

Ilmanlaatuanturit - markkinoiden ja teknologian kehitysaskeleita

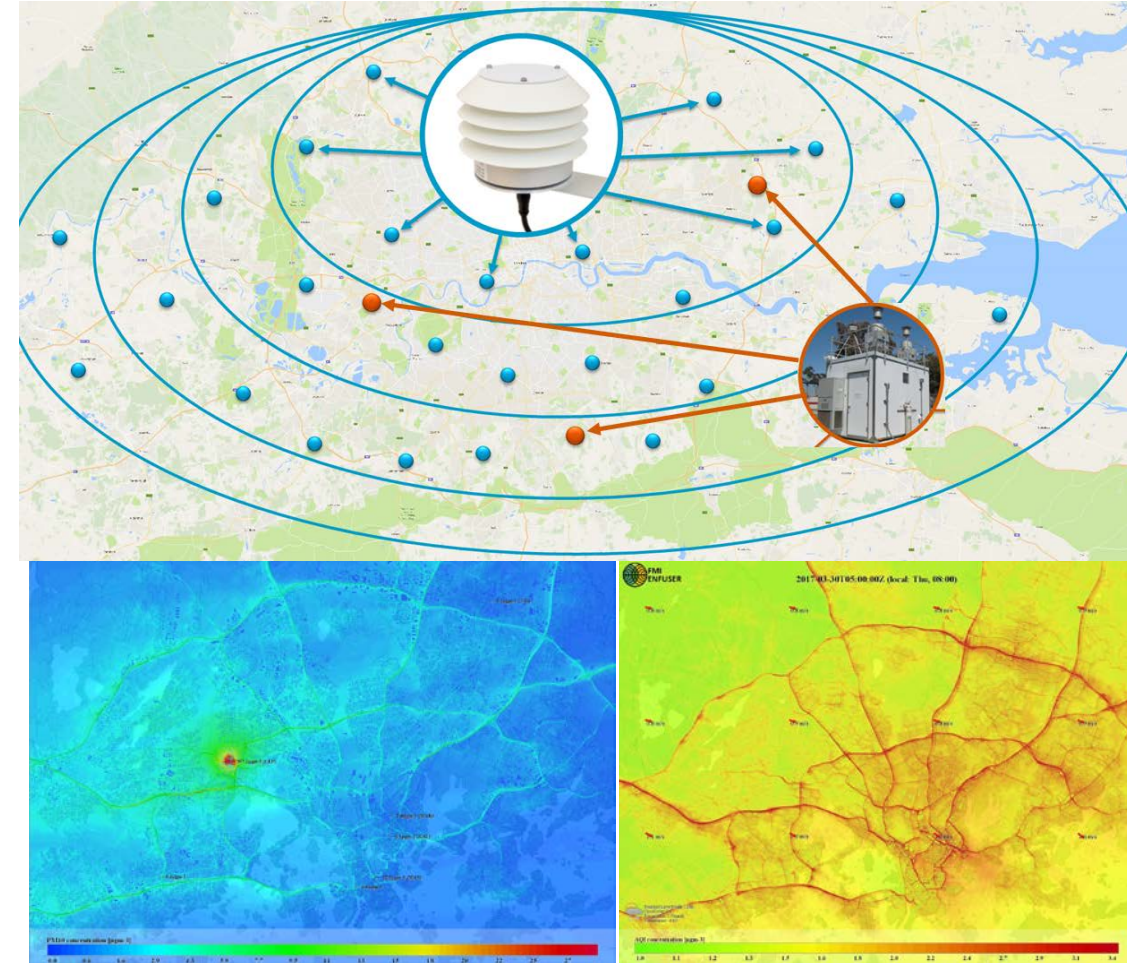
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2019-05-07

VAISALA

Global trends in ambient air quality monitoring

- Air pollution – single biggest environmental health risk of our time
- More accurate data and forecasts is needed for pollution control actions
 - Health alerts
 - Pollution point source identification
 - Traffic restrictions or advisories
 - Urban city design
- Current fixed measurements are often too sparse to get accurate information of the very local air quality
- High-resolution modeling and IoT networks have developed rapidly
- **This has created a new market for compact air quality sensors**



