Creating Animations

Colin Childs and Hardeep Bajwa provide an overview of animation capabilities in ArcGIS to demonstrate common workflows for effectively visualizing and analyzing your data.

http://video.esri.com/watch/656/creating-animations

Video Transcription

00:01 This is a technical workshop on creating animations and we hope to make it a fun-filled afternoon for you guys.

00:07 Hope to animate your afternoon and, you know.

00:12 I'm Hardeep Bajwa.

00:13 I work as a product engineer on animations and ArcGIS and I've been in this role for quite a few years and…

00:22 …I work for the software development group.

00:24 Copresenting with me is Colin Childs.

00:27 He's an Esri instructor and he gets really animated when he does his demos, so he's the right guy to do the demos.

00:35 So in this session what we'll be talking about is, of course, animations and we'll be going through the basic animation concept.

00:42 What are animations composed of?

00:43 And we'll be talking about different types of animations.

00:47 Finally we'll be talking about how you can manage and share your animations.

00:52 So that's a pretty big topic.

00:54 Then we have something dedicated towards visualizing temporal data.

00:58 So there's a new concept of time in ArcGIS 10.

01:00 Now let's take a look at what it would be like to do the same thing in ArcGlobe.

01:01 And we also had some time animations in ArcGIS 9.

01:05 So how does this relate with each other?

01:08 And finally, we'll be talking about exporting animations.

01:12 And don't look at the screen right now and don't try to, something wrong with Microsoft PowerPoint.

01:20 Nothing with our software.

01:24 So now let's talk about animations and I'll give you an introduction on what animations are.

01:30 This functionality is available inside of ArcMap, ArcScene, and ArcGlobe.

01:34 What it allows you to do is create simple and complex dynamic effects.

01:39 You can create flybys.

01:40 You can move through your study area.

01:42 And you can actually create animations by changing the layer transparency, for example, create a fading in and fading out effect.

01:51 And also you can manipulate some of the scene properties.

01:55 So in a nutshell, it's all about dynamic effects when we talk about animations.

02:00 What it actually does is it allows you to automate the process of effective demonstration and visualization of data.

02:07 So if you think about it, when we put up that animation out here it was talking about the study area there.

02:13 It was of Crater Lake and you could visualize it from different perspectives.

02:17 So I like to say that quite often, you know, a picture's worth a thousand words.

02:26 So that's a famous quotation, and I believe in animation is worth the entire story.

02:32 So you can actually tell a story using an animation.

02:34 So you can talk about your study area, you can perform analysis on that study area; look at it from different perspectives.

02:41 Turn on and off different layers during an animation and basically tell a story about your study area.

02:47 And it's very effective in terms of demonstrating in front of stakeholders or your managers and look…

02:53 …good in front of your managers.

02:54 So that's where you would use animations.

02:58 In terms of the dictionary kind of definition for animations is that it is the rapid display of a sequence of 2D or 3D…

03:06 …views in order to create a dynamic visual effect.

03:09 So in a way, something very similar to a filmstrip.

03:13 So what we're doing is we have these frames and we're just playing these in a rapid fashion.

03:18 So that's an animation.

03:20 In terms of animations in ArcGIS, they consist of one or more animation tracks, and these can be of the same type…

03:29 …or they can be of different types.

03:31 And as I go through these slides, you'll become more and more clear what are animation tracks and what are these…

03:37 …composed of.

03:38 So an animation track is for the collection of key frames.

03:43 And if you look at the screen here, you can see that we have a camera track and if you can relate this to a filmstrip.

03:49 So we have a collection of key frames, or frames, where we've captured the camera location.

03:55 And if I play this animation track it's going to look animated.

03:58 So it's going to create an illusion by interpolating between the camera positions.

04:04 So moving on further, you can have one track, or you can have multiple tracks in there.

04:10 So I have two tracks here now.

04:12 One is storing the camera properties at different times, and the other one is storing the layer transparency…

04:18 …at different times.

04:19 So you can play these animations tracks together and create a dynamic effect here.

04:25 So while the camera is moving, or while you're wandering around the globe, you can change the transparency of…

04:29 …the layers and create a dynamic visual affect.

04:33 And we're going to cover this in the demo as well.

04:36 Now I talked about key frames.

04:39 The key frames are the properties of the object which you are trying to animate.

04:43 So in this case, I have five different key frames, and this is a camera track.

04:48 And I've captured these key frames at different perspectives around the globe.

04:52 And when I played the animation track what we're actually going to do is when we move from key frame one…

04:57 …or camera position one, to camera position two, we're actually going to interpolate in between those key frames.

05:03 So that's the one which gives you the dynamic illusion, or the dynamic effect of the movement of the camera.

05:09 So in a nutshell, the message here is that an animation is composed of animation tracks which are further…

05:18 …composed of key frames.

05:21 So the key frames are the ones which store the objects of the camera, or the layer and that's what we animate…

05:26 …as we move along the time line.

05:31 And now moving on to the different types of animations, we have here the map view animation.

05:37 So these are the ArcMap animations which we support.

05:40 One is the map view animation, I said, is essentially what we're doing is we're animating the view extent.

05:47 So we've captured one view extent and then we zoomed in and captured yet another view extent and stored it…

05:53 …in a key frame.

05:55 And then when we play the animation track, it's going to look like an animated effect.

06:01 Then the other type of animation which we support in ArcMap is the map layer animation.

06:06 So this one allows you to toggle the visibility of layers so you can turn on and off layers and you can also play…

06:12 …with the transparency.

06:13 You can show a fade in and fade out effect.

06:15 So in this case we have the fishery closures and so that's one dataset and after a while, the oil spill dataset is turned on…

06:23 …so we're just toggling the layer visibility in this case.

06:29 Right in ArcScene we have the camera animation, so this is the animation type which allows you to move the camera…

06:36 …from two different perspectives and visualize it an animated form.

06:40 The properties are listed out here, I forgot to mention in the last slide, but the properties which you can store with…

06:47 …the key frame are the observer, the target, the inclination, all the camera properties.

06:52 And what we do is we basically interpolate between two camera positions when we play the animation.

06:59 Then we also have the layer animation which allows you to toggle the visibility and the visibility of the layer…

07:06 …so you can turn on and off layers here.

07:08 Also we have the transparency.

07:10 You can fade in and fade out layers.

07:11 So you can see here how with the camera animation I also have layer animation which is showing us the portions…

07:19 …beneath the dam, in this particular area.

07:21 So I'm making the aerial imagery transparent as we move along the time line.

07:27 Something unique to ArcScene is that you can also change, the, you can transform layers.

