

European
Global Navigation
Satellite Systems
Agency



EGNOS

NAVIGATION SOLUTIONS
POWERED BY EUROPE

Galileo in Smart Cities and Mobility

Fiammetta Diani

Head of Market Development - European GNSS Agency

Milano Smart City, 14 November 2019



The European GNSS Agency



- We are in charge of managing operations and service provision of Galileo (2017) and EGNOS (2014)
- We are delivering safe and secure European satellite system
- We foster the market for EGNOS and Galileo worldwide and we support European companies to be the leaders
- We are making sure that European citizens are benefitting from EGNOS and Galileo

202
Staff

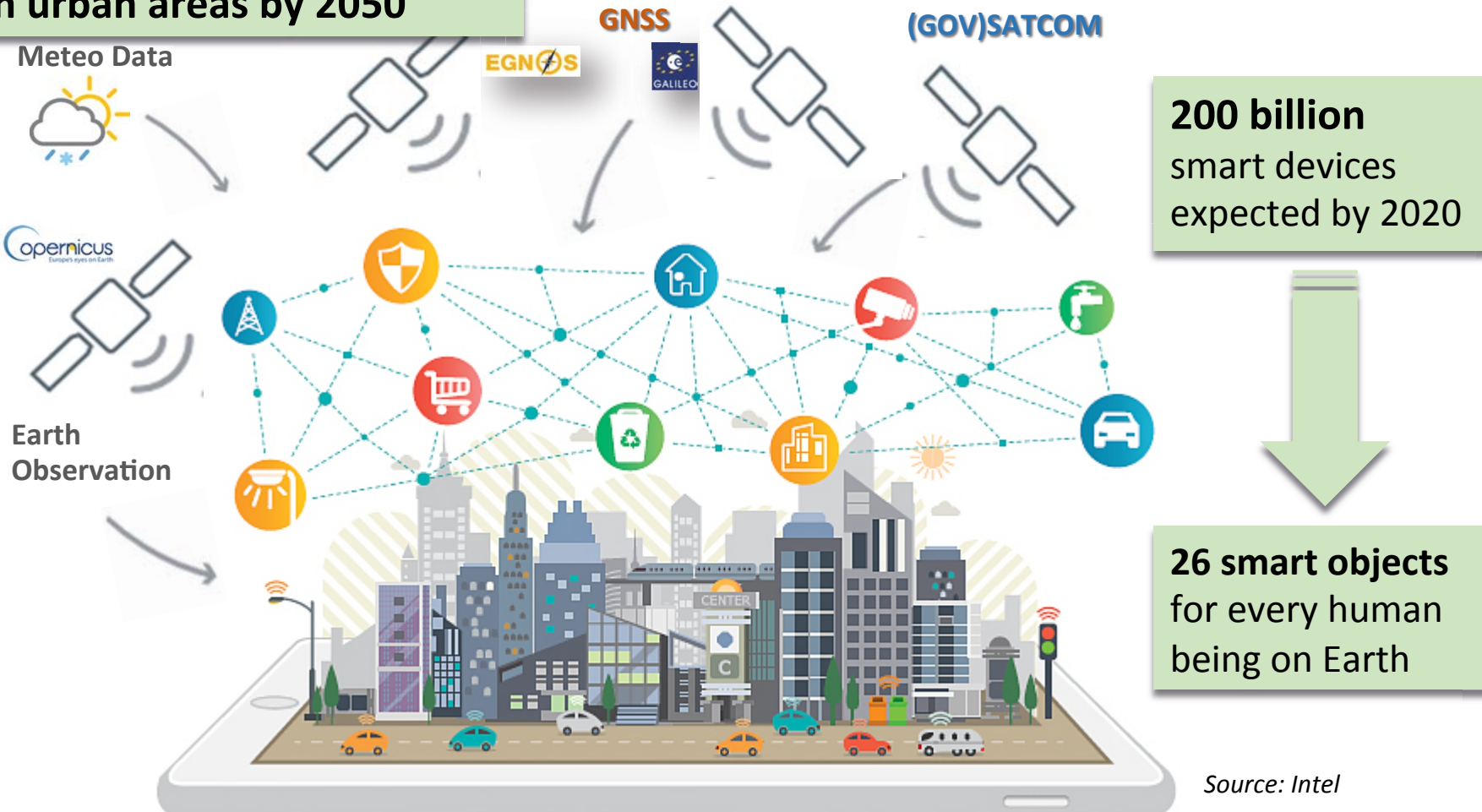
21
Nationalities

 Prague – HQ
 St. Germain en Laye – GSMC
 Madrid – GSMC
 Torrejon – GSC
 Noordwijk – GRC
 Toulouse – EGNOS
 Brussels – COMM

The digital transformation of cities and mobility



68% of the world population projected to live in urban areas by 2050



Source: Intel

Most of the smart city applications rely on trustable and secure positioning and timing



Logistics



Mobile payments



Waste management



Efficient energy distribution
(heating, cooling..)

