FROM R&D TO PRODUCT VIA OPEN SOURCE/STANDARDS

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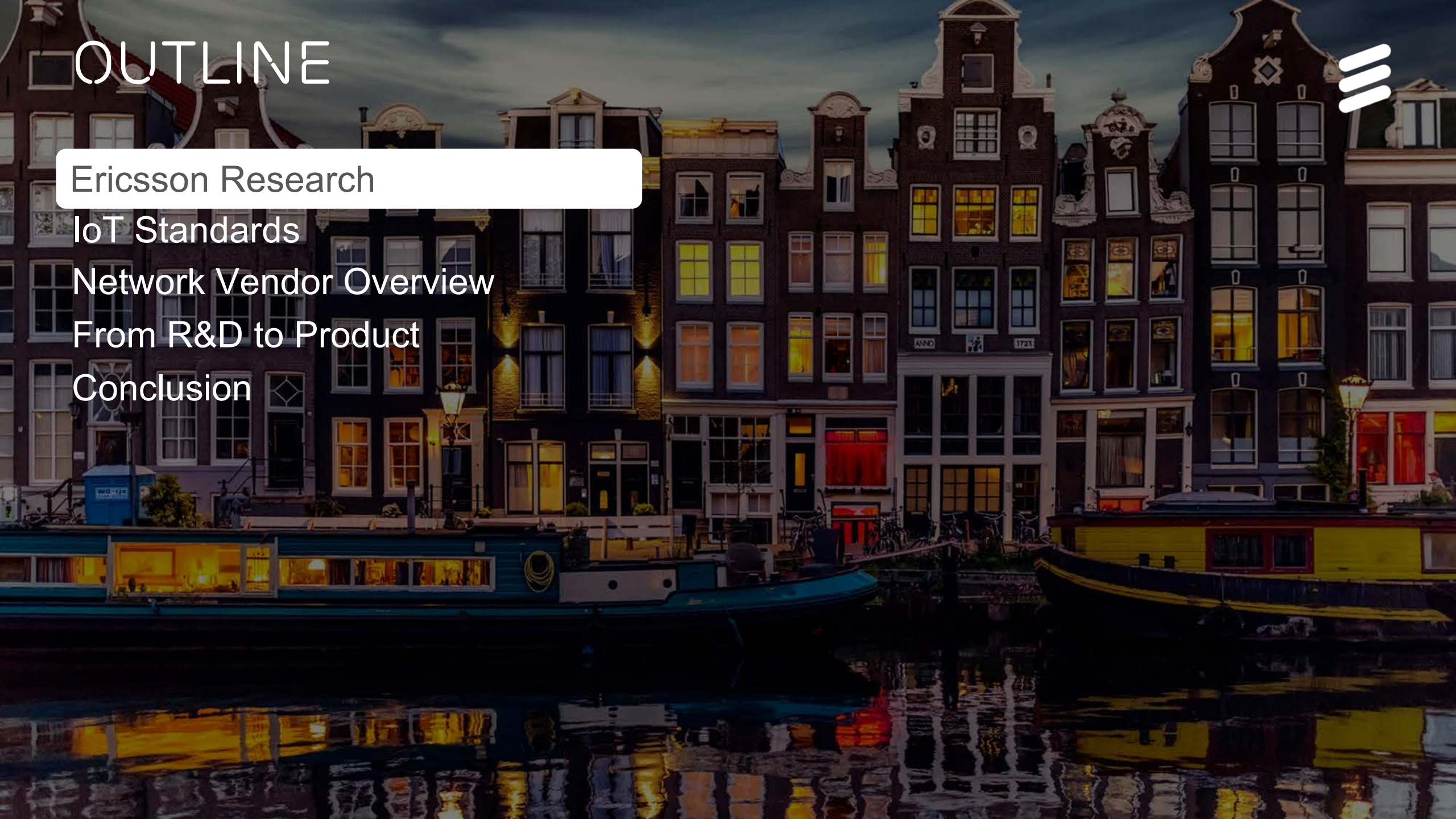
OUTLINE



- Ericsson Research
- IoT Standards
- Network Vendor Overview
- From R&D to Product
- Conclusion

