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

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@CitySDK_Hanna

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

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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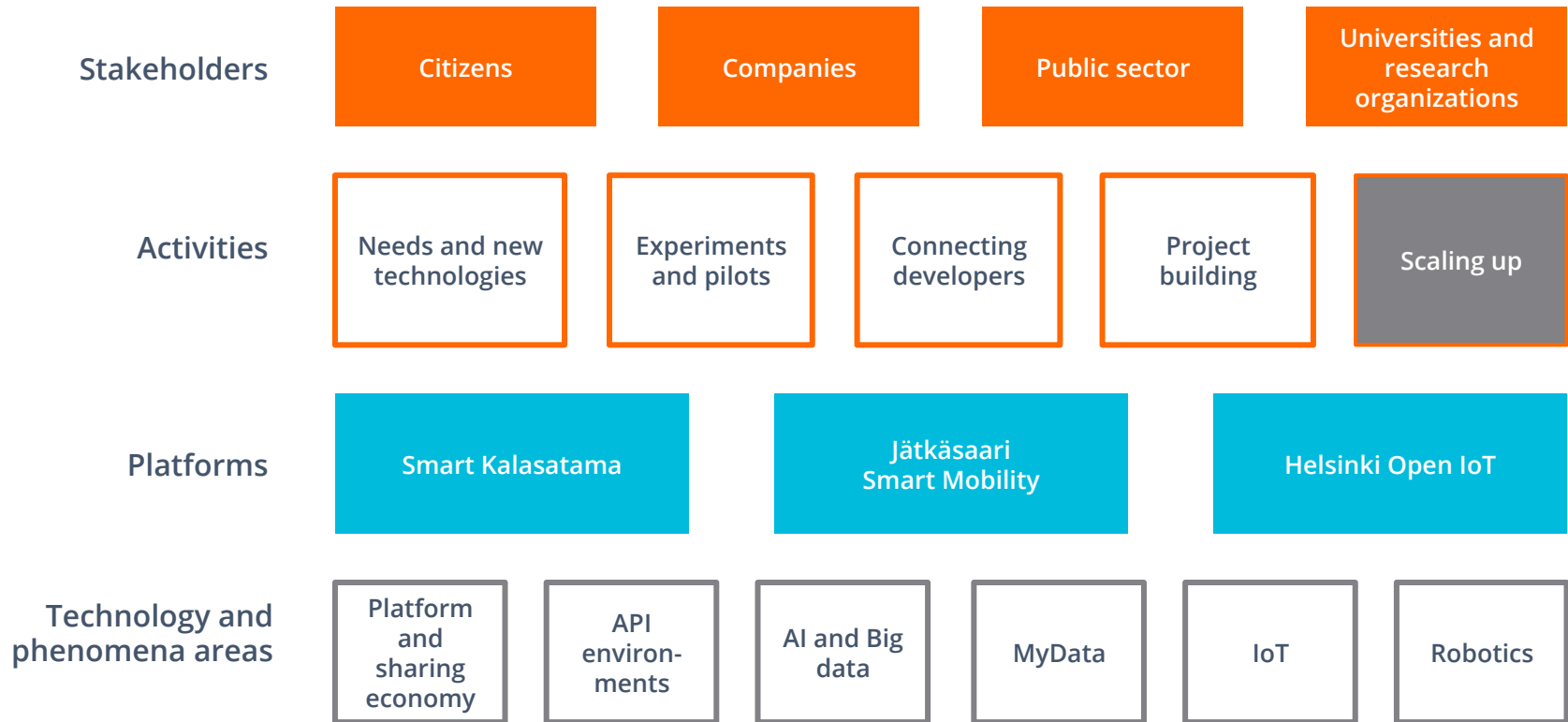# What is Forum Virium Helsinki?

- 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
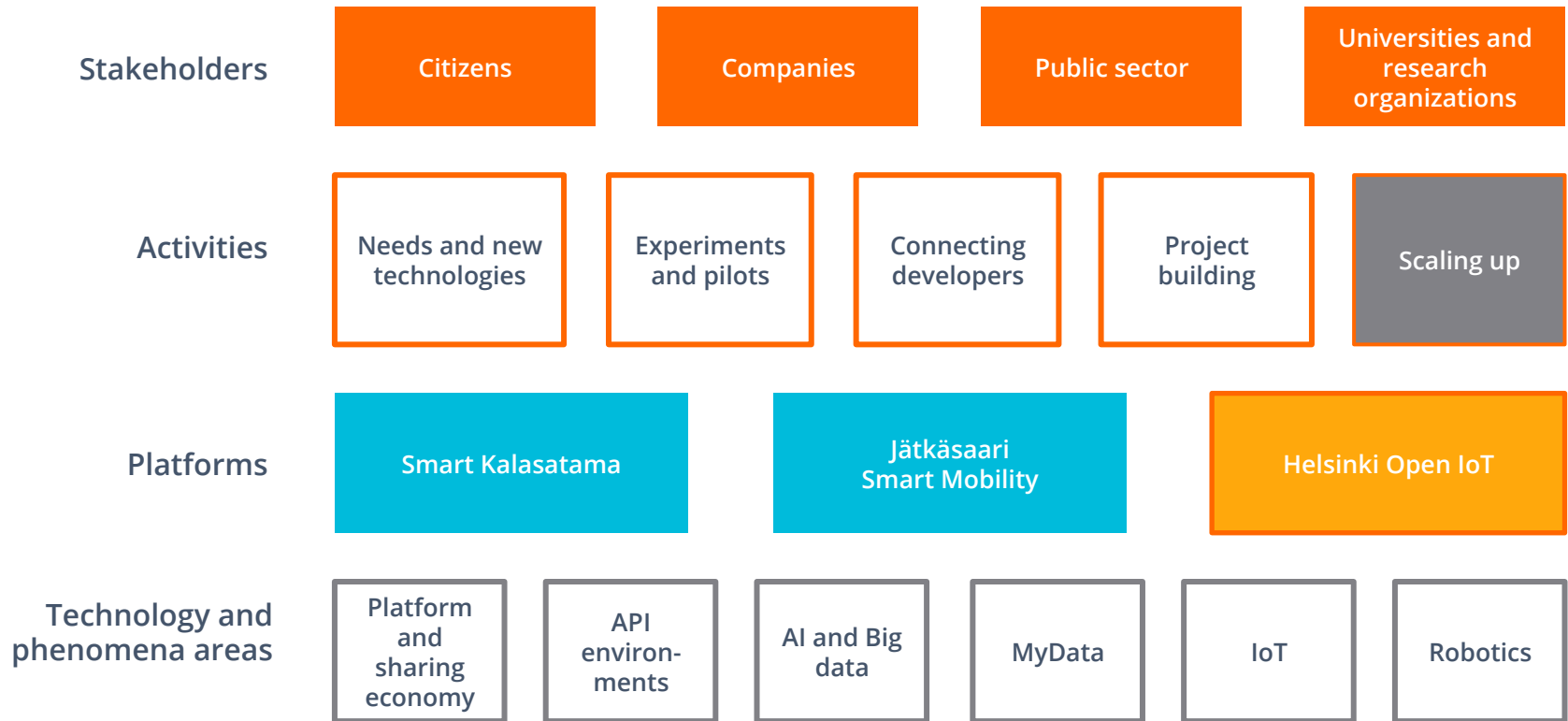
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What does Forum Virium Helsinki do?

- 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
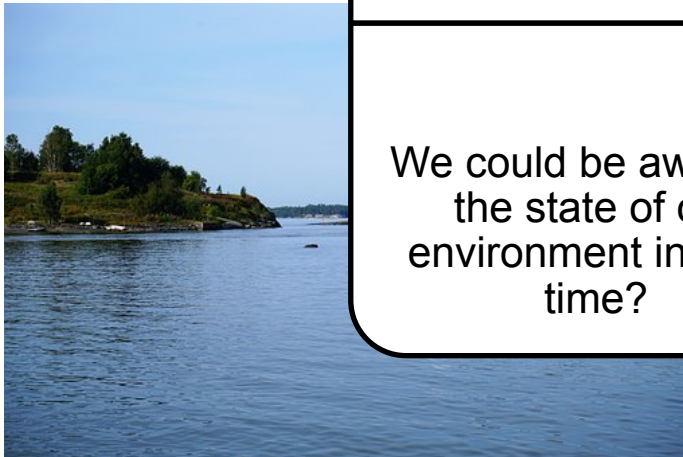
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Co-creating urban futures

Stakeholders	Citizens	Companies	Public sector	Universities and research organizations		
Activities	Needs and new technologies	Experiments and pilots	Connecting developers	Project building	Scaling up	
Platforms	Smart Kalasatama		Jätkäsaari Smart Mobility		Helsinki Open IoT	
Technology and phenomena areas	Platform and sharing economy	API environments	AI and Big data	MyData	IoT	Robotics

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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?