Street lights management



Smart communications

Galileo is enabled in the majority of cars and consumer platforms



- 26 Satellites launched in 7 years! : 22 are fully operational
- 12 additional satellites under manufacturing (next launch end-2020)
- Galileo is operational since almost 3 years (Dec. 15, 2016)



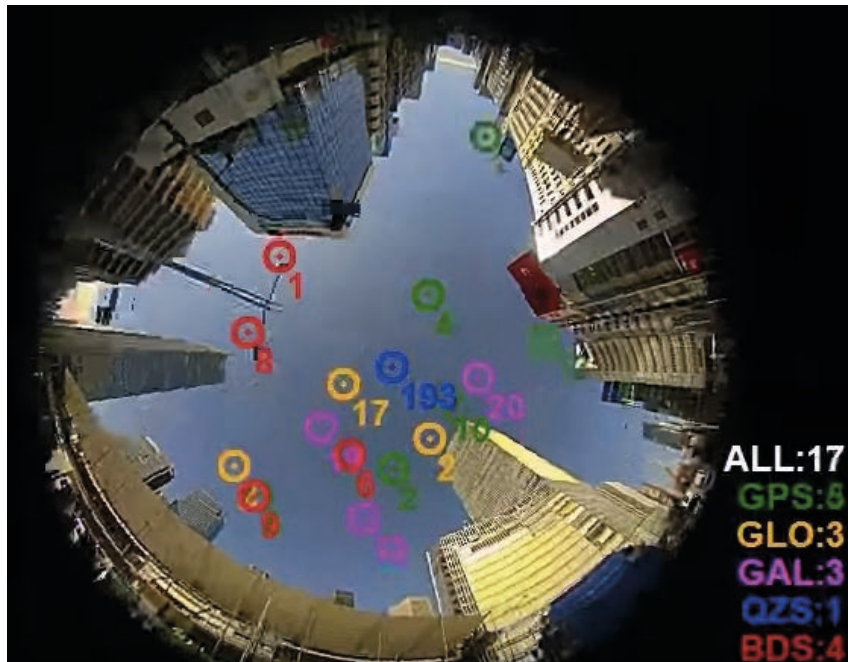
+1,000 Mill. Galileo devices as of today



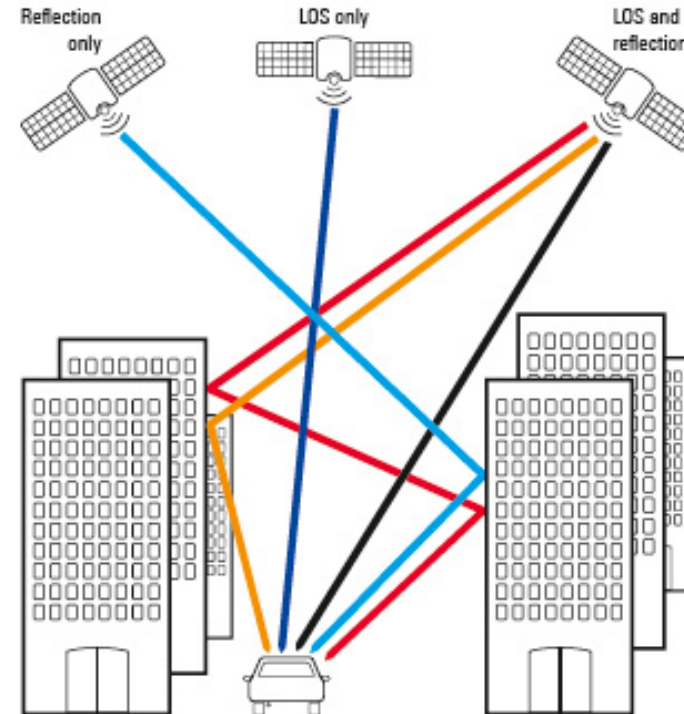
USEGALILEO.EU
FIND A GALILEO-ENABLED DEVICE TO USE TODAY



Galileo Open Service improves positioning performance WORLDWIDE for FREE



Multiple GNSS: more satellites visible in harsh environment (urban canyons, tree canopy,...)



Multiple frequencies remove ionospheric errors and mitigate multipath reflections