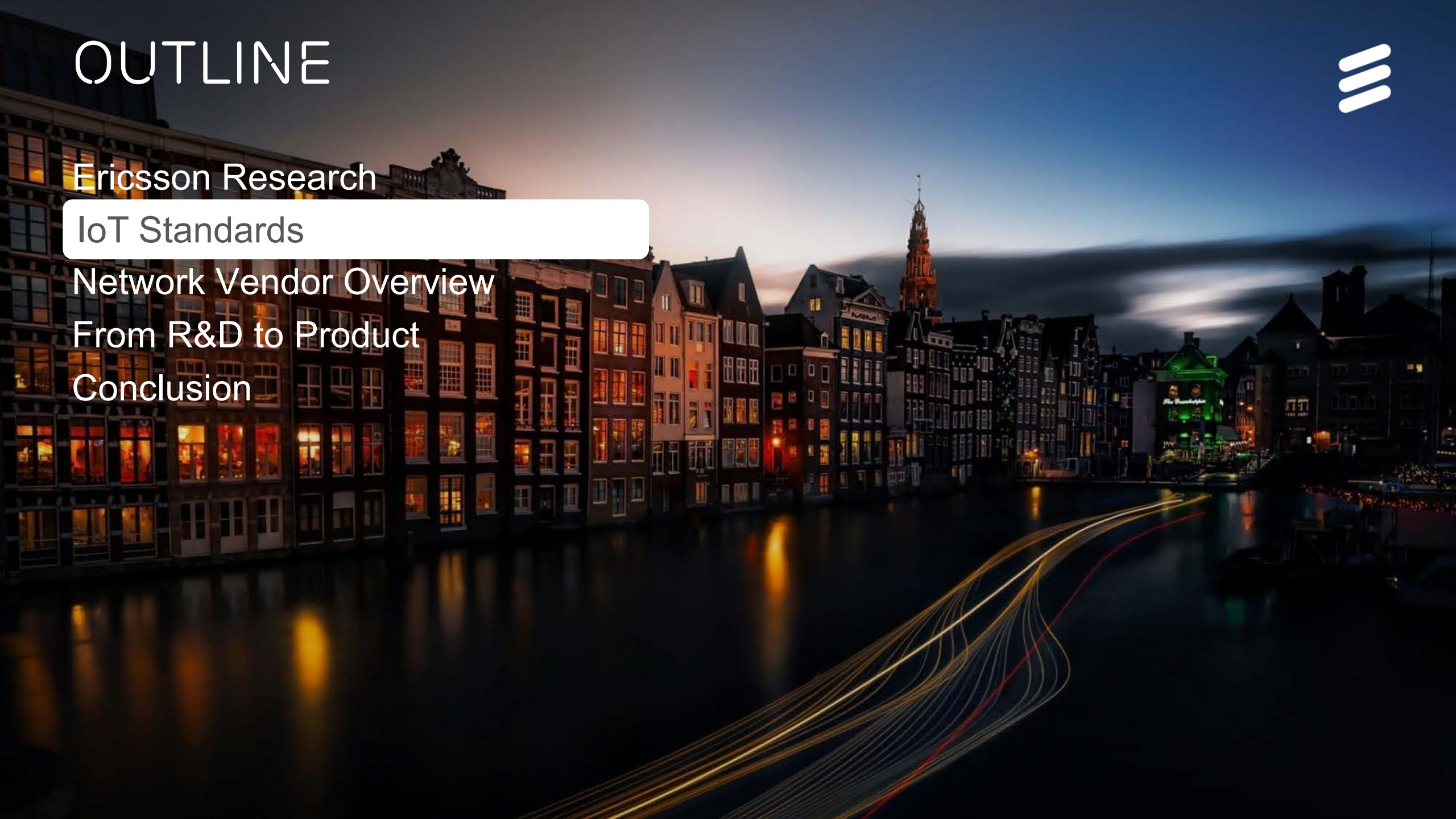
ERICSSON RESEARCH

10	4	~650	~50%
countries	continents	researchers	PhDs

WORKING ON RESEARCH: EXPECTATION

WORKING ON RESEARCH: REALITY

OUTLINE



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CIRCA 18 YEARS OF IOT STANDARDS

