



Research Group
Cartography

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Association Cartographique Internationale



Modern Cartography

Georg Gartner
Barcelona 2013

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Cartography? Is that still around?



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Cartography?

maps are **perfect interfaces** between
geoinformation and human users

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Cartography?



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Cartography?

maps are **perfect interfaces** between
geoinformation and human users

maps are efficient **systems to structure** and order
information by spatial component

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Cartography?

cartography is about **efficient communication** of spatial information

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Cartography?

efficient communication of spatial information

to

answer space-related questions

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Cartography?

efficient communication of spatial information

to

answer space-related questions

support spatial behaviour

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Cartography?

efficient communication of spatial information
to

answer space-related questions

support spatial behaviour

enable spatial problem solving

(reasoning, planning)

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Cartography?

efficient communication of spatial information
to

answer space-related questions

support spatial behaviour

enable spatial problem solving

support spatial awareness

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Cartography?

efficient communication of spatial information
to

answer space-related questions

support spatial behaviour

enable spatial problem solving

support spatial awareness

by

creation and use of maps anytime, anywhere



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Modern Cartography?

creation and use of maps anytime, anywhere

→ real-time

→ ubiquitous

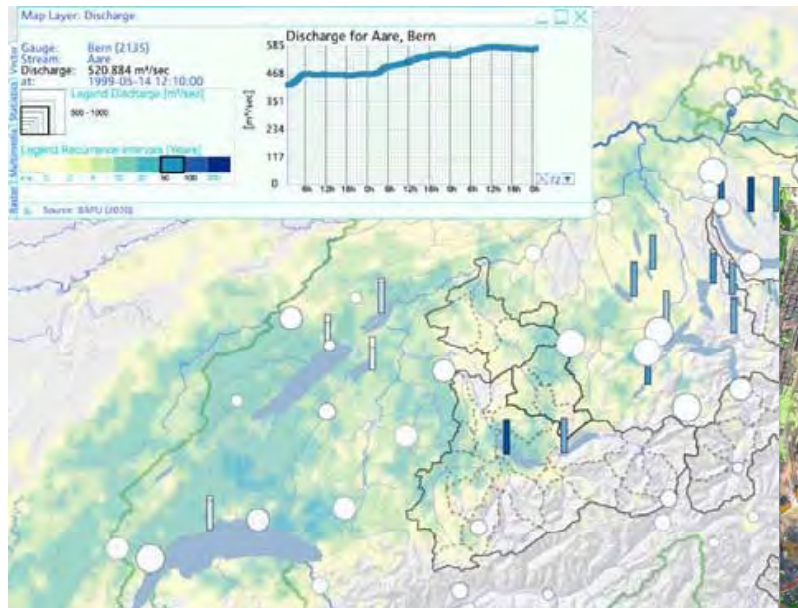
→ media-adequate

→ personalised

→ designed

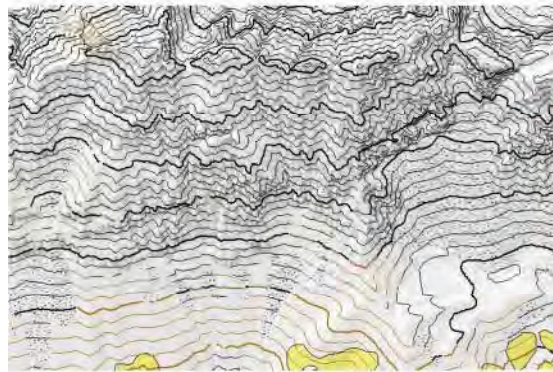
Data acquisition and Sensors

Rapid Mapping, Real-Time Cartography



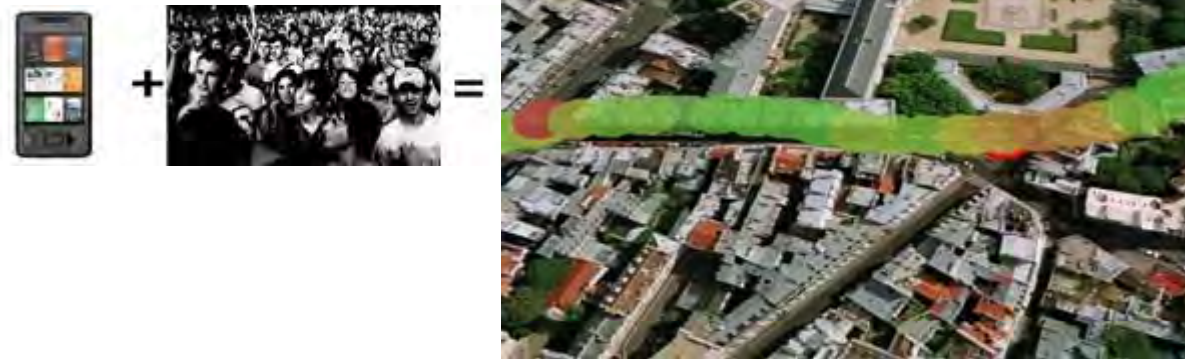
Data acquisition and Sensors

automated map derivation



Data acquisition and Sensors

Crowd Sourcing



Data acquisition and Sensors

Crowd Sourcing





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Crowd Sourcing

A yellow banner with a map background. On the left, it says 'Das Projekt zur Erfassung emotionaler Raumwahrnehmung' and 'EMOMAP' with a smiley face icon. In the center, a speech bubble says 'Ich bin hier!'. On the right, it says 'Forschungsprojekt gefördert von' and shows logos for 'bm vti' and 'FFG'.

Das Projekt zur Erfassung
emotionaler Raumwahrnehmung

EMOMAP

Ich bin hier!

Forschungsprojekt
gefördert von

bm vti

FFG

Collaborative Cartography

Archäologie im Crowdsourcing-Ansatz, <http://exploration.nationalgeographic.com/mongolia/> (via <http://irevolution.net>)

NATIONAL GEOGRAPHIC Inspiring people to care about the planet since 1888 | [Learn More »](#) [SUBSCRIPTIONS](#)

Search

HOME PHOTOGRAPHY ANIMALS ENVIRONMENT TRAVEL **ADVENTURE** NATGEOTV KIDS VIDEO SHOP

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[HOME/MAP](#) [HOW TO VIDEO](#) [BLOG](#) [HISTORY AND CULTURE](#) [ABOUT THE EXPEDITION](#) [BEHIND THE SCIENCE](#)

EXPLORE

HELP US SOLVE AN 800-YEAR-OLD MYSTERY.

Explorer Albert Lin and his team are conducting a noninvasive survey in the region of the lost tomb of ruler Genghis Khan. You can help—by tagging clues and artifacts on satellite images of the area.

