



Big Data Infrastructures for IoT Applications

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Infrastructure & data at scale

IoT and big data for answering urban challenges

- More than half of the world population lives in cities
- Urban population percentage is around 75% in Europe, 90% in Japan
- On 2% of the earth's surface, cities use 75% of the world resources



IoT and big data as the basis for smart cities

- ▶ **Smartness:** *ability to think and respond quickly and effectively*
 - ▶ To be responsive to events
 - ▶ Fast to analyse, reason, plan and make decisions
 - ▶ Fast to react with desirable effects
- ▶ **Smart city:** city with ability to think and respond quickly and effectively
 - ▶ To be responsive - **capture all events going around (with sensors, social networks, crowd sensing, etc.)**
 - ▶ Fast to analyse, reason, plan and make decisions – **integration, real-time big data analytics, complex event processing, rule engines, business intelligence**
 - ▶ Fast to react with desirable effects – real-time actuating, apply quick measures, collect feedbacks and iterate...

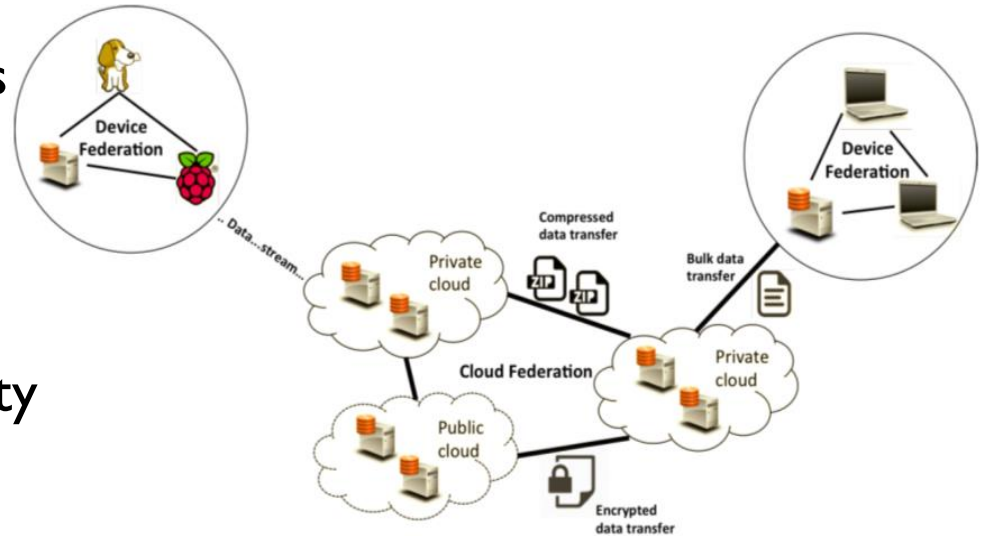


What are the Key Challenges ?