IETF

- LWIG
- ✓ 6LoWPAN
- 6Lo
- 6TiSCH
- LPWAN
- ROLL

Connectivity & Routing

- CORE
- CBOR
- T2TRG

Applications

- ACE
- COSE ✓
- DICE ✓
- SUIT new
- TEEP new

Security

W3C

OMA

- LWM2M
- IPSO

OCF

…

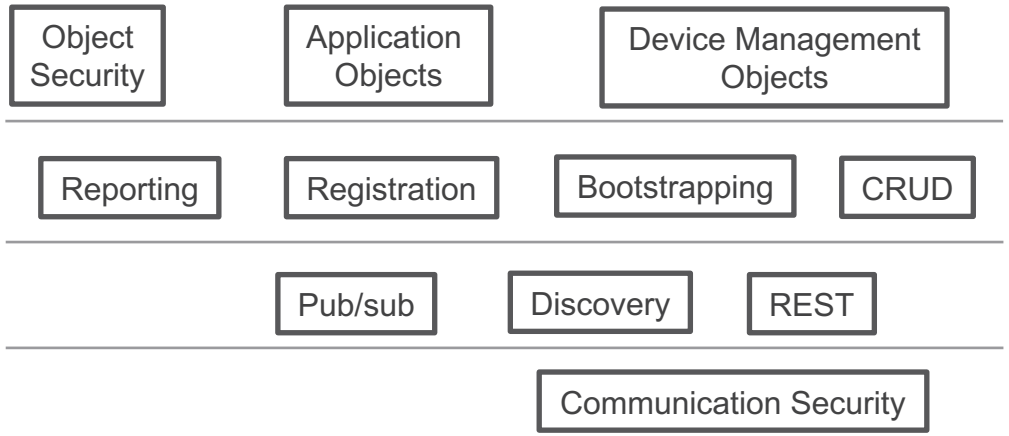
CIRCA 18 YEARS OF IOT STANDARDS

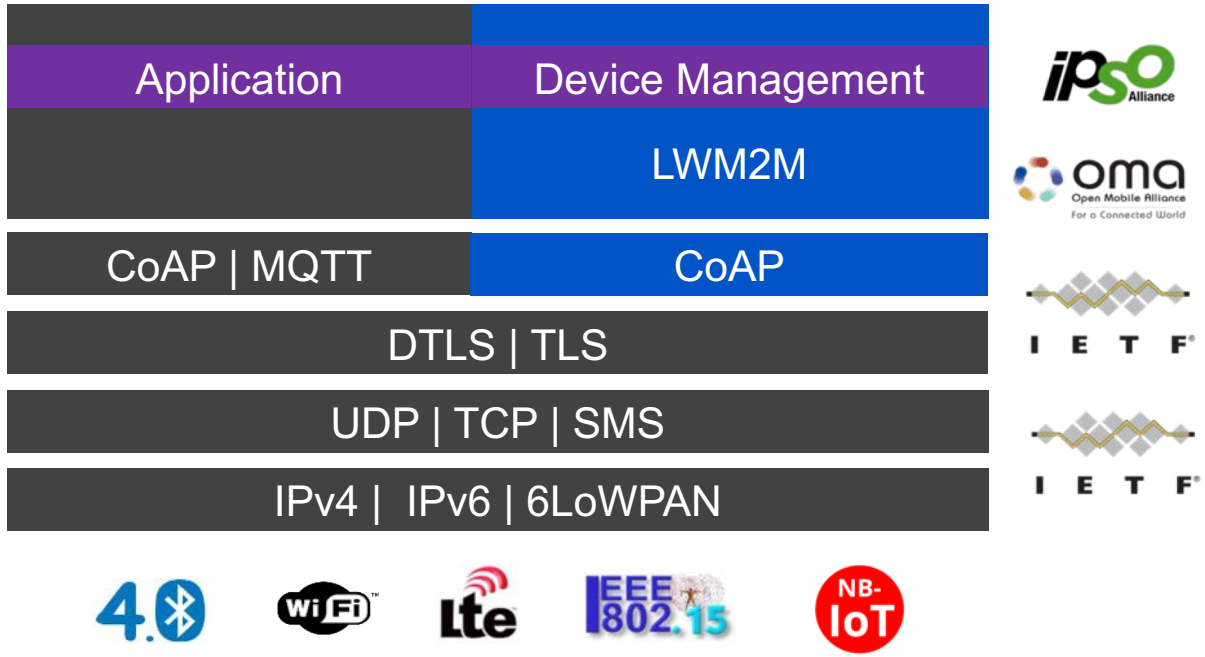
RFC 2689	RFC 3485	RFC 3544	RFC 3819	RFC 3940	RFC 3941	RFC 4629
RFC 4919	RFC 4944	RFC 5049	RFC 5401	RFC 5740	RFC 5856	RFC 5857
RFC 5858	RFC 6282	RFC 6469	RFC 6568	RFC 6606	RFC 6775	RFC 6690
RFC 7049	RFC 7228	RFC 7252	RFC 7388	RFC 7390	RFC 7400	RFC 7641
RFC 7668	RFC 7744	RFC 7925	RFC 7959	RFC 8075	RFC 8132	RFC 8152
RFC 8307	RFC 8323	RFC 8376	RFC 8392			

…and more

WEB FOR IOT AND CONSTRAINED DEVICES

- Stack wide interoperability
- Full functional support
  - Security, dev mgmt, apps
  - S/w upgrades, bootstrap
- Common extensible semantic model
  - Applications
  - Management
- Well-proven technologies
- Openly standardized
- Driven and adopted by major industry leaders





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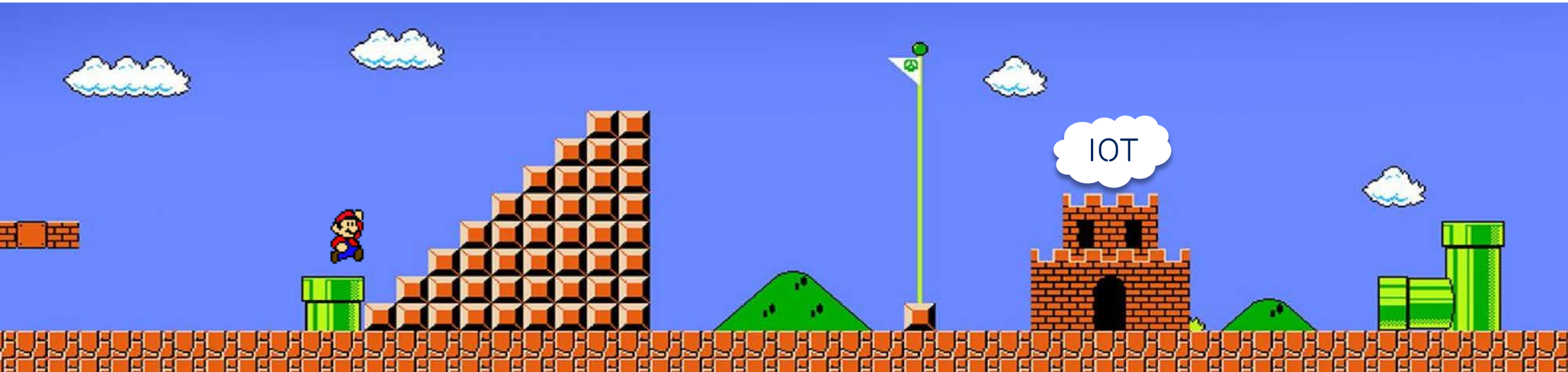
NETWORK VENDOR OVERVIEW

- **Telecom infrastructure providers**
  - Ericsson, Nokia, Huawei, Cisco/Jasper.
  - Experience from connectivity management. Focus on 5G.
- **Cloud Players**
  - Microsoft, Google, Cumulocity
  - Strong at providing generic platforms.
- **System Integrators**
  - Accenture, IBM
  - Strong at system integration and custom solutions.
- **Operators**
  - AT&T, Verizon, Vodafone, Telia, DT, Telefonica and Orange.
  - Homegrown IoT platform solutions.
- **Telecom infrastructure providers trying to get out of the “datapipe” role into higher value segments.**
- How
  - Creating IOT platforms that manage the devices, collect the device data and make it available for other applications.



