

## Continuous Testing at Porsche

Continuous integration testing tool chain for efficient test processes despite large amounts of data

## Modular environment simulation for ECU tests

Early ECU testing on the HiL system using modeling

## New Mobile Radio Solution for SON

COM5.SON from MicroNova paves the way for Service Management and Orchestration

## More IT security and compliance

ManageEngine solutions support 2G Energy AG in active directory management



## „Partnership in Uncertain Times“



Dear Reader,

“2021 – Now Delivery Is Made” – that was the title of the editorial in the previous issue. A great deal has also been delivered in technological terms; on the other hand, the issue of supply shortages is at present very acute. And there are other issues that are causing uncertainty: will it be possible to maintain the easing of coronavirus restrictions? Will it be possible for a truly stable government to be formed in Germany, and what exactly will its direction be? Can we as a society and economy cope with or alleviate the staff shortages and dissatisfaction in many sectors? Where are inflation and an overheated real estate market leading us? The list goes on.

So all in all, there are quite a few question marks hanging over our daily lives. This makes it all the more important to have trusting partnerships that enable – and I’ll use a keyword in advance – sustainable cooperation. This is true both in the private domain as well as in the professional context. And it makes the excellent close working relationship that we enjoy with you, our customers, every day all the more important and valuable. For our part, we are doing everything we can to justify this trust.

This can be seen, for example, in Testing Solutions, which contributes valuable articles to this issue of InNOVation starting on page 8. The topics include automotive cybersecurity – important for networked vehicles – and fuel cell development as well as modeling for the automation of electronic control unit tests. The first step is another success story in our cooperation with Porsche.

The challenges surrounding 5G technology are keeping our Telco Solutions team busy. Self-organized networks (SONs) are particularly important here. Starting on page 20, there are technical articles on this as well as information on MicroNova’s O-RAN Alliance membership.

In Enterprise Solutions, the former IT Management, starting on page 30, there is news about ManageEngine products and – I’m always pleased about this – another customer reference. Moreover, the MicroNova team for monday.com has added a few more tips for successful project management as a follow-up to the article in the previous issue of InNOVation.

As you can see, our editorial team has once again assembled a wealth of topics. And in doing so, also thought of the sustainability already mentioned above. The issues raised at the outset are certainly also significant in this context – and so MicroNova founder and supervisory board chairman Josef W. Karl has provided insights into what the company has to offer in ecological terms “to the left and right of our operational path”. This much can be revealed: we delivered in this respect as well.

I now wish you, as ever, an enjoyable read. And stay healthy!

Orazio Ragonesi



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# Continuous Testing at Porsche

Porsche AG reaches a new level in test automation with 'CI Testing Toolchain': The EXAM Test Case Generator, together with the Cluu application platform, ensures efficient test processes despite large volumes of data.

TEXT: Matthias Kapche PICTURES: © metamorworks / Shutterstock.com

Modern vehicles offer an enormous variety of functions. However, the software this requires also entails a high degree of complexity and huge amounts of data during development – while development times are becoming shorter and shorter at the same time. In order to still be able to test all applications quickly and reliably before they hit the road, the highest possible degree of automation is required for validation.

That's why Porsche AG has been using MicroNova's EXAM test automation solution for all hardware-in-the-loop (HiL) test benches since 2009. Test case implementation generally proceeds in the same way: First, test specifiers create the corresponding test specifications as prose text from the software requirements of the ECUs. Based on these texts, test engineers then implement the test cases for execution in EXAM.

## Automatic test case generation with the TCG

This approach has two possible sources of error: First, the test specification may be written incorrectly or inaccurately, and second, it may be misinterpreted by the test engineer when generating the test case. To eliminate these flaws, the testing consultants and automation experts at MicroNova developed the 'Test



Case Generator' (TCG) in collaboration with Andreas Zahn from chassis development at Porsche back in 2018. As an extension to EXAM, the TCG automates the process of test case creation, increasing its efficiency many times over. A uniform and structured syntax is defined and applied when writing the test specifications, which forms the basis for the Test Case Generator to automatically generate test cases.

The underlying uniform software libraries and functions are maintained centrally at MicroNova. When requirements and test specifications change, both existing and new test cases can be implemented quickly.

The degree of automation was increased through the use of the Test Case Generator and the susceptibility to errors of test sequences was also significantly reduced. What remained, however, was the manual effort involved in coordinating with the relevant department as to when which tests should run, and for preparing reports after each test run. This offered further potential for optimization.

#### Continuous testing with the CI toolchain

With this in mind, the idea of the Continuous Integration (CI) testing toolchain was developed in a proven and trusting collaboration with Andreas Zahn. The aim was to standardize the coordination of function developers' test orders and to establish this approach in the area of chassis development.

For this scenario, MicroNova's software specialists developed the new 'CI Dashboard' application based on the Cluu platform from the firm Softwarehelden. The aim was for it to be used for the central planning and reporting of the required software tests. This increase in automation means a continuous test run with various test orders can then ideally be carried out over weeks without manual effort.

#### From test order to report

The CI testing toolchain continues to use the EXAM test automation solution and the Test Case Generator, which are established throughout the group. In addition, the Cluu application platform expands the functionality, as it serves as the central data hub at Porsche AG. Cluu abstracts all heterogeneous data sources, such as various databases, and makes the information available to the user via web applications, comparable to smartphone apps.

The following applications are used for the CI testing toolchain:

All configurations of the individual HiL systems for automated test operation are stored in the **HiL test bench management** system. The configurations contain, for example, information about the current assembly status, i.e. which ECUs are actually installed and which are simulated by the HiL system. The application also provides detailed information on which HiL connection the EXAM test automation solution uses to communicate with the HiL test bench.

The test sequences for each individual HiL test bench are planned using the **CI dashboard**, and the relevant engineers define the vehicle variant to be tested in each case. The dashboard forms the interface between the developers for ECU functions and the test managers who check these functions. It is also possible to test several vehicle variants one after the other.

Handling vehicle variants, or rather all the data this requires, is managed and configured using the **Porsche Testing Data Manager** (PTD Manager) tool developed by MicroNova specifically for this project. The application provides a large number of virtual vehicle models in the 'virtual vehicle garage' for the fully automated tests with EXAM. In order to minimize time-consuming 'reflashing' and 'recoding' of the ECUs, MicroNova consultants developed and integrated the 'TestOrders Manager' function. This allows orders for the respective vehicle variants to be pooled together and performed one after the other – as intended by the test managers in the planning calendar. In addition, the PTD Manager contains the 'ExecutionHelper', which coordinates batch execution of the test suites and starts them

one after the other in EXAM. This provides stability for test runs over long periods of time, as the defined initial state of the system is restored in each case.

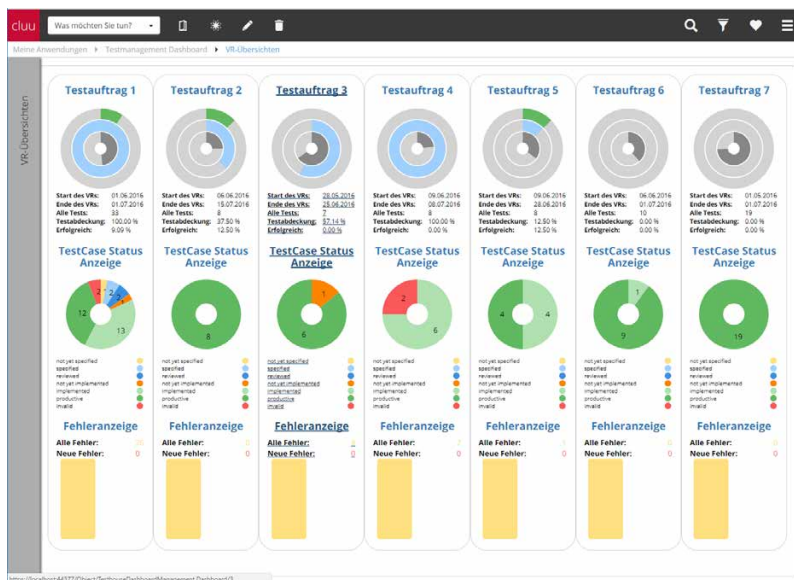
Employees from software development and test management can see the current status of the test runs at any time in the **Cluu Reporting Dashboard**. The dashboard also clearly displays the reports and any errors found in the ECU software after the runs have been completed.

**Flexibility and collaboration for future-proof testing**

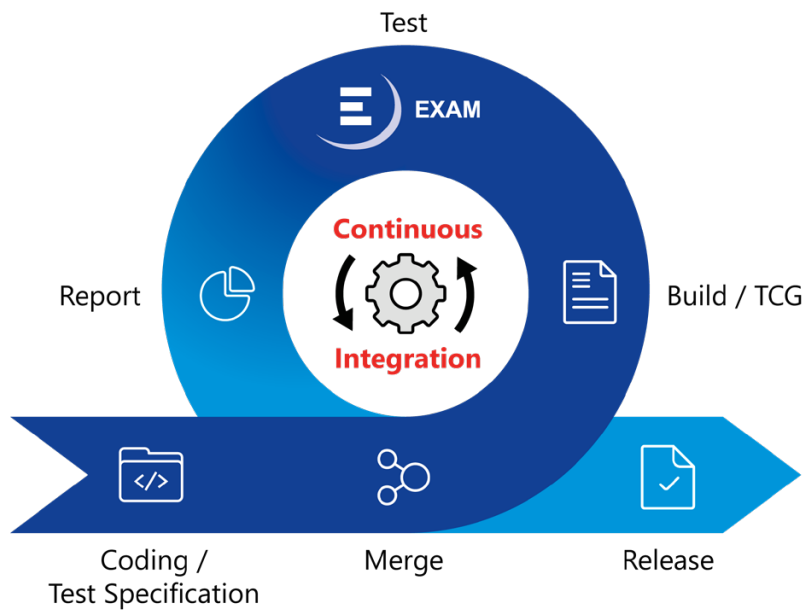
Even after the introduction of the CI testing toolchain, MicroNova's consultants continue to work closely with Porsche's software developers and test engineers. Feedback on im-

plementations can flow continuously and directly into the SCRUM-based development process, and bugs can be fixed quickly. In addition, tests that go hand-in-hand with development on the individual CI tool modules are carried out and evaluated in EXAM.

"Together with MicroNova, we have created a wonderfully agile basis for testing of the future. Thanks to the fast response times of the entire team, we were able to set up a fully automated testing toolchain in the shortest possible time," says Porsche's Andreas Zahn on his satisfaction with the results so far. "However, the project is not yet finished. Due to the constant change in the current world of automotive software, it is always necessary to react quickly to new requirements."



**1** The Cluu platform serves as a central data hub and report dashboard for the CI testing tool chain.



**2** "Continuous testing" describes the automatic execution of test jobs in the software development process.

The first version of the CI testing toolchain has been firmly established in the chassis development process at Porsche since spring 2021 and has already proven its worth. Engineers in the sports car manufacturer's integration test facility also use the new toolchain and have been able to make their projects much more efficient thanks to the higher level of automation. MicroNova's consultants are also constantly working on customizations and further developments. Other areas of the VW Group are now also interested in the efficient and uniform way of working made possible by the CI testing toolchain. This is an exciting project that is certain to become even more widespread in modern vehicle development.

#### More Info:

You can read a detailed article on the introduction of the TCG at Porsche under the references in the Testing section of the website [www.micronova.de/en/testing](http://www.micronova.de/en/testing)

# Safety first on the data highway

Cyber security for vehicles: Together with SecOps Solutions GmbH, MicroNova is supporting car manufacturers and suppliers in the implementation of new UNECE regulations.

