Geographic Information Systems 2018/19
Week 8, Topic 3

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In this session...

Spatial Data Quality and Accuracy

- Standards
- Error handling

Data Quality Issues

Explain the key concepts and terminology associated with data error and quality

Describe errors in spatial data

List types of error that arise in GIS

Outline typical ssources of error in a GIS project

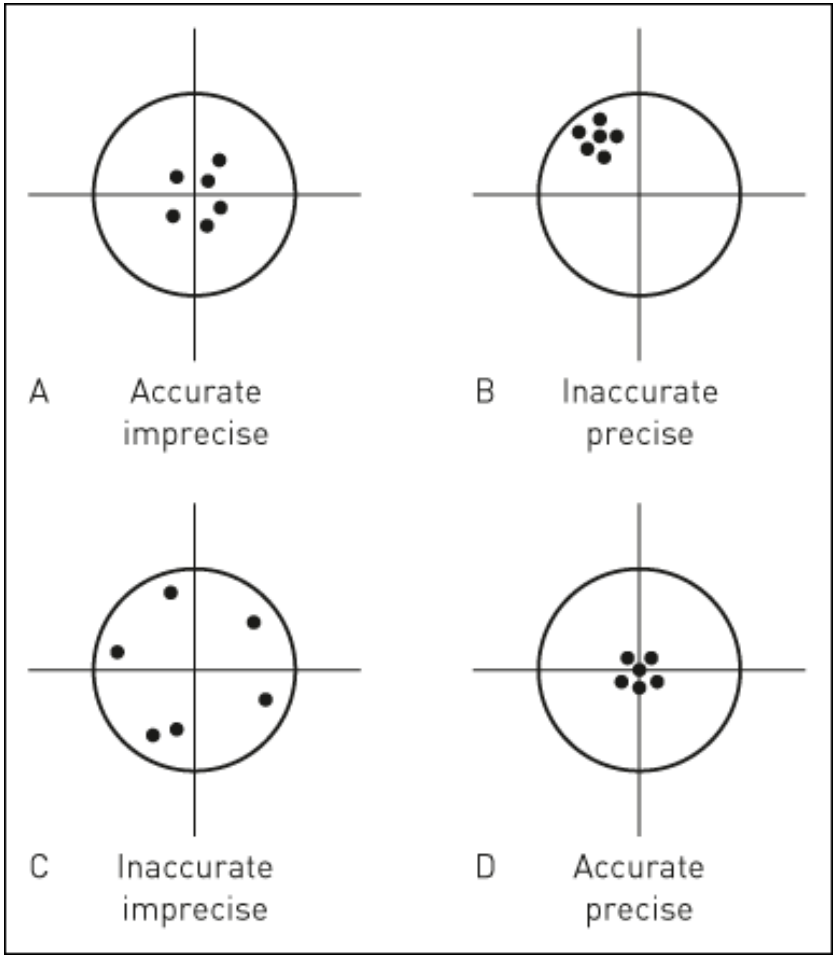
Explain how GIS errors can be modelled and traced

Describe how errors in GIS can be managed

Some terms

- Error
  - Flaws in data
  - Individual or persistent / widespread
- Accuracy
  - Within tolerances
- Precision
  - Does not imply accuracy
  - Spurious accuracy
- Bias
  - Systematic variation
- Resolution
  - Smallest feature that can be displayed
- Generalisation
  - Simplifying complexity
- Completeness
  - Spatial
  - Temporal
- Sample data
  - Field checking
- Compatability
  - Resolution
  - Data type