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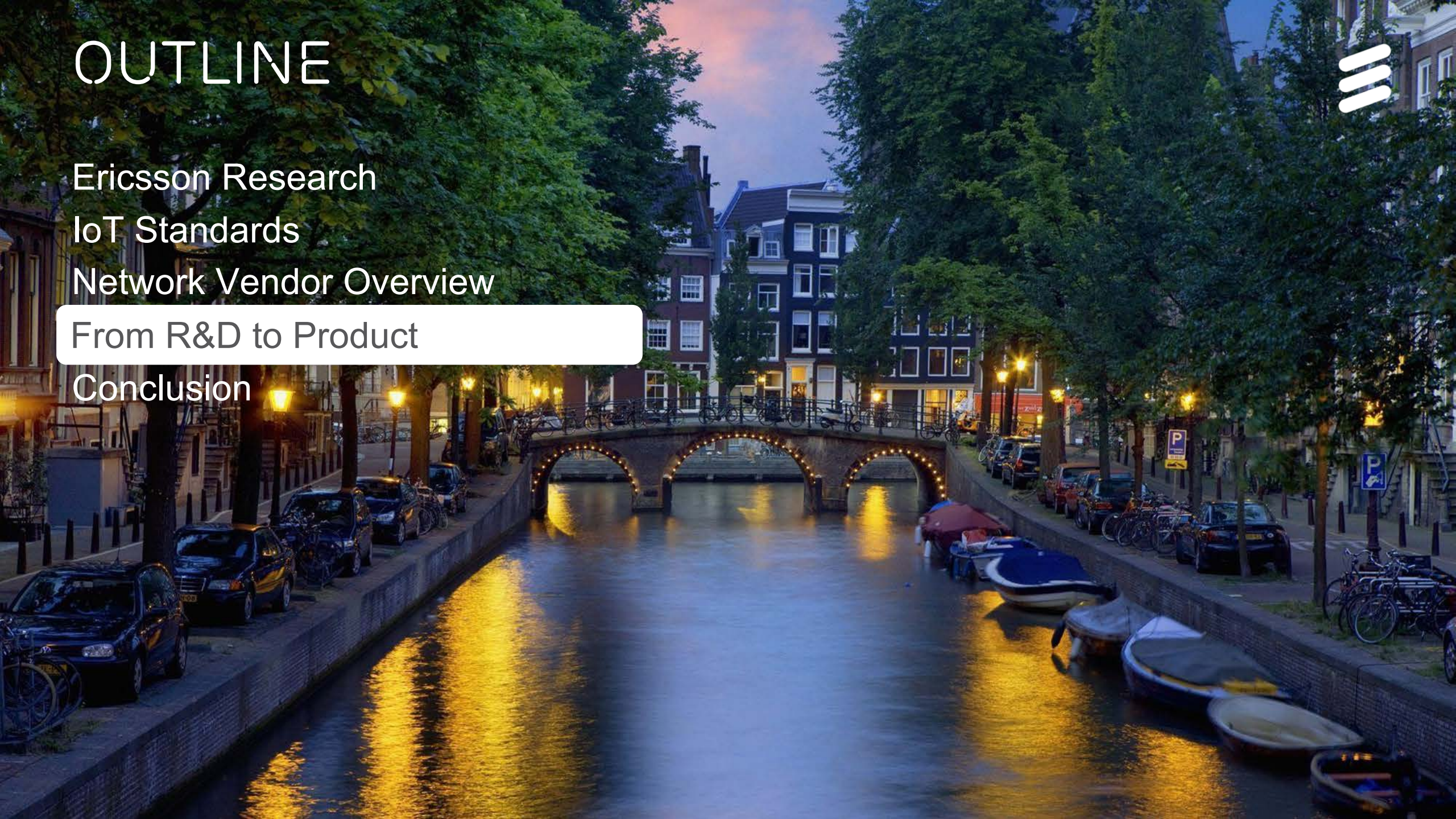


2014 – YANZI NETWORKS

The challenge
Creating smart buildings and tracking. Lack of interoperability at network, application and semantics.

The solution
Using common standards (802.15.4, IPv6, RPL, CoAP, IPSO). Use of Open Source (Contiki).

The result

- Very connected to research with RISE (Research Institutes of Sweden) and the Contiki developers.
- Focus on simple and quick device deployment as well as security.
- Acquired (control stock) for roughly 50M€ this July.

2015 – SMART ROCKBOLT

The challenge
Structural damages in mines. Lack of adequate alert systems and of measuring capabilities. No interest in reinventing the wheel.

The solution
Collaboration btw companies, Luleå University (PIMM project). Use of well-known standards.

The result

- Smart Rockbolt providing visual cues about the cave status. Gathering of telemetry from the bolt creating a “Digitalized mining Area”.
- Thingwave company as spinoff (8 people team).

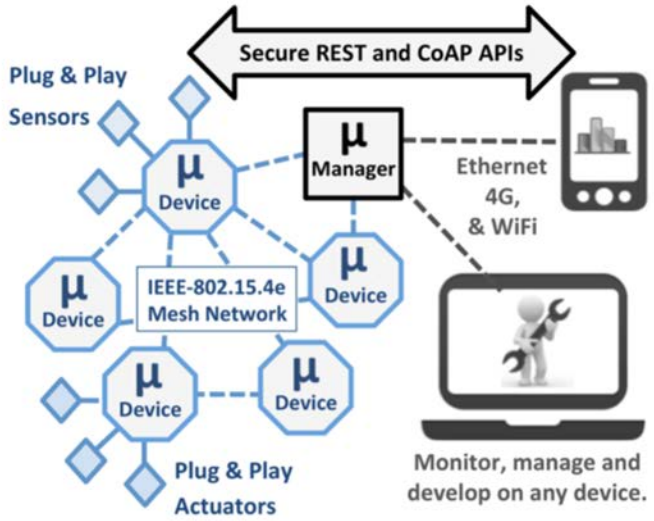
2015 – VERSASENSE (MICROPNP)

The challenge
Industrial sensing solutions require efforts in terms of development, installation, integration, and management. In particular PnP type of deployments. Don't fall in vendor lock-in.

The solution
Use of open standards for the most part (802.15.4, 6LoWPAN, IPSO, CoAP…). Add differentiation on some of the features.

The result

- Added their improved mesh reliability mechanism to differenciate (SmartMesh). Participate in IoT competitions to gain publicity.
- Spinoff MicroPnP/Versasense automatically identifies all connected embedded devices.
- Built by original postdoc team at KU Leuven in Belgium.