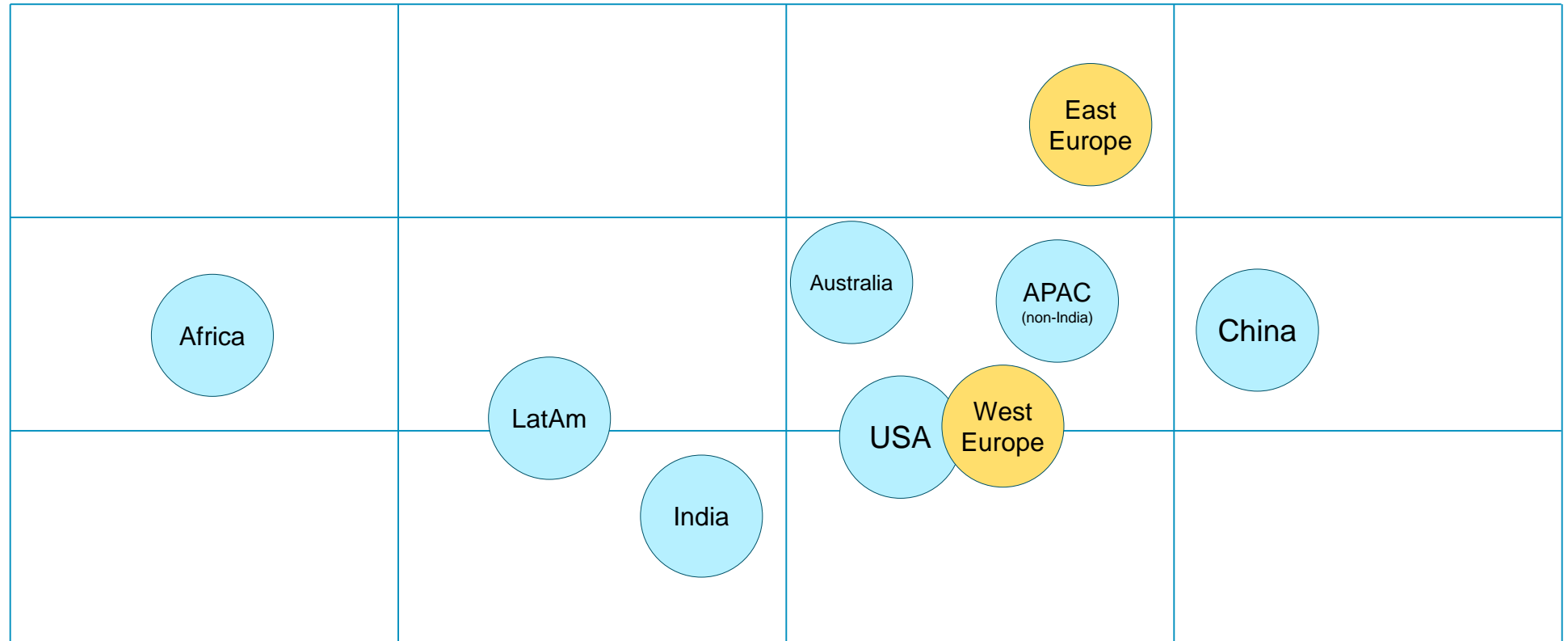
Evolutionary stages of supplementary AQ varies between regions

Attitude on legislation

Flexible
"If it's cheaper and works we use it"

Neutral
"Legislation will follow, now is time to test"

Conservative
"We need an EPA certificate first"



