TOM HUGHES: All right. Good morning, everyone. Apologies if my voice is a little croaky. It was a late night last night.

So you probably straightaway hear, I'm not from around here. So a little bit of geography first. We're going to learn a lot today. Some of it's going to be about where I live.

So, I live in a city called Bristol. It's 120 miles west of London. Bristol is famous for this bridge, this engineer, who designed this ship, which came over to America, and this alcohol. Actually, quite a lot of alcohol. Bristol's a big producer of craft beer in the UK.

So, great infrastructure, great engineers, great alcohol, home away from home. And great alcohol. Great night last night. Thank you, everyone here for making the effort of getting up and coming in to the talk. I really appreciate the fact that you're here.

Presenting at AU has been a bit of an aspiration of mine for the last few years. And you guys are making it happen as much as I am right now. So I'd like to start with a thank you, and I'll finish with one at the end.

A little bit of important housekeeping-- so, I work for a company called Mott MacDonald. I don't know how many people in this room know of Mott MacDonald. But this is our approach to connected thinking and solving the planet's most intricate challenges.

So, this is sort of the dry side of the stuff that you've already seen already, I guess. This is-- I work for Mott MacDonald. I specialize in the UK level 2 BIM requirements. And that's really why I'm here today, to talk to you about the delivery of asset information, but not necessarily just from a UK perspective.

I've been with Mott MacDonald for nine years now with a master's degree in civil engineering. So it's an engineering background that I come from. I'm now currently working in the technology team. It's the glue that holds that connected space together and provides people with the tools to do their jobs.

So, this is the less dry bit. This is me 12 years ago. And I added this just this morning. So, basically, I'm proud to be a geek.

I was really, really impressed by Anna Nixon's presentation in the keynote. I just wanted to say, it's really important, that encouragement of getting engaged with technology as a youngster. I wouldn't be here today if I hadn't had teachers at school that had me doing this kind of work. And I think-- even if you never look at property data sets in Civil 3D, you never look at the COBie export from Navisworks-- if you have a look at STEM ambassadorship, if you take that away, I'd be really, really happy.

So this is my class summary. Again, it's quite a lot of words. You've probably read most of them already.

But to make this easier to communicate now, really, this class is about looking at changing your perspective on what asset information is for an infrastructure project. And some of the common misconceptions that I've come across working day to day within Mott MacDonald would be things like, Civil 3D can't produce asset information; clients aren't asking for asset information; and that COBie isn't suitable for an infrastructure project. And I think they're all misconceptions that hopefully I can challenge today.

So, at the end of this class, hopefully, you'll be able to add rich data to an infrastructure model. You'll be able to configure the COBie Extension for Navisworks based on client information requirements, be able to set up and manage property data sets, and we'll also have a look at a couple of new features in Civil 3D 2017 that might make that workflow easier.

So, trying to be balanced about what we're doing today, I've tried to split for as much of the "how" with some of the "why." Because just telling you how to do something doesn't mean that you're necessarily going to see the value in doing it. Hopefully, we'll have time for some questions. But also, I'd invite you to, as we go along, if there's anything that crops up and you want to just jot something away and send me a tweet, I'm more than happy to take a look at those at the end and get back to you later in the day.

So, a little segue first. I want to have a look at some very basic ideas about collecting data with a live, real-world example. And for that, I'm going to need a volunteer. Alas, Christine, you always bring great energy to the conversation. All I'd like you to do is just ask the questions on the screen.

CHRISTINE: Ask the questions?

TOM HUGHES: Yeah.

CHRISTINE: What is your name?

TOM HUGHES: You should know that, right.

CHRISTINE: When is your birthday?

TOM HUGHES: It's the 16th of September.

CHRISTINE: Where were you born?

TOM HUGHES: I was born in a little, well, a town called Huddersfield, in the north of England.

CHRISTINE: What is your favorite color?

TOM HUGHES: Green.

CHRISTINE: What is your favorite food?

