Ways of Designing

Carl Steinitz, Research Professor, Graduate School of Design, Harvard University, presents "Ways of Designing" at the 2010 GeoDesign Summit.

http://video.esri.com/watch/54/ways-of-designing

Video Transcription

00:10 I wrote a paper many years ago called Design as a Verb, Design as a Noun.

00:18 I'm interested in design as a verb in order to achieve design as a noun.

00:27 There's always going to be a key role in design for observation, conception, intuition...

00:33 ...invention, historic emulation, and ideology.

00:39 That's from Hilary Putnam, who's son is married to my daughter but he's Harvard's most famous philosopher.

00:47 Every design has a vision, a strategy, tactics, and actions.

00:53 The vision is why and what.

00:57 Why are we doing this and what are we trying to do?

01:00 The strategy is what and where.

01:03 The tactics are where and how.

01:06 And the actions are how and when.

01:10 And the first...the first of these, the vision, the strategy, are probably generalizable.

01:19 But the tactics and actions are unique to the place, to the time, to the people.

01:27 The vision and strategy requires experience.

01:33 Young people tend not to have it.

01:37 The tactics and actions can be taught.

01:42 Scale matters.

01:46 And Galileo was right; many devices which work on a small scale do not work on a large scale.

01:52 There is no such thing as the design method.

02:02 At this scale, to this scale, is where most designers work.

02:09 I know people who work in a very tiny scale.

02:12 Or a large scale if you're technically correct.

02:15 And I know people who work on nations and galaxies, but they're not people who call themselves designers.

02:25 At this scale, the risk is very high of making a big mistake.

02:32 You put the city in the wrong place, you can kill people.

02:35 I'll give an example later in my talk.

02:39 At this scale, the risk is low.

02:40 I don't care if Mike has a baroque garden and Ron has a modernist garden.

02:46 I just don't care. The risk is small; it's their problem, not my problem.

02:49 But if they poison my water, it's my problem also.

02:55 And that involves what you're focusing on as a designer.

02:59 At this scale, come on.

03:01 Time out.

03:04 I hate these things.

03:07 At this scale, because the risk is high, you have to focus on strategy.

03:13 At this scale, because the risk is low, you can focus on details, and you spend your time that way.

03:25 At this scale, the science and complexity are really important.

03:33 They're less important here.

03:35 But the public understanding is lower at this end and it's very high at this end.

03:40 A lot of people don't need architects, don't need designers.

03:42 They're perfectly happy.

03:48 All designs have to go through six questions, and more than once.

03:53 I've written about this many times. It's the framework which I've used for 20 or 30 years.

03:58 There are six questions.

04:00 How should the landscape be described in content, space, and time?

04:04 This question is answered by representation models, which are the data upon which a study, a design, a research relies.

04:12 How does the landscape operate?

04:14 What are the functional and structural relationships among its elements?

04:17 This is answered by process models that provide information for the several assessments that are the content of the study.

04:25 The third question. Is the current landscape working well?

04:29 This question is answered by evaluation models...

04:31 ...which are dependent upon the cultural knowledge of the decision-making stakeholders.

04:36 Crowding is not the same in Arizona and Hong Kong.

04:43 How might the landscape be altered, changed?

04:46 By what policies and actions? Where and when?

04:49 This question is answered by the change models that will be tested in the research or the study or the design.

04:55 By the way, design is research. Make no mistake about it.

05:02 This question is answered by the change models. These are also data as assumed for the future.

05:10 And they have to be in the same lexicon as your data.

05:15 What differences might the changes cause?

05:17 This question is answered by impact models, which are the information produced by the process models...

05:21 ...under changed conditions under the assumption that your design is built.

05:27 And finally, how should the landscape be changed?

05:31 And this question is answered by decision models which, like the evaluation models...

05:34 ...are dependent on the cultural knowledge of the stakeholders and responsible decision makers.

05:42 In practice, those are representation, process, evaluation, change, impact decision models.

