GUY PENFOLD: So just to give you a refresher on what the class is about, the summary of the class. You've probably read this obviously when you registered for the class. We at Autodesk provided some consulting services to a customer, one of or EBA customers, with the use of Glue and Field on a oil and gas project, very large project. I can't mention the customer, and I can't mention the project during the presentation, unfortunately, due to NDA in place. But you'll see very, very quickly how we realize some benefits behind these net technology in this particular space.

My background, I'm actually a BIM consultant within Autodesk Consulting Group. I'm from Australia, based out of Sydney. I've got a strong construction background, not necessarily in the oil and gas industry but in the building industry itself. And a lot of the information that you'll see here could be easily applied to the building industry, as well across the AEC-based portfolio. I'm an implementation consultant, accredited, and I've done quite a few implementations. T I've been through 360 Glue, Field, point layouts and Building Ops. And obviously experienced Navisworks user and trainer as well.

So we're trying to educate you guys in what we did on this particular project. What I'll do, I'll break this into two key areas in terms of the presentation. The first will be the customer's approach to what they are trying to achieve with this particular project and the application of the technology. And, secondly, the actual price so what we did in implementing Glue in the field in the project. As I said, unfortunately I can't mention the project or the customer. Just know that this was a very large project, of many oil and gas rigs being built on a particular dock in Asia.

So I can't take credit for this little anecdote, but the first rule of any technology used in the business is the automation applied to an efficient process will magnify the efficiency. And the converse is the same. If you apply technology to an inefficient process system becomes more efficient. That was really important with the customer. The customer wanted to make sure they had a problem to solve and apply the technology to that problem. And that's what we sort of achieved at the end of the day.

So the customer had a very driven approach to what he was trying to achieve on this particular project, and projects in general. But his lead planner on this particular job, he came onto the job about ten months into construction. So was sort of light in the pace, and he was keen to

drive a completions driven approach. So trying to figure out how we could get things completed faster and more efficiently on the job site. Which then saved dollars obviously in the actual delivery of the project.

So the objective was to remove complication from complexity. OK? One of the main focal points behind what he was trying to achieve. Create alignment with the team, give the team the ability to sort of make decisions based on real live information in the field. Create visibility, and remove that excuse, that accountability problem that we have on construction sites today. If we could see what the problem was we could then identify it and then remove that excuse from the people on the site. And create empowerment, give the guys the ability to make those decisions. You know, it's a what I can't do versus what I can do approach.

So at the end of the day, the right information to the right person at the right time and the right format, that's really important. And it was really critical to this success of this particular project that we applied the technology to. And finally this is probably the three key areas of any projects, whether it be BIM based projects or AEC projects or oil and gas projects. The people, the process, and the technology is what drives those enablements, and then we influence the outcomes. So we can do that by having that in control, being in control of that particular area. Do it once, do it right, finish what we started.

So the customer had a construction management system in play. It was a database system they were using to drive this completion based approach. On the left hand saw we had engineering data being generated from the model. We had engineering statuses, rules of credit, completions data, contract schedules, and work packs that are in play there. And what we're trying to do is plan, execute, and improve. And with that we can make decisions, we can make better decision making, we can coordinate, validate, and analyze the information we're getting from the system. And then on a micro-level provide change management, materials accountability, and those sorts of things around that process.

By doing that we can then contribute to control delivery. Opportunities and constraints analysis, we can mitigate risks and vulnerabilities in the project delivery. We could manage to change, troubleshoot the NC stuff and commercial protection against the actual project deliverables as well. So we have this supercharged model from the data being driven in their database, in Navisworks, rationalizing the information, and then realizing the benefits behind that.

So why? Now you guys would probably understand this better than I would, not being an oil and gas person but the trend in terms of the S curve here in terms of how we go about completing a project or doing a project in the oil and gas industry. So bulk construction makes up a fairly chunky part of the actual construction process in the oil and gas. The major steel infrastructure is a fairly big chunky part. The completion process is quite heavy as well.

So what we're trying to achieve here in these areas here is pull that back and have the opportunities available earlier in the process to mitigate that risk and that problem. And that goes back into not only completions of the tray that we'll talk about shortly, but also mitigating potential safety issues. If we can sort of plan that information better and get that completions based information earlier we can sort of try and mitigate those risks and those issues in terms of safety as well.

We're always rushing at the end, and the same thing happens in the AEC industry, we rush at the end. We make mistakes. We get errors. Capitalizing completions opportunities earlier, pretty much we're trying to do here. So what are we doing? We've got structure, we've got piping and fabrication, we've got E&I services, we've got room completions, hydro tests. This is all the stuff we're doing through that life cycle of the actual product delivery. Discovery work, later on in the process pull it all back, bring it forward to then realizing opportunities to sort of move that project in a more streamlined manner effectively.

