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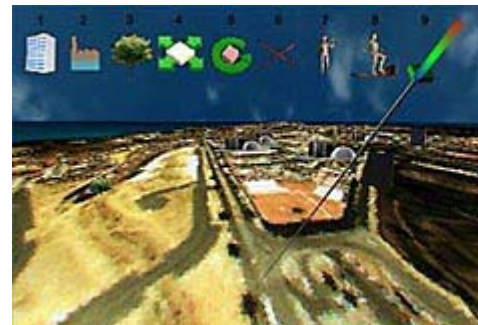
# Spatial Data Infrastructures and Collective Intelligence

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July 4th, 2007

## Dreams of the Past

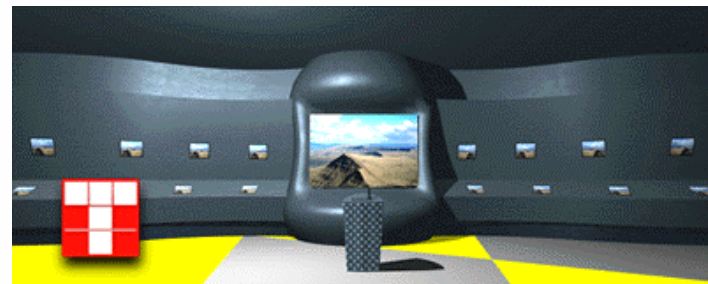
Research at Grupo de Análise de Sistemas Ambientais, New University of Lisbon, and Centro Nacional de Informação Geográfica, 1992-98

### Virtual Tejo



- 1 - Create building
- 2 - Create factory
- 3 - Create tree
- 4 - Translate object
- 5 - Rotate object
- 6 - Delete object
- 7 - Move / Stop toggle
- 8 - Fly / Walk toggle
- 9 - Virtual pointer

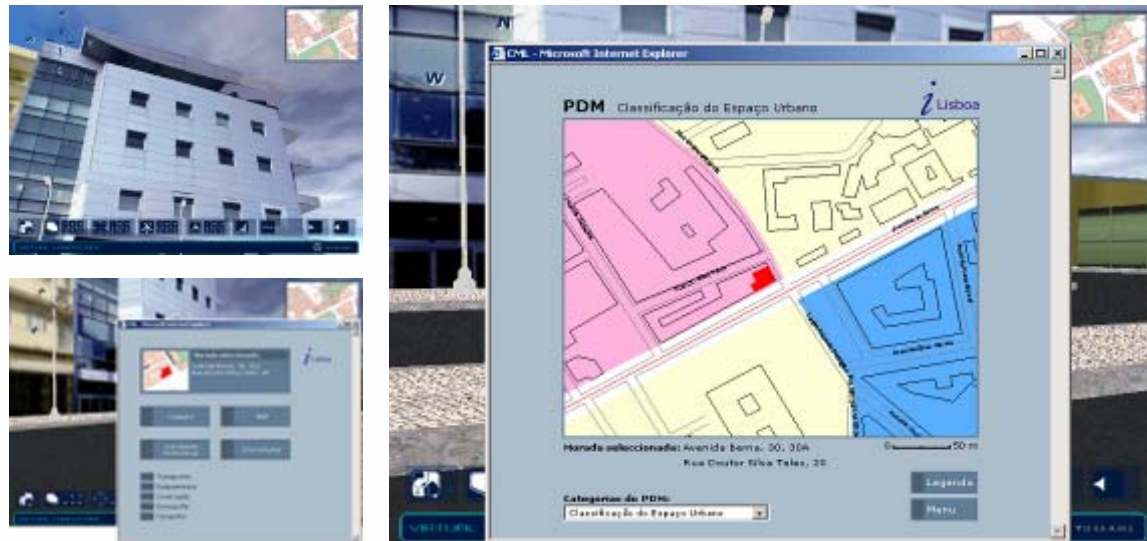
### Portugal Digital, Expo98



## Using Spatial Data Infrastructures Today

Applications in urban planning (Lisbon) and water resources management (INAG)

Access via SQL, Web services and Web parsing



## Using Spatial Data Infrastructures Today

Geo-filtering of contents to provide contextual information and services in real time to life facilitators (georeferencing Really Simple Syndication, <http://georss.org/>)

SapoHome and, in the future, maybe SapoCar



# Spatial Data Infrastructures of the Future

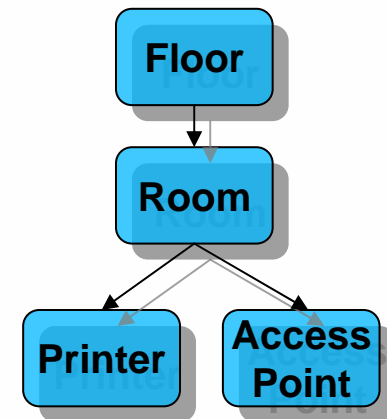
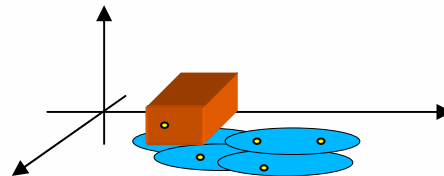
## Micro-Geography

