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Detection, Integration And Correction Methods For Homologous Geographic Objects

IMUalpha 2013

Outline

- **UNIMAP Project**
 - General Information
 - Definitions
 - Problematic
- Current Methods for POIs Integration
 1. Practitioners Method
 2. Computer Science Method
 3. Collaborative Method
- Conclusion

UNIMAP Project - General Information

Project	Integration of Location-Based Services of Several Providers	
Financed By	LabEx Intelligences des Mondes Urbains (IMU)	
Duration	03/2013-02/2016	
Consortium	LIRIS - Database CNRS UMR 5205	Bilal BERJAWI Franck FAVETTA Fabien DUCHATEAU Maryvonne MIQUEL Robert LAURINI
	EVS - ISTHME CNRS UMR 5600	Thierry JOLIVEAU Elisabeth CHESNEAU Pierre-Olivier Mazagol
	Tourist offices of Rhône-Alpes	Rhône-Alpes Tourisme OnlyLyon Tourisme et Congrès Tourisme de Saint-Etienne Métropole
	Other partners	LIRIS – GRAMA Brescia University- Italy
Website	http://liris-unimap01.insa-lyon.fr	

UNIMAP Project - Definitions

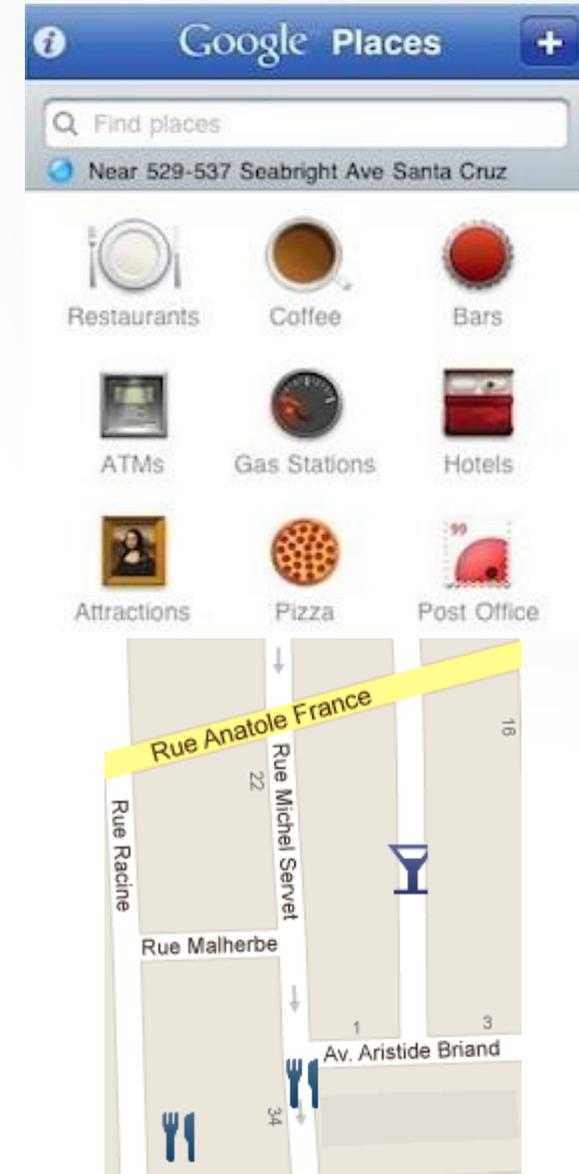
Point of Interest (POI):

is a specific point location that someone may find useful or interesting

Location-Based services (LBS):