So we didn't actually apply the technology to the piping, we only applied it to the cable tray, and we'll get to that shortly in the actual case study in the project. The opportunities for piping are realized as well. This was something that said to the customer in this entire planning life, that we don't start testing of spools until we've done 65% of the actual spool install. That's a common area, and particularly in this industry. But what if we could identify areas and realize those areas are complete earlier then test them earlier. So realize things that could be visualized and analyzed and assessed earlier to then streamline and increase or remove that delay in timeline of completing the project.

And these are sort of the trigger points, the opportunities and constraints are easier to work with to reduce the time lag. Same applies with E&I. So the tray installs is real life and then the application of the technology to this particular problem we had on site. So the analysis, the constraints opportunities.

So opportunities is a set of circumstances that makes it possible to do something. So we had

opportunities here, we could work with the information we had in the database and align the model to then realize opportunities and then provide that to the project to get better outcomes. So move to the next stage and then open work fronts. So we're trying to facilitate a better use of staff on the site as well during that process. So a constraint is a limitation or restriction. OK? And that's obviously what we're trying to mitigate and remove from the actual process.

So there's three phases of this opportunity constraint analysis. The completion driven approach that the customer was trying to drive, they want to sort of have this approach to getting things complete in a timely manner. Identify, communicate, and then perform the actions. And then we repeat, we keep doing it over and over again.

So a piping example that was provided as part of the Navisworks and database alignments they did on the project. On the 10th of January 2015, 28% spool was installed. They had 233 test packs available for walk, which is 15% of the overall test packs. And they had them available to go right then and there. But he was told quite clearly we don't do any walks down until 65% of the spool is complete. So we had all this available sort of areas ready for walk, but we couldn't do it because it wasn't the done thing. And it was known, it was realized, it was real, it was captured in the model against the data that was available.

And there's the information there on the screen there. The first time we had half the spool install done, 450 test packs complete, and we had that granularity is there as well and 90% punch. So before that magic 65% number, we had a fairly significant amount of information that were being installed, being done, being captured. Ready for walk, but we couldn't do it because we were told we what we didn't do the walks until we get to this magic number 65%. So there's efficiency improvement straight away in what you can see there on the piping application.

So a 3D model overview. So we wanted to use the 3D model and align that with this management system they had in place of the data to visualize and analyze what we could put in. Now it can't plan, it can't execute, and it can't make decisions but it can help to do that for you. It can show you what you need to do to then do things better in that process. So we basically then had this management tool, aligned with the Navisworks model and data, data alignment with data tools and Navisworks. A supercharged model with a very heavy data management workflow implied.

So visualizing, things like structure, piping procurement, delivery of installation, equipment

based activities, cable trays, and end devices. So the focal point for us in the POC at Autodesk was basically cable tray installation on the project. But they then saw the benefits of that particular process and then move to the next level and work within devices as well. And realized they could sort of use end devices as a method of knowing when to terminate cables at the end devices, making more informed choices about work fronts that could be go and done in a more timely manner, in a more strategic manner.

Opportunities in terms of piping. It shows the test packs ready for walk and the progress in those test packs. It creates a focus to easy opportunities that are critical to the project in all these cases here. It's important to note, too, that when we get to the actual case study that the Field and Glue application a very small portion of technology was applied to this project. And we'll see at the end of this, at the end of the presentation, half will want to go with it.

Tray install, visualizing the tray installation status. Overall status, the grain is complete, other colors are not bolted, not painted, bolted, et cetera. Not bolted so that gave us some quick fixes in terms of you have to decide and do those quick bolting fixes on the model as well. Paint and bolt, so that was color-coded as well. And then priority checks. So we have this data rich model to provide visuals of what we could go out and do as we needed to.

Opportunities, room completions on the cable trays. Attach available cable pulls on the cable trays as well. We could see straight away what was available to pull on those trays on ALL and on the LIRs. So that was quite valuable in the overall scheme of things for the customer in driving this particular approach.

And go one step further down to individual cables, which is unusual in our space. We don't tend to get too micro-level on the componentry, but the customer saw a way of doing it and then drove that process forward with the technology as well. E&I equipment, so end devices were obviously realized, too, later in the project. Color coded in the actual different status of the end devices not installed, check installation and the like. The orange ones you'll see shortly were the ones that are ready for pull. All cables are pulled ready for termination. So we could sort of see what was required to be done and then ship the work out to the contractors you had done.

And the room completions as well. Same with subsystems, with the gas turbines and aligning that information to it as well. So progressive inspection, leading indicators, the field status capture independent from what contractors report. They had discrepancies in what the

contractors were reporting back to them from what was actually being done. So they were telling them that 70% of the cable tray were being finished and validated and complete, but only 15% in real life was complete. Purely based on what data was available in the model, and color coding that model to suit. You'll see shortly in the case study what that meant.

