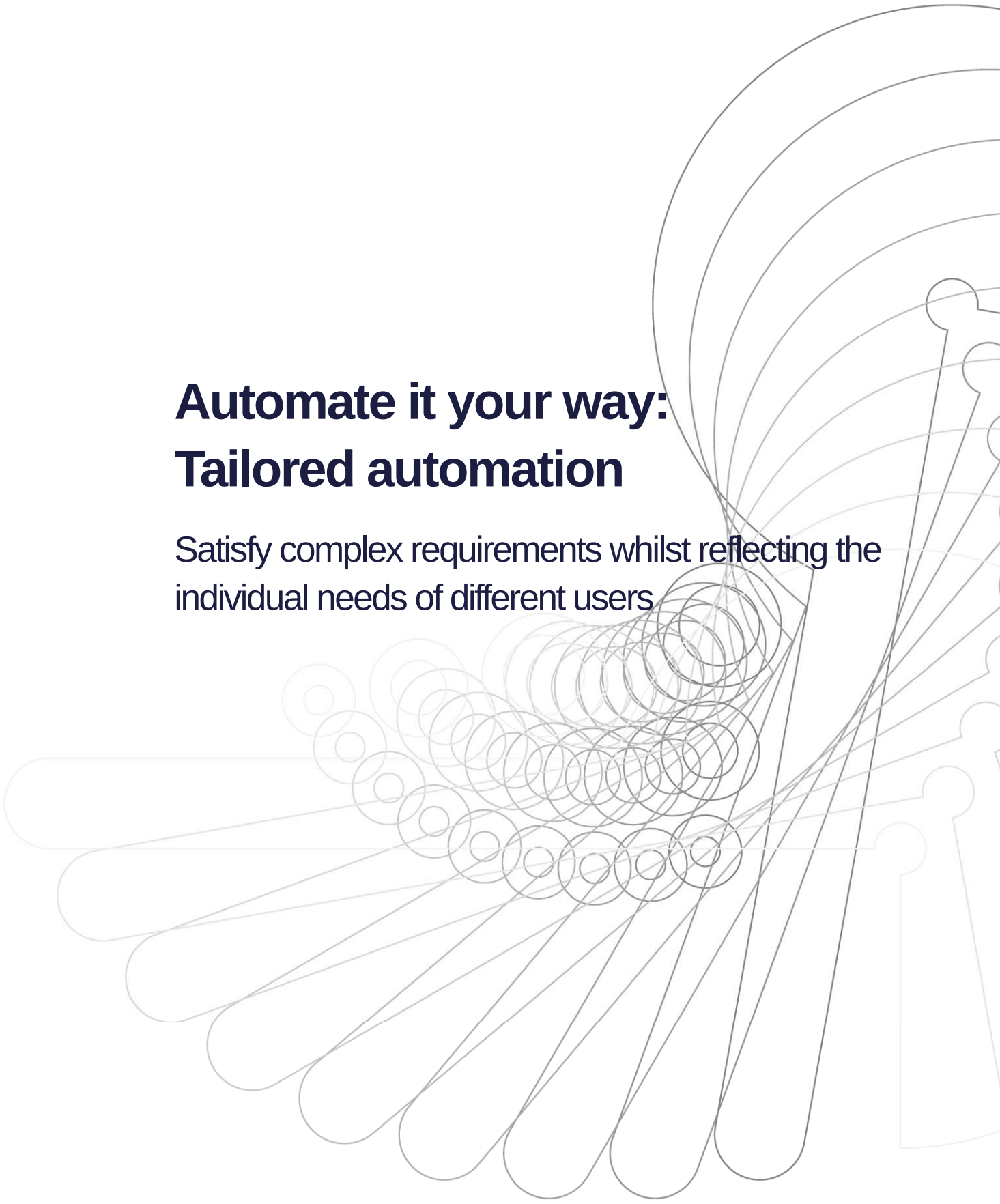
Automate it your way: Tailored automation

