June 2021

INTERRUPT INSIDE

A technology magazine by Data Respons

AIoT

The artificial intelligence of things

Putting tech buzzword under the microscope

Six sustainable tech projects from 2020

Data Respons contributes to varying green tech projects in Europe.

Software for efficiency and co-operation - and a lighter footprint

Man vs. machine A software engineer and his Tesla

Kenneth Ragnvaldsen

Enabling a Digital future with Data Respons.

How to get started becoming a circular business

DR has signed the 10 principles for a circular economy

Digital Twin

A concept worth exploring

CONTENT

CEO INTERVIEW

KENNETH RAGNVALDSEN

We had quick chat with Data Respons CEO, Kenneth Ragnvaldsen, and got his take on industrial digitalisation and Data Repons' role in advancing digitalisation in Europe.

What's your Data Respons story?

I've been working with tech, software and digitalization since I graduated many years ago. When it comes to Data Respons, I have been the CEO for the last 18 years. Together with fantastic people we have transformed the company from a small national player to one of the fastest growing digital companies in Europe, with 20% growth annually for the last 20 years. Data Respons has been working with IoT – internet of things – long before this was even a name. Internally we call ourselves "the change agents" assisting our customers in their digital transformation.

What does "Enabling a digital future" mean for you?

For me, it means that we are supporting the evolution where everything is getting automated, connected, smarter and digitalized. As everything around us is going to be more and more focused on data we are enabling new products, processes and business models that are truly digital.

By connecting everything and using data more intelligently ***(IoT)***, building smarter products and systems, we can create a more efficient, productive, and sustainable world. For instance, in the future, we will most likely not own our own car, but we will share it and we will use our phone just to pick it up and then go wherever we want. Sharing platforms in an interconnected world is going to be the future everywhere around us.

In addition to connectivity I believe processes is another key topic within digitalization. Most processes can be automated and be done smarter. ***Digitalizing*** whatever we're doing manually in each factory, or in the office, or even in the car. We have the technology to automate and digitalize almost everything. But to create real value, digitalization of processes requires substantial investments, new ways of working and a set of new internal processes that ensures that your new digital process is up to date and in sync with a dynamic world. Finally, every product and service we have around us needs to be data driven. From every product there is a lot data generated and until recently the world has been more focused on gathering all this data, and not enough on understanding and using it.

Big data has been a buzzword for years, but I believe that it's the years ahead that will demonstrate what big data entails. As companies better understand the potential and value their data stream can provide, things will change. And they must. As consumers we are increasingly expecting that we get tailored made offers and experiences because we know it's possible through the technology and data that's available today.

Could you give us a few examples of some of the most successful digital projects that Data Respons has worked on?

Data Respons is involved in all the mega trends that are really changing the play of every industry you can imagine. Making data driven products and services means you need to have expertise and experience from the sensor level to the final app on your mobile. There are lots of examples to draw upon, but let's talk about a few big industries that are embarking on huge digital transformations. A good example is the future of the car. Most cars are stationary 90% of the time, which is not very sustainable and owning a car is becoming increasingly difficult in big cities.

Last, but not least the next generation of urban young people will not want to own a car, they just want the flexibility and the freedom of being able to use a car, whenever they need it. For this purpose, we have built an e-mobility solution for one of our biggest clients. We developed a new cloud-based car-sharing platform where the user can locate an available electric car on their phone, drive it wherever they want and when they are done, leave it for the next user. The platform impresses with its rapid, automated registration process, app-driven locking and unlocking of vehicles and automated billing of parking fees without any user effort.

When talking about mobility we have a long track record in/of digitalizing the transportation industry – the future goal is of course to make transportation more like a service. Together with our client, we have built a complete digital feet management system. Today between 30 and 50% of the capacity of trucks is empty. If that number can be reduced, it will generate enormous efficiency gains and enable more sustainability, and you can achieve that with intelligent systems interacting. The platform allows real-time re-routing of trucks and more efficient use of the entire fleet, thus saving cost, protecting investments, and extending the life cycle of hardware components

with connectivity and software updates. Last, but not least we have an example on how software and digitalization is making a difference. In Germany we are working on an online energy trading platform for renewable energy. On this platform anyone can sell their own renewable energy from a min. quantity of 3000 MWh, like solar, wind, water or biogas. As an energy supplier you can thus be sure that your offer is taken to market in the best possible way, and that you will get the correct market price, without any delay. This platform also indirectly incentivizes more people to invest in small scale renewable energy by making it possible and easy to sell their excess energy to the market. I could give a thousand more examples!

Last year Data Respons was acquired by the global engineering company AKKA Technologies. How is Data Respons fitting into another tech company?

Externally I strongly believe that with Data Respons as a part of AKKA, the Group has become a leading player in industrial digitalization. Hardware and software specialists across industries can support each other and help our customers gain the competitive edge they need in a digitalized world. Internally we are sharing our 30 years of thinking and working on digitalization.

Also, as Data Respons has grown we have become quite skilled at building agile digital companies, and we are sharing those experiences with the rest of the Group. Sharing best practices on a culture that embraces digital opportunities is valuable for everyone.

To succeed in becoming a trusted digital specialist you need to be the best at what you do, by having a lot of high-level skilled experts. By offering our culture, and know-how we are contributing to making AKKA a digital powerhouse across every industry.

How do you see AKKA and Data Respons evolving over the next few years?

Our goal, for AKKA and Data Respons, is to be a global and leading player within industrial digitalization. To achieve that goal, it's not enough to have only the digital expertise, nor to have only product engineering know-how. Combining these two skillsets in every dimension is where we're going. We are strengthening our role as the best partner for our customers and bring real value add to their digital transformation.

PUTTING TECH BUZZWORD UNDER THE MICROSCOPE AIOT - THE ARTIFICIAL INTELLIGENCE OF THINGS

AIOT - THE ARTIFICIAL INTELLIGENCE OF THINGS

Is the convergence of Artificial Intelligence and Internet of Things the new tech mega trend to rule the world? Not really, says Data Respons Solutions CTO Hans Christian Lønstad. AIoT is part of something much bigger.

BY: Arne Vollertsen for Data Respons

When you find yourself overwhelmed by tech marketing buzzwords it is always a sobering experience to ask an expert for clarification. What is AIoT – and why should we care? As an experienced CTO and software engineer Hans Christian wLøn-stad is eminently qualified to pick the AIoT buzzword apart and put it into the proper context:

– The first time I heard about AIoT was in an advertisement from Nvidia, who is a big player in this game. AIoT is the ability to put together machine learning and edge computing, and it's a natural development in both machine learning and edge computing. There are many good reasons for machine learning to take place at the edge, among them reducing latency and Cloud related cost, and enhancing performance.

Smart cameras

– For instance, the "smart camera" is currently one of the most popular applications in this area. These surveillance cameras are used to monitor crowds or traffic, or for inspection and quality control on a production line. Nvidia has a very strong foothold in this area, and they offer the possibility to process vision data on the device, instead of having to send it up to the cloud. You can even buy pre-trained models for certain use cases, like counting the number of people or cars in an image.

– However, in my opinion AIoT is just a small part of something much bigger. It's part of the mega trend towards automation, and one of the building blocks to enable us to design autonomous systems at a level of complexity and precision we haven't seen before.

No magic ingredient

But according Hans Christian Lønstad, Artificial Intelligence is not the magic ingredient that will effortlessly bring us to the next level of human/digital interaction. Far from it. In fact, he prefers to use the expression Machine Learning and leave AI to the marketing people. Because, as he points out, 99,9 per cent of AI is Machine Learning anyway.

– We're seeing more and more low cost edge computing hardware with facilities for machine learning computation. To be precise, what is situated at the edge is the decision part of Machine Learning. It is called an "inference engine", which is a glorified matrix multiplier architecture increasingly supported in standard processors, cellular phone CPUs and in hardware in general. The inference part of Machine Learning requires much, much lighter computational resources than the training of a Machine Learning syste

Edge and cloud combined

– That is why we often see a combination of edge and cloud computing, for reinforced Machine Learning. Let's have a look at Tesla. A Tesla uses a lot of Machine Learning at the edge to respond to input from on-board cameras and sensors while driving. When the car is parked and connected to a wifi, it uploads huge amounts of data to the cloud to be used as input for enhancing the Machine Learning algorithms. So, you have two levels of Machine Learning, one in the cloud, the other at the edge. The training takes place in the cloud, and the actual decision-making takes place at the edge, based on models trained in the cloud.

Training is difficult

Actually, training a Machine Learning model is a task not to be underestimated, Lønstad explains.

– You can buy pre-trained models like the ones provided by Nvidia. They give you the benefit that you're quickly up to speed with what you want to do. But there is a downside: Precision is low. We are talking maybe 80 per cent correctness on pre-trained models for camera vision. That may be good enough for many applications, but in other use cases it's unacceptable.

