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Technology for Cadastral Applications

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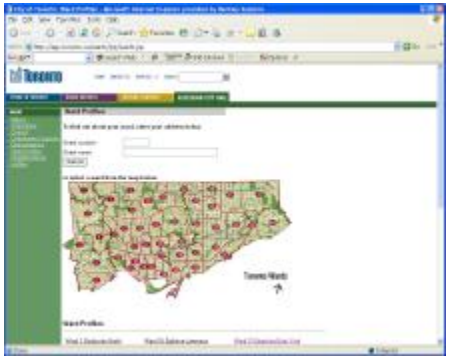
Marketing Manager – Geospatial Applications

Agenda

- Cadastral Mapping Issues
  - Ø Precision and Accuracy
  - Ø Data Creation
  - Ø Data Management
  - Ø Data Publishing
- Available Technology
  - Ø Desktop
  - Ø Server
- Future of Land Mapping Applications

Terms *Do* Matter

- Geography – ***Geographic*** Information Systems
- Geospatial – Open ***Geospatial*** Consortium
- Geometry – ***Geometric*** Precision
- Engineering – ***Engineering*** Accuracy
- Mapping – Cadastral ***Mapping***



Cadastral Mapping Issues - Precision

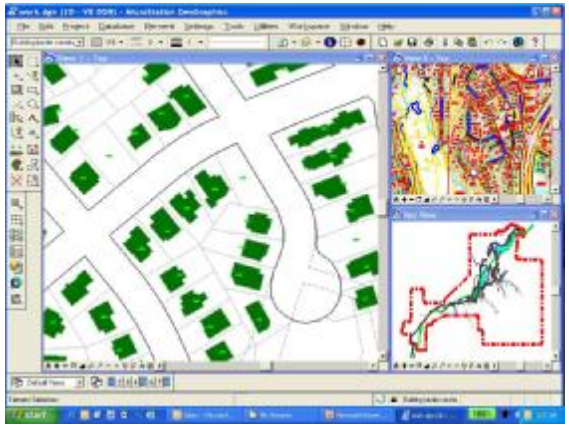
- The GIS/Engineering Divide - Geography vs. Geometry
  - Ø Traditional GIS
    - » Looks at generalizations – relative location, proximity, shape, size, etc.
    - » Often relies on interpretive techniques (digitizing, warping) that reduce quality and accuracy; increase inconsistency
    - » Generally not capable of accurately depicting geometry, including 3D, complex and compound shapes, and real-life representations

Cadastral Mapping Issues - Precision

- The GIS/Engineering Divide
  - Ø Engineering Applications
    - » Engineering platforms instill engineering discipline, rely upon *measurement* techniques – how big, how high, how far, how deep?
    - » Highly accurate Engineering platform better suited and widely used for data capture, editing and maintenance
      - – Cadastral applications
      - – General land base creation and editing

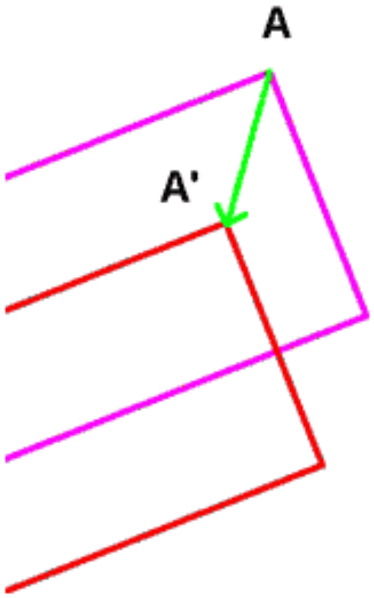
Cadastral Mapping Issues - Precision

- Cadastral Mapping
  - Ø A Geometric Discipline; A Geodetic Application
    - » Creating an accurate spatial record of a part of the earth's surface
    - » Maps move from symbolic representation to geodetic geometry – a precise, measured spatial record



Cadastral Mapping Issues – Precision

- Positional Accuracy Improvement (PAI) Program Improves:
  - Ø **Geometric fidelity**: Correct, accurate geometry for all map elements
  - Ø **Relative accuracy**: Positional consistency of a data point in relation to other near points of detail
  - Ø **Absolute accuracy**: Agreement of a point in a map with real coordinates in the British National Grid reference system



Cadastral Mapping Issues - Accuracy

- Modeling the real world
  - Ø 2D/3D graphic representation – 2D interpretation vs. 3D realism
  - Ø Geometry is created in 3-D context for infrastructure mapping – why not for cadastral mapping?
  - Ø Engineering assets of all types populate and extend this geometry - mapping and engineering disciplines become one

