Creating outstanding digital cockpits with Qt Automotive Suite

Get your digital cockpit first to the finish line with Qt.

Embedded World 2017

Trends in cockpit digitalization require a new approach to user experience design and software development

1972

45 years

2017

Speech Input

Head-up display

Digital instrument cluster

Sensor fusion

Touch Screen

Smartphone connectivity

Car-to-X communication

Augmented reality

Object detection

Internet connectivity

Gesture control

Autonomous Driving

Big Data & Analytics

Driver Assistance

OEMs are seeking ways to harmonize and accelerate the development of digital cockpits

Harmonize IVI tool chain	› Establish a common tool chain for IVI development across the company › Enable quick development cycles from early design through prototyping to target hardware › Use the same tools and assets for development of head units, instrument clusters, head-up displays, passenger screens, digital control panels, etc.
Common development platform	› Build a prototyping platform that can be used by user experience design & development teams across all bands and model series › Build and deliver an SDK as part of the platform › Build a library of UI assets reusable across projects and brands
Customize environment	› Get source code access to development tools › Customize and extend the development environment › Brand and customize the SDK

Introducing the Qt Automotive Suite (QtAS)

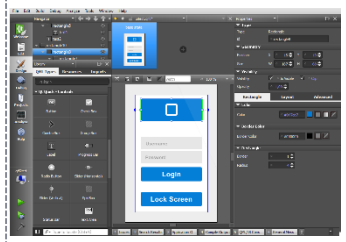
Pre-built assets

Neptune — Automotive reference UI enabling 3rd party app integration

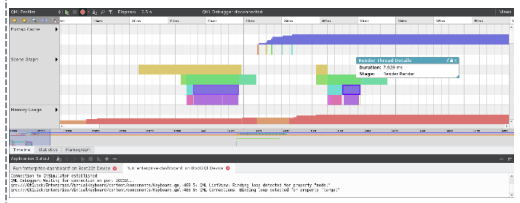
Input Fwk — Virtual keyboard; Easily integrate speech, gesture, handwriting, etc.

Qt IVI — Cross-platform automotive APIs (e.g. Vehicle Info+Config)

Extensive tooling



Qt Creator is an integrated development environment (IDE) and central to building custom SDKs



QML Profiler for identifying rendering bottlenecks

GammaRay for deep UI introspection

Strong Ecosystem

The Qt Automotive Suite is built and maintained together with strong community partners.