– If you want higher precision and you have items with specific features that you need to put in the system, then you need to get your fingers dirty and train the model yourself. You need to qualify your data and your algorithm, and this is where it gets complicated. That is a lot of work, and you need vast amounts of data.

Garbage in & out

According to Hans Christian Lønstad, the performance of a Machine Learning system depends on the data that is fed into it. The old saying "Garbage in equals garbage out" applies very much to Machine Learning. The quality of output is determined by the quality of the input.

– Machine Learning is statistics. It is a statistical approach, as opposed to a conventional algorithm with some kind of direct connection between input and output. But you need a lot of high-quality data to train you Machine Learning system. And data is easily biased, so we will have systematic errors which is not a good thing. It's a kind of paradox with all statistical data. If you want to reduce the variance in the result, you need to accept more bias and vice versa. So it will never get perfect.

– In my opinion, there is only a very, very exclusive group of companies that has access to enough high-quality data to build good Machine Learning systems. If you look at who has succeeded with Machine Learning, it's basically the big Internet companies like Google and Facebook, which are collecting data from their users in any way they can. They have an abundance of data, and their users are giving it to them for free. In an industrial setting you won't have the same possibilities.

Don't get overambitious

Hans Christian Lønstad issues a warning to companies attracted to the high-flying concept of Artificial Intelligence:

– Don't think, that because companies like Facebook and other big league players are succeeding with this, you will as well. That's a wrong assumption, so you should be careful not to get overambitious. Without access to similar amounts of data it's impossible to build Machine Learning systems on that level of sophistication. But you can build something that's good enough for some specific purposes, you just need to be careful to make the right choices.

WANT TO KNOW MORE ABOUT DATA RESPONS SOLUTIONS?

Hans Christian Løvstad

CHIEF TECHNOLOGY OFFICER
Data Respons Solutions

hcl@datarespons.no

– As mentioned before, there is potential in Machine Learning in an industrial setting in regards to computer vision for quality control, for instance. But it's not for free. You need to put a lot of effort into training the systems, qualifying the data, and evaluate and develop over time.

Not good enough

And, while Hans Christian Lønstad is hard at work sticking pins in the hot air balloons of tech buzzwords, here is another one that needs deflating. In Lønstads opinion, Closed Loop Machine Learning won't be as big as some people are hoping for. In his opinion it's just not good enough, and you can't use it to drive a car, for instance. If you require close to 100% confidence, you can't use machine learning, which is why it cannot be used in safety-related systems. In these you won't accept the risk of somebody getting injured or dying, even if that risk is only 2 per cent, which actually is a very high confidence level in machine learning.

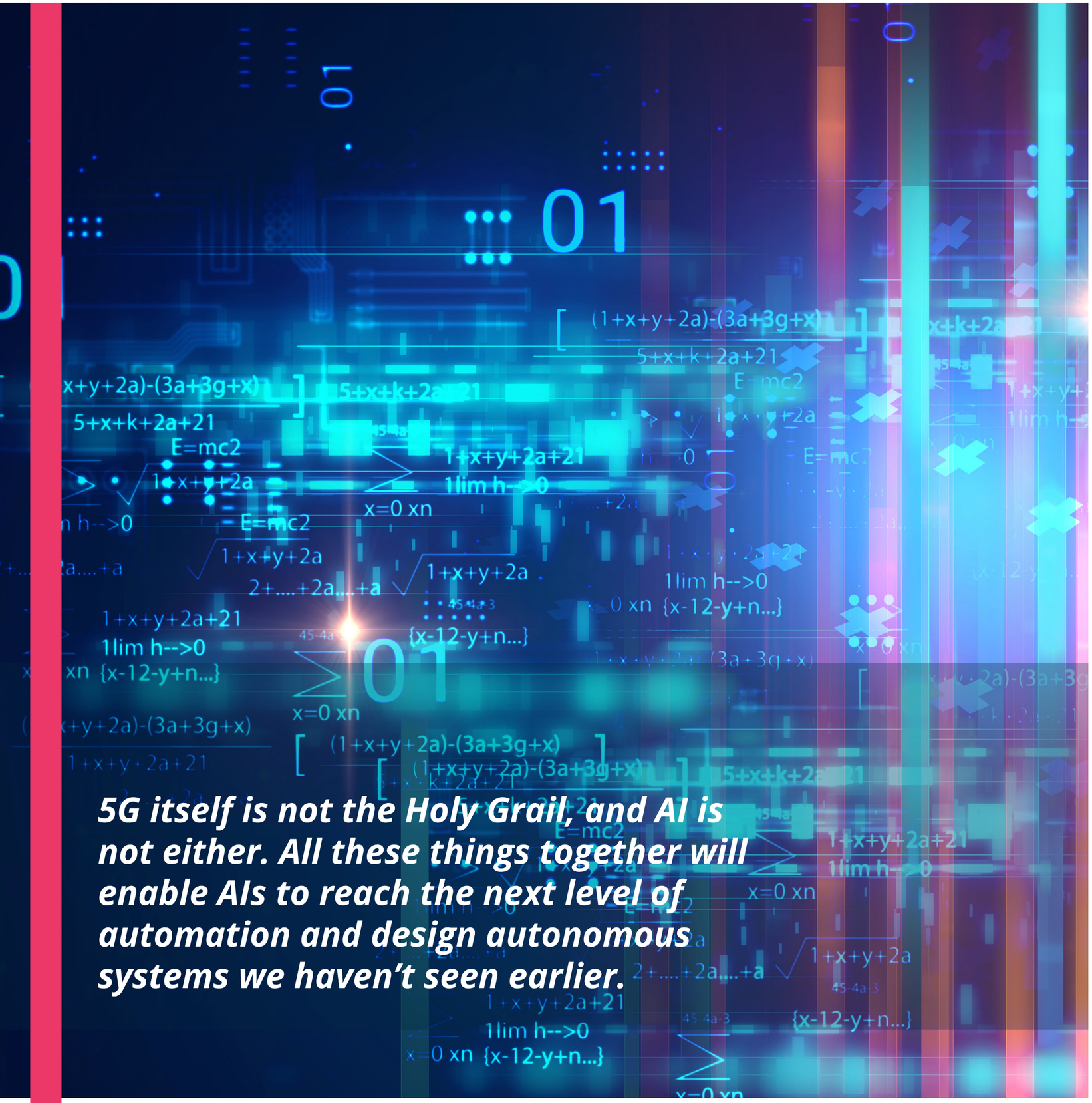
Also, you can't use Closed Loop Machine Learning for decisions that have legal implications towards a person, for instance compensating people for something according to specific legal rights. In this, 95 per cent certainty is not enough. Moreover, in these cases you are required to document your decision, and to have a trackable line of events leading up to the decision. A Machine Learning "black box" is unacceptable in these use cases.

Tool for decision-making

– Instead, Machine Learning can perform a lot of tasks going through vast amounts of data and finding the bits and pieces that need your attention. We are drowning in information, and Machine Learning can help you sort out what you really should look at. It can be a helpful tool for decision-making. It probably shouldn't be the decision-maker itself, but it can assist you in making decisions by focusing the information you have to look into. In that way we can apply it in many areas, but again, that's statistics. Machine Learning is statistical methods, and those have been used for years.

5G

As mentioned in the beginning, AIoT is the ability to put together machine learning and edge computing. It's a natural development in both



5G itself is not the Holy Grail, and AI is not either. All these things together will enable AIs to reach the next level of automation and design autonomous systems we haven't seen earlier.

machine learning and edge computing, and it's part of the mega trend towards automation. According to Hans Christian Lønstad, an important enabler in this game will be 5G:

– With 5G you can have powerful computing resources at the edge. When we are talking about AIoT, we should bring in 5G and edge computing at the next level. With 5G you can have computing resources very close to the IoT devices. You can eliminate latency issues and you won't need to ship bulk data up to the internet and up to cloud systems. In production facilities you can have private 5G networks, which allow you to handle the cost implications of sending more data.

Huge engineering task

– 5G is an enabler for doing more sophisticated Machine Learning at the edge. But 5G itself is not the Holy Grail, and AI is not either. All these things together will enable us to reach the next level of automation and design autonomous systems we haven't seen earlier.

– These super-complex systems need to be put together. That is a huge engineering task and will involve tons of software. The solutions will be different, from application to application and from industry to industry. The technology itself may be horizontal, but the verticals applying this technology and putting it together as a system to achieve specific applications – that will require an enormous effort and big investments.5G is an enabler for doing more sophisticated Machine Learning at the edge. But 5G itself is not the Holy Grail, and AI is not either. All these things together will enable us to reach the next level of automation and design autonomous systems we haven't seen earlier.

