



Proposal large-scale research facility (GOF)

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 Frits van Latum (TU Delft, Library/ 3TU.Datacentrum)
 Peter van Oosterom (TU Delft, GIS technology)

Trial interview, 12 December 2011, Geonovum, Amersfoort

Partners

1. Technische Universiteit Delft, Prof. dr. ir. Peter van Oosterom
2. Alterra, Ir. Jandirk Bulens
3. Data Archiving and Networked Services (DANS), Dr. Peter Doorn
4. Geonovum, Drs. Rob van de Velde
5. NLR, Dr. Rob van Swol
6. Universiteit van Amsterdam, Prof. dr. Tom van Engers
7. Universiteit Twente, ITC, Dr. ir. Rolf de By
8. Universiteit Utrecht, Prof. dr. Steven de Jong
9. Vrije Universiteit Amsterdam/EduGIS, Prof. dr. Joop v/d Schee
10. Wageningen Universiteit, Prof. dr. ir. Arnold Bregt



Maps4Science Motivation

- NL → one of the worlds' best-measured countries
 Great data sets: topo base map, AHN-2, geology, socio-economic,...
- However, geo-data use within academia is poor, reasons:
 1. Licence restrictions
 2. Technical inability to handle data types (3D, massive data,...)
 3. Lack of awareness
- Maps4Science goals:
 1. Production tool (geo-data storage, delivery, and services)
 2. Research topic itself

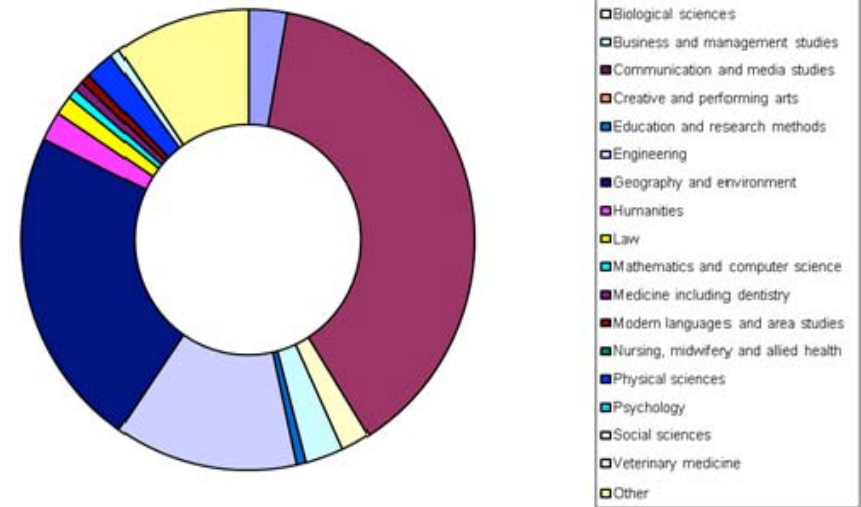
Various local 'geo-desks' NL Univ's

1. Different status/phases
 - UU geo-loket
 - Special map collections WUR library
 - GeoDesk Alterra
 - Geo data warehouse UT/ITC
 - TUD kaartenkamer/ TUD Maps
 - VU Geoplaza
2. Different locations within organizations: central/library, faculty/dept
3. Overlapping activities (data/services) and all having more ambitions
4. With KB and DANS in joint platform 'UKB werkgroep kaarten en GIS'
 DANS=Data Archiving & Networked Services, Institute KNAW/NWO

Maps4Science 2nd in world after UK (and parallel with USA)

- EDINA, the only similar facility (<http://edina.ac.uk>):
 - National academic data centre, 1995 designated by JISC (UK's information&digital technologies expert for education&research)
 - Funded by JISC, research councils (ESRC, NERC), and Universities
 - Annual assessment, business plan and update strategic plan
 - Hosted by University of Edinburgh with the University Data Library
- EDINA organization: management (9), data library (5), administration (4), user support (14), service delivery (50= bibliographic&multimedia 22 + research&geodata 27 + learning&teaching 1), IT infrastructure (8), Warrington office (3)
- Differences: more centralized, less as research topic itself
- USA/NSF has now call of the 'Earth Cube'

User Disciplines



source: <http://edina.ac.uk/impact> (geology digimap)

