
# Managing Complexity as a Service with data-driven services

***In today's complex world, many businesses struggle to continuously take solid decisions to manage and reduce complexity. They miss the necessary approaches for data-driven decision making.***

***With new data-driven services your clients do not want to miss, you will become a unique partner for your clients. This will help you grow your business during today's disruptive times.***

***By Yvo Saanen – TBA Group and Jan van Veen - moreMomentum***

https://www.moremomentum.eu/events/202102-yvo-saanen-digital-services-panel (including recording)

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***On February 17th, Yvo Saanen, Commercial Director of TBA Group, was guest speaker at the moreMomentum Services Community. After his introductory presentation, members and a few invited guests engaged in peer discussions in smaller groups and reconvened after the break for a panel discussion with Yvo.***

***Below is the transcript of the panel discussion with Yvo.***

***The recording and transcript of the introductory presentation can be found on*** Introductory presentation: https://www.moremomentum.eu/lp/202102-yvo-saanen-digital-services-webinar

## PARTICIPANTS

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## INTRODUCTION – BY JAN VAN VEEN

In essence, the main topics we have is:

- Get a more practical insight about what is modelling?
  - What does it take?
  - How to do it?
  - How long does it take?
  - How to ensure you have a valid model?
- A deeper dive on how to use these tools and techniques and how to become more data driven in improving our internal service operations
- How can we create more customer value with it and also capture that value? So instead of just getting things for free? How can we also monetize it and generate revenue streams from it?

## HOW TO MODEL

I will kick off with let's say the first question coming from the group is or have Yvo, maybe you can paint a bit more picture of how do you approach creating models? And so how difficult is it? How long does it take? How do you know for sure that your model makes sense and is valid?

## Simple trend analysis versus complex modelling

**Jan**

But maybe even before we go into that is? Isn't there low hanging fruit before start modelling but more using data and some trends analysis? Because I can really get a lot of insights from that before we start making complex models.

**Yvo**

Thank you young and good to be here in a live version of myself.

Regarding making complex models, we should clearly make the models as simple as possible. So we are can work with the model, understand the model, so that is easy to find out how the model can help us.

How to start with modelling? And it all depends on what you want to achieve? What is the problem you want to solve? So there is always a clear objective and notion of the problem. Something is inefficient. Something costs too much money. Something does not lead to the desired productivity results. So there is a problem.

So modelling really starts with understanding the current situation and a clear problem description. And doing that, you also will limit the problem description, or you will not take the whole world into account build a very complex model of that. And you will always fail.

So you always need to scope what is relevant to take into account. And then you start doing that, and then you come to the phase of model validation. So ensuring that your model is right and fit for purpose.

If you look at simple trend analysis, and again, you provoked me a little bit, Jan, by saying trend analysis is simple. First of all, I think trend analysis, assuming certain correlations is modelling, where we create a simplified representation of reality where we assume that if we see vibrations in a machine, or temperature variations, that something is wrong. That's a modelling assumption, that's a simplification of all the physical relationships that are taking place within this particular machine if we look at a machine. So already there in trend analysis, we use a modelling approach to create insight in phenomena that we don't exactly understand. That can become also very complicated, let's say, models that, for instance, economists, or banks, or people were working on stock markets used to predict stock markets, super complex econometric models, that try to include all kinds of parameters, so they become better in predicting the market, and of course, very difficult. So again, that's also kind of trend analysis.

It all comes down to basically your third question on this list. How do we handle the data? How do we feed data to the model? How do we ensure that this data we are capturing is the right data, that we understand this data, what it actually means if you have certain values? What do we do with anomalies in the data set, there is not a single data set that I've seen in 25 years, that doesn't have a lot of anomalies that we cannot explain, that we have to remove, to make any sense out of the data.

Miss-reads or sensors, simply wrong registration of a value that somebody recorded, can be of any kind, we always see a lot of anomalies that will not fit to how we see the world.

## Defining the problem

**Jan**

So to make it, let's say more and more practical if you say we want to know the problem. How granular do you want that to have? I know for example, I am a machine manufacturer that starts with sensors, and doing predictive maintenance around one known off high frequent failure of a certain arm. And that they at some point noted that a that electric motor did three trials or some new attempts or something like that, that that was a very good indication that within one month that arm was going to fail.

So if I were to say the problem is this arm often breaks. And now we start developing model around that. Is that concrete simple or is too simplistic now?

**Yvo**

That can be. I mean, the first question I would ask is, is a real problem in your overall process? Let's say the arm is not a critical resource whatsoever. So, although it breaks all the time, in the overall process of the customer, it doesn't reduce, let's say line output system output, it's very likely that something that frequently breaks would have impact. So typically, a good problem analysis starts with where is the bottleneck in the system. And when you see a lot of complex production lines, or all are linked systems, think of supply chains, we always try to find where is the bottleneck?

And do we in the first place know where the bottleneck is. And I can tell you very often people even don't know where the bottleneck is. And they're focusing on one particular part. And it turns out not to be the bottleneck at all. So even when you would solve that the total output of the system doesn't improve. So, you have spent a lot of time and analysis and every one of you on the wrong thing on the wrong problem. So, I think essential as a service provider, is that you are able to also take this helicopter view.

So, the customer puts a problem on your desk, and into say this arm - and it's a good example to make it very concrete -this arm is always breaking. And I think the first thing you need to assess what is the real problem that it causes? So, maybe it is really is this arm that that will hamper your process. But very often it may not be the case. So, I think, to have an helicopter view, what does it really mean for the customer? How much output is he losing because of this frequent break breakdown?

You may also want to know, zooming out what is actually the root cause? Are they using the machine in the correct way? Or is it really the arm that is the problem the mechanical design of the arm. So, it's very important to be able to zoom out to first get the right scoping of the problem.

And then common mistake is to only focus on what is put on your table, the arm is wrong, solve the arm, create a stronger arm? Well, in most cases, it won't be the right solution. So, allow yourself to understand -and I think that's also when we come to the later questions around creating value - is by understanding the customer's process much better. Understanding what your contribution to the process is. And if you're part of that process doesn't work well: What is the impact on the customer? How much revenue loss does he have? As a result? How much productivity loss does he have?

It also will create a lot more room for finding solutions, then maybe a very hard problem to solve is making this arm stronger. Takes a long time before I mean, what will you do?

**Jan**

So, understanding the problem may even be a customer and engineering approach before you start doing a lot of things with data?

**Yvo**

Well, I think data will also help a lot by understanding the process. I mean, if you see how this this machine with his arm is being fed with orders, for instance, to process may be very irregular, maybe it has to switch in modes all the time, maybe they forgot to do his maintenance intervals, it could be all kinds of data sources that help you understand the real problem.

What I'm really saying is, you need to look beyond your own components to understand what the real problem is to also be able to help the customer solving the problem because very often the focus is not on the root cause. But on some symptom. The customer sees this machine going breaking down all the time. But is that the real problem? Or is the symptom of something else? Or is it maybe even an irrelevant problem, it is a problem. It's true that he sees this, but it doesn't cause any negative consequences.