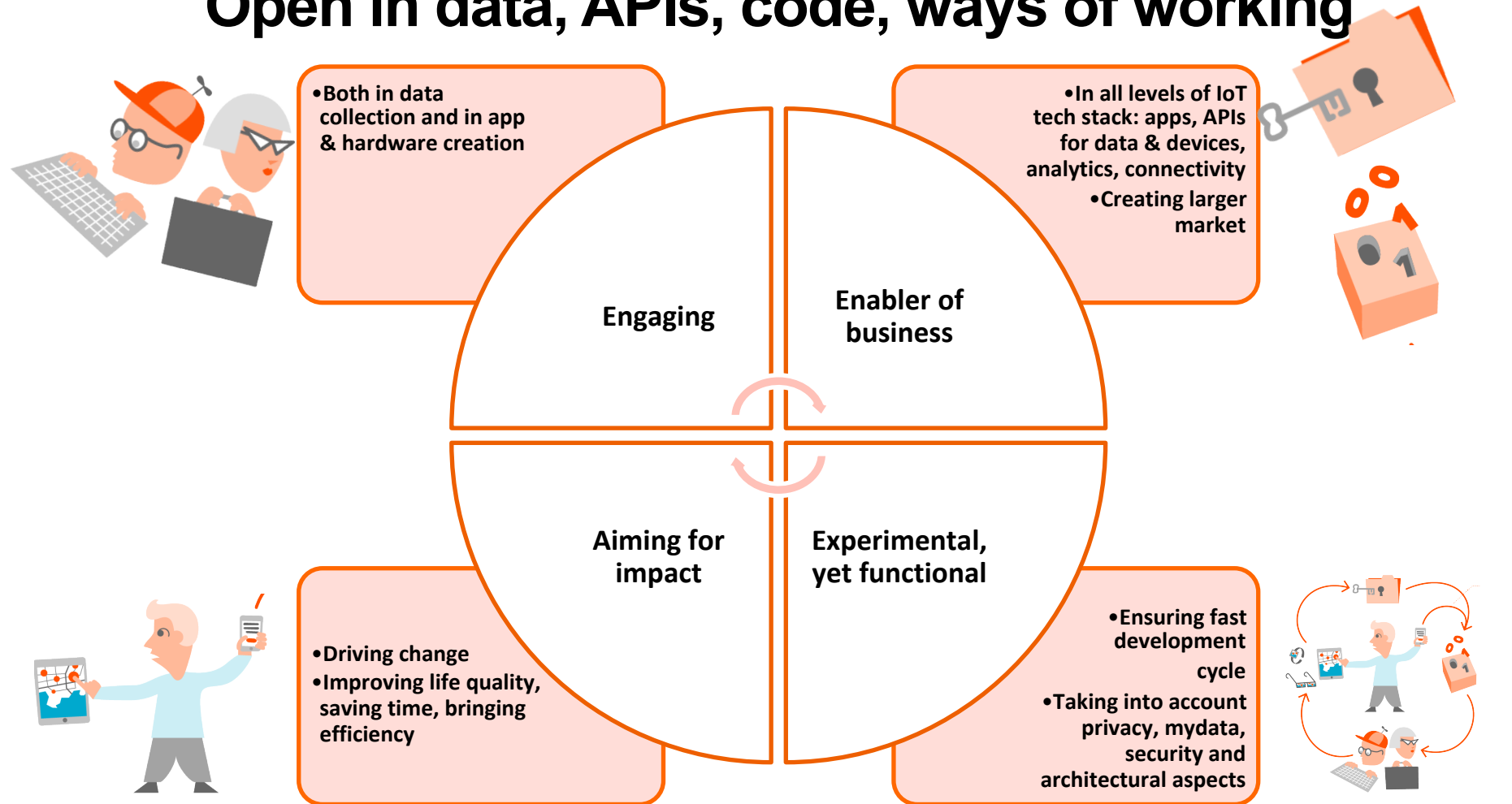Spaces would adapt heating and AC according to their usage?

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

• In all levels of IoT tech stack: apps, APIs for data & devices, analytics, connectivity

• Creating larger market

Engaging

Enabler of business

Aiming for impact

Experimental, yet functional

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

• 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

CitySDK
2012-2014

3 APIs

Six city strategy 2014-2017
4 APIs

Synchronicity

2017-2019
Northbound and Southbound APIs

MySmartLife 2017-2022
SensorThings API

Consent management

Helsinki data harmonization timeline

Open And
Agile Smart
Cities (OASC)
2015->

**MySmartLife
2017-2022**
SensorThings
API

Consent
management

Synchronicity

2017-2019
Northbound
and
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APIs

**Six city
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**CitySDK
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3 APIs
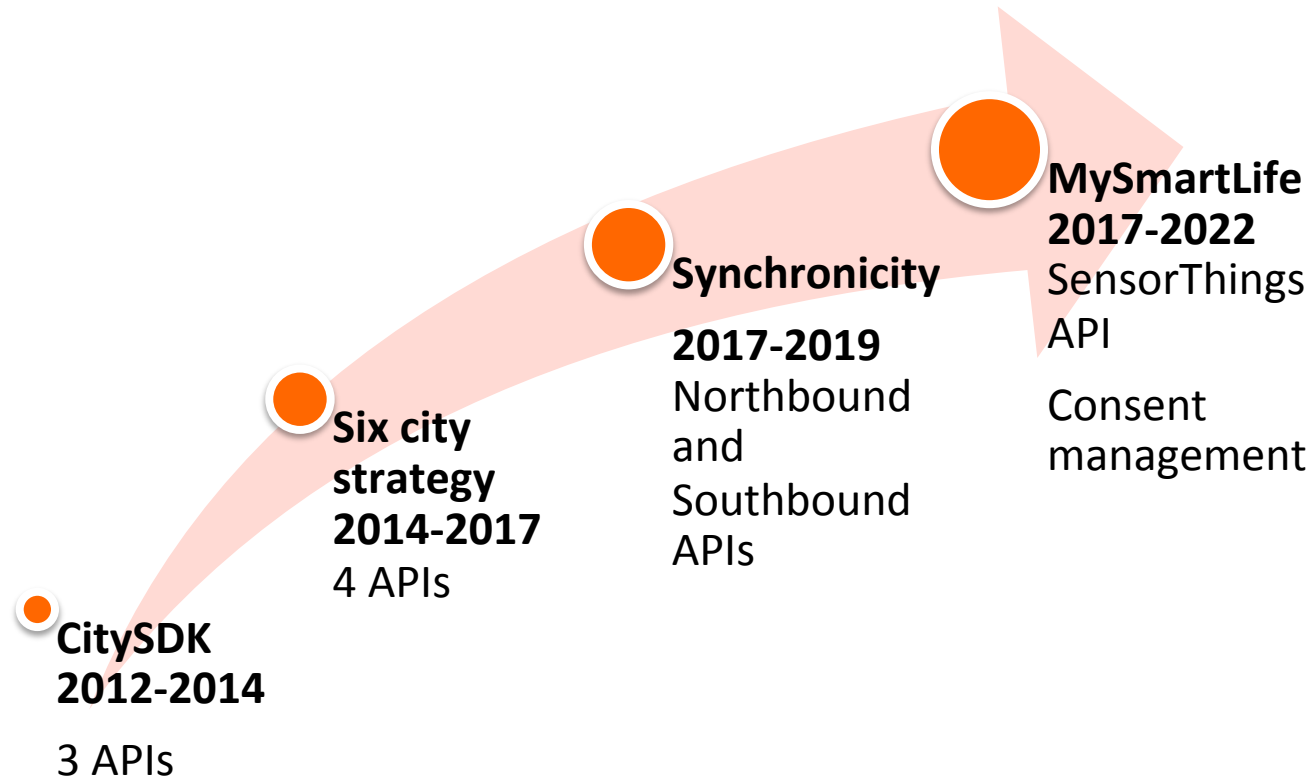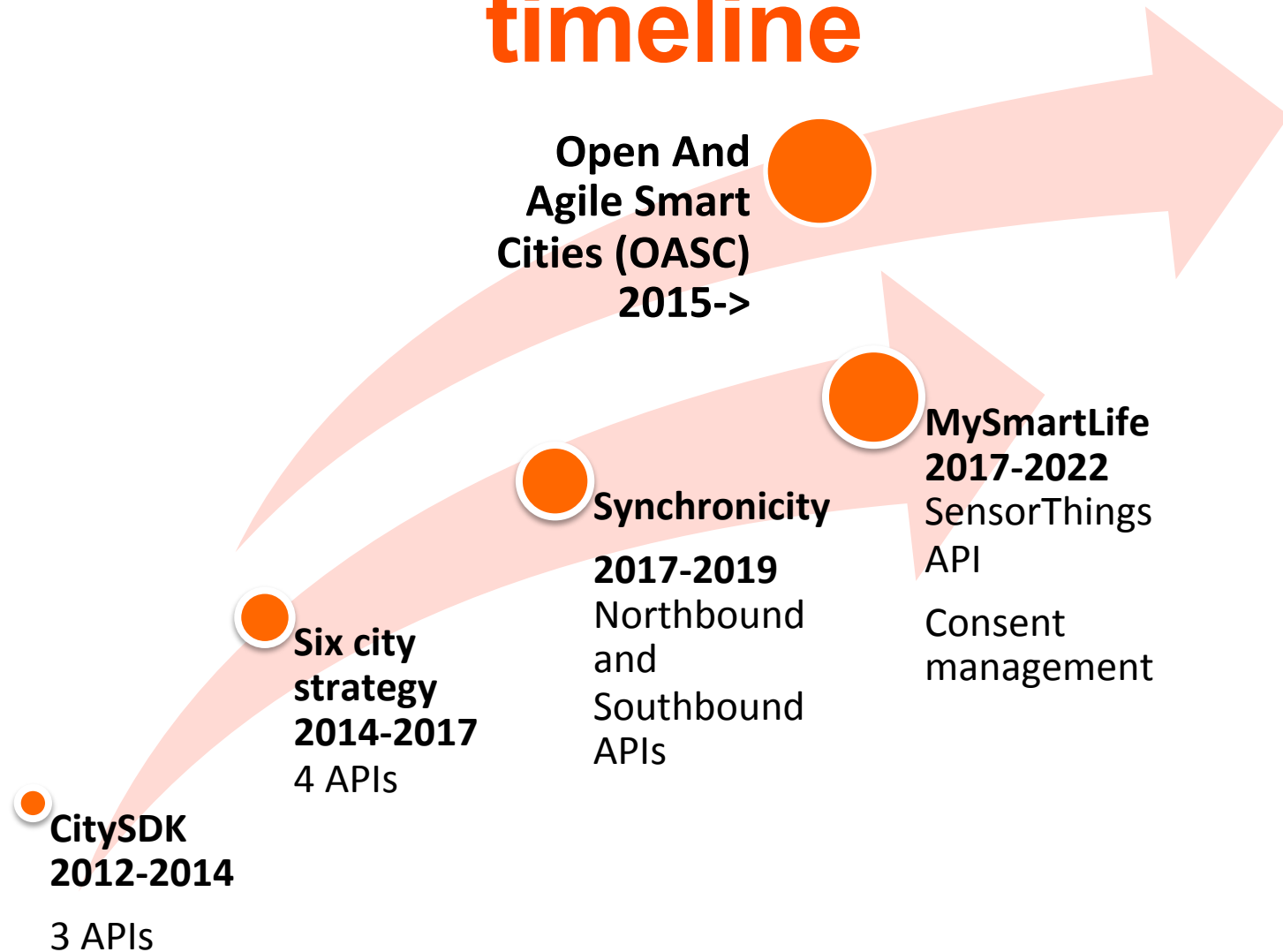
Data-fueled services and systems create demand for