DEVELOPING TECHNOLOGIES TO PROMOTE RENEWABLE ENERGIES

We have an ambition to be directly involved in at least 100 sustainable tech projects every year that makes a difference. Here's six examples from 2020.

SIX SUSTAINABLE TECH PROJECTS FROM 2020

By: Isabelle Sarah Borchsenius | Marketing, Communication & Sustainability Manager

2020, has taught us how quickly we can adapt to new challenges. From one day to the next, the majority of our employees left the offices and got used to working remotely. People, companies and politics adapted almost overnight. With this experience in mind, we know we have the capability to make quick changes and we can transfer this experience to
other challenges. For instance, the transition from fossil to renewable energy.

Covid also reminded us, once again, of the necessity of increasing the speed to reach the UN Sustainable Development Goals and in this, businesses play a crucial role.
Data Respons has committed itself to enable minimum 100 sustainable technology every year. With an added ambition to increase the number of projects year on year to support our ambition to facilitate sustainability through technology.

Here are six green tech projects from 2020 that enabled more sustainability, realized by our German daughter company, IT Sonix, through their customers.

1. ONLINE ENERGY TRADING PLATFORM FOR RENEWABLE ENERGY

IT Sonix has developed an energy trading platform for its German market and is now expanding the concept to the whole of Europe. On this platform anyone can sell their own renewable energy from a min. size of 3000 MWh, like for instance solar, wind, water or biogas. As an energy supplier you can thus be sure that your offer is taken to market in the best possible way, and that you will get the correct market price, without any delay.

"We developed the platform that enables trading renewable energies for our customer. We have been working on this project for over a year and until now is was a rather small team.

We are delighted that we can contribute to our customers success. Now we help to make it available in all Europe. This case contributes to the green shift by enabling the possibility to capitalize on sustainable energy production with little effort and energy market knowledge",

CTO at IT Sonix, Arthur Schiefer.

ONLINE SOLAR POWER PLATFORM FOR ALL

This platform also indirectly incentives more people to invest in small scale renewable energy by making it possible and easy to sell their excess energy to the market.

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2. ONLINE SOLAR POWER PLATFORM FOR ALL

Another similar project is an online platform to publish a proposal for a solar power plant. The owner of any given land area describes the conditions and environment for where solar power panels shall be installed. Solar energy and energy storage providers can then contact the landowners and propose their individual offers. Another advantage this platform provides is that the platform also functions as a bridge to the open energy market. As a landowner with a solar energy plant on your property you can buy the energy back later at a discount or use it at other places like your vacation home.

Through this online platform an owner of an area that can fit a small solar plant can easily connect with the right companies and become almost self-sufficient with renewable energy. Most importantly the platform lowers the bar for more people to become providers of renewable energy and taking part in the smart

energy infrastructure.

3. SMARTER AND MORE EFFECTIVE WINDMILLS

The third project is about making winds turbines and more effective and intelligent through automation and smarter connectivity. Wind turbines need regular maintenance and cannot run under certain circumstances, like when endangered birds are passing through the area or when the wind reaches too strong levels.

It Sonix developed and implemented a software stack that gathers data on the availability of wind turbines through a given timeframe. As a consequence, data allows more reliable planning of operational time and predicted downtime. Through better data and operational understanding, it also becomes easier to integrate wind energy into the grid and have clear picture on the potential energy mix at any given time.

4. CHARGING NETWORK

If you are one of the pioneers that have purchased an electric car in Germany, you probably have experienced some frustrations in not finding a functioning charger or you got lost in the jungle of varying charging providers.

IT Sonix has developed a platform that gathers several charging providers on the same digital platform making it easier have an electric car and use it across charging providers. The platform is already being rolled out across Germany and next in line is Europe. Adding more existing charging providers and new car chargers.

5. CAR SHARING

Cars are parked 95% of the time. IT Sonix has also developed a cloud backend and architecture, worked on frontend user experience, and designed mobile apps, that enables pure electric car sharing in Berlin. The mission is to use cars more efficiently, contribute to electrification and avoid unused cars and reduce the number of cars in the cities. The platform is planned to roll out internationally in 2021.

Electric car sharing provides flexible mobility without the costs, commitment, and responsibilities of owning an own car. At the same time, you contribute to a quieter, less polluted and more livable city by only occupying a car when you really need it and by driving purely electric. Ultimately, this solution helps to save money, both for businesses and individuals as both customer types can rent electric cars on-demand and hereby reduce costs.

6. TRANSPORTING MORE GOODS WITH FEWER TRUCKS

IT Sonix has developed a solution that connects every truck to the cloud, thus enabling connectivity and data gathering on a whole new level. Better data and connectivity enable much efficiency and the possibility to transport more goods with fewer trucks on the road.

The solution has provided the steppingstone for automated and optimized rides. Also making it possible to predict which routes save the most emissions, and to give the driver feedback on how to drive more economically. To mention a few of the features.

Allowing a company to track its vehicles in real-time helps to avoid delays, simplifies communication and avoids unnecessary rides. Finally, it increases safety by addressing unsafe driving and helps the driver to optimize the driver experience through own driver app.

THIS IS **IT SONIX**

IT Sonix is located in Leipzig with 125 employees.
The company is leading niche providers of specialist services and SW technology (Java, Embedded, Cloud and AI) specifically aimed at "Connected Car" solutions, internet of things, mobile services and embedded applications.

They have been active in telematics, communication and project management for more than 15 years specializing in agile software development for client-server, mobile applications and on-boar units.
The company are deeply involved in the ongoing digital transition for some of the leading automotive brands in Germany, some of the world's most dynamic and R&D intensive industries.

It Sonix have been part of the Data Respons group since 2018.

The Importance of Refactoring

"If it's not broken, don't try to fix it" the old adage goes, but when it comes to software engineering at least, this is poor advice — at best.

By: Björn Rudolfsson, Technical Consultat Sylog

Anyone who has worked more than a few years in software development knows that one of the hardest sells is convincing your boss to allow time for refactoring and cleaning up the code. On the surface it may seem like a reasonable stance — after all, no project asked for the change, no customer is paying for it — so why would you waste time on it?

Why indeed should you refactor, if leaving the code as-is doesn't cost you anything?

Because the code that's "not broken" is costing you, you just haven't noticed it.

The truth is that just like things in the physical world, code also needs to be maintained. It may not degrade and wear as physical objects do, but hidden in any piece of code are bugs no one's found, bad designs no one's bothered to correct, and potential improvements just waiting to be discovered.

I've lost count of how many times I've been introduced to codebases that for the main part have remained untouched for years or even decades. The old faux-truth of not fixing what's not broken is embedded deep, and hard to shift.

I think a large part of the blame lies with the all too common project-financing model, where all resources for development are allotted to projects. Projects have very specific deliverables and stakeholders and are rarely interested in paying for anything outside their scope, and so refactoring is left by the wayside.

But doing it this way means that code will only be fixed or improved upon if there's an explicit requirement for it in a project, or a bug is discovered. It's genuinely surprising how often companies neglect to allocate any resources at all for general development and maintenance outside of projects.

So, what happens when you leave code unattended and unloved? You build up technical debt, and to exemplify this, here are some typical issues you will find in poorly maintained code and the costs associated with them:

PUBAR or Patched-Up-Beyond-All-Recognition

This is code that was written a very long ago and has been repeatedly patched by a succession of developers to make quick fixes for errors detected. Significant for this type of code is that each patch has only been done to fix an immediate issue with little or no consideration for side-effects or long-term impacts ("there's no time for a proper fix, just patch it"). The code tends to have large complex methods spanning hundreds of lines, and deeply nested if-statements.

This is the kind of code that breaks any time there's a major update of the product because it relies on internal dependencies or hard-coded assumptions. This type of code is costly for several reasons: it will break when least expected when you change something else and thus cause unanticipated work (and therefore delays in the project); it's often difficult to understand due to lack of coherent design and implementation thus takes more time to get into and fix (and therefore causing delays in the project); it tends to be brittle and cause issues at the customer requiring support effort (causing delays in the project and bad-will at the customer).

Holy code

This was written at the dawn of time and hasn't been changed since. The person who wrote it left the company ages ago, there's zero documentation, and no one currently really understands how it works. It's often full of commented-out code (with no explanation) but no comments explaining the actual intent behind the code. If you change any of it, it usually breaks. The cost of this type of code is a bit insidious; it will keep working for years on end, until that one day when it suddenly doesn't and it breaks down completely. The only option then is to re-write it from scratch, at great cost, and often it will also require other changes in the system (causing big delays in the project).

"We'll do it properly in the release"

This was written as a temporary hack years ago with the intention of doing a proper implementation later in the project. This never happened, and temporary became permanent. Significant for this type of code is that it barely works and is held together with spit and shoestring, or just plain luck, and is fertile ground for new and interesting bugs. As with holy code, this code tends to break firmly at the worst possible moment, and with a similar fallout in terms of cost.