You need to know that. And so, I think that as a service provider or as an OEM, you need to know this time you need to know what is my role in the overall process. And if you don't know that you can never be a good service provider.

## Who should do the modelling: Clients, 3rd party service providers, OEM's?

**Jean Claude**

Who has the capacity to build this modelling? I mean, we mentioned during this morning discussion that as an OEM - I am an OEM - I have an expertise in my system, I should be able to release modelling. But at the same time, some customers are asking me the raw data. They maybe then set the modelling and tomorrow John Doe Data Consulting, may come to my customer and sell also the kind of service and building his own modelling. So, what is beyond the expertise needed in building this model?

Basically, anyone that can do that with a bit of good judgement, or you really need a specific expertise, which I mean it's really a different problem if you answer one way or the other.

**Yvo**

I would say either party, the OEMs have components could be modelling, the process owner so the customer could be doing the modelling and either party could always use a specialist to do the modelling. It's like a plumber. So modelling is like plumbing. It's a very specific piece of expertise.

I think if you look at pitfalls, one of the pitfalls is you buy a package - a modelling package - and you start doing by yourself. That typically leads to nothing. So, I've seen that happen, a lot of times people think, "I can do modelling". I've also tried plugging myself. I did not go very well. So, in the end, I had to call a specialist. So, I believe modelling is really something very specific.

And what I try to explain this morning is that you see a lot of engineers who think they can model, and they put detail after detail after detail in this model. It's one of those big pitfalls. They think they need all the details to have an accurate model. And that's far from the truth. You really need - so what we call the art of modelling - actually this reduction that I put so large, another slide: Reduction! What do I need to come to a correct assessment?

And a good modeller creates for that purpose, the simplest model possible. Now that simplest model can still be a very complicated model. But it's the simplest model possible. That's the best model there is. So modelling is a very specific trade. And even a software engineer, and I employ about 250, software engineers and about 50 modellers. I can tell you, a software programmer is not a modeller and a modeller is not a software programmer. They're very different skills. And one of those elements of the skills of a modeller is, is looking at the scope. How far do you need to zoom out to get the right definition of your problem? What should be included in that to come to the right conclusions? What data do I need? How do I prepare? How do I handle raw data, for instance, for a model, but also in more general? If we want to create insight, we need to do something with the raw data.

And as I argued this morning, is there is a lot of data, we're sitting on this huge amount of data. It's unbelievable how much data if you just look at Konecranes, my mother company, they have got so much data. And it's almost

unusable. It's almost unusable. It's really raw data. And raw data means there; is no meaning there is no structure, and there's little understanding of what it really is.

So, to bring raw data to something useful, we first need to know when we put in the data measurements, the registration, what are we registering? What does a certain value range really mean? What does it mean when an alarm is registered? Is something really broken? You know, so, understanding what we are measuring, classifying and categorising, structuring this whole data model is essential.

And I think this is one of the big challenges that many OEMs are currently facing, not only OEMs, but also users of the end systems, is there's a lot of data being collected. But structure and understanding of the data is lacking. So we're really at the beginning of this, although we thought it would be already very far, which is I don't think that's the case.

## Can AI help finding hidden clues?

**Maarten**

Ja, Jan, I have a question about that specific topic. Because I think data and modelling, you know, you do it for two reasons. Either you want to solve the problem. And then at least you know what the problem is, or you want to find new insights and find new opportunities. And as you say Yvo, modelling is a special trade. But my question is, can artificial help us to make suggestions for that categorization in that creative process of finding the clues the hidden clues if, if that makes sense?

**Yvo**

Can artificial intelligence help with finding the clues? I would say yes. Yes. A lot of artificial intelligence that we see today is what we call trained artificial intelligence. And it's trained by humans.

So human says, I suspect there is a relationship between A and B, let's say a certain valve vibrating and the breakdown of the machine. But just to give an example. And let's, let's run the data set, look at all the data and see whether that exists. And then of course, computer is very good at finding that relationship. That area is already well explored, and actually not so interesting. It's very important. But it's not so interesting, if we look at the capabilities of artificial intelligence.

Where we really talk about true artificial intelligence, is actually the algorithm that comes with that relationship says, I look at this data. And based on the data, I find there is this relationship, without telling the algorithm he should look for this relationship. That's what a human mind can do. We see correlations, we saw the picture that I showed with a muffin and the dog eyes, right. Computers are typically very bad to say, which is the muffin, which is the dog. We can spot it right away. This is an area of artificial intelligence that is starting to be explored. And I would say still poorly understood what that really means. Because you have an algorithm that is suddenly searching for correlations that we haven't told that potentially are there. So I really believe that this is a trend, a future trend, where we will learn where we can really process data without setting up the algorithms to analyse the data. But this is an area where we're still in the very infancy stages.

## What are the advantages of an OEM

**Jan**

Maybe back to question Jean-Claude, just now asked: If we can see that clients or users of equipment and machinery, they could develop the capabilities to model their operations and model their systems and predict failures, third party service providers could help them or even providing service to do it for them, or manufacturers can do it. Now, if the critical trait is: are you able to handle the data and model that so that's a very special trade - that is nothing specific to manufacturing - where is the benefits of being a manufacturer which is crucial in this in this function?

Well, first of all, or is that easy to avoid, because it's not really an engineering or technical?

**Yvo**

Well, what is important is the knowledge about what you manufacture, whether it's a machine or whole production line, or a whole automated terminal. So that knowledge about that product, and how it works may help you a lot in creating the right model.

If you look at data gathering, then if you have a user of that product, let's say that machine, he may have that that customer may have one of them, and you have sold 1.000. So you are able, if you set up your data streams, well, to gather data from 10000 machines, where you end customer may have 1. Well, of course one is a very poor predicter for what's going to happen with a machine in general. So, I think here, manufacturers, OEMs have a clear benefit over customers, because they should be able to gather data from the entire fleet of similar types of machines. And look at all those use patterns. And that will tell a lot more than these few instances that the customer always has. And they always have less of that than you will have access to. And this is really where I see also the potential of getting the data is because of the fact that you have a much greater view you can actually add value.

Some customers may say, "I have 20 factories and across those 20 factories, I have 100 of your machines. So, I can do that better". And maybe they're right, but only a few of those, many will have only a few they don't have that overall visibility. So, then the power of large numbers is in this data analysis, very important. So I think that that is a very strong argument why manufacturers are actually or ought to play a role in this whole data analysis and getting value out of data.

**Jan**

Jean Claude, did this answer your question?

**Jean Claude**

Yes, absolutely. Yes. I mean, that was one of the main questions this morning. I mean, some - again some of our customers when it comes to a predictive maintenance or condition-based maintenance asking us, "well, you know, what that belongs to me. I don't need your analysis, give me the raw data, I will manage it". And I understand the answer, which pretty much what I was expecting as well, getting the level of expertise, the capacity to analyse the data to make a model is very unlikely, coming from a customer with a limited number. And I will add on top of that, as we mentioned this morning, that they don't have only one of our equipment, but they have many other equipment from many other OEM.

