Forum Virium IoT programme: Smarter cities through data, IoT and machine learning

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@CitySDK_Hanna

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FORUM
VIRIUM
HELSINKI

Let's make Helsinki the most functional Smart City in the World

Photo: Lauri Rotko

Forum Virium aims to build Helsinki into the most functional smart city in the world in collaboration with companies, the scientific community and residents.

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What is Forum Virium Helsinki?

- An innovation unit established in 2005, which develops urban solutions of the future
- These encompass smart mobility, robotics, artificial intelligence, data and the Internet of Things
- A non-profit limited liability company fully owned by the City of Helsinki
- Employs 35 top experts
- The unit operations are funded by the City of Helsinki and different EU projects with about EUR 5 million a year

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What does Forum Virium Helsinki do?

- Smart city projects in Finland and EU countries
- Collaboration with companies, the scientific community and residents
- Digitalization of the City of Helsinki
- Our achievements:
  - We made Helsinki data open to the public
  - We turned Kalasatama into a smart city district
  - Next we will bring robot buses onto the city’s streets

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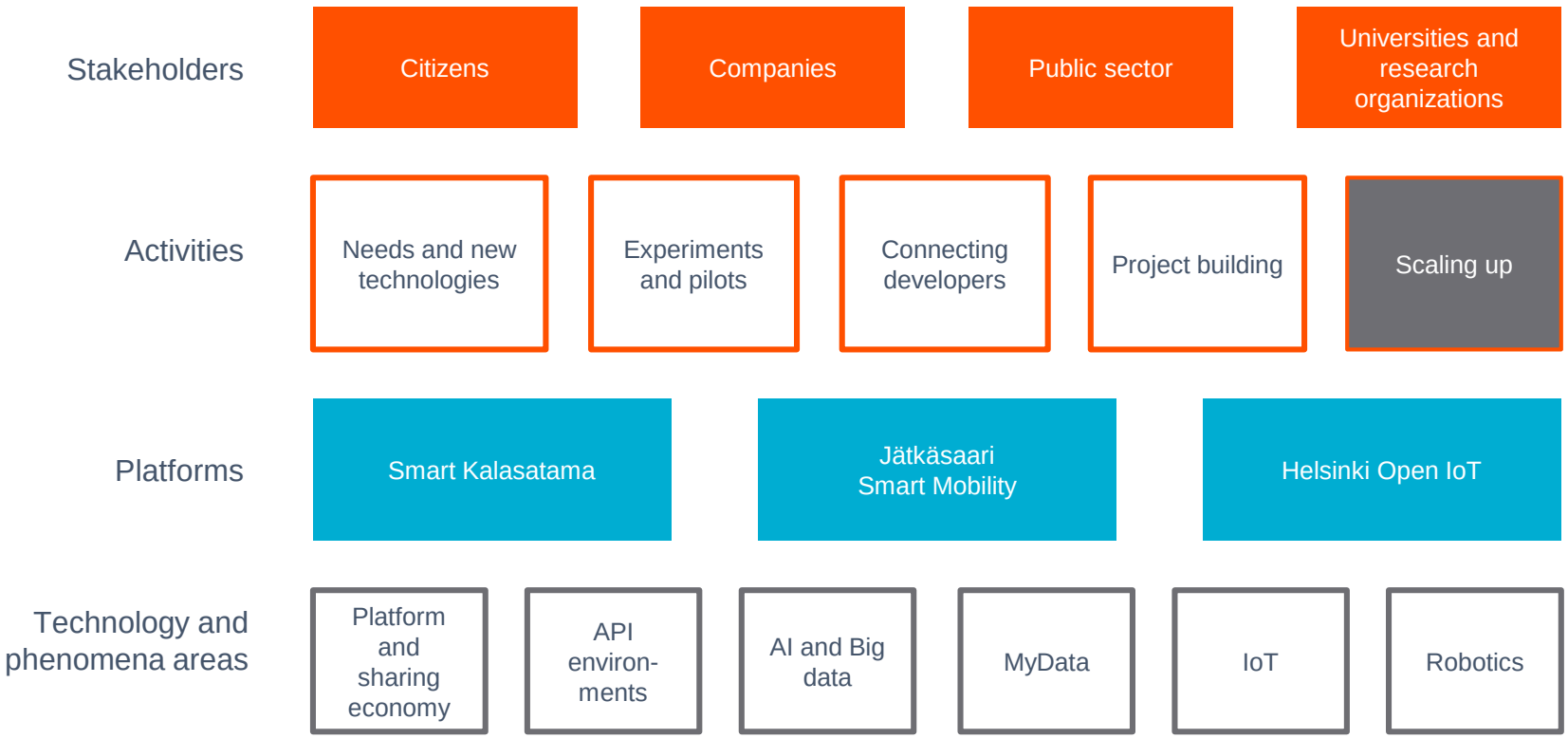
Co-creating urban futures



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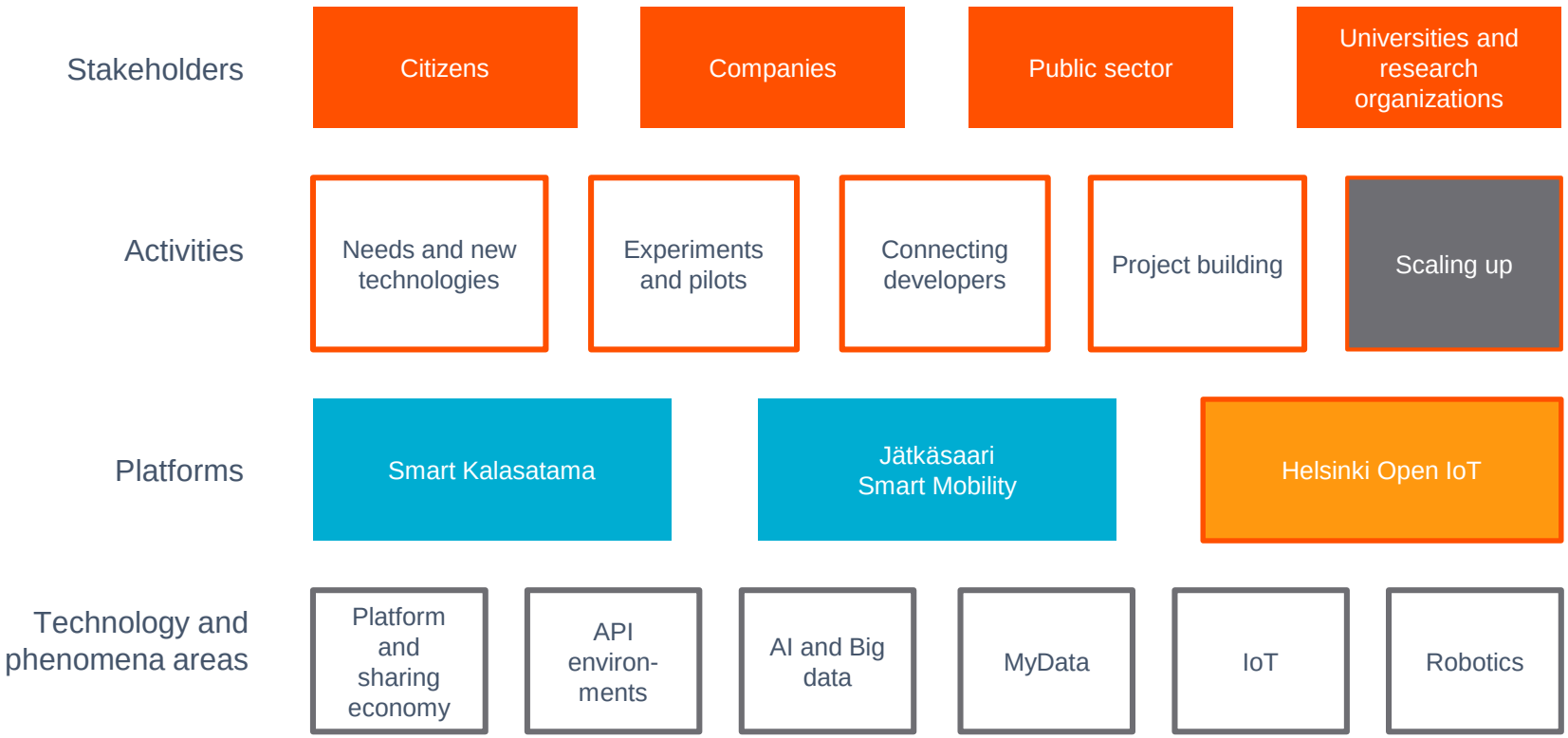
Co-creating urban futures



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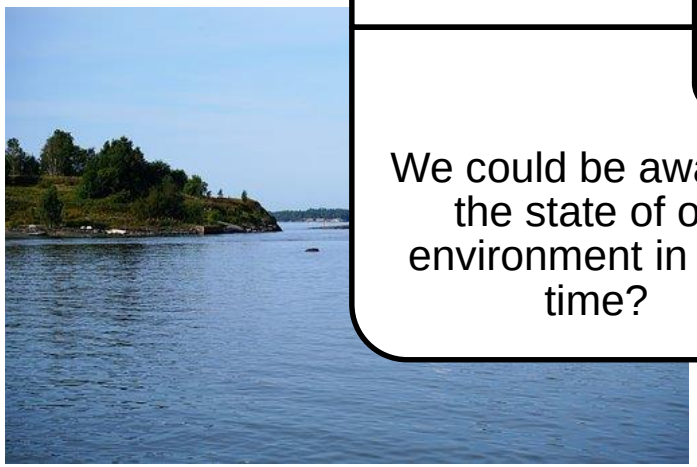
We could choose routes based on their air quality?

People with baby pram could discover vacant pram spots in trams?

What if



We could be aware of the state of our environment in real-time?