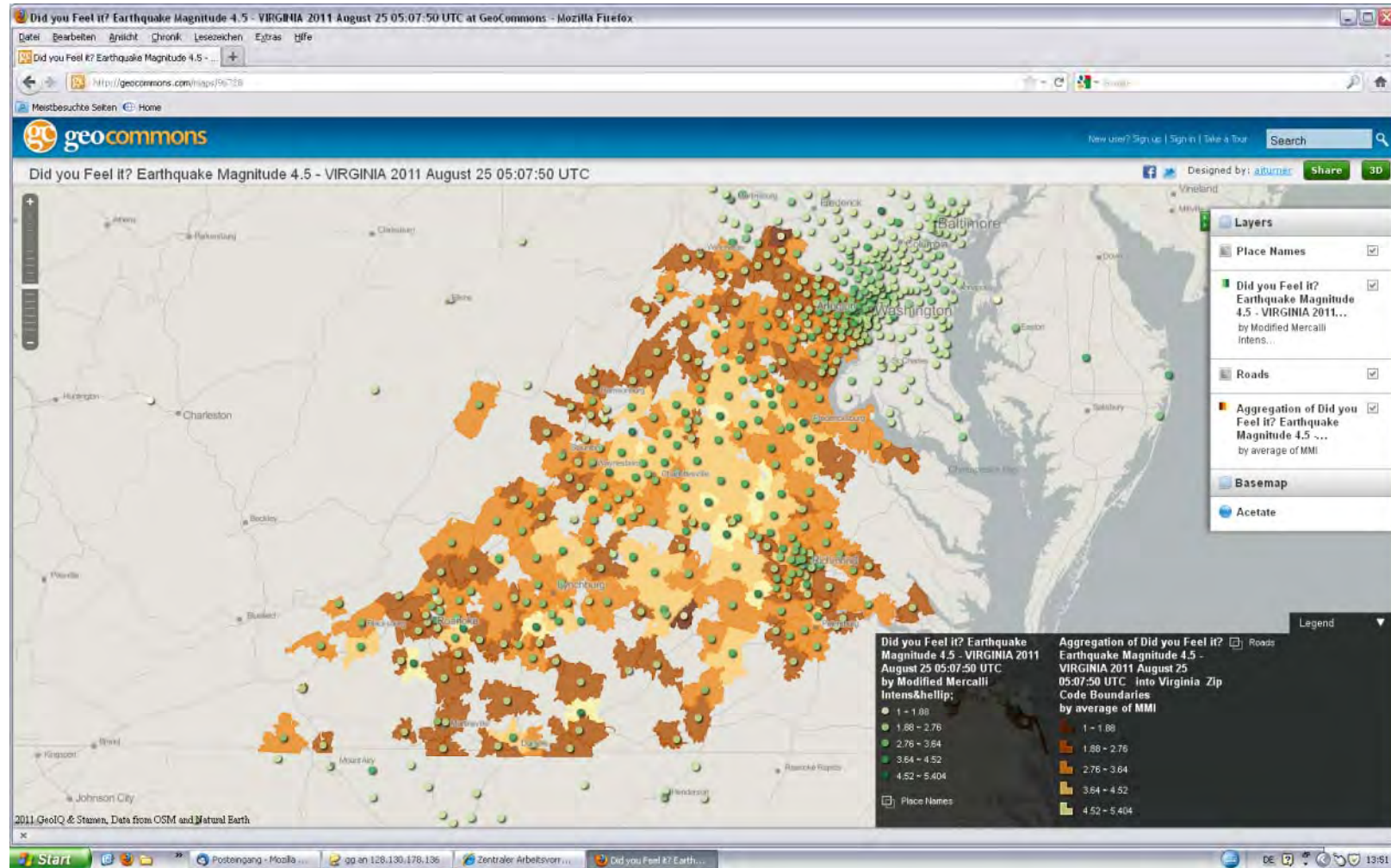
[GET STARTED](#)

10334 online explorers

665855 images/files processed

User-defined collaborative cartography

www.geocommons.com



Grassroot Mapping

Initiative zum Erzeugen eigenen Kartenmaterials, z.B. bei Demonstrationen, Umweltverschmutzungen, etc. <http://grassrootsmapping.org/> (via <http://oe1.orf.at/programm/281248>). U.a. auch http://wiki.openstreetmap.org/wiki/User:Balrog/Aerial_Imagery



This map was made for under \$200
by volunteers using a helium balloon, a digital camera, and a boat.

Know an area that needs to be mapped? Get in touch.
team@publiclab.org
(514) 558-0647

Reimagining the data lifecycle
Urban Design & Office Hours

On Site
Background

They say that the...
The problem of...
...and...
...the...
...the...
...the...

Wilkinson Bay Louisiana
as of 2010 - for 14 years
July 22, 2010

...the...
...the...
...the...

The Public Laboratory for Open Technology & Science



BaseMaps

z.B. mit CloudMade, Google Maps API v3 oder stepmap.de (Abb.: <http://scribblemaps.com>, <http://maps.cloudmade.com>)

Nachteil: Gestaltung lesbarer und für den Anwendungszweck sinnvoller Grundlagenkarten ist eine komplexe Aufgabe

all

- administrative
- administrative.country
- administrative.province
- administrative.locality
- administrative.neighborhood

Farbton

Sättigung

Leichtigkeit

Gamma

Invert Lightness

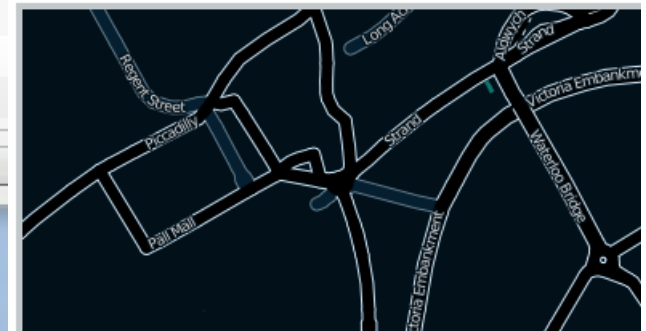
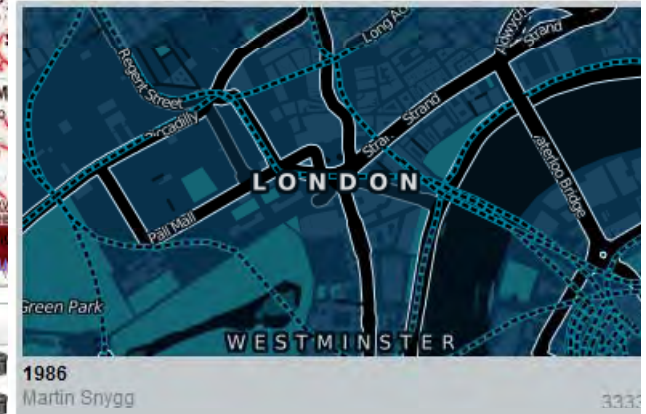
Add Style

