What Is GIS and How Can It Help Me

Are you new to GIS and looking for a bigger picture of what it is, how it works, and how it will make a difference? This introductory session will explore the basic concepts of GIS, what it does, why millions of people around the globe rely on it, and how public and private organizations worldwide can find real value in learning more about this powerful technology.

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Video Transcription

00:01 This presentation I'm going to go through is really not going to be a lot of technical talk.

00:05 It's going to be really down and basic and really straightforward and what have you.

00:10 And what we're going to do is we're going to go through the ideas of what GIS is, and how you implement it...

00:17 ...and how you go through the process.

00:22 So, what we're going to cover is what is GIS, how does it work, what are the benefits of using it...

00:31 ...why is GIS unique, and how do I learn more about GIS?

00:35 Because it's a continued education, right?

00:38 The more you do it... How many of you are from government?

00:42 How many of you are from commercial?

00:46 Other, education, lots of different...

00:49 So what you can see there is there's a lot of different types of people that get involved with GIS.

00:54 So, let me tell you a little bit about myself and why I'm here.

00:57 This is actually my 25th User Conference.

01:01 I know I don't look that old, but the guy that comes in and presents with me, you'll see he's really old.

01:07 So, the key is that, I've actually been, I was one of the first users of Esri technology.

01:13 I was actually customer number 95.

01:16 And, I actually spent half my career as a user and half my career at Esri.

01:22 And I came to Esri from the perspective of I wanted to change everything that frustrated the

heck out of me...

01:28 ...and wanted to kind of move it forward.

01:30 And, you know, I've seen a lot of things change, and I've seen a lot of things stay the same.

01:34 And so, what my perspective is, is everything that I went through trying to tell everybody else what this was.

01:42 And I actually got to a fork in the road at some point whether I had the choice of staying as an urban planner or going into GIS.

01:52 And I took one path, and that's where I am today.

01:55 So, a little bit about my background, just to give you a perspective.

01:58 I was actually one of the first people in the United States to put GIS on the Internet.

02:02 First to use 3D statistics through modeling, and what I'll say is I didn't do it, I had some guys that did that for me...

02:10 ... and some women that did that for me.

02:12 But the concept was I understood how to ask the questions to get what I needed out.

02:19 There's a reason I don't do demos. And that's the thing that I always try to work with people just so they understand the basics.

02:26 So, I like to start off by reading slides, this slide, because I hate it when other people read their slides.

02:33 But I think this is important.

02:35 What's the formal definition of a GIS?

02:37 So I'll read it with you.

02:38 "An organized collection of computer hardware, software, geographic data, and personnel designed to...

02:44 ...effectively capture, store, manipulate, analyze, and display all forms of geographically referenced information."

02:49 This is in every textbook I've ever picked up and I still don't know what it means.

02:56 And so therein lies part of the problem, is you've got into this new field, it's called GIS, and you kind of know what it is...

03:03 ...and this is what you're relying on, and you're going to hand this to your people you want to use it...

03:09 ...and the people that you're trying to get to buy into it.

03:13 And so what I learned over the years is that GIS means something different to everybody.

03:19 You've got to kind of pick what the definition is.

03:21 And let me kind of share with you a little story.

03:24 When I first got into GIS, I would come in and I worked for a planning director...

03:29 ...and she always referred to me as the computer guy.

03:33 And I really don't know that much about computers.

03:38 I do, because I work for a software company; it's weird, through osmosis...

03:41 ...I've learned the language, but don't ask me to come over and fix your Internet setup; I can't do it.

03:46 So, what I learned is, everybody I talked to, I had to have a different explanation.

03:52 And you have to work on your explanation of what this is.

03:55 So how many of you have gone to your holiday gift party or holiday party...

03:59 ...and somebody walks up to you and says, what do you do?

04:05 Okay, I'm going to tie two pieces together - what you do and starting a conversation with people are two very common things.

04:12 So I would find myself with Grandma or Mom or whomever, and they'd say, what do you do?

04:16 And I'd say, well, I do GIS.

04:18 And then they'd sit there and they'd say, well, what is that?

04:20 And I'd say, well, it's an organized collection of...

04:23 And they would just... I had no friends at the end of this, right?

04:26 It was like being an Amway salesman.

04:29 So when we went through this whole process, I learned I had to explain it to people differently.

04:34 And I learned that I had to change my definition whether I was talking to Mom, whether I was talking to...

04:39 ...my manager, I was talking to a person that I was trying to get the tool to use.

04:44 I told you he was going to be a lot older than me.

04:46 So, what does GIS mean for you?

04:51 So, a trick I kind of started to learn, I go to a lot of shows where there's a lot of elected officials...

04:56 ...and a lot of city managers and what have you, and what I found was they'd come up to the booth...

05:02 ...or whatever we were doing and they'd say, oh, yep, love that GIS stuff.

05:06 All I know is, and they'd go off. And I'd say, what I realized is their perspective of what GIS was...

05:13 ...was limited based on what the person in the back office was telling them.

05:18 And so with that came this idea; I'd just walk up and I'd say to somebody, let me ask you a question.

05:26 Have you been using it to do revenue auditing?

05:30 They'd just look at me.

05:32 Have you been using it to reroute your trash trucks?

05:36 They'd just stare at me.

05:37 Because they didn't have a full definition of what this thing called GIS was.

05:42 And so when you take a look at the different things that you do, I'm used to this.

05:47 So when you get to this stuff, what you do is you start to come up with your own definition.

05:50 So I just kind of started working on an idea, trying to explain to people what in the world this GIS was.

05:56 And so my point is - and this is not my driver's license in any shape or form.

06:01 [Audience participation] That's your pay stub.

06:04 We actually are friends, don't worry about it.

06:06 Anyway, so what we did is... I realize is, you carry around a GIS database each and every day.

06:14 It's called a driver's license.

06:16 So here's the reality. What is GIS?

06:20 It's a way of organizing information.

06:24 So if I told you, you carry around a driver's license, and you walk around out there with it...

06:30 ...the IT world would look at some of the items and organize it this way.

06:36 They might say, well, I'm going to organize you by driver's license number.

06:40 Well, okay, I could do that, I guess.

06:42 That's the same as a social security number, a business license number, a customer number on your bill.

06:47 Well, that's a way to organize.

06:48 But what if you want to start exchanging data from this part of the country to that part of the

country...

06:52 ...and they don't use the same naming, the same numbering system?

06:57 I can't use it.

06:58 But then they said, okay, well, I'll organize everything by your name.

07:01 Well, as unique as I think I am...

07:04 ...Chris Thomas is about as common as John Smith, Tracey Jones. There's millions.

07:10 So that's not a good way to do it.

07:12 But when you look at your driver's license...

07:14 ...you have the driver's license number and you have the person's name, what's the next line?

07:20 The address; the street address.

07:23 What's the second line?

07:25 The city; I've just given you two geographies.

07:28 What's the third line?

07:29 The state; I've just given you the third.

07:32 The fourth, the ZIP Code.

07:33 Aren't those all geographic tags?

07:36 So now I can start taking a look.

07:38 What's the first three digits of a phone number?

07:42 An area code.

07:43 So the point is, in all this data that we have out there, there's all these identifiers that are geographically referenced.

07:49 So you carry around a GIS database, each and every day.

07:53 You just didn't know it.

07:55 You didn't think of it in that context before.

08:00 So, let me kind of share with you this little story.

08:03 I worked for a city, and it was times much like these, and the economy was terrible.

08:07 And we were in a meeting, and we basically thought that we should start looking...

08:13 ...to figure out ways to generate more revenue for the organization.

08:15 And if you're in the commercial world, I would think that that's the same process, right?

08:18 How do I keep my revenue streams coming.

08:20 So we were at a big meeting and I was sitting there, and I ended up from urban planning to the IT department...

08:26 ...because they had nowhere else to put this and because the other departments were already fighting over it.

08:31 So, we were sitting in the meeting and I worked in the department that was IT...

08:34 ...the administrative services, the finance department, the budget department, and...you get the idea.

