Training session
High-Quality Service in Urban Transport Systems
Transports à Haut Niveau de Service
高品质的城市交通系统

Public Transport & Geographic Information Standards

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MobiGIS

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Summary

1. Presentation of MobiGIS
2. Role of standards
3. Public transport standards
4. Geographic Information Systems
5. European experiences
6. Conclusion

MobiGIS presentation

MobiGIS is an IT engineering company promoting the use of Geographic Information Systems (**GIS**) technologies in public and private organisations

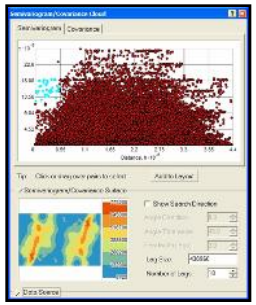
World-class consultants in various industries

- Environment
- Mobility and travel
- Transportation
- Logistics

MobiGIS's services

- **Business services for GIS projects**
  - Consultancy
  - Application development and deployment (desktop, mobile, server applications)

- **Innovation for sustainable development on transportation issues**
  - GIS Transportation solutions
    - Analysis, planning, multimodal routing
    - Standards and data models
  - Partnerships with world-class research centres

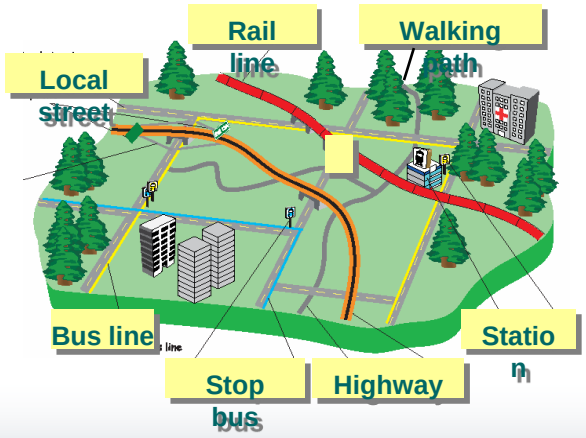


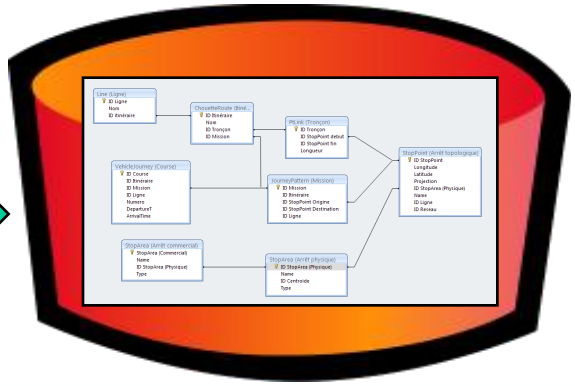
Summary

1. MobiGIS presentation
2. Role of standards
3. Public transport standards
4. Geographic Information Systems
5. European experiences
6. Conclusion

Role of standards

- **Standards are important to model the real world**
  - Define the semantic and exact definitions of concepts, objects, properties, etc.
  - Describe the relationships between data, message structures, data format, etc.



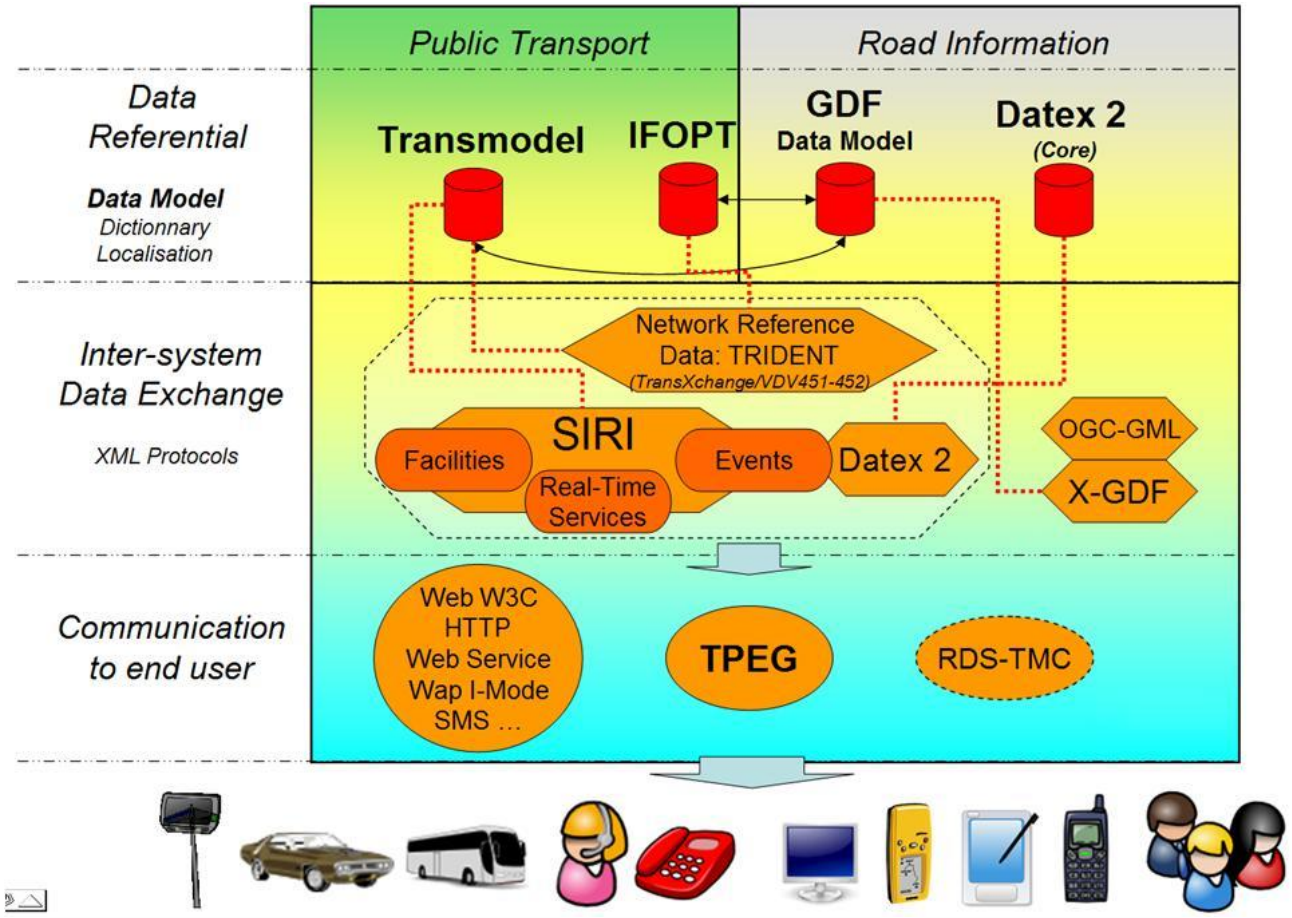


Role of standards

- **The world of transport gradually uses standards**
  - to ensure
    - the data supply of travel information services
    - the interoperability of systems
  - to minimize investments and save time
  - to break the too strong dependences with proprietary solutions