Styles

Feature	Element	Visibility	Hue	Saturator	Lightness	Gamma	Invert Lig
administrative.locality	geometrie	auf		25			
water	geometrie	auf	ff0000	60		1	true

Add To Karte

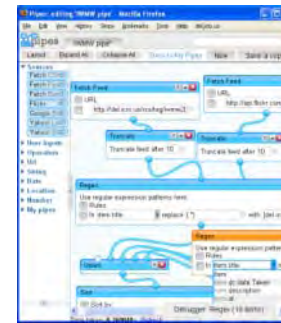
Style Vorschau



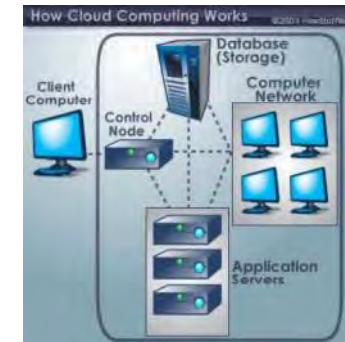


Data handling

Pipes



Clouds



Real-Time Streaming

<http://github.com/blog/622-inline-commit-notes>
about 21 hours ago via web

RT @mm: MICHIGAN STATE
about 23 hours ago via Seismic

Brisket and cod tacos on the
<http://4sq.com/6NhsW3>
10:33 PM Mar 27th via foursquare Tr

I'm at The Mauna Loa Club (3
San Francisco). <http://4sq.com/5HxL0P>
9:53 PM Mar 27th via foursquare from Cow Hollow

Delete

Real-Time Cartography (Live Trains)

Vaguely live map of trains in the United Kingdom - Mozilla Firefox

Axis Maps LLC - Cartography, Visualizatio

http://traintimes.org.uk/map/

Live train map for Birmingham New Street

Choose station: [Link to this](#) Move trains at 10x normal speed Data collected: Mon, 26 Sep 2011 13:01:00 +0100

Map of the United Kingdom showing train routes and stations. Yellow pins indicate stations, and red lines represent trains in motion. The map includes a scale bar (0 to 20 miles) and a legend for map styles (Map, Satellite, Hybrid).

What is this? [Hide >](#)
This map shows all trains currently on approach to a particular station. The yellow pins are stations (click for a local map of that station), the red pins trains. The trains move in approximately real time, or rather quicker if you check the speed-up box.

How does it work?
Live departure data is fetched from the National Rail website, much like my [timetable site](#), and then it does a bit of maths and magic.

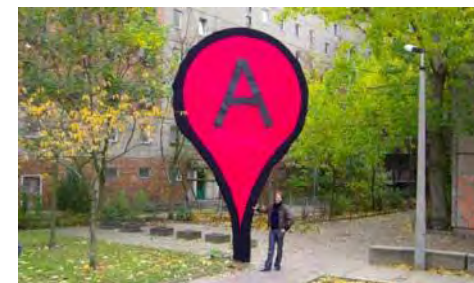
Who did this?
[Matthew Somerville](#). Formerly a civil servant, I'm now normally to be found working for [mySociety](#) helping create and update various popular democracy and civic websites, like [TheyWorkForYou](#) and [FixMyStreet](#). But I'm always open to offers for other fun stuff. :) I can be emailed at matthew@dracos.co.uk.

This site is not affiliated, associated, endorsed, or in any other way connected officially with the National Rail site. The train pop-ups contain links to the relevant page on National Rail's site; this page is not responsible for them, nor the collection of the train time

Start Postengang - Mixla Microsoft PowerPoint Wechseldatenträger Vaguely live map of N...