So by doing that we can draw the behavior of the contractor. So we can try to say, well you're not being honest with what you're doing in terms of the installation of the tray. Let's drive this behavior in a better way, improve productivity, and then leads to realization and performance. So the case study-- so leveraging BIM 360, to drive project performance. Again, we were engaged to do a proof of concept on the project for cable tray, you know, cable tray only as a starting point. The data was available to us. We wanted to utilize this opportunity for constraints analysis. We had model visualization around this space. Wanted to use progressive inspections and the Glue and Field platform to do that. And then a closely knit tie between the contractor in terms of collaboration and working with the contractor.

This is the size of the project, quite a considerable, number of cables, cable trays, panel devices, et cetera. Quite a large project. Again, we were focusing pretty much just on that cable tray aspect there, but quite a large number of cable trays. So what was the problem that the customer identified? There was no visibility on the cable tray installation status, or there was no reliable visibility of cable tray installation status.

The process that we used to catch that information was very slow, it was a manual process. There were discrepancies between the actuals versus the sub-cons reporting. And there was lost opportunities in terms of being able to corrective action problems on site during the construction. So a solution, leverage existing design models. They had a model in play. It was a supercharged model that had a database alignment to it, had all the data available to us. And there was not cost because it was already there. The services the orders were providing were part of the EBA it was already there. The CSM requirements, which is part of the EBA, it was already there.

So we had this no cost to the customer in terms of driving this technology forward on the project. So calbe tray was a critical path. It had dependencies. Cable trays need to be installed prior to doing cable port, simple as that. And end devices need to be installed after the fact as well. So you need to have this cable tray, it was a critical path to getting things done.

We wanted to have the ability to identify issues in a timely manner and rectify those issues in a

timely manner. And capitalize on things that could be completed earlier when it was available. So correcting those to work for us. So the process, wanted to save time in capturing, processing, and analyzing the data and reporting that data. Prioritize activities of site stuff, putting in the right place to get things done in a timely manner. And then validate the subcontractor reporting on the status of that tray install as a starting point.

And by having this model, which was data rich, provided an improved communication of status and priorities. There were visuals there, it was color coded, it was easy for everybody to understand from the sub-client up to the end-client. And we all had a single point of truth for everything moving forward.

So the process, the inputs, the process, and the outputs that we were using BIM 360 Field and Glue. Much to my disgust, we had PDMS as the other offering platform. Having said that, the data available from the PDMS model was quite significant. So it was quite good in terms of aligning the line runs of the cable trays to Field database. It was very, very good. We had engineering data in there, we had planning data in there. We had construction and commissioning data in there as well and contractor data in there, too. And that was all being pushed into a SQL database to manage that supercharged model in the early stages.

We then took that information out of Aveva's PDMS into an RVM file, which produced a model based output and a text data out And then in Navisworks that thing comes back together and provides you this hierarchy of information that you can then manipulate and deal with and align the information to the Field and Glue platforms. With the embedded data from Navisworks into the database and tied that together, and then we did this Glue and Field push and pull. So were basically taking a model from Navisworks with the data inside it, pushing it to Glue, sharing it with Field, and then providing that to the Field guys to then do their activities on site.

this portion on the top right hand corner on the process, was a bi-daily walk out on the site. They were doing it twice a day. They'd go out in the morning with their synced iPads, they would then do the status tracking, come back at lunchtime, synchronize it back to the system, re-sync, and go out again. So twice a day they were during that process. That just repeats on a daily basis. This enabled the guys to have access to the information in the Field obviously. We could then pull information from the field database that was being captured in real time back into the main construction management database, and then do the more heavy lifting or the more high end visualizations you store in the earlier slides.

OK? So we're not just doing these status based activities, we're doing a combination of two things. There was one sort of slight issue there, the prices of aligning databases from Field to their construction management wasn't automated. It was a export, import, export, import process. But in saying that, that was a pretty minor issue really in terms of the technology usage. The long term goal would be to do an integration between their system and Field. OK?

So we're analyzing that data regularly, every day. And you'll see very shortly the analytics behind what we did in cable tray installation and how good that was. So the outputs, I said before, visualization of the model, in terms of completion and status of the tray, and ready for terminations of cables of the end devices as well. And then access to data in real time or relatively real time.

So we have all those five key areas there, the opportunities, the open completion work fronts available to us. We had the full model visibility, and you'll see very shortly that with the noble drawings and the model there was discrepancies in the two areas as well. And we'll see that shortly what that was. So the progressive inspection process, the manual process. And you probably do this yourselves now, and you manage this process yourselves. We have model drawings with the scope of the different nodes of the other tray. The inspectors will go on site and they'll identify the particular area they're looking at. They'll then get down on the ground with their drawings, the highlighters and color code the tray and update the punch items that are required to be fixed on those trays. They return back to the site shed, they input that information back into the spreadsheet and then back into the management system.

That process resulted in just under 5,000 meters of cable tray validated in 55 days. Now, if that rate was continued on this project they wouldn't have realized the actual sailaway data, the actual rig wouldn't have happened. A three to five day time lag in the information getting back from the Field into the actual database. So that's a pretty significant lag.