07:33 So you can scale those layers, you can translate those layers and a typical example there is if you want to move…

07:39 …a plane along the flight path, so you can use that, the translation properties, and move it along the flight path…

07:47 …inside of ArcScene.

07:48 So that's kind of unique to ArcScene, what you can do here.

07:53 In terms of scene, there's another animation which is, again, unique to ArcScene when you can change the…

08:00 …sun position and the sun…the background color to show a day and night kind of effect.

08:05 So that's the scene animation type.

08:09 Moving on, we have the ArcGlobe animations and the first one here is the globe camera animation and as you can see here…

08:17 …you can visualize the data from different perspectives.

08:22 And the other one is the global area animation.

08:24 Notice that the only properties you can change in global area animation are the visibility and the transparency.

08:29 You cannot actually apply the 3D transformations here.

08:32 So you cannot move a plane along the flight path if you want to.

08:36 That's only unique to ArcScene.

08:41 Right. Then moving on to time animations, so this is something which we supported in ArcGIS 9 and in ArcGIS 10…

08:48 ...what we've done is we've unified this experience so if you're working with temporal data you should...

08:52 ...use the ArcGIS 10 time slider.

08:55 But if you want to create some dynamic visual effects when you want to, in this case I'm moving the camera...

09:01 ...to the oil spill area in Gulf of Mexico and then I'm animating over time.

09:06 So that's when you would use the time animations.

09:09 So there's a very specific use case for using the time animations.

09:12 We will cover that later in the session as well.

09:17 And finally, how do you create these animations?

09:21 It's basically using the Animations toolbar.

09:24 So the Animations toolbar is available inside of ArcMap...

09:27 ...ArcScene, and ArcGlobe, and it has a drop-down menu when you can create key frames.

09:33 You can also create group animations, flybys along the path, and you can also, once you've created your animations...

09:40 ...you can save these animations and you can export these as videos as QuickTime or as Windows Media Player's...

09:47 ...AVI format.

09:49 So those are options there and new at ArcGIS 10 we've also added the option to export as sequential frames...

09:57 ...so you can export your animation as frames on disk which is basically the BMP and JPEG format.

10:02 I'll be covering that later as well.

10:05 Once you've created your animations you can use the animation control dialog; it's on...

10:09 ...the right side and you can play, pause, stop, and record animations on that.

10:13 So it's like a standard animations player.

10:17 One very useful tool is the Capture View tool.

10:21 It's a camera button out there, and what it allows you to do is exactly going to capture the view as it is and create...

10:27 ...an animation for you.

10:29 So it's the simplest way to create an animation or a flyby for a certain area is using the

Capture View tool.

10:36 So we'll be covering that in the demo.

10:39 Here's a laundry list of what you can do with the…

10:42 …you know, what type of animations you can create.

10:45 Everything is simple.

10:46 Forget what I said on the advanced, there's no advanced stuff here, so I'm just kidding.

10:50 So the advanced stuff I will tell you is actually the ArcObjects customization.

10:54 If you want to a change a different property, you know, for example, if you want to change the layer…

10:59 …contrast, you can actually create some ArcObjects customization and change the contrast on the layer, for example.

11:07 Which is not supported out of the box.

11:09 So it's a very flexible framework in terms of customization.

11:15 Alright, it's off to Colin now.

11:21 Alright, everybody.

11:22 Everybody hear me at the back there?

11:25 Hands up if you hear. Good.

11:27 Okay, let's take a little adventure.

11:29 Let's go and play with some animations.

11:31 And I'm planning a vacation pretty soon and I was thinking of perhaps visiting Crater Lake and I looked around…

11:39 …found some really nice data of Crater Lake.

11:41 Thought I'd put a hillshade down below and I would drape the elevation with a little shading…

11:49 …on top of that and then I would take the lake itself, and I change its transparency and I've got a really nice view…

11:55 …of what the lake looks like, and I'd like to spend a little time creating an animation to show my wife what…

12:01 …we could possibly expect to see while we're looking and visiting Crater Lake.

12:05 So what I may want to do, because she doesn't like using GIS software all that much, is I may want to go…

12:11 …and create an animation.

12:13 So I go to my Customize dialog and the Animation toolbar is now embedded into the Toolbars option here and…

12:20 …I'd bring up the toolbar.

12:22 Now this is a very, very simple toolbar because it gives me access to all the tools I want to use and what I need to…

12:28 …create an animation.

12:30 If I drop down, I see I have the opportunity here to create key frames.

12:35 These are kind of the equivalent of snapshots, or pictures, and I may put a whole bunch of them together into a track…

12:42 …and then I can play that track.

12:43 I could also create a group animation, as Hardeep mentioned, where I can have all these layers get turned on…

12:49 …and turned off as I'm viewing something and so I can fade out and fade in and see different things…

12:56 …or I could create a time animation which we'll talk about a little later.

13:00 If I had previously created an animation, I could also load in an animation file that has stored all these properties…

13:07 …or parameters that I need to re-create an existing animation that I might have made.

13:14 Well let's do it really, really simply and look at the animation tool and there's a really, really simple tool…

13:19 …called Capture View and I call it the "Say Cheese button."

13:23 As I click it, I'm going, "Say cheese."

13:25 I'm taking a snapshot.

13:27 So I've basically created a single key frame that would be strung together with other key frames to create an animation.

13:36 So if I can view this, I can go and have a look at the Animation Manager and see that that single click that I just…

13:43 …did with my little camera tool created a single key frame and it automatically also created a track for me in…

13:50 …which to store or to play these keys or pictures, or frames, if you like, as I progress.

14:01 Now let me close this and let's go to a different area.

14:07 …and I'm going to go to an area called Watchman's Butte and I'm going to zoom to that area and I see…

14:13 ...there's a lookout tower, so I want to create another key frame, so I'm going to use the Capture View button.

14:18 Then I'm going to move to another area on the opposite side of the lake called Mount Scott, and I'll zoom to that one...

14:24 ...and I'm going to capture a view. And then I may move to an area to the south called Applegate Peak and...

14:31 ...zoom to that area and capture another frame.

14:36 Finally I'm going to end up looking at an area called Wizard Island and I notice there's a hiking trail on there...

14:41 ... so that might be quite fun to do.

14:43 Perhaps we'll use a canoe, go across the lake and end up on the island and go and hike on the island.

14:49 So again, we'll take another view, capture a view.

14:53 Before I go and do all the fun stuff, let's take a look at what happened each time I used that Capture View button...

14:59 ...and you'll see that I created several key frames, several snapshots.

15:04 Now these individual key frames, if you look at their properties, are quite interesting.

15:09 They're recording the min and max x and y location.

