

METANET - Distributed Interactive Knowledge Network

Hannes Weingartner

META-D.O.N
Association for Cultural Substitution Services
Linz / Vienna

April 17, 2010

- 1 project
- 2 knowledge networks
- 3 semaspace
- 4 openstreetmap
- 5 realization

project introduction

- **METANET:** the technical aspect of a project of the **Meta-D.O.N Association:** investigation of sociocultural transformations in Serbia from scientific and artistic perspective - **New[B]Order** - <http://www.meta-don.org/newborder/>
- project on the topography of the centre-periphery-complex in post-socialist Eastern Europe using the example of Belgrade
- metastatic penetration of social spaces scientifically measured to create quantitative and qualitative indicators for social disintegration

project introduction

- e.g. indicators
 - privatization aspects of companies in Serbia - **Freedom Fighters Activists** (<http://www.freedomfight.net/cms/>)
 - subversive signs of the periphery
 - turbo folk politics
- capture indicators cartographically with a link to a visual semantic database
- concept of an interactive geospatial **knowledge network**
- web application based on **free- and open source software components**

project partners

- CK13, Novi Sad (SRB)
- Freedom Fight Activists (SRB)
- Kuda.org - New Media Center, Novi Sad (SRB)
- Museum Of Contemporary Art, Belgrade (SRB)
- Institute for Social- and Welfare Policy, JKU Linz (AT)
- Institute for Comprehensive Analysis of Economy, JKU Linz (AT)
- Editorial Collaboration: Radio FRO – Freies Radio Oberösterreich (AT)

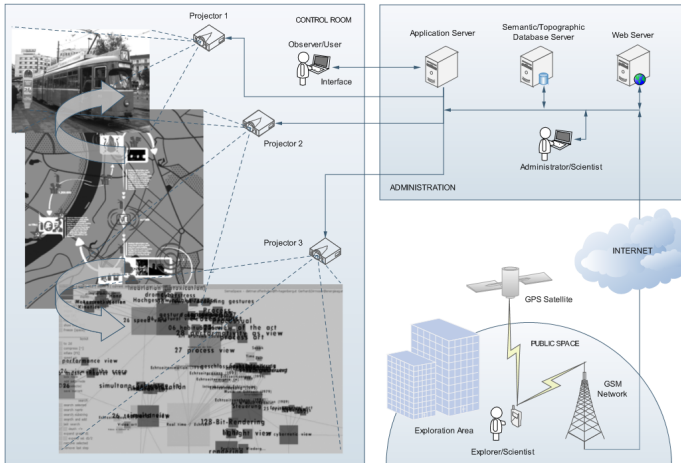
project goal

- providing a tool for individuals and communities to get **connected to complex relationships of scientific measurement** with cartographical aspects
- receiving a better **overall view of knowledge related to public areas** which can be meaningful for exploring topics of interests by the user
- **flexibility in usage:** generic tool for scientific research projects
- **administration:** intuitive CMS interface for researchers
- smart algorithms for finding similarities/references between artifacts
- **usability:** advanced hardware and software interfaces to the user (e.g for exhibitions)

project domains

- project consists of three **technical domains**
- **metablog - artifacts input:**
 - text, sound, images, an mm data through web-based CMS
 - mobile devices for geo-tagged content input
- **metamap:** 2D map for customized geographical representation of artifacts and transformation processes between them
- **metaspace:** 2D/3D semantic graph/subgraph associated with map artifacts for mapping the degree of connectivity between them

project domains



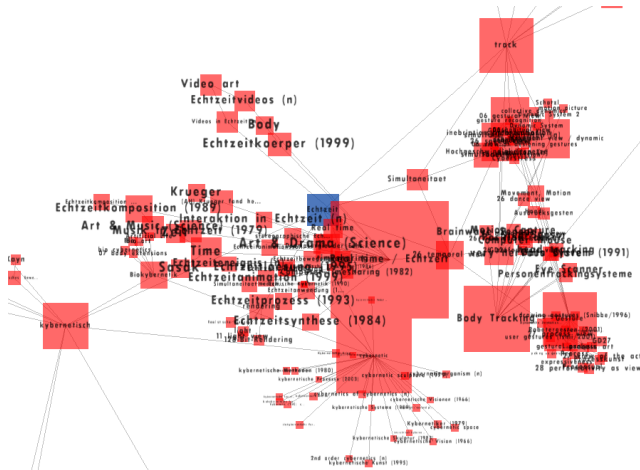
project challenges

- **metaspace hardware HCI** design and implementation for a seamless exploration of data in the semantic space - extension to keyboard and mouse
- **customization of map** design and implementation of interactive icons and transformations - extendable map APIs
- **intuitive administration** and performative web CMS interface for knowledge workers - ajax based server interaction
- **data consistency** between metamap and metaspace - network interface and structured graph datasets for synchronization
- **complex algorithms** for dependency calculation based on meta data and severity - generating an ontology of data