In contrast, the digitized process with BIM 360, we retrieved the inspection scope onto the iPads in 3D models. We had the scopes isolated in viewpoints. We had the model availability for the [INAUDIBLE], and that got a lot easier in the space. 2D drawings are a lot harder than 3D models. They would mark up the cable tray. They'd choose the cable tray item. They would then change the status of that cable tray item, and then they would then continue that process through their site investigations, recording, updating, et cetera.

They were able to-- in a minute, I'll show you shortly. So just under 6,000 meters of tray

installation validation was done in 11 days. That's a quarter more in one fifth of the time. Compare that to the under 5,000 meters of tray validated in 55 days. It changed the entire landscape in terms of delivering that project on time. In fact, the planer, the lead planner left the project three months early because he had no job. Don't worry about that, ignore that one for a while.

So it was a significant improvement in productivity and accuracy. Accuracy was important, too. You know, they said that 15% installed versus-- so I said before that the contractor was reporting a large percentage complete whereas the realizations was that 15% was complete. So then we had that that real information, not this pie-in-the-sky stuff that somebody was providing back. Massive efficiency improvement. So these are real numbers, we're not talking-- this is [INAUDIBLE], right? [INAUDIBLE] and a massive efficiency improvement.

Numbers that they've never seen before on an oil and gas site in their lives. And I don't think that even with the application of the technology that we were putting in play it had been done before in this sort of degree. What I will say is the planner that was in charge of this project was a very driven guy, very smart guy had all his ducks in a row. He was ready to rock and roll with this stuff pretty much straight away. He drove it because he wanted it to succeed. You have to have passion, drive to succeed in doing something like this. You can't expect that magical, you know, to happen. That needs to be done by somebody who knows what they're doing. In fact, one of the lead guys, the customer, said that he's a Rain Man. He can just do this stuff and he's just-- it comes out of him like he's raining cards. It's incredible.

So nodal drawings versus iPads, The actual benefits behind that for the accurate tray installation. Real meter reach, not the pie-in-the-sky stuff. For example, one example he used was the sub he had actually reported that 30 meters of tray had been installed on a particular line run when that model was only 30 meters long. So you could easily visualize and see from the data available in the model if that guy was telling the truth or not. So we're validating the discrepancies there as well.

Real time capture, in relative terms, status. All the design tray was actually available in the model, we didn't have victims of the branch nodes available on the nodal drawings. So we have all the data, all that trays available. There's no lag, so the model was updated regularly. We have to do it to capture photos against those trays as well. I made up that in cable pull availability by the next morning, so we could see straight away if we could do cable pulls the next day by selling cable tray validation. And there was no need to look at the revisions, it was

a current version. It was a single point of truth for what they were doing in terms of the management of the project, and the realization in terms of the actual delivery of that validation process. Eleven days versus 55 days, and the number of meters has been validated.

What's important when you align technology a team on the site is the ability for that team to adapt and use that technology in a timely manner and be willing to change their processes and procedures. For a young team on the ground, in this particular site, but we wanted to make sure they really got the system in place for them to use it efficiently as well. So they asked the right questions, they looked at areas of improvement, and they looked at concern areas as well in terms of the technology being used on the project, as well.

The guys on the ground we're very adaptive, they change very quickly. Within a week they were on the ground doing cable tray status validation on their iPads. The way it was configured was quite intelligent, but the improvements made were about giving them more viewpoints, more breakdowns, more areas to focus on. So it was good, but as those questions came back they improved it to making it better. Which that obviously improved the time to get things done.

One of the concern areas there was what happens to the leave players, the guys on leave. Well, that was just a training exercise effectively of the team. This is a quick video of the model in Navisworks, the model of being pulled down from Glue and then into Navisworks. And this is basically, you'll say the color coding application there. We had the statuses there in color codes, obviously in the bottom left hand corner there in terms of no issues, tray needs attention, and not bolted, painting, et cetera. And then we can provide those viewpoints, and the color coded has viewpoints. And information was collected in the field, pushed back in the model, and then color coded accordingly.

A very simple process in relative terms. Again, the data structure of the model from PDMS was very, very good. OK? You have to have a very clear and very well structured data platform for the model. The filtering options, so the guys had the ability to filter the actual trays. We used in field-- there's an equipment module in the field environment that's what we use to identify the components in the modeling environment. Like you filter out the different tray types, the styluses, et cetera. And then do a report, it will show a report shortly, after the fact as well.

The press and changing of the information was very simple, your iPads are a very simple tool to use. And there's the component, and once you find the actual item on the tray you could

then go and isolate that and move that component on the iPad very quickly. Yeah, I know. I saw that before I missed that. OK. You'll see that that one component was selected, that bend on that tray there. The way in which the hierarchy was structured in Navisworks, if I was to change the status on that bend it would change the entire set on that run.

So that's how this hierarchy was set up in the environment. It was critical, we wanted to have the status on the run, not the individual components. Because now our line runs were actually driven to drive from the actual completions process anyway. Photos, so it wasn't realized in the initial stages that they could take photos against the trays as well to provide that additional information on what wasn't complete and what was incomplete in that process.

