality. This means that only objects from this template can be used in the Smart Object Template. For example, only variables from this Smart Object Template can be used in a symbol; variables from the project or other templates are not permitted.

Can I use a Smart Object Template in another Smart Object Template?

Yes. Just as you can use symbols in other symbols, you can use Smart Object Templates in other Smart Object Templates. In an example from the energy industry, the smallest Smart Object Template represents a disconnecter. It contains detail screens for the disconnecter, variables, and command processing with all available switching actions. Templates for circuit breakers or transformers, for example, are prepared as additional objects. If you want to create a complete branch as a Smart Object Template, you can create and use a Smart Object Template for the disconnecter in this branch. By giving these templates a specific name, the corresponding disconnecter variables are available in the branch. If, for example, the disconnecter template

contains a “Feedback” variable, the branch template will include variables such as “GroundDisconnecter_Feedback.” If a branch Smart Object is created later in the project, the “Branch1_GroundDisconnecter_Feedback” variable is automatically created in the project. This example can also be applied to a pump house with different pumps and other units.

Every project is connected to a real process. How do I connect Smart Objects to my equipment?

The zenon communication drivers are the connecting link to the real world. This is also the case for Smart Objects, where the applications can be roughly divided into two categories. On the one hand, there are the Smart Object Templates which were developed with a specific device, such as a certain type of pump, a specific bay controller, or a robot from XY, in mind. On the other hand, there are comprehensive Smart Object Templates; for example, for dashboard tiles for OEE displays or menu items.

For the former category, the communication protocol can already be defined during creation. If, for example, a pump only supports Modbus, the driver can already be fixed in the template. As a user, you only need to set the IP address correctly. With Smart Object Templates of the second category, the creator usually does not yet know which variables are required or which communication protocol is used. In this case, the released properties ensure the greatest possible flexibility as they enable individual variables in the Smart Object to be replaced in their entirety. If, on the other hand, you want to define alarm definitions, limit values, and other settings in the Smart Object Template, but want to adopt existing variable addresses from the project, you will be able to do this in the Smart Object.

I am creating a library of Smart Object Templates for my company. How can I share this library with my colleagues?

Naturally, export and import functions are also available for Smart Object Templates. The template’s version number and the fact that changes can be detected are features that are particularly beneficial when using the import function. This ensures that you do not accidentally import an older version into a current project or inadvertently overwrite the Smart Object Templates currently being used.

BERNHARD SCHUIKI
INDUSTRY SPECIALIST ENERGY

TLS integration based on IEC 62351 part 3

Attacks against the OT (Operational Technology) infrastructure can cause outages, result in the theft of intellectual property, or end in significant physical damage occurring.

Any automation infrastructure is a potential target for many kinds of attacks. Whether in the collection of real-time data, the setting of set-point values, or the sending of commands, it is now clear that the automation industry has not, to date, been sufficiently focused on security. The development of many existing industrial communication protocols focused on their ease of use, reliability, and interoperability. Security concepts were not on the agenda.

Industrial systems were always standalone systems. The assumption was they would operate on isolated, air-gap networks rather than leveraging the open connectivity and Internet concepts of today. Although the same communication standards are still widely used today, historically they have not kept up with the evolving networking and security threat landscape.

Out of over 300 different communication protocols supported by IEC 62351, less than 10 specify security by design. Less than 20 have bolt-on security features defined after standards were initially released. This means a huge challenge in terms of cyber security. "Unsecure" communication channels expose OT asset owners to typical attack vectors, such as replay attacks, man-in-the-middle attacks, brute-force attacks, denial-of-service attacks, and spoofing and tampering attacks. Especially in critical infrastructure, with widespread communication networks and assets, these threats are a major concern.

AN OVERALL SECURITY CONCEPT

Fortunately, efforts to improve security for existing protocols and standards are taking flight and we can adopt these efforts as one aspect of an overall security concept. The IEC 62351 standards series provides mechanisms which can be adopted by other existing standards like IEC 61850, IEC 60870, and IEEE 1815 (DNP3). When implemented, these mechanisms can help ensure secure communication. For us, as a major provider in this industry, we see it as

our responsibility to actively participate in the creation of these standards and to be among the first providers to offer solutions for our customers based on these secure standards.

IEC 62351-3 introduces the use of TLS (Transport Layer Security), which is a cryptographic layer designed to provide secure communication between TCP/IP based endpoints. The primary goals are establishing mutual authentication between two endpoints, providing data integrity, and – optionally – data privacy.

By applying TLS to existing TCP/IP-based communication protocols, several major security threats can be mitigated:

- The use of cryptography and encryption protects sensitive data from unwanted disclosure.
- The use of cryptography and digital certificates ensures that connections are only established when the identity of the opposite end is established and trusted.
- The use of cryptography allows each end to verify the data received to establish that the data was sent by the trusted opposite end and was not manipulated during transport over the network.

TLS can provide security between two endpoints. However, it does not provide security at the application layer of the protocol. It also does not provide a way to establish the role and corresponding access rights of a particular application behind the endpoint. For this, other parts in the IEC 62351 standards series have been defined: part 5 for secure authentication; part 8 for role-based access control; and part 4 and part 6 for securing MMS. By applying security at the transport level using TLS and security at the application level, you can achieve end-to-end security, also over multiple hops.

TLS INTEGRATION IN ZENON BASED ON THE REQUIREMENTS OF IEC 62351-3

Most of you will have used TLS in other domains, such as online banking or shopping over the Internet. IEC 62351-3 provides the means to define the proper use of TLS in other referencing standards like IEC 60870-5-7 and IEEE Std™ 1815-2012. Referencing standards are required to provide parameters for the particular adoption of TLS for a specific communication protocol.

Unlike TLS used in a web-browsing session, which is usually short-lived, connections within a substation or between a substation and a control center can live on for weeks or months without interruption. To ensure the highest security, cryptographic material will therefore need to be regularly renewed. In addition, certificate revocation checking will be required on a regular basis to verify that certificates that have been revoked will lead to the termination of the connection. IEC 62351-3 defines correct behavior for long-lived connections. With TLS used in a web-browsing session, only the web server has a certificate – to prove its identity to the web browser and to provide trust. It is in the interest of the web server to allow anyone to be able to connect and use its services.

An IED, RTU, PLC, or Gateway does not have the requirement to let the world connect. Quite the opposite is true. Typically, only one or two systems should be allowed to connect. A TLS server can therefore require the TLS client to provide a certificate and only allow the connection when the certificate is a certificate from a trusted Certificate Authority or when it is the specific expected certificate for the peer connection that is signed by the trusted Certificate Authority. IEC 62351-3 specifies that both endpoints use a certificate.

When doing online banking, keeping data confidential and private is one of the key functions of using TLS. For communication within a substation, it may not always be necessary or desirable to keep data private. IEC 62351-3 allows the use of cipher suites that provide no encryption but still have the other benefits of TLS, like mutual authentication and data integrity. Referencing standards like IEC 60870-5-7 or IEEE Std 1815 can specify whether the use of null-encrypting ciphers is permissible. In zenon, TLS according to IEC 62351-3 is currently implemented for the IEC870 master driver, the Access IEC870SI process gateway, the DNP3_TG master driver, and the AccessDNP3_SG process gateway, with further implementations on the way. With the release of version 8.10, the use of TLS version 1.3 will now also be available.

SUMMARY

IEC 62351-3 provides an excellent foundation to solve some of the major security threats to existing communication protocols used in the OT domain. The principle is “simple” enough and can be applied to any TCP/IP-based communication protocol. While initially intended for use in critical infrastructure, it has the potential to become a standard for many automation applications. At present, support of this technology by hardware and software vendors in the automation industry is limited. But now we are seeing the first successful applications being built, it is very likely that wider adoption will be just a matter of time.



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A vertical strip on the left side of the page shows a blurred industrial setting with various pipes, valves, and machinery in shades of blue and grey.

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CENTRALIZED HMI INFRASTRUCTURE WITH ZENON

How can we transform HMI challenges into digitalization opportunities?



The Human Machine Interface (HMI) topic is so important for manufacturing teams in a time of digital innovation. Over the last few months, we've been talking to people about what they are aiming for and how zenon as an industrial software platform can help. We dedicate this article to all professionals in the food & beverage industry who have shared their opinions with me on the HMI topic during our recent trips to Africa, Asia, South America, and Europe.

In a classic solution setup, the machine HMI is an assembly of a hardware panel, an operating system, a runtime application, and a project running within it. They are different components with different lifecycles, but also subject to continuous technological development. Machine suppliers continually invest in improvements to provide much more than simple machine operation. The HMI makes it possible to interact with machine complexity in an easier and more user-friendly way, thereby avoiding operation errors and downtime. The HMI is essential for high machine reliability and efficient production.

Recently, we've had the chance to hear the opinions of production teams from different manufacturing plants across several continents regarding the topic of HMIs. We share the accumulated thoughts of various team members below.

OLD AND NEW CHALLENGES FOR MACHINE HMI

Speaking with machine operators and people working in packaging areas always brings interesting insights into manufacturing reality. For years there has been a clear trend toward reducing the number of people operating a given filling line. One operator will be responsible for a group of machines. They need to walk from one machine to another and undertake the necessary tasks without causing time or material losses. Sometimes the operator has to adapt from the look and feel of one HMI to another: how do they navigate through the interface options? How do they execute an action? What are the meanings of particular colors? The key question that arises from this is: how do we create an HMI concept that helps the operator to manage a group of machines even more easily?

When it comes to filling area supervision, line managers are keen to manage production flexibility while maintaining optimum quality, efficiency, and consumption. Seeking to process complexity in an easier way, they stand to profit from the growing quantity of production data and associated analytical tools. For line managers, the HMI is the main way operators can be integrated with optimization initiatives across different machines and processes. Fast and precise information from the HMI to other systems and back again is at least as important as the recording of data and events from each machine. The line manager's key challenge therefore lies in how to increase the integration between different production equipment and people.

IT managers in breweries worldwide are focused on ensuring their IT infrastructure is optimally networked and the software kept up-to-date, secure, and running well. The bandwidth of automation and IT networks is

growing. Increasingly robust hardware is being deployed. This prepares the way for new digitalization initiatives. However, risk is introduced by HMI panels that use aging operating systems that cannot be updated with security patches. This represents a critical component of the entire line yet it must be kept disconnected from the rest of the infrastructure. This situation represents a lost chance to integrate machines within the wider plant architecture. We have to ask: what are the overall upgrade costs for an HMI? How is that offset by the advantages of upgrading? How much easier would it be to manage the operator's access rights at plant level, instead of machine level?

For automation specialists in production, the HMI is one of the many automation components they need to deal with, alongside PLCs, motor drives, measurement devices, and much more. A PLC might allow a specialist to take ownership of it in the post-guarantee phase and even extend its lifetime. However, the HMI is often presented as a "black box," where very limited improvements to the machine lifetime are possible. The challenge here is how we can enable the automation specialist to more easily keep up to date with technological development across a heterogeneous automation landscape.