May 2018: World's first dual-frequency GNSS smartphone in the market

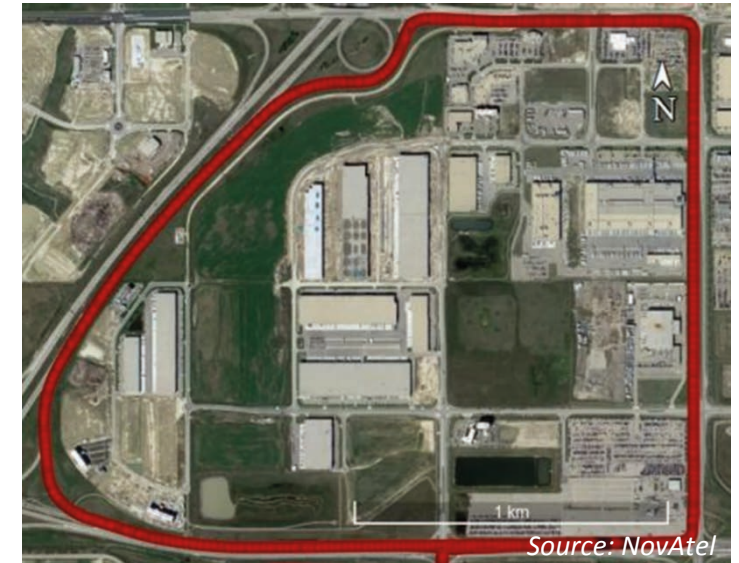
Galileo dual frequency
L1/E1 – L5/E5




CSA

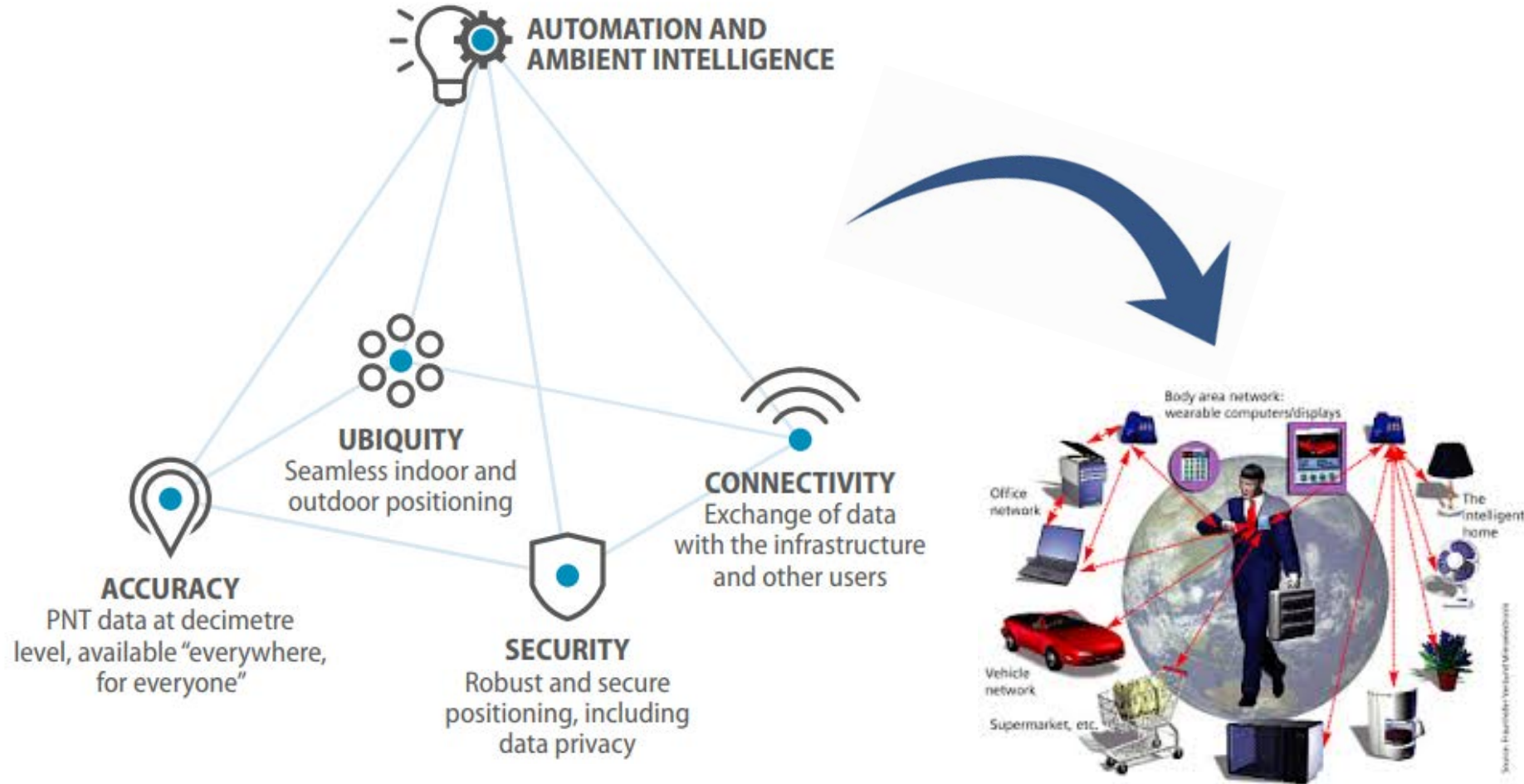


In light urban environment



	50% [m]	68% [m]	95% [m]
Teseo V  life.augmented	1.03	1.21	1.81

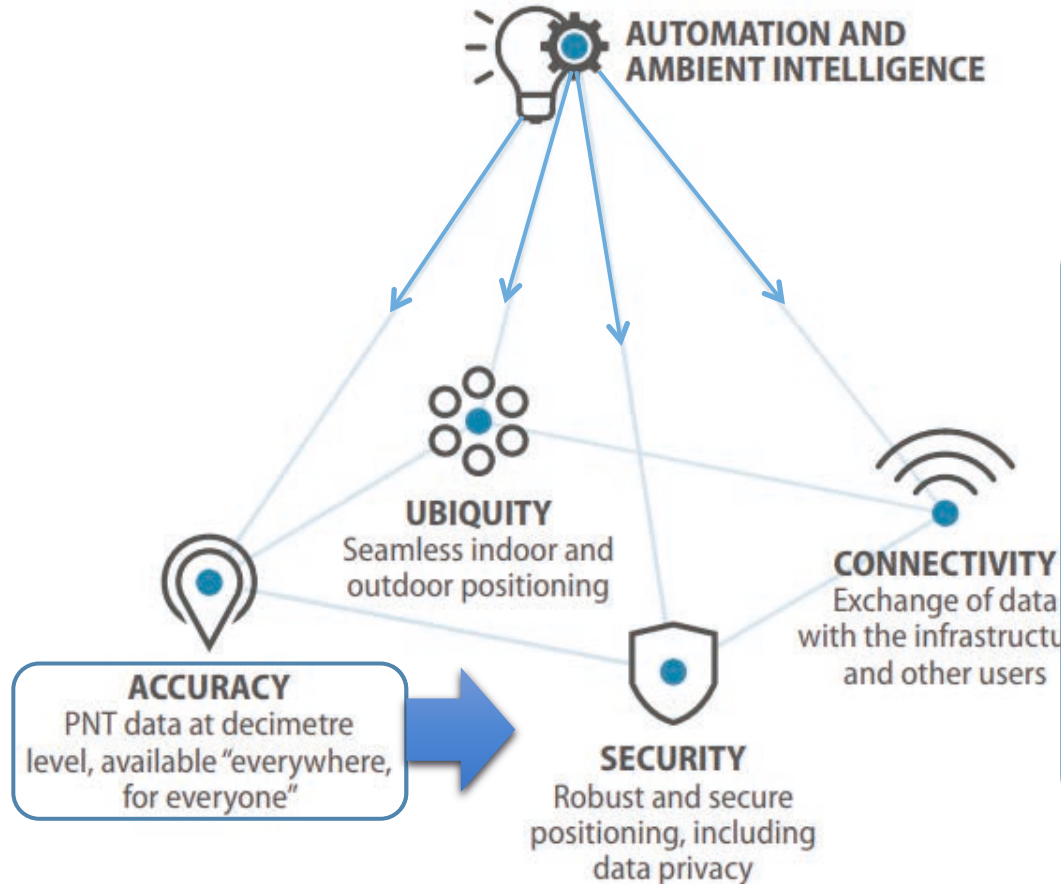
What technologies for the digital transformation of cities and mobility?