So that was a very valuable asset to the team in capturing physical photographs against that particular tray. I mean that and then it gave them the ability then to do mock-ups on clashing and coordination issues on site as well in those areas, too. You'll see that shortly. This it taking photos. So basically you're finding a tray, you identity that tray on site, you select it, you open it up, you attach your photo to it. It was as simple as that, a very, very simple process. And that's why the guys liked it. Their feedback in the first week, as I said before, was nothing but positive. They were happy they had their iPad. They could work with that model. There was no line on the ground and you're highlighting the drawings. It was very, very appreciated change in process on the site.

Again, color coding on the iPad, so that those viewpoints. I talked about before in Navisworks are now available on your iPad to isolate information based on zones, based on tray type and the like. Navigation process was very simple. They found it very easy. Quite often they'd be using the immersive view tools inside of the iPad environment to hold the iPad up in space and see where they were for the Pseudo AR.

And, finally, once that information was captured in the field on the iPad, we synchronized it back to the system and the Field information was there available to them to actually reference and look at. Not only that, the information was then pulled from Field into the external spreadsheet, pushed into their own database system to drive that high level, and that functioning model visualizations in Navisworks, and timelines. And the photos as well in the web environment as well.

What's, I suppose, good about Field is that the platform is very customizable. So any properties that you want to have in that database align to objects in the physical world can be

done. It's a very malleable product. So it gives us that flexibility as well. What you'll see in a minute in terms of the constraints in the project the customer realized their constraints and they knew they could deal with those constraints on the technology.

And reporting, so we could do reports on what wasn't complete and provide that information to parties involved in the sub-con environment. Those reports could be scheduled and sent out on a daily basis, on a bi-daily basis, on a weekly basis, a monthly basis, the to the people involved. The reports are pretty raw but they give you a good-- the information is there for the guys to use to generate the moving forward. So just so you know, this is a timeline of cable tray validation from the start of June, it was June.

In the early stages this is a manual process. So they're doing manual validation cable tray, and not much is happening in the first few weeks. You'll see as the timeline progresses we get some yellow there, which is not started, not complete. And so we get some validation complete. So this is continuing through June into July. It's this manual process, again, a lot of yellow, not a lot of green. We We don't have confirmation that we can go and do cable pull. But you'll see very shortly that as we move into the early stages of August, we implemented BIM 360 Field and Glue. And you'll see how quickly the color changes to green over a very short time frame, very shortly in this timeline. You'll see that invoke at about mid-august I think it was. Yeah.

So your August there, and that validation process became very apparent very quickly. A lot of green in a very short time. So what are the achievements? So low hanging fruit, so things like bolting needs to be done in a hurry. Like this, there's a whole lot of stuff there that's red there that might be just purely bolting. Go out and do it, get it out of the way, finish it. So that's the low hanging fruit. Work patch that can be done, generated, to do that work quickly and efficiently.

Prioritizing the site team on site, and then collaborate with the team, the contractors, the design team, the lead planners. That collaboration process was really important. That's important with any project in this day and age, whether it be oil and gas rig or an AEC building. This is to tray per week. Accurate tray status equals available cable pull. If we know that tray is being laid and it's been complete we can do cable pull. So we can pull that timeline forward and do it earlier. So we're talking on average not doing per week in terms of cable pull. That number is quite high, and their record cable pool was 73,000 meters of cable pull. And now this is metric, not imperial, sorry.

That's a very high number. Those little numbers there, they had never seen those sorts of cable pull numbers on a site ever. So just by validating cable tray and accurate statuses on a cable tray provided that value. So end devices, they provide the same-- they then said, right we've done cable tray, it works. It functions very, very well. We've got this massive dynamics, I'm sorry, analytics coming out of it, positive analytics, more timely validation of tray, it's working very well for us. Where can we go next? End devices.

Opportunity for terminations on the end devices. Again, work fronts opened up for the terminations of those particular cables when they complete at the end device. having cable numbers or different aspects of what's required to be checked against a end device. This sort of thing here can be tied to field external to the equipment module, but this is a visual tied to the data. You can see straight away this provided massive value to the guys in the higher echelons of the organization and the end client. They could see, oh, well, [INAUDIBLE] not gonna be able to do that now. Why aren't we doing that now? Why aren't we going out and doing that work? It's ready to go. What are we waiting for?

So there's those opportunities for cable pulls that are complete and ready to terminate. So it was realized that the benefits from cable tray pull then provides to end devices as well. Leak testing. This is outside our scope now. We had already been in there, done the work with them in terms of cable trays, done the implementation, now we're driving it forward. This is where the person involved in doing this work was so driven and saw the benefits they said, let's go next step while there's futurists that wants to push the envelope on a process and use it for their next stage.