So, having the knowledge, the expertise, and the capacity to do somethings with data, is questionable. So yeah, yeah, that answered the question.

## Silo vs holistic optimisation

**Jan**

Maybe you can add to that: you do not only have more data from a bigger sample of installed base, but only also you see a lot of clients with different operations and different mistakes they make, because I think what also Yvo said, quite often, a failure of equipment is not only the equipment, but also maybe how it is used the processes or how they clean up the systems or, or what, what all kinds of things can be. You also have more data and information and insights on that as well, which is probably interconnected with each other.

**Yvo**

Absolutely. Absolutely. Totally Jan.

By the way, there's, this one other very, very important point in this discussion is that very few customers actually take the time to do this analysis properly. And so, although they may have the capability, let's assume they have enough installations, and they wanted to do it themselves. They don't. I mean, although they're sitting on all this data that all these machines from maybe various manufacturers are gathering, they don't bring it into context. They don't analyse on a very regular basis, what the data tells them what they should do.

So, the first step is already analysing. Well, some do some don't. But then the next follow up is, okay, what does the data tell us? What should we change, and get that cycle of continuous improvement, rolling on a very consistent basis?

And that's why I really believe in those type of service contracts, because those service contracts will force or will facilitate, whether you see it positively or negatively, that this process is running, and keeps on going. Which is so important, because it's not only important, because you need to know all the time what's happening and what, what is next. But also, because the circumstances are changing, and the manufacturer is producing more, or he's changing his product mix. And suddenly, you get more breakdowns of a particular machine. Why is that? The machine is old? No, it's maybe the whole change in how the factory is being managed, or the demand - the market is changing.

That will happen in other places as well. So you need to stay it's not never a one-time exercise. It should be a continuous process.

**Jan**

We helped some clients with this is to have a kind of ongoing improvement programme based on statistics. Having a list of the top instruments or machines that have the most incidents in the in a year. So apparently something is going different there than with all the other ones. We conducted an investigation and got the right people together to analyse. With service, but also sales, application support, customer training and also the client themselves. And then you start going, talking with your clients about "Hey, but what's going on what happened?"

And at some point, you discover that actually they're using it different than others are. And that that actually is the main cause, why always that part is breaking. So, it's not the problem of the part, but actually how it is used. Or maybe combination.

Doing that, together with the clients can be very powerful in terms of getting insights, but also, by the way, getting a good customer experience and loyalty.

**Yvo**

That capability that you just described, the holistic view on the overall operation, I would call that. That, again, is another expertise that only a few people really master. So, having that capability of seeing all the aspects that could influence the output, whether that's money or produced, or no, doesn't really matter. That is that is rare, I would say. And typically, in most companies not present.

So, you always see this silo based optimization. You see the maintenance department, optimising their processes. I've seen customers in terminals, then they say, the maintenance department says, Oh, I always have 99% of my equipment available at the start of the shift. So that's their KPI. It's also their KPI. And then operation says yes, but five minutes after the beginning of the shift 30% breaks down because you did such a lousy maintenance. "Sorry, that's not a KPI at the beginning of the shift 99% was available". So, it already started with the definition of the KPIs. They're wrong. I mean, and there's so much misalignment between how we measure and how we see our own departments. That's it's self-inflicted problems, you could say. So, let's that's a broader topic, Jan, I would say.

## How long does it take to model? And is it worth it?

**Yvo**

That's, that's, of course, a concern that is raised quite often. I would say, modelling always takes too long. And why is that? Because people have a problem. And they want to have it solved. And they want to know what's the best solution. And the modelling is in that way.

Because the modelling is that is the step in the process to really understand the problem well. And people like to look at solutions. That's also why in this process, the step to focus first on the problem requires a lot of discipline from people. Because they already, you know, that hurt, they can speed up the machine, or they have this new RFID technology. And people like to talk about solutions. You don't like to talk about problems, who likes to talk about problems. Not so nice. But it's very important to know whether this arm of this machine is breaking down and is really the problem. Because otherwise, we may spend all kinds of solutions and money and time to fix that arm and get no results overall.

That's a waste of time. That's a problem. So, in that sense, the modelling part. So really getting from a not so clear description of what is really going on to a model, we understand, validate that model takes typically, let's say two to three months, depends, of course, on the complexity, it may take longer, but I would say it can take as short as one week and takes as long as six months. And also gather the right data to represent typical situations that you see in a system in a factory or in a terminal in a transportation and the supply chain, what have you.

So, it's a tedious process. Always takes too long that when you have the model, then it can last for a long time. So, the nice thing, I have terminals who keep coming back to us, sometimes two years in between and they have another question. And then we saw we take them all off the shelf. We check whether something really major has changed. We may tweak that part. And then we have them all already up and running.

So, it's not like it's a continuous exercise to build models. No, you rather reuse that model. And even sometimes becomes the history of all the things we've already looked at in the past as solutions, because you see that people change, ideas that were discarded five years ago, come back on the table. Then you see how we run that scenario

already. Three years ago, this was the answer. Okay, next point. So actually, very nice to have such a tool that you take off the shelf when needed.

And some actually run it all the time, they use it all the time as one of their basic tools to manage their operations. If they have an idea, they run it first by the model, before they determine what I should continue with that. But that's rare.

## The need to invest in capabilities!

**Jan**

Very good day. But could it be that let's say the biggest mistake or pitfall that service manufacturers or any kind of company can make is: having high aspirations about becoming more digital, for internal sake, and for customer value sake, collect a lot of data at all kinds of sensors, but actually not building the capability, the team with knowledge, the expertise, the tooling, the infrastructure, to really build this art or this trade or this function. So, it is something to invest in, and that you really see that this kind of team embedded in your organisation. Does that make sense? Is that something you see?

**Yvo**

Yes, and not only with manufacturers, also with their customers. So, they invest a lot in gathering data. But they forget to invest in how do we really action this? How do we get real value out of it. Because just gathering the data doesn't help you at all. It is just a lot of work. And to really make this integral part of the way you are working, to internalise focusing on the outcome, what the data tells you in your decisions on a continuous basis and that's still very much lacking across the industry, I would say, having people that have a time to really analyse what's going on? And what is the biggest problem? And how should we solve it?

It's very often you hire and McKinsey or Boston Consulting Group or any other consultant to tell you what's wrong. And then they tell you what's wrong, and then they leave. They leave also, because they're very expensive. So, you want to have that that exposure as short as possible.

But you should create this this culture. In any organisation, whether you are a manufacturer, whether you are a consultant, whether you're an end customer producing something, you should have that culture of what does the data tell me? What should I improve on a continuous basis? Daily

**Jan**

So, this is, let's say, the cultural aspect of becoming data driven, or having the habit that we, yeah, that everybody in the organisation is also starting with the senior leadership understanding and also breathing that for pretty much any kind of job, we have some digital solutions and tools and data to use. Yeah, so are we doing this Yes or no? And how can we do it better?

