AKKODIS

Thinkers
& Makers

A Smart Industry tech magazine, sharing insights and stories from the people that make incredible happen through their ideas & their actions.

The Mainframe is Dead, Long Live the Mainframe

The New Sky Economy

Releasing a Digital Twin Into the Real World of Aviation

How a Bike Factory is Boosting Sustainability & Inclusivity

AKKODIS

Make Incredible Happen

Welcome to Thinkers & Makers, the Smart Industry Tech Magazine

Thinkers & Makers is an inclusive concept that humanizes the approach to engineering and technology. It encompasses the breadth of our people and how we identify and solve problems at Akkodis. We are Thinkers who stretch outside their comfort zones to drive innovation, and Makers who team up with clients and partners to turn those innovations into tangible solutions. Together, we enable a smarter, more sustainable tomorrow. This is the 'Smart' in Smart Industry...and it will be brought to life over and over again in this, and every issue of Thinkers & Makers magazine.

Editorial

> **"** The Whole **is** **Greater** than the Sum of its Parts**.**

Jan Gupta
President Akkodis

Welcome to our latest issue of Thinkers & Makers – the Smart Industry tech magazine brought to you by Akkodis.

A motor vehicle is more useful than its components, and a building is more valuable than the pile of lumber and other materials that comprise it. This concept of the 'whole' being greater than its 'parts' was introduced over 2,000 years ago by Ancient Greek philosopher, Aristotle, and still has relevance today.

Tech is a Critical 'Part'

Smart Industry leverages digitalization to connect things and use data more intelligently. It is transforming the world's industries and driving economies and societies forward. Digital technology is a critical 'part' that contributes great value to the 'whole' of many of our 21st century things, processes and solutions.

This issue of Thinkers & Makers features several examples of how tech is being used to bring individual 'parts' together in ways not previously possible to create game-changing solutions across industries and around the world that make people's lives safer, more efficient and more fulfilling. You'll discover how digital control is being leveraged to bring rail and firefighting technologies together to create the world's first rescue super-trains that will protect European railways and tunnels. You'll read about how it has helped bring about the advent of the Software Defined Satellite, uniting hardware and software, ground and air, to redefine a satellite's payload in orbit, a milestone in space engineering.

You'll explore the world of e-mobility -- learning of Akkodis' concept for a modular, standardized battery infrastructure that, as part of an ecosystem that brings together a variety of industries including Automotive & Transportation and Energy, can have ground-breaking impacts across the e-mobility value chain and beyond. You'll also read about how production and manufacturing logistics expertise can be applied to build a state-of-the-art e-bike factory complete with a workspace designed to accommodate workers with disabilities.

Finally, you'll see how technology can bring together physical and digital worlds. In Aviation, you'll read about a high-tech digital platform that provides aircraft manufacturers with an unprecedented post-delivery view of their planes to help serve their clients faster and more efficiently. You'll also see how data analytics used in sports help the world's top rugby players maintain their competitive edge.

Stronger Together

As you immerse yourself in the articles that follow, you'll hear from our own Thinkers & Makers – the Akkodis tech experts that are driving the Smart Industry transformation. Reflecting on their insights, their tech expertise is clear, but what is also clear is their amazing ability to connect with our clients and partners, understand their needs, and envision a tech-enabled future beyond what exists today.

Mathematically, the whole is equal to the sum of its parts, neither more nor less. Although I'm an engineer at heart, I must say that my experience at Akkodis tells me otherwise. I have witnessed firsthand that what we do together with our clients and partners is truly greater than what any of us can do alone. Of course, tech is a 'part' that contributes great value to the 'whole,' but more so, it is the synergy that exists between individuals working together in a cooperative effort that brings about revolutionary outcomes.

I hope you enjoy this edition of Thinkers & Makers and together, let's make 1 + 1 = 3.

Releasing a Digital Twin Into the Real World of Aviation

3DJuump, originally a digital platform allowing aerospace design and production engineers to work together on complex hi-tech products, is branching out from the design office to the day-to-day world of aviation.

The 3DJuump platform started with a research project involving very large digital mockups of an aircraft used to help build 3D training simulators, explains Sylvain Bonneau, head of the Akkodis 3DJuump division.

"We discovered that most of the 3D material existed already, in CAD files," Bonneau says. But even though the data was available, we had to recreate it from scratch with infographics. It was frustrating to know the data was there, we just couldn't use it."

The tools that would have allowed the team to transfer the data simply did not exist.

"CAD files are mainly mathematical descriptions of the surface of an object. On the other hand, mass market 3D graphics for real-time display are based on meshes, consisting of triangles. These are two different languages," Bonneau says. "We wanted to bridge this gap to avoid recreating everything."

From Drawing Board to Proprietary Solution

A portable server played a key role in moving the platform developed by Bonneau and his team from the drawing board to the real world of aircraft maintenance. They set themselves an ambitious goal: displaying the huge, data rich digital mockup of an aircraft and its parts on a standard computer. And, amazingly, as far back as 2008, they got close to achieving it. The team members therefore decided to develop their work into a commercial product.

Fast forward to 2023 and 3DJuump is now a considerable success and in use as the main digital collaboration platform for design and product engineering teams across several parts of a global aircraft manufacturer, including its space and helicopter divisions.

Bonneau and his team wondered if the 3DJuump digital mockup could now be used to interpret real-life data from in-use aircraft? Could a digital twin help manufacturers keep better track of their aircraft after delivery to operators?

Post-Delivery Data

Information about aircraft once they have been delivered can be useful to manufacturers in many ways. Over the lifetime of an aircraft, it will be subject to several modifications, cabin upgrades or redesigns to make it fit for new purposes.

Aircraft owners often go back to the manufacturer for redesign and modification. But to be able to make a tailor-made and precisely priced proposal for a specific aircraft, manufacturers need data, everything from documentation showing modifications to equipment flight time.

Specific aircraft data would make it much easier and cheaper for manufacturers to design modifications and a digital twin of a specific aircraft would help them give customers a real vision of the proposed plan.

> " Manufacturers have no real idea of their aircraft 'in the wild', what modifications have been carried out, and so on, Bonneau says. This is a very big issue for them.

Operators, whose transport aircraft are regularly modified or upgraded to fulfill new roles, are interested in sharing aircraft data with manufacturers. The Akkodis team of platform specialists works with clients to integrate real-life data into the 3DJuump digital twin platform.