TOM HUGHES: Pizza.

CHRISTINE: Do you have a hobby?

TOM HUGHES: Cooking.

CHRISTINE: Where did you go on your last vacation?

TOM HUGHES: I went to Bali.

CHRISTINE: Did you enjoy last night?

TOM HUGHES: Yes.

AUDIENCE: [LAUGHTER]

TOM HUGHES: So we'll come back to that in a little while. But thinking about asset information, one of the common things that we might get, working day-to-day, is what actually is asset information. So, coming from the UK, I've really tried to avoid putting in the BIM Bingo images. But I think this is one that needs a little bit of a revival.

So, this is all about when you look at something that's complex but a small view, you might not necessarily get the bigger picture. And having grappled with what COBie is, or what asset information is, for the last year or so, and speaking to a lot of different people from different

parts of the business, the way I've internalized it is, I like to think asset information is a collection of data that will add value to the operation and maintenance of a built asset, fundamentally by answering questions about the design and construction. Now, I don't necessarily take that as the definition, but when I think about it, that's what I like to think about.

And so this is the call back to the exercise we just did. So, Christine, you did a great job with the questions. Can you do this?

CHRISTINE: I wonder who likes pizza?

TOM HUGHES: So the time machine goes back two or three minutes, gets the information-- queries the information-- and returns an answer. So moving that into something that might be more realistic or something that we might see day-to-day-- so, imagine a question about how many plate girder bridges that were over a certain age haven't been inspected in a certain frame.

So that's the ability to filter that structured information and then query it based on some values that we've defined within the question. And that's really where we start to look at something that, within Mott MacDonald, we call smart infrastructure. So this idea of aggregating data, applying some structure to it, then applying some intelligence that allows us to make some informed decisions. And that's actually-- within Mott MacDonald, now, that's a recognized practice within our business. And so we're supporting clients around the globe in making those informed decisions.

So this is it. Asset information to me is like a time machine. And this is a question that I dealt with when I first joined Mott MacDonald nine years ago. I wonder if this culvert can take an extra 1.5 meters cubed per second. And what was the driver for that? Well, particularly in this room, I'm guessing there's a lot of people who maybe aren't aware that in the UK, we had one of the worst infrastructure disasters in 2007.

So this is a town about half an hour's drive north of Bristol, so where I was living at the time. Some major, major flooding. Widespread destruction, so, 3.2 billion pounds worth of destruction.

13 People died. 4,600 houses were without electricity for two days. 1,500 houses without water for two weeks. It was a major disaster.

Following on from that, there was a big review in a report-- what were the main causes of this,

and what can we learn from it? There were 96 recommendations in a document called the Pitt Review. I've picked out three that relate directly to information. And this is produced in 2008, so, pre-BIM. But these are the things.

Definitive electronic maps of all drainage ditches and streams, making clear who is responsible for maintaining them. So, this isn't necessarily what we would think of as being an asset. But this is part of that system that delivers the drainage that prevents the assets from failing.

A joint nerve center run by the weather agency-- so the Met Office-- and the Environment Agency, producing accurate warnings based on pooled information. So this idea of bringing information together from the owners of the assets that are designed to protect us from flooding, and the scientists who can predict what the rainfall is going to be. And joining that together and making that a cohesive approach.

And then, finally, openness about flood risk and making that information available to people when they're buying houses. So, this idea that information shouldn't be [? sorted ?] away within the engineering sciences. And that should be something that we're all aware of. We all are potentially at risk from flooding.

So, how can we move to a situation where we know more about the assets which protect us from flooding? Well, I was lucky enough to be working on some projects with the Environment Agency this year. And we started the process of asset information requirements.

So, first of all, what information is required? And really, that's the big question that we need to ask when we think about asset information, is what information do we need about a specific asset? How should it be structured? How are we going to get value from that? And then, who's responsible for producing it? And how should it be exchanged?