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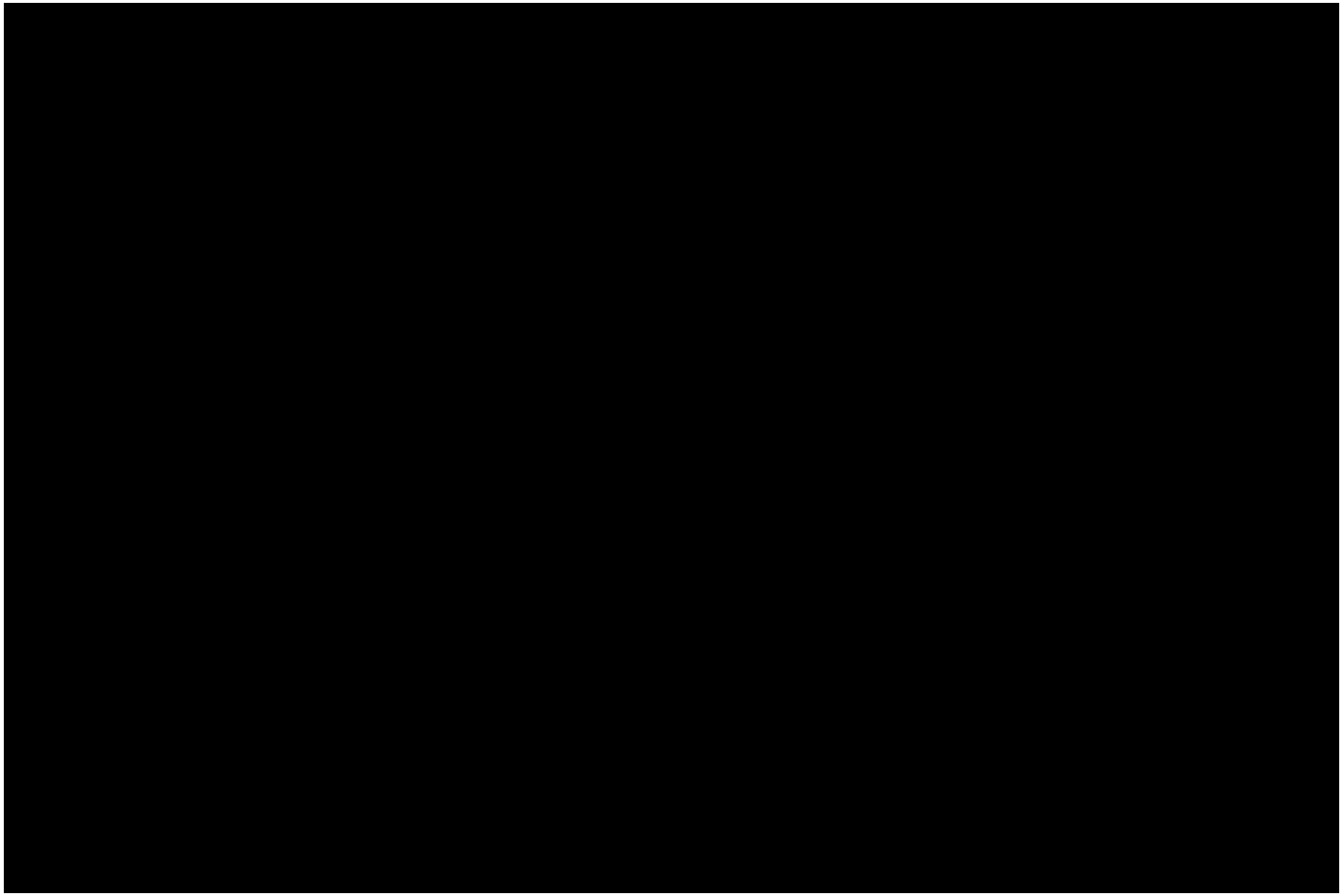
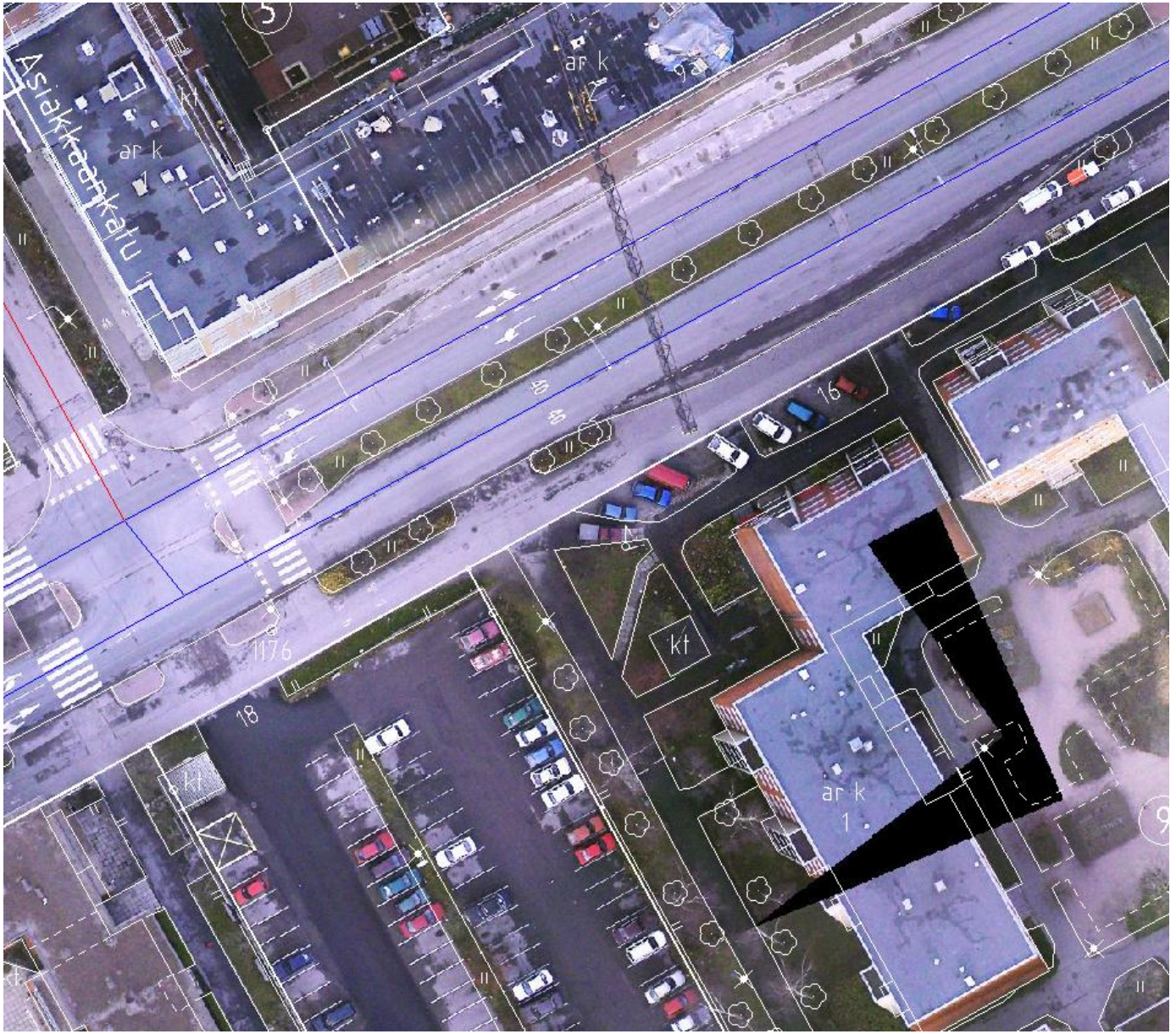