Satisfy complex requirements whilst reflecting the individual needs of different users



zenon®

Content

Tailored automation

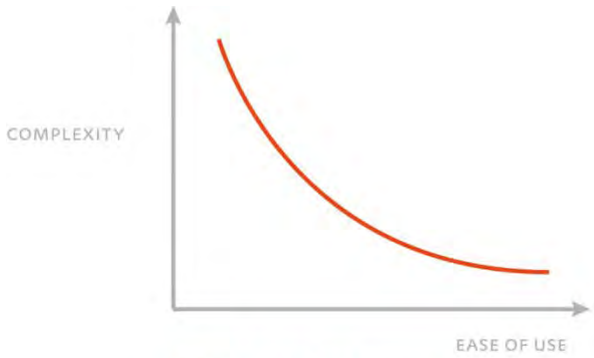
Automation systems must be able to satisfy complex requirements – both in the design phase and in everyday use. Different users may well have different requirements from the same equipment and project teams have to deal with all kinds of varied conditions.

The requirements and scenarios are different for operation and system engineering: for everyday use, the most important demands are a good overview, clear information and quick responses. However for engineering purposes, topics such as standardization, reusability and different user expertise are at the forefront.

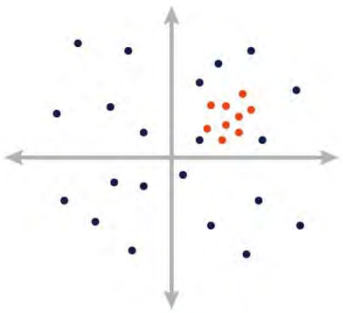
But what part does individualization play in both operation and in system engineering? As you will see in this paper, individualization can be decisive in increasing productivity and reducing the overall costs of automation ownership.

1. Production System

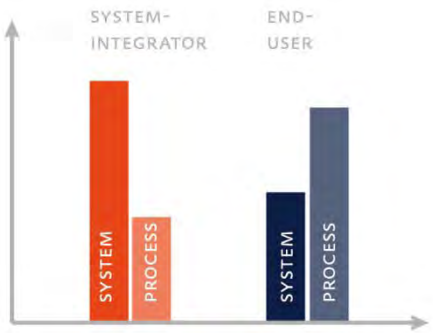
Many software packages reach their limits here:



COMPLEXITY VERSUS
SIMPLE OPERATION



HOMOGENEITY VERSUS
DIFFERENT HABITS



EXPERTISE OF INTEGRATORS VERSUS
BASIC KNOWLEDGE OF END USERS

Individual systems that are orientated to the requirements of each individual user appear to be a good solution. What does such a system have to be able to do? In Runtime and during project planning?

The problem: which system for whom?

Much emphasis is placed on the need for automation systems to be flexible. But how do you know whether an automation system has optimal flexibility – and who is it optimal for? Maintenance Engineers may define “optimal” differently to Production Operators or Managers; experts expect more complexity than beginners – and each would like a system that is precisely tailored to their expectations.

In practice, we commonly find three approaches to this:

- **Solution 1: different systems for each function (operation, maintenance, analysis, optimization, etc).**
  This way, each system can be optimally designed and tailored. However when used together, the extreme complexity leads to a high propensity for errors and a high degree of effort for installation and maintenance. The systems involved must exchange data. Different maintenance cycles for the individual software products and different suppliers must be coordinated. This places great demands on the business in terms of expertise, money and manpower.

- **Solution 2: All functions under one single user interface**
  This looks good and is compact, but quickly becomes very complex and, thus, too complicated for inexperienced users. Operating errors increase in frequency and, because it is understood as an expert system that is reserved for only a few trained employees, the interface is not widely accepted in the company. An additional effect with a big impact: expert systems result in high personnel costs. Employees are more difficult to find, require more time for a more complex and lengthy induction and the increased initial investment places greater importance on the retention of staff, which can be a highly expensive exercise.

- **Solution 3: simple user interface with many wizards**
  This solution is popular with inexperienced users. However the many interim stages tire experts, who generally then also yearn for complex application possibilities and individual ways to find a solution. The system is seen as not very productive and cannot meet expert requirements.

These three most common approaches to finding a solution look practical at first glance, but their weaknesses are exposed as soon as the automation tasks become more complex. Is there an alternative, fourth solution that avoids these pitfalls?