Bonneau believes other users, including naval craft with components provided by different suppliers, could benefit from the platform.
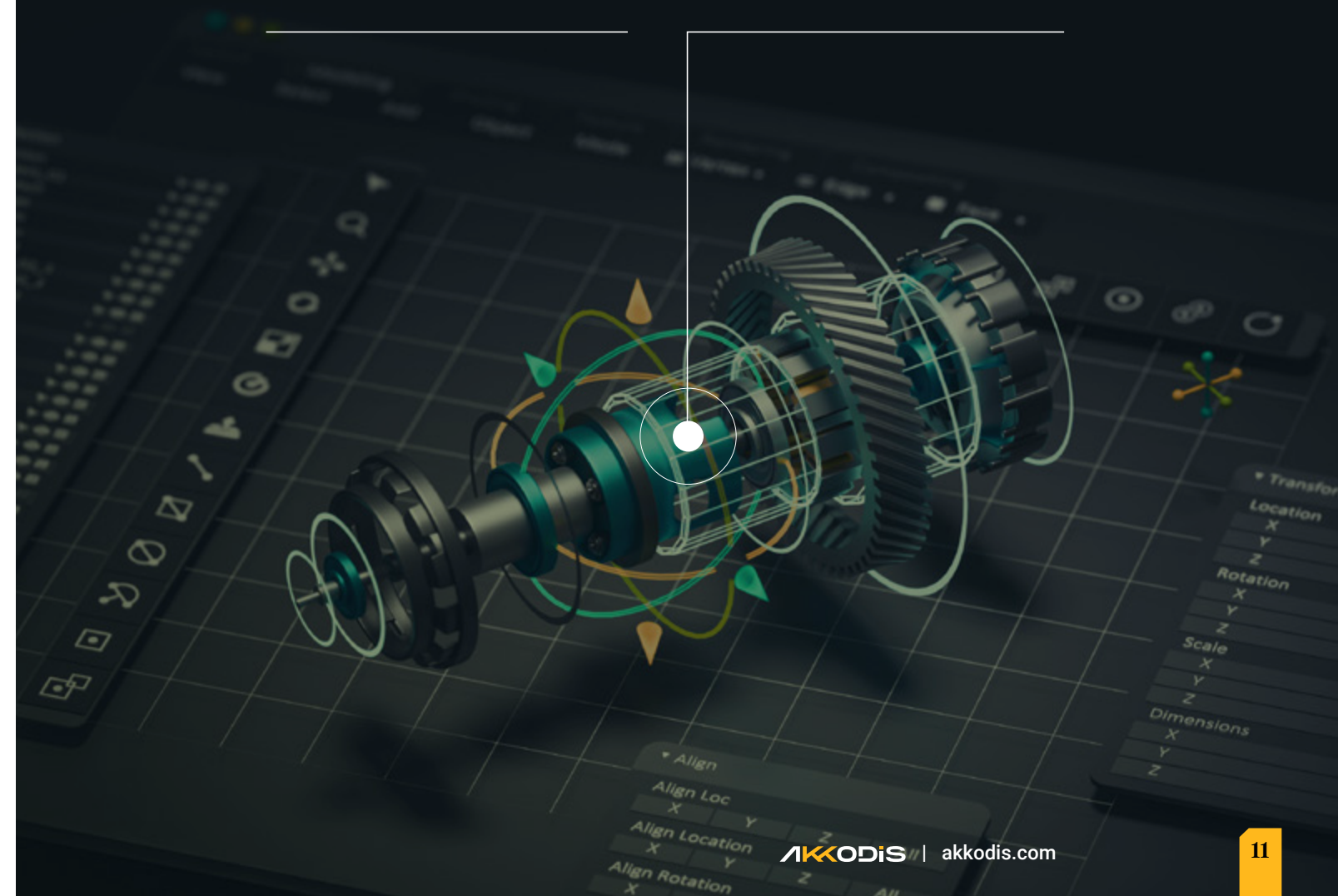
> To establish an efficient maintenance platform for such a super complex piece of machinery, with information flowing freely between subcontractors, navy, on-board and on-shore maintenance teams – this is where 3DJuump could come in.

The team ran up against one tricky problem – how to attach data to individual aircraft parts. While aircraft parts are identifiable by serial number, manufacturers do not have access to the information they can provide, for example whether a part has been replaced by an identical one and how long it has been in operation.

The team needed to find a way to distinguish between a part number, which identifies a type of component, and a serial number, which identifies one specific piece of equipment.

"The platform was not initially ready to bear this kind of information and we had to make it evolve," Bonneau says. "That was the main difficulty, but we solved the problem, and I think that makes 3DJuump maybe the only platform able to support this kind of use case.

Portable Server Solution

The team also had to adapt 3DJuump to address the set-up of private communication networks. When working on adapting 3DJuump, which is a client/server platform, to maintenance of classified transport aircraft, there were security-related difficulties in trying to deploy it in the client's private network. The solution to that problem was to run a portable server instead.

Now, the standalone solution of a large suitcase with a server, ad-hoc Wi-Fi and a number of tablets connected to it ensures the 3DJuump digital twin is available in the aircraft on a small tablet connected to the mobile server. Personnel can do a tour of the aircraft before and after every flight and check and document every change that occurs.

In the case of a cabin upgrade, aircraft may spend weeks and months on the ground. With a 3DJuump tablet and portable server, technicians can document their work daily, aligning it with the design office and sharing their view of the work.

As the digital and the physical world increasingly converge, Bonneau and his team of digital experts are doing an innovative job in aviation, bringing digital mock-ups to life with up to the minute real-life information.

Get in touch with our
3DJuump Experts

How a Bike Factory is

Boosting Sustainability & Inclusivity

Manufacturing Boost

APFE wanted to take advantage of the strong and growing demand and came to Akkodis for help. At first the idea was to offer APFE skills-based sponsorship, a concept enshrined in French law that allows employees to put their skills to use by helping social causes. But it quickly became clear that the scope of the project was too ambitious for that format to make sense.

"It was too complicated a project to manage it via skills-sponsorship, but APFE had a budget for this transformation so we put forward a plan," says Laurent Chaput, technology offering manager at Akkodis.

The first step was a feasibility study. "We have a lot of experience in production lines – we've worked with many major manufacturers across different sectors," he adds.