**Yvo**

Exactly. And really bring it to the boardroom? Right? I mean, and I would say I've met many customers who really initially didn't believe in this. They said, No, no, no. Gut feel tells me my intuition is good enough to make the right decisions. And if things are simple, I think that's, indeed true. But as they get more complex, it may even harm more than its, then it contributes. And I've seen some really turning around after seeing what the power is of bringing data into context, into a model to help them understand take the right decision, and what are the

other decisions would have led to if they would have made that decision? Really, people saying afterwards Wow, I didn't know. I was really surprised how much it would give you. It's like if you are, you know, you're trying to put a nail in the wall, and you find out that a screw is much better you screwed in the roll, you know, you never heard of a screwdriver, you see how. But now you always use a drill and a screwdriver, you see how much better it is for the final solution.

**Jan**

In interesting example, I heard a while ago, about helping people to understand the opportunity of using more data. It is about making senior leadership understand the challenges around digital solutions. It was an example of a digital transformation VP at Pirelli (manufacturer of tires). This guy at some point got a bit fed up, because all the time, any kind of budget request dropped off the table so that we're not building any kind of capabilities in teams, and infrastructure.

So, at some point, he organised a workshop, and top management was invited to join. So, and he was quite persistent in that. So, they joined. And then the surprise was part of the workshop was actually: here, you have a Raspberry Pi processor or computer, you have a screen you have a sensor. And the assignment is to read out data from a sensor and display a kind of KPI dashboard of just one metric of the result against the target value.

Do it now! "But how do we do it?" Well, there's Google, Raspberry Pi is very well documented. The scripting, language is very well documented. So, all the information knowledge is out there. So go ahead. So, all different kinds of teams start working on it. And at some point, the senior leadership, people said: "Well, hey, but this is not for us, we're going". So, then this guy said, okay, you're giving up. You're walking away for it. So that was a harsh moment. So, they had to continue. And they in the end, they did manage. And but the interesting thing is that this that did help to kind of increase your awareness about what kind of .... why does it require investments to build these kind of capabilities, they kind of now felt it more in very small scale. But at that point, it was clear that digital capabilities require investments. So, he got more investment request approved instead of pushed off the table. Yeah. So, a very small, simple example of that, that, let's say, cultivating the culture and the habits and the awareness around you is probably part of the big challenge.

## Need for a complete data model, not only sensor data

**Yvo**

A nice addition here is to really think about the entire data model you need. If we come back to your machine with your arm, right, which is breaking down what we see, in today's practice with trying to analyse the data, we see that there are some elements already captured for a long time, in good frequency, well accessible. For instance, let's say the moves the arm performs, typically very well registered. And then probably all the internal failures that they are registered also are there. But what the arm produced, or which operations the arm was being used for, or how much maintenance was performed on the arm, or which spare parts replaced in the arm, or how much downtime the arm cost in the rest of the process is not there. So, you see you have a very detailed, well documents, piece of information. But if you look at the overall data and the structure and the correlations, to really address the problem that's missing. I can tell you that you have nothing.

And this is I think one of those big challenges that need to be solved is if you start working on providing service in this area, trying to get more value out of your delivery or machine with the service surrounding it, make sure you have a complete data model that you really think before you start with this. What should I capture, to be able to provide what I want to provide? And what I see today is there's a lot of information being gathered without

that sense of purpose in the beginning. And then it turns out to be only half the story, meaning no story, you have nothing.

**Jan**

So, you can start building that data model very small around one or two first problems you're solving and then step by step start expanding on it or have different data models?

**Yvo**

As long as it is complete, for what you want to analyse, yes, that's I think, the essential. You definitely can start small. But make sure that all the information that you need to analyse what you want to analyse or what you want to improve is there. If you don't have that, then it's just no use.

## Including the use of equipment

**Jean Claude**

Maybe one comment after the last was discussion. There was a speaker one day telling us that the success of the digital transformation is 70, or 80%, within the company, and 20 to 30%, towards customer. But today, we are really focusing on customer. Yes, fantastic, we can monitor a component deviation, let's sell a service to the customer. This is what we need. But it's very limited amount of customer and very limited amount of data. In the meantime, we are gathering tonne of data that could be used to improve our component, and that we're not choosing. This is another way for me to say we don't choose what we are.

**Yvo**

I think it's a very good comment actually comes to the second part of this questions is where should we focus? What can we learn ourselves about our products, from the data? And from the usage data? I mean, from my own experience, do we really know how our equipment is being used? Well, I think if you look at the people who designed this equipment, we're servicing maybe a bit better, but the designers have very little knowledge of what it really does for the customer.

So, this data may really help in improving the product, maybe even down spec-ing it. Maybe they thought it has to be so. I mean, one of the discussions is lifting capability, for instance, or carrying capability. And they initially think oh yeah, the customer requires, you know, capability of lifting 60 tonnes. And then when you analyse how frequently do, we actually need to hoist or lift 60 tonnes? Okay, 0.01%. Okay, what if we couldn't lift that thing? What would you be able to do then? Very often that that weight comes together when two containers need to be lifted at the same time. very infrequently. I would argue, as a supplier, you should say, Okay, let's reduce it to 50 tonnes, and in the case that we have a pair of containers that weighs more than 50 tonnes, we lift them in single. Super simple solution. No, a typical engineering solution is to build the capability of lifting 60 tonnes. Because that's what the requirement is.  I think data allows us also to challenge the customer and what they're asking. So, we can make more efficient, cheaper and more reliable products or machines. So I think I'm fulling with you Jean-Claud.

## Bigger picture domain expertise

**Yvo**

Really using it to enhance our own products and services. I mean, it's not just the product itself, but also how we delivered a product, how we maintain the product. Think of update times, let's say we want to update the software of is of a certain machine. A lot of focus is how much downtime does it create? Well, there may be a lot of situations where there is very regular downtime in factory anyway, because they work two shifts a day. Well, there's one shift every day that you can update the software, without any downtime to the process. No, we are focusing on making the downtime of an upgrade as short as possible. Know your customer, know that process so we can actually enhance our services. Also, that is what data tells us in in many cases.

So the third thing I want to say to this to this question is, and it comes with how we started: As a service provider, around your product, try to know more about the whole use of your products as part of the whole system of the customer. If you can do that, if you bring that to the table, you go across your boundaries of your pure products, you can really add value. So understanding the entire process and how your delivery fits in that whole system. If you can do that, that's where you really start adding more value than others, maybe. That's how you can distinguish yourselves.

**Jan**

Could you give an example of would that?



**Yvo**

Well, think of you're in a production line. And there are 10 machines in the production line to deliver a packaged product. So it goes from, you know, a robot, let's say you producing sweets. And at first you have a melting machine, and then you have a mixing machine. And then you have a machine that cuts the sweet stuff in pieces so that the shape exists and it's i a packaging machine, then it's in bigger packages, and then it's put in a box. That's a that's the supply. That's the process and you are supplying the machine that cuts the thing in pieces. Okay, what is the role in that entire process? How many parallel machines of those do you have? What happens if your machine produces 10% less? What if you turn it a bit down and as a result of putting it slower, does the overall process go slower? Let's say you have a problem with overheating of the machine. And the overheating becomes, is because the machine is put at such a high speed. I'm just making up the example. Maybe turning it a little bit down would reduce the failure rate of this machine dramatically. Because typically, this is not a linear relationship.

