Qt for MCU webinar 4th Sep 2019

Aurindam Jana

Business Development

Santtu Ahonen

Product Manager

- Why Microcontrollers?
- Limitations of existing toolkits
- Qt's attempts
- Qt for MCUs

Aurindam Jana

Business Development

Increasing Expectations on Hardware

The number of smart connected devices is predicted to grow significantly, and many of those devices are expected to have requirements such as:

Real-time Processing

Low power consumption

Instant Boot time

Low BOM cost


ECO MODE
Temperature
38°C
Saved: 0,177 / 2%
69%
16
%
Time elapsed: 3:19


Espresso Doppio
on/off
milk
ml
EQ.9

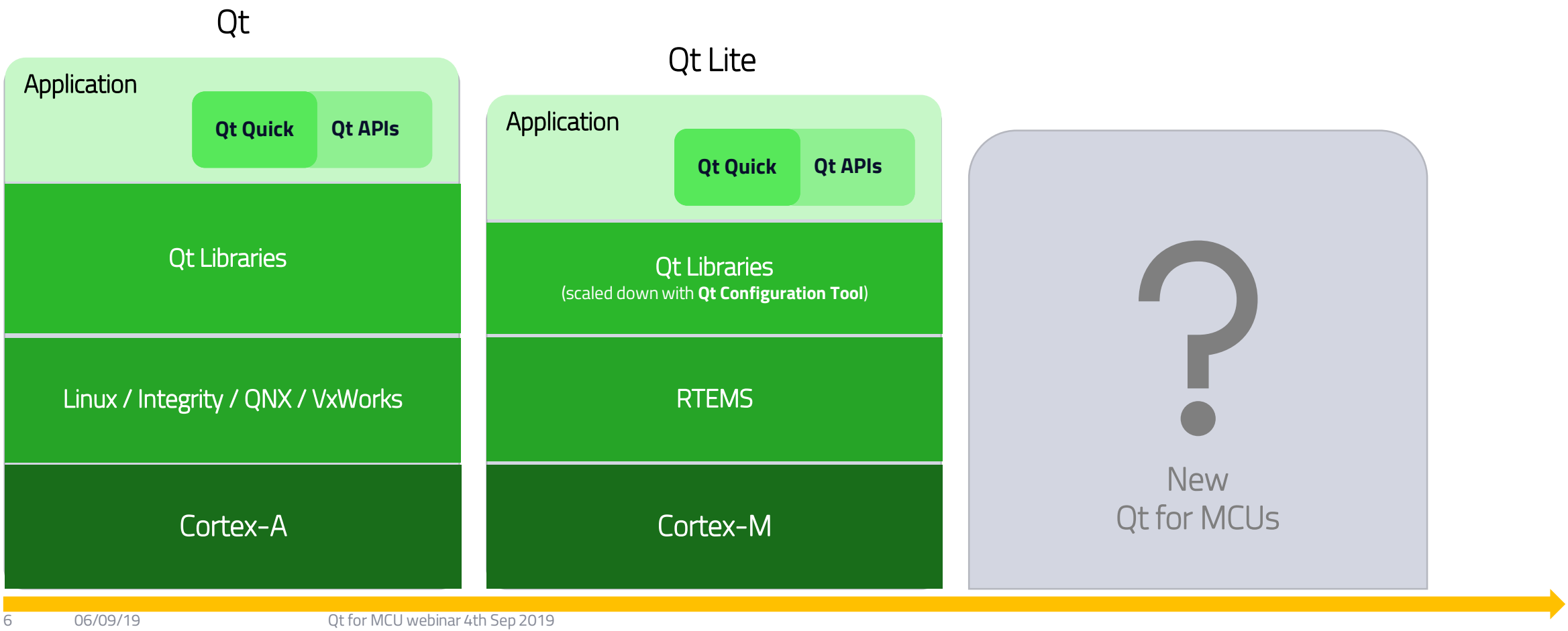
Limitations of graphics toolkits for MCUs

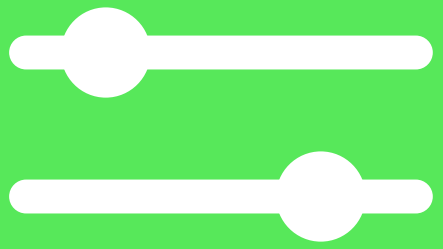
Limitations

1. **Programming APIs**
2. **Scalability**
3. **Architecture**
4. **Old Style User Interface**

Qt's attempts

Previous approach of Qt on MCU was to lower the memory footprint of a Qt application to fit within the memory constraints of MCU. However growing needs of MCU required much compact footprint.