Role of standards

- **Standards are used at several levels**



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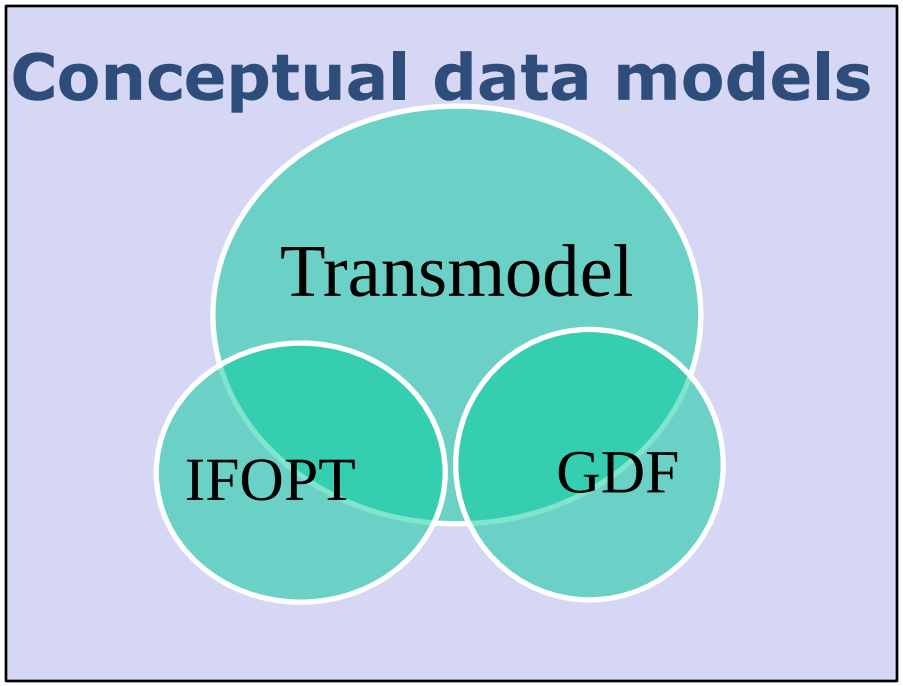
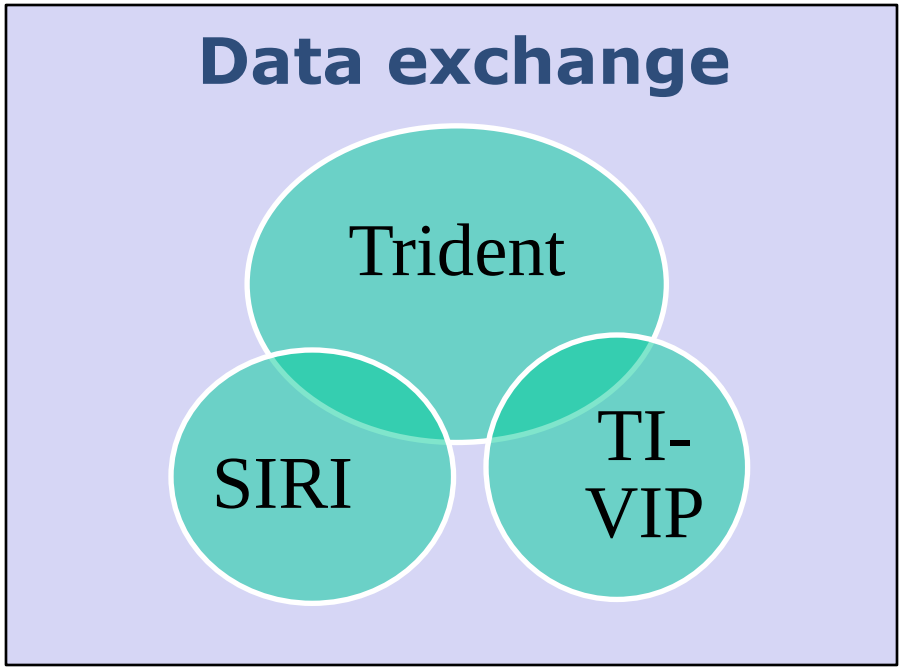
Public transport standards in development in Europe





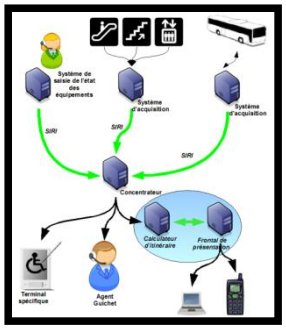
- **Developed at different levels**
  - ISO (International Organization for Standardization)
  - CEN (European Committee for Standardization)
  - National projects

Conceptual data model standards

- **TRANSMODEL v5.1 *(EN 12896)***
  - Reference data model for public transport operations
- **IFOPT v1.0d (CEN)**
  - Model for the main fixed objects related to public access to Public Transport
- **GDF v4 (ISO/TC204)**
  - Interchange file format for geographic files

Data exchange standards

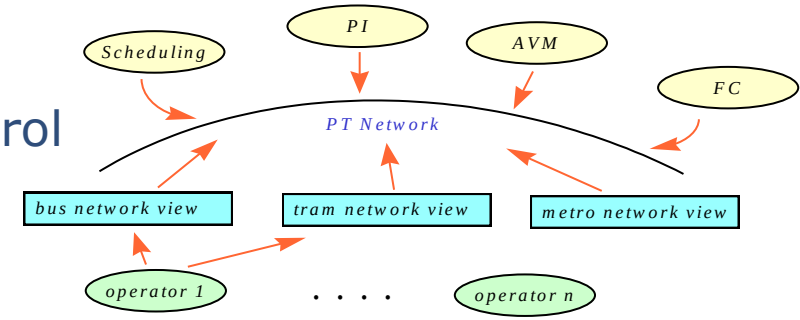
- **TRIDENT *(EU Project)***
  - TRansport Intermodality Data sharing and Exchange NeTwork
- **SIRI *(CEN/TS 15531)***
  - Standard Interface for Real time Information related to public transport operations



- **TI-VIP *(EU Project)***
  - Traveller Information for Visually Impaired Persons

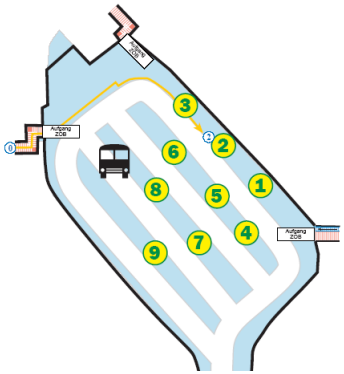
Conceptual data model

- **TRANSMODEL**
  - Reference data model for public transport operations
  - Covers the following domains :
    - Urban bus, trolleybus, tramway and light rail operators
    - Vehicle journey
    - Personnel disposition
    - Operations monitoring and control
    - Passenger Information
    - Fare, Collection
    - Management Information/Statistics.