The APFE project was on a much smaller scale, but the principles were the same – setting out a plan for the production, logistics and storage zones and the electrical and airflow supply for machines at the site and then turning the plan into a reality. Initially, the team carried out feasibility studies for a 5,000 m² building based on APFE's ambition to produce 200,000 bicycles per year. However, funding issues meant the project had to be adapted and APFE decided to shift the plans to a space on its own site, a former factory for which there was no historical data.

F rance is the spiritual home of cycling. As well as hosting the world's most famous cycle race, the Tour de France, it's where the pedal cycle was invented (or so the legend goes). Now, with help from Akkodis, a bicycle factory in western France is making its mark in two important areas – sustainable mobility and inclusivity in the workplace.

Akkodis has been working with APF Entreprises (APFE) a company that is part of APF, a national organization that helps promote the inclusion of people with disabilities in the workplace. The two teamed up in 2022 to create a specially adapted, inclusive factory space for workers with disabilities to assemble cycles of all kinds, tapping right into the growing green mobility revolution.

Europe's green transport market is booming, as citizens seek ways to limit their environmental footprint and take better care of their own health. Cycling ticks all the boxes, with battery-powered bikes a particularly versatile solution. They're greener than a car, but thanks to their batteries, more practical than a standard cycle, particularly when it comes to hilly routes or long distances.

> "
>
> The team came up with a specially adapted workspace for 14 AFPE employees, which is just as productive as a standard assembly line.

Revising the Plan

The team had to revise its implementation study for the cycle assembly line, as well as revising the logistics part, including the flows to supply the production line, delivery of raw materials, storage of finished bikes and preparation areas for assembly line workers.

Their simulations helped establish that a production rate of 80,000 cycles (standard mountain and city bikes, children's bikes and electric cycles) per year was the maximum the new space would allow, taking into account factors including the positions of each workstation on the production line and the storage areas.

As construction of the production line began, Akkodis was also studying the site's set-up in terms of the supply of compressed air and electricity needed to power the assembly line's different workstations and tools. The experts concluded that the site's existing electrical system, which was in a poor state and badly documented, needed to be refitted, so the team created a new, specially adapted network.

Surfing the Cycling Wave

As well as promoting social inclusivity and green transport, launching the production of high-tech electric bicycles in France gives an economic boost to the local area. Crucially, the space needed to allow for the company's staff, no matter their disability, to focus on their work assembling bicycles.

Taking part in a project that helps encourage greater inclusivity was important. "There is a strong culture of inclusivity within Akkodis on everything from gender and sexual orientation to social diversity and disability." Chaput says.

The team came up with a specially adapted workspace for 14 AFPE employees, which is just as productive as a standard assembly line. "We researched the specific requirements of employees with disabilities and came up with plans to fit anti-fatigue work mats, practical and light accessories and in some cases, specially adapted seats." says Akkodis project manager Thierry Créach who led the project.

The new factory was inaugurated in July 2023 and allows APFE to showcase its expertise in including people with disabilities in the workforce.

APFE is not stopping there. It also wants to work on the renovation and reuse of public-hire bicycles, to improve their environmental footprint. After APFE obtained a license to assemble electric tricycles, Akkodis managed to integrate that new plan into the overall set-up at the production site, using 3D modeling software to map out the changes before they became a reality. APFE now has plans to present 15 of the electric tricycles at the Paralympic Games and a long-term target of producing 1,500 per year.

The AA Battery of the Future

While automotive manufacturers strive to develop proprietary car batteries with better range and more power than their competitors, Akkodis envisions a potential future where standardization will lead to significant ecosystem benefits.

A seemingly unremarkable blue box lies at the heart of a new mobility ecosystem developed by a cross-disciplinary team of Akkodis engineers. It may not look spectacular, but it is able to power almost anything electrical – providing a potential solution to a key challenge as the electrification of mobility, industry and broader society gathers momentum.

Developing battery systems that are powerful, versatile, and scalable is a big challenge. The Akkodis Smart Ecosystem team believes the answer to that question must be holistic. Instead of focusing on optimizing batteries for one specific purpose, it is time to develop storage solutions that work across the entire e-mobility value chain. What is more, they should be adaptable to other domains, in which batteries are key to switching from fossil fuels to renewable energy.

Unremarkable Blue Box

This is where the unremarkable blue box comes in. It is the keystone of an end-to-end solution designed not only to power a range of electric vehicles but also to go beyond the transport sector for use in other battery-powered applications.

In its role as the Swiss Army knife of batteries, the blue box is uniform on the outside but flexible on the inside. Size and interface are standardized, yet different battery chemistries and cell types can be used inside the module. This allows for various configurations, such as a high-power output or a high number of charging cycles.

"Our idea is to have a battery system usable in the automotive field and combine it with a broad range of other use cases," says Nicolas Billebault, department director at Akkodis E-Mobility & Energy. "To make that work you need standardization. In the past, you had the AA battery as a standard form factor you could use in every possible electronic device. This is what the AA battery of the future could look like. You can use it in your car, your e-scooter, and your cargo bike. And you can use it to store the energy produced by the solar installation on your house."

> "
> Our idea is to have a battery system usable in the automotive field and combine it with a broad range of other use cases.

Smart Battery Concept

Akkodis presented the Smart Battery concept at the IAA International Motor Show Germany in Munich in September, including a small electric car known as the Akkodis Urban Lifestyle Vehicle (ULV).

"The ULV is a good example of how the battery concept works," says Frank Huff, vice president Akkodis Design & Concept. "People driving in the city don't use much range during the week, commuting from home to work. It doesn't make sense to carry a large and heavy battery around in your car but at the weekend you may need full battery capacity for longer trips. In our ULV, you have a reduced battery as a fixed part of the car, and the possibility of adding extra battery modules for weekends and holidays."

Right Battery, Right Time, Right Place

It's all about having the right battery capacity at the right time in the right place. During the week extra car batteries could be used to store energy coming from rooftop solar panels. Making batteries flexible means both optimizing their usage and reducing the number of batteries needed, with a significant sustainability benefit as fewer resources are used.

Billebault and Huff freely acknowledge that their idea is not new. At least not within the automotive sector, where interchangeable batteries for the likes of e-scooters are quite common in Asia. But the idea of utilizing the same battery across different forms of transportation, and going beyond automotive, attracted plenty of attention at the Munich show.

"We had a lot of interesting discussions with people from many different sectors, who came to us with use cases we hadn't even thought of such as motorhomes," Huff says. "The battery in your motorhome stands unused maybe 90% of the time. Why not use it elsewhere?"