05:52 And it's not linear. By no means is it linear.

05:57 And eventually somebody says yes, let's do it.

05:58 You start out by saying, where am I, what's going on, who's in problems, what kind of changes are being talked about?

06:05 Do they think it's going to be worse, and why do they want us here in the first place?

06:12 It's the first set of tasks any designer does meeting with people, meeting with clients, meeting with communities.

06:18 You're trying to answer the question, why am I here?

06:21 Why do they want me?

06:27 The second pass is, how are we going to do what we're supposed to think we're supposed to do?

06:32 And it's the design of the design process that's the second pass.

06:37 And frankly, it does not begin with data and it doesn't begin with technology.

06:42 Believe me, it doesn't begin with technology.

06:44 It begins with understanding the decision-making process.

06:47 How are they going to know if we are giving them a good design?

06:52 And understanding the decision process is far more important than understanding the technology.

07:01 The third pass-through is, let's do the project.

07:05 Let's organize our data, do whatever we do, et cetera, et cetera, et cetera.

07:11 And it's almost always the case that you're organizing information, building models, evaluation...

07:17 ...change (which I'm going to focus on), of comparing impacts, presenting a decision, and it's almost always no.

07:24 Almost every design that I've ever heard of has feedback loops.

07:30 It means you have to do some crazy things. Get better data, get better consultants, reevaluate, redesign.

07:35 We make our students redesign all the time.

07:39 And eventually somebody says, you're finished.

07:42 Time has run out. Money has run out. We need something.

07:45 But in that process, you might change scale.

07:47 And the change of scale goes through the process again.

07:50 And it could be change down or change up in scale.

08:01 They build your design, they implement your policy. They do whatever they're going to do...

08:05 ...and the next generation who studies the same place is going to have your design as their input data.

08:13 And time goes on.

08:17 My talk is going to focus on the ways that change models get generated.

08:23 But if you believe that design is just making change models, you're wrong.

08:29 Because if you...excuse me, because if you haven't captured the representation process, evaluation impact, and decision models...

08:38 ...no yes decision will ever be made and no design will ever implemented.

08:42 So it's a very fragile process.

08:45 And making a design is probably the easiest part of it.

08:50 I can make a design for anything. It might not be a good design.

08:55 So what's the design problem?

08:58 The design problem is, how do I get from time zero to time future?

09:04 That's the problem.

09:08 And there are two strategies.

09:10 One strategy is design, or imagine, if you will, the future.

09:16 Go right from now to the future.

09:19 And then try to figure out, how do I get it done?

09:25 And the second strategy is, design a scenario based on the present and ask, in what future might it result?

09:34 Those are the two strategies.

09:37 But there are five methods.

09:39 There are five strategies about thinking about the strategy of developing a design.

09:45 And I call them anticipatory, sequential, combinatorial, constraining, and optimizing.

09:51 I'm going to go through them diagrammatically and then I'm going to give five short examples, one of each of these.

09:57 And the technology is not the way to judge the design, okay?

10:01 There'll be pencil and paper, some will be computer, it doesn't matter.

10:05 It's the thinking process that went through them that is the subject of my talk.

10:11 The anticipatory one says, we imagine the future.

10:16 It's holistic. We see the whole design.

10:20 And then we have to use deductive logic to see if we can get back to the present.

10:26 How do I retro...how do I go from the future and make the decisions that get me back into the present?

10:35 The second approach is sequential.

10:39 It's directed out and it does use abductive logic, thanks to a nice paper that Tom sent me.

10:47 It means that you are pretty sure that you can make a series of steps and link them into a design.

10:53 And you're frequently wrong.

10:55 You frequently run off and then you can change your mind and try to get it in.

10:59 All designers who do abductive work save their old drawings and their old computer prose.

11:04 Because they know when they've gone off, they can go back.

11:10 In the second one, in the ab...in the se, I'm sorry, come on. Go back.

