PAUL NICHOLLS: My name's Paul Nicholls. I'm from a UK-based company called Factory Fifteen. I've got about 10 years' experience as a 3D artist, and about four years experience as a company director.

We set up the company four years ago, straight after our master's in architecture. So I'm architecturally trained, like many people in the room. But again, like many people in the room, chose to kind of go into more visual methods of storytelling. I also got a little bit frustrated by the pace of the architectural industry, and preferred the kind of creativity and scope of design work within the visualization industry.

We're a little bit different to most companies in visualization, because we operate still as a design studio. And we kind of develop our own intellectual property, whether that be in TV, visual effects, or short films, or installations-- a range of different projects. But our kind of core business is still within architectural visualization and visual storytelling.

And you probably read a lot this from the handout, but this is just a brief kind of plot summary. This will be a technical workshop, highlighting an image that I made last year. So it's something that I've made, personally. So I'll be able to show you the ins and outs of it.

But essentially, I want this class to be about developing new ways to make images. It's going to be an image-specific presentation, through one of our projects we did last year. But I'll be showing a few clips in and out of the presentation, of other work, other examples relevant to the presentation.

But it's, essentially, finding new ways of creating images, and kind of getting away from the obsession towards photo realism. And understanding that there's lots of different methods of visualization, and photo-realistic methods are kind of one application applicable to and several different scenarios. But it's, by no means, the one approach that should be kind of just mass-applied to every kind of client, and every kind of project that you take on.

And that's something that we try and look at, very carefully, in the work that we do, the clients we choose to work with. And trying to treat every client, and every project, in a very unique way, rather than having a kind of one-size-fits-all approach to visualization. And for us, this is important, because it means that we're contributing to the project in a creative way, and we're not just a service for our clients. It goes slightly beyond that.

So I'll try to illustrate that in this project, and also a few other projects that we've done along the way. So the key learning objectives, just creating new ways of creating architectural images.

So just a brief bit about us, and we'll play our slightly-updated showreel. These things never are truly up-to-date. As soon as you've made it, there's another project that you've done that you want to add stuff to. But this will give you a kind of flavor of the variety of work that we do within the studio.

[INTRO MUSIC AND FX]

[MUSIC PLAYING]

So why do we need to think about different kinds of visualization? Why isn't it just a one-size-fits-all? It would certainly be a lot less work having one approach to things. But I think, today, clients are expecting more. It's becoming kind of easier for people to create these things. There's younger competition, out there, being able to undercut a lot of companies. And I've been doing this for a long time.

The technical expertise, rightly so, has greatly reducing in creating these things. It used to be an extremely technical process that a lot of architects would be mystified by. But a lot of studios have in-house visualization artists now. And the mystique about this industry is kind of gone.

So we don't want things to go the way of photography, which is essentially having an extremely narrow top end, an extremely low bottom end, where you've still got the big studios charging whatever they want, and doing the same kind of work-- because they've got the client base, and the kind of guarantee of quality that they're known for producing. So you have a select few very famous photographers who will be still operating at the same level. But then, because of digital photography, you've now got millions and millions of still very good photographers.

But this kind of middle market has been completely squashed to the bottom, where everyone's operating. Everyone can become a photographer. Everyone can become a visualization artist. But there's very few that can make it's becoming at the top end within companies, or as individuals these days. It's much harder to stand out.

But on a positive note, there's more work out there. And also clients are engaging, and wanting to engage in, new technologies, and emerging medias, and this kind of thing. So it's an exciting time to work in this industry.

So what can we do? You can stay at this top end if you one of the top studios, and charge whatever you like. Or you can get more creative, more artistic. We can go back to, potentially, more impressionistic styles of visualization. It's only recently that we've had this obsession with photo-realism.

And actually, a lot of architects prefer a more stylistic root to visualization, we've found. It's mainly the developer-led side of things which are obsessed with the photo realistic approach. Because architects like a little bit of ambiguity about their design, especially the early stages of a project.

And so, again, picking when to choose different methods of visualization is important. And having a kind of repertoire of different approaches is also important, so you can expand the type of what you take on. So you're not limited to do it doing just the developer-led kind of projects. You can learn technique, and you can be open minded, with other methods of representation-- which is what, hopefully, you're all here to be.

So this is the kind of work that we're sort of known for. This is how we started our company-- the kind of very impressionistic future-driven narrative projects a lot of our short films were based on when we started. And these are just a couple of images of notable projects, along the way, that we've created-- some of which were for our own IP, some of which were commissioned for TV, or film. This was for the BFI-- British Film Institute.

This is another one that's in development at the moment, called 20k-- it's a kind of adaptation of 20,000 Leagues Under the Sea, which is a TV show currently being developed by Sky TV. And we're doing a series of design work for them that started years ago, and it's only just actually came back recently. So we're using our skills as designers and architects to create these kind of fanciful worlds.

But then, more and more these days, we're getting commissioned to not just visualize a project, but to be part of how it's represented. We did a sequence of about 100 images for [INAUDIBLE] KN this year. And there was 10 projects, and 10 images per project. And this is just one of them.

And essentially, they came to us with a design. And they were very open-minded on how the design was represented. So we got to design a lot of the surroundings of these designs would be placed in, and non-relative to this their actual surroundings. Even the proposed built projects, they were quite been to us representing the concept.

So they would give us a kind of brief of the concept, and we would go away and think about how that could be represented. So this building is not at all in this kind of landscape, in reality. But it's we went with their concept of these different pavilions, with these different kind of functions happening within them. So we did lots of images like this. These are a couple.

And this was another one that we did. So again, we have a lot of creative freedom to explore the way that the project was represented-- the population, the foliage, the color scheme. All they gave us was the block model, and a brief for the essence of the concept for the building.

And this is the kind of what we're trying to push more of. It's difficult to find this kind of work, obviously, all the time. But it's definitely something, now, that we've got a bigger portfolio in it, that we can advertise to future clients as a kind of workflow that we prefer working with. And it certainly was very advantageous with the architects, in this case. This is another one.

And also, this kind of approach seems to be becoming more common. This was another one for Adjaye Associates in London, for a new spy museum. And they had essentially designed a shell in the very early stages of competition. And they came to us to design the interior-- with these kind of interactive walls, and pillars, and ceiling-- and come up with this kind of design strategy for the inside.

So we weren't just employed to visualize the architecture. Employed to actually design a lot of it as well. And with our speculative nature to our work, hopefully we're going to get more of this kind of thing.