15:12 So basically just the extent of the area that I had snapped as a key frame.

15:18 So this is a property of creating an animation in ArcMap is it captures purely a min and max extent...

15:25 ...for the area that I am looking at.

15:28 Notice again I also have one track, and this track will play for the entire duration of the animation and I can...

15:35 ...set how long I'd like the duration to be.

15:38 I can also see here that that one track has the ability, or is showing me the time period and if I wanted to, I could kind...

15:46 ...of click on here and move around and show the animation itself visually from the Animation Manager.

15:53 Let's do it this way.

15:54 Let's click on the button here that opens the animation controls and, as Hardeep mentioned, I could...

16:00 ...very simply hit the play button and the software will fill in all the spaces between the key

frames and…

16:07 …animate my animation.

16:09 But that was rather quick, wasn't it?

16:10 You didn't really see much happening there.

16:12 So what we could do, actually, it's busy calculating.

16:17 I tested this a few minutes ago.

16:19 It always happens.

16:21 Let's go back over here to the Options.

16:29 Alright, that was not supposed to happen. My apologies, everybody. That was definitely not supposed to happen.

16:37 We'll come back to that one in a few minutes.

16:39 Let's open up ArcScene. Let's do something similar in ArcScene.

16:42 So Animation Manager is up and active.

16:45 Again, I've got this from the Customize dialog from my toolbars, brought it up and put it in my interface.

16:51 Let's do the same thing. Let's capture a view.

16:54 This time we'll change perspective a little and we'll move to another area, capture another view, move to another area here…

17:03 …capture another view. Let's go back to this area here. Capture another view, and what we should expect in the…

17:10 …Animation Manager are several key frames including a single track and a time view.

17:17 Now let's take a look at those tracks, those key frames this time.

17:21 Unlike the map document which only captured an x and a y min and max, in the ArcScene environment, what's actually…

17:29 …happened is it's captured a target x and y and z location, an azimuth and an inclination.

17:36 And if I choose to, I could also change the roll.

17:40 So think of this as being in an airplane and I'm kind of pitching and rolling around and I'm viewing the surface.

17:45 Well, I could change those properties as well.

17:48 I could change the viewing angle for each of these frames as well and other properties such as the…

17:55 ...author extent for x,y min and max.

17:57 Let's see if we're a little more successful this time.

18:00 Let's bring up the animation controls and let's see what happens when we play the animation.

18:05 So notice how the angle, the pitch, the roll, all of those properties are now incorporated and our animation is created...

18:12 ...from the key frames that I've used, or generated a little earlier.

18:16 Now a few things you can do with the animation control is go to the Options and say, You know what...

18:22 ...you played it in 10 seconds, that was a touch too fast. Let's make it 15 seconds this time.

18:27 And, by the way, I'd like you to perhaps change and play only from a certain duration, not the entire animation.

18:36 Or, I want to play it once forward, or I'd like it to be in a loop so it will just continuously animate the same information.

18:45 So if we now try the animation and take those options away, it's going to be a little slower and kind of extending the...

18:52 ...time period to a 15-second time period between the individual key frames that I've captured.

18:58 The important message here is it works pretty much the same in ArcMap as it does in ArcScene.

19:05 The main thing you need to be aware of is that ArcScene, when you create a simple animation like this, is going...

19:11 ...to add additional properties to each key frame; angles, distance, inclination, azimuth and other properties...

19:19 ...which, as you will notice here, you can manually go and modify if you wish to.

19:24 So you don't have to be perfect when you capture a key frame.

19:28 You can modify the properties at a slightly different time period.

19:32 You can even change the temporal order.

19:35 So in other words, I may want to change this key frame. I'd select it and I want to make it the first key frame in my animation.

19:43 So you can modify some of these properties a little differently.

19:47 That's a touch fast again, but you get the general idea of how that would happen.

19:58 In ArcGlobe we may expect something a little different.

20:01 So we'll minimize this and we'll take you to ArcGlobe. And anybody recognize the city here?

20:08 Come on. You guys should know this. Who of you from the US, you should recognize this city.

20:13 It's the city of the Liberty Bell. It's Philadelphia, right?

20:17 So this is Philadelphia and the city of Philadelphia have a pretty comprehensive database of really good information of…

20:25 …downtown buildings, and we're using ArcGlobe here to preview some of those buildings and we've texturized them…

20:32 …so they look very natural, they look very realistic. And the city's received a request recently for a parade through the city.

20:42 And as part of the process of evaluating whether they would allow the parade and potentially where they would suggest…

20:48 …the parade route to be, one of their GIS technicians and researchers was actually looking at the city center and…

20:57 …trying to figure out what the impact would be on traffic congestion in other areas.

21:02 So let's take a look at how we can create a very simple animation that we may propose to the company or organization…

21:09 …that are planning the parade.

21:10 So we'll use the same animation tools, and we'll use the same Capture View tool, and we capture one key frame.

21:18 Let's change the perspective again, capture another key frame.

21:22 This time we'll zoom in because we think that they may want to take the parade down this main road here, so we…

21:28 …may go here, and let's zoom in a little more on this and we'll kind of stop here. And perhaps what they…

21:36 …want to do is they may want to congregate and meet in this area.

21:39 So again, we have in our Animation Manager, four globe camera key frames.

21:45 So see the name's changed from ArcMap and ArcScene to a camera key frame this time.

21:51 Now take a look at the interesting thing here. The properties of each key frame are now the latitude and longitude, the altitude…

21:59 …the observer's latitude, in other words, how high and at from what angle is the observer viewing…

22:05 …what lat-long position is the observer and the observer altitude viewing angle, and a roll offset.

22:11 So here, you can position yourself as if you were in an airplane, or you were on the top of a building looking…

22:18 ...down on the possible parade site.

22:20 And you can modify these properties at will, as you wish to, to make a much more realistic type of animation.

22:28 Let's close this up. Let's bring up the animation controls and let's just use the defaults here and we'll fly...

22:35 ...through a little bit of, not even fly through, but we're just observing where the possible parade route might go.

22:41 A little later we'll see the parade route as the organization has proposed it and we'll do a flyby with it.

22:48 But this gives you a bit of an idea of how easy it is to create animation both in ArcMap, ArcScene and in ArcGlobe.

22:55 Hardeep, thank you.

23:08 Alright, thanks Colin.

23:10 And as Colin showed you, it's pretty simple in terms of capturing the view and creating an animation out of it...

23:16 ...and he talked about the Animation Manager.

23:19 So what the Animation Manager allows you to do is actually organize and manage animation tracks and key frames.

23:26 So you can change the properties. Once you've captured those, you can change the properties later on.