11:15 In the sequential one, the designer is pretty sure he or she knows what they're doing.

11:22 Abduction requires ego.

11:29 In the third one, the combinatorial, you are not sure of what to do...

11:36 ...because you recognize that every one of these steps has alternatives.

11:40 And so what you have is an enormous combinatorial problem.

11:43 I've got nine alternative roads and three alternative shopping centers...

11:47 ...and five alternative hospitals and 4,000 alternative housing patterns.

11:50 And the combinatorial problem is present.

11:53 And you're not foolish. You understand that it's a combinatorial problem.

11:58 And so you study the combinations of the most important things...

12:00 ...and hope that one comes out through comparative evaluation and leads you further into the design.

12:05 And you can repeat that process. And it uses inductive logic.

12:12 The fifth...the fourth method is one where you have so many alternatives that the point of the design is to narrow the options.

12:21 Narrow the constraints. Increase the constraints.

12:25 And it's basically experimental and it's basically using sensitivity analysis on the constraints.

12:32 We had a demonstration of this cross-country thing where all they're doing is narrowing the constraints.

12:37 That's the design process. And you do that so you can get further.

12:46 The fifth one is optimizing.

12:49 In this one, the decision makers do know what they want.

12:55 And they have a metric for comparing the benefits and costs of the component decisions.

13:01 And if you know that, you go right to the answer.

13:05 But you'd better be sure you know what you're doing.

13:08 And these are different.

13:09 It's...that fifth one is directed, it's objective-driven, you know what the objectives are...

13:15 ...you can measure them, you can compare them.

13:17 For example, profit is an easy one. Go right to the answer.

13:25 Here are some examples.

13:28 The anticipatory one.

13:34 The beginning student who thinks he or she is a designer.

14:28 The best explanation for how that process works, and it's very common as a process...

14:34 None of us...

14:36 Let me assume, half the people in this room have been trained in one form or another as designers.

14:40 And I would bet half of those have woken up in a sweat in the middle of the night and seen the answer whole.

14:48 Alright? You've seen the answer whole.

14:50 And you come in the next morning and you say, hey, that's the answer, put it down.

14:53 I've done that many times.

14:55 How does that process work?

14:57 The best explanation that I've ever heard and seen was presented by Christian Hammond...

15:02 ...who is the codirector of the Center for Intelligent Information at Northwestern University.

15:07 He wrote a brilliant paper in 1990 on how chefs invent new dishes.

15:15 On rule-based design.

15:17 And this is how he explains the process.

15:20 The most important is something called case memory...

15:23 ...which is stored problems and their solutions and the ways to tweak the solutions.

15:27 In other words, answers, things to avoid...

15:32 ...and the rules by which you judge whether the answers should be developed or avoided.

15:37 That's your brain or your brain augmented by Google.

15:43 You get a current problem and you go to your case memory to look for similar cases.

15:48 And you ask additional questions of the client or the people or whoever is telling you to do things to narrow the search.

15:55 You've got a huge case memory if you're older and experienced.

15:59 And you're trying to narrow the precedents.

16:01 Those of us who teach with precedents.

16:03 You're narrowing the precedents.

16:06 And you find the closest fit and you retrieve its solution.

16:09 And you look for ways to modify a solution to better fit the current problem.

16:15 That's the design process.

16:17 And you're proposing the solution to the user and ask the user about its success.

16:21 And if it's unsuccessful, you look for ways, additional ways, to modify the solution.

16:26 And maybe you go back and try another precedent.

16:29 But if you're successful, you store the problem and its solution...

16:33 ...and the unsuccessful ones and the rules by which you were judged in your case memory.

16:37 That's called learning, okay?

16:42 And that's an example.

16:43 I know the good and bad points of every one of these plans.

16:50 I know from Sullivan and Schaefer, that conservation areas are better big than small...

16:56 ...one than many, compact than spread, connected than separated, and with interiors rather than linear.

