Working with CAD Data in ArcGIS

This session will focus on best practices for working with CAD data in ArcGIS. Topics will include georeferencing CAD feature classes in ArcMap, using geoprocessing tools to import CAD datasets to the Geodatabase, and exporting Geodatabase feature classes to CAD drawings. This session will also cover ESRI's Mapping Specification for CAD and the ArcGIS for AutoCAD plug-in application.

http://video.esri.com/watch/75/working-with-cad-data-in-arcgis

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Video Transcription

00:01 Welcome. Good afternoon and welcome to the Working with CAD Data Technical Workshop.

00:04 My name is Phil Sanchez, and today I'm joined by my colleague Jeff Reinhart.

00:08 We're both members of the CAD software development team based in Esri, Redlands, and thank you for coming.

00:15 So our agenda for today is to cover the following topics.

00:19 So this, it's probably obvious that this technical workshop is going to focus on how you can integrate your CAD data in ArcGIS.

00:26 And we're also going to show some best practices on how to prepare CAD data for use in ArcGIS.

00:32 So I'll provide an overview about how Esri supports CAD data, how we represent CAD datasets in ArcGIS.

00:39 Then we'll shift over to more workflow-based topics using CAD feature layers in ArcMap.

00:45 We'll cover how to convert CAD data to the geodatabase and also vice versa, how to write out geodatabase content to CAD formats.

00:54 And then lastly, we're going to cover a little bit on working with map services.

00:58 So ArcGIS map services inside of CAD, both AutoCAD and MicroStation.

01:04 So I think most of you already know what CAD drawings are.

01:07 For those of you that are new to working with CAD, they are a file-based data source that primarily contains geometry.

01:15 It's going to represent some real-world objects.

01:18 It's also going to contain a lot of symbology.

01:20 So symbology and CAD files represents information.

01:24 CAD drawings are organized in layers or levels, depending on if you're using MicroStation or

AutoCAD.

01:29 And they can have additional data attached to them, additional data that we want to show how you can leverage inside of ArcGIS.

01:38 So more importantly for all of you GIS users, how is CAD important in the geospatial context?

01:45 Well for one, based on what we've seen over the years is that CAD drawings are one of the largest sources of data for GIS...

01:52 ...and that ranges from everywhere from like content that defines a basemap to a lot of different content for areas that are listed here...

02:02 ...in terms of the industries like such as surveying and cadastre, for infrastructure, for civil engineering...

02:08 ...and the design fields such as architecture.

02:11 There's some new CAD formats emerging these days, what they call building information models...

02:16 ...so that's becoming part of CAD in the geospatial context.

02:21 And also, all together this has helped comprising what we seen lately is in the 3D virtual cities.

02:27 So CAD is a very integral part of geospatial data, and our goal and our desire is to provide support for that inside of ArcGIS.

02:38 So Esri, that's right, Esri has provided support for CAD data for quite some time...

02:44 ...going back to actually the ArcInfo workstation day, working with supporting .dxf files, IGDF, IGDS files...

02:52 ...so we have a long history with working with CAD.

02:55 Back then, it required some conversion, but in present day with ArcGIS 10 or 9.3.1, or even earlier, starting at ArcGIS 8...

03:03 ...this is all out-of-the-box functionality.

03:07 So you don't have to have an extension to work with CAD data.

03:09 You can directly access it in ArcMap.

03:13 In regards to the file formats that we currently support, we support the AutoCAD .dwg and .dxf file...

03:21 ...currently up to AutoCAD 2011.

03:24 So for those of you that have the latest version of AutoCAD, you can use that in ArcGIS 10.

03:29 9.3 was supporting up to 2009, so we've added support for that at 10.

03:34 For MicroStation, we support up to version 8, but going all the way back to the early versions

of DGN...

03:40 ...so the 5.x, the version 7, and so forth.

03:45 Bentley hasn't come out with a new DGN version, but when they do...

03:49 ...same with Autodesk, we always strive to keep up with those new releases

03:53 We'll update our libraries, either get that out in a service pack or the next general release.

03:56 So it's always a constant process for us.

03:59 But those are the two main CAD formats that we do support, and I think out in the industry...

04:03 ...we see those are the two main software programs that you all are using.

04:07 Another interesting note about our tools, all CAD geoprocessing tools are available at all license levels.

04:14 So previously, we did have some tools that were at the ArcInfo level.

04:17 That has all been brought down to the ArcView level.

04:19 So anything that we show today that's specific to CAD geoprocessing...

04:23 ...you have access to that regardless what license you have for ArcGIS.

04:30 So the way that we represent CAD datasets in ArcGIS can be looked at in terms of some items or a container of items.

04:38 Now, first and foremost is we support geometry, so that's going to be your points, your lines, your polygons, or annotation.

04:46 I think we support most of the common entity types.

04:49 There's always room for improvement there.

04:53 We also support attributes, so entities always have attributes that are inherent to them called CAD properties.

04:58 You're going to get that in the CAD feature class by default.

05:01 We also support other attributes, what we would call user defined such as tags and blocks, attribute definitions, and so forth.

05:09 So that combines geometry with your attributes.

05:12 Now on the bottom section here, we have coordinate system listed, so when you first use CAD data in ArcGIS...

05:19 ...most likely it's not going to have a coordinate system defined, but we have tools that allow you to do that.

05:23 So that's going to allow you to align your CAD datasets with other GIS data inside of

ArcMap...

05:28 ...so that we can reproject to the proper coordinate location.

05:32 We also have a concept of a world file.

05:34 So world files are text files that are used to define transformation.

05:40 In cases where you need to position a CAD drawing, you know, again to align with your GIS data.

05:47 So sometimes you see CAD drawings.

05:50 Maybe they were created at 00.

05:52 I don't know, maybe you guys have dealt with that before, so we have ways to deal with it.

05:57 In regards to how a CAD feature dataset appears in the catalog window, it's a read-only representation of a single CAD file.

06:06 So it's a one-to-one relationship so you have a CAD drawing, one CAD drawing equals one CAD feature dataset.

06:13 And those CAD feature datasets are similar to a geodatabase feature dataset.

06:16 They're going to have feature classes that are organized by geometry type.

06:20 So every time you browse those in the catalog tree or you add data...

06:24 ...you're always going to notice you have feature classes inside that dataset.

06:28 You can work with individual feature classes.

06:30 You can work with the entire dataset.

06:32 Depends on what you're doing.

06:34 And, again, our spatial reference are defined by external files, PRJ file in the world file.

06:41 So let's talk about how you use CAD data in ArcMap.

06:45 So there is different scenarios and it really depends on what your project needs are.

06:51 It can be...you can use CAD data simply as a background for visualization in terms of to provide additional cartography to your map.

07:00 You can use CAD data as input to geoprocessing tools.

07:03 So if you need to do additional things to your CAD layers, it's fully supported by the geoprocessing framework.

07:09 Then lastly, conversion.

07:10 Conversion's a very popular task, and we know that a lot of you need to convert your data, migrate it to the geodatabase.

07:20 So when you add a CAD dataset or CAD feature layer to ArcMap...

07:23 ...you're going to see it rendered similar to how it would appear in AutoCAD or MicroStation.

07:28 And that's because we're using the CAD properties that represent symbology.

07:32 We're using those properties to render the features inside of ArcMap.

07:36 And we do that by a CAD style that's installed on your hard drive.

07:41 So that's something that you'll always have access to.

07:45 Of course you can change your symbology to suit your needs...

07:48 ...so you can always modify features based on a certain field type or field values.

07:55 The good thing is you can always restore the appearance of the CAD dataset back to its original appearance.

07:59 We have a Restore Original button.

08:01 It might be hard to see on that dialog, but that's located on the Symbology tab when you open up the CAD feature layer properties.

08:07 So you can always revert back to the original appearance.

08:11 We support most of the common line types and line styles from AutoCAD and MicroStation...

08:15 ...but there may be cases where you don't see, it's not exactly 100 percent matched.

08:19 So for instance, custom line styles is something we don't support, but we're always looking at that, proving that in the future.

08:29 [Inaudible audience question]

08:31 Yes. You just add data.

08:33 You browse to a folder and add a CAD feature dataset right to ArcMap.

08:38 So, that's what we consider a direct read workflow, just adding it right to the map.

08:44 So I mentioned something about CAD properties earlier that we do support properties as attributes.

08:51 So every CAD feature class that you access in the catalog tree or in ArcMap...

08:58 ...it's always going to have an attribute table associated with it.

09:00 And, again, some of these properties that are represented as attributes, they're always going to be part of the drawing.

09:06 An entity is always going to have a color.