There are of course many flavors of bad code, and I could write a whole series of articles on that topic alone, but the above is where your code typically ends up if you ignore your code-smells. As you can see, just because your code isn't broken doesn't mean it isn't costing you. Skipping regular refactoring is like skipping regular service of your car. Sure, it will run fine for a while, but then problems will start cropping up and slowly begin affecting performance. And when it inevitably does break down, it will be very expensive.

So, how do you introduce refactoring in your organization? This will largely depend on your organization. Most developers understand the value of refactoring, so usually, the ones needing to be convinced are management. After all, they are the ones having to pay for this. The important thing about refactoring, however, is that it's done regularly.

HERE ARE SOME SUGGESTIONS

On a regular basis

On a regular basis — every one or two sprints if you are using Agile, or at least once a month — select one component or module per developer for refactoring. Set aside at least a whole day for this. If it's the first time you're doing refactoring it's a good idea to spend this first instance just going through the whole component and note obvious problem areas. Then in the next slot, you can start doing improvements.

Assign components to developers who haven't worked on it before

Assign components to developers who haven't worked on it before (or at least not much). This way you will both get fresh eyes on the code and spread code knowledge across your team.
For large and complex components it may be a good idea to refactor using pair-programming or hold team brainstorming meetings to hash out ideas.

The objective is to see if you can find improvements

It's important to note that just like code reviewing, refactoring is not a mud-slinging contest. The objective is not to talk down other people's code, but to see if you can find improvements. For this reason it's important that the team realizes they own all the code together as a team. If the code is crap, then the team needs to own that, and fix the code. Blaming one individual is not going to be helpful, even if they are the culprit. Instead, take the opportunity to teach good programming practices as well as fixing the issue. If it's done in a constructive spirit, no one needs to feel their toes were stepped on, and your team will be all the better for it.

The fact of the matter is, the team owns the code, and if you want really good code you need to care about the code. Not just the product itself or the functionality it provides, but the actual code. When developers care about the code and feel they own it, they will produce better code. And better code provides better functionality and fewer bugs.

It's also important to understand that refactoring is not bug fixing. Bug fixing is reactive — you find a bug, you fix the bug. Refactoring is proactive — you try to improve the code just to make it better, to avoid getting bugs in the first place, which in the long run is much, much cheaper. Refactoring also tends to look at the bigger picture, not just fixing specific flaws, but re-evaluating design and implementation, to see if you can do better.

The thing about writing software is; the moment you've finished developing a component you know how you should have done it in the first place. Every programmer recognizes this, the feeling of "if I only knew then what I know now, I would have done it like this instead". We've experienced it many times. In writing this is a well-known concept. You do a first draft to get your ideas down, and then you revise, often multiple times, to get to the finished product. As writer Neil Gaiman puts it:

"The process of doing your second draft is a process of making it look like you knew what you were doing all along."

Sadly we rarely get that opportunity as developers, we are typically forced to push our first draft out as the final product. And that's why refactoring is so important. It gives you an opportunity to revise your implementation with the wisdom of hindsight.

To do that second draft. To do it right.

Man vs. Machine

A software engineer and his Tesla

By: Arne Vollertsen for Data Respons

Meet Hans Christian Lønstad, CTO of Data Respons Solutions. A software engineer with 20+ years experience working at Data Respons, Hans Christian knows a thing or two about technology, and he is the proud owner of a Tesla Model 3. So, what would be more obvious than to ask him how that relationship is going – is that much-hyped car brand delivering on its promise? What are the upsides and downsides of owning a Tesla? And what are his thoughts on the current state of the automotive industry?

Hans Christian, why a Tesla?

– Initially I decided on buying an electric car to save money. In Norway electric cars are exempt from VAT, and they enjoy a number of other benefits. I studied the cars on offer and realised that Tesla is ahead of the competition when it comes to range and charging infrastructure, just to mention a few things. On top of that, everything works together seamlessly. A Tesla appears smarter than other cars.

What do you think of Tesla as a car manufacturer?

– I find it interesting to see what a company can achieve, that has no history and is not bound by any kind of legacy. They started out with a blank sheet of paper.

– As I see it, Tesla is a great example of a truly disruptive business case, similar to when Apple launched the iPhone. Apple was the frontrunner, and afterwards all the Android phones produced in Asia followed.

– Now new car manufacturers are doing like Tesla. If I remember correctly, there are 10 new electric car brands emerging out of China. And just like Tesla they are starting from scratch. Also, the old car manufacturers are investing heavily in electric cars. Soon the electric car market will become fiercely competitive, and it's hard to say if Tesla will be able to maintain its position. Who knows, maybe Tesla will continue as the flagship of electric cars. It's still ahead of the competition, and that must be the reason why its value is so hysterically high, even though it hasn't made much money yet.

What does owning a Tesla tell you about the current state of the automotive industry?

– If you look at a conventional car, it consists of a lot of subsystems, many of them manufactured by subcontractors. That concept worked well, as long as these components were isolated subsystems without the need for coherent communication and update mechanisms. But slowly everything became more and more dependent on communication between components (east/west) and to cloud platforms (north/south). A car may employ 25 or more computer modules and without a coherent software stack tying it together you'll never be able to build a truly modern car.

What are the legacy car manufacturers doing to get past that barrier?

– They are investing heavily to develop a software stack and equipment configuration, and we're already seeing some results. Volkswagen for instance is launching a series of electric cars based on the same platform. Some of the German software companies that are part of the Data Respons group are contributing to this new way of constructing a car, working for Audi, Mercedes, and others.

– But parts of the industry have had difficulties embracing that new approach to designing a car. About 4 or 5 years ago I attended a talk given by the head of development of Volvo. He told us that 70 per cent of development costs for a new model go into software, and only 30 per cent into mechanical components. That trend came as a shock to some vehicle industry executives, and now conventional manufacturers are investing enormous amounts in developing a state-of-the-art software stack and platform.

In your opinion, what can legacy carmakers learn from Tesla?

– An electric car is actually very simple. There are very few moving parts. Anyone could make an electric car. But the software required is where things get complicated. Here Tesla has a leading edge, and now other manufacturers are working hard to develop similar systems.

– However, I find at a bit strange that everybody is developing their own system. I wouldn't be surprised if in 10 years time we'll have an open source software stack that may be employed as a baseline for car manufacturers to license.

You've had your car for about a year. Are you satisfied with it?

– With the exception of the screen going black on occasion (you have a ctrl alt del on the steering wheel), the car has proven to be reliable. It also appears well built, although not quite on German premium cars standards.

– On top of that it's fun to drive. My car is a performance model and it's very powerful. You would have to pay 5 times the amount for a petrol car to get similar performance.

– And moreover, I'm looking forward to what Tesla has to offer when it comes to self-driving.

How so?

– I'm interested in how self-driving technology is developing. When I bought my car I paid a premium for the upcoming "Full Self-Driving" package, which is said to enable the car to find its way to a destination without any driver intervention. A beta version has already been distributed to a select number of Tesla owners in the US, but I'm not sure the package will even be available in Europe. We'll see about that.

Are we going to see autonomous vehicles in the near future?

– I don't think so. For years autonomous cars have been touted as the next big thing in automotive, but in reality many automakers are backing off on this promise and focusing on lower hanging fruits such as driver assistance systems. In general, I'm sceptical to the idea of full self-driving, at least when not confined to strictly regulated and provisioned environments. The general urban traffic scenario is highly complex and it is unlikely that machine learning can accomplish fluid traffic given the complexity of the task. Remember these algorithms depend on statistical confidence in order to make the right choice. Whenever a decision with potential safety implications is to be made, this confidence level must be very high – otherwise the car will probably have to halt. This is likely to be a recipe for a traffic jam.

– Tesla employs sensors as cameras, ultrasound and radar to establish the situational awareness required for autonomous driving. Cameras may however be blinded or confused by lack of contrast as is easily observed driving in winter conditions in Norway.

– There also exist ethic and legal aspects to the whole concept of autonomous cars. Who is responsible in the event of an accident? The non-driving driver or the car manufacturer? The algorithm supplier? What will the insurance cost become – if you ever get one?

How about your own car, how does it behave in traffic?

– A part of the screen will at all times show objects recognised by the car and thus give an indication of the situational awareness as perceived by the car. The deviation from my own understanding of the current traffic situation tells my something about the ability to navigate traffic – as a side note I have driven 40 years without accidents. In general, my experience is that the car definitely does not get the full picture. It is also dependent on lane markings to stay on track when auto steer is activated.

– One funny observation is that updates may lead to worse performance for instance in assisted breaking, probably due to stricter requirements to statistical confidence being put on the car makers. The car will generally appear more "nervous".