The Qt Company

PELAGICORE Experience Change

KDAB

Built on the leading C++ Cross-Platform Framework…

One Technology for All Platforms

Cross-Platform Class Library

Shorter Time-to-Market

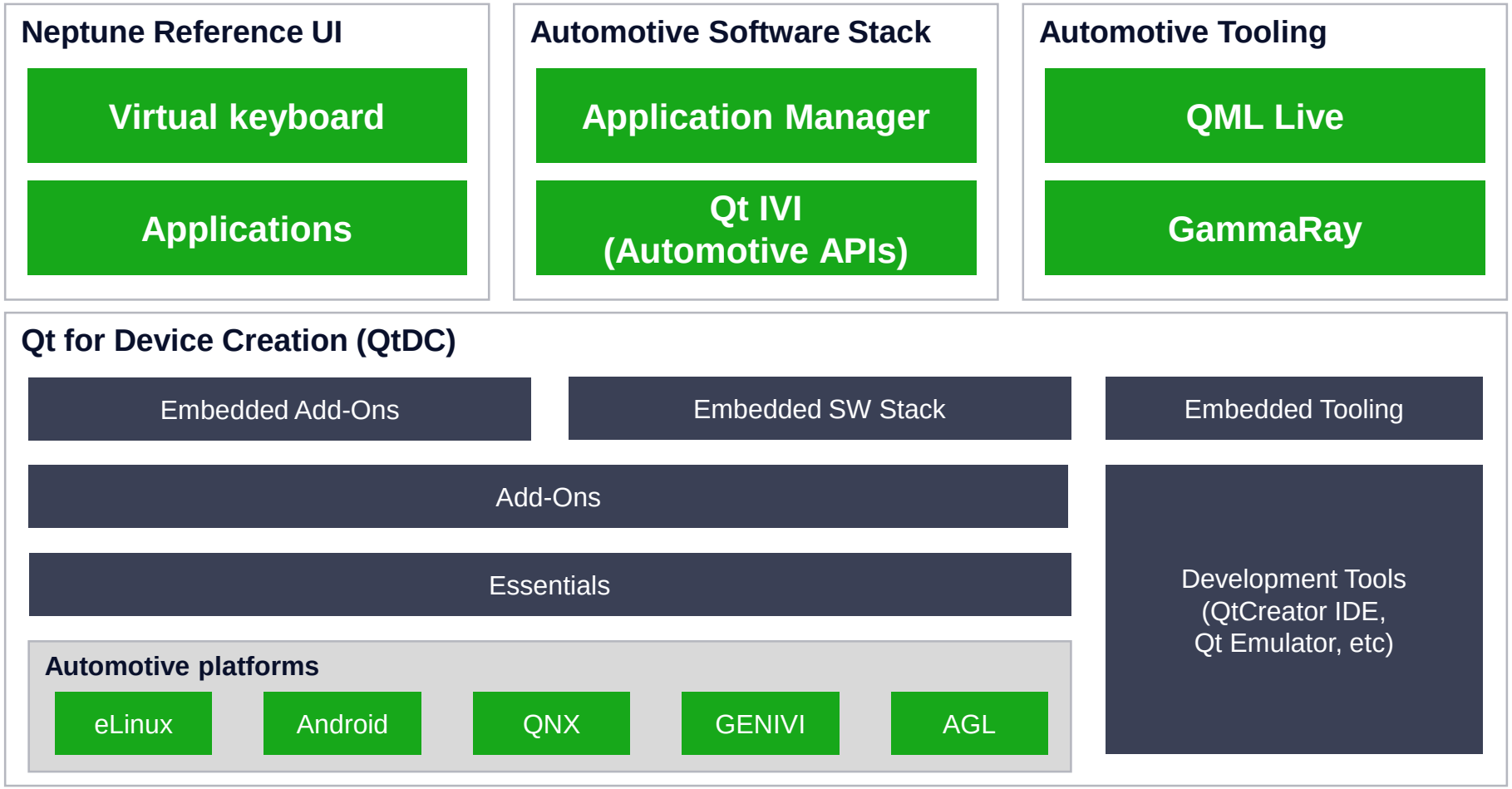
Integrated Development Tools

Productive development environment

Cross-Platform IDE, Qt Creator

Used by ~1 Million developers in 70+ industries

…the Qt Automotive Suite includes a set of pre-built components and specific tools for IVI development



Value

- Qt for device creation offering specifically enhanced for automotive customers
- Pre-built components for rapid project start
  - Reference UI
  - Application Manager
  - QtIVI
- Embedded tooling
  - Remotely deploy
  - Remotely debug
- Additional tooling pre-integrated with Qt Creator
  - QMLlive
  - GammaRay
  - Emulator