09:08 It's always going to have a layer that it's assigned to and so forth.

09:11 And so that's always going to be present in the attribute table which is useful for performing queries.

09:19 Maybe you want to isolate a certain set of the CAD feature class inside of maybe in ArcMap or for a geoprocessing input.

09:27 So that's available.

09:28 We also support user-defined data such as block attribute definitions and tags for MicroStation, even MS links.

09:36 So for those of you that have some legacy DGN data, if you open up the feature class...

09:41 ...you'll notice that there's some MS link fields, MS catalog...

09:44 ...so you can always use those fields to join to other external tables that you are working with at your organization.

09:54 Do you support extended attributes?

09:57 The question is, do you support extended attributes like extended entity data?

10:02 We do in a geoprocessing tool that has been deprecated at 9.3.1, so I think...there's only a few users...

10:12 ...we always ask users who uses X data.

10:15 In fact, who uses X data still?

10:17 Okay, so we still have a couple people.

10:21 So, at 10, tools that you do have that, for instance, the Import From CAD tool supports X data.

10:27 If you have that tool in a model that you continue to use, that model will still work in 10...

10:32 ...so you'll still be able to access that X data.

10:34 We're looking at ways to provide equivalency between the deprecated tools that we've, you know, previously deprecated in older versions...

10:40 ...and where we're at with 10, so if you do have issues, we can always, you know, talk offline and figure out new solutions for you.

10:47 And actually, we have a new data structure that we want to talk about today that might address migrating from X data to a newer technology.

10:57 So MicroStation has a concept of tags that can be very powerful, very useful for you for MicroStation users...

11:06 ...that allows you to define basically fills and fill values inside of a DGN file.

11:12 Do ArcGIS by default will read those tags as fields and those tag values as attributes...

11:17 ...and so you can actually get more information from the CAD drawing than just a standard...

11:21 ...you know, symbols or symbol properties.

11:24 So that's something that if you do have control of the way that the DGN file is generated...

11:31 ...perhaps you can provide requirements to your contractors or another group within your organization.

11:36 Tags are your friends if you're an ArcMap users.

11:40 So, that's kind of a best practice that we recommend.

11:42 We know that not everybody has control of how the CAD data is created.

11:46 You know, it's not your fault that you have 25,000 entities on layer zero, but, you know, there're ways around that.

11:51 So, in regards to AutoCAD, there's a concept of blocks and attribute definitions.

11:57 And similar to how MicroStation tags work, it's kind of the same concept...

12:02 ...where you do have a field and an attribute both in AutoCAD and ArcGIS.

12:07 So this is just a screen shot showing on the left-hand side...

12:10 ...and previously the left-hand side was MicroStation and now AutoCAD property windows.

12:16 And then we're just looking at identifying ArcMap.

12:17 And you can see that you get the same information carried over from one application to another.

12:23 So again, it's a best practice.

12:26 It's possible to have that information generated for you when you use it inside of ArcGIS.

12:31 It's always going to benefit in the long run.

12:35 Okay, so to answer your question about X data, we now have a new technology called the mapping specification for CAD...

12:41 ...and you might hear us abbreviate it as MSC.

12:45 We developed this framework at 9.3.1, and the purpose is to provide a way for AutoCAD users...

12:51 ...to define GIS feature classes inside their drawing and assign attributes to those...

12:56 ...and also to embed a coordinate system inside the drawing.

13:00 So earlier I mentioned when you bring a CAD dataset inside of ArcMap...

13:04 ...it's not going to have a coordinate system most of the time.

13:06 With the mapping specification for CAD, you can prepare this information inside of AutoCAD...

13:12 ...and when that drawing is delivered to a GIS user, ArcGIS user, they'll have access to this information.

13:18 So the purpose here is first to provide better interoperability between AutoCAD and ArcGIS...

13:29 The goal here is to leverage existing data.

13:31 So take your CAD standards and basically use that information to basically create feature classes, queries inside of your drawing.

13:34 ...and our goal is not to force CAD users to change the way that they work.

13:41 Our ArcGIS Desktop tools recognize them, and then going out back to CAD or Export To CAD tool in the geoprocessing toolbox...

13:48 ...that also will create, by default starting at 9.3.1, these additional features classes.

13:53 So for those of you that have exported out to an AutoCAD file at 9.3.1, if you ever look at that drawing back in ArcMap...

14:00 ...you're going to notice, hey, I have all these extra features classes, and they're not just point, polyline annotation, and so forth.

14:06 So that's a very useful technology that we want to promote.

14:10 We're trying to get the word out for a best practice to attribute your data...

14:15 ...and organize your CAD data using that mapping specification for CAD.

14:20 So here's an example.

14:21 This is just a graphic showing if you have a line entity inside of AutoCAD...

14:25 ...of course it's going to have the standard properties that are assigned to it such as layer and color...

14:30 ...but you can also assign additional information such as if you have...in this case it's a let's say a water main...

14:37 ...you have material, diameter, and length, so that information's going to get carried over into ArcGIS through the drawing file.

14:44 So this is, again, there's no charge for this.

14:48 It's an open standard, so if you have AutoCAD developers...

14:52 ...if you don't want to use our products to develop this type of schema inside of your drawing, you can also just use our open API.

15:01 So you can have a custom toolset to create these types of feature classes and coordinate systems...

15:07 ...inside your drawing inside of AutoCAD.

15:12 Alright, so let's move on to another topic that's quite popular.

15:16 Every year down in San Diego, we get a lot of questions about how do you georeference?

15:20 How do you position CAD data?

15:22 A lot of times it may be created in a local coordinate system.

15:26 And that's okay, because we have tools to address this.

15:28 Now ideally, it's always best if the drawing is in the proper coordinate location...

15:33 ...but we have ways to transform that data so that it does align with your other datasets.

15:41 And that's...that's supported by the georeferencing toolbar.

15:44 So this toolbar is available in ArcMap.

15:46 It's the same toolbar that works for raster layers, and if you're also familiar with the editor spatial adjustment toolbar...

15:52 ...it's the same type of workflow.

15:54 You can interactively move the drawing around.

15:58 But it...really the real, I guess the accurate, more accurate workflow is to create control points...

16:04 ...that can define your deltas from your From location to your To location.

16:09 And that's supported by world files.

16:11 So I talked about that earlier.

16:13 Basically, a world file is a simple text file that's going to contain those deltas.

16:17 It's going to have your from X1, your from Y1, so it's basically two rows.

16:22 So in ArcGIS, we support a two-point similarity transformation.

16:26 If you need to perform additional adjustment methods, maybe even rubbersheeting.

16:31 That's where you're going to need to convert your data to a geodatabase feature class to perform that type of transformation.

16:37 But if you're talking about, if you want to maintain that aspect ratio and just need a reposition to line up with the other data...

16:43 ...the georeferencing toolbar can take care of that for you in ArcMap.

16:48 Something that a lot of people don't know about.

16:50 We have this...we introduced it I think back in 9.3, the concept of a universal projection and universal world file.

16:57 So this is very useful if you have a large set of tiled CAD drawings, so a folder or workspace that has, you know, many CAD files, hundreds...

17:07 ...it'd be very tedious to go through and create a projection file for each, you know, drawing...

17:11 ...so by using the special prefix, Esri_CAD.prj in that workspace...

17:18 ...one projection file will reproject everything in the entire workspace, all the CAD drawings.

17:23 And the same concept applies to the world file.

17:25 So you can have...now the world file is special because they have to be tiled.

17:29 If they're stacked, a word file for one drawing is not going to work for another drawing.

17:34 But if they're tiled and if they're all created in let's say a local coordinate system...

17:38 ...that universal world file will be able to move them all in an ArcMap session.

17:43 Now, something important to note is when we transform CAD data, we're not actually manipulating the drawing itself.

17:51 The drawing stays intact.

17:52 It's just the accompanying world file that's defining the deltas.

17:56 So if you look at it in AutoCAD, if you transform it in ArcMap, and you take it back to AutoCAD...

17:59 ...and you say, wow, you know, I thought I transformed it, it's because we're not actually manipulating the geometry.

18:03 So it's something to be aware of but, you know, maybe down the road we would look at some tools...

18:07 Okay. So enough of me to talk here.

18:08 ...that would provide a transmission in the CAD drawing, but for now, it's just...it's just controlled by that external file.

18:20 I'm going to pass things over to Jeff.

18:21 He's going to do a demonstration of using CAD feature layers in ArcMap, what we call CAD 101.

18:26 So he's going to cover some of the things I just talked about.

18:29 Alright. I don't really need to do much.