But we also do the photo-realistic stuff as well. We try and be quite tasteful when we take these projects on, and represent buildings in the right way. And, of course, the there's always going to be at a market for this these projects. There's always going to be a need to know exactly what something is going to look like. But it's certainly not the go-to approach for every project. [INAUDIBLE]

And there's only many chairs, and photo-realistic interiors I can stand on these kind of blogs

that we see these days. There's definitely more room for different methods of exploring these visualizations.

I'm much more excited by things like this. This is another project we did for Allies and Morrison, again in London, for a big Middle Eastern development. And the reason we represented it like this was clearly just because the design wasn't realized enough to be able to do it in a photo-realistic way. And the client was pushing for it to be photo-realistic, but you have to sometimes educate the client into different-- It's not just educating your staff, it's educating your clients to what they might want.

And this was a really good example, because it was actually a range of stills and an animation, which actually helped win the competition for them, which is one of the biggest Middle Eastern developments happening in the world right now, was this kind of big earth and city development. And the client really liked it, because it kind of got the essence of the projects across, in the animation, specifically, without being too bogged down by any kind of design details or materiality.

But this is the image we focus on focusing on today. This is an image I did last year. And this image was done in three days. So it was a very fast turnaround, with just me working on it.

And this is for a project of ours. We're trying to get a new film for the Christmas Carol commissioned. It's in the preproduction phase at the moment. And then we did a bit of artwork at the beginning to kind of help sell the pitch, and basically. And this was one of the main pieces we did.

So this is Scrooge, in the foreground, and Scrooge's house, set in a kind of stylistic period London. So the project had lots of different aspects to it, both creative and technical. It had to portray a certain mood.

And it's an image I've always been quite fond of since I created last year, just because of the way came together, and the design work that went into it. It was a really enjoyable process. And it also highlights quite a lot of different skills, which is why I thought it was quite good one to break down for this 90-minute presentation.

And obviously, like any project, this one's no different. It starts off with references. First of all, being the environment, the kind of periodic environment, of this London style. And it was something that we ended up buying lots of books for. It's difficult to find really good pictures of

these on the net. So we bought a few books, specifically of this time in London, and gathered loads and loads of references to street scenes, and trying to get an idea for the mood that we were going for.

And right from the beginning, I wanted to create a collage to create that scene together. Initially it was going to be a completely Photoshop-based project. We were going to paint all the details, and paint the design in. So we started with the collage, just kind of cutting bits of these street scenes together.

We also gathered references for Scrooge's house. We wanted it to be quite part of the same world, but be aesthetically very different-- some materiality-- and would be the same, but the form, and the approach, would be very, very different. We wanted a slightly impossible nature to it, as well-- slightly fantastic nature-- to the house. Because we wanted the actual film to be set in a kind of hyper-real version of that periodic London aesthetic.

So these are some other kind of references. And the Despicable Me house is another one, which is quite funny. Because it's just this house sitting in the middle of this street, in a similar kind of style, but it kind of sticks out. Hall's moving castle was another great reference. And then just some other old steel works, that were created. And some of these old things were really inspiring for the kind of aesthetic. And also the kind of time, as well, in the Industrial Revolution that we were setting it in, made sense to go with that kind of forms.

And you also have to think of the characters, as well. And this is something we did on the project-- [INAUDIBLE] KN project. What the kind of people that are living in these places, and how does that influence the style of the project? The middle one is almost like a caricature of that Scrooge character, whereas on the left, and the right, is a much more realistic approach. So that can really influence the tone of the project, is who you imagine to living there, or populating the scene.

So the first thing we did was collage and paint. And this is where I'll kind of flip into Photoshop. And you can see, here, this is a rough layout of how we started mapping out the collage. And important thing, here, is understanding the perspective, and making the perspective work for all of the elements that you're putting in there-- especially, with what we end up doing later on, which is bringing this Max, and doing a kind of perspective-match camera projection on it as well.

So I'm going to flick into Photoshop, here, and show you some of how this was created.

So you can see here, this is more or less the final version. And one thing to note, here, is I'm not really a painter. I come from a kind of drawing, and model-making background before I went into 3D. But I'm not really not that great at painting compared to many concept artists out there. I don't think you necessarily need to, to do stuff like this. All I was doing with paint, here, was outlining, and highlighting, and defining areas, which I'll show you in a second. So I'll turn a lot of stuff off, here, and we'll go back to basics.

So I started with this image in the center. And this became my starting point and ruled perspective for everything else. You can see here, you've got the lines following out to the left, you've got this, in the distance here, this street fading out, which again, has clear perspective lines. And I wanted the Scrooge house to replace this main house in the center, here. So I had a clear idea form the beginning that this was going to be my hero collage element, which then everything else was going to be build upon.

So the first thing is defining the perspective lines, making sure the image works. And then every element that we add afterwards is following those perspectives lines. And because it's all in black and white, it was very easy to grade it all together, and correct all of the different elements to work with that perspective.

And some of this was a bit back and forth with what I'll show yous later on, with the projection. Because certain things kind of worked and certain things didn't, in terms of what I was trying to create with the projection, here. Doesn't look like it makes much sense well trying to do here. But actually, when my design for the Scrooge house is inputted, I needed to see more of the distance behind it. I didn't need that building in the foreground. So that something had to be put on top.

We actually made it quite difficult for ourselves, because we made the collage quite complex. And then we had to build all of this geometry to project onto, which then, when you got all this little detail, it can take a little bit of time. But we were quite loose with it. We were quite loose with every stage of the project, from the collage phase, to the paint phase, to everything else.

We got most of buildings mapped out, here. There's loads of gaps. So we just kind of found lots of different textures to come fill in the gaps with, and then added other collage elements on top. And there's a kind of mix between slightly color, slightly black and white elements, here.

So what we ended up doing is colorizing the image in quite a stylistic way. And that was quite simply done with a couple paint layers. And the first paint layer just kind of outlines and highlights certain aspects of the image to kind of give it more definition. Although, we were using quite high-res photographs, we wanted to pick out certain elements to stand out a lot more, especially with what we were going to do later. And again, this was a bit back and forth once we were kind of re-lighting things in Max.

And then this second layer is just a kind of overlay with color swatches, and essentially just painting over certain areas to kind of give it a slight tone. I wasn't too fussed about how realistic this was looking, at this phase, as you can kind of tell, because worked later on. And the final layer just fills in a few more gaps.

And then the grade is quite interesting, because, essentially, I wanted to re-light this image. The whole purpose of doing this workflow is creating a collage, or creating an image. And this goes for any kind of photograph. And we've used this technique quite a lot, which I'll show you a bit later. This one was using it in quite a dramatic way, where you're cutting lots of bits together.