08:38 It was just a whole collection of different departments.

08:41 And so we're in the meeting and the finance director says, let's go ahead and try to find...

08:46 ...some escaped revenues and, well, use those GIS guys; maybe they can help you.

08:52 Vote of confidence, right?

08:55 So when I came in, we sat down, I sat down with the business license manager, and I said...

08:59 ...so Dennis, you're into technology, what do you think we should be doing here?

09:04 And he says, well, you know, Chris, what I thought we would do is we'd look for unlicensed businesses in the city.

09:08 And I said, well, how are we going to do that, Dennis?

09:09 And he said, well, I'm going to go and we're going to drive the entire city...

09:12 ...and try to match a list of businesses to what we have in the system, and then verify that it's there or not there.

09:19 He was talking about sending people out.

09:22 And his idea was, I could give him a map.

09:25 Isn't that what everybody thinks about GIS, I'm just going to give you a map?

09:28 I could give him a map and I could map out where the land uses were, and it would cause...

09:32 ...him only to drive the streets that we thought businesses were at.

09:36 Now, theoretically, that would have saved a lot of time and energy.

09:39 But I looked at Dennis and I said, what if we did this, and we never left the building?

09:45 He says, what are you talking about? I'm game, but what are you talking about?

09:47 I said okay, Dennis, pull up your GIS database.

09:51 He said, I don't have one.

09:52 I said, sure you do.

09:55 I said, pull up your business license database.

09:58 He had a system that maintained all the people that had business licenses.

10:01 So I pulled it up and I said, so there it is.

10:04 He said, no, I don't have a business license...this is not a GIS.

10:06 I said, what's the first thing in there, Dennis?

10:09 He said, it's the business license number.

10:11 Driver's license number.

10:12 What's the second item, Dennis?

10:14 The business name. Driver's license name.

10:17 What's the third thing in the database?

10:21 The address. There's the billing address, the headquarter address, the location, it's all address.

10:26 I said, what we're going to do, Dennis, is I'm going to take a file over into...

10:29 ...planning department that we've collected all the information.

10:32 It says it's a house, it says it's a vacant field, it says it's a commercial building.

10:36 We're going to take that database and match the geography on that...

10:39 ...and we're going to match it against the geography in the business license file.

10:44 And we'll see what comes out of it.

10:46 So, taking two different geographic reference databases from two departments that...

10:50 ...already had data, but not necessarily a mapping system.

10:55 So, what we did is we ended up creating a mailing list directory out of it...

10:58 ...and we sent out all these people notice that said I think you're operating a business without a license.

11:04 And what happened, by spending 16 man-hours, we recovered $156,000 in escaped revenue and never left the building.

11:11 Not bad for a day's work, and I really didn't do anything.

11:15 So, the point of it was, we said, well, that was just on a test area, just to see, show him we could do this.

11:21 So, we kind of showed the results of what was going on and we went through the process and...

11:26 ...we showed it at a meeting with all the department heads.

11:29 And the city engineer looked at it and said, well, you idiot...

11:31 ...you're probably sending notices to vacant buildings.

11:35 Again, we had taken the address file in one department, the file of the planning department...

11:40 ...and we took the file, the business license file, and we matched these together.

11:45 I said, well, that's interesting, you might be right.

11:47 So what did we do? We took the water billing, and we found that the meter database had...

11:51 ...the customer number, the address, and it was on or off; it was irrigation or it was...and we stripped them all together.

11:59 We just matched all the geographies together.

12:02 Lo and behold, we found $256,000 in escaped revenues.

12:08 And we used existing data.

12:10 The idea is organizing things by the geography, and not looking at the systems...

12:15 ...as independent and new things.

12:17 So, we ended up spending only 32 man-hours on the whole thing, and we ended up having something unique.

12:25 Remember all those buildings that I might have been sending a notice to, that might have been vacant...

12:29 ...but I had it as a register?

12:30 I now had an inventory of vacant buildings that I could post on a website as vacant properties...

12:36 ...that might be available for economic development purposes.

12:38 I had an inventory of vacant buildings in the city.

12:41 I now created a new GIS database out of combining four others.

12:47 So, the idea is that the data that you create and the stuff that you put together begets something else.

12:52 And guess what, we never created a map. Not once.

12:59 So, the idea is that we want you to go through this process and we want you to redefine your view of what GIS is.

13:05 We want you to stop today and go through all that stuff you saw but start thinking about the real-world context...

13:10 ...of how you develop and how do you explain to people what it is you do.

13:16 And so, what you find out is we do maps, we do modeling, we have websites with executive dashboards...

13:22 ...that have widgets that move and do really neat things that get people intrigued.

13:25 We can do layering, we can do financial auditing.

13:30 But the definition is depending on who you talk to.

13:33 If I talk to a revenue manager, do I want to talk to him about buying a GIS or using a GIS...

13:38 ...or do I want to talk to him about a revenue auditing system?

13:41 Isn't that what I just described to you?

13:44 So how...if I describe to a police department, a decision support tool.

13:49 Or maybe I would describe GIS as a way to increase accountability on transparency...

13:56 ...or way to increase productivity.

13:58 That's a much different definition of what GIS is than the first one I showed you.

14:04 So when somebody says what do you do, it's I use maps and data to improve services...

14:10 ...and there's a whole laundry list of these things.

14:13 That's a much easier way to communicate.

14:14 But I'm going to help you with your business processes.

14:20 So, what does it take to build a GIS system?

14:23 Well, this is the core. It's software; data, and you got it right, it can be existing data; hardware...

14:30 ...can't do it without hardware; even if it's in the cloud, there's hardware somewhere; I'm going to have some applications...

14:36 ...I'm going to have training; and I need some staff.

14:38 Now when it gets to staff, do I need a whole GIS team?

14:43 Possibly, but I want you to understand one thing. There's a differentiation between a GIS professional...

14:51 ...a lot of the people here that understand how to build data, how to put things in...

14:55 ...how to run algorithms; that's a GIS professional.

14:58 How to make the system network together.

15:01 But there's also a thing called a professional that uses GIS, and there's the differentiator.

15:07 So, if I'm a crime analyst, I'm a crime analyst.

15:10 If I use GIS to analyze crime, I'm a professional that uses GIS; I didn't need to turn that person into a GIS professional.

15:21 And so what you have here is the two most important things that you need in a GIS.

15:25 I'd love to tell you it's the software, and I know a lot of people would like to tell you it's the hardware...

15:29 ...but it's the data and the people.

15:33 Those are the two elements that you cannot build a system without.

15:38 So, I'm starting, I get the idea with GIS, and I got to sit down, and I want to start organizing the information I have.

15:46 And it would be interesting to find that this is where everybody starts to fight.

15:50 They decide they're going to apply GIS to a project just to get it going.

15:55 And they usually pick the project that's going to take too long.

15:59 But the idea here is really pretty simple; this idea of layering that you kept hearing.

16:03 I'm going to take this layer and put it over that layer; you heard the term mashups a hundred times yesterday.

16:08 That just means I'm going to take some data over here, I'm going to take some data over here...

16:11 ...and I'm going to put it together, and then it's going to be something new.

16:15 Now I see some older people here; not... But who remembers the encyclopedias...

16:20 ...when they were in a book form? Right, right.

16:24 So my favorite volume always was the human body one, right?

16:30 Remember it had the clear acetates in it, and you would pull the acetates and you could see the circulatory system and network.

16:36 I could see the brain, I could see the muscles.

16:39 That's what layering is; it's just laying one thing over the top.

16:43 I pull back some, I see a little bit more.

16:45 I put some more, I see a different picture. Right?

16:50 And that's what layering and all these concepts are.

16:52 So what this idea is, it's just stacking things on top of it. That's the terminology.

16:56 But when you start a GIS, what you want to do is you want to find the data everybody uses.

17:03 That's what you want to build as your foundation, not applying it necessarily to the one project.

17:07 Because the project data that you had may not allow you to go to the next project.

17:12 So the easiest way to do this is really simple - get people in a room that might or may not be users.