UX

Provide a smartphone-like user experience with Qt Quick Controls

Reuse

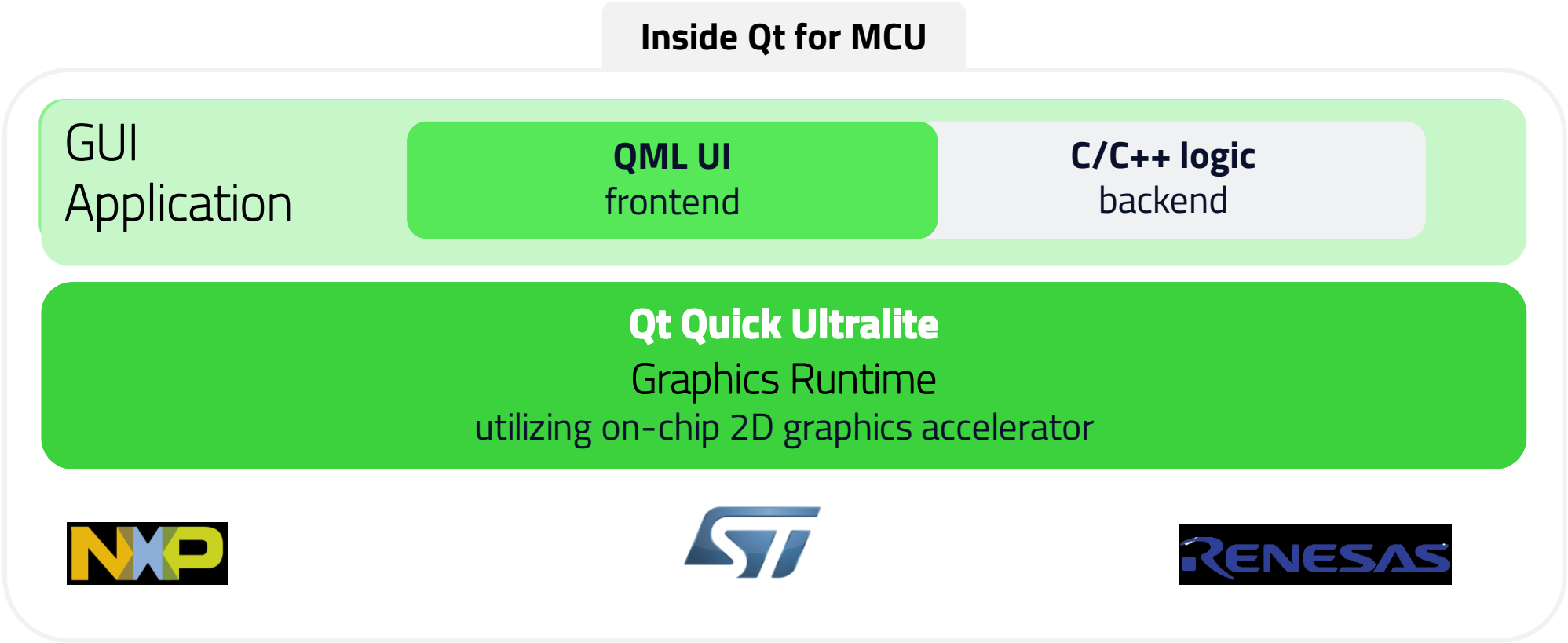
Reuse source code across ARM architectures