So leak testing, improve visibility of leak packs, you know, or doing the leak points. That sort of stuff became apparent as well. Again, I'll stress that the data structure in that model was very, very good, extremely good. And the database they had in the construction management platform was very good as well, and the alignment was very good. Easy update preparation statuses, search valve tags. All of that was in there and built into the actual system when they configured it. Now I had nothing to do with configuration, it was just purely on the back of what we did with cable tray install. They learned so much from that they then took that to the next took it the next step further.

So what are the benefits? Massive time savings for the customer, huge. To the point I said before that the planner who was working as a contractor for the customer, their customer

finished his job early. No job to go to. Minimal overheads. We utilized the existing database, the existing model, to drive these efficiencies, these process. Efficiencies. We had better communication in the team. The 3D model provided a single point of truth for visuals, for data, all that.

We IDed issues earlier in that process. We identified potential work packs that we could go and do earlier. There was near real time reporting. There was a one day lag, well half a day lag effectively, in that reporting process. And it replaces the manual process and paper process. So it was quite real, the benefits there.

The success factors, there was strong support from the lead planner. I said before he's a driven guy, very smart guy, he's a rain man, et cetera. He wanted to test this. He knew there's a problem. He wanted to give us a go to see how it would run on the POC. It was a success, then took the next step further, as I said before. There was resistance initially. It won't work, it's going to fall over, it's no good. Thinking outside the square, don't do that. But it did work.

The scope was realistic. We didn't say, let's take Field and apply Field to piping, cable trays, end devices, leak testing. He did that himself after the POC was realized as being successful. We did a lot of extensive testing prior to the engagement. We had the CSN, as I said before, working with the customer trying to identify what the best solution was to this problem he had. And we applied quite a bit of time in that space as well to get the right solution prior to going there.

And we had a collaborative approach, and the customer accepted the constraints in what it could and what it couldn't do. And he realized that we can't do everything, but he had the backing to work with that anyway. Opportunity for future based projects, from the start effectively. So he was 10 months into construction, if you could apply this philosophy and this approach earlier in the project there's benefits there to everybody: the contractor, the consultant, the entire team, the end client, et cetera.

Providing that visibility to the client. That model was in the Cloud, it was in Glue, it could be looked at any time you wanted to to see what the status was, in terms of color coding, very quickly. Extending the usage to the actual quality commissioning and the water completions activities, so into the piping, into the end devices and more doing that work as well. And having a data rich model to hand over at completion. We're not doing any post data inputs, it's all there as part of the process. And it's a good tool to realize you can use it for dispute resolution

if you need to, auto trial was very, very good.

A bit of a summary again. We had a field data capture approach that was massively improved in terms of efficiencies versus the manual process. We had increased time in the field by the field personnel. We had data availability for analysis a lot quicker and easier. We had status accuracy from the field on what was being done versus what was persuant to being done. Improved cable pull potentials on the site. End devices being available for terminations was available, too. The loops and the late testing provided some efficiencies there as well. So they were driving that technology to the nth degree.

So just a summary of the project benefits: accurate project status visibility, visualized opportunities and constraints, enabled communication, open communication, with the 3D model. It empowered the team to make decisions to rive the outcomes. And they realized the sailaway date of that rig in 2017 for the First Oil. And that basically gives us a reduction of three months in a the scheduled 12 month delivery time. Instead it put the lead planner out of a job earlier.

Summary, completion based approach or focus. This is the customer's ID, progressive inspections, influences to the content or the behavior. So we can try and change how they operate in the site environment. Empowerment, so by making good decisions you can empower the team. Validation or visualization summary of the model and the data in that model. Accountability, no excuses. And capitalize on early completion works. So bring that process forward. What you know has been completed can then be-- the next stage of the project can be done. Improve construction performance. That's the end result with what we're trying to achieve here.

And with that we get improved safety, improved quality, increased schedule certainty, and client satisfaction. We hope. So the client leave satisfied. So I can't take credit for this anecdote, this is the customer's anecdote, which I call it quite apt. And it does, I suppose, tie into what we tried to achieve with the application of technology and our process.

So a girl and a boy meet. They go on a few dates, get to know each other really well. They decide to make a commitment. They get married. They decide for their honeymoon to go on a road trip. They head off with good intentions, their maps in hand, ready to go and have a fun honeymoon. On their road trip they take a wrong turn, go the wrong way. They get into an argument. I'd turn back if I was you. There's a problem here. And they get in an argument,

they fight and they have problems and there's concerns on the road trip. Divorce is ahead, there's a problem there. So they're moving towards divorce, they can't get continuity in their decisions, wrong directions, disoriented, et cetera. And finally, we get a split.

The second one said, I mate, I make a commitment, get married, go on a road trip they get a JP system. When we get back, GPS system everything's happy, arrive at their destination, and we live happily ever after. So by applying technology to a problem we have certainty in the actual outcome. And in a lot of cases a lot can be said about our industries. Oil and gas, you know, relationships is what it's all about. OK? If we have a project that starts off with all good intentions, we're trying to move towards a common goal, and you're delivering a good project but things got wrong during the project and problems ensue. And we get into arguments and fights and litigation exists, that's no good for anybody.