What if…

- … a system adapted to its users and made demands of them that were appropriate to their abilities?
- …a system offered a great deal of support on request, but also left individual realization methods open?
- …a system orientated itself to the requirements of the user and not the other way around?

This system must be able to work with varied data and combine different tasks such as maintenance, operation, analysis or optimization. The shop floor worker needs to be able to work with the administrator without limitations; in a system with varied requirements, different expertise, different perspectives and ways of working. Such systems exist. We will show you what differentiates these from others using zenon as an example. *'Do it your way'*.

The solution: your individual HMI/SCADA

zenon brings new possibilities for individualization into automation and creates perfect conditions for supporting a range of varied requirements. The first consideration of any project is to decide what functionality is required? Which systems would I like to get rid of, which would I carry on using and integrate? However, these decisions are always influenced, to a greater or lesser extent, by cost. zenon opens up pleasing alternatives here; with its modular construction, and a very high number of possibilities for individualization, you only pay for what you really need.

Modularity, and the possibility to easily individualize, make it possible to easily provide each operator with an HMI that not only exactly meets his requirements, but also his visual preferences and working habits. In this way, everybody - from control room staff and operating personnel through to maintenance engineers and managers - use one and the same tool to access the same basis of data. Each has their own tailor-made interface, optimized for their respective requirements. Data is automatically synchronized, updated and, with finely adjustable user rights, provided to all appropriate team members.

“My” system: communicative, adaptable, individual

However, zenon also integrates very flexibly into other systems, creates connections, enables exchange of data and makes interaction with the user easier and clearer. Flexibility that has many pleasant consequences. For example, previously rigid KPIs can become perfectly defined benchmarks.

Three steps to productivity

Productivity has many roots. In order for people to perform at their best and for them to make fast, effective decisions, they generally need three basic prerequisites:

1. To feel comfortable both physically and psychologically in the working environment.
2. To be able to adapt the working environment to their personal needs.
3. To be able to benefit from the team and encourage other team members.

1. Feeling comfortable

Excellent design ensures a high individual comfort factor and, using zenon, this is possible without a great deal of engineering being required and without extra costs. zenon has what software developers call ‘usability’; think of it as delivering the software version of ergonomics. zenon makes it possible: even at the planning stage, freely designable window shapes make it possible to design very clear user interfaces. Think, for example, of tab navigation or speech bubbles for comments. In practice, it is not just a nice effect but, from a usability point of view, the basis for less errors and more productivity.

