



Cross-Platform Software Considerations for Internet of Things

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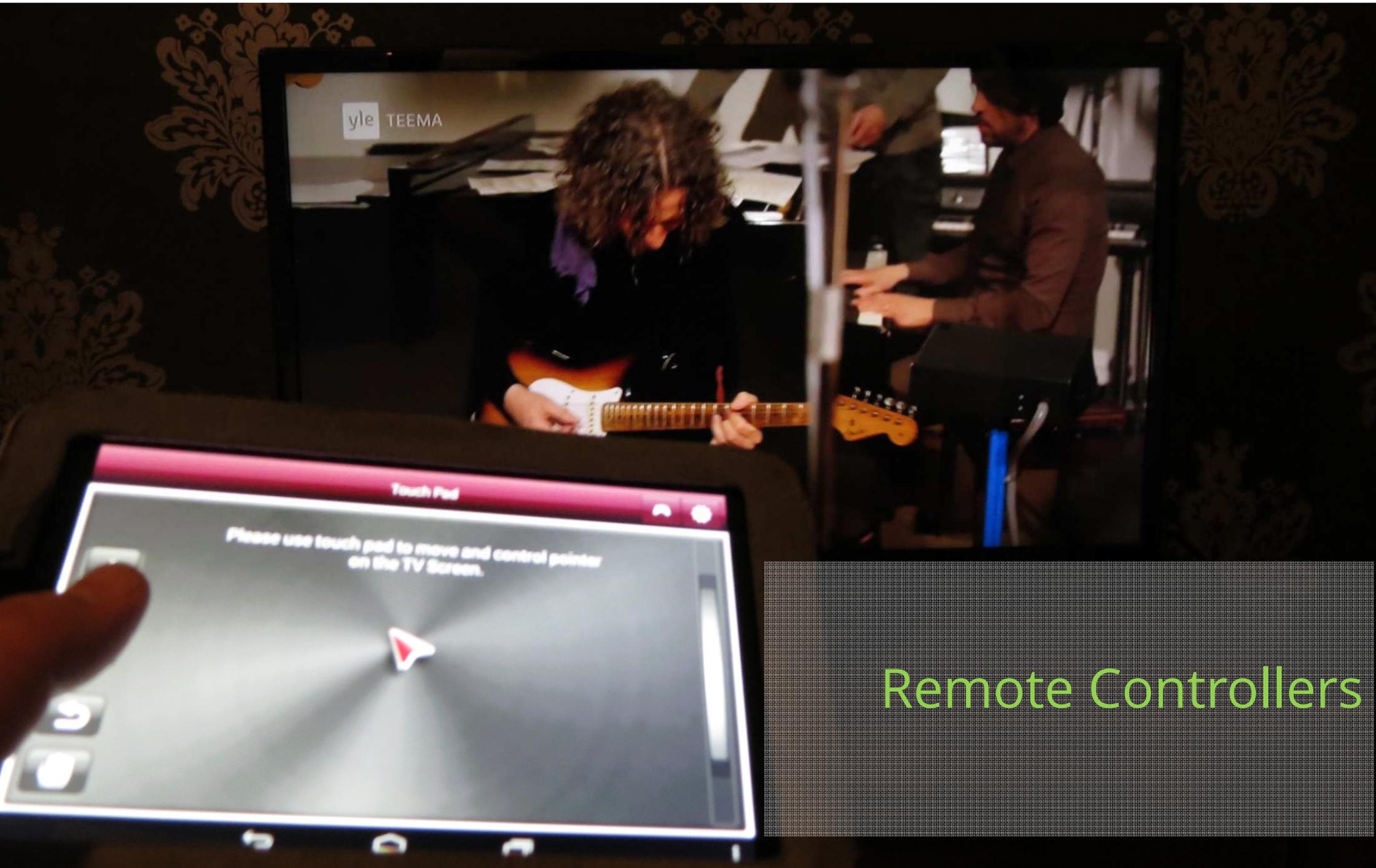
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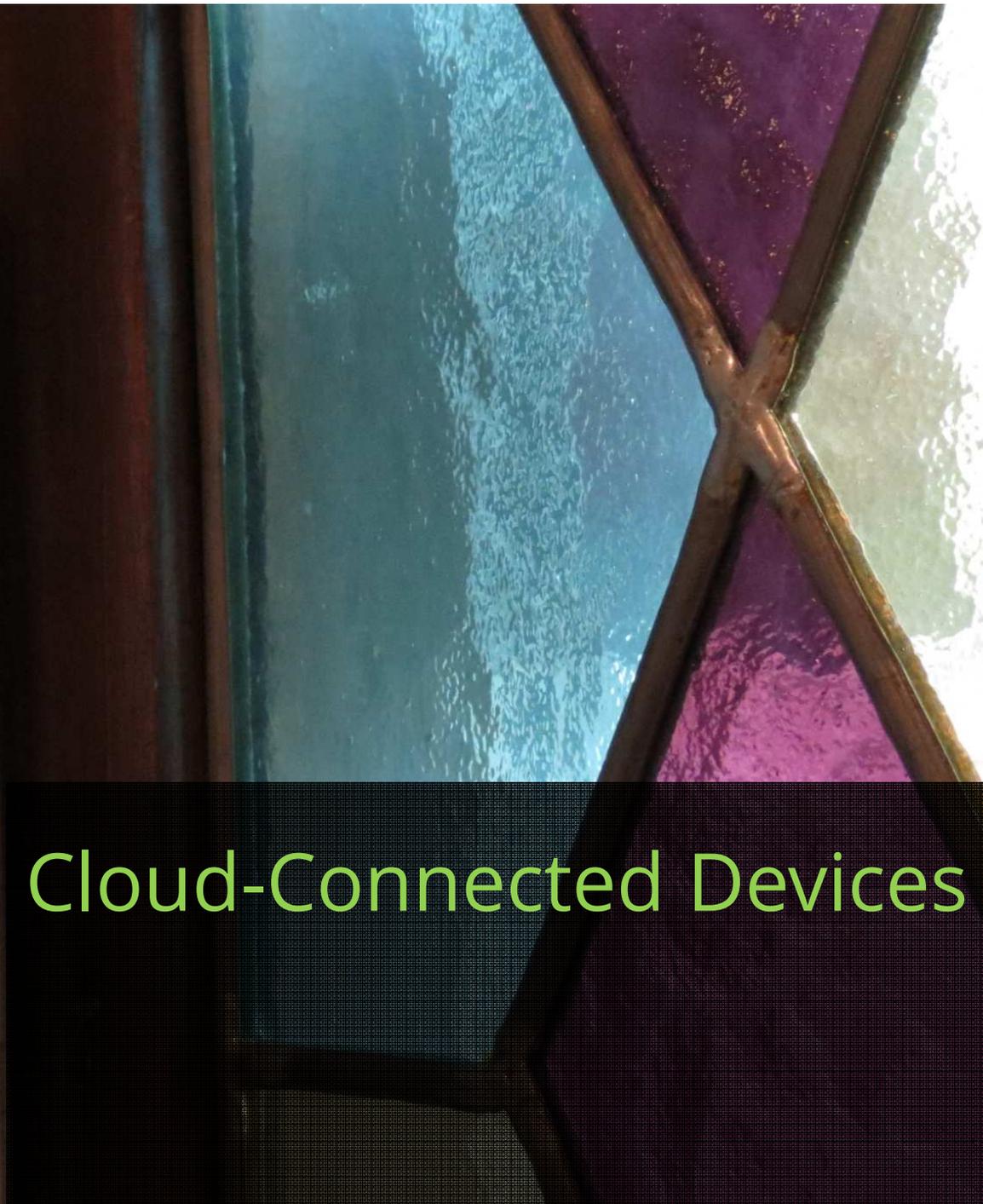
EVERYDAY INNOVATIONS