18:34 Phil covered everything, so keep going, Phil, that's good. Yeah. No.

18:38 Okay, let's switch to me now.

18:42 Okay, the first thing I want to point out is new at ArcGIS 10 is we have these tabs on the side.

18:47 I'm sure you've seen them in other presentations, and just because it's CAD data, doesn't mean we participate any different.

18:54 So one of the things we can do is in the Search tab which I really like, is I can do things in like CAD.

19:00 I do a search on CAD, and I can find all my CAD data.

19:03 Because I don't know what you guys, but I put it things, I can't find where it is, where is that CAD file?

19:07 The same thing with tools.

19:08 You can type in specific words that'll help you, so DWG.

19:13 I can find all my DWG files that I have there.

19:16 So in this case, what I want to show you guys is the Morey County.

19:25 So if I enter that, there's Morey County file that I want to get.

19:31 So quickly, I can add my CAD file that way as well instead of doing the traditional Add Data.

19:35 It's just a nice way of organizing this stuff.

19:39 Okay. Here's a CAD file, and as Phil touched upon already, it already looks different, doesn't it?

19:44 Because it doesn't have just a point line polygon annotation.

19:50 And also the island we've been doing demos and using my laptop...

19:53 ...so if anything blows up, it's because whoever's at the island wrecked my demo, so...anyway.

20:00 So we have all these feature classes here and if you're used to looking at a point feature class for example...

20:06 ...we'll look at the field information.

20:09 And at 9.3.1 and previous, you'd see a lot more fields present in a CAD feature class.

20:14 That's because at 10, we've actually hidden by default some of these feature classes that Phil talked about...

20:19 ...being able to render CAD better that we use these fields.

20:23 But generally to the users, most people don't need all the additional CAD fields, but if you do, they are available for you.

20:29 So if you were to go here, and go Properties, I go to My Fields.

20:36 Here's the large list of fields that we do expose that are available to you if you need them.

20:40 So, for example, doc path.

20:42 I want to export and I want to know where my file came from, so you can use those things.

20:47 So you could turn them on or off, however you choose to use them.

20:51 The other thing, too, is these mapping specification for CAD, the feature classes that he talked about.

20:56 That's the additional feature classes, and if we turn off everything, and I turn on my polyline...

21:03 ...I'm going to get everything, because that's the entire CAD drawing, all the polyline geometry, and that's added there.

21:09 But if we want to go look down here at these MSC feature classes that are organized, we look at roads, for example.

21:16 And I'm only getting this road feature class.

21:18 As you can see, it's rendered just like a regular CAD feature class.

21:22 If we do an identify on it, pick a piece of text that flies out...

21:27 ...and we'll see here that we've got our traditional fields that I showed you as well, but all these MSC feature classes...

21:33 ...mapping specifications for CAD feature classes, you're going to get additional fields in there as well...

21:38 ...like code and object ID.

21:40 If we pick something different, water fittings and identify that, you get the same thing.

21:47 You're going to get our standard CAD feature classes but we're also getting these additional fields, these attribution fields.

21:53 And as we go along further in the presentation, we'll show you how they're become really important...

21:57 ...for not just our GIS users, but the CAD users as well.

22:01 So, that's what I wanted to do there.

22:04 So the other thing is Phil talked about is doing georeferencing.

22:10 Do you guys...just a show of hands...do people do a lot of georeferencing or have done georeferencing the CAD data?

22:15 Or does it just come in perfectly every time?

22:18 Yeah, me too.

22:22 So [inaudible]

22:32 Okay. So here's a typical scenario.

22:34 You've brought some CAD data in or maybe you have CAD data already in your file.

22:39 These are all these ones here.

22:41 But, you've got one more to bring in.

22:43 And you add it in, and you do...I can't find it.

22:48 I added it to my spot right here, and I don't see it anywhere.

22:50 I zoom full extent and what's that over there?

22:55 As you start zooming in into the pinhole, and you eventually can't find it because it's lost, right?

23:01 But, what I want to show here is that I've got this CAD file that's off in a zero-zero land or who knows where it is...

23:10 ...in some local coordinate system.

23:12 What I want to do is I want to quickly and easily move the CAD file into the right location so that when I use it in ArcGIS...

23:19 ...it comes in the right spot.

23:23 So I'm going to go the Georeferencing toolbar and that's just...I already have it on of course...

23:27 ...but that's just the georeferencing toolbar...same one that you use for raster.

23:31 And if you really want to kill a demo, you pick the wrong target layer or you don't change it...

23:36 ...then you go and move and you move the wrong file, and it's in the wrong spot.

23:39 But in this case, I want to get my 22, and because it acts on the dataset level, not just the feature class level...

23:46 ...they're all exposed but any one of them will do.

23:49 So if I use my georeferencing, I can...the first thing I like to do is I like to fit to display...

23:55 ...because I want to move it into the location that I want it to come into.

24:01 Oh, I killed the demo.

24:22 Twenty-four. Which one is it?

24:23 It's twenty-two.

24:27 There we go, ah you know what?

24:30 Sorry guys, I already georeferenced it.

24:33 See, that's what happens when you show your computer on there.

24:35 [Inaudible audience comment]

24:36 Yeah, that's right.

24:37 [Inaudible audience comment]

24:39 Okay. So, going down to here.

24:46 [Inaudible audience comment]

24:47 What's that?

24:48 You lost him.

24:49 I'm not. I'm fixing my demo on the fly here is what we're doing right now.

24:54 Maybe it's time for more questions.

24:55 Yeah.

24:58 Actually, anyone have any questions at this point? Alright. Hand back there.

25:02 [Inaudible audience question]

25:08 About georeferencing?

25:09 Okay. So the question is, where can you find more information about georeferencing?

25:14 To answer, yes. The help system would be the first place.

25:16 We have, at 10 by the way, we've revamped our help system.

25:20 We've reorganized it.

25:21 There's a lot of good content in there.

25:24 So that's where you want to check...go there first.

25:26 We also have...a couple years ago we did a live training seminar for working with CAD data...

25:33 ...and we have a georeferencing video in there as well.

25:36 We have the resource center that we hope to start posting some videos for some of the common workflows...

25:41 ...such as georeferencing or conversion.

25:43 So please check our resource center as well.

25:46 And then this demonstration or this technical workshop will be available postconference.

25:52 So you can always look back and watch Jeff, you know, ruin the demo.

25:55 Flounder. I just ruined it.

25:56 And then, just don't do it that way, so it'll be good.

25:58 [Inaudible audience question]

26:05 Yeah, I think the best would probably be the help system, but we'll try to get a video up there soon...

26:09 ...so that you can just point a video, you know, point them to a link and they can watch that video.

26:12 So that's, yeah, we know, we recognize that georeferencing is a very popular topic.

26:18 So we'll work on getting some content out there.

26:21 So, yes, sir.

26:23 [Audience question] The slides you had with the georeferencing methods, I got the two-point similarity.

26:28 Can you just tell me the rest of that list real quick?

26:31 Yeah. So the question is, regards to the transformation methods, you saw the two-point similarity listed...

26:37 ...and that's all we do support, so that's just for CAD.

26:40 So the other transformation methods would be supported by the spatial adjustment toolbar in the Editor.

26:46 That would be in a fine transformation.

26:47 It also supports a similarity transformation, but it also supports a piece-wise transformation.

26:51 So that's that rubbersheeting that you would basically skew your data, so, you know, just start rubbersheeting all your CAD drawings.

26:58 Your engineers are going to love that.

27:00 Yeah.

27:01 Start skewing arcs and circles, it's perfect, so.

27:04 So I'll just go back in here. I messed up that other part.

27:07 But what I can do is I can pick this 24A even though it's in the right spot, I'm going to actually move it around.

27:11 I know that's bad, but, so what I can do is I've identified this 24A.

27:16 I can, oops.

27:24 I can move it around.

27:25 I can [unintelligible]

27:26 So imagine that this CAD file, we'll just imagine that this CAD file is not in the right location.

27:30 So I can shift it, move it to another location, and I can do things like scale it as well and fit to

display if I was moving it into my spot.

27:40 So what I want to do here is...

27:42 Turn off your autoadjust.

27:46 So what I want to do is I want to use some control points.

27:48 That would be the easiest way of doing this.

27:57 So what I want to do is I want to use these two control points.

28:00 As Phil mentioned, we only do two-point transformations, not multipoint.

28:04 And the nice thing at 10 as well is snapping is on by default.

28:08 So in the past, you were to zoom in, zoom in, zoom in trying to find the right exact spot where you want to move your CAD file.

28:13 You can't, so...or it was difficult.

28:16 So now you can use the snapping environment.

