



# Observations for a Better World Weather and Environment

Vaisala Capital Markets Day, June 13, 2017

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**VAISALA**

# Weather and Environment Today

The background of the slide is a composite image. The upper portion shows a dark, stormy sky with multiple bright white lightning bolts striking down. The lower portion shows a paved road that curves through green, rolling hills under a slightly less dark sky. A red and white chevron road sign is visible on the right side of the road.

- Undisputable global leader in weather observations
- The traditional weather market is not a growth market
- On-going digital transformation opens new dynamics
- Growth opportunities in environmental measurements

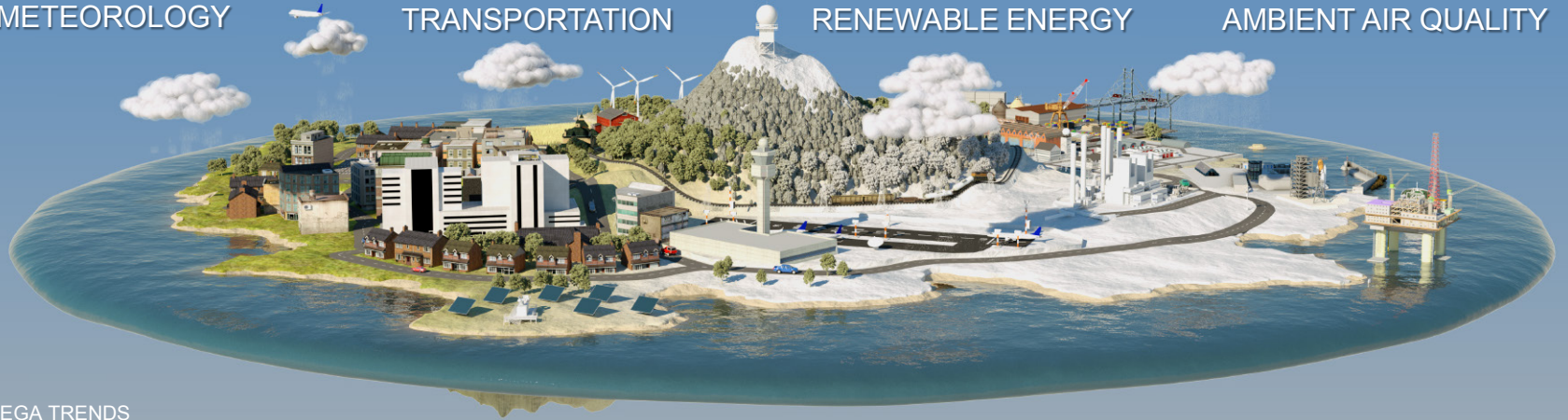
# Weather and Environment Markets

METEOROLOGY

TRANSPORTATION

RENEWABLE ENERGY

AMBIENT AIR QUALITY



MEGA TRENDS



Climate Change



Renewable Energy



Digitalization & Big Data



Future of Mobility







Urbanization



Sustainability Awareness

# Global Market Sizes and Growth

	Meteorology Infrastructure	Transportation	Renewable Energy	Ambient Air Quality	
MEUR					
<b>Market size*</b>	450–500	300	325–375	150–200	<b>Market share indication:</b> Low <10% Mid 10–25% High >25%
<b>Market growth p.a.</b>	0%	0-5%	>10%	>5%	
<b>Vaisala market share 2017*</b>	High	High	Low	Low	
<b>Market size total</b>	~ EUR 1.3 Billion / ~20% market share				

\* Vaisala estimate of the size of market that is addressable currently or with organic development in the roadmaps

# Weather and Environment Strategy

1. Industry leading products
2. Large system project capability
3. Digital solutions for weather critical operations
4. Selective expansion to environmental measurements

- Leverage science-based technology leadership and application expertise
- Ensure highest customer delight and reliability

