The Path to Geodesign: The Family Car of Digital Landscape Architecture?

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Non-designers in design and planning

- People don’t know they can participate
- Individual voices ignored
- Special interests/loud voices dominate
- The input is not taken seriously/not trusted
- Outcomes are pre-determined
- Only the minimum is done to satisfy the law
- Poor outcomes guarantee future disinterest
Current Digital Landscape Architecture

• We create landscape representations that are increasingly realistic, vivid and engaging
• We conduct analyses that are increasingly precise, broad-scale and insightful
• Our models of the future are increasingly scalable, robust and verifiable

• DLA has transformed design and planning, making evidence-based design and transparent communications realistic propositions
Geodesign

- "Geodesign is a design and planning method which tightly couples the creation of design proposals with impact simulations informed by geographic contexts.”
  (Flaxman 2010)

- This presentation focuses on extension of the Geodesign Framework (Steinitz, 2013) which addresses:
  - project conceptualization, analysis, design specification, stakeholder participation and collaboration, design creation, simulation, and evaluation.
    (Wikipedia)
DLA and Geodesign

• Although geodesign does not depend on digital tools, the expanding DLA toolset closely complements the geodesign framework

• DLA enhances the principle operations of the geodesign framework

• In turn, geodesign provides an integrating framework for the tools of DLA
The geodesign framework

Steinitz, 2013.
A Framework for Geodesign
The geodesign framework and DLA

Realistic, vivid and engaging landscape representations

Precise, broad-scale and insightful analyses

Scalable, robust and verifiable models
Stakeholder engagement or report/review

Realistic, vivid and engaging landscape representations

Precise, broad-scale and insightful analyses

Scalable, robust and verifiable models
The Geodesign Black Box

• Our work can be very useful to stakeholders
• Most stakeholders are fascinated by the things we do, and would like to be much more involved
• But to most of them our works are mysterious:
  – They are neither science nor art, but both
  – Our methods do not seem linear and logical
  – Visualization appears almost magical
• Stakeholders need to be fully engaged in design
Fully engaging the “People of the Place”
Arnstein’s Ladder of Participation

• Real power to affect outcomes

Arnstein, 1969
The Participants of the Place
Understand Study Area

Specify the Methods

Perform the Study
The Participants of the Place need to...

- Understand the study area
  - Participate in telling its story
- Identify and specify suitable methods
  - Explore and understand its systems
- Fully participate in conducting the study
  - Engage with each other and experts to develop solutions that are mutually agreed to, and which they are motivated to implement
Communicating complex ideas – 3 tools

• Storytelling
  – Sharing context—spatial, temporal, cultural
  – Motivating—to embrace and champion change

• System exploration games
  – Investigating—the systems of the landscape
  – Revealing—the ways those systems interact

• Group interactions
  – Collaborating—to find shared ideas and solutions
  – Synergies—better ideas emerge from more ideas

Storytelling

• Stories are:
  – Evocative,
  – Meaningful,
  – Contagious,
  – Inspiring.

• They:
  – Convey time and place,
  – Capture cultural meaning,
  – Communicate human values alongside scientific facts,
  – Articulate real-world issues, engaging reader emotions and encouraging empathy.

Bal & Veltkamp (2013)
System exploration games

• Serious Games are:
  – Mental contests,
  – Rule-driven,
  – Engaging,
  – Revealing,

• They:
  – Simulate real-world systems,
  – Train strategic skills,
  – Allow risk-free exploration,
  – Support discovery and learning at player’s own pace, allowing mistakes to be made and corrected.

Breuer & Bente (2010)

Build a Prairie, Bell Museum, 1999

BBC Climate Challenge, 2011

Banished, Shining Rock Software, 2015

Climate Defense, Auroch Digital, 2013

SIM CITY 2000

Good work! These forbs will help create a healthy a beautiful prairie. Watch them grow!
Group interactions

- Group settings are:
  - Collaborative,
  - Egalitarian,
  - Constructive,
  - Motivational.