Real-time data, personal data

New ways of data collection through IoT, Smart City

Connectivity

Consent management (GDPR, mydata models)

Forum Virium IoT program aims at

- Verifying impact
- Testing new technologies
- Enabling service and hardware development
- Experimenting with new means for data collection
- Introducing intelligence
- Moving towards open modular solutions
- Creating DSM through harmonization
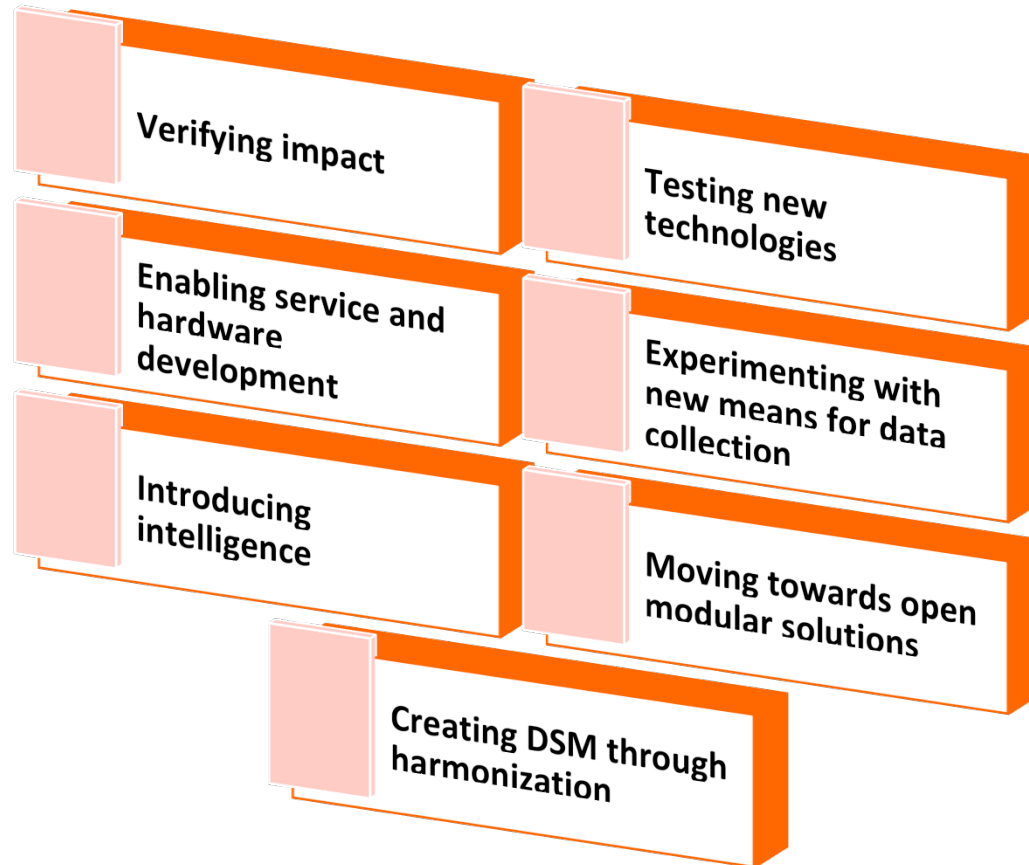
Our IoT-program projects tackling these issues

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 experimentations 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

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

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

The basics: the Smart City Platform

Cloud Enabled

User Centric

Co-Created

Data-Driven

Pluggable
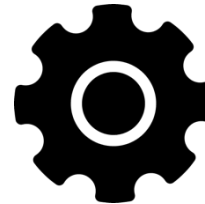
Service Oriented

The basics: Quality requirements

Open Source

Distributed & Decoupled

Interoperability
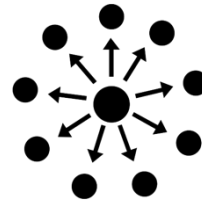
Scalability

Security
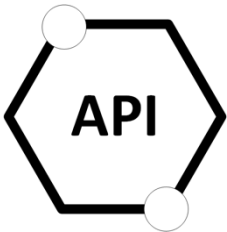
Open Standards

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

IoE Platform
Team Indra

Data Prediction

API Market

Crypto-currency

FIWOO
Team Bosonit

Advanced Analytics

FIWOO

SELECT
for Cities

Automatic Open Data Population

Personalised Infographics

Orchestra Cities
Team Martel

Real Time Decisions

Knowage Suite

City Enabler
Team Engineering

Microservices

Semantic Computing

Snap4 City
Team Florence University

CITY ENABLER

ORCHESTRA CITIES
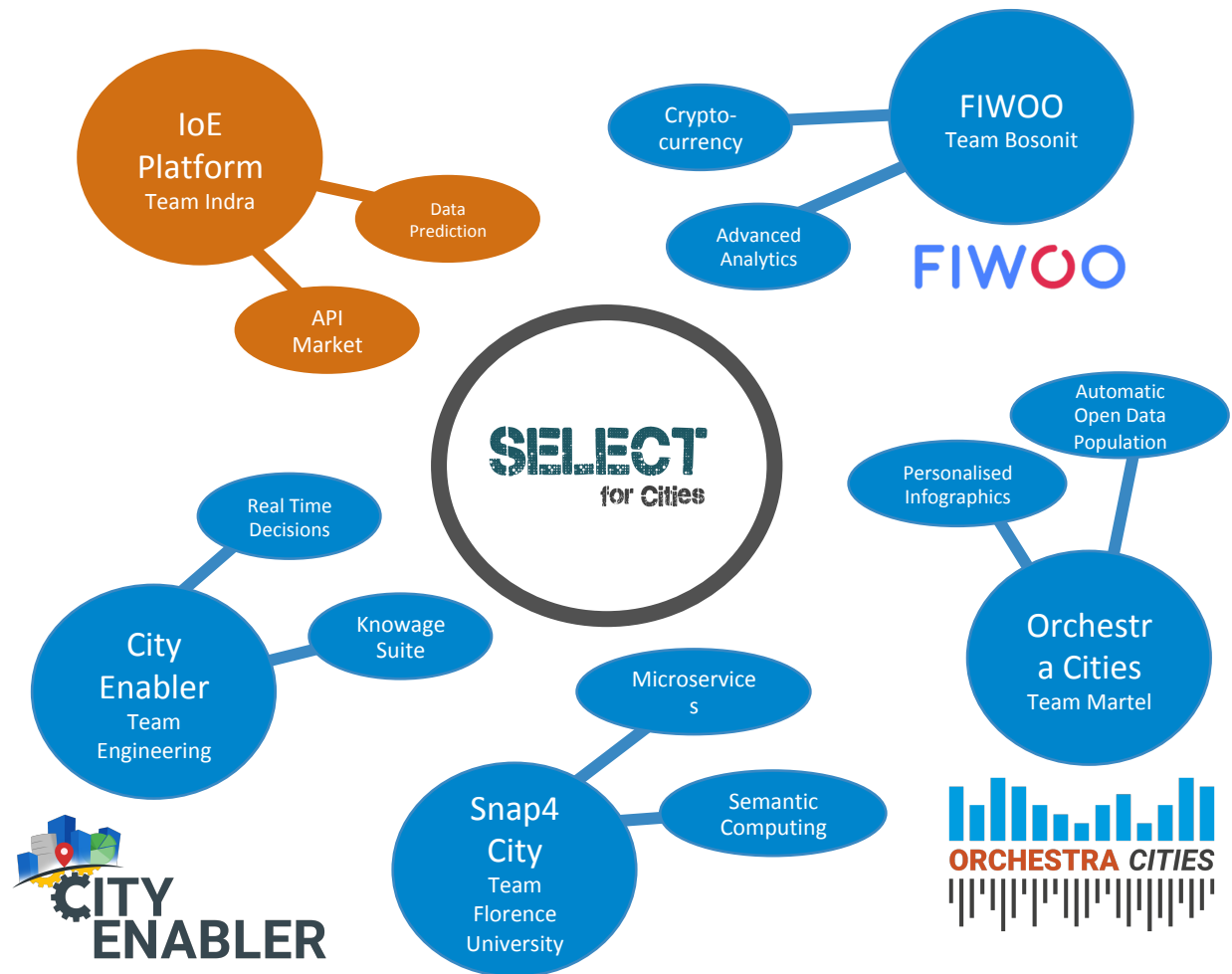
Keep up to date with project outcomes:

select4cities.eu
Select4Cities

@SELECT4CITIES

Going further southbound

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MySMARTLife:

Helsinki, Hamburg and Nantes contributing to OGC

SensorThings datamodel
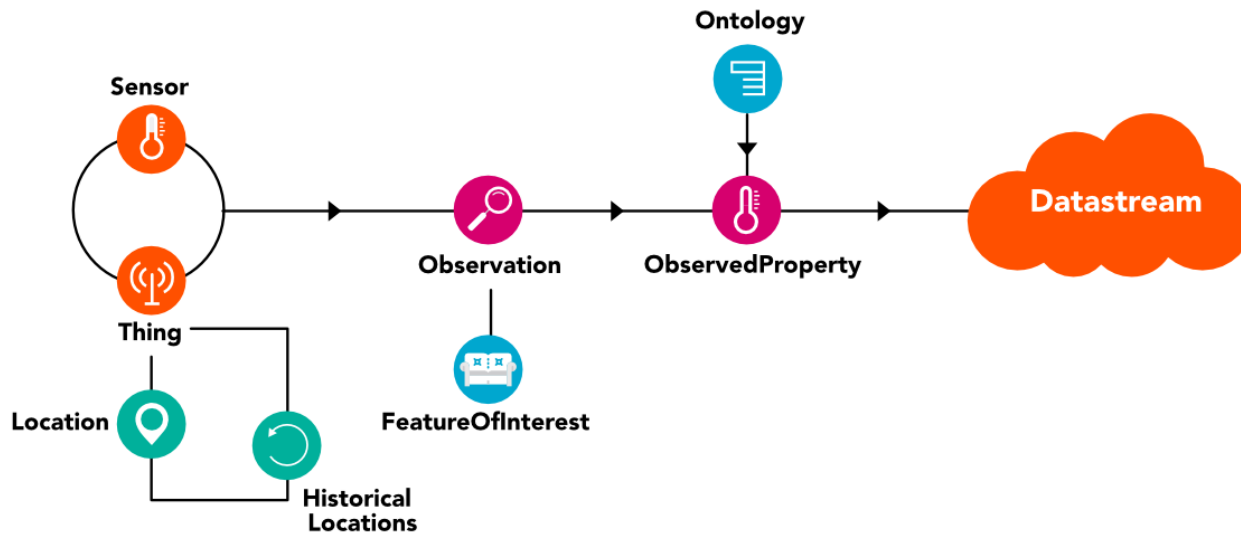
Synchronicity:
driving DSM for IoT enabled Smart City Solutions
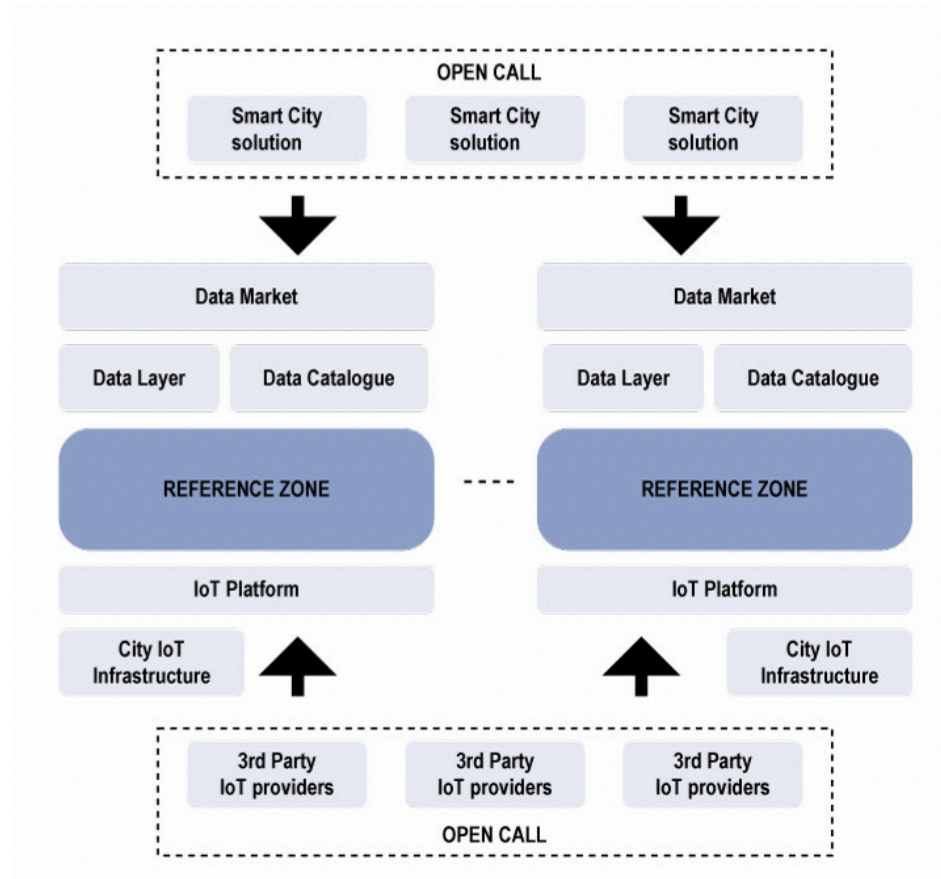
BIoTope:

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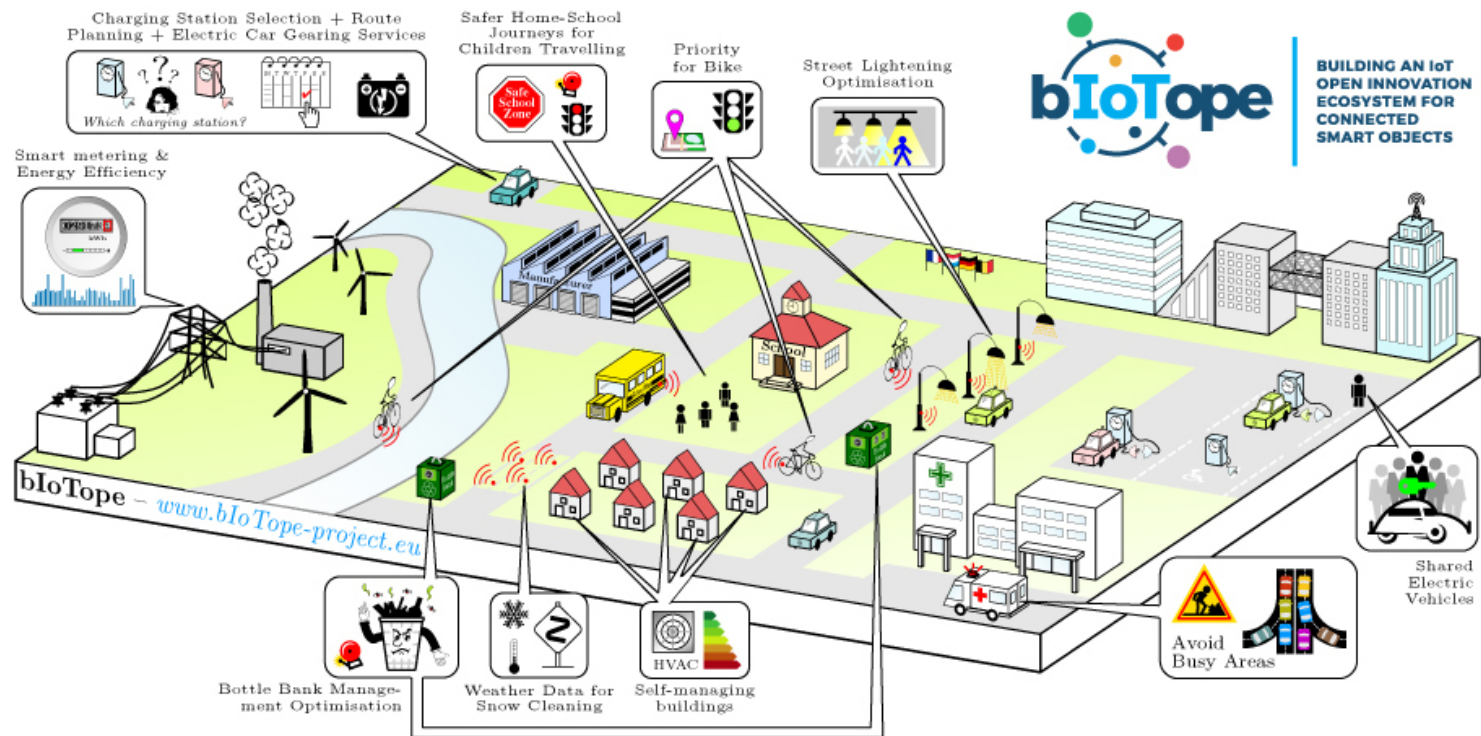
IoT Mark