28:18 It's on by default.

28:19 We can click that as well and then we can go to our next piece and add the next line, snapping is on there and there.

28:27 And then we can do things like update display.

28:31 Let's see if it comes in.

28:33 So then it comes in and you've georeferenced it.

28:35 I was off on my snapping a little bit, but, so you can move the CAD file around.

28:39 And once you get it where you want, you can update the georeference, and that's where you're going to save your world file.

28:48 So then that's were I would save my 24 world file. Save it.

28:53 And now anytime I'm able to use this CAD file, come back to use this CAD file in ArcGIS, it's going to come in in the right spot.

28:58 Of course, if I opened up this CAD file in AutoCAD, it's going to be in the same location it was before.

29:04 You're not changing that at all.

29:05 It's just an external reference which Phil mentioned already.

29:09 And that's pretty much it what I wanted to show.

29:13 Come back next time on Wednesday and I'll have it working better.

29:23 Alright, well thanks, Jeff.

29:24 So one thing I do want to mention about snapping, at 9.3.1 and earlier, you would need to have an edit session active to snap...

29:30 ...but with just CAD data, that was somewhat difficult.

29:33 You actually had to trick it and just add a shapefile or feature class, but now snapping's on all the time in ArcMap.

29:39 So that's something to, you know, one nice thing about 10 is the snapping environment.

29:45 So now we're going to move into the next topic.

29:48 The next workflow-based topic is CAD data conversion or converting geodatabase or CAD features to the geodatabase.

29:57 Now the geoprocessing framework is basically where this all happens.

30:03 So when do you need to convert your CAD data?

30:05 Well you need to convert it when you need to do things beyond what you've just seen...

30:09 ...when you need to edit data for instance or you need to incorporate that the features from the CAD drawing...

30:17 ...into your feature class for, let's say, cartographic representations.

30:22 Other things that require a read-write, you know, environment.

30:28 So there is the concept of just taking one CAD feature class and converting it straight to a geodatabase feature class...

30:34 ...a one-to-one.

30:35 But there's also things that you want to do to get the most out of your CAD drawing.

30:40 And so this graphic is showing some typical scenarios.

30:43 Now, again, just like...talked about how you can get additional information from attributes...

30:49 ...well there's a lot of information in the CAD drawing, but when you add that to ArcGIS, it may not be ready for you...

30:55 ...ready to use the way that you would like to use it.

30:58 So this is really fundamental GIS, but we always get a lot of questions about, how do I, you know, get this text, you know...

31:05 ...inside of my drawing, inside of my polygons.

31:06 These are my parcel ID values or, you know, something that's a diameter that's next to a water main line or something.

31:14 So we have tools in geoprocessing framework that allow these types of proximity function, spatial joins, for instance...

31:22 ...or to modify your geometry.

31:25 You know, not all...sometimes when you see some polygons in AutoCAD, they look like polygons, yet in ArcMap...

31:30 ...they're not polygons, where's my field pattern.

31:32 So we have tools that allow you to generate polygons from lines.

31:36 So these are some of the common scenarios.

31:38 In one [unintelligible], you know, this is where you'd want to perhaps automate some of these functions...

31:52 So with CAD drawings, you can take one CAD drawing and create a brand new geodatabase...

31:56 ...many CAD drawings to create a new geodatabase.

31:59 You can append to existing geodatabase feature classes with CAD features, and you can also merge them with other layers.

32:05 So it really depends on how you need to integrate that CAD dataset into your geodatabase.

32:12 So, again, talking about how CAD data is a very important source for geospatial data.

32:20 The geoprocessing framework supports the ability to convert that.

32:25 So just like many things in ArcGIS, there's always several ways to do something.

32:30 So for instance, if you just want to quickly convert data inside of ArcMap, you can select your CAD feature layer in the TOC...

32:37 ...right-click and just go Export Data, and you're going to get output to a geodatabase feature class straight from the TOC.

32:44 So you don't have to use a toolbox in that scenario.

32:47 If you're editing, you want to just grab some geometry from a CAD feature class and paste it into your targeting editing feature class...

32:54 ...that's another possibility, too.

32:55 You can also use that approach.

32:57 But the more traditional ways are going to focus around ArcToolbox and the tools...

33:02 ...such as feature class to feature class in Copy Features and for annotations.

33:06 So CAD annotation is special, and we have a tool called Import CAD Annotation...

33:10 ...that allows you to take your CAD text and convert it to real geodatabase annotation.

33:15 For those of you that have ever taken some CAD text and converted it just using, let's say, Copy Features...

33:21 ...you don't see your text when you're done because it's actually taking the underlying geometry...

33:25 ...and persisting that in the output geodatabase.

33:28 So for CAD, for CAD text, you always want to use Import CAD Annotation.

33:34 Now at ArcGIS 10, we have a new tool called the CAD to Geodatabase tool...

33:37 ...and this tool is intended for to be used as a bulk loader.

33:42 So it's basically a batch process where you would have, again, going back to that concept of a folder or workspace...

33:48 ...with a lot of different, lot of tile drawings, or a lot of drawings that you want to convert to the geodatabase...

33:55 ...this is the tool that you'd want to use.

33:56 Now this tool's not for everybody, because there's cases where you may want to use the Append command...

34:03 ...to add to an existing feature class or you're just working with one single feature class.

34:07 So this tool works at the dataset level.

34:09 So you actually pick the drawings when you actually go browse and add the data.

34:16 And what it does, it combines copy features, merge, and the Import CAD Annotation tool into a single tool.

34:22 So this is a nice tool for those of you that have to convert a lot of CAD drawings into the geodatabase...

34:29 ...and want to save some time, want to do it in one operation.

34:32 And, of course, this can also be used in ModelBuilder to automate the process.

34:36 If you're going to run these processes on a daily or weekly basis, it does fully support that as well.

34:44 Now on the flip side, we have tools that allow you to export geodatabase features to CAD.

34:50 It doesn't seem...it seems like most people are taking CAD data into the geodatabase...

34:54 ...and it's a smaller portion of people that are actually exporting back out to CAD.

34:58 But this is one of our very powerful tools called the Export to CAD tool.

35:02 And this allows you to simply just drag a layer into the tool from ArcMap and simply just click OK...

35:10 ...pick a couple things such as the output type.

35:13 We support writing to many different versions of AutoCAD including the current AutoCAD 2010 format...

35:19 ...which AutoCAD 2011 uses as well as MicroStation V8.

35:24 So you have some options there.

35:27 And you can also basically use it in a very simple fashion where you're just dragging layers on...

35:34 ...or you can combine it with additional information in the feature class.

35:38 So the input feature classes, you can have fields in there that we call CAD reserve fields and these fields help define the output.

35:48 So you can dictate which drawing files those feature classes will write to.

35:54 For instance, you can have one feature class and write that out to say 10 different drawings...

35:58 ...if you're dealing with a large feature class.

36:01 So there's various ways that you can leverage this tool.

36:05 To take it to the next level, we support the concept of a seed file.

36:08 So a seed file can, again, be very useful for interchanging data between GIS and CAD.

36:17 In terms of the Export To CAD tool, the see file will dictate how that data's being created.

36:23 So if you have a CAD standard, for instance, in your organization or a CAD department says...

36:30 ...we need to have CAD drawings constructed this way.

36:34 So as a GIS user, you could use a seed file that they deliver to you that has predefined schema...

36:40 ...meaning that it has all the drawing layers defined.

36:42 It has line styles, text styles, and so forth, even blocks, block attributes or cells, and so forth.

36:49 So there's a lot of different ways to use see files.

36:52 Now for MicroStation, they're necessary.

36:54 For AutoCAD, they're optional.

36:56 So if it's appropriate, that's always a good way to really have more control over how you export data to your CAD end users...

37:04 ...if that's a requirement.

37:05 I know that sometimes you do have to take content in your maps, in your geodatabase...

37:09 ...and deliver it to a contractor or some engineering department that needs to work with CAD or can only work with CAD formats.

37:16 Got a question.

37:17 [Inaudible audience question]

37:21 Yeah. Yeah, the question is, do have a CAD person send you the seed file and then you use that?

37:26 And the answer is yes.

37:28 That seed file is typically...you want it to be blank.

37:31 It's not...it doesn't contain any entities, any geometry, but it does have, let's say just an example...

37:38 ...it has all your drawing layers defined.

37:40 Now also, by default, the Export To CAD tool will take the feature class, like if you have...if you added three feature classes....

37:49 ...streets, parcels roads, and you export that without just using a default seed file or just no seed file...those feature classes...