17:01 I know that. It's in my case memory.

17:10 And now what I'm going to do...I'm sorry, go forward.

17:14 I've read...I was Kevin Lynch's first doctoral student. I know his metropolitan theory form.

17:15 And now what I'm going to do is I'm going to say, hey, I've got a problem.

17:18 I've got a problem and I know the ring strategy, I know what's good about that.

17:22 And I'm going to go to my site and I'm going to say, let's go get that design from my memory

and see if it fits.

17:28 And if it doesn't, I'll take Tony Garnier's linear town and see if it fits.

17:34 And then I'll adapt it. And for that, sketching is pretty good.

17:38 But the real issue is what's in your case memory.

17:42 And especially what are the rules that allow you to adapt it.

17:47 That's design for 50 percent of the designers.

17:51 And the rest is details. The rest is embroidery on the basic concept.

17:58 And the student thinks it's new, but I've got it in my case memory, which allows me to be the teacher and critic.

18:07 The second approach is sequential.

18:09 In this approach, you don't see it whole, but you see the pieces and the choices that you have to make.

18:16 And you believe that you can link them in a design.

18:21 This is a 35-year-old project.

18:23 It's the first time that I caused students...maybe invented, a design Delphi method.

18:31 This is Bermuda. That's the garbage dump.

18:35 The prime minister, who is the first black man to be elected prime minister, in about '75, 1975, grew up next to the dump.

18:44 That's the dump.

18:46 That's the floodplain that has to accommodate a hundred-year flood.

18:49 And that's the central park, and that's the governor general's house...

18:53 ...the residence of the queen's representative, also looking over the dump.

18:57 And he ran on the promise of Close the Dump.

19:00 That was his campaign, and he got elected.

19:03 I took my graduate students to there and we talked to the people.

19:07 The first time that's ever happened in Bermuda.

19:11 And every night I made them do a diagram of every idea that they got...

19:16 ...and every idea that they had themselves, to scale.

19:19 Tiny little diagrams, 8-1/2 by 11, on plastic.

19:24 And by the time we were done, we decided that there were five things that every design had to have.

19:31 It had to be on stable soils.

19:34 It had to have three and a half million cubic feet of garbage placed on it...

19:38 ...before the dump could be closed while they built an incinerator.

19:42 So you were grading with a dump.

19:44 It had to protect the flood, et cetera.

19:47 And we had about 100 diagrams.

19:49 And I used a Delphi method to ask them, which issues are most important?

19:55 And they ended up with socioeconomic, open space, the marsh, on-site circulation, development around it, et cetera.

20:02 In other words, this is more important that this, than this, than this, than this.

20:05 And then I asked them, of the diagrams that they got from the people...

20:09 ...or that they made themselves, which were the most likely to succeed?

20:13 And these are more likely to succeed than those...this is not a good machine.

20:20 ...Than those.

20:21 In other words, that diagram is the flexible, the most important diagram of the most important policy to put in your design.

20:29 And then I ran a lottery.

20:31 And the student who won the lottery, Ron over here, had his first choice of any five or six diagrams for his design.

20:38 And being smart, he picks this, this, this, this, and this obviously.

20:42 And then Karen here, she can do whatever she wants except if it's already been picked.

20:48 And Karen says, I'm going to do this one and then these two and then maybe that one.

20:52 And I had fifteen students.

20:55 And each one had to do a design in four weeks to the same graphic representation, alright?

21:01 So these are all different designs because they have different diagrams.

21:04 And the students are smart and they're abductively designing.

21:07 And in four weeks, we had fifteen of these things and they were all boxed.

21:12 And they were all flown with four students to Bermuda.

21:15 And every design was put on the table and the committee that was in charge of the dump evaluated them.

21:21 And they said no to twelve of the designs and three to carry forward.

21:26 So the twelve students whose projects were stopped, their work stopped.

21:30 And they had to join the students whose work went forward.