TEXT: Mathias Weber (SecOps Solutions GmbH), Stephan Schmidt (MicroNova AG)  
PICTURES: © railway fx / Shutterstock.com

The more software, assistance systems and data channels are used in modern vehicles, the more important their protection against unauthorized access becomes. In January 2021, two new regulations of the United Nations Economic Commission for Europe (UNECE) came into force: UN R155 for the Cyber Security Management System (CSMS) and UN R156 for the Software Update Management System (SUMS).

## EU regulations for cyber security

The regulations were adopted by the "World Forum for Harmonization of Vehicle Regulations", a UNECE working group (WP.29), and compliance with them is intended to better protect passenger cars, vans, trucks and buses against hacking attacks. This applies both to attacks from outside, i.e. from the Internet, and to those that exploit

vulnerabilities within the system, for example the vehicle hotspot.

According to experts, this step has long been necessary because the powerful ECU architectures in modern vehicles are connected to the Internet over long periods of time. Various successful attacks have further proven the necessity. They range from minor cases in which, for example, individual vehicles could no longer be controlled,





to serious ones in which the software of one manufacturer’s entire fleet was affected.

The UN R155 and UN R156 regulations therefore target the two areas that are most relevant in terms of cyber security: the development and production of vehicles, and the management of software used, for example in the case of over-the-air (OTA) updates. To comply with the new requirements, manufacturers must operate a certified management system for both cyber security (UN R155) and software updates (UN R156) over the entire life of a vehicle. These systems are audited every three years and must be verified by the manufacturer for all new vehicles.

Both regulations are legally enforceable by UNECE WP.29 and will be converted into national registration law in all participating countries by 2022 (for new vehicle models) or 2024 (for existing ones). This leaves OEMs little time to adapt to the complex challenges without jeopardizing the approval of

new vehicle models – especially as the necessary adjustments run through all stages of development and production.

**ISO standard for CSMS**

The ISO/SAE 21434 standard, published in September 2021, plays a crucial role in the search for solutions to meet these strict requirements. It describes in detail the processes and methods required to create and implement a functioning and, above all, accredited Cyber Security Management System. The ISO/SAE 21434 standard is also explicitly mentioned in various places in the UN regulations, which shows how indispensable it will be for the approval of future vehicle models.

Designing and implementing a Cyber Security Management System that complies with this ISO standard poses major challenges for car manufacturers and suppliers. Since the approval requirements will become valid in the EU in just a few months, a system that covers all relevant points of vehicle

**01 Kick-off**

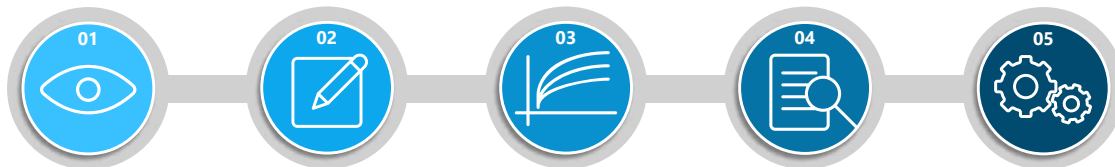
- ✓ Kick-off meeting
- ✓ Build design team from stakeholders

**03 Execution**

- ✓ Involve MicroNova’s technical experts
- ✓ Develop concept for cost optimization
- ✓ Product security gap analysis

**05 Implementation**

- ✓ Presentation of results to stakeholders
- ✓ Support for assessments
- ✓ Roll-out to production



**02 Planning**

- ✓ Determine the necessary information
- ✓ Establish the scope of the project
- ✓ Define targets and prioritize tasks

**04 Review**

- ✓ Validate the concept
- ✓ Develop fields of action and security requirements
- ✓ Document results

**1 Cyber security process from MicroNova and SecOps Solutions**

production must be created in the shortest possible time. These include:

- » Quality Management: Cyber security governance, culture, audits and risk management
- » Project Management: Nine chapters of the ISO standard alone deal with necessary measures in detail
- » Continuous cyber security activities
- » Development of components (software and hardware) that are secure from cyber attacks
- » Verification and validation of cyber security quality and achievement of cyber security objectives
- » Product security incident response handling
- » Immobilization of vehicles

### Support for the implementation of UN R155 and UN R156

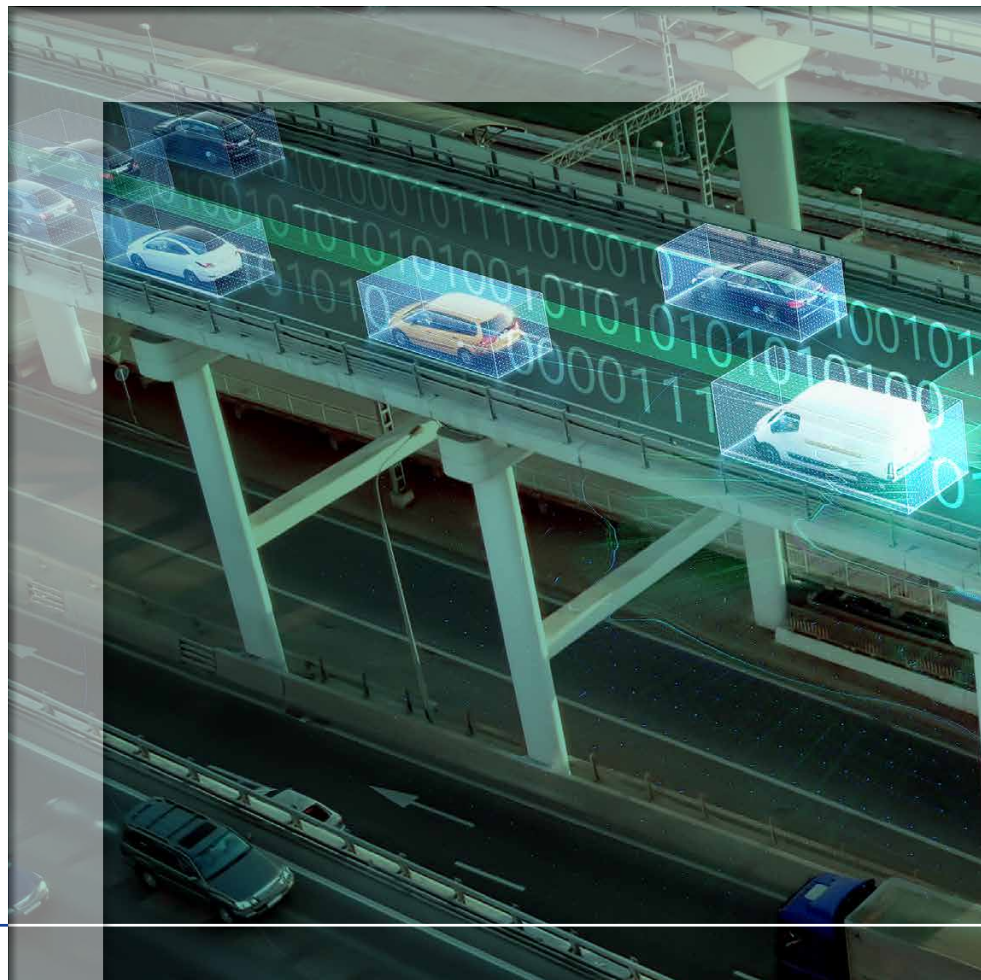
This variety and heterogeneity of topics, combined with the necessary new know-how and time constraints, pose a particular challenge for OEMs and their suppliers. MicroNova supports companies from the automotive industry in implementing the requirements of UN R155 and UN R156, combining the years of experience of its consultants in the field of ECU development and validation with the expertise of its partner company SecOps Solutions, whose technology consultants develop innovative cyber security solutions with a focus on product cyber security, DevSecOps, ISO 21434 and key lifecycle management for the

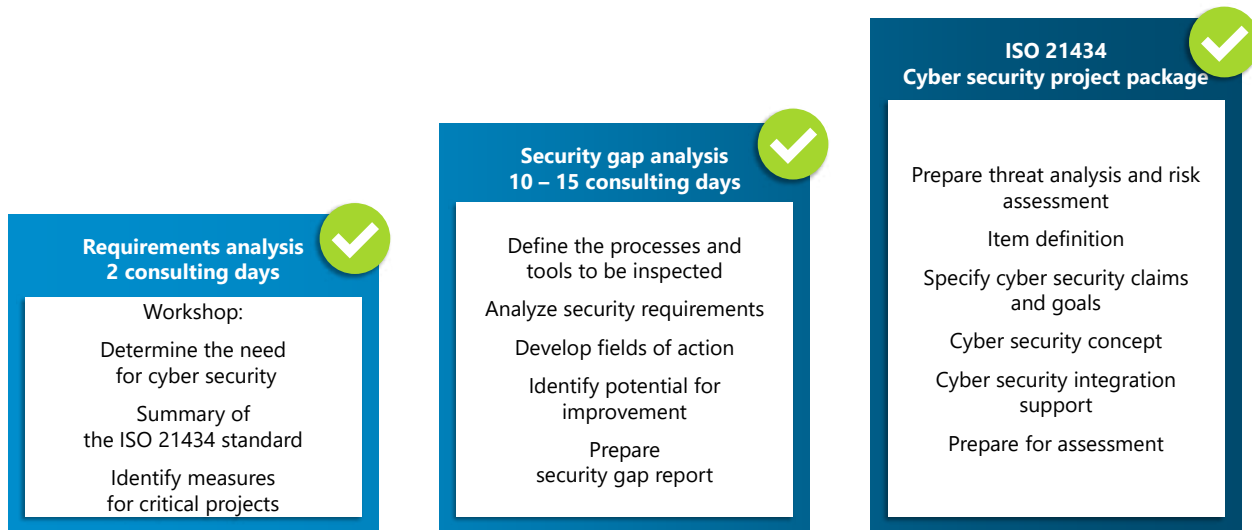
automotive industry. To achieve this, they use their experience in setting up Cyber Security Management Systems at international automotive manufacturers and suppliers, and in implementing such systems within the scope of numerous ECU projects.