Open Internet of things
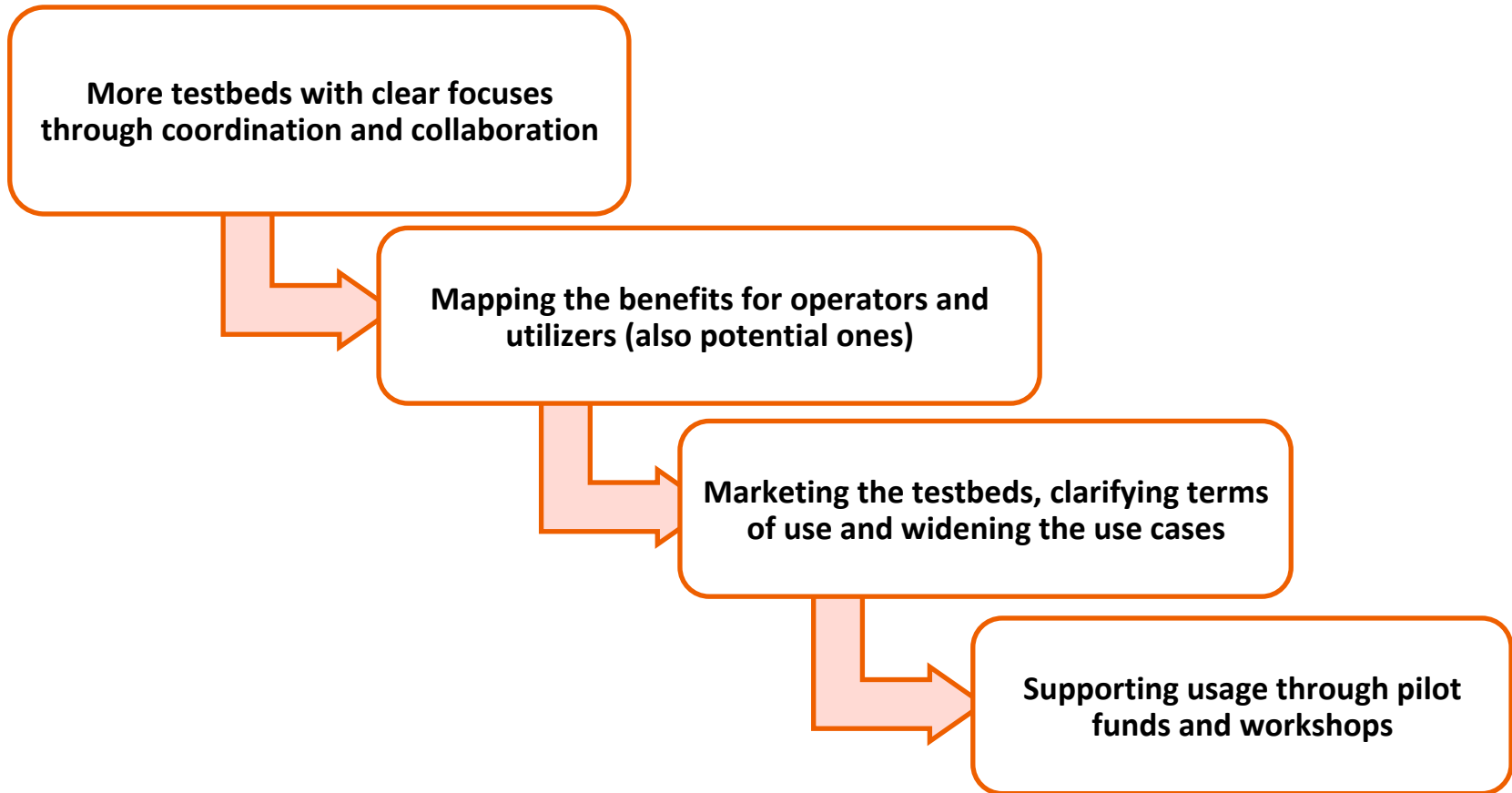Certification Mark

#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

More testbeds with clear focuses through coordination and collaboration

Mapping the benefits for operators and utilizers (also potential ones)

Marketing the testbeds, clarifying terms of use and widening the use cases

Supporting usage through pilot funds and workshops

Start June 2018

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BLE + Internet connection

BLE link

Internet
connection
LTE/3G,
WiFi

CSV dump

anonymised
visualisation

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:
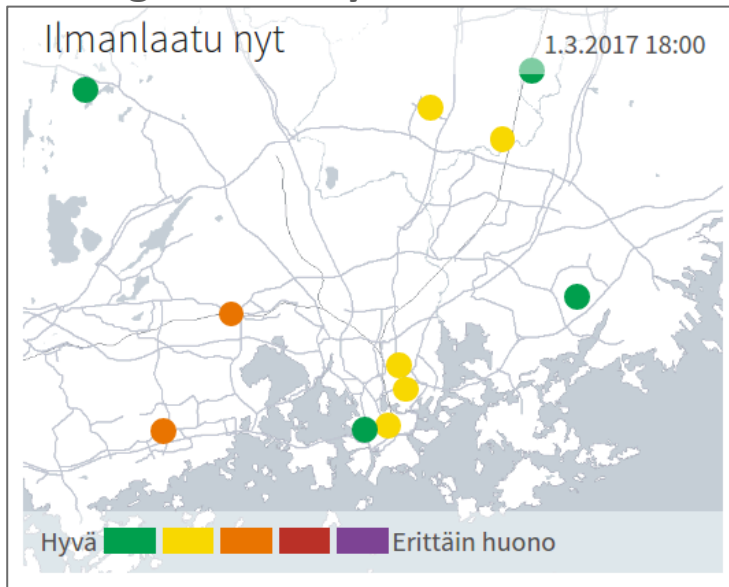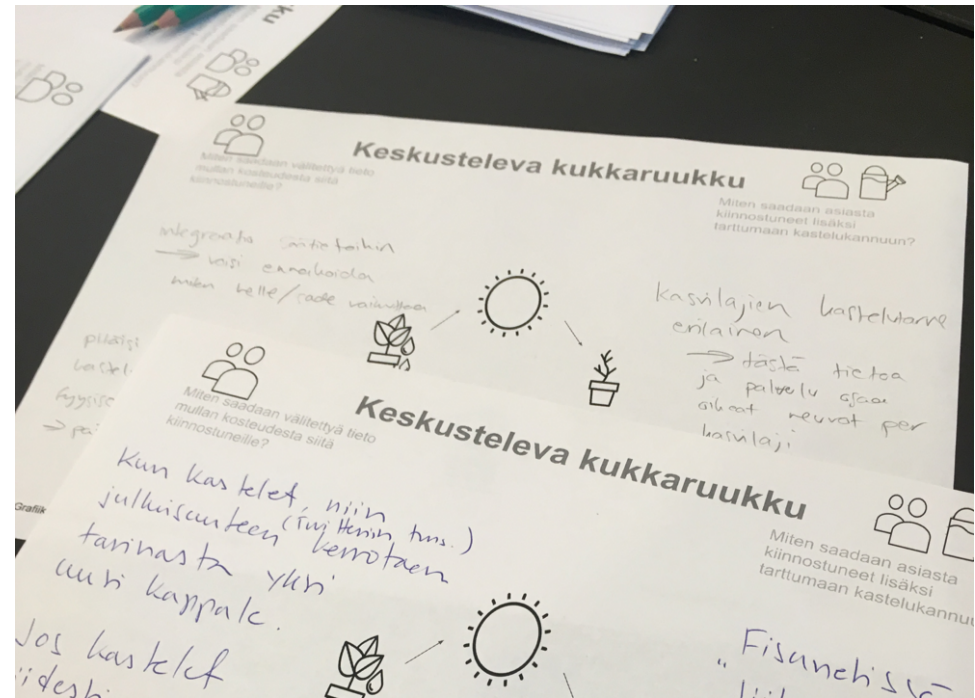

Data gathered by private citizens:

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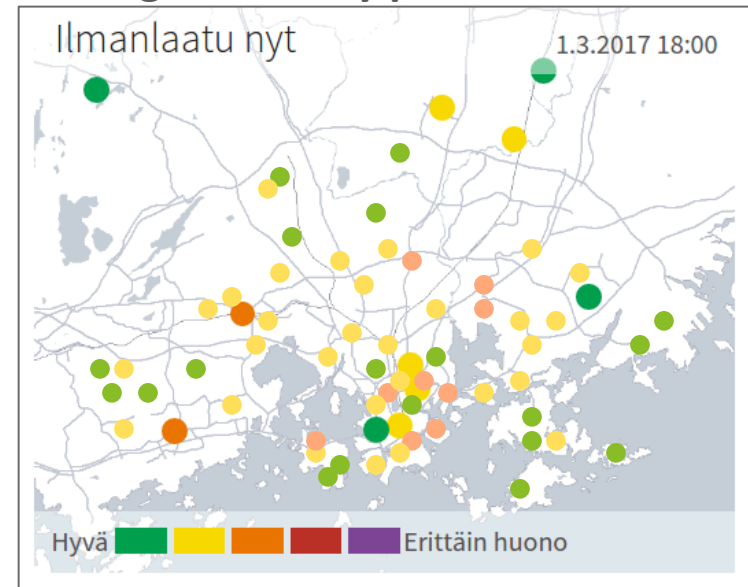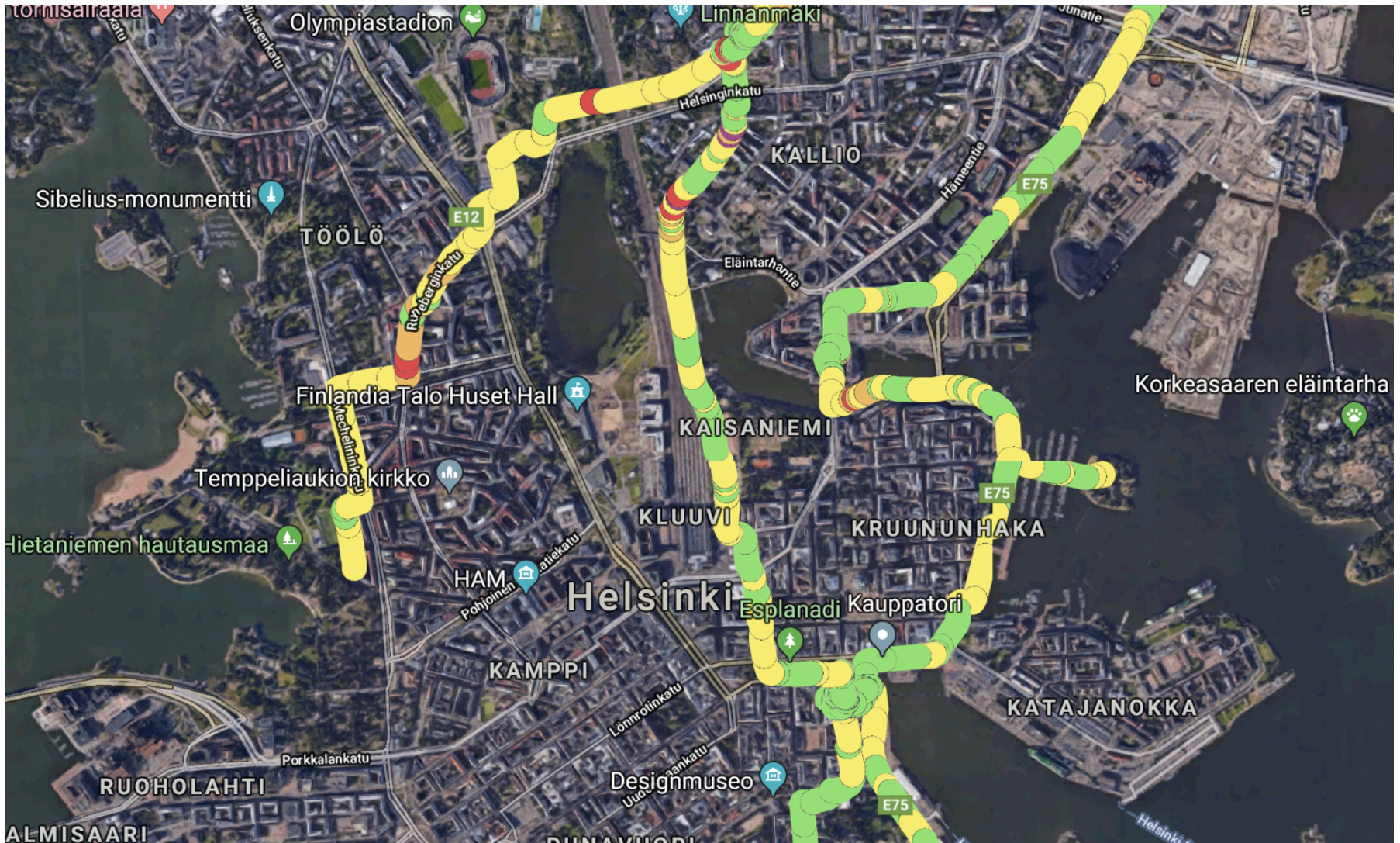
Vekotinverstas:

is a low threshold environment for IoT experimentation.
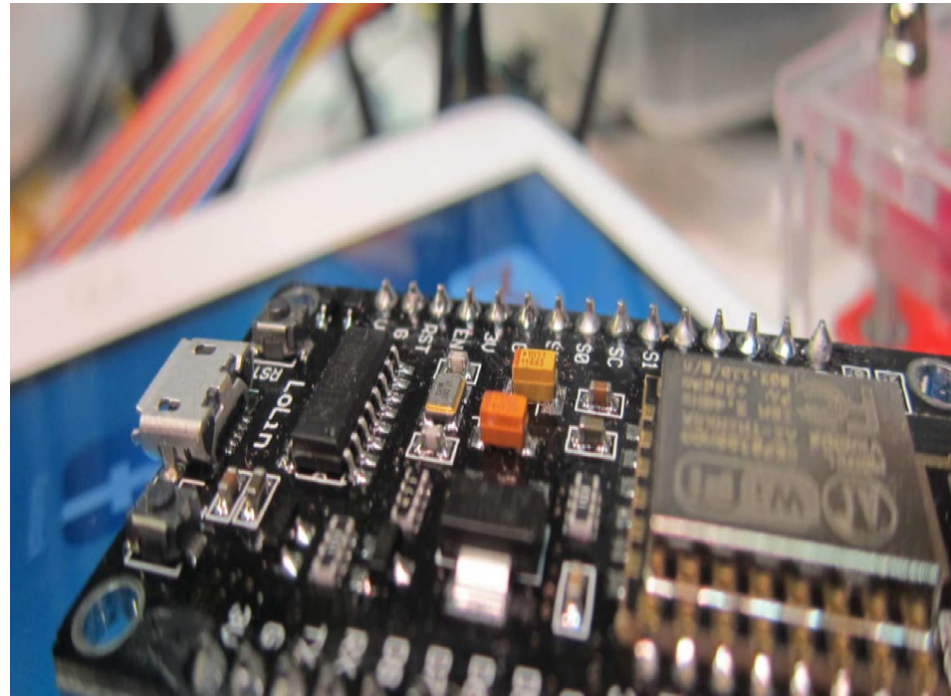
Vekotinverstas:

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)
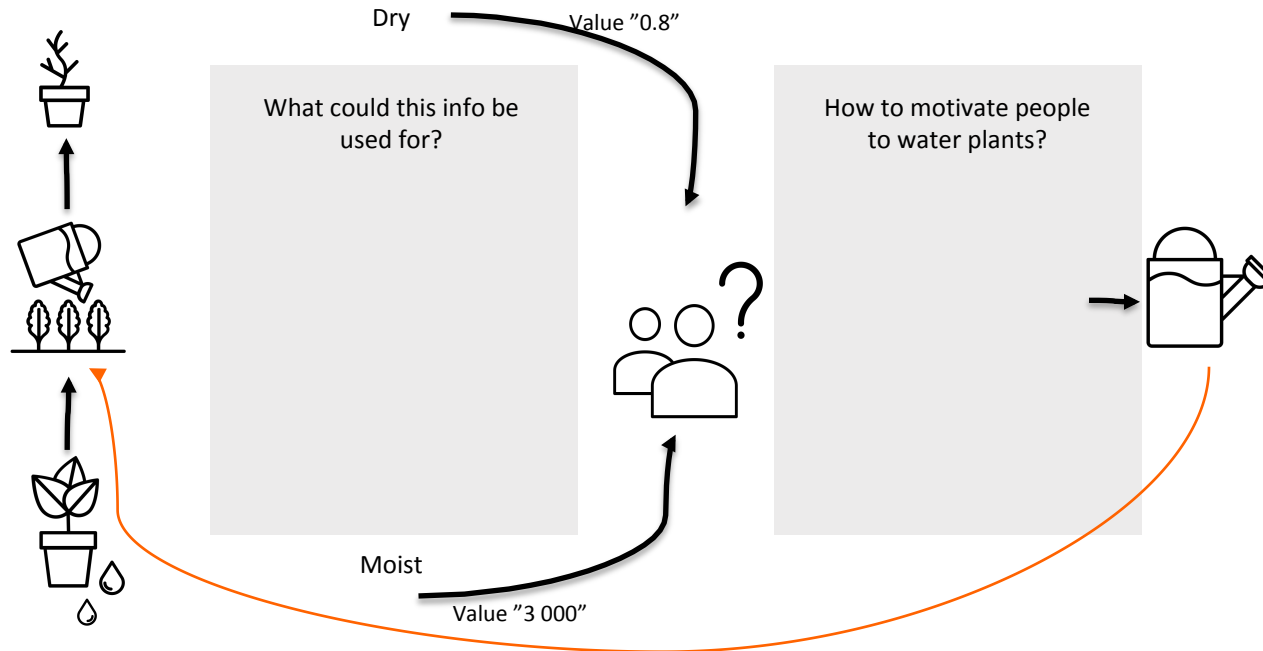- Power bank
- Casing

Parts connected and inside the casing:

https://github.com/VekotinVerstas

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Engaging citizens:
Vekotinverstas ideation sessions

Chatting flower pot

What could it enable?

