Lesson 1: Introduction to Geographic Information Systems for Urban Planning

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What will you learn from this lesson?

- Introducing Urban Planning
  - Motivation of urban planning
  - Urban planning practice
  - Urban planning in Singapore
- Geographic Information Systems (GIS) Fundamentals
  - Basic concepts of GIS
  - Major components of a GIS
  - GIS toolkits

What is Urban Planning?

- A technical and political process concerned with the development and design of land use and the environment and the infrastructure passing into and out of urban areas.

- The primary concern is the public welfare, which includes considerations of efficiency, sanitation, protection and use of the environment, as well as effects on social and economic activities.

- Urban planning is considered an interdisciplinary field that includes social engineering and design sciences.

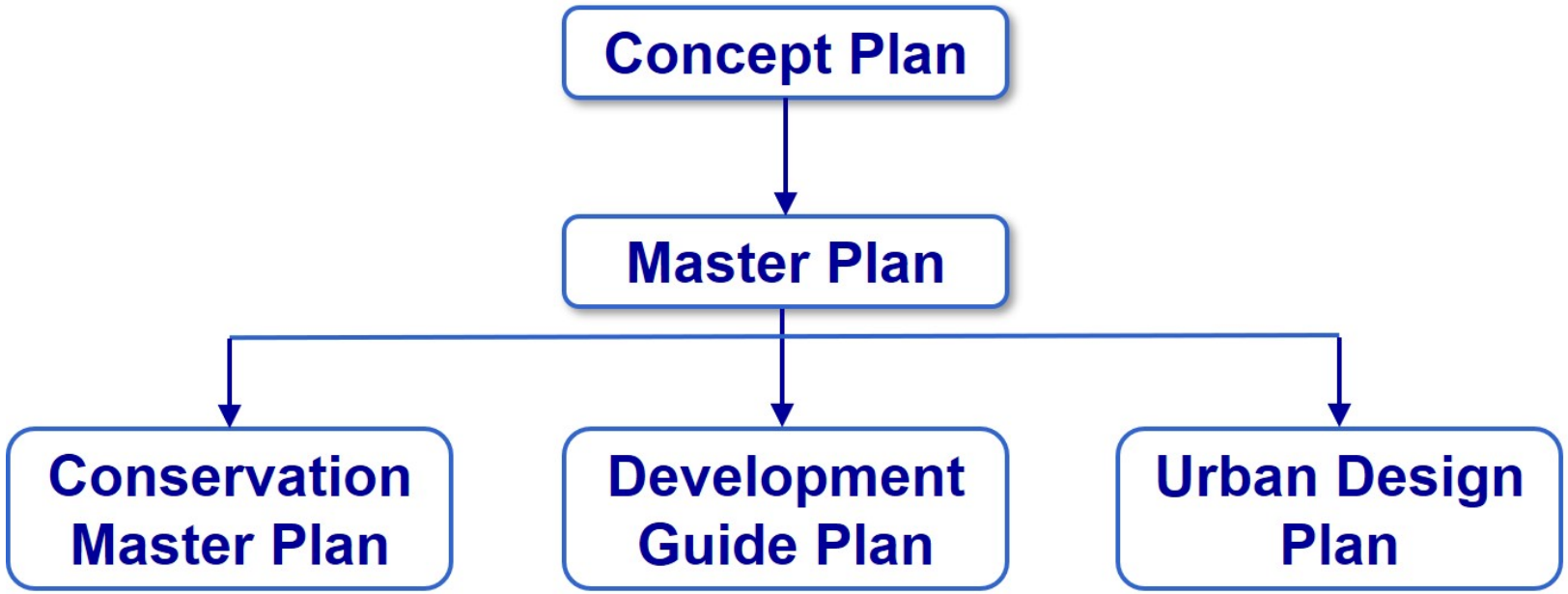
Urban Planning in Practice

Practitioners of urban planning are concerned with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation and management.

Enforcement methodologies include governmental zoning, planning permissions, and building codes, as well as private easements and restrictive covenants.

Urban Planning in Singapore

Functions of Singapore's national planning authority



Source: Singapore, Urban Redevelopment Authority

Why Geographic Information Matters?

About 80% of all data maintained by organizations around the world has a location component.

(Source: BusinessWeek Research Services, 2006)

GI in Smart Nation

Thursday, Jan 8, 2015

THE STRAITS TIMES / Singapore

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Singapore needs to be 'smart city' to stay ahead: PM

PUBLISHED ON NOV 24, 2014 11:13 AM

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The need for Singapore to be a "smart nation", using the latest technology to benefit the country, goes beyond just making life better for the people, said Prime Minister Lee Hsien Loong at the launch of the Smart Nation initiative on Monday. -- PHOTO: ST FILE

One major initiative will be to let people access maps and build up geospatial databases by contributing information such as animal sightings, traffic incidents or the best mee pok eateries.