But that level of versatility needs more than "just" the AA battery of the future – the battery needs to be surrounded by a whole universe of technology.

"
We had a lot of interesting discussions with people from many different sectors, who came to us with use cases we hadn't even thought of such as motorhomes," Huff says. "The battery in your motorhome stands unused maybe 90% of the time. Why not use it elsewhere?

The Akkodis team has built on years of experience with battery technology, charging stations and control software to create that ecosystem. Swapping stations are an important part of the Smart Battery infrastructure, together with an e-scooter developed by Akkodis partner Trinity Electric Vehicles and a photovoltaic system developed in cooperation with photovoltaic expert Qcells.

On the software side, the battery management system is hosted in the cloud with AI-supported battery state-of-health capability, determining when the battery should be changed and leading the user to a fully charged battery at the nearest charging station. Akkodis also uses digital ledger technologies to ensure trusted traceability of the exchangeable battery modules, which can, of course, be completely recycled.
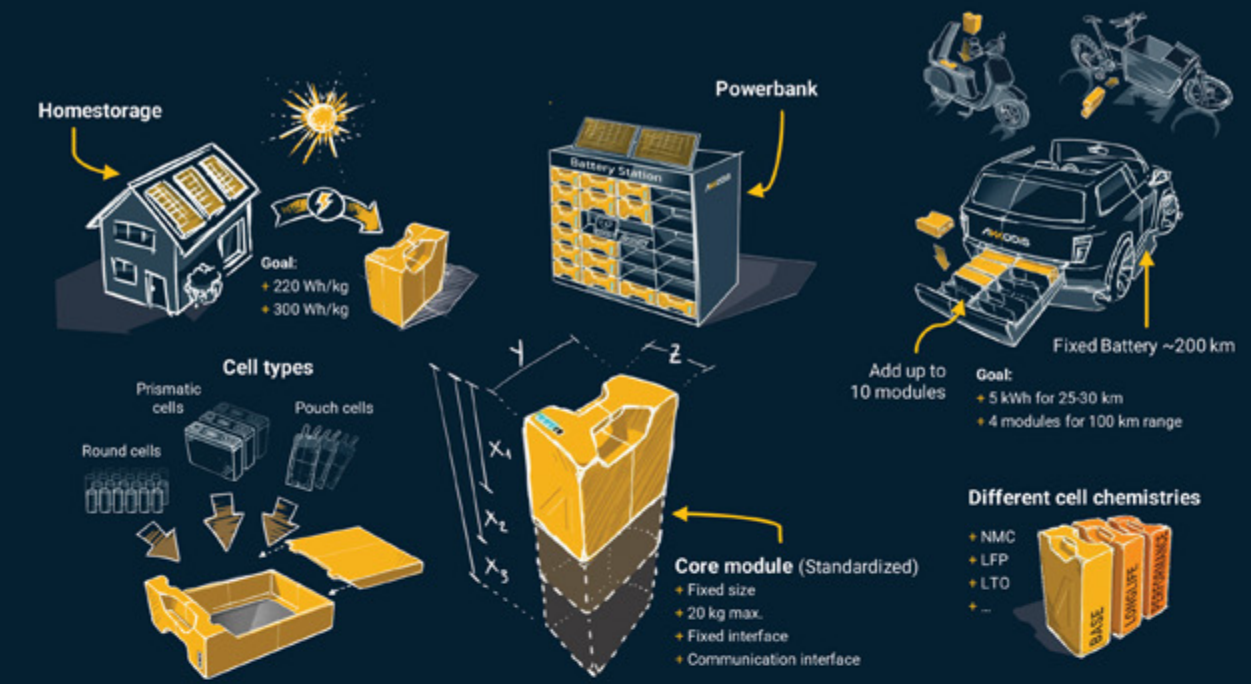
Smart Battery Ecosystem

Overcoming Challenges

So why not get to work right away to create such a battery ecosystem?

There are challenges to overcome before large-scale adoption. Automotive manufacturers may like the concept but for now, the high voltage battery is the most strategic component of their vehicles and they invest heavily in optimizing battery power, range, lifetime and management. For that reason, they may not be interested in a standardized solution. For now.

"
We've had a super strong collaboration between the different technical departments in Akkodis. In my opinion it's a good example of how we can work together and how big our portfolio is in this area.

But there's nothing to stop players from different sectors – energy providers, governments, battery manufacturers – joining forces to promote such an ecosystem.

"As for Akkodis, it was all about demonstrating the concept and highlighting the in-house capabilities available to make it a reality, says Billebault. "We've had a super strong collaboration between the different technical departments in Akkodis. So many people have been working – and are still working – on this concept. In my opinion it's a good example of how we can work together and how big our portfolio is in this area."

The teams have covered all the technical aspects such as different chemistries, energy density, design of mechanical and electrical interfaces, thermic software, battery management and more.

"On all these topics we have the technical depth to be able to build everything and make it work," Huff says. "Right now, we're working on building fully functional prototypes of every part of the Smart Battery ecosystem, to demonstrate even more precisely and convincingly what the battery infrastructure of the future could look like. It's only a blue box, but with so much potential!"

The New
Sky Economy

Access to space has become cheaper than ever, lowering the threshold for innovation built on space-based resources. Launch costs are falling, leading to a growing number of satellites. New generations of satellites are becoming increasingly software-defined, and satellite-provided services becoming more affordable for a growing number of application developers. The New Sky Economy is upon us.

More and more satellites are circling the Earth, whether they're large conventional satellites positioned in high and medium Earth orbit or the new, emerging low Earth orbit satellite systems. The closer to Earth they are, the smaller and more numerous they become, going from 10s to 100s to even 1000s, although these swarms of mini satellites are still in their infancy. Experts call this trend "The New Sky Economy".

Our satellite infrastructure is becoming more and more powerful to serve the needs for communication, exploration and monitoring: Earth observation is becoming increasingly fine-grained, for scientific, commercial and defense purposes. The satcom domain is evolving rapidly to cater to the connectivity demands for IoT, M2M and various mobility applications. Satellite navigation is evolving into an indispensable tool for many purposes and an integral part of various autonomy solutions.

" Arguably the most fundamental change in satellite technology is the advent of the Software Defined Satellite. By moving an increasing number of properties from hardware to software, new satellites have the capability to get their payload redefined from the ground system, instead of being statically configured.