21:33 And there were some very famous architects whose work got stopped.

21:38 So these were the three finalists.

21:41 Team A which, as you see, has roads going right through it.

21:44 Team B, famous landscape architect from Minnesota.

21:48 A flat design. Flat, on an unstable soil, by the way, based on garbage.

21:54 And the third one, no road.

21:56 These are different.

21:58 And these were presented to 10,000 people in five meetings.

22:02 That's a tenth of the population of Bermuda, and that's the prime minister and his wife.

22:08 And the prime minister decided to have a referendum, not by iPhone but on paper, alright?

22:16 And this design won. This design won.

22:20 And two of my students decided to marry and stay.

22:23 And they were given rent-free a house for one month...for a year, and made a design.

22:28 And that design is now graded out because it took 20 years to stabilize the soil.

22:32 And what was the design? That was the design.

22:38 Is it chance? I don't know.

22:40 But it's been a robust method. It is abductive logic, okay?

22:47 The third approach is combinatorial.

22:50 In this approach, you know that you've got very, very important decisions.

22:51 And if the designer makes the wrong move in the beginning, that's the end of the story.

22:55 There's a parido distribution of decisions.

22:57 If they make a wrong move just before the end, it's not exactly the end of the story.

22:59 A design might have 20 to 30 decisions.

23:02 Maybe 20 to 40 decisions that a person has to make before they let go and let somebody else operate in another scale.

23:09 And there is a parido distribution.

23:11 Some things are more important than other things.

23:15 The highway really is more important than what species of tree you plant. Mostly.

23:22 So what's really the technique here is to study the combinations, and not to many, of the top three or so factors.

23:32 And it's really important to try to capture the major generating assumptions and then let go and not worry about it too much.

23:41 Don't try to make a finished design. But do make sure that you're on the right track.

23:48 This is the designer.

24:04 This is a workshop that Christina Von Haren, who spoke yesterday, and Juan Carlos, Tess, and I worked on.

24:13 This was a workshop looking at the future of Cagliari, the capital city of Sardinia.

24:19 And the students in this, we had basically a week. I had them for 24 hours.

24:26 Basically, the students were engineers, architects, urban designers, landscape architects...

24:32 ...half Italian, Moroccan, half German, God knows from where, in English.

24:40 Cagliari is a city of about 400,000, it's sprawling, it's a Roman city.

24:46 The data don't exist. This is the land use data. That's their GIS for land use.

24:54 We designed based on 10 evaluation models, habitat, visual, cultural, energy, transport, hydrology.

25:05 Nothing obscure about that.

25:08 I had the...we had the students, in half a day, evaluate each of these systems in a very simple map.

25:16 All graphically, no computers at all.

25:18 This was last year.

25:20 We said, if you draw it in red it's a problem.

25:22 If you draw it in green it's something you want to protect.

25:24 Very, very simple. Don't waste time, go right to it.

25:30 And you have to propose projects that will help you.

25:34 So these diagrams, for example, are color-coded as project alternatives.

25:40 One, two, three, four, five, six, seven, eight, nine, ten...for improving habitat.

25:45 These are potential projects for importing transport.

25:47 And there were 150 projects, color-coded for different sectors of growing a metropolitan area.

25:55 This is on day one.

25:58 Eight hours, alright?

26:04 Then we divided it into six stakeholder groups.

26:07 Conservationists, developers, regional planners, an energy foundation...

26:11 ...tourism development, and local government that wants to be reelected.

26:15 And we told the students they could take no more than 20 projects.

26:21 The best 20 projects that would help them for their client.

26:24 And so they go to the table, they borrow the plastic, they put it on an overhead projector on a light table...

26:30 ...and they end up...come on. And they end up with a design.

26:36 And we're slowly taking the diagrams that are more frequent and putting them into the computer.

26:41 Juan Carlos organized that.

26:44 And we went through a stage, this is, these are the teams, those are their designs, they are sharing plastic.