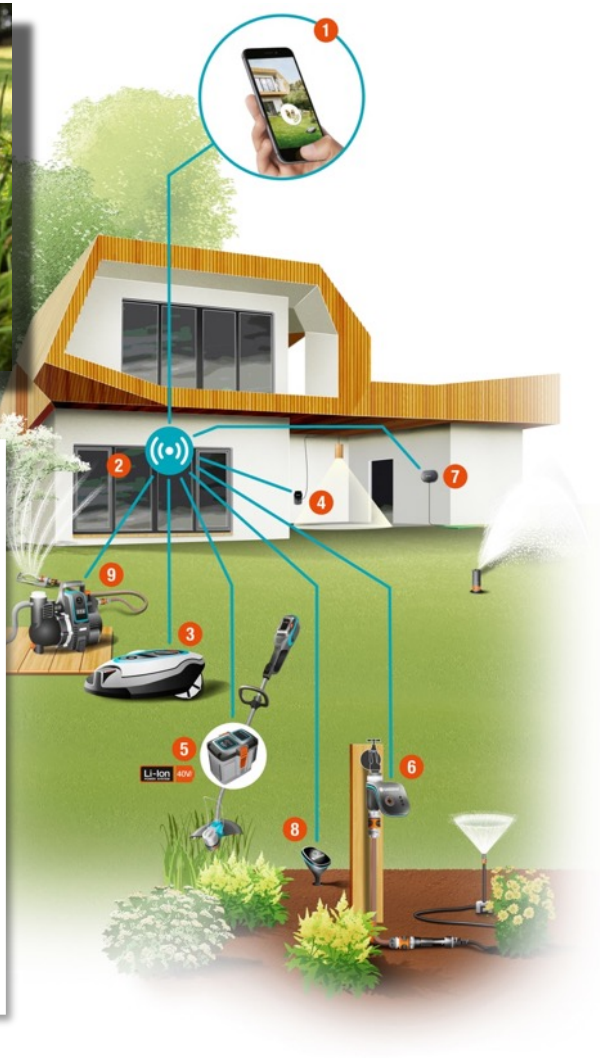
2016 – HUSQVARNA GARDENA

The challenge
New generation of “smart mowers“ and “smart gardening” solutions. Management of devices.

The solution
Common R&D project between few companies. Looking into state-of-the-art protocols (LWM2M) and Open Source (Contiki) technologies.

The result

- Part of the Gardena portfolio uses these standards and technologies.
- New IoT product market segment validated last month via stock crash (19%) of other unit.
  - “**exit from low price point product segments** and brands, particularly in petrol powered lawnmowers and garden tractors.”
  - “To **focus on future premium product** and service offerings under the core brands of Husqvarna and **Gardena**.”



Swedish Chainsaw Massacre Hits Husqvarna

By Niklas Magnusson
July 17, 2018, 11:08 AM GMT+3
Updated on July 17, 2018, 11:31 AM GMT+3

- Shares fall the most since Husqvarna was listed in June 2006
- Company to restructure Consumer Brands Division, exit segments

2016 – ACKLIO

The challenge

- Low-Power Wireless Access (LPWA) compression.
- Compatibility problems between radio technologies.

The solution

Open Standards (LPWAN, 6Lo, CoRE, CBOR…). Work started while at Télécom Bretagne engineering school R&D.

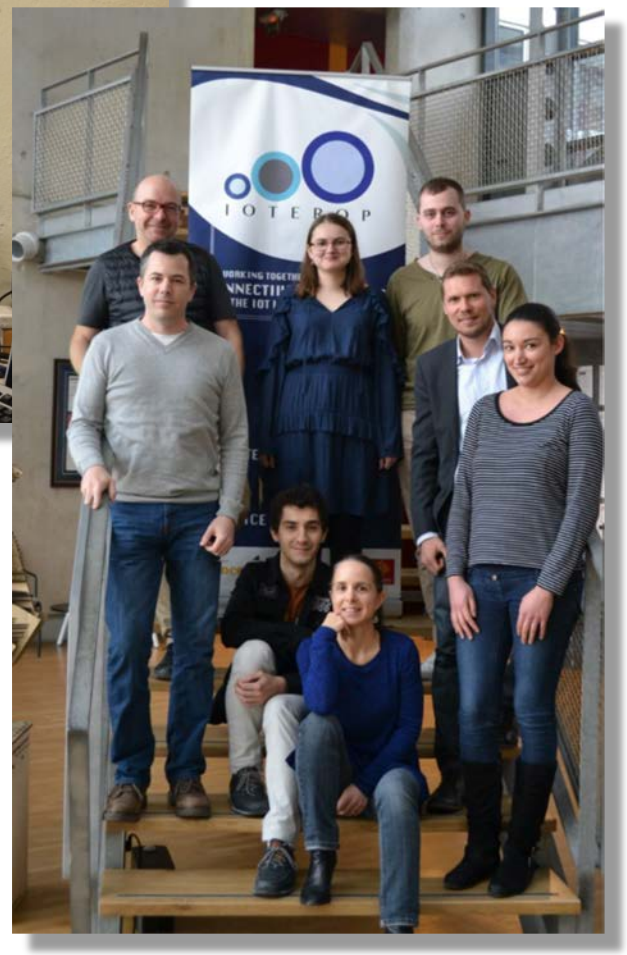
The result

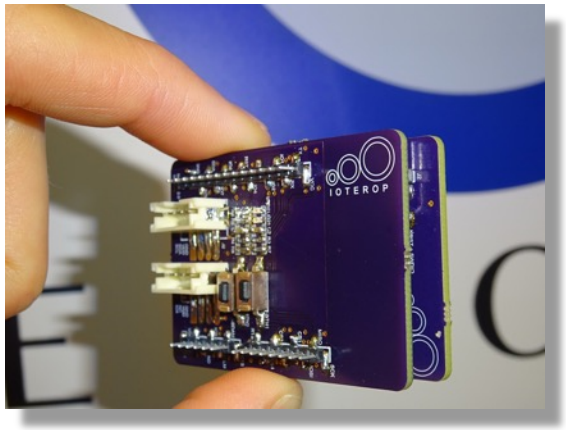
- Acklio, a company focusing on LPWAN networking.
- Contribute to Static Context Header Compression (SCHC), chairing LPWAN, contribute to CoRE.
- Take advantage of slow 3GPP standard process (no NB-IoT at the time).

