10 Most Significant Innovations in Geographic Information Science

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Metrics for significance

The innovation :

- Was widely adopted
- Lead to scientific breakthrough or benefits
- Improved data or information understanding
- Lead to increased ease of use

1). Specification of spatial data types: Object, object-relational databases

Why?

- Provided pathway for GIS to fully participates in the database world

2). Specification of spatial relations

Why?

- Ontologically important – codified concepts and terms
- Basis for spatial query language
- Formalizes qualitative concepts for natural language processing

Statistical

3). Conditional simulation

Why?

- Creates the basis for statistical analysis of geographic distributions

4). Local spatial statistics: local autocorrelation, geographically weighted regression, local cluster detection

Why?

- Geographically meaningful, computationally important in geosensor networks

User interface

5). Common interface icons; pan zoom, identify

Why?

- Widespread adoption, recognizability, ease of use

6). Geographic Brushing, linked views

Why?

- Spatial exploratory power, linkage of attribute space to geographic space, statically space to geographic space, space to space

7). Standardization; common formats and specification for spatial data

ISO standard - specifies how we expect spatial data to be documented

Why?

- Supports common expectations, Promotes much broader use and ease of use

Visualization

8). Dorling cartograms

Why?

Simple elegant solution to area equalization

9). Generalization as a constrained optimization problem

Why?

Constraints operate locally

10). Google Earth

Why?

- Incorporates much of GIS innovation and thinking
- Popularizes simple analysis of geographic phenomena
- Encourages exploration in an easy to use format