Thinking back to the example, where we had people viewing that complex scenario with slightly different viewpoints, I think there is, currently, slightly different viewpoints about asset information. And if you've been through the class handouts, it goes into a little bit more detail of some of these. But currently, in most situations, from an owner or a maintainer's perspective, they've got asset information, but it's usually locked away in a fixed format. So that could be paper. It could be electronic format. But if that's effectively locked away within their systems, it's very difficult for that data to be used or to be interrogated in a way that adds value.

One of the things we've definitely identified is that typically, the operator/maintainers have got a really good understanding of the information that they need. So where we're able to speak with operations and maintenance teams, they are usually very, very able to define what it is they want. But typically, within a lot of projects, they simply don't exist at the point when the information is being created at the beginning of the process.

So this is possibly our perspective. Stole this image of the front of the InfraWorks box. So we are working in rich information environments.

But typically, we're focused on producing quite standard deliverables. Certainly in the UK, we're producing effectively DWGs, PDFs, the odd Navisworks model, but not necessarily anything more. And we do have the opportunity to produce more. But I think because they're not so easily defined or so easily measured, we don't necessarily get the feedback that they require.

Then the client's perspective. So, as we showed with the disaster from flooding in 2007, actually, clients have got the greatest vested interest in seeing information passed from design and construction stages through to the asset operation and maintenance. And I think from a client's perspective, what can be difficult is when a client is defining the brief for the early stage design and for the construction, what information will they need in the future.

That can be difficult, to define it early on. And then also, how can they get it. And I think part of it is about closing that loop, so that as the professionals within the construction industry, we're more able to tell clients what we can produce, what they might need, and that we basically get these requests and we deliver based on requests.

So, this is the opportunity, really, I think, as a Civil 3D user, as Civil 3D users in the room, the opportunity to better understand the capability of the software. Because that's really what we've got the influence on. What can we do within the software.

We've then got the opportunity, as we understand the software better, to assist our colleagues in constructive discussions with our clients. So we might not necessarily always be in discussion with our clients. But by informing our colleagues who are, we've got a more informed scenario. We might actually be able to define the information within a BIM project.

And then the production and delivery of structured data is something that adds value. So that's got the potential to add value to what you're offering to your clients. And adding that value is

what leads towards smart infrastructure, which leads towards intelligent decisions and ultimately, to better outcomes for everyone. This is important endgame for the opportunity that everyone has a better scenario.

So, thinking about flooding and the impact of the floods that occurred in 2007, this is some work that Mott MacDonald did with the Environment Agency. There we go. So this is looking at a flood simulation at the River Exe, which is also in the southwest of England.

The flood defenses in and around Exeter, which is the main city on the River Exe, were originally produced in the late '60s and early '70s. So they've basically been in place for about 40 years. And since they've been in place, there's been no major flood incidents in that location. The problem is that when they looked at the level of intensity of the rainfall that caused the flooding up in Gloucester, and started applying those similar simulations to the different river catchments within the same sort of region, we'll see in a second the potential impact for that kind of event, had it occurred in Exeter, rather than in Gloucester.

So this is normal flow conditions. It's great. No problem. We look at a 1 in 100 year annual probability flood event. And actually, there, you've got the potential for 3 and 1/2 thousand homes to be flooded. And this is how, through modeling this and using the model to communicate, we can show not only where the flood defense is going to fail, but then how that flood is going to spread as the water flows through the river and over into town.

If anyone wants to find out more about the scheme, that's the link to the government website for the Exe flood defense scheme. So you can see the details. Proposed works will increase the level of flood defense to that 1 in 100 year return period. Represents, I think it said-- a 25 million pound investment across the whole life cycle of the scheme.

So I suppose, really, that's the "why." So we're going to have a look at the "how" now. So, I like this quote. For people that have seen my presentations before, I'll usually try and sneak a quote in somewhere. So this is, you don't have to be a hero to do certain things, just an ordinary person with the right motivation. It's Edmund Hillary, climbing Everest.