Accuracy versus precision

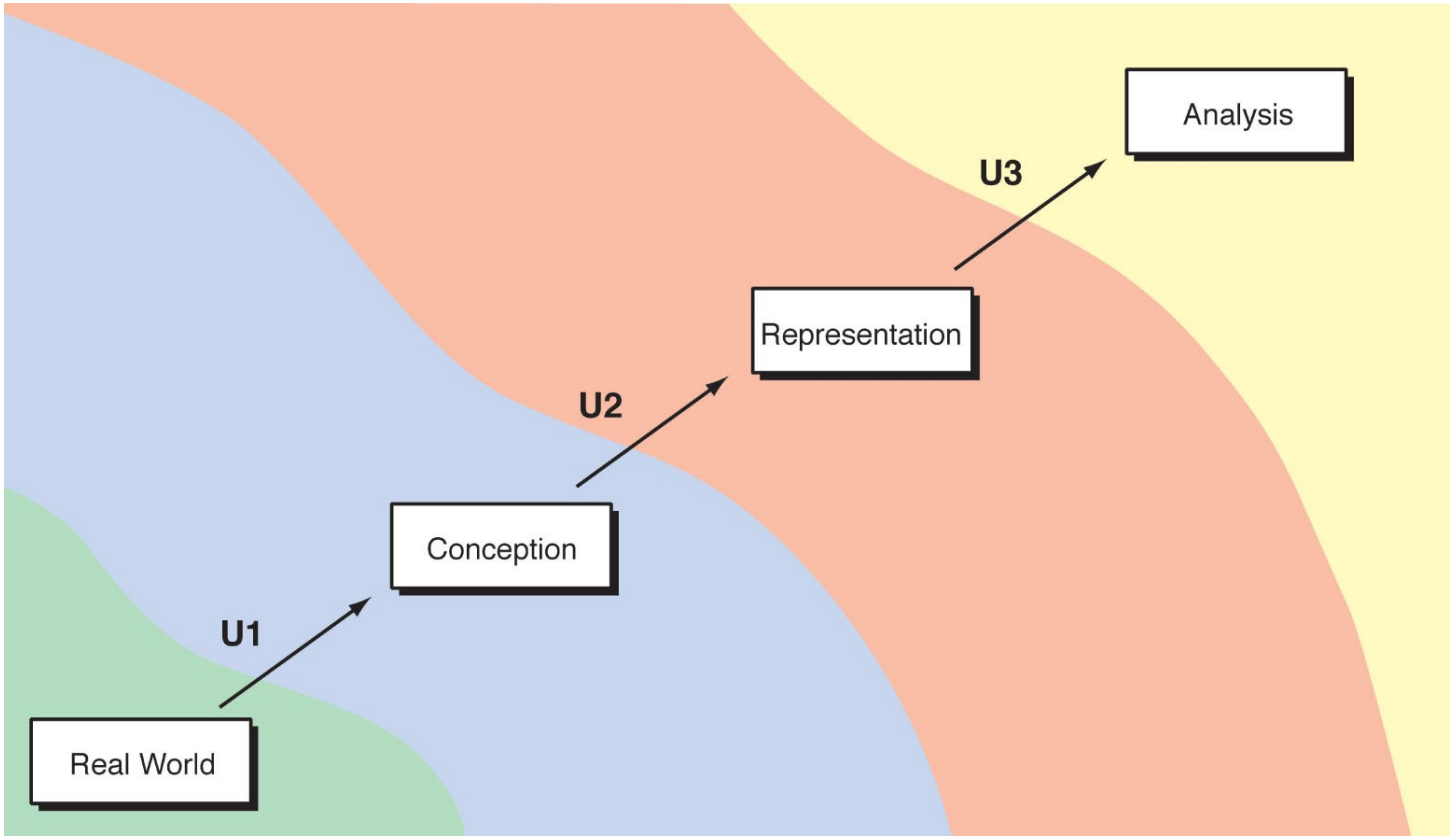


Sources of Error

- Understanding and modeling of reality
- Source data
  - Recording
  - Instrument calibration
  - Classification
- Data encoding
  - Digitizing errors
- Data editing and conversion
  - Automatic error correction
  - Format conversion
- Data processing and analysis
  - Scale
  - Aggregation
  - Classification
- Data output
  - Poor communication

