



Observations for a Better World Vaisala R&D

R&D frontrunners, June 9, 2016

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VAISALA



Contents

- **Vaisala**
- **Technology and software leadership**
- **Development process**
- **Innovation examples**
- **Way forward**
- **Conclusions**

Weather Business

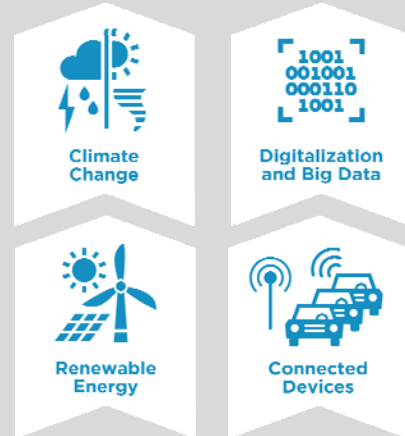
Our Markets



Our Observation Solutions



Mega Trends



Controlled Environment Business

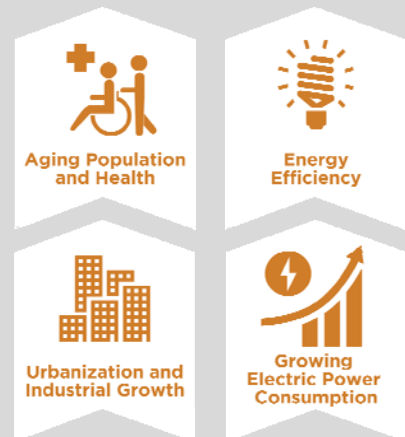
Our Markets



Our Measurement Solutions

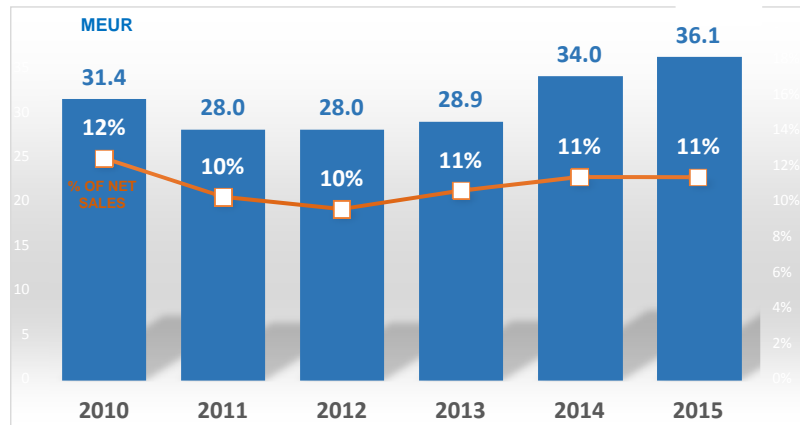


Mega Trends



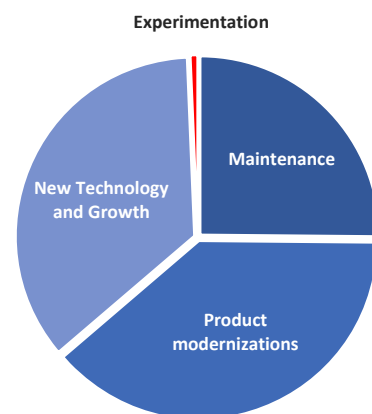
Continuous Innovation to Sustain Leadership Position

- 352** Personnel in Research and Development
- 2 / 3** of Vaisala personnel with University or Doctoral degree
- 45** Research and Technology Team involved in applied science



Investment portfolio

- Comprehensive offering
- Product lifetime over 10 years in many cases
- Development scope ranging from silicon chips to complete systems, software and information services
- Co-operation with several universities and customers (e.g. Helsinki University, University of Colorado, FMI, Idaho DOT)





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Technological Milestones

Upper air soundings

1930–1960



Automatisation of weather observations
Revolution of sensing technologies
Industrial measurements

1970–1990



Application solutions
Information technologies
Remote sensing

2000–



Leading Technologies

Discovering novel techniques and technologies in sensing, analysis, prediction and information delivery

Thin-film and MEMS sensor technologies

For humidity, dewpoint, pressure, CO2 measurements for all Vaisala's markets

Optical sensing technologies

For measurement of cloud height, visibility, present weather, carbon dioxide, oxygen

RF remote sensing

Used in wind profiling, weather radar, thunderstorm measurements and in windfinding for radiosondes

Other sensing technologies

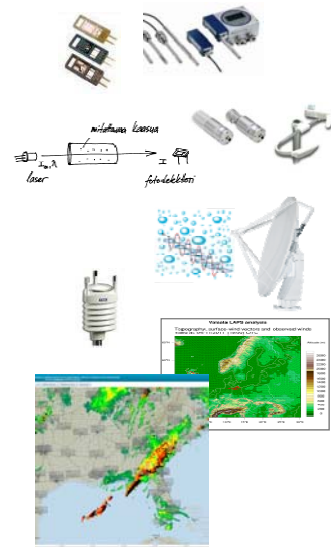
Ultrasonic wind sensors, acoustic and capacitive precipitation sensors, magnetic traffic counting, etc.