And this was Civil 3D Gunslinger, held in London in February of this year. And for the Gunslingers-- the main focus of the Gunslingers is validation of the product workflows. But a certain amount of latitude is given to Gunslingers to allow them to use the workflows creatively so the product team can see what people might be trying to use the features for outside of what they were originally intended.

So I took it upon myself-- because I happened to be working on this Exe project-- we hadn't got a requirement to do any COBie deliverables. But I wanted a proof of concept to show that if we were asked for it, this is the approach that we could take. And because I'd been working with the Environment Agency at that point, I had access to their team that was responsible for defining their asset information requirements at the individual object level of assets.

And it allowed me to get hold of this spreadsheet here, which is effectively the shopping list of data that the Environment Agency want to know about flood defense. And what's really important here is that as well as the information, you'll see that they've got the data drop, so, when do they want that information. And that allows us to put some more structure into what we're going to do so that we can produce information at the right time on the project.

And then this, this is a typical concept detail. Like, for flood defenses, there's not a huge amount of detailing that goes in at concept. We know what the level of the flood defense needs to be to reach the standard of protection that's required. And we've got a rough idea of what the foundation is going to be. But effectively, it's very simple at this point.

And this isn't going to be about creating a subassembly here. But the point about bringing this up is-- as a show of hands, how many people here use subassemblies? Pretty much everyone, right?

How many people here can use a subassembly composer to create their own subassemblies? Right. You're not going to get very far in Civil 3D if you can't. And that is about creating the graphical information on a project. So effectively, the focus of what most of us do is create graphical information. So this is how I went about creating non-graphical information and the definitions to hold that.

So, how many people have heard of property data sets? And how many people have created their own property data sets to hold specific asset information? So probably about 10%. So, for every 10 people that are creating the graphical bit of information, only 10% know how to match that with the non-graphical data.

So, the class handout-- I put a lot of effort into the class handout to make this as step-by-step as possible. I did think about and did record a couple of Screencast videos. But actually, when it came to entering in property data set definitions, no one wants to sit and watch a video of someone typing the name of data into--

But this is basically the interface. It's simple. Actually create property set definitions. You can then start to add the definitions into the groups. And this is it.

So there's really, under the manual property sets, there's three that we've used to some effect within what we've created so far. So, just using manual text. It's just a placeholder that you can enter some manual text, you could add a default in there. Or you could just leave it blank so that as users do it, they can tag some text into their objects.

We've got lists. So lists are really useful. Because you can predefine a list set. And then you know that when your users are selecting from the list, they're selecting from a structured, allowed-- just like in Excel, where you can have a validated list.

True or false. Again, very useful. Maybe that's something that you add, just as a logic.

And then integers, just count. So, you know you just want the count, single-digit count. It stops people putting stuff in there that otherwise would not necessarily be useful.

So this is the list. So, as well as property sets, if you go down to Multi-Purpose Objects, List Definitions, you can just create a simple list that's the allowed values, that when you put them in the property set definition, you can call on that when you're in the model.

There are a few others. So you've got the ability to do classification sets, which can be good if you've got client-based classification standards. And you can also add some automatic sets and some formula-based sets, where you can compute between different property sets and also add some coding in there. So again, just, the more you start to use these things or the more you try and solve the problems of actually delivering the asset information, users start to use these more and more.

One of the things that people might have noticed is I've actually, for a flood defense wall, created three different set definitions. And that was around structuring based on this data delivery plan that the EA worked too. And that, again, might be different for different clients. But it's this idea that information is delivered at a point in the project and it's not all there at one point.

So going back to the example that we had on the earlier slide, and just restructuring that data slightly and aligning that to an information delivery plan. So effectively, saying that you might have some stuff that's defined in the brief. So, we would know we were going to design a

bridge before we were asked to do any design.