Learning
Educating themselves on sensors

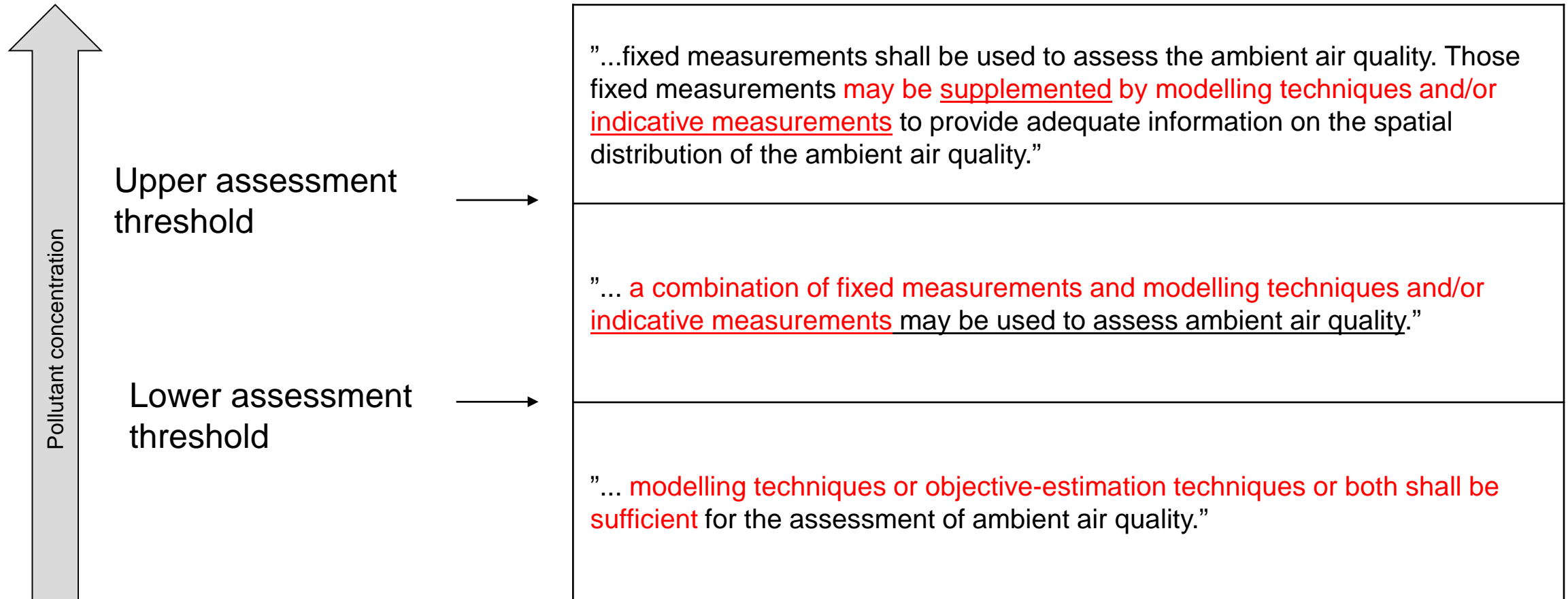
Piloting
Co-location tests, small deployments

Advanced piloting
Network pilots with modelling

Operational
Large operational deployments

Current sensor usage

Directive 2008/50/EC legislation on indicative measurements



Source: Directive 2008/50/EC on ambient air quality and cleaner air for Europe

CEN / TC 264 / WG 42 Guideline preparation

Air quality — Performance evaluation of air quality sensors — Part 1: Gaseous pollutants in ambient air

— Part 2: Ambient air — Performance evaluation of sensors for the determination of concentrations of particulate matter (PM₁₀; PM_{2,5}) in ambient air