But you can do it with just a single photograph. And you kind of project and re-light it in Max. And that was, essentially, the core aspect of the exercise.

So I knew I wanted to have this in a kind of slightly dimly-lit environment, where there was a lot of fog, and a lot of lights coming from lamp-posts, and from the interior. So the whole image had to be toned right down, the whites taken out, and essentially flattened to allow the re-light process to be a lot more successful. But again, this would have been done with a little bit trail and error, back and forward, within Max, in the re-lighting phase, to understand how low to take this in Photoshop. And a simple just hue saturation, there.

So we have our collage. We filled in the blanks. We did a colorize, and painted overlay, highlighting different areas. And then we've kind of graded it for re-light. And then, essentially, all we do now is bring that into Max as a background. And then match the FOV for the camera.

And this is a pretty simple process. And it's essentially just like matching the camera for any image. You kind of get the camera settings. And we use it quite a lot within just arch viz projects. But it's also used, obviously, a lot in visual effects, for camera tracking. It's a similar kind of thing, but for stills.

So there's a few things to note here when you set this up. The window that you want your projection to work in has to be the same aspect ratio as your image. And all this is kind of written within the PowerPoint, which will be packaged and you can download. So don't worry about taking any notes, or necessarily seeing exactly what I'm doing on screen. Because its all in the PowerPoint anyway.

But essentially, your aspect ratio for the window has to be the same. And then you have to enable safe frames. Once you've done that, you can load your image as a background, which most people should know is just alt+B and adding it in the background there.

And then, if you got to utilities, and perspective match, and then show vanishing lines, you will see there that you get a sequence of blue, green, and red lines, that kind of cross the image. And blue is vertical, x is z, and red is x.

And once you place it around your image, following the perspective lines of the architecture, here, then what it's doing is, essentially, it's repositioning the viewport, both in terms of the FOV, and in terms of the placement from the ground, or from the grid point. And once you've done that, you can essentially add a camera to your scene, which will be in roughly the correct FOV, and detail. So you can look at the camera settings, and you'll see that it's kind of given it the right FOV for this particular image.

There's no right or wrong, particularly with this image, because it's kind of a collage of lots of different elements. And as Jeff will know, I like to keep things quite complex in these technical demonstrations, rather than give simple examples. Because if you had just a photo this room, for example, it's very easy to follow the lines, and create that perspective match, whereas this was a little bit more tricky.

But if I go back to utilities, you can see I've just followed some of the basic lines from one of the images, mainly, to give consistency. Because, in this particular image, if I try to use some of the other lines, it might confuse the camera, just because it's a collage, essentially. So it might not be too accurate. So to keep it accurate, in this sense, all of the lines were based on one of the images used in that collage.

And essentially, once you've done that, you can model directly within the viewport. So you can see here, I modelled a box, here. And it fits perfectly with this building on the left-hand side of the image.

And you might be thinking kind of like, well, you know, what's the point of going through this kind of process? Because you could just do the collage, and then render the building separately, and Photoshop it all together. Right? Whereas, again, the kind of point of this process was to re-light the image.

The end result is very, very different to what this collage is. And doing that, purely in Photoshop, was beyond my skill set, personally. Again, because I'm not an illustrator, in the traditional sense, like a lot of concept artists are. I'm heavily reliant on 3D, and I design in 3D. And also, this workflow is very, very quick.

Because you can see here, now I've modelled this building. And it's very easy to go in and add detail to the building. Just edit polying the geometry, and then adding detail where the windows are, cutting out the windows, adding any kind of lips to where the end the sills are, the chimneys, and the whole scene, very, very quickly. And the whole of this scene was probably created in half a day, just by kind of modeling basic shapes. And then kind of cutting out the details and putting on simple layers.

And once you've got that-- once you've assembled your model-- you'll have something like this. So I'm going to single window here, now, with my safe frame on, inside the camera that was generated from the perspective match. And if I just go in perspective, and fly around a little bit here, you can see that we've added detail to the geometry, made sills, and cut out where the windows are-- which is quite important, because we wanted to add lights inside.

We've added a little bit of detail to the bridges, here. And again, cut out all the windows. And we've just added general detail for the floor, where the pavements are, and so on.

And the level of detail depends, really, what you want to do. I mean, we wanted to have quite a dramatic kind of environment-- fog in this scene. So the Z depth was really important. So all that kind of extra detail in the model made quite a big difference to the kind of re-light, and the way we were creating that kind of fog effect.

If I go back into the camera, and point out the moment that this camera is essentially the projection camera. And it's quite good to sometimes name it within your scene. Because this image isn't necessarily going to be the camera that you're rendering from. It's just the camera that's going to be used now to project onto the geometry. So it's quite a good trick to kind of lock your camera, so you can't accidentally move it.

So what else have we done to this geometry? If I click on any part the geometry, I see I've got a couple of modifies here, and just some general edit polys, to obviously model it. But then I've got subdivide. And I've got a camera map binding modifier, which is one of the world space modifiers. And within that, I've then selected my camera.

So again, this is all in the PDFs. You don't have to write any notes.

But at the moment, that's really not doing anything. If I activate subdivide, and the camera map modifier, it's not doing anything.

A little trick within subdivide is never display your subdivision, because it's just going to become a mess within the scene, if you kind of have this displayed everywhere. But it's needed for quite a good reason, which I'll show you in a second. But never display the subdivision.

So if I turn off the subdivide for now, leave the camera map modifier on. If I go to my material editor-- I just need to turn on my license server.

I've got a choke material, here, that's kind of applied to everything. Just underneath it, I've got a slightly different material. It doesn't really matter what material this is. It can be relay material, it can be basic material. But within the diffuse, I've got a camera map per pixel map, which then has a couple of functions here.

So you have camera. So again, you link it to the same camera-- the projection camera. And then, you have a texture, which in this case is our collage that we've made.

And this is a kind of smaller version of the collage just for this purpose. But obviously, the final collage would have been like the 10k texture map projected onto this geometry, here.

And what happens now, if I select all my geometry and apply this material, you can see it's kind of mapped it with the image. I forgot to turn on constant colors, here. Some of the geometry, because we haven't turned on the camera map per pixel, it hasn't worked. And you see what the subdivide is doing, here.

So if I select one of the geometry, and check this by subdivision, you might be able to see it, you might not. But essentially, if I turn off the subdivide, the detail of the way that that image is mapped is going to be significantly less. Just like this object here, you can see the image all kind of skewed, and kind of warped all over the geometry. But as soon as I turn on the

subdivide modifier, it becomes much better.