But if we apply an approach that technology can assist and guide us in the right direction and solve a problem then we're all happy, we all succeed, we all have a happy outcome in the project. That's it from me guys. Please feel free to fill out the validations or the evaluation forms on your iPads or iPhones find should say. And also if you have any questions about the BIM 360, Glue, Field, et cetera, please feel free to go and visit the answer bar. Any questions for me? Sure.

AUDIENCE:	[INAUDIBLE] One thing that we've seen in the oil and gas in particular, the requirement [INAUDIBLE]. That can be a major impediment [INAUDIBLE].

GUY PENFOLD:	Sure.

AUDIENCE:	Did you run into that at all [INAUDIBLE] implementation?

GUY PENFOLD:	Not with your iPads, no. It was fine. I'm surprised. I mean that's--

AUDIENCE:	[INAUDIBLE].

GUY PENFOLD:	Yeah, it was new. Yes, they are retrofits.

AUDIENCE:	[INAUDIBLE] required [INAUDIBLE].

GUY PENFOLD:	It's what? I get a question all the time about iPads versus the Android devices and the tough pads and all that sort of stuff. And, unfortunately, we haven't got a platform that runs on the tough pads, which would be ideal because then you've got this device which is sort of more

robust in the field environment.t and probably certified to run in hose environments as well. But yet no problems with the new build, and it wasn't running. So it was all fine and dandy. Anybody else? Yeah?

AUDIENCE: Did anyone think about using [INAUDIBLE]? You said [INAUDIBLE]. I was curious [INAUDIBLE].

GUY PENFOLD: Absolutely.

AUDIENCE: Language support?

GUY PENFOLD: Absolutely. Yeah.

AUDIENCE: [INAUDIBLE].

GUY PENFOLD: Yeah, sure. Absolutely. Isn't it--

AUDIENCE: [INAUDIBLE].

GUY PENFOLD: Correct. Another component that can be aligned to the database to do that. Yeah, absolutely. There's no real limitation because--

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: They didn't get that far. they didn't get that far. They didn't get that far. they went as far as what I've shown you there probably due to the time constraints on the project. I guess if you planned it up front earlier in the project you might have that facility to do that, you yeah, for sure.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: yeah, potential. Yeah, I agree.

AUDIENCE: [INAUDIBLE] is there a way to take that [INAUDIBLE] test data or road map data and get that back [INAUDIBLE]?

GUY PENFOLD: Yeah, sure. Absolutely. I mean, like I said before, the next step for them would be to do an integration between their construction management system, their database system and Field so that that information is pushed and pulled automatically. And it would still exist in their database, but be available in real time to the actual field database as well. So either way it

could exist in either location really.

AUDIENCE: [INAUDIBLE]?

GUY PENFOLD: Correct. Absolutely. Correct. There are two databases, the two single databases, they're just two things that exist in different locations. You've just got to tie them together.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: Yeah. Sure.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: Absolutely.

AUDIENCE: When you get into the office, and then [INAUDIBLE]

GUY PENFOLD: Sure.

AUDIENCE: [INAUDIBLE] take pictures that showed [INAUDIBLE].

GUY PENFOLD: Well, I think in the keynote this morning, I mean, even [INAUDIBLE] said there's things two years ago that they mentioned would be done, happened two years later. So you sort of will--

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: There you go. That's it, in lag time. Yeah, sure.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: We did the-- what do you mean employment implementation? You mean in terms of running it and driving it?

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: That was done by the consultant who was doing the planning of the actual construction. It wasn't the contractor.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: Yes.

AUDIENCE: Well, how challenging was [INAUDIBLE]?

GUY PENFOLD: It wasn't that difficult because the guy that was driving it from the planning point of view had a very good background in database management and controls. And he knew what he needed to do with it. It wasn't-- it's not my field of expertise to be honest with you, but he had it under control. He had the guys on board working with him day in and day out, driving that process and that linking process together. And I said before, you have to have somebody who's willing to drive it, who's willing to control it, who's willing to accept the challenges that are out there to do it. This wouldn't have succeeded had you not had that guy on board. That's as simple as that. That guy was the one that drove that process and made it work. If he wasn't there it wouldn't have happened. I've got his details if you want to contact him. He's happy to receive emails et cetera from you guys if you need to talk to him. Sure.

AUDIENCE: [INAUDIBLE] really cool stuff. Just curious, when you're walking down, putting myself in [INAUDIBLE] shoes, they're walking these systems. How do they keep track of the work that's already been completed in the field? Was there some way of indicating? Because when I think about the challenge of going out repeatedly day by day, re-walking the same systems over and over again, the thing that gets in my way is that, oh, I've already walked that.

GUY PENFOLD: Sure.