Cadastral Mapping Issues

- Data Creation and Maintenance
  - Ø Data collection techniques
    - » Traditional surveys and photogrammetric data collection
    - » LIDAR and other sensed data collection
    - » Digital video capture
    - » 3D model creation of cadastre and associated infrastructure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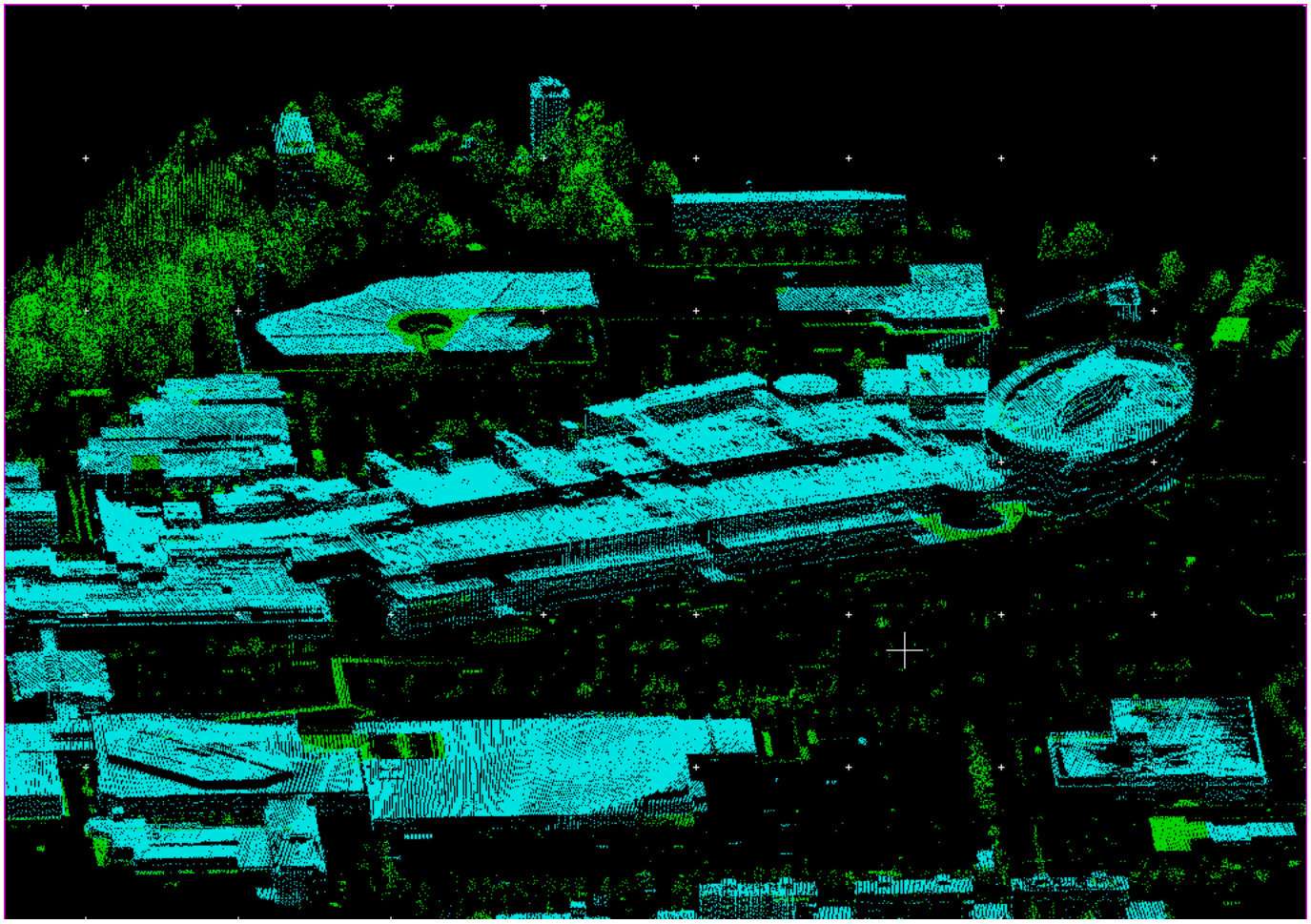