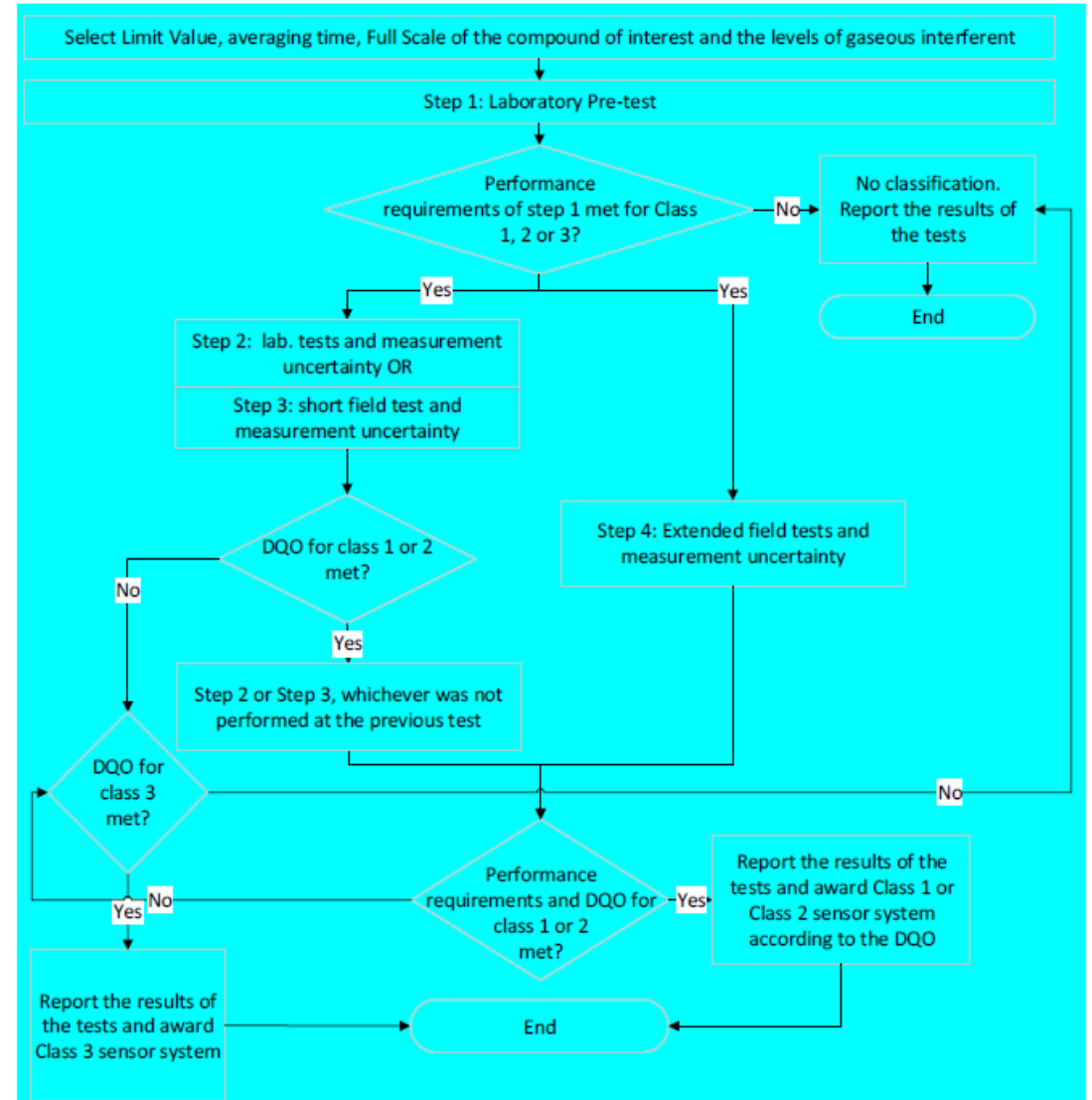


Figure 1 — Protocol of evaluation of sensor

Vaisala air quality transmitters for supplementary air quality networks

AQT410



Electrochemical cells with advanced algorithms



Measures four gases selected from:
NO₂, NO, O₃, CO, SO₂ and H₂S

AQT420



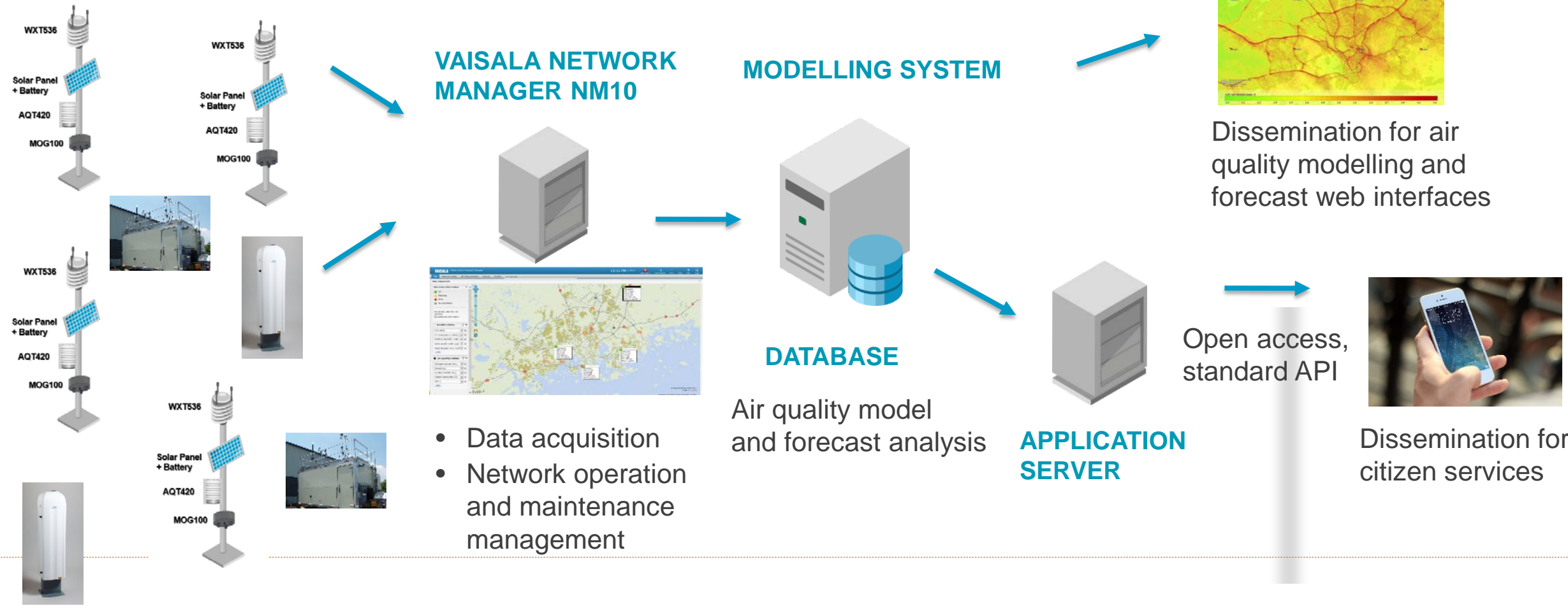
Measures four gases and PM2.5 and
PM10 Particulate Matter

Optical
Particulate
Counter



Smart Urban Air Quality Architecture

NETWORK OF AIR QUALITY AND WEATHER SENSORS AND FIXED MEASUREMENTS



Challenges with compact air quality sensors

- Sufficient performance against fixed measurements
 - Correct way of testing and validating
- Consistency of measurements throughout the year in different climates
 - Influence of temperature and humidity changes and rain
 - Limitations of optical particulate counters in small size fraction
- Consistency of sensors against each other

Development work on-going for both gas and PM measurements to tackle these issues