Space Engineering is Adapting Accordingly

For increased competitiveness, development time is shortened, and cost reduction is high on the agenda. A way to achieve both is by moving towards large series production and from "hand built" to industrial manufacturing.

Payload systems are growing more sophisticated, with remote sensing technologies for Earth observation, sat-nav etc. evolving, together with new generations of radio technology able to cope with the steady increase in data rates.

Digital technology is indispensable, for the development of new applications and services as well as in optimizing the tools for system engineering, testing, simulation and more. Technologies like cloud and machine learning are giving rise to scalable and innovative business models lowering the threshold or entry into the space sector.

And needless to say, security and safety are top priority, whether it's mission safety, cyber security or data processing and analysis.

Arguably the most fundamental change in satellite technology is the advent of the Software Defined Satellite. By moving an increasing number of properties from hardware to software, new satellites have the capability of getting their payload redefined from the ground system, instead of being statically configured.

The payload, which is the equipment the satellite carries to carry out its mission, can be reconfigured remotely. In this way, instead of launching a new satellite, operators could take a telecom satellite and give it another mission.

This capability is a game changer in the industry, allowing new generations of satellites to adapt to new roles in a much more agile manner than before. Satellites can be reconfigured and thus change their mission throughout their lifetime based on changing demand. The next-generation software-defined network from the ground to space promises more flexibility, such as providing coverage for moving targets or for temporary purposes like natural disasters.

In recent years, the Akkodis Space Software Service Center, has grown significantly, to address customer demand for software development. The center is developing software for mission control, satellite navigation, image analysis etc., for on-board segments as well as integration, verification and validation related to the ground segments.

Space Inspire™

Akkodis is involved in the design and simulation of Attitude and Orbit Control System (AOCS), and Satellite Operation definition and testing activities for the Space Inspire™ product line of Thales Alenia Space. The solution, which is software-defined and thus reprogrammable in orbit, allows satellite operators unprecedented flexibility in how they allocate capacity to adapt to changing demand.

Spacebus Neo

Akkodis has contributed to the design and development of the Spacebus Neo geostationary satellite platform. Spacebus Neo features all-electric propulsion, a flexible, modular system architecture and highly configurable software, making the platform easily adaptable to different payload types.

Akkodis teams in Toulouse, Cannes and Bucharest were actively engaged in various aspects of the platform's design and development including the definition of payload configuration strategy, the development, validation and testing of Platform On-Board Software as well as the development of the satellite configuration database. In addition to the platform-related activities, Akkodis worked on software tuning and configuration for each satellite.

Copernicus Marine Service

The Copernicus Marine Service implemented by Mercator Ocean International, is the European Union's Earth observation programme, which monitors the health of the ocean. The programme offers information services that draw from satellite Earth Observation and non-space data to provide regular and systematic baseline information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems. Akkodis tech experts supported Mercator in the implementation of hardware and software infrastructure of the Copernicus Marine Environment Monitoring Service (CMEMS), integration of new operation chains, and the realization of Front and Back-office specifications.

"

Since the start of our collaboration in 2018, Akkodis successfully put in place a team to support Mercator as it moved forward to greater operationality as an Entrusted Entity by the European Commission for the Copernicus Programme. Working in a very complex environment such as ours, at the edge of science (ocean forecasting, climate systems, earth observations), of HPC and cloud computing, leveraging on Akkodis experts that can adapt swiftly to our context made a big difference. Today, while we are shaping up the future European Digital Twin of the Ocean (EDITO Horizon Europe Project) Akkodis experts support Mercator, empowering us with the most recent technologies.

Renaud Dussurget
Head of Operational Engineering, Mercator Ocean International

OneWeb

OneWeb is a constellation of 648 Low Earth Orbit satellites which aims to provide high-speed Internet access in areas not served by terrestrial links. Akkodis experts were involved in multiple areas of the project, predominantly operations engineering activities leading up to the first launch, as well as in orbit support such as in-flight anomaly analysis and technical follow-up. The team also provided support on functional validation activities.

Get in touch with our
Aerospace & Defense Experts

Blazing the Trail:
Equipping a Firefighting Super Train

Austrian and Swiss railways will soon be making use of a brand new, bright yellow firefighting super train to keep their networks safe – and Akkodis is providing the controls that make it possible.

An Austrian railway operator has commissioned 18 hi-tech Servicejet trains, which are equipped with 40 m³ of water and two types of fire-extinguishing foam cannons, to protect its network, which includes parts of Switzerland.

The €230 million trains travel at 160km/h and can evacuate up to 324 people. They are equipped with thermal imaging cameras and protective ventilation and are designed to fight fires under difficult conditions in railway tunnels. The first is due to go into service in 2024.

Working closely with the firefighting equipment manufacturer, Akkodis is tasked with designing the complex electronic control system enabling the on-board firefighters to operate the train's high- and low-pressure water cannons.

"Mainly, we work in the automotive sector, so switching to rail was a first for us," says team lead Marc Meise. He and his team of 10 developers at Akkodis' office in Linz called on colleagues elsewhere in Austria to bolster their competences and create the ideal team for the project.

"It has been both fun and challenging to work at this scale, and not least to design a control system compliant with the demands of a highly regulated rail sector," Meise says.

> "
> It has been both fun and challenging to work at this scale, and not least to design a control system compliant with the demands of a highly regulated rail sector

From Screens to Pumps

The on-board firefighters operate the water and foam cannons via two screens connected to a pump module located in the middle of the train, underneath huge tanks holding various extinguishing agents.

The firefighters' commands are executed by complex electronics inside the module, activating an array of sensors and actuators, pumps and valves that control elements including the pressure, mix of extinguishing agents and filling – all programmed by Meise's team.

The starting point was standard electronic control modules designed for the rail sector, but these were pushed to their limits, Meise says.

"Choosing those modules ensured that we had equipment with all the necessary certifications for railway use," Meise says. "We specified the modules we needed to go with the firefighting solution, and then we developed the control software to sit on top of the modules. Our software translates the firefighters' commands, for instance choosing a specific mix of water and foam, from clicks on a screen to actions performed by the pump module."

The modules are rarely used in such a complex electronic control environment but with careful design and planning, the Akkodis team made everything work as specified.