Today's digitalization manager already has a clear opinion about OT/IT integration. We're on an unassailable path towards virtualization. And there is little hardware which is not subject to "bring your own device" considerations. Architectures combine classical systems with hybrid IoT approaches, from the sensors to the Cloud. The HMI is just one important component in the "smart factory" way of thinking. How can we disconnect component bundles, such as the HMI, to make them more easily upgradable? Where should we run the HMI application: on hardware at machine level or at line level? The priority is to enable new machine operation concepts, focused not on the machine but on the user. We want to ensure that the new technologies based on big data and the Cloud can be used to help production teams.

With respect to the HMI as an equipment component to be repaired, replaced, or improved, maintenance managers worry about the cost of spare parts. For the individual components of the HMI bundle, continuous development makes the price/performance ratio better and better. But how can maintenance managers ensure they profit from this development?

All of these considerations are precious inputs from manufacturing teams that deserve understanding and reflection. The concreteness and the frequency of which we heard these inputs inspired us to propose the following solution.

A SOLUTION WITH MANY OPPORTUNITIES

Let's call our solution a "centralized HMI infrastructure." It is fully based on existing zenon technologies being used in numerous plant-wide applications. These technologies have been validated against a variety of standards important to the sector. Let's consider their main principles and components – and their benefits. Warning: you'll need to use some of your zenon knowledge here!

1. REBUILDING THE HMI BUNDLE AT CENTRAL LINE LEVEL

The central infrastructure consists of a physical or virtualized server – see *Figure*, showing the operating system and the zenon Runtime software. Within this environment, the zenon HMI project (app) of every machine is inserted as a module. Based on a set of prerequisites and native zenon functionalities, these HMI apps are integrated harmoniously. They directly communicate with the machine PLCs, supported by a performant and reliable communication network.

This way, the HMI bundle is transformed into a combination of easy-to-maintain components. zenon is always ready for the newest operating systems and assures compatibility and the conversion of different project versions.

In zenon, the hierarchical project integration brings a special bonus to this solution – something that is often "unexpected" if zenon is new to you. Without extra engineering effort, all the HMI data, events, alarms, and context information are centralized within one "Line Controller" project. Moreover, the straightforward use of Active Directory in zenon enables common user management across all the HMIs, and their use can be harmonized with existing IT security concepts. Plus, if you need even more reliability from the entire centralized HMI infrastructure, zenon's redundancy is one valuable option at your disposal.

2. DEVELOPING FLEXIBLE MACHINE OPERATION CONCEPTS

How many operators are necessary for the entire line? For what group of machines is each operator responsible? Where should we install the interface so that the operator can safely operate one or more machines? And what are the operator's needs in terms of the simultaneous information from different machines, e.g. status, alarms, performance? Answering these questions helps us to develop an optimized operational concept with the focus firmly on facilitating and enhancing the operator's contribution to plant performance. What does this mean for the centralized HMI infrastructure? It's likely you will use a number of panel PCs. On every one you will run one or more machine/HMI projects, depending

on the need to operate or supervise. The machine projects run as clients of the ones already started on the server and are automatically updated with central changes. We are not creating "black boxes" here. Instead, you enjoy greater freedom to maintain hardware, operating systems, and your zenon projects. The machines benefit from a longer lifecycle. The operators benefit from a higher level of HMI usability.

3. DEEPENING OT/IT INTEGRATION

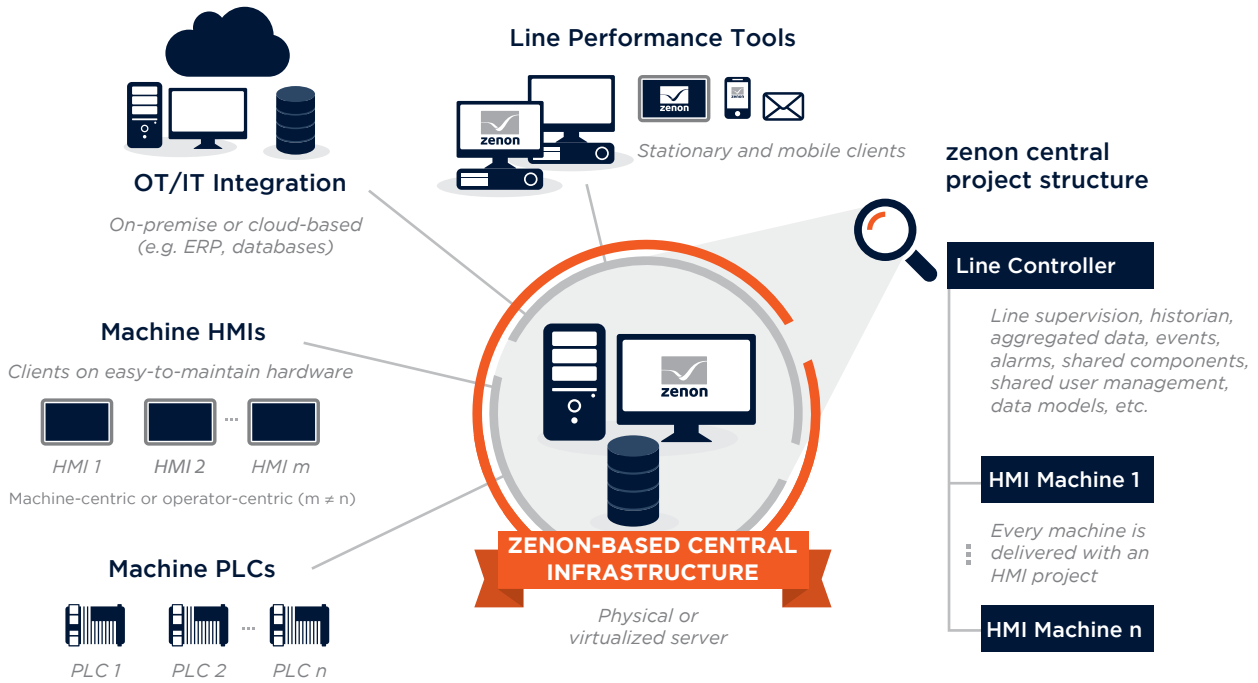
The centralized HMI infrastructure with zenon is, by default, the place to integrate OT and IT. First, there is a direct robust communication with the PLCs. The HMI apps of every machine are made available for users wherever they need it, according to centrally managed user roles. Over configurable mechanisms, zenon supervises the reliability and activity of the entire infrastructure. Second, zenon offers various ways to integrate plant systems and business applications, such as ERP interfaces (e.g. SAP), SQL data archiving, Cloud architectures, and Process Gateways (e.g. OPC UA).

For digitalization managers, the centralized HMI infrastructure enables new concepts that benefit line managers and their colleagues – making it easier to continuously improve plant performance. Real-world examples are numerous – from ERP to HMI communication for reduced changeover in the filling lines, through to predictive intelligence running in the Cloud.

4. ENABLING WIDER USE OF LINE PERFORMANCE TOOLS

One important result of integrating all HMI projects centrally is the zenon Line Controller. Here, zenon automatically centralizes data, events, alarms, and context information. The Line Controller is like an HMI/SCADA system for the complete line that delivers real-time supervision and operation. It enables users to improve the speed of machine changeover or to visualize lines in top-down approaches – from aggregated indicators to the smallest details about productivity, quality, or energy consumption. zenon makes it possible to extend these functionalities continuously; add new ideas such as the process recorder, 3D-visualization, or standard operating procedures management.

How can users fully profit from such a large amount of available data? zenon enables you to historicize and contextualize data – from HMI projects to SQL. You can use reporting systems such as zenon Analyzer for extensive analysis. Or you may use other systems as a data consumer too. The centralized HMI infrastructure supports mobile solutions or further types of client/server approaches. You maximally profit from data, wherever you need it.



A centralized HMI infrastructure with zenon is defined by clear characteristics: maintainability, extensibility, interoperability, usability.

CONCLUSIONS

We've learnt from manufacturing teams worldwide that the classic HMI both faces and creates numerous challenges today. But zenon offers exciting possibilities to build sustainable solutions. A centralized HMI infrastructure with zenon is defined by clear characteristics: maintainability, extensibility, interoperability, usability. This offers a huge number of new possibilities to transform the human machine interface into a real contributor to optimal plant performance.

To add your feedback to our market survey or to find out more about zenon, please get in touch.



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ZENON SUCCESS STORY

SPECK PRODUCTION IS FUTURE-PROOFED WITH ZENON

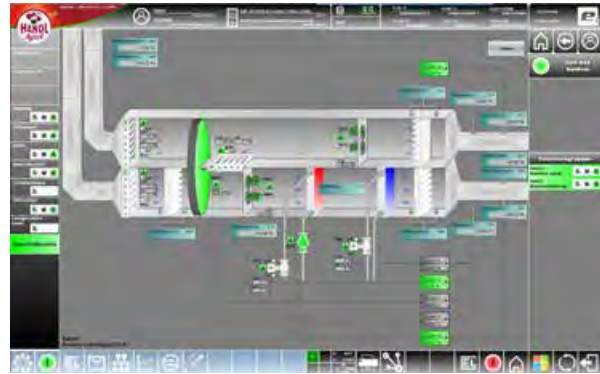
Automation meets tradition at speck producer HANDL TYROL



5,000 metric tons of bacon a year are shipped from the state-of-the-art production facility of HANDL TYROL GmbH in Haiming in the Austrian Tyrol. The overall plant automation solution implemented by COPA-DATA's Silver Partner ematric gmbh, based on the zenon software platform, enables highly efficient production of traditional delicacies.



The entire plant, including all machines, systems, and building technology, is displayed in zenon.



zenon gives users control of all equipment – from stand-alone machines to complete production sites or the entire multi-site enterprise.

For thousands of years, humankind has cultivated the art of preserving meat through curing, drying, and smoking. The combination of meat with salt, fire, air, and spices creates the specialty known as Tiroler Speck, an authentic Tyrolean cured ham. It is particularly popular in alpine regions as an energy-rich snack. Speck is made using a mixture of the Nordic smoker and Mediterranean dry cure methods with a little salt and cold smoke, lots of fresh air, and an aging period of several weeks. It is identifiable by an EU Protected Geographical Indication (PGI).

The best-known and largest producer of Tiroler Speck PGI is HANDL TYROL. Founded in 1902, the family-owned company employs around 550 people at four locations. It produces annually some 15,000 metric tons of original Tyrolean bacon, ham, raw sausage, and roast meat products which it exports to 25 countries. In addition to the highest quality standards and the great taste of the products, HANDL TYROL owes its success to frequent innovation in production technology and product variants.

TRADITION WITH A TWIST

The process of making Tiroler Speck PGI for retail sale takes several months. After being salted, the meat arrives in the curing room where it remains for three weeks. It is then cold-smoked with beech wood at around 20 degrees. The meat is then air-dried for eight to sixteen weeks. By this point, it has lost about 40 percent of its original mass. After the meat has been shaped and trimmed, it is cut and packaged.

To exploit the opportunities of new markets and rising demand, HANDL TYROL decided to set up a new production facility for its core ham and loin bacon products. It would do things the old way with a twist, as per its own definition

of innovation. “The proven, efficient, and partly prescribed production processes will be maintained,” explains Karl Christian Handl, Managing Partner of HANDL TYROL GmbH, discussing the objectives of the project. “At the same time, a high level of automation in line with Industry 4.0 will enable the flexible and energy-efficient production of large quantities, and make it easier to meet high quality standards and reporting obligations.”