14:22

Earth Viewer and Carto Search Engines



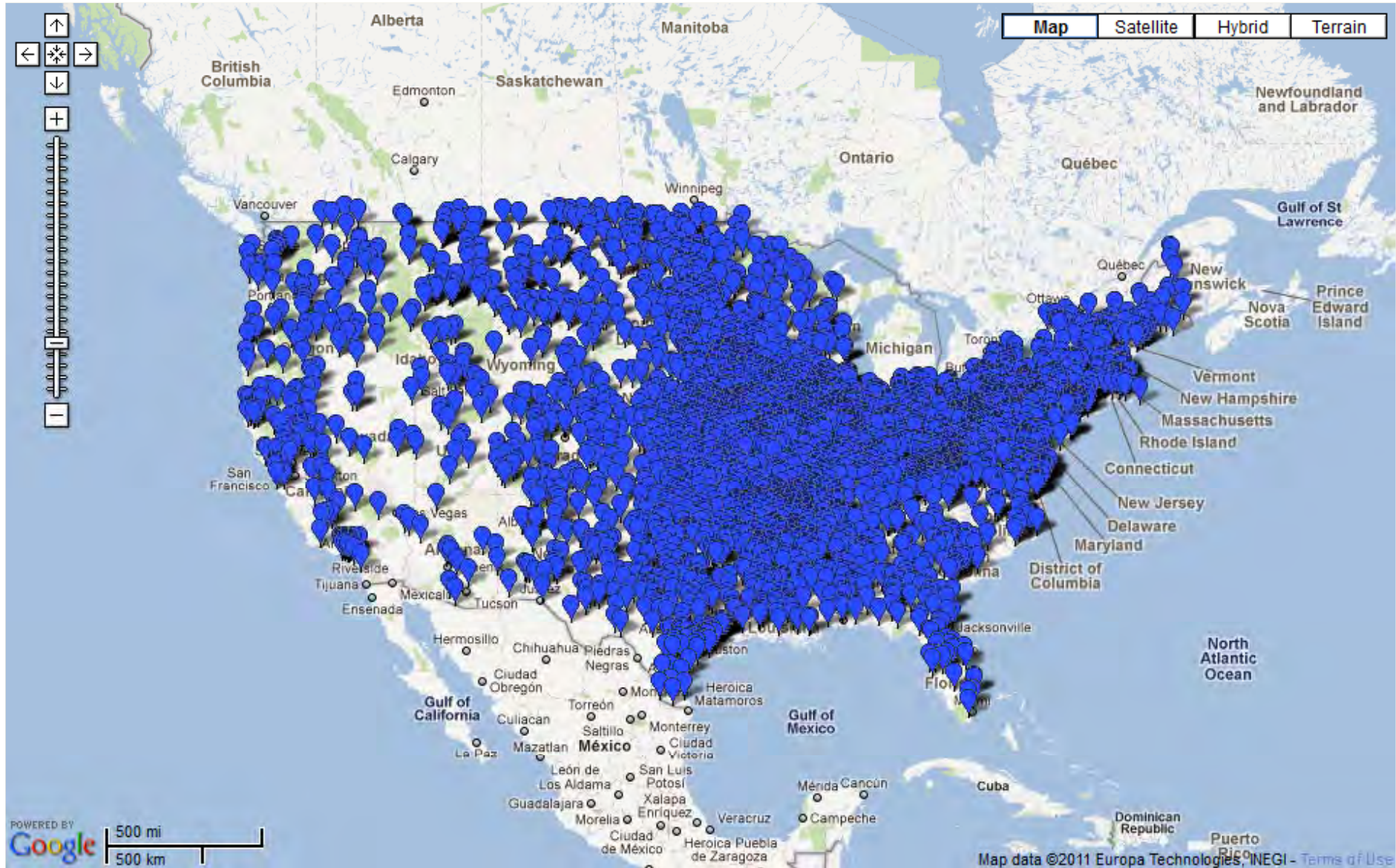
Mashups



Remaining Challenges..

Schlechte Lesbarkeit aufgrund fehlendem oder mangelhaftem Clustering, z.B. <http://www.savethepostoffice.com/raoi-closing-map>

Clustering-Tools sind mittlerweile vorhanden. Allerdings fehlen noch gute geographische Clustering-Lösungen (z.B. basierend auf Grenzen)





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Location Based Services / Mobile Apps





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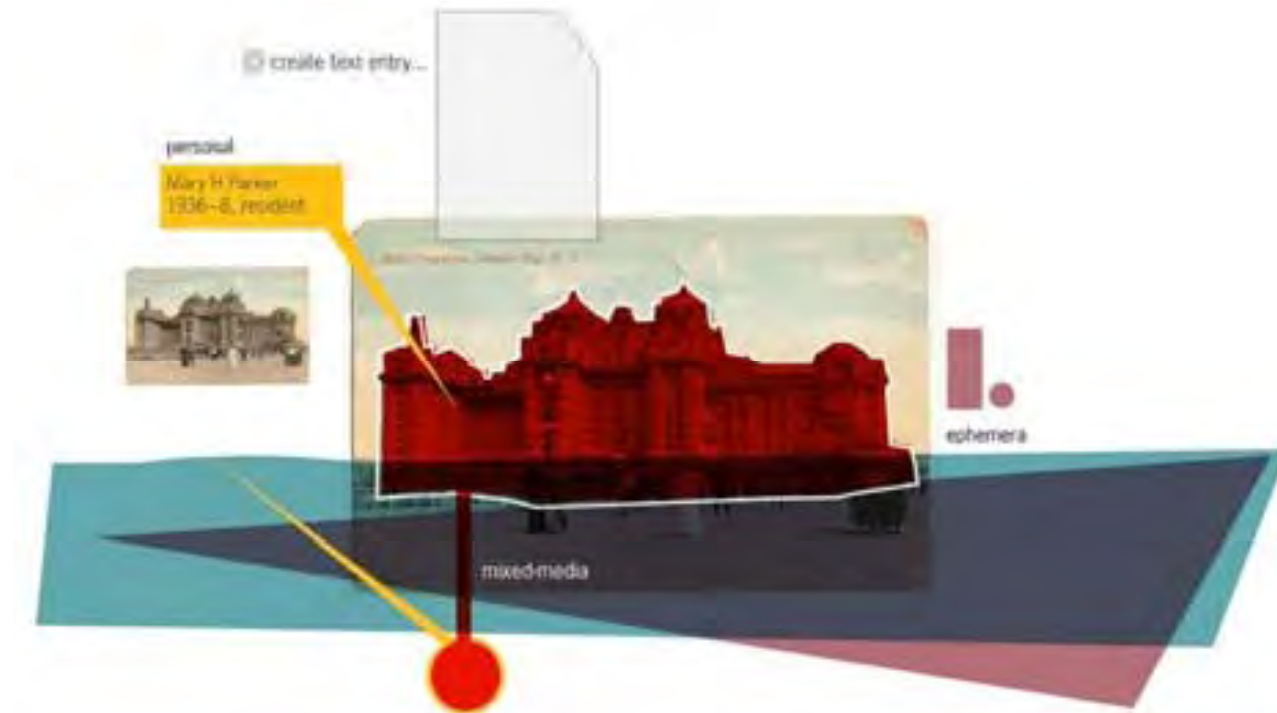
Ubiquitous Computing



