

Săptămâna Geodeziei Românești
Romanian Surveying Week

23-28 September 2019
Cluj-Napoca, Romania

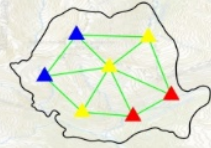


Spatial Information Management: Now and Tomorrow

Hartmut Müller, Germany

Wednesday, Sept 25, 2019, Plenary Session Keynote Speakers Presentation

Romanian Surveying Week 23-28/09/2019
University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania



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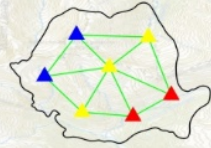
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USAMV
Cluj-Napoca



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Fédération Internationale des Géomètres
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Spatial Information Management

Now



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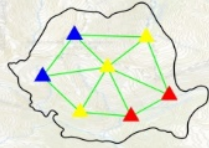
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Disruptive Innovation at beginning 20th century

Easter morning 1900: 5th Ave, New York City. Spot the automobile.



Source: US National Archives.



Disruptive Innovation at the beginning of the 20th century

Easter morning 1900: 5th Ave, New York City. Spot the automobile.

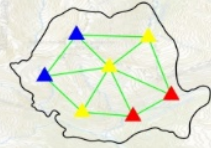


Source: US National Archives.

Easter morning 1913: 5th Ave, New York City. Spot the horse.



Source: George Grantham Bain Collection.



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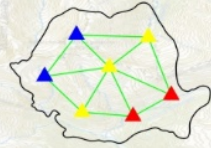
Disruptive Innovation at the beginning of 21th century (?)

2005

Pope John Paul II → Pope Benedikt XVI



<https://www.spiegel.de/panorama/bild-889031-473266.html>



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Disruptive Innovation at the beginning of 21th century (?)

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Pope John Paul II → Pope Benedikt XVI



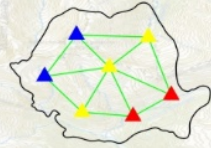
<https://www.spiegel.de/panorama/bild-889031-473266.html>

2013

Pope Benedikt XVI → Pope Francis I



<https://www.spiegel.de/panorama/bild-889031-473242.html>



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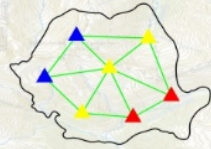


Selected current trends and digital technologies in SIM

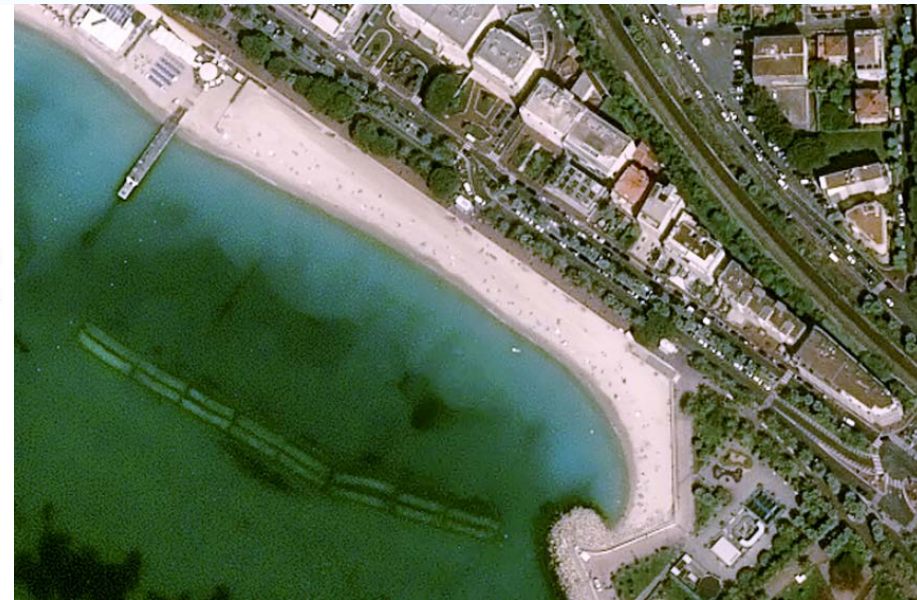
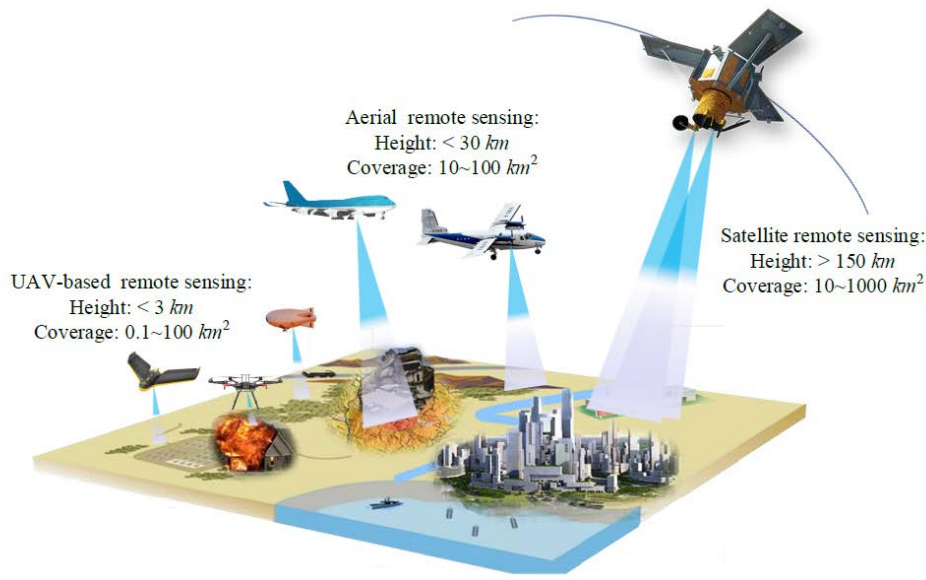
Earth Observation

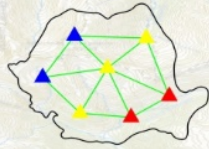
Global Navigation Satellite Systems GNSS