Source: Singapore needs to be 'smart city' to stay ahead: PM

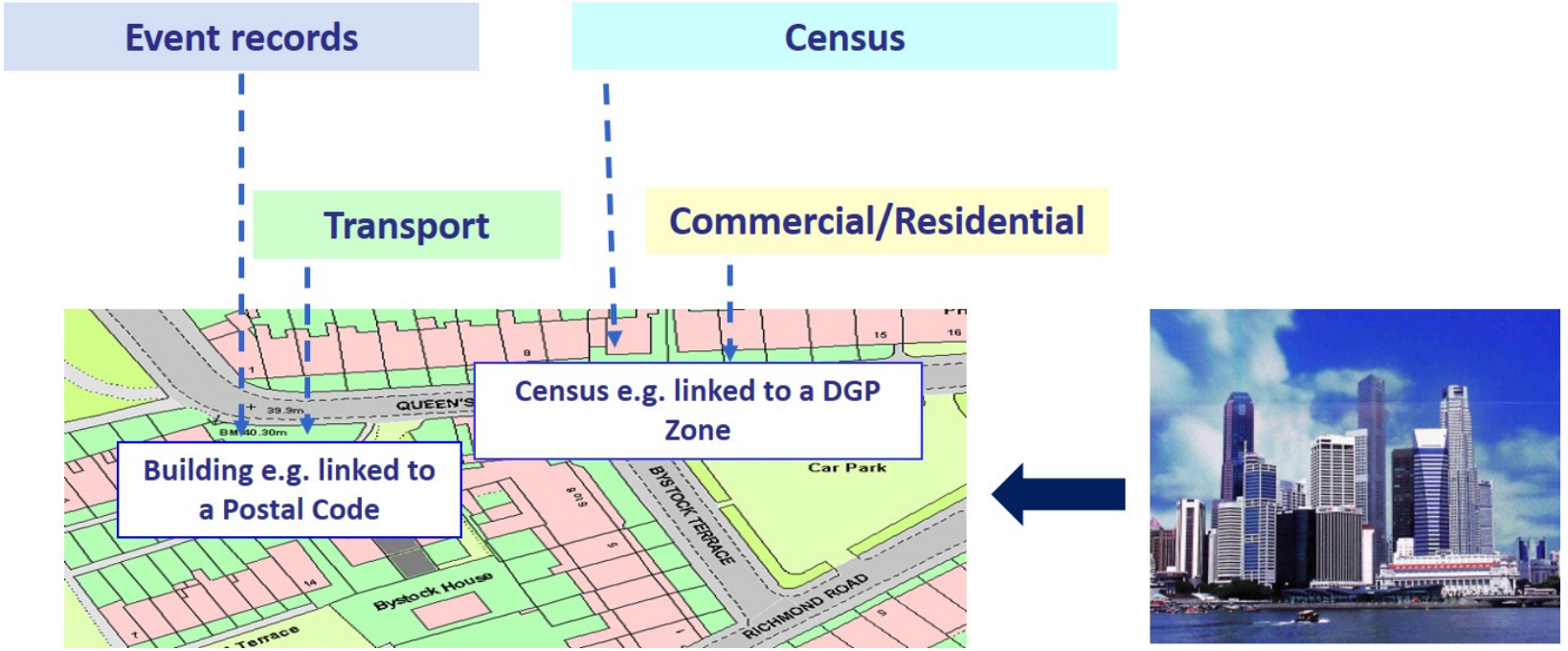
The explosion in the availability of Government GI

GIS Fundamentals

- Introduction to GIS
- Major component of a GIS
- GIS functions
- GIS toolkits

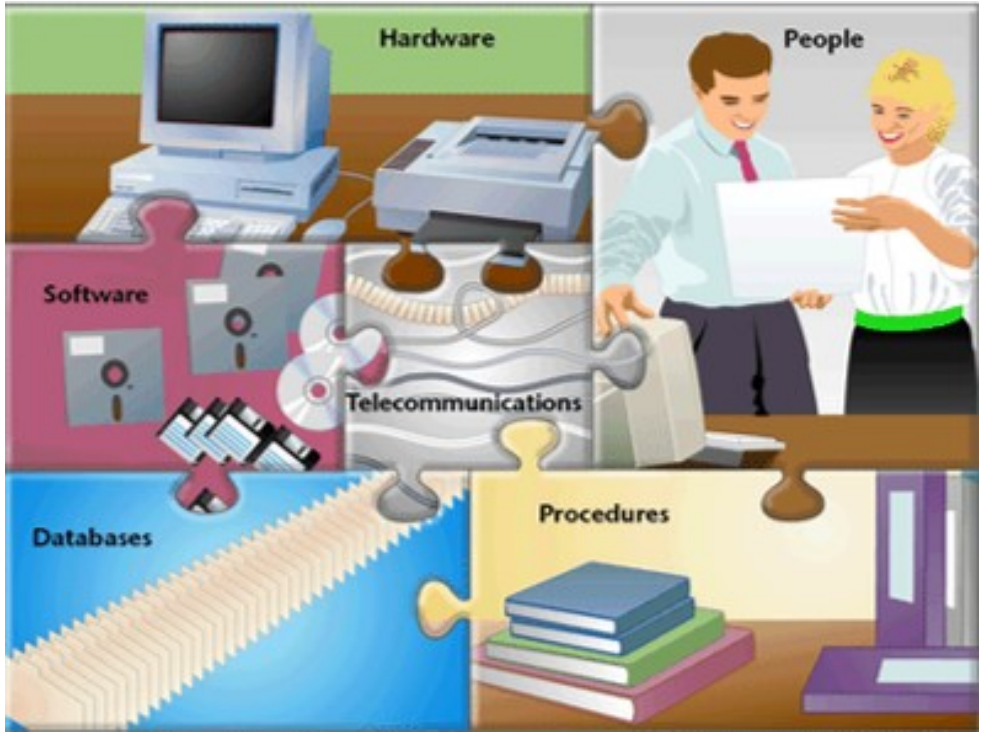
GIS as a toolkit

A Geographic Information System (GIS) is a toolkit for creating, managing, analyzing, visualising, and sharing data of any kind according to where it's located.



Components of a GIS

GIS extends the study of information systems by including geospatial data management, geoprocessing and geographically mediated knowledge.