Radio tagged world allowing for the ultimate geo-referencing

Micro and nano sensors

Multimedia spaces of 100 Megabit per second

Geometric and symbolic location models



\* From U. Leonhardt, 1998

[http://www.doc.ic.ac.uk/~ul/pdf/thesis\\_w\\_bookmarks.pdf](http://www.doc.ic.ac.uk/~ul/pdf/thesis_w_bookmarks.pdf)

# Spatial Data Infrastructures of the Future

## Location Models for Micro-Geography

### Probability

- Sensor data
- Imprecise geometric data
- Uncertain semantic data

### Time

- Hierachies change over time
- Physical environments change over time
- Tracking

### Semantic

- Ontologies to reduce uncertainty



\*adapted from Kris Kolodiej and José Danado, "In Building Position", GIM 04

# Spatial Data Infrastructures of the Future

## Micro-Geography Applications and Needs

### Location based services typology

Proximity and position- detection of objects

Fencing- detect areas where special movements occur

Navigation- instructions to go from an origin to a destination

Tracking- monitoring the movement of an object in space

### Indoor mapping

Built plans

Infrastructure (up to 10 cm error)

Map symbology is critical

### Interfaces

Mobile phones (up to 100x100 pixels)

Blackberry (250x120 pixels)

PDA's (240x320 pixels)



# Spatial Data Infrastructures of the Future

Invisible Computing Using Large  
Screens

## Adidas Eyeball

World Cup in Football  
2006. Present in  
Paris, Manchester, Barcelona,  
Milan, Munich, Cologne and  
Berlin

## Vodafone Cube

One of three most important  
design projects in Europe  
(Business Week, 2004)



# Spatial Data Infrastructures of the Future

Invisible Computing using Medium Sized Urban Screens

Interaction with MUIs using cameras

NOKIA Mupi installed in over 15 countries with JC Decaux

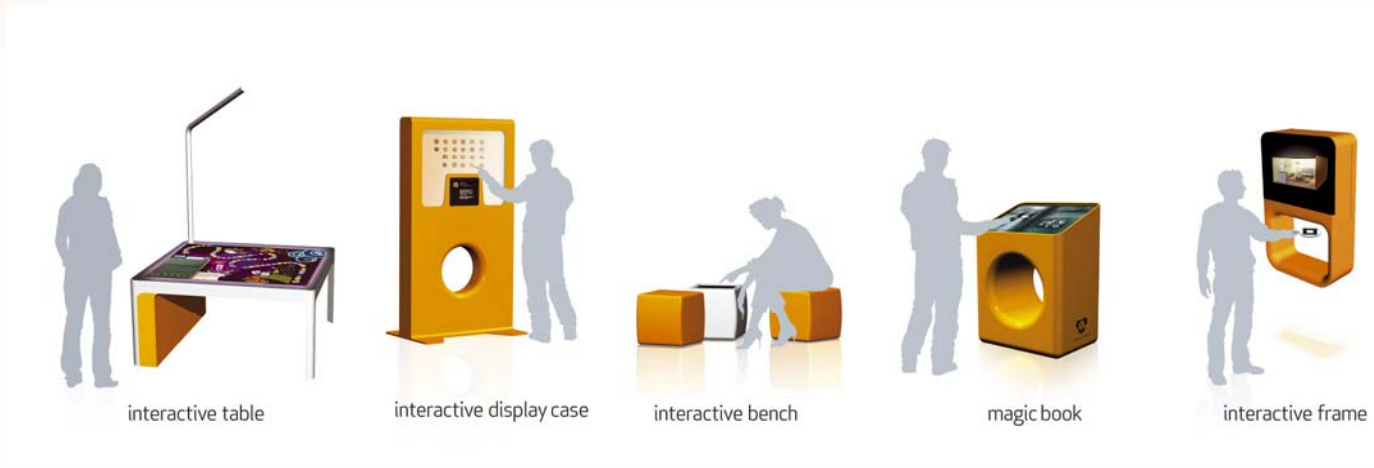
Gesture based interfaces

Shanghai Subway for Ford and other companies with JC Decaux



# Spatial Data Infrastructures of the Future

Invisible Computing Using Interactive Furniture Based Interfaces



# Collective Intelligence and GIS

## We Are Smarter Than Me Tradition in GIS

Open GIS Consortium (<http://www.opengeospatial.org/>)

Voluntary consensus organization

OGC standards

Open Source Geospatial Foundation (<http://www.osgeo.org/>)

Web mapping (i.e., MapServer)

Desktop applications (i.e., GRASS)

Geospatial libraries (i.e., GeoTools)

Metadata catalog (i.e., GeoNetwork Open Source)



# Collective Intelligence and Neo-Geography

## GIS versus Collective Neo-Geography

Where 2.0 O'Reilly Conference (<http://conferences.oreillynet.com/where2006/>)

## Google Earth (GE)

100 million people downloaded GE

Collective sites such as Google Maps Mania

(<http://googlemapsmania.blogspot.com/>)

Public participation tools

## Google maps mashup

Social networks

Events

Places

## User data

Intangible emotional associations to space

Grassroot street data collection

Symbolic locational data



# Collective Intelligence and Spatial Data Infrastructures

## Spatial Data Infrastructures

Open source GIS software

Open GIS standards

Neo-Geography tools and interfaces

User data complementing and defying institutional data

Predictive markets will be used to plan data collection

Spatial data infrastructures will feed professional and citizen oriented applications in XL, L, M and S screens



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