The ,Open‘ Trend



Earth Observation



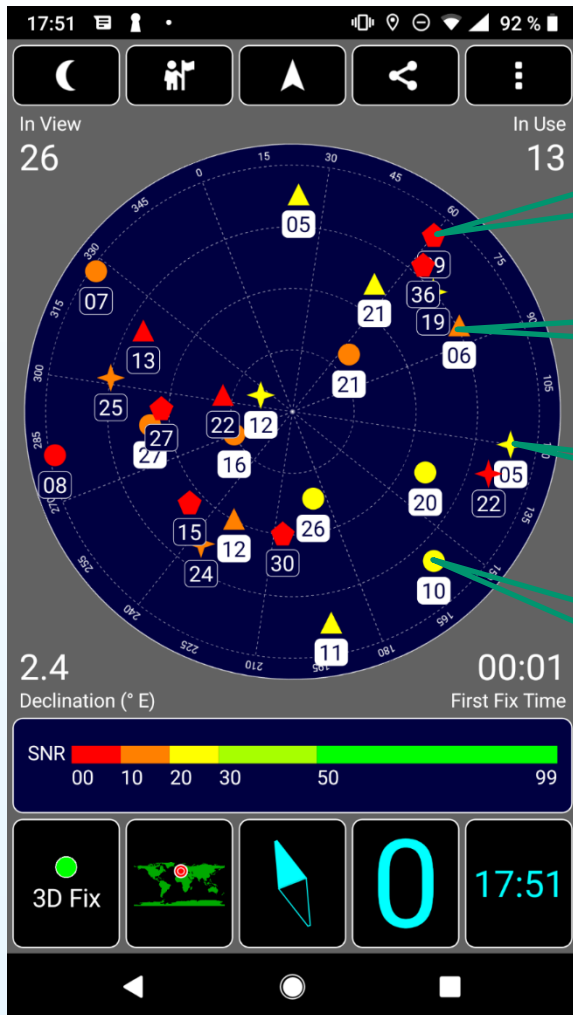


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GALILEO
European
Union



GLONASS
Russian
Federation



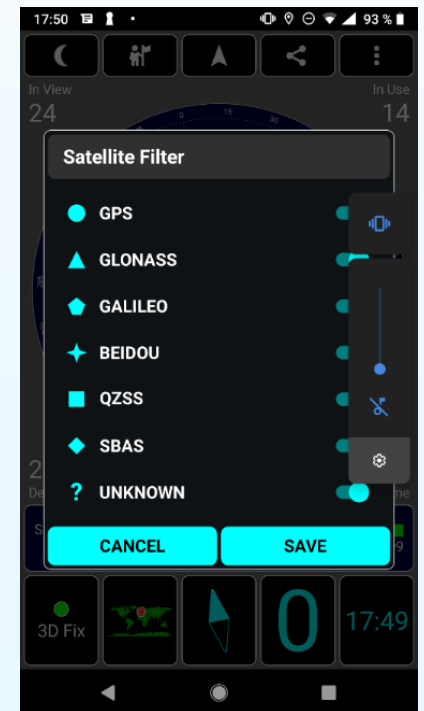
BeiDou
China

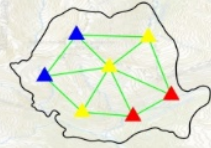


NAVSTAR GPS
United
States



Smartphone GNSS





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The ,Open‘ Trend

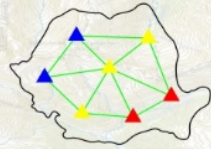
Open Source

Open Data

Open Government Data

Crowdsourcing

Volunteered Geographic Information



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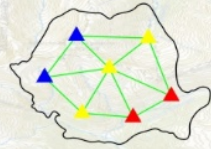


Open Source Software



Sentinel
Toolbox





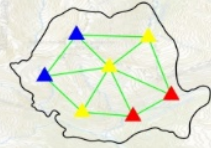
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Open Data - Open Government Data





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Discussion

Started November 8, 2018



Stephanie Poole

2.71 · Harper Adams University

Motivation of Volunteers to participate in Citizen Science projects and Surveys? Incentives? Love of the Topic? Education?

Hello, I am interested in everyone thoughts on what motivates a volunteer to participate in a survey of any form.

I am currently undertaking a literature review on citizen science and would like first hand experience reviews on why volunteers participated.

Thanks

Stephanie

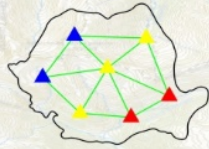
Volunteerism Surveys Citizen Science Citizen Participation Volunteering

Survey Archaeological Survey Architectural Survey Biodiversity Survey

Field Survey Geological Survey Geomorphological Survey Archaeological-Survey

Biodiversity-Survey

Open Data Crowdsourcing



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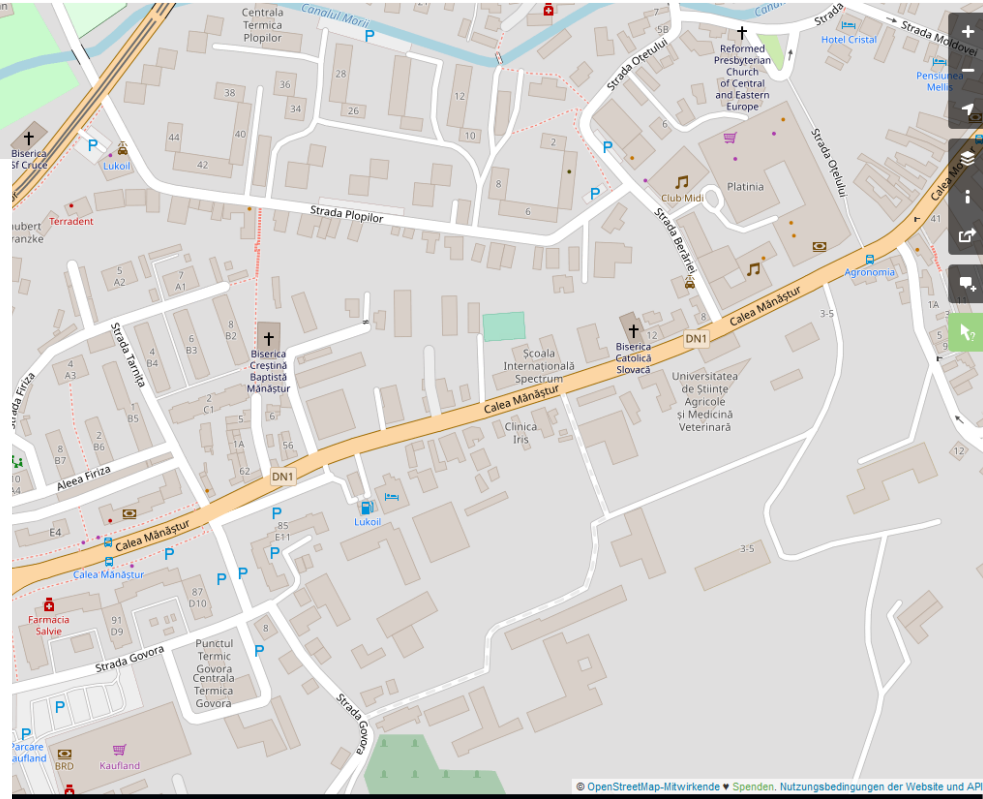
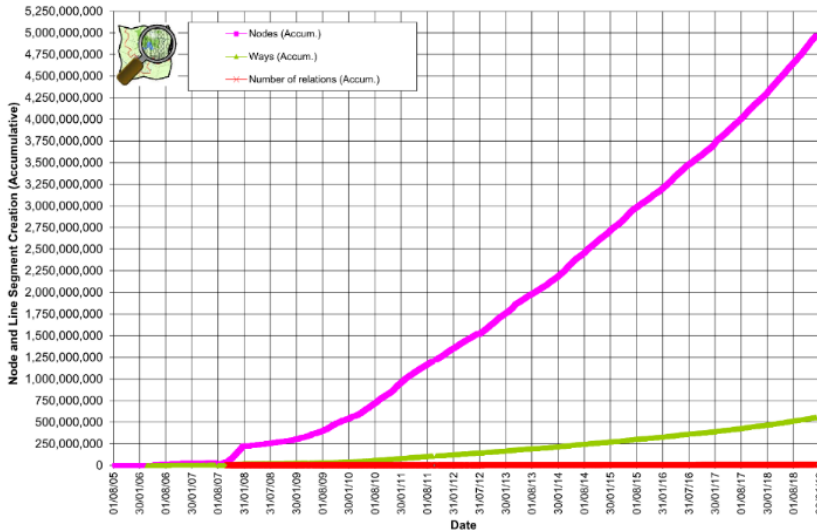
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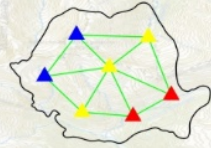


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Volunteered Geographic Information VGI

OpenStreetMap Database Statistics
Node, Way and Relation Creation





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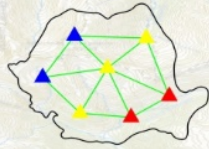
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Spatial Information Management