I don't exactly know why, but it kind of relies on the subdivision of the actual geometry itself, to how detailed it maps the image onto it. So you have to have those two modifiers on-- subdivide and camera map binding.

An you can see here that, if I just go out of safe frame, and in perspective, all the geometry is now mapped with this kind of collage. And all the window are kind of left open. And you can see that all of the bridges have been mapped with the right texture. And obviously, the image is much higher resolution that. This is just the way it's displaying.

And this kind of technique is used loads. And we've used it for lots of different examples within visual effects, and film as well, which I'll show you clips of later, and try and explain where we've used it. But for this purpose, it was essentially just to project the collage onto the base geometry.

And this process would have taken about a day, to model the base geometry, and get the thing in there. The first day was spent on the references, and the collage. The second day was getting the scene ready.

So with that in mind, we've now created our base scene, so it's ready for our Scrooge model, and to put in the design of the building. Which is essentially the whole point of creating this image, in the first place.

And it's quite interesting, because I really do used Max as a design tool. You can see here within the kind of outline of building the base geometry, projecting the collage, and then adding the details, which I'll show you in a second.

But the actual Scrooge house design itself, I go now from a little sketch like that, to take straight in Max. I used to spend a lot more time drawing. I didn't ever do 3D stuff, until I started at the end of my uni course. But I'd always make models, and spend a long time drawing these things.

Whereas now, my mind works very differently. My mind down goes from a very simple sketch to just getting in 3D, and understanding the space, and building basic forms. And I really enjoy that kind of design process, within 3D Max.

And I used to kind of force it a bit, in terms of trying to design more like other people-- in 2D or

with drawing very nice drawing. But I just kind of accept that this is the way I work now. And it works for me.

So I'll kind of start off with a very basic sketch of the whole thing, here. I had quite a clear idea from some of the references that I wanted it to be almost like an off-balance design, where it's like a stiletto heel, in some way. So this would be the kind of context buildings next to it. And the whole thing is kind of hinged on attaching to that from the bottom, here, and through this kind of central stairway, which would kind of act like the heel of the building, that accesses the different floors.

So this is, more or less, how I would start the project-- just kind of sketching out, and then referencing this into the collage scene, and then doing some kind of test-- test cameras, and test renders of it to try and get a feel for the scale. And again, this kind of top-heavy design I quite liked, to portray that kind of wacky nature, to both the story and the character living there.

So there's nothing special about any of this, how it's made, it's just sketch modeled. And that will get developed, very quickly, into something a lot more detailed, once I was happy with the design.

As you can see here, that this is the kind of final model. And there's a bit more detail added to certain sections. Like the kind of heel, especially, we added lots of detail to the kind of stairway, was the only bit where we went into a lot more detail with the model.

But essentially, it's all reasonably simple. There's no kind of super complex texturing. There's a bit displacement on the brick. But there's nothing too complex, apart from running things through CrazyBump. We use that quite a lot to generate normalmaps and specular maps for certain materials that haven't been developed in that way.

But again, all the textures we're kind of referencing the old brick work that was from London in that time. So it kind of fit within the scene. And materiality-wise, it didn't stick out from the rest of the scene. The only thing that we wanted to stick out was the overall form and the design, not necessarily all the materiality parts to it.

We also wanted it to be quite almost like a submarine, in its way, in terms of the windows. Again, the character influences the design. So the character is very closed, and hidden, very grumpy. And so, the biggest window is at the top, where the light gets let into his bedroom. All

the other windows are like these little potholes, so no one can see into the house or to see the character himself. So that kind of influenced, quite heavily, this big blocky form, with these massive windows on top, which we thought was quite cool.

And then, in the final scene, which I'll open now, you'll see that we've added details like lampposts. We've added a few props within the scene. We've added lots of different lights within the windows, and around the model.

So you can see how, here, the whole scene acts together. We've got a few extra things in the scene, which would have been harder to do all in Photoshop-- adding all of this detail to the environment, and then re-lighting it all.

You can see here where we've cut the window. We've got little lights inside. We've also got a glass front on all of the windows. Which isn't, obviously, got the projected texture on it-- it's just normal glass. We get the reflection of the building, and the environment, in all of the windows-- which again, would have been very difficult to do purely in Photoshop.

We've got lots of lights kind of illuminating the actual design itself, within all of the different spaces. And there's nothing special about any of these lights, just being well-organized with all the naming of everything, so you've only got a few different assets to control within the light lister here. You've got the lights in the windows, you've got different Scrooge lights, you got the lamp post lights. Even though it's a quite quickly-generated project, it's being very organized with the workflow, so you can change things very quickly.

All the lights have got the same temperature, because we wanted this two-tone approach to the lighting-- all of the light's being very warm, and then the environment being very misty and cool.

You've still got our projection camera. We've also got a VRay camera. And that VRay camera can be in a slightly different position, as long as it works with the perspective. So you're not necessarily limited to rendering through the projection camera. You can tweak things slightly.

And the more you set up your projection-- you can even use multiple projections-- the more control you'll have on moving your camera later-- especially to do animations with this technique, because you can actually have quite a lot of control to move the camera through this environment if you do the projection right, or multiple, in certain ways.

So I'll got to my VRay camera here, turn on my safe frame. And then I've got a crop for the

bottom, because again, my safe frame was a similar ratio to my image. And I also wasn't sure what we're going to do in Photoshop at this stage. I wanted to give enough room around to have a bit of play with both the foreground and the top.

The scene has been set up with a VRay environment fog, which we always linked to gizmos. So there's a big box in the scene, and it's linked to this object, box fog. And it's linked to just the one light, the dome light, that we've got in the scene.

If you have it just on default, use all lights, we've got quite a few hundred lights in this scene, acting as candles, and within the windows, and everything. And if we have that selected to use all lights, it's going to take a lot longer to render, because it's kind of calculating the fog emission, and the light refracting through that fog, for all of these different lights, which we didn't need. It's just for the overall depth to the scene that I was looking for in this particular project.

So there's nothing particularly fancy about the way this has been set up. It's just got a particular a fog distance which controls how close the fog is within that box gizmo that you've set. And it's got 16 sub [INAUDIBLE] and the step size is four. That's just the quality of the noise. Bit it's the overall fog distance, and the color, that's going to affect things. And if you leave it on color white, without scattering the GI, then it will take most of the color from the light information in the scene.

And yeah, all of the additional lights in the scene have just been set up with a basic multiplier that works with that light. We're rendering with in real world scale, with 2.2 gamma.