Two Vienna-based Akkodis consultants, Samuel Giger and Clemens Környefalvy, responsible respectively for embedded hardware and software, were instrumental in achieving that result. They carried out extensive research into the characteristics of pump hydraulics (valves, pumps, sensors, and actuators) to ensure they could be controlled via the standard electronic control modules.

One of the main challenges was that the modules were originally designed for simple tasks such as controlling doors or air conditioning, rather than being part of complex control systems.

The two experts worked at the firefighting equipment manufacturer's plant, programming the control software and testing it directly on the pump module. With a 110-kW traction motor moving water and foam through the system, they could connect all the parts and fine-tune the hardware and software along the way.

Challenging and Rewarding

The project has been both challenging and rewarding, Meise says. The team used off-the-shelf components, removing significant obstacles, as the modules are already compliant with rail regulations and widely used in the industry.

The project stipulated that Akkodis would build the control systems for the first two pump modules, before handing over assembly of the remaining 16 to the firefighting equipment manufacturer. Such a handover required detailed documentation, together with extensive training of their personnel.

Moving from automotive to rail made for a steep learning curve to begin with, but the team now feels confident and prepared to take on other rail sector development projects, an area that should offer big potential.

> "
> Rail is a huge market, but when you look more closely, there are not that many companies that can do rail. With the specialist knowledge our team here in Linz has gained in integrating electronic control modules, which are widely used in the sector, we feel confident to take on other complex control software assignments.

Smart Scrums: Helping Rugby Get Digital

At first glance, the rugby game may seem to have little connection with the high-tech digital world of data and software.
But Akkodis is helping French rugby club Stade Toulousain improve a key part of its game: the scrum.

Rugby union in general, and French rugby in particular, is in the spotlight, as the 2023 men's Rugby World Cup takes place in stadiums across France in September and October. Thousands of fans have congregated from all around the globe to cheer on their teams, joining the many, many supporters of Les Bleus hoping for a World Cup victory on their home turf. It's a special moment for French fans, and for Stade Toulousain, home club to many of the national team's star players.

As rugby spectators the world over cheer the tries and wince at the collisions, the World Cup is also a chance for teams to show off the results of data analysis methods that are helping them boost their game.

Akkodis has been using its expertise to help improve the Toulouse-based club's scrum performance, by upgrading its high-tech, connected scrum training machine. For the uninitiated, the scrum is a pivotal part of the rugby game. Players crouch down in interlocking rows to square up to the opposing team, before the ball is thrown in underneath and the two sides compete for all-important possession.

Stade Toulousain is one of only two rugby teams in France equipped with a connected scrum machine, and it's a valuable tool for improving performance. "The goal is to improve the starting position and the bind of the scrum (when the players link up) to make the movement more consistent," says Joris Durand, head of the embedded software department at Akkodis. "Exerting the right pressure helps to destabilize the opposing team."

"

The machine analyzes the pressure exerted by each player and pushes back to simulate the opposing players.

Precise Analysis

It's important that the scrum doesn't collapse, and that's where the scrum machine comes in: players practice pushing against hydraulic-operated dummies that represent the opposing team and can exert pushing pressure back, simulating the forces involved in a real scrum. Exerting the right pressure, in the right direction, gets the right results. So it's important for coaches to be able to analyze precisely what's going on as the players inch their way forward across the field or in this case, the training room.

The Stade Toulousain scrum machine was already equipped with sensors and cameras but Akkodis has been working with the club for several months to update and improve the technology. "The machine analyzes the pressure exerted by each player and pushes back to simulate the opposing players," explains Durand.
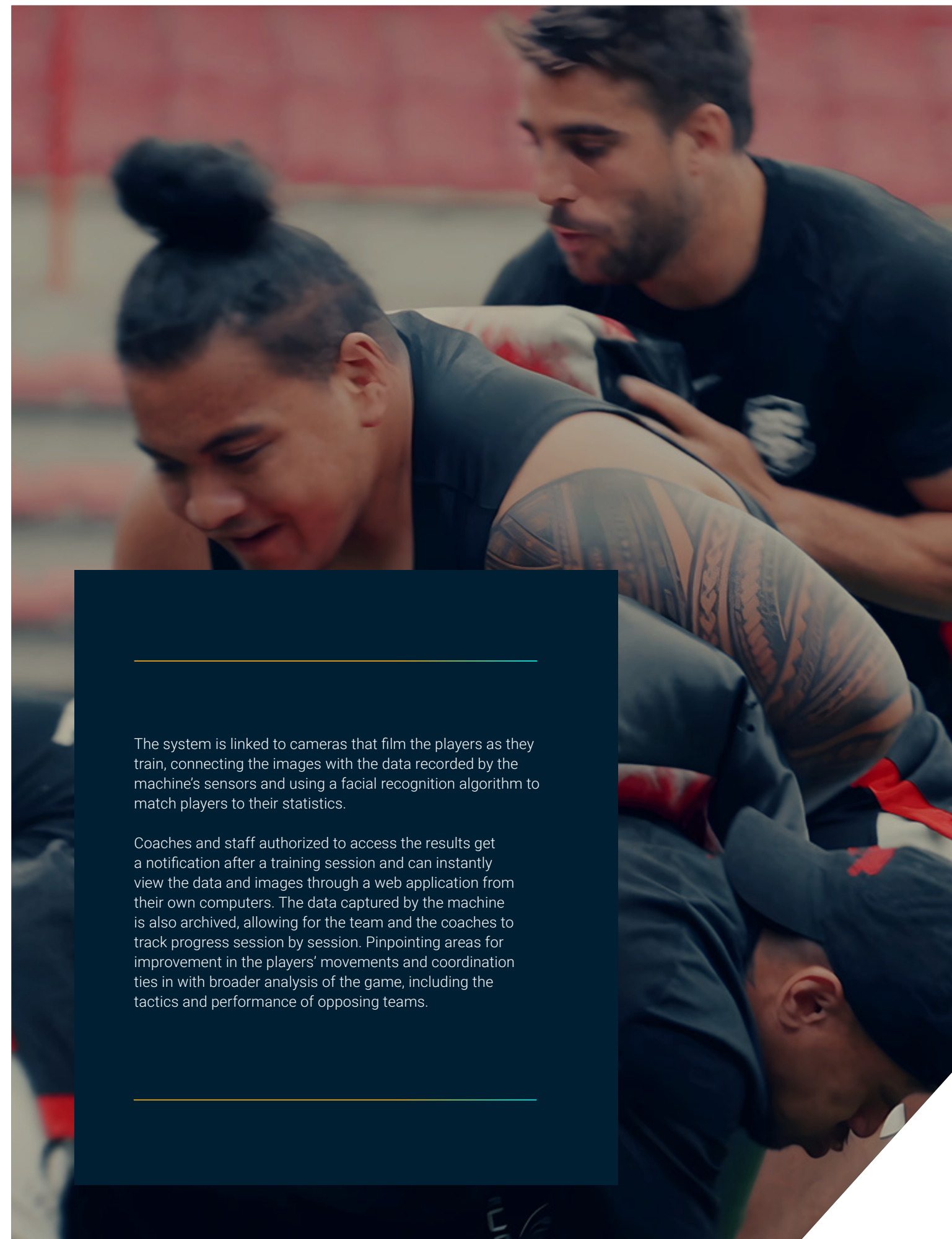
The system is linked to cameras that film the players as they train, connecting the images with the data recorded by the machine's sensors and using a facial recognition algorithm to match players to their statistics.