TRIED AND TESTED IN EXISTING PLANTS

With the aim of integrating the building technology within the overall automation, HANDL had already equipped its existing locations with a control system before the construction of the new speck production facility. “The inventory showed the wide variety of existing control and automation systems that had to be integrated,” recalls Rainer Haag, Managing Director of COPA-DATA’s Silver Partner ematric gmbh. “Because of its ability to communicate with virtually every imaginable third-party system, we knew we wanted to use zenon.”

On the basis of COPA-DATA’s proven software platform, a control system for heating, ventilation, cooling, and other building services had been created, which has had a direct impact on production. Over several years, the automation specialists at ematric gradually integrated more existing systems using zenon. This resulted in a comprehensive, multi-site production and building management system.

UNIFORM SYSTEM ENVIRONMENT

One goal of the planning for the new production plant was to integrate production equipment and building technology in a complete plant automation system. HANDL sought a uniform system environment with a higher-order control



With a high level of automation, HANDL TYROL makes Tiroler Speck PGI from pork at the Haiming plant.



In one control room at each location, all operating states are clearly displayed on multiple monitors.

center that would control the production processes and ensure a simple and error-free data exchange with the ERP system. Another expectation of the system equipment was to significantly reduce the effort required to compile the extensive necessary documentation.

“We have had excellent experiences in existing plants with the zenon software platform and its implementation by ematic,” says Karl Christian Handl. “That’s why we decided to follow this path for the new building as well.” Unlike the earlier projects, all the process equipment, production machines, and conveyor systems, including an automated guided vehicle system, were included here.

building design then followed. A digital twin of the system, based on the computer models, provided an excellent basis for ematic’s project work.

TRANSFORMATION OF THE AUTOMATION PYRAMID

In addition to proving itself in the existing plants and the capability of direct connection between the ERP and SCADA systems, zenon’s redundancy and security were important selection criteria. The software can be operated with redundant servers and has numerous options for operation directly from the client system. “We designed

“The fully integrated data flow across all systems enables us to control the entire plant with minimal effort”

KARL CHRISTIAN HANDL,
MANAGING PARTNER, HANDL TYROL GMBH

HANDL had planned the system in great detail to ensure the project’s objectives were achieved. The machines, systems, and auxiliary units were designed only after computer simulations of the expected goods flows were mapped by an external organization. Dimensioning and

the entire system in such a way that even in the event of a total server failure, each of the individual machines can continue to function effectively,” explains HMI/SCADA specialist Daniel Weiskopf from ematic. “This also allows

for maintenance and update activities without interruption to manufacturing processes or data.”

In order to ensure seamless data consistency with high operational reliability, HANDL and ematric turned the traditional automation pyramid on its head. After consultation with COPA-DATA, they replaced everything between the ERP and MES systems and the machines and units with one platform: zenon. The comprehensive software for the highly automated operation of machines and systems covers the traditional SCADA, HMI, and PLC levels of a process control system.

This form of implementation significantly reduces the number of interfaces between different systems. It simplifies the configuration and maintenance of the overall system, and minimizes the number of possible sources of error.

BRINGING TRADITION INTO THE FUTURE

The ematric technicians used a large number of the many features offered by zenon. In addition to the SAP interface, they utilized Equipment Modeling and the Extended Trend module, to name just a few. Since there are around 40 PLCs from different manufacturers in the overall system, ematric engineers also used the integrated software modules for VSTA and the soft PLC zenon Logic to optimally integrate all hardware.

The implementation occurred in parallel with the construction of the new production facility. In addition to PLC programming and the customization of zenon, it also included setting up a control center at each location. In the control centers, all of the operating states are clearly displayed on multiple monitors. Malfunctions and faults can be detected immediately, and the steps necessary to efficiently troubleshoot an issue can be initiated quickly. Thanks to alerts from zenon Message Control and access via web services, faults can be resolved very quickly and downtime avoided.

With a standardized user interface and extensive reporting options which can incorporate historical data, the zenon implementation supports employees with optimized production control. “The fully integrated data flow across all systems enables us to control the entire plant with minimal effort,” confirms Karl Christian Handl. “By integrating all systems in zenon, we can respond quickly to faults and carry out process optimization.” In addition, quality and cost optimizations can be derived from testing, production, and the use of data collected in a variety of reports.

After a one-month trial run, the plant went into full operation without the need for any further updates. Since then, Tiroler Speck PGI is being made at HANDL TYROL's Haiming plant using an unbeatable combination of traditional methods and state-of-the-art technology.

Complete automation with zenon ensures highly efficient operation, enables further growth, and ensures a consistently high-quality end product. As Karl Christian Handl commented at the opening ceremony: “A vision was made a reality – tradition became the future.”

HIGHLIGHTS:

- Site-wide equipment control and monitoring
- Intuitive operation via one control room per location
- High level of automation
- High energy efficiency and overall system efficiency (OEE)
- Simplified quality assurance and verification
- Comprehensive, automated reporting process

CONTACT:

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Abracadabra:

Wizard makes it easy to convert distribution management system to zenon

NO NEED TO WORRY WHEN CONVERTING SICAM® 230 PROJECTS* -
RECORDED DATA IS SIMPLY CARRIED OVER.



HMI and SCADA systems are subject to a lifecycle and need to be renewed after a certain number of years. If the user is happy with the system, they will expect to be able to simply install an update. However, if the manufacturer is no longer supporting the incumbent system, the user will have to switch to a different solution. Because the application engineering and the recorded process data will then be incompatible, the user has to spend considerable amounts of money on new engineering and testing work. In the worst-case scenario, process data may be lost. In the case of the Siemens SICAM 230 control center system, users are in luck because, since zenon forms the core of this product, many features can be retained.

When a SICAM 230 application is converted to zenon, an average of 80 to 100 percent of the existing application engineering can be retained. 100 percent of the archived data, alarms, and events will remain available and can be accessed directly. This is possible because zenon recognizes 41 of the 46 screen types. It is a similar situation with the dynamic elements (such as buttons, numeric values, and combined elements). zenon can display 16 of the 18 dynamic elements without any problem. The degree of direct transferability results from how many times the unknown elements are used.

The SICAM 230 conversion wizard can be used for elements that cannot be transferred directly. This additional application for the Editor converts specific dynamic elements into generally comprehensible zenon elements and replaces specific drivers with zenon drivers. The wizard can be installed in the SICAM 230 environment for this purpose. COPA-DATA will provide information about the wizard setup on request.

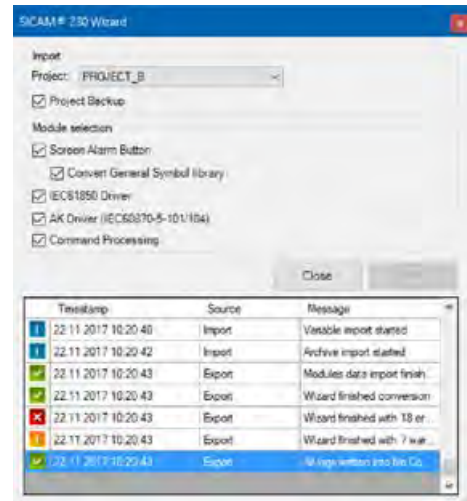
The wizard helps with conversion in four areas: buttons for screen alarms, command elements, the AK driver, and the IEC 61850 driver.

It scans the project for buttons for screen alarms and command elements and maps their functionality to produce zenon elements. Meanwhile, the two drivers are replaced with zenon drivers and the variables are transferred accordingly.

BUTTONS FOR SCREEN ALARMS AND COMMAND ELEMENTS

The wizard starts by searching for buttons for screen alarm functions in screens and symbols. Based on this information, it creates a screen hierarchy which is mapped in the equipment model with the name "Screentopology." At the same time, it creates marker variables for the alarm/event classes found and links these with the equipment model levels. The equipment model includes alarm sums and the results are written to the marker variables. A symbol for displaying the values of the marker variables and for the button that switches to the desired screen is supplied by the wizard. It consists of a button with overlying combined elements. The button is linked with the screen switch function and the combined elements are linked with the marker variables. The whole symbol is placed in the original location of the screen alarm button that is to be replaced. The user can adapt the appearance of the symbol to suit their own design preferences.

The wizard also searches among the screens and symbols in the case of command elements. However, instead of replacing the command element with a new symbol, the wizard replaces it directly with a new combined element. To do this, the wizard links the base variable of the command

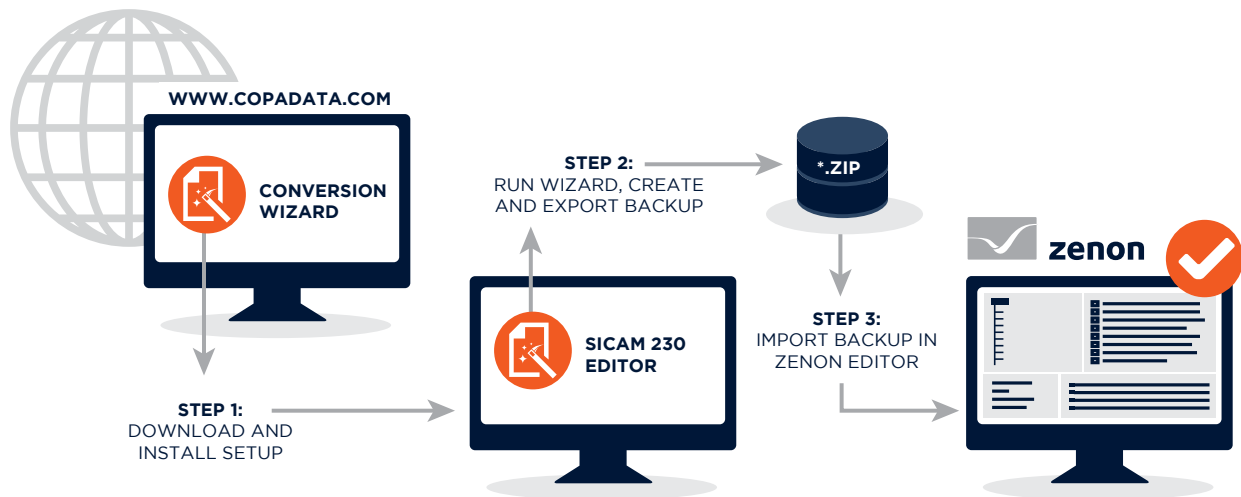


The conversion wizard can automatically convert various subsections and displays its accomplishments in the log window.

element with the combined element, deletes the command element, and maps the transparent combined element of the same size in its place. To ensure that commands are processed correctly after the conversion, there must be a command group present with configured command actions. As it is not particularly easy for the wizard to identify possible matches between the variable names, a command group is created for each command element. The project engineer can rectify this intermediate step later by introducing wildcards and deleting the superfluous command groups manually. If screens of the type "command processing" are present in addition to the command elements, the wizard changes the screen type from SICAM 230 command processing to zenon command processing and replaces all unknown screen-specific elements.