37:58 ...that tool will create new drawing layers in the drawing called roads, streets, and utilities, and so forth.

38:06 But you can use the fields, the reserve fields, to overwrite that.

38:10 So you have a lot of control between seed files and your CAD reserve fields.

38:14 But to answer you question, yes, you...typically it's going to be created by someone that has CAD...

38:20 ...and then you as an ArcGIS would use that to deliver drawings the way that they asked for them.

38:27 Okay. So I'm going to pass things over to Jeff, and he's going to do another demo for CAD in geodatabase...

38:32 ...and as well showing how you can use Export To CAD.

38:39 Okay, back again.

38:41 So in this case, what I have here is actually some DGN files.

38:45 But what I'm doing here with the DGN would work the same way with DWG or with AutoCAD.

38:50 It doesn't make any difference.

38:52 So if we look at these, they're tiled CAD drawings like Phil mentioned.

38:58 We can turn those on.

39:00 So a lot of...I assume most of the people here that you convert a lot of CAD or CAD data to GIS data?

39:06 Is that correct in assuming that?

39:08 Okay. Alright.

39:09 So new at 10 we've added some quick reference or some shortcut menus to get at these tools that Phil was talking about earlier.

39:18 So for example, if we zoom in a little bit tighter so we can see here under this CAD file...

39:22 ...you can see a pretty typical CAD file.

39:24 It's got some parcels with some text.

39:26 The text means something to whatever the line is next to it.

39:32 So what we can do is do things like this where we got an annotation feature class...

39:37 ...if we turn that on and off, that's what that is.

39:39 But what I'd like to do is convert it to annotation feature...I'd like to convert it to Esri annotation.

39:48 So I can use the...did I miss it? Oh, sorry.

39:58 I want to convert geodatabase to annotation.

40:01 So what it does is it brings up a tool Phil has already talked about, and it's Import CAD Annotation.

40:07 But the nice thing is I didn't have to go search for it or I didn't have to go find the tool.

40:11 It's connected right to the feature class.

40:13 So it's going to bring that annotation feature class and I want to put it out to a specific location, say...oops...

40:33 ...and we'll put it into Lots for example and we'll call it Test 2.

40:48 So it's going to do that.

40:53 ...but sometimes when you export your CAD text annotation, does it come out the right size or the right color or the right...

40:59 ...you lose that symbology, right?

41:00 So the important thing here is to try and do this from ArcMap.

41:03 Run inside ArcMap because it takes advantage of the projection, the spatial reference that you have set...

41:09 ...along with the units that are set in your CAD drawing.

41:12 And it'll just make the translation a lot easier on you.

41:15 So in this case it's taking a default of a thousand, and we won't bother with any other...and we're going to run that tool.

41:28 Just going to run the background, you can see back here.

41:37 Yeah. I guess I should mention at 10, too, new at 10 is tools running in the background by default.

41:45 So if we turn off those CAD files all together and I zoom into the annotation that I made...

41:50 ...you can see, if I just [unintelligible], you can see that we maintained and we brought the text across.

41:55 And it looks very similar to what I did in CAD, so that's always a nice thing.

42:02 The next thing I want to show is, if I go to one of the geometry feature classes, and I use the context menu as well...

42:09 ...and I go Convert CAD Feature Layer, that's going to bring up a tool that Phil talked about as well is Copy Features.

42:17 So we can go do the same thing, and we'll call this polygon...oops...22...so we can do the same thing where we run that tool...

42:33 ...once again, running in the background by default.

42:35 It's done. It adds it to the...and now we've created our feature class from our CAD data rather quickly.

42:50 The next thing I should show you is the CAD To Geodatabase tool.

42:55 I could go into my search window and change to my tools and find my CAD...I typed it before...

43:03 ...and it's going to find it here and I could add it that way.

43:05 But another way to do it as well is to go here, back to one of my geometries...

43:13 ...and use another context menu that we've added a well is Convert CAD Feature Dataset.

43:18 Now this isn't going to work on the feature class level but the feature dataset level, taking in an entire CAD drawing...

43:23 ...and it's going to do that bulk loading that we talked about.

43:28 So if we get the second one in there as well and I want to output to an existing geodatabase in this tool.

43:45 Oops. Too far in.

43:47 So I add that in and then we'll just give it a, my 22.

43:51 So it's going to create a dataset, and the same thing happens.

43:53 Because that tool, if you think about, it incorporates import CAD annotation, the tool I just showed you before.

43:58 It has the same reference scale information that we want to use along with the spatial reference.

44:03 We're going to get the same kind of behavior.

44:05 So if we execute this tool, once again it's running in the background.

44:17 And then it adds it to it.

44:18 So if I turn off my CAD files, you can see that now I've brought across...

44:24 ...rather quickly, I brought across this tiled CAD data into a single geodatabase feature classes, sorry.

44:32 Alright. So this CAD GDB tool is something you can do at 9.3.1 right now.

44:38 It's just that you would have to string it together, those tools in a model...

44:42 ...and to do this, this is just a really quick way of doing it without having to go into ModelBuilder.

44:46 It's just kind of a productivity tool for that.

44:50 Yes, question.

44:51 Oh, yeah, go ahead.

44:52 [Inaudible audience question.]

44:57 Yeah. Question is, what is multipatch?

44:59 It's a separate feature class geometry type.

45:03 Typically, multipatches are going to be used in a 3D context such as ArcScene and ArcGlobe.

45:08 With CAD data, a lot of times what you see in the polygon feature class, you're going to see in the multipatch feature class.

45:13 The multipatches really has more implications when you're dealing with them inside of ArcScene.

45:19 So it's basically like a feature class that supports 3D geometry.

45:23 That's the way to look at it. Question.

45:25 Go ahead.

45:26 [Audience question] Can you import/export civil 3D object?

45:28 Question is, can we import/export civil 3D objects? The answer is no.

45:36 Another question.

45:38 [Audience question] Earlier, in your introduction [unintelligible] one of your slides showed [unintelligible] had line features and converted into polygons.

45:52 Yes.

45:53 [Audience question] If the line feature isn't closed...

45:58 That's good. So the question is, if I've got these lines and I want to make a polygon out of them from the CAD file...

46:04 ...but they're not quite closed or they're not snapped, what happens?

46:07 And let me show you.

46:08 That's one of the next things I'm going to work on right now through the demo, so if you hold on two seconds, I'll show you what happens.

46:15 We planted him.

46:16 Yeah, he's a plant. We'll pay you later.

46:19 [Inaudible audience question]

46:23 Okay. Good. Good.

46:24 Okay, so the next thing like we talked about is creating polygons out of CAD lines.

46:28 That's something that a lot of people want to do.

46:32 So we have...there's actually a geoprocessing tool that available for that.

46:37 If we go in here and we go back to our search and we look in our tools, and I always forget names...

46:43 ...so you just type in polygon and you look at it and you look down through here, there's Feature to Polygon.

46:47 That's the tool I want to do, I want to use.

46:53 So in this case, I want to use this tool and I want to input my CAD lines and with that point inside...

47:00 ...I want that to become an attribute of my polygon.

47:03 But before I do that, let me show you something.

47:08 Often you get in here, in these CAD files, and there's multiple text inside the CAD file.

47:13 So it's difficult to figure out which one you want, but you know which piece of text that you're interested in.

47:17 So one thing you can do to help streamline this is go to your Annotation feature class and

Properties and do a query definition.

47:26 So you use [unintelligible], if you've used it on, I'm sure I'm showing you something you know all about...

47:30 ...but if you do that and what I'm interested is all the text on level 39, and I can apply that.

47:37 And I can go and do the same thing here, too.

47:39 Properties, build my query.

47:51 Okay, so now you can see that I'm getting just this text in the red or orange.

47:57 That's what I want to be an attribute of my polygon.

48:00 So now we go back to this tool, and we do Feature to Polygon.

48:07 So now I'm going to bring in my polyline information because that's what I want to make the polygons from...

48:12 ...and it's reading that it's in meters. That's fine.

48:15 I want to output it to...

48:27 ...and what I also want to do is I want to use the annotation from there as well because I want that to be the attribute.

48:34 And since I've the query def on there already, it's only going to read that piece text from that level.

48:39 So when I execute that...punch in this once again...going to run in the background when it's finished here.

48:45 It's going to add it so I'll turn off that.

48:49 Let's go a little bigger.

48:51 So now if we zoom in...there so you can see created polygons from that.

48:56 I do an identify on one of them and I get my polygon but I also get my extra linkage information I was after but the...

49:06 ...the ref name giving you the value of the 1851, and that was the attribute that you want to come across your polygon.

49:12 So that's something that we get a lot of questions about.