- They:
  - Diffuse knowledge,
  - Encourage adaptation and interdependence,
  - Increase achievement, productivity and mutual respect while reaching more integrative outcomes.

Pak & Brieva, 2010

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Johnson & Johnson (2013).

McIntyre, 2003

Orland & Murtha, 2014

Tygron NL
Design for participatory design

Motivational force

Control system

Decision mechanism

Storytelling

System exploration

Group interactions
Design for participatory design

Motivation
- Storytelling

Control system
- System exploration

Decision mechanism
- Group interactions
Example: landscape and natural gas

• New technologies
  – Hydraulic fracturing, “fracking”, breaks rock to allow oil and gas to escape.
  – Directional (horizontal) drilling makes contact with more of the resource.
  – Two technologies combined in the mid-2000s making vast reserves of natural gas in dense shale deposits economic to develop.
Timber, oil, coal... natural gas
Planning by non-planners

- Private ownership of natural resources
- Life-changing economic value to landowners
- Oil and gas exempt from key US laws—e.g., Clean Water, Clean Air, NEPA
- Weak planning codes in rural counties

- Rural Sullivan County, PA
- 6,428 people, 6/sq km
- Projected gas wells in Sullivan County—6,000
- Lifetime royalty/well — $1.6m = $1.5m/person for each person in the county
What people face...

• Change over which they have little influence
• Too much unfamiliar technical information

• Non-expert rural citizens...
  – Don’t know what to expect
  – Are forced to make irrevocable choices
  – Need to be able to minimize the risks they face
Storytelling, highlighting the issues

• How big will it be?
• How bad will it be?
• What will it be like afterwards?
• How is that guaranteed?
System exploration via a serious game

- Discover how ecosystems interact
- Reveal costs and benefits of alternate design and planning choices
- Explore trade-offs between alternate outcomes
Group interactions via multi-user game

- Discover others’ values
- Learn how ideas impact outcomes
- Collaborate in decision-making
- Accept responsibility for outcomes
The GIS infrastructure

• Ability to support the widest range of participant queries

• Ability to provide feedback on widest range of implications

• Ability to archive and browse all past analyses as stories
Thematic integration

1. Story uses familiar language to introduce key critical citizen concerns framed as common environmental analyses.

2. Serious game reveals trade-offs to be made in land use planning.

3. Role playing game played in real-world GIS data environment.

4. Story and games reveal range and scope of issues that can be addressed via geodesign framework.

10,910 hectares impacted by pipelines.
Thematic integration, story→learn

1. Story uses familiar language to introduce critical citizen concerns framed as common environmental analyses.

2. Serious game reveals trade-offs to be made in land use planning.
Thematic integration, learn → explore

2. Serious game reveals trade-offs to be made in land use planning

3. Role playing game played in real-world GIS data environment
Thematic integration, explore → apply

3. Role playing game played in real-world GIS data environment

4. Story and games reveal range and scope of issues that can be addressed via geodesign framework
Progress to date

Animator

Artist

Game designer

Database designer

Programmer
One core idea, many adaptations
Progress to be made

The Family Car
• Places used
  – Local and Regional
• Adaptability
  – Purpose-made – Formula 1 racing car
  – All-around – hatchback, wagon
• Sufficiency
  – Porsche
  – Ford

Geodesign
• Places used
  – Local, Regional, Global
• Adaptability
  – ArcGIS, Corporate dashboard, proprietary data
  – Storymaps, ???
• Sufficiency
  – Current geodesign tools
  – ???
Key design requirements

The Family Car

• A clear, consistent and equitable user interface
  – Large windscreen
  – Steering wheel, speedometer and pedals
• A reliable foundation in science
  – Comprehensive vehicle performance data
  – Integrated fuel, power, emissions models

Geodesign

• A clear, consistent and equitable user interface
  – Information-rich visualization
  – Intuitive user controls to operate in the landscape
• A reliable foundation in science
  – Comprehensive environmental performance data
  – Integrated and interoperable landscape system models