CARTOGRAPHY
in a Web World

Nationale GI Minor

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Agenda

- Short introduction to ITC and me
- Cartography: communicating spatial data
- Changing GIS & Cartography
  - technology: new mapping possibilities
  - technology: 3 kinds of open: open standards, open source & open data
  - results in easy access to powerful tools & data
  - everyone's a mapmaker now...!
- Hands-on workshop:
  - Using selected Open Source tools and Open Data to visualize your spatial data
short introduction to ITC

http://www.itc.nl/
Faculty of Geo-Information Science and Earth Observation of the University of Twente

- located in Enschede (The Netherlands)
- yearly registration: > 400 students
- average duration of stay: 14 months
- average age: 34 years
- 1950-2010 > 14,000 students from > 160 countries
- scientific & supporting staff: ± 190 fte
ITC’s mission

- the use of geographic information for sustainable development
- knowledge transfer: learning
- knowledge development: research and advisory services
- strengthen capabilities of individuals and organisations
  - in developing countries
  - mid career professionals
Education at ITC: Target Group

- Young and mid-career professionals, and scientists from developing and emerging countries
- Increasingly professionals from industrialised countries

Photo: © Gerard Kuster
Education at ITC: Programmes

Graduate programme
- Doctorate (PhD) 3½ to 4 years

Degree programme:
- Master of Science (MSc) 18 months
- Master (PM) 12 months

Diploma programme:
- Postgraduate diploma (PGD) 9 months
- Diploma 9 months

Language of instruction is English
Education at ITC

8 courses:

- Geoinformatics (MSc, Master, PGD, diploma)
- Applied Earth Sciences (MSc, PGD)
- Environmental Modelling and Management (MSc)
- Governance and Spatial Information Management (MSc)
- Land Administration (MSc, PGD)
- Natural Resources Management (MSc, PGD)
- Urban Planning and Management (MSc, PGD)
- Water Resources and Environmental Management (MSc, PGD)
Cartography: communicating spatial data
Why use carto-graphics?

Maps give a sense of Place and Time

THE CARTOGRAPHIC COMMUNICATION PROCESS
# Cartographic Grammar: rules for good maps

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<th>IMAGE LEVEL</th>
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- **Characteristics**
  - strong
  - weak

- **Implicit definition**
  - possible

- **Perception**
  - characteristic
  - definition
Changing GIS & Mapping

Minority Report
©2002 20th Century Fox

science fiction or reality?
“…CUE TOM CRUISE...!”

[‘Minority Report’ - Steven Spielberg, 2002]

Washington 2039:

John Anderton on the run for the ‘pre-crime’ police...
ALL ELEMENTS ALREADY EXIST...

1. Positioning – localising

Localising of person / device by the network
biometry (iris-scanner / fingerprint)
magnetic (smart-cards, smart-keys)
radiometric (transponders / GSM cell-timing)
ALL ELEMENTS ALREADY EXIST...

1. Positioning – localising

Positioning by device (using network)
- Feedback of network-positioning (e.g. by SMS)
- Global Positioning Systems
- Inertial Navigation Systems
- GSM / UMTS self-positioning
ALL ELEMENTS ALREADY EXIST...

2. Mobile information devices (MIDs)
   • graphic and alphanumerical display
   • simple user interface
   • portable
ALL ELEMENTS ALREADY EXIST...

3. wireless connections between the parts

- between MIDs and network (WIDs or using phone)
- between MIDs themselves (IR, bluetooth)
- between MID and user (speech, 3D-gloves)
ALL ELEMENTS ALREADY EXIST...

4. Location aware GIS => Location Based Services
match services to combination of person+position

any GIS is ‘location aware’, but you also need:
distributed data + applications
locations of objects and persons, but also:
locations of services
temporal awareness
ALL ELEMENTS ALREADY EXIST...

5. Location based services
   • match services to combination of person+position
Changing Cartography

GEOGRAPHY

FROM TIME TO GEOGRAPHY

COMMON REPRESENTATION (both scales fixed)

FROM GEOGRAPHY TO TIME

kartoweb.itc.nl/kobben/D3tests/tracksViewer/napoleon.html
A change in my world

My tools once were these:
A change in my world

...but now look like this:
Changing Cartography

- new, more and easier data
- new types of maps
- new digital dissemination
CHANGING CARTOGRAPHY

new, more and easier data

- localising and (self)locating
- “big data”
- open data
new types of maps

- Combining maps with other graphics, sound and moving images: Multimedia
- Interactive maps
- Realism & false realism: Virtual worlds
- Depiction of movement & change: Animated maps
Virtual Worlds
Animated maps

http://kartoweb.itc.nl/gondwana/
CHANGING CARTOGRAPHY

⇒ new (digital) data dissemination

On CD–ROM, DVD, etcetera

On the World Wide Web
Web as a mapping platform

Cameron Beccario
http://earth.nullschool.net/
Web as a mapping platform

combines what we discussed before:

- new data sources
  - Spatial Data Infrastructures, Portals, Sensor Networks
  - user = producer: Prosumers, Crowd-sourcing

- new map types

- new dissemination methods
Open Standards for Interoperability

To communicate between systems we need to standardise the messages between them.
GeoWebServices

If webservices have *spatial* functionality, for example if they use geographic data, can output maps or find routes, we call them **geowebservices**

- Google Maps, Bing maps, etc.: interfaces are publicly available, but defined, developed and owned by commercial companies
- Open Standard GeoWebServices: Open Web Services (OWS) of the Open Geospatial Consortium (OGC).
Open SOURCE software

Source code is freely accessible
- free for all to use, change and (re)distribute
- usually allowed to sell products that include source code

Development done in public:
- usually not by a company
- by a community: distributed, informal team of developers
Open source software STACK

(web)map-viewers, Graphic User Interfaces, desktop GIS, etcetera
  • thin clients
  • thick clients

middleware: geo-webservices
data-, map- and process services

Back-end: spatial databases

LIBRARIES:
software components for:
• data access
• conversion
• analysis
• projection
• graphics
• etc...
The OSGEO stack at ITC

Prototype
Mozilla
Qt

GDAL/OGR
Proj4
Geotools/
GEOS
Open Data

Open Data is maybe even more important than Open Source

- **without data, software means nothing**

- much of the data is still proprietary

- some movement to public access of geo-data

  - EU INSPIRE initiative
  - USA federal data
  - **OpenStreetMap**
Result: Easy access to lots of data & maps

- Crowd sourced and open data through open API's

http://openstreetmap.org/
Result: Easy access to powerful tools & data

➔ *mashing up open data and animated maps*

Result: Easy access to powerful tools & data

➔ “Coding Cartography”

kartoweb.itc.nl/kobben/D3tests/distancePerception.html
Result: Easy access to powerful tools & data ➔ everyone's a mapmaker now...!

http://cartodb.com
HANDS-ON WORKSHOP

• Using selected Open Source tools and Open Data to visualize your spatial data
  ▶ OpenStreetMap data and maps in a browser
  ▶ The CartoDB interactive webmapping site
  ▶ Creating your own mapping webpage
  ▶ Creating your own KML data
  ▶ Combine the KML with the OpenStreetMap

• materials to be found at:
  http://kartoweb.itc.nl/kobben/visualisation-hands-on/