3D Modelling



Geo Media techniques





Big Data



Geo data infrastructure



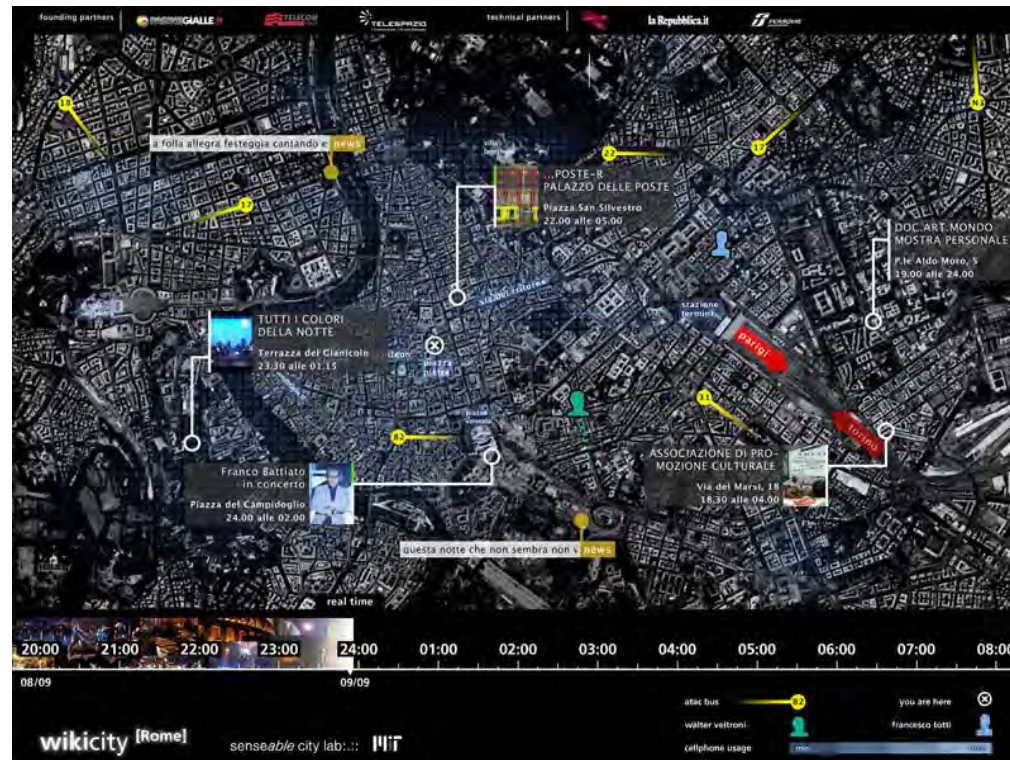
Cartography in the inf & comm area

function of maps: **Artefact** → decreasing



Cartography in the inf & comm area

function of maps: **Interface** → **increasing**

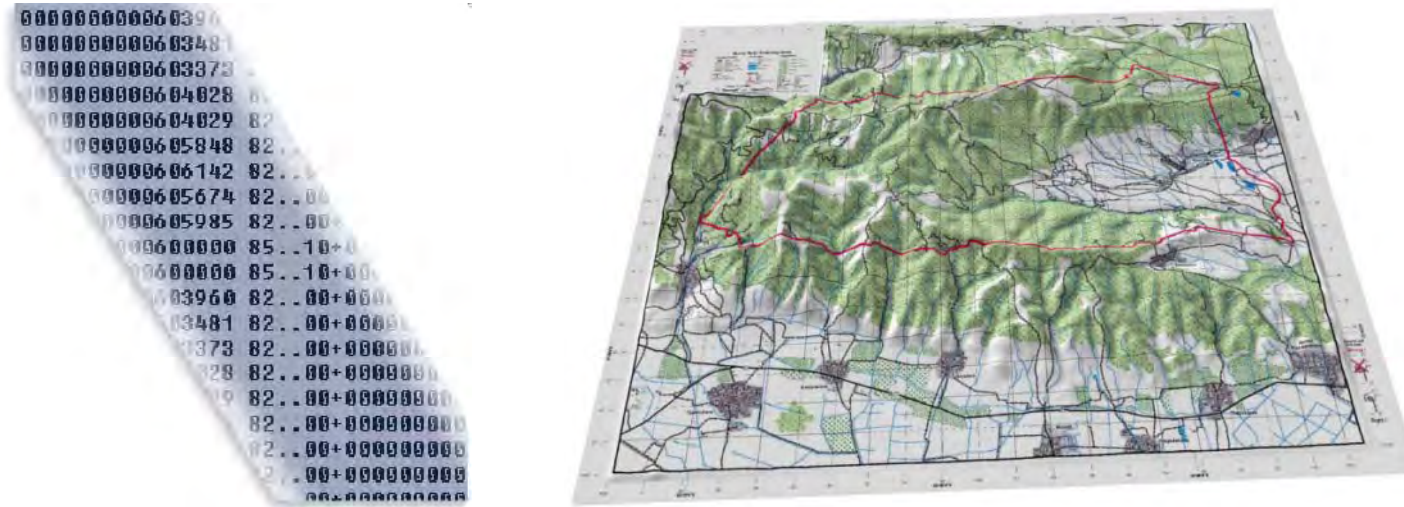


Cartography in the inf & comm area

function of maps: Metapher



Implication **Visualisation**



Efficient way of communication

Implikation **User centered**



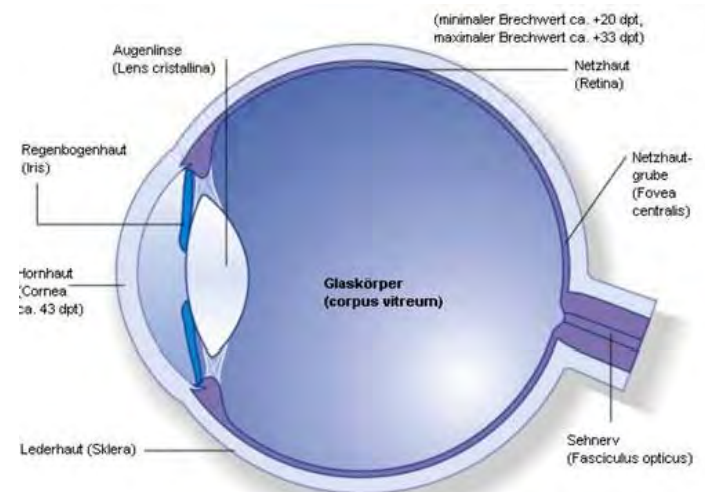
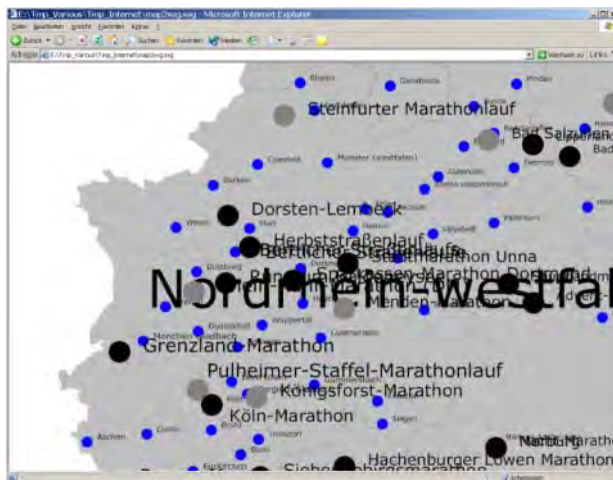
User dependent content and design
→ Personalisation, Adaptivity