Speed Up

Fast, effective development with QML and Qt Tools

Qt for MCUs – *Ultimate performance, Tiny footprint*

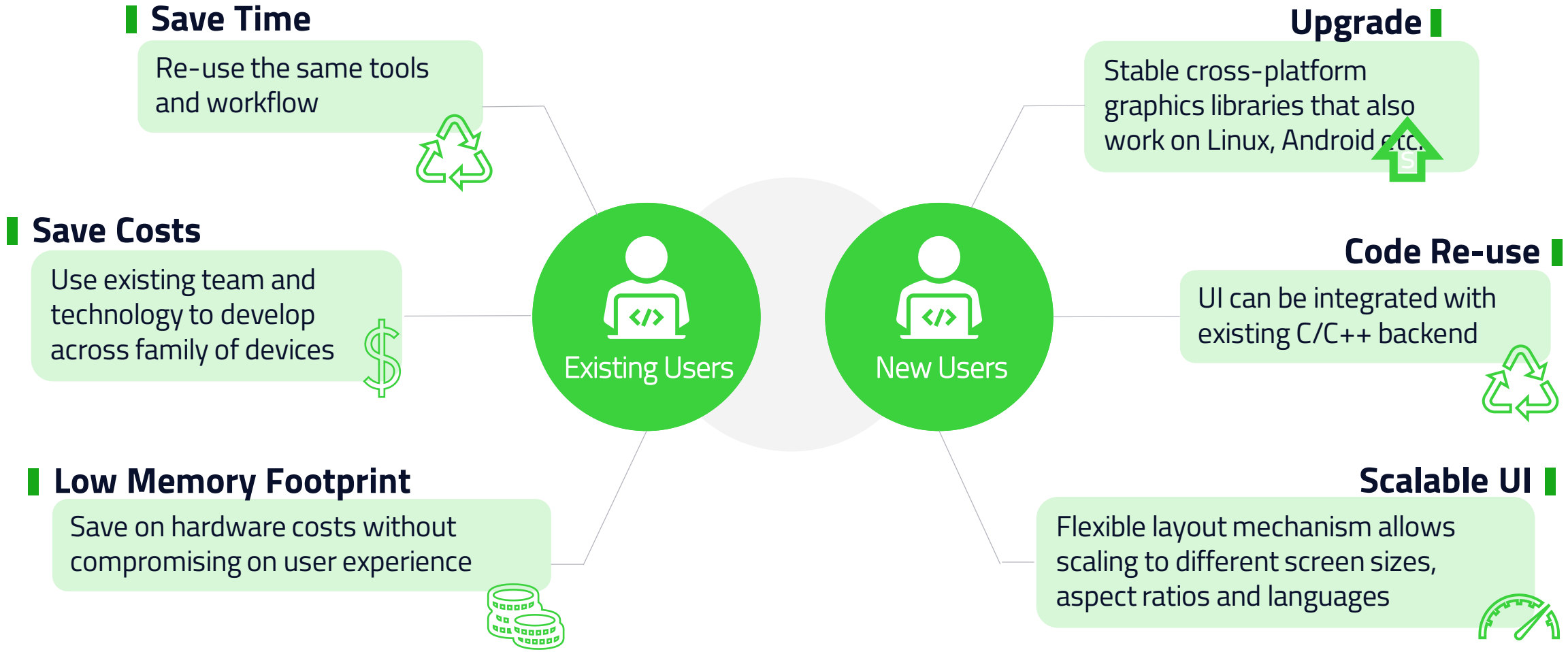
Qt for MCUs uses a new graphic runtime, Qt Quick Ultralite, that delivers high performance with low memory consumption, which is achieved by a new translation of QML to C++.



Why Qt for MCUs?

Limitations	Qt for MCUs
1 **Programming APIs**	1 **WYSIWYG Editor, C++ and QML APIs**
2 **Scalability**	2 **Scalable UI**
3 **Architecture**	3 **Cross-platform Architecture**
4 **Old Style User Interface**	4 **Modern UI Controls**