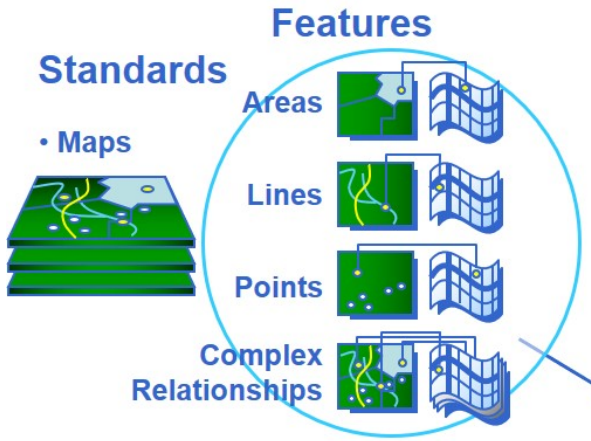
Getting to Know GIS Functions

Geospatial Data Management

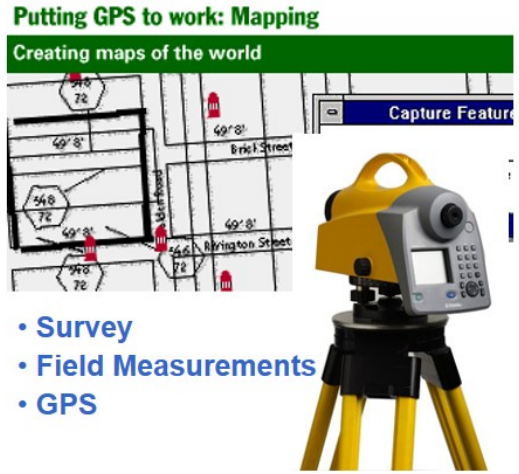
GIS Mapping and Geovisualisation

GIS Analysis

Geospatial Data Management: Data Capture



DBMS



Geospatial Data Management: Data Integration

- Spatial Information + Attribute Information
- Spatial data model: vector vs raster

Spatial Information

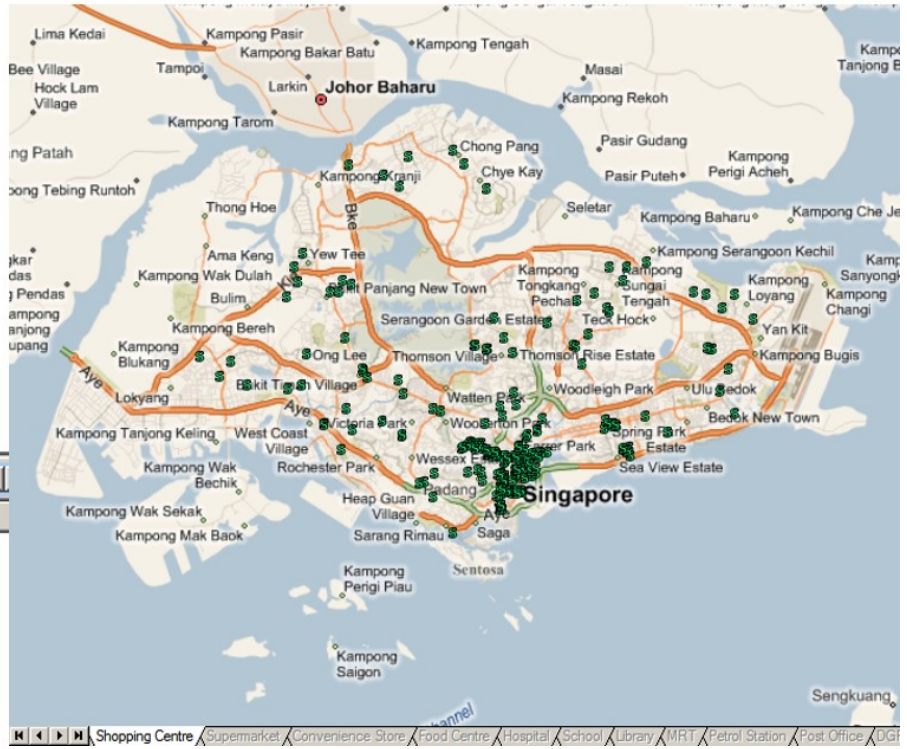
HDB Transaction Table *

ID	X (I)	Y (I)	Longitu...	Latitud...
1274081	31498.3...	31758.1...	103.8665	1.3035
1274082	22454.2...	31650.8...	103.7852	1.3026
1274083	22454.2...	31650.8...	103.7852	1.3026
1274084	22454.2...	31650.8...	103.7852	1.3026
1274085	22831.5...	32793.2...	103.7886	1.3129
1274086	34658.4...	38466.7...	103.8949	1.3642
1274087	34658.4...	38466.7...	103.8949	1.3642