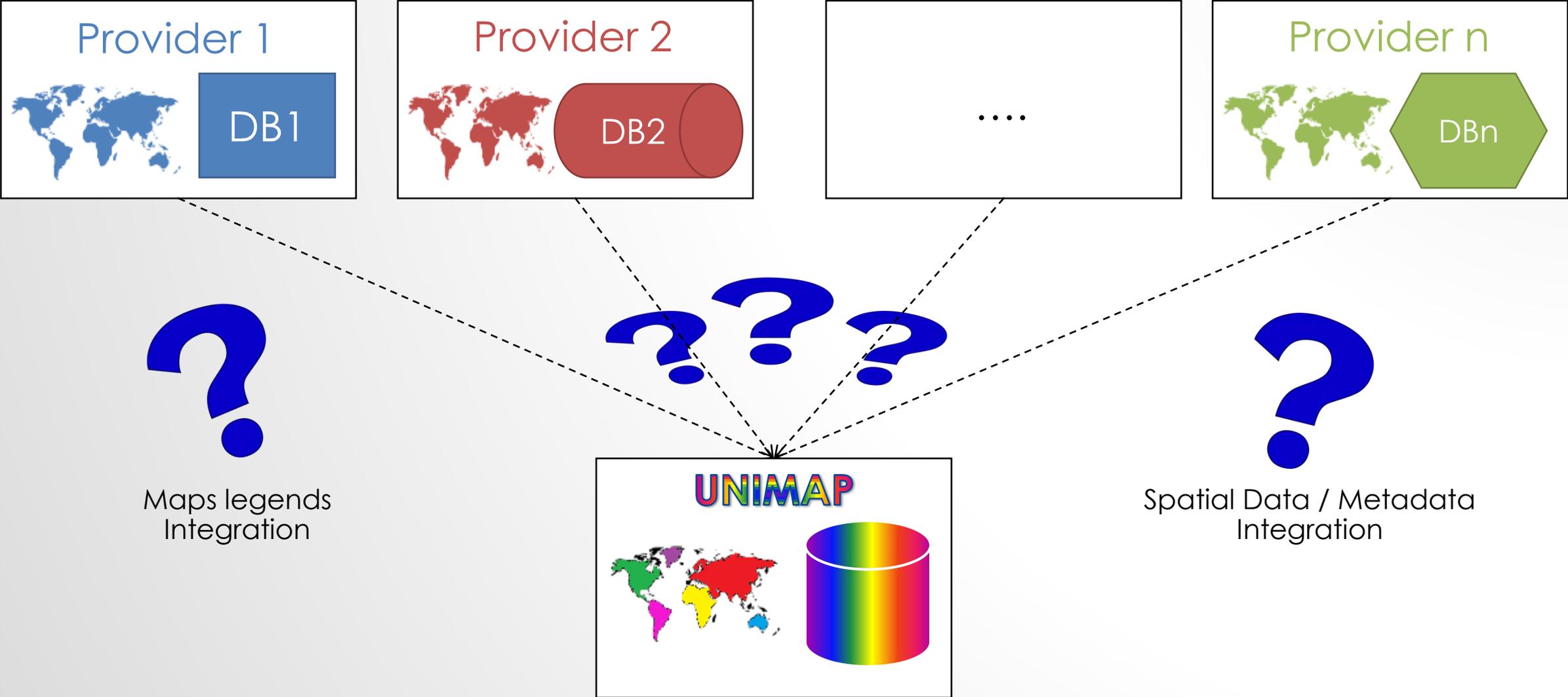
allow people to find nearby POIs based on their geographic location

Examples of LBS providers:



