

CyberGIS-enabled GeoDesign for Regional Sustainability

Timothy Nyerges from the University of Washington presents "CyberGIS-enabled GeoDesign for Regional Sustainability" at the 2011 GeoDesign Summit.

http://video.esri.com/watch/197/cybergis_dash_enabled-geodesign-for-regional-sustainability

Video Transcription

00:01 This is Tim Nyerges from the University of Washington.

00:02 Thanks very much, Diana.

00:04 Is it on?

00:07 Cyber GIS enabled geodesign for regional sustainability management.

00:10 This is a three-scale talk.

00:12 It's a research agenda over 15 years.

00:15 It's an outline for a program unlike program masters in GIS versus sustainability management...

00:22 ...and it's somewhat about the cyber GIS project as well.

00:25 Can I do this in three minutes?

00:29 Okay. Societal grand challenge here.

00:31 We just had a presentation by Janet and Robbie that talked about what's going on on shorelines.

00:36 There's a big issue going, Chesapeake Bay, big issue Puget Sound, big issue 28 estuaries.

00:41 There...Janet was talking about NERRs (National Estuarine Research Reserves)

00:43 This is about EPA estuaries as well.

00:45 So they're different organizationally.

00:47 Some are overlapping, as it would be, but it's a land and water problem.

00:52 \$12 billion according to the governor of the state of Washington for cleanup.

00:56 Puget Sound is in peril.

00:58 The water quality's in such bad shape.

01:00 A lot of people don't realize that, don't know that.

01:02 \$12 billion to clean up over the 2007 to 2020 time frame here.

01:08 The issue here is that this grand challenge I believe is an opportunity here for geodesign.

01:14 It's a societal grand challenge for geodesign information technologies.

01:18 So, Puget Sound as I mentioned, second largest estuary in the country by surface area...

01:23 ...believe it or not, largest in the country by volume of water.

01:26 We are deeper than the Chesapeake Bay and, therefore, it's larger in terms of perhaps the nature of what is there.

01:34 Largest octopus in the United States are found in the waters of Puget Sound.

01:40 2,500 miles of shoreline; 2,500 miles of shoreline...

01:43 ...I could have put a picture in here but then I'd have to do a thousand pictures maybe is what it would be.

01:47 This is a caricature of what the problem is here.

01:50 It's a four-scale problem.

01:52 Problem that has some hardening going on along the shorelines.

01:55 We don't see it right here but there appears in riprap and other stuff.

01:59 There's a transition of shoreline going on.

02:01 There's a shoreline management program that's going on.

02:04 Shoreline management only handles up to the maybe the 200 foot to 250 foot corridor up from the near shore...

02:10 ...and then the watershed beyond that.

02:12 So this four-scale problem is essentially the focus of the Puget Sound Near Shore Ecosystem Research program...

02:18 ...and what I have adopted over the last several years is to do the broader scale of this.

02:24 Sustainability management.

02:25 Sustainability management. There is a bigger D than the big D.

02:29 It's super D is what it is.

02:31 Super D is the relationship between a plan, and improvement program, and project implementation.

02:39 I heard the AECOM people this morning allude to this issue.

02:42 There are about two or three others that have alluded to this issue as well.

02:46 Society plans.

02:47 There's no doubt we heard a lot about planning.

02:49 Society creates improvement programs.

02:51 That's a lot about finding the revenue.

02:53 Where's the money going to come from to do grand things in the world?

02:56 And then we have to spend that money.

02:58 Thousands of projects out there, all over the world, doing sustainability-like things.

03:02 How do you link those three together?

03:04 That's the super D.

03:05 This is a very long-term process going on.

03:08 But one of the challenges that we have here is that super D, interestingly enough, that probably isn't. OK. Well.

03:17 Should have been another slide in there.

03:19 The idea here is that little D down here in terms of microsteps that we could take inside one of the Steinitz framework...

03:28 ...kind of problems.

03:29 Six phases in the Steinitz framework.

03:31 Each one has multiple steps in it.

03:32 That's the little D that Mike Goodchild referred to.

03:35 The bigger D thing is the sixth process, but this workflow that Carl has outlined...

03:41 ...every one of those six phases looks different for a project implementation than it does for an improvement program...

03:47 ...than it does for a plan.

03:49 So we need to integrate those together in terms of database.

03:53 And so the idea here, what's missing from all of that is the adaptive management process.

03:57 A number of people have talked about feedback mechanisms.

04:00 The feedback mechanism here happens at the little D level.

04:04 It happens at the big D level.

04:05 It happens at the super D level.

04:07 ...and then all of those feedbacks roll up essentially to understanding what the heck's going on.

04:12 Well how do we manage all of this?

04:14 So we're in a situation now where workflow technologies are actually reasonable in a form...

04:20 ...that it even allows us to consider this, and so that's the kind of technology we'll be using to link those together...

04:25 ...but I don't have enough time to go into all of that.

04:27 I do have some time, a little bit here, a few seconds to go into what's the real focus?

04:32 All of those Ds, little, big, super, what's really at hand?

04:36 And I'm very glad that Carl set me up for this one.

04:38 What's...he said that one of the biggest problems right now is in the process model.

04:42 So the process model issue here, it's a model that we're going to need that characterizes relationships in space and time...

04:51 ...but we need emergent participatory workflows to handle all of those process models that may be associated with all those Ds.

05:00 We have to have a computational environment that's going to be process based essentially.

05:05 And so that brings us to what I'm going to call here the geoscape modeling problem.

05:10 The geoscape model idea here is essentially from Bill Miller who shared with me some insights about his scapes.

05:17 He did this again on Wednesday.

05:19 It's the humanscape linked to the landscape linked to the waterscape.

05:23 You choose whatever in a database design what's part of those scapes as it would be...

05:27 ...but all of those scapes in this process model are going to have to rely upon...

05:32 ...the three mixed modes that we have right now of simulation modeling.

05:35 Agent-based models, to screen event models, systems dynamics...

05:38 ...there's only two packages of a thousand packages in the world that actually do mixed mode modeling.

05:43 We're using that right now in part of a National Science Foundation project but it's not this National Science Foundation project.

05:50 So this National Science Foundation project is cyber GIS; I'm the co-PI of the cyber GIS

project...

05:56 ...and the cyber GIS project has, this is verbatim out of the proposal essentially...

06:02 ...you can read what it does up here.

06:04 But my particular take on my counter of this \$4.5 million...excuse me \$4.4 million project is to do habitat restoration...

06:15 ..at watershed-scale modeling that's going to include alternative future modeling for using the open source...

06:22 ...and vision software tied to the open-end spec, nonpoint source pollution modeling environment...

06:28 ...and with that I'm going to close.

06:29 Did I make it?

06:31 I know I'm between you and lunch, and this is what's got to happen.