

Time Awareness

See how the use of time-aware tools in ArcGIS is applied to helping with the Gulf of Mexico oil spill. See how the response effort has changed over time, and watch how time aware capabilities are used to track vessels and do boom placement. The demo also shows the incorporation of real-time feeds, social media feeds, and live GPS feeds into a map to help first responders pull information from the community.

<http://video.esri.com/watch/44/time-awareness>

Video Transcription

00:01 And now let's take it one more dimension.

00:03 Let's take it to the fourth dimension and bring in the component of time...space and time.

00:09 ArcGIS 10 is time aware.

00:12 There's all kinds of different time we're going to work with...real time, database time, historical time, decision time.

00:19 Many of the problems that we face and we have to solve are space-time problems.

00:24 If you want to know when and where pirates are going to attack in the Gulf of Aden, that's a space-time problem.

00:30 If you want to understand the migration patterns of caribou in Canada, that's a space-time problem.

00:36 Another space-time problem is the Deep Water Horizon oil spill in the Gulf of Mexico.

00:42 To tell us a little bit more about this are my colleagues Bronwyn, Nate, and then followed by Undral. Bronwyn.

00:48 Thank you, John.

00:50 Many of you have seen this map in the news over the past 84 days.

00:55 This devastating event happening in the Gulf of Mexico is a space-time problem...

01:00 ...which we will use to demonstrate that many spatial events contain a component of time.

01:05 Just as the world changes over space and time...

01:09 ...so does the GIS data which we use each and every day to model these real-world relationships.

01:16 Zooming in to Orange Beach, we can take a closer look at the boom placement strategy.

01:24 Booms are a critical aspect of oil spill response.

01:28 They are placed often in coordination with other response techniques...

01:31 ...like skimmer boats to protect the shoreline and other sensitive areas.

01:36 Now, I'm not a boom placement expert, and I'm going to use this application built for the public...

01:44 ...to investigate the response on this day, June 6th.

01:48 I can see that some of my booms are still in the proposal phase...

01:51 ...while others have been staged and others in yellow have already been deployed.

01:58 This boom layer is a time-aware layer, which means that although I can look at it on June 6th...

02:05 ...far more interesting to me is to navigate through time and see how the response effort has changed...

02:13 ...new booms are placed, others are removed, and the status is updated.

02:19 Now as I was moving through the calendar, there was a lot of activity right around here.

02:25 By moving to my satellite imagery, I get a different view of...of...of the area and can see more clearly that in fact...

02:34 ...all the activity around this big circular boom was to protect these three small islands at the mouth of the channel.

02:42 This application designed for the public for people like you and me...

02:45 ...to investigate the response effort and learn about the incident.

02:50 It's also the platform for the emergency operation center...

02:53 ...to share the most current information available about the response.

02:59 Now Nate is going to tell us a little bit more about time-aware layers. Nate.

03:04 Thanks, Bronwyn.

03:12 All of our data like oil trajectory includes a date and a time stamp.

03:18 New in ArcGIS 10, we can enable time on this layer.

03:24 Like the Web application we saw earlier, Desktop includes a time slider.

03:32 This time slider doesn't just work with one layer but all time-aware map layers.

03:37 So here we can see the status and location of booms change along with the oil spill plume.

03:47 This also applies to imagery.

03:49 One of the interesting datasets used to manage this incident is RADARSAT-2 imagery provided by MDA Federal.

03:56 Now this is really impressive imagery.

03:58 The radar data is actually able to detect the small changes in the gulf wave pattern...

04:04 ...and can be very useful in identifying the oil spill plume.

04:07 So here in yellow we can see the plume pretty clearly. Let's take a look at a couple of other dates...

04:14 ...the 8th and then again on the 10th; we can see the plume quite clearly here in yellow.

04:21 So seeing this imagery in the preview window is interesting.

04:24 But what we really want to do is overlay it with the rest of our map layers.

04:31 So we see that this dataset is made up of a large collection of imagery, and you'll notice in the attributes that...

04:37 when this imagery was collected, it was stamped with an acquisition date.

04:41 Using this field, we can enable time on this layer...

04:46 ...and now we can interact with the collection just like all our other map-aware or time-aware map layers.

05:00 Another way to manage a space-time problem is to access real-time feeds in order to perform real-time analysis.

05:12 It's so easy to forget just how much activity there is in the gulf.

05:16 So from this view we can see oil platforms, wells, oil and gas pipelines...

05:24 ...as well as the real-time location of vessels and the tracks showing where these vessels have been.

05:30 The real-time locations of these vessels are provided by IHS Fairplay's live AIS feed.

05:36 Let's check out the Deep Water Horizon incident site and see what's happening there right now.

05:44 Well, we can see there's an awful lot of activity today.

05:48 We can see our moving vessels symbolized by these arrows and then our stationary vessels here symbolized by our rectangles.

05:55 So when managing the repair of this incident site, obviously safety is a big concern.

06:00 So what we've done is we've taken the well site, buffered it by 5 nautical miles...

06:04 ...and now we need to manage this area to ensure safety.

06:07 As soon as a vessel enters this area, we need to be notified.

06:11 With ArcGIS, we can set up an action or an alert that will highlight any vessels that enter this

area.