Attribute Information

HDB Transaction Table *

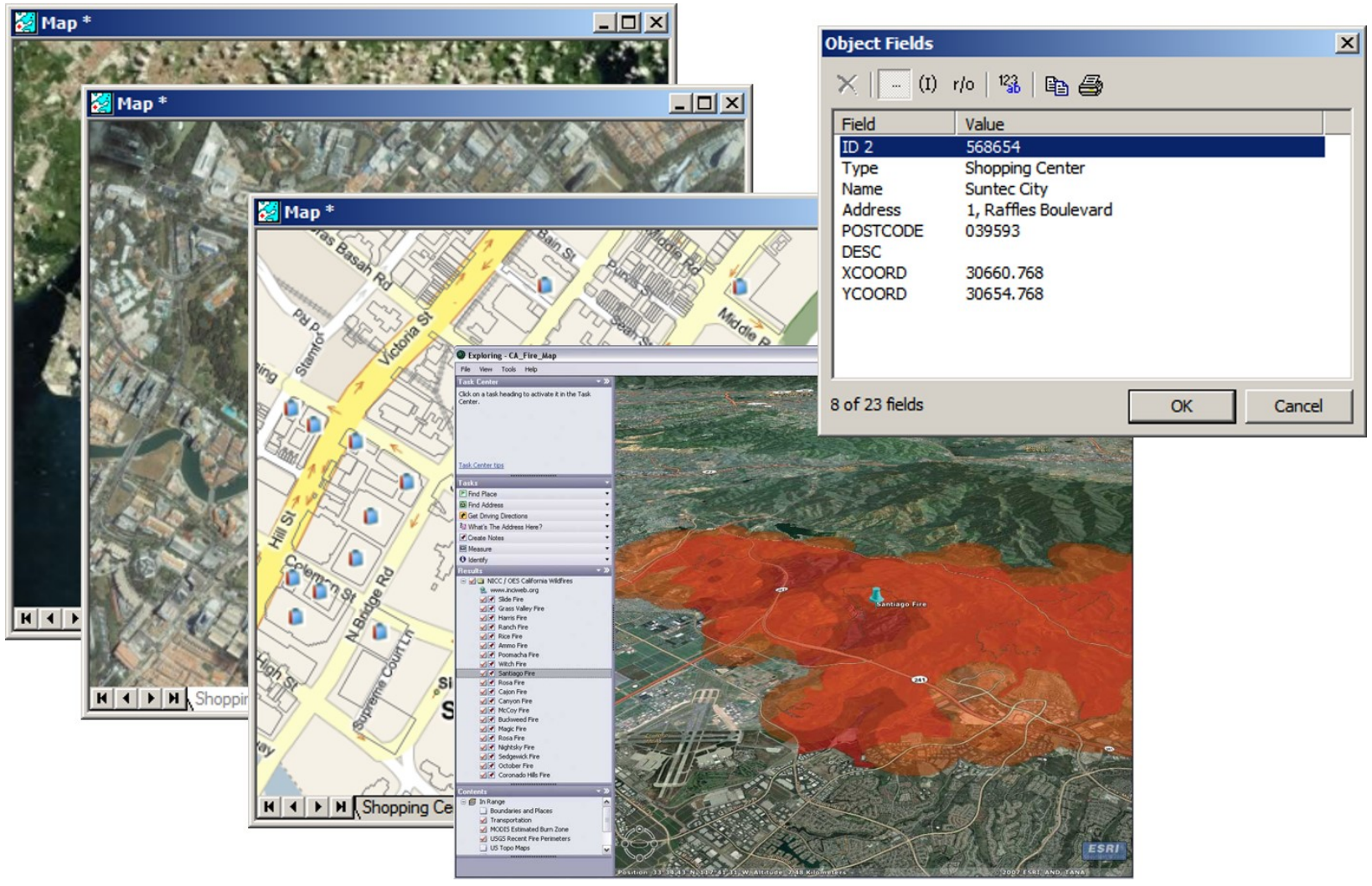
ID	ADDRESS	POSTAL...	CATEGORY	PRICE
1274081	1 Beach Rd	190001	HDB3RM	250000
1274082	1 Dover Road	130001	HDB3RM	236000
1274083	1 Dover Road	130001	HDB3RM	215000
1274084	1 Dover Road	130001	HDB3RM	220000
1274085	1 Ghim Moh Road	270001	HDB3RM	275000
1274086	1 Hougang Ave 3	530001	HDB3RM	141000
1274087	1 Hougang Ave 3	530001	HDB3RM	155000
1274088	1 Kg Kayu Rd	432001	HDB3RM	180000



Geospatial Data Management: Georeferencing

Integrating layers of GIS data into an unified view

Geovisulisation: interactive maps

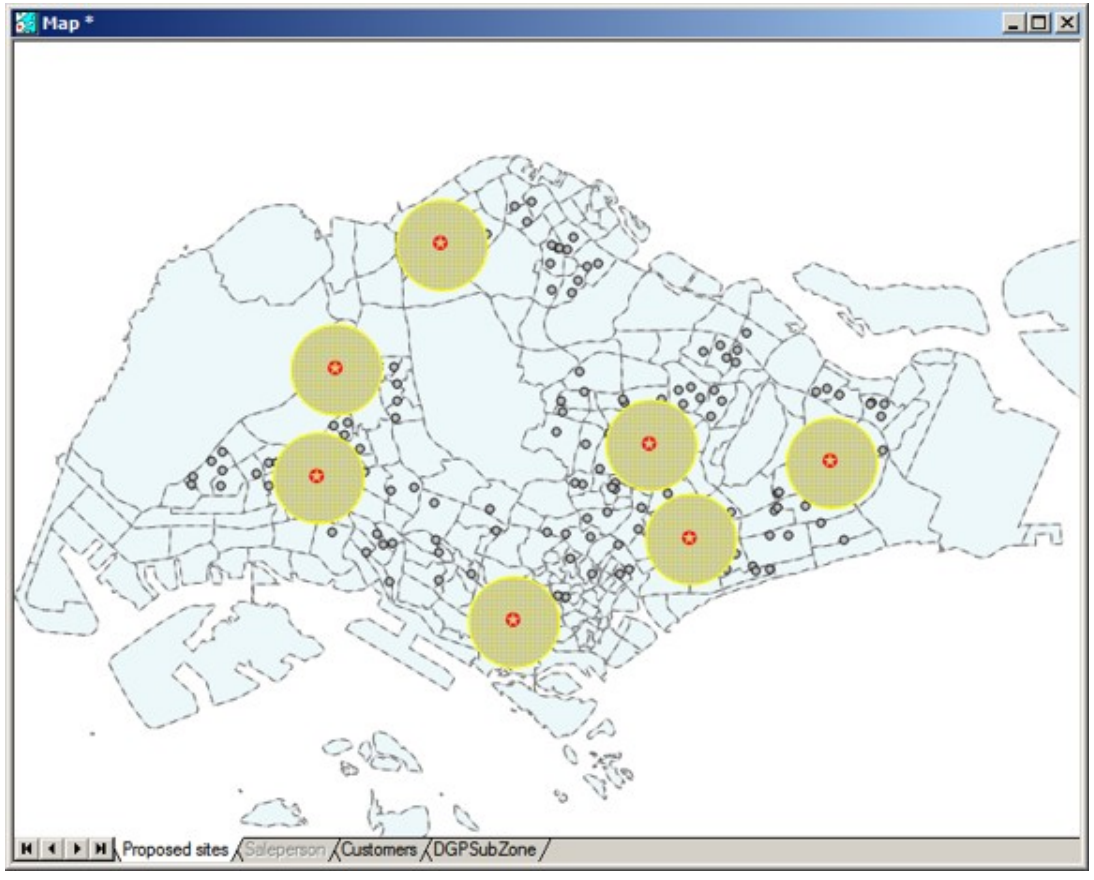


GISs generates information

- Locations What is at.....?
- Conditions Which environment.....?
- Trends What has changed....?
- Patterns What data are related.....?
- Models What if .....?