Tomorrow



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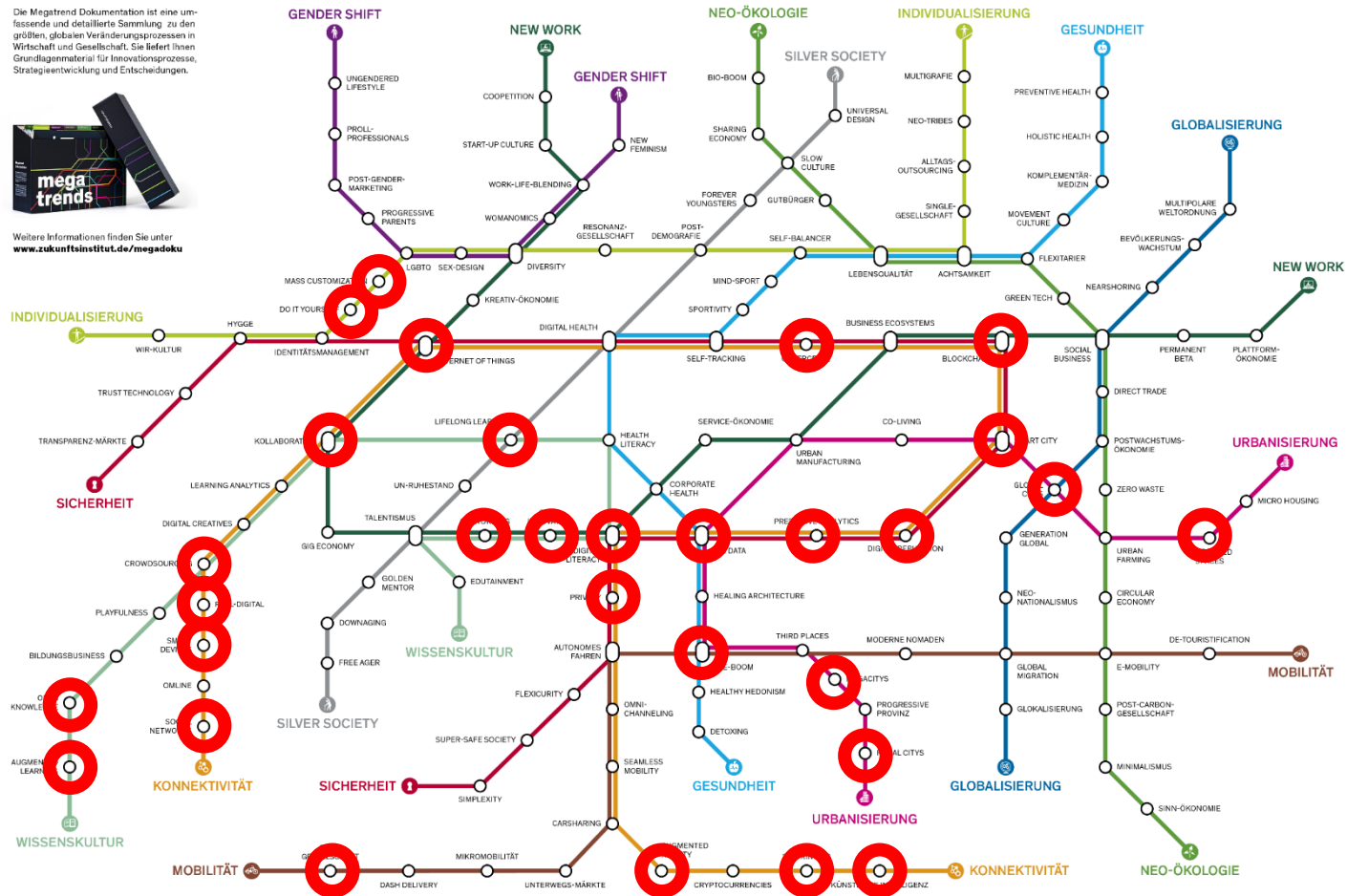
Megatrend Dokumentation

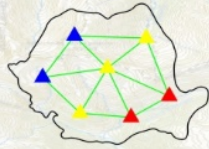
Die Megatrend Dokumentation ist eine umfassende und detaillierte Sammlung zu den größten, globalen Veränderungsprozessen in Wirtschaft und Gesellschaft. Sie liefert Ihnen Grundlagenmaterial für Innovationsprozesse, Strategieentwicklung und Entscheidungen.



Weitere Informationen finden Sie unter
www.zukunftsinstitut.de/megadoku

zukunftsinstitut





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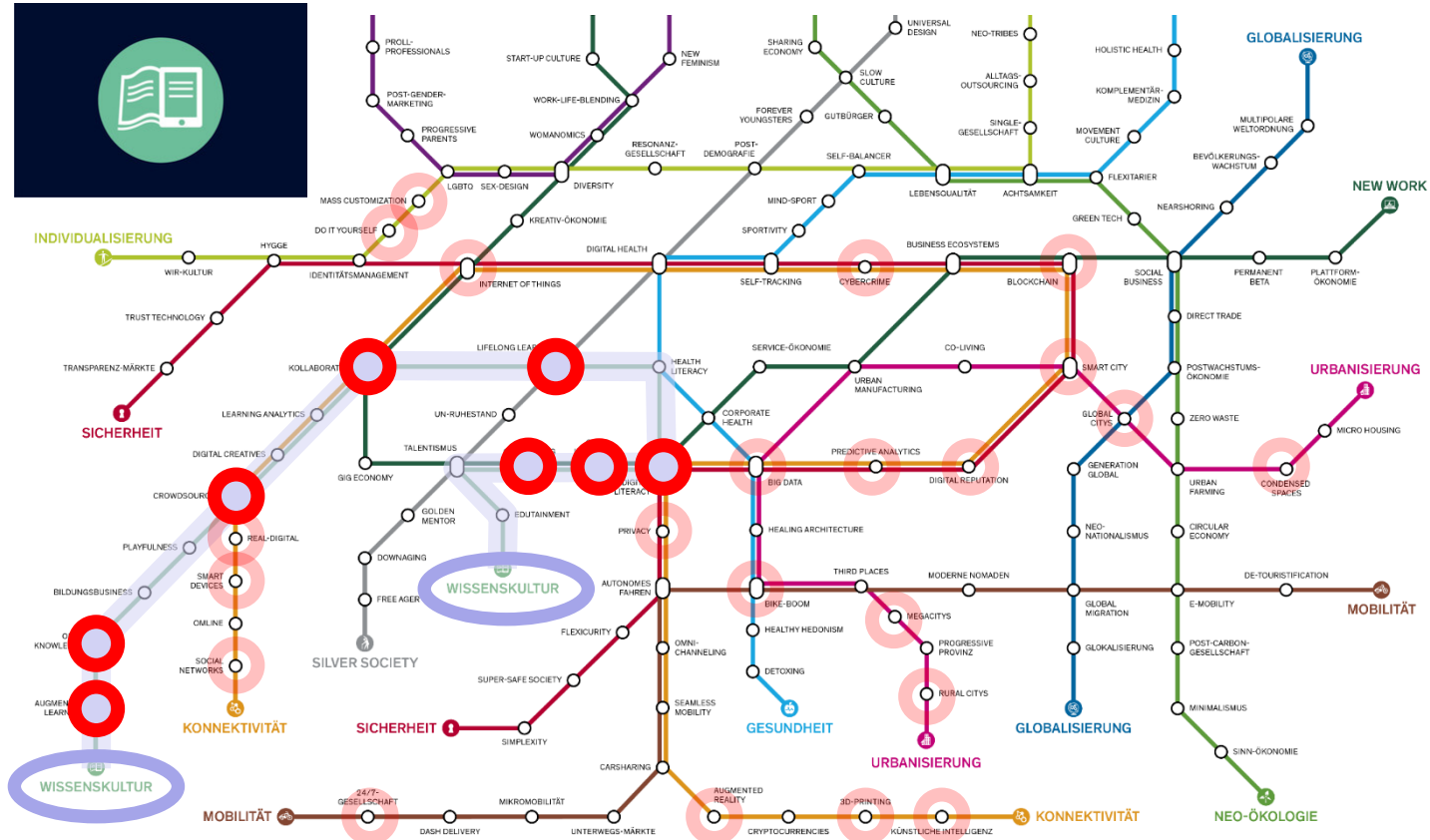
Megatrend Dokumentation

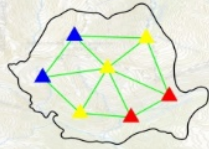
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Megatrend Knowledge Culture