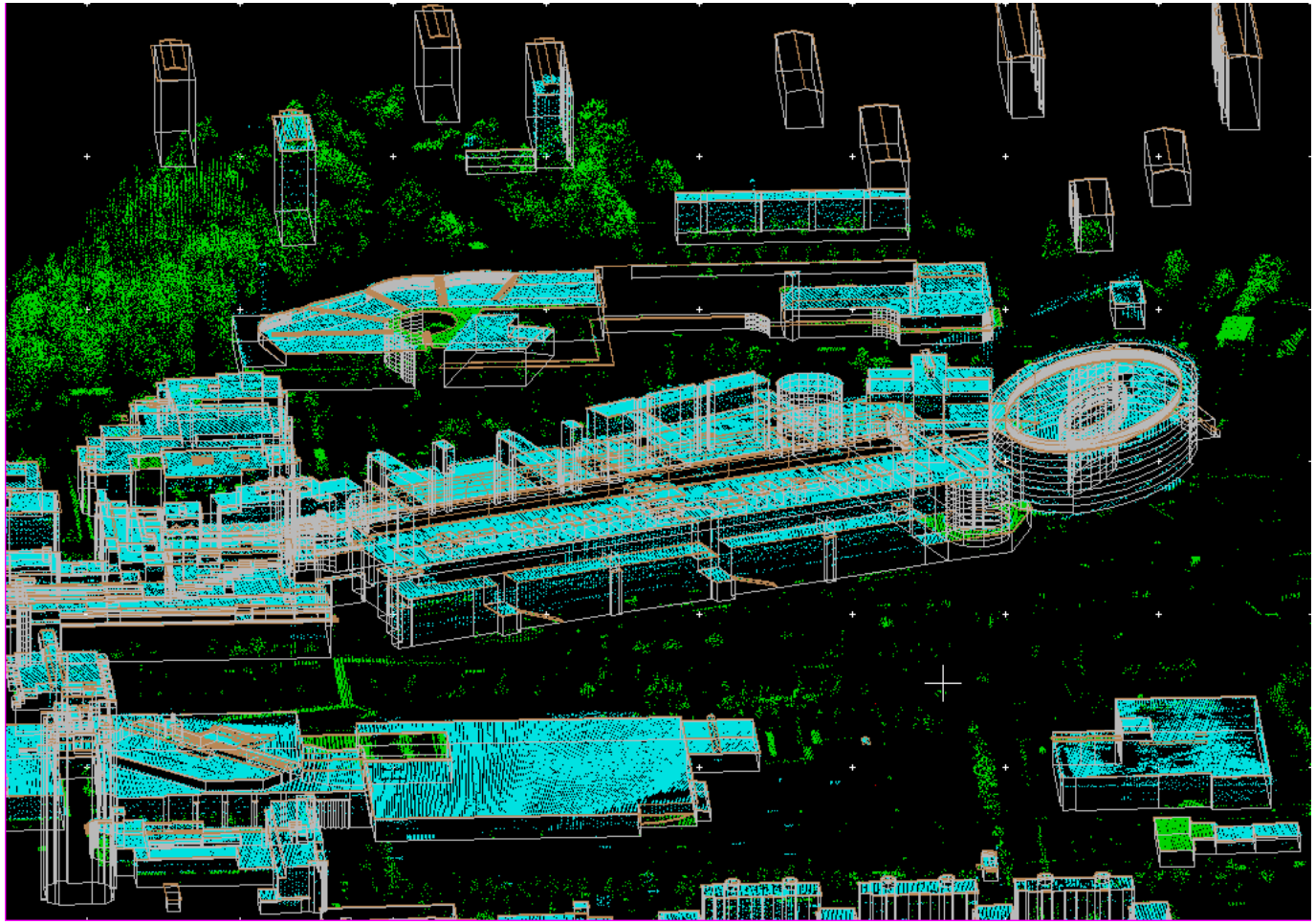

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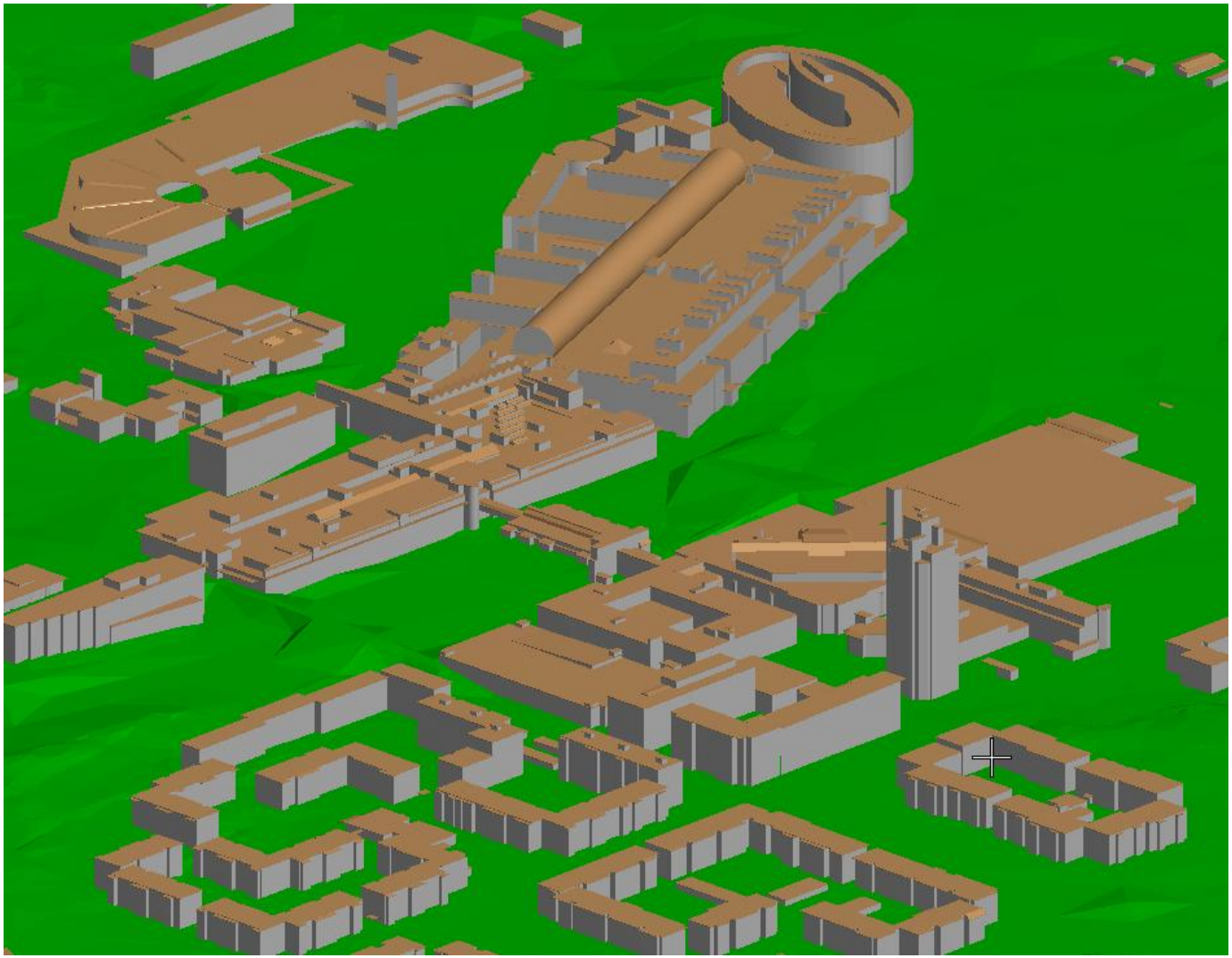