Data processing

Statistical and numerical models, complex algorithms, data fusion

Software and display technologies

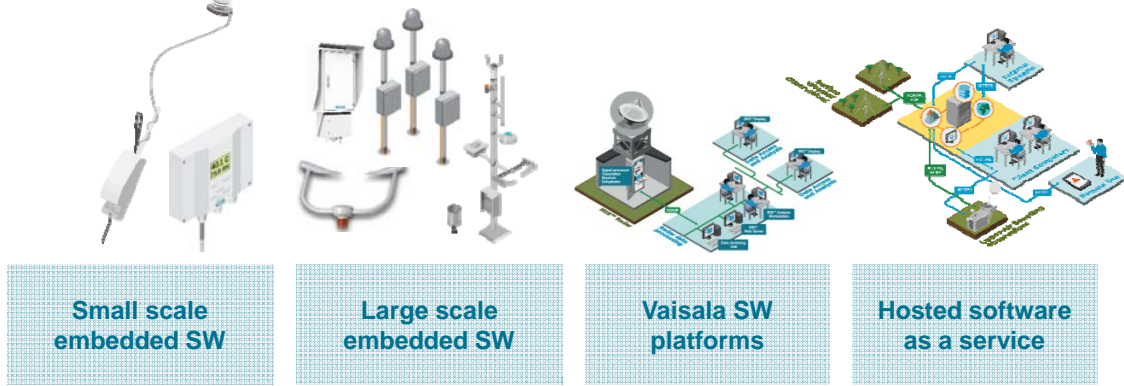
Variety of modern SW technologies: Geographic Info Systems (GIS), Service Oriented Architecture (SOA), Java, Web, Flex, embedded Linux, ..



Global Leader Across the Offering

					
Radiosonde	Weather, Multiweather	Visibility, Present weather	Ceilometers	Road/Aviation Weather stations	Weather radars
#1	#1	#1	#1	#1	#1-3

Software Development Scale Significant



Mobile devices supported with the same software utilizing standard browsers or device specific apps utilizing partner network

Software Product Examples



IRIS Weather Radar Software

- Updates through releases
- Simple and easy-to-understand interface
- Accurate precipitation estimation and classification
- Earlier weather watches and warnings
- Track Storm Movement and Vertical Structure of Storms
- Access and share data from anywhere



Network Manager

- One secure platform to manage small and large observation networks with high-quality data 24/7
- Affordable and easy to buy and maintain over the product life cycle
- Efficiency through optimized central operations combining remote monitoring, control and diagnostics
- Possible to integrate also non-Vaisala instruments



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Development methods



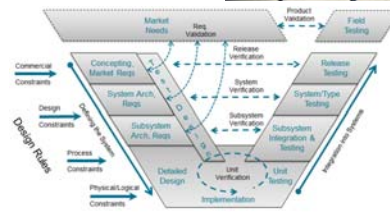
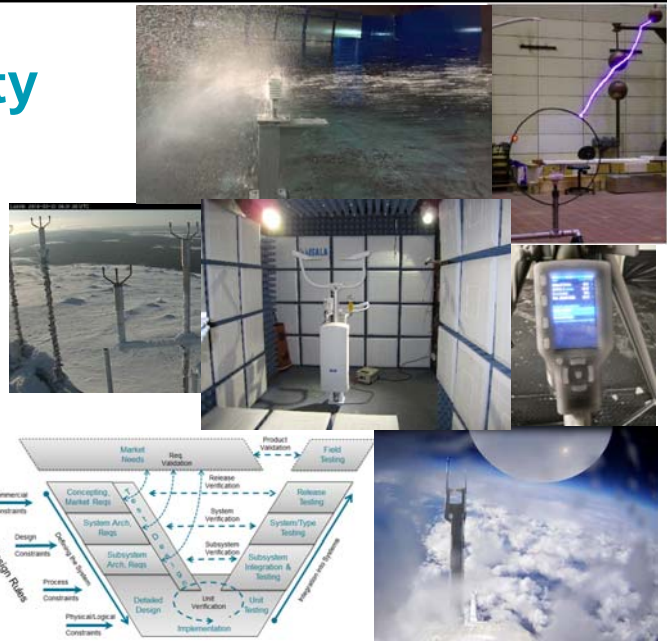
- Development projects utilizing agile and lean methodologies e.g.
 - Prototyping with customers
 - Visual planning and learning cycles
- All software development is done in agile teams
- Software architecture and interfaces are governed and common platforms are used whenever feasible

