



# **FUTURES OF GEOGRAPHIC INFORMATION IN A DIGITALISING SOCIETY**

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European Forum for Geography and Statistics,  
Helsinki 2018**

# DIGITALISING SOCIETY

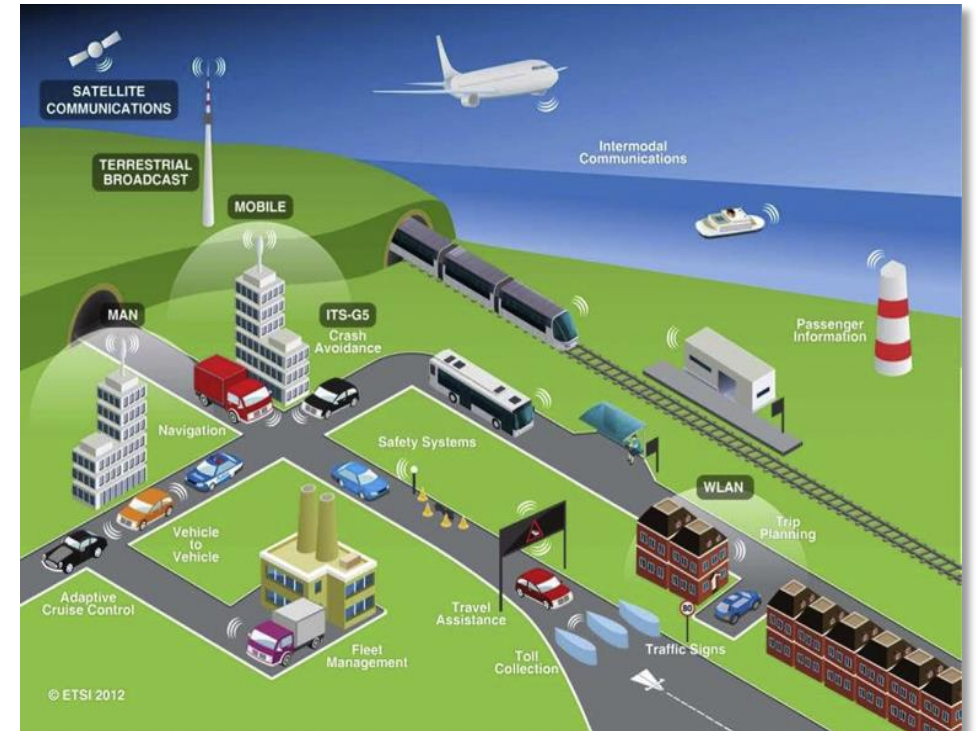
A societal form in which vast amounts of data are gathered and utilised through different kinds of digital systems and infrastructures, both distributed and centralised

## Intelligent city



Kukka et al. 2015

## Intelligent transport system



European Telecommunications Institute cit.  
Leviäkangas 2016

# SELECTED PROSPECTS FROM RESEARCH LITERATURE

Ubiquitous cartography (Gartner 2007)

Volunteered geographic information (Elwood 2008)

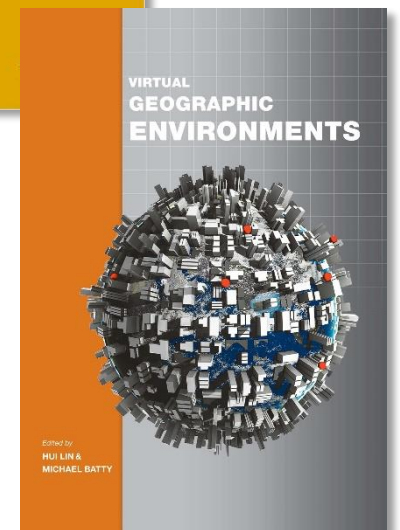
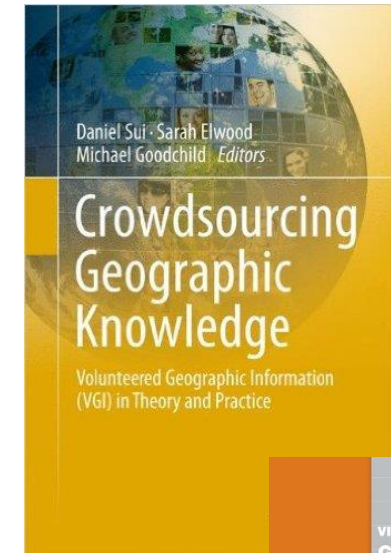
Crowdsourcing geographic information (Goodchild & Glennon 2010)