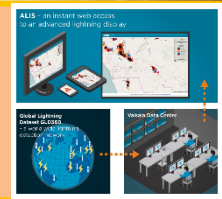
**BUSINESS PARTNER  
FOR INTEGRATED  
OPERATIONAL VALUE**

**Digital Solutions**



**ONE STOP SHOP  
PROJECT HOUSE**

**Installation and  
integration**



**RELIABLE  
MEASUREMENT  
TECHNOLOGY**

**Hardware, Software &  
Basic Services**



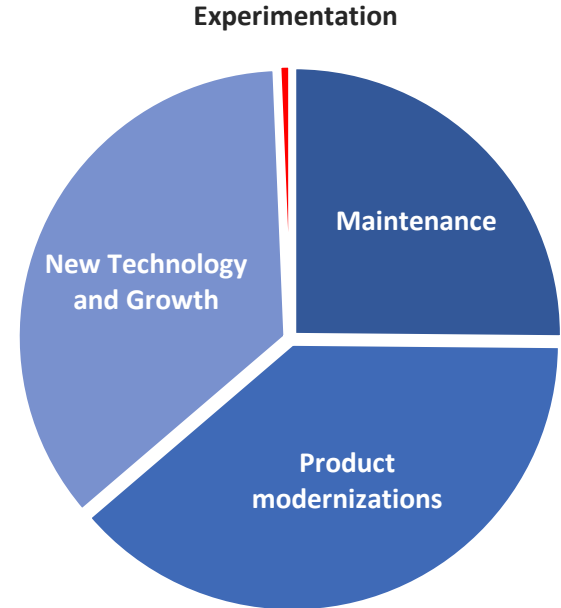
- 
- 1) Industry Leading Products
  - 2) Large System Project Capability
  - 3) Unique Digital Solutions
  - 4) Environmental Measurements

# Leadership with a Broad Product Portfolio



# Investments to Sustain Product Leadership

- Comprehensive offering requires significant maintenance and modernization efforts
  - Product lifetime in many cases even 20 years
  - Wide development scope from silicon chips to complete systems, software and digital solutions
- Quality, reliability and product performance are key competitive assets
- Co-operation with several universities and customers to support innovation





# Maintain Position and Renew

## Maintain strong market position

- Secure quality and reliability
- Implement and maintain modern system architectures
- Optimize total cost of ownership
- Introduce competitive replacement products

## Create new growth

- Shift R&D investment to new opportunities in instruments, air quality and new openings
- Bring new products to market
- Seek M&A opportunities