DRIVERS AND VARIABLES

In addition to the screen elements, the wizard can also convert drivers and variables. SICAM 230 applications usually use an AK driver to communicate with devices from the 1703 series and their successors. zenon supports the commonly used IEC 60870-5-101 and -104 protocols with its drivers. The wizard reads the AK driver configuration information and applies this to the newly created zenon driver (IEC870). The wizard differentiates between 101 and 104 connections, takes into account timing parameters, takes on a secondary IP address (if applicable), and calculates



Just a few steps allow the wizard to be installed and opened on the computer with the SICAM 230 Editor. The result is acquired as a zenon backup on the computer with the zenon Editor.

a COA (Common Object Address) that is suitable for zenon from CASDU values. The wizard also carries out the time-consuming process of converting the variable addresses. It uses the values of region, component, component group, value number, and data type to create a COA and IOA (Information Object Address) that zenon can understand. The private types TI136-141 and 160 of the 1703 devices are understood by the IEC870 driver and thus converted. The private index is also adopted, if available. The marker variables of the AK driver are transferred to the variables of the internal zenon driver.

The AK driver is used in most cases, but some systems might use the IEC 61850 driver. This can also be converted into a zenon driver (IEC850) by the wizard and parameters such as the IP address and server name are adopted. All IEC 61850 variables receive the necessary net address and the object reference (IEC 61850 address) is transferred to the symbol address field.

The conversion of the topological line into an ALC line (Automatic Line Coloring) does not take place in the wizard. Because the two line types are configured in very different ways, the topological lines must be redrawn as zenon lines with ALC. The network manager is also changed to the available SNMPv3 driver manually. This means that the IT infrastructure (switches, devices) can continue to be monitored.

Operators of 1703-based equipment can continue to use the toolbox/OPM as the primary engineering tool. By changing a few settings, export files can be created which zenon can import directly.

The main advantages of transferring a SICAM 230 project to zenon:

- The engineering environment can continue to be used.
- The recorded process data can be used without needing to be converted.
- The conversion wizard speeds up the project conversion process and minimizes the amount of testing work required.



JÜRGEN RESCH

Industry Manager Energy
COPA-DATA Headquarters

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

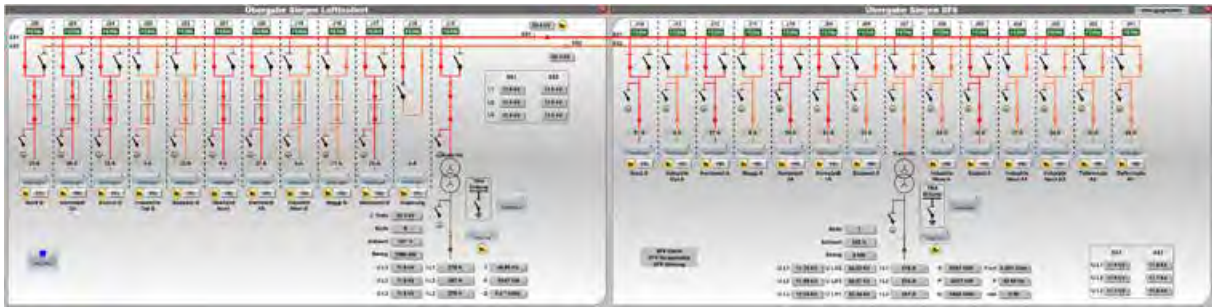
ZENON SUCCESS STORY

SCALABLE AND FUTURE-PROOF WITH ZENON

Thüga Energienetze migrates to new distribution management system



The network operator Thüga Energienetze GmbH has converted its distribution management system from SICAM® 230 to zenon from COPA-DATA. The scalable, easily expandable platform is future-proof and ideally suits the business model of the company, which also offers services related to its distribution management system to its customers.



Power transfer station for the city of Singen and surrounding districts.

Thüga Energienetze GmbH, headquartered in Schifferstadt, Germany, operates electricity, water, heat, and natural gas grids in southern Germany as a partner to municipalities, municipal utilities, private households, and industry and trade. The company supplies more than 120 municipalities in Baden-Württemberg, Bavaria, and Rhineland-Palatinate with natural gas and electricity in a reliable and environmentally friendly manner. Special challenges include contemporary trends such as digitalization, renewables, and electromobility, as well as the large-scale expansion of infrastructure.

In addition, Thüga Energienetze offers complete services from a single source for municipalities, commerce, the energy industry, and private customers – including certified fault management across the 24-hour distribution management system; network monitoring; network and operational management; the hosting of control system platforms; and installation, commissioning, and maintenance of communications and distribution management technology.

UPGRADE TO A FUTURE-PROOF SOLUTION

With the SICAM® 230 process control system Thüga Energienetze GmbH used formerly, the company was no longer able to offer its customers a future-proof solution. No energy industry-specific enhancements had been developed for the product in recent years. “SICAM 230 product support will be phased out over the next few years. We didn’t want this to impact our customers,” says Heiko Bölli, head of Network Services for Secondary Technology at Thüga Energienetze, describing the problem.

The company therefore decided to switch to zenon Energy Edition from COPA-DATA, the core system of SICAM® 230. The integrated software platform is characterized by its high flexibility. Thanks to its multi-hierarchical project structure, modular design, and numerous interfaces to various products, it can be expanded quickly, and functions can easily be removed or added as required. This

is an essential requirement, since Thüga Energienetze not only uses the distribution management system for its own operations, but it also offers it as a solution to customers – for example, in the form of network monitoring services. “With the highly scalable zenon software platform, we can parameterize and do not have to program anything. It fits in much better with our business model than any other product available on the market,” summarizes Bölli.

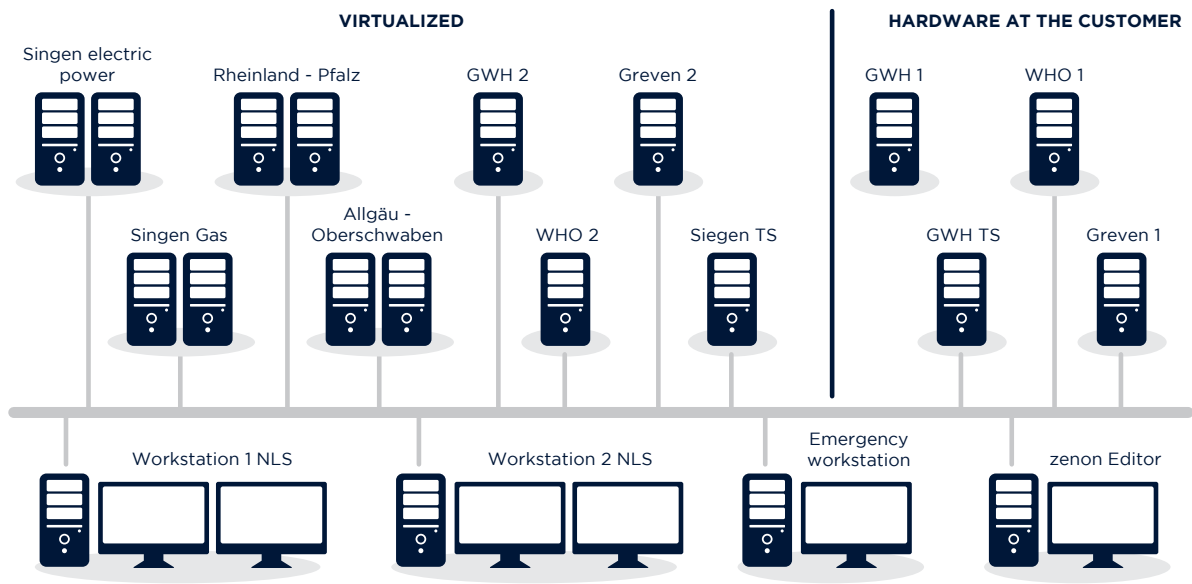
DEALING DIRECTLY WITH THE SOFTWARE MANUFACTURER

Thüga Energienetze GmbH virtualized its entire server landscape several years ago in order to simplify the backup and recovery processes of individual process control servers. This offers another benefit as zenon version updates can be performed easily and without risk. Bölli states: “The server on which our control system runs is located at the end customer’s site; we only map the redundancies. This means that if the connection to the distribution management system fails, the customer can still take care of everything related to the grid themselves.”

zenon is not only innovative, but also sustainable and future-proof: “As a consequence of our switching to work directly with the software manufacturer, our customers don’t have to worry that SICAM® will be discontinued at some point,” explains Bölli.

FAST AND EFFICIENT MIGRATION

Since both systems are based on the same product, the changeover went smoothly and quickly. After the first stage of the migration, one workstation was equipped with zenon, while the other continued to run the old system. Before long, Thüga Energienetze switched entirely to zenon. In total, the migration took just five months. “The total of around 40,000 variables could be migrated almost one to one. A complete data point test was not necessary; the temporary parallel operation was sufficient for system comparison – and provided enormous time and cost savings,” says Bölli.



zenon System Overview – Choose either complete virtualization or the option of setting up a master server at the customer site with a standby server at Thüga Energienetze GmbH.

COMPREHENSIVE SUPPORT THROUGH COPA-DATA

An orientation phase was also unnecessary. “We have known zenon since 1999 – that is, as long as we’ve used SICAM® 230. The source code for both systems comes from COPA-DATA; only the add-ons were developed for SICAM® 230,” explains Bölli. Some of these features – such as topology or screen alarming – had to be reconfigured during migration. “That was the only challenge. But since COPA-DATA has always supported us with fast solutions, the migration went absolutely smoothly. Our contacts at COPA-DATA were available around the clock.”

Thüga Energienetze is already in talks with potential migration customers. Regular consultations are essential, emphasizes Bölli. “The energy market is subject to constant change. The requirements are always changing, and this means the software must be adaptable too. With COPA-DATA, we have a professional and reliable partner by our side.”

