ERIC VAN WIJLAND: Thank you. So good morning to you all. Yeah, thank you for showing up at our class. And we have the advantage that we are in the beginning of the AU, so we have more people than we should have at the end of AU. So we all had our breakfast, nice cup of coffee, so we are fresh to go.

We have a lot of slides, maybe over 100 slides. So I would kindly ask you to leave the questions at the end of the presentation, so we have more time for that. And we can deal with them afterwards.

And before we get started, an introduction of ourselves. My name is Eric van Wijland. I work at Volker InfraDesign. That's a engineering company, in-house engineering company, of VolkerWessels. I'm a BIM specialist at VolkerWessels. And on the projects, I'm a BIM coordinator, but it's all related to BIM.

I started seven years ago as a 3D draftsman. And I started to work with Revit. And I learned more and more applications, which all had some connections with BIM. So now I'm implementing BIM on all the projects of Volker InfraDesign of a lot of projects now. And my challenge is always to find the best solution, the best workflow exchange between all the software.

ROY VAN HATTEM: Also, hi from me. My name is Roy van Hattem. I'm the co-speaker for this presentation. And I am also a structural designer and a BIM consultant within Royal HaskoningDHV. That's an worldwide engineering consultants. So we have about more than 6,000 colleagues.

Yeah, well, I start as a structural designer, I think, about 10 years ago. I first started in the power plant industry. So there we were, where I have a 3D design. And then they ask in my company if I would join the infrastructure side to get the 3D design on the next level. So that's why they asked me to join them.

And in-house, I'm the chairman of the knowledge group. And yeah, the knowledge group, they're speaking about the Revit, how to you use it the most efficiency way. So Revit and Navisworks and InfraWorks, all the tools from Autodesk.

And also, yeah, like Eric, I look for the software possibilities a connection between different programs. So I think we're going to show something in this presentation.

ERIC VAN WIJLAND: So this is what we say on every project we are starting. Well, it's always a challenge to start. We also get a lot of questions last year to speak at the AU, so that's another challenge we had. And so, yeah, we accepted the challenge and here we are.

Well, we took the journey. It's a 13-hour journey, but it's totally worth it when you see all the excitement and you get all the information from the University.

And I even had still some notes in my backpack from last year. Because when you get back to your own country, your own company, it's your challenge to implement everything you learned on the AU. And it's a big challenge, also, in our company, but also on the project we are working on. So yeah, it's a long journey, but it's totally worth it.

Yeah, we had to enclose the class summary. But I think you all read them before you subscribed to the class, so I will skip to this one.

ROY VAN HATTEM: Yeah, there were also key learning objectives. We also had to do this. It was in a template, which was delivered by Autodesk. So we have to summarize those four points. And this will be the index to our presentation.

So first point, organize project from conceptual design to detailed design. And also, how you manage the construction phase. Also, about this on data management, like Autodesk [INAUDIBLE]. And yeah, so the last two, yeah, combine/exchange designs and multiple disciplines that we will show in the presentation.

ERIC VAN WIJLAND: Yeah, you're clicking on it. Yeah.

ROY VAN HATTEM: Yeah, sure, that's the direction. I am from Royal HaskoningDHV and Eric is from VolkerWessels. So we are from two different companies. Maybe you are wondering why we are doing this presentation together. I want to show you something how we know each other.

And on the left part, that's a project we are working on now. It's a sea lock in IJmuiden in the Netherlands. It's the biggest sea lock in the world that we are building now. So we're working together on the project.

And on the right-hand side, you see the Civil Infra Benelux group. That is a national group of all kinds of consultancy contractors working together on what is the best way to use Revit. They're making templates, families, short notes how you can use it best.

So we are both in that national group. So from there we know a lot of people. Also, giving classes here at the AU. So that's how we know each other.

ERIC VAN WIJLAND: And we also both participating in the Civil Infra Benelux. It's a work group between Belgium, the Netherlands, and Luxembourg.

It set up a couple of years ago. They started with Civil 3D. They made the template for the Dutch market. Well, Civil 3D was actually the only software they had. And after a couple of years, Revit became more and more important for infrastructure. And well, it's more suitable for buildings and MEP than infrastructure, so our goal was to make Revit suitable for the infrastructure market. So we designed the templates.

We both are there on voluntary basis. And actually, it's a group of all power users from all the engineering companies and contractors, the big ones, in Holland. We make the templates. We make a library, a standard library, for everyone. It's open, accessible.

And some of the board members also attended at the AU. And some of them will also speak at the AU. But I will show you a slide of them later on in the presentation.

ROY VAN HATTEM: Yeah, this is [INAUDIBLE] from some projects that we are doing at the moment. You see the top three. The first one is called SAAone. That's the largest infrastructure project that we have done so far. Yeah, we will tell some more after this slide.

And then we have an embankment in Limmel. It's in the south of the Netherlands. It's also a large project for us.

And for this presentation, our main focus should be the sea lock in IJmuiden, what is now the biggest lock in the world that we are building at this moment. So that will be the main focus for this presentation.

And to zoom in on one of them, the project SAAone. It contains the largest aqueduct of Europe. This was the first project, actually, in Europe, which had to do with BIM. Also, from the client, they asked us to deliver in BIM standards.

ERIC VAN WIJLAND: This is the project. It contains 33 kilometers of motorway. It has three big intersections. It had over more than 60 structures. So yeah, you have a lot of design teams.

It had four special structures. And it has a maximum price of 815 million, so almost 1 billion euros. It's one of the biggest in Europe, I think, four or five years ago.

To zoom in on only the detailed design phase, we had a design team of more than 150 people. We are taught two model managers. And I was also one model manager on SAAone project.

We had over five teams. So 24 3D engineers. And they were all from different companies, so they brought all their own software, all their own workflows. Yeah, we had to combine them.

We used Navisworks. We used Inventor, also Bentley software, of course, and Tecla, and still AutoCAD. A lot of people are still using it. Not everyone is working in 3D. So still some AutoCAD, but it's getting less and less. Allplan for the reinforcements. And our main goal was to have one integrated design and perform [? class ?] detection, because it's a large part of-- yeah, and around Amsterdam.

Model code in accordance with system engineering. We'll go on that point later on. And the model is used is interface and integrated design session.

And it was for a lot of people, the first time they worked with BIM. So it was a really hard time for us. And I think that's also the reason there were two model managers or BIM coordinators to implement BIM.

ROY VAN HATTEM: And it's a project embankment demo. It's a little bit smaller than what Eric just told about SAAone. This embankment is a part of the dike. The dikes in the Netherlands, because we have a lot of water. And Netherlands is on the sea level, so we have to protect our houses against flooding.

So this structure has gone in place for a structure that is already there. It's 100 years old. So this structure is going to replace the structure that is there now.

And then, yeah, if you see, we only did the conceptual design for this project. And if you see the numbers, there's, yeah, a much smaller team on it.

So we have one model manager and one concrete construction. So one person is designing the construction. And yeah, most you can combine those. So you can have model manager who's also modeling concrete.

And then we have one designer and inventor for the gates. That's probably always the same for the gates.

And we have one designer for the road and the ground around the structure. And he had a say. And we used Navisworks to make an integrated model, Revit for the structure, Civil 3D for the road and ground works.

And he also [INAUDIBLE] that, yeah, it's one integrated design. So you see all the interfaces. You can do class detection. You can communicate with the client about what's going on, where are the interfaces, where are the clashes.