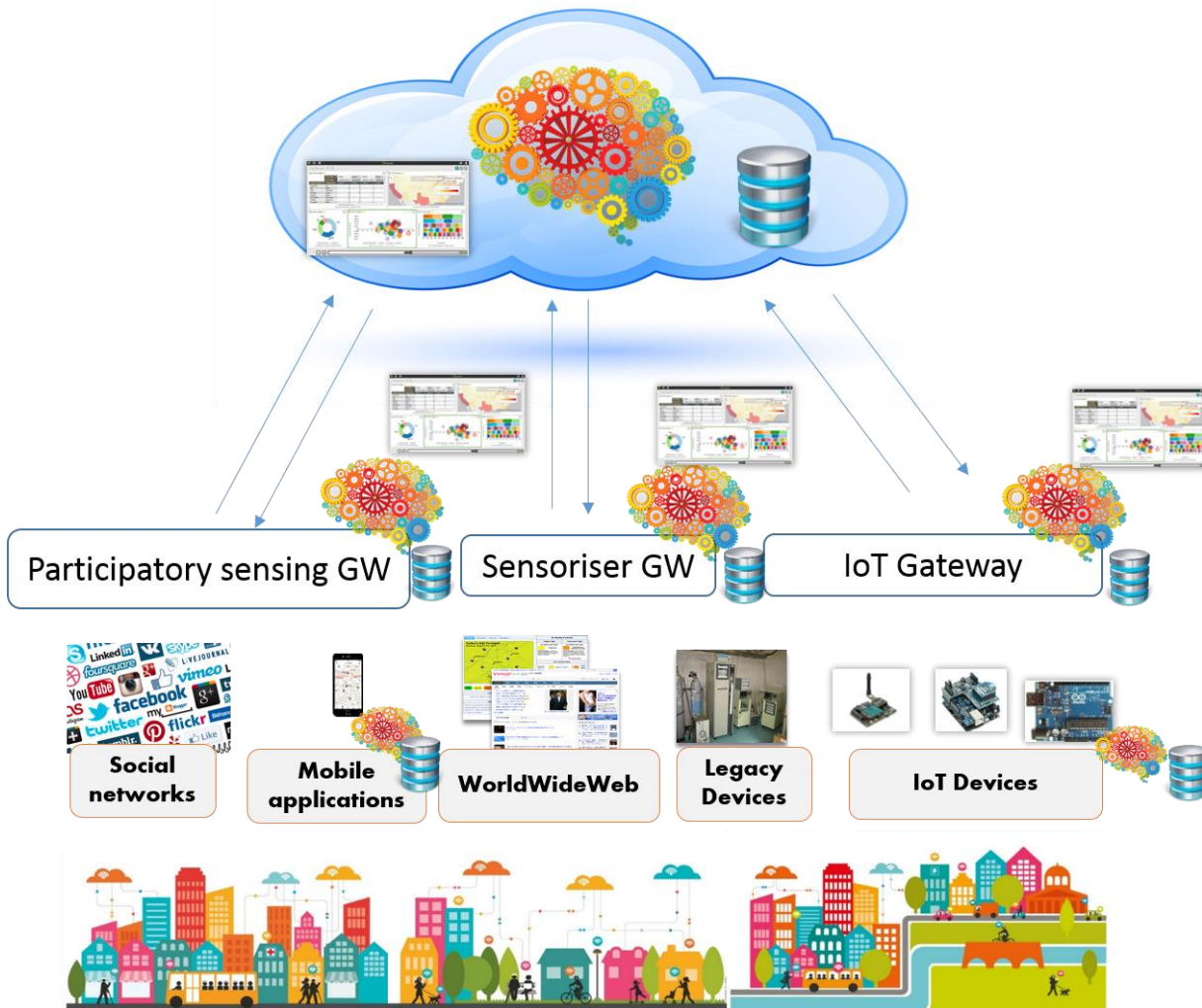
- ▶ General purpose, interoperable architectures enabling data-driven IoT applications
- ▶ IoT infrastructures with self-awareness, programmability and dependability properties
- ▶ Big data analytics as a source for dynamic, real-time decision making
- ▶ Citizens as a source of innovation: participation from design to implementation

Key challenge: Big data in IoT

- ▶ The challenge is to move data among the devices belonging to a device federation, as well as among the resources in a cloud federation, and between the two.
 - ▶ Computation movement requires a dynamic deployment of the data processing tasks,
 - ▶ While the data movement could require only a transformation of the data format (e.g., compression, encryption).
- ▶ The goal is to let the developers define the requirements on the needed data, and let the infrastructures providing these data timely, securely and accurately with all the complexity hidden.