If we know that it can be easily done without reducing the overall output of the spite of the of the whole chain. That's it's a great piece of information. Because you reduce your errors, probably the error leads to complete stoppage of the of the production line, and the output remains the same even improves because the error rate goes down. If you don't look beyond your machine, you can never tell this.

I'll give you one example. One that is definitely correct because I this is a real example from our practice with automated terminals. We have their automated guided vehicles. So basically, automated cars, transport containers. And these cars, these automated guided vehicles, always drive at the maximum speed. They operate like Formula One race cars. They weigh a bit more, but they operate like Formula One race cars. Even when there is a lot of slack in the process, they act as if it's the 100-metre sprint. If we would know which transportation move has priority, we would put the maximum speed on that one. And all the other ones we would go in much slower mode, saving energy, saving wear, saving the wear and tear on the engine. We don't do that we only look at this machine: Maximum outflow of this thing. Very stupid!

**Jan**

So, what this brings you is, first of all, if there's a problem around your own machine, you can better put it in context of the bigger thing. And that way come up with a better solution. Probably will also help you become kind of trusted advisor, because you can raise .. There's a good saying, that the person bringing a problem to the table. The first is the trusted advisor and the bond bringing it and who owns the problem but doesn't put it on the table is often in trouble. So, if you're able to kind of indicate a problem in the whole process, probably you're the best friend of your clients, even though it may be not directly related to the functioning of your own machine.

**Yvo**

Absolutely.

**Jan**

So, the moral of the story is, it's the importance of developing domain expertise around the entire operation of your clients or your larger scope domain expertise.

## Tools are just tools

**Yvo**

So maybe one side remark, this is very important remarks you're making. So, it's not about the digital tools we have. It's about bringing this to an understanding, much better understanding than our competitors, to really bring this understanding and value and domain expertise to the customer. So, with those tools, because the tools are just the tools like the hammer, and the screwdriver, you can buy them at the hardware store, you know, not important. It's what you do with it. And this broader view is essential there. So often, the focus is very much on tools. And the tools need to be there, but they are not the essential part.

**Jan**

Excellent. Maarten, I think this point about how can we improve our internal operations processes came from your group? Are there any more specific questions be raised? And by the way, anybody else?

**Maarten**

Not really, because I think Yvo addressed it while discussing the process of getting from raw data to modelling. So that I think is also applies to using it to find better solutions for your best practices in services. Jan, so don't think there's anything additional to add to that, unless anyone else of the group recognises the topic and sees an aspect that I'm overlooking.

## Capture experience from the field

**Maarten**

Another question in our group was, how can we use data and data modelling to find better practices between our say, group of 300 field service technicians, their tooling, the situations the way they work? So that was, that was the background.

**Yvo**

We have all these service technicians, right. And they are in the field, you know, typically at the customer. So with them, there is a very long and narrow knowledge about the few customers, they work for. Sure, if you collect all that knowledge - and that's this is where tools again come in - and you make that knowledge that they gather from the field, make it from intangible, tangible. Which is often not the case, right? So they do their work, they perform a great job at the customer: customer happy. But what they did, why they did it, what the real problem was, and how they sold it, is only in their heads to bring that back to the home base as a best practice, or as an experience that our 299 service engineers can also use. That's a very important thing.

**Maarten**

Yeah. And that is capturing data as part of your daily process and culture. Yeah, and I think this is one area where that certainly would bring value. And the challenge is to find the critical few things that you asked them to collect and share in a structured way.

**Yvo**

I'll give you an example. We recently analysed a data set, and we had 20,000 error reports made by service technicians. And there's a nice big data set. From this 20,000, 12,000 entries were unique. The most frequent one was 60. So there was one item that turned up 60 times out of 20,000. So that means it was not structured at all.

There was beforehand before you started gathering, no agreement of how similar things - because they were all maintaining the same type of machine - how to be classified, so that actually you could say, I have 500 cases of this, 1200 cases of that. Because then you start using the data and most likely the case if you would really look in detail there are the same but there was no structure put in place to register the problem or the remedy, or the action that they performed. It was just a free-flowing text field. And every service technician - typically not trained on how to do that - filled in his own thing. And you end up with a huge amount of data, completely useless.

**Maarten**

Well, I think another way of doing it in practice, what I've seen that works, and this you could do in a more optimised way is that field service technicians, they love sharing knowledge, especially if they know why that is important for the company. So if you specify a single problem that you want to solve, this is an easy thing to do. And then you have your model, you find the three questions you ask them, you'll get it. If you do it free format, and as a culture, I think you'll drown easily misty waters.

## AI for capturing unstructured data

**Laurent**

Maybe I can share a little bit of experience when the data are not organised. And when their data these data are text data coming from the example you've given. And I'm working with a French company, which is working with AI software tools, dedicated to text analysis. And we've been running two or three projects, where we had, for example, exactly the same kind of field service reports of what has been done, and so on, written many, many, many different ways, with no categorization and so on.

With that kind of AI tool, we can find some categories, we can find some reference things, even if the wording is not exactly the same. Because some of the AI algorithms are able to understand the sense of the word, what does it means that word, and what the other words could be similar, even if they are not exactly the same word. So AI may help in this way, sometimes, tools are coming in

**Jan**

Is that let's say the function of natural language understanding which comes into play here?

**Laurent**

That is part of it, but not only.  It's a mix of two or three different tools linked to AI.

**Yvo**

Now, I fully agree that that is a possibility. And it's simply an after-the-fact solution to a problem - self-inflicted problem. So if we would have thought beforehand, how do we want to register data? We wouldn't need this. Right? Because we already know what we're looking for.

We had similar case of everything was in PDFs. So everything was a PDF or a written form. Okay, what can you do with that? Well, we develop tools to automatically interpret what was on this form. But it's all solving a problem we recreated ourselves already. So if you look at digitalization, how can we make it such that he already beforehand set up the right data model? So that the collection becomes facilitating what we want to achieve? But, yeah, this is more dealing with today's practice, and solving this.

# HOW TO SELL DATA

**Jan**

Another challenges, is creating customer value with data, and capturing the value – that is monetizing the data and capabilities.

Jean Claude, you were quite vocal here about let's say that you're challenging question. Maybe you can elaborate a bit.

**Jean Claude**

Well, let's take again this example of predictive maintenance or condition-based maintenance, we have the capacity to detect, identify the vehicle deviation on the way a specific component is working. Good. So now what are we doing with that information? Whether it is a whole data, we mentioned probably what I'll be telling you so no need to elaborate too much. Or is it a service that you sell to the customer and then how do you sell, or you do or the price, is that really bring value?

Telling to the customer: "Mr. Customer, be careful. This component is deviating from standard way of working, you should now look at it". Is that something we can sell or not? I don't know. We are trying, we're looking at it.