You might get some stuff that actually the type of that bridge is then defined through the design and development. When it was constructed is defined by the construction. And then there's also data that's going to come in as part of the operations and maintenance cycle. So it's that whole life cycle of information delivery.

So moving on from the creation of property data sets is the ability to apply them as part of a reference template. So one of the things that were in the handouts for the class-- when we were creating these property set definitions, we were doing it in a drawing template rather than in the drawing that contained the model itself. Because that gave us the ability to reference that template and have a standard reference that contained all of that standard data structure. And that any model that we were working on and needed that, we could just push that in as a reference to give us the data structure as part of the workflow.

It's new functionality for Civil 3D 2017, and really useful for a huge variety of things. So this was one of the unintended uses that the product team hadn't thought about-- property set definitions coming through as styles-- and suggested that we could give it a try. It worked. And actually, it's been really useful. So I always recommend taking some time to think about how a new function could be used in a variety of ways.

So, you've created the property sets. And you've got a model that has your graphical definition. Well, what are you going to do to actually build that data and add the data to the model?

So, what you'll find is that when you create property sets, you can select what object types they're allowed to be applied to. And provided that you've enabled them to be applied to the object type you want to apply them to in your model, when you select the object and go into the properties of the object, you'll find that just in the bottom left-hand corner, there's buttons there that allow you to add property sets. It allowed the property sets that were available within that model, for that object type. And they then appear as part of the extended data.

And you can see that because we've grouped those properly sets into the data deliverable groupings, that actually, that gives us a way of, within the design, well, do we have the information that was required from the scope? Is it there? Now, that's not necessarily something, at this point, that's been done by the client. But at least that's a way for the designer to be aware of what the scope was from the client.

So you can see there, we've got things like the current standard of protection-- so where do they think the current protection level lies; and when was that last assessed; and what's the required-- where does the design have to be. Now this is just an example of, in the design data, we've then got a design standard of protection there that's coming from a list that I defined as just a few examples of levels of protection that we might have. So there we can see, we're going to that 1 in 100 year return period that was specified within the videos.

So that's just an example of how that information can be managed and the information can be placed into that model. But for the proof of concept, one of the things when talking with the client was they don't have access to Civil 3D, typically. So how are they going to at least be able to view this information that we're now putting into their models?

So, as a client group, their preferred way of viewing the 3D models is Navisworks at the moment. And Navisworks has got the ability to view the property set data. So this is in Navisworks Manage that I'm looking at it. But we went through and did a validation to make sure that we have the same access in Navisworks Freedom. So actually, anyone that's got access to a free viewer to view this model can view the same data set.

It's not necessarily full asset information because it's effectively just viewing the project information model that was handed over at the end of design and construction. It's not necessarily got that long-term update cycle, unless the client is somehow updating the models when they're doing things like inspections. But it gives them visibility, at least, of what the design and construction information was.

So, to take that further, we wanted to look at how we could produce some of the required deliverables on the UK level 2. So with a bit of work between myself and some of the Navisworks team from the UK, we got an early launch copy of the Navisworks COBie extension, which is effectively a Navisworks plug-in. Guests, as a show of hands, how many people are aware of the Navisworks extension?

And I think that says quite a lot. Partly, I think it says a lot because it's been brought out as part of the UK level 2 suite of work that Autodesk has done. But it's not specifically a UK level 2 tool.

And if anything, it's actually a very, very powerful data extractor from a Navisworks model, that you could use in a variety of ways which have got nothing to do with COBie. And I think that's

one thing that potentially, as an action of today, would be to have a look at the tool, use it, and maybe think about some of the ways that we've used it to do specific client asset data and how you might use that in your workflows. And obviously, that gives the opportunity to feed back more into the Navisworks team about how that tool is going to be used or how it could be used.

So, it's a really, really simple interface. It's six buttons. Most of them just to load stuff. And there's a couple of buttons to configure things.