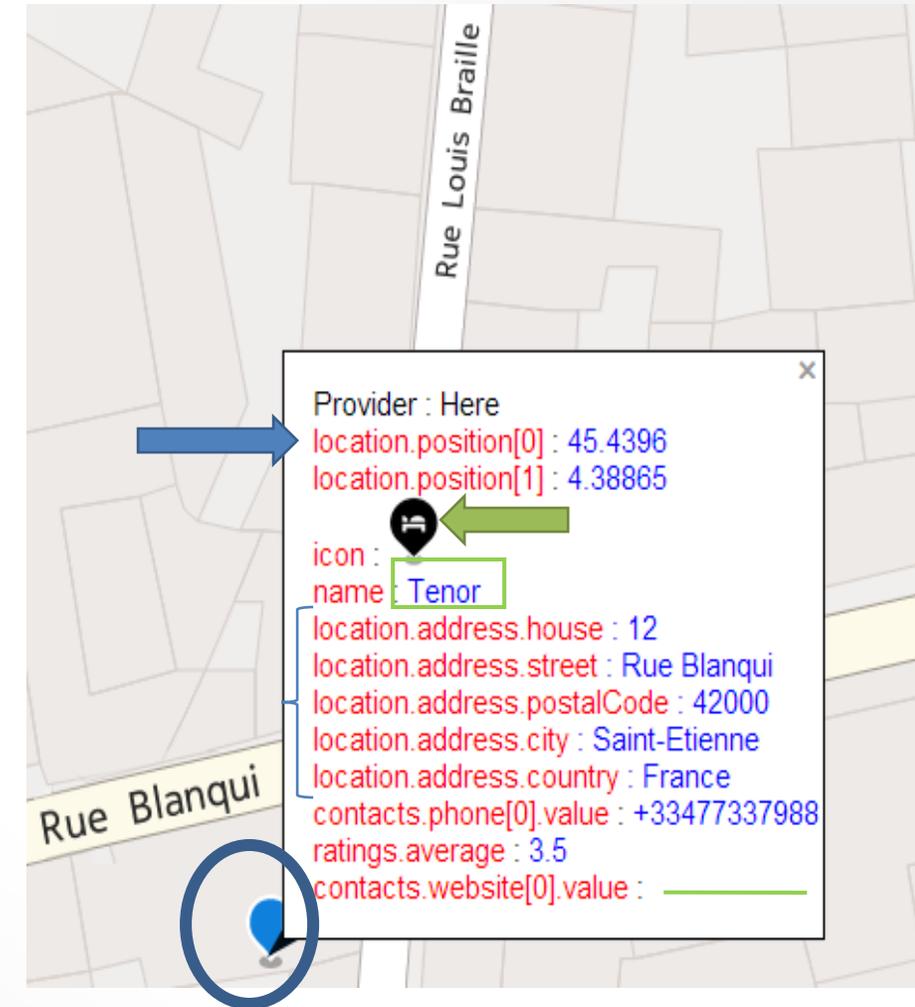
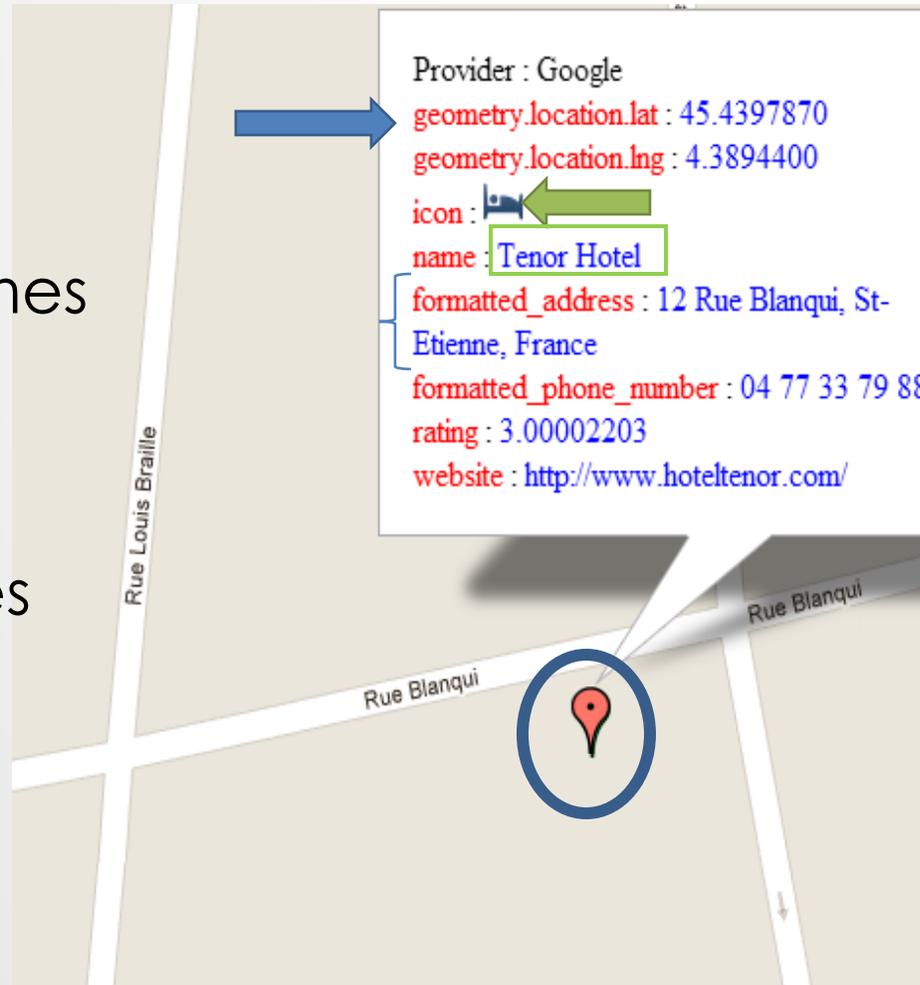
Reference: Roula Karam. Multi-Providers Location Based Services for Mobile-Tourism: a Use Case for Location and Cartographic Integrations on Mobile Devices PhD thesis. Liris-5272, INSA de Lyon, September 2011