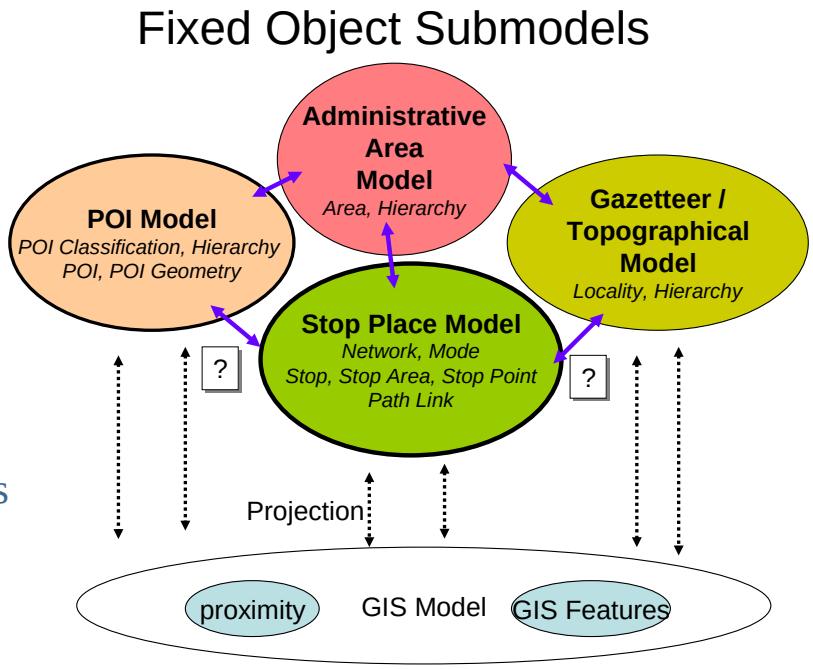
Conceptual data model

- **IFOPT**
  - Model for the main fixed objects related to public access to Public Transport
    - stop points, stations, entrances, etc.
  - Built on the TransModel Standard
  - Physical representation of stop places

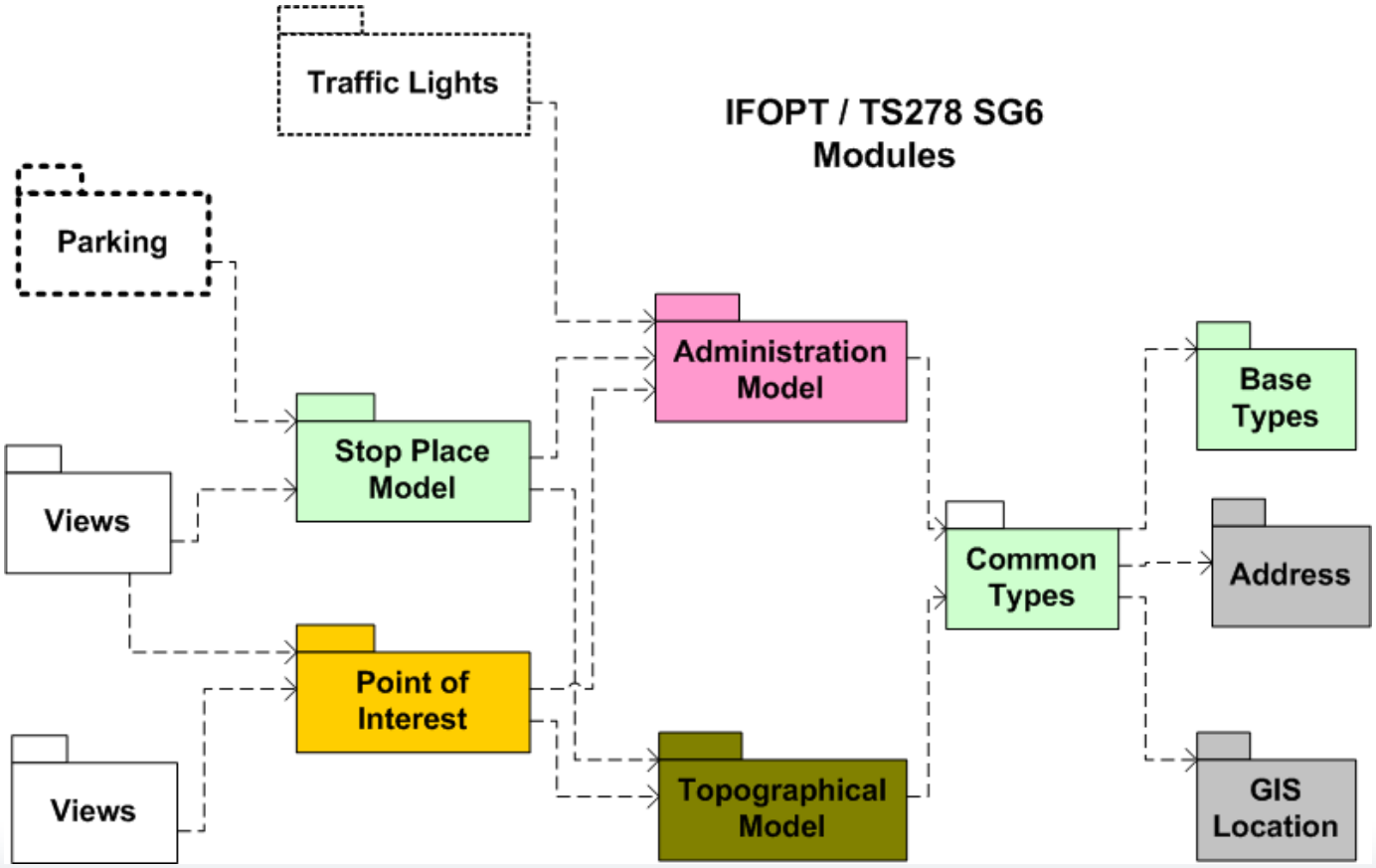


IFOPT: Covered entities

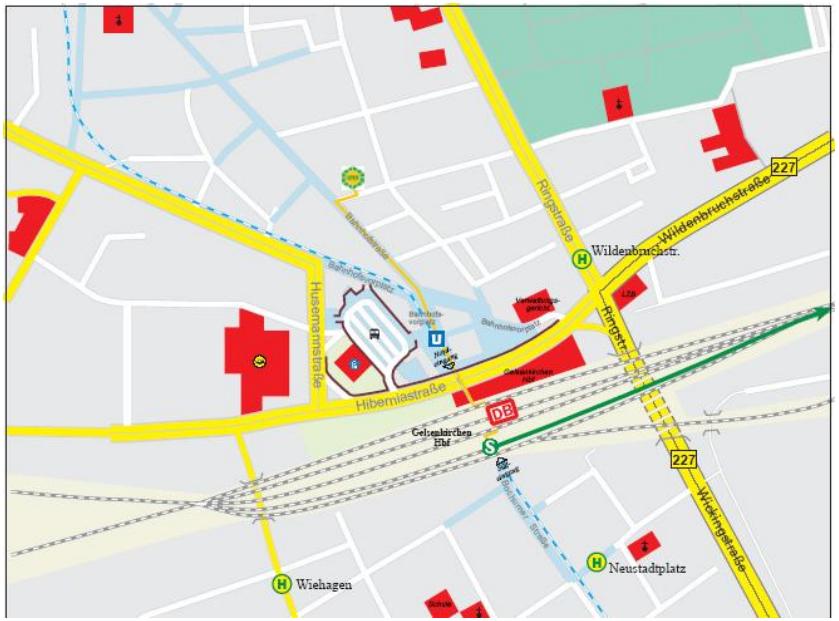
- **Stop Model:**
  - Rail Stations, Metro Stations, Bus and Coach Stations, On-street bus, etc. and their associated equipment.
- **Point of Interest Model**:
  - Well known locations to which both Tourists and Residents are likely to wish to Travel, such as Museums, Parks, etc.
- **Topographical model:**
  - Cities, Towns and other settlements to which people may wish to travel and whose relation to Stop Places and Points of Interest is relevant
- **Administrative Model:**
  - An organisational structure or Administrators, roles and Administrative Areas used to manage other data elements