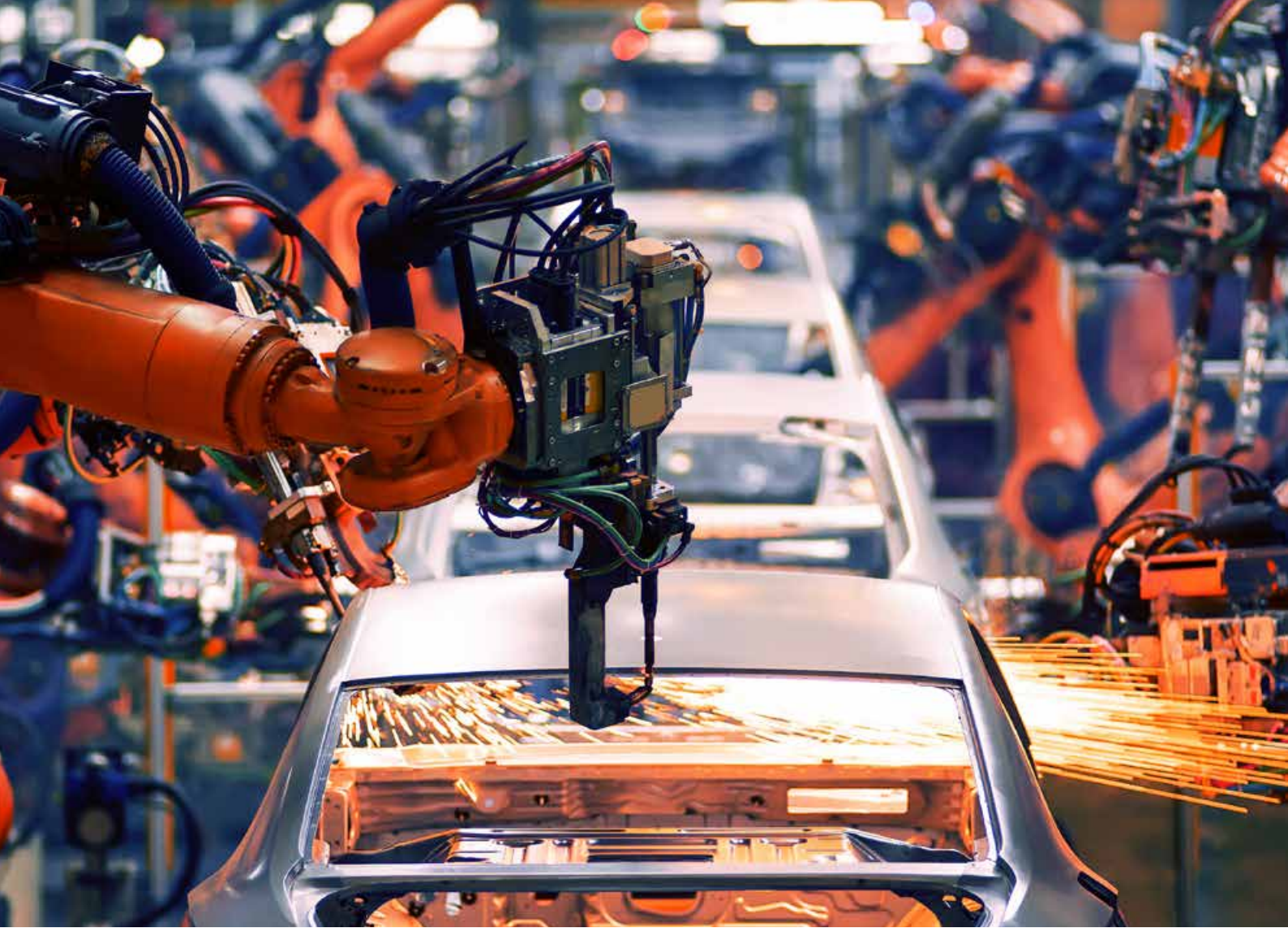
HIGHLIGHTS:

- Multi-hierarchical project structure
- Flexibly expandable solution with numerous interfaces
- No programming required and high scalability
- Sustainable, future-proof solution
- Fast, easy backups and updates
- Direct support contact with manufacturer
- Fast, smooth migration of some 40,000 variables
- No data point test required
- Comprehensive support through COPA-DATA

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*SICAM® is a registered trademark of Siemens AG and its affiliated companies.



Optimizing production with a time machine

How the zenon Process Recorder enhances productivity and quality

Manufacturing processes in the automotive industry are highly optimized because malfunctions, downtime, or faulty process control can have serious consequences for production. To analyze these influencing factors, data from various sources has to be interpreted and connections identified. It therefore makes sense not only to use zenon to collect data, but also to analyze it. This is where the zenon Process Recorder comes into play.

This zenon module uses the usual zenon process screens, but instead of simply displaying current values, you can display data from any point in time. Additional controls are used to select these points in time and the recorded values can be continuously played back, much as you would playback a recording. However, the runtime can still be navigated as it is during live operation and the user simply switches between the various screens. Thanks to this zenon “time machine,” the user can retrospectively view and analyze past process sequences at a selected point in time. Replays can be displayed as often as required and provide insights into influencing factors that are often not apparent at first glance.

GOING THE WRONG WAY - AN EXAMPLE FROM CONVEYOR TECHNOLOGY

In this example from one COPA-DATA customer, car bodies from different series are transported via a mix point. Several controllers are used to control the conveyor technology and the PLCs exchange data through the controllers via direct interfaces. The vehicles are identified via conveyed data carriers, and the conveyor destinations are determined by sending queries to the control system. Using zenon, this system is monitored from a control room and the users can also intervene, for example, by redefining the destinations or blocking or setting transport routes for individual vehicles.

In individual cases, vehicles may be transported to incorrect destinations or not delivered within the specified time period. The zenon Process Recorder is therefore used to analyze the causes. The module is integrated with the existing zenon project and records the variables from the connected controllers. The Process Recorder can be configured at the click of a mouse and, due to the optimized recording process, there is no noticeable impact on the servers’ CPU. The memory space that the data requires is also low. In addition to current data processing functions, the zenon mix point servers now also record the Process Recorder values. Since the Process Recorder playbacks can be viewed on a separate workstation provided in the control room for data analysis, the mix point can still be controlled online without being affected by the module.

REPRODUCING PROCESSES WITH THE SIMULATION MODE

On a control-room workstation, the zenon client can start the Process Recorder in a simulation mode. Regardless of the online connection to the server, the Process Recorder uses the recorded data to display the values on the monitors. A special control screen enables the user to navigate along the timeline. It lists the timestamps of the recorded data. Similar to a media player, it also features buttons for going forward and backward, playing, or pausing the recording. The situation in question can thus be displayed for analysis on the monitor. The user can then use the control elements to repeat certain situations at will or to stop the display to analyze the data. In this specific application, the module has already been used successfully to determine the cause of incorrect vehicle deliveries. As a result, the overall control system has been further optimized.

IMPROVING QUALITY WITH AN EXAMPLE FROM COMPONENT PRODUCTION

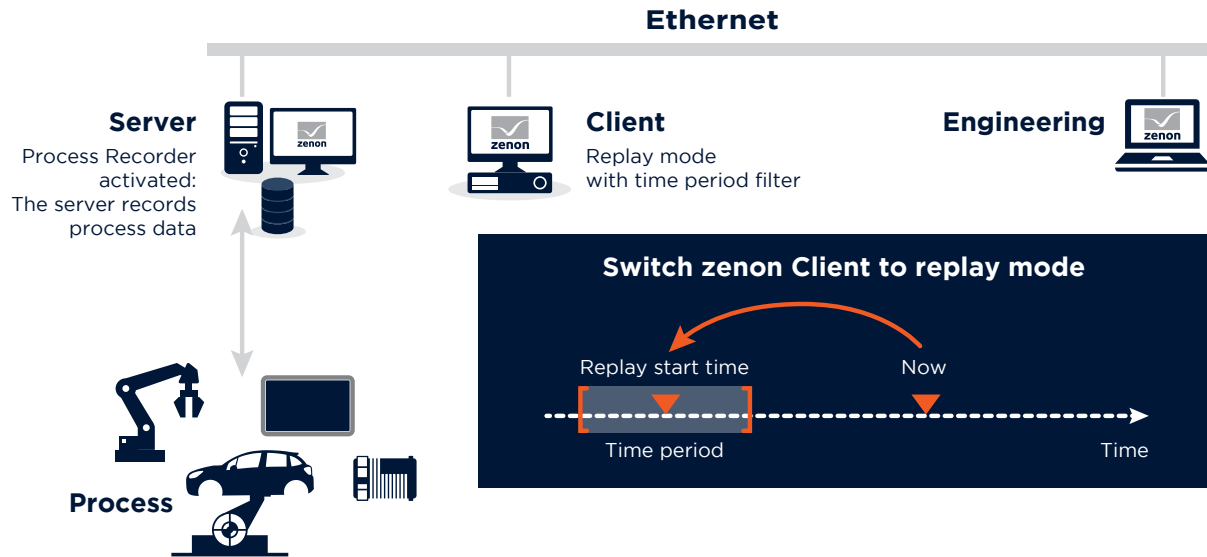
In another case, the Process Recorder is used in component production where the workpieces are processed by machines from different manufacturers. Moreover, environmental influences such as the ambient temperature have to be controlled, as they influence production quality. A machine data acquisition system (MDA) based on zenon is used for production control, while the zenon

SIMPLE PROJECT CONFIGURATION OF THE PROCESS RECORDER IN FOUR STEPS

- Activation of the Process Recorder in the project
- Activation of the variables that are to be recorded by the Process Recorder
- Creation of the function for simulation mode
- Creation of the screen and the function for the control of the Process Recorder in simulation mode

FAST FACTS

- Playback of past events in project simulation mode, in the process screen directly
- Subsequent analysis of errors for traceability and quality improvements
- Simple configuration in four steps



The Process Recorder continuously records processes, which can later be played back in detail on the process screen in a similar way to a media player. Only the relevant time frame will be transferred to the zenon client; the rest of the data is hidden.

direct drivers are used to read and process the production and quality data from the individual machines in a central location. In addition, the system connects energy meters and data from the air conditioning systems. The determined values enable the calculation of production figures, energy consumption, quality indicators, and production reports.

In this case, the Process Recorder was set up to further optimize production. The Process Recorder data was subsequently analyzed on the MDA screens, enabling users to determine previously unknown correlations between different influencing factors. The investment in the Process Recorder quickly paid for itself through an increase in production quality and the prevention of rejects.

SIMPLE CONFIGURATION

The Process Recorder can be integrated with existing zenon projects quickly and easily. As an integrated module, it only needs to be activated with a user license. The individual projects are then configured at the click of a mouse, simply by enabling the variables to be monitored. It is not necessary to set save cycles, as the Process Recorder records data based on events. Only two functions are required to start and end simulation mode. A separate screen type is available for controlling playback in simulation mode. The existing zenon screens are used for display and analysis purposes and do not need to be adapted.

As a result, the Process Recorder helps users gain an in-depth understanding of the interaction between the

machines and equipment used. By displaying the data and operating actions from various subsystems or controllers, it is a valuable addition to effective production optimization.



BERND WIMMER
Industry Manager Automotive

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



BUILDING A HEALTHIER FUTURE - FOR ALL!

The results of an analysis of trends in the global pharmaceutical market were presented during the Pharmintech Exhibition 2019, held in Bologna over April 10–12. Together with the IQVIA “The global use of medicine in 2019 and outlook to 2023” report, the “Pharmintech Monitor” research offers interesting insights into the changes underway in the life sciences sector.

In 1978, human insulin was created in Herbert Boyer's laboratory in San Francisco by inserting DNA into *Escherichia coli* bacteria, signaling the birth of biotechnology and the start of a new future for the pharmaceutical industry. Today, the life sciences sector is a clear example of where knowledge sharing and exchange between different fields such as genomics, big data, robotics, and nanotechnology is delivering improved patient outcomes. Personalized medicine and digital medicines are becoming a reality and are positioned to totally restyle the approach to many illnesses. They offer an improvement in therapies that seemed unthinkable until only recently. Medicines are now not just for treating an illness, but for treating the illness based on genetic characteristics. This is a highly innovative sector that calls for close collaboration between the academic world, companies, and institutions.

At the same time, the expiration of patent coverage for many medicines and the resultant growth in generic medicines has reduced the entry barriers for treatments in developing countries. Governments around the world are looking to increase patient access to low-cost medicines, thus increasing demand and creating the conditions for a gradual improvement in quality of life for an ever-growing number of people.

A MARKET IN CONSTANT GROWTH

What are the expectations for the global pharmaceutical market? According to IQVIA,⁽¹⁾ by 2023 the total value of the market should reach 1.5 trillion US dollars, with an

average annual growth of between 3 and 6 percent. This is a decrease compared to the 6.3 percent seen in the last five years. The USA continues to have more marked growth (4-7 percent) compared to the main European countries (1-4 percent), while China proves to be the biggest "pharmemerging" market. It is expected to reach 140-170 billion dollars by 2023. Turkey, Egypt, and Pakistan stand out among the emerging countries, with average growth between 5 and 8 percent.