Why Qt for MCUs? *User perspective*



Qt for ARM processors

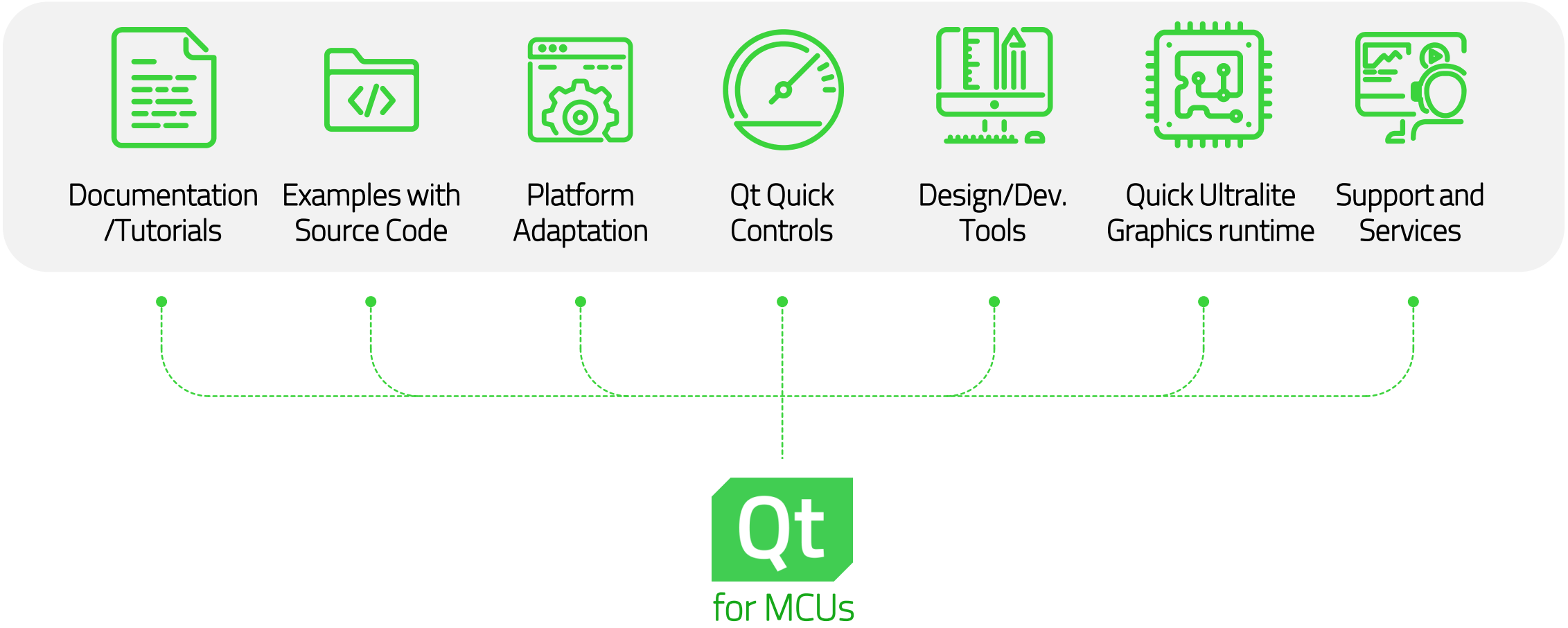
Architecture	ARM processor	Qt Support
ARMv6-M	Cortex-M0, Cortex-M1	Not supported.
ARMv7-M	Cortex-M3	
ARMv7E-M	**Cortex-M4, Cortex-M7**	**Qt for MCU**
ARMv8-M	Cortex-M23, Cortex-M33	Not supported
ARMv7-A	Cortex-A5, Cortex-A7, Cortex-A8, Cortex-A9, Cortex-A12, Cortex-A15, Cortex-A17	Qt for Device Creation
ARMv8-A	Cortex-A32	
ARMv8-A	Cortex-A35, Cortex-A53, Cortex-A57, Cortex-A72, Cortex-A73	
ARMv8.#-A	Cortex-A55, Cortex-A75	

- What is in the package?
- What is Qt Quick Ultralite rendering engine?
- Memory footprints and performance
- Available packages

Santtu Ahonen

Product Manager

What is in the package?



Supporting Hardware
32-bit ARM Cortex-M microcontrollers

- **RT1050**
- RT1060 (Under work)

ARM gcc compiler

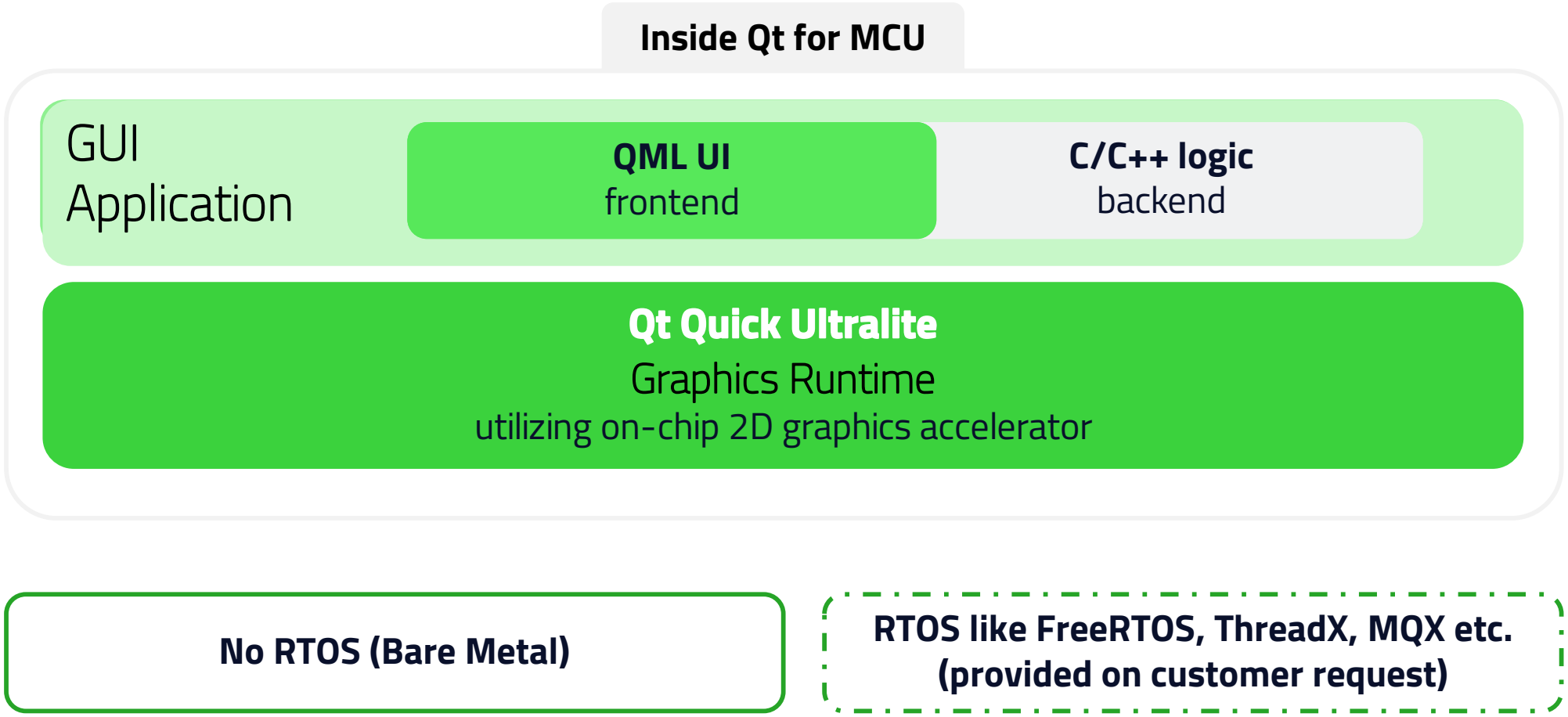
- **STM32F769i**
- STM32F7508
- STM32H750B