17:21 What do I mean by that?

17:22 You get in a room, says, okay, when you do your work, how do you do your work?

17:26 Remember, I told you the best thing to ask people is to get a dialog of what they do?

17:32 I mean, when you go up at a party, what do you do for a living?

17:36 And that other person doesn't shut up for the next 25 minutes, right?

17:39 It's kind of like asking about their kids or grandkids.

17:42 The point is, is to get them talking about what they do for a living.

17:47 Not to ask them, if I got a GIS system, what would I do with it?

17:49 Because the answer is oh, it's endless, there's all kinds of things we could be doing.

17:54 But what you want to do is you want to apply the GIS to something in what they already do to improve the processes.

18:01 So if somebody comes in and you had five different departments, - say it was police, fire, planning, elections, say okay...

18:07 ...how many of you use streets?

18:11 How many of you guys could use right-of-ways?

18:15 How many of you need parcels?

18:18 Well, so you kind of go into a list.

18:20 How many could use hazardous zones? Oh, a handful of people.

18:24 The point is, where would you start? Where everybody has a common need.

18:30 I might start with streets if I'm a city.

18:31 I might start with something different if it's a different...but the idea is look at the common thread.

18:37 And then the second question is, how much detail do you need?

18:40 A person in public works needs more detail and more accuracy than the person who happens to drive down it.

18:46 They're not as concerned with the lane striping, whether it's red curbs, whether there's a divider.

18:52 They don't care.

18:54 And so you start to ask the questions how to build it, and this is how you build a foundation for your GIS, is by looking at that.

19:01 And sometimes, as I started to point out in my story, sometimes you don't necessarily have to build it.

19:07 Sometimes it's doing an inventory of what you have in place and seeing if I can extract and pull that in.

19:13 And that's how you build your GIS system 10 times faster.

19:18 So, the idea behind GIS is really simple.

19:20 I'm taking the database behind the scenes; it could be a spreadsheet, it could be a high-end database, it could be anything.

19:27 You're just basically taking words and pictures and mapping those together.

19:33 You're putting two things.

19:35 I kind of know where something is, so if I clicked on that, what would I want to come up behind it?

19:41 What you end up with is this digital database, and what you start to learn is that not only are these simple...

19:46 ...databases fair game, everything's fair game.

19:50 I take a picture with my iPhone, it gives you a geotag, that's fair game.

19:56 A video that goes down a sewer pipe, fair game.

19:59 A camera on a traffic signal, fair game.

20:02 Deeds in a recorder's office?

20:04 What does that deed have on it?

20:06 About 20 references to geography.

20:09 Everything is fair game into a GIS system, because what you're doing is you're organizing everything by the geography.

20:15 And that's the idea is that everything that you use allows you to build a GIS.

20:21 So, what I'm getting towards is that everybody just expects you to go in and say, print maps,

and this map just comes out.

20:29 What you have to explain to people, and I just had a conversation with a research group in Texas...

20:35 ...they were mad because our GIS system didn't come with all these maps.

20:41 I'm like, well, what kind of maps you looking for?

20:43 They said, well, I want parcel maps.

20:44 I said, well, so does everybody else.

20:46 That's the holy grail, right?

20:48 What GIS does is you do one thing that just does the analysis, but part of it is to build a map...

20:51 ...and so what you're doing is you need to set expectations of people of what you're going to get out of this thing.

21:00 You just don't click a button and it just makes a map.

21:03 I know that people go to these mapping websites and it says...but somebody had to create that somewhere.

21:09 And that's where a lot of you come in, where you will build this data and this information.

21:13 So, the other thing is when you're starting to look at data is everybody has different definitions of data.

21:21 So I noticed that if I was working with the housing bureaus or the census bureaus, what is a hotel or a motel?

21:29 It's transient housing.

21:31 If I go talk to a commercial venture or an economic development department, what's a hotel or a motel?

21:36 It's a business.

21:38 People have different definitions of the most simplest things.

21:41 And so I got into this habit of really trying to get into people's minds as to what they wanted to do...

21:45 ...with the technology, and always starting forth with the question, what do you do, not what do you want to do.

21:55 Because that other part will come.

21:57 And I would go around as a GIS manager and people, they'd say, hey, I need to use stuff, give me a list of your data.

22:02 And I kept saying, but what is it you want to do?

22:05 And we'd go back and forth and back and forth, and this is what I learned.

22:10 I learned that people would have different databases, so I went to the business license department...

22:16 ...and the guy was telling me he could not use me.

22:18 And I said, well, why not?

22:20 He said, because you don't have our dust control moratorium area.

22:25 That's the big deal? The dust control moratorium area?

22:29 And basically, he had a hand-drawn map on the wall and he said, that right there.

22:33 You don't even have it.

22:34 And literally, it divided the city in two.

22:38 That's all it was, it was a line.

22:39 I said, can I borrow that for a minute?

22:40 So I went downstairs, I looked at something, and I noticed that the dust control moratorium area for...

22:49 ...the planning department looked just like the wind control district for the helicopter unit, which looked...

22:56 ...just like the soil control zone for the planning department.

22:59 They were the identical geographies.

23:01 But had I called it out as one or the other, the assumption was I didn't have what they needed.

23:09 So I had to go through an education process of educating them on what we could do, is constantly...

23:14 ...asking the dialog, what's your next project?

23:17 What will you be working on? What's the hot buttons?

23:20 And that way I got an understanding of what data existed, or what data didn't exist, so I can either pull or create...

23:26 ...whichever I needed.

23:29 And so, much like that other idea is that what you have is this foundation, is what's used in one department...

23:36 ...can be used by multiple departments.

23:38 So, I might get that the water lines were really important to the department I started working with...

23:42 ...maybe it's water, maybe it's engineering department, or public works.

23:46 So they put the water lines, but who else could use that?

23:50 Remember the story I told you about the water meters?

23:54 Well, guess what, the business license department could use it.

23:56 I could use it to do things like routing services and trying to send out workers to specific locations.

24:02 I could use it to do unfunded mandates, like finding assets.

24:05 I can go through and what's a big thing when doing economic development?

24:08 Is there infrastructure to it?

24:12 So one data layer that you select has multiple applications, and so what you want to do is constantly be thinking forward.

24:20 And so when you do these things, the data creation, is just keep in mind that you're knocking down...

24:26 ...the next department.

24:27 What my advice to you would be is, when you start a GIS program, don't always begin to work with the department...

24:34 ...you start...you think is the most logical.

24:36 When I was in government, the two most logical departments were planning and engineering.

24:40 I don't know if anybody here is a planner or engineer, but they don't necessarily see eye to eye on things.

24:45 Police and firemen don't either.

24:47 And what my goal was always to do is always anticipate who would be using the technology.

24:52 And what that did is it helped me minimize the impact of the internal fighting that would happen...

24:57 ...is who would get priority on things.

25:00 So when I started my GIS system, I invited the librarian.

25:04 That doesn't sound right. The librarian?

25:06 And she said the same thing.

25:07 I said, hey, Sue, would you like to come to my GIS steering committee for managers?

25:12 And she said sure; and she goes, but why?

25:13 I said, well, you're into technology; I get my...you're calling me all the time, my books are

overdue...

25:18 ...you scan my books as well; you're into technology.

25:20 All I need is a neutral party to look at what people are saying and be the tie breaker so I don't have to.

25:27 So she would go to all the meetings and we'd go through the process and, you know, there's a joke...

25:31 ...if you left engineers to draw the maps, you'd never be finished because they have such a high accuracy requirement...

25:36 ...and if you left it to urban planning, which I was one, all the maps would look like cartoon characters.

25:41 Right? You can't use it.

25:43 What I did was we started going down this path and we started using this idea of reaching out to the public...

25:48 ...by offering services at a terminal based on things like CDBG grants or just finding their zoning...

25:53 ...where people can go to the terminal at the library, this is free Internet, and what I was selling her...

25:57 ...on is the library was the conduit to deliver GIS applications.

26:03 Because she was in all the meetings I didn't have to go reeducate her.