So also for non-technical clients or colleagues, you can use the model. So that's what it is.

This is the sea lock IJmuiden. It's one of the large projects we are working now in the Netherlands. It's a big sea lock.

A few-- some dimensions. This is about 500 meters between this. And it's 70 meters wide. So it is capable for the largest ships in the world to enter the Port of Amsterdam. So next slide.

If you see that this is the theme that we are working now at the moment for the detailed design. And you see, you have one or two model managers, BIM coordinators.

And you see the list. So we have now five people who are designing construction. They're building pits, but you also see 10 designers for reinforcements. So that's quite a lot to do all the reinforcement work.

For the rest, you see the most sources that we use for as tooling. They are pretty the same like Navisworks again. We have one called VOSS. This is what [INAUDIBLE] is using. That's our [? dredgery ?] contractor. And he uses that tool for sending one-one one information to the dredger. So that's why they developed a tool for us.

And he is also the goals and added value. They are almost the same. And you will see it in the rest of the presentation.

I think you see here a nice overview from the project, this project, this [? view. ?] We made it in InfraWorks. So what you see now is GIS information combined with a lot of Revit models and also Civil 3D.

And we use these kind of pictures to speak with the client. Is that what you want? Is this OK?

So we do a validation with this kind of pictures to go in discussion with the client. And he understand this more non-technically than you send him drawings or Navisworks models. They are more technically, so that's why we use this.

I don't know if you walk the strip down and forward, back and forward, maybe yesterday or Sunday. Don't know when you arrive here. But maybe you saw the Stratosphere Tower. And if I trust Wikipedia, they told me that it's 350 meters high. So we projected the Stratosphere Tower in our project and you see the results. So you can see that the size is enormous for this project.

ERIC VAN WIJLAND: Now you can see why it's the biggest lock of the world.

ROY VAN HATTEM: Yeah.

ERIC VAN WIJLAND: It's a concrete box, but it's a little bit more.

OK, well, the index of the presentation, the layout. We're going to discuss every item in the life cycle of the design phase. But already on this phase, there's already a discussion on every project. What do you understand on preliminary design? What do you understand for detailed design? And there are even some different terms and, how you can call it, execution of construction design. So that's already a challenge on the project.

But it goes from the client to the as-built. But of course, as-built, you have to hand over to the client. So that's the reason it goes around.

The first start with the requirements. These are not the requirements of the lock. It's what you do with the requirements. And we'll go in later on that what the particular requirements are.

But the contract of [INAUDIBLE] was a DBFMO. It stands for design, build, finance, maintain, and operate. We had to do it for 25 years.

ROY VAN HATTEM: 26 years.

ERIC VAN 26. But the client delivers the contract digitally. And it's linked on the engineering software

WIJLAND: platform called Relatics. And we go on deeper in that later on.

And the structure is decomposed in a System Breakdown Structure. So it's called SBS. So it will connect them to all small identities of the project. So the door, the building, the walls.

After that, the contractor uses the System Breakdown Structure to break it down a little bit further. So you have three doors on the lock. So SBS is the door of the lock and the product breakdown structure is one door. So you have three doors, so that's more decomposed.

And the System Breakdown Structure is actually the backbone of our project information. So it's not my business, actually, on the project, but its really important for, actually, also your BIM implementation.

To get a good overview in the past, you had a client who designed it. And they told us, the contractor, how you build it and where to build it and what to build. Now there's more and more responsibility to the contractor. So it had to finance its own project. And the client translated what he wants. Actually, he doesn't hand over the drawings, but he hand over the requirements and we have to make the drawings. Maybe in the future, we have to find out ourselves what kind of projects we want to do.

And we have to maintain contract of 26 years. And after that, we can propose a new construction or an upgrade of the structure, but we don't know what is coming. But we're getting more and more responsibility on the contractor side.

Also, the client has an idea of how they want to have the information get delivered. On the right side, you can see all the packages of the items of configurations they are using. Morning. And it's our job to get all our information into their system. So we have to make it suitable for that configuration. And you can see later in the presentation how we are going to deliver it in the project and as-built.

ROY VAN HATTEM: I shall tell you something about the conceptual design phase, how we are doing that. Maybe it's interesting that in the Netherlands, our government, they deploys a project on the market. And they were just picking three alliances who are going to make the same object, they going to design the same object. So the government sent three-- they will inform three parties to make the same design.

And if you look how they going to choose one, it's just about the best price and incorporate

with the best value, added value. And so that's how they choose it.

So we were one of the alliances, one of three. And I will tell you something from how we are organized, how did we receive the requirements by the client. Also, the design build and finance and maintain contract. How did we really realize the design? And how do we calculate the price? So that is what we're doing first before we are actually enrolled to even build this contract.

Now, if you see this is the alliance, you see a lot of different contractors in it. And it's nice to tell that one of them separately couldn't build this object, so we have to combine all kinds of organizations to do this contract.

So if you are looking here, there are the two biggest contractors in the Netherlands. Here are the two dredgers. Here you have about six or seven engineering consultancy. And also, because we have to finance it through us, there are also two financers or banks who provide us the money to build this. And if we go further in the project, our client will pay us for the progress that we are make.

If you look at the organization and what tools they are using, so this is a real thing what we have to deal with is that all kinds of different organizations, they are using their tools. So if we are in alliance like this, we have about 12 tools that we are using and about seven of them are from Autodesk. Which here we are at Navisworks, Civil 3D, but we're also using some non-Autodesk non-Autodesk products.

You see the organization chart of our project. And there are a lot of people. But if you focus on the designers, you see here on top of the organization, there are two BIM coordinators. Then you see a little bit here that there are the BIM modelers. And if you go down more, there are the 3D draftsmen who make the drawings.

So that's how we organize. And yeah, what I told you before, we are about 37 people at the moment and still increasing.

So what we have organized. We have three kinds of types of how we fill in our BIM coordinator. First, it's BIM engineer role. So we have a large-size organization. That's the upper part. Then we have a medium-size organization chart, like this, and a small.

So for this project, of course, we use this organization chart. Then we have the BIM

coordinator, who makes the BIM execution plan. That's how-- has everything arranged.

And then the BIM engineer. They will just implement the BIM execution plan, where their team underneath them will do the work from the 3D models.

So this is how we organize now. And if you compare that to the small-size organization, there you can combine a role like BIM coordinator and you do also modeling yourself. So that's possible only in small projects. If you have to do one, a viaduct or something. So But for the projects like this, we have an organization arranged for this like this.

ERIC VAN WIJLAND: This is the location of the lock. It's IJmuiden. The existing lock is getting too small for the growing ships, of course. And now [DUTCH], the Department of Transportation, they made a proposal of the location of the lock, but as you can see, they didn't thought about the door or what kind of a type of lock or the orientation of the lock, and that's up to us. But they have to translate it through the requirements and we have to design something like this.

And you have to be aware of that the connection to the left and the right is always there. So the traffic, we have to go on. We cannot de-route them another way, so they have to drive half an hour more if you disconnect them. So you have to think about your logistics, how do you transportation of the materials, et cetera.

So on the side of the contractor, I just said what the client delivers as a requirement. But the contractor will accept the System Breakdown Structure and we will relate all our information through that System Breakdown Structure. So our requirements, the verifications we have, the documents, the geography, geometry, et cetera. This also what we're going to connect with the BIM model.