GNSS USER TECHNOLOGY REPORT
ISSUE 2

<https://www.gsa.europa.eu/newsroom/news/gnss-user-technology-report-2018-available-download-now>

What technologies for the digital transformation of cities and mobility?



Contribution of Galileo High Accuracy

NEW (from 2021)

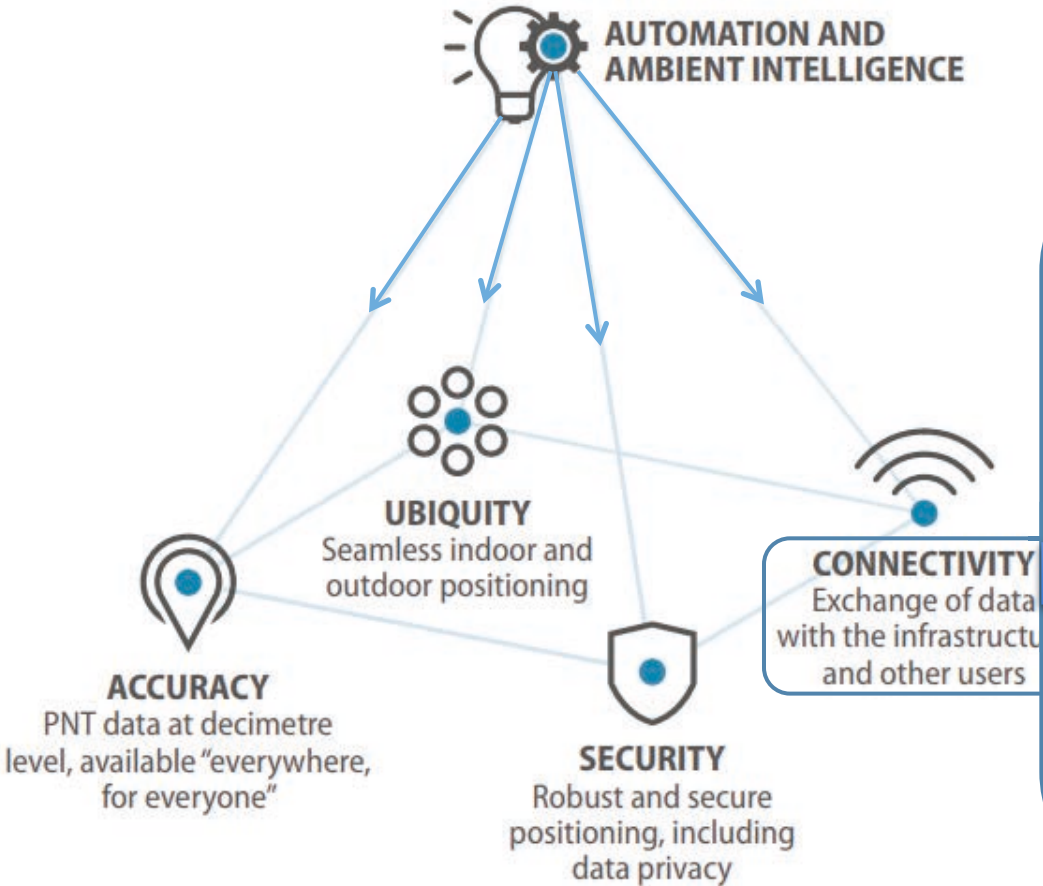
High Accuracy service will bring a decimeter level error:

- *based on the Galileo E6b signal*

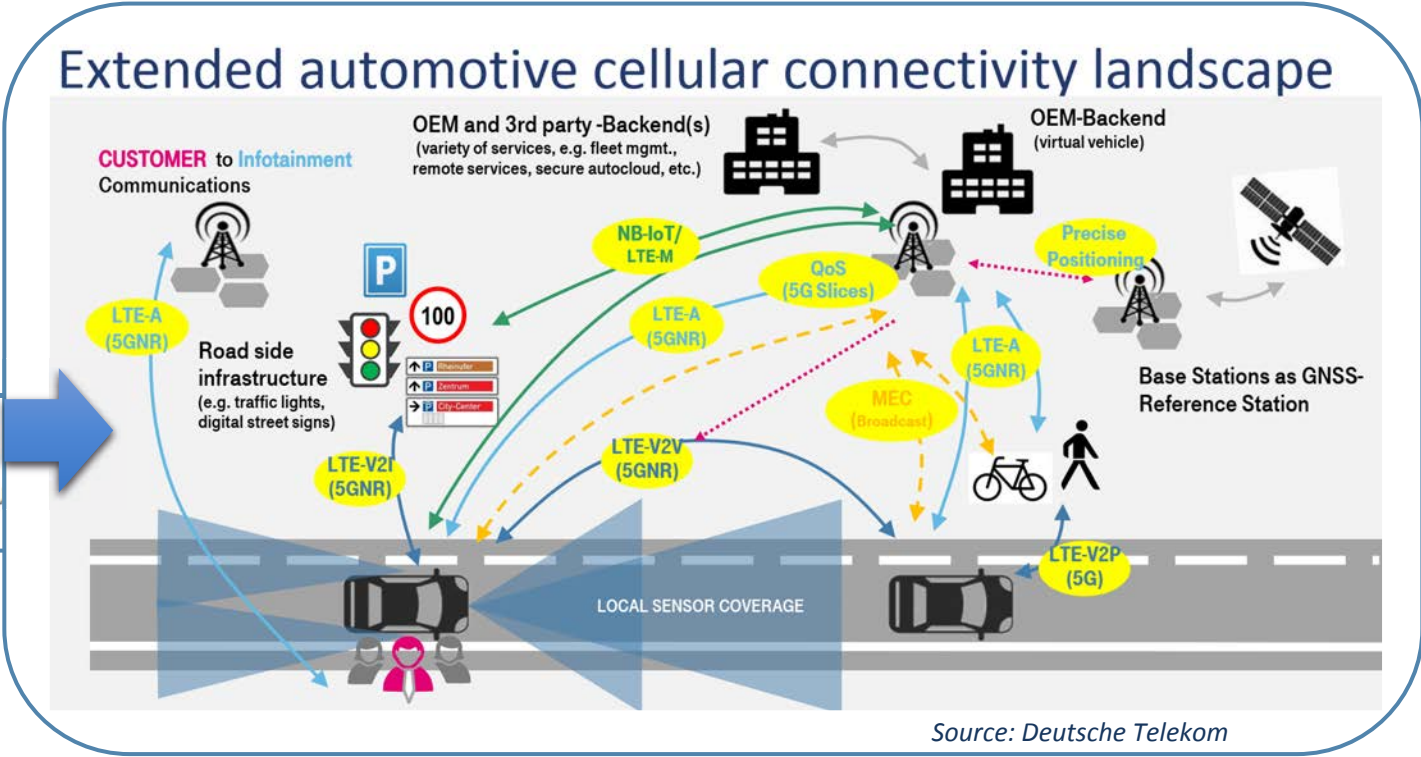


- Positioning accuracy with **decimeter level error ($\approx 20\text{cm}$)** depending on user receiver, algorithms, environment...
- **No need of proximity to base stations** to access corrections