ARM gcc compiler

- **RH850**

GHS compiler

Qt for MCUs – *Ultimate performance, Tiny footprint*



Qt for MCUs on NXP RT1050

› Thermostat Demo

Showcases different user interface controls, user interactions and list models

Key Metrics		NXP RT1050
Screen Resolution / Colors		480x272,16 bit color
framebuffer		522 kB
Internal RAM	Heap	12 kB
	Stack	5 kB
	.data	1398 kB (mostly assets)
	.bss	211 kB
	Total	**228 kB (+ 1398 kB assets)**
Ext RAM	.ncache	522 kB (framebuffers in non-cacheable RAM)
ROM	.text	278 kB (+ 1398 kB assets)
Frame rate	**Scrolling / Local Animations**	60 fps
	Transitions	60 fps

To see the full demo clip, please visit https://youtu.be/p9_Qy3kw1wc

Qt for MCUs on STM32F7

- **Thermostat Demo**

  Showcases different user interface controls, user interactions and list models

Key Metrics		STM32F769i	STM32F7508
Screen Resolution / Colors		800x480 / 32 bit color	480x272 / 32 bit color
framebuffer		3072 kB	1045 kB
SRAM (internal RAM)	Heap	14 kB	14 kB
	Stack	5 kB	5 kB
	.data	11 kB	10 kB
	.bss	197 kB	195 kB (+ 1045 kB framebuffers)
	Total	**226 kB**	**224 kB (+ 1045 kB framebuffers)**
ROM	.rodata	11 kB	10 kB
	.text	281 kB	196 kB
	AssetData	3166 kB	1388 kB
	Total	**292 kB** (+3166 kB assets)	**206 kB** (+ 1388 kB assets)
Frame rate	**Scrolling / Local Animations**	60 fps	60 fps
	Transitions	30 fps	30 fps