Oh, and there's also one thing. BIM, it's not only stands for BIM information model, but of course, also BIM information management, in my opinion.

All the project's outputs are required according to the-- we call it in Dutch, ILS, but it's Information Delivery Manual. And it will describe you how to deliver the information, like a DWG and IFC or NWG for [INAUDIBLE].

For Navisworks, it doesn't matter. They describe it for you how they want to get the information to get it also suitable for their system. I show you the slides in the beginning, where you had the containers on the right from the client. And this is the information they want

to receive to fill them on their side.

The BIM deliveries, it's an open standard. It's called COINS. And we will describe that later on at the end. And of course, [INAUDIBLE] it has all the related information inside.

ROY VAN HATTEM: I will tell you something about the requirement that we receive digitally from our client. So over here, that's also, again, the DBFM contract. And this is just what we receive from our client. We didn't receive any drawings from-- you has to build this or that. So we just receive a checklist like this, where we going to start to model the sea lock.

So if you look at some properties, yeah, the gully has to be 500 meters long. They said that the gully has to be between 65 or 70 meters wide. So you can make your own choice how big you're going to make it.

But if you make it bigger, you get a deduction in your price. So you write in for a price, but you get a reduction if you make the 70 meters instead of the 56. So that's how they build in some things like that.

And also, from this new contract form, you has also some things that are for maintaining. So we have to maintain the primary roadway. You have to maintain the existing locks that are in the complex. So this is what Eric told. You have don't interruption with your waterways or traffic or road traffic.

So there are all kinds of things that we have to adjust in the project and the design. So it's not only making concrete or steel gates, it's also properties like this that has to be included in the design.

And here what we said earlier, we are also responsible for 26 years of maintenance for the lock. So that includes, also, how you're going to design something. Do you use better materials, so we have less maintenance? So that's all included in your design. So that's how they forced us to think about stuff like this.

And if you see, the contract value, we have a half a billion dollars. We have this in euros and dollars. So it's quite a big contract, I think.

OK, now, besides all the requirements, we also need information like altitude and the soil, how the soil is here, the ground, what are the statistics from where we're going to build, so we can

make a best design as possible.

So in the Netherlands, I don't know how you do that in the US, for example, but this is a cart from the Netherlands, and they all make blocks. And you can download a block like here and you get information like this. It is 2 or 3D at [? WG ?] where all information is in.

So yeah, that's how we start. So after the requirements, we have the basic information about where we're going to build and that's how we start for-- to start the design.

ERIC VAN WIJLAND: And this is an open standard. And if you want more detail in the item, you have to pay for it, actually. You can get a lot of them from open standard.

ROY VAN HATTEM: Yeah. Now I will show you some live demo about InfraWorks, how we use that open standard to make some kind of, like, this pictures in InfraWorks.

ERIC VAN WIJLAND: Just in time.

ROY VAN HATTEM: On the screen?

ERIC VAN WIJLAND: Yep, thank you.

ROY VAN HATTEM: If you see here, we have read in the information that we received from the open data. And because it is maintained by the government, this data, this old structure, all the lines are in the nice, the good gold layer name.

So what we do now, because it's always written down in the same layers, we made scripts in InfraWorks, so that what it actually does is it finds and replace. As you find the layer name in your AutoCAD file, and you find to replace it through an InfraWorks object. So that's how we do it.

So for example, the trees in the WG, this doesn't spot where it shows this is a tree. And there are about 1,000 spots. So then we replace that spot into a tree. So we know exactly in this InfraWorks model that where are the trees are, conform our government. So that can you build further on, with all sort of markings, the lamppost, all the dredging systems. We can all set it up in InfraWorks in not that much time.

ERIC VAN WIJLAND: And we have a lot of sessions with the client and also the stakeholders. So it's very useful to give them a sort of visualization what we are doing. And of course, this is not lock, because it's a little bit-- we couldn't use it on the presentation, because a little bit more information than we can show you. But this was A15?

ROY VAN HATTEM: Yeah.

ERIC VAN WIJLAND: Yeah. It's really easy to set up in the beginning. We are still in the concept phase. So we're still gathering all the information we need for the project.

ROY VAN HATTEM: And so by some scripting, you can make stuff like that in, yeah, let's say, one day, I think, if you are good with it. And from here on, you can discuss with your clients, shall we go that way or this way? Can you sketch something? How do you want to-- how the road design will look like by your client.

So we just invite them to our office and they will just sketch on the screen. Because can you do this or that? And then we go further with the design.

So I think InfraWorks is a very powerful tool to discuss things like that with your client. And that's very easy to make a model like this with the scripting. So that's what we want to show you about this is--

ERIC VAN WIJLAND: And what we saw yesterday on the transportation summit, what you can do more and more with InfraWorks, you can implement your complete design from InfraWorks and at the end, you can export it to Revit. But it's a very powerful tool, not only in conceptual phase.

So again, the system engineering, what I was talking about. This is the System Breakdown Structure. This is a sentence which explains system engineering, but I always say system engineering is actually engineering the systems. So it's the backbone of your complete project.

Oh, you can also use the click Come on. Oh, there was a link message in my--

So yeah, unfortunately, it's not in English. It's the only slide I had in Dutch. [INAUDIBLE] too. But it will show you how the System Breakdown Structure works.

In the beginning, actually, a System Breakdown Structure from the Transportation of

Department, you've got your lock with the door with the walls, the buildings on top of it. We used to make the 3D model to connect them. We connect all the requirements for system engineering.

And we use their System Breakdown Structure to make our own, but most of the time, we can copy them and we can use that more and more now on the project. But in the beginning, there was a very small System Breakdown Structure, so we have to design the structure, but now we can copy them.

And at the end-- you see, also, this is through the contractor side, of course-- we use it for asset management structure. And we have to decompose it a little bit more, so we get more information on one item. You can add more information. Because when you have three doors in your lock, maybe one door has an earlier replacement or a maintenance instead of the other one. So you have to connect all your data to one door instead of all three of them.

And there's also the information we hand over to the client at the end.

So how do we connect it to a 3D model? We divide the design scope in such a way it matches the design System Breakdown Structure. So what I said, nowadays, it's really one-to-one, but in the beginning, it was still, yeah, find out what's the best way to decompose.

But still, on every project, it raises the question, what is the limit of decomposition you do of the structure? You can decompose it to every sheet pile if you want, but then you have to add all the requirements and documents and drawings to that particular pile. So you want to decompose it not too deep, but also not too high. So it's always a chance to find the best way.

Well, the system engineering has an object library. It is a physical geometry. It contains physical geometry and also temporary items, but that's more during the constructional phase.

The breakdown structure has an impact on all disciplines, because we all have to deliver from the ground works to concrete and steel works. We all have to do deliver it. If we're connected to the system breakdown and it has a big impact on the deliverables at the end.

So if you put a lot of effort in it in the beginning, it's really good to use that. You have advantages at the end. And to show you, here on the right side, you can see it has a higher project performance when they use projects with system engineering capability.

ROY VAN And so what I told before in earlier this presentation, there were three teams who are

HATTEM: designing the same with the same requirements, same contract value. And of course, there can be only one winner. So our government decided that we had the best price in combination with the best added value and quality of the project. So our alliance were the contract that's going to build this.

So now we won the contract. So yeah, what we said earlier, now is the challenge for real. So what we all promise in the early phase, we have to make it real.