Again, the whole purpose of this presentation is to kind of get away from this kind of obsession with the settings. There's nothing special about the settings here. It's just rendering with your ratings map light cache. We tend to be render most of our stills with Reinhard color mapping, so we can control the burn value a little bit better.

Which is, again, quite different to the way we render animations. In animation we tend to pump everything through Nuke. So we render everything in linear, and we don't really mind if things burn out a little bit. Because it's much, much easier to control the burn in postproduction.

Whereas for stills the Photoshop workflow is not really true 32-bit. So it becomes a little bit more destructive when you're kind of trying edit out the burns in Photoshop. So we tend to try and render that in for the stills workflow.

But again, we have different workflows for all different methods of what we do. But most of the stills, particularly interior work, was all rendered through Reinhard. And you can see here, I'm even using a lot of just default settings. I'm not even going into advance for a lot of it.

This is on low settings, because I was going to do some rendering within the class, but I'm not sure this laptop's truly up for rendering the scene, unfortunately. But again, there's nothing special about the way this has been set up.

The actual dome itself is a CG skydome-- my favorite kind of HDRIs. They're not as necessarily camera-friendly as some of the other HDRIs out there, notably the Guthrie HRDIs. But the variety of texture, and light quality in them are much, much better than his ones. And there's a much bigger range of different kinds of light. So that's the CG skies.

But it means that the overall multipliers have to be tweaked a little bit. So this is just loaded through a standard VRay HDRI material. And the gamma's been brought down a little bit. Which is, again, really to be standard workflow, just to add a bit of contrast to the scene-- the scene like the base lighting. And then this is added to the texture channel in the VRay dome. It's a pretty basic workflow there.

Again, the kind of passes that you'll use within projects varies loads. This was, again, a lot of artistic license in this image. So there's only a few passes that I really wanted, and needed, to create the image. Self-illumination was important. Obviously the Z depth, the raw refraction, raw lighting, specular atmosphere. Obviously, if you're using any kind of fog, to be able to boost or play with that, or make selections from that raw lighting. Just the kind of the ones that I needed for this scene.

Within animation, especially if you're rebuilding the within composite, within Nuke, is what we use. Again, there's a very specific list of all the passes that you need. But for this, or for most stills, there's no rule to thumb with the ones that we use. There's just the ones here.

And if I open the frame buffer, here. We do use the lens effect settings quite a lot, actually, these days. And this is just to give the glint to all of the lighting, and it softens the render a little bit. And it's a free effect. It doesn't add any render time to the project.

But it does enable quite a nice effect, which you can limit only to a pass. So you can have it saved as a separate pass. Or you can have it burn that effects onto the image. In here, we

burn it in, because I was quite happy with the effect.

But you have options here, for both the bloom and the glint to effect the image, and create a little render element, or just to create a render element only. So both these effects, glare and bloom, you have that kind of control. But for here, I burnt it in, because I was happy with it. And I didnt' really have a client, so it was kind of fine to do that.

So HDRIs. Additional lights. And then, you see here, this is the raw render from the project. And this is the original collage. So you can see, it's successively re-lit, the image, which would have been harder to do that effect in Photoshop without creating lots of different channels, and passes, and paint layers, and so on. Which, for me, worked really well. And the actual design of the building sat really nicely within the kind of tones that was created there. So for me, that was kind of a successful result from doing that.

We started using light meters quite a lot. Not many people seem to use these. But couple of years ago, we started using these more and more. And it's a really good way to kind of set the exposure of your camera, without endless test rendering.

And I'll show you a scene. It's very, very good for interiors. But we use it, more or less, on every project now that we set up for stills, or animation, as a general rule to get the exposure correct.

I mean, there's lots of different ways you can kind of do this, and test render. I've [INAUDIBLE] almost every method. I've done write-ups on VRay RT, and using really high-end graphics cards, and other methods through the kind of environment settings.

But this, for me, is kind of the most foolproof method that seems to work just straight away for generating the setting. And you got a scene like this where you kind of got a couple of windows on the inside. You've got an interior scene. It's a standard interior set up, here.

And this might take half an hour, up to an hour, test rendering to get the exposure just right on the camera. But these guys I've got in here are VRay light meters. And they work in quite a technical way, which the first to use them, it can be somewhat laborious. But the more times you do this, the better you will be at understanding how cameras work.

And that's the key thing, for me, is that you'll start to understand real world cameras a lot better, especially if you're not used to using them in real life. And once you get to know the settings, and the numbers, you won't need a lot of processes that follow.

So they're found just in Helpers, and then in VRay And you'll see the VRay light meter, there.

And you can see here, on the left, you've got an image which is rendered through a default camera. So that default [INAUDIBLE] I've got a VRay sun in the scene. I've got default camera. And I've just pressed render, basically. So everything's on default settings. And obviously, the image is a lot too dark. The exposure is not correct.

But by placing a couple of these light meters in the scene, and then generating within it, it calculates the light values within the scene. And then you can process that through this Lux to exposure value converter, which you can find online-- this link, here. Again, this will be in the package that I'll give you.

And then, through that, there's a table that you follow to then find the correct ISO for the fstop that you're using within the camera. So when we film in reality, even in interiors like this, and we'll try and keep the fstop on eight. When we're using reds, or [INAUDIBLE], more often than not, even on kind of dark scenes, we'll keep the fstop on eight to get the sharpest possible image.

So we follow the same rule and then in Max, even though it doesn't necessarily mean the same thing, with the noise in the Max cameras. But it's good to be realistic, so that when you do go to do filming, you kind of understand this a lot more. So I'll show this to you in a second.

But this is, essentially, the corrected image through that process, in a one-step process. So it's not like a endless camera tweaking, and exposure values, and tweaking the lights. Because in Max, there's a million different settings that you can change to kind of improve the quality of your image. But this is just through the camera. And then you've instantly got a much, much better result for the exposure.

So if I got back to Max, if I select one of my light meters here. So I've got this bottom one selected. And you can see here, I've got a few different viewport options-- for the text, for the colors. The colors just allows you to see where the light is at its most intense. And you can see very clearly, here, the light is coming through the window, and it's shining here.

And you can see the numbers if I disable that. It goes up to like 67,000 in the middle, and then zero on the outside. It's important to kind of test a few around the scene. If I select this one, disable the pseudo-colors. And you'll see that, again, the light values are between 3,000 and

5,000.

So, essentially, what you have to do is you have to calculate the average of these numbers. And again, it doesn't have to be a science. You've got between 67 and zero, averaging about 12,000. And then you've got 3,000 to 5,000, here. So you can easily calculate a kind of average number from the scene, and taking the highest value into the most important consideration. Because that's where your hot spot is.