Like all other Teslas your car is communicating with the Tesla headquarters. Have you noticed anything peculiar in that regard?

– For the car to receive updates and transmit data it has to connect to WiFi. In my house I've installed a sophisticated WiFi network, which allows me to see all clients and how much data they transmit. It tells me that when parked in my garage the car transmits considerable amounts of data after being taken for a drive. Its many sensors collect a lot of data, and Tesla is very good at using its fleet of cars to channel data back into their machine learning systems to improve them.

– That is one of the reasons why Tesla is ahead of the competition. They extract data to train their machine learning models. It is likely to be some kind of reinforcement learning, where they pick real world data related to situations when something unforeseen occurs. For instance, the car drives on autopilot and suddenly the driver grabs the wheel or steps on the brakes. I assume they want to analyse sensor data related to such an incident, and that makes good sense. But I'm guessing here, because the only thing I can see is that the car is uploading a lot of data. Exactly how it's done, that is something Tesla keeps as a business secret.

Hans Christian, thank you for your time, and I hope you continue having fun with your car!

Hans Christian Løvstad

CHIEF TECHNOLOGY OFFICER
Data Respons Solutions

hcl@datarespons.no

New virtual machine for the cars of tomorrow

Cars are quickly converting into cyber centres on wheels, and buyers expect new features to be introduced just as fast as in their smartphones and consumer electronics. That puts tremendous pressure on car manufacturers. To relieve some of the pressure MicroDoc is now introducing GraalVM embedded, a virtual machine allowing for faster development cycles while retaining the stability and longevity required by the auto industry.

BY: Arne Vollertsen for Data Respons

Java in the automotive industry

A significant amount of telematics services, connectivity services, and infotainment systems in the automotive industry are programmed in Java. But while there are many good reasons for Java being the most widely used programming language in the world, it has a few shortcomings as well, startup performance being one of them, memory footprint another. GraalVM remedies these shortcomings. It accelerates startup time by a factor of up to 10, can reduce resource consumption, and can host multiple programming languages and run different software on the same infrastructure.

Initially developed by Oracle to be the programming interface of the future for the Oracle database, GraalVM is now being introduced to the embedded world. Especially in the automotive industry GraalVM will make a huge difference, says MicroDoc CEO Dr. Christian Kuka.

– It's well known that the largest part of development costs for a new model goes into software. Essentially, a modern car is a big rolling smartphone, and that is a huge challenge to the auto industry. Why? Because, on one hand you have your costumers. They expect to be offered new features as fast as they're used to from smartphones and other consumer electronics. On the other hand, car manufacturers have strict safety and warranty obligations. That means you want software that's extremely stable and reliable, and therefore you have to focus very much on certifications, testing etc. Thus, you can end up with very long development cycles for new complex applications.

Long lifecycle

According to Dr. Christian Kuka the GraalVM can help narrow this gap between customer expectation and industry requirements. It allows you to reuse existing components and legacy code already tested and approved. Also, as GraalVM is hardware independent, you can use your existing infrastructure instead of having to introduce a new one. In addition to that, GraalVM fits the auto life cycle. It's supported by one of the biggest IT companies on the planet, and as part of the Oracle database it has a life cycle that is appropriate for automotive use cases.

Accordingly, MicroDoc offers its customers long term contracts, so that they still can get GraalVM updates and security fixes during the usual automotive product lifecycle. manufacturers using the GraalVM will be able to quickly integrate new features into their platform, and at the same time guaranteeing the availability of those features throughout the car's lifetime. And GraalVM allows manufacturers to use the same infrastructure for new features while also using it for long-running, stable functionality without the need for frequent updates.

Addressing restrictions

As mentioned, GraalVM was initially developed to meet the requirements in the cloud for infrastructure supporting micro services. In the automotive industry you have similar restrictions of resources in regards to memory, CPU power etc. GraalVM addresses these restrictions and allows developers to do much more with the limited resources at hand. Instead of having different languages and different virtual machines run simultaneously and interacting on the same device, GraalVM can run everything. It will work for every language, and allows you to get rid of independent components and have everything built on the same infrastructure, and on the same virtual machine.

GraalVM runs applications written in languages like JavaScript, Python, Ruby, and R, and it even supports the execution of C and C++ in a safe, virtualized environment. It runs any language with an LLVM compiler, including SWIFT and Rust, together with the entire Java universe, including Scala, Kotlin, and Java itself. Moreover, you can mix Java with JavaScript and Python, and you can use existing libraries and frameworks available in those languages and use them in one single programme.

General-purpose backbone

According to Dr. Christian Kuka, these features allow GraalVM to function as a general-purpose backbone that can host basically everything in a car, with the exception of features with hard realtime requirements.

– GraalVM will make a significant difference in regards to everything that relates to interaction with users, infrastructure, network and cloud services. It allows for faster start-up time, and quicker response to any kind of user input. As an example, in today's telematic applications you have to wait until the application has loaded all resources and is completely up and running before it can operate, and i.e. transmit your current position to a backend service. By that time you're already back on the street

and the first kilometres are missing in the records. With GraalVM, the application is up and running nearly instantly and able to record your position with the beginning of your trip.

– Due to the fact that GraalVM supports different programming models and languages, it is suited for many different types of applications in a car. That goes in particular for applications relying on connectivity with backends. These backends can be for the OEMs themselves, for instance for predictive maintenance, or it can be connections to 3rd party applications like insurance apps.

For instance, in Italy you can save a lot of money if you install an application that gives you pay-as-you-drive auto insurance. That's big business in Italy, and you can basically cut your insurance costs in half if you have this feature in your car.

The connected car

Looking into the future, cars will connect to a great number of services, be it advanced navigation services, special points of interest, weather services, radar control warnings and the like. That trend has started already. As an example, the head unit in a state-of-the-art car has up to 50 concurrent web connections open to all kinds of services that are not hosted by the OEM. And that number will increase. Just like a smartphone, a car will connect to any number of services, and the GraalVM will be its crucial switchboard.

The GraalVM can host not only OEM applications. It offers a standardized programming model for any kind of 3rd party application in a car. This allows 3rd parties to add software and to rely on a proven programming mode to do so, be it Java, JavaScript or something else. Just write the code and with GraalVM it's encapsulated and put in the car. Execution of 3rd party code in a VM also separates it form vital internal functions and enhances the overall system robustness and security.

Apart from future-proofing, GraalVM also allows for updating of existing systems. Its ability to reduce memory footprint and resource consumption makes it possible to add new features to older systems currently in the field, despite of their limitations.

Furthermore, you can update a car during runtime, which is important, when you need to quickly address emerging vulnerabilities by installing software updates while the car is operating.

License and open source
In addition to this, as Dr. Christian Kuka points out, GraalVM has the advantage of coming in both an open source version and within a commercial licensing model.

– If you're a developer, it gives you the freedom to try out the technology and get familiar with it without upfront investment. Afterwards, when you're ready to integrate it into a vehicle's system you can choose the security of a commercial model. And while the open source world is full of IP traps, a license shields you from e.g. patent trolls on the Virgin Islands, who make a living suing companies that use open source software. MicroDoc has a commercial model that gives you all the necessary IP rights, and it's done under EU legislation, which is very different from buying software from the US.

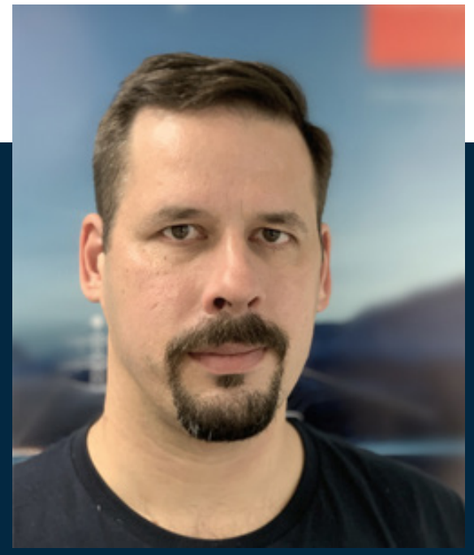
So, to sum it all up, while our cars are quickly converting into giant smartphones on wheels, GraalVM will be their new virtual engine, taking care of the increasing complexity, while at the same time narrowing the gap between demanding customers and the auto industry's own demand for stable and reliable systems.

Read more about GraalVM and MicroDoc Here!

Do you have any questions? Get in touch!

Dr. Christian Kuka

MANAGING DIRECTOR
MICRODOC
christian.kuka@microdoc.com



The strength of being an expert in both IT and banking

– We're developing technology and processes to support this kind of lean, fast, and convenient services. The banks, which are successful, know that this is the way forward. The others will slowly vanish, if they don't make that transition.