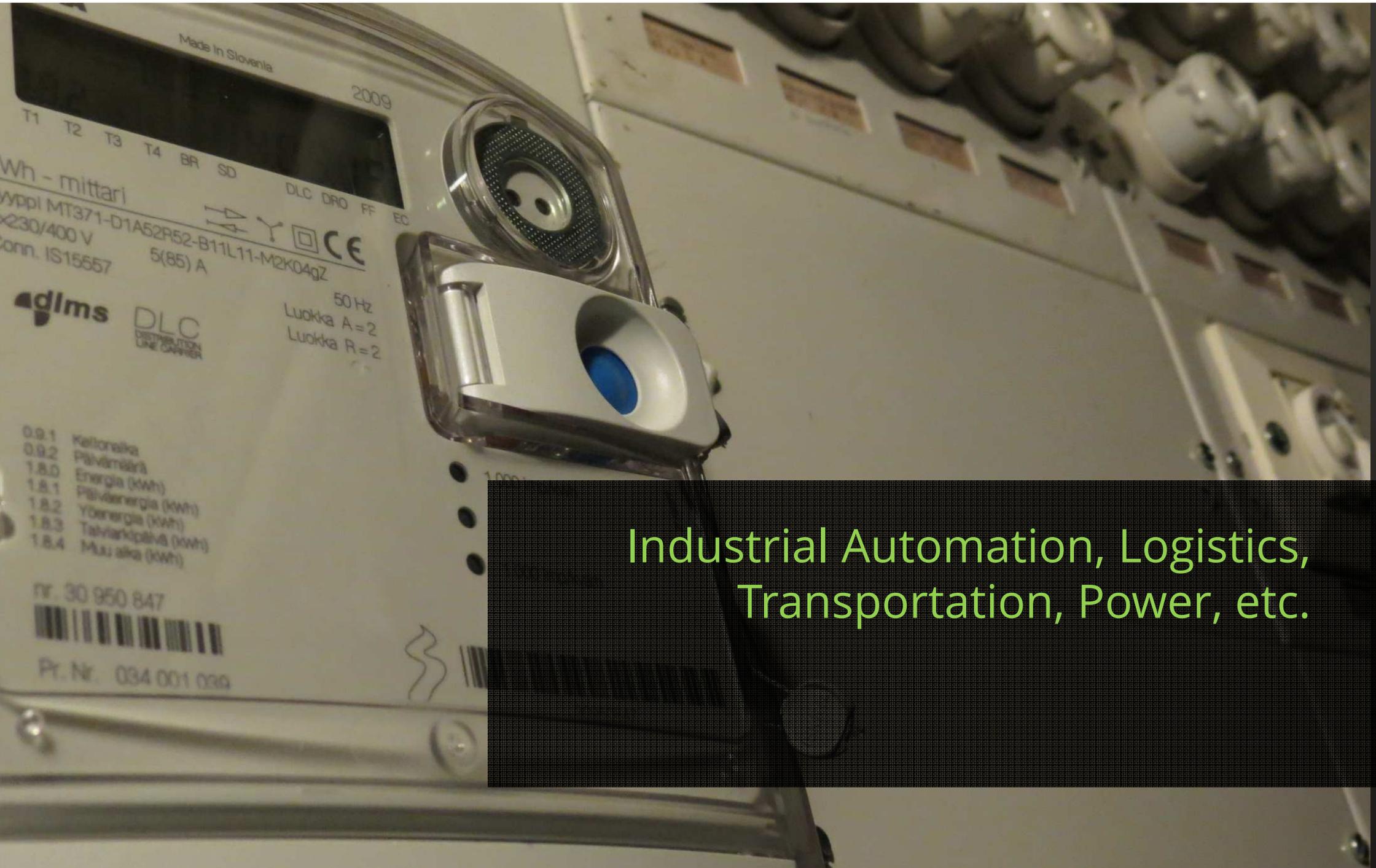
Remote Controllers



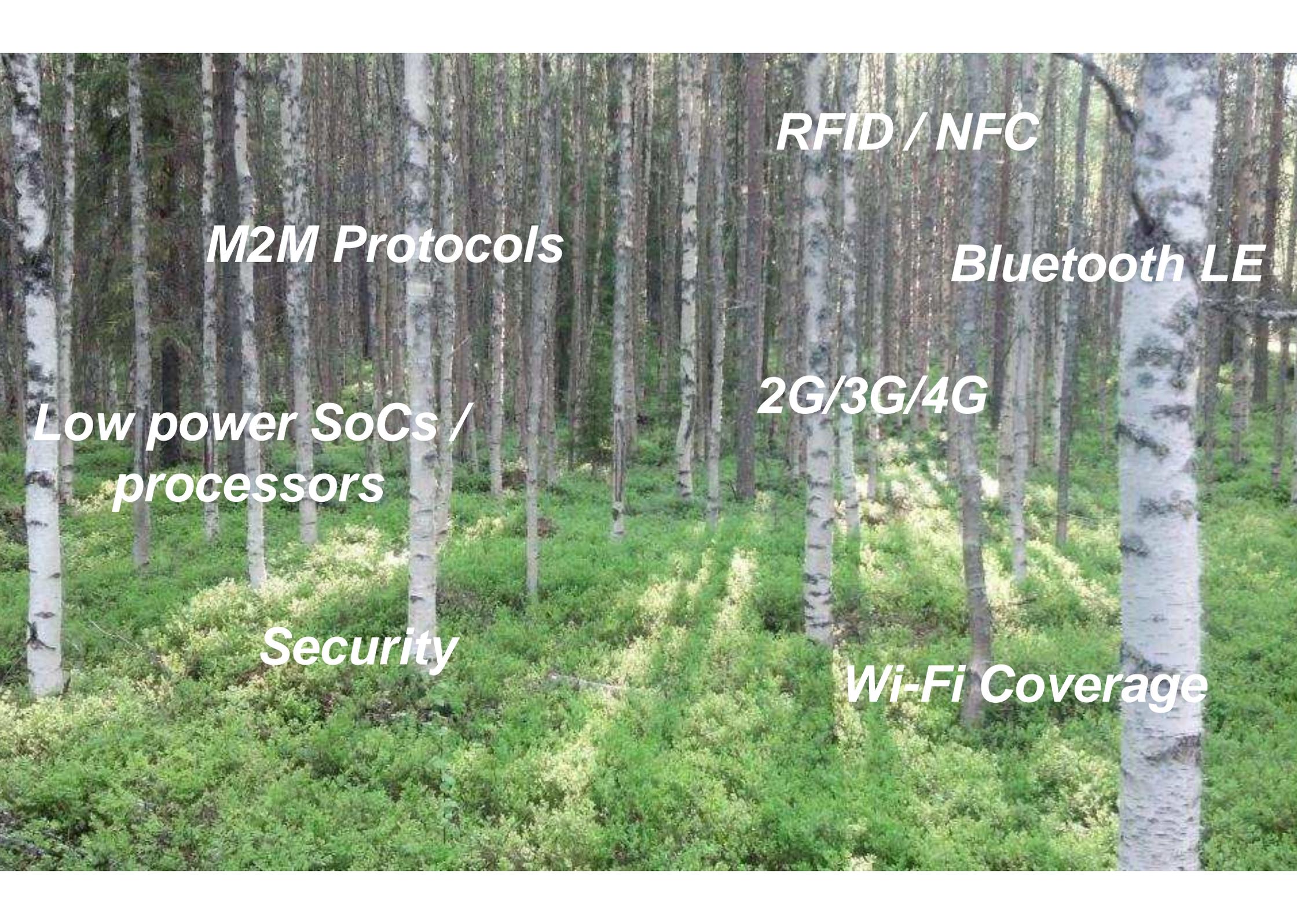
Auxiliary Displays



Cloud-Connected Devices



Industrial Automation, Logistics,
Transportation, Power, etc.