Dry   Value "0.8"

What could this info be used for?

How to motivate people to water plants?

Moist

Value "3 000"

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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

Zone 3: Viikki Environment house

Zone 1: Merihaka
1970s residential construction

Zone 2: Kalasatama
New high-performance residential area
Korkeasaari Zoo

CENTER OF HELSINKI

Mobility pilots in Kamppi

Mobility pilots in Jätkäsaari
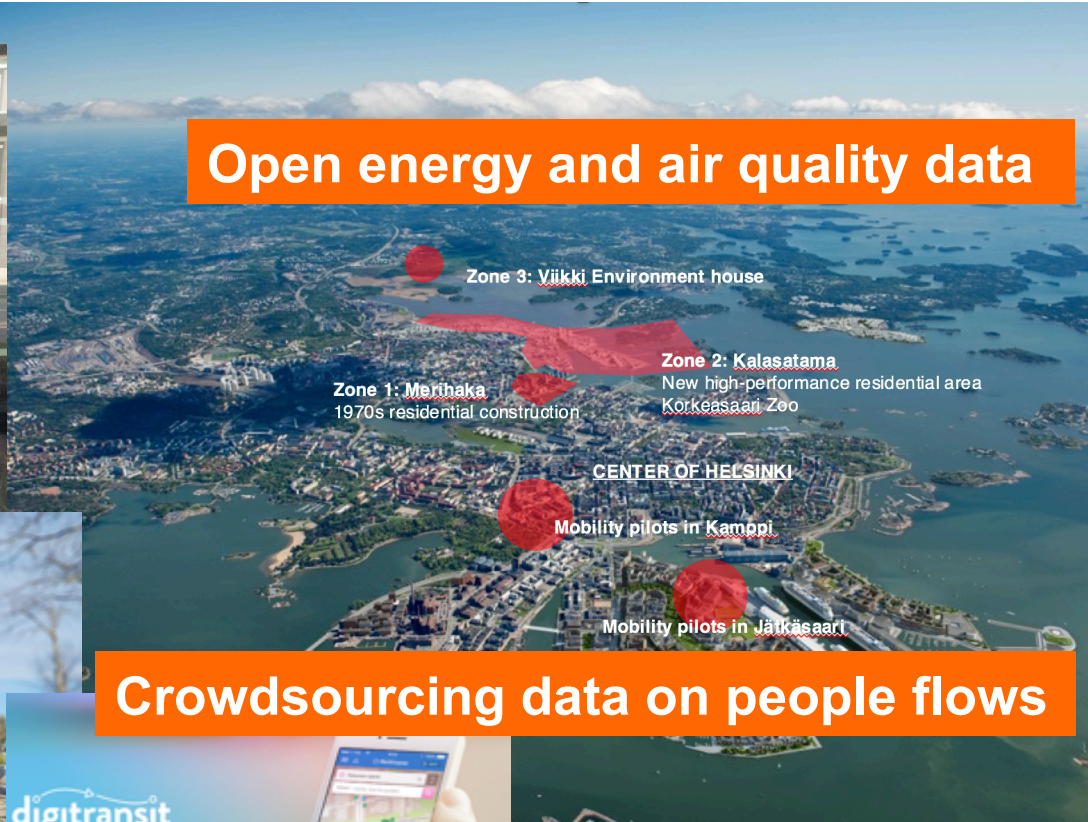
Crowdsourcing data on people flows

Electric vehicles, charging stations and smart mobility

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Smart homes – more data
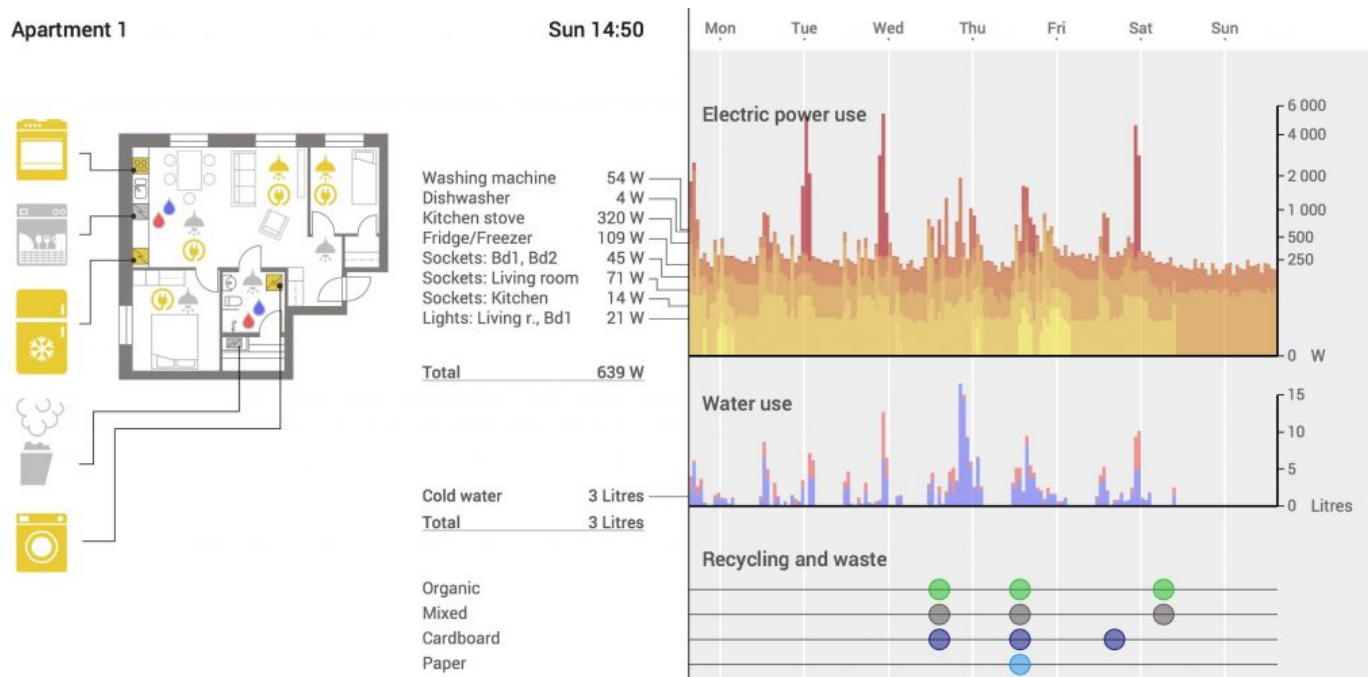
Personal Data

*'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)

MyData Vision

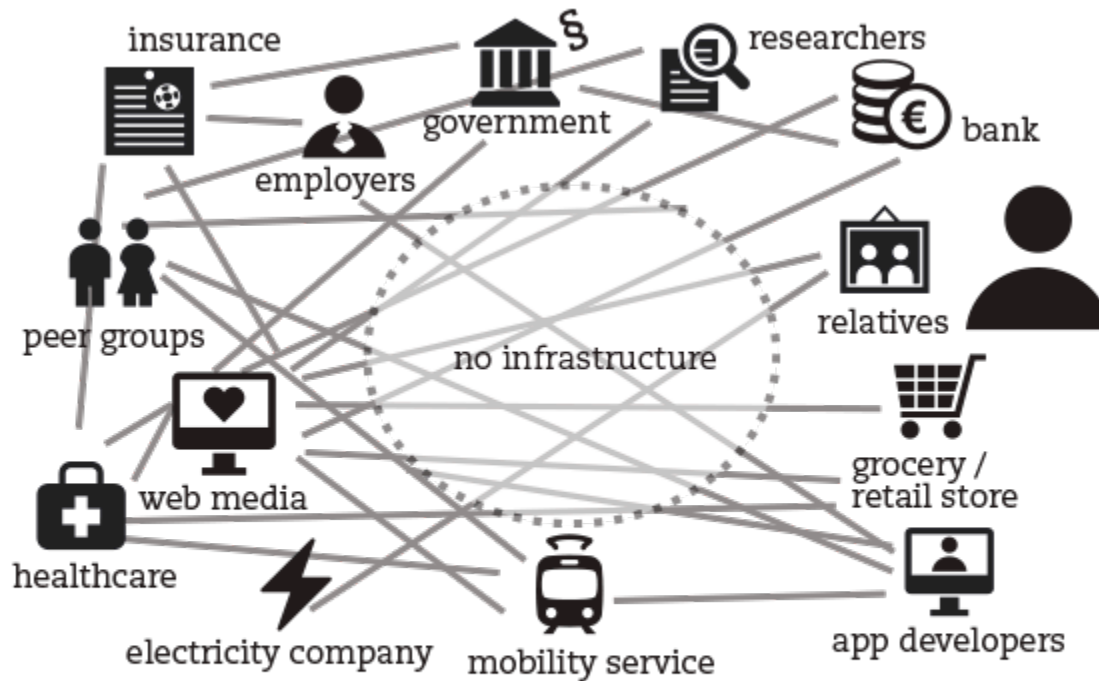The core idea is that individuals should be in control of their own data.