IFOPT: Object relationships

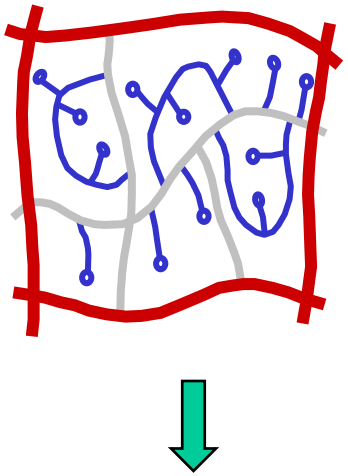


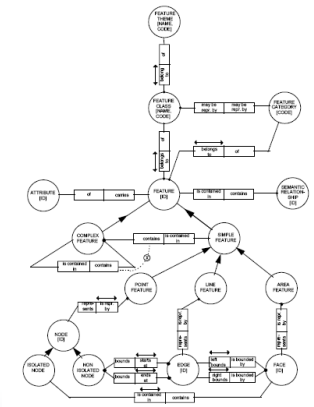
IFOPT: Examples of modelled stop places



Conceptual data model

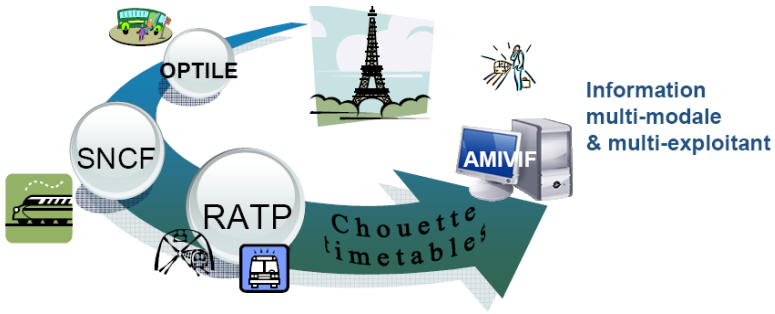
- **Geographic Data Files (GDF)**
  - Interchange file format for geographic files.
  - Used for the description, classification and encoding of road networks and road environment features
  - Recents improvements (X-GDF)
    - UML formalisation, improved logical, physical, and topological models, better visualisation
  - Planned works (Better integration with IFOPT)



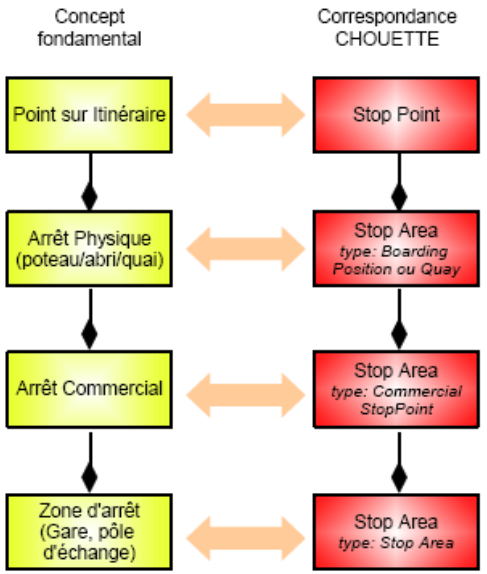


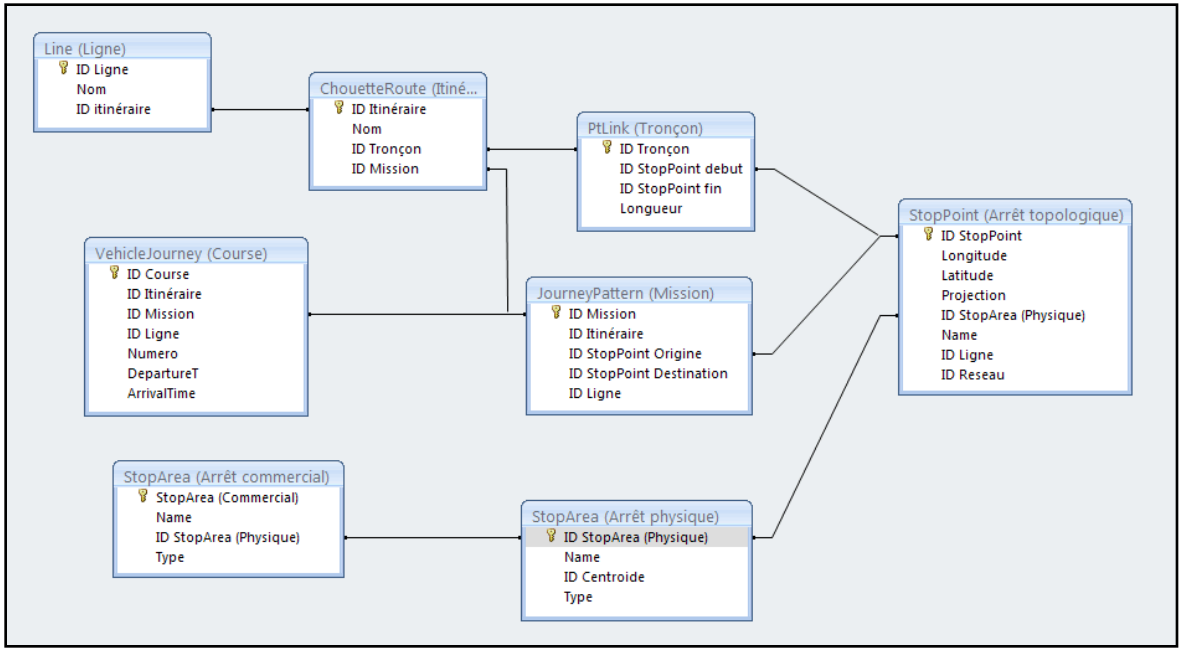
Data exchange

- **TRIDENT**
  - Defines mechanisms for TRansport Intermodality Data sharing and Exchange NeTwork
  - Based on Transmodel (conceptual data model)
  - Developped in the frame of European projects
  - A French implementation called CHOUETTE
  - Used
    - France: RATP, Toulouse
    - Transport Direct (GB)
    - Italy, Netherlands



TRIDENT: Overview of the object model



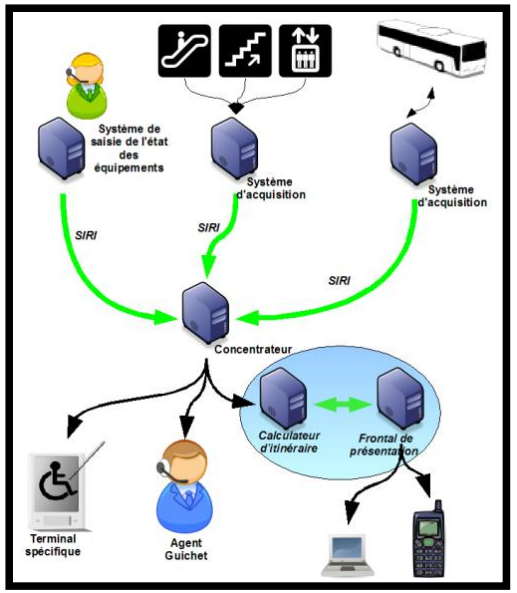


Software: Chouette

- **Chouette is a tool used to create and exchange public transport information (network description, timetables, etc.)**
  - Developed by the French Government
  - Used by city operators
  - Database structure based on Transmodel
  - Data exchange format: XML Trident