A photograph of a dense forest of birch trees. The trees have characteristic white bark with dark lenticels. The ground is covered in lush green undergrowth, including moss and small plants. Sunlight filters through the canopy, creating dappled light on the forest floor.

RFID / NFC

M2M Protocols

Bluetooth LE

*Low power SoCs /
processors*

2G/3G/4G

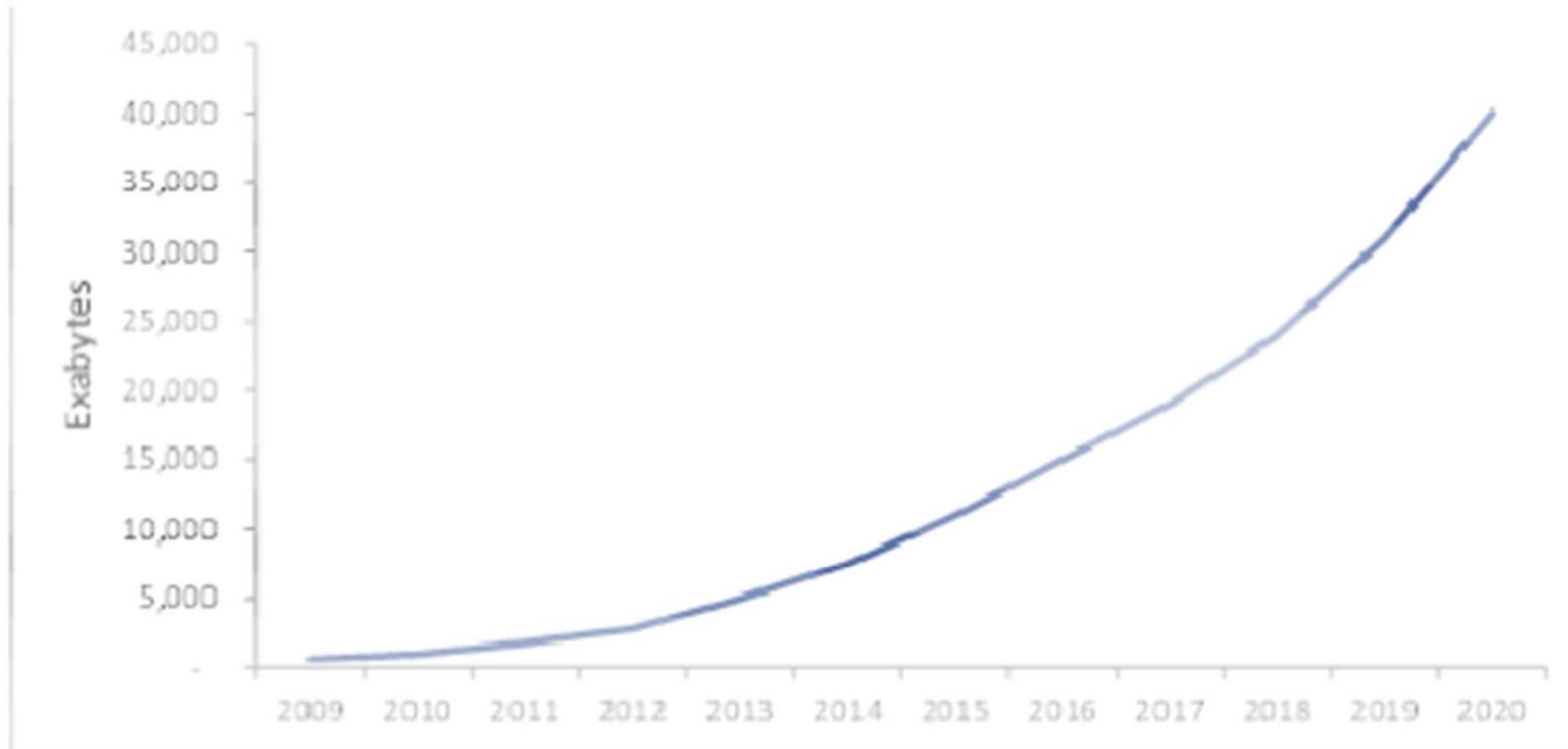
Security

Wi-Fi Coverage

How About Software Developers?