Spaces would adapt heating and AC according to their usage?

IoT can help us solve many challenges in Smart Cities

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Helsinki Open Smart City IoT

Open in data, APIs, code, ways of working

- Both in data collection and in app & hardware creation

Engaging

Enabler of business

- In all levels of IoT tech stack: apps, APIs for data & devices, analytics, connectivity
- Creating larger market

Aiming for impact

- Driving change
- Improving life quality, saving time, bringing efficiency

Experimental, yet functional

- Ensuring fast development cycle
- Taking into account privacy, mydata, security and architectural aspects

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Role of data is changing

- Public resource stuck in silos
- Open data for transparency and efficiency
- Enabling third party service development
- API-first with city services
- Cities “Making our open data your business” and creating a larger market

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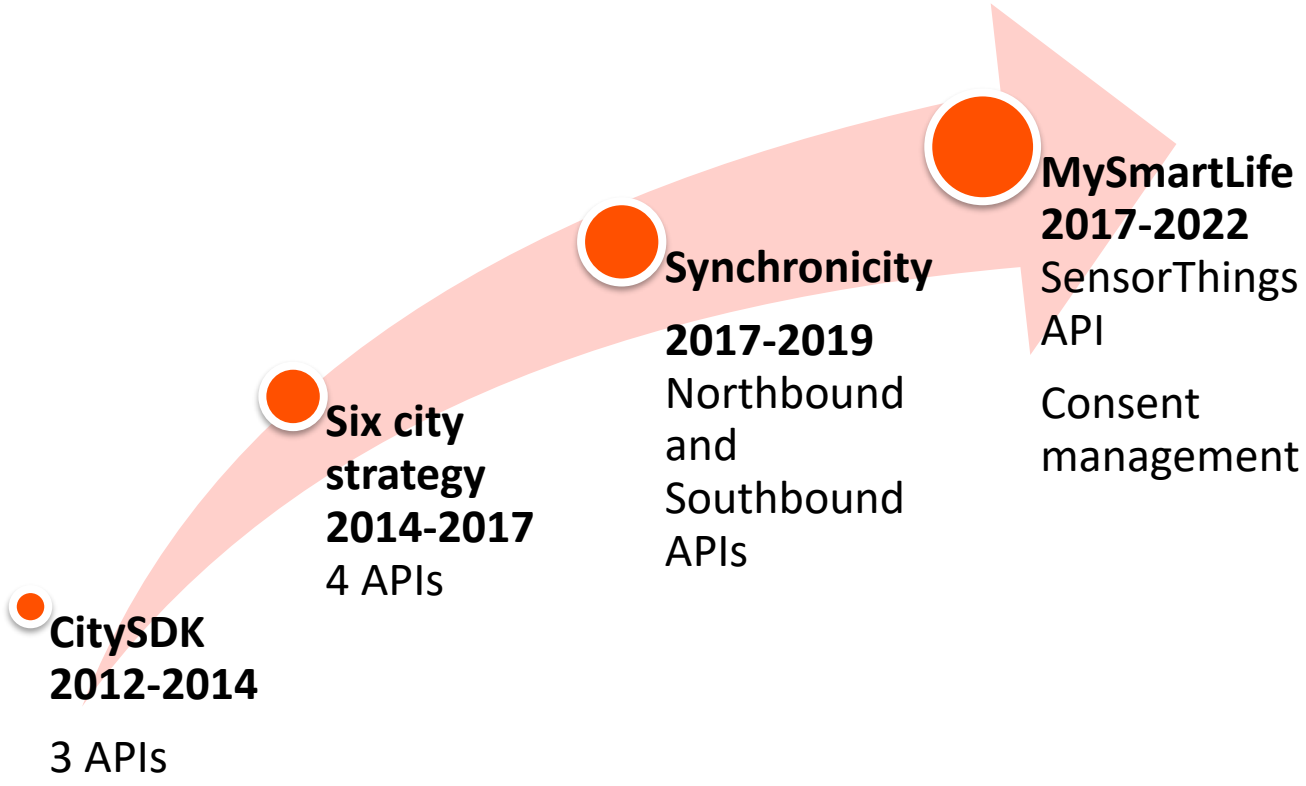
Helsinki data harmonization timeline



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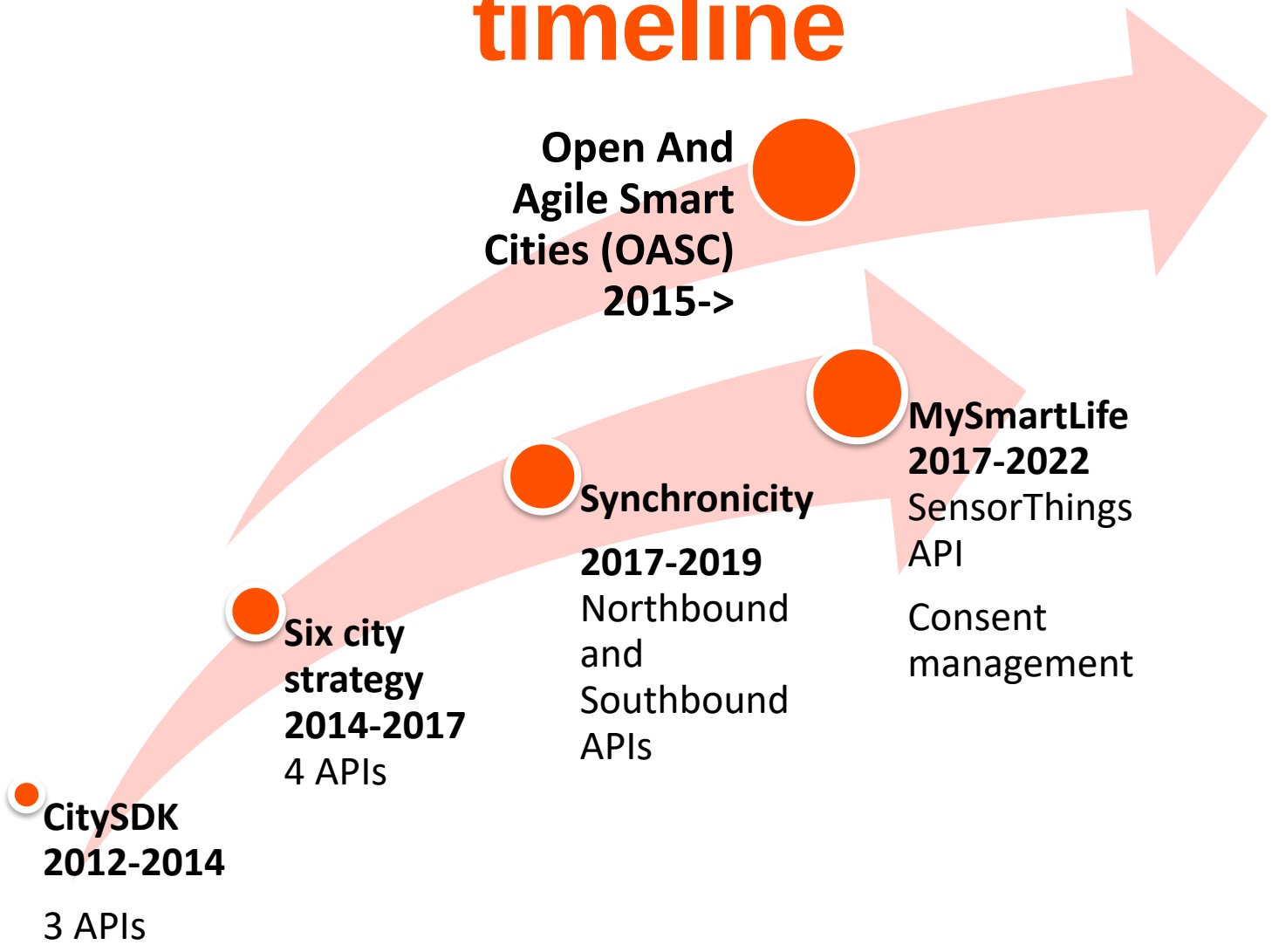
Helsinki data harmonization timeline



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Data-fueled services and systems create demand for

- Real-time data, personal data
- New ways of data collection through IoT, Smart City
- Connectivity
- Consent management (GDPR, mydata models)

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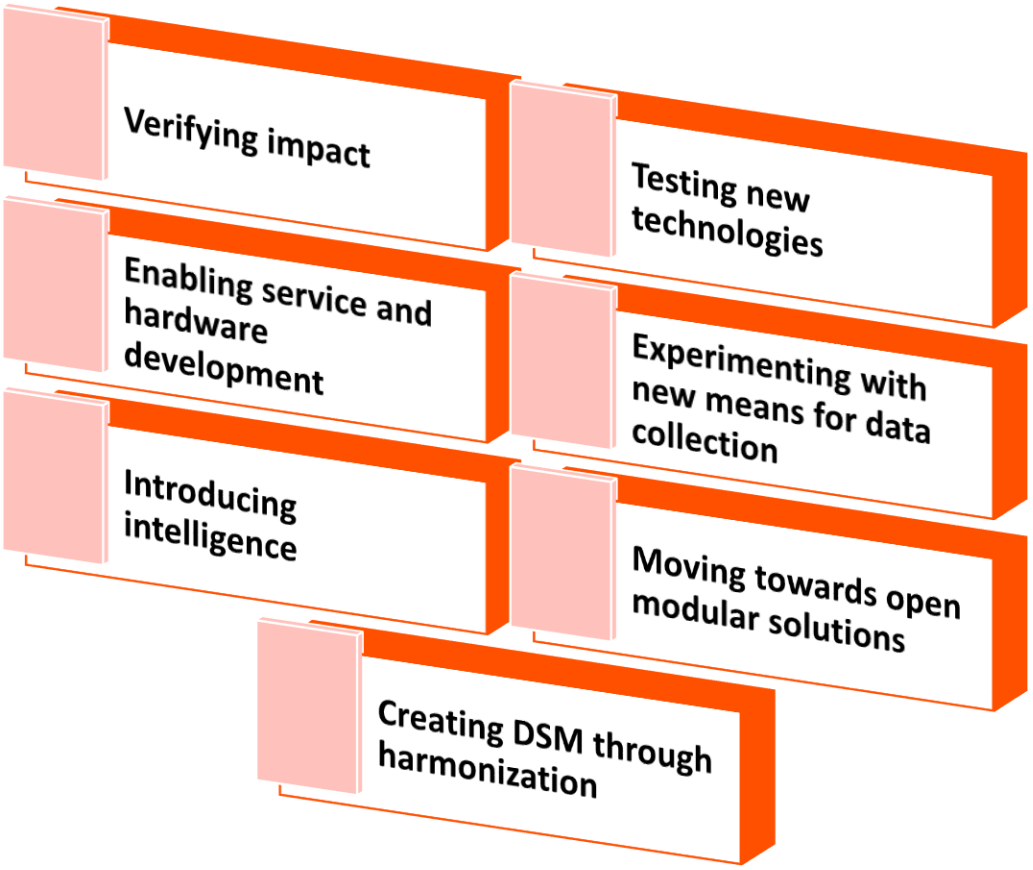
Forum Virium IoT program aims at