DR. DIRK FROBESE. CEO AT FROBESE

Dirk Frobese started out developing software for banks and insurance companies. But he soon found out that software alone wouldn't solve his customers' problems. They needed somebody to analyse and improve their workflows and processes as well. Since then the 90+ Frobese team has become highly successful in serving as translators and mediators between banking and technology.

BY: Arne Vollertsen for Data Respons

– What we do is so much more than programming some functionality, says Dirk Frobese.

We are right at the heart of our customers' business and working as their trusted partner in long-term digital transition.

What he experienced in the banking sector ran contrary to Dirk Frobese's education as an electronics engineer. At university he had been trained to logically structure everything he did, in the same way you would analyse the flow of current when designing a piece of electronics. But when he looked at his customers in the banking and insurance world, he said to himself: "What a mess!"

– You would think that people specializing in numbers and finance would do their job in a very systematic and logical way, but no. It seemed as if their work had grown by itself over many years with nobody ever asking if this was the right way to do things. There were a lot of people working, but they didn't necessarily know what the others were doing, and some of them were doing the same thing twice. And of course everything was paper based.

Full bandwidth of skills

Gradually Dirk Frobese built a company specializing in analysing and improving workflows and processes in the industry. Because, as he points out, what's the point in replacing an outdated system with new technology, unless you optimize the workflow you want to digitalize as well?

The Frobese team includes the full bandwidth of skills for that task. You have software developers, you have people with university degrees in economics, and you have people from the banking and

insurance world. This diverse skill set ensures that Frobese can deliver on all three of the company's main business areas: software development, analysis of workflows and processes and management of large-scale transition projects.

– Typically our customers are well-established and mature companies that want to update their infrastructure and offer new services and applications to their customers. Some of them are inspired by the many emerging Fintech companies, that have brought a lot of innovation to the sector regarding automation and delivery of financial services.

Translators

According to its founder the strength of Frobese lies in its understanding of both technology and of banking. The Frobese team knows how to talk to upper management, which typically consists of people with a background in finance and banking, and it can talk with the IT people of the bank as well.

– In fact, we are right in the middle between the two. We consider ourselves translators between them because often we find that the top managers have difficulties understanding their own IT people.

– What makes us special is, that we can navigate in both worlds. We can do nice PowerPoint presentations in front of the board of directors, just like business consultants from Deloitte or KPMG. But what sets us apart from them is, that we can actually build what we are showing on those PowerPoint slides.

Software and compliance

Nowadays, when it comes to software development, Frobese is primarily focusing on integration and adding new functionality and developing new APIs for data exchange between different systems. We are a broad team of experts in data warehouse solutions, together with specializing in compliance. The banking and insurance sector is intensely regulated, and Frobese is offering a framework called G2C – governance to compliance – for customers to handle complex compliance issues, for instance regarding identity access management.

Regarding workflows and processes, the Frobese team is looking at how banks are handling different tasks. Based on that workflow knowledge Frobese improves and streamlines them with technology, always acknowledging that digitalization has to start at the beginning of a workflow, not at the end of it.

Large-scale projects

In recent years the project management leg of Frobese has grown significantly. We are handling large transition projects, many of them with a multi million Euro budget. These projects are "mission critical" to customers and Frobese is providing all necessary management skills, be it change management, project management, or test management and in all shapes, be it agile or traditional, whatever is feasible for the task at hand. As Dirk Frobese puts it:

– It's like performing heart surgery. The systems are all interconnected in complex structures and it's difficult to change anything, because it has repercussions throughout the entire system. However, you must do it to move forward.

– On top of that, in this sector transition is difficult and very costly. Just as an example, let's look at the test management side of a project. When we are building a new system, we are required to build a test system similar to the production system, to be absolutely sure, that on D-day everything works exactly as it's supposed to. We have to prove that the numbers are and will be correct, end of week, end of month and end of year. It's very complex and costly to build such a shadow production. It takes a lot of effort, but there is no way around it. If anything goes wrong you can't just say to the authorities in charge of banking oversight that you have for instance 20 million Euros you can't account for. It's in there somewhere, you just can't find it right now.

Conservative sector

Although Dirk Frobese has built up a thriving business as a technology specialist catering to the banking and insurance sector primarily in Northern Germany, he feels that part of the industry is falling behind, being too cautious and conservative.

In his opinion, too many executives still see IT as a cost, instead of a new business opportunity.

Therefore they're reluctant to invest in the digital transition necessary to secure the long-term success of their business. And thus, you'll find ancient systems still running out there, or as Dirk Frobese puts it: "A lot of old iron".

– There is a lot of legacy IT running in basements in some places. We're talking relational databases, we're talking Cobol code. But by now, the guys who are able to maintain these old systems may be in their 70s and it is close to impossible finding anybody else wanting to keep the old code running. Good luck to you, if you're trying to find a young programmer to maintaining your Cobol code.

– I know there are a lot of managers out there ignoring this problem. You still see banks in which upper management doesn't understand IT, and some banks are big and old fashioned and unwilling to change. But they'll slowly go out of business if they're unable to reinvent themselves.

– Banks and insurance companies are IT driven and they can't exist without it. Luckily more and more companies in the sector are realizing this and I'm glad to see a change, because what the sector needs is digital transition.

Making a VW Golf

According to Dirk Frobese, the banking and insurance sector started out being quite innovative. That was a few decades ago, when large scale and personal computers revolutionized data management and workplaces. Since then, many organisations have failed to keep up with technological development and failed to utilize what technology has to offer.

In his view, banking has to become more like the auto industry, with platforms, standard components and well-defined workflows. Banking executives have to learn how to make a VW Golf, meaning a standardized, high-volume product, efficiently produced. Only when they've redesigned their workflows and processes to achieve that, they can begin thinking about a Bentley or a Ferrari. Then they can offer handmade and expensive products and make a profit from them, because they have a solid base with standard components, automatic workflows etc.

Openness needed

– Banks need to become more transparent and open to their customers. One of our customers, a large German savings bank, has realized that and has laid out a nice vision for their future business: They want to enable their customers to do almost everything from their sofa at home. Let's say you want a loan to buy a house. You can fill in all the numbers at home, anytime it suits you. Only when you get to the point, when the regulations require you to meet with your banker you go to the bank. At that point he already has all the data you've submitted and together you make a decision. Then you get the money and you can buy your house. That's it. You did most of the work yourself and that reduces cost for the bank, as well as being more convenient for you as a customer.

– We're developing technology and processes to support this kind of lean, fast, and convenient services. The banks, which are successful, know that this is the way forward. The others will slowly vanish, if they don't make that transition.

THIS IS **FROBESE**

The frobese GmbH Informatikservices specialists have a strong record in large projects, managing the business- and it-architectural lifecycle especially in core banking and general financial service businesses. We develop customized concepts, transformation strategies and solutions that build up or support the business of our customers and we also step up to the project management frontline to meet goals and to deliver success.
Our long-standing customers include NORD/LB, KKH, Finanz Informatik and VÖB Service.

Our expertise extends to IT/strategy consulting, transformation of core financial business structures, business process management, organizational consulting, business field development, IT quality management, requirements management, procedures and models, software architectures, implementation, test management and testing.

Frobese have been part of the Data Respons group since 2020.

SOFTWARE FOR EFFICIENCY AND CO-OPERATION - AND A LIGHTER FOOTPRINT

By: Arne Vollertsen for Data Respons

Software is a key enabler for improving workflows and decision-making.

Companies turn to Sylog for expert help in their effort to build future proof solutions and to integrate systems for optimized workflows and to maximize their use of resources.

Here's a look at some of the Sylog projects highlighting the power of software.

- Digitalization, integration and optimization – these are the things we are working with.

Regardless of which applications we're looking at, software can save time and resources, and make us all work smarter and more efficiently. We are helping our customers to achieve these benefits across many different domains., says

Therese Hansson-Rosenqvist,
CEO of Sylog Väst AB, headquartered in Göteborg.

Automotive

As the automotive industry is strongly present in and around
Göteborg, Sylog has a lot of activity in that sector, much of it related to electrification and autonomous driving. Electrification of the vehicle drivetrain together with the electrification of other vehicle
components is a massive trend in the automotive industry. Another trend is development of technologies for driver assistance, route
optimization, and other steps towards the ultimate goal of
autonomous driving.

Hybrid drivetrain

As an example, as many modern vehicles have a hybrid drivetrain with both batteries and a combustion engine, you need to balance the usage of fuel and battery, for instance in regards to route planning.
Sylog is developing driver assistance software to plan routes more efficiently, not only to get from A to B as quickly as possible, but also to balance fuel and electricity to achieve the best blend of resources. Software can send recommendations to the driver, or even enable the car to take that decision itself.