The sector is growing, although not as intensely as in previous years. This slowdown in growth is essentially due to three factors:

- Price pressure, especially in the USA and Europe, due to the policies of the national health services, the actions of insurers, new distribution channels, and large-scale distribution.
- The continued growth of generic medicines and biosimilars against "patent" (originator) medicines.
- Euro-dollar currency effects (Europe vs. USA).

The impact of the loss of exclusivity in developed markets is forecasted to be around 121 billion dollars between 2019 and 2023, a period in which 18 of the 20 biggest branded medicines will lose their patents, opening the way to generics or biosimilars.

Figure 2 shows Pharmintech Monitor's⁽²⁾ evaluation of the global pharmaceutical market and the trend for the period 2018-2021.

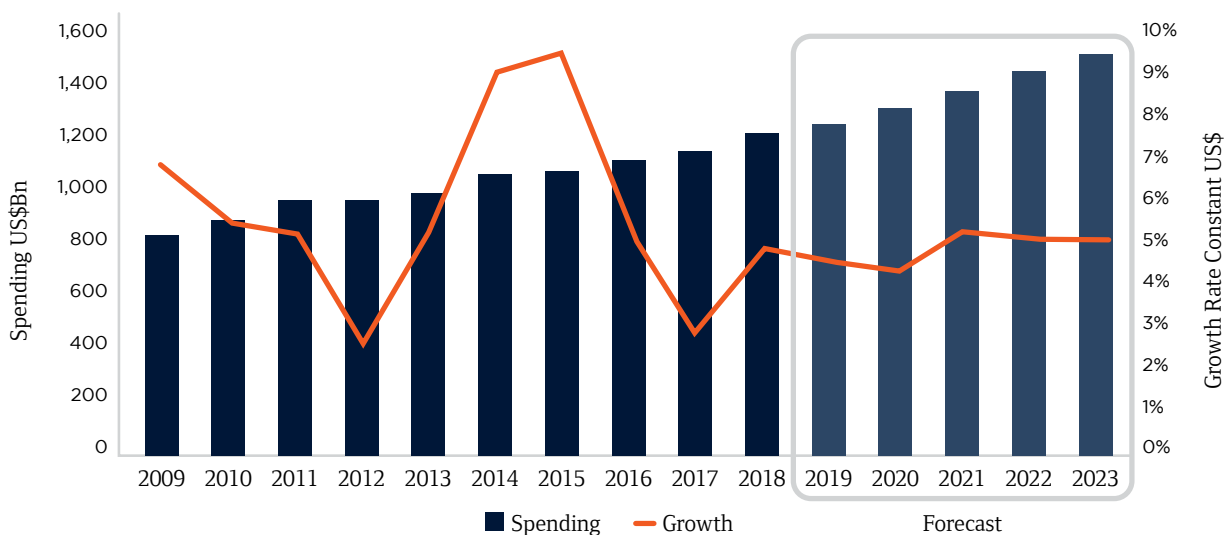


Figure 1: Global Medicine Spending and Growth 2009-2023.
Source: IQVIA Market Prognosis, Sept. 2018; IQVIA Institute, Dec. 2018

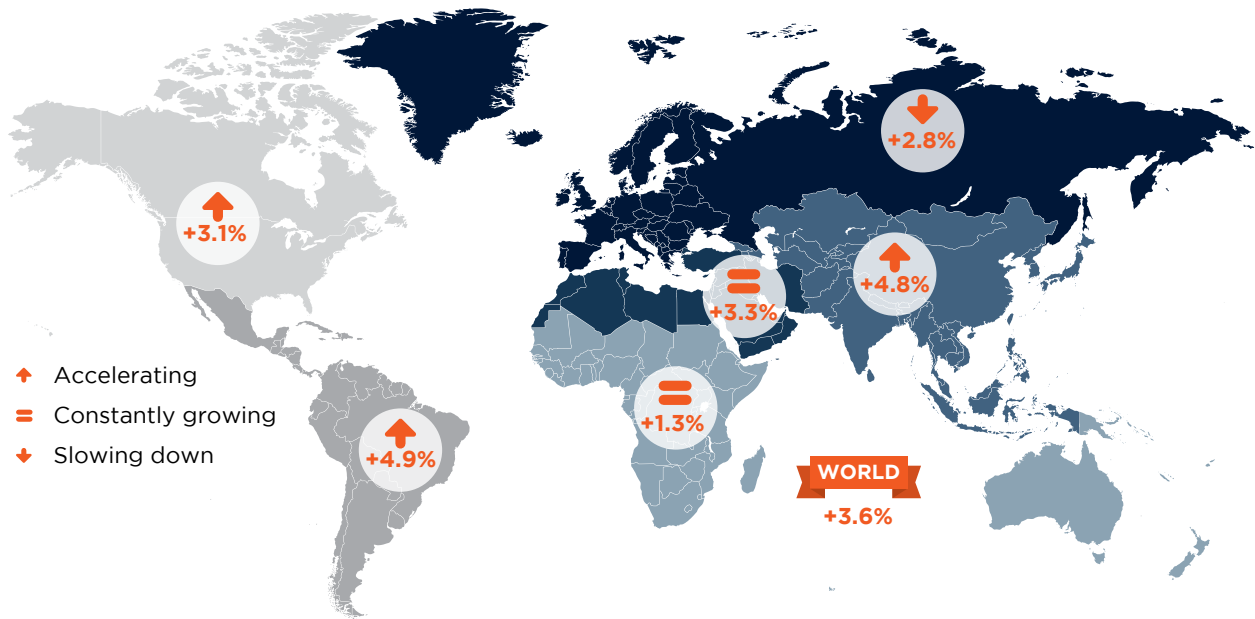


Figure 2: Pharmaceutical market trends during the period 2018-2021 divided into macro areas.
Source: Pharmintech Monitor.

WHAT ABOUT THE BIGGEST DRUG MANUFACTURERS?

Another common trend in big pharma is an increase in R&D costs, equivalent to around 18.3 percent of sales value. This accounts for a slight reduction in gross operating margins (EBITDA), which fell from 34.7 percent in 2016 to 32.3 percent in 2018. Moreover, there is the added strain of an increase in the costs associated with the discovery and the route to market for new drugs and a drop in turnover due to the gradual expiration of patents.

THE RELENTLESS ADVANCE OF GENERIC MEDICINES

The spread of generic medicines is more evident in emerging countries: the market share of generics is 88.9 percent in China and 74.8 percent in India. However, this phenomenon is also present in developed countries. In Germany and England, the utilization rate is around 60 percent, while in Italy the share for generics grew from 9.8 percent in 2008 to 22 percent in 2018.

We are therefore seeing a gradual specialization by companies dedicated to this sector, with the most important company specializing in the manufacture of generic medicines being Mylan. It has a turnover in excess of 10 billion dollars. It is followed closely by Teva Pharmaceuticals and Sandoz (Novartis group) and then companies with a lower turnover such as Sun Pharmaceuticals, Fresenius, Lupin, Cipla, and many others.

CONTRACT DEVELOPMENT AND MANUFACTURING ORGANIZATIONS (CDMO)

Manufacturing within the pharmaceutical industry also takes place through companies working on the basis of Contract Development and Manufacturing, an internationally established organizational model whereby companies holding market authorizations for medicinal products outsource their manufacturing and pharmaceutical development activities. The activity of these companies has been on the rise in recent years, in terms of both staff and turnover as well as investment, and the sector continues to grow. According to Farindustria,⁽³⁾ in Italy, the top EU country for pharmaceutical production, the value of CDMO production grew 41 percent between 2010 and 2016, driven by exports in particular.

Contract development and manufacturing is worth €7.9 billion in the European Union.

The sole aim of CDMOs is to manufacture quality medicines at the lowest possible price. The distinctive characteristics of CDMO activity leads companies to allocate significant resources to investment in manufacturing aimed at supporting efficiency and quality. Over three-quarters of investments relate to production lines (53 percent to new lines and 25 percent to the modernization of existing lines). This figure demonstrates the importance of partnerships with equipment suppliers, hardware and software technologies, and capital goods in general.

VALUE OF CDMO MANUFACTURING

MILLIONS OF EUROS

Europe total	7,900
Italy.....	1,872
Germany.....	1,747
France.....	1,519
United Kingdom	784
Spain	496
Other EU countries*	1,483

* Austria, Belgium, Greece, Croatia, Ireland, Portugal, Czech Republic, Romania, Sweden

% OUT OF EU TOTAL

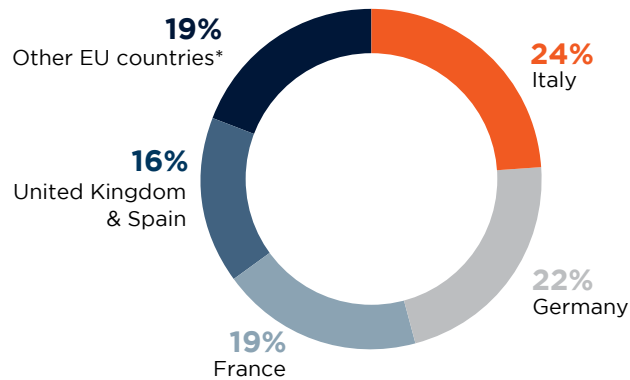


Figure 3: Main EU countries by production through CDMOs.
Source: Farindustria

PHARMACEUTICAL MARKET IN THE EU

Italy is the European Union's top pharmaceutical manufacturer, surpassing Germany in 2017 with production totaling €31.2 billion compared to Germany's €30 billion. This success is down to a boom in exports, which account for around €25 billion. These countries are followed by the UK (€21.7 billion), France (€20.2 billion), and Spain (€15.5 billion). Outside the EU, Swiss production has a value of around €46 billion.⁽⁵⁾

GOOD NEWS FOR EQUIPMENT MANUFACTURERS

Our many clients that specialize in equipment manufacturing for the pharmaceutical industry can enjoy a positive outlook over the next three years.

Figure on Page 63 shows the sales forecasts for packaging equipment for the pharmaceutical industry. It appears to be more dynamic than the forecasts for the industry's own growth (+4.4 percent overall for equipment vs. +3.6 percent for the pharmaceutical industry).

This is down to a high volume of technology and investments for renewal and replacement of production equipment, the majority of which are compatible with the new standards defined by Industry 4.0 and capable of complying with the requirements of Data Integrity guidelines.

A COMBINATION OF EFFICIENCY & COMPLIANCE

The brief overview outlined here provides a snapshot of the transformation underway in the pharmaceutical industry. For a more in-depth look, please refer to the reports cited in the notes at the end of this article.

We have seen how the development of a new generation of drugs will make extensive use of technologies related to ICT, big data, and artificial intelligence.

The gradual opening of markets through the introduction of generic medicines and biosimilars intensifies competition between companies that are increasingly focused on mass production. For these companies, the fundamental objectives will be production efficiency, flexibility, and overall cost reduction thanks to the digitalization of production processes.

Unlike other industry sectors, the world of life sciences must continue to get to grips with the good manufacturing practices (GMP) required by the regulatory authorities of different countries.