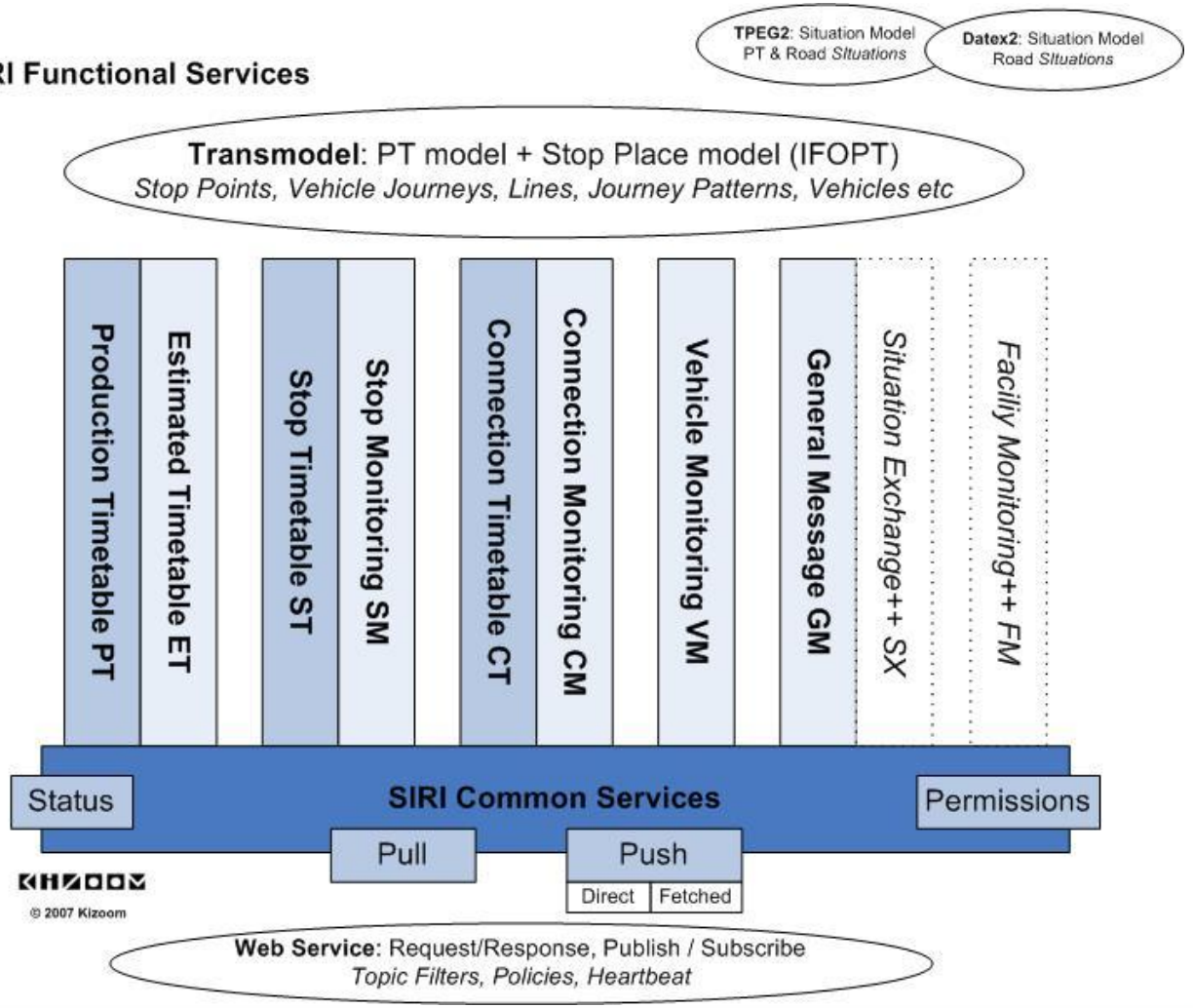
Data exchange

- **SIRI**
  - XML protocol to allow distributed computers to exchange real-time information about public transport services and vehicles
  - Technical specification
  - Complementary to Trident
  - Based on Transmodel (conceptual model)
  - Developped in the frame of CEN



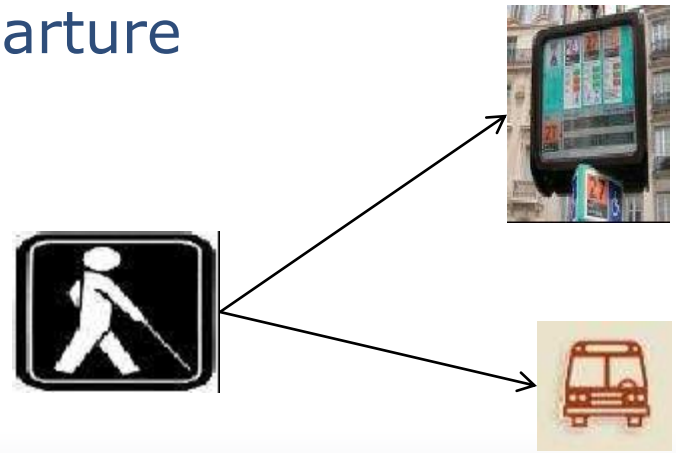
Data exchange

- **SIRI**



Data exchange

- **TI-VIP**
  - Traveller Information for Visually Impaired Persons
  - Assistance and guidance
    - Before the vehicle arrival
    - After the vehicle departure



Getting more information

- **TRANSMODEL**
  http://www.transmodel.org/en/cadre1.html
- **IFOPT**
  http://www.naptan.org.uk/ifopt/index.htm
- **GDF**
  http://www.ertico.com/en/links/links/gdf_-_geographic_data_files.htm
- **TRIDENT & CHOUETTE:** www.predim.org
- **SIRI**:

  http://www.kizoom.com/standards/siri/

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2. Role of standards
3. Public transport standards
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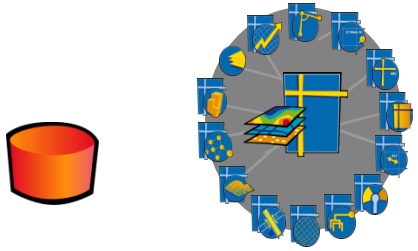
What is GIS?