This unique combination of experience and know-how around the required processes, methods and tools allows MicroNova and SecOps Solutions to successfully implement highly complex cyber security projects together. Consultants from the two companies ensure that security requirements are taken into account at an early stage in the development process. This means that those responsible in the respective departments can be relatively relaxed when it comes

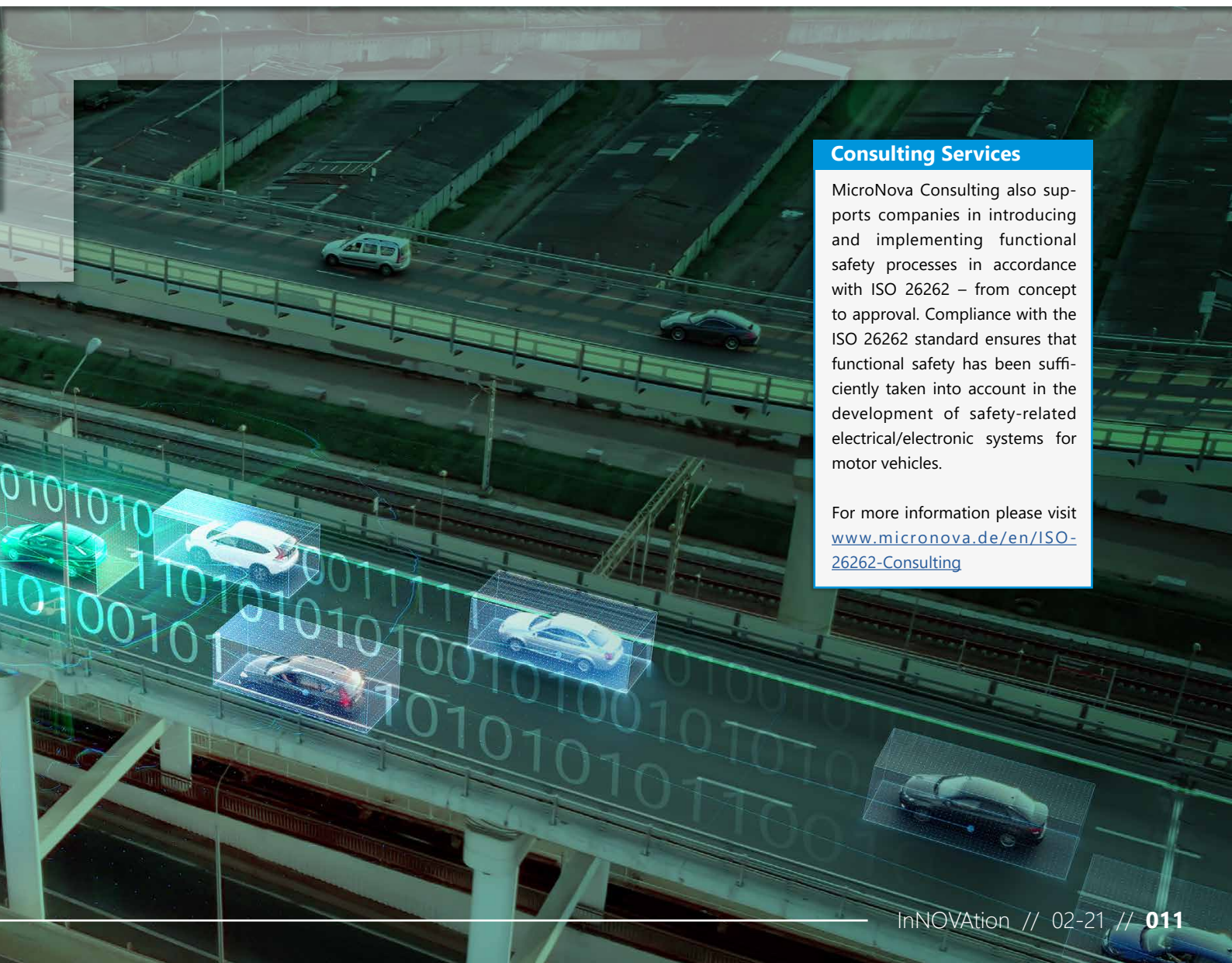
to the final audits on the new regulations. The services offered also include support in the targeted preparation for assessments on UN R155 and UN R156.

Customers from the automotive industry can choose the scope and type of consulting that exactly meets their needs from the joint portfolio of MicroNova and SecOps Solutions: from initial consulting services to complete integration projects in development and testing.





**2** Custom assignment packages



**Consulting Services**

MicroNova Consulting also supports companies in introducing and implementing functional safety processes in accordance with ISO 26262 – from concept to approval. Compliance with the ISO 26262 standard ensures that functional safety has been sufficiently taken into account in the development of safety-related electrical/electronic systems for motor vehicles.

For more information please visit [www.micronova.de/en/ISO-26262-Consulting](http://www.micronova.de/en/ISO-26262-Consulting)

# Modular environment simulation for ECU tests

Time constraints in vehicle development? No problem: Simulation models enable early and extensive ECU tests on the HiL system – even before all prototypes are available. MicroNova offers comprehensive services on the topic of modeling in order to optimally support automotive manufacturers and suppliers.

**TEXT:** Matthias Lorenz, Stephan Schmidt **PICTURES:** © ParabolStudio / Shutterstock.com

Various assistance systems and a growing number of autonomous driving functions are making ECUs for modern vehicles increasingly more complex. At the same time, they should of course function reliably. This has an impact on the validation of the ECU

(Electronic Control Unit) in the development process, as a large number of scenarios have to be checked, ideally at the earliest stage possible in order to be able to detect and correct errors in good time.

Intensive testing, preferably at the beginning of the development process, entails a great challenge: A lot of information or prototypes are not even available at the time when the hardware-in-the-loop (HiL) test benches are being set up. Often, a test bench



must first be created with incomplete data, then adapted again and again at a later time when more up-to-date information is available. These conversions are cost-intensive because they tie up capacity and delay the process. This approach also complicates the planning of test procedures.

### Models for ECUs

To counter this and respond to the scarce availability of ECU prototypes in the initial phase, development teams resort to ECU behavior models, which ensure that the test process can be started at an early stage, even though a real ECU is not yet available or has not yet been fully commissioned on the test bench.

Even with single HiL systems in which 'only' one or a few ECUs are to be tested, nothing works without models. In order to be able to start testing despite components that are missing or not quite finished, the testing departments of car manufacturers and their suppliers ideally need a way to use any combination between real parts and simulations of the ECUs involved. The use of models not only eliminates the dependence on individual components, but at the same time also increases the depth of testing. This is

### Overview of modeling services

- » Development & maintenance of models
- » Sensor simulation & complex simulation of electrical loads
- » Simulation of physical relationships in real time
- » Replication of the environment through a combination of simulation and reality
- » Integration of models into the test infrastructure
- » Restbus simulation
- » Creation of AI-based model parts
- » Support and expansion of EXAM library models when using the test automation solution

For more information, visit [www.micronova.de/en/modeling](http://www.micronova.de/en/modeling)

because the flexible simulations make it possible to reproduce a large number of faults that are difficult or impossible to reproduce with real components, such as cells or cell controllers in high-voltage batteries.

### Networked HiL systems

The benefits of simulation models are particularly apparent in networked HiL systems. These are used to validate complex driving functions, such as the driver assistance systems (DAS) mentioned above. The requirements in this area are extremely high, yet test resources and the possibilities to test in road traffic are limited. In order to obtain approvals for their ECUs, the OEMs have to demonstrate many thousands of test kilometers, which can only be done by means of HiL test benches and simulations.

Supplying the various sensors and actuators of the DAS control units with data that is as close to reality as possible, and therefore putting the simulated vehicle into a state in which driver assistance systems can be tested, requires a large number of models. These are all coupled with an environment simulation, which, as the name suggests, replicates the environment in which the vehicle travels. The real ECUs on the HiL system receive large amounts of sensor and actuator data from the simulation. It is also possible to generate complex data on the basis of models, such as camera images, radar data of obstacles, or information on other road users. The correct functioning of the ECUs can therefore be checked under realistic conditions – without the high expense and time needed to conduct tests in the 'real' reality.



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**Virtualization**

In ECU virtualization, an ECU is simulated in full detail with a high degree of compatibility to the actual device under test. This allows the unchanged original software to be analyzed in a virtual DUT. Virtual ECUs have a wide range of applications for which MicroNova offers a comprehensive portfolio of products and services. Many topics from the field of modeling are relevant, such as restbus simulation. The 'NovaCarts Virtual' software enables development departments to run real test systems as a fully virtual version with the same models and parameters.

For more information, visit: [www.micronova.de/en/virtual-ECU](http://www.micronova.de/en/virtual-ECU) and [www.micronova.de/en/NovaCartsVirtual](http://www.micronova.de/en/NovaCartsVirtual)

**Modular models speed up commissioning**

The diverse requirements show how numerous the use cases are for environment models in automotive testing. At an early stage, MicroNova recognized the advantages and necessity of such modeling, as well as its potential applications, and consistently relies on modularization in the NovaCarts product range. This means that a separate model is created for each control unit and each function, which can be run independently directly on the HiL simulator – without the need for costly recompilation of the entire model. MicroNova's decades of experience in the development of HiL test benches naturally also benefits the modeling quality of the simulations.

No special hardware is required to compile the models; adaptations can be made easily and without spending too much time. The major benefit here is the enormous time saving: for exam-

ple, if a component is not available at short notice or the prototype behavior does not yet meet the desired requirements, the engineers can react with flexibility during commissioning. Work can be continued with minimal delay without having to endure long wait times for recalculations. There is no need to purchase specialist modeling hardware, as the compilation is efficient in terms of resources used.

Besides the development time, the runtime of a model is crucial in order to achieve the desired real-time behavior. This is accomplished both by the type of modeling and by adapting the computing hardware. Clients benefit from the years of experience of MicroNova consultants as early as when selecting suitable hardware. One way of shortening the runtime is 'co-simu-

lation', which can be applied to both the hardware and the software used. In the first case, CPU-intensive functions can be outsourced to external simulation computers. Alternatively, converting the models allows them to run on FPGAs (Field Programmable Gate Arrays), which benefits the runtime. Co-simulation in terms of the software targets the tools used: Not every application is equally suitable for every simulation. The experts at MicroNova can make recommendations here as to when it makes sense to split a model between different tools and how this can be implemented.

**MicroNova simulation models: Custom creation, maintenance and development**

The advantages of modeling are particularly evident in the NovaCarts HiL systems, whose entire architecture is designed to efficiently replicate control units. Of course, MicroNova's consultants also have many years of experience in integrating their own models into the test environments of all common hardware vendors in the automotive sector. The handling of different models and requirements was internalized in a wide variety of



projects. Therefore, the MicroNova service in the field of modeling ranges from simple static restbus models to complex environmental simulations or, for example, the physical replication of an electric engine.

Car manufacturers and suppliers benefit from over 30 years of experience in model creation as well as the maintenance and expansion of customer models. MicroNova also has extensive expertise in agile software development gained from numerous projects. The internal hardware development team also works agilely. In modeling, our consultants and customers are usually organized together in scrum teams – for maximum efficiency in vehicle development.



Just asking...

Orazio Ragonese, CEO, MicroNova AG

The Chinese market is considered the world's largest automotive market. It accounts for a good third of total sales of all car manufacturers and is considered the driver of electromobility. What are MicroNova's current activities in China?

China is of course a strategic target market for us. A lot is happening in the field of electromobility especially, including due to government-imposed target quotas for new vehicle registrations. And this huge potential naturally brings forth numerous start-ups that are pushing into this major market for electric cars. However, the competition is tough and the pace of development is enormous. To survive in this environment, these young companies need innovative test solutions and proven technologies. Which is where established providers like MicroNova can play a vital role. With our experience and extensive know-how in the field of ECU testing in general and Battery Management Systems (BMS) in particular, we can certainly make a decisive contribution.

In light of this, we are looking to establish and expand our new customer business in China. The NovaCarts portfolio in the battery segment is complete and reliably covers all parts of a BMS test – from the powerless testing of all ECUs for electric and hybrid vehicles to the interconnected whole with power.

However, getting a foothold in the Chinese market is not easy for European companies because of the difficult legal framework, and usually involves considerable investment costs. So MicroNova is pursuing a strategy with local partners: For example, we are already cooperating extensively with in-tech GmbH, an engineering firm that is well positioned in the market through its Chinese parent company and that also has its own sites in the country.

Under this sales cooperation, MicroNova's NovaCarts HiL systems and hardware are available in China through in-tech. Our partner also provides support for the Chinese market and oversees commissioning on site. Joint proposals between the two companies have already been made and MicroNova's products will also be on in-tech's stand at Testing Expo China 2021 in Shanghai in December.