23:30 And you can manage your animations using this Animation Manager.

23:35 The other thing is, one handy tool here is you can also select a particular key frame and you can update that...

23:42 ...particular key frame. You know, wherever the camera position is you could actually change and you can update that...

23:48 ...particular location.

23:49 So you can make changes to the properties of the key frames and the animation track.

23:56 In terms of the time scale properties, you know this is something...it's a little complicated now thing...

24:02 ...in terms of the Animation Manager, but if you can think about it that the animation inside of the ArcMap...

24:09 ...or ArcScene, or ArcGlobe applications, it's normalized from zero to one, so it has a zero to one scale.

24:15 And within that, all the animation tracks are having a normalized time.

24:21 So for example, I have the layer track, the scene track and the camera track in this particular graphic.

24:26 The camera track is being played for from zero to one, which means that it's going to be played for the entire animation.

24:33 Whereas, the scene track is going to start around 40 percent of the animation and end at about 75 percent.

24:39 So you get this concept what it allows us to do is we can place these animation tracks with respect to each other.

24:46 So this is the time scale properties which allow us to create those dynamic visual effects.

24:54 Now as I mentioned, individual tracks can span any section of this zero to one range and here's a scene track example…

25:03 …and also key frames have a time stamp between zero and one.

25:07 So you can also organize the key frames with respect to each other.

25:11 So Colin just showed you how you can change the temporal order of the key frames, so this is what he did.

25:16 You know, and you could do it actually on the time view of the Animation Manager.

25:26 Alright. Playing animations, if you've already seen this in the demo, it allows us to create, or you can play, pause, stop and…

25:32 …record animations.

25:34 So another way to record your flybys is using the Record button.

25:39 You could actually navigate in Scene or Globe and actually record those as a camera track.

25:45 The other options here on the Animation Controls dialog are the looping options.

25:50 You can play once forward, which is a default mode, and then you can repeat the animation.

25:55 So you can play, press the Play button, and if you have loop, play once, reverse, it will actually play in the reverse order.

26:02 If you have it looped forward, it's going to keep looping, you know, playing forward the animation.

26:09 Alright. To the next demo.

26:14 Alright, you're switching back to me.

26:16 Let's see if we can bring up that ArcMap demo that we showed you a few minutes ago that crashed on me…

26:23 …and I wanted to show you some new things in there.

26:25 So, you notice I was playing around with some bookmarks and I was…I literally had the bookmark manager open and I was…

26:32 …switching between bookmarks.

26:34 Well, hang on, could I create key frames automatically, or kind of interactively from the bookmarks without me having…

26:41 …to use the little camera tool to go off and do that?

26:44 So let's take a look at how we will use the Book box to generate new key frames and build an animation that way.

26:53 So here's an example. So we're going to use the Create Key Frame choice out of the animation, and this time…

26:59 …it's going to say, "What is it you want to animate?"

27:02 I'm going to say I want to animate a map view.

27:05 What do you want to derive the individual key frames from, would be the next question.

27:10 I want to import them from bookmarks, please.

27:12 Alright, well, which of the bookmarks would you like to use?

27:15 Well, I'd like to begin with Crater Lake.

27:18 Where is the data source going to come from? From Layers.

27:21 What is the destination track? Well, let's just create a new one.

27:24 I'm just going to leave the default names and create a key frame from that.

27:28 Now let's go to our second bookmark and create a new track. I don't have to do a new track; they can all…

27:36 …go in the same track and we'll create a new key frame.

27:39 And we'll do the same with the next one, and create a new key frame, and the last two as well.

27:49 And let's do the last one. Okay, now what do we expect to happen?

27:55 Let's take a look. In the Animation Manager we're going to have one key frame with multiple tracks.

28:02 So I did something a little different this time than what I had done earlier.

28:05 I could have created multiple key frames on one track if I wanted to.

28:10 And again, I can see the time view, and this is what I wanted to illustrate to you, which as Hardeep was showing you…

28:15 …is the time view allows you to view how long each of those tracks would play.

28:20 So what I could do here is I could change the time of one track and say, I'd like you only to play between zero and say, .25 of…

28:29 …the full amount of time of the animation if I wanted to.

28:33 Well, let's see what happens when we hit the Play button here.

28:36 And hmmm, nothing happens at this point. What did I do?

28:41 Well, a suggestion is integrate one animation track and key frame some…

28:46 Okay. Yeah, I think what I should have done here and let's do that, is clear the animation, so you learned a lesson…

28:51 …you need to clear animation if you want to start again.

28:54 Key frame…so we want to create one destination track, and let's call this Bookmarks.

29:03 Okay, and we're importing from our bookmark.

29:06 Our key frame, this one we'll just call this Crater, and hit New and Create It.

29:16 [Inaudible comment]

29:19 Okay, Create, and we'll create another one, and a third one, or fourth one here, and another one here and let's take…

29:29 …a look this time.

29:30 So just to elaborate like what Colin just did was actually, he created one track and then you inserting key frames in that…

29:39 …one track, so you don't need multiple tracks in that case.

29:42 So this was the stuff which he did earlier. Because each track has to have some key frames for us to interpolate…

29:49 …in between those key frames. So that's the only difference.

29:53 Okay, good. So let's try that animation this time. So if we play it, we'll see that it's going and using the bookmarks this…

30:01 …time to create the animation for us.

30:04 So that was a way of incorporating bookmarks instead of individual places that I would go to and use the camera animation.

30:12 Now let's take a look at a few other things.

30:13 So I'm going to close this one down, and let's take a look at something else that's kind of interesting here.

30:19 This is a data frame in ArcScene that has some…several different images.

30:26 It has a mesh, a photo of the study area and a topographic map.

30:32 And we're previewing these three different layers and we can't really see them unless we turn on and turn off the layers.

30:40 So how about creating an animation, and we'll call this a group layer animation where all the layers within this image data…

30:46 …data frame, which is a group layer, will sequentially be turned on and turned off and we fade in and fade out from them.

30:54 So this is called a group layer animation.

30:57 So let's see, we'll go and say, create a group layer animation and it says, what's the base name?

31:02 What do you want to animate? I want to animate the image data group layer.

31:07 So all the layers that are located in the image layer group will be animated and I want them all to play for the time…

31:14 …the entire duration. Do I want layers to disappear one at a time, or not?

31:19 Do I want all the layers to come in one at a time? Sure I do.

31:23 And do I want any fading? A little bit of fading, and I want to blend the layers as they fade.

31:28 Hit the OK button and let's take a look at what's happened in the Animation Manager.