2016 – IOTEROP

The challenge
Hard to integrate constrained device management. Hard to manage devices.

The solution
Used Open standards (CoAP, IPSO) and LwM2M.
Build an abstraction layer for simpler integration.



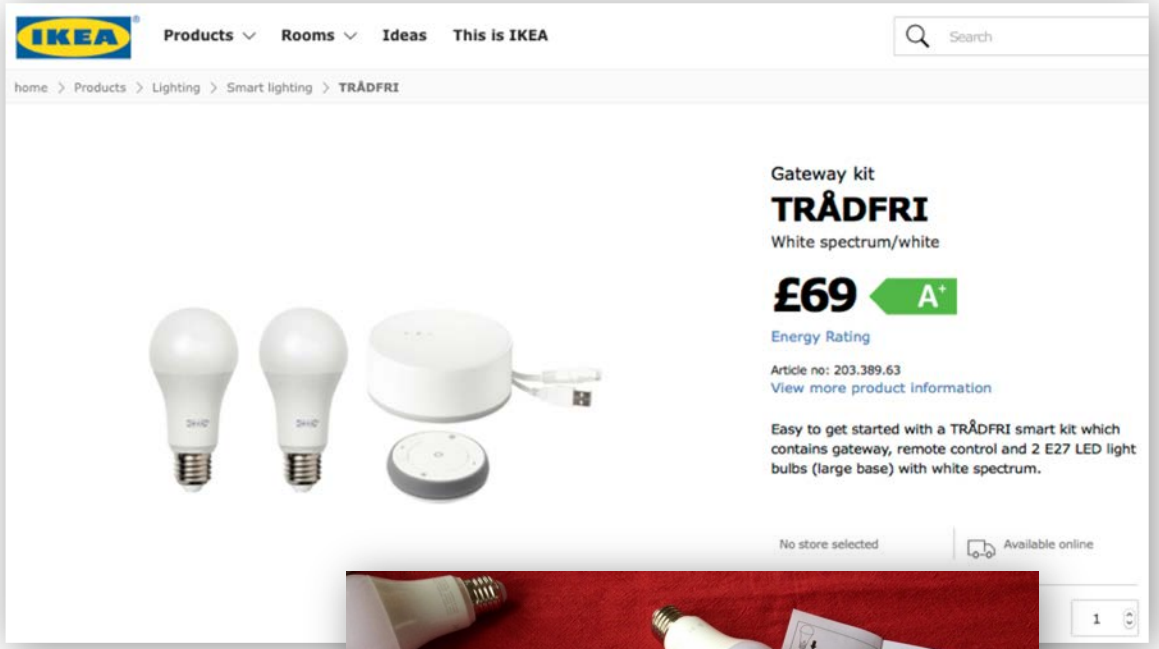


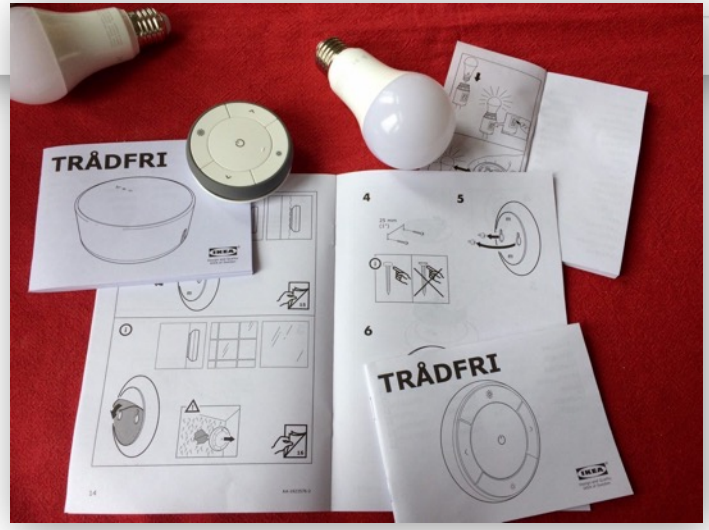
The result
- Quitted employer and built IoTerop.
- Focus on design (HW design to integrate with devices) and software (LwM2M implementation) catering to the Telco side of IoT.
- Active contribution to OMA.

2017 - IKEA TRÅDFI

The challenge
Smart lighting control is expensive and complex.

The solution
Hire experienced consultants.
Used Open Standards (802.15.4, CoAP, IPSO) and LwM2M.





The result

- Build IKEA Trådfri on state-of-the-art standards.
- Proves that there is no need to ask for permission to the community at large…. nobody knew about this. Found out because of IPSO TLV format:

```
{"5850":1,"5851":127,"5707":0,"5708":0,"5709":24930
,"5710":24694,"9003":0,"5711":250,"5706":"f5faf6"}
```

- Runs RIOT too!

2017 – "PRECISION ENVIRONMENTAL MONITORING COMPANY"

The challenge

— Continue being a segment leader with 1500 people, >300m€ revenue, 22m€ income.
— New technologies keep appearing. Complexity of managing devices.

The solution

Move from in-house solution to open standards. Build a PoC with other industry leaders in the area.

The result

— Selected a set of Open Standards after validating through the PoC to build next iteration of product line.
— Consider contributing back to the Open Source community.

2018 – "TWO UTILITY COMPANIES"

The challenge
Smart metering software largely built on DLMS and COSEM.
PLC is unreliable when appliances are on.