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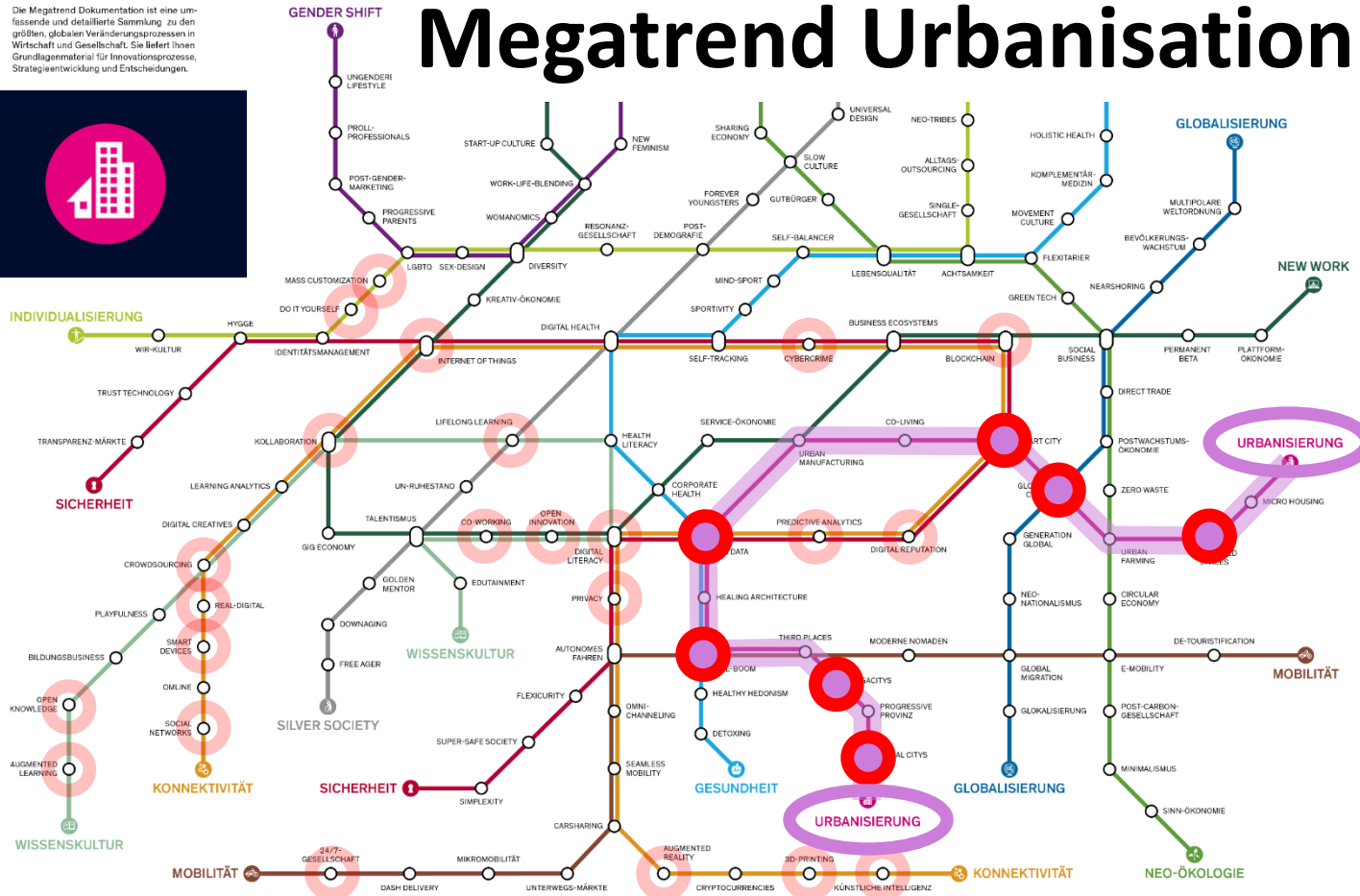
Megatrend Dokumentation

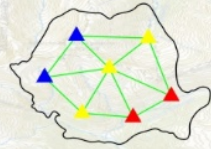
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Megatrend Urbanisation





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Megatrends \leftrightarrow Spatial Information Management

Knowledge Culture



Kollaboration
Edutainment
DigitalLiteracy
Crowdsourcing
OpenInnovation
DigitalCreatives
LearningAnalytics
AugmentedReality
LifelongLearning
HealthLiteracy
Co-Working
Playfulness
Talentismus

OpenKnowledge
Bildungsbusiness

Connectivity



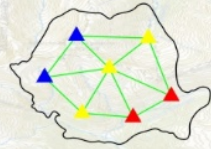
Real-Online
DigitalHealth
Privacy
Digital
Carsharing
BigData
Crowdsourcing
BusinessEcosystems
AutonomesFahren
3D-Printing
Cybercrime
Blockchain
Kollaboration
KünstlicheIntelligenz
DigitalLiteracy
LearningAnalytics
DigitalCreatives
SmartDevices
Selftracking
InternetOfThings
Omnichanneling
PredictiveAnalytics
SeamlessMobility
SocialNetworks

SmartCities

Urbanisation



MicroHousing
UrbanManufacturing
GlobalCities
SmartCities
Megacitys
ThirdPlaces
CondensedSpaces
Co-LivingRuralCitys
UrbanFarming
ProgressiveProvinz
HealingArchitecture
Bike-Boom
BigData



Geo-Computation

Smart City Management

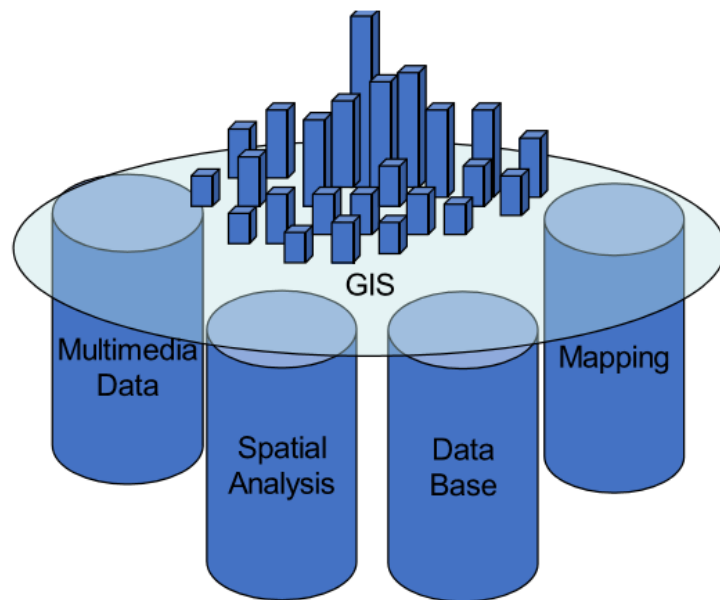


Figure 10. The four pillars of GIS.