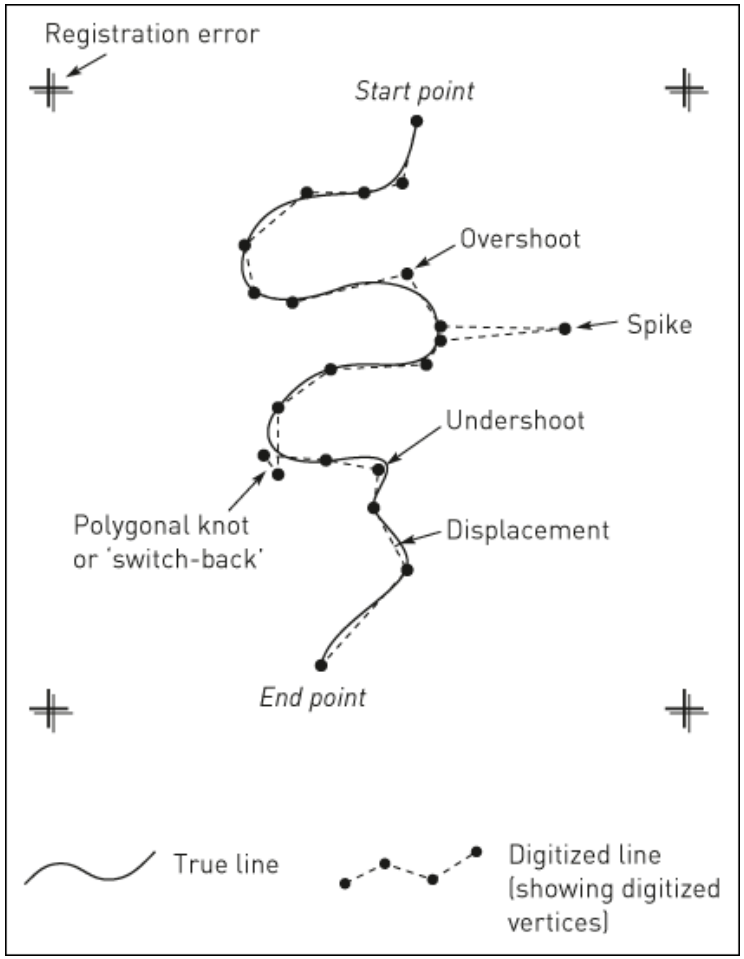
Attribute and spatial data checking

- Impossible values
  - Range checks
- Extreme values
  - Cross check against source document
- Internal consistency
  - Statistics, totals and means
- Scattergrams
  - Check any data item that departs markedly from regression line
- Trend surfaces
  - Highlight points that depart from the norm



A conceptual view of uncertainty. The three filters, U1, U2, and U3, distort the way in which the complexity of the real world is conceived, represented, and analyzed in a cumulative way.

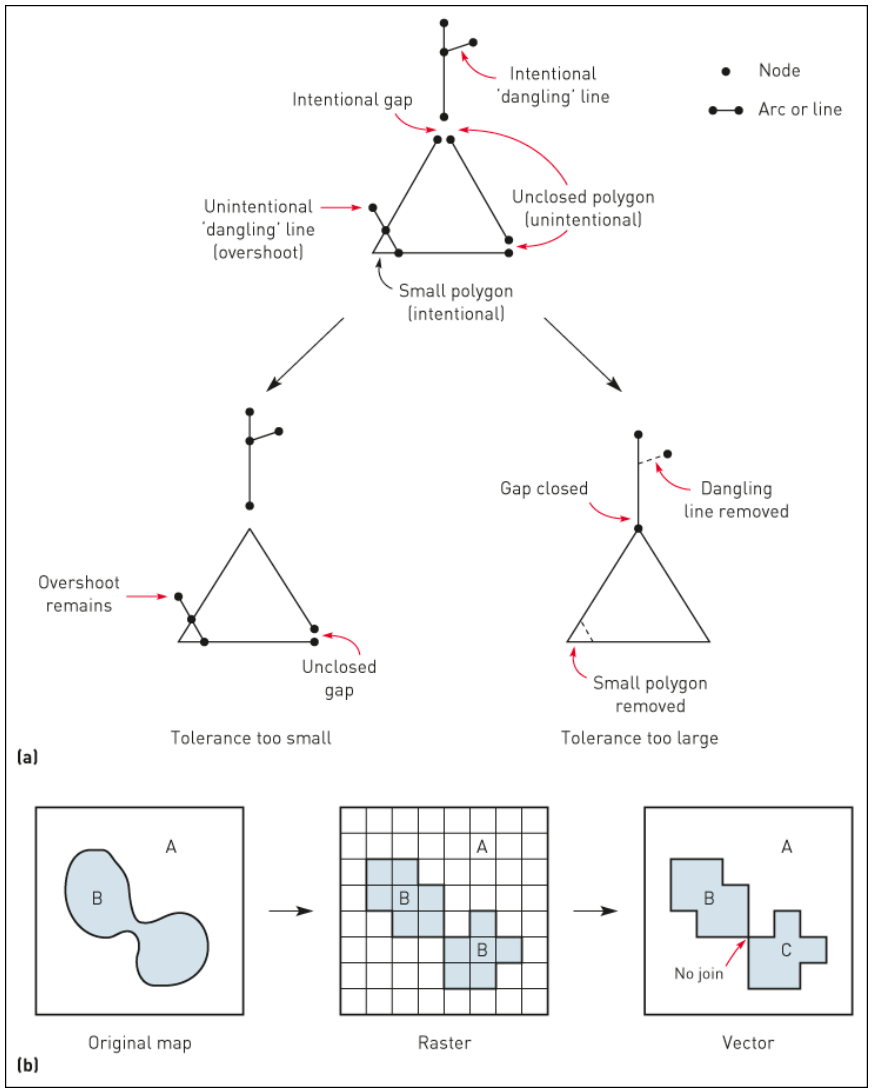
Location Errors



Location errors refer to the geometric inaccuracies of digitized features.