So, as part of a tool, when you install it, there is a quick start guide. And what the quick start guide does-- there's a lot of flexibility. So one of the things is, when you first open your model, you need to tell the exporter tool what properties from the model you want to put into what sections of the output. So you can do that by just dragging and dropping, which is great if you've got quite a consistent data structure.

But what we were looking at for the Environment Agency for their asset data was something that wasn't necessarily typical with a traditional COBie structure. And this is why I think it's an important presentation. This isn't necessarily just COBie.

So as soon as you have a look in the template and realize that effectively, it's just looking for a standard extraction format so it knows what to look for in the model, and it will then just put that information into a spreadsheet for you, provided that you've set up structured property sets-- which you did through the first steps of the "how" part of this exercise-- you can just build an Excel template that says, hey, any time I've got this property, I want to put it in this column. And then it really is as simple as loading the template into the tool, selecting the objects within the model that contain the data you want to extract, and then hit Import. And so this is just an example of taking that information from one object within the model. But you can select multiple objects.

You can also bring multiple models together into Navisworks. So imagine you've got multiple Civil 3D models, that you then put them all into Navisworks, and then extract all of the data out through this tool. Really, really powerful, potentially really powerful way of speeding up a lot of what we do.

Also, it's got the ability to produce Excel, but also SQLite. So there's a lot of opportunities there to drive proper data workflows, just through a really simple tool. And really, that's what it's about.

We define the data at the start. We put it in. And we define the data coming out. And it gives us this end-to-end workflow that allows us to actually have much more control over what it is that we're producing. It's not the greatest image because it doesn't look like there's any control on that machine.

So, we had the "why." We had the "how." Hopefully just as a recap-- so I wanted to change perceptions. And I really hope this has helped to change perceptions for you on understanding what asset information is, why it's valuable, and how it Civil 3D and Navisworks can be used together.

I wanted to show you how to add rich data to an infrastructure model. And we did look at the ability to do that with property data sets and how that opens up doors for you to do things in different ways. We looked at the configuration of the COBie tool, so the configuration that's on board, but also the ability to just set your own templates up, just in an Excel, and structure that any way that you want. Also, it will work across multiple Excel sheets within the workbook. So if you've got a really complex structure that you want to get out, it's actually quite simple.

How to set up and manage the property set definitions. So, they're easy to set up. But they're not the quickest things to set up. And that could be something where you're applying a little bit of scripting.

So this was just a proof of concept that I did in probably a day and a half, while I was on the Gunslingers. But actually to do that for a larger data set needs a little bit more thought. But the ability to manage those as part of a template, I think, is something that would certainly go into our workflows as we develop these on a project. Rather than having that as something-- you've got the ability then to define different templates for different clients, different templates for different asset types. So that when you're actually producing your models, you can just put in what you need, when you need it.

So we didn't cover quite all of these, actually, in the end. So one of the things I did want to point out is actually that corridor model that we did for the flood defense wall, we didn't actually create alignment for that. So the ability to just create alignment off a feature line. But we did do referencing style templates. We did do the property set definitions.

And one of the great things about property set definitions is they've been rolled back in Civil 3D 2016. So, through the update release packs, they're now in Civil 3D 2016 as well. So it's

not even necessarily that you need to be on the very latest version to get some of these benefits.

So, yeah. Back to where we started. Back to a thank you for you guys coming. I really do appreciate you being here. I hope it has been an opportunity for you to see some things that maybe you wouldn't have done or not used previously.

And so, yeah. I would like to have as many questions as you've got. Because really, that's where we can have a discussion and maybe brainstorm this out a little bit.

[APPLAUSE]

TOM HUGHES: Hey.

AUDIENCE: Do you see any requirements for adding unique tags to the assets?

TOM HUGHES: So, just to repeat the question, that was, do I see any requirements to add unique tagging? Yes. So definitely in the UK, the idea of asset tagging is, across the client groups is-- whether it's in the rail sector or in the environment sector-- the idea that independent ID tagging of assets will allow them to connect the physical item in the world to the data that they've got. There's the opportunity to do that with this. I think, at the moment, it wouldn't be a particularly automatic way of generating those unique tags. But there's no reason that that couldn't be calling data from somewhere else to place that into the model.