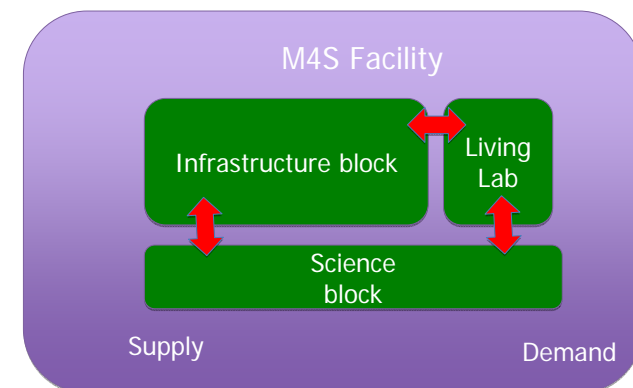
Scientist different than 'normal' user? (of Gov geo-service or Google Earth)

1. Looking for unexpected relationships (more strange data combi's)
2. More interested in source measurements (reinterpretations)
3. Large areas/regions of interest, more data, discovering patterns
4. Producing more own data (from measurements, computations)
5. More requiring w.r.t. 3D and temporal (not only 'now') support
6. Wanting to share geo-processing chains
7. Non geo-info professional (medicine, history, economics, etc.)

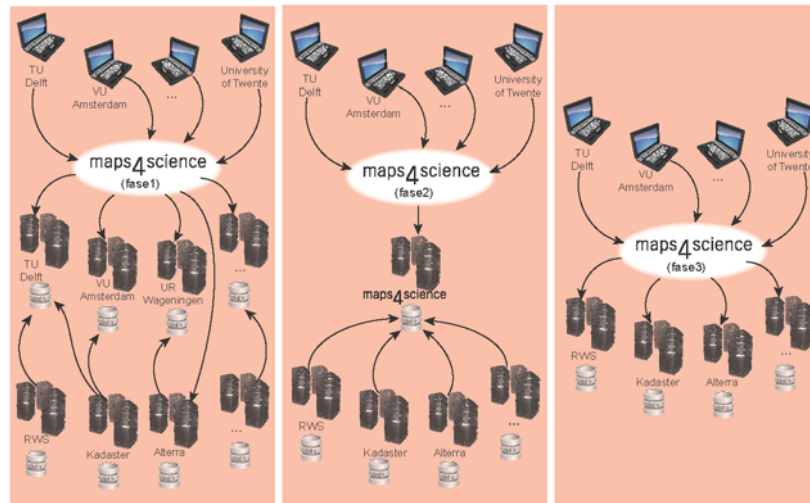
- Answer: yes (and no)
- Same ease of use, but with much more types of **data** and services huge challenge...

M4S Structure

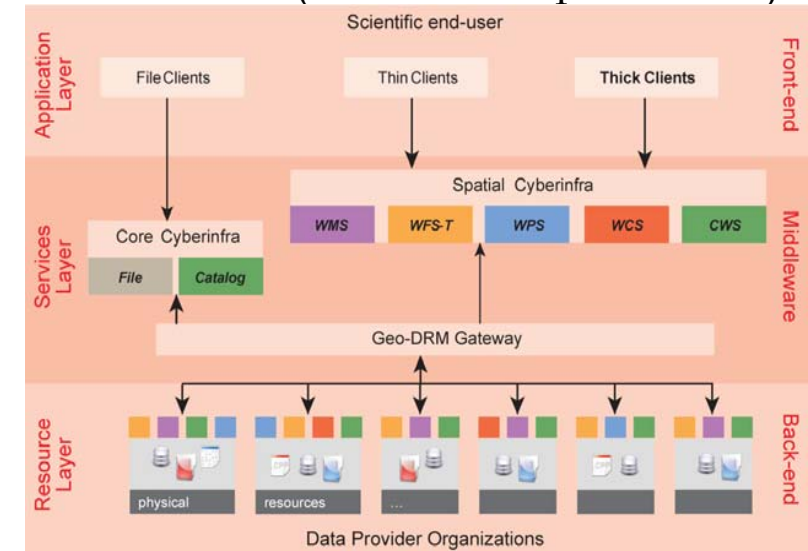
- To be included in NOW GOF roadmap and financing
- Spatial Cyber Infrastructure
- 3 building blocks: **Infrastructure Block**, **Science Block**, **Living Lab**



Instead of local facilities towards a national facility, phases



Architecture (linked data provisions)



Our 4 science cases

1. Geo-Information Science case: 9 GI research topic
2. Science with geo-information case: 6 domains
3. Spatial Cyberinfrastructure science case
4. Digital rights management science case