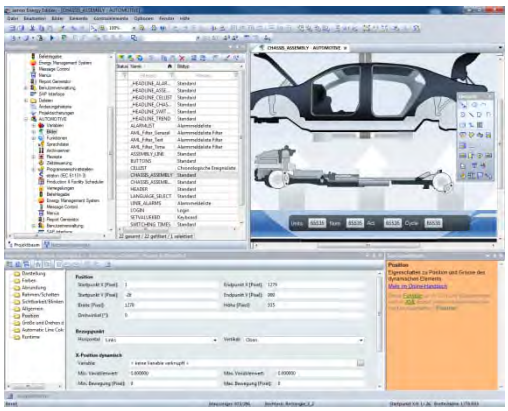


Figure 1: Engineering default settings

Figure 2: optimized for screen editing

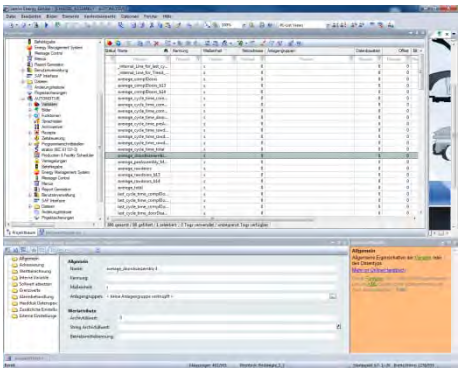


Figure 3: optimized for variables handling

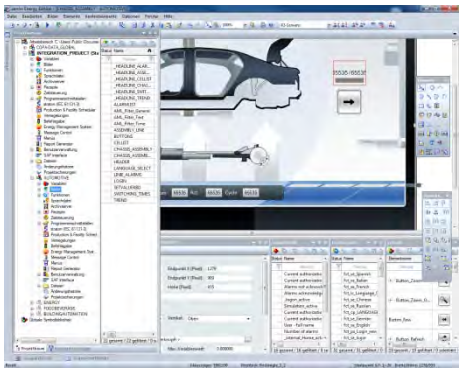


Figure 4: Screen editing with displayed project tree

Figure 5: Fullscreen mode with toolbars

2. Personalize

Anyone that works at a desk is familiar with the notion of a personalized workspace: you set out your desk according to your own personal preferences. The things you use every day are always kept conveniently to hand in their usual place and, as a result, your productivity increases. With ‘hot desking’, shared workstations and collectively used software applications, the same holds true. Imagine the following scenario: you log in, set the application up as you need it, are called away from the terminal and in your absence someone else logs in and uses the application. All the changes you have made to the display have been lost by the time you next come to use the application. Frustrating! Like your desk, the user interface of your application should also be adaptable to your own personal preferences.

In order for each user, whether at an HMI or in the control room, to be able to enjoy their tailor-made workplace, user profiles are automatically accessed by

zenon when the user logs in. User defined views and an environment identical to that of the last log out - for example, for filters, window arrangements and menus - are automatically reconstructed. You can, therefore, continue to work precisely where you last left off or, if you prefer, as your own user profile has been pre-defined as a default. Administrators receive additional functionalities and managers can view the KPIs straight away. Limit Maintenance staff to work only in the maintenance module.

3. Working together

A common system creates a common basis for data, in which information and knowledge is not only available for everybody in real time, but, because no interfaces or manual transfer are required, the data can be guaranteed to be free of errors. A shared system that enables individual user interfaces can make a significant contribution to productivity improvements. Personal strengths can be optimally integrated into the working process in this way. Comments and actions from individual employees supplement the work of others and together they create synergies that can reduce costs and errors.

If the control center staff are aware of any maintenance work that is currently being carried out, it is easier for them to correctly interpret system messages and, therefore, to act correctly. From the outset, the production planner can take into account whether equipment is or is not available. Interrelationships throughout the process can be better identified and analyzed and processes can be optimized as a whole. And because things do not always run smoothly, a common system is created that provides the best support for users to make quick and correct decisions.

Which decision do you want to make tomorrow?

Process control systems serve, not only to help production staff operate equipment, but also to help Production Management make data-based decisions. Decision making requirements are as individual as each plant and change constantly. A modern system must offer support decision making in a manner that is just as individual and flexible. For example, it must deliver quick access to often-used views such as event lists, alarm lists or trend displays. Pre-defined filters reduce information complexity for non-specialists and enable direct access to a particular view, such as a batch, time period or equipment area – Using zenon, the possibilities for selection, limitation and focus are virtually unlimited. At the same time, zenon offers, via its filters, the ability to display any desired combination of different criteria, complex or simple, just as it is needed. Filters and views that have been defined once can be saved for use later or shared with

colleagues very easily. And a reminder: if a different user logs in, this user will also view the application just as he defined it last.

It is very helpful for analysis if common filters for event lists, alarm lists and trends can be defined throughout the project. However, how comprehensive and in-depth the analyses and insights are naturally depends on the authorizations that have been defined; thus analysis can be tailored and individual, too.

Flexible perspective

For complex control systems, several monitors together are often used for display. Here too, adaptation, e.g. which information is displayed where, is a requirement for high productivity. For example, in normal operation a control panel operator has an overview of equipment on two monitors; the system events to the right and the alarm information list on the left. In the event of a problem, however, he would like to see, in detail, the part of equipment concerned and have filtered event and alarm information pertaining to the problem displayed on a third monitor, next to the others. On a fourth monitor, the maintenance management should also be displayed, in order to trigger repair work immediately.