But there is also another way to use this information, which is with a maintenance contract. When we are in a maintenance contract, the job of course is to try to reduce the cost as much as possible to secure better margins. And in that case, condition based monitoring and predictive maintenance are a very strong advantage. Because you can push every single component to the maximum lifetime and changing just when it's needed. Which is good folio your cost and, and. and service contact margin, which is very clear.

So this contract margin, the benefit for me is very clear. Now selling this information as a service to a customer. How do you value it? That's a question mark. And you can take back again, the discussion, but some customers telling us you know what, I'm not interested in your analysis, I just want the raw data. And by the way, the raw data belongs to me because it's my equipment, I allow you to connect with my equipment. So I will not pay for that. This is kind of a special event today, including the maintenance compact, strong value for the OEM as a service, including the analyses, what is the value? And the raw data, how can we sell?

## New business models

**Yvo**

Yeah, I guess, it's all about who provides value here? I think the case that the customer says I can do it better. It's my data, I'll do it. I think it's very hard to argue against this.

Unless you have really the offering. There are examples where companies really changed their business model in being paid in a different way. You probably know the case of Rolls Royce engines of aeroplanes. They used to sell engines. And of course, they also used to sell service contracts for engines. Many years ago, they said they had to change our business model, we will sell engine running hours. So, they don't sell engines anymore. Rolls Royce doesn't sell engines, they only sell running hours. So, you pay for a running hour. So, they maintain the machines, the engines, and they sell the running hours to the airlines. Okay, well initially is of course a big risk, because do you know enough? Do you feel confident to sell running hours?

And that's I think, at least when I look at our practice, this is where there's a lot of doubt is: What is actually the price of such a running hour. How can we ensure that is the right price that we still make enough money to do

the maintenance and to provide a reliable running hour. So and this is where I think the key lies in transforming a business model from providing the machine and hopefully, providing a service contract into for sure, getting involved in the customers process and making more money out of that. Because if you look at that, if you look at the business case, there's a lot of Harvard Business Review articles about that. They make a lot more money now than they were when selling the machine selling the engine. I think there's a similar business case on Philips Medical Equipment, very similar, completely changing the business model, and in the end making much more profit.

But if you're in the fight of what your maintenance mechanic costs versus the one he can hire locally, and that's the discussion around getting service contracts: lost cause. So, we really need to focus in order to monetize this is how can we create a business model that really adds value to the customer and to ourselves as an OEM? That's the combination you need to look for. And, in my opinion, if we keep focusing on the traditional models, it's very hard. Because on costs, especially as a large OEM typically the cost of labour is higher than the service shop around the corner. So, if that's the focus, and then we are with the data, we can do it better. No, really put your money where your mouth is show that your overall maintenance costs are the overall cost of using the machine is lower than when he does it himself. I think that's the key. And that requires really rethinking How to do that. Okay.

**Maarten**

Maybe Jan and Yvo, I can add a bit to this element that may also be relevant to Jean Claude, I'm not sure. But, you know, there's one question is how to sell your raw data and develop value out of it. In our group, what we saw is that sometimes to create that value, you need data from your customer. Because that is the missing link. And that is causing, say, a 70-80%, of, of the problems that you're trying to solve. And we made the joke that that is not a digital twin, it's a digital triplet, that you want: that customer process, what you are measuring, and the original design and purpose of your system. And here, you have the same challenge and maybe it's even easier. Because if you can, customers are sitting on that data. But if you can embed that problem into a service contract and give them the comfort that they're also looking for, so you make it a joint problem to solve. You're going to use your raw data and leverage on the free data. That's a point taken Yvo in that dealing, and they may be opening up the data that you desperately need to really improve that value and also mitigate the risks you're having on that site. So, I think the key to me would be to find the common objectives to solve with your customer.

**Yvo**

Yeah, I think you're absolutely right. And that's of course, a way of approaching it towards the customer. And some customers may be more or less willing to do so. Right? It depends really on their culture, what do they want to do, and there are some that will not be interested at all. And some really say, you do it, because you have more knowledge than I do. And some will be in the middle. I think if you take the approach that Rolls Royce took and of course, they will have had their requirements to data they would like to receive to be able to know more than what just the engine would let's say register, from its sensors, and from its reading hours from whatever you measure around the machine. Where did it go to? What kind of, you know, distances did the machine fly and what have you all kind of things that they need it to make this business model work.

I will take that one step further. And having this joint approach where you say, give me a bit of yours, and I can provide additional value with what I provide, and I'll share with you it's a larger rethink of how you want to place your service, or the value you really add with your machine and the surrounding services into the marketplace. And I think there is room for both. But if you don't know what the greater use of the machine is in the bigger picture today, that's a recipe for disaster in a few year's time. So that's what you at least need to work on.

**Jan**

I think there's, by the way different future models for success. And I'm not sure if in every industry let's say that the power-by-the-hour kind of model is the Holy Grail. And time will tell by the way, none of us have a crystal ball. I think it also depends on are you a discrete product manufacturer which functions for as an old or are you a component provided in a bigger system where somebody else is managing the whole system? Or are you providing the whole plant system yourself and also what kind of capabilities do your clients see. Some clients say hey, but managing that complexity is our competence, and we don't need that kind of as-a-service model now. And maybe in the future that will change so. So that means there are also other models to explore and back to Jean Claude's question. If your segment is a lot of Do-It-Yourself customers, then probably you're addressing .. for that segment you need to have another kind of problem to solve. It's not about we can deliver higher uptime. But we can help you to perform a better create a better maintenance department with some tools and data and training or something like that. So so it's not about uptime, but high performance of your maintenance team, whatever exactly their problem is. And I think that is part of the challenge: what exactly is your pain points they want to solve? And how can you play a role with that. And sometimes, you will see conflicting stories, if you talk with one stakeholder or another stakeholder, that will be a different story. So, I know for example, in the business of Ale: reagents rental: So you get an instrument, and you pay for the consumables.

**Ale**

Yep. So, the model with reagent rentals, it includes the instrument, consumables, indeed, and the service. So, we are paid for up and running hour, for the use of the instruments, for the reagents, for the service. All paid via the purchase of the reagents.

**Yvo**

What customer are you addressing? So, they're, they're always also always customers who would like to own stuff. They want to own the machine, they want to own the data, they want to have some control. And some actually look, for instance, I mean, they use only this machine once a year, why would you own it. And that doesn't make sense. So I think that's why different business needs may well co-exist.

**Jan**

Another model is whereas a manufacturer of instruments and the tests, and the consumables - so more than the instruments you sell. There's also another model you offer to, for example, hospitals are that you will operate the whole laboratory as a service. Which means you don't sell the equipment; you don't even have that reagent rental contract anymore. But you manage the whole operation. So, all people that are working in the lab is not employee of the hospital, but of your company, as manufacturer and service provider. But you can only sell that to somebody else who has other problems to solve, then the person who would sell the reagent rental contract or the maintenance contracts. Because if you try to sell to them, hey, but we also can run your whole operation you're trying to take over his job, that's not going to be a friendly conversation. So, you have to talk with another stakeholder. So, what are all so if what you also mentioned before, Yvo, you have to understand the whole process, but that actually goes to that point that you even have to understand, let's say what are the crucial challenges of the CEO of your client, the CFO of your clients, the operations director and the all kinds of people. And then you will start finding other kinds of opportunities, of what services to provide, how to sell it, to whom to sell it. And at some point, maybe even what kind of new business model could be the next step? Yeah.

