Place-based Models of Instruction:
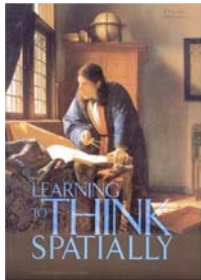
Spatial Sciences Institute

GIS @ USC
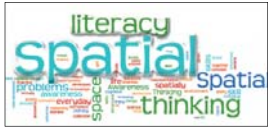
John P. Wilson
USC Center for Scholarly Technology
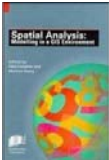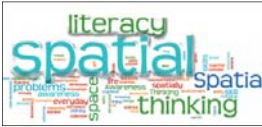16 November 2012

Outline

- Background
  - Spatial Sciences Institute
  - Learning Opportunities
  - Technology Support
- Guiding Principles
  - Spatial … cross-cutting
  - Spatial … Science | Technology | Discovery
  - Geospatial Technologies
- Spatial @ USC
  - Academic Pathways
  - Spatial Literacy
  - GI Infrastructure
- Questions

2

Spatial @ USC

- Spatial Sciences Institute was established in July 2010
- New classes
- New Minor in Spatial Studies
- New B.S. in GeoDesign
- New Online M.S. & Graduate Certificate Programs in Geographic Information Science & Technology
- New Ph.D. in Population, Health & Place
- Enhanced support for spatially enabled research & teaching across USC

3

Spatial … cross-cutting … the spatial turn

- Rapid spread of spatial thinking and GIS throughout the sciences
  - Snow's 19th century work on cholera
  - ACM SIGSPATIAL
- Has swept through social sciences and humanities as well
  - All human action literally *takes place* somewhere
  - Spatial dimension of social interaction key for understanding all of the classic questions about the human condition
- Cf. with statistics as a field of study

Map showing clusters of cholera cases in London epidemic of 1854

4

Starbuck's GIS Strategy

- Statistics (2009)
  - 16,635 U.S. stores
  - $9.8 billion in revenue
- GIS Operations
  - Global Market Planning Group uses ArcGIS Desktop plus several extensions to perform advanced analytics, business & geospatial intelligence
  - Real Estate Partners uses ArcGIS Server with tablets and smart phones to run reports, view maps & models, generate commentary, etc.

Continuously build fresh go-to-market strategies
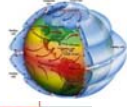
What is going on in this trade area?
What are the general retail trends in this area?
Where are the competitors?
Who are those competitors?
Where is business being generated?
Where are the highest traffic volumes?
Where are people living?
Where are they going to work?
How are they traveling to work?

5

Spatial science … technology … discovery
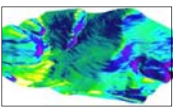
Geographic Information Science

Scientific Discovery

Geospatial Technologies

6

4/15/2015

Geographic information science

Typical Geospatial Workflow

Slide courtesy of Paul Bolstad, University of Minnesota

Spatial analysis

Class	Examples
Core concepts	Place, scale, location, distance, centrality, area
Place-based analysis	Distance & directional analysis, geometrical processing, point pattern analysis, map algebra, grid models
Spatial statistics	Exploratory spatial data analysis & spatial statistics, incl. spatial autocorrelation & spatial regression
Surface analysis	Surface form & flow analysis, gridding & interpolation methods, visibility analysis
Network analysis	Shortest path calculation, traveling salesman problems, facility location & routing
Geo-computation	Agent-based modeling, artificial neural networks & evolutionary computing
Geo-visualization	Spatial query, representation as process & meaning, map (data) transformation

Various classes of transformations, manipulations & methods that comprise spatial analysis

(Source: Smith et al. 2000, Longley et al. 2010)

Map projections …

Flat-earth thinking. Thank you to those readers who pointed out that, by superimposing concentric circles on a Mercator projection, the map in our May 3rd issue (now corrected online) greatly underestimated the potential reach of North Korea's missiles. We stand corrected.

Context … location … location … location!

Representation, Pattern, Process   Integration, Synthesis

Informed site analysis!

Geospatial technologies

- Traditional components
  o Geographic information systems
  o Global positioning systems
  o Remote sensing systems
- Provide tools to solve real world problems
  o Locating things – knowing where things are
  o Routing – bringing people & assets to locations
  o Location/allocation – site optimization
  o Locating linear facilities – highways, pipelines, corridors, transmission lines
  o Land use models – predicting urban growth, control conditions, public participation

2

Multiple Platforms

- Provides multiple entry and exit points for users
- Bundles software with data
- Supports geo-processing workflows and services
- Rapid growth in demand for people with spatial skills

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13

Spatial Pathways for Undergraduate Students

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14

Spatial Pathways for Graduate Students

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14

Spatial @ USC …

- **SSCI 101 Spatial Analytics Workshops (2 units)**
  - GIS for Business
  - GIS for Design
  - GIS for Environment
  - GIS for …
- **New GIS Courses**
  - Maps & Spatial Reasoning
  - Principles of Geographic Information Science
  - Spatial Sciences Practicum
- **GeoPortal Server**
- **GIS Help Desk**

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16

Geographic information infrastructure

- Contains knowledge describing natural and human environments on Earth
- Includes multiple components
  - Data
  - Data models that provide structure to the data
  - Models and analytic tools that show predictions or suitability
  - Geospatial workflows
  - Metadata, which describes the aforementioned components, and is key to **sharing, discovery and access**
- Relies on web & **mobile** environments to make these ways of thinking about the world more accessible

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17

Questions …

Project for Public Spaces

Placemaking plans

City-wide strategic plans

Capacity building and cultural change

Placemaking 101

Lighter

Quicker

Cheaper

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18

3