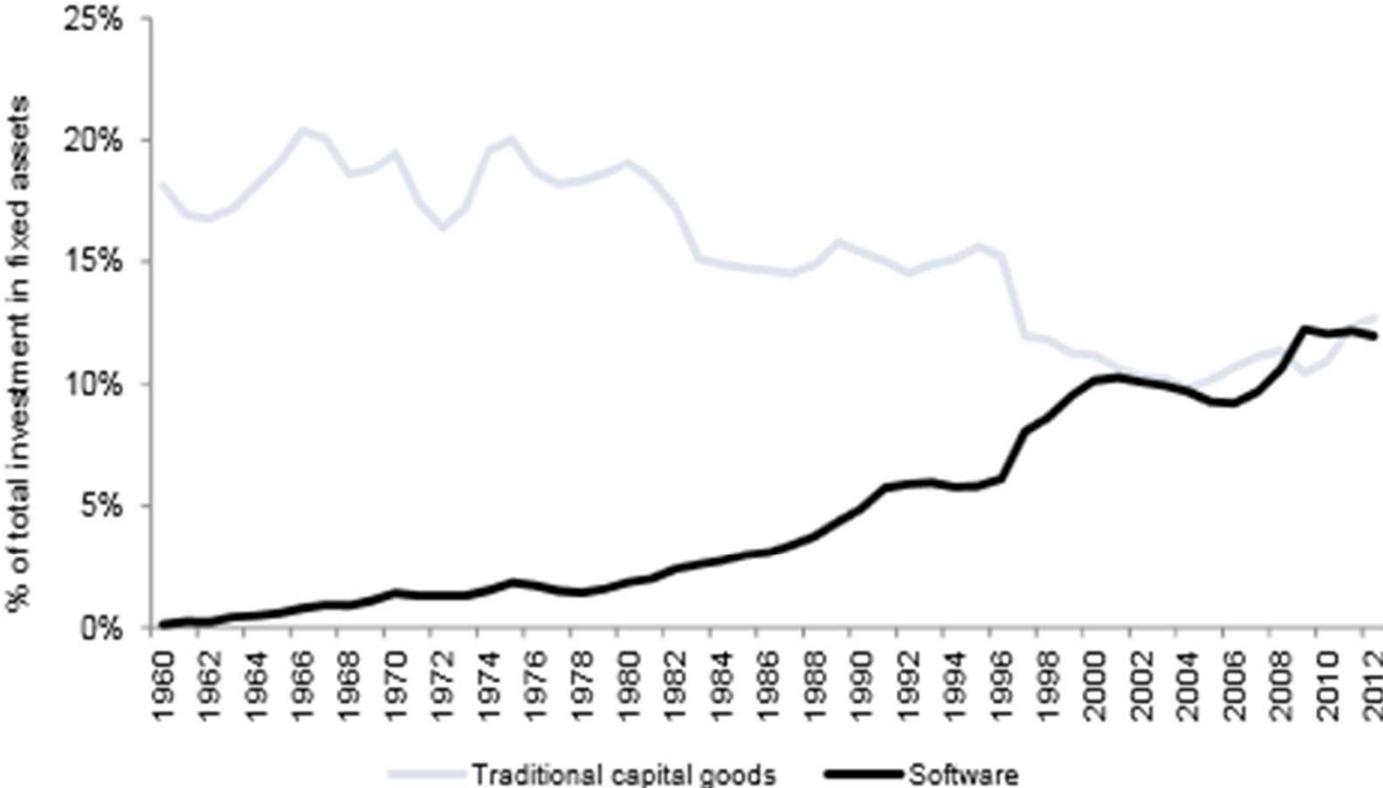
Why isn't anyone thinking about the software developers?

Exhibit 5: Worldwide data growth projections



Source: IDC "The Digital Universe" December 2012.

Exhibit 6: Investment in software is on the rise, signaling a shift away from hardware

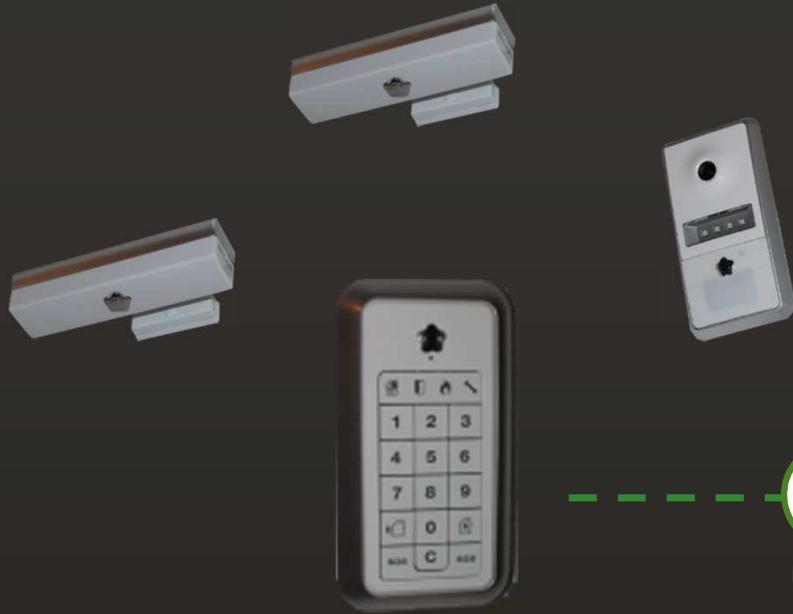


Source: BEA, Goldman Sachs Global Investment Research.