To see the full demo clip, please visit https://youtu.be/p9_Qy3kw1wc

Qt for MCUs on Renesas RH850/D1M1A

- **Automotive Instrument Cluster Demo**

  : Showcases a real use-case instrument cluster in a car

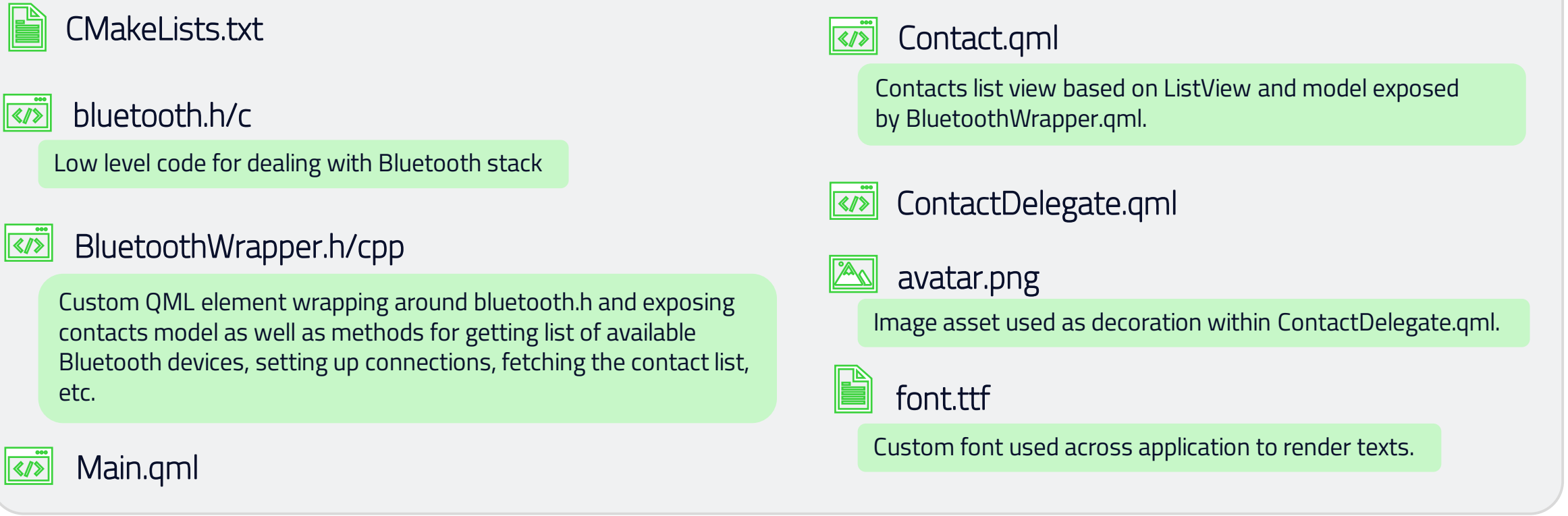
Key Metrics		RH850/D1M1A
Screen Resolution / Colors		800x480, 32 bit color
Framebuffer (on VRAM)		3072 kB
Internal RAM	Heap	84 kB
	Stack	8 kB
	.data	19 kB
	.bss	332 kB
	Total	**443 kB**
ROM	.rodata	2072 kB (mostly assets)
	.text	642 kB
	Total	**642 kB + 19 kB (.data) + 2072 kB (assets)**
Frame rate	**Scrolling / Local Animations**	60 fps
	Transitions	60 fps