Figure 6: zenon multiple monitor administration for flexible perspective

zenon masters this challenge by means of its advanced and elegant multiple monitor administration. This makes it possible for a user to sort the displays on a multiple monitor system as they desire, save the arrangement as a profile and then call it up again later with just a mouse click. In practice, this enables the user to build up a list of favorite views that might be needed for different tasks and

requirements. One of the important advantages of zenon multiple monitor administration is that multiple monitor systems also run without problems on individual monitors. For example, on a laptop that is used for analysis zenon automatically takes care of displaying the screens on the single display. At the same time, the fully automatic resolution adaptation guarantees that you can work with different monitor resolutions without sections of the display being unused and without losing the view of important equipment when part of the visualization is 'cut off'. In practice, more significant functions such as system analysis or performance evaluations can, if required, be carried out using the HMI.

Clever Chameleon Technology

Figure 7: Developed by designers and usability experts in order to meet different requirements – the five premade skins in zenon: (FLTR) Simulation Mode, Administrator Mode, Design, Color Corrected and Eagle Eye.

COPA-DATA has introduced Chameleon Technology into zenon with version 6.50. It brings with it the option to tailor a system through the use of color palettes. Once created, these 'skins' enable the user to accommodate varied conditions in a mouse click: from external lighting conditions, through operators with a red-green visual impairment, to integration of many partial projects into one design with a uniform look and feel. At the same time, zenon also supports online switching of fonts, languages and units – including a correct recalculation of the values when switching the units. Even system texts can be switched. With standard dialogs, it is also possible to adapt fonts and font sizes or define individual error messages.

2. Engineering

Engineers developing an application have as many varied requirements from an HMI or SCADA system as the Production team do.

The problem: different strokes

- **Different know-how**
  Projects are usually created and put into operation by very experienced system integrators. Additional maintenance work and small expansions are then often undertaken by the system users at the end customers. However, they generally have less experience in HMI/SCADA design and there is a risk that they may unintentionally damage functionality.

- **Different ways of working**
  If several system integrators are commissioned with part projects by a large company, joint standards must be defined. Only in this way can the various part projects be combined into a complete solution without difficulties.

- **Many requirements – many tools**
  In general, many demands are placed on system integrators. Therefore, there is pressure upon them to master many tools and combine solutions, from production data acquisition, through operation, alarm management and archiving to performance optimization, maintenance management and more. This often increasingly leads to more of the same basic modules being reused with as little adaptation as possible and solutions for different customers becoming increasingly similar.

- **Different hardware**
  Whereas in the system integrator’s project engineering office there are often powerful multi-monitor systems, which always have sufficient space for diverse tasks, when launching a project or carrying out maintenance work, there is often only a laptop with limited space available. Some project engineers may not have their own office computer and, on some sites, work has to be carried out by a single engineer with only a laptop. In short: Without optimized work space conditions, productivity may suffer greatly.

What if…

- … you could open parts of the project to other developers or customers for editing and reserve other parts for the specialists?
- … you could forward common standards to subcontractors directly as a project framework?
- … you could reuse solutions that you have created as and when desired – and yet create tailor made solutions for your customers from them?
- … a system orientates itself to the requirements of the development engineers, in order to optimally display the tasks they are working on?

In engineering too, the cost question cannot be overlooked. Here, it is not about the cost of licenses, but about the cost of development time. In comparison to the license costs, the engineering costs are clearly the major part of the overall cost of the project. Any system integrator who can reduce development times has a decisive competitive advantage.

The solution: many tasks – one tool

zenon is the engineering tool that adapts precisely to the preferences and requirements of the project engineers.

As a result of zenon's modular construction, you always use and license only the functionality that is required in the respective zenon project. From small machine operating terminals to production data acquisition and control systems with several hundred thousand variables: everybody benefits from maximum scalability, a large degree of flexibility and easy integration – always with the same single engineering tool.

With zenon multiple project administration, applications are clearly structured into logical or functional parts. Projects can be cooperatively created by a team using zenon's multi-user engineering. In this way, even complex distributed systems can easily be created and administered.

Object-orientated parameterizing instead of programming

In zenon, the focus is on setting parameters. Functionalities are safely selected and allocated using simple selections. Scripting is possible – but not necessary. zenon is accessible whatever your level of expertise. Project engineers can quickly familiarize themselves with unknown projects because they do not need

to first understand unknown code. Element properties and functions set as parameters can easily be administered into lists of personal favorites.