Targeted M&A

New products

Replacement products

Total cost of ownership

Modern system architectures

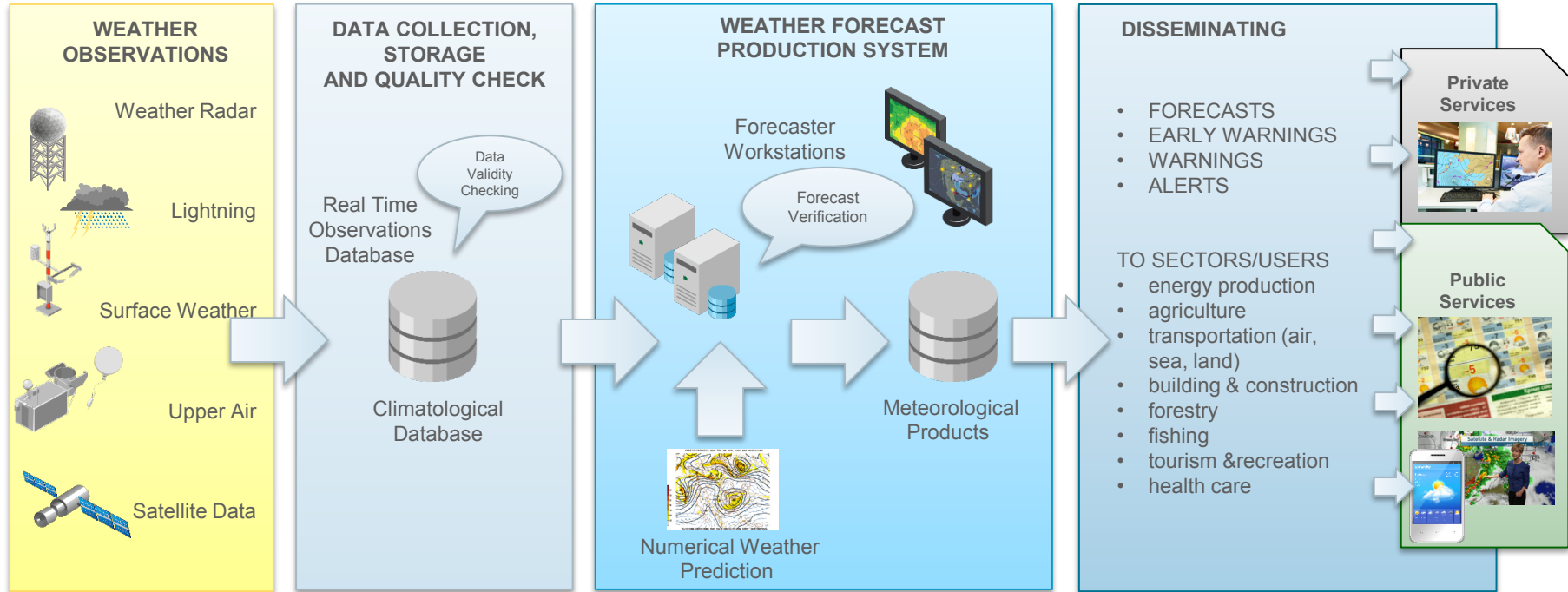
Quality and reliability

- 
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# Meteorological System Architecture

## Vaisala Capacity Building Program

for Public Weather Services of **NMS**

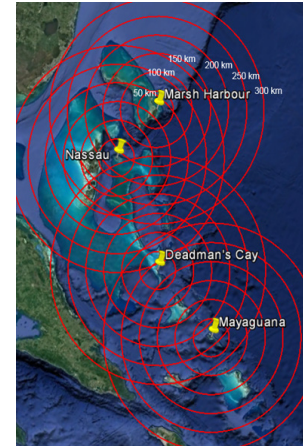


# Our Approach to Build Weather Infrastructure

- Scaling up observation systems and network
  - Sounding systems, radars, lightning network, weather station network, aviation weather systems
  - Data center & network management for data collection and communication
- Integrated weather forecasting system
  - Weather information system
  - Forecast verification system
  - Numerical weather prediction capability
  - Use of entire observation systems
- Capability building, extensive training and knowledge transfer
  - Observation system use and network management training (use and maintenance)
  - Meteorological training (radar/lightning/aviation meteorology, forecasting, warnings, etc.)
  - Partnering with meteorological institutes (e.g. FMI)
- Support for customers to arrange funding

# Bahamas Capacity Building Project

- **Value:** USD 19 million
- **Project Scope**
  - **Scaling up observation network**
    - 4 new weather radars and 1 upgraded radar
    - 9 airport weather observation systems
    - 16 automatic weather stations with sensors
    - Integration of entire system, including satellite data
  - **Integrated weather forecasting system**
    - Weather information and forecast producing system
    - Severe weather alert system
  - **Extensive training and capability building**
    - Metacast TV studio and production system for meteorologists
    - Extensive training
  - **5 year warranty and maintenance contract**
- **Status**
  - First radar up in May 2017, expected project completion in 2 years



As of Thursday, March 16, 2017



The newly-installed WRM 200 doppler radar at the weather station at LPIA. Photo: Shawn Hanna/Tribune Staff

By NICO SCAVELLA

Tribune Staff Reporter

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ONE of the four Doppler radars purchased by the government to bolster the functionality of the Meteorology Department will be fully installed and operational by the second week of April, Director of Meteorology Trevor Basden said yesterday.

The installation of the other three Doppler radars, set to be installed in Abaco, Long Island and Mayaguana, will be complete by November, 2018.

The existing Doppler radar, which was first purchased in 2005 and became the subject of contention following the passage of Hurricane Joaquin in 2015, will be refurbished and subsequently installed in Ragged Island, Mr Basden said. Refurbishing that radar will cost approximately \$1.43m, a figure that is built into the near \$20m price-tag for the acquisition of the four new radars from Finnish company Vaisala, he added.

## \$20 Mil On New Doppler Radars

Posted on 16 March 2017. by Jones Bahamas

The government has invested over \$20 million into The Department of Meteorology it gets set to install four new Doppler Radars on different islands in The Bahamas.

The new radars will be installed over a two-year span on Family Islands such as Marsh Harbour, Abaco; Deadman's Cay, Long Island and Mayaguana.

The first one of the four new radars was revealed yesterday as Minister of Transport and Aviation, Glenys Hanna-Martin, and some staff of the Department of



Meteorology of Weather Station at the Lynden Pindling International Airport (LPIA) conducted a walk about at the Weather Station site.