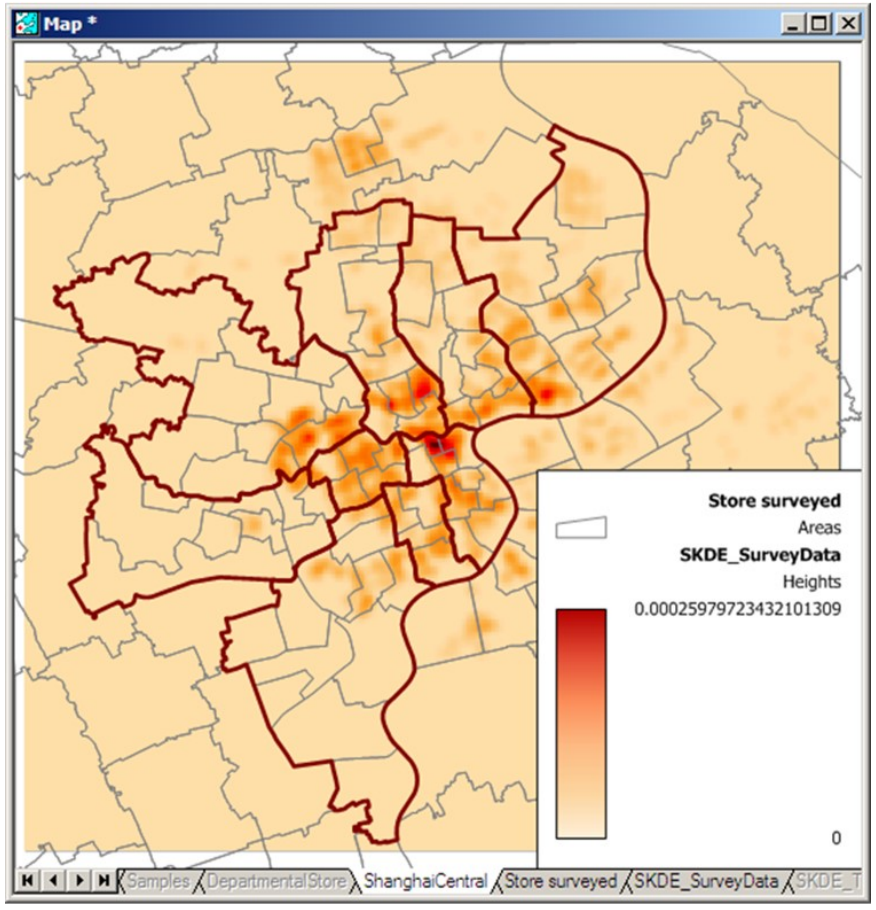
GIS analysis – vector-based

- Geoprocessing techniques: buffering, overlaying etc



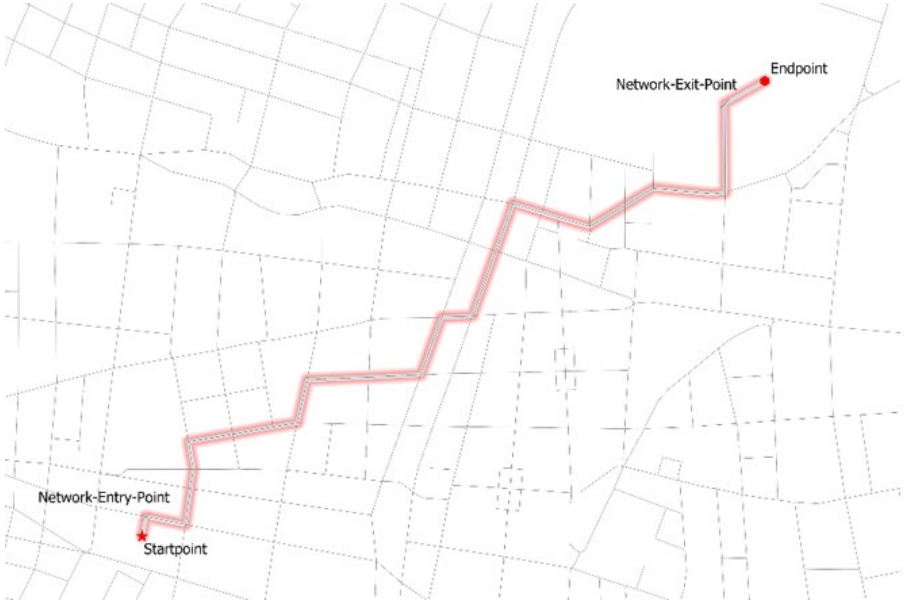
GIS analysis – raster-based

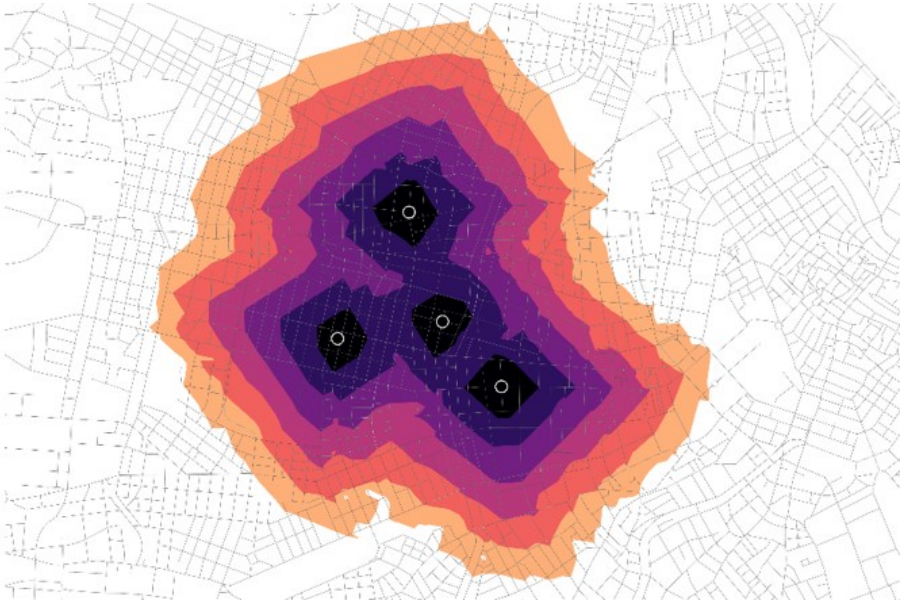
Map algebra, surface analysis, cartographic modelling.