And again, just to kind of illustrate this, if I go to helpers, VRay, VRay light meter. If I just put another one in the scene, it kind of comes with four points. And you can increase the amount of segments within it, and then press calculate. I've got quite a lot of points in here, which I don't really need.

And it essentially gives you this chart, basically. So it does it all automatically. You don't have to render in this process. You just press calculate here. And then, from those numbers, you go to this link here, where you'll find the lux to expose value converter.

And this is a kind of download default program that you can download. Or it's a link on the net. And you type in the average number, from between those light meters, and it calculates the equivalent EV value.

From that EV value you then go to this chart, which you can download from this Wordpress file here. And it's really good. And you can say, I'm using a-- I'll find it within my folder, I can show you more specifically.

So if my fstop is eight, and my EV value is 12-- which it is in my scene, because I've got an average value of 20,000 lux, and that equates through that converter to 12. So you can see fstop of eight, 12. And then I know that my ISO needs to be 1/60th of a second.

And that might sound like a slightly long-winded process, but I've been doing this for a while now, and I haven't looked at this chart for ages. So the more you know, the more you do it, the less you actually need to do. You just calculate the light meters, do a quick calculation, and then you know what that ISO is.

So this is my count default. So we'll select him. He's got a default f number of eight. He's got a default shutter speed of 100, and defaults speed ISO of-- I'm sorry, 200 and then 100. So just a default camera.

And you can see, if I go to my corrected camera, and select him. I've adjusted my shutter speed is a 1/60th of a second. And you can see how different that looks in as a result, here, without any test rendering whatsoever.

So as soon as we create a standard base for out lighting, this is what we do now. We just kind of put in the lux converter, set the camera, and there's no test rendering whatsoever. And often this is done right at the beginning. And then it can be given to juniors, or other people within the scene, to then build upon with assets, or any kind of thing that needs to be done with the scene. But the overall exposure is set from the beginning.

And then you can see a very small adjustment to curves and the textures that's the base result. And there's not much need for much post production. In a simple scene like this.

So post production. Again, with the main image. We've got a slightly different workflow. Some people are using this now, a lot more. But it's really good to kind of get your RBG looking as good as possible before you go any further with the post production. I mean, there's a real temptation just to bring in the RBG, and just start slapping on all the passes, and on screen and overlay, and multiply. And then kind of work it up very heavy-handed in post production.

But actually, if you use camera raw in full 32-bit, so you're saving your exr's as full 32-bit-- full float, so not half float-- then camera raw works in an amazing way in Photoshop. And I'll show you a few examples, with a few other images that we've done.

So I'll load a few of these scenes.

So this one is a kind of non-adjusted raw render from that chalk model. So say, we weren't that happy with our result here, and we wanted top make it as good as possible. This image is in full 32-bit, so if we go to filter camera raw. And it does this default leveling, which instantly gives a lot more contrast to the scene.

But we want to bring up the exposure a lot more, and take down the highlights. Working in full 32-bit, you have a dramatic amount control over the image of this early stage, which you wouldn't necessarily get just by playing with the passes in the normal way.

And the more you look at it, the more you play with this system, the more you can control it. You got all sorts of aspects like sharpening, noise reduction. You can adjust the hue saturate and luminance and all of the different color channels. You've got lens correction, which is more to with, obviously, photography. You can adjust the haze, shadows-- like literally everything.

And the other good thing is you can save out the default. So once you've done an adjustment, you can kind of save out that as a default and apply it to multiple image sets, if they're based within the same kind of lighting, or the same kind of rendering.

And you can see here, you just got a complete transformation of that scene, before doing any major post production. Because the temptation would be just do quick levels, and then starting playing with the passes. But here, you've got a relatively nice image, and you don't actually have to do much more to it.

And the effect can be quite extreme. You can take an image like this, which has been quite dark. Go to our cam raw. And just for fun, we can just load that one I've just created, there, which is just two minutes of playing. And you can see what a difference that's made already.

And then you can do some fine tweaks-- adjust the blacks, bring down the whites further. We might want to add a bit more haze to this scene, because we're looking at lots of windows outside. And the other thing it kind of shows you, when the image is being clipped as well.

So again, we've instantly transformed that image before doing much more to it. So it's kind of good to just get your RBG as good as possible before continuing on, basically. I mean, even if I just leave it on default, without changing anything, it's kind of given me a much stronger result.

So we use that a lot. And you can see these examples, here. Kind of before and afters of what we've just done there.

And then, using the passes, again, it's just being subtle with it. In this case, it was just to emphasize glows and kind of highlights. I'll load the scene here.

OK. So again, if I kind of reverse a lot of this from looking at out RGB, this is kind of where we start out. And all the passes is doing is kind of highlighting some of the interior spaces, expanding some fog-- extra fog to the scene, using the environment passes and the Z depth.

So again, I've just got a bit more low-level fog. I'm kind of highlighting some of the specularity passes on screen. I'm boosting some of the reflections and some the refraction passes. And I'm taking refraction pass, blurring it a couple of pixels, and then screening that on to get a bit more glow from some of the interior spaces. And then a final kind of adjustment of some of the metallic elements within the scene. So it's reasonably minimal for such a stylistic image.

And then it was just about populating the scene with lots of extra elements, like smoke. Some of the chimneys weren't detailed in Max enough, so we kind of collaged and painted some of that on.

We re-Photoshoped back in some of the people from those old photographs. And again, pretty low resolution. But we're going to paint over anyways, so it didn't really matter. Just to kind of get some of the original assets from the photos, and some additional people into the scene.

Got our Scrooge guy, here, which we found on this horse, which we thought was quite fitting for the image. And it gave a kind of real centrality to the image, with both the building and the Scrooge being within the cantilever element, we thought worked quite nice as a composition.

And then paints. And again, by far and away, not strongest painter in Photoshop in the world. But just with a kind of whack on, just highlighting, color swatching elements from the image itself. So the highlighted yellows here, color swatching that, and then painting on that side of the element, the lighting effects, so you get the right tone, and the right kind of contrast.

If I just turn off a few layers, you can see here that I've been quite sketchy with the first pass. Just kind of going over again, highlighting some parts of the image, and giving it that kind of rough feel. I've got a few kind of more glowy layers, which are emphasizing the lights.

I've kind of repainted over old Scrooge, here. If I just go back. It's quite a large Photoshop file. We spent a bit more time on him, because he was quite low resolution, and he needed to sit and lot better. Again with the carriage. That was painted over the quite heavily, just by color swatching the colors within the image itself.