- **Small embedded**
 - HW constrained
- **Scrum**
 - continuous integration
 - 3 week sprints, steady pace
 - one developer as a Scrum master
- **Kanban**
 - maintains flow, limits Work In Progress



Quality and reliability

- Quality, reliability and product performance are key in our value proposition
- Our development methods are agile, but product performance is always verified with all new products and existing product periodically or whenever changes are made



User experience



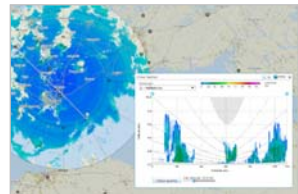
User research
Who, where and how use the product



Graphical design
Professional and visually appealing products to be proud of



Usability testing
Learn early and in detail what are the issues that cause difficulties to the users



Interaction design
Efficient, effective and pleasant to use products



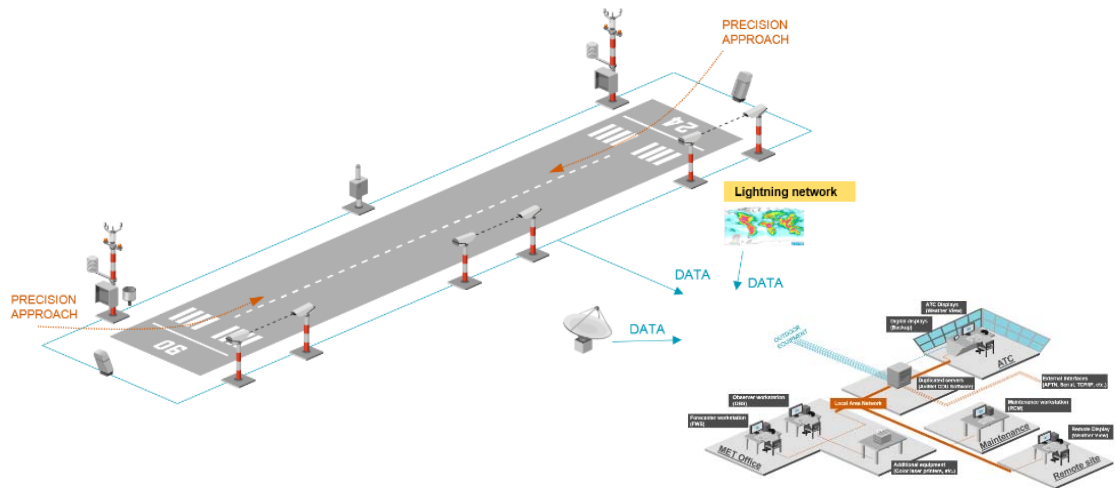
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Checktime de-icing solution for airlines