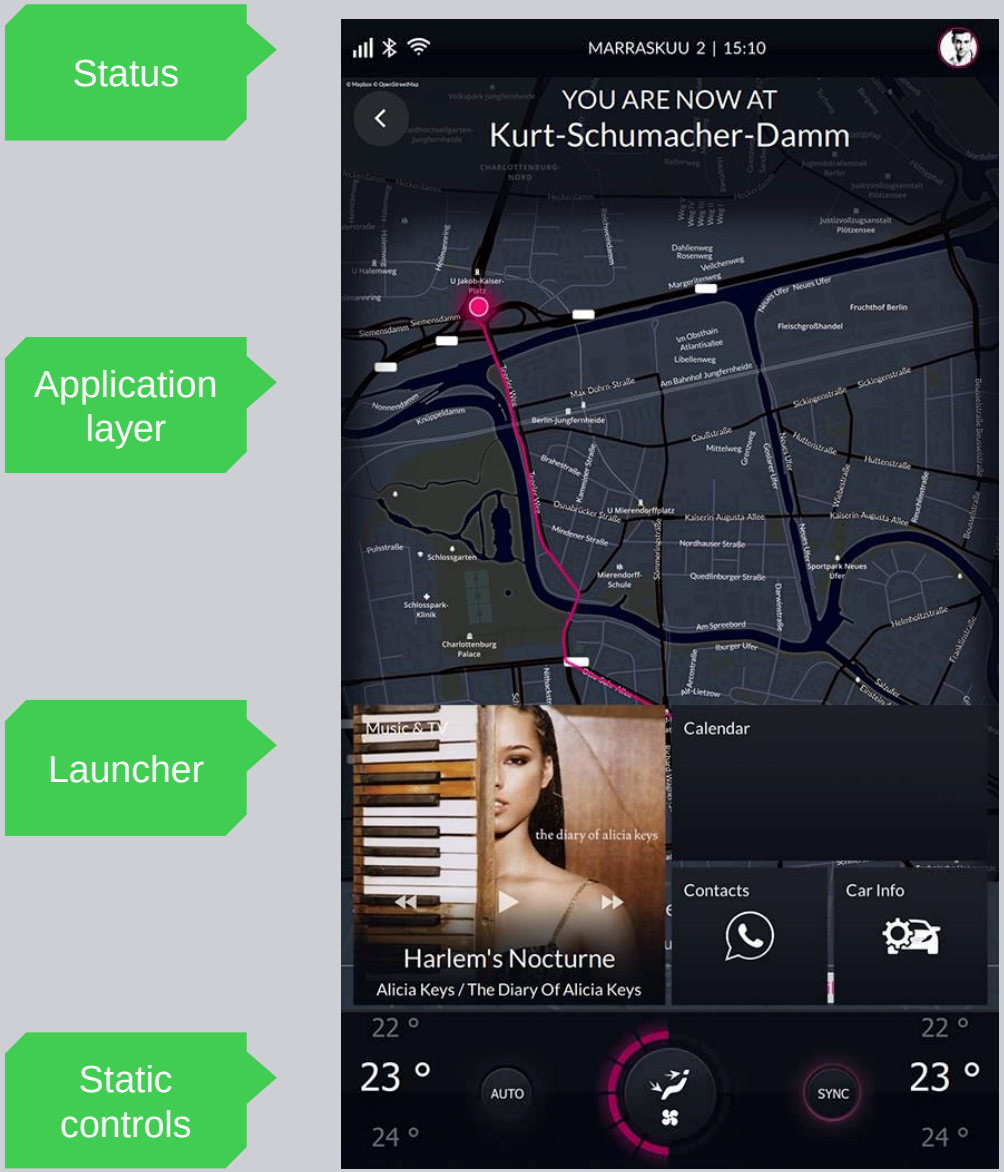
Application Manager & Compositor

Create your unique software platform

- Create a multi-process architecture
- Improve robustness by splitting your screen area into different functional units / applications
- Reduce risks and dependencies by eliminating monolithic HMI applications and enable independent teams & 3rd party app development

The developer experience with productivity at its core

- Less lines of code to test, debug and maintain - creating window servers on high abstraction levels
- Enable simultaneous development & testing by separating your UI into different functional units
- Minimize risk by only updating one unit at a time
- Security model to protect the integrity of Wayland hardware accelerated compositing
- Supports both OpenGL and HTML applications