So if you look what we're going to do now, you need three things. You need the right people connected through your project. And also, the value of the contract that you have written in, the $500 million. Of course, you can't spend more than that, because then you make loss on your project.

And if you look at what all things you have to arrange then is you have to-- the software challenge, what you saw earlier, that we have 12 tools that we're all using. So we have to written down how we're going to use them and which way on which product. So we all written it down in a BIM execution plan, what Eric will tell later on what's in there.

So how are we going to share knowledge with other companies? What kind of document management system will be used? Because we have about 12 different companies, so they all have their own opinion from what is the best. So we have all discussed stuff like that before we start.

And also, how we're going to coordinate integral review procedures. Are we going to do that with Navisworks or with something else?

ERIC VAN WIJLAND: So the BIM execution plan, or we call it protocol. I can stand-- or I can stand behind.

Well, this is the most important document, well, I will see in the project or I have to generate, actually, in the project, and especially in the beginning, because everything you decide depends on the BIM protocol.

You have your system breakdown implementation, the representation of the drawing, of course. How are you going to deliver it? And how are you going to hand it over to the executional phase? The as-built in 2D or in 3D or what kind of format you're going to deliver.

The I from BIM. We do a quick scan in the beginning of the project to define if we're going to

do rebar in 3D. Are we going to implement 4D? Are we going to implement 5D? So in connection to the costs.

What kind of software tools we're having. Also, what kind of year of the release, but also the update. And the exchange between software. What is the best way to exchange between [INAUDIBLE] software, but also other parties.

And the document management software. We are using Vault. It's one of the first projects now for VolkerWessels, where we're using Vault, because we are still used the fileshare. I think a lot of people are still using the fileshare, but you totally have no connection to the system breakdown. You have no verification of your revision. Actually, nothing. So we're using Vault, but I come back on that later on.

To show you the example of what the index of a BIM protocol will look like. So what I said, you have the agreement about a software, what kind of codes you are going to implement, so what kind of parameters you're going to implement in Revit. What is the input items and output if you get some software designed from the third parties.

And the communication between the teams' IT. That's always a challenge on a project, because we have a lot of different companies with their own IT department, so you have to connect them now on one place. And our goal is to have the complete design team on the project itself, so we are located near IJmuiden and we're not all in our own office. So we want to combine them on the same location.

What are you going to do with survey? The quantity takeoff, GIS. Cloud usage, well, it has a lot of information in which it's the basis of your project.

[SPEAKING DUTCH]

ROY VAN HATTEM: What we told earlier, Eric and me are all in the Civil Benelux group. And there we made the template.

ERIC VAN WIJLAND: And this is one from the agreement you have from your BIM protocol, what kind of template you're going to use. So because we are all in the Civil Infra Benelux and we all have the same templates, it's getting more and more easier to work together in one project. Because I think all the projects which are now combined in [INAUDIBLE] are also-- well, some of the power users [INAUDIBLE] for Benelux template.

ROY VAN HATTEM: Yeah, I will show you something about the template, how it's built. If you look here down below, you have the project browser. And on top of it, we have some views where we put the project on coordinates.

So we were at the end of the WG to-- after that, acquire coordinates to put our project on coordinates. So that's also in the BIM execution plan, that everyone has to work on coordinates. So that's very powerful for-- if you transfer everything to Navisworks, that's all fall in one place. So that's one thing that we have arranged.

Then we have here the Export views. We already made the Export view available for the users that they can export this view to the BIM coordinator. So that is something that we have built in.

And also, if you look down here, this is the Work view and the Plot view. And the Work view is just for the users. They can make sections just to look, is this model right? And if the section is OK, then they transfer it to Plot. And that is the Plot view, as they are coming on the sheet.

So the Plot view is this section included with annotations, dimensions, stuff like that. So that's how we separate those two. Because the Work views, you have endless Work views, maybe, for the users, but you only have views that will be on the sheet. So that's how we arranged them.

I think, yeah, there's a lot more to tell what we all arranged, but we made, also, a document for all the users. And this is the document. And if you see the index, you have what families are in the template, what 2D annotations, how the project box is organized, how the section arrows and the few arrows looks like, which parameters are inside the template, and how they export things.

So we make a document like this, and we send it to all the users, and that's how we want that they use the template.

ERIC VAN WIJLAND: And a lot of companies are already familiar with this template, so it's easy on a combined project.

ROY VAN HATTEM: Yeah, I think that most of the companies in the Netherlands use this template. So I think it's nice to have a standard. So if we are an alliance like this project, everyone knows already about this template and is familiar with it, so that makes one challenge less for us. So that's what I want to say about this subject.

ERIC VAN WIJLAND: [INAUDIBLE]

And another item. We also want to give you some demos, but I recorded this one. There's always a discussion between Civil 3D or the ground works, earth works, and the concrete structure, who is going to deliver the toposurface? Because we are more in details on divided of the concrete side. What kind of top surface you want around the item?

There's now a tool plug-in. It's called Site Designer. You can exchange your data of your toposurface with XML, not with the DWG. I think a lot of you maybe recognize the problems of what you get with the DWG exchange to Revit. It will make a triangulation, but it's not the triangulation you want.

And now we're using XML. Civil 3D can use XML and Revit can use XML. We can see they shifted the ground works. And you can send it back to Revit and use the data.

That's our main goal, you have always the same data. So there's one XML file. And Civil 3D is using the same XML file as Revit, instead of making an export of the DWG from Civil 3D to put it in Revit.

So it's always looking for those kinds of workflows. And not all companies are aware of the new workflow, so that's a challenge in the project. We have an alliance like [INAUDIBLE] is to exchange this information and knowledge with the other companies.

ROY VAN HATTEM: I will show something more about we just saw our template. And what also is in there, there are some metadata properties. And that's get more and more important in our projects, because you have to treat each geometry.

But yeah, what Eric told about the PBS codes. People from other disciplines, disciplines, he has to know if this object, what kind of object is it, and what are the properties, what are the costs.

So what we do, we select the object. And we have here properties where we fill in the PBS code. So if you look here, or this down here, PBS Code. So we all use letters. And it is written down in the BIM execution plan what the code should be. So the 3D modeler has to enter this inside this model to make a better traceability in the Navisworks model.

So in the Navisworks model, you can filter on this code and you see the objects. You see the objects what are confirmed with this code.

So you can make this further with [? LOD ?] levels, what date this is object revised. So all kind of this metadata will be plugged in into our 3D geometry. So it's not only designing the geometry, but also designing the properties. So that's all written down in the BIM execution plan.

One back. Sorry.

ERIC VAN WIJLAND: There's always a problem with the clicking.

So again, the System Breakdown Structure. The parameter, what Roy was telling about, we connect to Navisworks when you're connected with a lot of applications, especially now Forge is coming up. You can use all the data you put inside your Revit model.

But in this project, we use it with a tool called BIM CAVE. And it's always a problem when buying external plug-ins for your software, because who is going to pay for in the project? And you have a lot of companies and they don't want to pay for it. So we're really fond of free tools. And we're from the Netherlands, so that's good.

Well, to give the-- as your demo, you can see the item. This is a picture of the lock. You can see the item on the left in the selection tree. And in there, there's also the PBS code. So it's the same in Revit.

