ArcGIS is 3D Capable

See how 3D GIS is used to analyze virtual city models to consider the impact of a proposed redevelopment project. The 3D editing environment provides answers about visibility concerns and the impact of building shadows on neighboring buildings. The results are shown on a map and can also be accessed using an app on a mobile device such as an iPad, to retrieve building attribute information.

http://video.esri.com/watch/43/arcgis-is-3d-capable

Video Transcription

00:01 Well, let's move on. Let's talk about 3D GIS.

00:07 ArcGIS 10 is a 3D system. That means data models, tools, analysis, visualization techniques.

00:15 When I first got started with 3D GIS, it was about subsurface geology in Texas.

00:21 But that's just one of many different disciplines that need this 3D capability.

00:25 You can be doing facility management and office space utilization; that's a 3D problem.

00:31 Or you could be planning airspace corridors and trying to deconflict airspace for safe travel...another example.

00:38 To take you through a few more examples, I'd like to introduce two members of our development team...

00:44 ...Gert van Maren and Nathan Shephard.

00:47 Thanks, John. Good day, folks.

00:51 I'm Gert, originally from the Netherlands...

00:54 ...and unfortunately, we lost the World Cup soccer final last night...yesterday against Spain.

01:00 However, I'm still excited about the new 3D capabilities of ArcGIS 10.

01:08 Not only can you view your 2D and 3D GIS data in ArcScene and ArcGlobe, but now for the first time...

01:15 ...you can edit and analyze in true 3D space.

01:19 At 10, ArcGIS is a complete system for 3D GIS. And many users can benefit from such a system.

01:27 And today, we're going to focus on local government and virtual cities.

01:31 I want to show you a virtual city project that Nathan and I have been working on just to try to give you a sense...

01:38 ...an idea, of how powerful 3D GIS can be.

01:42 But first, let me show you how ArcGIS Explorer and a virtual city model can be used to brief city councilors and other stakeholders...

01:51 ...such as the public, about upcoming redevelopment projects in inner cities.

01:56 And one example of such a city is Rotterdam in the Netherlands.

02:01 Now ArcGIS Explorer is a great tool to present your city in 3D.

02:05 You can navigate around to give the audience a feel for the layout of the city, with its River Maas in the center.

02:12 And you can zoom in to particular areas of interest. And this is the Wilhelminakade here on this peninsula.

02:19 Now, the city of Rotterdam has the grand vision of a Manhattan on the Maas redevelopment at this particular location.

02:27 Five high-rises designed by famous architects, such as Rem Koolhaas, will be built here over the course of 4 to 5 years.

02:35 Now, during the planning stages of this big redevelopment, a number of issues were raised by the public on blogs and forums.

02:42 And the two most common asked questions were...

02:45 ...How visible are these buildings going to be from various locations around the city?

02:51 And the second question was, What will the impact be and, more in particular, what will the shadow impact be of this new development?

02:59 Now let's go over to Nathan, and he's going to show you how the new 3D capabilities of ArcGIS 10 can help answer these questions.

03:07 Thanks, Gert.

03:09 Before I answer those questions, I need to add one more building into my virtual city.

03:16 So I'm going to use the 3D edit environment and interactively place the architect's model directly into my 3D view...

03:26 ...and then move it into place.

03:32 Now most of my attributes have been populated by my edit template; I can always come in and update them as needed.

03:41 We can see that the height of this building is going to be about 150 meters tall.

03:45 So I'm going to just validate that I got the right model and they came in in the right units using the 3D Measure tool.

03:56 And we see that's right on 150 meters, so we've got the right model and our city is complete.

04:05 So let's just zoom around and see what it's going to look like.

04:15 Very nice.

04:19 Okay, let's get back to those questions.

04:22 The first question was, How visible are these buildings going to be? It's fundamentally a line-of-sight problem.

04:28 So I've abstracted the question out to ask, How visible will these buildings be from the major roads?

04:34 I can run these representative viewpoints through the standard line-of-sight tools.