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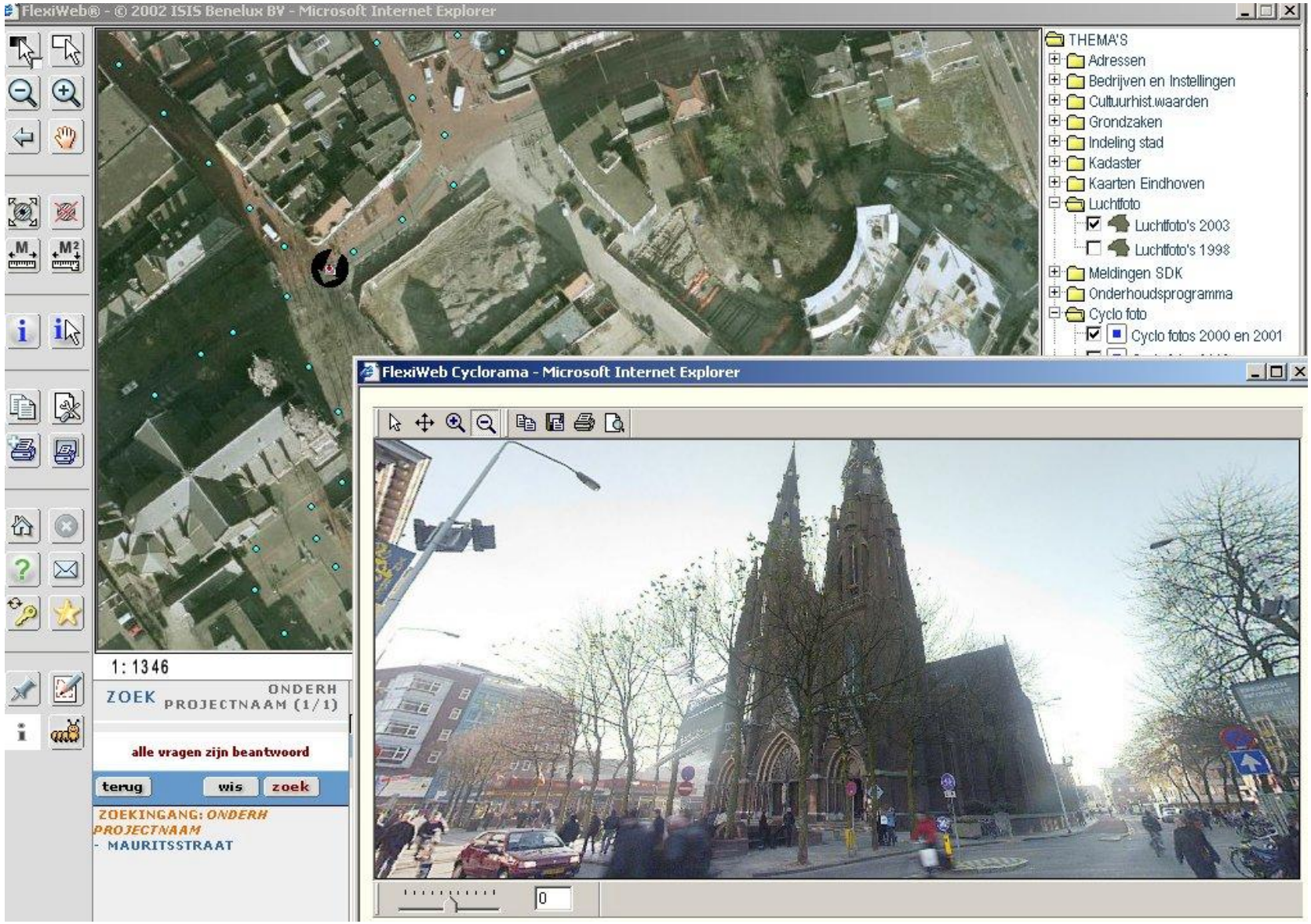
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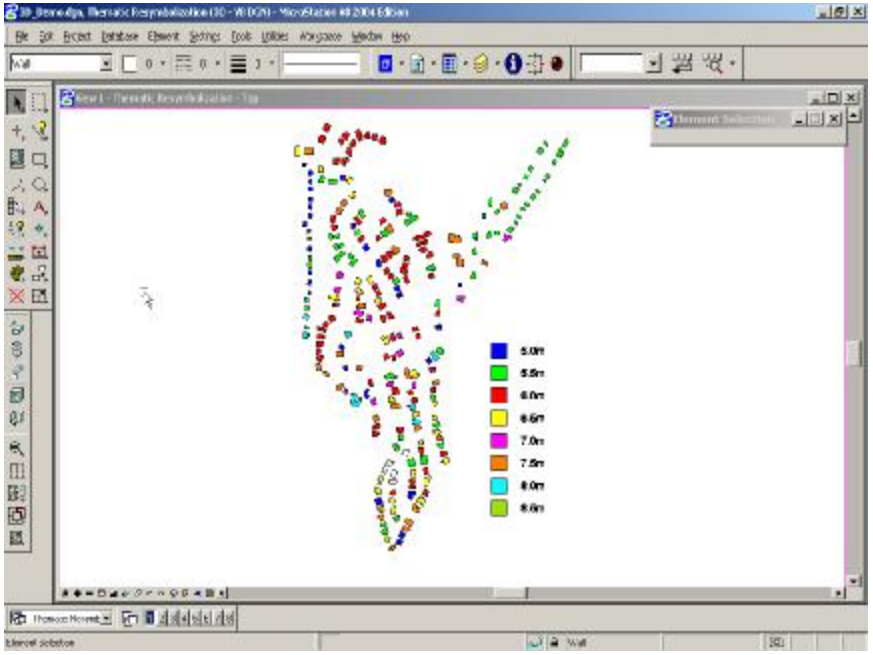
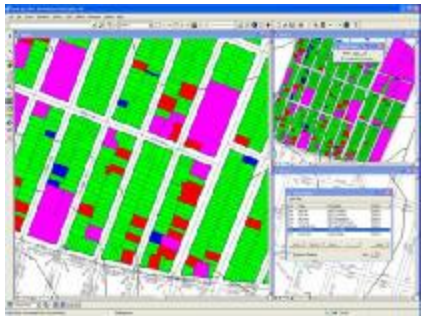
Cadastral Mapping Issues