IoT, big data and cloud for answering urban challenges: BigClouT approach



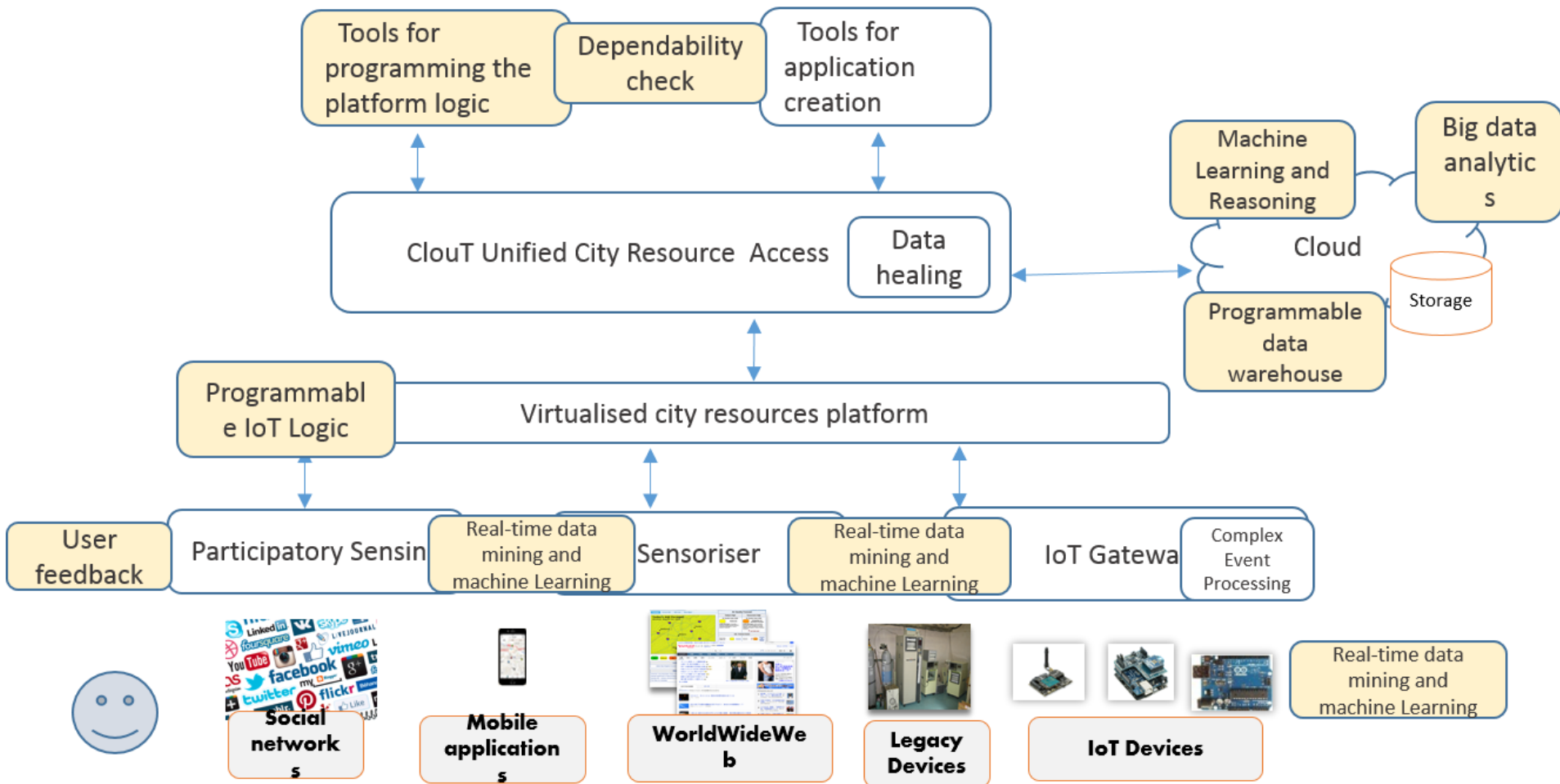
Cloud computing, analysis and visualisation on aggregated big data

Edge computing for adaptive processing, distributed intelligence and management.