User rights individually assigned

The object-orientated parameterizing philosophy of COPA-DATA creates unique possibilities for engineering in many areas. For example, if it is a case of adhering to given standards or assigning limited engineering rights to other users. Individual element properties can be made accessible, which allows an inexperienced user to make changes whilst critical properties remain protected. Engineering rights can be linked to the log-in, which makes access and limitations easy to configure and document.

Global/central instead of local

Consistent object-orientation also offers the advantage that properties only need to be changed at one location. If, for example, a symbol that is used in hundreds of motors receives a new property or new characteristic, this change need only be configured once. The modification is then automatically transferred to all other linked symbols. For example, a switch symbol used in a branch of energy equipment can be adapted to country-specific requirements.

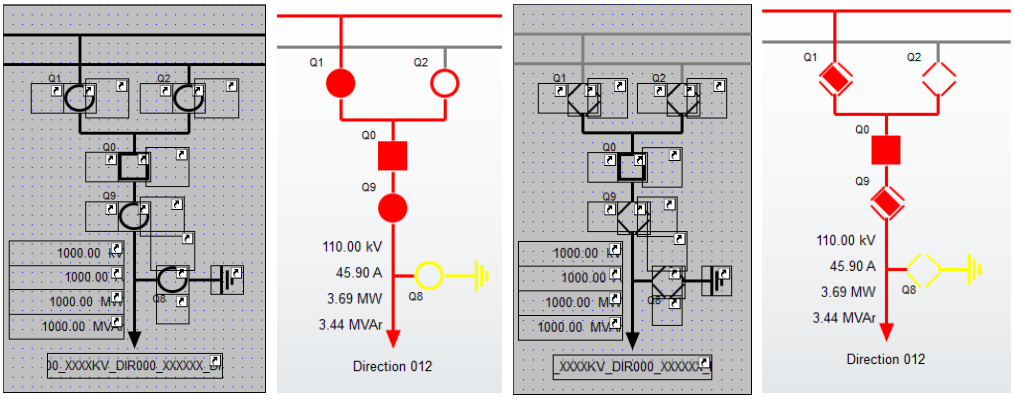


Figure 8: Customization based on a few mouse-clicks, e.g. in energy management.

Automatically adapt your desktop

Different engineering tasks require different ways of working and different perspectives. With zenon, it is very simple to adapt the desktop and call it up in an automated manner. Editor profiles predefined by usability experts are available for frequently-required engineering tasks. These profiles optimally adapt the window layout. They are called up with a mouse click, in the same way as the individual profile, or they can be automated: for example, a mouse click on the “Screens” or “Variable” nodes is sufficient for them to automatically adapt the Editor layout. In short: The zenon Editor offers much space for its users to design screens or table views across the whole surface for editing variables.

Open to your ideas

With its programming interface, zenon is open to external enhancements and other applications in both the Editor and in Runtime. Its open import/export mechanisms (XML, CSV, etc.) make it easy to backup and archive data and to exchange it with other applications.