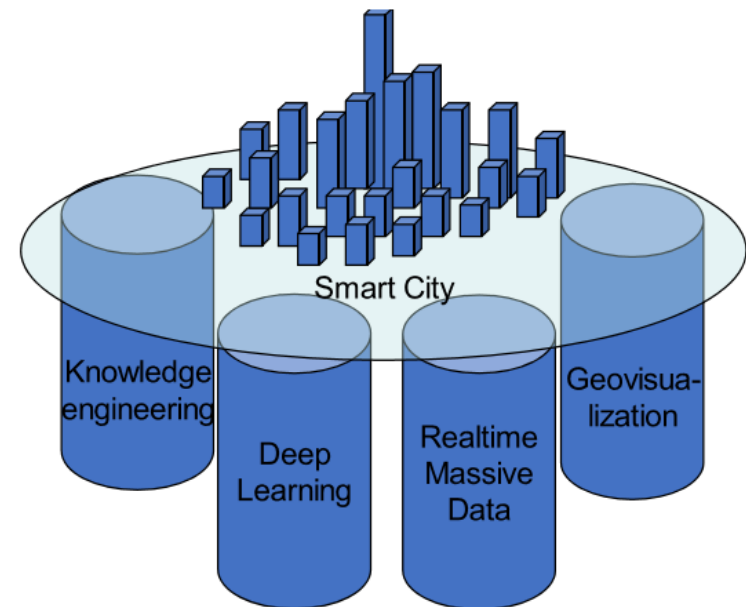
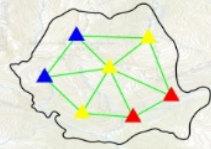
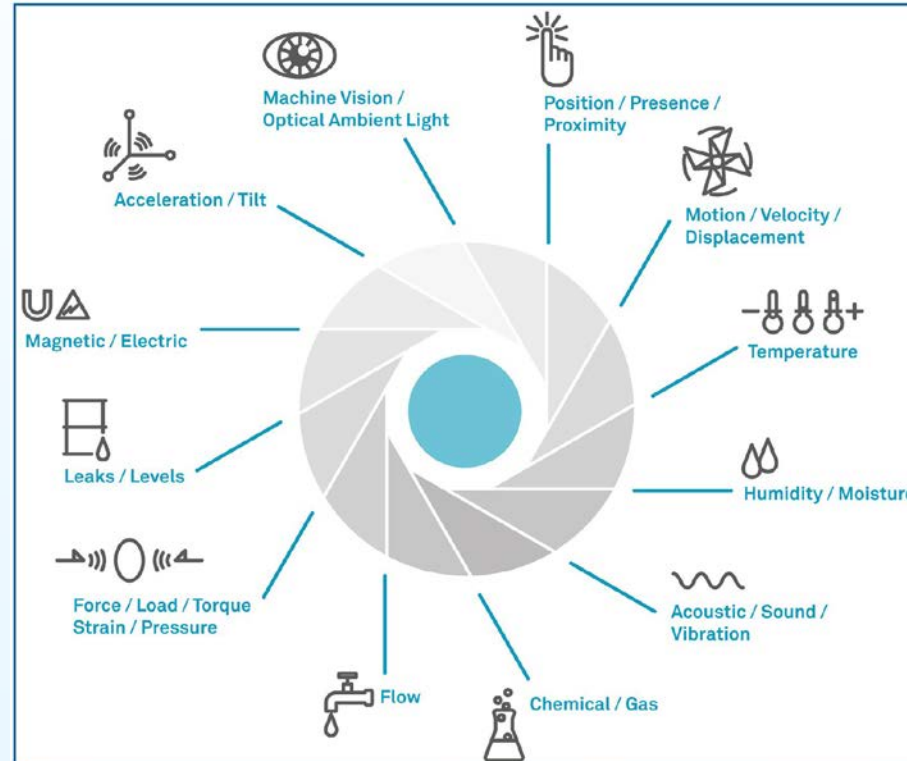
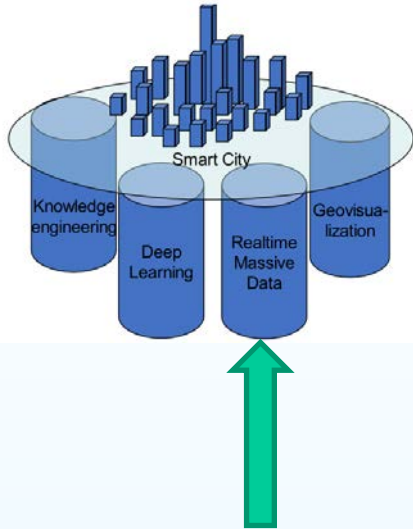


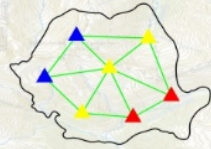
Figure 12. The four ICT pillars of Smart Cities.



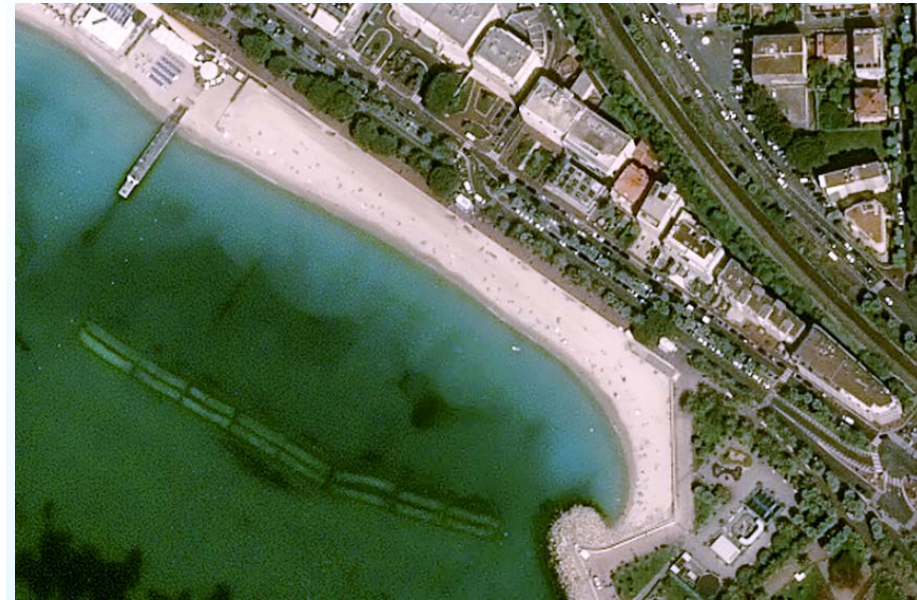
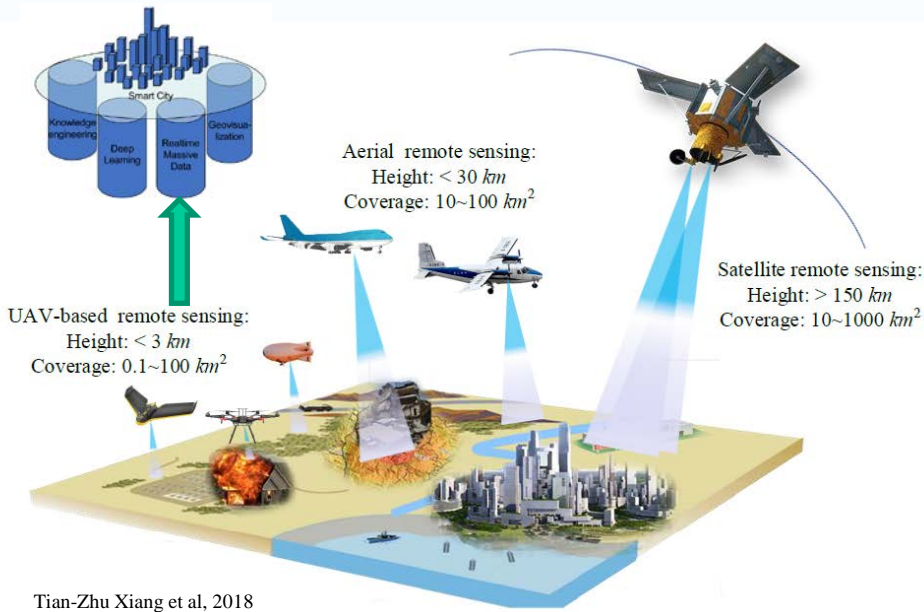
Further Development of Sensors

Miniaturisation, Heterogeneity, Big Data



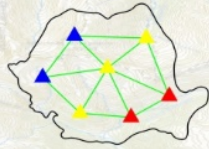


Further Development of Earth Observation



Airbus Constellation Key Features

Pléiades Neo (launch in 2020)	Swath 14km	Revisit capacity twice daily, anywhere	Resolution panchromatic: 30cm multispectral: 1.2m	Daily acquisition capacity: 2,000,000km ²
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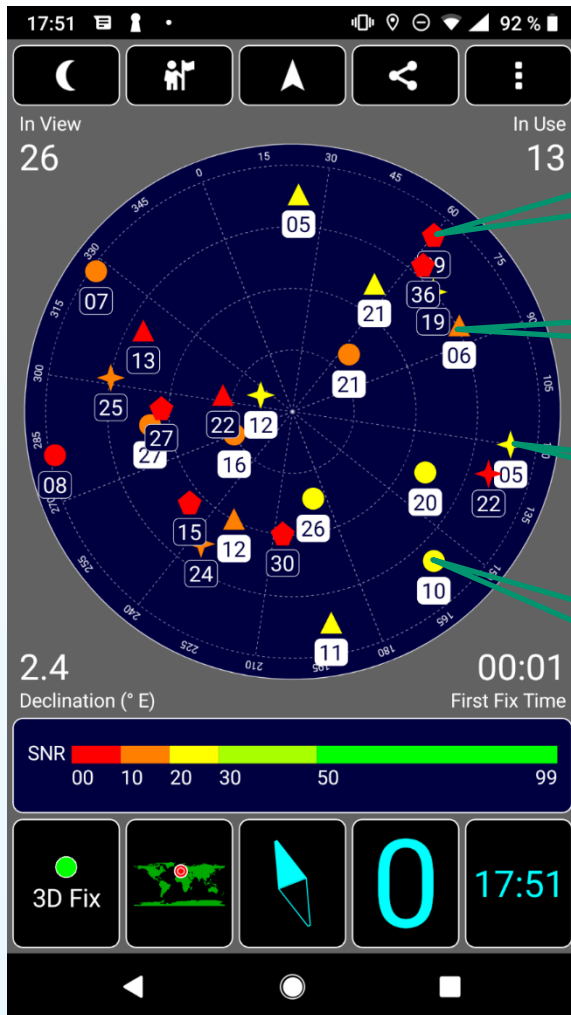
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Smartphone GNSS