Scientific breakthroughs (1): GI-science itself

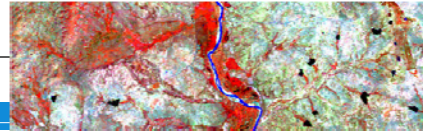
- Create best GII (geoweb)
 1. Architecture, resources and standards;
 2. Usability and dissemination modes;
 3. Management of very large data sets;
 4. Semantics of GI;
 5. Services, searches and optimization;
 6. Standardized data models and data quality;
 7. Volunteered GI and citizen science;
 8. GII-assessment;
 9. Satellites as a service.

TU Delft Maps



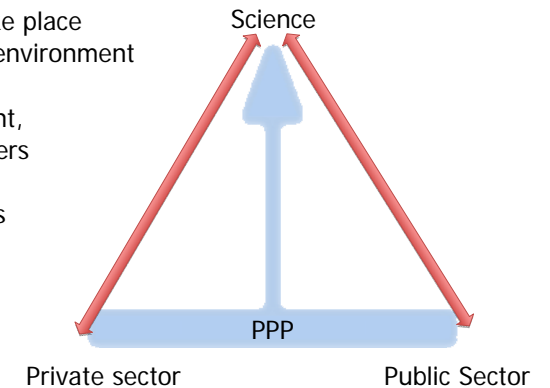
Scientific breakthroughs (2): Annex B science cases using geo-data

- Health: Measuring and Forecasting the Spread of Epidemics
Prof. dr. Peter Sloom (UvA)
- Water resources: Better management through geo-information
Prof. dr. ir. Nick van der Giesen (TUD)
- Crime: Geo-information and GI-Science as Crime reduction tools
Prof. dr. Marianne Junger (UT)
- Agriculture: Avian Influenza - Don't spread the disease
Ir. Henk Janssen, WUR;
- Cultural history: The Integrating Heritage Program
Prof. dr. Jan Kolen, Prof. dr. Henk Scholten (VU)
- GNSS performance: Support mission-critical applications by predicting GNSS performance
Drs. Judith van Bruggen-van Putten (NLR)

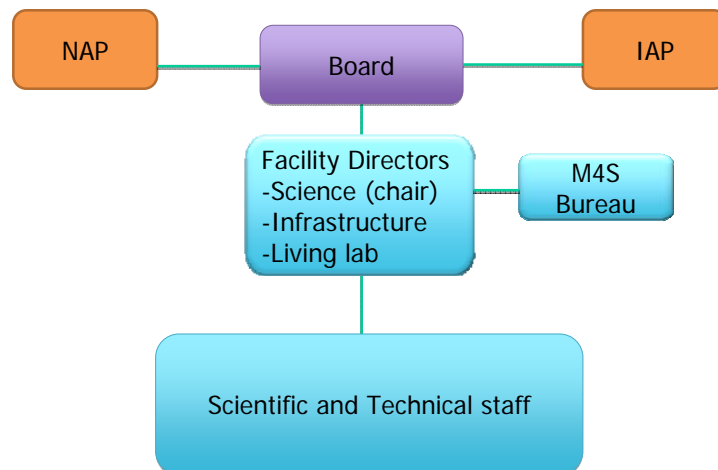


Living Lab

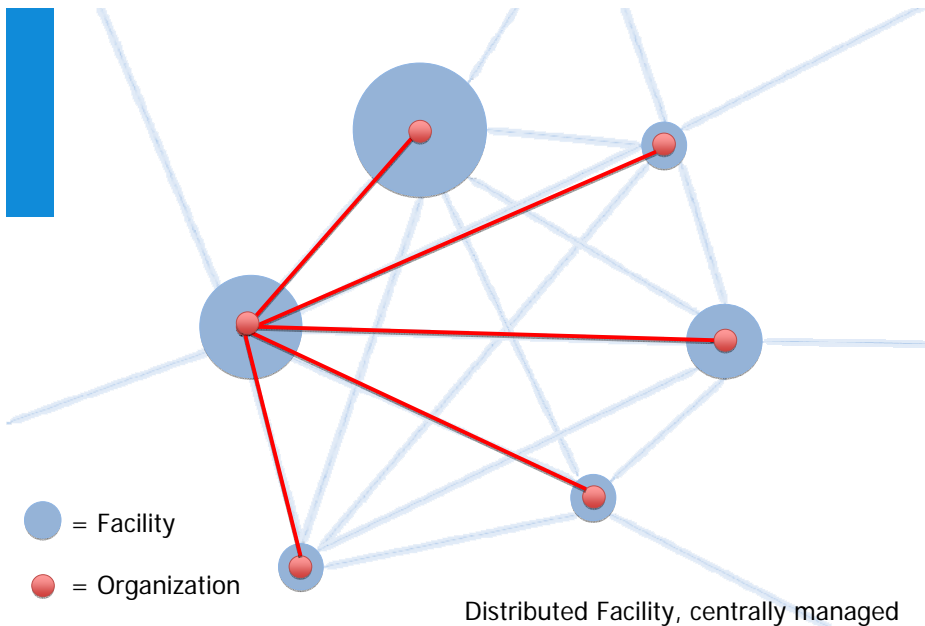
- Collaboration with Public and Private sector: golden triangle
- Development must take place in real world (virtual) environment
- Cross-over environment, involving all stakeholders
- Real world applications
- Open environment (OGC testbed-like)