You can filter on that with the BIM CAVE tool on all the properties. And in this case, there are, I think, more than 100 PBS codes. So it's a little bit-- a lot of work to do it all manually, so you can use this kind of tools to make it a little bit easier.

And you also want to have it suitable for everyone in your design team. So what we did was creating some viewpoints. And as you know, you can export it to Freedom and everyone can use Freedom. We use it in a Citrix environment, so everyone has access to the same software.

What we did is create three views. And there's one view, which shows the complete structure, including temporary items, and one only the end of the finished state of the lock, and what is the current situation.

And one important thing is you have to select the height required and override the appearance. Because if you do that on every viewpoint, the file that gets much larger than it is now.

So we have three items. But the advantage is when you have them sort on three items, so existing situation and temporary and finalized, after that step, you can click on the SBS item you want to see and we made them with the tool, with the BIM CAVE tool, to make the search set. And you can see here, we de-select this item.

So you first select-- I also had here, as step two, you first select what you want to see. You want to see the existing situation. You click, in step one, on existing. And the second, you are going to the PBS what you are looking for. And there we placed just small arrow.

And the disadvantage is of Navisworks when you zoom out, the arrow will disappear. But in this case, it's good for us, because then you want to look around in your project. So first, you get a location where it this. And after that, you can look around. So that just made it more and more easier to use.

This is an example of an older project. Also, what you can do with the PBS code, connect it to the item in Revit. This is in Navisworks. There's a small link in there. If you click on it, you can filter it, then you go to the requirements of the item.

So you can easily talk with stakeholders. And your complete design team only need access to Navisworks. And from there, they can go to the requirements they need instead of going through this Relatics environment and find the object by hand, et cetera. So it's easier to find all the information.

Also, the drawings, you can click on the item. You go to your document software. We now have an upgrade from SharePoint, but this is an old one. You can easily find all the drawings you want in just maybe three clicks.

In a presentation on Thursday--

ROY VAN HATTEM: Yeah.

ERIC VAN WIJLAND: --Thursday afternoon, one of our colleagues are going to show you how you can also make the links in InfraWorks. But it's the same code, it's the same PBS they are using, but then they make it clickable in InfraWorks. So you can use in Navisworks or in InfraWorks as well. But you can see it in that class. [INAUDIBLE]

ROY VAN HATTEM: Yeah, we have a slide at the end of the presentation which number the class is and which time. So if you are interested, you can join them.

ERIC VAN WIJLAND: On the project, this is another project what I picked out some examples to give you the best view on this. We're using A360 in collaboration for Revit. To give you an example for A360, we want to show the model to the complete design team, also, the stakeholders. But in that case, we have to give everyone Navisworks and also give them a sort of small course how to use Navisworks. Because not everyone is really fond of the tools and it's a little bit hard for some of them to use, so we tried to make it more attractive and we implemented in SharePoint.

In our project, we're working with document management system from Microsoft. It's called SharePoint. And everyone is in SharePoint. A lot of them know how it works, so why not implement our view in SharePoint?

This A360 team site. We have a project. You can insert the NWD file from Navisworks inside A360.

And you can see on the right, there are only two members of the team, because, yeah, me and a colleague, in case I get sick, so he can log in. He can't copy the embedded codes. This embedded code you can implement it in SharePoint. So you don't have to be worried about connecting-- well, adding everyone of your team to A360, because a contributor is free, but I think administrator or someone else, you have to pay for it. So you only access for A360. And after that, you can implement it as a iframe inside SharePoint, so it's accessible for everyone.

You can add a password if you want. And you can-- that this is behind a log in of SharePoint.

So your complete design team can open the model. You can also download it. You can still download it and input it in Navisworks if you want, but it's more accessible for the complete design team.

So on the left, you see the item they're using on the right. And they don't have to log in on A360. They only have to log in on SharePoint.

And you can do everything with the model. And you can search on the PBS code if you want. And it's always annoying that the scroll button is the other way.

And you can see that the data of the parameters there are included. So you can do really cool stuff with A360 nowadays.

Another tip I want to give you about the clash control. There's a lot of software you can buy to perform your clash control. Well, Navisworks can perform the clash control, but how are you going to maintain them? Where are you going to write them down or monitor them? Who is using it or who is solving it? You don't know. You cannot import in Revit if you had the clash control in Navisworks, you don't know in Revit where it is.

So this is a very simple solution. It's not that sophisticated. But yeah, as you can see, you can script it if you want. But for an example, I used some files with a pipe going through there that will give some clashes, some six clashes.

And what you can do from Navisworks is export a report. And in that report, you can add the locations of the clash control, of the clash points. You can make the exports. And after that, you can insert it-- well, you can export it to Excel. It's a CSV file, comma-separated file. And then you can use any software you want to translate [? the XIC ?] coordinates to an item.

Now, we use the solids, just a normal, ordinary block in AutoCAD. But when you create those items, you can make small solids, which you can use in every software package. In this case, you can use it in AutoCAD to find the item. So you can send this file as an [? XREF ?] to an engineer and tell him, well, there are some clashes on your side, and he can find the exact spot of that clash.

There is some fancy software for this, but it's also free to do. And it's very easy by hand if you want to do it.

You can see the Navisworks again, where the location is. And you can export it to Revit, if you want, to find the location. And we can also connected to a System Breakdown Structure or to Relatics if we want to get more information out of it.

But this is the example from the lock. We added some annotation text, like [? Clash ?] 25, 26, so you can also find where the clash is and get more information.

OK, [INAUDIBLE]? OK.

ROY VAN HATTEM: OK. So now that we have won the conceptual design, we're now going to show you something of how the process is going for the preliminary design and the detailed design. In the Netherlands, there are two different types. We have preliminary design and detailed design. But I think in the US, there are only-- that you combine those two in one kind of phase. But in the Netherlands, we have two phases.

So if you look at design is available for the project team, what we use, the model that we have made in the conceptual design phase, we use the same model in the next phase. So if you look to the life cycle of the model, we just evolve the model instead of starting from scratch again. So that's how we do that in this project. And I think it's a very good acceleration in your design time. So we will always do the same like this.

Also, in this phase, we're implementing Vault. We didn't use Vault in the conceptual design phase, because we had very less users. And now we're at 37 people, we have to use a tool like Vault to manage all the data and not have a lot of double copies on the network drive.

So we also will say something about the level of detail, development. And also, who the presentation will be from the models and the drawings. We have some examples later on from how the drawings looks like now of what we think what the drawing should be like in the future. So that will be later on in the presentation.

OK, here you see an example of the conceptual design. You see all kind of boxes there-- reservations for the space that is needed for the objects. So if you see here, here's a lock head and here, and also the lock chamber. This is a dimension of this. It's just from the requirements what you have shown earlier. So this is where we start.

And all those lines, they are all borders where we have to stay in between. These are the borders that are given by the government. So if we exceed that line, then we get a penalty. So that's how we start.

If we look to the next-- oop-- this is a picture of the detailed design where we are now. So all the boxes are gone. And we have replaced them for more detailed design. So you see all kinds of structure, lampposts, the road is there, the buildings, the lock heads will [INAUDIBLE].

So yeah, if you look at this, much more information available now than there was in the conceptual design phase. So if you have some details on closeups, you see the lock head and

the roads and the lampposts and the boulders and all kind of the-- all the [? hack ?] works, signs, ladders. Everything we modeled in 3D, so we get all the interface right.

You see a zoom picture of the control building. So we also modeled that in the Revit architecture. So all the discipline.