GALILEO
European
Union



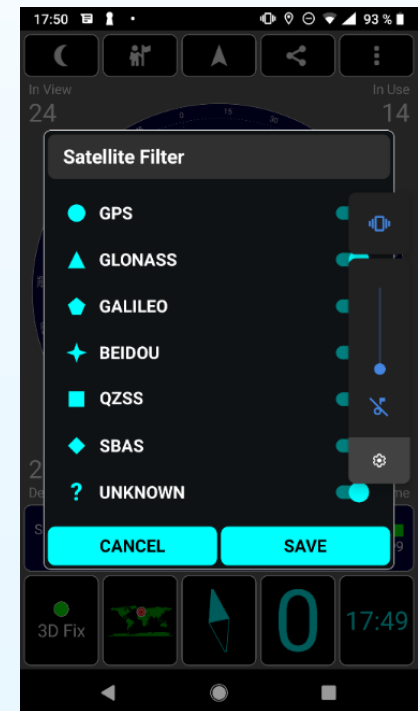
GLONASS
Russian
Federation

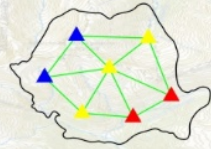


BeiDou
China



NAVSTAR GPS
United
States





High Accurate Positioning via Smartphone

23 Oct 2017 | 16:00 GMT

Superaccurate GPS Coming to Smartphones in 2018

Broadcom's mass-market GPS chips boost accuracy to 30 centimeters

By Samuel K. Moore

GPSTest

barbeauDev Tools

USK ab 0 Jahren

Supports dual-frequency* GNSS for:

- GPS (USA Navstar) (L1, L2, L3, L4, L5)
- Galileo (European Union) (E1, E5, E5a, E5b, E6)
- GLONASS (Russia) (L1, L2, L3, L5)
- QZSS (Japan) (L1, L2, L5, L6)
- BeiDou/COMPASS (China) (B1, B1-2, B2, B2a, B3)
- Various satellite-based augmentation systems SBAS (e.g., GAGAN, Anik F1, Galaxy 15, Inmarsat 3-F2, Inmarsat 4-F3, SES-5) (L1, L5)

Dual-frequency GNSS on Android devices



Sean Barbeau [Follow](#)

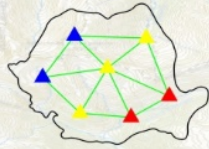
Apr 4, 2018 · 14 min read

L1+L5 support for GPS is here! ...or is it?

Does your device support L1 + L5?

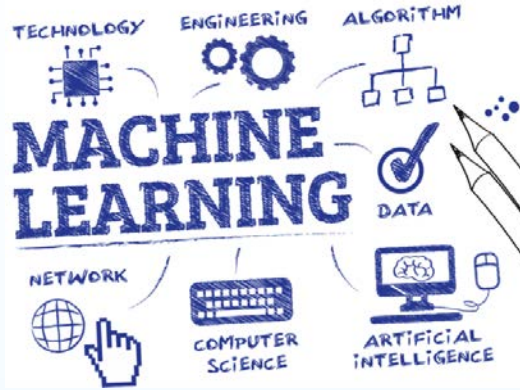
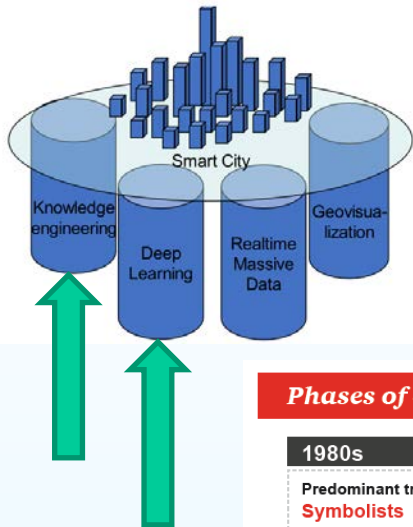
First, let's start with the easiest way to tell if your Android device supports both L1 and L5 signals.

Download [GPSTest](#) by barbeauDev from [Google Play](#) or [F-Droid](#) (full disclosure, I'm the developer of this [open-source app](#)):



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Phases of evolution

1980s	1990s to 2000	Early to mid-2010s
<p>Predominant tribe Symbolists</p>	<p>Predominant tribe Bayesians</p>	<p>Predominant tribe Connectionists</p>
<p>Architecture Server or mainframe</p>	<p>Architecture Small server clusters</p>	<p>Architecture Large server farms (the cloud)</p>
<p>Predominant theory Knowledge engineering</p>	<p>Predominant theory Probability theory</p>	<p>Predominant theory Neuroscience and probability</p>
<p>Basic decision logic: Decision support systems with limited utility</p>	<p>Classification: Scalable comparison and contrast that's good enough for many purposes</p>	<p>Recognition: More precise image and voice recognition, translation, sentiment analysis, etc.</p>



2020s+

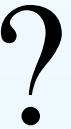
Predominant tribe
Connectionists + Symbolists + Bayesians + ...

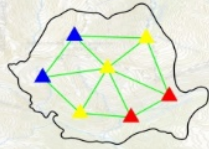
Architecture
Clouds and fog

Predominant theory
Networks when sensing, but rules when reasoning and acting

Spam classifier + **Non-spam classifier**

Simple sensing, reasoning, and actions: Bounded autonomy or human-machine interaction



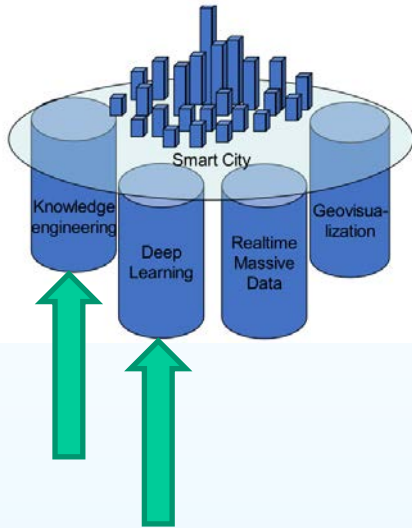


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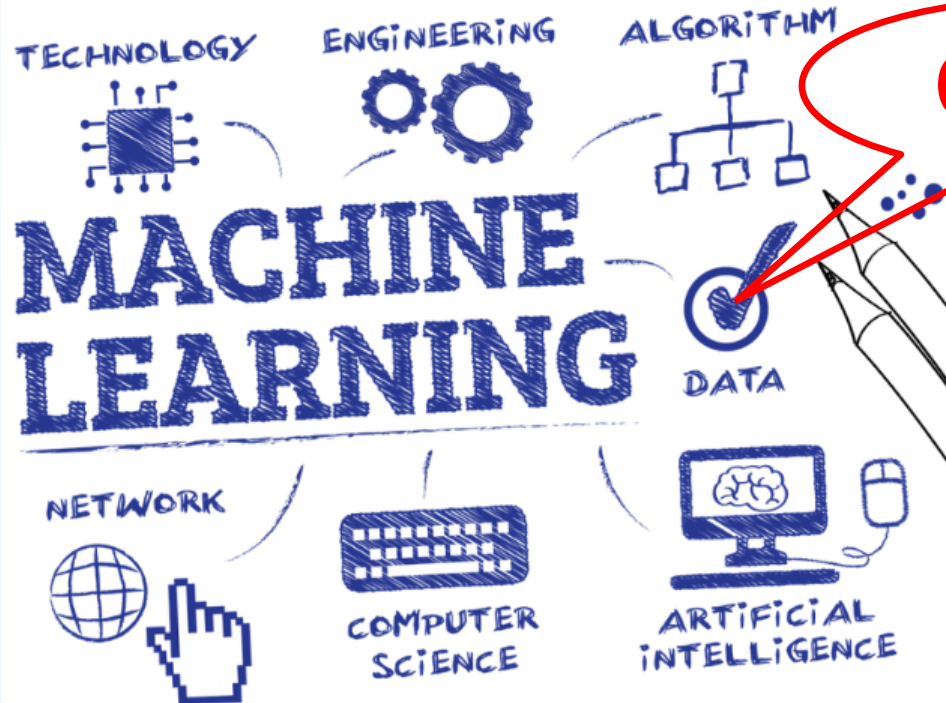