Management structure



Body	Composition	Responsibility
Board	Partners; mix of Directors of Libraries and Institutes 2x year	<ul style="list-style-type: none"> • Strategic decisions; determines annual and financial report and long term and yearly work plan • Responsible to funding agencies
NAP	Representation of intended users from Science (profs), Government/Business directors (users/data suppliers) and top-level GI/ICT profs; E.g. Kadaster, NCG, GBN, IPN; 2x year	<ul style="list-style-type: none"> • Strategic advise • Approves on yearly working plan • Monitors progress
IAP	Representation of prominent, experienced researchers from international research organizations and business, e.g. Edina, JRC, GSDI, NofN, OGC, Oracle, Google; 1x year	<ul style="list-style-type: none"> • Strategic advise • Review • Advise in international matters (cooperation, harmonization,...)
Directors	Director of Science (TUD) Director of Infrastructure (TUD Library) Director of Living Lab (IIP-Geo) 1x month	<ul style="list-style-type: none"> • Secretary of the board • Responsible for realizing M4S Facility (final responsibility is within the board) • Daily management



Business case

- Libraries actively involved
- Partners contribute where possible (data, experience, software...)
- No doubling of activities, developments
- Central coordination TU Delft (standardization)
- Hardware decisions not too early (and phased), due to lower prices in the future zo
- Lean en mean Maps4Science support bureau
- **Two years of development** for (first version) Maps4Science Facility
- **Five years of production** of new facility (continuous improvements)
- Existing (local) facilities are first two years called Maps4Science
- Next few weeks, more detailed program (who does what)

Block	Work Packages	MEuro	Partners (initial)
Infrastructure block	Spatial Cyber Infrastructure	2,8	TUD,UT,DANS,VU,WU,UU,G
	R&D geo governance (DRM)	1,0	UvA,TUD,DANS
	R&D GII	1,0	Alterra,NLR,TUD
	Personnel	3,9	TUD,UT,VU,UU,WU
	Housing & office & communic.	0,6	TUD
	Transition (decommissioning)	0,6	TUD,UT,DANS,VU,WU,UU,G
	Maintenance	3,0	TUD
	Evaluation and improvements	1,0	TUD
	Customization educational needs	1,2	VU,TUD
	<i>Subtotal</i>	15,3	
Science block	GII Science case	4,2	TUD,WU,UT
	Demonstration science use cases	1,9	TUD,UvA,UT,WU,VU,NLR
	<i>Subtotal</i>	6,1	
Living Lab	Testbed facility, Live city lab, Layar visualization, Multiscale & Gaming simulation	1,4	IIPGeo,TUD,G(eonovum), GBN,NCG,SAGEO (Business & Government)
Total		22,8	

Future (after the 2+5 years) project

- Currently, all project partners spend resources (staff, money) on local facilities (already for many decades)
 - Boards (rectors, deans, directors) have indicated to provide at least 25% own funding during live time project
 - Use of facility should be well proven during lifetime project
- **Partners (and supporters) will continue with facility after project in most appropriate embedding (TUD Library, DANS, SURF,...)**

Time is right → Content is becoming more available

- 'Verhagen plaatst open data hoog op Digitale Agenda', in Automatisering Gids by Rolf Zaal;
- 'Toepassing van de Wet openbaarheid van bestuur (in Dutch), brief van de Minister van BZK over Open Data bij de overheid;
- 'Toegang tot Onderzoeksdata', SURFshare report, Stichting SURF;
- INSPIRE and 'Basisregistraties' are will provide results;
- 'Een nationale satellietdatabank als horizontaal thema binnen de topsectoren!' (Nieuwsbericht' Min ELI, 04-10-2011);
- Min I&M stelt vanaf 1 januari 2012 de Basisregistratie Topografie gratis beschikbaar;
- 'OGC Plan for White Papers on NSF Earth Cube'.