26:07 So when I went to her and said, hey, Sue, what do you think about putting GIS in the public library...

26:10 ...to give citizens access to some of this information they call for all the time, you know what her answer was?

26:16 Yes. We had already educated her. She knew what was coming.

26:20 And so the idea is, always look at what might be the opportunities, because that shortens your time frame in the implementation.

26:28 And so when you look at those things, you want to leverage your investment, in that picture what GIS is?

26:32 It's not always about that paper map.

26:34 You've got things for mapping and reporting, you've got an Internet site; you might be doing logistics.

26:40 So, when you get that package overnight?

26:44 How do they do that?

26:47 That's a GIS system.

26:49 It calculates where you live, they put in your address, they scan it, there's a GPS receiver, it goes into a database...

26:54 ...they figure out how to take your package to put it to the next location.

26:57 They triangulate, they send your package there, then it ships to another truck.

27:01 That's all being done by GIS.

27:04 And so what you have here is you have logistics, you have the visualization.

27:07 How many people have maps on their phones now, right?

27:11 So when you're thinking about what are the applications and how am I going to do this, you want to go through...

27:15 ...the whole enterprise.

27:17 How will I be using this, what are the opportunities?

27:20 Because I still to this day talk to GIS people, I'll say, how many of you have an enterprise GIS in your organization?

27:25 All that means is organization-wide.

27:28 And all the hands go up. I'll say, oh, so are you doing mobile? Well, no.

27:33 Well, do you have a logistics site that you're doing routing? Well, no.

27:37 Well, isn't this the way people work?

27:40 If somebody calls in and wants a building inspection, what's the second thing they do after they call?

27:45 They go out with the data on the property and write on it and put it back into a database somewhere.

27:49 In other words, connect the pieces.

27:53 And so, when you're looking for your applications of what GIS can do, people have a tendency to go after...

28:00 ...the low-hanging fruit, what's going to be the easy win.

28:04 Or they pick something that's just going to take forever, because it's politically sensitive, there's just not the right resources.

28:12 So if you look at this, I've got to just, people want to do property notifications all the time.

28:17 That's if you're going to build a building, and you need to notify your neighbors you're building a building...

28:20 ...so they're not mad at you later, that was like one of the biggest applications.

28:24 You know what the return on investment for that is?

28:26 Pretty much nothing.

28:29 But that one over here in the far left that I talked to you about was using simple databases on a street file...

28:35 ...the business license auto on the far left?

28:37 Minimal time, minimal data requirements, and a big fiscal impact for the organization.

28:44 So my point is, is look at all the different things so that when you're selling people on ideas of the value proposition...

28:48 ...which GIS brings, you understand that there's different values and time and lengths to each project...

28:53 ...that you do based on what they need, what the data is, what the process they're going to need to go through...

28:59 ...and what the end results are that they're trying to achieve.

29:05 So, having talked about all this data and trying to move into applications, people build data and go find applications.

29:14 It's a website, it's an iPhone application, it's whatever it is.

29:19 But the reality is, data should meet the applications at all times.

29:23 You should always be thinking about what is it you want the end result to be?

29:29 So, what I see happen oftentimes is when people ask, what can GIS do...

29:34 ...they look at these things and they go, oh, we can do maps and record things, we can issue permits...

29:40 ...we can route people; we can do...we can map the elections results.

29:46 What do you do when you do that?

29:48 Well, I do a study, I do an analysis, I do a route, I review in compliance.

29:51 My point is, where does GIS fit?

29:53 It's not the driver for things you do.

29:56 It does the things like the studies and the output.

29:59 You were going to pick up the trash already.

30:03 You were going to do a permit already.

30:06 So where the GIS applies is back to the process and the outputs of what you need people to

do.

30:13 So when you look at the workflow, and this is where GIS got this biggest uptake is in this area...

30:18 ...which is the idea of looking at the entire work chain.

30:20 So when I look at this line, I say okay, I want to put a database of service requests.

30:24 It could be permitting. It could be almost anything. Solid waste.

30:27 Okay, I'm going to create GIS and I'm going to put it there, and there will be a database repository.

30:33 A geodatabase.

30:35 Okay. I'm going to create a system that creates work orders.

30:39 Well, I need the work orders; I need a foundation to know when somebody comes in that when I type in their address...

30:44 ...I can validate where that is and where it's going, so I can put GIS there.

30:49 Well, now I want to generate schedules because I want somebody to be able to dial in, call, tap on a map...

30:53 ...or call me, and I want to be able to put it in.

30:55 Well, people would stop there, but what's the next step?

30:57 Again, it's then they would route.

31:00 And so now I'm out in the field.

31:01 I didn't have all my maps and data with me, so I take the data with me on a phone that's tied to the Internet.

31:06 I can download this stuff back and forth, I can route myself; I've got a call, I can change that.

31:11 The idea is to look at all the different things that GIS can do for you, and if you're kind of looking at me right now...

31:16 ...thinking, where is this guy going with this?

31:18 I firmly believe GIS can solve almost every single problem.

31:23 You cannot throw a problem at me that I cannot figure out how to apply GIS to.

31:27 So I'm driving down the road, and my wife hates me because I'm driving down and I'll hear "Mickey Thompson's ...

31:32 ...off-road racing! Be there!"

31:34 My mind begins to think about how you can control the traffic, how I'm going to market the

event...

31:38 ...to old people that want to go to drag racing, I go to...my mind starts working.

31:44 I go to the movies and I'm watching The American President and that was with Annette Benning, and I'm sitting there...

31:49 ...everybody's crying and I'm going, hey, there's GIS in the background.

31:52 It's used for elections.

31:54 And I see GIS in each and every thing we do.

31:57 And so what I hope that you get is this sensation that you will start to understand that GIS actually can ...

32:04 ...impact actually all the work activities that you do in a very positive way.

32:11 So, I want to play a little game with you.

32:13 How many of you went to the map exhibit gallery last night?

32:17 So you saw a lot of pretty maps, right?

32:19 The problem with the map exhibit gallery, a little bit with me is, that's the impression people leave...

32:24 ...because that's what you're always showing them.

32:27 So pretend you're on a...you've decided that you want to be an engaged citizen. Could you do that?

32:32 And you tell me that, they tell you they're going to come in, they want a park committee ...

32:36 ...to come and define where some new parks are.

32:39 And they tell you that they're going to locate this facility and they've got a couple of things that they want to do.

32:43 They want to go through and they want to find between 25 and 30 acres; they want it to be on city property...

32:56 ...they'd like it to be near a neighborhood, so do you guys have a picture in mind?

33:01 You don't have to raise your hand, but you've got one, right?

33:03 And this is what you go through, right?

33:06 This is how people began to use GIS.

33:10 So, the next thing that GIS does, it cannot take that flat world and put it into real context.

33:15 So what if I told you I just oriented that same map?

33:18 Is the parcel that you were thinking the right one now?

33:22 If you were picking the one over there that's kind of sloping down with all of them...

33:26 ...it would be kind of hard to get that basketball when it gets away from you, right?

33:30 The idea is that GIS starts to give you a decision support tool that's different, where you can...

33:34 ...take the data and present it back in the real world.

33:38 That flat map, while it was interesting, on the surface was a useful tool, I can now begin to bring it back into a context...

33:44 ...so people start to see what it is I'm talking about.

33:49 So, in this case as I'll go through this, is this is the foreclosure activity in Moreno Valley, California...

33:55 ...which was a big foreclosure area here in Southern California.

33:58 One of the highest in the nation.

34:00 And they were using a lot of maps to understand delinquencies, where funding could go, where they could put officers...

34:05 ...because the houses were being foreclosed on; people were going in [unintelligible]

34:09 And on the surface this tells a really interesting story.

34:12 It tells me where my foreclosure hot spots are.

34:17 But this is interesting; you can time stamp and animate data.

34:21 I don't have to take a static screen shot.

34:24 So what we're going to do is we're going to run this little animation here that comes part of the core of the technology.

34:29 And this is showing foreclosures and changes in property values over the last couple of years.