31:33 So each individual…so there are basically, for each layer, there's a fade in and a fade out key frame, and each…

31:41 …layer also has its own track. So for each track, so each layer itself is a separate track and it'll come…

31:48 …it'll be on, fade out, fade in the next one. So we're expecting that to happen.

31:53 So under the key frames you'll see that you have begin and end times.

31:57 They're all going to be displayed at the same time in this case, as well.

32:02 Let's choose the Close button. Let's hit the Play, and let's see what comes back at us here.

32:07 So each layer comes on, eventually fades out. Next layer comes on, fades out and then the last layer comes on.

32:16 Now let's do a little something else here. Why don't we go and combine what we're looking at here with layers…

32:23 …being turned on and turned off with a little navigation.

32:26 So we can do a little bit of work by navigating and we can add another type of track, in this case, to do that.

32:33 Let me move this out of the way and you'll see that you can add a key frame in here, and this key frame is another…

32:40 …track that we could be adding. So let's add another…in fact what we'll do first of all, is let's clear everything up.

32:47 We'll start from scratch with a key frame, and what is it we want to do? Do we want to animate the scene? Yes, we do.

32:54 Actually, the simplest way to do this is just going to be to use the camera.

32:59 Do this. Capture a couple of frames like that.

33:04 Alright, so now we have one track that is created, a capture track, and we have key frames for that one track.

33:13 And the next thing we're going to do is add to this a group animation. Now the group animation…

33:19 …I don't want to display it exactly the same time as my previous animation.

33:24 I want to start this at 0.5 of the time, so halfway within the full animation, we'll want to start fading in and…

33:32 …fading out the layers of the image data group layer. And I'm going to use the same blend in and blend out properties here.

33:41 So initially we can expect some rotation and movement around, and then about halfway through the entire animation…

33:48 …that stops and we start seeing the layers come on and off.

33:52 So let's play. Now we see the rotation based on those capture views I just did, and there we go, about halfway…

33:59 …through we start seeing the layers come on and go off.

34:03 That's an example of what Hardeep showed you was multiple layers, or multiple tracks and then notice the tracks…

34:11 …here have their own time period. And if we look at the time view, we'll see that the viewed capture track plays…

34:18 …continuously, but the three layer, or three tracks that were created for each individual layer begin at .5, at…

34:26 …halfway through the animation time.

34:29 So that's an example of a little bit more complex and a little bit more advanced functionality you can do.

34:36 Now let's move over and look at one more thing.

34:38 And I told you the city of Philadelphia was entertaining the possibility of an organization

doing a march…

34:46 …or parade through the city.

34:48 Well, the organization came back and they said that they decided that this would pretty much be the parade route…

34:55 …that they would like to follow through the city. So they want to begin in this park area here, and they want…

35:01 …their parade to follow down one of the main streets, down around the back of the side of the buildings and end…

35:07 …up in another park area.

35:09 So we want to go and have a look at the basics of this. We want to go and explore, for example, a little bit…

35:17 …of the potential of this parade, and in fact, if we were going to do a full explanation and a full exploration…

35:24 …we may actually want to put cameras on buildings and view the parade and all sorts of different analysis which we can…

35:30 …do with 3D, by the way.

35:32 Well, let's go and see what it looks like animating the flyby, or the flight path, if you like, of this parade…

35:39 …the parade route that was suggested and requested by the organization.

35:44 So we're going to clear our animation and this time we're going to use a different type of animation called a flyby from path.

35:53 The only problem is that the path and flyby by path animation is not active, so what we need to do…

36:00 …is we really need to go back to the parade route we have here and we need to select the feature.

36:06 I'm just going to do this in a really easy way. I'm just going to select it over here, so the parade route…

36:10 …is selected, and if I now go to my Animation toolbar, I see that Create Flyby from Path is active.

36:18 Now what'll happen here is, every vertex, or almost every vertex along the path potentially will be the location…

36:25 …of a new key frame. So when I create a flyby from path, I have a couple of things I need to do.

36:33 And one of them I can play with is called the simplification factor.

36:37 This sort of weeds out some of those vertices. If I don't turn the simplification factor on, I could get a very jerky…

36:44 …type of animation, but if I remove some of the excess vertices and make it a smoother type of path, I probably…

36:52 …am going to get a much, much easier on the eye, or more pleasing animation.

36:57 So let's do that. And let's take a look at some orientation settings, and you notice I can set a look ahead…

37:04 …type of characteristic. I can set the azimuth, alt, inclination and roll, so if I were in a helicopter, or I were…

37:11 …in an airplane, I could set some of those characteristics.

37:15 Now I've purposely not set one of the settings so that you can see what'll happen if you don't set a vertical offset.

37:22 So let's import the track, or import the path and we're ready to play.

37:27 Now I purposely did this, so as I start flying, I'm at street level.

37:33 So I'm literally flying, if you like, at street level along the path, along the route that was proposed for this parade.

37:43 And you can see it's a little jarring, so I really want to raise myself above the ground a little.

37:48 I want to take a look at this from a slightly different perspective.

37:51 So I could do it this way. I could go and change some of my properties here in the key frame, individually if I like, or…

37:59 …alternatively I'm just going to go back and I'm going to change the flyby from path vertical offset and I'm…

38:06 …going to put myself about 55 feet above the ground and import again and run the animation.

38:14 You can see I get a much nicer view this time of the potential parade route.

38:19 These buildings don't have textures. We only had some textures for some of the buildings here.

38:24 So you can see the parade route will follow an area along this main freeway, and then end up in the park area.

38:31 Now again, you'll notice it was a little blocky, a little jarring as you were moving around?

38:36 Well, if we go back again, and we make the simplification factor a little higher, and we import again…

38:42 …and run through, we'll get a much smoother effect this time round. Not too bad.

38:47 We could place ourselves even higher above the buildings if we wanted to as well.

38:52 But you get the general idea of how simple and relatively easy it is to create an animation and then once the animation's created…

38:59 …using the Animation Manager, you can modify some things, change the properties, angle, roll, pitch and other characteristics.

39:07 Thank you. Hardeep.

39:12 Alright, thank you, Colin.

39:14 And how many of you…I actually wanted to, I was kind of curious, like how many of you are interested in…

39:21 …working with temporal data? A lot of you, actually.

39:24 And how many of you know about the existing ArcGIS 9 functionality? Like we do have time animations…

39:32 …with respect to that. Have you guys worked with time animations at all? Okay.

39:37 So I wanted to kind of spend some time on, you know, we had the concept of time animations in ArcGIS 9…

39:45 …and in ArcGIS 10 what we've done is we've simplified the experience of working with temporal data.

39:51 And what we've done is we've actually made the map time aware.