To see the full demo clip, please visit https://youtu.be/p9_Qy3kw1wc

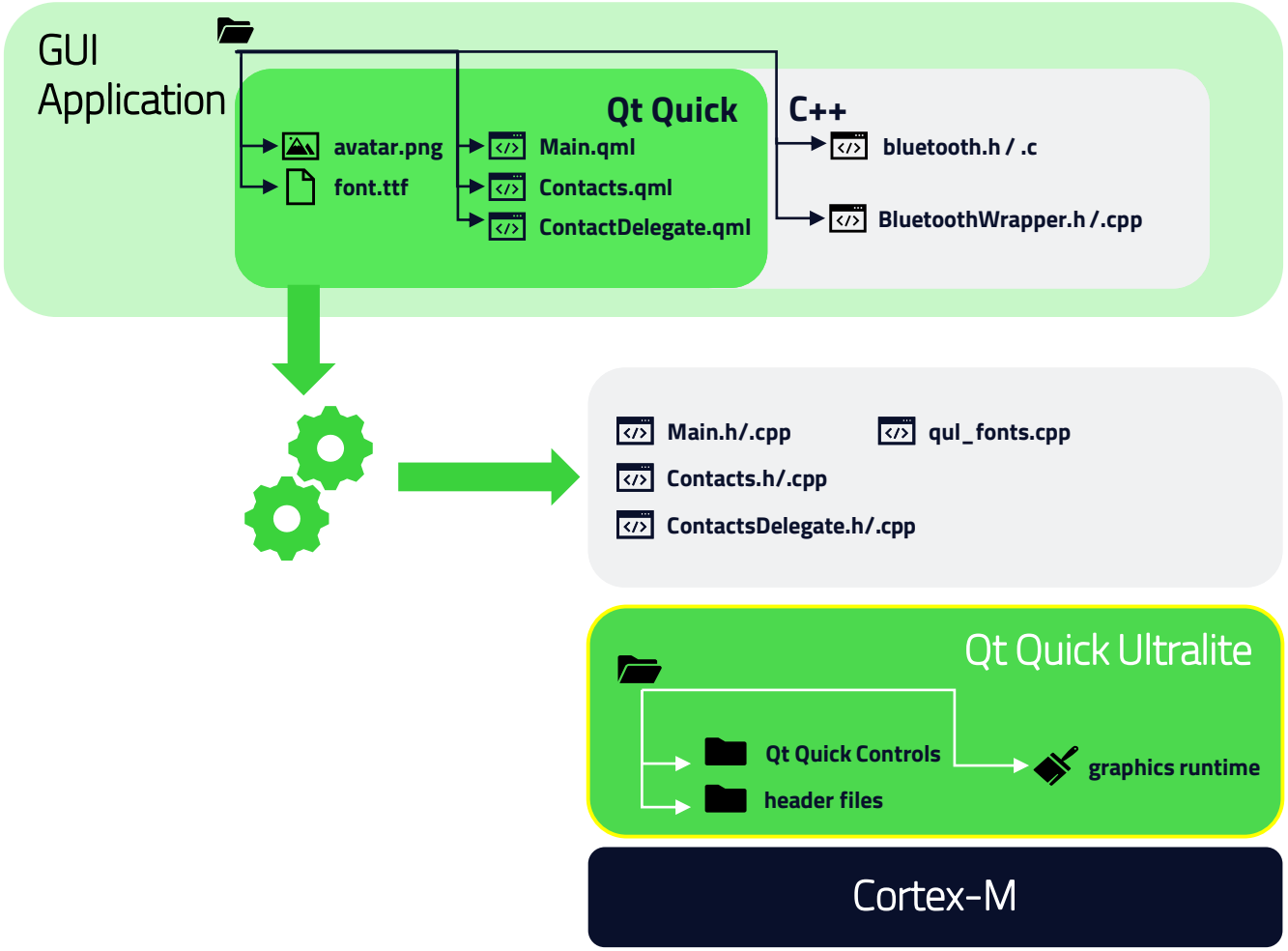
An Example Qt Quick Application

Let's consider an example application that connects over Bluetooth to a mobile phone and fetches the contacts list.

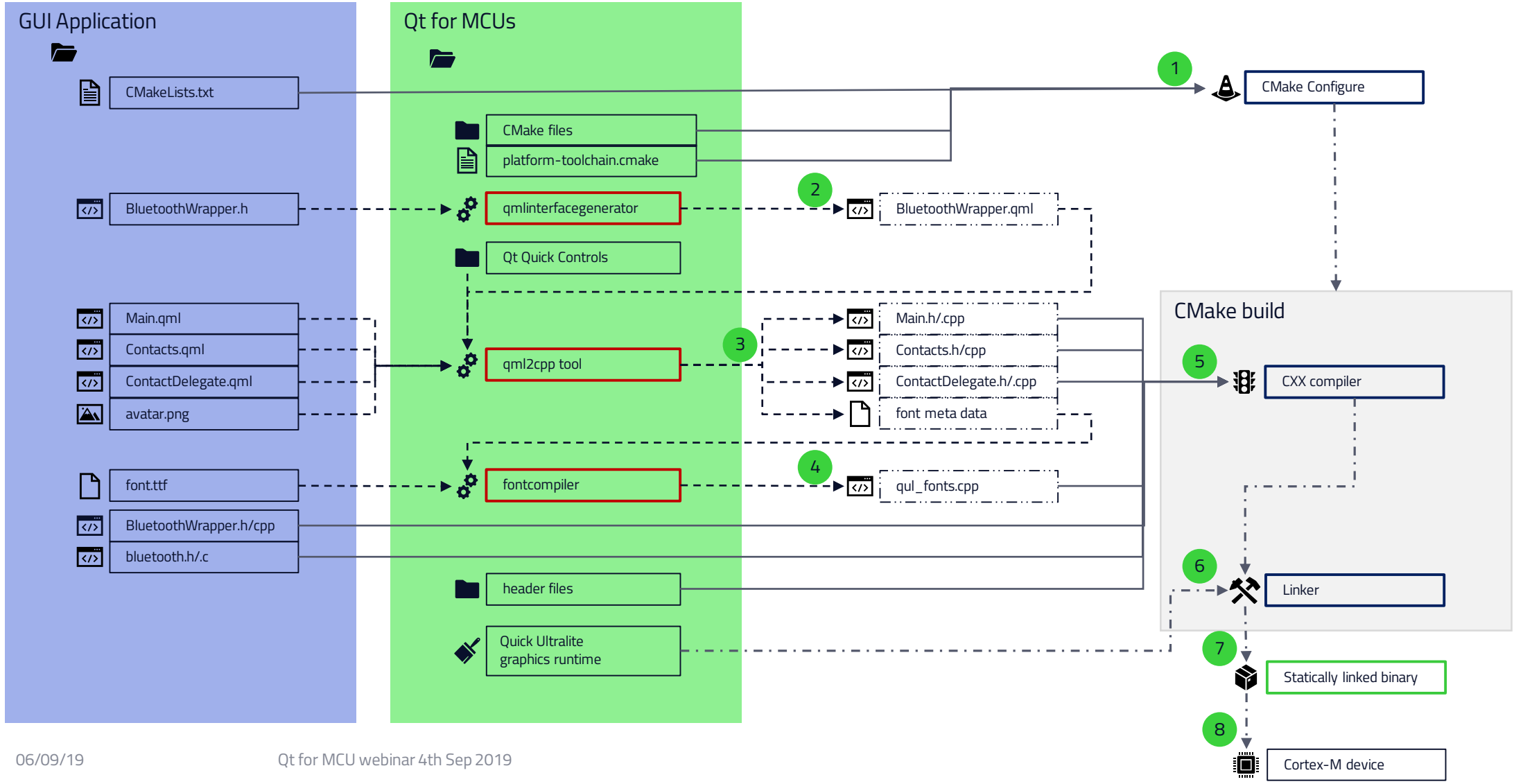
This application code could consist of following files:



Qt Quick application on Qt for MCU



Building the example Qt Quick Application



Packages for engineering and evaluation

	Demo packages	Evaluation packages	Engineering package
Content overview	• Demo Binaries • Documentation.	• Binaries – Hardware adaption, host tools and Quick Ultralite runtime • Sources code – demos • Documentation	• Source code • Integration into Qt tools such as Qt Creator • Documentation
Licensing	Qt Commercial License, Technology Preview		Qt Commercial License
Criteria for access	Download from webpage	Sign up for Eval license	Developer License
Download media through	www.qt.io/qt-for-mcu	account.qt.io/downloads (for Renesas RH850 only through Sales)	Through Qt Professional Services
Schedule	Available (since 21st August 2019)	Soon	Soon

DEMO!

Qt World Summit 2019

Check out the agenda that released a week ago and join us!
https://www.qt.io/qtws19/home

Berlin
4 November 2019 – Training Day
5-6 November 2019 – Conference Days

Tokyo
29 November – Conference Day

Note: Americas will be in May 2020.

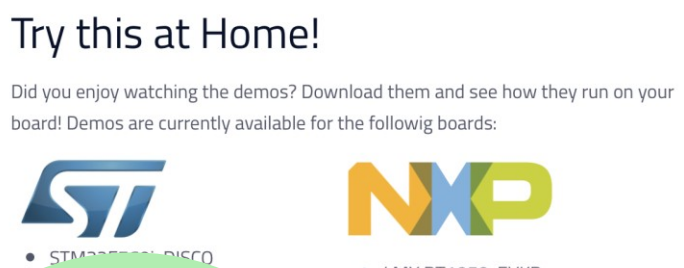
Other upcoming events

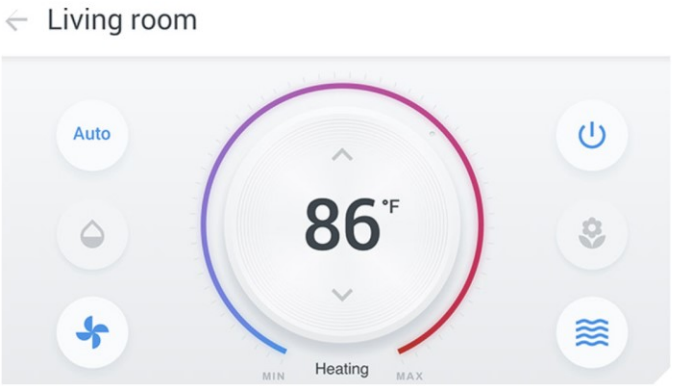
Qt is coming to your neighborhood!
https://www.qt.io/events

Join Us!

APAC	EMEA	US
Meet Qt, Shenzhen Sept 10	**Meet Qt**, Bologna Sept 10	**NXP Techdays**, Boston Sept 10
Meet Qt, Tokyo Sept 11	**Meet Qt**, Paris Oct 1	**MedTech Con 2019**, Boston Sept 23-25
Meet Qt, Bangalore Sept 17	**Engineering Design Show**, Coventry Oct 16	**Meet Qt**, Dallas Oct 3
	NXP Techdays, Sophia Antipolis Oct 17	**ARM TechCon,** San Jose Oct 8-10
	Squish Days Europe, Munich Oct 17	**Meet Qt**, Pittsburgh Oct 17

Q&A





Give it a try!
https://www.qt.io/qt-for-mcu