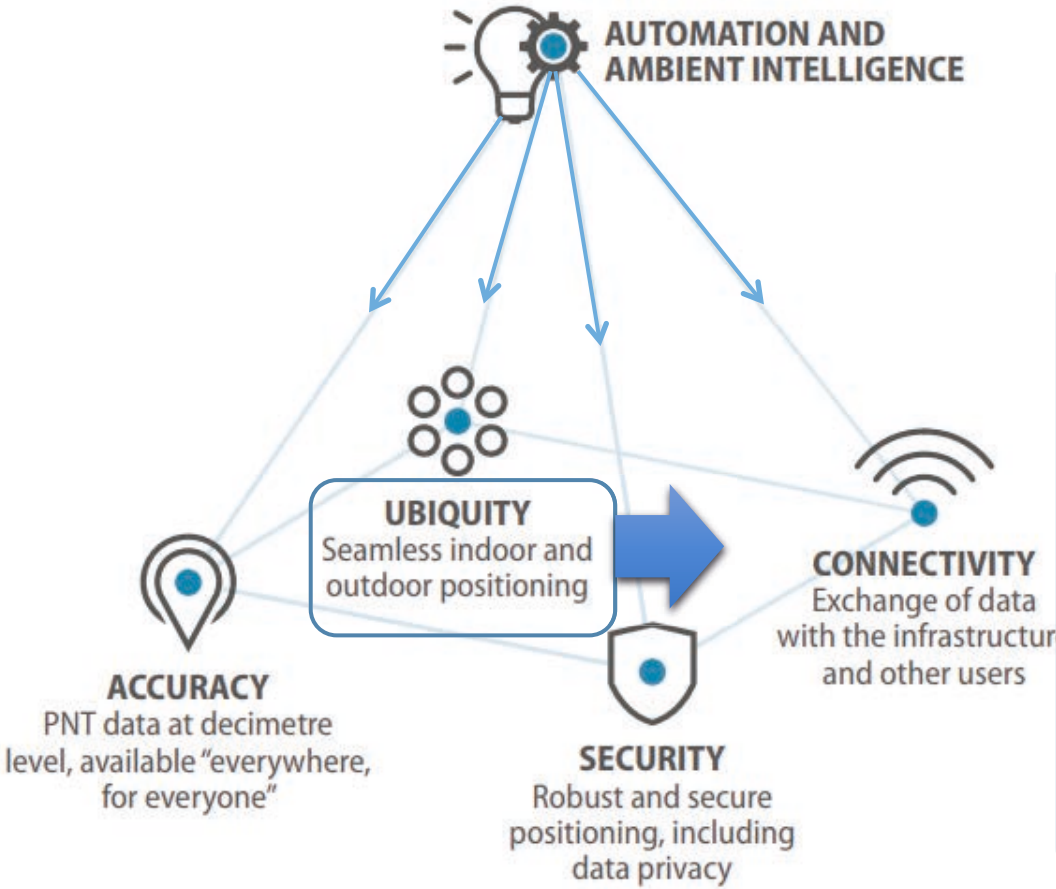
What technologies for the digital transformation of cities and mobility?



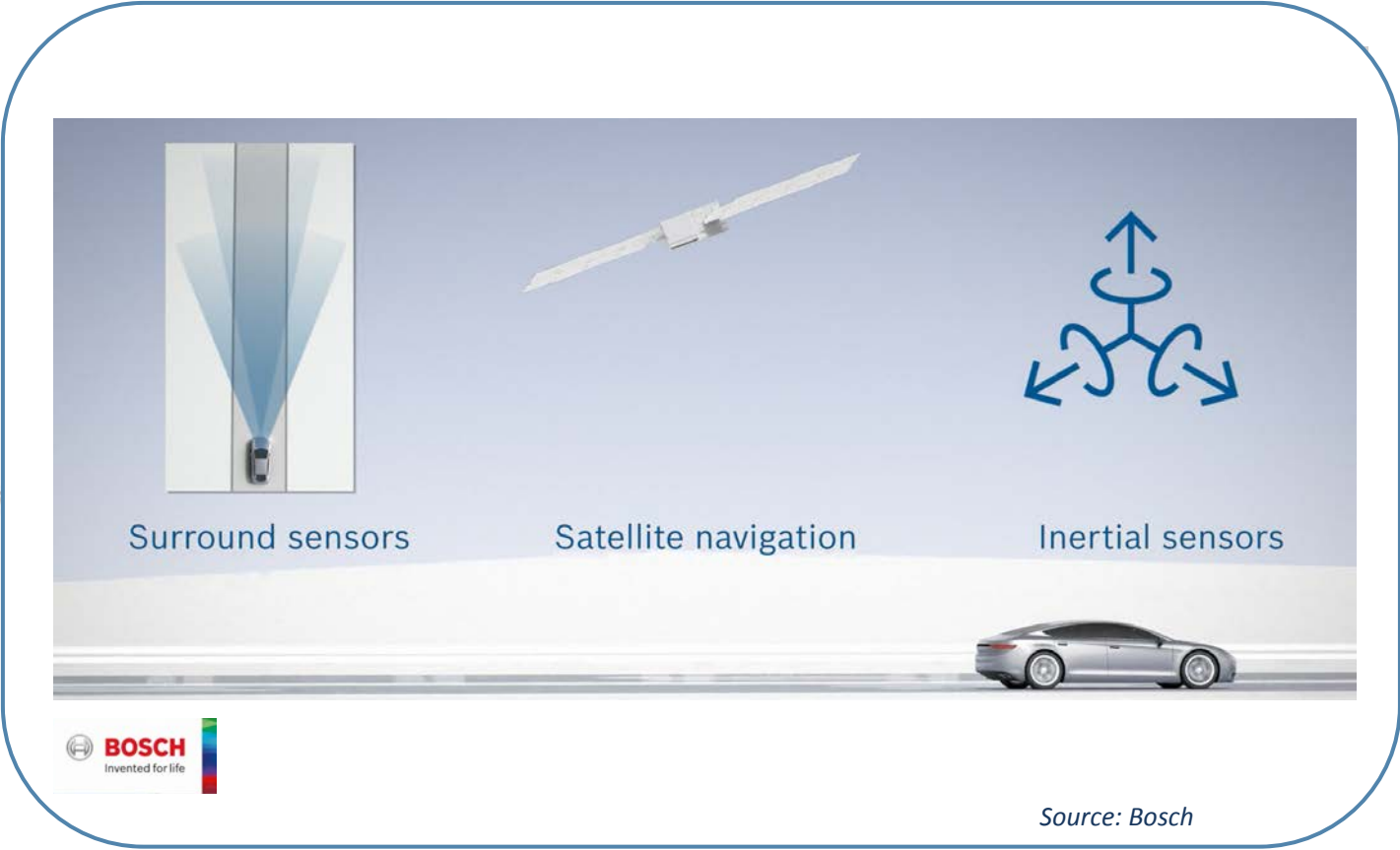
GNSS Integrity/High Accuracy corrections via 5G