And here is what Eric told us, that this is the final situation. And we also have all the temporary work in the Navisworks model. So we can check the interface when we're going to build this building [? bid ?] in combination with the final situation. So yeah, what we do in 3D is also the temporary work. So we just model everything to get everything right.

What you saw before, that were all the Navisworks. And now you see some pictures from the Revit model. This is the lock head where the doors are moving. So you see here, the lock head, here will be the door. And the door's moving about this construction to the other side if they want to close the lock.

And also, you see here, some details, some connections. They're all modeled in 3D. Because those anchors, we want to have them in 3D, so we can check them-- the reinforcement in the next phase. So it will be easier to do the last phase in 3D, because we have everything modeled in the phase like this in the detailed design.

This is the other side of the complex. This is called the lock head at the [? canal ?] side. There's also a shaft where the door is moving, but we have, also, a maintenance shaft, where our third door is. So here is our maintenance door. And if there's a collision or there's some reparations that should be done, then we get this door out and get this door out, and we replace them in this shaft. So this is less how the construction works for us.

If you look here, you see an example of the gate. I think some dimensions. The height is about 30 meters, 70 meters long, and the wide is 12 meters. So you can compare this to a 10th floor apartment complex.

So if you look at this, you're just moving a building. You're moving a building to close the door. And if see here, every detail is modeled in Inventor. So that's how the modelers from the gate are doing this in Inventor.

Because there's a very big interface between the concrete, what you just saw and the gate,

because of all the things attached to the concrete, where it is possible that the door can move, we want that door inside of Revit, because our concrete model is in Revit. And of course, you can do your interference check at the end in Navisworks, but you want it in front. So the 3D modeler from the construction in Revit, he needs the door in Revit. So we've written down some export steps that we have written down in the BIM execution plan how we're going do with this.

So if you look here, the Inventor gate model is converted to an ADSK file. And we find out that there's about a maximum of 125 megabytes. If you transfer a bigger file, you get errors in Revit. So it's quite interesting.

And yeah, what we do then, if you have this file and it's less than 125, then we place it into a Revit family. And after that, it's just basic Revit. Then you load your Revit family into your Revit model. And the 3D modeler from the concrete sees the door, so he knows where the clashes are, and what Eric shows you about the balls and where the clashes are, or why he has to be model concrete, so [INAUDIBLE] can be attached to the door.

Now here are some fenders. We have modeled them in SolidWorks, because the company who has done this objects like here, they use as [INAUDIBLE] tool, they use SolidWorks. You can do the same in Inventor, I think. But yeah, the company who's working on these fenders, they use SolidWorks.

So yeah, that's also a challenge for us. How do you convert SolidWorks to Navisworks? So you have all think about that, how you're going to do that. I think next time, we will just force them to use Inventor or something. Less work for us.

OK, here is some from the existing ground. What I said earlier, the dredger company, they use VOSS, because they can send the dredgers with this information. Because yeah, they show this, the existing situation that we haven't made it VOSS. But of course, the other groundwork, we have modeled that in Civil 3D 2016.

Also, for a large project like this, we have a lot of installation stuff, like power supply, water supply, internet connection, stuff like that. And for this project, we have chosen to also model everything in 3D, because you have a big interface between all your connections with power supply and your concrete.

So for this project, all the MEP parts are also modeled in Revit MEP. So you see a nice

overview of all the pipes and stuff that are in the project. So we have a dedicated designer who does this. So it's quite-- if you look at the motors and stuff.

And here's something about the control building. It's modeled in Revit Architecture So yeah, I think it's just basic Revit, like walls and floors and stairs. I think, yeah, not more.

So I just saw-- let you show you some slides that we use different kinds of tools in different kinds of projects we are working on. So we made the kind of metrics where you can see if you want to do a bridge design in a conceptual design phase, then we use for modeling, we use Civil 3D or InfraWorks in combination with 3ds Max.

And also, for the reviewing, we're using Navisworks. So this kind of metrics we're using to convince our project manager or our director that if we want to do a dike or dams of embankment, we use Civil 3D. Because it is technically possible to do a dike in Revit, but if you have to adapt it, then you're going to cry. So that's why we tell our management, please, if you have a project like this, use Civil 3D.

So that's why we [INAUDIBLE] metrics. And usually, all kinds of projects that we are doing, we categorize them. So with the locks. And so there's is a certain nice communication tool that we use to our management.

I think what you show a lot of 3D geometry? Start [INAUDIBLE]? And also, for our clients and contractors, we made four of these simulations. And what you see here is not Navisworks, but we use a tool like Synchro. That's not from Autodesk. But with this tool, it's very powerful that if you see here, all the sheet piles, they are in Revit.

But what you see later on, there will be a floor here. And in Revit, that's just one floor. It is just 70 meters long, 26 meters wide, and just modeled as one floor. But if you want in 4D planning like this, you want to separate those, because they're going to build it in slices of 20 meters.

So what you see in a few seconds, you see the floor separated in sections, and that's all done by [INAUDIBLE] and not by the 3D designer, because those splits and what you see are, those splits, yeah, we don't know where the split will be as the design team. And where the split will be, yeah, we get the information very late. So this is a very handy tool where you can just split models that we have made in Revit or Civil 3D to split them.

So that's how we made for these simulations instead of in Navisworks, where it's also possible,

but it's not possible to make those slices or make some cuts in your project. So I think it's nice invention. And maybe it should be possible in Navisworks in the next version. So we will talk with the developers.

ERIC VAN WIJLAND: So the document management software we use is Vault. False The challenges were we have multiple companies with their own IT. So they have to install Vault. And of course, there was also a discussion about the cloud, but then yeah, you don't know where to store your data. It's in the US. And we actually want to have it on-premise, so on our side of the firewall.

There are differences in licensing on Autodesk products. Now they get more and more the same with the tokens, but yeah, there are still some problems with the licensing between the companies. How are we going to solve to work sharing? Especially, the work sharing, the collaboration with Revit. You can do it on collaboration for Revit in the cloud, but you have to store it eventually-- of archive it eventually in Vault. And on the project [INAUDIBLE] we chose for a fileshare location, not the [INAUDIBLE], but only from just the fileshare, where they were together, and on the Friday afternoon, it made a synchronization with Vault.

We had LAN and WAN access. So it's inside the company, but we also made a replication to the data center, so it's accessible to the other companies from outside the building, actually.

Implementing on ongoing projects is a big challenge. I would not prefer. But it's a big challenge, because you have to translate all your fileshare information to the Vault. It took us, I think, two to three weeks.

And of course, acceptance by the team member. It's a totally different way of working with [INAUDIBLE] 3D in Vault. It's different with Revit. AutoCAD, you have to be sure that it's getting accepted by the team members.

Well, you can see an example of a file. This is a PDF drawing. It's generated automatically on the background on the [INAUDIBLE] of Vault. But in there, there's also the metadata of the PBS code. So that's the same PBS code we used in the beginning of the project, in the conceptual design, actually. And it goes, also, to the drawings and to the elements. And every item is connecting through the PBS code. So you can filter it on PBS code. It's really handy for deliverable at the end, of course.

The configuration of Vault. The biggest location of the company is in Haarlem. It's nearby IJmuiden. There we have some Revit engineers. They work together on a fileshare. There's a

replica between the data center and the location, so there's one-to-one. The SQL is stored on the data center. So the whole team is actually working on one server, so that it's a smooth connection.