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# Helping Customers to Make Critical Decisions



## Energy Utilities

Asset development  
process efficiency  
Asset performance,  
energy integration,  
and weather impacts



## Transmission and Distribution System Operators

System reliability  
Repair cost and time  
Personnel safety



## State / Country Departments of Transportation

Road maintenance  
under adverse  
weather conditions  
Operational costs



## Airport Airside Operations

Runway winter  
maintenance costs  
Delays  
Asset protection  
Personnel safety



## Airline Ground Operations

Aircraft de-icing and  
anti-icing costs  
Delays  
Asset protection  
Personnel safety

Main Pain  
Points



# Broad Offering of Digital Solutions

## Ground Transportation

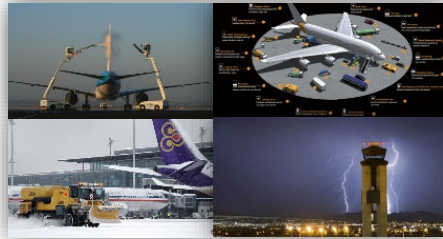
Road network operations  
Transportation connectivity and automation



RoadDSS

## Aviation

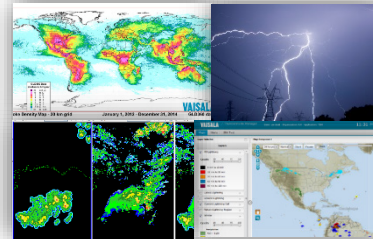
Airline Ground Operations  
Airport Airside Operations



AviMet DSS

## Lightning

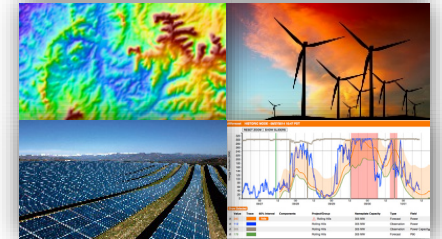
Efficiency  
Safety



Thunderstorm Manager

## Renewable Energy

Pre-construction  
Asset Operations



Vaisala NOW

Consulting

# Service and Network Monitoring 24/7/365



Vaisala Network monitoring center, Tucson, Arizona, US

# Achieving Growth

## Solution roadmaps and innovation

- Work with selected lead customers
- Roadmaps based on deep understanding of target customer operations
- Leverage cutting-edge analytics and AI
- Build and use a common resource cube
- Secure rights to broad sets of data

Visionary Roadmaps

Lead Customers

Common resource cube

Harness AI capabilities

## Infrastructure modernization and DevOps culture

- Cost optimization and cloud migration
- Agility and speed of innovation and deployment

DevOps culture

Infrastructure modernization

- 
- 1) Industry Leading Products
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# From "Weather" to "Weather and Environment"

Weather



Air Quality

Weather

...

Ambient water

Emissions

Solar radiation

Ambient Noise

# Several Application Areas in Air Quality

## Ambient Air Quality



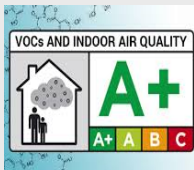
Regulatory ambient air quality monitoring stations