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Our IoT-program projects tackling these issues

Select for Cities
Open & GDPR ready Smart City IoT R&D through PCP with Antwerp & Copenhagen.

Budget: 1,843,201 €
Duration: till 09/2019

Synchronicity
DSM for urban IoT services through harmonization and open calls for scaling.

Budget: 631 250 €
Duration: till 12/2019

MySMARTLife
Levereging IoT & enabling data driven business on advancing with / monitoring of climate positive actions.

Budget: 1 035 738 €
Duration: 11/2021

BIoTope
Easily create new IoT systems and rapidly harness available information using advanced Systems-of-Systems (SoS) capabilities for Connected Smart Objects.

Budget: 360 000€
Duration: 05/2019

Vekotinverstas
Welcoming environment for all to get started with IoT experimentions and workshops.

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DSM for IoT
Role of southbound

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Helsinki advancing with and benefiting from southbound interoperability

- Contributing through:
  - Supporting interoperability through procuring
  - Standardisation and interoperability activity and validation
  - Ensuring connectivity offering
  - Piloting
- Benefiting while:
  - Engaging companies, developers, citizens
  - Supporting data usage through consent-management and mydata model
  - Managing risk
  - Supporting scalable solutions
  - Reusing solutions

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Using pre-commercial procurement to get things right for cities, businesses and citizens

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SELECT for Cities

Light Touch Procurement with PCP

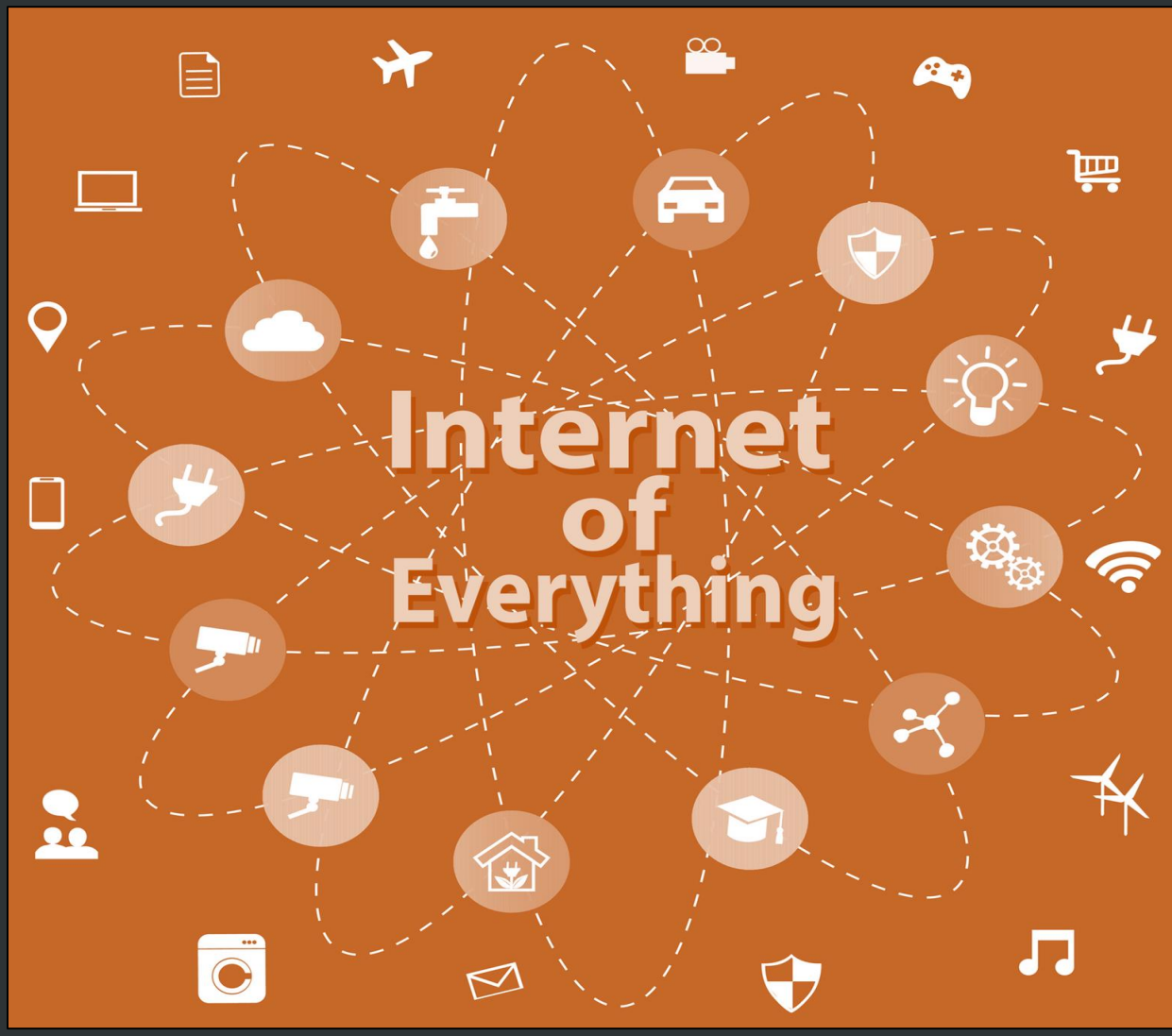
This project has received funding from the EU's H2020 Research & Innovation Programme under GA 688196.

More urban data produced in last 2 years than the whole of mankind…

…yet less than 6% is analysed.

Internet of Everything provides an unparalleled opportunity for city innovation

…but needs to be bought together…



SELECT for Cities competition aims to harness data in a city-wide platform for Smart City innovation