UNIMAP Project - Problematic



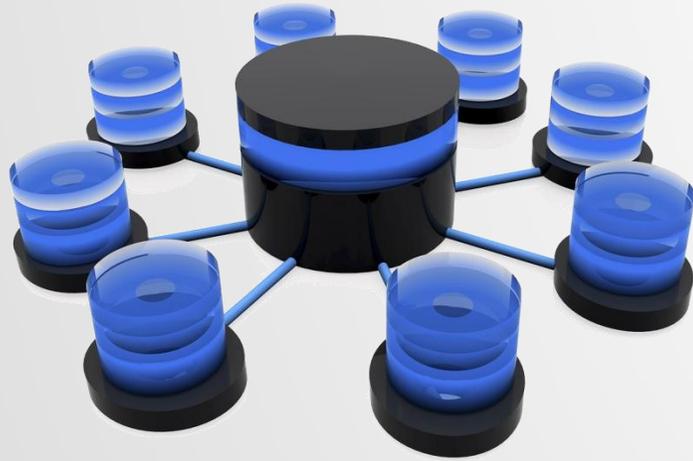
UNIMAP Project - Problematic - Motivation Example

- Positioning
- ➔ Attributes names
- { Structure
- ← Legends
- Different values
- Missing values



UNIMAP Project - Problematic - Multidisciplinary

Computer Science



Geographic Science



Humanities and Social Sciences



This presentation focus only on POIs integration part of project

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Current Methods for POIs Integration

Practitioners Method

1. Geographic experts visit places on the ground in order to check and validate POIs positioning and attributes



2. Memberships for POIs in tourist companies' databases



Current Methods for POIs Integration

Practitioners Method - Example

Strategy of SITRA database

Managing:

- Any touristic POI in Rhône-Alpes can apply for a membership
- Each tourist office manages POIs in its area

Using:

- Everyone benefits from SITRA database for personal uses (Web application, Desktop application, API)

Reference: <http://www.sitra-tourisme.com/>



Current Methods for POIs Integration

Practitioners Method - Analysis

Pros:

- Produces accurate data 
- Very efficient for a limited region 

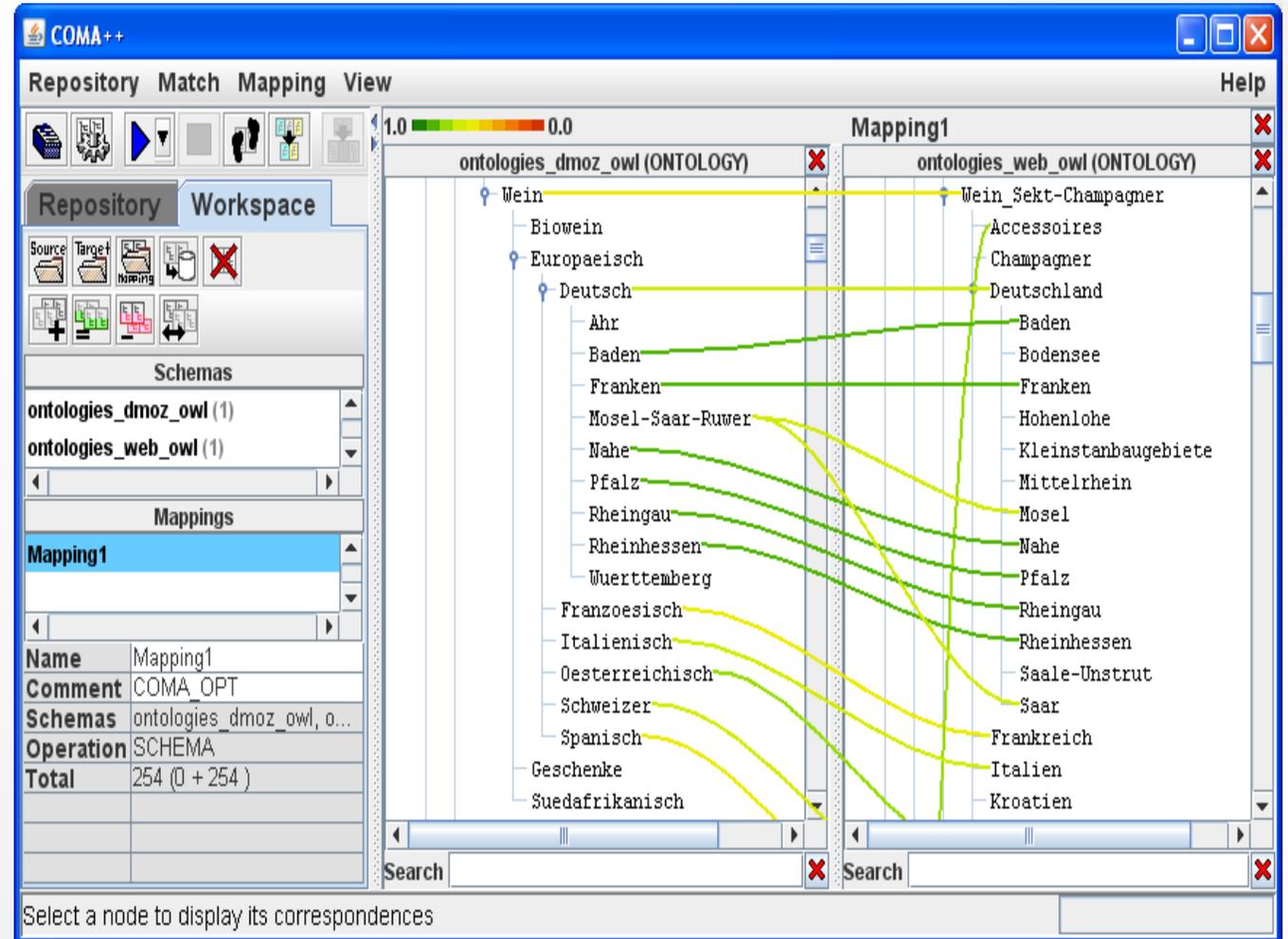
Cons:

- Hard to apply in a large area 
- Do not guarantee an efficient data updating process 
- Expensive method 

Current Methods for POIs Integration

Computer Science Method

Helps to detect homologous objects exist in different data sources in order to integrate/correct them



Current Methods for POIs Integration

Computer Science Method - Example

Schema matching and ontology matching:

- COMA++ combines various similarity measures to select the correspondences between the schemata
- Cupid uses machine learning techniques to discover these correspondences
- ...

Object matching:

- FEBRL is a common process to remove duplicates in databases
- ...

References:

- David Aumueller and Hong Hai Do and Sabine Massmann and Erhard Rahm. Schema and ontology matching with COMA++. In SIGMOD 2005.
- Jayant Madhavan and Philip A. Bernstein and Erhard Rahm. Generic Schema Matching with Cupid. In VLDB 2001.
- Hanna Köpcke, Erhard Rahm. Frameworks for entity matching: A comparison. In Data knowledge Engineering 2010.

Current Methods for POIs Integration

Computer Science Method - Analysis

Pros:

- Handles large scale data 
- Guarantee an frequent data updating process 
- Not expansive 

Cons:

- Mainly helps in detection of homologous objects 
- Not usable by non expert users (Tuning) 
- Not yet adapted for geographical homologous objects 