Supplementary AQ monitoring

Handhelds

Research  
Nanoparticles

## Indoor Air Quality



Building automation, HVAC, air filtering

Particles, VOC, CO<sub>2</sub>, CO

Moisture, mold and microbes

Home / Consumer

## Industrial AQ / process monitoring



Critical production environments, clean rooms,

Particle/contamination monitoring

Production processes

Quality control

## Occupational Safety



Detection for toxic and explosive gas for health and safety

Noise monitoring

## CBRN / Emergency Response

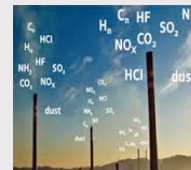


Detection for chemical, biological, radiation, and nuclear warfare and hazards

Toxic and explosive gas, flame, liquid detection

Emergency response, fire and rescue

## CEMS / Emission monitoring



Regulatory stack emission monitoring in process exhaust gas streams

Stack emission inspections

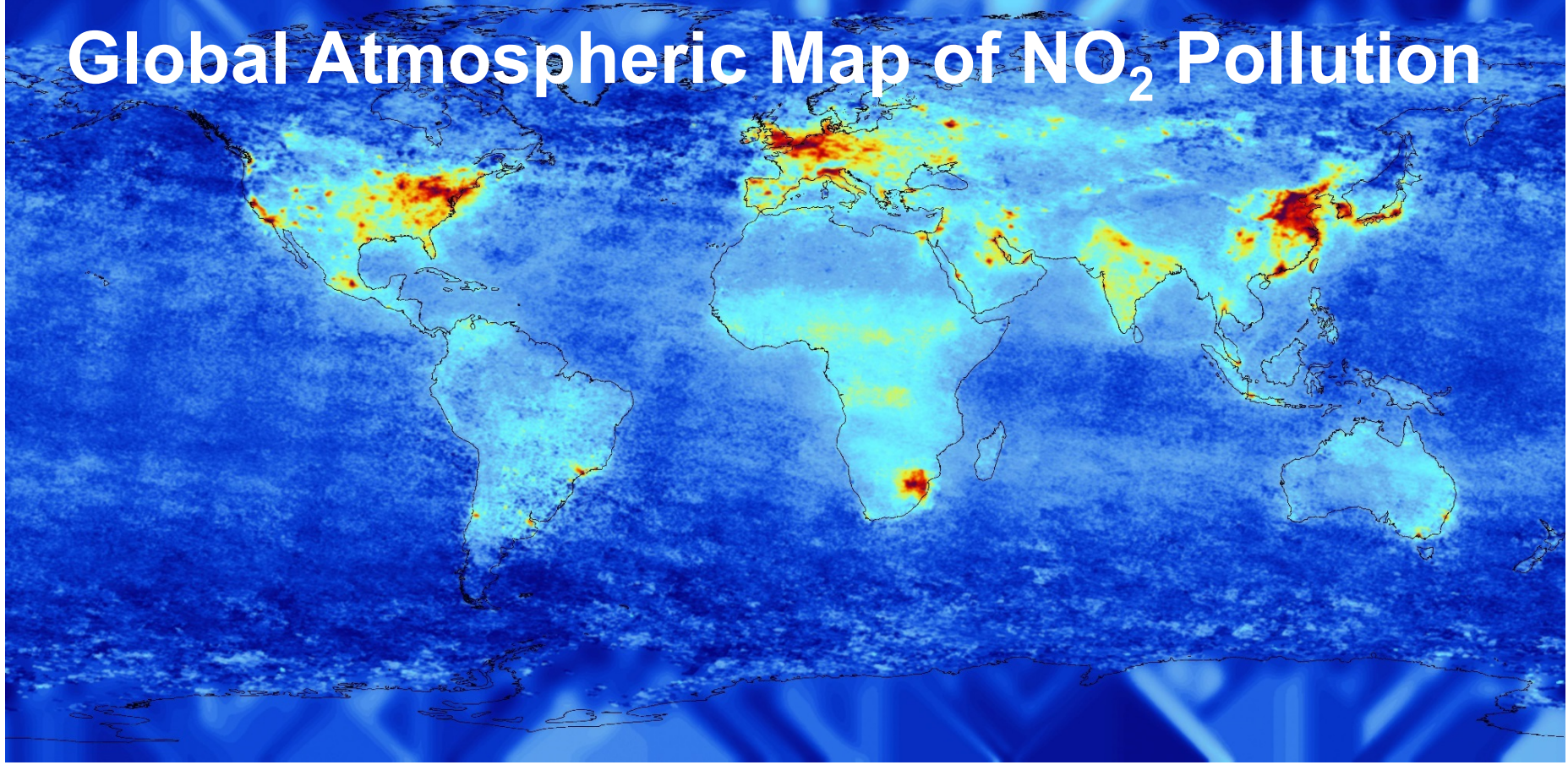
## Vehicle Emission monitoring



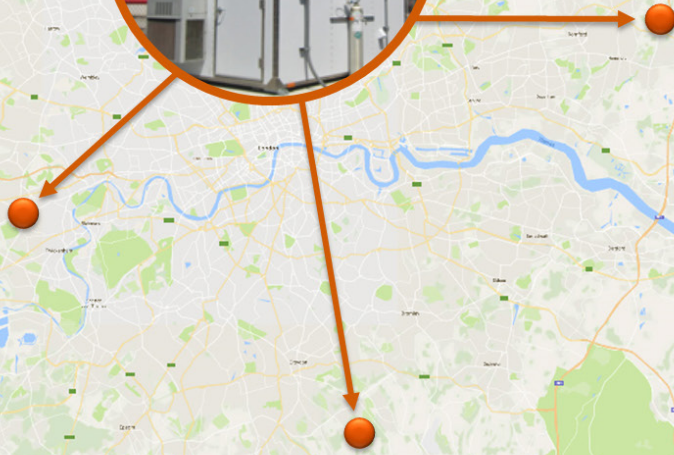
Regulatory vehicle emission testing, Engine manufacturing and testing