Programmable city data platform including IoT and other data sources

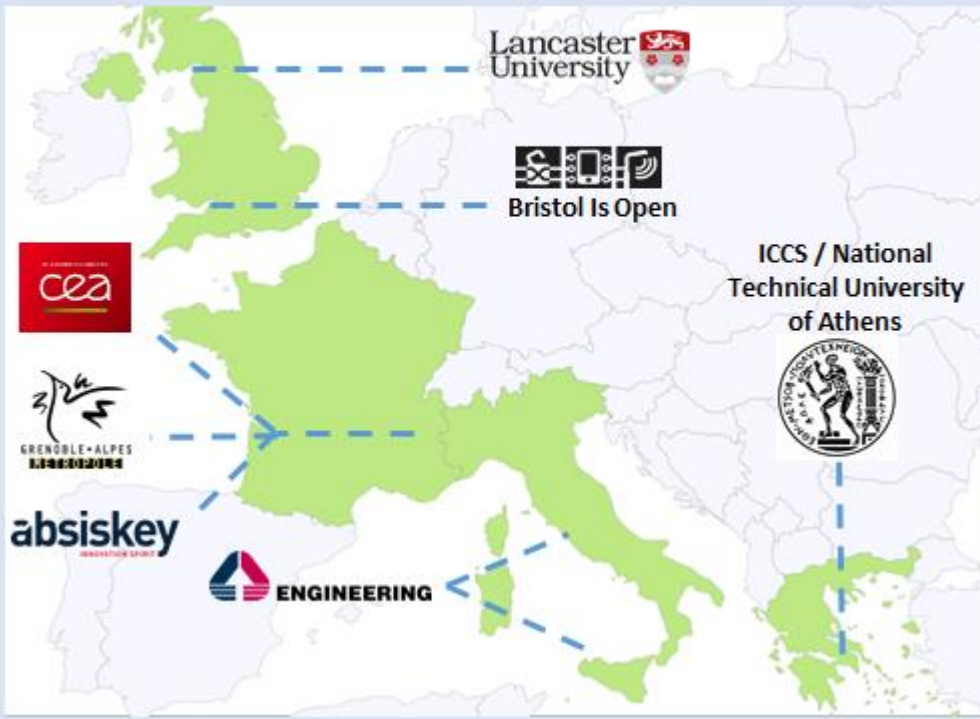


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EU - Japan project BigClouT

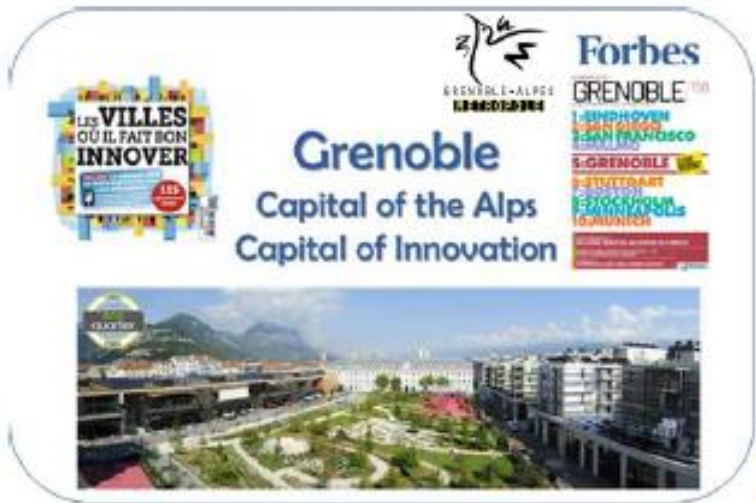
BigClouT project partners



BigClouT project partners



4 Pilot sites




LES VILLES OÙ IL FAIT BON INNOVER

Grenoble
Capital of the Alps
Capital of Innovation

Forbes
GRENOBLE 150

1-SINGAPORE
2-SAN FRANCISCO
3-NEW YORK
4-GRENOBLE
5-STUTTGART
6-SHANGHAI
7-TOYOTA CITY
8-TOYOTA CITY
9-TOYOTA CITY
10-TOYOTA CITY




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- Environmental** *Leading*
- EFFICIENCY** *Leading*
- TRANSPARENCY** *Leading*

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Tsukuba

City of Science
Low carbon society








Fujisawa

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