SELECT for Cities

The basics: the Smart City Platform

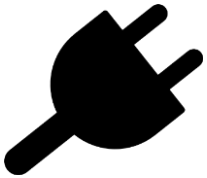
User Centric

Cloud Enabled

Co-Created

Data-Driven

Service Oriented



Pluggable

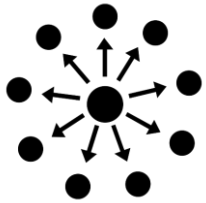
SELECT for Cities

The basics: Quality requirements

Open Source

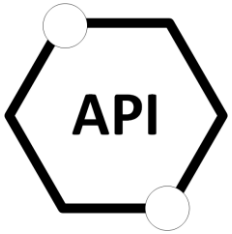
Distributed & Decoupled

Interoperability



Scalability

Security



Open Standards

Legacy & heterogeneous

Robustness

Privacy

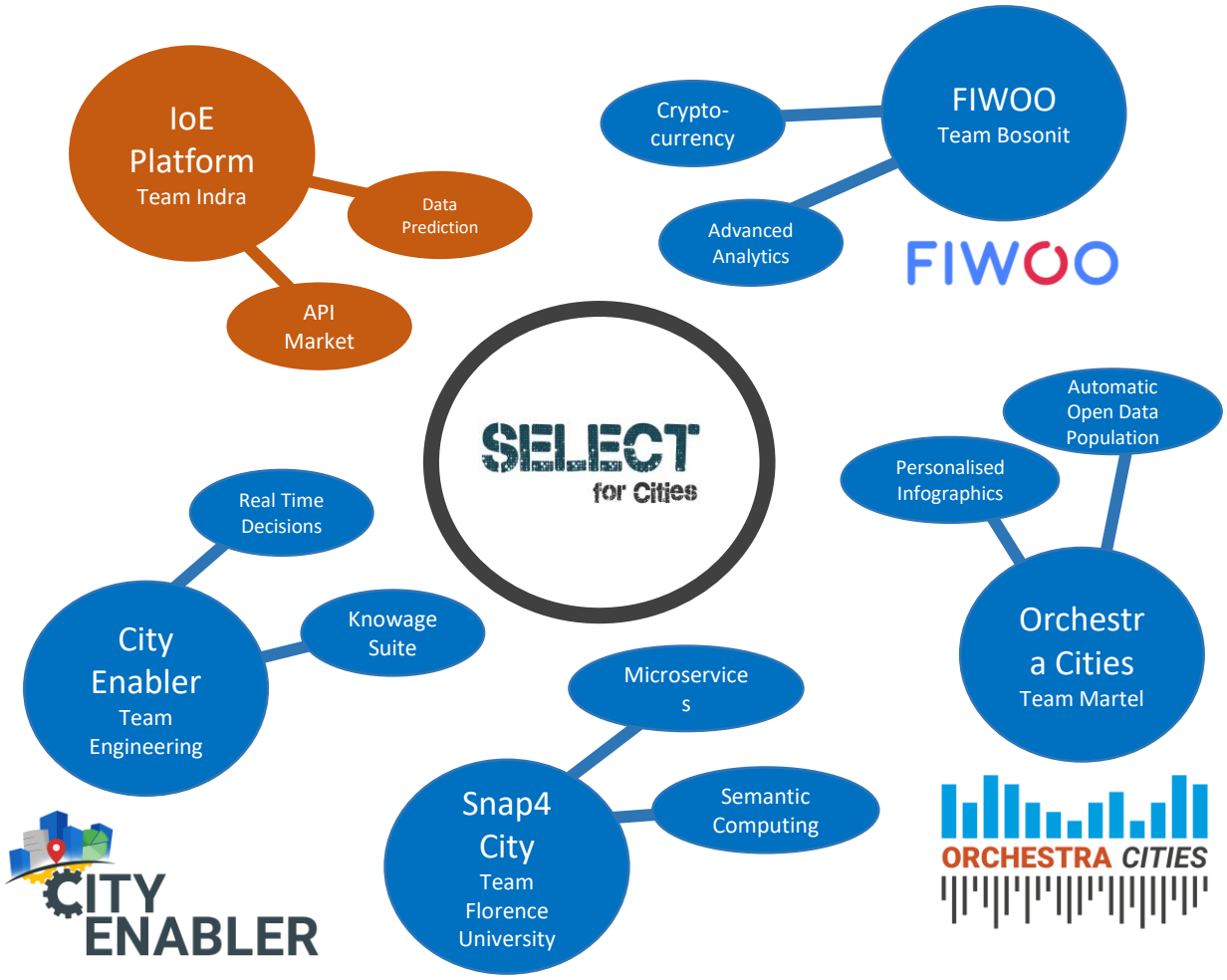
5 Prototypes

- Diverse approaches
- Varied architectures
- Different innovations

To deliver…

- Data-driven decisions
- Citizen-centric services
- Open innovation

= Solutions enabled by FIWARE Components



SELECT for Cities

ANTWERP

City of Copenhagen

digipolis

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imec

21c Work Smarter

Keep up to date with project outcomes:

select4cities.eu

Select4Cities

@SELECT4CITIES

Going further southbound

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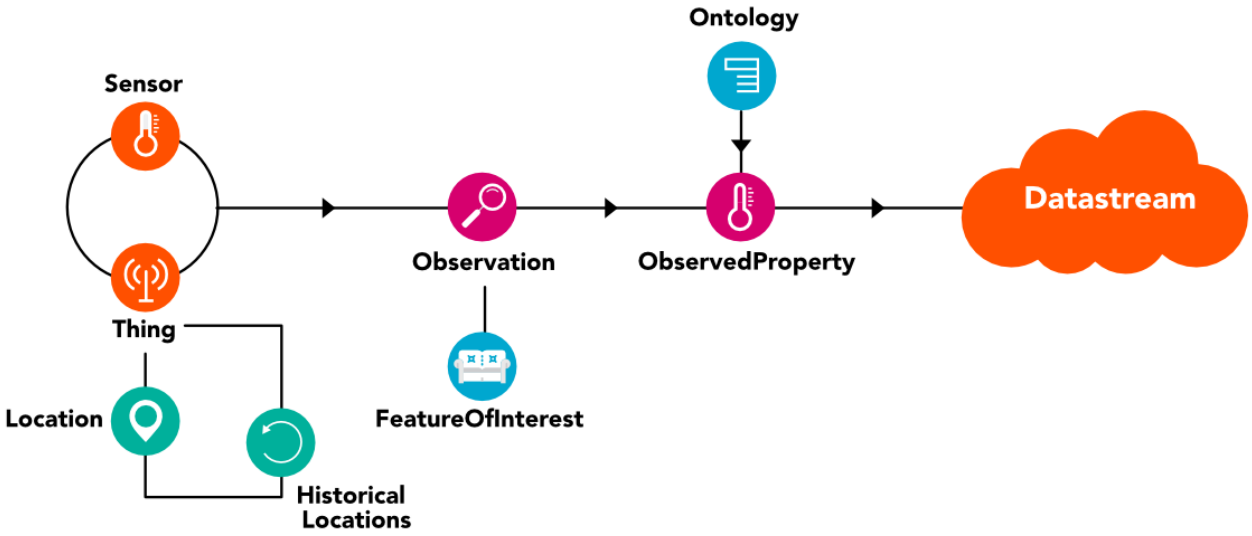
MySMARTLife:

Helsinki, Hamburg and Nantes contributing to OGC SensorThings datamodel



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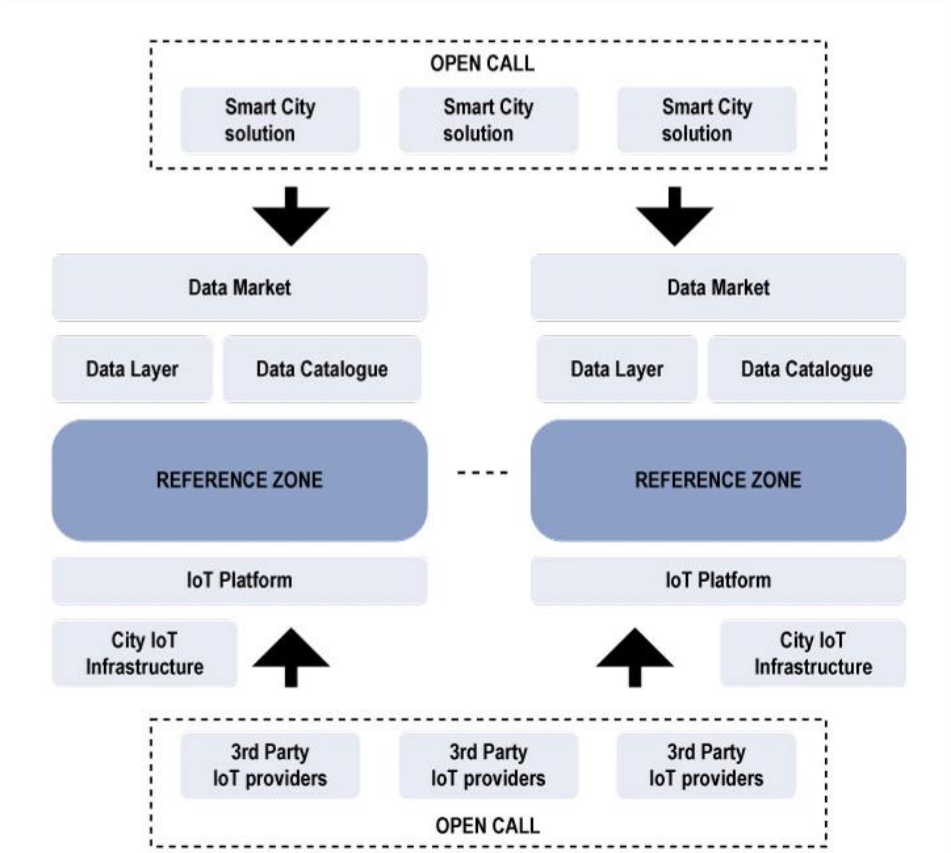
Synchronicity:

driving DSM for IoT enabled Smart City Solutions



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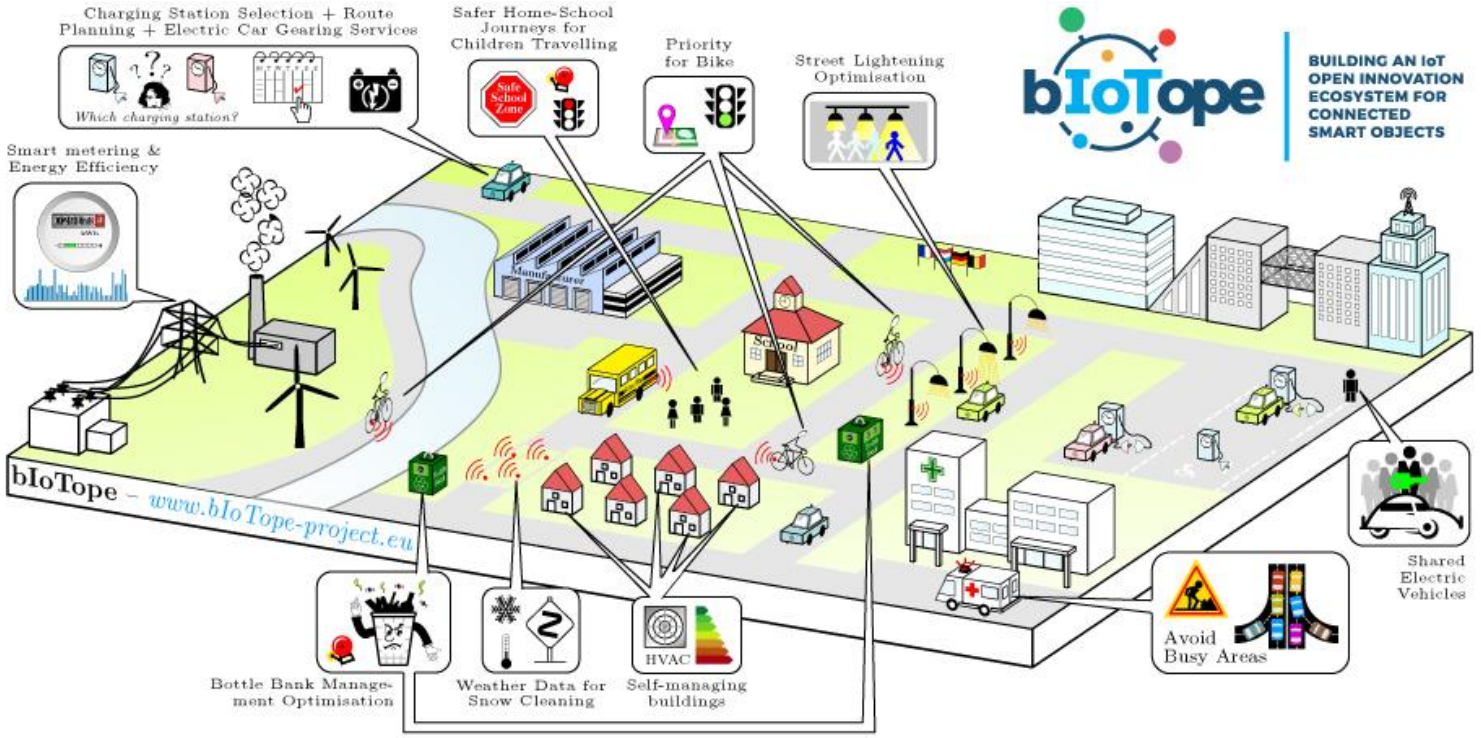
BIoTope:

contributing to Open Group's O-MI/O-DF development and ecosystem



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IoT Mark

Open Internet of things Certification Mark

#iotmark

Twitter Newsletter

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Ensuring connectivity options