Geographic information and “big data”: will automatic calculation change how we understanding research contexts (Boyd & Crawford 2012; Kitchin 2013); big data hybrids (Lazer et al 2014)

Data-driven geography (Miller & Goodchild 2015)

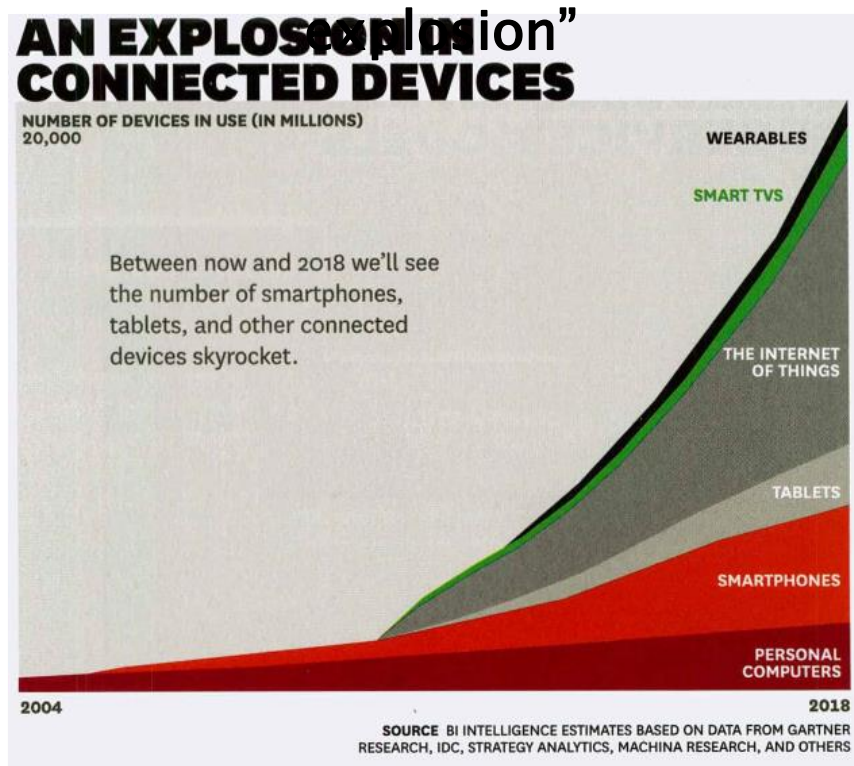
Algorithmic geography (Kwan 2016)

Intelligent cities, urban “big data”, urban intelligence (Boche 2016)



# AN “EXPLOSION OF GEOGRAPHIC INFORMATION”?

Emerging “connection



Iansiti & Lakhani 2014

Geographic information can be harnessed basically “from everywhere”

- Emerging Internet of Things (IoT) will combine working, home and personal environments: information devices, building services, refrigerators, intelligent clothing...
- Sensors will be “all around”: environmental sensors, sensors mixed with paints, sensors controlling the production and transportation of foodstuffs, sensors for domestic animals, soil sensors, infrastructure sensors...
- Intelligent urban environments: street lighting turns on when needed, management of infrastructures...

I argue that the development will lead to an “explosion of geographic information”

How to control this “explosion”?

What kind of societal regulation will be required?