This set-up means we are well positioned and can quickly scale our activities in the leading Chinese market with a high degree of flexibility.

001

# New simulation platform for the validation of Fuel Cell Control Units

Cooperation between MicroNova and SMART TESTSOLUTIONS:  
Combined expertise from the fields of fuel cell measurement  
technology and HiL applications.

TEXT: Abdülkerim Dagi, Detlef Naundorf PICTURES: © Chesky / Shutterstock.com;  
© Smart Testsolutions

HYDROG  
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### Comprehensive validation with NovaCarts

By combining the new Fuel Cell HiL platform with the “NovaCarts Battery” HiL system, it is also possible to simulate functions of the connected battery, for example State-of-Charge (SoC) and State-of-Health (SoH) controls, and cell balancing. The “NovaCarts eEngine” HiL simulator also enables validation of the entire control unit network of Fuel Cell Electric Vehicles (FCEV).

In the fall of 2020, MicroNova and Smart Test solutions announced their cooperation in the field of test technologies for fuel cell control units. One year later, the companies have now presented an initial system at the “f-cell” trade fair: The hardware-in-the-loop (HiL) system “NovaCarts Fuel Cell featuring SMART-TS MCM” provides manufacturers of fuel cell systems for mobile and stationary applications a powerful real-time platform for the validation of Fuel Cell Control Units (FCCU).

The platform is based on MicroNova’s “NovaCarts Fuel Cell” HiL simulator. Smart Test solutions contributes the modules that simulate the individual cell voltages of a fuel cell, “MCM IntelliSim”.

### Innovative test technology for challenging validation

A wide power range between partial and full load, transient processes, and changing ambient conditions make controlling a fuel cell system in vehicles a complex task. The FCCU is there-

fore crucial when it comes to reliability and efficiency, as well as for achieving a long service life of the systems. The validation of this control unit is equally important.

The new HiL system has been developed specifically for this task. The platform simulates the entire fuel cell stack along with its power units, as well as the environment of the associated control unit and can be expanded via firmware update for future FCCU technologies.

The cell voltages are simulated by the compact and robust MCM-IntelliSim modules from Smart Test solutions. These can simply be plugged together to form a multi-cell stack in the same way as the familiar "CVM G5" cell voltage monitoring modules. Combined with a master module, the simulation modules can be used to actively simulate each cell of a fuel cell stack without having to incorporate a real stack into the test environment. Cascading makes 1,000 or 2,000 simulation channels possible. The master module provides the connection to the simulation via Ethernet or EtherCAT, thereby ensuring real-time operation.

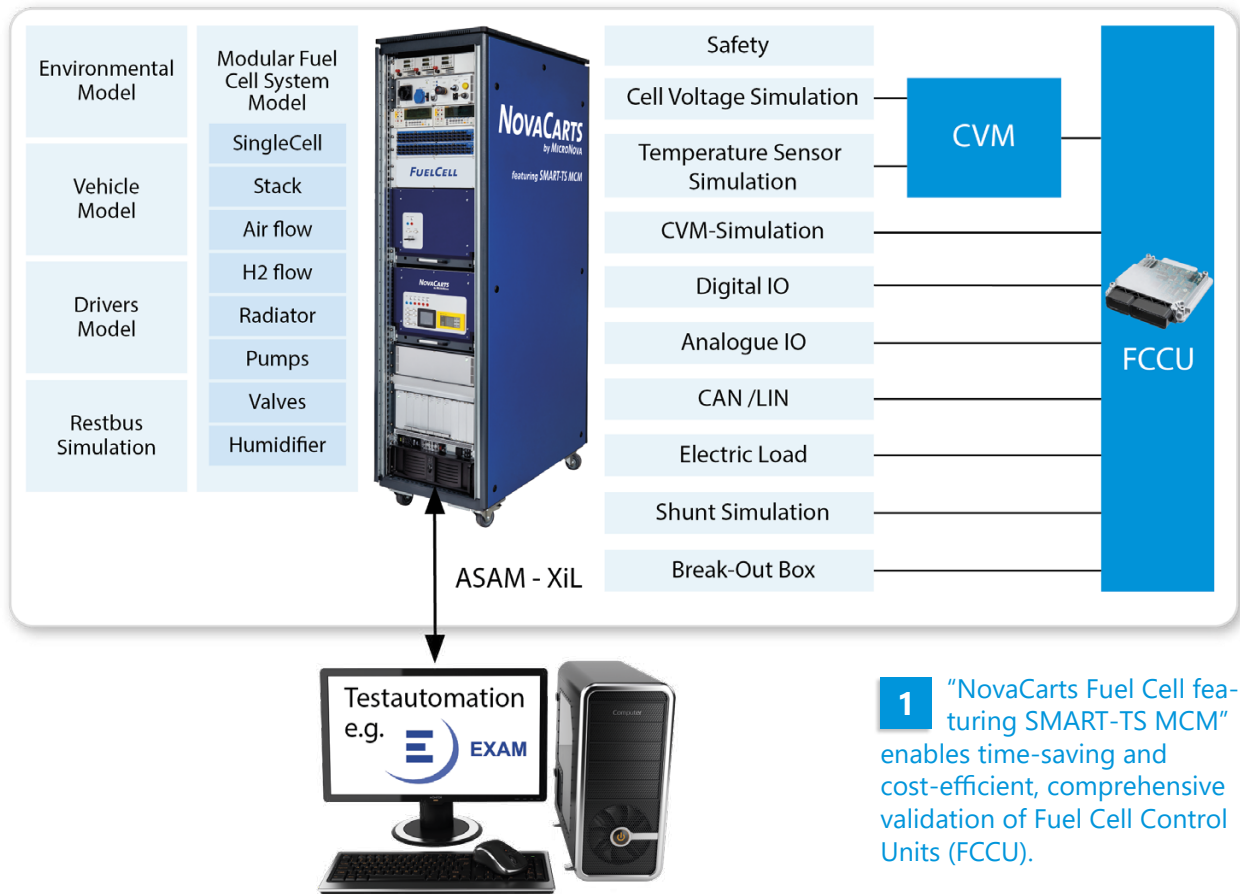
For less dynamic applications, operation via CAN without a master module may be sufficient.

**Flexible and futureproof**

Development of the chemical, mechanical, and electrical specifications of the fuel cell is continuously being advanced in the industry. One important aspect here is the development of high-performance ECUs and their software – and accordingly an efficient and focused testing and validation methodology. The concept of the Fuel Cell HiL system is adapted to the specific test tasks in each case. For example, different electrical loads

can be used depending on the testing requirements. This reduces development costs, saves time, and increases efficiency in software development.

Safety-critical points such as leakage detection, or switch-on or pre-charge functions of the electrical components can therefore be tested at an early stage in the development phase. Simulation and behavior models are executed deterministically on the real-time simulation computer. The modular design and consistent networking of the individual components via real-time Ethernet further make subsequent modifications easy.



**1** "NovaCarts Fuel Cell featuring SMART-TS MCM" enables time-saving and cost-efficient, comprehensive validation of Fuel Cell Control Units (FCCU).

Technical Data IntelliSIM	
Dimensions of each module	100 x 10,5 x 30 mm
Simulation channels per module	10
Simulation range per channel	-3 to +3 V
Accuracy	Max. $\pm$ 6 mV
Output rate	$\leq$ 1.000 Hz
Permanent galvanic isolation	1.400 V DC



2 MCM I/O-Module from SMART TESTSOLUTIONS

The I/O assemblies from MicroNova and Smart Testsolutions are equally suited to achieving optimum results in terms of performance and price sensitivity. With the new simulation platform, the two companies offer car manufacturers and suppliers a time-saving and cost-efficient, comprehensive test solution for the validation of FCCUs.

#### Advantages of HiL tests compared to validation on the system test bench

- » Much lower procurement and operating costs due to fast commissioning and short changeover times
- » No need to handle hydrogen and its associated safety regulations and risks
- » High degree of flexibility – from single component HiL system (e.g. stack only) to system HiL test and integrated HiL system
- » Time saving and quality assurance thanks to easily reproducible tests
- » Straightforward testing of errors and critical states
- » Automated and continuous testing with established test automation tools and connection to a CI/CD test infrastructure

# COM5.SDN SON – the road to an SMO system

Adding management and orchestration to COM5.SDN  
for powerful mobile communication networks.

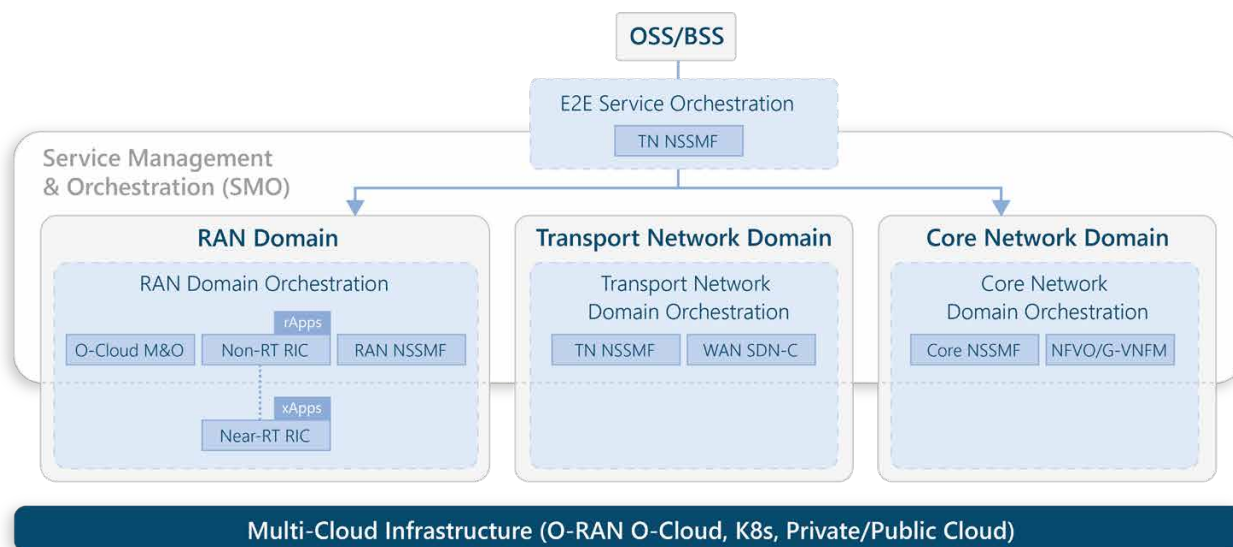
TEXT: Ingo Bauer PICTURES: © Den Rise, MSSA, KPhrom / Shutterstock.com

5G provides the technology for a service-oriented network, since a key feature of the 5G network is its support for different service classes / qualities.

This offers several advantages for Mobile Network Operators (MNOs): On the one hand, it allows for customer-

specific, individual generation and set-up of network services. On the other hand, MNOs have greater flexibility in the use and optimization of their resources in the mobile network. Which is why the phrase 'service-oriented network' is often used.

We have already explained its underlying technology in detail in the article 'Network slicing: a key 5G technology' in issue 1-21 of InNOVation, along with the various layers of the Service Management and Orchestration (SMO) system. In this article we will therefore focus on the management and orchestration of the network itself, in particular RAN domain management or the RAN domain orchestrator.



**1** The illustration shows a typical SMO architecture, which usually consists of one or more orchestration platforms at different levels of abstraction or for different network domains.