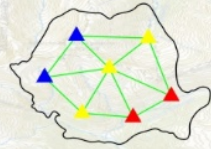
Madhav Mishra [Follow](#)

May 2, 2018 · 4 min read

What Is Machine Learning?

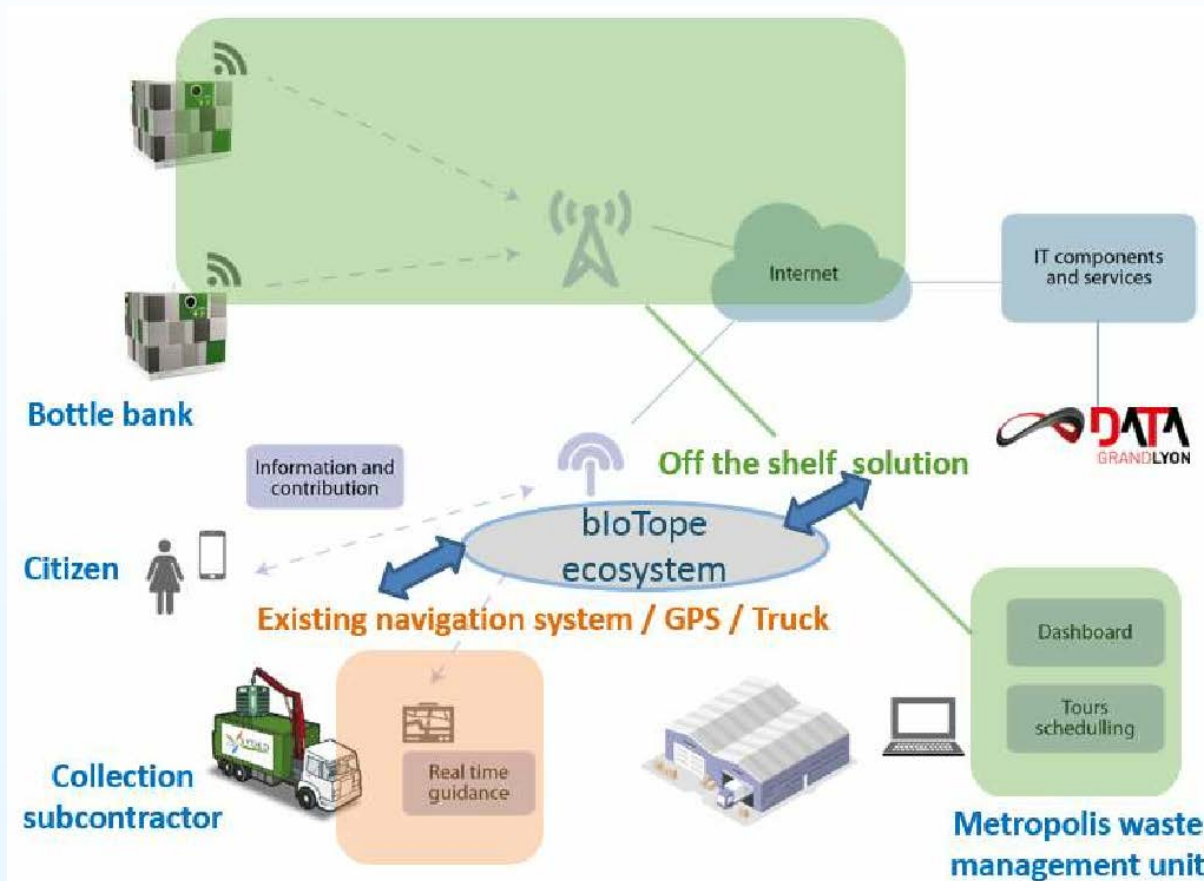
Machine Learning is the science (and art) of programming computers so they can learn from data.