Coaches and staff authorized to access the results get a notification after a training session and can instantly view the data and images through a web application from their own computers. The data captured by the machine is also archived, allowing for the team and the coaches to track progress session by session. Pinpointing areas for improvement in the players' movements and coordination ties in with broader analysis of the game, including the tactics and performance of opposing teams.

Capitalizing on Data

"All matches are filmed so the coaches and trainers can identify weaknesses in the opposing team. There are strategies to put in place and the machine allows the team to visualize where to push," Durand says. Durand sees the scrum machine and its data analysis as just a small part of a broader trend toward greater use of data to improve sporting performance which goes far beyond the rugby pitch.

"Toulouse also has a great football team, which also uses video analysis. Lots of sports clubs analyze video to improve their performance, spot weaknesses and set out plans to improve and evolve," Durand says. "It's really about capitalizing on the data that has been recorded to propose new strategies."

Durand plays rugby himself and notes that while the developers "don't need to speak rugby, it certainly helps to come up with the right solution when you know the sport."

"

The possibilities demonstrated by the scrum machine in fact go even further than the sporting world – the way in which Akkodis technology can help optimize the performance of players on the rugby field highlights the potential for data to contribute to advances in other sectors too. Many of our industry clients need to be able to capture data and make better use of it, Durand says.

Strategic Push

The Stade Toulousain players themselves see the instant digital feedback as a performance accelerator. "They can visualize and evaluate their own performance straightaway and start improving from the next exercise, they don't have to wait for the next training session," Durand says. He sees room for further technological developments that could give even more useful feedback on the players' scrum training.

"We are working on three-axis pressure sensors. Currently the sensors measure horizontal pressure but in a scrum, you need to be strategic and work to improve the stability of the scrum, reduce pressure from the top and avoid team collapse. Three-axis sensors will allow us to analyze vertical, lateral and horizontal pressure."

Further ahead, Akkodis is even looking into sensor-equipped rugby shirts that could measure the position of a player's shoulders as they slam into their opponent in the scrum. "That would give a much more detailed and precise analysis of pressure on the opponent," Durand says.

As the world's top teams battle it out for the coveted Webb Ellis trophy, coaches and players alike will be hoping the digital insights that boosted their training will help them to victory in 2023 – and beyond.

AKKODIS | **STADE TOULOUSAIN**

Akkodis x Stade Toulousain Partnership
Watch the video

The Mainframe is Dead, Long Live the Mainframe

Developing technology rarely means starting from scratch. There is always some legacy to take into account and the bridging of legacy systems and modern technology is a business in itself. Never more so than in the world of mainframes. Although declared dead decades ago, they continue to run the world's banking and insurance industry–and much more. Akkodis tech experts are helping their clients navigate between old and new.

W hen it comes to Enterprise IT, it's easy to feel like an archeologist digging down into the past, with more fossils to be found the deeper the dig. But, although they're ancient, these fossil systems are still an indispensable part of the infrastructure, connected to the upper layers by an intricate web of software and interdependency.

Number Crunchers

Mainframes are still around for a reason. Their ability to crunch numbers at speed is second to none, and they're stable and reliable. Hardware can be replaced while the system is running, and performance shifted from one processor to another, always maintaining full control over CPU and memory usage.

So, it should come as no surprise, that according to Akkodis expert Patrick Leixner, a German manufacturer of premium cars is generating and storing the "heart" of every new car in a mainframe—the secret keys for the car's immobilizer

Automotive Mainframes

Leixner is head of a seven-strong mainframe team based in Ingolstadt. For Leixner and his team, mainframes are a growing business area, and that includes maintenance of that secret key storage system. A niche, yes, but an expanding one. Mainly catering to the automotive industry, they assist manufacturers in maintaining mainframes running data warehouses and other essential systems.

A "just-in-time" system manages parts delivered by suppliers, collects data from the production lines and supply chains, consolidates it, and generates delivery notes, which are forwarded to the car manufacturer's billing system.

Banking and Insurance

Dirk Frobese, manager of an Akkodis unit specialized in software development for the banking sector, is clearly envious of Leixner's team of mainframe experts. He is looking high and low for mainframe people.

In Frobese's line of business, mainframes are even more common than in automotive, but he has only one expert and a few freelance developers with sufficient skills in mainframes and the programming language that goes with them, Cobol. To meet the needs of his customers, he recently launched a new initiative called "'Kings of Cobol", offering retired Cobol programmers lucrative freelance assignments. Trying to get young engineers on board is fighting a losing battle. They simply refuse to work with what the developer community considers "big iron".

Leixner seems to be a notable exception to this rule. By far the youngest member of the mainframe team, he finds it fascinating to work with software older than himself.

More Tansactions Than Google

The fact that mainframes are highly reliable number crunchers secures their survival in large enterprise IT infrastructures. Mainframes are used by 71% of Fortune 500 companies. They handle 90% of all credit card transactions, and host more daily transactions than Google. Airlines, banks, insurers—all rely on mainframes.

But it is not all smooth sailing. Apart from the difficulties in finding skilled people, Frobese says the main problem is Cobol CICS (Customer Information Control System), the IBM transaction system used in Cobol financial applications.

"Nearly 30 years ago, I was fresh from university and started working with software for the banking and insurance sector," Frobese explains. "At that time, we had a vision to get rid of the host and replace it with client/server applications. Our customers wanted us to develop nicer user interfaces than the green-on-black screens they were used to. We began to develop Java applications to replace Cobol clients. Then came another tier, a server layer controlling the clients and running with Java. And then we built an API, a kind of middle frame, to transport the interaction from the user interface to the mainframe handling the transaction."