# ON GEOGRAPHIES OF EMERGING TECHNOLOGIES



## Location and geographic information

- Key question is how location or geo-based technologies will be utilised in society and in living environments
- Technological development is going towards immersive solutions, that is, operations in virtual spaces and virtual worlds
- Societal tensions between virtual and physical locations; virtual and physical experiences

# PROSPECTS: AUTOMATED TRANSPORT AND GEOGRAPHIC INFORMATION

## Drones

- Regulation in many countries have changed towards more enabling directions for drones
- It has been shown in practice that drones can do e.g. packet deliveries, assembling tasks and different kinds supervision and monitoring tasks
- Regulation for flying of drones beyond visual line of sight is already emerging



## Maritime transport

- Automated vessels are developed and tested for water transport
- Vessels could utilise wind power, wave power and solar power
- Loading and unloading can also be automated



# PROSPECTS: REAL-TIME 3D MODELLING OF THE ENVIRONMENT

Novel 3D cameras and laser scanners, new algorithms and increasing processing efficiency have enabled real-time 3D modelling of the environment

Nokia's OZO camera realises professional 3D content almost in real-time

Lidar systems for robot cars have developed rapidly

These solutions will be central in the development of automatic mobility

*Applications:* robotics, transportation, industry, commerce, services, entertainment, education, security

**This technology will have direct impacts on how geographic information will be collected, organised and understood in the future.**



# PROSPECTS: VIRTUAL GEOGRAPHIC INFORMATION?

## Augmented reality

- Insertion of digital components in the everyday environment
- First “hype” was Pokemon Go

## Virtual services and virtual reality

- Examples: Uber, Airbnb, Be My Eyes, online doctor organised by Google, Wikihouse, Opendesk and Flipboard
- In the future it is possible to spend longer periods in virtual worlds via AR glasses and immersive technologies

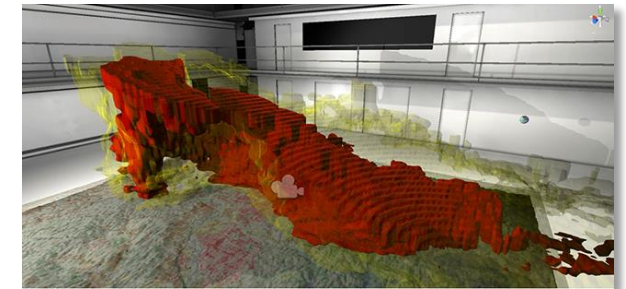
## Gamification of co-operation and society

- Strategy games in the web
- Gamified systems in organisations: identification of targets, intensification of co-operation capabilities, removal of unnecessary hierarchies

**In the future, people can switch “locations” between real world, augmented reality and virtual worlds.**

**How to take into account the relations between these “layers of reality”?**

**What will be the “virtual geographic information” of the future?**





# PROSPECTS: IDENTIFICATION TECHNOLOGIES

## Character recognition

- Character recognition has rapidly become common via algorithms and learning AI systems
- Psychosis (speech), cancer (optical), brain stroke (bodily signals)

## Human recognition (DNA, face)

- DNA readers: Graig Venter has developed an application, already in the commercialisation phase, that is able to produce a facial picture from a DNA sequence
- For example, Facebook identifies humans even from the pictures that have been taken from different angles

## Projection and automated recognition of emotions

- Facial expressions and motions can be used to detect human emotions
- This can be utilised when developing e.g. robots, visual phone services, interfaces that measure user emotions and therapeutic applications

**Will identification technologies enable new kinds of elements in geographic information?**

**How will we control who is collecting location specific information about us?**



Spielberg/Kubrick:  
A.I. - Artificial Intelligence

# OPEN QUESTIONS ON REGULATION AND ETHICS

**Will people be “mapped” all the time, everywhere?**

- Will we live in an “aquarium society”, as suggested by futurist Mannermaa (2008)?

**Question of transparency**

- Is it desirable for people to be located all the time? Under which conditions?
- Can the development be affected? How?

**Ethics of artificial intelligence (AI)**

- What kinds of limits should be set to development of AI solutions?
- Several public intellectuals and technology developers have expressed concerned views about AI

**Ethics of algorithms**

- Who is regulating the use of algorithms?
- Will it be politician, government official, CEO of a software company,

# CONCLUSIONS

Geographic information will be central component in the future technology environment (data, artefacts, systems)

Geographic information will be widely utilised in everyday living environments, in research and in business development

Questions related to transparency and regulation of geographic information will be among key societal themes in the future digitalising society



**THANK YOU!**

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