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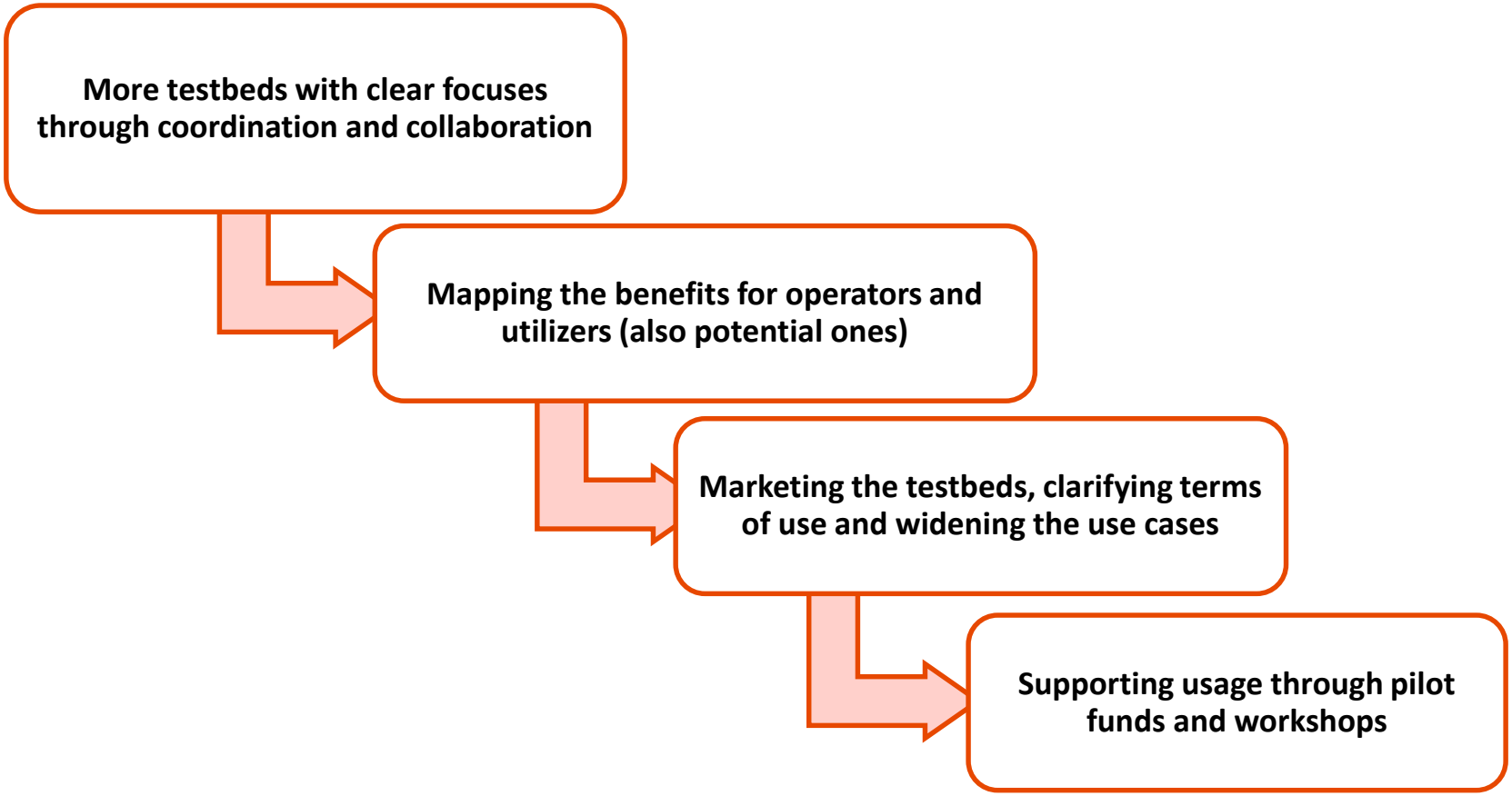
Urban Sense project aiming for focused 5G testbeds that enable experimentations and ecosystem building



Start June 2018

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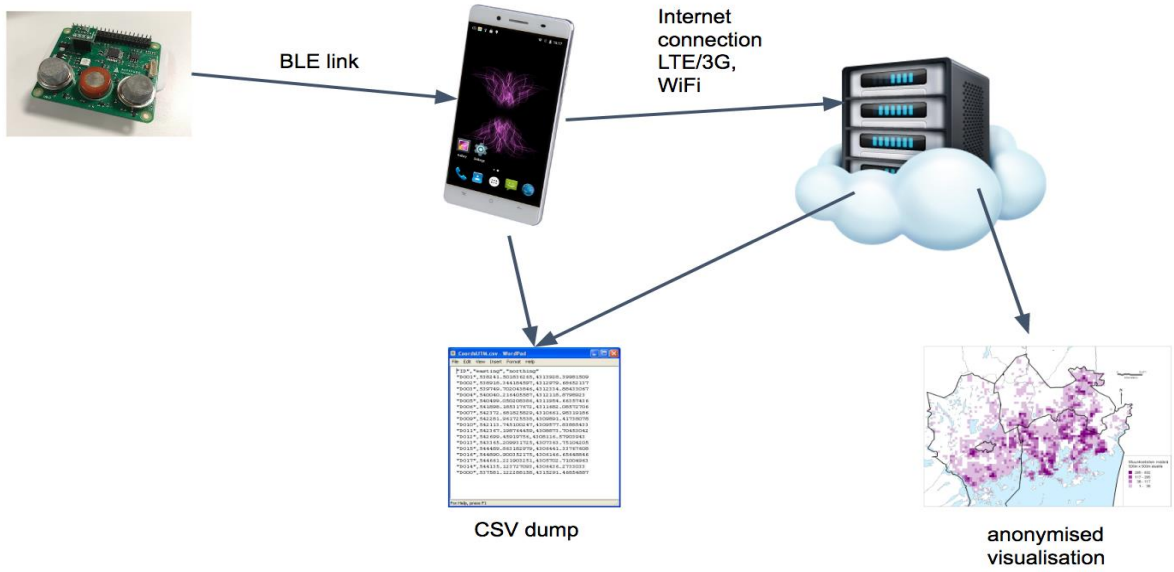
BLE + Internet connection



https://github.com/VekotinVerstas/rpi-air-workshop

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Empowering citizens

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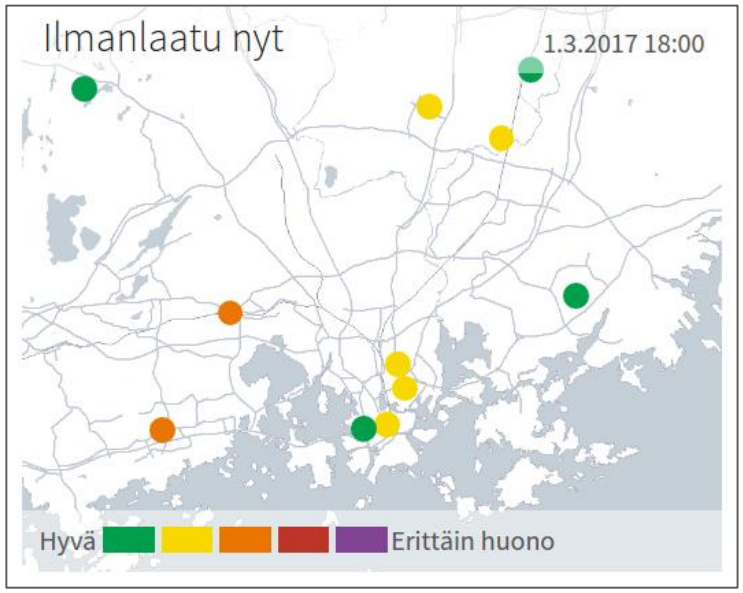
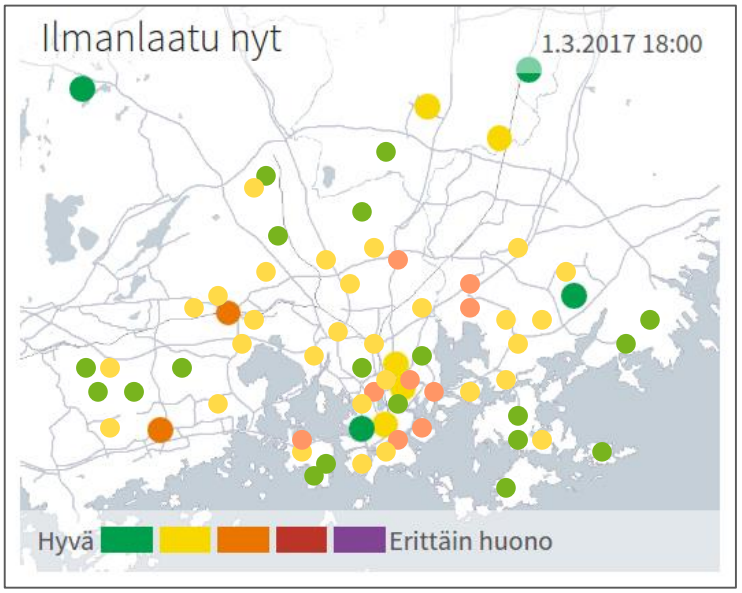
Environmental data - situation vs. future?