34:35 And what it's telling you is things change.

34:39 Some areas have hot spots, things grow.

34:42 And so I move from a flat dynamic series of maps to trying to communicate property values and how it's...

34:51 ...actually shifting in real time so that if you're actually trying to do programs, whether it be revenue...

34:56 ...whether it be assessment, whether it be law enforcement, code enforcement, doesn't matter what it is, I can alter my plan...

35:05 ...I can change the way I work, and not live within a static environment.

35:10 And so, to me, you might not do this right off the bat, but this is the way to begin to think of

what GIS can do for you.

35:17 All right, Bill. It should be able to run. Let's let this run through. We're almost to the end.

35:23 So to me, the best way to tell people what GIS is, is to relate it back to personal life.

35:32 Things you do.

35:33 You all have hobbies, your kids do things, you have things that people do, and if you can understand...

35:39 ...how you have been impacted by GIS each and every day, then you can start to understand...

35:43 ...how it can impact the work you do and then communicate to others, so...

35:47 Here's a couple things.

35:50 You can explain to people that when you go out there and you see a water main bust, I can take this...

35:58 ...and I can engage this with a work order management system, I can put this...

36:01 ...into permitting, it's an executive dashboard, it could be a mobile application.

36:05 So we're kind of already realizing that, that data for maps on a phone had to come from something.

36:14 So when you start to go, many of your newspapers use GIS.

36:20 So, remember red states/blue states and how you watch on election night how people are changing...

36:25 ...you can see which county is voting the way and what have you?

36:28 What is that mapping software on the television? It's GIS.

36:32 When you see the weather patterns behind the map, what is that?

36:38 When you see a map of the Gulf and what's going on, look in the bottom left corner next to the AP...

36:43 ...you're going to see source, Esri.

36:47 That map, investigative journalism.

36:52 You're going to find it in government and a lot of application areas from police and fire.

36:55 So when they call 9-1-1, and they pull up your phone number, remember the area code?

37:00 And it stops on a map.

37:01 Or you're driving around with the cell phone because it has a GPS receiver.

37:05 How do they know where you are?

37:08 All your 9-1-1 systems have a GIS in it, so you now start to see how it impacts you personally.

37:14 So in government it's used for land use and it's used for circulation models.

37:18 Tax appraising. So when you go to your tax bill, how is that calculated?

37:25 It's in a database somewhere and they put it through for you.

37:28 It's used in urban planning.

37:36 But it's used on a lot of the websites; you've got law enforcement so...

37:39 ...if you want to do crime statistics, it's used for everything from the back-office person who's doing the crime statistics...

37:43 ...to sending a map to the officer for routing, to enforcing the public.

37:48 So, a Megan's Law viewer, where are the sex offenders in my neighborhood? It's GIS.

37:53 Economic development.

37:54 So if I want to go out into a real estate site and I want to look for homes...

38:00 ...I can go on there; what are you probably dialing into? A GIS system.

38:04 But I'm really more interested not in just the home but I'd like to know a little about the area...

38:07 ...what's the male to female ratio? What is the entertainment? Where is the entertainment?

38:11 So now I start adding value by adding the right questions of the way people would want to find a home or a business.

38:19 It's mobile application, so when you see that meter reader person out there, with that little device doing this?

38:24 There's a little GPS receiver in it.

38:26 And that GPS receiver ties back into a database and you plug it back in, set it in a cradle...

38:31 ...and it populates all the locations of where things are.

38:34 That way you could start to begin to look at collecting information, looking at how good a job that person's doing that day.

38:40 It's used in police helicopters, it's in code enforcement.

38:46 But, in economic development, it's used in customer analysis so we have a product that's called Business Analyst Online.

38:52 You can actually look at the opportunities for whether or not a business will make it or not.

38:58 So it's used in education.

38:59 So how they figure out how to do bus routes.

39:03 Where the line is so you go to that school versus that school.

39:09 No Child Left Behind, or educational attainment sites, that's all GIS.

39:14 It's used in disaster relief, so when Haiti was happening, all the information that you were...

39:19 ...going to websites to see the maps and everything.

39:20 You know, when you go to... Have you guys heard about the pipeline explosion down in the Gulf?

39:26 Have you seen all the maps that are associated with that?

39:29 That's Esri technology behind the scenes.

39:31 It's used to figure out, on a disaster, how to get the right people there.

39:35 So they take things like Tapestry data, which is called psychographic data, the way...

39:39 ...people do things, the types of patterns they buy.

39:42 So they know that if they bring in the Red Cross or the Humane Society, whether they need to bring in...

39:47 ...big trailers for horses or dog kennels for Fifi, based on the types of products people buy.

39:57 They look at languages spoken in specific geographies, so that when you wanted to file your insurance claim...

40:02 ...you know the type of people to send in the areas.

40:05 They need to have this type of language, they have to have this type of skill set, and you can deploy people.

40:09 Most of your insurance companies use GIS.

40:14 It's used in facilities management, so it's not just what's on the ground, but it's also related to the buildings.

40:19 So, if I'm FedEx or one of these types of people, I need to know it's in Bin A at this location, I pull it off so...

40:26 ...it's inside the building, so I could actually use GIS to figure out which of the rooms...

40:31 ...have people in it, shut on and [off] things.

40:36 When you're looking at things like the Olympics and GIS is managing all those activities and events.

40:44 So it's used for alternative energy.

40:47 So, you can sit there and you can take wind propellers and you can figure out where you can put them...

40:51 ...and what they've learned, it's not where you put it, it's how high you put it.

40:54 You can put it almost anywhere.

40:55 But it's looking for analysis on where to put solar panels.

40:59 It's public-awareness sites.

41:06 So, now I can model with GIS.

41:12 So, remember on 9/11, watch this analysis.

41:16 See how it started over here, and then went back, and went off to the coast?

41:25 So I'm animating. So remember when everybody was running around on 9/11 with masks on and stuff like that?

41:33 It was raining, and the wind had picked up.

41:36 And remember there was all this asbestos and stuff in the buildings.

41:39 What does this show you?

41:40 It shows you that all the asbestos, fluorocarbons, and all this stuff went off the coast, came back in...

41:45 ...ended up in Philadelphia.

41:46 What does that do for you?

41:47 I start to understand the long-term impacts for children that are being exposed to these toxins that...

41:54 ...started here and are going to go here.

41:55 Go to the next slide then.

42:00 It's used in business, and it's used in business by a lot.

42:02 Most businesses use it.

42:03 So when you ever go to a place and they ask you, can I have your phone number starting with the...

42:08 [Audience participation] Area code.

42:10 ...or they ask you for your ZIP Code, what is that person doing?

42:15 They're collecting information about you to figure out where you come from and where a better store would be.

42:23 So, a lot of your stores use it for allocation and trying to figure out where to put new businesses.

42:29 You'll find it on real estate sites.

42:31 You know the On-Star system, because you locked yourself out of the car?

42:34 How does it know where your car is?

42:38 It's GIS, right?

42:39 So you're impacted by all these each and every day

42:42 When you pick up and somebody... How many are familiar with Sears?

42:46 So when Sears, you call up Sears and you say you want a delivery or a repair and they give you a four-hour...

42:52 ...time window, guess what they use to figure out where you are in relationship to all their deliveries?

42:58 They are using GIS.

43:01 How many of you have ever gone to a AAA map site, or a travel site?

43:06 The map that gets printed, that's GIS.

43:09 How many of you have ever used a Thomas Bros., Rand McNally, or any printed map book in the last 15, 20 years?

43:14 Guess what they make that in?

43:17 That's GIS.

43:19 They created that using GIS technology.

43:21 The outside of it, the stuff that's on the web and in your car, guess what that is.

43:27 When you see NAVTEQ or Tele Atlas on all these mapping sites you go to, they created that information...

43:32 ...and that routing in GIS.

43:36 It's used for marketing.

43:37 So, when you look at it, the billboard companies?

43:40 They actually figure out where to put billboards and market it to companies based on who drives by each day.