Implication **Media adequate**



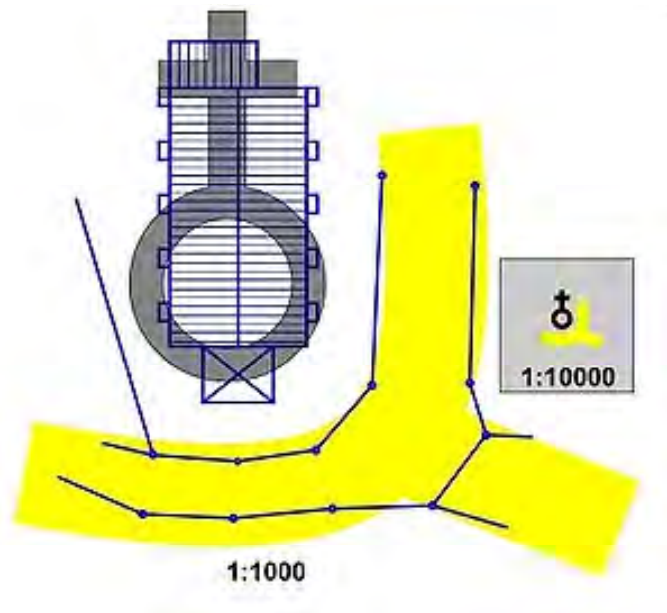
Media adequate design

Implication Cartographic Dogma



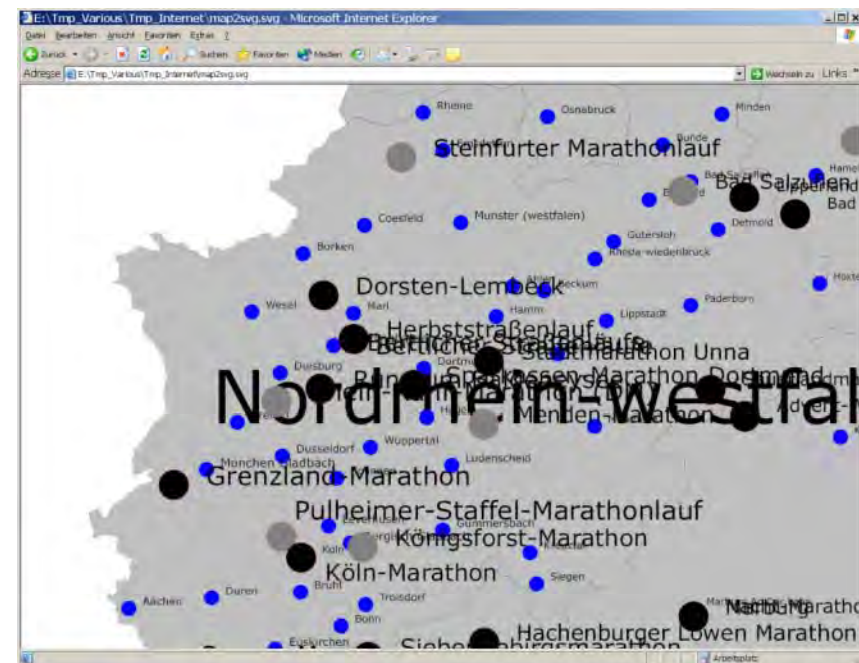
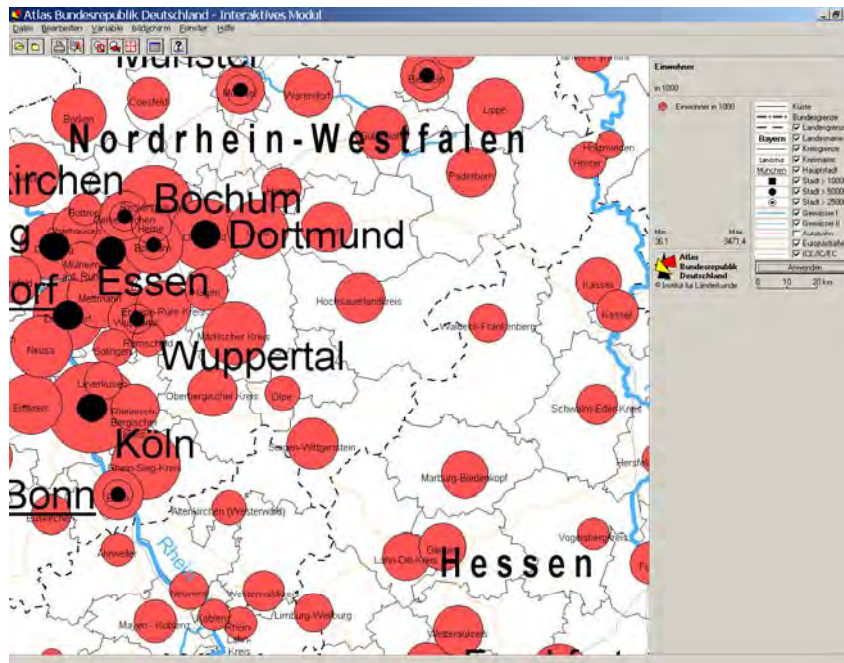
Balance of scale and perceptivity

Implication Cartographic Modelling



Cartographic Modelling by applying the constraints

Implication Cartographic Modelling



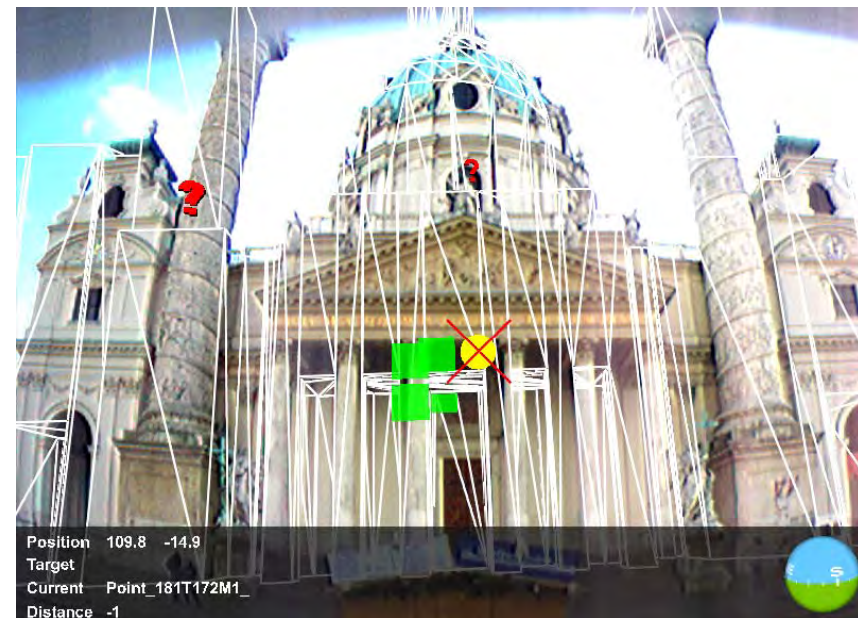
Optimisation/Formalisation of syntax of 2D Graphics

Implication Cartographic Modelling



Optimisation/Formalisation of the semantic dimension

Implication Cross Media



Derivation of presentation models in various media

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Modern Cartography?