Data gathered by officials:



Data gathered by private citizens:



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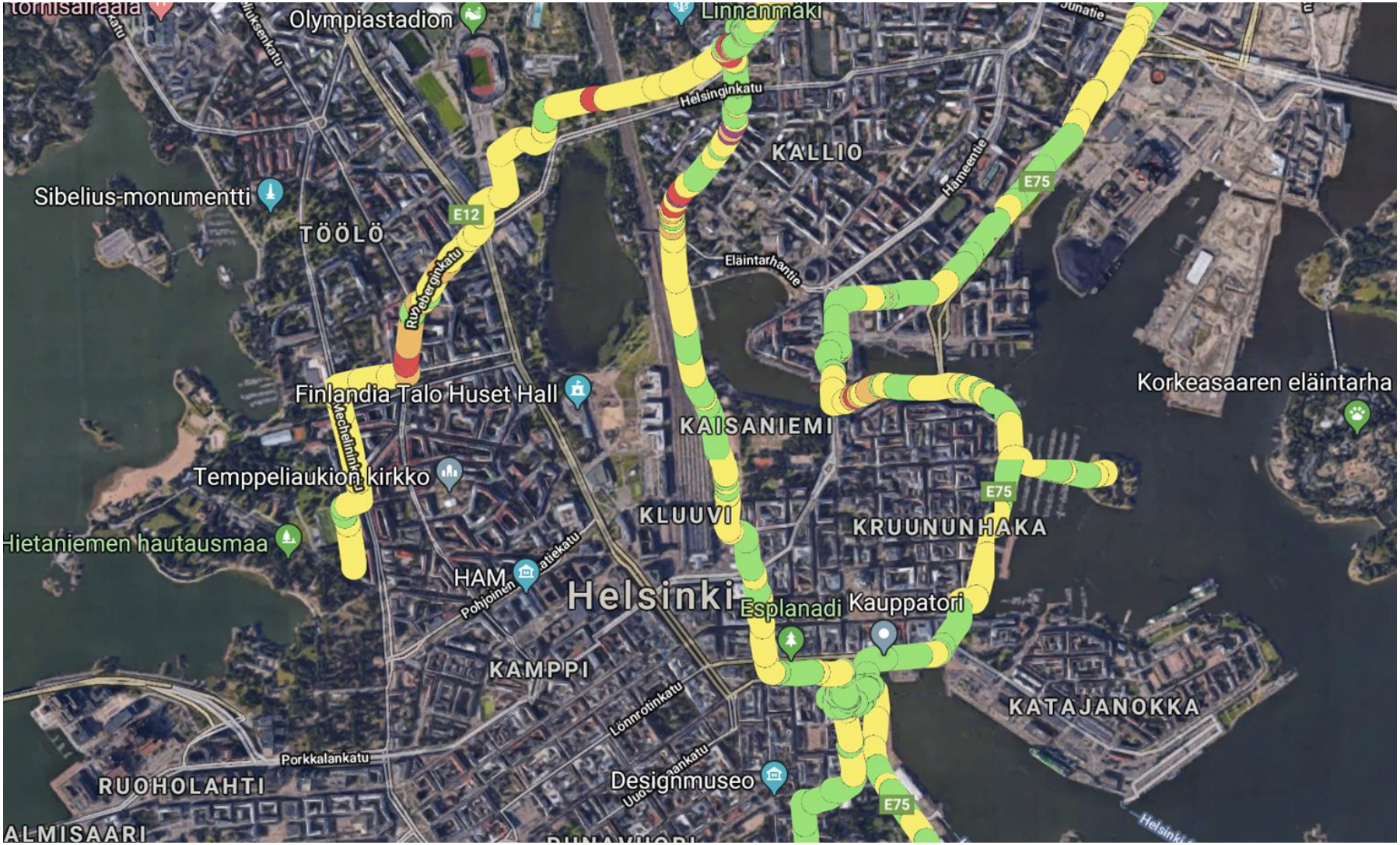

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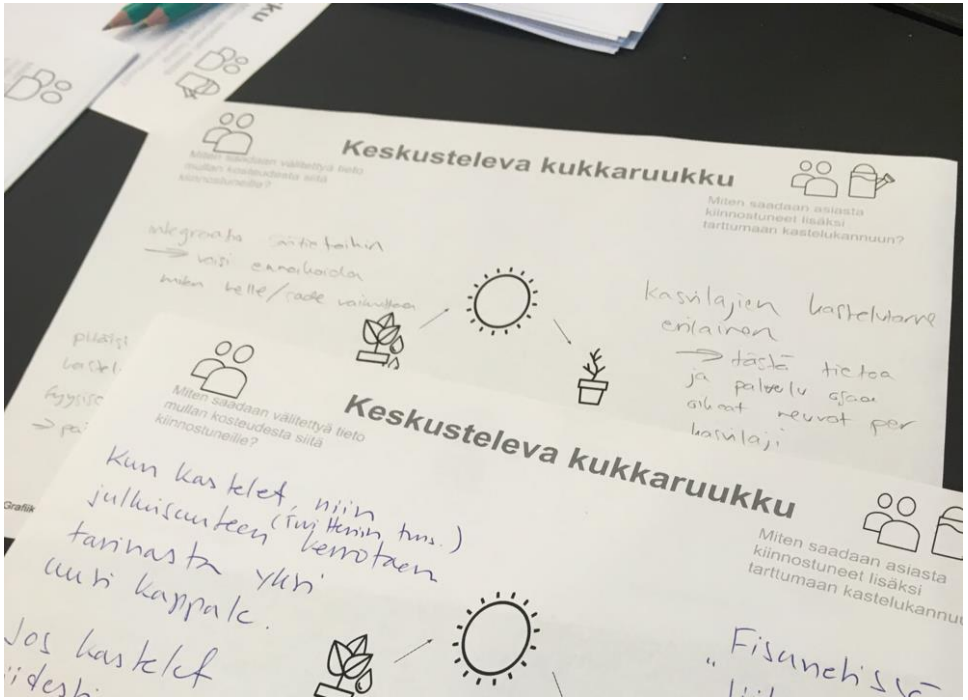
Vekotinverstas:

is a low threshold environment for IoT experimentation.

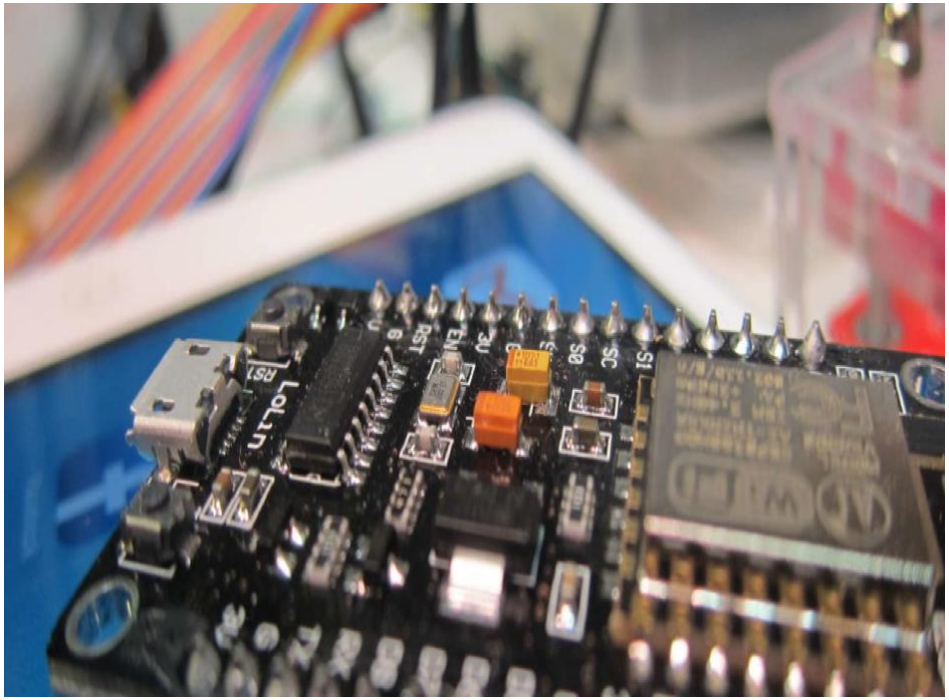
Vekotinverstas:

Brings together people who are interested in IoT, hacking and new ways of collecting data.