**Yvo**

I agree. But I think it all comes down to knowing what's going on around you with your solutions and products and broadening your main offering. And this is coming back to the whole discussion of today. It's all driven by that data of how it's being used.

I mean, the fact that you have.  think of rental equipment, let's say advanced drilling machine. Now, and your construction company, many construction companies will have their advanced drilling machine. If they will analyse how often they use that advanced drilling machine, they could see it and probably, in certain cases, much better to rent for the time that they need it the drilling machine. We've saved them a lot of costs. But they don't analyse that they just buy the machine. And they have it. And it's always idle, and when they needed it broken down. So, it's exactly what you say you need to be on top of your data to also discover what is the better way of using

## The value of higher uptime

**Jan**

Maybe one thing to share, what I did share in in our group discussion is if we try to sell new offerings or new value, there can be few obstacles, which can make it more difficult to monetize than we would hope for.

One is that every industry has kind of currency of continuous improvement of performance. Every year 5%, better performance on A, B or C. So in terms of service and maintenance service contracts, there is also kind of currency of how you should improve your performance every time again, and again, and again, and all your competitors, you're doing exactly the same. It is the expected. It is the commodity. And it's hard to see if you can get money for that additional, because it's expected. And maybe even they would expect the better improvement also for a 5% reduction of the price every year.

So, I think that is more the game in most industries than trying to improve your uptime with predictive and data and see that you can get more money, unless you're in an industry where the uptime at this moment is very low, is very critical and you're one of the few who's going to do it. Then probably you can really raise your price for it. But I think in most industries, this is not really the case.

And the other thing is, is it really a core problem of your clients, which they are struggling with? And that's the theme of today anyway, what is the problem you're trying to solve. So, your clients will be happy to pay extra for extra uptime, if they are anxiously looking for ways to improve the uptime. They're investing in all kinds of ways in, for example, redundancy, own capabilities, training or other service providers and there you come with this great solution. And then it's a good alternative. But if they're not really looking for improvement in that area, probably they're not very much inclined to be very enthusiastic about it and pay for it, they would like it, of course, if you offer it because every small improvement is useful. So, I think that is part of the challenge we have with predictive maintenance and maintenance service contracts and see if you can monetize. But we have to do it because that ongoing battle. Yes.

**Yvo**

I mean, I in that sense, I don't know how it is in other industries, right? I know from the port industry, this is a big problem: let's say unavailability of machines, as a result of poor maintenance, only corrective maintenance, not knowing what is really happening with the machine. And the resulting costs are gigantic. And I'm not exaggerating. I mean McKinsey did four years ago, a global survey in ports, how much waste is there. And it's not just waste because of, you know, lack of good maintenance practices. But that was a big portion of it. And the estimated

waste globally was about 17 billion euro 17 billion euro for a niche industry. That because the port industries and niche industry small industry. 17 billion euros savings in waste, and I would say at least 25% is related to maintenance. It is a big problem. Equipment that is not available causes a lot of disruption, delays, additional costs, what have you. If you look at spare parts management in ports, having the critical spare parts readily available is typically difficult. It takes weeks to get the right parts at the location. So, sometimes machines, critical machines are out of operation for four or five, six weeks, just because the spare part wasn't there. If we could reduce that, by knowing that critical part would break down, that there is a very clear business case now. I'm very convinced. I don't know. I mean, please comment from your other experiences but in the port industry, I have no doubt this is a very big area of improvement.

**Jan**

A thought the trigger now with nice maybe it's not only that the value is not there, really, but it's too much hidden. And we need this kind of bigger picture waste-analysis to provoke some other thoughts with clients. So you say hey, but this is really the this so much percent waste at this moment happening in your business and this portion come from maintenance and this portion comes from that etc.

How is that with the other industries? Do you really see clients seeing the waste by poor maintenance and lack of availability, you are increased costs, which you could remove by more predictive maintenance and better maintenance?

**Jean Claude**

That's what that was one of the value-selling argument of course of predictive maintenance. Now, the question is, among our customers, not all customers are running at full capacity, if they're running at full capacity, and every single hour of additional production is additional sales, additional margin for the customer. And it's very easy to sell the value to customers, if actually doesn't matter, because if they produce more, they will not sell more, then your case is much, much weaker. So, you really have to target the right customer for these kind of offerings.

**Jan**

And you have to come up with a monetary business case. So yes, this is the money you're losing at the moment. And by doing this, and this, you can get so much less cost or more. But you have to show the money.

**Jean Claude**

But again, the big money is coming when they produce additional whatever they sell, and they can generate additional sales at additional margin. This is where the additional money is. Otherwise, it's much more difficult to sell.

## Improving your customer's workflow and processes

**Ruud**

I can tell for our industry. People who don't know me, I'm working in the Netherlands for MPS Press Systems We are making and supplier of big presses in the labelling and packaging industry. And what we notice next to

the maintenance, we also have to usage of the machine by the operators of those customers. The way the machines are handled. Machines are more than 1 million euro. So, it's quite expensive.

Now on average worldwide, the utilisation is only 10%. So, you can imagine that 90% is wasting time, wasting money only due to the fact of the way the machine is operated, inefficient, not knowing how to operate the machine the best way. The production is running, everybody's busy.

So, what we now see in our data because we are measuring that in most of the machines that the process around the machine is not optimised and people are not aware of it. Operators are loading new substrate in the machine. And by the way, we first go to the warehouse pick it up. Oh we have to find a lorry. Where is it? On average, we see 15 minutes, and everybody say "it is only 15 minutes". If we do it in our office and we show it with video so we train our customers on a normal speed, we do it in one and a half minutes with the logistics around the process. should be organised. If you need a knife, it should be not far away from your working place. It should be nearby. And those kinds of information, what you can measure out the systems we can provide to our customers and show them that they really can save money.

We are now offering these services, which is quite expensive, for free. So slowly, also the mindset, you as a company have to change make your customers, they are not always that far as we are. And I think we as a service department or service organisation, we are thinking about tomorrow, how should we improve? How could we improve and still our up to our organisation we are far from optimal?

**Ale**

This focuses more on training and workflow assessment?

**Ruud**

Yes, even though we are a machine manufacturer, we are offering Lean training to our industry.

**Ale**

In those kind of assessment with the conclusion and sometimes also be I know your machines are very expensive, but good redundancy and you know, a machine that can take over instead of getting to the 99.9 or 100%. uptime.

