Database for Land Use Modelling and Related Research

Project 2.4: Integrated Urban Modelling & Economic Analysis

2nd Annual iCity-ORF Student Presentation Day
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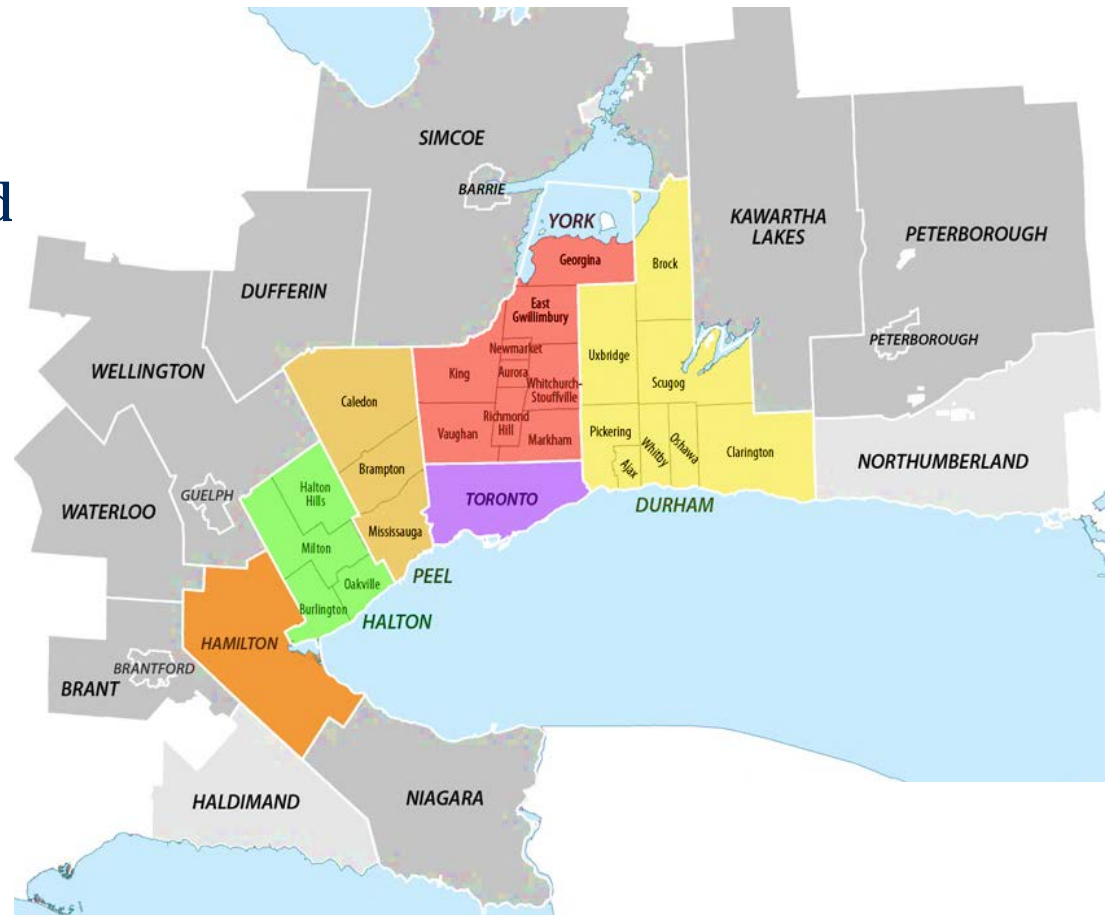Transportation Research Institute

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Project 2.4: Integrated Urban Modelling & Economic Analysis

Scope of Project:

- Analysis of urban land use dynamics through integrated urban modelling

- Evaluate economic impacts resulting from land use and transportation planning and policy

Study area: Greater Toronto and Hamilton Area (GTHA)

Research Problem and Objective

Required database for Urban modelling:

Time-series land use; built form, density and tenure; demographics, housing, employment and economic activity distribution; building uses; transport connectivity; accessibility measures; land values and property prices

- PROBLEM: Relevant data?
  - Lack of information on existing data
  - Time consuming searches/ downloads/ library visits
- OBJECTIVE: Collect and organize a database for the Project
  - Allow easy browsing and quick access
  - Upload value-added updates/ new data

Data Collection

- **Sources**
  - Map and Data Library, Robarts, UofT
  - Scholars Geoportal
  - Open Data websites
  - GIS and Cartography Office, Dept. of Geography, UofT
- **Formats**
  - GIS Shape files, MapInfo tables, Excel sheets, Text files
  - Scanned images of historical land use maps, Metropolitan Toronto planning documents
- **Inventory and meta data documentation for datasets**

GIS Datasets

Enhanced Points of Interests (EPOI)

Creator: DMTI Spatial Inc.