Location errors can be examined by referring to the data source for digitizing.

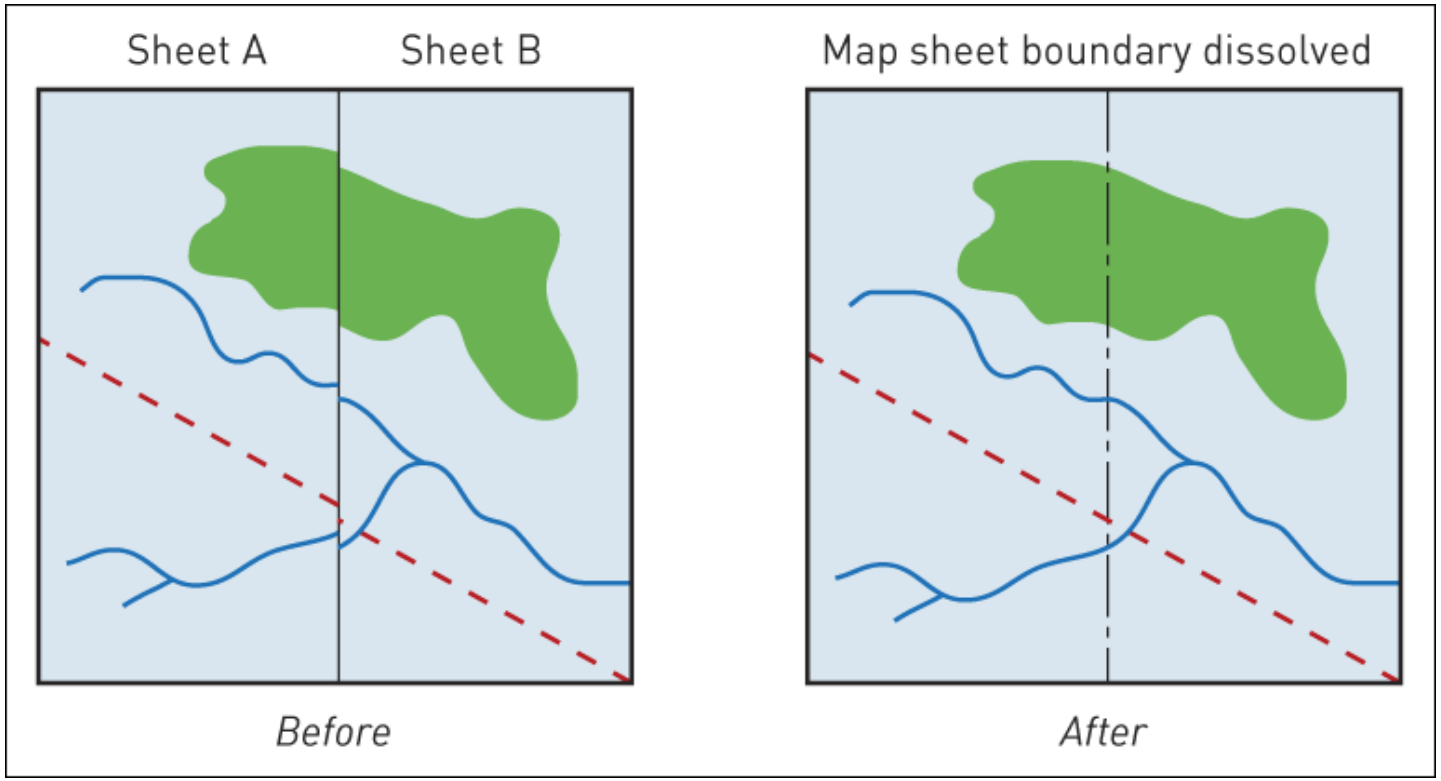
Topological Errors



Topological errors violate the topological relationships either required by a GIS package or defined by the user.

Topological errors with geometric features: undershoot, overshoot, dangling node, pseudo node, direction error, label error

Edge matching



Process of joining separately digitized but adjacent map sheets

Solve mismatches at sheet boundaries

Solve incompatible classifications

Rebuild topology

Eliminate redundant sheet boundaries

Coming next...

Vector Data Analysis