26:52 So if this was all digital, and we've done it all digital many times, you basically share a file of a diagram of a project.

26:59 Why not?

27:02 But between these stages, we evaluated them.

27:05 How?

27:06 By asking the students who did the first analysis to compare every design.

27:12 And so we made a second design and then a digital version because we had started to digitize...not digitize it, wrong word...

27:24 ...draw the projects that were the most common.

27:29 And then we had a presentation to the planners, to the faculty, to the...lots of people.

27:35 And each design was presented as a series of projects that would result in a 20-year future for the area.

27:45 What should the hydrology government do, what should the transport people do, what

the...like government is organized.

27:52 That's one design, that's a second design.

27:54 They're different. Believe me, they're different.

27:57 And then we asked the planners, this is the chief regional planner and the chief city planner, which is the best design?

28:04 And they didn't agree.

28:06 And they started talking to each other and the Italian students got to talking, everybody started yelling at each other.

28:11 It was very, very interesting.

28:13 And then I asked...I asked a slightly different question.

28:16 I said, which projects, not which plan is best, but which projects have legs?

28:22 Which ones recur again and again and again?

28:26 So we did a frequency distribution, because we knew.

28:30 We had a frequency distribution of which projects were used the most by the most plans.

28:35 And I asked Juan Carlos, who's sitting there, kick them up on the computer in real time.

28:41 And there it is.

28:42 That's plan number seven.

28:43 And all of a sudden, the people who made decisions for the city said yeah, that's not a bad plan.

28:49 Not a bad plan at all.

28:51 It has projects. Conserve the wetlands, protect the open water areas, increase biomass energy...

28:57 ...increase a network of public transit around the wetlands, connect the habitats...

29:02 ...and expand the city along the major roads, but at lower density because that's what people really want.

29:10 And that's today, and that's 20 years from now.

29:16 Alright?

29:19 The fourth method is constraining.

29:22 Here we're dealing with a client who has some idea of what they want but really doesn't.

29:31 This is the largest industrial zone in Italy.

29:36 25,000 people work here.

29:39 Right here, off my photo...off this slide, is the city of Padua.

29:44 And in the 1960s, in the 1960s, the politics of the Venetto was basically a war between...

29:54 ...not insulting anybody here, I hope...between a right-wing Catholic government and the communists.

30:01 And the workers were communists mainly.

30:04 And so they decided...yeah, well...they decided to move the place out, move the workers out.

30:11 And they created a park that's a no-man's land.

30:13 It's basically drug people and prostitutes...a problem.

30:18 So we...and they had to green this area.

30:22 So we had the students go out there, they made diagrams.

30:24 This time, Juan Carlos organized something that was very clever.

30:28 The diagrams were all on a spreadsheet.

30:31 So a student could go and ask, which 20 projects would best allow connecting green spaces?

30:36 Which one would give an identify of a central park?

30:38 And we made exercises by simply calling up a spreadsheet and overlaying the diagrams.

30:43 In other words, the spreadsheet is the tool. The diagrams are the tools.

30:47 The design comes out of the selection of the elements.

30:51 It's not pencil and paper, it's not sketch-up.

30:54 We had 15 designs.

30:55 They were evaluated, and the outcome of the evaluation was the diagrams that they wanted to see going forward.

31:03 We made plans from those groups.

31:06 The plans were very sophisticated, staged, and with projects of all kinds.

31:12 We brought them to Italy.

31:14 Thousands of people saw them in the bank in the main street, on the Via Cora.

31:19 Then we had a quiet meeting with the students, the director of the park, the industry, and the mayor.

31:25 And the mayor asked me, which is the best design? And I said, none of these.

31:29 I said, I think this, this, this, this, this.

31:32 And then we had all those things up on a computer.

31:34 And we said well, let's see what that looks like as a design.

31:36 Bop, bop, bop, bop, bop...and we made a design live, in real time.