project technologies

- **main aspect:** utilization of proved open-source/free tools for adapting them to our needs
- **dependencies on tools:**
 - **Semaspace** (<http://residence.aec.at/didi/FLweb/>)
 - **OpenStreetMap** aka OSM (<http://www.openstreetmap.org/>)
 - **Google Web Toolkit 2.0** aka GWT (<http://code.google.com/webtoolkit/>)
- **language:**
 - Java
 - Java Script

knowledge networks theory



knowledge networks theory

- **what are knowledge networks?**

- **network of people** with a high interest in learning, investigating, developing and improving the knowledge subject matter and share common work goals
- **enlarges the collective knowledge** of individuals (tacit knowledge)
- **community of practice (COP):** model for a learning process of self organized individuals connected within social communities sharing same interests (Jean Lave)
- activities of COP members usually bring **hidden and locked knowledge to light** that resides in our heads
- COP will enable members to leverage the knowledge that exists in a knowledge network more quickly

(<http://www.ewenger.com/theory/>)

knowledge networks theory

- **community of interest (COI):** knowledge network which is 'looser' than COP - larger in membership - can significantly **assist the knowledge worker** in trying to obtain answers to knowledge needs
- **knowledge representation and visual interfaces**
(<http://media.lbg.ac.at>)
 - **semantic networks** become readable if their structures are described through an ontology
 - **ontologies** are abstract knowledge models for describing used concepts and their possible relationships
 - interactive tools realize the generation of **smooth image of information** to take ambiguity and complexity into account

semaspace outline

- **fast OpenGL accelerated graph editor and browser** for large knowledge networks with more than 10000 text-fields
- developed by **Dietmar Offenhuber and Gerhard Dirmoser** - Ludwig Boltzmann Institute for Media Art Research
- **interactive graph layout** in 2D and 3D
- 'semaspace fills the gap between complex tools for network analysis and simple graph editors or mind-mapping tools' (Dirmoser)
- Gerhard Dirmoser creates complex large-scale wall diagrams on topics like **25 years of ARS Electronica** (2003)

semaspace outline

- possible to manually **define the nodes' overall shape** of the network by placing and subsequently locking the position of individual nodes
- **nodes** can incorporate data such as images, sound and text (added while navigating the graph)
- GUI for **web clients** and **exhibitions**
- **Java SWT** desktop application
- embedding into web clients with **virtools webplayer**

semaspace dependencies

- **JOGL:** open source Java binding to OpenGL API from Sun (for hardware supported 3D graphics)
- **JFTGL:** java based lib for accessing TT fonts within OpenGL
- **Apache Batik SVG toolkit:** open source Java based toolkit for using images in the SVG format (XML based)
- **semaspace demo**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - **browsing (zoom, rotation)**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - browsing (zoom, rotation)
 - **2D/3D**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - browsing (zoom, rotation)
 - 2D/3D
 - **fog**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - browsing (zoom, rotation)
 - 2D/3D
 - fog
 - **freeze**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - browsing (zoom, rotation)
 - 2D/3D
 - fog
 - freeze
 - **node distance**

semaspace extensions

- **video nodes**
- **remote graph access and manipulation** through network connection and tagged datasets
- research and implementation of **extending hardware interfaces** for...
 - browsing (zoom, rotation)
 - 2D/3D
 - fog
 - freeze
 - node distance
 - **collapsing**

OSM outline

- **OSM: open source map solution** for web clients
- everyone can extend the map
- collecting GPS coordinates
- like wikipedia for maps
- **no legal or technical restrictions** on their use - full creativity
- other implementations do not allow highly customized overlays

OSM creating data

- **creating OSM data** with OSM map editors:
 - Java OSM (JOSM) - desktop app
 - Potlatch - flash
 - Merkaartor - for UNIX, WIN, MAC
- **adding tags** (node, linear, area) for OSM data to be rendered and uploaded
- **slippy map**: OSM default web interface for browsing rendered OSM data