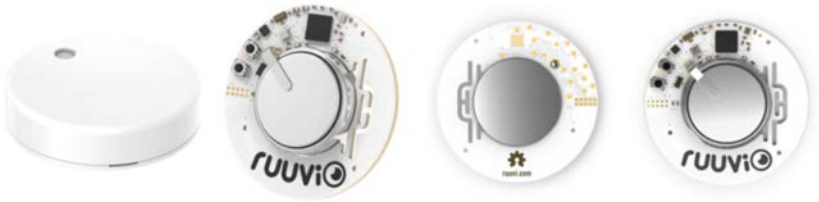
The solution
Look into state-of-the-art network and device management standards.
Look into other potential radio technologies.

The result
- Selected a set of Open Standards (CoAP, IPSO) to build next iteration of product line.
- As a result, new study on security properties needed.
- PoC to use NB-IoT in progress.

2018 – RUUVI TAG

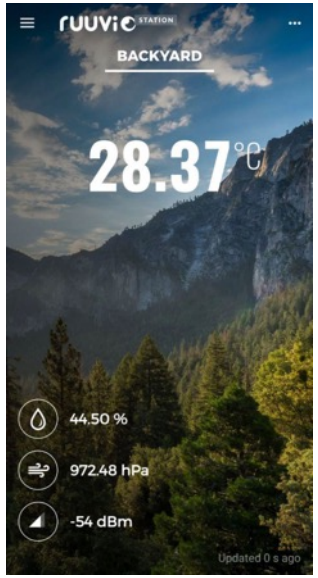
The challenge
Complexity and cost of environmental monitoring. Lack of open source hardware development.

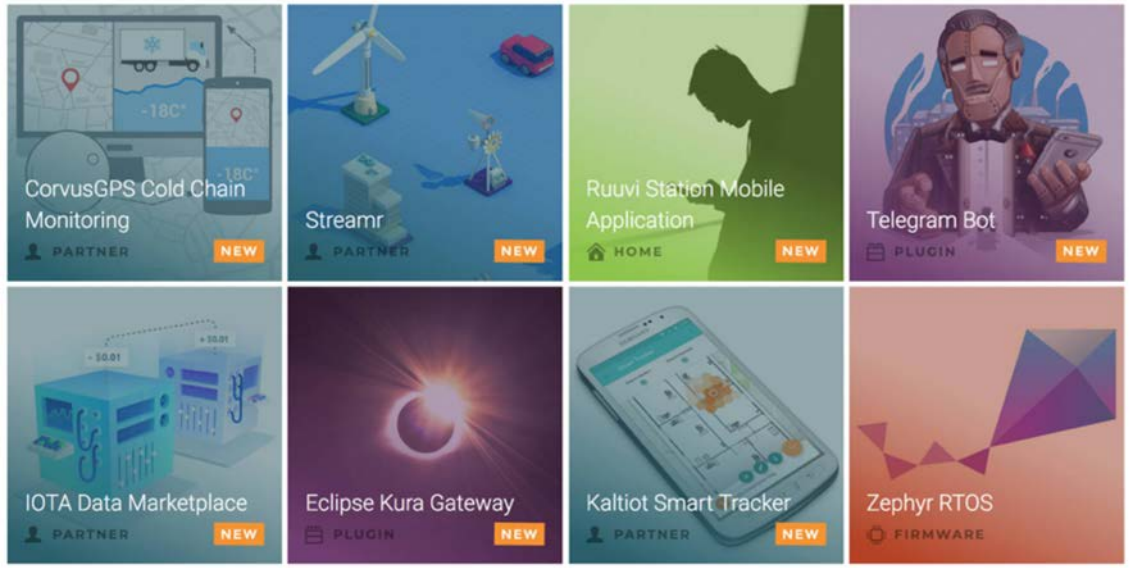
The solution
Create an open-source to avoid future vendor lock-ins, save money and simplify prototyping. Benefit from larger community.



The result

- RuuviTag open-source sensor beacon platform.
- Becomes an generic IoT Platform for telemetry.
- Benefits from its community to get ideas and be used on other applications: Kaltiot tracker, ColdChain monitoring, RIOT, Zephyr…