39:55 And if you have a time dataset which has, actually an attribute field with the time values associated with…

40:02 …the features, you can use that feature class or, you know, the dataset and visualize your data over time.

40:10 The experience is such that you can actually configure the time properties on the layer and here I have the…

40:17 …layer properties. I'm pretty sure you can't read it at the back, but the message there is that there is a time tab…

40:23 …on the layer properties dialog in ArcGIS 10.

40:26 So that's where you would actually specify your time properties.

40:30 And we'll show you a demo on that. It'll be much more clear there. And once you've configured the time properties…

40:36 …what you can do in ArcGIS 10 is you can use the time slider.

40:39 So you can visualize the data over time using a simplified time slider.

40:44 The other thing about this experience is that you can actually publish this time-enabled layer and use a web API or…

40:51 ...web client to visualize this data.

40:53 For example, you could publish this time-enabled layer and use it in ArcGIS.com.

40:58 And when you use it in ArcGIS.com, the time-enabled layer, along with it is shown a time slider.

41:06 So you can directly use the time slider there.

41:08 So that's kind of cool in terms of the simplified user experience. However, as I mentioned earlier, we had the concept...

41:16 ...of time animations. So it did a similar thing, but it was using the Animations Manager.

41:22 The other thing it was doing is actually you had to create the time key frames and you know, there was a special...

41:30 ...wizard for doing that. So for those of you who were kind of interested in time animations, we still support time animations...

41:38 ...but my recommendation is that if you are using temporal data, go with the time slider instead of using a time animation.

41:45 The only specific use case when you would actually use a time animation and the Animation Manager is when you...

41:51 ...want to create a dynamic visual effect. For example, in the next slide here, in the demo, you can see that I'm...

41:59 ...zooming in to a particular study area. In this case, it's the oil spill in Gulf of Mexico.

42:04 So that was the camera track and then I'm using a time animation track to show the changes over time.

42:10 So that's when you would use a time animation. And a lot of times you want the fade in and fade out kind of effect...

42:17 ...using the layer animation, so you could use the time animation track with the camera track or the layer track...

42:22 ...to create those dynamic visual effects.

42:25 The other part is, that when you're using the time slider, you cannot actually animate the camera with the time slider.

42:32 So that's the message here. So we wanted to put in some slides here on temporal visualization, so off to you, Colin.

42:41 It's going to be much more...the demo is going to be much more explanative in terms of what I meant...

42:49 ...when I was talking about time.

42:53 Okay, everybody. Quick question. Where were you on the 17th of January in 1994?

43:00 Was anybody here in the Los Angeles area? Anybody at all? A couple of you?

43:05 Do you remember what happened on the 17th of January in 1994 at about 12:30?

43:10 [Audience comment] Northridge earthquake?

43:11 Can you remember that really nice jiggle you had? The Northridge earthquake.

43:15 So I thought what we'd do in this example, is explore the Northridge earthquake and take a look at some really interesting…

43:22 …data related to earthquakes that occurred before, and then at the time of, and then all the aftershocks after the…

43:29 …Northridge earthquake and then some of the effects to some of the areas surrounding Northridge after the earthquake happened.

43:37 So here is a little example of the major fault lines in the Northridge area.

43:43 Northridge actually falls sort of in the central or in this area of the Valley in LA, and it's a really interesting area, but…

43:51 …for many, many months before the earthquake, there were smaller earthquakes. Lots and lots and lots of them.

43:59 This is just the number of earthquakes that occurred over a period of about a year before the major one hit…

44:07 …on the 17th of January, 1994.

44:10 You could just see the huge number here, but you know this number doesn't tell us very much.

44:15 You can just see a whole bunch of dots. The bigger the dot, the higher the magnitude of the earthquake…

44:20 …smaller the dot, the lower the magnitude.

44:23 But wouldn't it be fun to be able to play this information over time and see, you know, weekly, daily.

44:30 Was there a growth in pattern, you know, a whole sort of flurry of earthquakes before the real big one hit, or not?

44:37 Well, what we could do, is we could take this earthquake data, if it had a date field, and we could use that date field…

44:44 …to drive animating, or displaying the time or date property.

44:49 So if we take a look at this attribute data, we see that we have the earthquake magnitudes and we do happen…

44:55 …to have the date of occurrence, and the time of occurrence, as recorded.

45:00 Now all over LA we have these sensors that measure micro earthquakes and bigger ones and

so on, and …

45:06 …a lot of them, if they're really big, they actually get elevated up to a laboratory in Pasadena that monitors…

45:14 …all these, and every now and then I get these alerts on my phone going, you know, 4.3 in this area.

45:19 That's when I get worried. About 4.7 I get really worried.

45:23 Well, anyway, wouldn't it be nice to be able to play all this information and view these earthquake occurrences as they happen?

45:31 Well, before I do any work on a date field like this, I may need to do a little bit of cleaning up.

45:37 Sometimes date or time information doesn't arrive in a format that is palatable to us, that we can really use.

45:45 Sometimes it's in more than one field, the from and a to time.

45:48 Sometimes it's in a format that we can't use at all. This happens to be okay, but assuming it wasn't, what would…

45:55 …I do to fix up this data and get it into a format that I could use in an animation, or with our time slider tools?

46:03 Well, I could use ArcToolbox, and within the ArcToolbox environment, within the Data Management toolbox…

46:10 …under the Fields toolset, there are a collection of tools that were designed specifically to allow you to modify…

46:19 …through geoprocessing your time field.

46:21 There's a calculate field, sorry, calculate end time. Calculate, or convert time field, convert time zone and…

46:31 …transpose fields. And all of these tools, I'm not going to use them, but all of them have been created potentially…

46:40 …and typically for you to take time or date information in one format and really to convert it into a format that is…

46:47 …more useful for us for animation and for analysis of this temporal characteristic of our data.

46:55 Well, let's go on with the adventure. So lots and lots of earthquakes happened and on the 17th of January, 1994…

47:02 …bingo. A really big earthquake happened. That was the real bad boy in Northridge.

47:08 And several freeways collapsed. Lots of bridges. You know, literally they concertinaed down and they…

47:14 …collapsed on top of each other and it was pretty bad. A lot of things.

47:19 Well, immediately after the earthquake, there were huge amounts of aftershocks.

47:24 Lots and lots of aftershocks. And if we view the aftershocks, we'll see that within minutes there were…magnitude 6.7 was…

47:32 …the actual earthquake, and then there was 5.89, 3.27 and they just progressed, for, you know, several minutes afterwards…

47:41 …as the earth started settling down again.

47:44 And those little earthquakes are in themselves very destructive.