But there are some parties who are working outside this location. They have made a connection through the WAN. It's a HTTPS connection. And we also have some parties who are using [INAUDIBLE], so we can send them items in [INAUDIBLE] and they have only access to particular items we pointed in [INAUDIBLE] in Vault. It's working pretty well now at the moment.

And we only used it for file sharing, collaboration, and revision. We're not using it for review at the end.

Then the realization phase. In the realization phase, you have to think about the representation of your drawing. What are you going to do with the exchange-- oh, this is spilling out-- with 3D parties and suppliers? So what are you going to do with your 3D rebar? You have to send 3D data to the field. We use MC Next. And you have your earthworks and virtual reality. Oh, [INAUDIBLE].

ROY VAN HATTEM: Yeah. You see a representation of the drawings that we are making now. This is a Revit model, but it's a drawing just 2D. And if you look at the drawing, I think it's the same about 25 years ago when we didn't have 3D models. So this is still the way that we are doing it at the moment. But I want to see you a new representation that I think is more powerful, that you use the 3D model more than that we do now at the project.

So in a previous slide, you saw a plan [INAUDIBLE] basic cross-sections from the structure, so with all [INAUDIBLE] and stuff.

So what we have done on a much smaller project, because this is our project and this is a smaller project that we are doing. And we tested our new representation of the drawing. So it was easier for us to implement that kind of way of making drawings, because is a smaller project. So we tested there.

And here you see a new representation of the drawings that we are making at this moment. So you see more and more 3D details with annotations on [INAUDIBLE] and text on the 3D view. So I think you used the 3D models more than that we did on our project. So I hope this will be the new standard from how we're going to present the drawings in the future.

Here you see another example. You see all the dimensions. You still see where it is, what it is. You don't have to translate from 2D to 3D and back to 2D. And you all lost information. And I think this is more powerful for the people who is going to build it outside or the client who going to check the drawings. So I hope we're going to transfer to a presentation like this in the future.

ERIC VAN WIJLAND: So now the client understands the drawing instead of only seeing the 2D views.

Also, one thing about the presentation of the 3D. I read in Revit it's only possible in Orthographic view to make your dimensions to annotation. But I saw on the roadmap that's also thinking of Perspective view that you can add dimension and annotation.

So I think for us, as a engineer, it's easy to work with Orthographic view. But I think for someone else in a team who doesn't know what Orthographic is or how to interpret it, it's better for him to have a Perspective view of the element. But I think maybe in '18 release.

In the survey, we did an example of we did a test on this is SAAone project, the project I show in the beginning of the presentation. The survey were asking us to-- had all the coordination on the drawing of every pile. So we have to generate a lot of coordinates on the drawing.

But eventually, they had an export from DWG, that someone made an AutoCAD drawing. And they used AutoCAD to pinpoint all the location of the piles and then go outside and place all the piles. But they had MC Next software, but there's also a plug-in for Revit. So we combine it in Revit. And they measured outside the location of the sheet [INAUDIBLE]. And we can implement it in Navisworks to check if it's on the real location what we designed.

And also the other way around. Export your family points to an Excel sheet and then go outside for the survey. And now we are testing it with Point Layout from Autodesk itself.

About the rebar-- this is also in Dutch. But what we did, actually, in the past, we had a 3D model. We made some drawings. It's 2, 2 and 1/2D, maybe, this one. But after that, we made only 2D drawings. And the rebar supply added some comments and it gets really confused and it has no interaction with the 3D model anymore. And

What we did now on the project, we have 3D views on the drawing. And we didn't make all the-- well, I would say, the stupid 2D views on the other drawings.

And we hand over the 3D elements in IFC format, because in this case, there was a rebar supplier who was using [INAUDIBLE] and we had a lot of work of a lot of support from them. You will see that in the beginning of the class from Autodesk. He supported us with the rebar implementation in Revit.

And we exported the IFC. And eventually, the rebar supplier made his drawings, just like, yeah, we call it in Holland, Ikea drawing. Oh, wait, this is the old current reinforcement that nobody gets or understands, actually. This is old stuff.

Now we have these plans outside. So if it's still a little bit tricky sometimes to do it with one person, to find out how to read the drawing, but they're really fond of it now outside. And yeah, it's the Ikea manual of how to make your rebar, so even we can go outside and place your rebar.

You can see, we made Revit export to IFC and eventually in [INAUDIBLE].

So now they have no [? kite ?] anymore outside as a [? zero ?] format of a drawing, but they have just a small booklet with a three drawings in there with the [INAUDIBLE] schedules of that particular step.

And maybe in the future, we can use, also, the HoloLens. We already know [INAUDIBLE] and it works. But outside it's too bright to use your HoloLens. So you have to do it in the dark, because you cannot make a projection during the day. So that's a challenge.

But the model is still in 3D there. So you can do the export to Unity and you have your model in 3D in Unity in a HoloLens in five minutes. But this is the end result. And it's always nice to see the end of what you design, of course.

[SPEAKING DUTCH]

ROY VAN HATTEM: Yeah, OK. So this is the last part of the presentation. We have built our structure, what you just saw on the pictures. And what now most important is, how do we get the digital data back to our client? Because he wants the building or the sea lock or whatever, but he also wants the digital information for his management and asset management. So that's why the last slides are going about.

So we're going to exchange data to the client. And you see some examples. So you have the

Navisworks file, IFC, Revit files, the drawings. In the Netherlands, we made the concept called [? COINS. ?] That's only what we are using in the Netherlands. It's Dutch product. And let we show on the next slide.

This is an organization chart from our OpenIJ at the moment that if you saw, we have a lot-- it's in Dutch, I'm sorry. But we have a lot of disciplines that are working on our project. And we have assigned one our team that he's going to collect all the data that we're going to sending back to the client. So he's going to inform him, send me the work preparation files or the design. So everything going to deliver their documents to this team. And this team makes the connection between us and the client. So that's how we do it at the moment.

Yeah, what I said, we do it with COINS. You can compare with it some kind of zip file. This is a zip file where you put in all kind of data. You see here, the two main structure. You have the BIM folder and the [INAUDIBLE] folder. And you see here, the extends is a .owl file. That is a extension of. And what we do, we put all kinds of data in that COINS container. So you put Word files, Excel, PDFs, Revit files, RFCs, that you would just put in there all together in one sort of zip file.

And this [INAUDIBLE] based. Yeah, we call this a Dutch [? get ?] standard. So that's the procedure from our government, that we all have to deliver by this standard.

So now, this is schematic profile. So you have all kind of objects, the PBS codes. And they have the link to the objects that are needed for that object. So if you have object A, you just get all the information that is needed for that object.

And what Eric shows before, the scheme of our client, yeah, this connect as best to their system. So if he sent it by using COINS, they can very easily implement this data into their data system. So I think it's very powerful, now at the moment, that we use this.

Here's an example how such a COINS container looks like. So you have some names, some assets, and the documents are inside.

ERIC VAN WIJLAND: So in the future, this is also the information you get from the client.

ROY VAN HATTEM: Yeah. So now we're just sending it back like this way, but yeah, we would like to receive it the same way. So I hope that will--

ERIC VAN WIJLAND: And I promised someone from Autodesk to add this slide to the presentation. We're now working with Autodesk about sharing our knowledge inside our company. That's already a tendency inside your company, of course, not only on [INAUDIBLE]. But together with them, we made a SharePoint page where we combined all the support questions and software tools, because it's getting more and more important.