- Enable to envision the geographic aspects of a body of data

- Store in a database a variety of data (i.e. road network, public transport network, real time data, images)

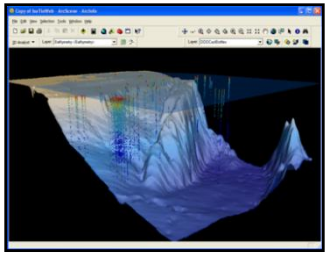


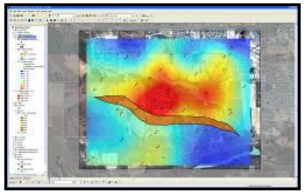
Geodatabase

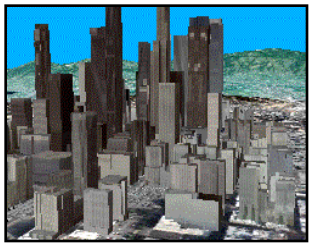
- Provide desktop, server, mobile, on-line solutions to perform GIS operations

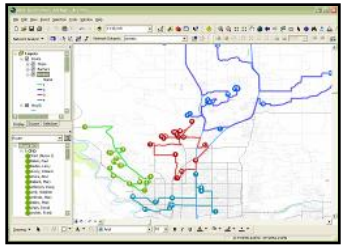
GIS in Transport

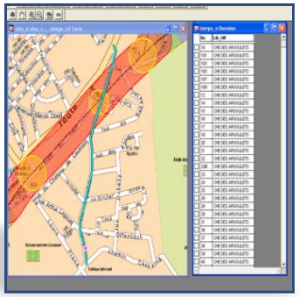
- **GIS are widely used to**
  - Model networks
  - Analyze geospatial data
  - Transport system planning
  - Visualize analysis results
  - Communicate
  - Broadcast information to end users





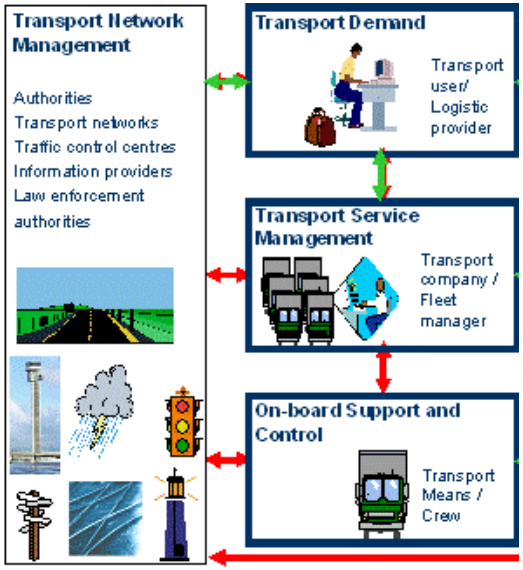






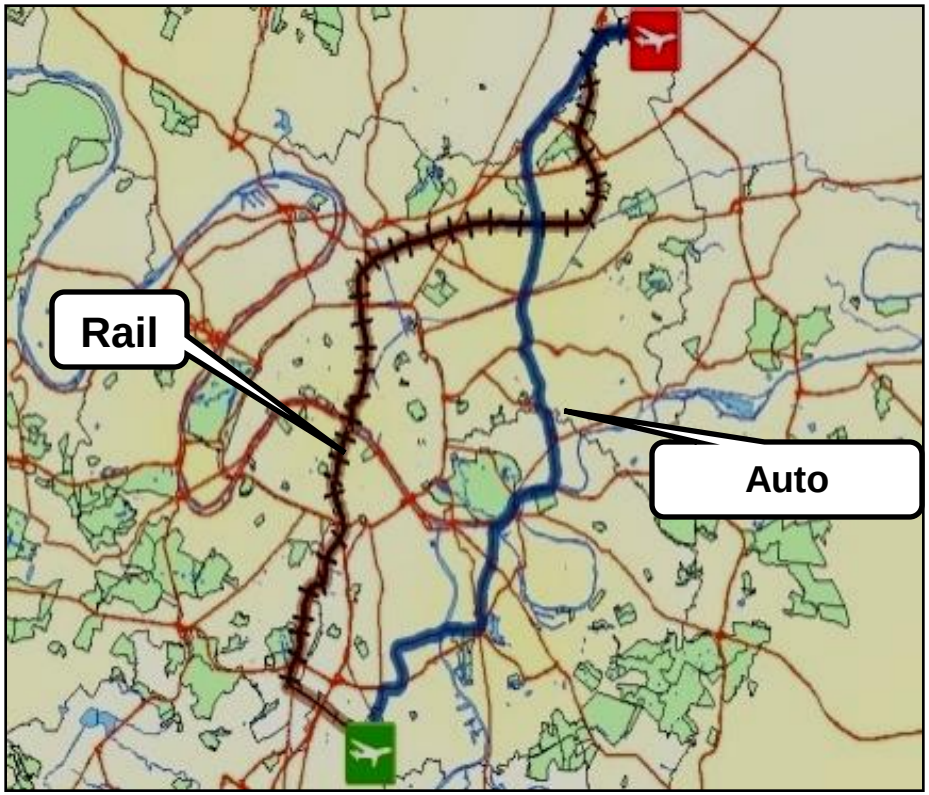
GIS in Transport

- **GIS are widely used by**
  - Transport authorities
  - Planning offices/department
  - Network operators
  - Consultants
  - Research centers
  - Businesses
  - End users



GIS uses: example 1

- **Multimodal route computation and visualisation**



GIS uses: example 2

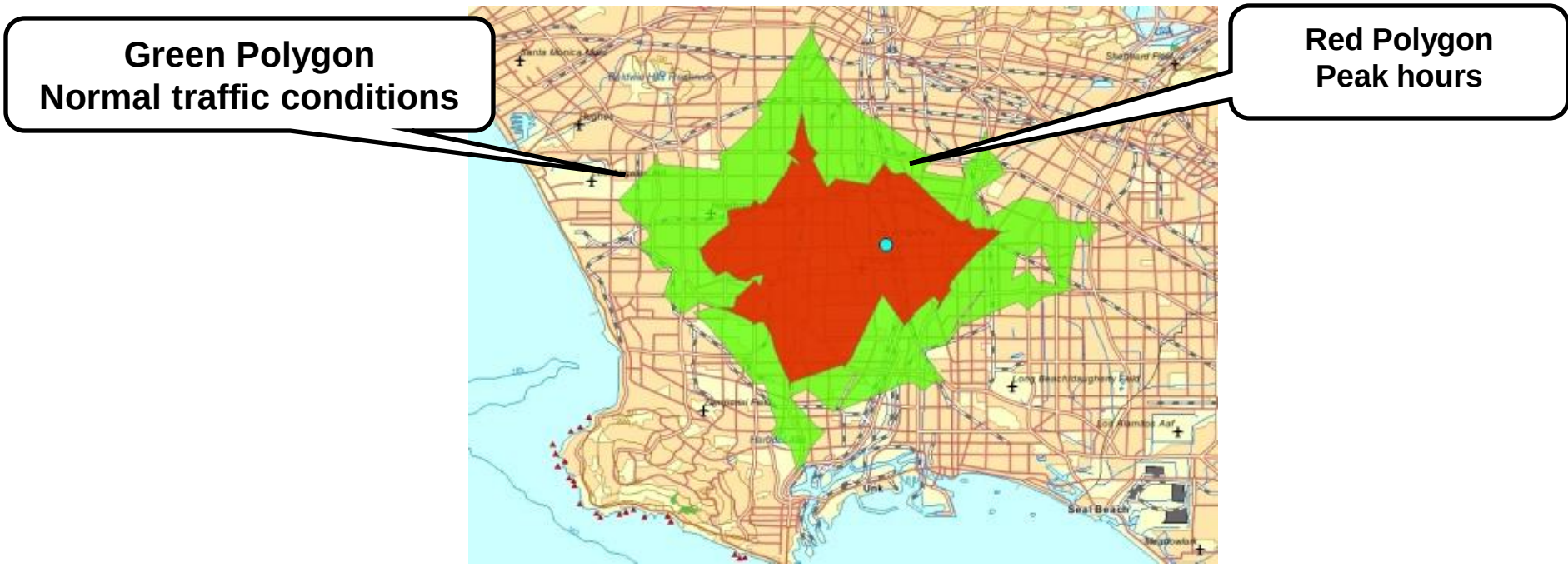
- **Network accessibility analysis from a location**