Everything looked good, in the end, Frobese says. "But in the background, the system was still running all these Cobol CICS transactions. However, now management had no incentive to replace the host, because all the users were happy with this nice, modern user interface we had developed for them. This is when the trouble began."

> " Mainframes are used by 71% of Fortune 500 companies. They handle 90% of all credit card transactions, and host more daily transactions than Google. Airlines, banks, insurers–all rely on mainframes.

Cobol CICS is the Problem

As Frobese explains, the main problem is Cobol CICS. Cobol is easily replaced, but not the CICS, the middleware that lies on top of the operating system and ensures that a transaction is safe. "In businesses like banking and insurance you have vast numbers of complicated transactions. If one of these transactions fails, for whatever reason, you can roll it back and find the cause of the failure." There is no real replacement for the CICS, so migrating to a newer system involves a lot of risk.

In addition to this, mainframes are a monopolist business dominated by IBM as the sole vendor. Customers pay for a license, without any alternative, and without any real competition between vendors. This means the price is rising slowly but steadily.

Here to Stay

That said, mainframes are here to stay. Frobese expects them to remain part of the IT infrastructure for many years to come.

Mainframe systems are ideal for number crunching and fast transactions. But for other kinds of banking and insurance logic, for instance calculation of loans, they can be replaced with other platforms such as Unix. "Just like when I started my career 30 years ago, we'll have a heterogenous environment with small clients, middle tier servers etc., and a host at the end, running a big database, data warehouse or transaction machine. That concept is old, and it won't change. We're going to continue to see it in the future," he says.
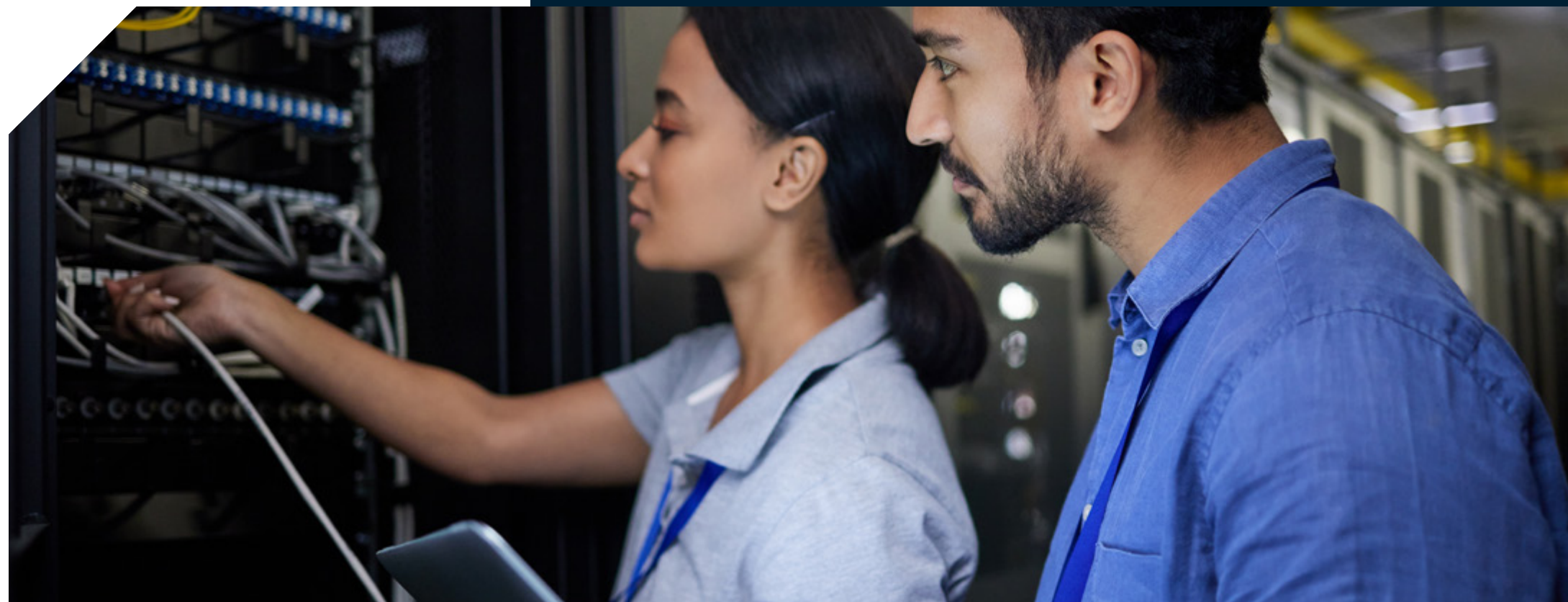
Finding Skilled People

The crux of the matter is however, finding people willing and able to work with this "big iron". Specialist companies such as Akkodis provide these skills for their clients, although Cobol programmers are few and far between. And both Frobese and Leixner are planning to expand this part of their business. They are even discussing joining forces to beef up their crew of Cobol experts, to meet the growing need.

Bridging new technology and legacy systems is good business. The mainframe is dead, long live the mainframe!

Get in touch with our Experts in
Banking & Financial Services

About Akkodis

Akkodis is a global digital engineering company and Smart Industry leader. We enable clients to advance in their digital transformation with Consulting, Solutions, Talent, and Academy services. Headquartered in Switzerland and part of the Adecco Group, Akkodis is a trusted tech partner to the world's industries. We co-create and pioneer solutions that help to solve major challenges, from accelerating the clean energy transition and green mobility, to improving user and patient centricity. Empowered by a culture of inclusion and diversity, our 50,000 tech experts across 30 countries combine best-in-class technologies and cross industry knowledge to drive purposeful innovation for a more sustainable tomorrow. We are passionate about Engineering a Smarter Future Together.

We are passionate about Engineering a Smarter Future Together.

Read more about how we
Make Incredible Happen
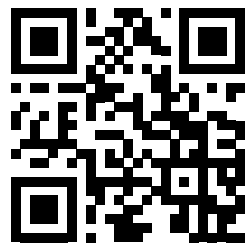
Engineering a Smarter Future Together.

AKKODIS

The global tech engineering company that
goes beyond possible, to make incredible happen.

akkodis.com