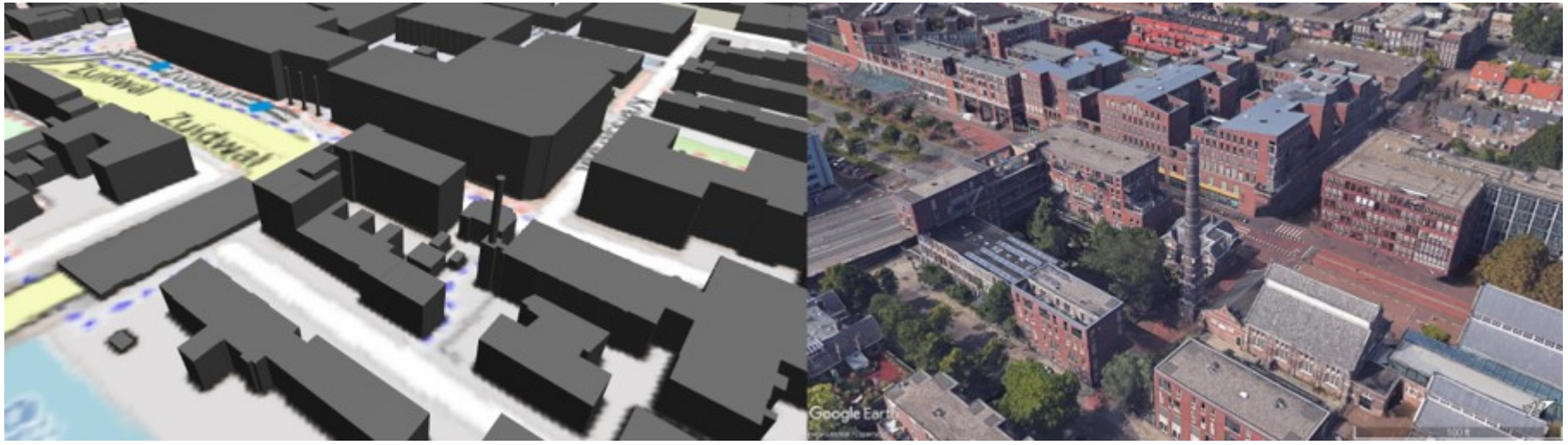
GIS Analysis – network-based

Shortest path analysis, travelling salesman modelling, network service area





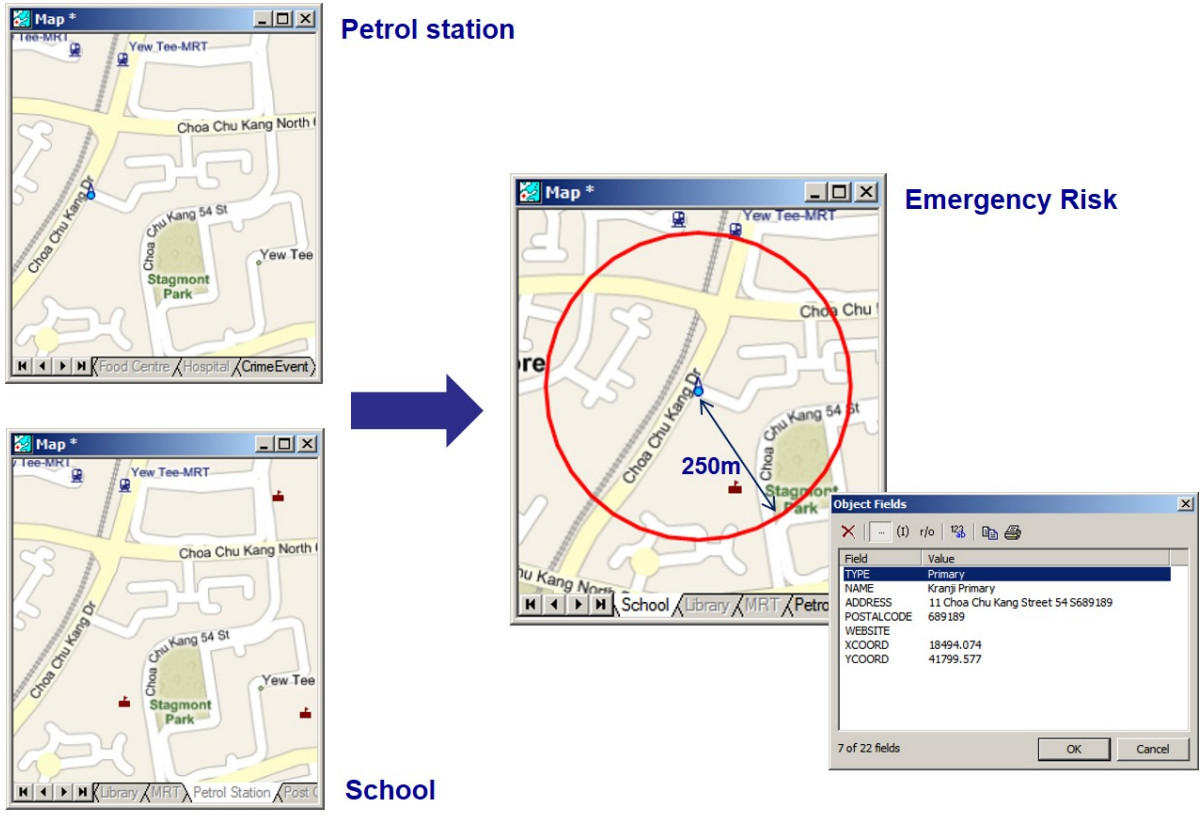
GIS Analysis: 3d Urban Models



Link to an 3d Urban Model

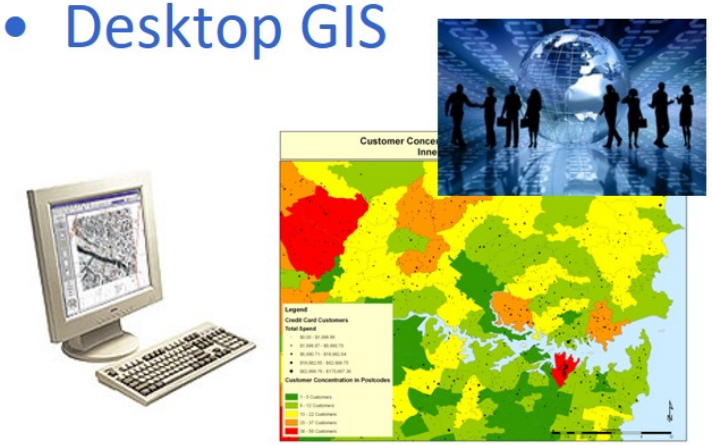
GIS as a Melting-Pot

Planning Support Systems for city

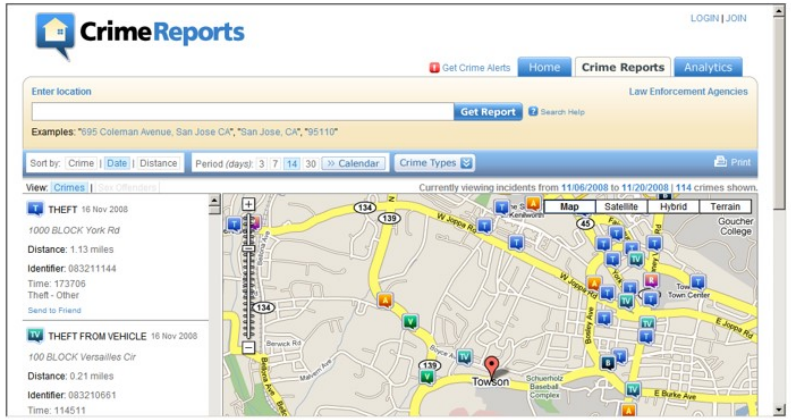


GIS platforms

- Desktop GIS