**Ruud**

Yes, some customers have, in fact, more machines. But what you see, it should be part of redundancy, but it is 99% extra production time. So, the redundance is gone. And I can imagine it's quite a big investment. And you don't let it stand still and doing nothing. Well, you can make money with it. It's a good business case. I mean,

But at the same with spare parts, we offer a red box, it's gigantic, big box with all kinds of important spare parts for if something breaks down, you don't have to wait. You can fix yourself with clear instruction, and you can continue your production. But what we see that the customers buy such a box, if they have to use spare parts they have to buy again to fill up the box that is complete. We are confronted with customers that I need to spare part Why do you ever read books? Yeah, it's empty.

It's again, the customer, they have to think also. And so we have to develop them in knowledge and how to act and to work with the machine. They have to take care also on their site to make it machine 100% operational. Another customer side, you can do everything you want. You don't meet your goal.

**Jan**

A gentleman. Thank you. Looking at time, it is a good time to start wrapping up. May be good to share with each other, let's say one or two takeaways of today. But also, maybe one or two feedback points about today, what you liked, or what we could improve.

Ruud, maybe I can start with you. One or two takeaways we wanted to

**Ruud**

I missed a small part of this latest session. But what I had in the previous session was the needs of a clear goal when you start modelling.

And; what your goal is when to what you want to reach. And then in parallel with this, how to do it. And I think I heard some things in the meeting, which made me write it down, because it's very interesting. I heard something about the Rolls Royce part, yeah. Okay. It's a little different company than we are. But in fact, what they did is the same we trying to do not selling a product, but selling a solution to a customer, whatever it might be.

And any feedback: I liked it. It was an open meeting. The group was not too big. I think it could be, especially in the break-out sessions, one or two people more to make it more of a dialogue with different information. These were good discussions.

**Jean Claude**

It was a time well spent today. I'm just very sorry, I could not attend the beginning of the of the day. But that's it for today. So, time well spent.

And lots of food for thought from, as I mentioned, for being the breakout session. And digitalization is a buzzword, everybody's talking about it, as it is just something by its own should be reintegrated into your service strategy, and also your product strategy. So I would say for me, I would not say the beginning, but the continuation of providing me food for thought and see how we can better use the amount of data we have available the way we have this data available. How can we improve our product and deliver better service to our customers? A continuous journey.

**Ale**

So also from my side was a bit disruptive today. So unfortunately, could not join the whole part.

But as said, This morning, we're in the early days of gathering a lot of information from our, from our instruments. So really, the latest platforms have this capability. So in terms of data gathering, and when working on predictive maintenance, it's still early days. But yeah, we're now in the transformation to get our instruments producing that data and to connect these instruments to the internet, which again, in the medical environment is not always easy. But we're working hard on that. But it's really interesting to see what would be the next stage of data mining, all this information, and then really moving to a predictive maintenance mode. So couldn't contribute much to that. It's early days.

Yes, I like the format, like the discussions. I think it's it works well.

So thanks for today and Yvo for your presentations. Thank you.

**Paolo**

I followed the discussion with interest and obviously, Yvo has already highlighted some of the struggles that we are, we are confronted with in Konecranes. And especially, you know, in our organisation in the service side.

And, what I can highlight perhaps the fact that despite you know, we have also a data collection platform so we have a lot of data, as Yvo has said, and despite the fact that we have the luxury of having Yvo and his organisation with us, that doesn't mean that you know, you have the solution ready. There is still you know, a number of things that have to be to be done and, and back to the basics actually, as was mentioned before is understanding what is the target, what you want to do, and having that very clear.

So is understanding the customer operation, what the customer problems are, and realising that there is there is no Armageddon, there is no one-size-fits-all, it has to be all the time, you know, drill down to what the, you know, that particular case that environment is. Because, you know, we have a lot of different equipment in our range, and they fit different propose, they have different value in the customer operations, they have different level of criticalities, every customer has different needs, they have different pain points. So, you know, you need to have very clear in your mind what the target is, because that will change the way you you use the data, you make your modelling and you address your resources.

So, having the right ingredients is obviously very important, as we know. But knowing you know how to cook the plate is also very important for because the customer might have different tastes. So you need to be able to use those ingredients to the taste of the customer. And this is what I must admit we are struggling at the moment, you know, we believe that we have the right ingredients. But how do we cook it, you know, to the taste of the customer, which changes all the time, from customer to customer, from equipment to equipment from region to region? That's the next level that we were still struggling with.

Yes the format I like yes, as I said last time, I think this is a good way to dig into into topics and and share also different angles and opinions. Thank you. Jan.

**Jan De Lathouwer**,

I think let's say the major take-away is I think: Know the problem, know the situation, scope, the problem rightly, but also especially look at the bigger picture. And I think that that is indeed an important one. In order to capture the value or the real, where you can really have influence in the whole chain, let's say, I think that that is indeed an important one.

And the second one is also interesting, I think what Yvo said on artificial intelligence, I think. Indeed, the most interesting area in the future might be indeed, where we can use AI in analysing raw data where we don't know the relationships between parameters. Because effectively Indeed, we as humans, we are always we are always trying to think already in in a certain way. And where we think that we know what the relationship between A and B is. But very often we do not see that or sometimes relationships that are there, but that we don't know. And that is indeed an area which is probably at this moment in time. Yeah, let's say to be explored. So. That's also interesting, I think.

Format, the format is for me very okay. Yeah. Good.

**Laurent**

Yeah. Having a wider angle and a very deep understanding from the, the earliest part of where my technology is helping to solve different kinds of problems. And what are the the final usage of the customer what he's doing with it, that there is a very wide gap. And that gap is not that easy to know, to understand. And that's where the data will help. That's for sure.

And maybe a second one will be that: knowing where to go. It doesn't mean that we know exactly the final point, but probably means that we have defined a customer per customer or segment per segment, what we want what they want to achieve, on the external point of view, and what kind of efficiency internal efficiency, we want to achieve, on the internal point of view, okay, having always these two side, what the customer is going to going to gain to go to obtain with us, but also what we can help how we can increase our own internal performances in the same way, at the same time.

**Yvo**

It was really enjoyable, especially discussion here is I learned a lot from this discussion, which is always a pleasure.

Definitely one takeaway is that there's a lot of similarity between various industries about the problems we're struggling with. And so sometimes you really think you're only in this unique business. And this is only not the case, it's very recognisable, what you're telling, although the industries are very different, and that's, that's encouraging.

What I what I hear and points from Ruud's story is fantastic to hear, you know, the, how we can, let's say, as the innovative Europeans, you know, beat some other cultures by going this next step, you know, really, and I'm really looking at the Chinese, where I guess we all in some respects are struggling with, with their, their approach to similar type of equipment and products. And to really find this this edge, where we can really add value. Still very fond of our own machines. You know, I hear from all your stories, I hear this enthusiasm, on making it better for the customer. That encourages me that Europe is not a lost country or continent, right? Although they're so expensive. So it's great to hear.

So very enjoyable.

**Jan van Veen**

Good. So thank you very much Yvo, for your time, and your input. It is very much appreciated and insightful. And then I would say, enjoy the rest of your day, and the rest of the week. I'm looking forward to see you next time. Take care.