AUDIENCE: Is there a way to tag items and features of data structure while you're on-site so that you don't have to repeat the work back in the field?

TOM HUGHES: Yes. So in terms of data entry [? on-site, ?] one of the things about this with the connection through Navisworks is the potential to look at your field collection. It's not something that we've currently looked at. But we have the potential on some of these jobs. So these are jobs that are being built. And it would be something that would be good to find out how that information could be brought in from site, so site tools.

AUDIENCE: I'd like to add a little bit to this [? yet again. ?] And the good thing about it is when you do the individual tagging, you can go into Navisworks and you can link it to an external database, making [? ODBC ?] connections. That way you can easily upgrade your model with all the information, even non-graphical models.

TOM HUGHES: That's great.

DUNCAN: You can also, if you export to the COBie spreadsheet, update that in Excel and import it back in again.

TOM HUGHES: Yeah.

AUDIENCE: Can you repeat what he said?

TOM HUGHES: So, Duncan said that if you export it to the COBie spreadsheet, you can update the data in the spreadsheet, and then import the data back in again to update the model in Navisworks. Hey.

AUDIENCE: Is most of the data set data, is that driven by what a client wants, or do you just develop a data set that's what you think the client might need?

TOM HUGHES: So this is totally client-driven in this scenario. And I think that's one of the really important things, is that with the tools that we've got, we do have quite a lot of capability to produce data. But if we don't know what we're being asked to produce, we typically don't produce anything. And so this scenario was because the client had an asset data requirement for each asset type within their asset portfolio.

I could go and ask, and say, well, what are-- in this case, it was 67 pieces of data for a flood defense wall-- what is the data that you need? And that's one of the things I think the dialogue between construction and clients needs to be around-- what information do you need? And how we can support, mutually, people understanding the information requirements.

AUDIENCE: [INAUDIBLE] COBie, is there any way I can get [INAUDIBLE] Navisworks linked to GIS [INAUDIBLE]?

TOM HUGHES: So I don't think there's a direct connection. But obviously, through an export to a custom-structured spreadsheet, you could just exchange the data that way. So you'd set up one template that would basically be that custom, middle, exchange format.

AUDIENCE: [INAUDIBLE] If you go to [INAUDIBLE].

And [INAUDIBLE] more, you can see that from a spreadsheet. Can you-- [INAUDIBLE] can you [INAUDIBLE]?

TOM HUGHES: Well, so, this is what we would like to do. So, obviously, sitting there with a day's time and

needing to do 50, well, you can do that in half an hour. I think the idea that actually, if you've got a client that's already defined those requirements, that you're right. You don't want to sit there and do 2 and 1/2 thousand of those. You'll probably quit.

I think there's definitely opportunities with some of the automation tools that Autodesk have got and are out there. So, yeah. I don't think it's an insurmountable thing. It would be great from a tool perspective if that was something that-- yeah. And we've fed that back to them at the Gunslinger.

Unfortunately, and this would be one thing that I would say, is because the level-- so, that's a show of hands for subassembly properties versus for property set definitions-- and that 10 to 1. Because there's that 10 to 1 imbalance between graphical and non-graphical, occasionally that means the focus of product development is focused on where there's the biggest use case [INAUDIBLE].

So I think, particularly, the more you can reinforce to Autodesk the importance of the non-graphical side of project delivery, the more likely we'll get tools like that coming into the software. They need to know that we need the tools. And they need to know there's a lot of people that would use them if they could.

AUDIENCE: Are your clients mostly using Navisworks products to receive the data you've been giving them?