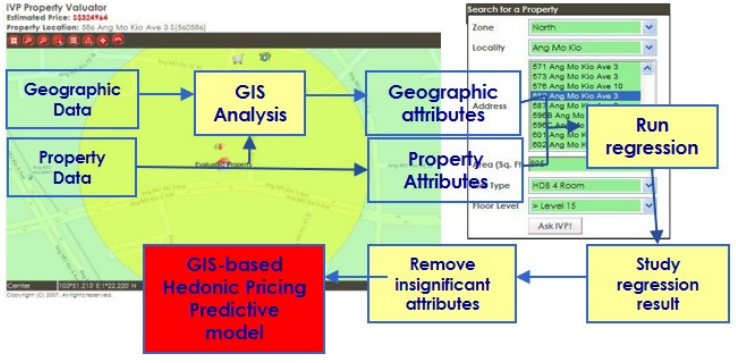


- Internet Map Service



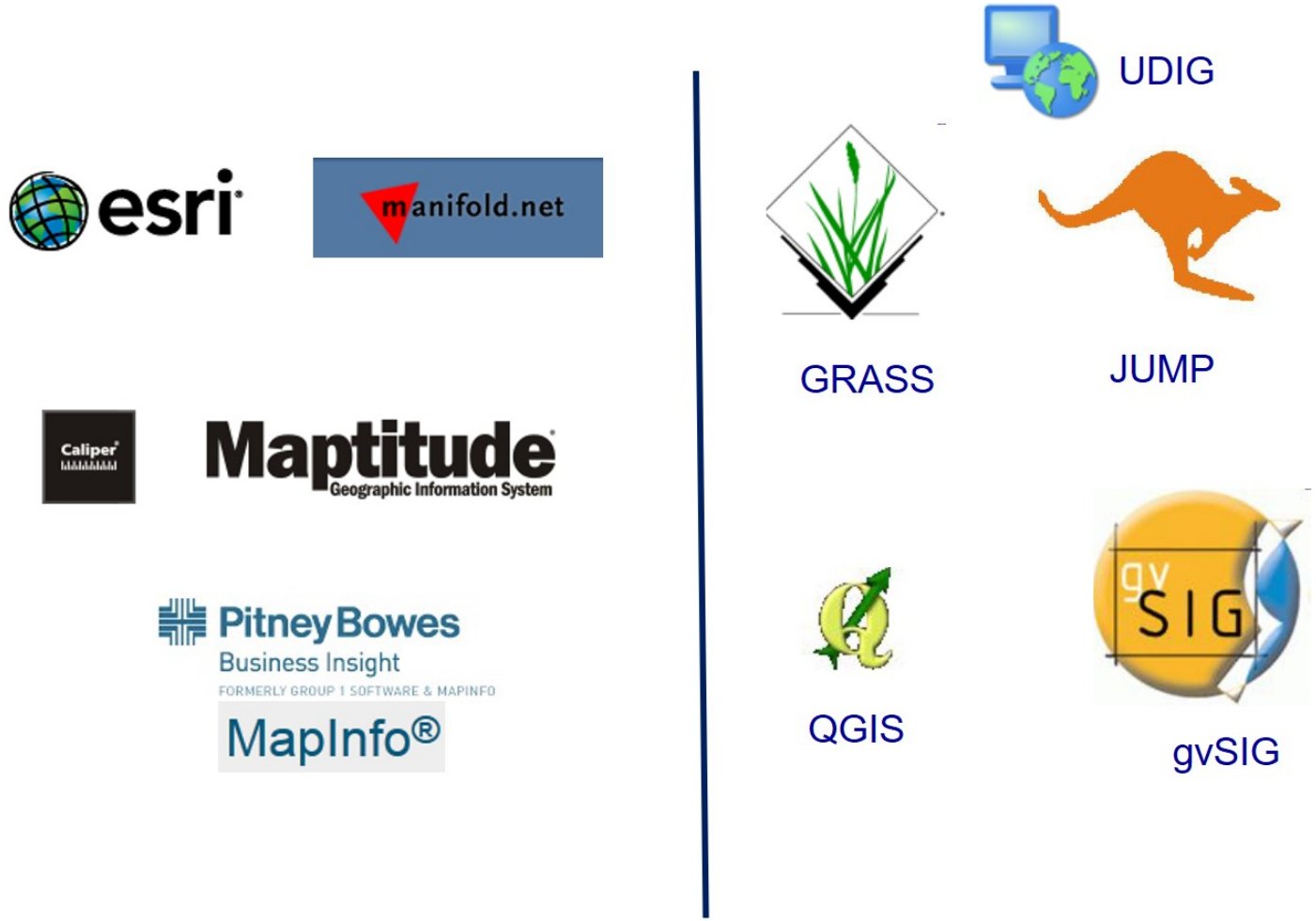
- Mobile GIS

- Server GIS



GIS Desktop Software

Proprietary vs Open Source



QGIS: An Open Source Desktop GIS

Visit this link to earn more about QGIS.

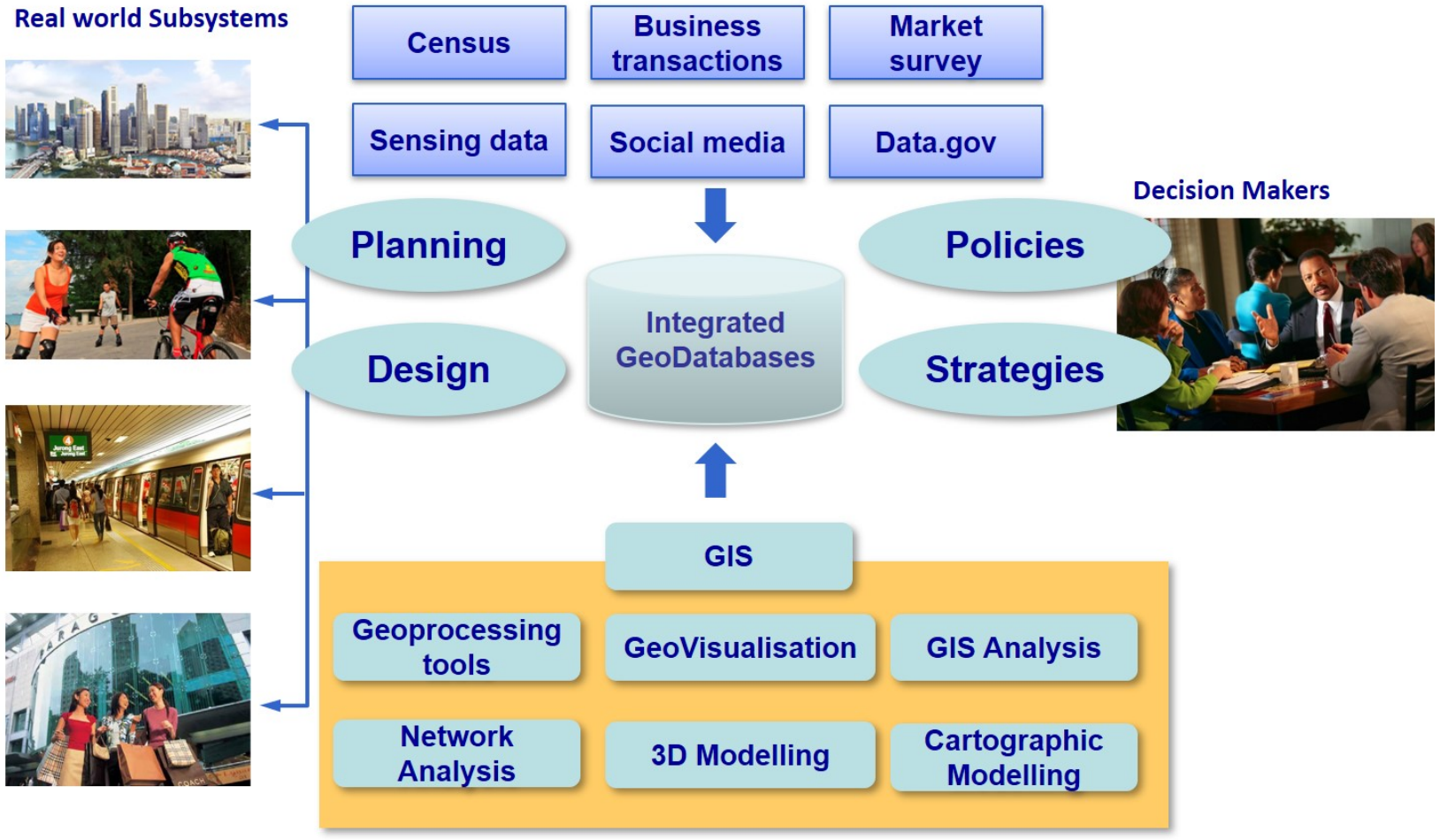
ArcGIS vs QGIS

Reference: 27 Differences Between ArcGIS and QGIS – The Most Epic GIS Software Battle in GIS History

GIS Users in Singapore

Building and Construction Authority

GIS Supported Urban Planning Framework



Social Consciousness

Using GIS to create a better world

'RAT RACE'

In conclusion, GIS support

Better informed decision making

Better communication with management

Better communication between departments

Better problem solving

More efficient use of resources

GIS = Get Intelligent Solutions