43:47 So they take in traffic counts, who is in the neighborhood.

43:50 I don't know why they think my neighborhood likes beautiful women that...but they do.

43:59 Do you know that the casinos use this?

44:02 They actually analyze where traffic is, going in and out of the casinos, again, back to the inside of the building.

44:08 And they take and they move winning slots machines based on where they want to move

people.

44:14 So, they would use it to market, they use it to get...

44:16 Your direct mail, most of that's all figured out by using GIS technology.

44:22 It's used in defense; of course the military will use this.

44:25 They use it in everything from trying to figure out the terrain for a tank to go through to a convoy...

44:31 ...to figuring out exactly the coordinates to take out an enemy.

44:36 We don't talk about this a lot, but it's probably one of the biggest areas where you'll find a lot of GIS technology.

44:42 And it's even used for simple things, something that's both in the military and in local government.

44:45 Do you know how many times they lose trash bins?

44:49 So there's a little RFB or a little tag underneath your trash bins, and that's to tell them where that is and they can...

44:55 ...track it by its location, because what will happen, to give you an example, somebody will go on a commercial site...

45:00 ...they want to build, they put a bin on, the bin comes on, it's left there, somebody comes in and says...

45:03 ...I just started a new business; they put a new bin in.

45:06 You ever gone to a site and there's four bins sitting outside the...

45:10 They actually use the GIS to try to figure out where things are, and City of Los Angeles is just saving millions of...

45:16 ...dollars a year just in figuring out where their trash bins are so they can go back through and analyze.

45:21 The Indian nations are some of our biggest and strongest users.

45:26 They do it for looking at natural resources, to preserve archaeological sites and guess what?

45:32 To get you to Indian bingo.

45:36 They use it for the marketing, for the economic development in their communities.

45:39 They use it in health and human services, and Bill will speak to this, but all your health surveillance.

45:44 If I were to go out and I was to try to track West Nile, and people want to report dead birds or standing water...

45:53 ...that's being put into a database that people can kind of take a look at.

45:56 So your health is impacted each day.

45:58 As you start to go through each enact of these activities, you can probably not think of a company...

46:03 ...you deal with that's not using this in some form or another.

46:08 So the idea is if I'm in commercial government, how do I make the equation back and forth?

46:11 It's used in the oil spills for everything from the monitoring to the cleanup to the response.

46:18 It's used in utilities.

46:19 Have you ever heard of Call Before You Dig?

46:22 See that sign? What is that?

46:24 It's GIS.

46:25 You call, you tell me where you are, they pull you up on a map.

46:30 You're impacted.

46:31 It does network tracing, it does sewer line breaks.

46:34 There's a new thing called BroadbandStat, and it's an idea of tracking where broadband is.

46:38 We've all heard of broadband. It's that irritating thing you don't have when you don't have your signal.

46:43 So, the idea is that in utilities, it's put there to create the data.

46:48 So, you know that commercial, have you seen this one, "Can you hear me now?"

46:53 "Can you hear me now?"

46:54 "Can you hear me now?"

46:56 What is that guy doing?

46:58 He's collecting GIS data.

47:01 So guess how the telephone companies figure out where to put the cell tower, based on coverage.

47:08 So your cell tower coverage, good or bad, is probably some part in GIS and the connection you have.

47:14 That's what that person's actually doing, is collecting GIS data, and that actually is the way it goes down.

47:20 It's used in transportation for routing, it's for doing traffic signaling...

47:26 ...for planning future roads and load balances.

47:28 It's used in science, this is probably the biggest area for us, for looking at underground water tables...

47:36 ...looking at the water and air quality...

47:39 ...to monitor things like global warming.

47:41 It's used to do census and demographic analysis and counts.

47:46 It's used for exploration. Think about this, it's a solar system, it's a series of bodies, it's a series of geographies.

47:56 The globe is a geography, the planet is a geography.

47:58 So they actually are mapping the solar system.

48:00 So when they were looking at the Mars lunar roving and they had all the maps and stuff like that...

48:04 ...they used GIS to look at these types of applications.

48:09 So, I'm going to pass this here, so hopefully what I've left with you so far is, there's a little bit difference...

48:15 ...of what I hope you thought GIS was and what it could do than when you first walked in here.

48:20 And we didn't mean it to solve all your problems, but the idea is to communicate GIS to people in much simpler terms.

48:26 To put it in a context that they'll understand, first, in their day-to-day life, and then begin to bring it into their work life.

48:32 So I'm going to pass this over to my old friend, Bill Davenhall.

48:36 Bill's been with the company since 1997, and he heads up our health vertical; I head up the government vertical for Esri.

48:45 Bill has a degree from...medical behavioral science. What I understand from talking to Bill is he was the first person...

48:50 ...to ever get a degree in that.

48:52 If you ever want to see Bill's famous information, Bill has a TEDMED talk, and it's taken the world by storm.

49:00 Go to TEDMED and look that up.

49:03 But he's got 31 years' experience, he's an author and speaker. We do a lot of the same types of things...

49:09 ...so I'm going to pass it over to Bill.

49:19 Thanks, Chris.

49:20 And I'm sorry I was late coming in, I'm sure Chris just took right over.

49:26 You know I'm a little upset about one thing you said.

49:28 I could understand why you may not want people talking about their children, but their grandchildren?

49:33 I can't believe you went over the cliff on that. You know?

49:37 How many people have grandchildren?

49:39 Meet me in the hall afterwards; I've got photos.

49:42 I'll be going out the other door.

49:46 So, you know, Chris and I have a lot of fun doing this, and I would say, you know, someone asked me one time...

49:51 ...could I imagine what hell would be like?

49:53 And I said yes, it would be in a stuck elevator with this guy talking about GIS.

50:00 You can imagine his enthusiasm about this. What? You think you could last an hour, or what?

50:06 So part of the success of this technology is really moving to that, one of the slides he had near the end...

50:13 ...that it's about the understanding of the data that you're putting on these maps that is really critical.

50:18 So, there's a lot of imagination that can be brought to bear in that, that we have to sort of every once in a while dust off...

50:25 ...and realize that there's somebody out there who's going to be like me, who's really not a GIS technician.

50:31 I mean, I really don't care how pretty a map looks.

50:36 I mean, you know, when I was looking for gold, at one time when I was a kid, you know, I needed one of those maps...

50:42 ...that just had, you know, on the back of a napkin, that said go to the tree and go left and right and put a big X there.

50:48 Right? And so I was into, how to...you know, simplicity.

50:52 And I didn't really know things about cartography; I mean, you know, now I'm richly blessed with understanding...

50:58 ...all these fine details of how people use this technology.

51:01 So, my role here this morning is to really take the edge off this technology and sort of

straighten it up a little bit...

51:11 ...and remind people who pay for this technology, and pay for your organizations to invest in it...

51:17 ...what really has to come out at the end.

51:19 It can be a useful tool, yes, it can help your business run smarter; but at the end of the day...

51:24 ...this has got to have some sort of practical implication to it.

51:29 So, if you look at these kinds of things, these are what I would call, you don't normally have the obvious...

51:35 ...conclusion that GIS was involved in these.

51:38 Some of these have been helped by, what I would call the adoption recently of our whole cellular technology...

51:44 ...and the fact that location is now with us.

51:47 It's always with us.

51:49 And we're now going to be wanting more of this location awareness than ever before.

51:55 You know, getting accurate travel directions, I think we all use the Internet for that and use GIS.

52:01 How about identifying epidemics?

52:04 You know, it's only recently that the public really got engaged with the H1, really beginning to understand...

52:09 ...how this could evolve.

52:12 Yet, we were not well served by GIS when it came time to try to find a place where you could get your family an H1 shot...

52:18 ...that was available that day, that hour, when you had time to do it, and it was not very convenient.

52:24 So we ended up throwing away 70 million doses of vaccine this year because people didn't go get their shots...

52:30 ...and I would say a lot of that could be contributed to the lack of appropriate information...

52:35 ...right time, right place kind of thing.

52:38 How about obtaining a business license?

52:40 Chris talked about that.