04:42 We can see this is going to be a very visible building from many locations around Rotterdam.

04:48 So I'm Australian, and naturally suspicious, so let's validate these results.

05:03 So here's where the major roads have a line of sight to Baltimore Building. See, there's a little gap here.

05:09 So let's come down to see what's going on. And sure enough, there's a building that's going to obscure that visibility.

05:21 If we come across to the other side, we can see the building comes out again.

05:26 So now that we have some confidence that our results are good, we need a way to share this with the people of Rotterdam.

05:33 A good way to do that is with a map.

05:35 So I can turn on the major roads, the sections of the road that can see the Baltimore Building...

05:41 ...put a nice basemap behind it, and a blue dot for the building.

05:45 It makes it really easy for them to understand how visible this building will be.

05:49 So we can repeat this for each of the other buildings and answer that first main question that people had about this construction.

05:59 This means that we can go on and look at the second question...shadows.

06:06 Before we can talk about future shadows, we need to know current shadows, so let's calculate them right now.

06:11 My GP model runs a Python script for creating sun positions...

06:15 ...sends those points and parallel rays through the Skyline tools, and creates shadow volumes.

06:20 And we also add an attribute saying what hour of the day that shadow represents.

06:29 So here's the results at 11 o'clock in the middle of winter.

06:33 And we can step through and see how that shadow's going to move through the day.

06:39 Or we can look at all of our results at once.

06:42 If we go back to the hourly view, turn on the planned buildings and their shadows...

06:49 ...you can step back through the day...

06:53 ...and see how it's going to change with this new construction.

06:57 So seeing this is very helpful and useful, but 3D GIS is more than just seeing the data; it's also about understanding it.

07:04 So we can summarize the impact at the building level.

07:07 So we can identify the buildings and the residents who are going to have, in some cases...

07:12 ...up to three extra hours of shadow from this construction.

07:16 And we can send them a letter and let them know about it before it happens.

07:24 So city-scale analysis is important, but it's also important at a single building level, so here is the KPN building.

07:32 It's in a great location, and if we step through the day, you can see that right now, it doesn't get very much shadow.

07:41 That's all going to change.

07:46 So in the same way that we summarized at the building level, we can also summarize at the window level.

07:55 Makes it really easy to identify which window's going to get six or even seven hours of extra shadow in the middle of winter.

08:01 That's almost the entire day in shadow.

08:05 This is just a couple of examples of how you can use 3D GIS to analyze your city, and I could work on this for days.

08:12 But, let's go back to Gert and see how you share these results in a mobile device.

08:17 Thanks, Nathan.

08:25 Now together with our business partners Procedural and Mental Images...

08:29 ...we've been exploring ways of how to get our virtual city model on a mobile device and view and interact with it.

08:36 Now this can be an iPhone or an iPad or a Tablet, such as the one I have here.

08:42 And here we go.

08:44 In a browser, no plug-in download...

08:47 ...I can navigate around my city model to give people in the street a bird's-eye view of...of where this new development is going to be...

08:57 ...but I can also go down to street level and talk to the people that live there...

09:02 ...and show them how their view is going to change over the next five years with this new development.

09:10 I can also show the results of the shadow analysis we just did earlier and, if need be...

09:18 ...I can access the wealth of geodatabase information in ArcGIS Server.

09:27 Now with this 3D demo, we only showed you a glimpse of the new 3D capabilities of ArcGIS 10.

09:33 I hope it triggered your mind as to how all this new functionality can be applied to your own line of work.

09:39 We're very excited about it, and I hope you will be too.

09:42 Over to you, John.

09:49 Thanks, Gert.

09:50 Thanks, Nathan.

09:52 You saw 3D GIS; you saw virtual cities. But that's...that's really just the tip of the iceberg.

09:58 Imagine going below the surface and doing these same types of analyses in the subsurface world.

10:03 Or going aboveground, going into the air and doing air pollution or weather modeling, climate modeling.

10:11 The use of 3D GIS is really endless.