By car

Using the transportation system

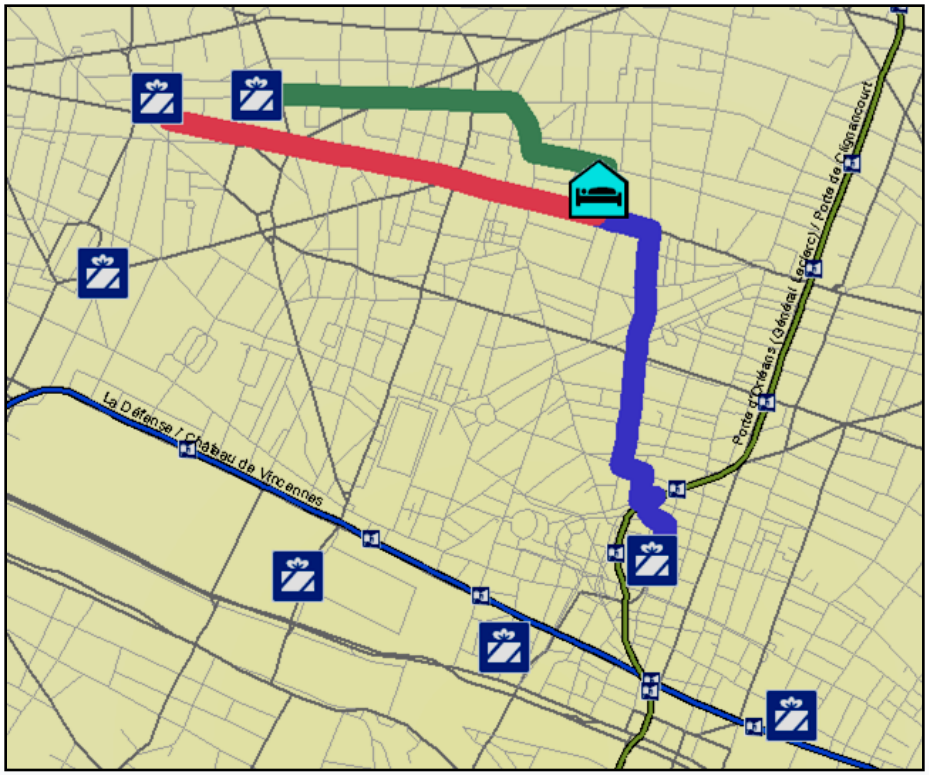
GIS uses: example 3

- **Drive time polygon computation downtown Los Angeles**



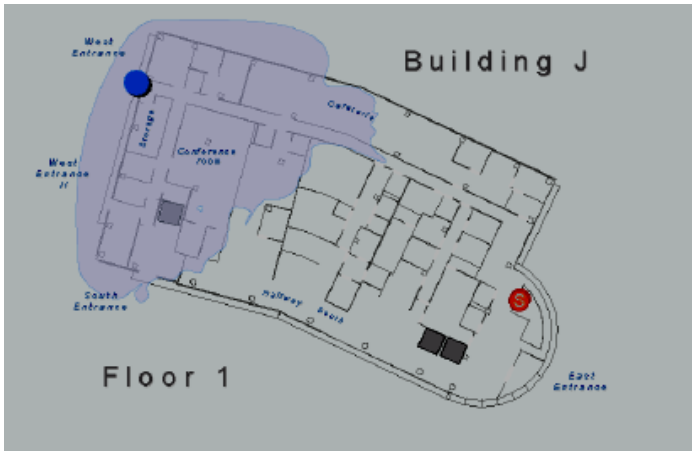
GIS uses: example 4

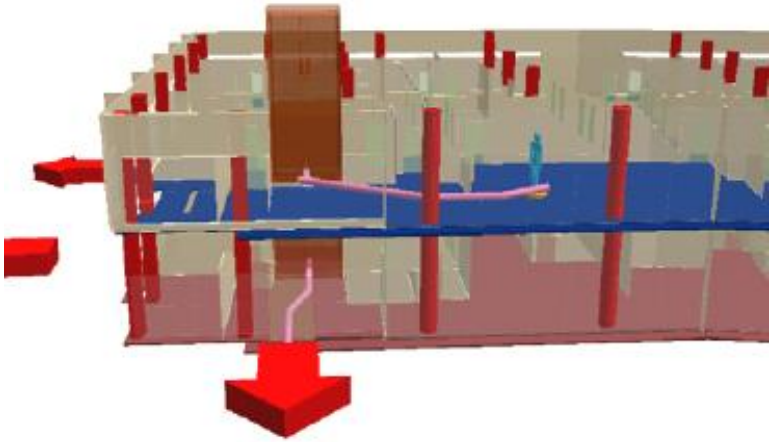
- **Find the nearest points of interest (i.e. stores) from a location (i.e. hotel)**



GIS uses: example 5

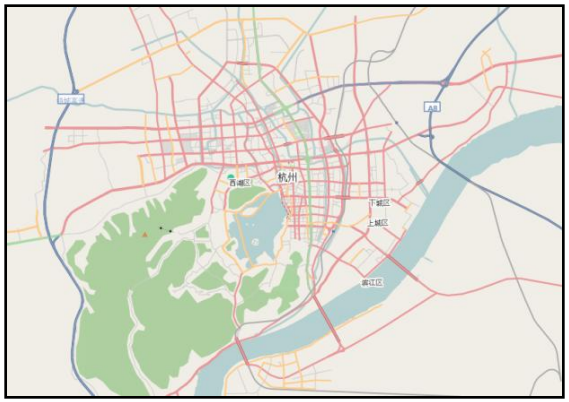
- User guidance in transportation hubs
- Evacuation planning using 2D and 3D views





GIS data for Transport

- **Road network data**
  - High quality data for mapping, transport planning, etc.
  - Various data sources
- **Public transport data**
  - Often proprietary data
- **Others data**
  - Points of Interest (POI)
  - Population data
  - Images (raster)
  - Etc.