They say BIM is no software, but I will say, BIM is related to software. And you really need the best software and the best workflows in exchange to achieve a high level of BIM. Yeah, so we did it together with Autodesk.

On Thursday there's also a class from my colleague, Jeroen Tishauser and Cristian Otter. And they will zoom in a little bit more on the InfraWorks site. So they connecting all the data, all the open standard data. But also, during the design phase, they are connecting it to InfraWorks to get a discussion earlier with the client and with the stakeholders. So I should write it down or make a picture of it.

[SPEAKING DUTCH] Yeah, so that's all. Are there any questions?

[APPLAUSE]

Yeah, well, just in time. [INAUDIBLE]

AUDIENCE: [INAUDIBLE] a question on the ILS. So [? what's the ?] client specified into their [INAUDIBLE] requirements. Do they detail what data they need? So you currently only specified that the file format, but the attributes that you assigned--

ERIC VAN WIJLAND: Yeah, yeah.

AUDIENCE: --to an object are really limited to a 3D [INAUDIBLE]

ERIC VAN WIJLAND: No, much more. But this is more focused on 3D engineering and BIM. But yeah, it's going to get much more in--

AUDIENCE: The ILS goes in detail on the information [INAUDIBLE].

ERIC VAN WIJLAND: Yeah, but it has to contain to fit in their system, yeah, what kind of metadata it has to contain for them.

AUDIENCE: [INAUDIBLE] warranties [INAUDIBLE].

ERIC VAN WIJLAND: Yeah, yeah, a location on the side of the road, the location of the barrier. Is it on the left side? Is it on the right side? And the poles they are using, if they need maintaining or-- yeah, that's all included in the system.

AUDIENCE: [INAUDIBLE] company, we make 2D drawings. They have a lot of references to other drawings from the suppliers or references to [INAUDIBLE].

ROY VAN HATTEM: A lot of times we ask them to design in 3D, ask them to make it suitable to fit in our system. So I think because the contract is now changing and we have to pick the contractors, so we're actually going to pick only contractors who are working with BIM and 3D, and we won't accept any 2D drawings anymore. But it's something-- yeah, it's changing in the market now.

ERIC VAN WIJLAND: Yeah.

AUDIENCE: [INAUDIBLE] if I want to make it 3D [INAUDIBLE] and I will say, [? hey, ?] for this point, you have [INAUDIBLE]. It's very easy on 2D drawings [INAUDIBLE].

ERIC VAN WIJLAND: Well, that's a challenge, of course, again, yeah. But we still have 2D drawings, of course, to be honest. For everyone who needs their information in 2D, yeah, you can get your 2D information. But sometimes we are generating 2D information, but they don't need it or they don't understand it, and then we can hand over 3D. Like, for example, the survey companies, yeah, of course, you still have 2D drawings to be exported. Yeah.

AUDIENCE: [INAUDIBLE]

ERIC VAN WIJLAND: Yeah, yeah.

AUDIENCE: [INAUDIBLE] at that specification [INAUDIBLE].

ERIC VAN WIJLAND: No, it's just, actually, the elements which are inside the project, which are going to design and also to make it suitable for their system. So they want to get information of the gate door or the concrete wall or the--

AUDIENCE: [INAUDIBLE]

ERIC VAN WIJLAND: Yeah, it's connected through the same code. Yeah. So all the requirements are connected through the SBS breakdown structure. So if you want to have some requirements on the steel, it's connected to the door item and it's not connected to the concrete elements in the lock. Normally, at the requirements, you have to find out yourself, well, what's made out of steel in my own project, and you have to connect them, the requirements of the steel, connect them to the steel elements, but now they do it for you, actually.

AUDIENCE: [INAUDIBLE]

ERIC VAN WIJLAND: Divided? Yeah, it's-- yeah.

AUDIENCE: [INAUDIBLE] a script that you mentioned that you [INAUDIBLE] government. How exactly-- did you script by itself or [INAUDIBLE].

ERIC VAN WIJLAND: You mean open source data.

ROY VAN HATTEM: No, the InfraWorks-- the script within InfraWorks.

ERIC VAN WIJLAND: It's a database you connect.

ROY VAN HATTEM: Yeah.

AUDIENCE: [INAUDIBLE]

ROY VAN HATTEM: Yeah, the trick is to find and replace. So find layer X and replace them to object x. So that's how you need to script it.

AUDIENCE: [INAUDIBLE] in the coding or--

ROY VAN HATTEM: Yeah, coding. Yeah, yeah. There's a lot of the internet about coding.

AUDIENCE: [INAUDIBLE] your presentation on the challenges of managing a [INAUDIBLE] commitment. It seems like you got a lot of it sorted out and it was a quite successful workflow that you've got

going. What would you, personally, speak to what was the biggest challenge you had to overcome to successfully deliver [INAUDIBLE]?

ERIC VAN WIJLAND: Well, it's the challenge to get everyone aligned with the same idea. So you have some subcontractors and third parties who still working in 2D.

ROY VAN HATTEM: Yeah, every organization has their own view of what is best. But together, we have to find one way what is best for all of us.

ERIC VAN WIJLAND: That's IT-related, software-related, how people are working with the software.

AUDIENCE: And so the biggest challenge [INAUDIBLE].

ERIC VAN WIJLAND: Yeah, there's a big human factor in all of this, yeah, if they accept it and the adoption of your BIM and your project. Yeah. OK.

AUDIENCE: [INAUDIBLE] still print out drawings. And do they rotate through the updates with all the markups on them?

ERIC VAN WIJLAND: No, on some projects, we took out the printer, so they couldn't plot it anymore or print it anymore. On OpenIJ we did everything project, the review on PDF digitally. And now on the project on an [? '18, ?] the project they are using on Thursday, we do it through Vault with the DWGF.

So I hope in the future in the cloud, but they do it digitally. And now they see the advantage. When you review digitally in Design Review, you can put it underneath the Revit model.

AUDIENCE: And push it back.

ERIC VAN WIJLAND: Yeah, and push it back. Yeah.

AUDIENCE: [INAUDIBLE]

ERIC VAN WIJLAND: And also, important with the 3D rebar, we did the review in Navisworks. So you have to ask the engineers to review it in 3D and that's hard. That's also-- oh, he's [INAUDIBLE].

That's a big challenge to get them from the drawing to a 3D element. And they want to have an overview of the complete structure. And then you can switch with Perspective and

Orthographic. And just ask them what they want to see and how they want to check their rebar, and then try to find the best way for them, with colors. And so we give them Navisworks Simulate instead of Freedom, because we can do more with Navisworks Simulate. Yeah.

AUDIENCE: And so do the drawings [INAUDIBLE] 3D use [INAUDIBLE] or is that just the proposal currently [INAUDIBLE] 3D view's annotation.

ERIC VAN WIJLAND: We had the discussion with the municipality in [INAUDIBLE] in Holland, and he agreed with the 3D drawings, because he can better understand it. And yeah, it's according to the law, they say you have to deliver it in 2D. But they did sign the agreement to take a deliverable in 3D views on the drawing and they accepted it. Yeah.

OK.

ROY VAN HATTEM: OK, well, thank you very much.

ERIC VAN WIJLAND: You're welcome. Yeah, ciao.