Current Methods for POIs Integration

Collaborative Method

1. Data are opened for everybody
2. Everyone can add/edit/delete POIs

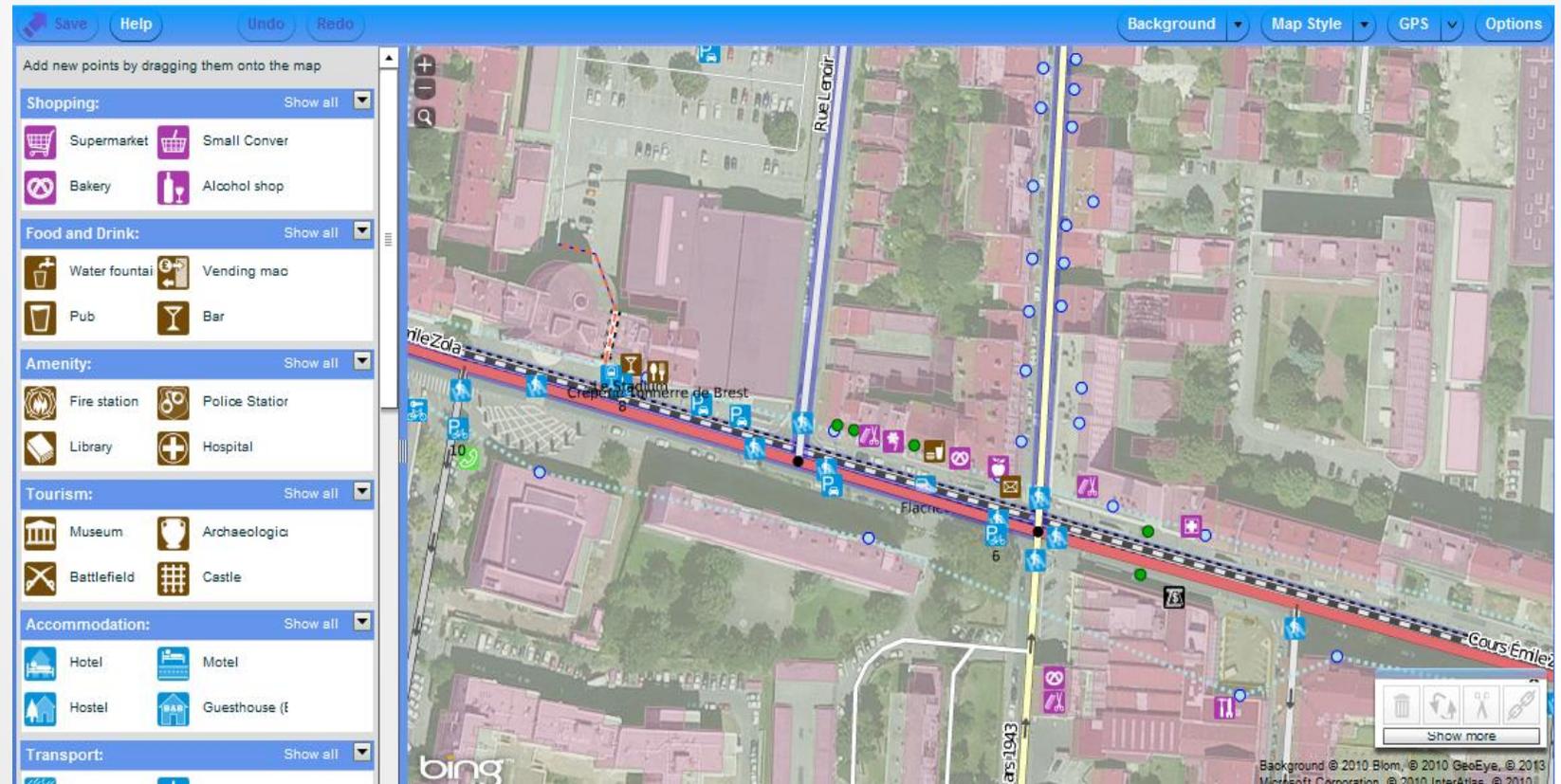


Current Methods for POIs Integration

Collaborative Method - Example

Potlatch 2 Editor for OpenStreetMap

Add/Edit/Delete POIs Using web application



Reference: <http://www.openstreetmap.org/>

Current Methods for POIs Integration

Collaborative Method - Analysis

Pros:

- Public Shared data 
- Not expensive 
- Data's size and repartition depend on users contributions (Urban area) 

Cons:

- Data's size depend on users contributions (Rural area) 
- Data inconsistency 

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Conclusion

- UNIMAP aims to offer LBS where data and concepts are combined from multi sources
- Issues with heterogeneity at data, schema and legend levels
- State of the art of detection and integration homologous geographic object
 - Practitioners, Computer Science and Collaborative methods
 - Combination method
- Perspectives
 - Use Computer Science method to detect POIs & invent new method to integrate them
 - Evaluation our work by the practitioners
 - Updating and correcting final result by Collaborative and Practitioners methods

Thank You For Attention

**Any Questions...
Just Ask!**