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.

Now in API economy...

insurance · government · researchers · bank · employers · peer groups · relatives · no infrastructure · web media · grocery / retail store · healthcare · electricity company · mobility service · app developers

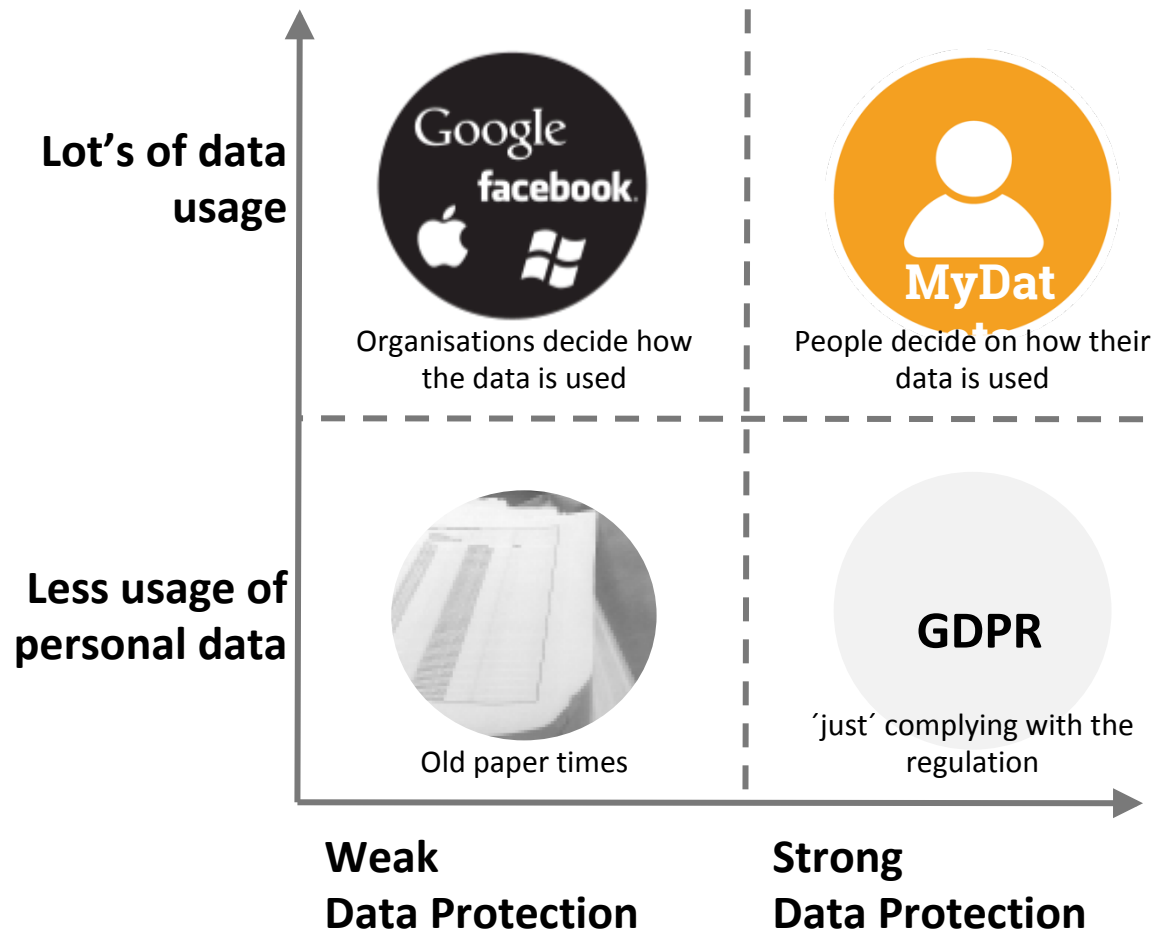# Organization Centric aggregators...
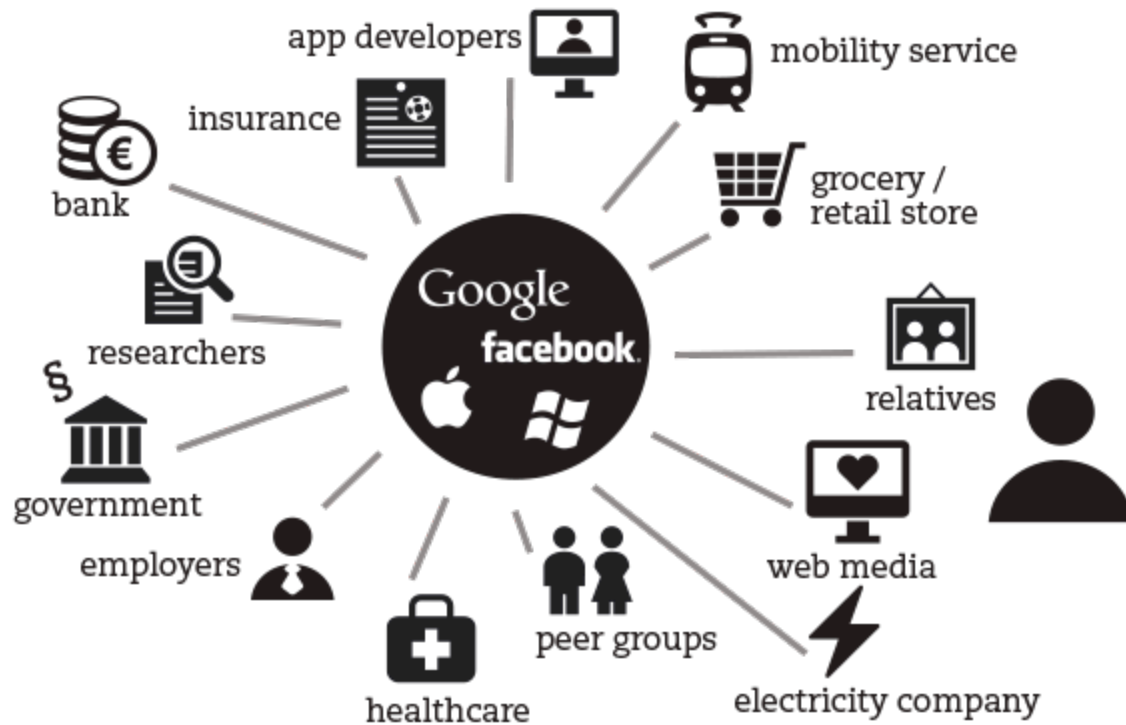
In MyData, Individual as:

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

Organisations decide how the data is used

People decide on how their data is used

Less usage of personal data

Old paper times

GDPR

´just´ complying with the regulation

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.

Yleisimmät tietotyypit kaupungin henkilörekisteriselosteissa
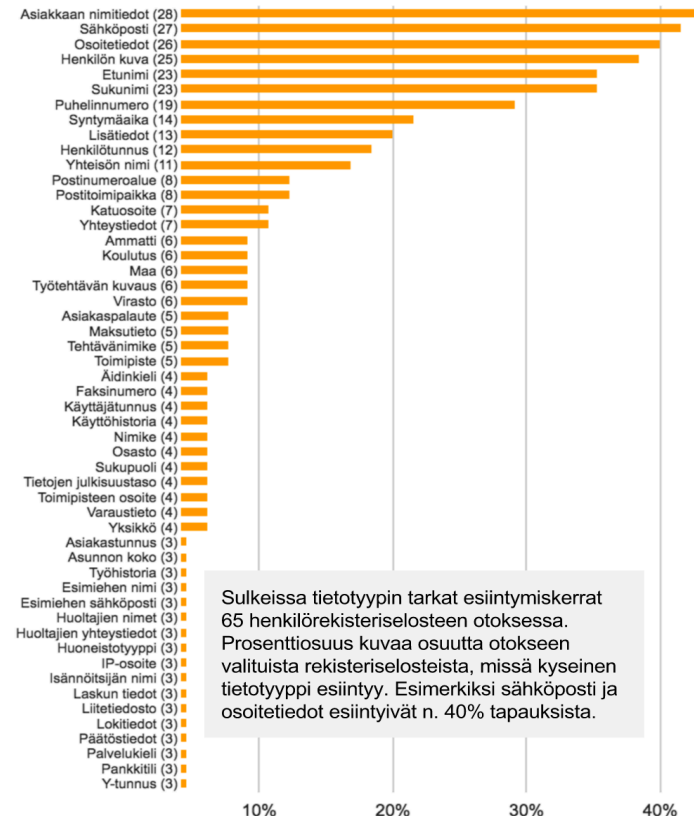
Sulkeissa tietotyypin tarkat esiintymiskerrat 65 henkilörekisteriselosteen otoksessa. Prosenttiosuus kuvaa osuutta otokseen valituista rekisteriselosteista, missä kyseinen tietotyyppi esiintyy. Esimerkiksi sähköposti ja osoitetiedot esiintyivät n. 40% tapauksista.

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
@CitySDK_Hanna