52:41 But there's all sorts of licenses that are obtained.

52:44 He's talking about business licenses.

52:45 What about professional licenses?

52:47 Nurses, doctors, health care workers.

52:49 All these people have board certifications that they go through in which an address is collected.

52:54 This is what provides most of the base information upon which we make policy decisions about things like health.

53:02 Determining where to build a store.

53:04 You know, while this sounds relatively new, it's always been done in the store location business to use...

53:13 ...some sort of geographic information to help people understand that.

53:17 How about buying homeowner's insurance?

53:20 You know, when you go on that phone and do that, you don't, you know, while you're talking...

53:26 ...someone is inputting your address of the property, and this is why they're able to give you a quote right on the phone.

53:32 They know how far it is to the nearest fire hydrant, they know the whole complete history, their loss history...

53:37 ...other people's loss history in that neighborhood, and this is why they're able to give you a quote.

53:41 And if you live in a bad part of town and you're asking for automobile coverage for theft, you know...

53:46 ...you're going to get a rate that reflects exactly what happened in a very small geographic area.

53:54 So, one of the things I always like to do is really explain to people how this technology really works.

53:59 How do you get a dot on a map?

54:02 I mean, you know, we all do this, and we sort of assume that we understand what we're doing...

54:07 ...but I like to really go over this, because at the end of the day people really don't understand how this happens.

54:12 So I'd like to tell you there's three ways this can happen.

54:15 The first way is that we use this thing with an address.

54:21 We essentially have a system in this country, as we have like in 27 countries, where we have

taken street addresses...

54:27 ...and we have built what's called schemas, and we basically say, we know where the beginning of the street is...

54:33 ...the end of the street, and it has an address range.

54:35 And so when you put your specific address in it, it finds it and says, oh, well, that's about...

54:40 ...50 percent between number 1 and number 2.

54:43 In other words, one end of the block and the other end of the block.

54:46 So if you're at the other end of the block, and you have 100, you know, it goes 1 and to 100, and you come in and...

54:51 ...you have 50 East Chestnut Street, well, that's where it's going to say that's 50 percent along that continuum.

54:56 This is where this point is going to be.

54:58 Our technology up to date has been like this, where we have approximated where that specific location is.

55:04 So in this case I said, 380 New York Street, that's Esri's address, it found us in the middle of the block.

55:10 Now, when Google started to appear and started to show us our houses and show us our rooftops...

55:16 ...and we put in the address, it often put the little cursor on the wrong house, right?

55:21 We say, well, that's not our house.

55:23 Well, part of the problem at that point was they were still using this particular type of technology...

55:28 ...which is still in use today, to approximate where that is.

55:31 So, that explains why sometimes the dot isn't on your rooftop.

55:35 Now, these are getting much more sophisticated because the underlying data, which we happened in the industry...

55:40 ...called spatial data infrastructure - that's a big word, right - it simply means that as the postal department...

55:48 ...as the census department gets more refined and wanting more specific geographic information, they refine this...

55:54 ...so at some point in time, it can be rooftop accuracy.

55:58 And you'll start to see this in the advertising of the companies who provide this data.

56:01 "We have rooftop accuracy."

56:03 So if you use sites like zillow.com - you ever use Zillow, the real estate one? - this is what you're talking about.

56:09 You're watching them get more precise about this.

56:14 So there's another way to get a dot on a map.

56:16 So I'm going to use a health example here.

56:18 That's a trap for catching mosquitoes.

56:24 And so, during the West Nile virus, well, it still exists in this country, but when it first started...

56:30 ...this is the way that the public health department went out and sampled geographic areas to determine whether...

56:37 ...the insects that they collected in that trap carried the West Nile virus.

56:41 So they would collect all the...it's got a light in it and the mosquitoes are attracted to it, then they take a sample from that.

56:48 They put them in a blender, they mix that up, and then they sample it and they sort of identify what the virus is...

56:57 ...and that's when they start to report it.

56:59 And after you do this, 10,000 different traps across the country, you begin to develop a pattern.

57:06 And so in this particular case the worker there has a handheld device that has a built-in GPS.

57:12 So, they had to do this very accurately because it makes a lot of difference in tracking that West Nile virus if you're...

57:19 ...you know 100 feet one way to the, you know, left or to the right.

57:24 So it started to improve this accuracy.

57:26 By simply using the orbiting satellite that provides the GPS, they were able to accurately then put...

57:34 ...a dot on a map and represent it in their analysis.

57:37 So that's the other way you can get a dot.

57:38 You can use some sort of portable device, like a cell phone now is actually giving you that precise location.

57:44 So when you hit that little thing on your 3GS, it gives you the location of where I am now, it's in part...

57:50 ...the same kind of technology they're using here.

57:53 And then the final way to get these kind of images going is, think about this as a moving, it's a moving shape.

58:01 And because we have satellite imagery, we can define that shape in terms of pixels...

58:06 ...that represent latitude and longitude.

58:08 And as that moves over a land mass, we also have the pixelation of the land mass under it.

58:14 So the example on the left is, in the forest fires in California, you could lay down the smoke plumes...

58:21 ...that come off the mountains, and lay it on top of demographic data that could calculate the number of children...

58:28 ...that were going to be breathing smoke over the next two weeks as a result of this.

58:32 And you see there's some numbers in there, and it says the places that had the most smoke, it's not necessarily...

58:37 ...who had the most smoke, it's who had the most smoke in which it was going to be breathed in by children?

58:42 And you found one area has two million people, and another area has thousands.

58:47 So you actually then can send notices to all the hospitals, to all the physicians, to all the schools...

58:53 ...who lie under that smoke plume, that they're going to experience problems.

58:57 So, we created these shapes by actually that pixelization that happens at the satellite imagery level...

59:04 ...and referencing it to the underlying data, it's either land mass or something else that we want to peg that picture to.

59:12 And that's how these images are actually created.

59:15 This is how we get information that, relatively speaking, 10 years [ago] didn't exist.

59:20 We had no way to represent it.

59:31 Now, this is a concept you see a lot used when people talk about GIS.

59:35 It has to do with layers. Right?

59:37 So everybody in this room has a job; even if you're retired you have a job.

59:43 It's going to have something to do with a layer of data.

59:46 Don't care what it is.

59:47 So if you're retired and you went to Radio Shack and you gave them that ZIP Code data, you represent a data layer.

59:54 And so, everything we possibly can do on this planet has a representation that's going to end up being a data layer.

1:00:00 And you suddenly see, it depends on what you're talking about here.

1:00:04 You know, we can have administrative boundaries.

1:00:06 We can have, look at that one called population attributes.

1:00:10 And it sort of looks like one of those heat maps, right?

1:00:14 Well, what it can do is you've now taken some specific data, you've created another piece of data...

1:00:19 ...combined two pieces, and now you've called something an index, and you describe the shape of that index.

1:00:24 That's one of those irregularly shaped things that you then start to use as data and then we visualize by putting it on a map.

1:00:35 So now there's other kinds of layers you can create.

1:00:38 So, the first slide happened to do with the outside world.

1:00:41 Now we move inside.

1:00:43 And we suddenly realize this can represent data inside a building.

1:00:47 So, in this room we're sitting, there are electrical lines behind the walls you can't see; there's pipes in the floors...

1:00:52 ...you can't see; you know, there's ventilation that you can't see, right?

1:00:57 But it all can be represented through engineering technology, right?

1:01:01 But it all is about the relationship, the A to B.

1:01:04 So, somebody sitting in the second row, we can start to measure the distance to the back corner.

1:01:10 And we can start to do all kinds of measurements and rules.

1:01:12 And you begin to see that, inside a building, GIS is just as important as that external world where we're...

1:01:18 ...looking at rocks, trees, sky, and ground, right?

1:01:22 So, in my business area, which is health, we have hospitals that are using this to examine where they locate patients...

1:01:28 ...where nursing stations are, how diseases move through the hospital from person to

person.

1:01:34 So, you know, you can have these infections that end up killing hospital patients because physicians and nurses...