Example projects



Helsinki Air Quality Testbed



Prague Smart City Project



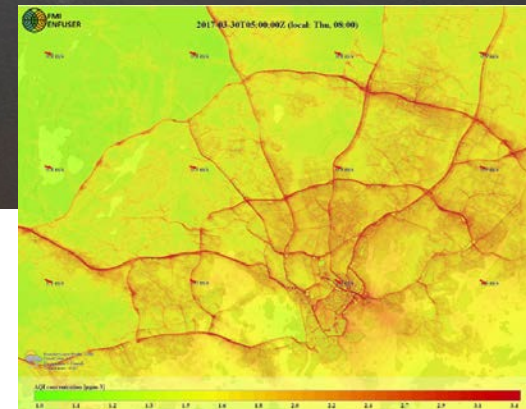
Nanjing Air Quality Testbed

Helsinki Metropolitan Air Quality Network

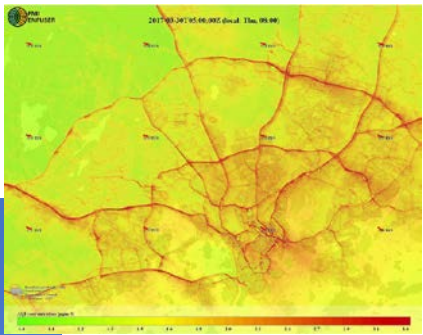
- 15 pcs of Vaisala AQT420 air quality sensors
- 3 pcs of Pegasor AQ™ Urban sensors
- FMI-ENFUSER high resolution model for accurate air quality forecasts
- Various research by HSY, Finnish Meteorology Institute and Helsinki University



FINNISH METEOROLOGICAL INSTITUTE

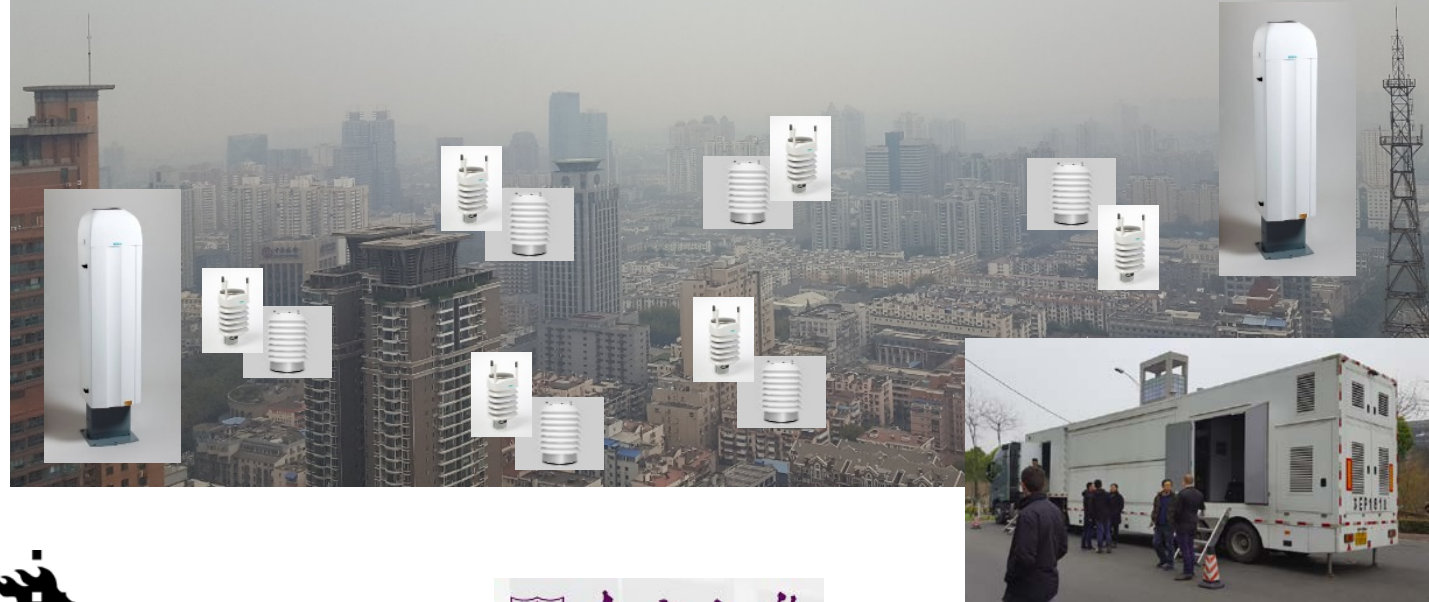
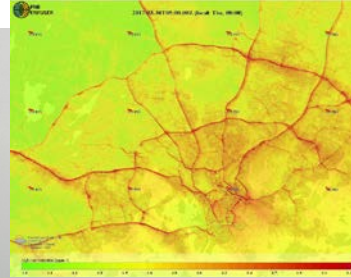