06:22 So here in orange we can see all the vessels that are currently moving in this area.

06:27 The action can actually go a step farther and fire off a real-time alert to another Web application or even e-mail.

06:34 So if you're not actively monitoring this area, you'll still be instantly notified of any change to its status.

06:40 I'm sure we'd all love to see one of the vessels come flying through this area, but keep in mind, this is a real feed...

06:46 ...and this is, of course, a large area.

06:52 So accessing another Web service, SeaWeb, we have access to all sorts of real-time information on any of these vessels.

07:03 So here we've identified the A Whale vessel, the oil skimming ship we've all heard about recently in the news.

07:10 With SeaWeb, we can see all sorts of information about this vessel but from a situational awareness perspective...

07:17 ...the last movements and ports visited by this ship are interesting and also very useful.

07:22 Now Bronwyn will share another example of how real-time feeds can be used in situational awareness. Bronwyn.

07:29 Thanks, Nate.

07:31 Social media has become a mainstream form of communication between friends...

07:36 ...from local government to citizens, and even from concerned community groups to government officials.

07:43 Turning on my tweets for the past month, I can get an idea of just the sheer magnitude of this spatial resource.

07:54 Now this feed is actually already being filtered by the keyword oil spill.

08:01 Social media is a new kind of spatial data which us, as GIS people, are probably not that familiar working with.

08:08 We don't have full control over the quality of information coming in.

08:13 But it does provide us a unique and timely view of what the members of our community are saying right now.

08:20 So many of you are probably familiar with Twitter and may even be geotweeting on your smartphones right now.

08:28 Ushahiti is another kind of near real-time social network that allows you to post alerts from a simple text message on your mobile phone.

08:38 These alerts are verified and then geocoded so we can use them in our spatial applications.

08:46 Zooming in to the Gulf of Mexico again, we can turn on our Twitter and Ushahiti feeds...

08:53 ...which have been filtered by the keyword oil spill and clipped to this region.

08:58 First responders can start to take advantage of this information coming from the community...

09:03 ...to collect data on maybe some stretches of beach that have not yet been...

09:11 ...stretches of beach that have not yet been cleaned up...

09:13 ...and we maybe haven't sent our shoreline assessment crews to tackle these areas yet.

09:20 So let's filter our Ushahiti feed one more time...

09:26 ...by the word tar.

09:30 What we have here is a collection of four points, all indicating community reports of tarballs on the beach.

09:37 Now based on this volunteered geographic information...

09:40 I may want to deploy field crews to do that initial assessment and verify these reports from the community.

09:47 So what do I need to know at this point? I need to know the current location of my shoreline assessment crews.

09:55 In my common operating picture, I have that information right at my fingertips.

10:01 My shoreline assessment teams report their current location from a live GPS feed coming from their mobile device.

10:08 This information paired with the timely alerts from my community give me the information I need to make decisions...

10:16 ...to keep the response moving forward, minimizing the impact of oil to people, property...

10:21 ...and the environment, which is ultimately our goal.

10:27 My teams report their current position, but using ArcGIS Mobile...

10:33 ...we can maintain a log of those positions so in the incident command...

10:37 ...we know where our assets, our people out in the field have been throughout the day.

10:44 So ArcGIS Server really connects our mobile teams with the fields.

10:53 Undral is out in the field right now...

10:56 ...ready to start collecting some new observations using an ArcGIS Mobile project...

11:01 ...very similar to what hundreds and hundreds of crews are using right now in the Gulf of Mexico.

11:08 Teams from the Louisiana National Guard, the U.S. and Florida Fish and Wildlife...

11:14 ...the U.S. Coast Guard, and a collection of other agencies...

11:17 ...are working day in and day out to build an inventory of assessment and perform vital cleanup operations.

11:26 With the implementation of the ArcGIS system, we have been able to...

11:31 ...we have been able to collect new observations and rapidly post those back into the enterprise...

11:38 ...so at the emergency operation center, our...

11:42 ...our decision makers have all the information they need about the current situation in the field to make better choices.

11:52 We'd like to leave you with one last thought.

11:55 If you are tasked with managing an emergency response...

12:00 ...you will be faced with a space-time problem, whether it be a flood, an earthquake, or even a man-made disaster.

12:09 Part of managing an emergency response is making difficult decisions about resource allocations...

12:15 ...decisions that inevitably will be questioned by lawyers, the media, or even the community at large.

12:22 You can do some simple things to help...to help validate these decisions...

12:30 ...things like printing the date on your map, printing the date for which your data is valid...

12:38 ...and identifying some time-aware attributes for dates of significant change to your features.

12:45 For example, a date a boom was staged and then deployed, inspected, and ultimately removed.

12:56 By taking advantage of the new time-aware functionality in ArcGIS 10...

13:00 ...we hope you will be more prepared than ever to manage your space and time problems.

13:04 Thank you. John.

13:10 Thank you Bronwyn, Nate, and Undral.

13:15 In conclusion, on behalf of all my colleagues at Esri, I want to say thank you.

13:21 On behalf of an incredible software development team that's built ArcGIS 10, listening to your needs, your ideas, and vision...

13:30 ...I want to say thank you.

13:32 Up next, the 2010 President's Award presentation. Please welcome once again, Jack.