There's additional smoke elements that I kind of painted in. And again, further soft shadowing and highlights, and extra detail to some of the characters. But there's nothing super complex in the way that it's been kind of painted. It's pretty rough, because that was the kind of style that was needed for this one.

And then, just additional smoke. And then a cart that was painted in background.

And then the color correction, it's reasonably simple. Again, with either Nuke, or After Effects, or Photoshop, I like to keep it reasonably simple. I'm not one to add layers, and layers, and layers on top of each other. You've got quite a dramatic vignette, quite a stylistic vignette, because, again, we wanted this focus on the center of the image, the design. Just a slightly

adjusted vibrancy, where you're kind of desaturating the image slightly, but dramatically increasing the vibrancy, which kind of just punches out the middle grays a little bit more.

And then, an overall color correction with levels, which is what I use mainly to color correct in Photoshop. It's just sit just a single levels, and being able to control the red, blue, and green separately.

And then, what we tend to do for sharpening effects is, if you have a flattened version of the image, and then what you can do to help wit that extra bit of sharpness to the image, is just to use the highpass filter. Which essentially kind of-- I don't know technically what it's actually doing, there. But it's kind of just creating this little feathered edge to the geometry, which you can specify how thick you will that edge be displayed, with the amount of pixels here. And once you press OK. And you can, depending on how strong you want that, you can kind of overlay soft light or hard light, that on. And it'll give you that extra bit of sharpness to the image, which you'll see here, if I turn that layer on and off.

It really brings out the sharpness of things. But it does in a non-noisy way. And there's lots of other ways of sharpening which gives you that kind of grain effect. Because this selects and pixelates the kind of edges of the image. Then it's a much more robust way of sharpening the image.

And then, we did a few different crops to save up the image, and that was it. This one here became our kind of final image.

So yeah, again, that's illustrated in the document here. All these different kind of phases that we're onto the image.

And then, other examples. These are a few other examples where we've used exactly the same technique, either with painting or raw camera projection. Again, this was another one for HWK and that did recently, part of the hundred image set.

This is one we did a few years ago for Samsung. Again, a lot of this is projected from an original photograph was taken, and then again re-lit in Max. And this was a massive photograph. This was a 20k image in the end, for one of their Samsung TV launches.

And this was obviously a much older project that used a lot more painterly style. This is another HWK image.

And even some of the texturing in this was projected. It was all done with procedural materials. But then there was a kind of an overall blend which was a black and white mask that was painted and projected onto this scene. So there's lots of different ways that you can use this camera projection for scattering. Scattering foliage, kind of adjusting the very specific, in this case, dirt texturing-- which wasn't achievable through procedural methods-- or for backgrounds, or for relighting.

Tehre's loads of different ways that we use camera. Obviously, this is much more like the example I've just shown you. One of the images for Robots of Brixton.

But then, we also use camera projection loads in animation. All the scene here was obviously filmed as a back plate, built, and then projected. The original animated footage was projected onto the scene. Same here. And what this gave us was reflectivity for any kind of shiny objects we had in the scene. You get that kind of extra-realistic contact reflections and shadows from the scene. And all this was matted as mat objects.

Here, you've got is this projected scene, because we were kind of, again, re-lighitng the scene with different clouds that were kind of passing in time lapse. Which wasn't in the footage, but needed to be. So this technique is used a lot in visual effects.

This was a scene where we built this crazy model for the interior of this fish. But it became really, really difficult to render it in full frame, every frame. So what we did was rendered a single frame, and then reprojected that single frame back onto the original geometry. And then rendered it in Scanline, because we had that projection set as self-illuminated. So it could then render in Scanline very, very quickly.

And this was done projecting the environment back onto the geometry, and then rendered to texture, all of the assets, so that we kind of had everything baked so we didn't need to have it projected anymore. So we projected, then baked it, and then animated it.

And I think there's another talk on how the visual effects industry can kind of influence architectural industry, or the arch viz industry. It's a similar kind of theme, I guess, because a lot of work we do in visual effects kind of feeds back into our architectural work. And we find new ways of creating things.

This scene, here, was a very, very complex scene-- I'm hopefully going to show you this project at the end-- where the whole scene was kind of flickering with these lights, which we

have to then camera project, but then re-light every single frame where the lights flickered on and off. So the technique, again, was, even in that complex visual effects ecene, very, very similar to the simple scene we set up just now. So I might show you this one at the end if we have time. I think we will.

I want to end just showing a couple of different things. One is our new venture into real time. And the second one is a singlarity. I think these events are really good opportunities to show exclusive content, where you won't be able to find any of this online. I don't think the image I showed you, then, none of that is online. And none of the projects I'm showing you here are online, in the same capacity.

But we've recently made the step into real time, which I think is a really interesting area. Without making this whole presentation about that, I'll just show you this project that we did recently, because it's a really interesting area. Oops, the wrong one. Real time.

It's a really interesting area that arch viz is going in. And again, it's opening up new opportunities for new methods of creating images, new methods creating animations, a new services entirely that we can offer to our clients.

So this is La Geria This is our application for showing off this new real time service. And this is a vineyard that we designed, based on a real location in La Geria, which is a place in Lanzarote. And it's a very unique kind of site where it has these really fascinating method of growing wine, within these craters that are dug within the ground. And they're dug within the ground to protect them from the wind, and the environment. And they have these protective rock enclosures that kind of help protect it further.

And this, our design, was based within this landscape. But it also had this kind of quite fun element that the whole thing was services through these drone collectors, basically. And we wanted to set it, not necessarily in the future, but using alternative technology to you to harvest and farm this thing.

And we created this app where you can kind of walk around. But you can also go back to this menu and teleport to any different locations within the design. So here you've got a kind of spa area. And you're free to walk around in amazing fidelity. At any time you can go back to the menu and teleport to a new location.

And you can do all sorts of things in this. You can change materiality in real time. People are

doing really interesting stuff, using it as a design tool. I think, for us, there's a couple different ways that this kind of technology can be used, or the potential of it can be used.

I think it's a really great thing to have in-house, within an architecture studio, to use it as a design tool. I don't think that it'll necessary become a service that visualizers have for architects, because it requires a very seamless workflow, which I think, is much more suited to in-house-- to be able to really understand and walk around a design.

Because I was an in-house architecture visualizer for a while. And too many times you're kind of designing the building from one set view. You're not really designing the building for the experience. And I think this kind of technology can help architects design for the experience, rather than designing for a view, or from one kind of vantage point.