Vekotinverstas:

Utilizes cheap microcontrollers and easy to use sensors



README.md

Workshop on crowdsourced data gathering

Further information

- Sensor box software repository, contains source code and installation instructions
- Bt2Cloud android application source code repository and downloadable installer package

Sensor box

Components:

- Raspberry Pi Zero W
- Particulate sensor SDS011, "Nova PM sensor" (+ flat white cable and USB-plug)
- Temperature/humidity/barometric pressure sensor BME280 (+ flat jumper wires, 4 wide)
- Power bank
- Casing

Parts connected and inside the casing:

https://github.com/VekotinVerstas

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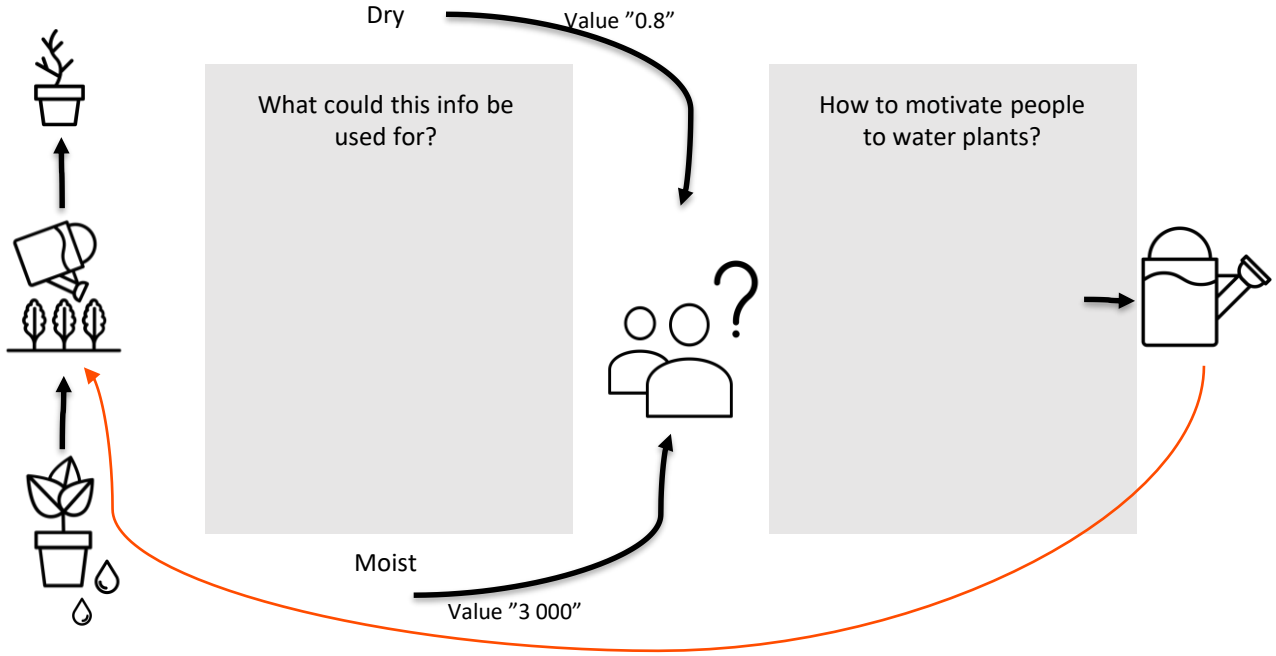
Engaging citizens:
Vekotinverstas ideation sessions

Chatting flower pot

Vekotinverstas.fi

What could it enable?



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Consent is the key for putting data to work

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Smart City – more data

Spaces and locks

Open energy and air quality data

Crowdsourcing data on people flows

Electric vehicles, charging stations and smart mobility

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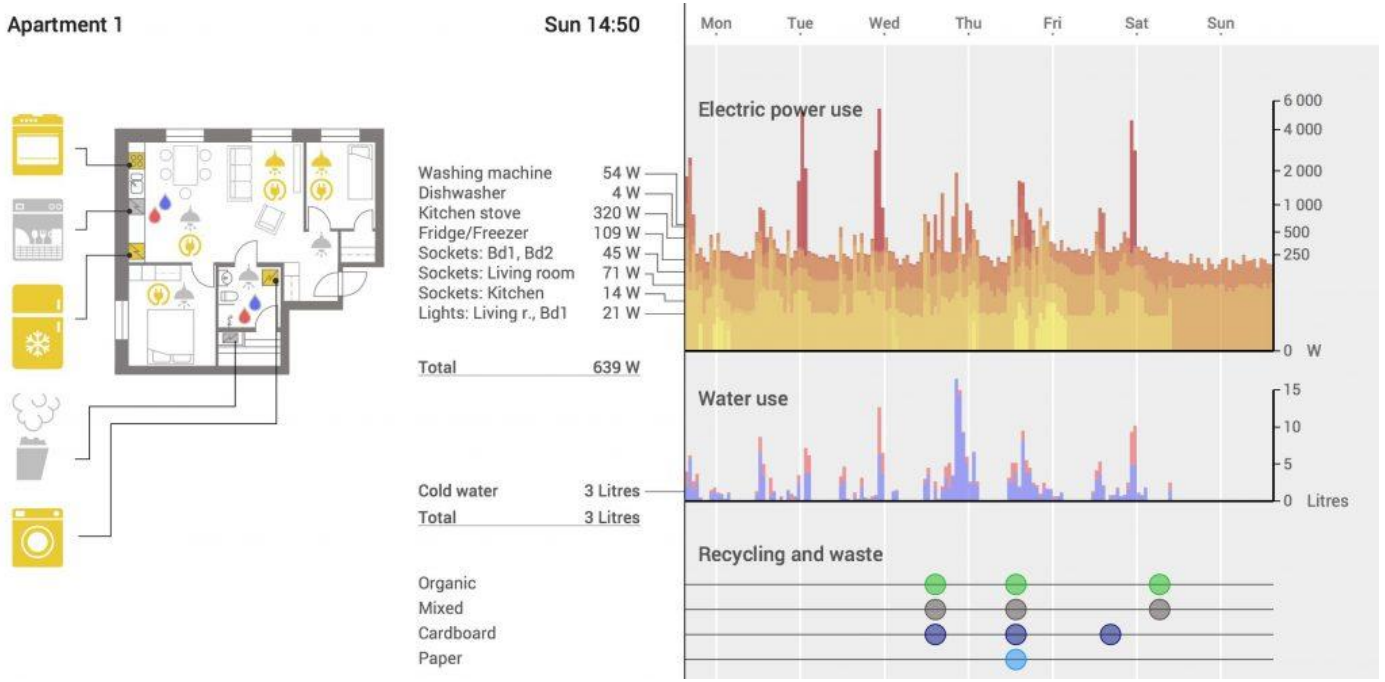
Smart homes – more data



Dataa Kalasataman asukkaiden sähkön- ja vedenkäytöstä sekä jätteiden kierrätyksestä (lähde: http://bit.ly/2buPUnP – CC BY 2.0)

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Personal Data

'personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, ***location data****, an* ***online identifier*** *or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person;*

(Source: GDPR Article 4, Definitions)

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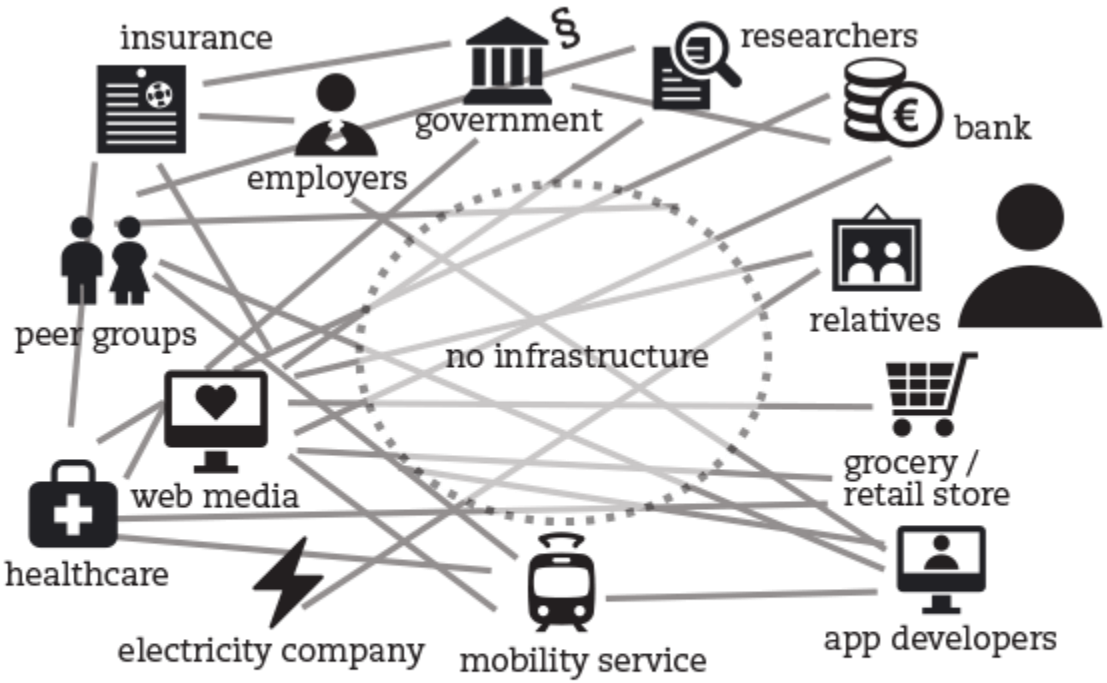
MyData Vision

The core idea is that individuals should be in control of their own data.