Helsinki Air Quality Tested / HAQT



Nanjing Air Quality Testbed, 3D pollutant measurement

- 20 pcs of Vaisala AQT420 Air quality sensors and 10 pcs WXT536 Multi-weather sensors installed around Nanjing area
- Vaisala CL51 Ceilometers and for vertical boundary layer monitoring
- High-end data from SORPES air quality super station
- FMI-ENFUSER model to study the effects of various components
- Software platform and applications for improved forecasting and alerting capabilities in Nanjing area



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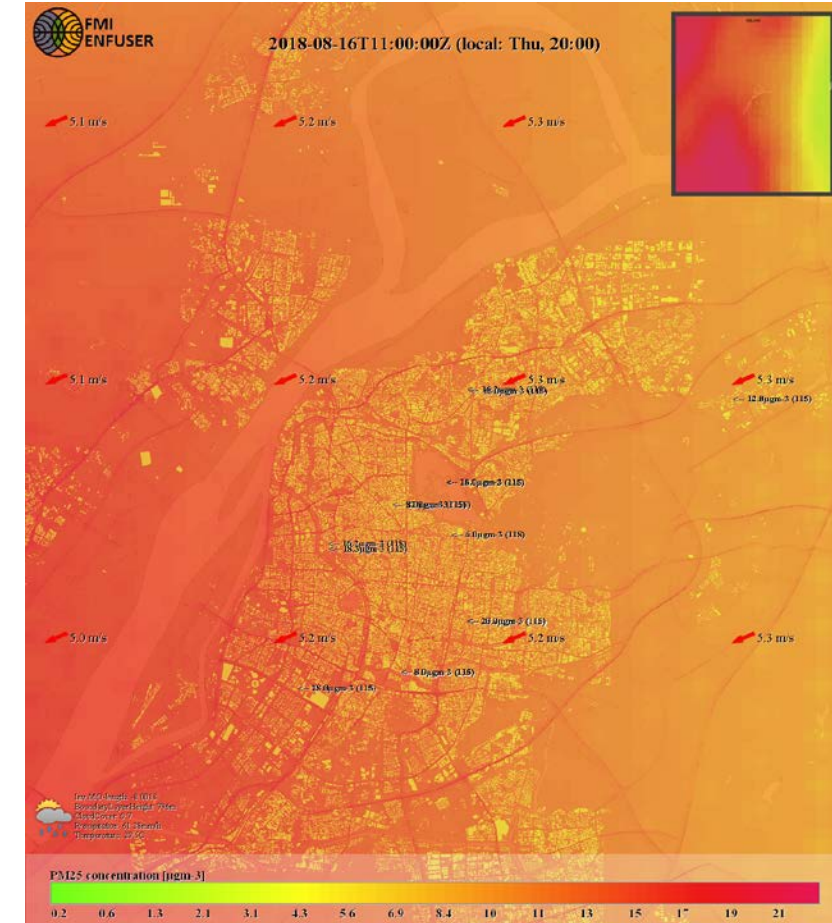


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Improved understanding of Yangtze river as source of pollution in the region



Prague Smart City Network

- Intelligent street lamps save energy and provide a good power source for various smart city sensors
- Vaisala AQT400 air quality sensors, 19 pcs
- Vaisala GMP252 sensors for CO₂ monitoring
- Noise monitoring and traffic counting included
- Data dissemination and services provided for citizens and tourists



Vaisala AQT420 Air Quality Sensor to measure NO₂, NO, CO and O₃ and PM2.5 and PM10 particulates



Vaisala GMP252 sensors for CO₂ monitoring



Vaisala HMP110T for temperature monitoring



Intelligent street lamps

An aerial photograph of a winter forest. The ground is covered in a thick layer of snow, with some tracks visible. The trees are heavily laden with snow, their branches creating a complex, white pattern against the darker trunks. The overall scene is serene and quiet.

Kiitos!