The COM5.SDN product line covers essential components for a multi-vendor/multi-technology RAN domain orchestrator. The modular design of the ‘COM5.SDN-R Controller’ makes it possible to integrate existing radio network technologies from established manufacturers such as Nokia, Ericsson or Huawei, as well as all technologies (2G-5G, non SRAN, Femto, Private Networks) and open standards such as Open-RAN. The crucial feature here is its support for the abstraction levels of manufacturer-specific data models into reduced, standardized data models, which are freely configurable and adaptable.

**COM5.SDN R-Controller**

MicroNova has implemented the COM5.SDN R-Controller in a cloud-based architecture and functionally transferred the tried-and-tested modules from the COM5-family into that very architecture, as well. This transformation enabled additional components to be added to the existing system with its proven functionality, such as COM5.SON (see graphic).

The architecture of the COM5.SDN R-Controller is divided into three layers: The adapter layer (OSS Adapter) for connecting to external systems, the mapping service layer (Mapping Services) for converting vendor-specific models into customer-oriented models, and the data service layer (Data Services). The latter is used to provide the relevant and prepared data so that it can later be processed via web-based interfaces for corresponding applications.

The layers and modules of the SDN R-Controller are described in more detail below. The layer model allows for

a clear separation and modularization of the necessary functionalities. This significantly increases flexibility and improves scalability. Furthermore, it has a positive impact on development, testing and deployment and paves the way for DevOps-oriented development.

**COM5.SDN OSS Adapter**

The OSS adapter layer (OSS: Operations Support Systems) provides interface adapters to the network in the form of microservices and also serves as a runtime platform for the integration of legacy systems (Actix One,

**ONAP: Open Network Automation Platform**

The most prominent example of an orchestration platform from the open source domain is the Open Network Automation Platform (ONAP). ONAP was formed in 2017 from the merger of two projects, ECOMP (AT&T’s Enhanced Control, Orchestration, Management & Policy) and Open O (Open Orchestrator). Originally founded by AT&T and China Mobile, the platform is now under the direction of the Linux Foundation. It is designed to orchestrate, manage and automate network and edge computing services for network operators, cloud providers and enterprises.

MyCOM, etc.). The standard interfaces for well-known brands such as Nokia, Ericsson and Huawei are used here, as well as the standardized, open O-RAN model. Adapters for common planning systems such as ATOLL, Cramer, x:akta etc. are available as well. This makes it possible to create a digital twin of the data within the cloud installation. In addition, the integration of existing data lake systems (see p. 26) is already planned and easy to implement.

Imports from the respective OSS are version-independent and generate a digital twin of the network as raw data, i.e., uninterpreted, manufacturer-specific data. The main focus of this approach is performance when importing large quantities of data from the network and importing changes into the network. The import processes are optimized to combine large bulk uploads with those of single or regional sites – with the aim of improving per-

formance and reducing the load on the OSS systems.

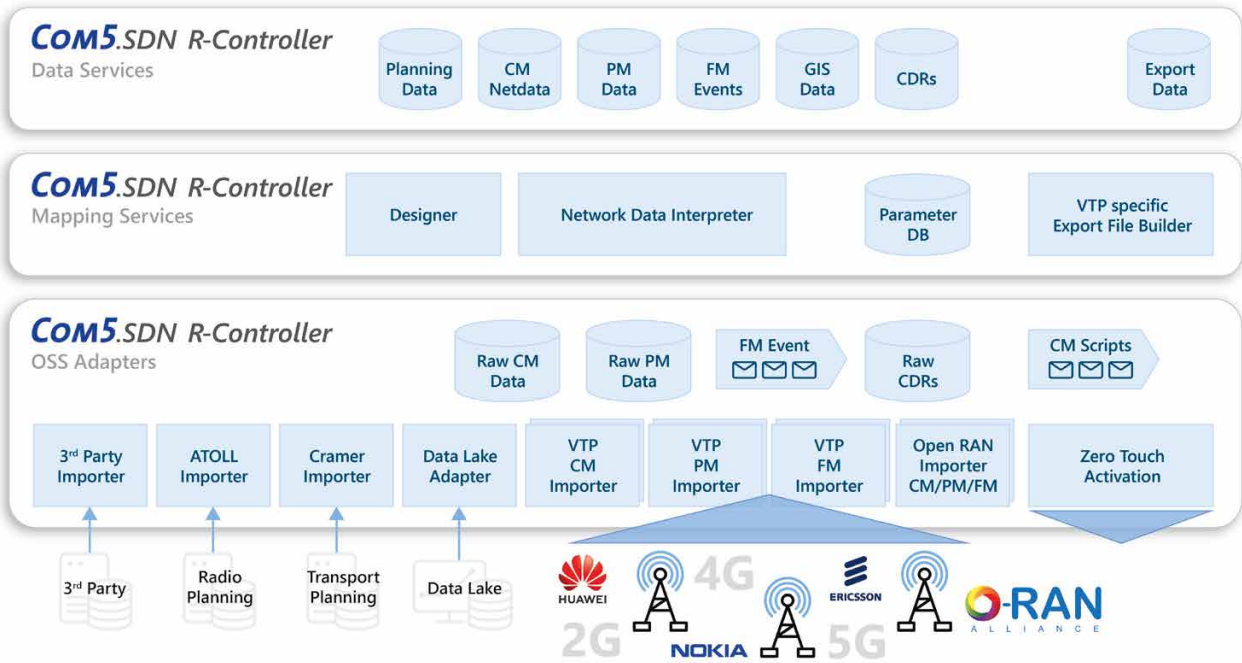
When exporting to the particular OSS, zero-touch activation is used and parameter changes are validated and activated directly. They can be automatically queued, grouped and split according to the size and load limits of the OSS, which in turn reduces the load on the OSS and increases its overall performance.

**COM5.SDN Mapping Services**

This layer in the COM5.SDN R-Controller is responsible for transforming the raw data provided by the COM5.SDN OSS Adapter into validated, cleansed and enhanced provider-specific and customer-oriented models. The algorithm processes the data incrementally, resulting in a continuously updated and structured model of the network. Essentially, this layer

is the heart of the SDN R-Controller, as it contains the network operator’s complete design guidelines or policies and is therefore crucial for network consistency – and ultimately for network quality.

The transformation of planning data into manufacturer-specific models is controlled by the parameter database (Parameters DB). The same also applies to planning and network data consistency checks, and to the application-specific generation of export files or scripts. The Parameters DB contains both the version-specific provider model and the customer-specific network design – rules, policies, default values, consistency checks, etc. – that is used to generate export files or scripts in the manufacturer-specific format. Users can fully customize the contents of the Parameters DB via a GUI-based designer that is part of COM5.Mobile.



**2** High level architecture of the COM5.SDN R-Controller

### C-SON software platform from atesio GmbH

A spin-off of the internationally active research institute 'Zuse Institute Berlin' (ZIB), atesio has extensive expertise in the automation of software-driven processes in the mobile communications sector. The company's SON approach combines traditional radio network planning and parameter planning approaches with the enhanced possibilities offered by the use of PM data from the network. In this way, atesio is seizing the opportunity of the trend towards Open-RAN and the emergence of the ONAP ecosystem. This move is supported by the cloud-enabled NGPS platform and years of experience in SON research with SON-inspired services, including the Cell Neighbor Relation Clearance Service and SON Light Cell Parameter Planning software. Equally significant is the use of Machine Learning (ML) on PM data collected through the construction and operation of the Radio Network Capacity Evolution system.

### COM5.SDN Data Services

The Data Services layer contains validated, cleansed and enriched manufacturer-specific, customer-oriented data. This is where all the information relevant for further applications comes together. The data is accessible to the Application Layer through open, web-based APIs. Since this is a configurable, abstract layer in the broadest sense, any mapping can be implemented – from manufacturer-independent information to standardized models like O-RAN.

On this basis, mobile communications firms can develop their own applications and integrate them directly (DevOps), independently of the complex data models and access methods of the manufacturer-specific network systems. Examples include COM5.Mobile, Network Slice Subsystem Management Function (NSSMF),

non-Real Time RAN Intelligence Controller (non-RT RIC) – and of course COM5.SDN SON.

### COM5.SDN SON

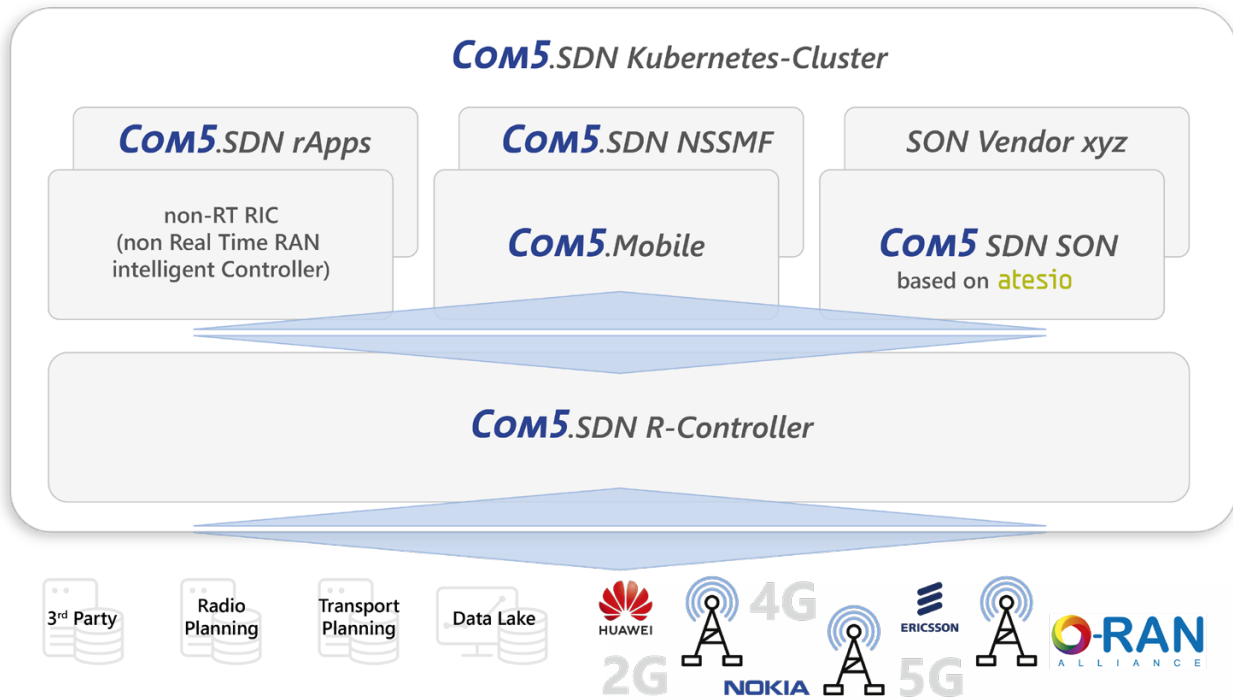
The open and freely configurable interfaces of the COM5.SDN R-Controller allow for easy extension at the application layer. Traditionally, the functional part of COM5.Mobile – i.e., COM5.Mobile Integrator and COM5.Mobile Optimizer – is integrated here, as well as the SON extension. The latter is offered by MicroNova together with its partner company atesio, which has many years of experience in the implementation of planning and optimization automation.

The cloud-based solution from atesio is capable of analyzing, planning and optimizing Multiple Radio Access Technology (Multi RAT; i.e. 2G, 3G, 4G and 5G) and multi-layer radio net-

works. It supports various deployment scenarios, including traditional on-premises use on a single server, as well as Kubernetes-based scalable and redundant deployments in public clouds. Potential hyperscalers include Amazon Web Services (AWS) and Google Cloud Platform, as well as Azure.