- Data Creation and Maintenance
  - Ø Fast, accurate, easy editing
    - » Speed
    - » Efficiency
    - » Flexibility of workflows



Cadastral Mapping Issues

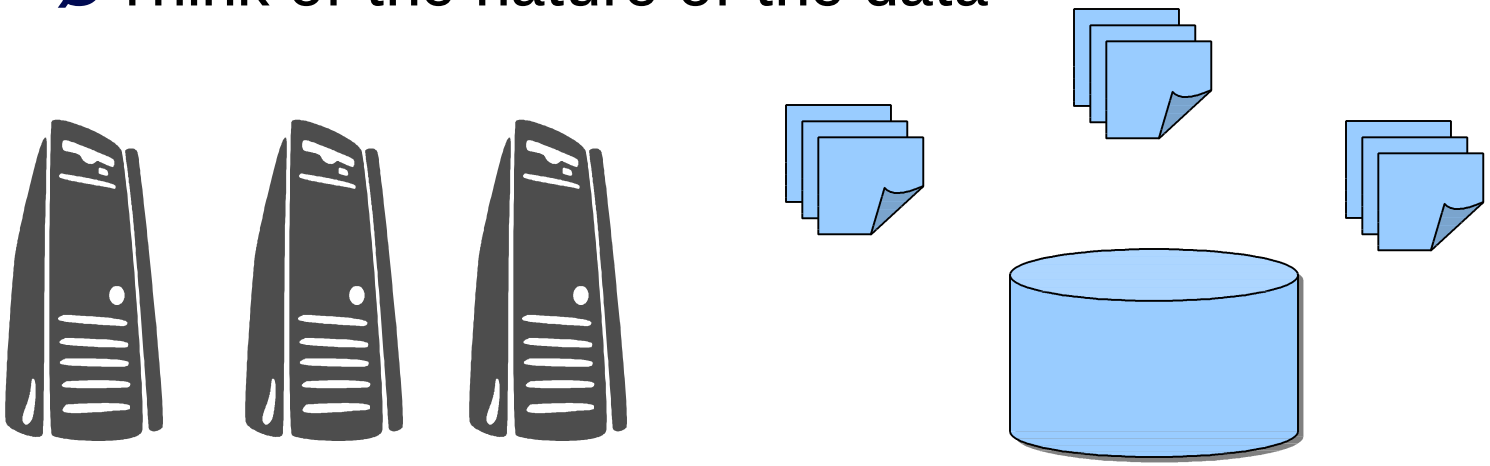
- Data Management
  - Ø Types of Data
    - » Vector maps
    - » Digital CAD drawings
    - » Scanned drawings
    - » Images
    - » Documents
    - » Videos
    - » Website links




http://www.bentley.com/3egov

Cadastral Mapping Issues

- Data Management
  - Ø Storage – where does data live properly?
    - » Graphics, geometry, designs – typically file-based storage
    - » Attributes, topology, relationships – generally databases
  - Ø Think of the nature of the data