Success Factors for IoT Software Vendors

- **Managing** the communication with connected devices/sensors;
- Providing **middleware** for integration to data repositories;
- **Storing** and **securing** the data; and
- **Analyzing** and **visualizing** the data

Goldman Sachs report: IoT primer, The Internet of Things: Making sense on the next mega-trend



Big Data

Mobile Devices

Desktop PCs

Embedded Devices
and Sensors

Problems for Creating an IoT System—from Software Perspective

- Creating an embedded device. Still as painful as always.
 - Rapid Embedded Workflow, easy device prototyping, direct deployment
- Creating an extendable architecture for a system of embedded devices
 - Future-proving software with CPT, platform independency, plugin architectures
- Creating a back-end for the embedded devices to hook into (OK, "The Internet" IS already there)
 - Integrated, Easy Access Cloud Services
- Making the devices and the backend data somehow reachable to all consumers
 - Cross-Platform Software Framework
- Big Data
 - Cloud computing, Data analysis and visualization libraries, being ready for large data sets

Using a Cross-Platform Toolkit for IoT Systems

Benefits:

- Immediate market reach
- Productivity
- Extendability, future-proving
- Smart technology strategy

Downsides:

- Compromises
- GUI design requires extra attention

Qt Developer Offering for IoT Systems

High-Level C++ Libraries for Device Creation

- Native performance
- Easy hardware access
- Networking
- Full HTML5 engine
- Bluetooth/Bluetooth LE
- Sensors
- Data base access
- Multi-threading and processing
- I/O libraries
- etc.

Rich UI Offering for Modern Look-and-Feel across All Targets

- Rapid UI Prototyping
- Declarative UI design with Qt Quick
- Comprehensive collection of customizable controls
- Native Look-and-feel or customizable styles
- Native, HTML5, or hybrid of both

Integrated Embedded Development Environment

- Qt Creator IDE
- Run on Win, OS X, Linux
- Rapid workflow: design-code-compile-deploy cycle
- Direct device deployment: embedded, mobile or desktop
- On-device debugging and profiling
- Drag'n'drop UI design

Qt Cloud Solutions

- Cloud Data Storage
- Managed WebSockets for real-time connections
- Managed Application Runtimes-Server-side Qt

Cross-Platform Support

- Maximize code re-use for multi-screen applications
- Deploy natively to all major desktop, mobile or embedded platforms

Rapid Workflow with Qt Quick



Designer



Developer

Qt Quick

Stunningly Fluent
Modern User Interfaces,
written with QML. Ideal for
rapid UI prototyping

Power of Cross-Platform
Native Qt/C++

Declarative UI Design

Imperative Logic

Core

Processes
Threads
IPC
Containers
I/O
Strings
Etc.