Autonomous driving

According to Therese Hansson-Rosenqvist, Sylog is also in various ways contributing to the car industry's journey towards autonomous driving. Sylog consultants are participating in development projects in that domain, both in regards to personal cars, trucks, buses and construction equipment. It's all about planning, information sharing, driving efficiently and safely - and reducing the environmental footprint along the way.

5 and 6G

Connectivity is a necessary requirement for the technologies and services surrounding automotive electrification and assisted driving. The connection has to be fast and powerful to cope with the increasing demands for data volume, bandwidth, and low latency.

Thus optimization of communication infrastructure is an integral part of the Sylog software domain. Among other things, Sylog is working together with a large telecom company developing software
infrastructure for 5G and 6G technologies. These super fast and powerful communication technologies will be the foundation on which a multitude of future services will be built.

Control room system

- Communication and connectivity is also a prerequisite for a number of security solutions and emergency services we are developing for different customers, says Therese Hansson-Rosenqvist.
As an example, Sylog consultants are working with control room systems for different customers.
The system developed is central to emergency services integrating telephony components, radio communication, camera feeds, necessary key data from external systems etc. These systems enable swifter response in case of emergencies, increased security in society, and higher efficiency for the workforce.

Mining trains

For an extreme example of how Sylog increases safety with software we have to go to Australia. Sylog consultants are coding software for mining trains, transporting iron ore from a huge mining district in the desert north of Perth, to the city's harbour.

As the working conditions are extreme with scorching heat and poisonous snakes, the trains need to be automated as much as possible, and not only for safety reasons, but also to fit more cars to the train to save energy and to streamline the transport of iron ore.

Airline crews

According to Therese Hansson-Rosenqvist, software enables organisations to handle complex processes to achieve increased efficiency, better coordination and deeper integration.

- As an example, we are working with our customers to develop systems for scheduling the work of airline crews. These work schedules for large airlines are very complex processes governed by flight and duty time limitations set by the regulators and unions. Also, the systems developed generate route optimizations in order to reduce fuel and make the flight more efficient for both crew and passengers.

Manufacturing

Sylog is also present in the manufacturing industry. A large manufacturer of mechanical components for the manufacturing industry is engaging Sylog to increase its work efficiency.
The general industry trend is pointing towards automation of maintenance and support, with online access to production equipment and processing of sensor input from the equipment to reduce the risk of sudden interruptions in production and unwanted downtime. The aim is to harvest information in near real-time of the condition of equipment and components, to predict failures and intervene before something happens, reducing waste, and optimizing the manufacturing process.

The large industrial manufacturer needed to optimize its handling of documentation. The high-quality components it's producing require verification of the quality of the materials used in production. These certificates have to be managed continuously, so Sylog developed an automated system with a dashboard showing the current state of documentation and certificates, with notifications sent out automatically, when expiring certificates needed to be renewed.

Digital transition

According to Therese Hansson-Rosenqvist, the digital transition has the potential to reduce the environmental footprint of both society and industry.

- We are helping our customers achieve their goals, both when it comes to reducing the usage of fossil fuels, when it comes to achieving more efficiency with less resources, and when it comes to providing access to data for better decision-making. Software is at the centre of all this, and for us it's exciting to be part of the digitalisation journey of so many different companies and organizations.

Want to know more? Get in touch with our experts at Sylog!

THERESE HANSSON-ROSENQVIST
rehansson-rosenqvist@sylog.se

PETER ÅSBERG
peter.asberg@sylog.se

Data Respons has signed the 10 Principles for a circular business

The bigger picture: why we should get serious about recycling and reusing "Humans manufacture enormous amounts of materials, resulting in copious amounts of greenhouse gases, nearly a third of the total 51 billion tons we emit per year. We need to get those emissions down to Zero." Bill Gates[1]
[1] Gates, Bill. 2021, p.110

BY: Isabelle Borchsenius.
Marketing, Communication and Sustainability Manager

TO REACH THAT GOAL, GATES STATES WE WILL NEED TO:

Find new ways to make materials with zero emissions
Recycle existing materials like steel, cement and plastic.
According to Gates, reusing something doesn't require nearly as much energy as recycling, so we should also be looking at ways to build and make things using repurposed materials.

HOW DOES DATA RESPONS FIT INTO THAT PICTURE?

The ICT-sector stands for approximately 730 million tons CO2 equivalent (Mt CO2-eq) or 1.4 percent of total global greenhouse gas emissions for the total life cycle carbon footprint. Modern applications are almost always deployed over the cloud, hosted at data centers that consume about 2% of global electricity today; by 2030, they could consume as much as 8%.

Data Respons is a specialized technology company and we are aware of our carbon footprint. As stated in our 2020 ESG-report (reporting on 2019 emissions), we had 9303 tons CO2 emissions. The majority of our emissions come from Scope 3 -purchase of goods, more detailed from production of technology devices.

We believe that in order to start the journey to reach net-zero, which we

aim to achieve by 2025, we need to implement circular economy, cradle-to-cradle (C2C) and eco design concepts. Data Respons' business model is mainly focused on software development services, which generally emits little greenhouse gasses. However, parts of our business also develop hardware technology, which is where we aim to introduce the concepts mentioned above. We believe that this is best achievable through through close collaboration and continuous interaction with our customers and suppliers.

DATA RESPONS JOINS SKIFT - 10 PRINCIPLES FOR CIRCULAR BUSINESS

As a first step into a more circular business, we need to increase our competence within green technology businesses. Consequently, we have recently joined the Nordic network SKIFT and signed their 10 principles for circular business. By joining this network of businesses, we have the opportunity to take part in knowledge-sharing, which will help us on the journey of transforming to an increasingly circular economy. The principles are intended as a simple guide which all companies include in their process of evolving from a linear to a circular economy.

"We are happy to see the leadership Data Respons take on their journey from a linear economy to a circular economy. Technology companies are powerhouses of innovation and play a critical role to achieve sustainable and green growth. A circular economy for technology companies will open new market horizons and at the same time reduce the exposure to the environment.

Skift is very grateful that Data Respons supports the 10 principles and becomes part of our learning platform for circular economy. We hope Data Response´s customers and suppliers also will support this call to action for a more circular economy among businesses!"

Bjørn K. Haugland,
CEO Skift – Business Climate Leaders

Our daughter company **Data Respons Solution**s produces embedded technology solutions, and thus have an important role in influencing their customers towards a shift from linear to circular production concepts.

"We do not develop our own products but develop solutions according to our customers specification. Our most valuable contribution is to positively influence our customers to choose sustainable options. We provide our customers with expertise to make the product both green, rugged, and profitable. This can be a difficult balancing where we need to take our customer's concerns of reduced quality seriously. Knowing that extreme environments place special demands on industrial solutions to ensure optimum functionality vs. protecting the environment."

Jørn Toppe, CEO at Data Respons Solutions.

Data Respons Solutions follows the ROHS-directive, that includes minimized use of energy, thinking long-term and using fewer components and parts. The products should be designed for lifetime sustainability, easy to maintain and service and easy to upgrade to increase the products lifetime.

We are, however, experiencing that there is a higher environmental focus among our customers. There is increased access to good technical alternative product / solutions that are environmentally friendly and that aren't conflicting with, or compromising, the technical solution. In the future, we aim to professionalize our procedures to offer our customers' circular products/solutions and make it traceable that the opportunities were reviewed with the customer".

Lynda Haig Thoresen, Marketing, Communications & Sustainability Manager, Data Respons Solutions.