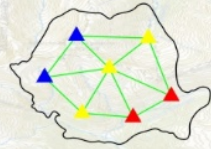




Smart City – Métropole de Lyon, France

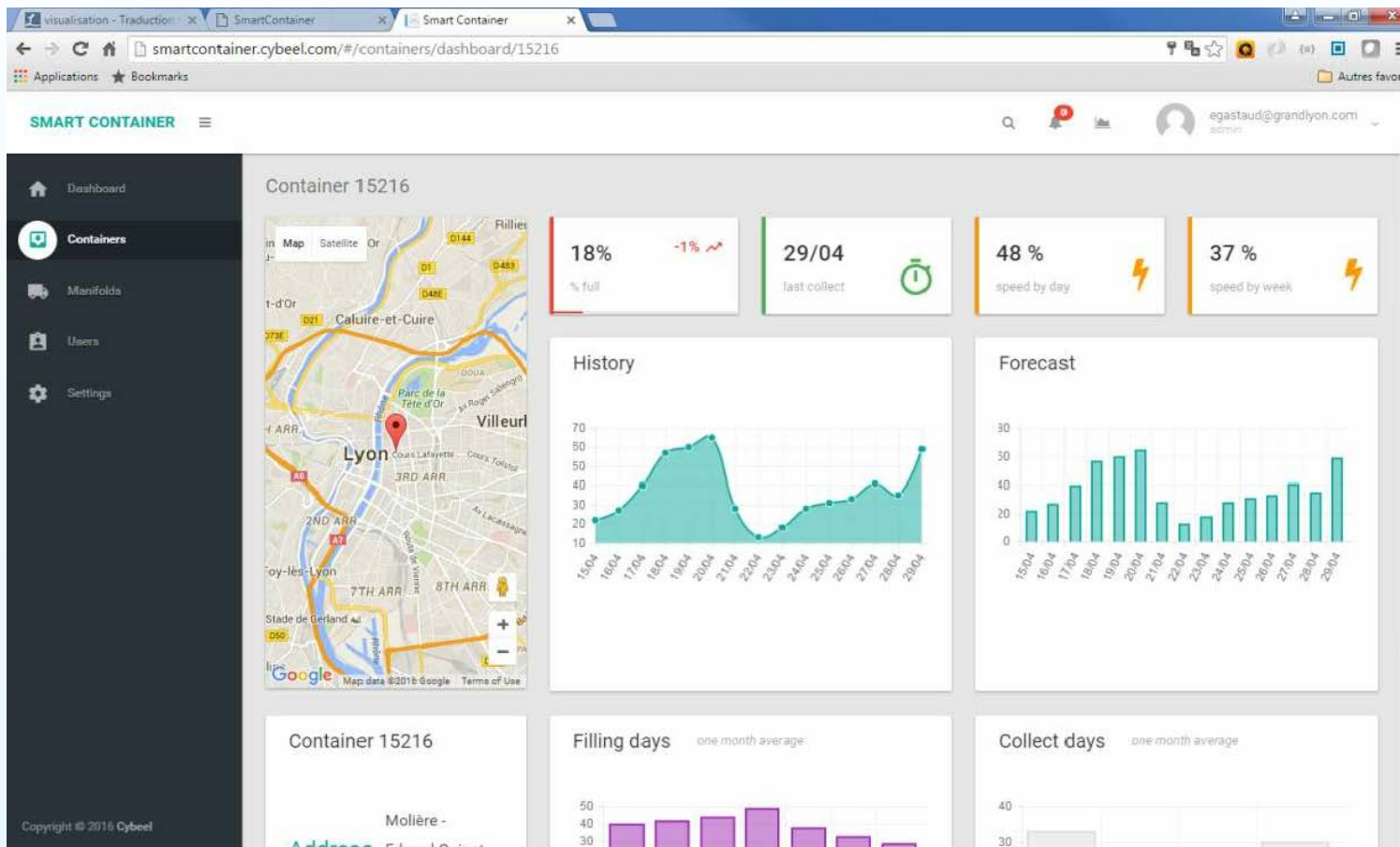
Use Case ,Used Glass Removal‘

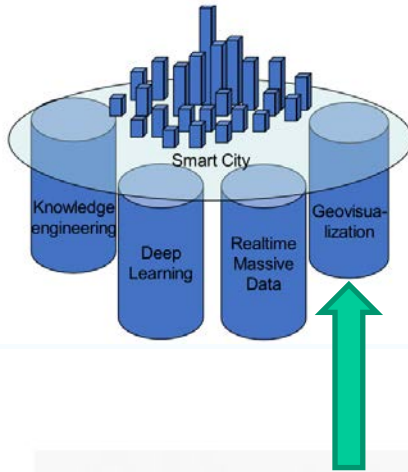
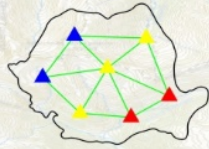




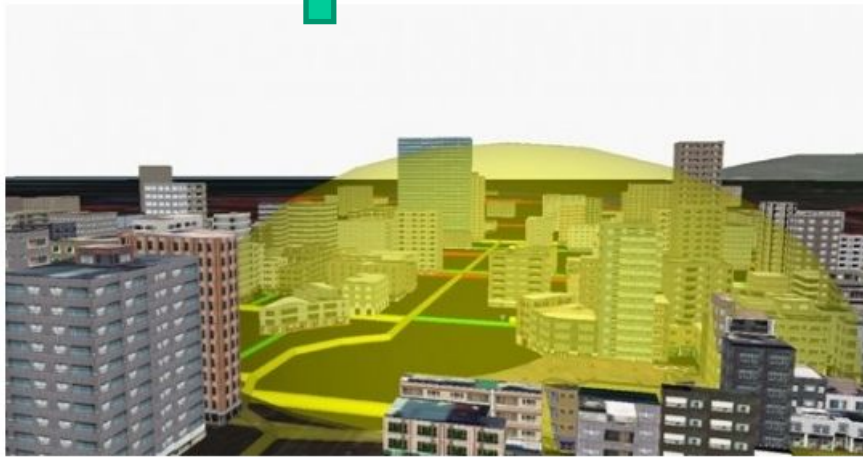
Smart City – Métropole de Lyon, France

Use Case ‚Used Glass Removal‘



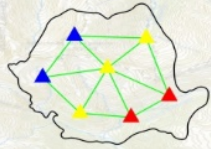


Geovisualization



3D influence zone of a gas explosion (yellow)



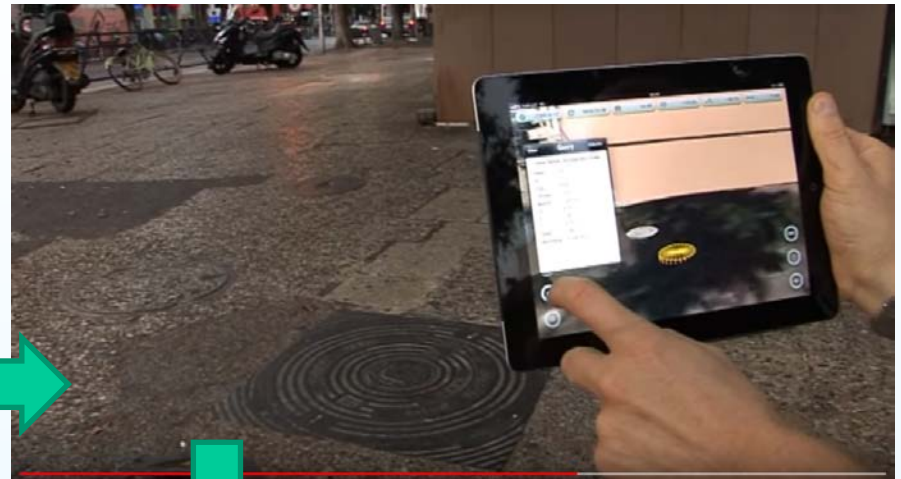


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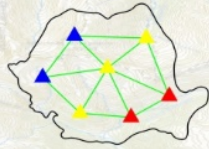
International Federation of Surveyors
Föderation Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieurinnen
FIG COMMISSION 3
Spatial Information Management



Augmented Reality

Sivan design

www.sivandesign.com/3d-gis

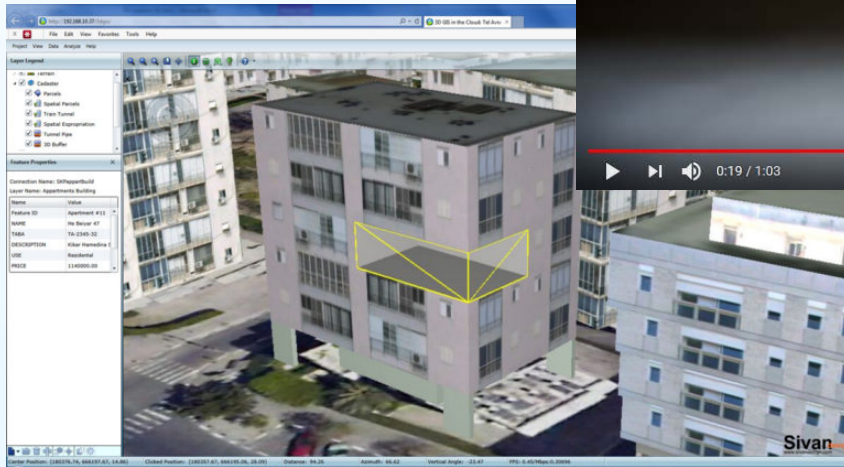
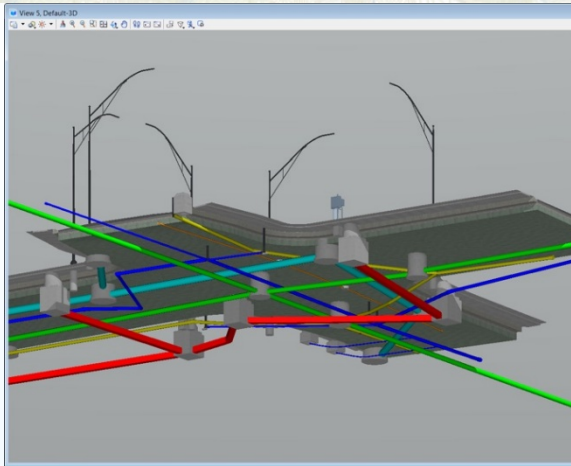


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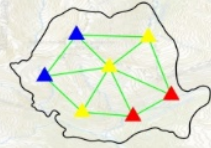


International Federation of Surveyors
Föderation Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure
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Spatial Information Management



https://www.youtube.com/watch?time_continue=141&v=PLh7EyiKvm4

<https://sivandesign.com/products/3dgis/cadastre/>



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Technology \leftrightarrow Society

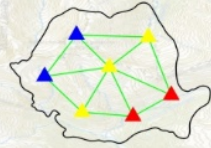
Data Protection

Data Privacy

„Algorithms“

Cyber Crime

Ethics



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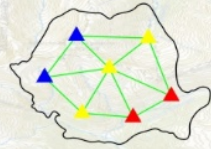


Thank you!



mailto: hartmut.mueller@hs-mainz.de
web: <http://i3mainz.hs-mainz.de>





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FIG COMMISSION 3 Annual Workshop Cluj-Napoca, Romania, 23 – 26 September, 2019



**“Advances in Geodata Analytics for Smart Cities
and Regions”**