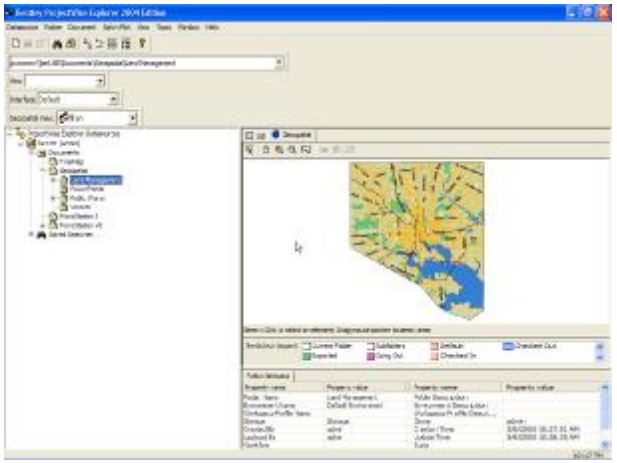
Cadastral Mapping Issues

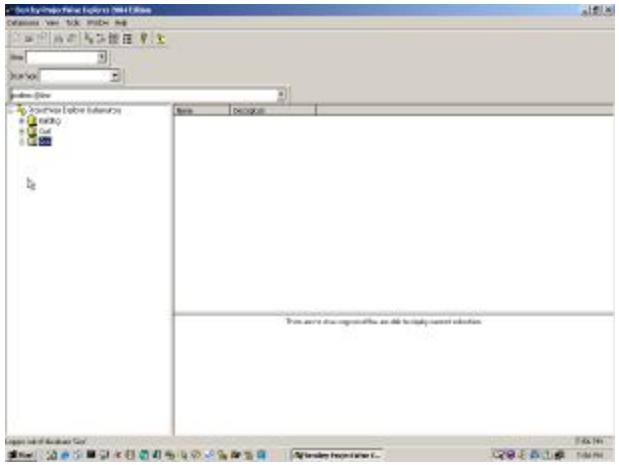
- Data Management
  - Ø Proprietary Data Management System
    - » Efficient data handling of controlled data types
    - » Not flexible in handling non GIS data
  - Ø Enterprise Data Store
    - » Excellent for large amounts of homogeneous or attribute data
    - » Not ideal for design documents and design workflows
  - Ø Federated Data Management
    - » Keep data in native format
    - » Powerful hybrid approach to real **corporate-wide** information management


DATA
LAND
DATA
REVENUE
PUBLIC SAFETY
DATA
INTEGRATION
TOOLS
PLANNING
PUBLIC WORKS/
INFRASTRUCTURE
DATA
ENVIRONMENTAL
DATA
DATA

Cadastral Mapping Issues

- Federated Data Management
  - Ø Adding the spatial component
    - » Organize and access spatial data spatially
  - Ø Integrating engineering, design, parcel maps, GIS analysis results and associated non-spatial information





Cadastral Mapping Issues

- Publishing and communications methods
  - Ø Fast, accurate hard-copy capability
    - » Need flexible, customizable output techniques
  - Ø Web-based display and printing
    - » Fast to set up; Easy to do; Meaningful results
  - Ø Digital transmission – email, mobile, PDF, etc.
    - » Internal and External communications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JPEG Image


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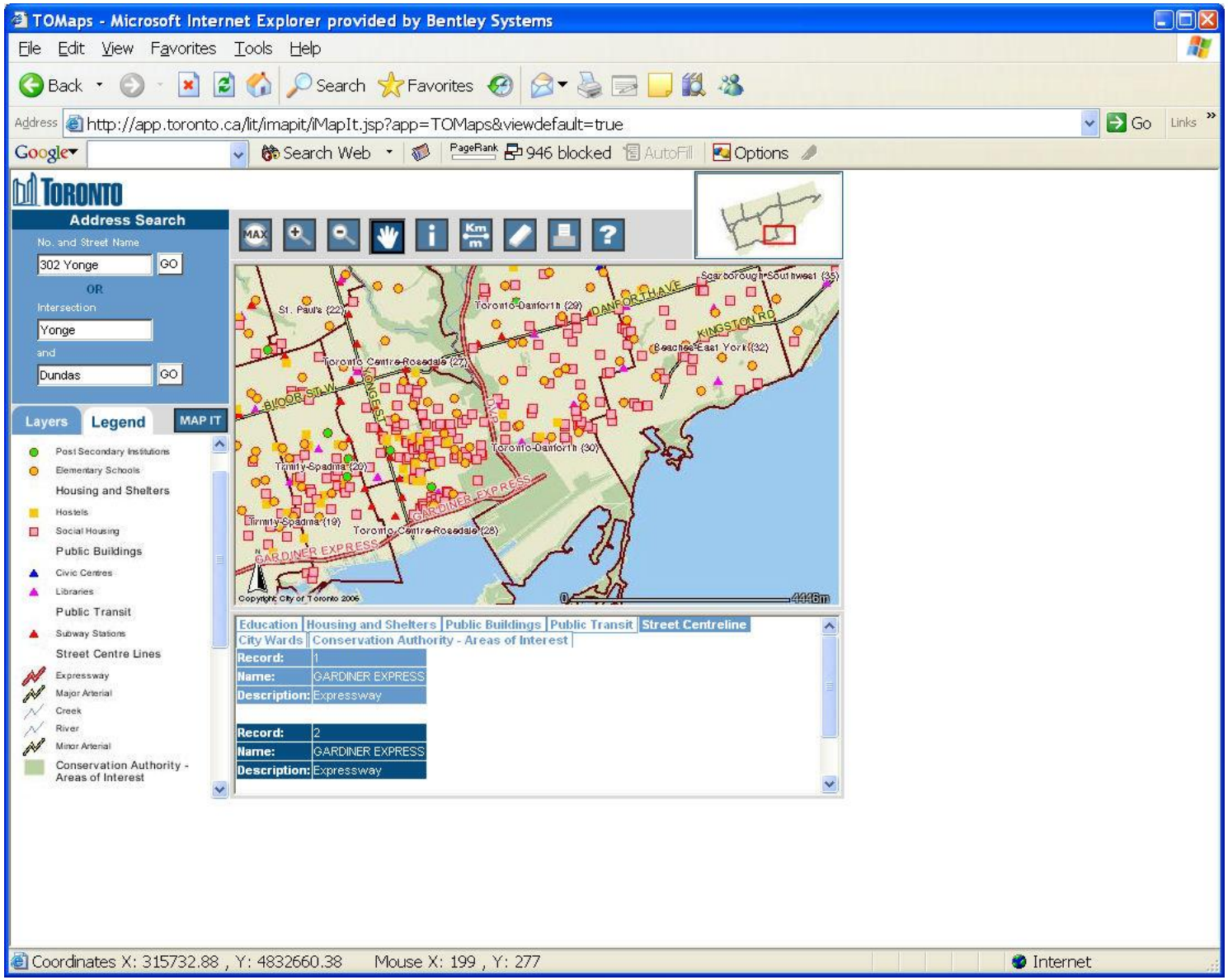
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Toronto-Danforth (29)
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Scarborough Southwest (35)
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Beaches-East York (32)
Toronto Centre-Rosedale (27)
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YONGE ST
Toronto-Danforth (30)
Trinity-Spadina (20)
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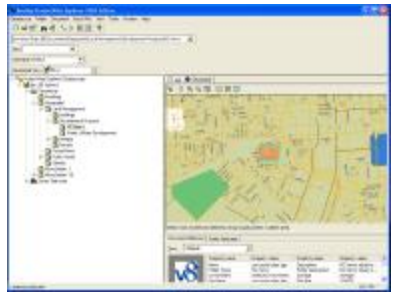
Available Technology

