Observations for a Better World
Vaisala R&D

R&D frontrunners, June 9, 2016
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Contents

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

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
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
CheckTime solution

ACARS message back to pilot with CT

ACARS server at Airline sends request to VAI with airport information

VAI server responds with Airport, fluid type and CheckTime

NCAR developed algorithms and Vaisala hosted service

Data Center
AviCast & CheckTime
ACARS support server

1 min. polling

CheckTime customer benefits

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

Safety
Sustainability
Savings
Environment
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 presence
- Agility for new ideas / prepared to invest
- Championing individuals
- Relationship with FAA and NCAR
Our System Vision

Customer

Single sign-on

Internet

Std APIs

Private and/or public cloud

AviCast
CheckTime
RoadDSS
TSMgr
NM

New xCasts

Long term data storage

Energy Assessment & Forecasting

Weather Impact Analytics & Observation Enhanced Forecasts

Observations

Forecasts

Internet

IoT compatible NG sensors

IoT weather data gateway

Mobile, tree and open data

Remote monitoring "anywhere"

API ecosystem, 3rd parties e.g. SmartMet

Generic weather models

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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