AUDIENCE: I don't want to re-walk that. I want to look at the new stuff. Do they just start with the data side when they go find a section of tray? Or did they go look in--

GUY PENFOLD: Combination, a combination of both. And with the iPads they had the ability to sort of isolate on hard items. So when they were doing a walk, they'd go tap it, change status, hide it, tap it, so they could close out stuff. They couldn't color code it on the spot in the iPad, and they couldn't do a pseudo color code for I've compiled that now in my current walk. It was more about they knew the sire, they knew the tray, they knew where they were going.

AUDIENCE: The challenge that I have isn't with the virtual model, it's with the physical.

GUY PENFOLD: Components? Sure.

AUDIENCE: Like yesterday there's let say, ten sections of tray.

GUY PENFOLD: Yeah.

AUDIENCE: I saw yesterday the first five, today the next five.

GUY PENFOLD: Yeah.

AUDIENCE: And I only need [INAUDIBLE] very, very familiar with the system. They're walking constantly. That they don't go and waste their time walking the first five [INAUDIBLE]?

GUY PENFOLD: I think it was to do with the view point correction. So the viewpoint correction had the tray that needed to be looked at versus what was already complete.

AUDIENCE: So there was some indication that this section was ready to be inspected?

GUY PENFOLD: Correct. Correct. And that was one of the questions from the team on site, can we get that? You asked that question, they asked the same question. What can we do to try and improve that visibility of what's not there versus what I've already done day in and day out.

AUDIENCE: [INAUDIBLE] came out with a really great list of what they need?

GUY PENFOLD: Correct. Correct. Absolutely, yeah. So that went very well.

AUDIENCE: [INAUDIBLE].

GUY PENFOLD: No, it was done through the planner's consulting team. They had a group of inspectors validating, and that was fed back to the conference saying, you can do this work now.

AUDIENCE: They had a quality surveyor that worked for them?

GUY PENFOLD: Correct. Correct. Correct. Absolutely.

AUDIENCE: [INAUDIBLE]

GUY PENFOLD: Yes.

AUDIENCE: [INAUDIBLE] Did the contractor utilize this system at all? Did you guys operate with them?

GUY PENFOLD: They tried to get them to get on board with it, and they weren't interested in it. Which is quite strange. I mean that was the barrier they had. I mean, I guess they could have done things a lot better had they had access to the system and you want to use it.

AUDIENCE: Did they see any response to the contractor because obviously they now had to represent the owner to some degree, and they had better data in order to hold the contractor accountable.

GUY PENFOLD: They didn't believe it. They didn't believe it.

AUDIENCE: [INAUDIBLE].

GUY PENFOLD: They didn't believe it, that was the problem. they said, that's not right. I said, well yeah it is. These numbers here are correct, your numbers are wrong. This is actual, this is fantasy.

AUDIENCE: One of your slides earlier mentioned [INAUDIBLE] some research into the solution. Who conducted the research and how was it funded?

GUY PENFOLD: It was the CSM. So in with our EBA customers they have a consulting services, PACS, PACS insurance credits they can use to do services. And they also have a CSM success manager to do sort of ground work stuff upfront with the customer. It was funded through the CSM. So he just did these discussions with the customer on a weekly basis to try to get the best solution for it. Did it actually involve me at some point? In terms of how we're going align a tray run to a database entry and failed in a hierarchy manner. Once we had that in play it was basically all systems go. It was only a very small portion of what needed to happen to get things to function within that visual tracking environment.

AUDIENCE: [INAUDIBLE] new programs [INAUDIBLE] let's just take a snapshot, map that out [INAUDIBLE] to see.

GUY PENFOLD: Yeah, sure. That'd be nice. Anybody else?

AUDIENCE: Did you generate most of your [INAUDIBLE]?

GUY PENFOLD: Didn't do it. Didn't use it. No. So we could have, but we didn't need to.

AUDIENCE: [INAUDIBLE].

GUY PENFOLD: Absolutely.

AUDIENCE: Turning these off and on, applying [INAUDIBLE].

GUY PENFOLD: It was looked at by the customer, but they realized they could do most of it without it at that point in time. I think that the data was so well-structured there was no need to put data into the model from the point of view of our construct as well. So it didn't add data the model, it was already there. Ideally, yes, we could have said if there was no ID associated with the components in the model that we wanted a unique identify we could done that would with our

construct for sure. We could have done the-- rebuilt models through our construct. A whole lot of stuff we could have done with it, but we didn't use it.

AUDIENCE: There's a session at 3:30. So [INAUDIBLE] it's not on the main schedule. [INAUDIBLE]

GUY PENFOLD: It's a great tool. I agree with you. It's a fantastic tool.

AUDIENCE: Marco Polo, 7:30. That starts at 7:30.

GUY PENFOLD: 7:30? Gee, that's a late one.

AUDIENCE: [INAUDIBLE] Marco Polo [INAUDIBLE].

GUY PENFOLD: Any more questions guys? No? Cool. Thanks guys. Thank you.