In this context, compliance with Data Integrity can be an opportunity to digitize processes related to the regulatory framework. For example: human

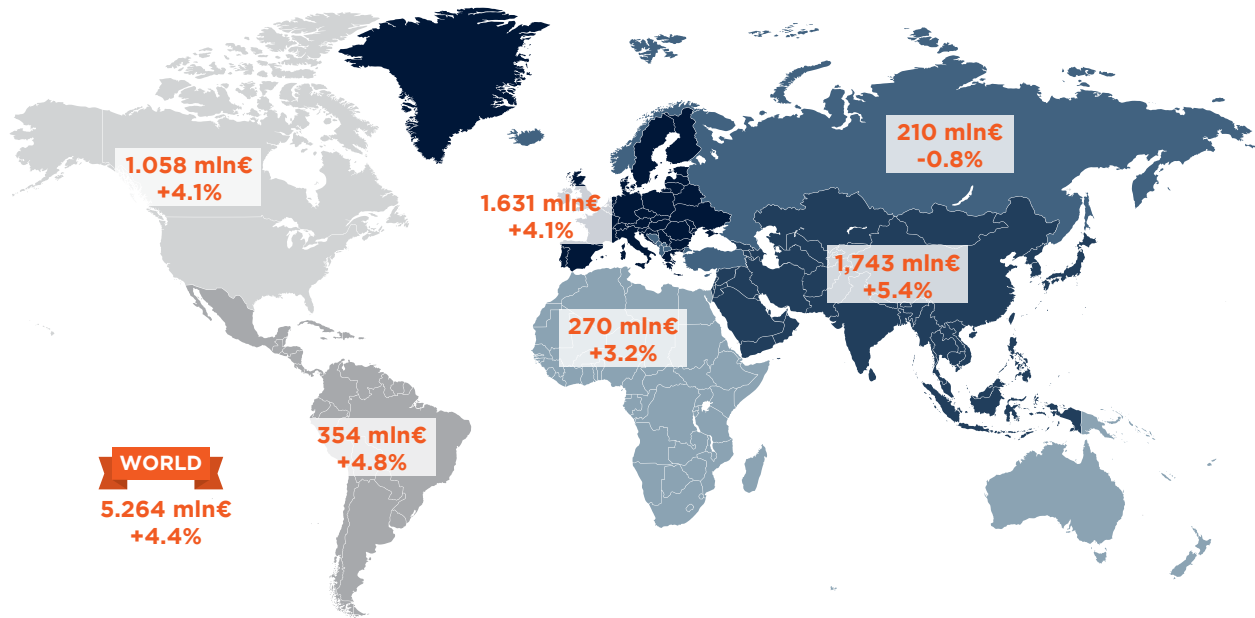


Figure 4: Pharmaceutical packaging equipment forecast 2018-2020. Market value and expected growth.
Source: Pharmintech Monitor – Italian Packaging Machinery Manufacturers' Association (UCIMA) Research Center.

error avoidance due to paper-based procedures, manual data entry reduction, electronic batch record, batch review by exception.

This is one reason why the International Society for Pharmaceutical Engineering (IPSE) has set up a working group on the issue of "Pharma 4.0." It will look at how to implement Industry 4.0-based manufacturing concepts in a sector as highly regulated as the pharmaceutical industry.⁽⁴⁾

zenon's extensive presence in the pharmaceutical industry has in part been made possible through COPA-DATA's collaboration with leading international equipment and installation manufacturers. Furthermore, the knowledge sharing and exchange of ideas between sectors traditionally focused on issues such as OEE and energy efficiency have enabled COPA-DATA to be involved in tackling the challenge of combining efficiency and GMP compliance for some time.



GIUSEPPE MENIN
Industry Manager Pharmaceutical

Giuseppe Menin began his career in the mechatronic engineering at the end of the 1980s, covering different technical roles in automation and software development. In 2004, he joined COPA-DATA Italy as an area manager. Since 2014, he has been a member of the International Society for Pharmaceutical Engineering (ISPE). As member of the Connected Machines working group within GAMP Italy, he is regularly in contact with professionals involved in the life sciences sector. He is currently covering the role of Industry Manager Pharmaceutical at COPA-DATA HQ.

Text Sources:

⁽¹⁾ IQVIA – The Global Use of Medicine in 2019 and Outlook to 2023
<https://www.iqvia.com/institute/reports/the-global-use-of-medicine-in-2019-and-outlook-to-2023>

⁽²⁾ UCIMA Research Center, Pharmintech Monitor (special thanks to Dr. Luca Baraldi)
http://www.pharmintech.com/pharmintech/pharmintech_monitor/PharmintechMonitor_2019.pdf
UCIMA website: <http://www.ucima.it/uc-it/servizi-associativi/centro-studi/>

⁽³⁾ Farindustria: 2018 Pharmaceutical Indicators –
https://www.farindustria.it/app/uploads/2017/12/Farindustria_IndicatoriFarmaceutici_WEB2018.pdf

⁽⁴⁾ ISPE Pharma 4.0 website: <https://ispe.org/initiatives/pharma-4.0>

⁽⁵⁾ Farindustria, using data from Eurostat, Istat, EFPIA, IQVIA.





AROUND
THE
WORLD

WHO IS WHO



Alan Binning

REGIONAL SALES MANAGER

COPA-DATA UK

AT COPA-DATA SINCE: 2018

RESPONSIBILITIES: Account management and new business development for customers in the east of England and Ireland. I also contribute to UK&I marketing strategy and participate in events and trade shows as well as the development, management, and growth of the UK&I sales force.

I GET MY INSPIRATION FROM ... my family and friends, they inspire me to enjoy life, achieve more, and take responsibility for my place in the world.

IT IS MY DREAM TO ... swim the length of Loch Ness!

You can reach me at:
alan.binning@copadata.co.uk



Anthony Burille

HEAD OF CUSTOMER SERVICES

COPA-DATA FRANCE

AT COPA-DATA SINCE: 2014

RESPONSIBILITIES: I started at COPA-DATA as a test engineer. Today, I'm responsible for conducting and coordinating tests, pre-sales, training, and support tasks at COPA-DATA's French subsidiary for both the straton and zenon products.

I GET MY INSPIRATION FROM ... how great our products are! I'm happy to help and to show our worldwide customers how easy it is to use zenon and straton. And, when it's not, I'll debate with the development teams about possible improvements.

IT IS MY DREAM TO ... continue to work and exchange ideas with experts in various domains, inside and outside our company and all over the world. And to learn new things every day.

You can reach me at:
anthony.burille@copadata.com



Helene Thurnhofer

PROJECT ENGINEER & PROJECT COACH

COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2015

RESPONSIBILITIES: Together with my team, I work on solution packages and help customers to implement higher-end zenon projects. I'm also an agile coach for the Professional Services team.

I GET MY INSPIRATION FROM ... my family, my pets, and my animal welfare work. I am passionate about rescuing animals from the street or distressing situations and rehoming them with loving families. It gives me a renewed sense of inspiration and motivation every single day.

IT IS MY DREAM TO ... rescue all of the world's suffering animals. As they say, saving one animal won't change the world, but the whole world can change for that one animal.

You can reach me at:
helene.thurnhofer@copadata.com

WHO IS WHO



Elsa Magalhaes

MARKETING MANAGER
COPA-DATA FRANCE

AT COPA-DATA SINCE: 2009

RESPONSIBILITIES: My main goal is to develop the company communication policy in order to generate brand awareness and create a quality image for COPA-DATA and its products in France. Through communication, I make sure that we generate strong business relationships based on trust between COPA-DATA and its clients/prospects. I also support the sales team in all its activities.

I GET MY INSPIRATION FROM ... my family. That is the most important thing to me.

IT IS MY DREAM TO ... travel the world and build my house with a dressing room full of shoes.

You can reach me at:
elsa.magalhaes@copadata.com



Thomas Lehrer

PRODUCT MANAGER
COPA-DATA HEADQUARTERS

AT COPA-DATA SINCE: 2011

RESPONSIBILITIES: Together with my colleagues, I'm responsible for controlling product development as part of the product management process. We act as an interface between the demands of the market and our development department. Our aim is to create products that are ready for series production and meet the needs of our markets and our customers. We work with all aspects of the zenon platform on a daily basis, but my real specialism is in reporting and analytics.

I GET MY INSPIRATION FROM ... my family when we're all together at home, out for a walk, or even just enjoying the garden. I'm a huge fan of card games, especially one called Tarock. No two games are the same and you learn something new each time you play it – just like in life!

IT IS MY DREAM TO ... find out more about the world, especially from the people who live in different places and their perspectives on life there. Travel is some of the best education you can have. I've managed to do some, but there are still so many places I want to discover.

You can reach me at:
thomas.lehrer@copadata.com



Eugenio Quesada Sierra

TECHNICAL CONSULTING
COPA-DATA IBÉRICA

AT COPA-DATA SINCE: 2015

RESPONSIBILITIES: As a member of the support and consulting team at COPA-DATA Ibérica I'm in charge of technical support for COPA-DATA products in Spain and Portugal as well as training for integrators. I also get involved with special cases – such as proof-of-concept projects for end customers and system integrators.

I GET MY INSPIRATION FROM ... my family, always present, and also from nature and music. Practicing yoga gives my mind a reset at times of stress and helps me in my daily work.

IT IS MY DREAM TO ... continue traveling, to know people and places.

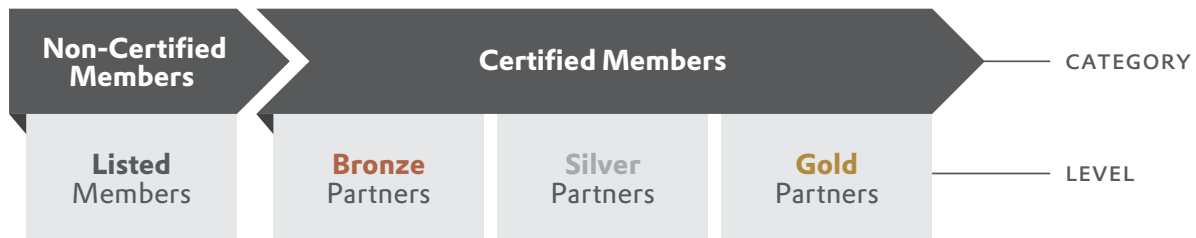
You can reach me at:
eugenio.quesada@copadata.com

COPA-DATA's global partner program is fit for the future

COPA-DATA PARTNER COMMUNITY



Officially launched in 2011, the COPA-DATA Partner Community (CDPC) can already call itself a success story, with a certified membership made up of 240 companies across more than 45 countries worldwide. Its motto is "Growing Together." To make sure that our global network of industry and energy automation specialists is able to continue growing in the future, COPA-DATA has now overhauled the partner program and the services it includes.



The new structure of the COPA-DATA partner program, with two membership categories (certified and non-certified) and four membership levels (in ascending order: Listed Member, Bronze Partner, Silver Partner, and Gold Partner). Higher levels bring more benefits and reflect the extent to which the members have engaged with COPA-DATA.