49:15 It's a simple way of doing it.

49:19 Any questions on that?

49:22 I'll go on to the next thing.

49:23 Now that leads into your other question is, that's all find and good if my lines are all closed

and I can make polygons under them.

49:29 I'm fine. What happens if they're not?

49:33 So if we go here and add a new map document, and I just happen to have some data like that.

49:49 So this is a pretty small example, but I just wanted to give you an idea how you would do with your organization.

49:57 At ArcGIS 10, they introduced tools that weren't necessarily considered for CAD, but they're really helpful for CAD users.

50:06 So if I go back to my tools and I want to do some line extends...

50:17 ...so they're in the Editor toolbox.

50:18 So unfortunately the tool is at an ArcEditor level license, so if you do have ArcView, you won't be able to do this without having this.

50:26 So it's a pretty simple tool.

50:28 But we're kind of stopped right there because it works off of feature class and it has to be writable.

50:33 CAD is not writable; CAD's a read-only data source, right?

50:36 So what we need to do first before we go on to that step is to take the polyline information and use our context again...

50:45 ...and we just want to create a shapefile...sorry, a shapefile, a feature class.

50:55 And we'll turn off that now.

50:59 So we've got our feature class so now a feature class is something that we can edit, and that's what that tool's going to work off of.

51:07 So if we go back to our line extend, we could drag that tool in, that feature class in, I'm sorry.

51:16 So here is an option on how many meters you want to extend the line.

51:22 I've already measured this and I obviously made the data, so I know it's about 15, 14 and a half meters away from there...

51:28 ...so I know that I'm safe if I use 20 meters.

51:32 That's my default, then we're going to extend extensions.

51:34 So if I execute that tool, it's going to edit the data in place.

51:38 So that's the other thing, too, is it's changing this data specifically.

51:42 You're not writing out to new output.

51:43 So it finished and extended...it closed up my lines right here, but I also have a problem where

I've got some overshoots.

51:49 Which sometimes...it's less common but it's something that you see as well.

51:55 I can open up that, grab my saved feature class, use my same 20 tolerance, using that option.

52:04 There, and now it's cleaned up that line as well.

52:07 So then now you could run a feature to polygon on this and it would be a closed polygon and you can use this.

52:12 Now saying all this, this is not...if you've already got topology in ArcGIS...

52:18 ...you also got more sophisticated tools and more things at your disposal.

52:23 This is just a quick way to clean things up for CAD users, something...

52:26 ...that supply of CAD that isn't quite snapped as you would hope it would be.

52:33 Any questions? Yeah.

52:34 [Audience question] So theoretically if you used this method to take some portion of a floor plan drawing...

52:43 ...then [inaudible] the floor plan [inaudible] polygon [inaudible].

52:51 Right. So the question is, you could take a floor plan type of drawing and use that...this tool...these combination tools...

52:58 ...to clean that up to close that off, and that's something you could do...

53:02 ...and that helps with CAD standards, too, because if you know that it's on a feature class that you can readily get at...

53:09 ...and just extend those lines and not necessarily the doors or whatever else that might be on there as well. So...

53:16 Any more questions? Yeah.

53:18 [Inaudible audience question]

53:25 Okay. So the question is, did I start editing? Do I go to an editing session?

53:29 And the answer is no.

53:30 I didn't go an edit session.

53:31 This is just a GP tool so it's acting on the whole feature class, and we're changing that on the fly and updating that feature class.

53:40 It's not part of an editing session.

53:42 If you do start an editing session, then you're probably going to be in more sophisticated rules and topology and things like that.

53:48 This is just a quick way to clean up your data.

53:52 Still do that in the Editor.

53:53 Yeah.

53:54 In this way, this is probably more geared towards doing a batch extend or trim for a feature class.

54:02 And you can also probably use selection tools, right, if you have a certain criteria that you can search for...

54:06 ...then you can only select a certain number of features and then perform an extend on that.

54:10 It's actually something we should probably try.

54:12 Yeah. Yeah. That's good. So another question?

54:14 [Audience question] I'm not a CAD expert in writing script, so [inaudible] out of MicroStation [inaudible].

54:30 Are B-splines supported in MicroStation and ArcGIS 10?

54:34 Yes.

54:35 It's a...it's a...we're looking at each other because is kinda a good answer?

54:41 [Inaudible audience question]

55:00 That's a good question.

55:02 [Inaudible audience question]

55:03 So just to repeat the question.

55:04 The question is, does ArcGIS 10 support B-splines from MicroStation?

55:10 We know that...I know I've tested it with AutoCAD splines, and it does support them...

55:14 ...and when Jeff said kinda, it's because we're still tessellating the geometry so it's not coming in as true splines.

55:20 We recognize that's not a complete solution, and we're still working on that in the future.

55:27 [Inaudible audience question]

55:29 Yeah. You just want some...and it's, I mean, will tessellated lines work for you?

55:33 Would that be good enough?

55:35 Would tessellated lines, little line segments?

55:37 [Audience question] Yes.

55:38 Then you're good.

55:39 Are B-splines squared?

55:40 At ArcGIS 10, that is supported where they're going to be tessellated obviously beyond this, we're out of time...

55:45 ...we'll look at having full support works, not tessellated, but that should be there for you in 10.

55:51 You have a question, or you had a question.

55:53 [Audience question] This may be an overlapping question [inaudible]...

55:57 ...how is ArcGIS handling arcs from [inaudible], creating arcs and ArcGIS converting to CAD from the MicroStation environment?

56:10 [Audience question] Right now, [inaudible].

56:14 So, and this is before ArcGIS 10.

56:19 ArcGIS supports true curves coming from AutoCAD and MicroStation.

56:22 So those would be elliptical arcs and circular arcs, circles and ellipses.

56:26 So we do support that.

56:28 The only time that, in fact we had a question at the island today, is that I lose my curve is what happens...

56:34 ...because that person was writing out to a shapefile.

56:36 So as long as you go into a geodatabase format, geodatabase supports true curves.

56:41 So whether you're bringing it in as a directory, you're going to see the curves so you'll be able to get the same area...

56:49 ...values if you do some calculations or when you do convert that to a geodatabase or if you convert it...

56:54 ...those true curves will also be preserved.

56:57 [Audience question] Okay, so if I convert [inaudible] geodatabase format to CAD, [inaudible].

57:04 So going the other way, you can...we do support curves...

57:07 ...but that's the case where you actually need to use the concept of CAD reserve fields...

57:11 ...and we have a field called End type, and if you populate End type with the proper element or entity type such as curve or arc or...

57:21 Arc, yeah.

57:22 I don't know the MicroStation terminology for all the curves in there, there's quite a bit, if you specify that...

57:27 ...you will get curves in the output.

57:31 Okay, so let's hold off for a little bit. We're running way out of time here. We're way behind here.

57:36 So I just want to do a quick export to CAD demo here, too.

57:40 Who pushes GIS data out to CAD, like DGN or DWG?

57:45 Okay, so there are few of you.

57:47 I'll just run through this fairly quickly.

57:48 I think it's an important part of the process, too, and I think more people should do it because...

57:52 ...we've all heard the talk of people saying, do I get a seed file from my CAD user so that I can get better CAD data?

57:59 Well, exported CAD allows you to create a seed file that your CAD people can start with so that when you get this CAD file back...

58:07 ...you don't have to reposition it because it's in the right spot.

58:11 You don't have to come with any more georeferencing talks.

58:13 It just works for you.

58:14 You're getting attribution that we'll talk about a little bit later.

58:17 So here in this Riverside data that I have, I've got some parcels here.

58:24 And the white ones are actually blocks with attribute definitions, and that's what the text is in here.

58:35 But what I want to do is I want to, my end game is to take these feature layers and I want to put those to a CAD file...

58:43 ...these ones in the blue with a centroid.

58:45 So I can use a tool like, I'm going to be old school for a moment, export to CAD.

58:56 Export to CAD used to be an ArcInfo level license.

59:00 Now it's ArcView at 9.3.1 and beyond, so everybody has access to this.

59:03 So we can add in our parcel centroid and our parcel polygon.

59:08 We're going to output to a DWG 2010 file.

59:13 I could use a sed file here because with the fields that I'm using, I could export this out and create these blocks on the fly.

59:22 Or else I can append to an existing drawing, but what I want to show you quickly on here is...

59:28 ...back on these input feature classes is we talked about entity field already, making curves.

59:34 But one of the things you can use is Insert, and in Auto...

59:37 ...that's one of these CAD-specific fields that's understood by Export to CAD.

59:41 It knows that Insert means block in AutoCAD for people who are there.