Ship emission monitoring

# Global Atmospheric Map of NO<sub>2</sub> Pollution

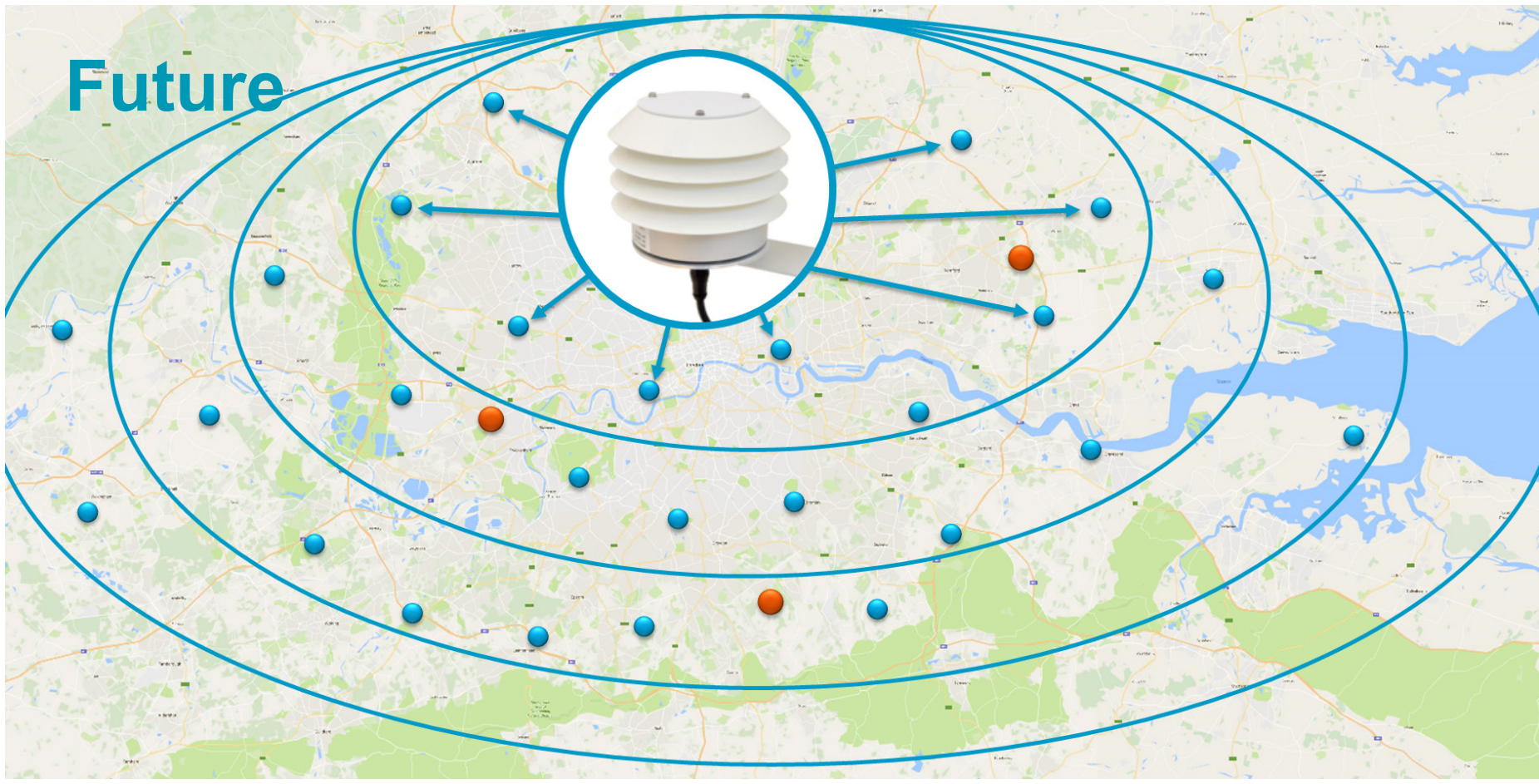


# Today

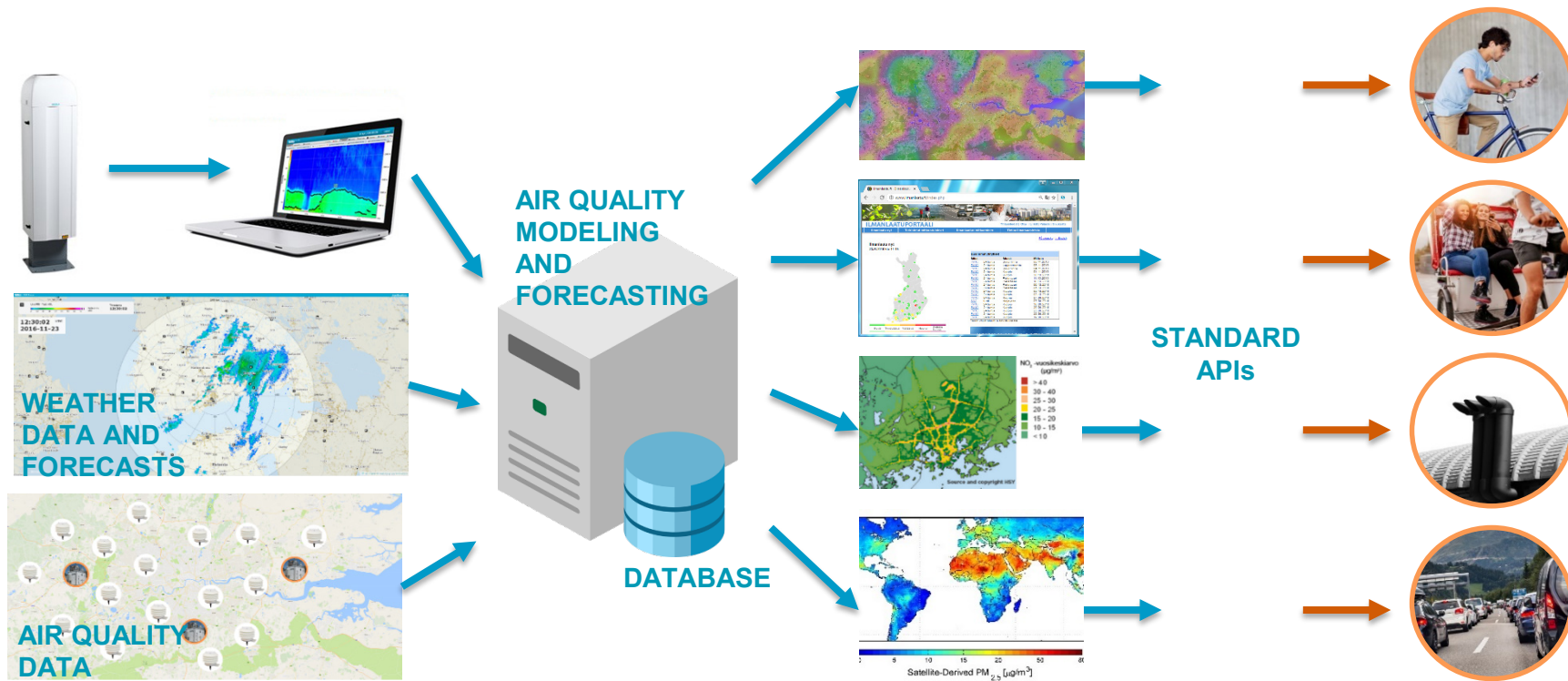




# Future



# Smart Urban Air Quality System



# Renew and Expand to Environmental Business

1. Continue to strengthen our position as the provider of leading weather observation products
2. Drive success with large capacity building projects
3. Embrace digital transformation and grow digital solutions business
4. Develop new business in environmental measurement markets



# Observations for a Better World