Use cases range from radio spectrum allocation, network evolution, combinations, planning and optimization, and automatic cell and parameter planning, through to C-SON functions – each also at the strategic level. The general approach to using advanced models forms the basis for what atesio sees as a 'network engineering perspective' and guiding principle for many algorithm-based solutions.

This strategy is based on the assumption that a network is designed with specific intentions. Accordingly,



**3** Cloud deployment of our COM5.SDN product line

both sites and cells serve a specific purpose. Data about cells is obtained from various sources, such as cartographic ones: the location of highways, rail lines, landmarks, commercial areas, shopping centers, etc. Similarly, the proximity of cells within the network and performance management data are also taken into account.

This data is aggregated within the SON platform into cell profiles, based on which the intended role of each cell in the network can be determined. Providing such a level of abstraction has often proven helpful in writing policies and objectives in the form of rules and strategies that can be used in automated network planning and optimization. Integration into the COM5-framework makes it possible to realize a closed-loop control system and creates the basis for a fully-fledged C-SON system.

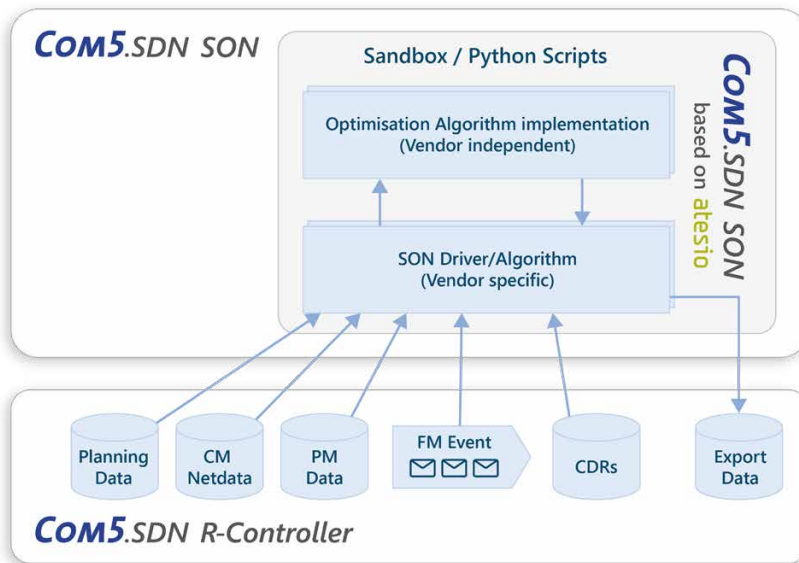
This C-SON system supports algorithms for both integration measures and optimization measures. The list below gives a rough overview of the supported options:

- » Automatic generation of initial parameters such as BCCH/TCH configurations, 4G/5G PCI calculations, TAC/LAC/RAC and RACH optimizations
- » Automatic Neighbor Relations (ANR)
- » Optimization of cell parameters such as BCCH/TCH, LAC/RAC/SAC, PCI, RACH
- » Coverage & Capacity Optimization (CCO)
- » Energy Saving (ES)

**Summary**

In order to ensure a successful 5G transformation, MNOs need to automate their processes for expanding and operating their networks. COM5.Mobile has established itself as the leading solution in the RAN environment in the German market. With COM5.SDN, MicroNova has succeeded in transferring its years of know-how and basic functionalities for automation into an SDN and microservice-based architecture. Its modular structure allows for separation into existing core functionalities in order to integrate both classic and Open-RAN based networks – and to rely on so-called rApps such as COM5.SDN SON.





**4** The integration into the COM5 framework enables the realization of a closed-loop control circuit.

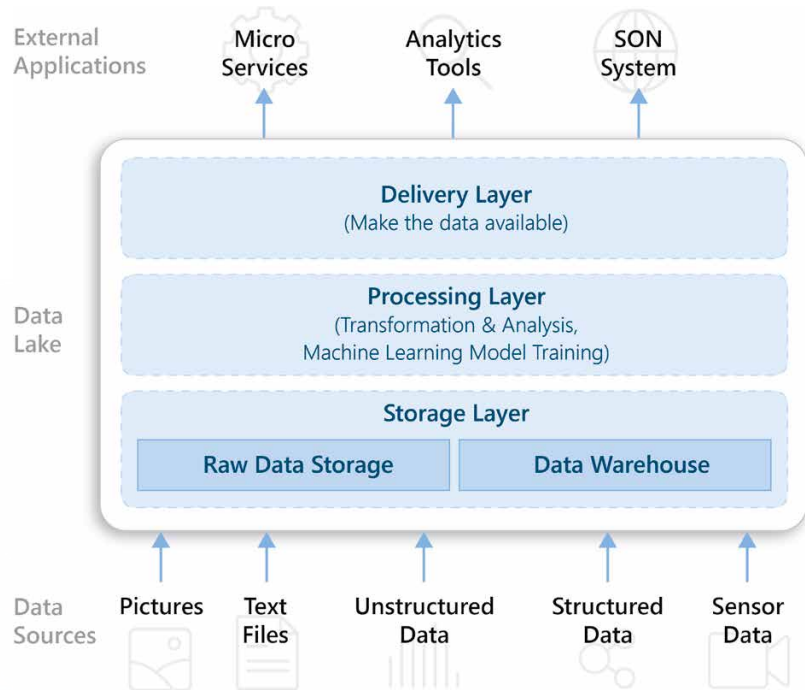


# Data Lake as a Basis for COM5.SDN

Data for smart orchestration and automation of mobile networks

TEXT: Ella Schmidtbreick, Ingo Bauer PICTURE: © Dudarev Mikhail / Shutterstock.com

COM5.SDN is the second product line of MicroNova’s Telco Solutions division – alongside COM5.Mobile – and addresses in particular the transition of existing mobile communication technology into the new structures for 5G. Among other things, COM5.SDN relies on the Open Network Automation Platform (ONAP), an open source framework of the Linux Foundation, and mainly performs tasks for the orchestration and automation of mobile communication networks. Building on this, MicroNova and its partner company atesio are developing a SON solution (SON = Self-Organizing Network) to improve the performance and efficiency of mobile networks (p. 20).



1 Data lake structure

The central component of ONAP is the DCAE component (DCAE = Data Collection Analytics and Events), which is primarily responsible for the gathering, storage and analysis of data. Given the complexity of the concept, a 'data lake' is used. This approach that is becoming increasingly popular, especially in connection with Big Data and Machine Learning (ML) – key building blocks for automation not only in the mobile communication sector.

### How a data lake works

A data lake is a sort of central storage environment with large amounts of data from different sources that can scale up to the petabyte range. It is unique in that the raw data is stored unstructured in its source format. In other words, the data is collected independently of its format and made available in a repository. In this way e. g. images, text files and sensor data can be taken from one consolidated data source.

### Data lake vs. data warehouse

The use of a data lake and a data warehouse are not mutually exclusive; in fact, they are often operated in parallel. It is also possible to integrate different data warehouses into one data lake, creating structured areas in the unstructured data lake. The term data lake was first used in 2010 by James

	Data lake	Data warehouse
Data structure	Unstructured	Structured
Purpose	Unclear	Clear
Benefits	Flexibility, scope of use	No maintenance, immediate analysis
Disadvantages	Complexity	Changes to stored information

## 2 Differences between data lake and data warehouse

Dixon (CTO of Pentaho). The idea of stockpiling large amounts of data existed as early as the 1980s and coined the term data warehouse. The differences between data lake and data warehouse are shown in chart 2.

One characteristic of a data lake is that data is initially stored without any concrete idea of its analysis or use. The intended use often only emerges over time – but if necessary, the data can be turned into valuable information. When the stored data is accessed, it is first duplicated and then formatted. Doing so retains the raw formats with all the original information. This allows it to be used for further Big Data analysis.

### Data lake and SON

Since the quantity of usable data or valuable information is crucial for the desired automation and orchestration in the management of mobile communication networks, the concept of a data lake lends itself well to the mobile sector – especially for the more complex 5G variant. Therefore, its use for MicroNova and atesio's SON solution brings benefits accordingly, especially in view of the future integration of artificial intelligence as a basis for COM5.SDN.

# MicroNova joins O-RAN Alliance

Innovations for an open and interoperable  
radio access network.

TEXT: Editorial staff PICTURE: © metamorworks / Shutterstock.com

An open standard for mobile networks that is independent of vendors and countries is the main goal of the O-RAN Alliance, a community of mobile network operators and related companies as well as research and academic institutions. As a new member, MicroNova contributes the knowledge it has built up over many years on the management of the Radio Access Network (RAN).

The need for this is high, as the O-RAN Alliance has set itself the goal of, for example, driving innovations for mobile network operators and service providers as well as for their end customers from the business and private sectors. One of these innovations is the Open RAN standard, which aims to enable a new, open and fully programmable radio access network. The expectations of the standard are high and will increase even more as 5G technology continues to be rolled out.

At the same time, the alliance behind it takes into account the desire for an approach that is independent of vendors and countries. Development work still needs to be done in order to be able to satisfy all the necessary technological requirements. This task is being taken on by the members of the O-RAN Alliance, who are growing in number.

### Experience and fresh ideas combined

In COM5.Mobile, MicroNova has for many years been offering a solution for the configuration and optimization of the radio access network; it is currently used by two of the three main mobile network operators in Germany. COM5.SDN Mediator is the first product that makes it possible to integrate different network technologies (2G, 3G, 4G, and 5G) into an SDN-/NFV- or Open-RAN-compliant architecture.

The strategic roadmap of COM5.SDN extends from the Radio Controller (R-Controller) to the Radio Intelligence Controller (Non-RT RIC – Non Real Time). Each of these solutions will provide significant added value in terms of mobile network management capabilities. By joining the O-RAN Alliance, this technology can now be more easily integrated into suitable projects that, among other things, also take into account concepts from the field of artificial intelligence.

The cooperation will also offer MicroNova the opportunity to participate in research projects or to further intensify existing activities – for example in the association 5G Berlin e.V. In this way, the successful cooperations with higher education institutions that have been in place for many years can also be advanced in the mobile communications environment.

### Technological emancipation

“While Europe is trying to emancipate itself in the cloud environment with the joint project GAIA-X, the O-RAN Alliance is an approach to establish a choice over technology from China. The O-RAN standard should, of course, primarily score points with innovations and technical added value,” explains Dr. Klaus Eder, MicroNova AG’s COO.

### GAIA-X

Gaia-X is a project to build a secure and connected data infrastructure that meets the highest standards of digital sovereignty and that promotes innovation. Representatives from business, politics and academia from Europe and around the world are working together to develop a lasting contribution to shaping the next generation of a European data infrastructure. Data and services are to be made available, brought together, shared and used in a trusting manner in an open and transparent digital ecosystem.

Source and more information:

<https://www.bmwi.de/Redaktion/EN/Dossier/gaia-x.html>

### SDN und NFV

- » **Software-Defined Networking (SDN)** is a network architecture that relies on control by software and is completely decoupled from the hardware. It enables a centrally managed and programmable network that can be managed very flexibly.
- » **Network Funktions Virtualization (NFV)** is a method for virtualizing network functions or services and creates the basis for the development and use of manufacturer-independent, standardized hardware and software solutions for network construction.