Network

HTTP
FTP
SSL

Sql

SQL and
Oracle
databases

XML

Bluetooth

Positioning

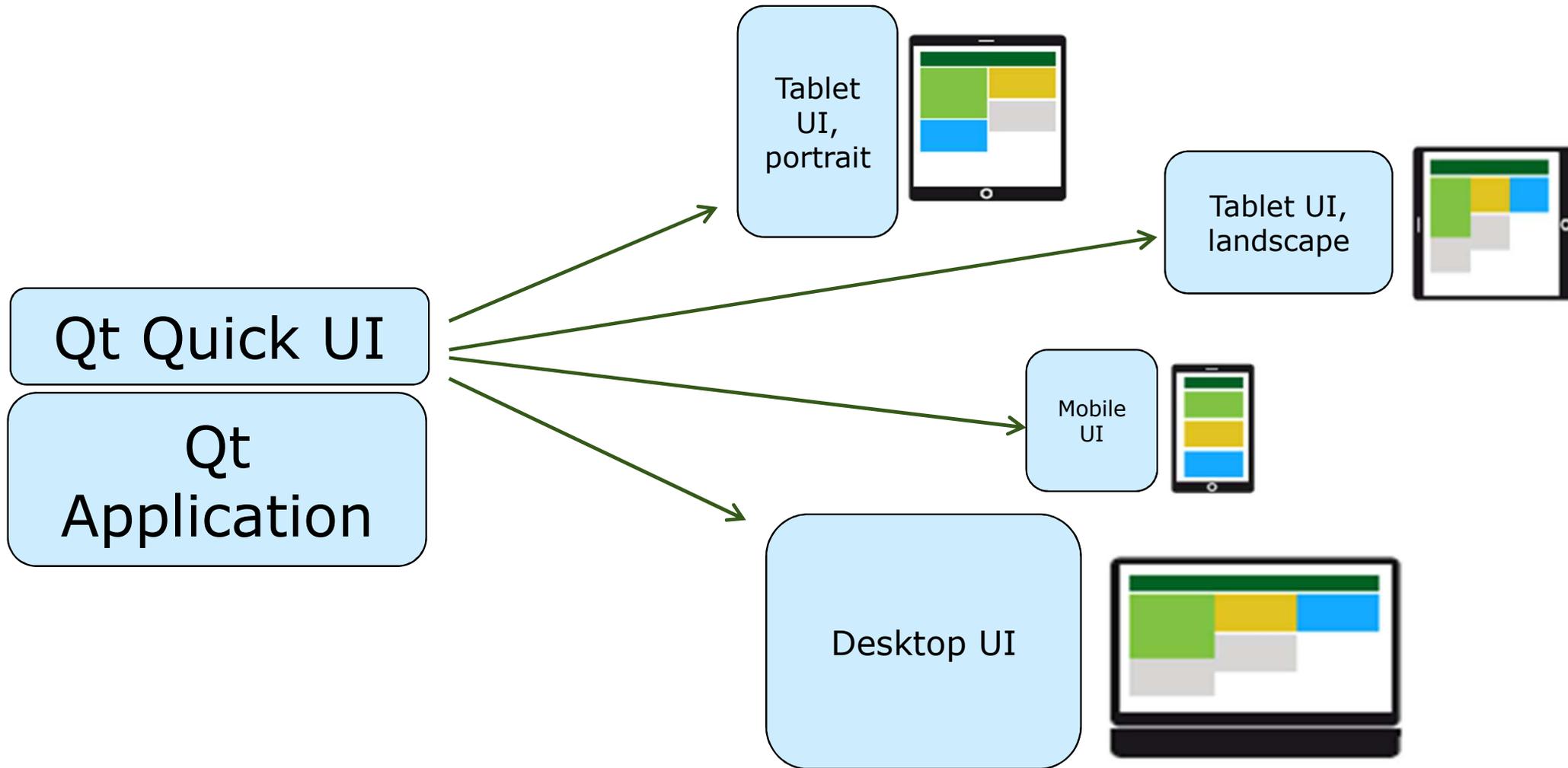
NFC

Serial Port