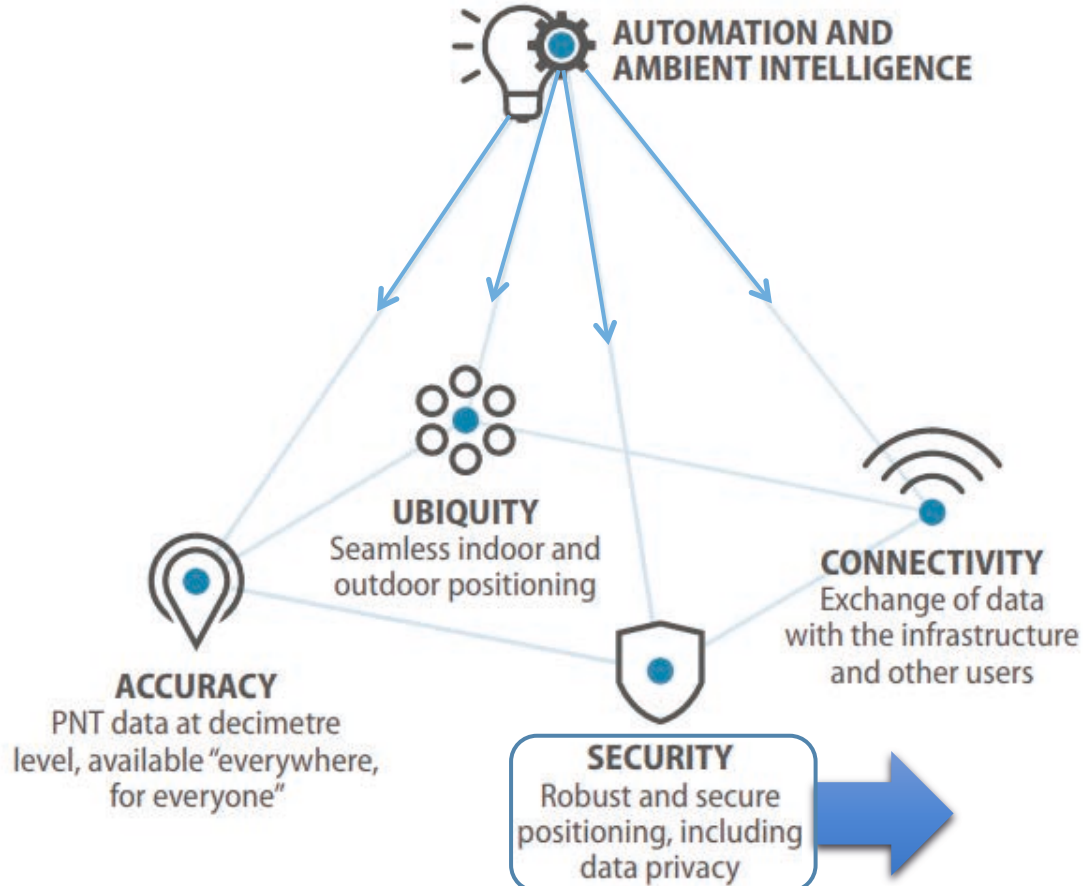
What technologies for the digital transformation of cities and mobility?



GNSS hybridization with other sensors



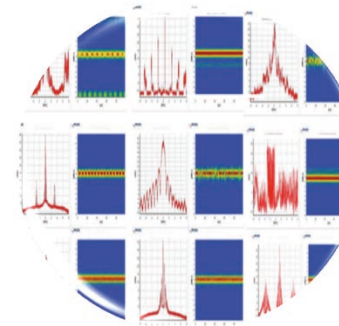
What technologies for the digital transformation of cities and mobility?



JAMMING can lead to degradation or denial of service

RF Interference (RFI) events are growing

- About 73.000 interferences have been identified and classified
- 23 countries around the globe
- Vast majority are unintentional