Three Assumptions:

1. Cartography is relevant
2. Cartography is attractive
3. Cartography is modern

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General Trends

Cartography is relevant

United Nations

Global Geospatial Information Management
(UN-GGIM)

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Promote Geospatial Advocacy and Awareness

from data-centric 'provider' focus to a **spatially enabled 'user' focus** by government and civil society

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Embracing Trends in Information Technology

open source, crowd sourcing, SOA, cloud, data as a service

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Promoting data sharing, accessibility and dissemination

base set of **reference and thematic data**, harmonized and free of charge

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Assuring the **quality of geospatial information**

articulate specific role Governments have in providing
**quality, current and authoritative national geospatial
information**

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Assuring the **quality of geospatial information**

Recognize the value and the limitations, of the **recent emergence of crowd sourcing, open street map, and volunteer geographic information**

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General Trends

Cartography is relevant

UN-GGIM Inventory of Issues

Assuring the **quality of geospatial information**

Consider the **emerging use of modern mobile applications and visualization techniques** to communicate issues and solutions

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General Trends

Cartography is relevant

UN-Committee of Experts on GGIM Future Trends

Future direction of **data creation**, maintenance and **management**

real-time, new methods (UAV), **social media**

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General Trends

Cartography is relevant

UN-Committee of Experts on GGIM Future Trends

Uses of geospatial data

ubiquitous use might lead to better decision-making,
require appropriate ethical standards

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General Trends

Cartography is relevant

UN-Committee of Experts on GGIM Future Trends

Legal and **Policy** Development

issues of increasing demand for free and open access

privacy challenges

legal status of national **spatial data infrastructures**

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General Trends

Cartography is relevant

UN-Committee of Experts on GGIM Future Trends

Skills requirements and training mechanisms

shift from a niche to **wider populace**

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Cartography is attractive

API	Popularity
Google Maps	47%
Flickr	11%
YouTube	9%
Amazon	7%
VirtualEarth	4%
Ebay	4%
411Sync	3%
YahooMaps	3%
Del.icio.us	3%
Yahoo	3%

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Cartography is attractive



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Cartography is modern





Strategies

- Education
- Research
- Cooperations

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Education

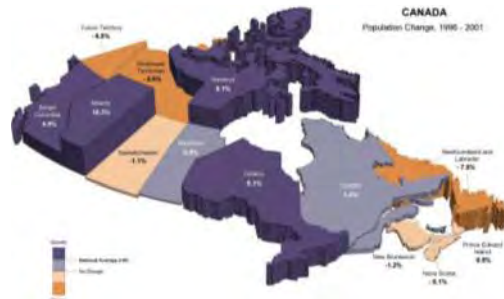
International **Masterprogramme „Cartography“**
TU München, TU Wien, TU Dresden

International Master Cartography





Augmented reality



thematic mapping



Visual Analytics

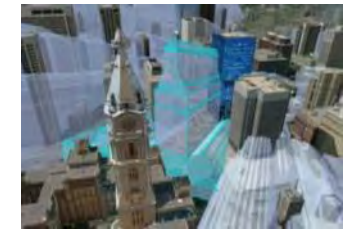


LBS



map and art

MODERN CARTOGRAPHY



3D, data analysis



map perception



data matching



maps in web 2.0



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Research

ICA Research Agenda (www.icaci.org)

Geographic Information

Metadata and SDI

Geospatial Analysis and Modelling

Usability

Geovisualisation

Map Production

Cartographic Theory

History of Cartography and GI Science

Education

Society



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Research Areas for the next years

What does a healthy development of modern cartography require?



Research Areas for the next years

Modern Cartography requires integrated **interdisciplinary approaches** in

- education
- research
- application development



Research Areas for the next years

Modern Cartography requires integrated interdisciplinary approaches of the domains of

- **Cartography**
- **Geoinformation sciences**
- **Computer sciences**
- **Communication sciences**
- **Human-computer interaction and Cognitive sciences**
- **Law and Business Sciences**
- **Design and Art**



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Research Areas for the next years

Modern Cartography requires integrated interdisciplinary Approaches

**for user-centered application developments
by applying engineering tools**

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International Cartographic Association mission

the **world authoritative body** for cartography
and geoinformation science

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International Cartographic Association mission

world authority means
national and affiliate members
represented at UN bodies and other
international organisations

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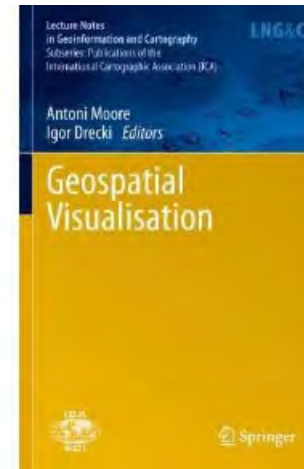
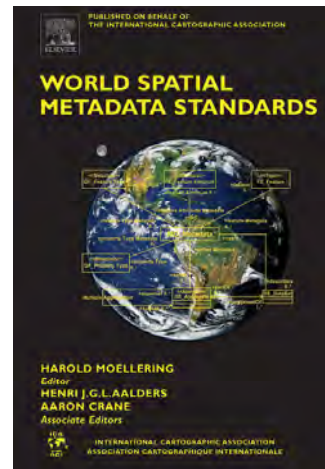
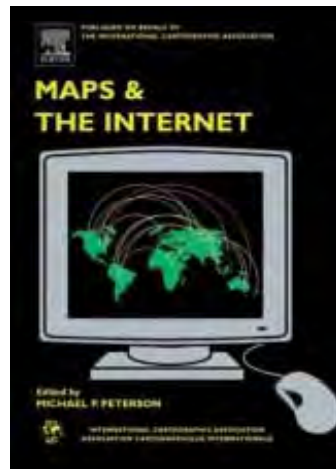
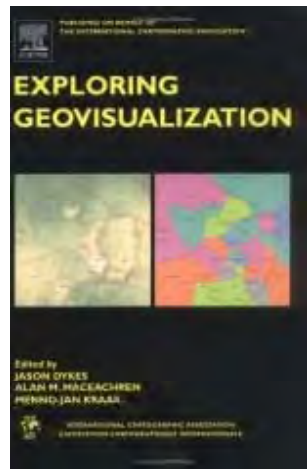
Aims

- Understanding and solve world-wide problems using cartography
- Informing about environmental, economical, social and spatial information through mapping
- Promote professional methods, techniques and solutions
- Global forum on cartography
- ..

