IoT – Technical foundation and use cases
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FORCE Technology – at a glance
Internet of Things devices everywhere!
Gartners Hype cycle
Development process

**Ideation:** The biggest barrier for implementing a new technology like IoT is to create a specific vision for the new product or service.

**Feasibility.** Having defined a specific application and developed the first prototype, it is critical to remove any technical barriers for the solution.

**Design and Development.** During this phase we coordinate requirements and development competence needs in a requirement specification.

**Test and validation.** The technical validation is just as important for the final product as the regulatory approvals.

**Integration and Manufacturing.** The IoT magic does not occur before the data from the device is integrated correctly into other systems and a robust production set-up has been established.

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**IoT definitions**

- The Internet of Things (IoT) is a framework in which all things have a representation and a presence in the Internet. More specifically, the Internet of Things aims at offering new applications and services bridging the physical and virtual worlds, in which Machine-to-Machine (M2M) communications represents the baseline communication that enables the interactions between Things and applications in the cloud. – IEEE Communication society
IoT-A Reference Architecture

Source: IoT-A D1.5 Final reference architectural reference model for the IoT v3.0

IoT system components

Source: FORCE TECHNOLOGY
Nordic IoT centre
Road to Manufacturing Solutions
Concept validation
Services

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**Concept validation**
- State-of-the-art
- Pretotyping
- Context validation
- Design panel
- User interactions
- Regulatory strategy
- Quality Process
- Business model
- Cloud implications
- Quality Process

**Feasibility studies**
- Link budget validation
- Environment evaluation
- Perceptual evaluation
- Conformance Req. Spec.
- Choice of Wireless Tech.
- System design
- Requirement Specification
- Prototyping
- Sensor hardware
- Sensor algorithm
- Energy Harvesting
- Battery lifetime
- Risk Assessment

**IC Design Services**
- Digital
- Analog
- Mixed signal
- Layout
- DFT
- Foundry libraries
- Optical sensors
- RF
- Power management
- Ultra low power
- Front-end
- Back-end

**IC manufacturing**
- Wafer purchase
- Wafer storage
- Wafer testing
- Package design
- Package Evaluation
- Encapsulation
- IC testing
- Storage & shipping
- Yield Analysis
- Supply chain optimization
- Supply chain management
- L
- HTOL

**IoT device design**
- PCB layout
- Design for manufacturing
- EMS
- Antenna Design
- Prototyping
- Small series
- Scale to Volume
- Embedded software
- App development
- Cloud implementation

**Test & validation**
- Accredited conformance testing
- ElectroMagnetic Compatibility(EMC)
- Real-life RF environments
- Environmental Impact
- Product Safety Evaluation
- Approval Management
- Technical construction file
- Extreme test
- Software validation
- Failure Analysis
- Troubleshooting
Nordic IoT centre – the philosophy

• Simulations and ideas to be proven in the real world
• Partnership and community driven development
• Understanding IoT requirements
• Technological foundation
• Application centered
• Secure solutions
• Scalability
• Availability

www.nordiciotcentre.com

Ideas -> applications in the real world
Simulations in the real world

Community: IoT and Wireless club

- 40 member companies
- 16 meetings annually
- 8 technical themes
  - Approval management
  - Radio design
  - System design
  - Components and modules
  - IoT system architectures
  - Energy Harvesting
  - Scalability and Big Data
  - Security and privacy
- Test facilities worth of 6 MDKK to be shared between members
Partner: CBS capability map

Source: CBS competitiveness platform, Data profit: A capability map for data-driven growth, Ritter et. Al., 2017

GOOEE - from selling lamps to selling data

- Video
Nordic IoT centre – the philosophy

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How can I Join? [www.wirelessklubben.dk](http://www.wirelessklubben.dk)
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Next Free events
Århus:
- 27th September
Hørsholm:
- 28th September