- Geocoded location database of business and recreational points of interest
- Businesses with SIC codes in healthcare, shopping, education and other categories

Temporal extent:

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
√	√	√	√	√	√	√	√	√	√	√	√

Research potential:

- Identifying agglomeration economies in the GTHA based on location patterns of office clusters and amenities

GIS Datasets

CanMap RouteLogistics Ontario

Creator: DMTI Spatial Inc.

- Land Use
- Geospatial database of building footprints, transportation infrastructure (roads, rail transit, toll booths, highway exits, trails), building uses (health, education, industrial, recreation), parks and water bodies

Temporal extent:

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
√	√	√	√	√	√	√	√	√	√	√	√	√	√

Research potential:

- Study intensification of built form and use around transit lines to estimate economic sustainability and potential for land value capture

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GIS Datasets

Ontario Parcel Data

Creator: Teranet

- Land parcels, addresses, unit type, PIN, assessment roll numbers

Temporal extent:

2002	2007	2009	2010	2012	2014	2016
√	√	√	√	√	√	√

Research potential:

- Overlay building footprints and land use on parcels to calculate lot coverage and land use intensity

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GIS Datasets

Clutter Data (GTA 2004, Toronto 2010)

Creator: Resource Management Strategies Inc. (RMSi)

- Built-up density (low-rise, mid-rise, high-rise)
- Land Use

3D Massing, Toronto

Creator: City of Toronto

- Building footprints and heights

Temporal extent:

2004	2010	2016
√	√	√

Research potential:

- Transit oriented development studies

GIS Datasets

Property Data Maps, Toronto

Creator: Works and Emergency Services, City of Toronto

- Spatial database of building footprints, property lines, curbs, pathways, traffic and pedestrian street lights, subway and street car tracks, roads, parking garages, parks, streams

Temporal extent:

2002	2004	2006	2008	2010	2011	2012	2013	2014	2015
√	√	√	√	√	√	√	√	√	√

Research potential:

- Measuring accessibility by road, transit and active modes

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GIS Datasets

Census Road Network Files

Creator: Statistics Canada

- Historical road and skeletal street network for all urban areas of Canada

Temporal extent:

1986	1991	1996	2001	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
√	√	√	√	√	√	√	√	√	√	√	√	√	√

Research potential:

- Road accessibility analysis for GTHA combined with socio-economic attributes and land use impact

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GIS Datasets

Canada Land Use Monitoring Program (CLUMP)

Creator: Natural Resources Canada

- Historical urban built up area for Toronto and Hamilton

Southern Ontario Land Resource Information System (SOLRIS) Version 2.0

Creator: Ontario Ministry of Natural Resources

- Recent built up area (buildings and paved surfaces) for GTHA

Temporal extent:

1966	1971	1976	1981	1986	1998	2002	2003	2006	2007	2010	2011
√	√	√	√	√	√	√	√	√	√	√	√

Research potential:

- Time series urban development pattern

GIS Datasets

Census Value Added series

Cartography Office Base Series and others

Creator: GIS and Cartography Office, Department of Geography, UofT; and the Neptis Foundation

- GTHA urban centres, built up area, transportation corridors
- Population and employment count attribute data joined to TTS traffic analysis zones

Temporal extent:

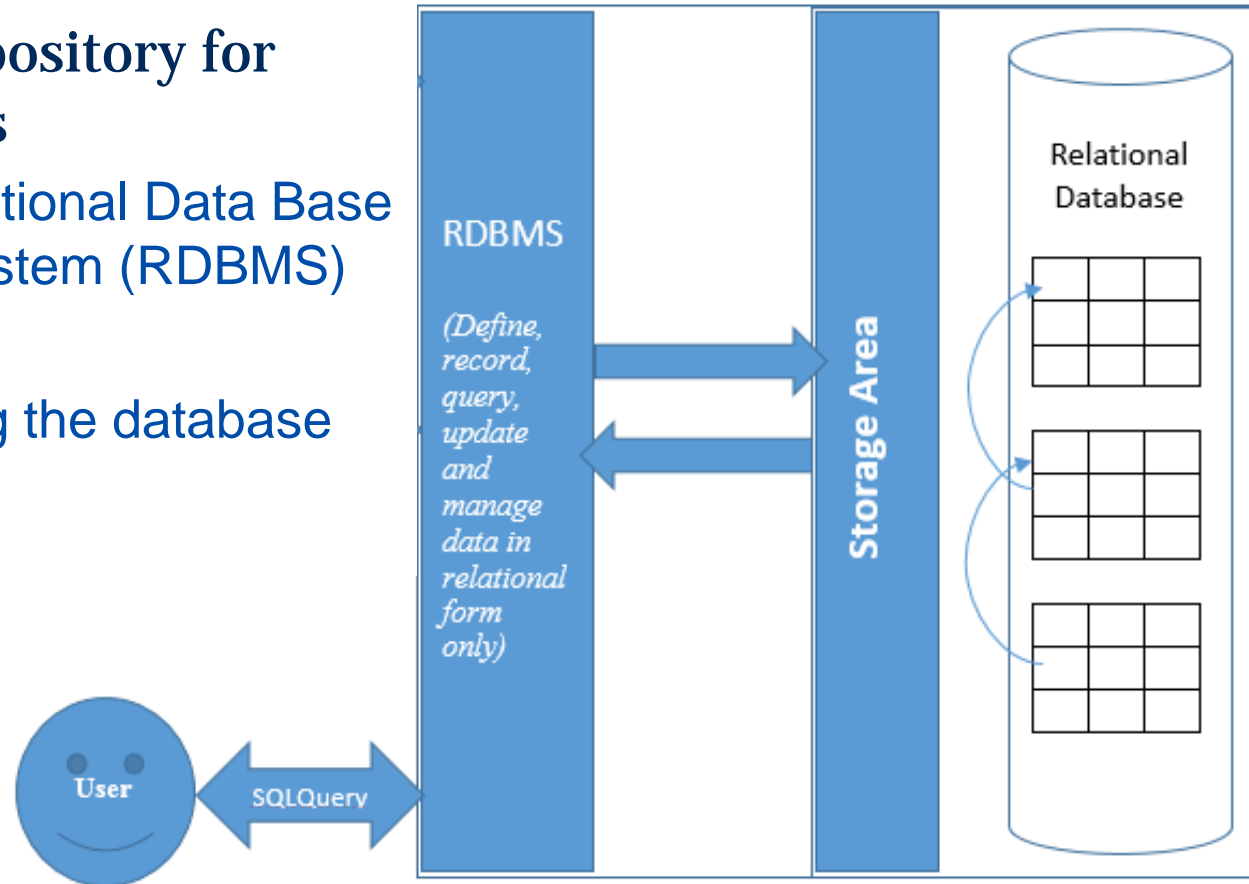| 1991	2001	2006
√	√	√

Research potential:

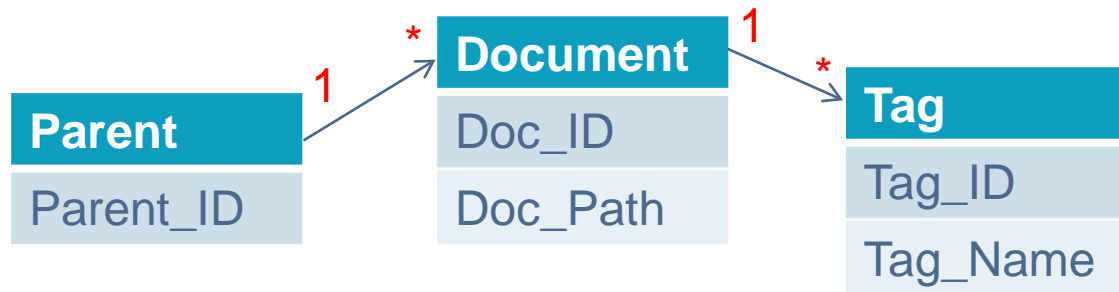- Study changes in population, dwellings, transportation infrastructure and employment trends

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Data Storage and Retrieval System

- **RDBMS based Repository for UTTRI researchers**
  - SQL Server Relational Data Base Management System (RDBMS)
  - Related tables
  - Tags for querying the database

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RDBMS Schema Design

Parent
Parent_ID

1 → * **Document**
Doc_ID
Doc_Path

1 → * **Tag**
Tag_ID
Tag_Name

6,Carpool Parking Lots
7,Populated Placenames
8,Toll Booths
9,Expressways
10,Forward Sortation Areas
11,Primary Highways
12,Major Roads
13,Secondary Highways
14,Main Highways
16,Local Roads
17,Building Footprints
18,Property Boundaries
21,Trails
22,Turn Restrictions

Next Steps: Online web-based platform

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Thank you for your patience!