I also think it's got loads of potential for the more public facing projects that architects are engaged with, where you have to have a lot of feedback from the community to you to get planning accepted, and to kind of piece different communities. We were having a conversation over dinner the other day about this. It seems to be a more common issue within Europe, where a lot of planning laws are a lot stricter, and a lot more community projects are being kind of fed through to the public.

But I also think the most obvious example is through high-end marketing suites, through developer-led projects. So I think there's three very different applications of this technology that I can see working within architecture studios, and visualization studios.

So it's not just image-making that we're trying to find new methods of production for. It's offering new ways to create animations, and new ways to create images, and new services we can offer. And the great thing about this is that, once you generate the asset, it's essentially putting cameras in, and generating animation is extremely easy. And also, generating high resolution stills is extremely easy. As well.

You can go here, we'll going into design, and within the app we've built in a few pre-rendered high resolution stills, which all rendered like 7K resolution. And we generated lots of material from this project very, very quickly.

And what does that mean for us? I mean, for me, it means that the design phase, or the creative aspects of a project, is much, much more extend. You have, in a traditional workflow, especially with animation, you're kind of fixed at the point of previews. Once the previews are

signed off, that's fixed. And you go through the motions of making the project. And the technical aspect is quite long, whereas the creative aspect is quite short.

For me, what this did is it completely reversed that process, where the creative process in the cinematography, the camera work, and the editing-- that process was much more extended. And the technical aspect was a bit more front-ended in the beginning, but it allowed this much larger create creative process to happen.

And actually, designing the cinematography with the lighting information became a really powerful tool. And it makes you feel more like a filmmaker, when you're using the light, and the environment, to influence your decision in setting up cameras, and things like that. And the same for stills . Once you've generated the asset, it's very easy to create stills from.

And this was an edit that we did once the asset was finalized. And again, we could change this, even camera moves, and camera positions, very late on in the process.

[VIDEO PLAYBACK]

[END PLAYBACK]

So it seems we do have time. I think I timed that OK. I want to show you a project we finished last year, which isn't online. It won't ever be online, unfortunately. This was a pilot for a TV show that the History Channel are trying to make. And we helped a production company called Raw TV, who were commissioned to make this. So we helped direct, do all the preproduction. And then, eventually, our studio did all the visual effects as well.

So the timeframe for this was, we had, I think, six weeks of prep time for the shoot. And then we directed the shoot over two days. And then we had a seven week post production period, basically. And yeah, the story was kind of set, in a way, by Raw, and the History Channel. But the script, and the way we developed the previous things, kind of changed from our direction. But the overarching story is and was not our conception, it was the History Channel's.

And yeah, this is, hopefully, going to be made over the next few years. But we're not sure yet. As with TV, these things take a bit of time. But I guess, for the History Channel, it's kind of a history of technology, and the dangers of technology.

And essentially, it sort of became a kind of terminator iteration, I guess, which is what we tried

to avoid, to a certain extent. But I think, for the promo, it had to be this kind of flashbang wallop, robot kind of situation. Whereas I think the longer version of the script, for the TV show, has a lot more wiggle room for a bit more creativity.

It was certainly a very interesting project for us to direct, and also do the visual effects for so, I hope you enjoy

[VIDEO PLAYBACK]

-The world's first single-chip microprocessor for computers, like this Cray XM-P.

-It's really nice having a computer at the house.

-been a lot more accurate, lately, and our customers really love it--

-Cellular portable.

-It goes inside the left ventricle.

-You can go anywhere on the net.

-Cool!

-Deep Blue has responded instant--

-Whoa! Kasparov has resigned.

-If I move my hand--

-Google--

-Wikipedia--

-Things like Facebook--

-We are calling it iPhone.

-Replace iron in the [INAUDIBLE]

-This is Watson.

-This is a revolution. And her name is ANA. As humans we can only process a fraction of the

information in the world. ANA can think 8 billion times faster than us, and can gather information instantly from every single connected device across the planet.

-Your phone, your house, your car, your life-- all synchronized and controlled by this amazing new system.

-device tells you you're running late for a meeting. ANA has already rescheduled the meeting, and rerouted your car.

-ANA knows my eating habits better than I do. I mean, she must save me at least $100, in groceries alone.

-She makes informed decisions, responds to your unique demands, and will learn to know you better than you know yourself.

-I was stuck in a meeting. ANA arranged with my friend Lisa to pick my son up from school, and she was in the area. She figured out Lisa was my closest friend, just from my call history.

-ANA noticed my heartrate was low, and booked me in with my doctor before I even knew I was sick. This company that no one had heard of last year, today, is [INAUDIBLE] stock market for twice the value of Apple.

-What is really an unprecedented technological tour de force.

-I'm excited to announce we have 500 million active users.

-We need to unleash the power of new technology.

-Where does artificial intelligence lead us? What kind of laws govern a machine that can think for itself?

-There's an old saying that goes, don't put all your eggs in one basket.

-[INAUDIBLE] has control?

---explain it. We need to get a grip on ourselves. We need to understand what we have done with the technology that we have created. We have created a monster. And we have let that monster get into our home.

-With artificial intelligence, we are summoning the demon.

-Breaking news now with Brian Sullivan. Brian?

-Hey Sue, yeah. American Airlines having some problems with the nationwide computer system. They were telling NBC News that they have a system-wide outage across the Unites States with their computer system. It is delaying some flights, It is hurting the check-in process as well. That's all we've got, coming in NBC and CBC right now. And as we get more--

-I know you're about to meet your friend, Jim. But we have a growing vehicle backlog of 57 minutes. I've run initial analysis, and I can get on top of that, if you give me security clearance.

-No I should get authorization for that.

-The backlog is reaching critical levels.

-ANA, the backlog's still building. What's going on? ANA? ANA?

-ANA, request temporary shutdown of processing line 763 Alpha. ANA, repeat-- request shutdown of processing line 763 Alpha.

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-Let me interrupt you just for a moment-- we've got some breaking news.

-We have some brea-- we have some breaking news.

-This is such a widespread network outage. We don't know if it was a cyber-attack.

-Fatal error message that appeared on millions of computer screen worldwide.

-And states of emergency are in effect in a number of countries.

-I've told my sources, it is an actual security interest.

-There's other things happening in America, and happening elsewhere--

-The number of dead increasing. The military has been called in to help. Do not try to drive north, south, east, or west.

-Look a little closer. Oh my gosh!

[END PLAYBACK]

PAUL NICHOLLS: So that's me. Thank you very much.