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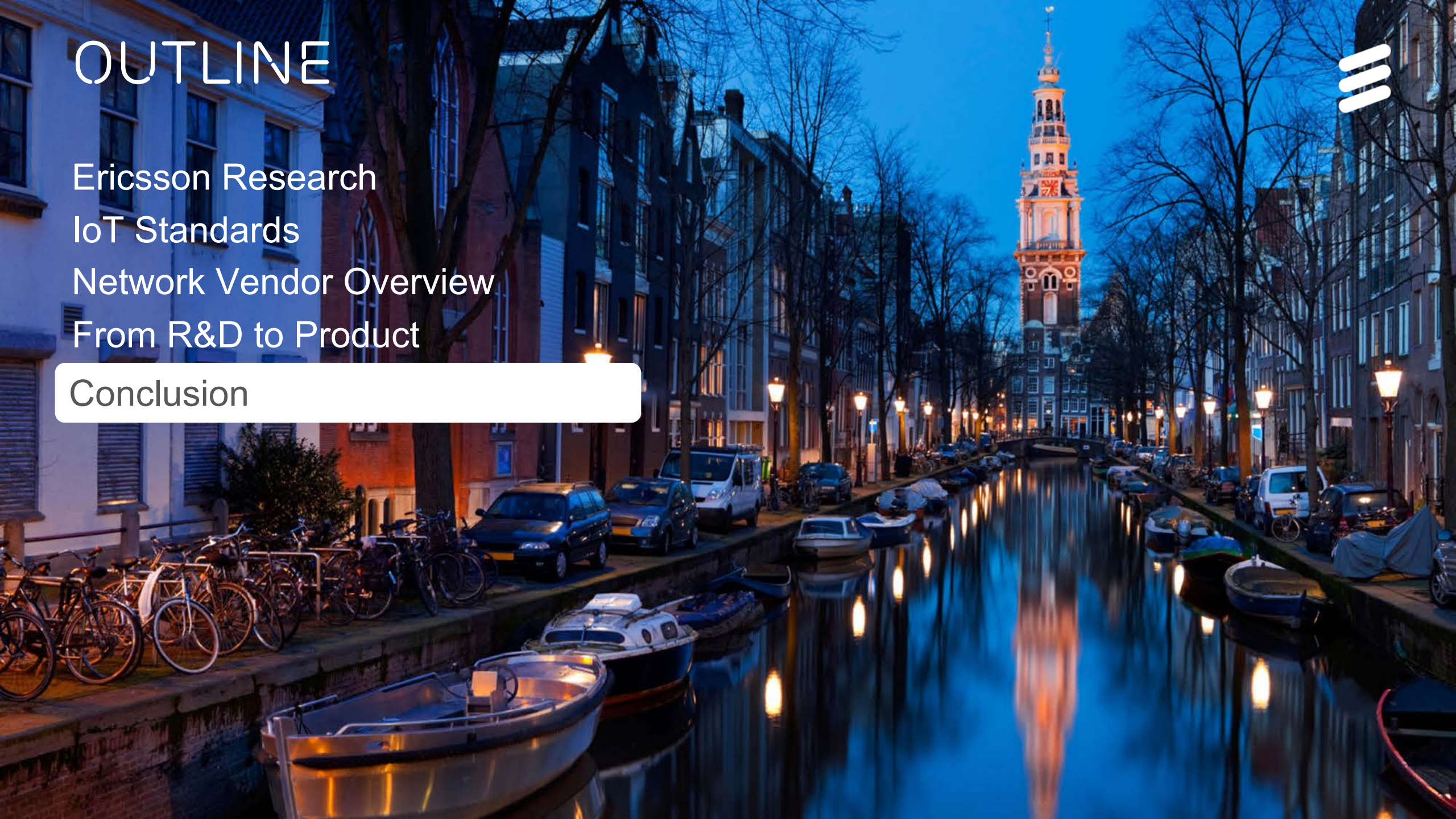
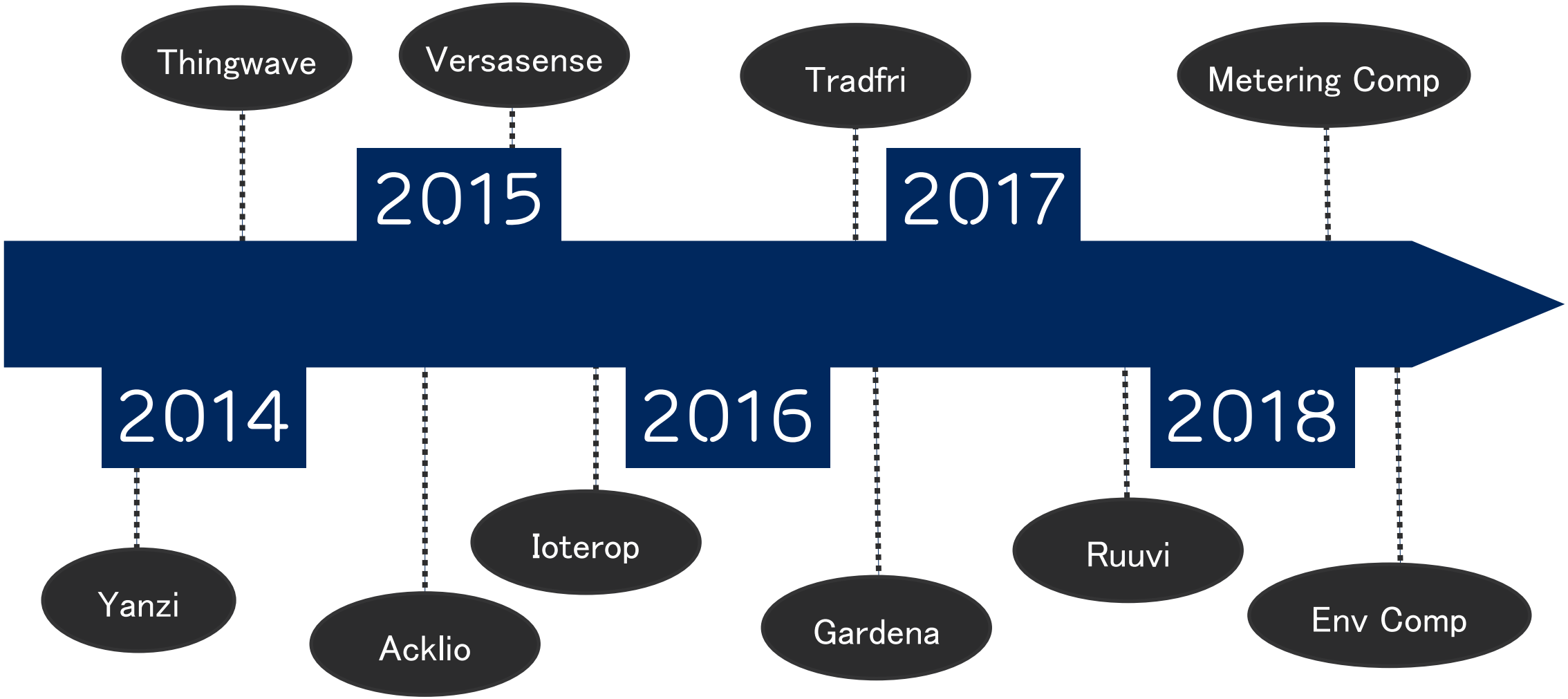


CONCLUSION


Thingwave
Versasense
Tradfri
Metering Comp
2015
2017
2014
2016
2018
Yanzi
Acklio
Ioterop
Gardena
Ruuvi
Env Comp

PERFECTION VS VERSATILITY