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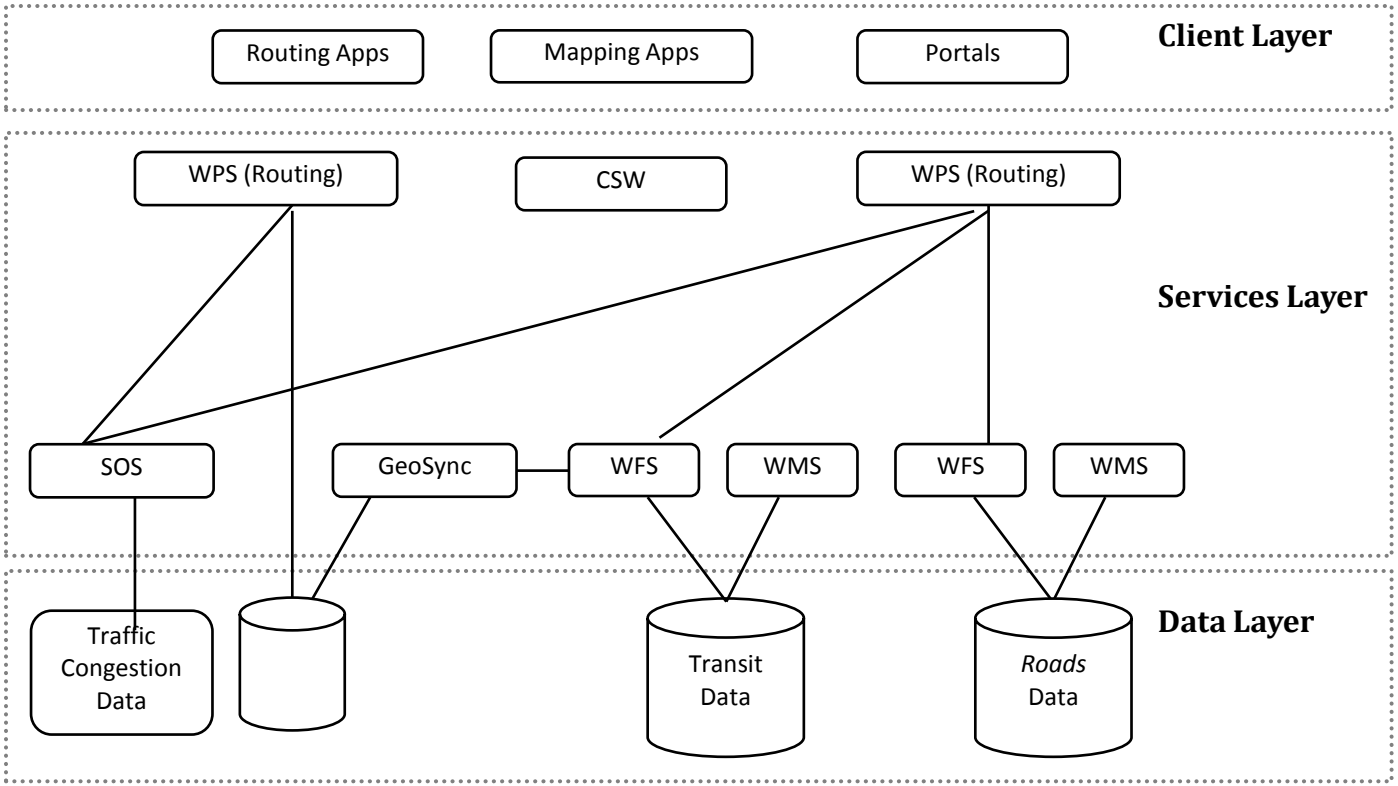
Open Geospatial Consortium Standards

- **Examples of approved standards**
  - Geographic data
    - Geography Markup Language (GML)
    - KML (Google)
  - Web services
    - CSW: Catalog Services for the Web
    - WPS: Web Processing Service
    - WFS: Web Feature Service
    - WMS: Web Mapping Service

OGC Standards



Legend

CSW: Catalog Services for the Web

GeoSync: Federated Geo-synchronization Service

SOS: Sensor Observation Service

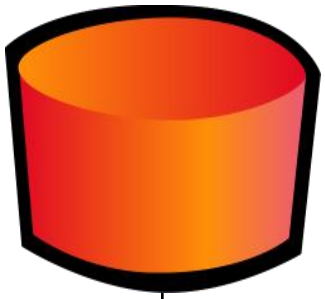
WPS: Web Processing Service

WFS: Web Feature Service

WMS: Web Mapping Service

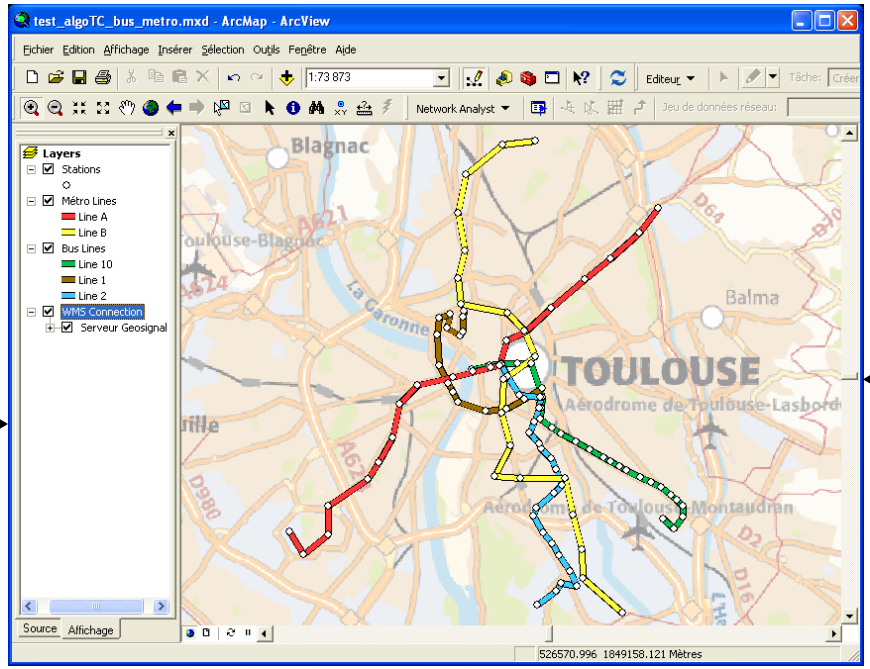
Transport and geographic data integration

Transport database



XML data
(Trident standard)

GIS software



Web Mapping Service

Base maps

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European experiences

- **France**
  - Regional
  - Urban

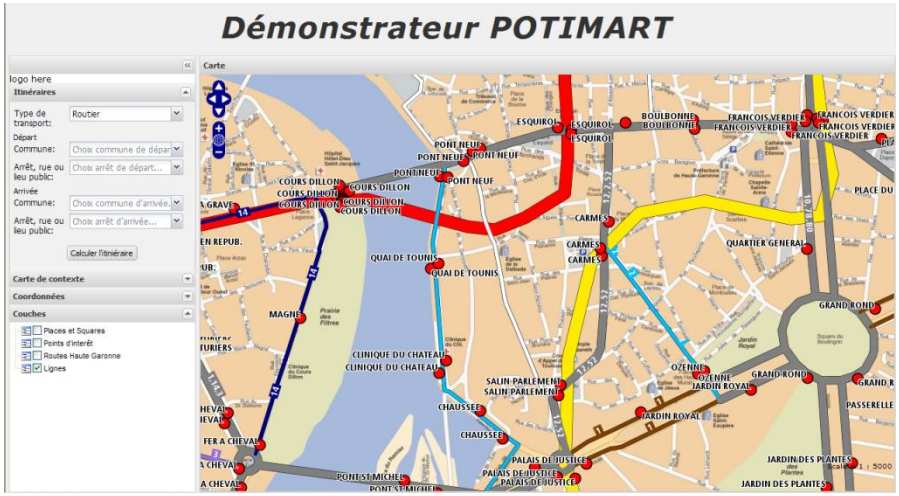
- **UK**
  - NAPTAN: National Public Transport Access Node database
  - Transport Direct : Free online route planner for public transport and car journeys

European experiences

- **POTIMART (www.potimart.org)**
  - Open Source GIS Transport Software for Multimodal Network Analysis
  - Supported by the French Ministry of Transport

Potimart

La plateforme SIG transport open source



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Conclusion

- **Standards and GIS are key components for transport operations**
- **Standards and GIS**
  - uses are spreading out
  - evolve to meet more user needs

Thank you & Questions ?

Contact

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www.mobigis.fr