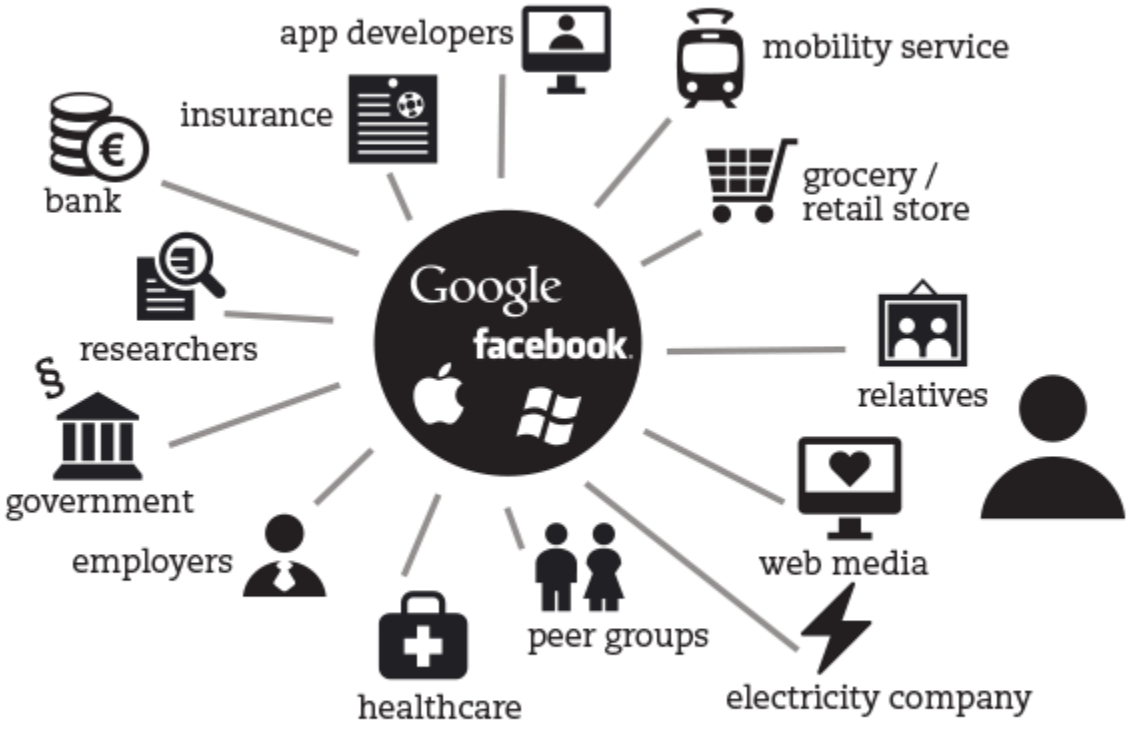
The MyData approach aims at strengthening digital human rights while opening new opportunities for businesses to develop innovative personal data based services built on mutual trust.

Source: **MyData Alliance**
Interoperability Model
https://docs.google.com/presentation/d/1j3aX8AQGdVtigF1WZouL8WccmYQzZQQje3wuaC2Zb1I/edit#slide=id.g1f749bffa4_2_80

Now in API economy...



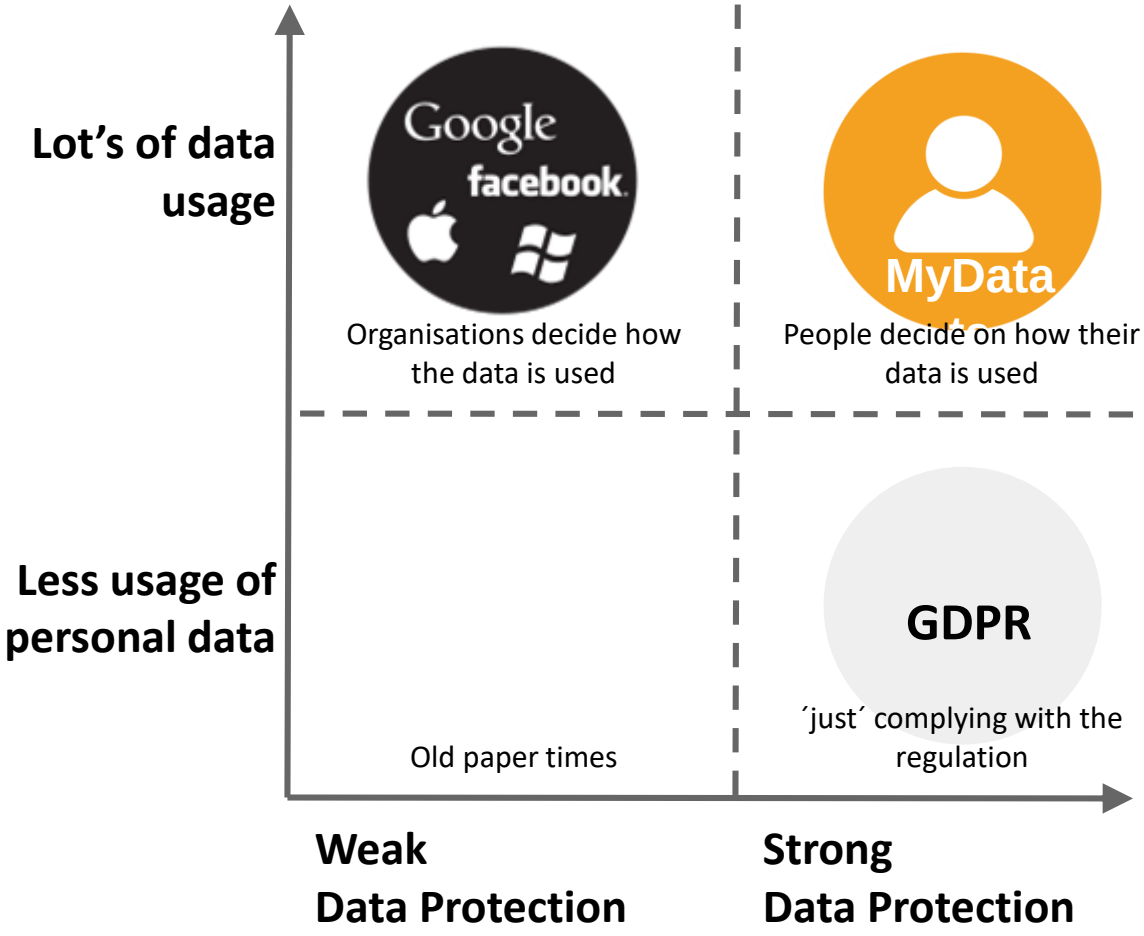
Organization Centric aggregators...



In MyData, Individual as:

Connection point: data from one person can be connected
(compare to geo location as correlation point for location data)

Control point: Individual decides who uses her data and how by giving consents
(permissions can be changed later)


Lot's of data usage
Less usage of personal data
Google
facebook
Organisations decide how the data is used
MyData
People decide on how their data is used
GDPR
´just´ complying with the regulation
Old paper times
Weak Data Protection
Strong Data Protection

MyData Principles

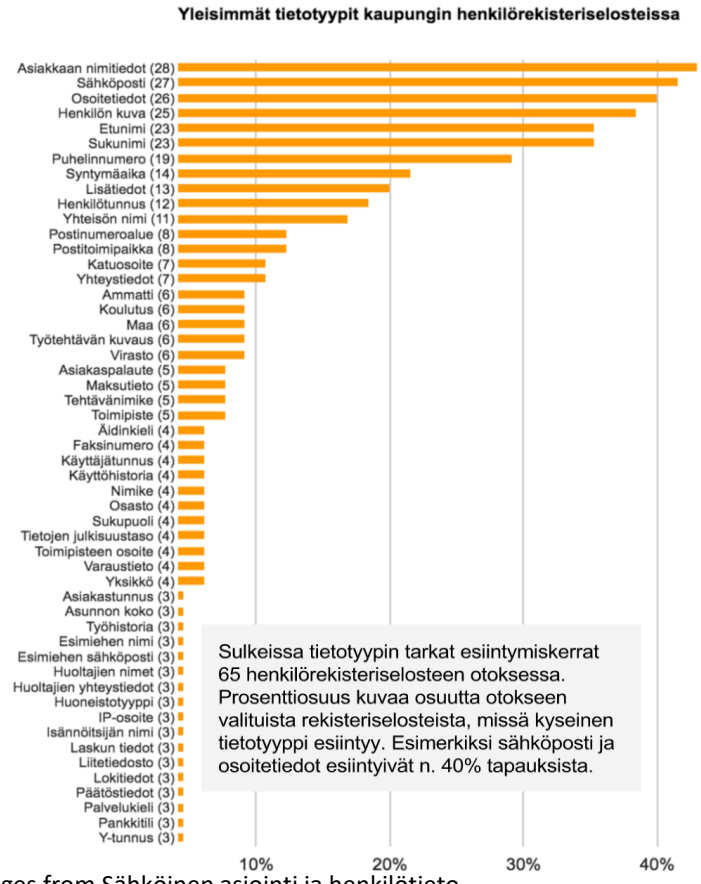
1. **Human Centric:** right to data, individual in control, privacy

2. **Usability of Data:** machine readable, open formats, APIs, standards

3. **Open Business Environment:** interoperability, possibility to change services without “data locks”

Helsinki committed to furthering mydata principles

- Helsinki has already taken first steps to this model by mapping the sources of the city's personal data reserves and drafting concepts for trying out MyData solutions in the future. https://www.hel.fi/uutiset/en/kaupunginkanslia/helsinki-commits-to-furthering-mydata-principles
- Report states that at least 209 out of almost 800 Helsinki's IT systems contain personal data
- Types of personal data vary -> but email or address were included in 40% of the cases
- Helsinki has also named Data protection officer. A data protection officer (DPO) is an enterprise security leadership role required by the GDPR.



Images from Sähköinen asiointi ja henkilötieto

Selvitys- ja kokeiluprojekti MyDatan hyödyntämisestä kaupungin palvelujen kehittämisessä

Antti Poikola, Emilia Hjelm, Daniel Schildt ja Open Knowledge Finland ry.

Funded by Helsingin innovaatiorahasto.

https://docs.google.com/document/d/1nmg5kSZuZgOk9E6WOkWCvHX0Xyfkh_AYEAwt6gWAZCQ/edit

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Helsinki becoming the most functional city in the world through open IoT ecosystem

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Be part of it

- Utilize or provide data
- Build things with us
- Pilot your solutions
- Leverage developed code or hw
- Take part in open calls

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Thank you!

Hanna.niemi-hugaerts@forumvirium.fi
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