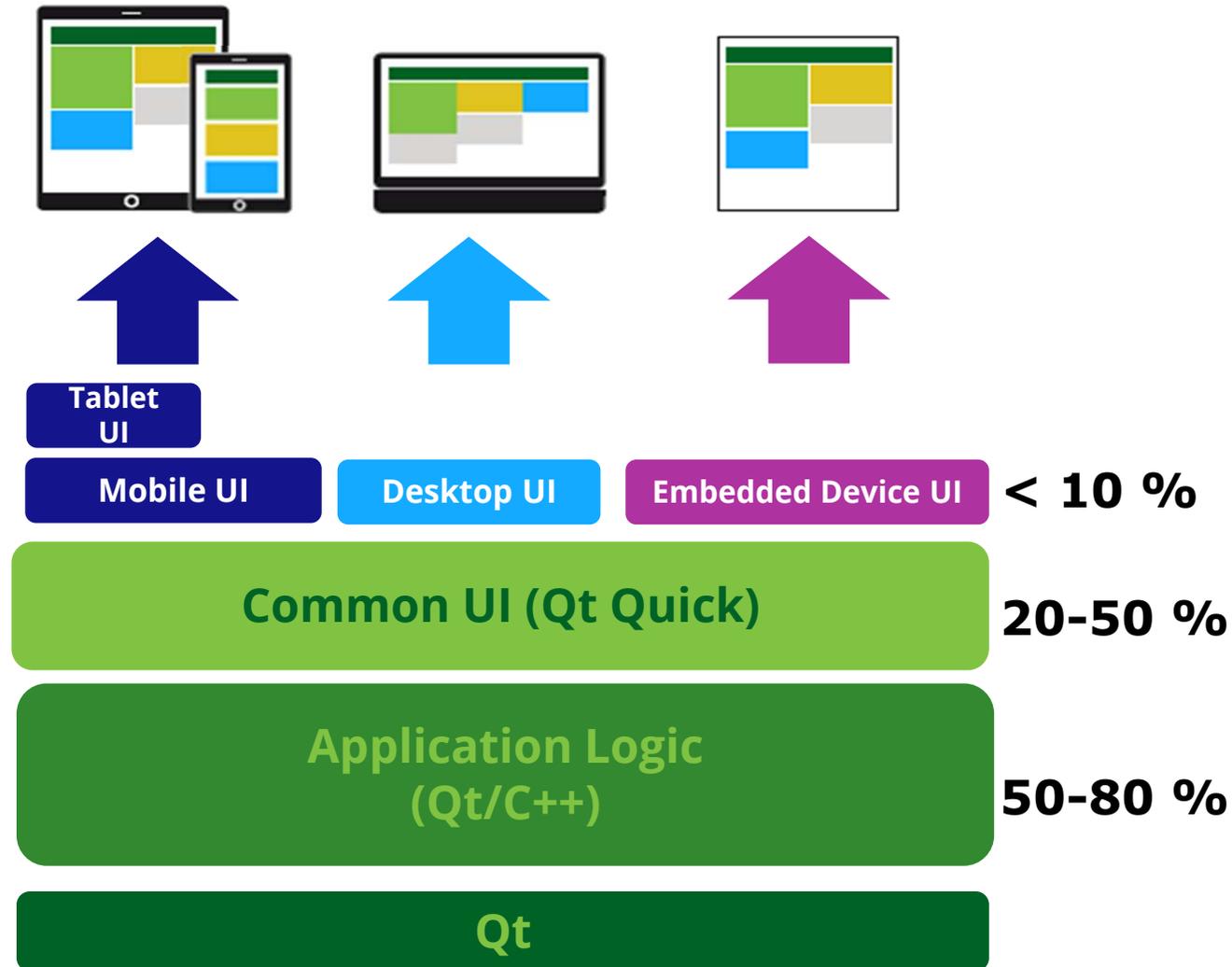
+ Direct Hardware Access



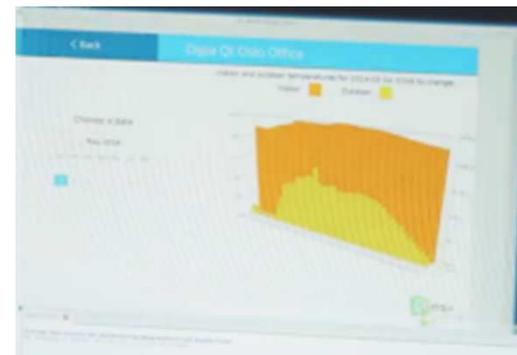
Responsive Design for Arbitrary Devices with Qt Quick