59:45 And it knows that for the ref name, that's the name of my block, Parcel ID.

59:48 And this APN and parcel ID are the attribution, the definitions off that block.

59:54 So it's going to use those fields to drive the export to CAD...

59:58 ...and the same thing here where I've got some additional fields as well, this other attribution that we talked about...

1:00:04 ...the MSC type attribution. So.

1:00:15 So we add them in.

1:00:16 What I really want to do is I want to go to an existing CAD file, and it's this as-built file...

1:00:28 ...and now it's telling me, hey, you can't do that because it already exists.

1:00:31 Well all I have to do is click my append.

1:00:33 And now because I'm going to export it to the seed file, in essence, but it's in already existing file.

1:00:38 It already has a blocked definition so it knows what a parcel ID is...

1:00:42 ...because it knows that if you give me a block that's parcel ID, I'm going to construct it this way.

1:00:48 So we'll execute that tool.

1:00:50 It's running here and it's created it.

1:00:52 So you can see that it's now update my parcels into this CAD file.

1:00:56 But let's look at it in AutoCAD, it's way more fun.

1:01:07 [Inaudible audience question]

1:01:09 What? Say...

1:01:10 [Audience question] Why did it update...?

1:01:11 Yeah, you saw it add [unintelligible], you can keep going there.

1:01:14 Okay.

1:01:15 At ArcGIS 10, we now...when you export to CAD, we now add that CAD drawing to the TOC by default...

1:01:21 ...so then you can verify if the output was valid.

1:01:25 Is that what your question was or was it how did the CAD file get updated?

1:01:29 [Audience question] No, how did ArcMap get updated?

1:01:30 Oh, yeah, I'm sorry. Okay.

1:01:31 [Inaudible audience question]

1:01:34 We exported to CAD but we added to the TOC starting at ArcGIS 10.

1:01:38 Just by default, it just adds it to the TOC.

1:01:40 So if I look at this CAD file, now because we're running short on time, I would have showed you this already...

1:01:49 ...but the green ones polygons were already there along with the block attributes...

1:01:53 ...but if we zoom in here, the yellow ones are what I just created, and if I list them in AutoCAD...

1:02:01 ...you can see that it's a block name is parcel ID and there's the tag value of parcel ID, another tag value APN.

1:02:10 So it's created these CAD files the way CAD people want them created. Right?

1:02:14 [Audience question] In the seed file.

1:02:15 It's right in the seed file.

1:02:16 That's what drives that.

1:02:17 So that's why exporting to CAD is pretty important for both directions, you know, for doing that kind of stuff.

1:02:24 [Audience question] This started as a green going to parcel. Now then you added those layers and then you exported them back again.

1:02:32 Right. Exactly. Yeah.

1:02:34 So if you guys...we're at the islands all week and I know I had to rush through this and stuff...

1:02:38 ...you guys want to see this at the islands, come on down, we can show you this a lot more in detail.

1:02:43 Happy to show you.

1:02:45 Alright, Phil.

1:02:49 Okay, thanks, Jeff.

1:02:50 So, yeah, I think we are a little short on time, but we just want to cover one last section

regards to map services.

1:02:58 So many of you are probably already using ArcGIS Server to take your maps and publish them out to...

1:03:06 ...within your organization as web services or out on the Internet for other people to consume them.

1:03:12 And so CAD is a part of that story as well.

1:03:16 We have solutions that allow CAD applications, AutoCAD for instance, to be a client of ArcGIS Server.

1:03:24 And we do this through this product called ArcGIS for AutoCAD, and that's a free download that's available on esri.com...

1:03:31 ...that allows you to connect to map services.

1:03:34 With MicroStation, we don't have a product specific to MicroStation at this time...

1:03:38 ...but at MicroStation the newer versions like V8i do support the ability to connect to WMS.

1:03:44 So in ArcGIS Server, if your map services are published with the WMS capability...

1:03:49 ...you're able to consume those map services inside of MicroStation.

1:03:53 Now a little bit more about ArcGIS for AutoCAD...

1:03:56 ...this is also the platform or the application that you use to define your mapping specification for CAD feature classes.

1:04:03 So it's basically there's two parts of the product.

1:04:06 The other part is, as I mentioned earlier, accessed through ArcGIS Server content.

1:04:11 So you can use map services in your drawing as a reference.

1:04:16 Perhaps you want to see some imagery of some as-built or some recent updates to a particular project site.

1:04:23 That information is accessible.

1:04:25 If it's accessible as a map service, you can add that to AutoCAD using ArcGIS for AutoCAD.

1:04:30 Some people we know that they use imagery as a basis for tracing some areas.

1:04:35 Clearly you're not going to be doing some detailed editing with those types of map services...

1:04:40 ...for large areas such as some land use drawings or soils, that's already...we have some customers already using that.

1:04:48 So, again, we're going to go back to Jeff and he's going to do another demo.

1:04:53 We have time.

1:04:59 Alright. So as promised, I was going to bring up Micro...sorry, going to switch it.

1:05:03 As promised, I want to bring up MicroStation and Phil talked about WMS being supported for MicroStation.

1:05:10 We don't actually have an ArcGIS for MicroStation client, but I just got some data today, and it worked.

1:05:17 So I want to show it to you guys.

1:05:19 So what I want to do here is I've already got a service that's published back in Charlotte.

1:05:27 Phil gets nervous when I say that because it's a long ways away, we'll see how it works.

1:05:31 Anyways, so what we want to do is...it is a WMS service that's been authored in ArcGIS...

1:05:37 ...but I want to use...I can use this raster manager and I've got MicroStation V8i here, so with V8 XM, I forget what version...

1:05:46 ...but V8 XM and V8i both support this.

1:05:49 So if I open up this manager, and I go Attach a WMS, I can go to this WXWMS file and I'll show you what that is in a moment...

1:06:02 ...but, and I can attach it and close this, and now I have an image being served up on ArcGIS Server, and we'll let that spin...

1:06:17 ...but I want to show you what it is.

1:06:27 So if we go to this file, which is that one, Open.

1:06:35 You can see that it's just an XML file but what it's doing it's pointing at this version...

1:06:39 ...and it organizes it so that you can use this in MicroStation.

1:06:44 So anyway.

1:06:45 Which contains the URL.

1:06:46 Which contains the URL.

1:06:48 So in any case, now you can go into here and we'll let that refresh up.

1:06:51 But that's the image service that's being used in MicroStation.

1:06:56 Okay. And Phil is actually going to demo ArcGIS for AutoCAD now, but we'll do the switch.

1:07:04 Any questions on anything so far while he gets set up?

1:07:10 Here can you...

1:07:11 Down here?

1:07:12 [Audience question] Just real quick, you said when you exported out from ArcGIS to MicroStation [inaudible] the seed file...

1:07:17 ...how about the CEL file to honor this planned visualization you're pointing back into the CAD environment...

1:07:25 ...is that supported and vice versa when you're bringing in you support...

1:07:30 Yeah, okay. So the question is, MicroStation has a .cel file, right?

1:07:34 I don't believe CEL files are...maybe I'm wrong, I'm not sure about that.

1:07:39 But CEL files exporting out right now we don't have support for those at the next release.

1:07:48 We're calling it the MicroStation love release.

1:07:50 We're going to spend a lot more time on the MicroStation side of things, because we've really been focusing on AutoCAD.

1:07:55 And it's actually funny you guys because usually we come to these things and we ask how many MicroStation users...

1:08:00 ...and put your hands up again.

1:08:03 This is the most we've seen in a long time.

1:08:04 It's usually AutoCAD, a lot more AutoCAD, only a few MicroStation.

1:08:07 So no. The answer is no we don't support those files but we will in the next release look at supporting...

1:08:13 ...more supporting MicroStation for exporting CELs and...

1:08:17 And importing as well.

1:08:18 [Audience question] [inaudible] can't the symbology in ArcGIS or what [inaudible] the same for hydrants or manholes [inaudible]

1:08:27 Okay. Okay. Yeah. Good.

1:08:29 Okay.

1:08:30 Okay. Hold it for a second.

1:08:32 I know we're getting close to finishing here.

1:08:35 I just want to show ArcGIS for AutoCAD again.

1:08:37 The session that follows this one at 3:15 is going to go into this product in a lot more detail.

1:08:43 But just to give you a preview of that or just a quick overview, again, the story is that ArcGIS for AutoCAD...

1:08:51 ...is another client for ArcGIS Server.

1:08:53 So this is a map service that I have running on this particular laptop that's running server.

1:08:59 So here it is, it's a map.

1:09:00 And it contains some city data or county, you know, basically a site plan for Murray County, Tennessee.