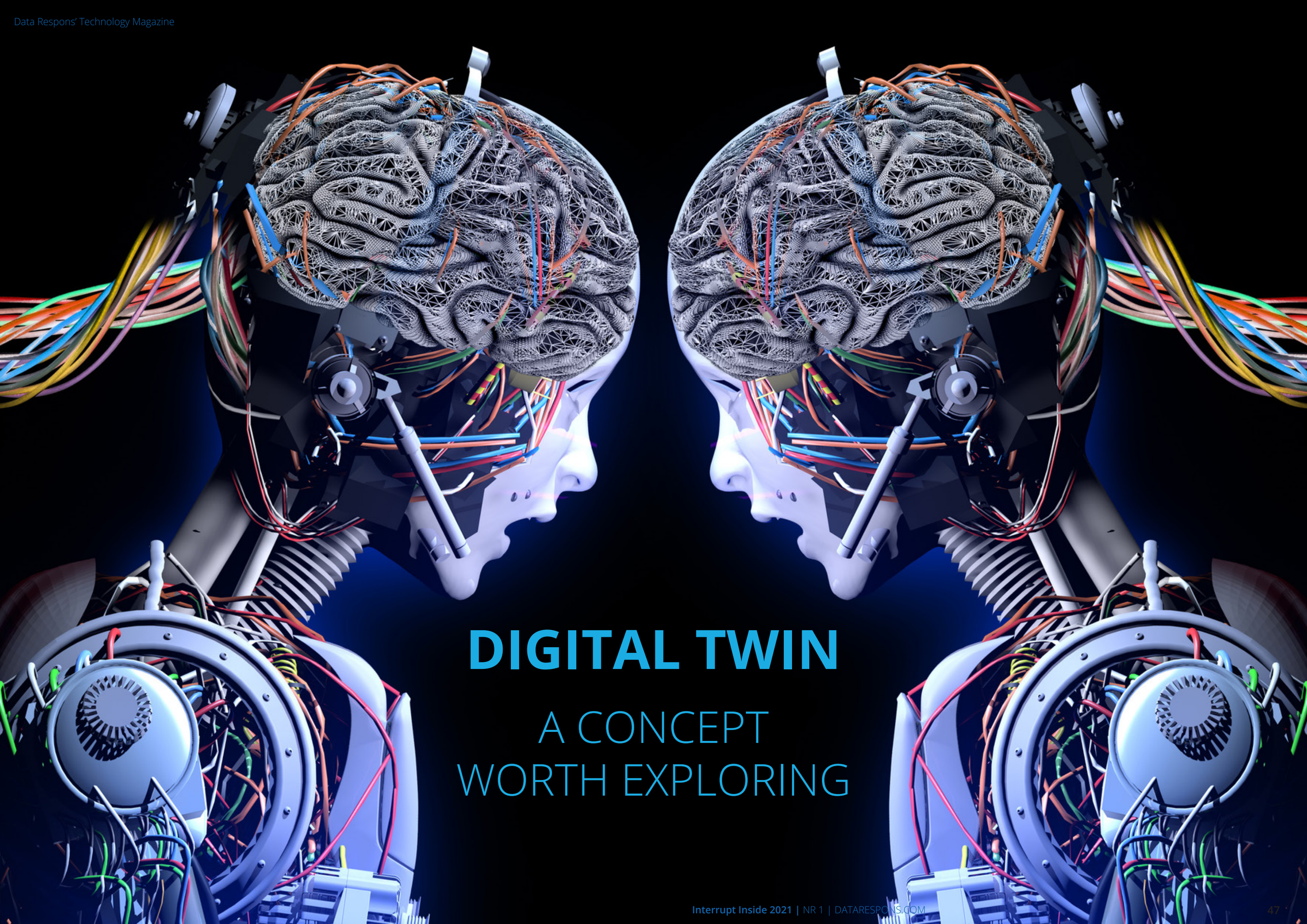
BELIEF IN LONG-TERM PAY-OFF

We believe that taking responsibility will pay off in the long run
At Data Respons, we believe in taking responsibility for how people, the environment and society are affected by our operations. However, we are convinced that by taking action to make our supply chain sustainable, we will see economically benefits, long term. At the same time, we will stay the desired choice for our customers, stakeholders and employees. Ultimately, this journey will lead to even more competitive and attractive products.

Read more about our ESG-work

THE **10 PRINCIPLES** FOR A CIRCULAR ECONOMY

1. *Active management for a circular economy. Turn existing business models to circular variants*
2. *Develop product and service portfolio for circular models*
3. *Add to regenerative processes, production and operation*
4. *Share resources*
5. *Treat own assets for maximum life, resource utilization and recycling*
6. *Make more circular purchases*
7. *Work for framework conditions that increase circularity*
8. *Collaborate up and down and across value chains to maximize circularity*
9. *Prioritizing technology development and a data-driven circular economy*
10. *Advocate customers to make sustainable choices for technology production*



DIGITAL TWIN

A CONCEPT WORTH EXPLORING

DIGITAL TWIN

Although introduced in an engineering setting almost 20 years ago the Digital Twin concept is still highly relevant and worth exploring. However, as is often the case with tech buzzwords, the more popular and widely used they become, the harder it gets to define them precisely and to distinguish between the smoke and mirrors of marketing and the real potential of the original concept.

By: Arne Vollertsen for Data Respons

From the 1970s

Actually, the conceptual idea of using a "twin" dates back to the 1970s and NASAs Apollo program. In 2003 the Digital Twin concept was taken up in a manufacturing setting, when NASA consultant and manufacturing scientist Michael Grieves introduced it in a lecture on product lifecycle management, defining its the three components: The physical product, its virtual shadow or counterpart, and the data flow back and forth between the two – data going from the physical product to the model, and information and processes going from the model to the physical product.

Model fed with data

Hans Christian Lønstad, CTO of Data Respons Solutions, elaborates:

- Basically, a Digital Twin is a model of an item and how it operates. The model is fed with real sensor data from its physical twin, so that it can evolve in the same pace as the physical object. For instance, let's take an airplane engine. It will be affected differently over time dependent on its usage. If you're flying across a desert and you get in a sandstorm, there will be a huge wear on the engine. Everything is recorded in the airplane, and when it's grounded the engine manufacturer can pull back all the data and feed it into the twin model. Feeding the digital twin with real-world data and observing it will give the manufacturer a pretty good idea of the condition of the specific item out in the field.

Specific instance

As Lønstad points out, you need to distinguish between the simulation model of the engine, which is a general model, and the specific instances of the general model, which are digital twins of individual engines fed with usage data from that specific engine. In that way you get a collection of data that can predict the condition of the physical item it's representing with high precision.

According to Lønstad, new business models can be developed on top of this concept, for instance propulsion as a service, with the customer only paying for engine hours instead of buying the engine itself.

- If you can get really detailed knowledge about the condition of your equipment you can do maintenance and plan service more efficiently. Manufacturers of expensive equipment can build good business cases on that knowledge. You can compare it to a car insurance system, where the insurance company is monitoring your driving. That makes it easier for them to choose the right risk profile for you and come up with the correct price for the insurance.

The Cargotec gateway

Data Respons Solutions is assisting Cargotec, one of the world's leading providers of cargo and load handling solutions, in creating the groundwork for business models based on digital twins. A team of Data Respons engineers has designed a versatile and globally applicable gateway for transmitting usage data from various cargo and load handling equipment marketed under the three Cargotec brands Kalmar, Hiab and MacGregor.

The gateway is an important milestone in Cargotec's digitalisation journey. According to Cargotec, digitalisation enables new business models and service offerings, and the company's goal is that in the near future 40 per cent of its net sales should come from software and service. With the technical infrastructure in place Cargotec is now working with utilizing the data collected, doing analytics and adding value to it.

On top of the hype cycle

The Digital Twin concept has gained a lot of inte-

rest in the past 5 years, both in industry and academia. It even managed to make it into the Gartner Top 10 Strategic Technology Trends of 2019, and in 2018 it was on top of the peak of inflated expectations on the well-known Gartner hype cycle.
What usually happens is that such a hyped concept then cascades down into the valley of disillusionment. However, if enough people put serious work into it, it will eventually become a productive technology and claw its way up to the plateau of productivity.

Serious work

In fact, some of the people putting serious work into the Digital Twins concept are working at Data Respons and its subsidiaries. What they're doing may not fit exactly into the strict definition of the concept put forward by Michael Grieves in 2003. But still it's all about digital representations of physical objects, processes or systems, and the interaction between objects and their digital shadow or counterpart.

Device Twin

For instance when you take a look at MicroDoc, one of the German subsidiaries of Data Respons, working mainly in the automotive sector. When working in the vehicle telematics area MicroDoc uses Digital Twins to display properties of the telematics units in for instance trucks. On the backend side the individual micro services can work with the twin without having to care about the actual hardware. The twin in the truck will be updated as soon as it connects to the backend.

- We call it a Device Twin, says Nicolas Helou, software architect and developer at MicroDoc.

- Our device management in the backend consists of a database and a number of services around it. The device management knows all these telematics devices in the trucks and knows their current state and configuration.

Digital representation

- We have organized this data in the Device Twins. The Device Twin is also a digital representation, but in this case, mostly of the configuration and the operating states of the devices in the truck. If you want to change the configuration of the telematics device in the truck, you talk to the Device Twin. You can change the configuration in the Device Twin and then it will synchronize this data with the device in the truck. If the device is not turned on at the moment, the Device Twin will just keep the information, and transmit it when the device is active.

Health Monitoring

- Another technology we're working with, resembling the Digital Twin concept, is something we call Health Monitoring: On a regular basis each device sends information to the backend about CPU usage, memory usage and other properties, which are all related to the health of the device. We can see if it works as it should, and all the health data is collected in the backend, where we have a graphic representation of all the devices in the system and their current state, both of every single device and of the system as a whole.

Data-driven manufacturing

No doubt the concept of the Digital Twin will continue to attract interest, and it will be driven by the developments in related technologies like Big Data, IoT, Industry 4.0 and large sensor networks. We're looking into the future of data-driven manufacturing, and Digital Twins will definitely be a part of that future.