“This is exactly where we want to and where we can add value. Our team has been successfully contributing its knowledge to projects in the telecommunications field for over 30 years. The access network is managed using our solutions for the majority of German mobile customers. This know-how will be useful in the O-RAN Alliance as well. We are looking forward to working with the members.”

# AD Management for Greater Compliance and IT Security at 2G Energy

AD Solutions disburden IT department and support ISO 27001 compliance.

TEXT: Editorial staff PICTURES: © 2G Energy AG

## 2G Energy AG:

- » Sector: Energy
- » Employees: approx. 670
- » Turnover: € 236.4 million (2019)
- » Headquarters: Heek
- » Established: 1995

2G Energy AG is one of the leading international manufacturers of combined heat and power (CHP) plants for generating and supplying electricity and heat on a decentralized basis. The company's product portfolio includes plants with an electrical output of between 20 and 4,500 kW for operation with natural gas, biogas, and other lean gases as well as hydrogen. Besides its headquarters in Heek, 2G has six sales and service companies in other European countries and the USA. Its customer base ranges from farmers to industrial companies, municipal-

ities, the housing industry, municipal utilities and large energy suppliers.

## A lot of work with standard Microsoft tools

The seven-person IT department at 2G Energy AG not only ensures smooth IT operations, but also provides access for endpoints, applications, etc. for the company's approximately 670 employees. Until now, the department used Microsoft's Active Directory tools, along with PowerShell and other scripts, to create, modify, and assign permissions to users in Active Directory (AD) – a time-consuming task.

A disadvantage of the standard Microsoft tools was also their limited auditing capabilities. 2G started searching for appropriate software in 2020, as it wanted to further expand its logging of AD changes. The new solution

should also enable simple AD tasks to be delegated to employees themselves, such as uploading profile photos, in order to reduce the workload of IT manager Jörg Frenker's team.

2G evaluated several tools from a number of vendors. Some were oversized for their own needs and came with a lot of non-essential features. The final decision was made in favor of the three ManageEngine solutions: ADManager Plus, ADAudit Plus, and ADSelfService Plus.

## ManageEngine ADManager Plus, ADAudit Plus, ADSelfService Plus

One of the clinching arguments for Jörg Frenker, Head of IT Infrastructure and Operations at 2G Energy AG, was that the products integrate well and do not include any unnecessary functions: "ManageEngine's solutions are

to the point. We use about 80 to 90 percent of the features, which is a very high proportion. So we're not paying for features that are of no value to us."

It was possible to transfer the three solutions into the production environment within a very short period because the IT manager had already downloaded and installed the corresponding demo versions for evaluation: "It took us just two days to set everything up, including the HTTPS connection," says Jörg Frenker enthusiastically. The internal links in the products meant that IT staff were able to switch quickly and easily from one tool to another right from the start.

#### Reduced workload for IT and compliance with ISO 27001 requirements

The AD management and reporting solution ADManager Plus is used by 2G primarily for creating new users and for rights management. Jörg Frenker particularly appreciates the rights and roles concept, which allows AD tasks to be delegated. For example, an IT trainee can now create new users without working directly in AD. Additional permissions can be assigned as needed depending on the employee's level of knowledge.

The company uses its own templates for account creation; these ensure that a new user automatically receives all the intended rights. "When we cre-

ated new users in the past we followed the principle of 'a bit like user XY, but without these rights and with those permissions,'" the IT manager explains. The templates now make assigning rights much faster. Furthermore, they also enable 2G to meet the requirements of the ISO/IEC 27001 guideline for rights/role concepts.

ADManager Plus was also able to reduce the IT department's workload when collaborating with 2G's various service providers. The staff member responsible for service provider support can now grant access to external users herself and no longer has to set up tickets with IT. An additional benefit is that the access granted using ADManager Plus can only be used during regular working hours – a further security feature preventing unauthorized system access.

Detailed reporting is another feature that Jörg Frenker would not want to forgo. The reports on password resets as well as on NTFS and share permissions mean that the IT manager can see at a glance whether permissions are correct or require modification – another stipulation of the ISO 27001 guideline.

ADAudit Plus, an auditing solution for Active Directory, has also become an important tool at 2G. "As market leaders, we are in high demand, especially for our expertise. To ensure that our research data do not go astray, we



*"ManageEngine's solutions fit our requirements perfectly. They contain all the functions we need and come without unnecessary bells and whistles that we wouldn't use anyway."*

– Jörg Frenker,  
Head of IT Infrastructure and  
Operations,  
2G Energy AG

#### Customer Benefits:

- » Less time spent on routine tasks
- » Predefined reports facilitate reporting
- » Simple delegation of AD activities – without having to work in AD
- » Easy operation by omitting unnecessary functions
- » Fewer scripts required





## 1 Headquarters of 2G Energy AG in Heek in the Münsterland region of Germany

use the FileServer Audit in ADAudit Plus to monitor whether data have been copied from specific file servers to a USB drive,” the IT manager explains. One positive side effect is that folders that have been accidentally moved can also be quickly located again with the tool.

In addition, 2G monitors login behavior with an integrated analytics function. ADAudit Plus will alert the IT department in real time should any unusual activity occur. “For example, we get a little skeptical when management suddenly logs on to domain controllers in the U.S. We then check whether it is a cyber attack and whether there may be an attempt to intercept login data,” explains the IT manager.

The ManageEngine solution also does a good job of tracking down incorrect user logins: “ADAudit Plus enables us to find out why there was an incorrect login attempt,” reports Jörg Frenker. This means, for example, that locked accounts can be reactivated faster. The IT department can inform the user in question proactively if they need to change their login details. “In this way, we ensure that a user is not suddenly confronted with a locked account and hence unable to work.”

ADSelfService Plus, a self-service password management solution, completes the trio. This allows employees to change their passwords and unlock their accounts themselves – further reducing the IT department’s workload. Since current password policies require users to renew passwords every 90 days, 2G also uses ADSelfService Plus to notify employees 14 days before this period expires. This used to require VB scripts, but now the reminders can be set up easily and conveniently in ADSelfService Plus.

Users also benefit from the new solution, as they are informed about exactly how many characters and special characters a new password must contain in order to meet internal requirements. They can also modify certain personal data in their AD profile themselves and, for example, upload a profile picture.

### Delegation and automation reduce the IT workload

Since the ManageEngine solutions were introduced, Jörg Frenker and his team have been able to simplify or delegate many routine tasks related to Active Directory management. The new templates for creating new users provide greater standardization and

further reduce the burden on the IT department.

2G also benefits from the new solutions in terms of IT security and compliance. Company data are better protected against unauthorized access, and numerous requirements of the ISO 27001 guideline, such as the rights/role concept, can now be implemented easily and reliably.

For Jörg Frenker, however, the status quo is not the end of the story. The IT manager is already planning to amend password policies as part of the next project to be implemented using the ManageEngine tools. In line with the recommendations of the Federal Office for Information Security (BSI), plans include two-factor authentication, more complex passwords, and the elimination of regular password changes – no problem thanks to ADSelfService Plus.





# New Solution from ManageEngine

ManageEngine adds new endpoint management and network monitoring solution for IT service providers to its product portfolio.

TEXT: Editorial staff PICTURE: © ESB Professional / Shutterstock.com; © ManageEngine

IT service providers need to understand their customers' IT networks and ideally automate everyday tasks – such as complying with particular security policies, meeting the customer's service level agreements (SLAs), generating specific reports, or invoicing. This often requires a variety of tools to monitor network performance and to manage individual endpoints, which Managed Service Providers (MSPs)

have to switch between. At the same time, the complexity of network management and the number of potential security threats are continuously on the rise.

To help IT service providers meet these challenges, ManageEngine has created "RMM Central", an integrated remote monitoring and management solution that allows MSPs to manage

and monitor their customers' entire IT networks from one centralized work interface. This gives IT service providers a detailed insight into each network they are responsible for in just one tool.

The new solution combines network monitoring functions, such as detecting and resolving performance issues and network errors, and endpoint

management tasks, such as installing patches, remote device maintenance and compiling hardware and software inventory lists. Bundling the various functions into one console simplifies everyday routine activities, minimizes resource use and costs, and maximizes the return on investment.

**Highlights von RMM Central**

» **Seamless network performance monitoring:** IT service providers can identify and resolve performance issues, alarms and outages before they cause significant problems and downtime.

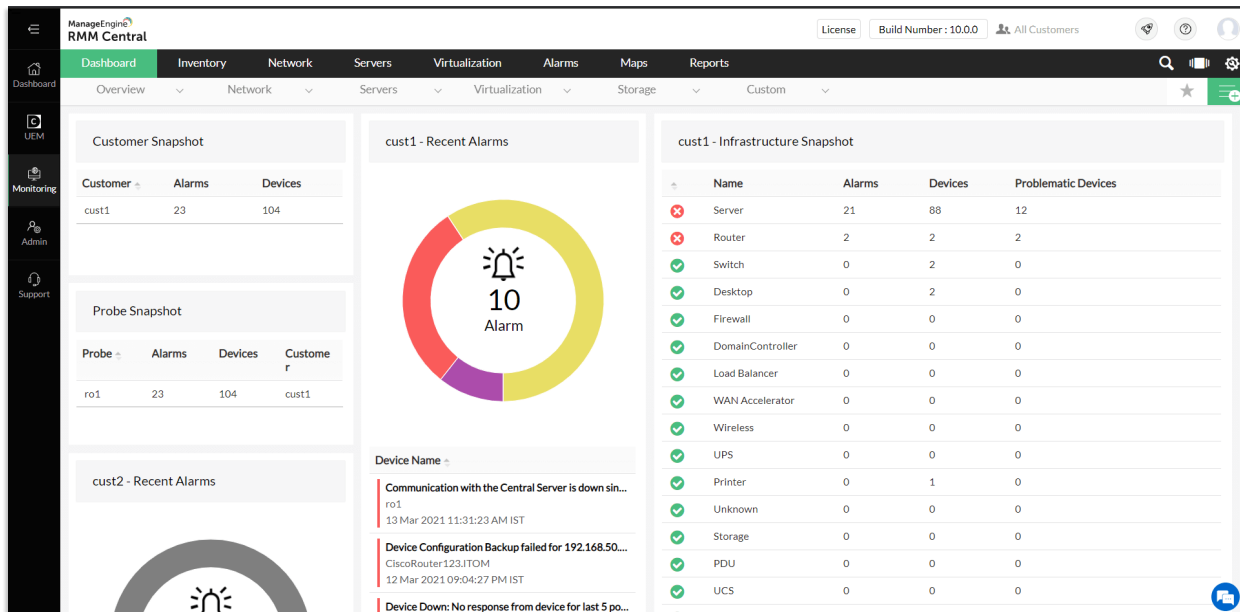
» **Automated, proactive IT security:** The solution can analyze and distribute missing patches, adapt security policies, and implement custom configurations for each customer network.

» **Centralized asset management:** Managed Service Providers can centrally manage all of their customers' hardware and software assets, analyze software usage, monitor software licenses, as well as detect and blacklist malicious applications on all managed devices.

» **Instant remote troubleshooting:** RMM Central allows IT service providers to remotely connect to endpoints, communicate with end users via voice and video during troubleshooting, and collaborate with multiple engineers simultaneously.

**Free trial version**

Further information and a free 30-day trial version are available from: <https://www.manageengine.de/rmm-central> (German only).



1 The RMM Central dashboard presents IT service providers with all the important information about their customers' networks at a glance.

# Distinguished Helpdesk Solution

“ServiceDesk Plus Cloud” from ManageEngine receives “PinkVERIFY ITIL 4” certification.