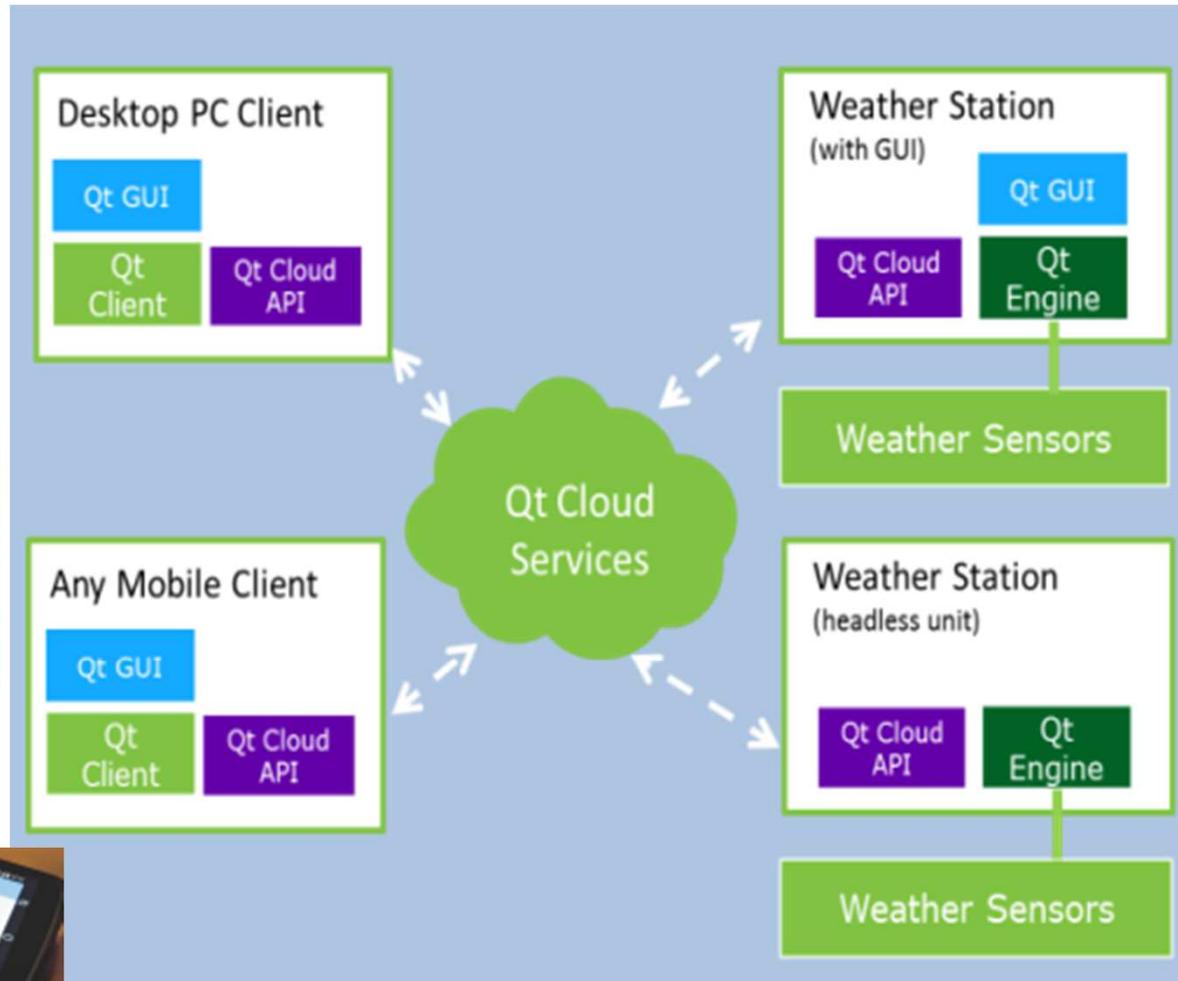
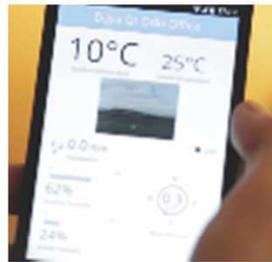
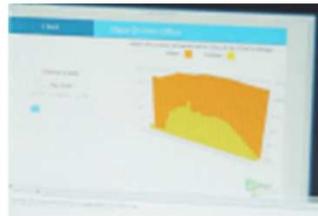
Maximize Re-Use--Structure of a Qt Multi-Screen Application



Qt Weather Station, IoT Proof-of-Concept



Qt Weather Station, Architecture



Thank You!

<http://www.qt.io>

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