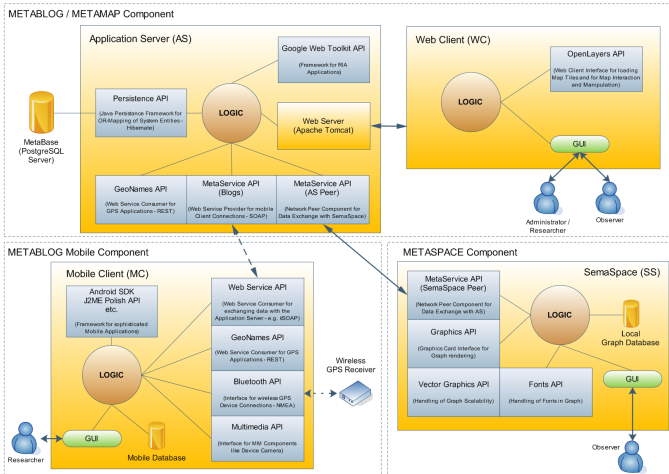
OSM rendering

- **generating rendered graphics** by using tools:
 - **kosmos**: lightweight OSM map rendering platform for WIN
 - **osmarender**: rendering platform for generating SVG image for OSM data based on XSLT
 - **mapnik**: opensource toolkit in C++ and Python, all OS platforms
 - default for OSM - mapnik renders 256 x 256 px tiles served from the OSM tile server
 - XML file holds rendering props like color, widths of lines, etc.
 - rendered tiles are referenced by URLs through JS from web client
 - raw OSM data can be downloaded for setting up an own tile server (e.g. planet.osm)
 - uses PostgreSQL / PostGIS as spatial database (osm2pgsql converter)

OSM embedding

- **integration in web page** like Google, Yahoo maps by using JS libs for customizing the map and interface
 - **OpenLayers:** feature-rich, open source, most popular for OSM maps, BSD lic. (www.openlayers.org)
 - dynamic map for the web page
 - displays tiles and markers from any source
 - separation between tools and data
 - projects of Open Source Geospatial Foundation (OSGeo)
 - **Mapstraction:** JS lib wrapper for multiple implementations (e.g. OL, Google, etc.)
- several project on google code with topic OSM on android
- integration of OL in GWT through open source project **GWT-OpenLayers**
(<http://sourceforge.net/projects/gwt-openlayers/>)

realization architecture



architecture interface

realization interface

Map Semaspace Refresh Logout

Indicators

Actions

- Add
- Remove
- Edit
- Search

Symbols

Researchers

Reporting

Settings

Parameters

ID 0003
Keys 105
Docs 2
Videos 0
Audios 1
Created 01.09.2009 07:06
Creator Don 1

Location Details

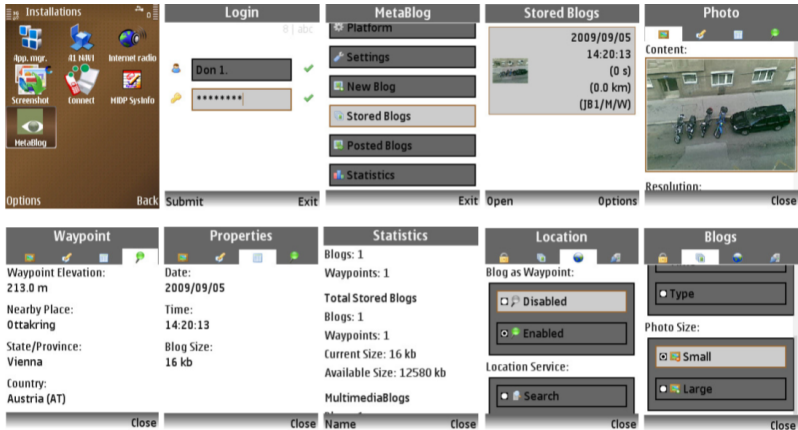
Country Serbia
City Belgrade
District Rakovica
Latitude 44°49'14"
Longitude 20°27'44"
Altitude 116,75 m
...

ID	Name	ICO	Researcher	Last Update	Category	Relatives	Location
0001	Indicator 01		Don 1	05.09.2009 20:56	Category 01	0	Belgrade
0002	Indicator 02		Don 2	05.09.2009 20:58	Category 02	1	Belgrade
0003	Indicator 03		Don 2	05.09.2009 21:06	Category 03	12	Belgrade
0004	Indicator 04		Don 1	05.09.2009 22:50	Category 01	23	Belgrade
0005	Indicator 05		Don 3	05.09.2009 22:58	Category 08	56	Belgrade
0006	Indicator 06		Don 1	05.09.2009 23:01	Category 12	0	Belgrade
0007	Indicator 07		Don 1	06.09.2009 00:09	Category 02	34	Belgrade

1566 Indicators found. Row 1-7 of 350

You are logged in as Administrator.

realization interface



Summary

• METANET - Distributed Interactive Knowledge Network

- a project of **Meta-D.O.N**: sociocultural transformations in Serbia
- tool for individuals and communities to get a **smooth image of social spaces** for taking ambiguity and complexity into account
- utilization of proved open-source/free tools for adapting them to our needs (semaspace, OSM, GWT)
- reference project: **A geographic knowledge representation system for multimedia geospatial retrieval and analysis** (<http://www.springerlink.com/content/qkh8hyecby6glww5/>)

Thank You.

For more information

<http://www.meta-don.org/newborder>
office@meta-don.org