1:09:08 So that's a map service.

1:09:09 And you look here, it's got the layers and so forth.

1:09:12 And so that's running on the server.

1:09:14 Now if I switch back to AutoCAD, I have a drawing already for Murray County.

1:09:18 Now one of the things...well the first thing I need to do here is load the application.

1:09:21 So I'll just go ahead and load that up.

1:09:24 And it's ArcGIS for AutoCAD.

1:09:25 This is a build that or release that we're working on.

1:09:28 It's going to be available in the near future.

1:09:31 Now one thing that we could do here is add a basemap to the drawing.

1:09:37 So if you want to see some imagery, that's something that is available from using this application.

1:09:46 As that goes, we also want to access this map service.

1:09:49 So for instance if you're an organization and you want to provide some content to your CAD users.

1:09:56 So here's our basemap.

1:09:58 You can see the drawing is aligned with it.

1:09:59 So now you can actually see what types of real-world, you know, objects or as-built is currently, you know, at that particular site.

1:10:12 Now if I...I'm going to go ahead and open up, I'm going to lose a little bit of screen here but I'll go ahead and turn that off.

1:10:18 And now I'm going to actually do a more traditional connection to a server.

1:10:22 So I want to actually look at the map service now.

1:10:24 So if I connect, it'll make a connection to the server, and I have some map services that I can add.

1:10:31 I'm going to add Murray County.

1:10:32 So when I add that to the drawing, that's going to add this map service.

1:10:35 So now if we zoom in, not only do we have a CAD drawing, we have some more information about it.

1:10:39 So I can identify features, for instance, in the map service to get more information about, for instance...

1:10:47 ...maybe this building footprint and so forth.

1:10:50 So this is a way that you can, for those of you that are publishing maps as map services right now...

1:10:57 ...that you can provide map service content to AutoCAD users.

1:11:02 Now I guess what's the difference between doing that versus exporting some data?

1:11:05 Well the nice thing about map services is that it persists all that rich cartography that's in the map.

1:11:11 So I know a lot of people spend a lot of time creating nice maps that have very good cartography, labeling, and so forth...

1:11:18 ...and that's the same information that an AutoCAD user will be able to access using ArcGIS for AutoCAD.

1:11:24 So see here, we get information about the features except for that one.

1:11:29 I think that was the previous map service.

1:11:31 Now earlier I talked about the mapping specification for CAD.

1:11:34 So this is the other part of ArcGIS for AutoCAD that allows you to work with feature classes.

1:11:40 So in this drawing, this has been created with the Export to CAD tool.

1:11:44 So I have these additional feature classes in the drawing, so if I drop down we can get information about footprints, for instance...

1:11:50 ...that's buildings, and you look down below here, we have basically the schema definition.

1:11:55 So I can create a new feature class.

1:11:57 I'm going to call it Parcels and give it a polygon feature class.

1:12:03 I can copy fields from additional feature class in the drawing or I can just add it and then manually do that on my own.

1:12:09 So now I have parcels, feature class define.

1:12:11 I'm going to go ahead and choose to pick all the features that are on a layer called Parcels, so I go, or Parcel.

1:12:18 So I'll go ahead and add that.

1:12:20 And now down below, I can actually start adding some attributes or some fields that are

going to help define the information in this drawing.

1:12:28 So I can add a field called Zoning, make it a text field, and so forth.

1:12:35 I can add ID, make it an integer, add field.

1:12:40 Now the nice thing about when you add, when you start defining a schema for a drawing...

1:12:45 ...you can actually use a default value or enter a default value.

1:12:49 So if I want to type residential, press enter.

1:12:55 Now I'm going to save the drawing.

1:12:56 I'm going to turn off my map service so we can see this a little bit better.

1:12:59 But now when I zoom in, I'm going to select a parcel.

1:13:04 Now this is on Layer Parcel.

1:13:06 Now if I open up the property sheet, AutoCAD's property sheet, we're going to select that and we should be seeing some attributes.

1:13:20 And I probably didn't do something right.

1:13:22 So the workflow is that you would define a feature class, you would assign, define a schema for it, add some attributes...

1:13:31 ...and then you'd be able to enter information.

1:13:34 So then you'd have a CAD operator that'd be able to start adding information to this drawing, little bit...

1:13:41 ...oh, I don't think I have a...anyway.

1:13:44 Well, of course that's not working, so, but, again, this is just a preview of this product.

1:13:50 And I invite you to stick around for the next session.

1:13:55 They'll show that in more detail.

1:13:57 And, let me go ahead and finish up here.

1:14:01 I must not have...oh, it's polyline. That's what it was.

1:14:09 Alright. So. So just to finish up here, again, we know that not all of you have control of how the CAD data is created.

1:14:22 But if you do, if you work with someone in your department that generates CAD data...

1:14:26 ...it's always best to request that they prepare it in certain ways it's going to benefit an ArcGIS user.

1:14:34 One is, of course, have them draw it in the proper coordinate location.

1:14:37 So that's always an important thing.

1:14:39 If it's not, we have tools to address that.

1:14:42 Logical layer and layer and level organization is always good.

1:14:45 Again, sometimes you have all the entities on layer zero, kind of painful, but most, I think, nowadays...

1:14:51 ...everyone understands the importance of CAD standards about exchanging data between CAD and GIS...

1:14:56 ...and so that's not such an issue these days.

1:15:00 You know, geometry connectivity, right.

1:15:02 You want lines that snap to each other.

1:15:04 And also ArcGIS for AutoCAD, this is more specific to AutoCAD users.

1:15:09 We only support features in model space.

1:15:11 So if you have any features in paper space, you're not going to see them in ArcMap.

1:15:15 So our recommendation is to keep those title blocks, keep the legends in paper space.

1:15:21 So earlier we talked about how do you get more information about working with CAD data.

1:15:27 So we have a resource center.

1:15:28 So for those of you that have checked out the ArcGIS.com site, we have a link to the resource center.

1:15:33 We have our own page that we're working on, adding more content for get help information there, samples, some downloads.

1:15:41 And we're working on getting more blog posts.

1:15:43 So please check that out to see the latest information about CAD integration.

1:15:48 Currently there is a course that's available that's provided by our educational services group.

1:15:54 It's called Working with CAD Data.

1:15:56 It's an instructor-led course and I provide the link there for those of you interested.

1:16:01 It's similar to what we talked about today but goes in a lot more detail with exercises, and you have an instructor to ask questions.

1:16:08 So it's a very good resource for anyone that wants to start really trying to work with CAD data more and is new to it...

1:16:15 ...and needs some more information about how do you perform these types of workflows.

1:16:18 We also have a live training seminar.

1:16:19 We did that a couple years ago but a lot of the same workflows still apply...

1:16:23 ...so that's a free resource available through the resource center.

1:16:27 And also want to mention, one of our colleagues, Margaret Maher, some of you may have talked to Margaret in Support Services...

1:16:32 ...but she recently published a book called Lining Up Data in ArcGIS: A Guide to Map Projections.

1:16:38 It's a very good book that talks about coordinate systems and projections, and she's very familiar with CAD...

1:16:42 ...and so there's a section in there that talks about how to create a custom projection for CAD files.

1:16:48 So something that we see, especially down when you have conversions like ground-to-grid conversions...

1:16:55 ...working with surveying, and so she's very familiar with those topics, and it's definitely a good book to check out.

1:17:02 Again, summary, you've seen various ways to work with CAD data, direct read...

1:17:06 ...conversion to the geodatabase or taking geodatabase to CAD.

1:17:11 We have the mapping specification for CAD that allows you to organize CAD drawings...

1:17:17 ...or it lets CAD users organize CAD drawings for better use in ArcGIS.

1:17:21 We always want to try to promote that.

1:17:23 It's definitely a technology that can help streamline integration workflows.

1:17:29 This new ArcGIS for AutoCAD version is coming late summer, early fall...

1:17:33 ...so we're going to have that supporting the new versions of AutoCAD, AutoCAD 2010 and 2011.

1:17:39 And post 10, we have plans to develop a mapping specification for CAD for MicroStation.

1:17:44 So we recognize that we have a lot of MicroStation users that need similar technology, similar functionality.

1:17:50 So we want to provide that type of framework for our MicroStation group out there.

1:17:56 In closing, I mentioned there's a workshop right after this.

1:17:58 There's another workshop tomorrow, second offering of this workshop and Thursday as well, Room 3 and Room 6C.

1:18:05 We're at the islands all week.

1:18:07 One last reminder, please fill out those evaluation forms.

1:18:10 And lastly, thank you very much for attending.

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