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International Cartographic Association Instruments: Publications



50th anniversary of ica 2009

Day 1	Day 2
100th Anniversary of the ICA (1909-2009) 10	100th Anniversary of the ICA (1909-2009) 10
ICA 100th Anniversary 11	ICA 100th Anniversary 11
ICA 100th Anniversary 12	ICA 100th Anniversary 12
ICA 100th Anniversary 13	ICA 100th Anniversary 13
ICA 100th Anniversary 14	ICA 100th Anniversary 14
ICA 100th Anniversary 15	ICA 100th Anniversary 15
ICA 100th Anniversary 16	ICA 100th Anniversary 16
ICA 100th Anniversary 17	ICA 100th Anniversary 17
ICA 100th Anniversary 18	ICA 100th Anniversary 18
ICA 100th Anniversary 19	ICA 100th Anniversary 19
ICA 100th Anniversary 20	ICA 100th Anniversary 20
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ICA 100th Anniversary 22	ICA 100th Anniversary 22
ICA 100th Anniversary 23	ICA 100th Anniversary 23
ICA 100th Anniversary 24	ICA 100th Anniversary 24
ICA 100th Anniversary 25	ICA 100th Anniversary 25
ICA 100th Anniversary 26	ICA 100th Anniversary 26
ICA 100th Anniversary 27	ICA 100th Anniversary 27
ICA 100th Anniversary 28	ICA 100th Anniversary 28
ICA 100th Anniversary 29	ICA 100th Anniversary 29
ICA 100th Anniversary 30	ICA 100th Anniversary 30
ICA 100th Anniversary 31	ICA 100th Anniversary 31

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International Cartographic Association Instruments: Map Exhibitions



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International Cartographic Association Instruments: Children Map Competition

10th International Exhibition, Paris, 2011
20 Years Barbara Petchenik Competition, Dresden, 2013

International Cartographic Association

Commission on Cartography and Children

Children Map the World

<http://icaci.org/> <http://lazarus.elte.hu/ccc/ccc.htm>

1 - Victoria Lan, Age 9, Canada; 2 - Trisha C. Reyes, Age 8, Philippines; 3 - Polina Kosovskaya, Age 15, Russia; 4 - Nikola Zlatarov, Age 7, Bulgaria; 5 - Nicholas William, Age 15, Indonesia; 6 - Suhita Nath, Age 11, India; 7 - Evelin Demeter, Age 12, Romania; 8 - M.Yusef Abdoosh, Age 6, Indonesia; 9 - Ami Kanno, Age 13, Japan; 10 - Ellie Pardoe, Age 8, United Kingdom; 11 - Dorsa Miradi, Age 8, Iran; 12 - Tamas Csikos, Age 14, Hungary; 13 - Marta Londzin, Age 13, Poland; 14 - Brooke Angaran, Age 9, USA; 15 - Marcia Grieva, Age 12, Russia

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Instruments: Research Agenda

Geographic Information
Metadata and SDI
Geospatial Analysis and Modelling
Usability
Geovisualisation
Map Production
Cartographic Theory
History of Cartography and GI Science
Education
Society

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Commissions

Commission on **Art and Cartography** Commission on **Atlases** Commission on **Cartography and Children** Commission on **Cartography in Early Warning and Crisis Management** Commission on **Cognitive Visualization** Commission on **Data Quality** Commission on **Digital Technologies in Cartographic Heritage** Commission on **Education and Training** Commission on **Generalisation and Multiple Representation** Commission on **Geoinformation Infrastructures and Standards** Commission on **Geospatial Analysis and Modeling** Commission on **Geovisualization** Commission on **GI for Sustainability** Commission on the **History of Cartography** Commission on **Map Design** Commission on **Map Production and Geo-Business** Commission on **Map Projections** Commission on **Mapping from Remote Sensor Imagery** Commission on **Maps and Graphics for Blind and Partially Sighted People** Commission on **Maps and Society** Commission on **Maps and the Internet** Commission on **Mountain Cartography** Commission on **Neocartography** Commission on **Open Source Geospatial Technologies** Commission on **Planetary Cartography** Commission on **Theoretical Cartography** Commission on **Ubiquitous Mapping** Commission on **Use and User Issues**

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Commissions

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Commission on **Cognitive Visualization** Commission on **Data Quality** Commission on **Digital Technologies in Cartographic Heritage** Commission on **Education and Training**
Commission on **Generalisation and Multiple Representation** Commission on **Geoinformation Infrastructures and Standards** Commission on **Geospatial Analysis and Modeling** Commission on **Geovisualization** Commission on **GI for Sustainability**
Commission on the **History of Cartography** Commission on **Map Design** Commission on **Map Production and Geo-Business** Commission on **Map Projections** Commission on **Mapping from Remote Sensor Imagery** Commission on **Maps and Graphics for Blind and Partially Sighted People** Commission on **Maps and Society** Commission on **Maps and the Internet** Commission on **Mountain Cartography** Commission on **Neocartography**
Commission on **Open Source Geospatial Technologies** Commission on **Planetary Cartography** Commission on **Theoretical Cartography** Commission on **Ubiquitous Mapping** Commission on **Use and User Issues**

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Outreach and Capacity Building

Hands-on Workshops

most recent at Cuba, Iran, New Zealand, South Africa, Tunisia, Germany
next week: Hands-on Workshop on OSGeo WebMapping

Seminars

most recent: Cartographic Generalisation Istanbul, Heritage Gent, Roma

Symposia upcoming: Service-oriented Mapping, Vienna

ICA- OSGeo MoU





**Establishing
research and
training
opportunities**



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International Cartographic Association

UN endorsed International Year of the Map 2015

ICA endorsed by UN-RCC
Global Activities

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International Cartographic Association

Instruments: Conferences

International Cartographic Conference

August 2013, Dresden, Germany

[**www.icc2013.org**](http://www.icc2013.org)



International Cartographic Association
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International Cartographic Association

Instruments: Conferences

International Cartographic Conference
August 2015 Rio de Janeiro, Brasil

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International Cartographic Association

www.icaci.org

The screenshot shows the ICA website homepage. At the top left is the ICA/ACI logo. To its right is the text 'International Cartographic Association' and 'Association Cartographique Internationale'. In the top right corner, there are social media icons for Twitter, LinkedIn, Facebook, YouTube, and RSS. Below the header is a blue navigation menu with links for 'News', 'Calendar', 'Publications', 'The Association', 'Members', 'Commissions', 'Research Agenda', 'ICC Conferences', and a question mark. The main content area features a large banner for the 'ICA Map of the Month' for 03/2012, which is a panoramic tourist map of Sunny Beach, Bulgaria. Below the banner are two news articles. The first article is titled 'CfP: LBS 2012 in Munich' and discusses the 9th International Symposium on Location-Based Services. The second article is titled 'CET Workshop Opportunities' and mentions workshops organized in Iran, Indonesia, and Viet Nam. On the right side of the page, there are two sidebars: 'Recent Posts' and 'Upcoming Events'. The 'Recent Posts' sidebar lists 'CfP: LBS 2012 in Munich', 'CET Workshop Opportunities', 'Education and Training Modules', and 'Mountain Cartography Workshop in New Zealand in September'. The 'Upcoming Events' sidebar lists 'Mar 26-Mar 30 GeoTunis 2012', 'Apr 17-Apr 19 Geo Siberia 2012', 'Apr 19-Apr 20 7th ICA Workshop on Digital Approaches to Cartographic Heritage', 'Apr 23-Apr 27 Geospatial World Forum', and 'Apr 24 Open Source GIS & WebMapping'. At the bottom right, there is a '2013' logo.