Aviation Total Weather Solution



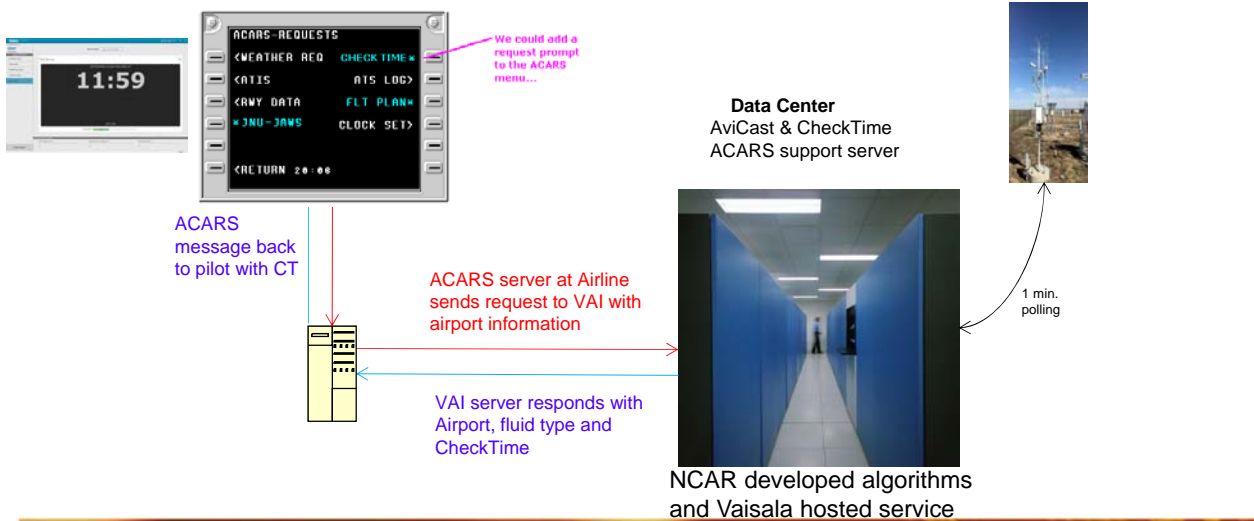
Customer problem



Category	Value	Color
Temperature	15.0	Green
Humidity	85.0	Yellow
Pressure	1013.25	Red
Wind Speed	10.0	Green
Wind Direction	090	Green
Visibility	10.0	Green
Cloud Ceiling	1000	Yellow
Cloud Base	500	Red
Cloud Top	1500	Yellow
Cloud Amount	4	Yellow
Cloud Type	CU	Yellow
Cloud Height	1000	Yellow
Cloud Base	500	Red
Cloud Top	1500	Yellow
Cloud Amount	4	Yellow
Cloud Type	CU	Yellow
Cloud Height	1000	Yellow

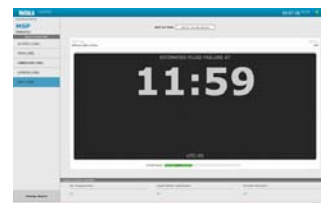


CheckTime solution



CheckTime customer benefits

- **Savings** on reduced anti-icing fluid use.
- **Savings** by using diluted fluids whenever feasible.
- **Savings** on environmental fees due less fluids used.
- **Safety** improvements especially in heavy snow conditions.



What enabled this innovation?

Market and customer insights

- Focusing to customers and understanding their processes
- Finding customers' valuable problems
- Application knowhow; weather measurement and forecasting
- User centric design

Enablers

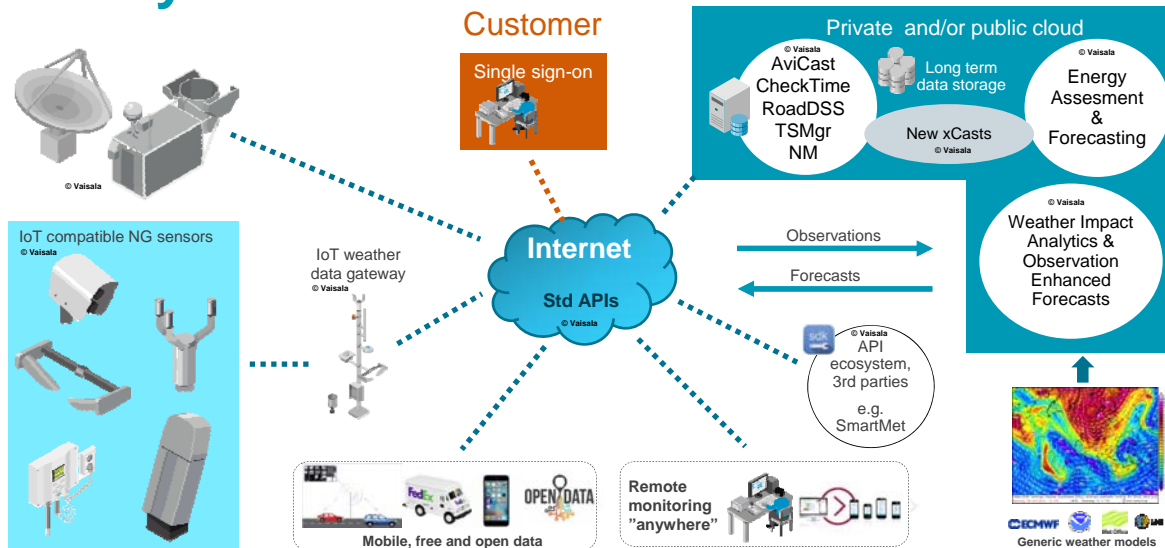
- Market prescience
- Agility for new ideas / prepared to invest
- Championing individuals
- Relationship with FAA and NCAR



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Our System Vision



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Enabling World Class Products

- Considerable investment to R&D. Emphasis on new technologies, applications and software providing differentiation
- Customer engagement a fundamental element of R&D
- Agile and lean development methodologies
- Partnering with leading research organizations and customers