1:01:40 ...at particular nursing stations didn't wash their hands.

1:01:44 Right? And this whole disease called MRSA is spread.

1:01:47 So, our technology of GIS is being used to do some relatively very important kinds of jobs...

1:01:53 ...and you don't even know it's happening.

1:01:55 But, it's represented through a layer of data in which you can think of every possible thing - the employment files...

1:02:00 ...they know the nurses, where the nurses came from and their training, they know the hours they've worked...

1:02:06 ...they know how many patients they had at a particular time.

1:02:09 You begin to see that that information database is all internal, and then they're applying it to...

1:02:15 ...some sort of problem they're trying to solve.

1:02:20 Now this one is about, you know, things that now concern me as a person.

1:02:26 I'm now interested in things like, well, I know where I live and work and play, and now I want to know about...

1:02:31 ...something like morbidity rates in my community.

1:02:34 I want to know about the quality of my life.

1:02:36 And we now know that there's data that's being created about those things.

1:02:41 And it's going to be focused through the lens, really, of geography.

1:02:45 And it's going to become very specific.

1:02:47 So we take a look at now person, place, and time.

1:02:50 We can add the element of time, so we can look at neighborhoods as they changed, and how you...

1:02:55 ...move through those neighborhoods in time.

1:02:58 And in the case of public health you're looking at the quality of your life as you move through these areas.

1:03:07 Okay, so this I'd like to just sort of have you think about.

1:03:11 This is why I am attracted to this technology.

1:03:17 It's really straightforward.

1:03:18 I mean, this probably is the reason why you like Google today...

1:03:22 ...or you like Google-like types of GIS...

1:03:25 ...is that you love this opportunity to rapidly scale from very finite areas to very broad areas...

1:03:33 ...and move back/forth seamlessly and never have to worry about scale.

1:03:38 Never have to worry about, you know, do things fit at these boundaries?

1:03:43 That's what we all want.

1:03:44 So, we get really intrigued when we go to any of these websites now.

1:03:48 We love to push that little wheel in and out, in and out, take a look at our neighbors, take a look at our relatives...

1:03:55 ...people we met on the street, you know, or maybe at this conference, where they live, what kind of neighborhoods.

1:04:00 This is what attracts us to it.

1:04:02 As a human being we love this kind of scalability, right?

1:04:07 And we want to see it all, and then we want to see it very specifically.

1:04:11 And you got to keep remembering that as you develop your approach to GIS, is that this is what people really want at the end.

1:04:18 They want this ability, and there's no information that's not included in that.

1:04:25 Whatever business you're in, whatever your profession is, you want the same kind of thing...

1:04:30 ...when you start to analyze your situations.

1:04:35 So, this is a slide that sort of tries to tell you that if you're in this room, the people at the bottom of that chart...

1:04:44 ...know the very most about this technology.

1:04:47 And the people up at the upper end, they know the least.

1:04:52 And so you can decide where, you know, what piece of that you're interested in, and it'll pretty much tell you...

1:04:57 ...your level of maturity, or your organization's maturity, in the use of this technology.

1:05:02 So I represent a lot of people up there at the upper end, and they're very immature in their utilization...

1:05:08 ...and understanding of this technology.

1:05:10 It's not that they're dense; it may be that their organizations have not been able to rationalize the expenditure...

1:05:17 ...for this technology, and rationalize the staffing that Chris pointed out is so important, right, that's needed.

1:05:23 They certainly have the data.

1:05:25 So you can begin to see that this is transformational.

1:05:29 You know, the people who will help the people up in the upper right are the people in the lower left.

1:05:35 Right? So sometimes I'll find that the organization in a country that helps the health ministry catch the wave...

1:05:43 ...on this technology is the land management, the forestry, people who have vast, have 40 years of experience...

1:05:51 ...in collecting data and making it useful and building GIS systems.

1:05:57 So, as Chris has really pointed out pretty profoundly, there's a lot of benefits of using this GIS.

1:06:04 There's not just one simple thing that it does.

1:06:07 And it's far beyond just creating maps.

1:06:11 There are many people who are using this technology every day that never produce a map.

1:06:16 But it's part of the underlying infrastructure of their decision-making process.

1:06:20 That's what they really wanted.

1:06:22 They didn't necessarily want a map at the end.

1:06:24 So, you want to sort of disabuse yourself that, when you think of GIS, it's always about a map.

1:06:30 It's not.

1:06:31 But yes, we are, we want these maps, when you do produce them, to be richly blessed, that they actually...

1:06:36 ...help people understand and communicate what you're trying to get across.

1:06:42 Now, Esri has a lot of great resources and I would say...

1:06:46 Oh, where's that slide?

1:06:48 Oh, so this is like why is GIS important?

1:06:51 This is sort of like a sales pitch that you will use when you go talk to upper management.

1:06:55 Now many of you may be upper management, right, so this isn't like a trick question.

1:07:00 But if you're going to try to acquire more resources to do this kind of work and move in this direction, this is what people...

1:07:08 ...this is what people who supply the money to create the opportunities want to hear from you.

1:07:14 They want you to say, well, this will integrate different types of data.

1:07:18 They like that. Improve the accuracy of the information.

1:07:22 And depends on what industry you're on.

1:07:23 I mean, you know, if you're talking to a hospital clinician about accuracy, they're very concerned about accuracy.

1:07:31 They're down to two digits, you know, two places to the right of the decimal point. Right?

1:07:36 And you know so you have to sort of understand what's expected in that place.

1:07:41 Accelerates our understanding of situations.

1:07:44 This is why situational awareness is so popular across all industries.

1:07:49 People are beginning to understand, they just can't...they're impatient, they're not going to wait very long...

1:07:54 ...to have a correct assessment of what's going around them.

1:07:57 Increases the intrinsic value of all our information.

1:08:01 So a lot of people pay for a lot of information.

1:08:03 And the worst thing you can always say is you never used it, right?

1:08:06 I mean this is a disaster; if you're going to go get more resources, and they say, well, what are you doing...

1:08:10 ...with all the data that we have?

1:08:11 And they say, well, not very much.

1:08:14 So, intrinsically you have to sell the notion that you're sitting on a pile of gold here that you haven't exploited.

1:08:20 And then it creates actionable intelligence.

1:08:21 We're actually going to do things with this knowledge we're going to gain from these information systems.

1:08:27 We're going to take some sort of action, whether it's intervening in some sort of transaction that's happening...

1:08:33 ...or anticipating some action that's going to happen in the future.

1:08:37 Okay, so to the resources.

1:08:39 We have a lot of resources at Esri.

1:08:42 In fact, I would say we are probably a bigger educational organization than we are a software development organization.

1:08:49 Helping people understand not just how to use the technology but what it means and how you leverage this...

1:08:56 ...to get to that actionable kind of information phase is what Esri spends a lot of internal resources on, and each one...

1:09:02 ...of us who work there are tasked with the responsibility of writing hundreds of thousands of words...

1:09:08 ...every year about this, to try to make it more clear, improve the vision that people would have of this technology.

1:09:15 So, these are some of the sites, I mean, these are the kinds of things we do.

1:09:18 We have newsletters, we have educational training, and we have many, many events.

1:09:24 In fact I learned this week we have 1,500 events a year that our events people manage.

1:09:30 So it's a tremendous amount of activity that Esri spends in that.

1:09:35 We publish a lot of books.

1:09:37 Many of the authors are internal authors like Chris and I who will write books.

1:09:41 We have about 40 people who are domain specialists...

1:09:45 ...across all industries, who have experience in these industries and are able to write valuable kinds of documents.

1:09:54 These are all meant to help you and your management understand the value of this technology and get utility out of it.

1:10:01 Next. We also have a big online presence.

1:10:04 This is getting bigger, in which most of our resources are now available online.

1:10:09 You can even get chapters of books now, online.

1:10:13 Next. Well, that's the last slide.

1:10:17 Thanks for being patient with us and spending some time with us.

1:10:21 We hope that your conference is going well and that you're still having fun.

1:10:26 Thank you very much.