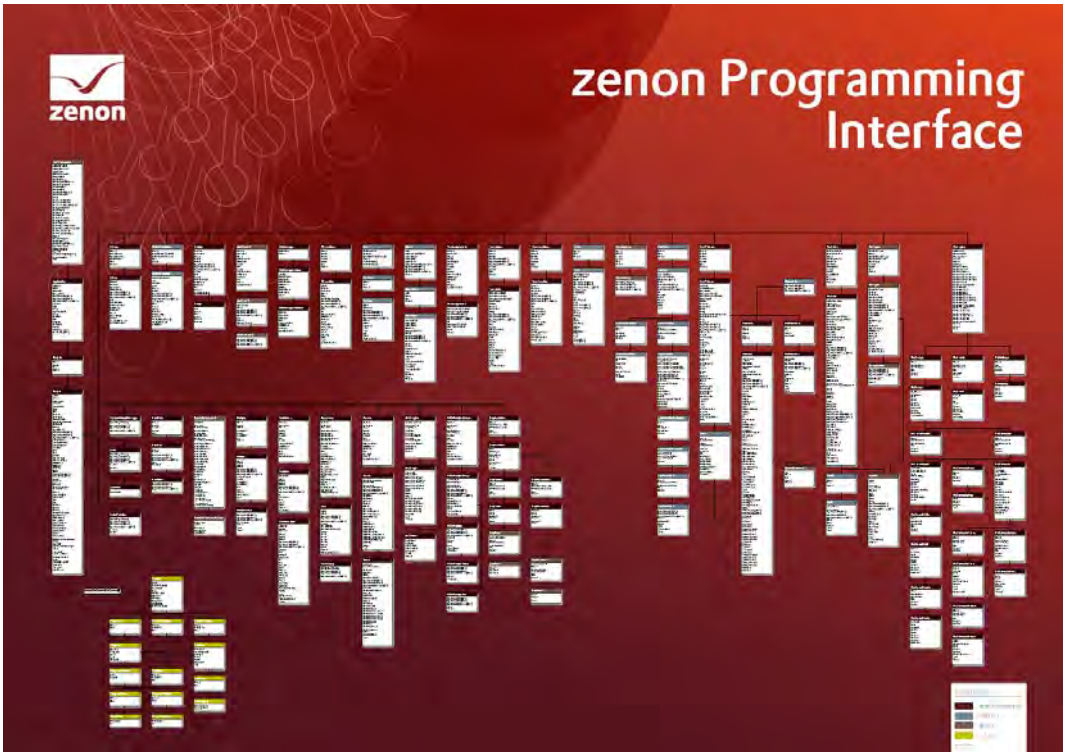


Figure 9: zenon Programming Interface overview

zenon wizards help to configure complex functionalities reliably. They can also be expanded as desired; right up to automatic engineering, which is a great

technology to ensure error free projects with minimal time-to-market. Using zenon's automatic engineering, customer projects have exhibited proven savings in development time of up to 90% in comparison with the previous solution.

> *"The ability to distribute engineering tasks whilst developing zenon applications for our customers allows us to increase our effectiveness and work closer as an engineering team. Being able to individualise the development environment based on personal preference or by common tasks (screen development, variable creation, etc.) using pre-defined profiles allows us to maximise each engineer's time. This means that our projects can be realised in a shorter time resulting in the customer taking delivery earlier such that they have a shorter time to benefit from the new solution and increase their return on investment (ROI). It also means that we can do more projects with similar resources increasing our own profitability. In short, zenon saves you time, increases customer satisfaction and helps make you money."*
>
> *Andy McKenzie, Engineering Director. Tritec Systems Ltd, Basingstoke, UK*

3. The benefits of individualization and personalization

zenon gives you the freedom to go your own way and to adapt your automation system to the various demands from both production operations and application development.

With zenon, you use a system that allows for individual solutions and fulfils versatile tasks: with its reusability options for objects, symbols, project parts or complete projects you reduce your engineering efforts, gain time and thus, save money. You can make selected parts of projects available for editing by other users, optimally use existing infrastructure, automate recurring activities with wizards and simplify complex procedures. And zenon delivers much more. It is the tool you need to increase your competitive advantage whilst at the same time reducing engineering time. *Do it your way*!

System integrators benefit from zenon just as much as system users at the end customer. For example:

zenon	**Your benefit**
Tailor made environment	▪ More ease of use ▪ Work faster and more reliably ▪ Fewer errors in operation ▪ Cost savings ▪ Increased productivity ▪ Differentiation from other providers
Better usability through individually designable user interfaces and appropriate filters	▪ Work faster and more reliably ▪ Fewer errors in operation ▪ Increased productivity ▪ Cost savings
Defined restart points for shared terminals	▪ Time savings ▪ Cost savings ▪ Faster reaction time
Optimal use of space in the Editor	▪ Increased efficiency ▪ Cost savings ▪ Increased flexibility
Experts and operators work with the same system	▪ Cost savings ▪ Leverage synergies ▪ Sharper learning curve
In the editor, central instructions to suppliers can be given and engineering standards can be defined.	▪ Lower implementation costs ▪ Fewer errors in project engineering on joint projects