→ No other GOF except generic ICT does support such a large amount of researchers

Link to generic ICT GOF 'Building the e-Infrastructure'

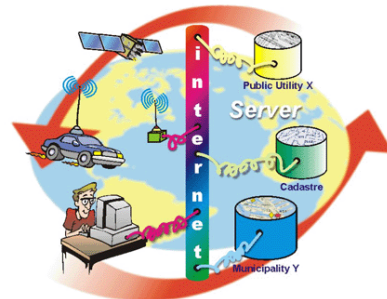
1. René van Schaik (Netherlands eScience Center)
2. discussion GOF-GOF connection to support Maps4Science needs:

'traditional' datasets of an estimated volume growth of 200 TB/year and 'non-traditional' datasets (such as sensor network data, VGI, LBS and other sources) of between 500 TB and 1000 TB/year resulting in a total storage (and processing) capability of 7 PB. Some important connections must be based on optical pathways to ensure fast and seamless access.

3. Netherlands eScience Center/ SURF Foundation/ SARA:
 - generic grid computing infrastructure (BiGGrid),
 - fast network connections and
 - substantial available data storage

"Doctor, take your own medicine..."

- (nearly) all scientists need geo-information, not only the geo-related disciplines (but also archaeology, epidemiology, engineering, social sciences, etc.) → data intensive science
 - Proposal for large national research facility: Maps4Science (2+5 years project, 22.8 meuro)
 - Dutch geo-data provides support
 - Node in international network; e.g. EDINA
 - Make best GII: 3D/time/scale, semantics, upload, large data, remote processing, data policy
- www.maps4science.nl



Supporters national (1/2) (red = new after 31 aug'11)

- SURF, Prof. dr. W.B.G. Liebrand
- Netherlands eScience Centre, Prof. dr. Jacob de Vlieg
- Kadaster, Dr. ir. M.A. Salzmann
- TNO | Geological Survey of the Netherlands, Dr. M.J. v/d Meulen
- KNMI, Royal Netherlands Meteorological Institute, Dr. G.H.J. v Oord
- RWS-DID, Rijkswaterstaat, Data-ICT-Dienst, Ir. Arie Versluis, MBA
- AHN Programme, Ir. R. van der Velden
- Het Waterschapshuis, Drs. J.W.A. van Enst
- The Hydrographic Office (Def), Kortenoeven, Kapitein ter Zee
- PBL - Netherlands Environmental Assessment Agency, Ir. R. v/d Berg
- Netherlands Space Office, Dr. G. Nieuwpoort

Supporters national (2/2)

- Geo Business Nederland, Drs. E.H.T.M. Nijpels
- Geomatica Business Park, Prof. ir. J. Stuip
- Noldus Information Technology, Dr. L.P.J.J. Noldus
- KNAW-NCG, Netherlands Geodetic Commission, Prof. dr. ir. M. Molenaar
- **GeoFort, Drs. Willemijn Simon van Leeuwen**
- Next Generation Infrastructures, Prof. dr. ir. M.P.C. Weijnen
- Stichting Arbeidsmarkt Geo, H. Westerbeek, MSc
- ICT Innovation Platform for Geo-information, Ir. Th. Thewessen
- **Ministry of Infrastructure and the Environment (I&M), Drs. H.W.J. Ovink**
- **Ministry of Economic Affairs, Agriculture and Innovation (ELI), Drs. J. Gooijer**

Supporters international

- OGC, Open Geospatial Consortium, Mark E. Reichardt
- Geoide Network, Canada, Prof. dr. Nicholas Chrisman
- CRC-SI, Cooperative Research Centre for Spatial Information, Australia, Dr. Peter Woodgate
- KU Leuven, Instituut voor de overheid, Dr. Joep Cromptvoets
- **ISO/TC 211 Geographic information/Geomatics, Olaf Østensen**
- **EuroSDR, Jean-Philippe Lagrange**
- **EDINA, UK National Data Centre (Uni Edinburgh), Peter Burnhill**
- **GSDI, Global Spatial Data Infrastructure Ass, Dr. Abbas Rajabifard**
- **AGILE, Danny Vandenbroucke, MSc**
- **EuroGeographics, Dave Lovell, OBE FRGS CGeog**
- **Oracle, James K. Steiner, Vice President Server Technologies**