TOM HUGHES: So, in this situation, yeah. In the Environment Agencies within the UK, we'd have something like the employer's information requirements that define how the Environment Agency wants to receive information. And within their client platforms, Navisworks is listed there as their preferred model viewer. It's not the only one. But I think they're aware that it's free for them to use Navisworks Freedom, and that they feel like they get good performance and they get the ability to view all the models they receive.

AUDIENCE: I got a question on the [INAUDIBLE] once you pull out the data for the spreadsheets, and pull it back-- update it and then pull it back to Navisworks, how is the link to the COPD updates?

TOM HUGHES: So that's not something that I've tried to do, updating the spreadsheets. I assume that that's not a link back. But I don't know. But from the more-- I suspect what Duncan would be suggesting is that we might hand over a Civil 3D model at design, but then maybe some of the operation and maintenance stuff that changes over time, which would never be in the Civil 3D

model, would be the stuff that you would update after the fact.

AUDIENCE: In fact, I'm looking for a static Navisworks model, is that on a more streamlined connection to the [INAUDIBLE]?

TOM HUGHES: Sorry, could you--

AUDIENCE: Once you've updated Navisworks properties, you don't want any formation [? to the ?] Civil 3D [INAUDIBLE].

TOM HUGHES: Well, so, I think the point is that the data that you would be maintaining through the reuploading of Navisworks wouldn't be something that's defined within the model from a design and construction perspective. Things like the date of last inspection, that's just something that exists alongside as part of the information associated with the asset, rather than interacting specifically with the model.

AUDIENCE: [INAUDIBLE] Just to throw a couple of comments, particularly about what you were saying. We worked with customers, we might solve so many problems-- And I think the comments [INAUDIBLE] I think what Tom's shown us is that Civil 3D contains important parts to provide some of the information. [INAUDIBLE]. So what we're starting to look at is [INAUDIBLE] external to Civil 3D's [INAUDIBLE]. So external, also, to Navisworks. [INAUDIBLE]. connections.

But also, we get that civil engineers are not the only people who enter that data. You've got hundreds of items of data [INAUDIBLE] or individual pieces of the infrastructure. And the civil engineers aren't [INAUDIBLE]. So we want the ability to interact in the same table of data [INAUDIBLE] that same time, even. Some of it [INAUDIBLE].

So those are the kinds of problems we currently need to solve. We must query into something where projects might be [INAUDIBLE]. I mean, the other thing that's interesting [INAUDIBLE]. And how those, you know, that [INAUDIBLE], that central place to access the information might play out.

I think [INAUDIBLE] this year. And I think people are scrambling to try and find solutions with this data right now. [INAUDIBLE].

TOM HUGHES: I totally second that. You know, the pressure form this year, particularly, when the majority of the clients in the UK that have got the mandate imposed on them is through the infrastructure

space. And they're all very keen to see ways that this can be done, and ways it can be done efficiently.

So part of this is, like, this isn't a finished, final workflow. This is the first iteration of something which will develop over time. The more that people use it, the more people share their own experiences of delivering asset information. So, yeah. It's an important conversation, I think. Go ahead.

AUDIENCE: I think in newer '17, and possibly '16, in the [? constructed ?] solids [INAUDIBLE]-- but can you add property data sets just to those?

TOM HUGHES: Yeah. And actually, we found that that seemed to behave better than adding property data sets to the corridor in some cases. It seemed that the export was better from the solids. There's also more opportunities to do other things with the solids as well. So some of the other classes that we've seen this week have been using solids for added value elsewhere. So, yeah.

I think that's one of the important things, is you choose the object type that those property data sets can apply to when you create the property data sets, so, having a think about what you're adding. So for example, there's the pipe example. You can just select that that property set can only be applied to pipes, so that you don't end up with sign foundation with a whole other pipe property data sets to it. It makes no sense.

OK. I mean, that was great. We've finished five or 10 minutes early. So I'm more than happy to hang around and chat to anyone individually.

But I'd like to thank you again. It was great of you all to come. And I hope you all enjoyed it.

[APPLAUSE]