47:48 Well, we noticed we have a date-time field that has the minute-time characteristic here.

47:53 And why don't we go and take a look at that. So let's turn on the aftershocks and we can see these aftershocks as they'd…

47:58 …happened in our study area, or our area of Northridge here. And again, they don't tell us very much until…

48:05 …we do something with that time characteristic. So let's see how we do that.

48:10 We right click and go to Properties tab, and one of the tabs you'll notice…and this is the same in ArcMap as well…

48:17 …by the way, it's the same Time tab, is a tab called the Time tab. And in order to use time, or temporal characteristics…

48:25 …you need to enable the time characteristic or property on this layer.

48:30 So by default, all layers are capable of showing or having that time property used, but it's only when you turn on…

48:40 …that property that you can start leveraging it.

48:44 Now the next thing you need to do is specify what format the time is stored in, in the source data.

48:50 Now you may recall, I had a single field that had date, time, hours, minutes and seconds in it.

48:57 So I have a single field format in which the time was maintained.

49:02 The software's also pretty clever. It looks at all the fields and it automatically picked up a field defined as a time…

49:12 …field called the Date Time. It was also pretty clever because it recognized that the format in which the time…

49:20 …was stored was year, month, day and then hour, minutes and seconds.

49:25 So it automatically picked that up from the format of the time field.

49:30 The next thing it did was… It gives you the option of modifying, by the way. The next thing it did was…

49:34 ...it says, well how, what sort of step interval do you want to use. In other words, when I play this data back for you...

49:41 ...when I show you the temporal characteristic, what do you want? Would you like every minute?

49:46 Every five minutes? Every hour? Well, we're really interested in seeing the aftershocks on a minute-by-minute...

49:52 ...basis after the earthquake occurred. Now the other thing that's really important for us is this data was captured...

49:59 ...on the West Coast. So we may want to put in our time zone, and we happen to be in Pacific time which is...

50:05 ...around negative eight hours away from the standard time. So UTC negative eight, or minus eight gives us...

50:14 ...Pacific time.

50:16 What we may also do is check on this little box that says Display data cumulatively.

50:21 So as one occurrence happens, the next one will be added. It doesn't remove the previous one.

50:27 So now we're ready to go and we're ready to take a look at the time characteristics here.

50:33 So the time is set up. I'm still seeing everything; why am I not seeing anything happen here?

50:40 Well, let's go and have a look at why.

50:42 'Cause what we need to do is we need to use our...let me move that out of the way...time slider.

50:48 And in order to use the time slider tool, we need to turn on the time slider to enable the time, and then we...

50:56 ...can go ahead and just play our time. So we turn it on, and now we're ready to play and, oops, that was a little quick...

51:03 ...wasn't it? A little too quick, so what we might want to do is go and change some of the properties here and our time step...

51:10 ...interval was 30 days. Not good. We want this every one minute.

51:17 And our time window is in minutes. So let's see what happens if we try it out now.

51:22 So on a minute-by-minute basis as soon as our earthquake occurred, we can see how the aftershocks started.

51:29 Some of them along certain faults, and the distribution is pretty interesting. A lot of them are along...

51:35 ...existing faults and the little lines you see there are actually the faults in the area that illustrate why they may have occurred.

51:44 And the orange ones are pretty big ones. In fact, if we open up the legend here, we can see that the orange ones…

51:52 …are anywhere between five and six in magnitude. This is the old scale that was used at that time. There's a new…

52:00 …scale that's used, this time around, nowadays.

52:02 But it gives you a good idea of how any data can really be animated if you have a time, or a temporal, characteristic to that data.

52:11 The important things you need to remember is, is that you may have to transpose the fields, modify the…

52:16 …fields a little to enable them to be used in here.

52:20 Now what about creating an animation? Well, the guys who wrote this stuff were really nice.

52:24 They added a button in here, and I'm just going to stop at this point. They added a little button in here that…

52:29 …says export my time slider characteristics to video. So you could do that right away, but of course, keep…

52:37 …in mind that this temporal modeling here is really much better supported in a true animation environment…

52:46 …where you add additional tracks. Tracks that play different things.

52:50 Maybe a group animation that turns different layers on and off at the same time as it's showing the temporal data…

52:57 …being displayed. So if we close our time slider and go to our animation here, we can create a time animation…

53:06 …and that's automatically created because we enabled time on our layer.

53:11 So if we go back and look at the Animation Manager, we're actually going to have a time animation track…

53:17 …automatically created, very easily, because we enabled time and we have that active.

53:23 And we have the two key frames here, in this case, that we will stitch together in between when we animate.

53:30 Now the next thing we may want to do, is we may want to zoom in a little over here in this area and…

53:36 …we may want to capture a frame. Do another frame over there. Maybe another one over there and…

53:42 …another one over there, and now if we play our animation, let's see what we have.

53:47 We have two tracks. We have the capture track, which is essentially a camera track, and our

animation track…

53:54 …and in this case, I may play both of them at exactly the same time, so now I'm using the ability to pan and zoom around…

54:02 …as my time information is being animated and displayed at the same time.

54:07 So keep in mind when you use time data, and animate it, it really is supported by adding additional tracks of information to it.

54:15 Hardeep? I'm done now.

54:20 So I guess, the demo which Colin just showed, you get the point like if you're just dealing with temporal data…

54:28 …you can use the time slider, but if you want to create a dynamic visual effect, like the camera is moving…

54:33 …and the temporal data is changing over time, you can actually create a time animation track and play it all together.

54:39 So that was the point there.

54:41 By the way, there's a technical workshop on working with temporal data tomorrow. So it's at one-fifteen in room 4.

54:48 So you might want to attend that as well, if you're interested in working with temporal data.

54:55 Now moving on to…Once you've created your animations, you can actually export these animations as videos.

55:01 The formats which we support are the AVI, or the Audio Video Interleaved format, and the other one…

55:06 …is the QuickTime format.

55:08 For the QuickTime format, there's a note here that you need to have the Apple QuickTime player…

55:13 …installed on your machines.

55:14 And from our testing, what we found is that there are some issues on Windows Vista and Windows 7, so it…

55:21 …works best on Windows XP. So we know of that issue.

55:25 But, as an interim what you could do is actually create the AVI files if that's acceptable.

55:32 The other thing, what we've done is, in ArcGIS 10 what we've provided is the ability to export animations as…

55:40 …sequential frames, so you can take these sequential frames, which are…the supported formats for those…

55:45 ...sequential frames are bitmaps and JPEGs. So instead of creating a video out of the animation, we...

55:51 ...actually spit out the BMPs or the JPEGs.