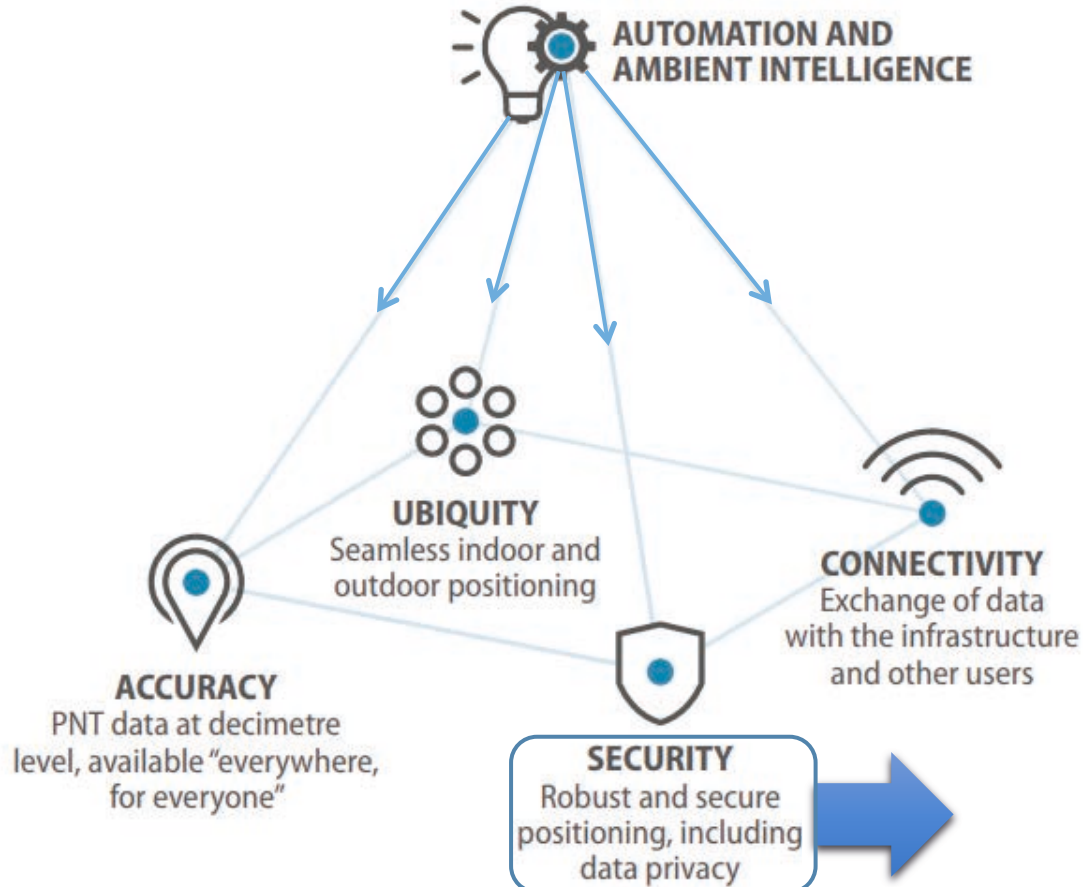


GALILEO SOLUTION TO RFI:

- ➔ FREQUENCY DIVERSITY (E1, E5, E6)
- ➔ WIDE-BAND SIGNALS (AltBOC)
- ➔ TECHNOLOGY DIVERSITY / SENSOR FUSION



What technologies for the digital transformation of cities and mobility?



SPOOFING is an emerging and more dangerous threat

Spoofing events are increasingly reported

- Motivation: Security is especially important where PNT is at the core of automated systems
- Price: Spoofing devices are affordable (tens of Euros)

DEC 2015 - USA-MEXICO



DHS: Drug Traffickers Are Spoofing Border Drones

JUNE 2017 - BLACK SEA



APR 2019 - GENEVA MOTOR SHOW



GPS Spoofing Mystery Affirms Need for Protection

NEW (from 2021)

GALILEO SOLUTION TO SPOOFING:

- NAVIGATION MESSAGE AUTHENTICATION
- SIGNAL AUTHENTICATION SERVICE
- PUBLIC REGULATED SERVICE
- TECHNOLOGY DIVERSITY / SENSOR FUSION

Funding Opportunities: EGNSS market uptake 2020



Opening: 5th Nov. 2019
Closure: 5th March 2020

Type of Action	Topic	Indicative budget (EUR mln)	Funding rate
IA	EGNSS applications fostering green, safe and smart mobility	10	70% (except for non-profit legal entities, where a rate of 100% applies)
IA	EGNSS applications fostering digitisation	4	
IA	EGNSS applications fostering societal resilience and protecting the environment	4	
PCP	EGNSS applications for public authorities' pilot	3	90%

Overall budget: 22 mln EUR

IA: activities aimed at producing plans and arrangements or designs for new, altered or improved products, processes or services
PCP: Pre-Commercial Procurement actions aim to encourage public procurement of research, development and validation of new solutions that can bring significant quality and efficiency improvements in areas of public interest, whilst opening market opportunities for industry and researchers active in Europe. It provides EU funding for a group of procurers ('buyers group') to undertake together one joint PCP procurement, so that there is one joint call for tender, one joint evaluation of offers, and a lead procurer³ awarding the R&D service contracts in the name and on behalf of the buyers group.

EGNSS applications for public authorities'



New innovative procurement tools for Galileo applications R&D (pilot in H2020 and full action in Horizon Europe) to:

- establish long-lasting cross-border **working relationships among public authorities**;
- stimulate the **industry competitiveness** (through a selection of suppliers competing to develop the product);
- develop innovative EGNSS enabled **products** that meet public institutions' needs → create **public market for Galileo**

Examples of applications for EGNSS PCP/PPI:



Helicopter emergency medical services, flight approaches to non-instrument runways

Mobility as a service, on-demand bus, public transport vehicles

Transmission of EGNOS corrections using AIS stations and IALA beacons, port operations

Innovative high accuracy solutions (e.g., RTK, PPP)

Solutions for efficient energy network

Monitoring of infrastructure

Other ideas: EGNSS for drones, crisis management; SAR

Call for action:

- identify the public authorities that could benefit from the EGNSS applications PCP/PPI and put them in contact with GSA;
- support dissemination of the new tool (e.g. through info days dedicated to the interested audience).







<https://www.gsa.europa.eu/market/market-report>



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