MORE BENEFITS FOR PARTNERS

The COPA-DATA Partner Community has the explicit aim of cultivating a close-knit, global network of specialists whose expertise and experience with the zenon software platform enables them to implement projects as effectively as possible. In a bid to move one step closer to this aim, the company has now modernized its partner program and adapted it in line with the needs of today's markets and customers. These efforts are reflected in the new structure of the program and the range of services it provides, as well as the requirements that need to be met at each membership level. The program focuses on product knowledge and certification, which is why the revised range of services includes numerous opportunities for undergoing extensive training in zenon – from free online courses and tutorial videos to downloads of WPF elements and templates, zenon certification, private previews of upcoming releases, meetings with COPA-DATA's Product Management team, and much more besides. In addition to product-based services, there are also options that focus on sales and marketing. Everything has been developed with a view to growing together even more effectively in the future.

MORE TRANSPARENCY FOR END CUSTOMERS

The COPA-DATA Partner Community is aimed at system integrators, OEMs, and machine builders, as well as education and research facilities. With two membership categories and four levels of membership, the revised program structure is now more transparent for end customers. This makes it easier to select the right business partner for their needs. Each membership level reflects the commitment that a member has shown to zenon, as well as its team's experience and expertise in the platform. Members can attain Bronze, Silver, or Gold Partner status, and there is now a new entry-level Listed Member status

designed to enable organizations to gain a comprehensive insight into the zenon platform and COPA-DATA at an early stage of membership. Although they don't need to commit themselves significantly, it potentially lays the groundwork for a successful partnership over the long term. Generally speaking, as the membership level increases, so too does the quality of the zenon projects and the associated services that the member delivers.

Find out more at: copadata.com/partner



JOHANNES PETROWISCH
Head of Corporate Partnerships

Johannes Petrowisch is Head of Corporate Partnerships at COPA-DATA Headquarters and thus responsible for building up strategic partnerships, managing the worldwide partner eco-system, and developing new business solutions based on latest technologies. Thereby he is especially focused on the Industrial Internet of Things (IIoT), Smart Factories, and Smart Cities.

PARTNER COMMUNITY WORLD CAFÉ

CERTIFIED PARTNERS LETTING YOUR PROJECTS SHINE WITH ZENON

Capula



UK



ABOUT US:

Capula is a leading systems integrator, established 50+ years ago. We deliver automation, control, and operational IT solutions for customers across multiple industries: power generation, renewables, process automation, energy management, transmission and distribution, pharmaceutical and chemicals.

OUR SOLUTIONS WITH ZENON:

Our IMPERIUM substation control system solution combines Capula's domain expertise with best-of-breed technology and has COPA-DATA's zenon Software Platform at its core. Integrating multiple communication protocols (including IEC 61850) with tailorable multi-client solutions provides complicated systems with a clear and simple user interface.

OUR CUSTOMER PROMISE:

With 10+ zenon certified engineers, we have the knowledge and domain expertise to integrate COPA-DATA products, delivering solutions that exceed customer expectations. Our combined technologies can transform business operations, to improve quality, efficiency, throughput, energy usage, and, thus, profitability.

www.capula.co.uk

ControlTech Engineering



SWITZERLAND



ABOUT US:

CTE is an owner-managed family business and one of the leading engineering firms for automation and IT in the region of Basel and North-Western Switzerland. We specialize in process engineering equipment. For over 29 years, we have been providing customers with partial and complete solutions ranging from preliminary projects and basic or detailed engineering to installation, commissioning, and the certification of equipment.

OUR SOLUTIONS WITH ZENON:

Since introducing zenon in 2012, we have implemented numerous customer applications relating to pharmaceuticals and equipment engineering. The majority of the projects were completed with Batch Control Professional Edition and include reporting in the field of pharmaceutical production. The system setup ranges from individual workplace solutions to networked client/server structures (multi-server or multi-client).

OUR CUSTOMER PROMISE:

It is important that we identify and fulfill our customers' requirements precisely. Striving to provide the best solution for any given scenario is the only way to move forward. Our staff undergo training on a regular basis to ensure that our customers' projects are looked after as efficiently and effectively as possible, drawing on the latest findings and standards in the field of automation engineering.

www.cte.ch

Fast Engineering



engineering

AUSTRALIA



ABOUT US:

Fast Engineering specializes in providing complete system integration solutions for solar farms and utility installations. Our experienced team are veterans of the Australian power industry and provide services for all aspects of control system architecture design and implementation.

OUR SOLUTIONS WITH ZENON:

Our solutions with the zenon Software Platform to date have been focused on the solar generation, HV substations, and battery storage industries. The solutions have employed the DNP3 and Modbus gateways, IEC 61850, Modbus RTUs, SNMP monitoring, zenon Logic, zenon Historian, and Cloud connectivity components.

OUR CUSTOMER PROMISE:

Fast Engineering's experienced team has a strong record in delivering low-maintenance, high-availability integrated solutions that are on the cutting edge of current technologies. Our experience stretches across a very diverse range and era of installations. With several true veterans of the SCADA and comms industry, our people measurably impact the projects they are involved with.

www.fastengineering.com.au

PARTNER COMMUNITY WORLD CAFÉ

CERTIFIED PARTNERS LETTING YOUR PROJECTS SHINE WITH ZENON

Salzburg University of Applied Sciences, ITS



FH Salzburg

AUSTRIA



ABOUT US:

For more than 20 years now, the Information Technology and System Management (ITS) department at Salzburg University of Applied Sciences has been conducting research at regional, national, and international levels. It focuses on embedded signal processing, software systems, convergent networking and mobility, smart grid and IT security, data science, automation technology, and robotics.

OUR ACTIVITIES WITH ZENON:

Since 2002, we have been cultivating a partnership with COPA-DATA that has extended to areas such as research projects, laboratory work, teaching, supervising dissertations, student projects, internships, and joint events. We actively share our insights with COPA-DATA – and vice versa – and many students and graduates go on to work in the company's appealing environment. Through the numerous research projects that have been conducted, it has also been possible to initiate key developments in Zenon on many occasions.

OUR AIM:

Our department provides a cutting-edge learning environment, widening horizons for many young people so that they can go on to establish a successful and secure career path. In its research activities, the ITS department works with COPA-DATA to develop applied results that are able to open up new possibilities for the production facilities of today and the years to come.

its.fh-salzburg.ac.at

Thüga Energienetze



GERMANY



ABOUT US:

Thüga Energienetze GmbH is part of the largest network of municipal energy companies in Germany. Together with 450 cities and municipalities and around 100 municipal companies in the energy and water sectors, Thüga Aktiengesellschaft forms Germany's largest network of energy companies.

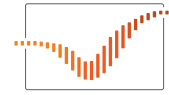
OUR SOLUTIONS WITH ZENON:

As our core business comprises electricity, gas, water, waste water, and heating networks, these are all covered by our distribution management system. Alongside a range of standard functions offered by the Zenon Software Platform, we use Automatic Line Coloring (ALC), the SQL connection, and Zenon Analyzer. The biggest advantage for us is the multi-hierarchical project structure, as we offer the distribution management system as an external service as well as using it for our own operations.

OUR CUSTOMER PROMISE:

We have been working with the Zenon Software Platform for over 20 years. Our service portfolio includes hosting control systems, parameterizing and expanding the distribution management system, as well as optional services such as fault management, network monitoring, and operational management.

www.thuega-energienetze.de



COPADATA
Partner Community

FAST FACTS



254 Members Worldwide

3 Gold Partners
33 Silver Partners
208 Bronze Partners
10 Listed Members



47 Countries

COPA-DATA partners cover more than 40 countries worldwide



Partner Categories

System Integrators, OEMs,
Machine Builders, Educational
Institutions and Research
Facilities

Figures as of September 2019



Entry Year



Partner Level

Industry Focus:



Cross-Industry



Pharmaceutical



Automotive



Food & Beverage



Energy &
Infrastructure



Educational
Insts. & Research
Facilities

The best solution drives us

WORKING TOGETHER TO INSPIRE CUSTOMERS



Cause for celebration: Sales Director Frank Hägele (left) and Managing Director Jürgen Schrödel (right) celebrate 20 successful years of COPA-DATA Germany.

COPA-DATA Germany has been in business for 20 years now. That's 20 years of making the world a more networked place. 20 years of fast-paced developments in technology. And 20 years of the company growing and evolving, yet staying consistently true to its mission of inspiring its customers through innovative ideas. In a world that is changing all the time, COPA-DATA's employees are a constant presence at our customers' sides and are passionate about finding the best solutions for their needs.

Jürgen Schrödel, Managing Director of COPA-DATA Germany, explains how it all started: "When we launched back in 1999, we had an ambitious goal of making the zenon brand an indispensable fixture of the production industry, both in Germany and worldwide. We were particularly keen to get on board with large companies trading on the DAX index." That dream has since become a reality, with the company counting a number of DAX and EURO STOXX businesses among its long-standing customers. "We started out by focusing on the automotive industry, given its highly automated approach to production. We also turned our

attention to pharmaceuticals and food & beverage, both non-cyclical industries." Non-factory applications have also been growing in importance for several years now, and today COPA-DATA offers interdisciplinary and integrated solutions for smart factory and smart city concepts.

Schrödel believes that COPA-DATA's employees – many of whom have been with the company for some time – are key to the successful growth the business has achieved in Germany. The requirements that its employees are expected to fulfill have changed significantly since its founding. The rise of automation and digitalization has

intensified the need to create better networks between the different stages in the production process. At the same time, production companies have been facing increasingly complex demands in the area of production control. This requires employees to not only approach their work from an analytical, interdisciplinary viewpoint, but also develop a keener understanding of the stages involved in production and the ways in which they could be linked. "Our employees are constantly being asked to get involved in new activities so that they can gather stocks of key information from processes. That's really the best way to generate valuable knowledge from the collected data. And it's something my team excels at," says Schrödel.

Of course, the company's technology has also evolved at an astounding rate over its two decades in business. "COPA-DATA's strategy hasn't actually changed all that much, however," says Schrödel. "Our philosophy has always focused on synergy and economies of scale, because we've found that a lean, device-independent solution is what really works for our customers. Selecting the best methods and the right technology is completely dependent on that approach." COPA-DATA employees always start this process by getting to know the customer – and all the customer's processes – in extensive detail. They do not start developing concepts to suit the customer until they have done this. Schrödel explains: "The best products won't reveal their full potential unless we've taken the time to understand the processes involved in implementing projects." Users benefit from a role and task-based interface that provides an ergonomic overview of production and media consumption. Staying true to our motto: zenon – designed to make your life easier

As it moves into the future, COPA-DATA wants to continue setting the pace for digitalization in production automation and the infrastructure involved in this. Its ultimate aim is to furnish the market with a homogeneous software platform that enables networking from sensor to dashboard level. There is a growing demand for customization in the production industry, all the way down to batch size one, and this requires a flexible approach to planning and manufacturing. The data volumes involved in product tracking are therefore increasing. The process needs to cover not only batches, but also every single component within an individual lifecycle – an essential requirement for tracking the outcomes of production reliably. Features that are based on big data, such as track & trace, are the features that customers look for when identifying a digitalization solution that meets their needs.

OUR VISION:

To carve out a leading role for ourselves in providing interdisciplinary solutions for digitalized brownfield and greenfield plants, and to make zenon an established presence as a software platform so that we can continue to grow at a faster pace than the market.