31:41 And that design is on the Internet as the industry's commitment for their 50th anniversary to the city.

31:50 And they are implementing it in their own way, making changes.

31:54 So the exercise was to get them to figure out what they really wanted by narrowing their options.

32:02 The last one is optimizing.

32:06 This is LaPaz, it's also on the Internet, the capital city of Baja, California...a sewer in Mexico.

32:12 A large group of people, terrible data, a whole set of integrated models.

32:17 A computer program is going to make the design as an optimizing program.

32:21 The scenarios were based on three alternative demographic and economic projections...

32:26 ...three alternative public policy sets, and two alternative levels of public finance.

32:33 There was a lot of sensitivity analysis.

32:35 We knew how much development we wanted.

32:37 We knew where it wanted to go on economically-driven attractiveness models...

32:43 ...because Rob Farris, our economist, interviewed developers.

32:48 There were different restrictions on land use as scenarios.

32:51 There was an algorithm for allocation...

32:54 ...a third-generation derivative of Britton Harris' work from the 1960s that Mike Flaxman organized.

33:01 And we started to do alternative designs.

33:03 The computer was presenting them out. We had 16 of them.

33:08 The design was the result of a process driven by economics.

33:13 And a computer did the design.

33:16 We did it, but the computer did the drawing.

33:20 And we compared it with some very complicated models.

33:24 Saline intrusion, groundwater change on different alternatives, which areas would get ugly...

33:30 ...how much gross regional product would there be, how much per-capita income would be.

33:35 And then we had to make a decision.

33:37 And here's the issue of decision making under optimization.

33:40 Every one of these designs was an optimum, but based on different criteria and assumptions, every one of them.

33:46 We had 10 optimum solutions.

33:49 So we had a public meeting.

33:51 And the governor says...hundreds of people.

33:54 The governor says, I believe that economic performance is equal to environmental performance.

34:06 Fine.

34:07 Two indices, a spreadsheet, equal means you're on this axis.

34:12 And design number 10 is the one that is equal.

34:14 But nine has more economic return.

34:19 And two is better environmentally.

34:24 So what's the answer?

34:26 The answer is, we're not really sure that this is the best answer because we don't trust the governor.

34:34 But we know the answer is somewhere in this triangle.

34:38 And we know that it's not any of the policies here.

34:43 And in a sense, the design is not what to do, but the design is what not to do.

34:50 Which, in a governmental environment, is probably even more valuable as the result of a design process.

34:58 And that's the best design.

34:59 But this is the thing that made the greatest impact. It's the index of developability.

35:05 When you're not sure of what's going to happen.

35:07 And we're not sure of what's going to happen.

35:10 And this is the index of environmental quality.

35:12 You saw one version of this yesterday, but they picked the wrong colors.

35:17 Because when you intersect this, the map says if it's green it means the conservationists want it but the developers don't.

35:26 So don't do anything.

35:28 If it's red, it means the developers want it but the conservationists don't.

35:34 So let it go to development if it wants to.

35:36 The real issue is brown.

35:38 And this is a piece of land that was stolen by the president of Mexico for private use in the 1950s.

35:44 And his grandson wants to build a billion dollar resort.

35:48 And because of this map, a public outcry came...

35:53 ...and the mayor took the first 50 meters of coastline...coastline away as public land.

36:02 And he's won in the Supreme Court.

36:05 So this is now protected land.

36:07 I'm finished. I am finished.

36:10 This is the single greatest, positive result of any study I've ever done based on the worst data.

36:18 And the whole study was done in four months.

36:22 So how might the landscape be changed?

36:25 This way, that way, that way, that way, or that way.

36:27 Those are design processes.

36:29 My last word. Designing something is an art.

36:35 It requires judgment.

36:37 It is not a science, although it depends on science.

36:41 There are no perfect formulae, but there are methods.

36:45 There is no universal toolkit, but there are tools.

36:48 And you cannot copy an example, but you can gain experience. Thank you.