55:55 So what you can do with those images is you can edit those images. You can actually add titles, for example...

56:01 ...or you could delete some of these images and then take it into a third-party software and create an actual...

56:07 ...video out of it.

56:08 The other thing you can do is, if you don't have a third-party software, what do you do?

56:12 You can actually use the Raster To Video geoprocessing tool. So what it does is it's going to take in those images...

56:18 ...and create a video for you. So once you've created those images using the sequential image exporter...

56:25 ...you can actually edit those and bring those back and stitch those together using the Raster To Video GP tool.

56:31 So that's a nutshell on this slide.

56:34 Alright. One other demo.

56:37 Okay.

56:38 And this is going to talk about exporting animations.

56:39 Alright, so switch back to A please.

56:43 Okay, back to our familiar ArcMap and Crater Lake and I thought I'd just show you this, so...

56:49 ...what I decided to do was take that little animation that we had created earlier and that we had played, and...

56:56 ...take a look at...I don't believe this.

57:01 Yeah, it's a very unhappy map document. Very, very, unhappy.

57:05 So just give me a second to bring it up again.

57:07 So what I decided to do, at this point, was, is to take that animation that I had created. This gives me an opportunity to load...

57:14 ...an animation file, by the way. So I saved out the animation to an AMA file which really just saved...

57:20 ...all the instructions that the Animation Manager would have on the key frames, the tracks, and so on, and...

57:27 ...instead of me playing the animation through the animation controls, what I may want to do is take this animation...

57:34 ...and export it out. So I could export the animation out either to an AVI file, as Hardeep mentioned here...

57:42 ...or I could have exported it out to a set of sequential images.

57:45 So essentially, those original key frames that I created become images, as well as several intermediate images...

57:55 ...that transitioned from each key frame. So if I choose sequential images, and I choose to place this in an area...

58:04 ...and hit the Export button, it's going to ask me what type of things I want to do, but...

58:10 You want to do it again?

58:11 Let's do it again, sorry.

58:12 So export animation to sequential images.

58:15 It is reading this file.

58:17 Okay, let's just call it Test. Okay, test images. I actually already have them, so we're good.

58:25 Right, if we export out, it will ask me what format do I want to export out to, JPEG or BMP?

58:31 It will ask me if I have any kind of file name prefix. I may just call this Crater.

58:36 So each image will go out with the keyword Crater 1, Crater 2, Crater 3.

58:41 How many images per second do I actually want to have?

58:45 Do I want one image per second to be taken? Right now it's going to create 40 images.

58:49 Let's just take one image per second. So I'll have 20 images; estimated folder size will be 26 megabytes.

58:57 So it's going to go out and it's going to literally snapshot frames through the animation and generate the...

59:04 ...animation as a series of sequential images.

59:08 Now to help us—actually you can see what it looks like, if you like. There they are. So you're literally seeing...

59:13 ...the sequential images taken and written out as a series of sequential images.

59:19 Now I did this previously. I took the same animation and I put them out as a series of sequential images...

59:27 ...like this and then I played around with...I have PaintShop Pro, and I thought, you know, maybe...

59:33 ...I'll do a little bit of work on this. So I made a copy of these and I brought it into PaintShop Pro...

59:38 ...and I said, "Okay, what I'm going to do is, I'm going to add a really nice title to the first couple of images."

59:47 So I have a nice title on each image in my processing package and I also took each of the images and I used an option...

59:56 ...to kind of watercolor them. Just for fun. And then, I said to myself, Well, how about creating a video out...

1:00:03 ...of these images that I've now modified, I've put titles on. I even put a frame around them. So what am I...

1:00:08 ...going to do to create a video? How do I do that?

1:00:10 And it's actually really, really simple. So what I want to do is, I want my toolbox open, and within ArcToolbox...

1:00:17 ...if I go to the Conversion toolset...So I go to the Conversion toolbox, I'm going to go from raster to video.

1:00:27 So I'm going to point the input folder to be the one that contains all my information.

1:00:34 Let's see, that's in demo four, and it would have been this folder here that had... actually, no, it would be the one...

1:00:40 ...I modified, which would be that one, and then I would specify the output video file to create.

1:00:47 I'd specify the input format of the images in the folder. I'd specify a Codec if I wanted to modify those...

1:00:54 ...and I would give a frame rate, if I chose to, and the quality.

1:00:59 Well, this takes a little while 'cause it's taking those individual sequential images and it's stitching them together...

1:01:05 ...to create a video for me. So to help us a little, I already created one and I'm going to go back in here again...

1:01:12 ...and I'm just going to run this little video clip, and hopefully we don't get blown up.

1:01:16 And there we go, so this was my little Crater Lake sequential images that I've stitched together.

1:01:22 I've made a watercolory view of them in PaintShop Pro, put a title on, put a little border around it.

1:01:29 I made a slightly different video. So you have some ability to do some video editing if you wish to here.

1:01:35 And that's exactly the same stuff that we started off with, exported out, modified, and then

built the video...

1:01:41 ...with the Raster To Video tool.

1:01:43 And that's me. Thank you. Hardeep?

1:01:46 Thanks, Colin. I'm going to switch first.

1:01:50 So we showed you, well, you know, Colin showed you a lot of cool stuff and the way you can actually go back...

1:01:57 ...to your offices and do some, or create some really cool animations is, you know, one is that we'll be...

1:02:04 ...providing, I guess, you know, you'll have the proceedings and the slides with the conference proceedings, I guess.

1:02:11 The other thing is, you can also look at the desktop help. So this is definitely there.

1:02:15 You know, if you don't get the PowerPoints.

1:02:18 You know, we have, on the resource center, you have this link, I put this on the slides, but under the desktop...

1:02:24 ...help, we have the professional library help and under that, we have the mapping and visualization and...

1:02:29 ...the animations help. So it talks about the different types of animations and how you create those animations.

1:02:35 How you create flybys from paths. How you create simple camera animations.

1:02:39 So all that stuff is right in the documentation. So here's the link towards that documentation.

1:02:45 And the other thing I mentioned was a technical workshop. So we have one technical workshop tomorrow...

1:02:53 ...Working with Temporal Data in ArcGIS, and then the other one is Creating Animations.

1:02:57 It's basically the same, it's a repeat offering for this session.

1:03:02 And I forgot to put Aileen's Demo Theatre. That's tomorrow, right?

1:03:09 Do you know what the time is, actually?

1:03:11 No? Sorry. So there's the Demo Theatre on working with temporal data.

1:03:17 Now this is in the Mapping and Visualization Island, so that's another place where you could actually go there and...

1:03:24 ...take a look at how you work with temporal data.

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