- Desktop applications
  - Ø Traditional GIS tools
    - » Strong on analysis
    - » Weak on data entry and maintenance
  - Ø Engineering design applications
    - » Designed for engineers, not for mappers
    - » Offer required precision but tools are cumbersome
  - Ø Hybrid Engineering / Cadastral Mapping Solutions
    - » Combine the best of both worlds
    - » Allow cadastral mappers to model real life

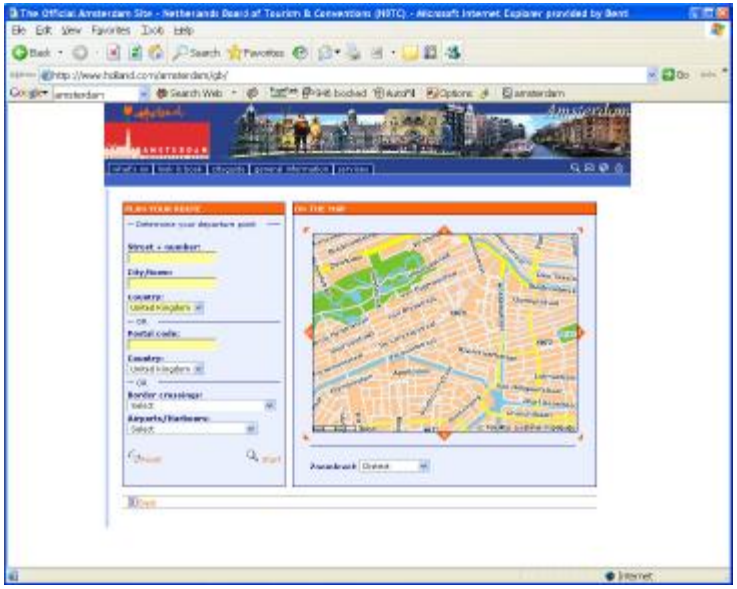


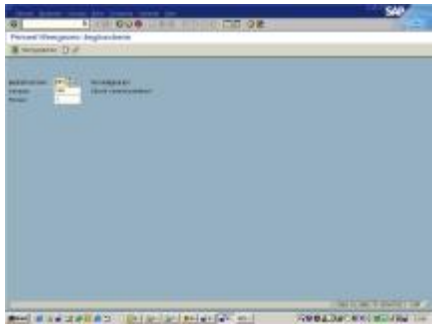
Available Technology

- Server-based information management
  - Ø Document management systems
    - » Traditional information management
  - Ø Database storage and retrieval
    - » Often proprietary middleware - tied to traditional GIS models
  - Ø Geospatial information management
    - » Hybrid Solution – Spatial interface to information management
    - » Federated data management, not data normalization

Available Technology

- Web-based information systems
  - Ø Traditionally for viewing only
  - Ø Expanding into data update, QC activities, map creation
  - Ø Digital publishing





Future of Land Management

- 3D cadastre
- Combination of traditional cadastre and real-world modeling and engineering applications
  - Ø Leveraging the power of engineering applications
  - Ø Expanding the definition of cadastre
  - Ø More than parcels and ownership records
- E-government sites as data communication mechanisms
- Virtual reality

Conclusions

- Engineering accuracy is required for cadastral applications
- Definition of cadastre will expand to include modeling of real world infrastructure
- 3D is required
- Federated information management is the only way to join multiple disciplines