TEXT: Editorial staff PICTURES: © tomertu / Shutterstock.com; © Pink Elephant



Pink Elephant’s “PinkVERIFY ITIL 4” certification is a valuable tool for many organizations when it comes to choosing the right IT Service Management (ITSM) tool. It is a mark of the tool’s quality and compatibility with ITIL 4 practices, as well as terminology, functionality, integration and workflow requirements.

ManageEngine’s ServiceDesk Plus Cloud ITSM software has recently received this certification for the ITIL practices “Incident Management”, “Change Enablement”, “Problem Management” and “Service Request Management”. Pink Elephant, a leading provider of ITIL certifications, confirms that the software distributed in Germany by MicroNova complies with the recommendations and standard procedures of ITIL 4.

In addition to ITIL 4 compatibility, Pink Elephant’s certification proves that ServiceDesk Plus provides users with the tools needed to implement ITIL 4 best practices within their organization. In order to receive the PinkVERIFY certification, the ManageEngine solution had to undergo an extensive evaluation process. This began with a detailed questionnaire provided by Pink Elephant on general and technical criteria and on criteria focused on the core module.

## ManageEngine ServiceDesk Plus

ServiceDesk Plus is an ITIL-ready helpdesk software solution with integrated asset and project management. The easy-to-use solution helps IT support teams deliver a premium service to end users with comprehensive ITSM capabilities. ServiceDesk Plus is used by more than 100,000 companies in 185 countries. The solution is available in three editions and 37 different languages. Further information and a free 30-day trial version are available from (German only): <https://www.manageengine.de/servicedeskplus>

Other components of the process included a live product demo, and analysis by an accredited “Pink Elephant IT Management Consultant”. The overall result for ServiceDesk Plus: The solution meets the evaluation criteria for each of the four ITIL 4 practices mentioned at 100 percent – a result that only four ITSM solutions from other vendors had previously achieved.



## 2 new tips for successful project management

In the last issue of InNOVation we said "Project management is as important as it is unique". And because this remains true, our team has come up with two new tips and scenarios that can easily be implemented with monday.com.

TEXT: Felix Bauer, Felix Bacci PICTURES: © ESB Basic / Shutterstock.com; © monday.com

### Scenario 1: Planning team resources properly

As more and more people are working from home, more than ever it is essential that managers pay attention to their employees – because particularly when not everyone is working in the same place, it is all too easy for employees to become overloaded with work since there is no classic finishing time, or because the sum of projects and responsibilities becomes too great. Managing teams without this live insight is extra challenging.

Often, employee frustration could simply be avoided because, for example, other team members still have free capacity – but due to a lack of structured (!) transparency, managers are sometimes simply unaware of this. And even the most helpful colleagues can't do anything if they don't know what challenges their teammates are facing. The same applies to the HR department, which again can only help if it is actually aware of the situation.

**The goal:** Transparent time management for projects and overview of capacity among employees including identification of bottlenecks.

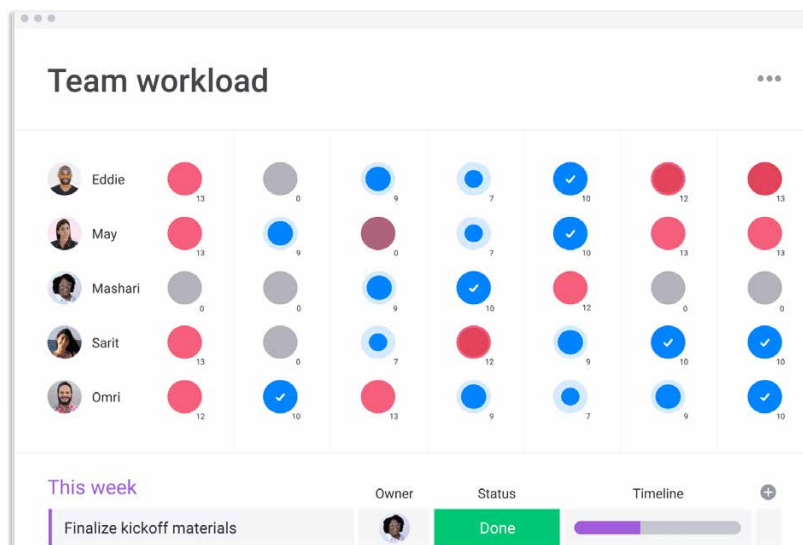
**The solution:** Structured resource management, i.e. planning how resources are used and how they are allocated, as well as tracking all hours already worked on projects – essential for successful project management. One way to do just that is with the Workload Widget from monday.com.

This can be used to track project times and display free capacities of individual team members.

Information is clearly arranged as usual in monday.com: Once the information has been entered, the widget automatically displays and constantly updates the data in one of two given views. It is possible to choose between effort (in hours) and number of projects/tasks (see screenshot). A red circle means that person is overloaded; a half-filled blue circle means free capacity; while a blue circle with a check mark represents perfect capacity utilization. Clear and simple.

### monday.com at MicroNova

As a gold partner of monday.com, MicroNova supports teams, departments (marketing, sales, development, HR, etc.), agencies, and companies in setting up the comprehensive project management and collaboration tool monday.com and customizing it perfectly to their individual needs. Whether first steps or a complex special request: Your personal contact will help you turn your individual wishes into reality with the help of boards, dashboards, automation or integrations in monday.com. This is our service promise.



## 1 Scheduling team resources with the workload widget

**Scenario 2: Implementing project management quickly and effectively**

At the foot of the mountain, a glance upwards can be discouraging. The same is also true of project management: Once companies have recognized a need, the real challenge is to identify, plan and deploy the implementation as a whole. How to build and design workflows so that they are optimized and automated? Where to find time and resources for organization and migration? How to train team members?

The goal: To make the introduction of project management fast and effective.

The solution: If it's a matter of getting up and running quickly, it is often worth considering the use of cloud-based software as it is generally easy to set up and handle. If it also comes with an appealing GUI, like monday.com, nothing stands in the way of rapid productive use: Project managers need only a few hours to familiarize themselves with the solution.

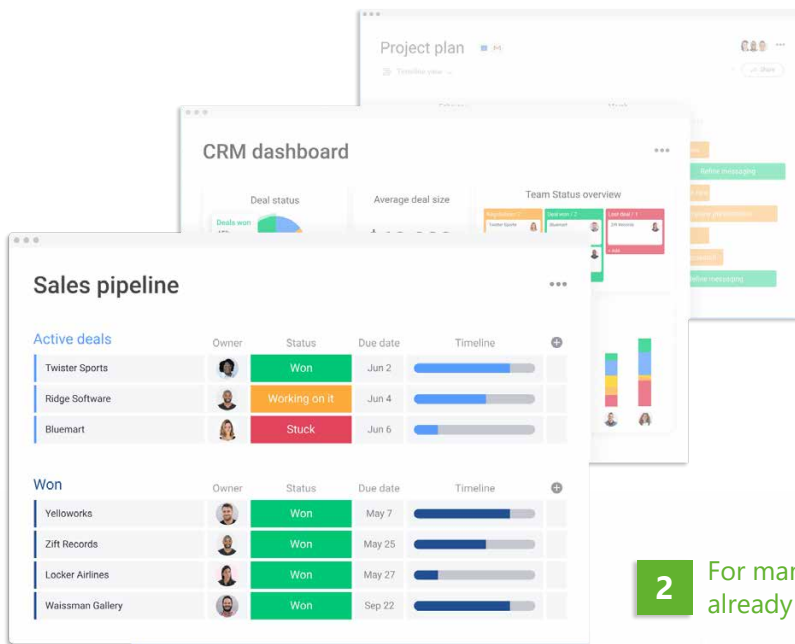
The templates already available for many scenarios are particularly helpful when using monday.com. These pre-built templates, charts, and task lists save time because they are based on established best practices from monday.com customers in a wide range of industries. Of course, these templates

can also be used as a starting point for your own process setup.

<https://monday.com/lang/de/project-management/templates>

**Projektmanagement mit monday.com**

monday.com is a cloud-based project management tool that helps teams work together more efficiently. What's special about this tool is that all communication about the project takes place within the tool itself or can be centrally pooled and organized in the tool thanks to numerous integrations (such as Microsoft Outlook, Trello, Jira, etc.). All information relevant to the project – from the task list, e-mails and chat messages to files – is centrally organized in monday.com, making it easy to find. For further information please see: <https://tinyurl.com/MicroNova-WorkOS>



**2** For many use cases there are already prefabricated templates.



# Sustainable Business

Dear Reader,

MicroNova has been operating sustainably for well over 30 years. We have been delivering innovations to you, our customers, without capital providers, venture capital, etc., but rather self-financed – this principle has often been mentioned in our customer magazine. It gives us room for maneuver to shape our future in the long term. After all, that's what sustainability is ultimately about: making the future possible through a sensible here and now.

Over all these years, we have deliberately chosen this approach, which is conservative in the best sense of the word. In my view, it is the best take for combining innovation with reliability and predictability for our customers and security for our team. This is because our goal was and is not to "make a fast buck", but to achieve long-term economic harmony. A balance, if you will.

Balance and sustainability are also essential in the ecological context. We haven't talked much about this dimension so far which doesn't mean we have been neglecting the subject. On the contrary. I too wish for my two grandchildren and future generations to grow up and live in an intact environment. That is why I am glad about the increased attention of the topic in business and society, hence it is a good time to provide appropriate insights from MicroNova.

Ecological sustainability is already part of our customer projects. For example, the Testing Solutions team supports manufacturers and suppliers in making mobility more environmentally friendly – starting with many test kilometers that do not have to take place in the vehicle thanks to our simulation solutions, and extending to the transformation of the powertrain.

MicroNova itself also does a lot in terms of ecology. Our new building at our headquarters in Vierkirchen meets the strict German KfW Efficiency House 55 energy standard and is heated by district heating from a biogas plant. We have already written about our two hives in InNOVation – by the way, the wish and the plan for this were developed long before the petition for a referendum on "Save the Bees". An insect hotel has since been added. Our canteen service is increasingly using sustainable packaging, etc. There are many small steps that add up to a lot of investment and hopefully make a positive contribution.

It might come as a surprise to many readers that MicroNova covers in terms of figures its entire electricity consumption with its own renewable energy, as I was able to acquire a small hydropower plant near our headquarters almost 20 years ago. It generates over 300,000kWh of environmentally friendly electricity a year, which is significantly more than MicroNova consumes in Germany, and thus avoids 223 tons of CO<sub>2</sub> – according to comparative figures from the German Federal Environment Agency. MicroNova is therefore more than CO<sub>2</sub> neutral thanks to our production of renewable energy.

Of course, we also take care to minimize consumption, for example by using LED lighting and other energy-saving technology. Incidentally, these LEDs are insect-friendly outdoors, both in terms of color temperature (3,000 K of warm, white light) and operating times. This prevents the many inhabitants of our flowering meadow, which already binds approx. 1.5 tons of CO<sub>2</sub> per year\* in addition to the trees and shrubs also planted, and of the insect hotel from being drawn into a light trap.

As you can see, we have accomplished a lot over the years – just like many other businesses. I therefore hope that the current political wind of change in terms of environmental sustainability will see all stakeholders as allies and understand their achievements as well as their capabilities. MicroNova itself will continue to do its utmost in the pursuit of ecological and economic harmony.

With warm regards,  
Josef W. Karl



Josef W. Karl

\* <https://ooe.lko.at/gr%C3%BCnland-schafft-luft-zum-leben+2400+3113330>

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