Pending support letters

- National
 - Deltares
 - NMDC (National Model and Data Centre)
 - CBS
 - Dataland
- International
 - Google
 - ESRI
 - Microsoft
 - IBM

GI Use in science

GI Use in science

The spread of epidemics

Products

- *A national radar for infectious diseases*
- *Data-driven epidemics forecasting*
- *Mitigation tools and forecasts for decision-makers*

Points of departure

Epidemics:

Rapid as in infectious diseases: Influenza, Pertussis,

Lyme

Slow as in Obesity

require strict surveillance

Important parameters are

Human behaviour (social contacts, mobility)

Man-made & natural environment

On all these fronts, important new quantitative data

sets are becoming available from

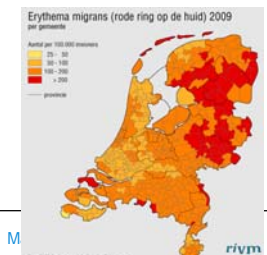
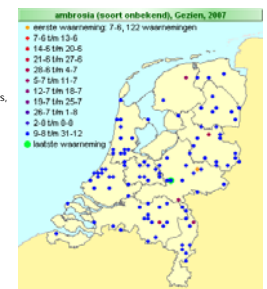
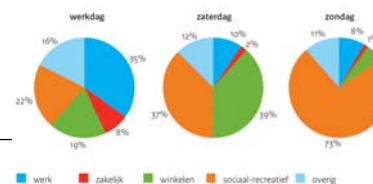
Official source holders

Government open data

Sensor networks

Citizen volunteering

Social networks



GI Use in science

Improved water management

Products

All geoinformation relevant for water management

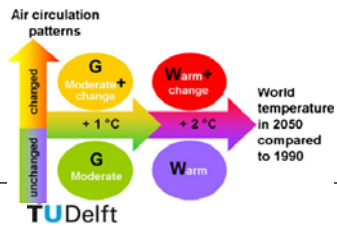
at the finger tips

High space/time resolution hydrological and

hydraulic modelling

Monitoring tools for dikes, urban rainfall run-off,

water table levels



GI Use in science

Points of departure

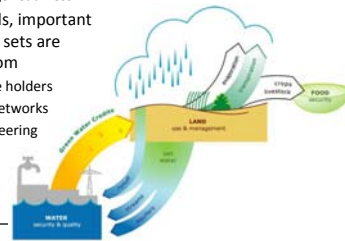
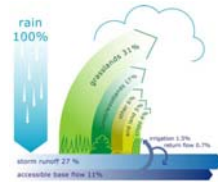
• Water as all important resource for human life

• Netherlands an important knowledge hub in domains of

- Data acquisition
- Water treatment and recycling
- Water crises: draughts, floods
- Water efficiency in agriculture
- Adaptive water management
- Coastal zone and delta management
- Climate change readiness

• In many of these fields, important new quantitative data sets are becoming available from

- Official source holders
- New sensor networks
- Citizen volunteering



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GI Use in science

GI as crime reduction tool

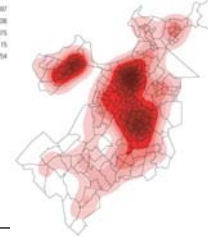
Products

Models for crime forecasting for the policy-maker

Improved spatial planning for the crime-aware

urban planner

Density map of burglary locations per square mile



TU Delft

GI Use in science

Points of departure

• Important crime types:

- Crime against property
- Crime against person

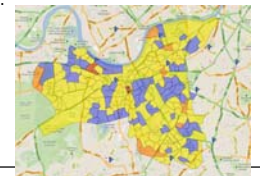
show erratic patterns in space and time, even though many (but untested) explanatory models exist

• Important environmental parameters are

- Land use over time
- Land and property value
- Accessibility
- Lighting conditions

• On all these fronts, models have remained untested due to lack of data. These are now becoming available from

- Official source holders (a.o. police, insurance companies)
- Government open data (city 3D)
- Sensor networks
- Citizen volunteering
- Social networks



Maps4Science

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