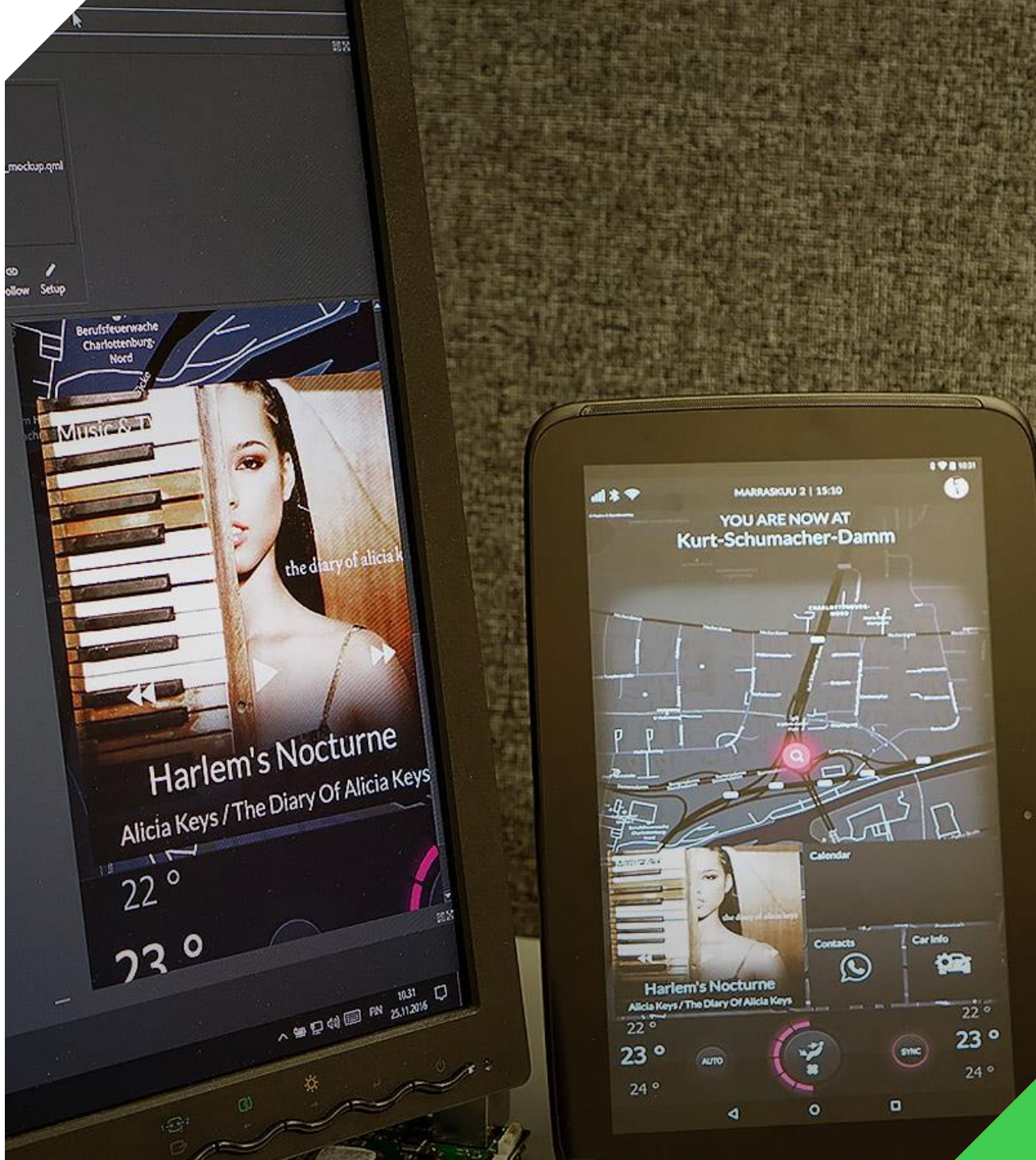
Qt IVI - Extensible Cross Platform APIs

- Industry wide APIs
- No OS/Middleware platform lock-in
- Enables industry wide 3rd party app ecosystem
- Security model to control app access to APIs
- Emulator backend for desktop simulation

Single click compile, download, run, debug to Target.
No Target Hardware? No Problem with device emulation

QML Live – Create a Better HMI by Iterating Designs Faster

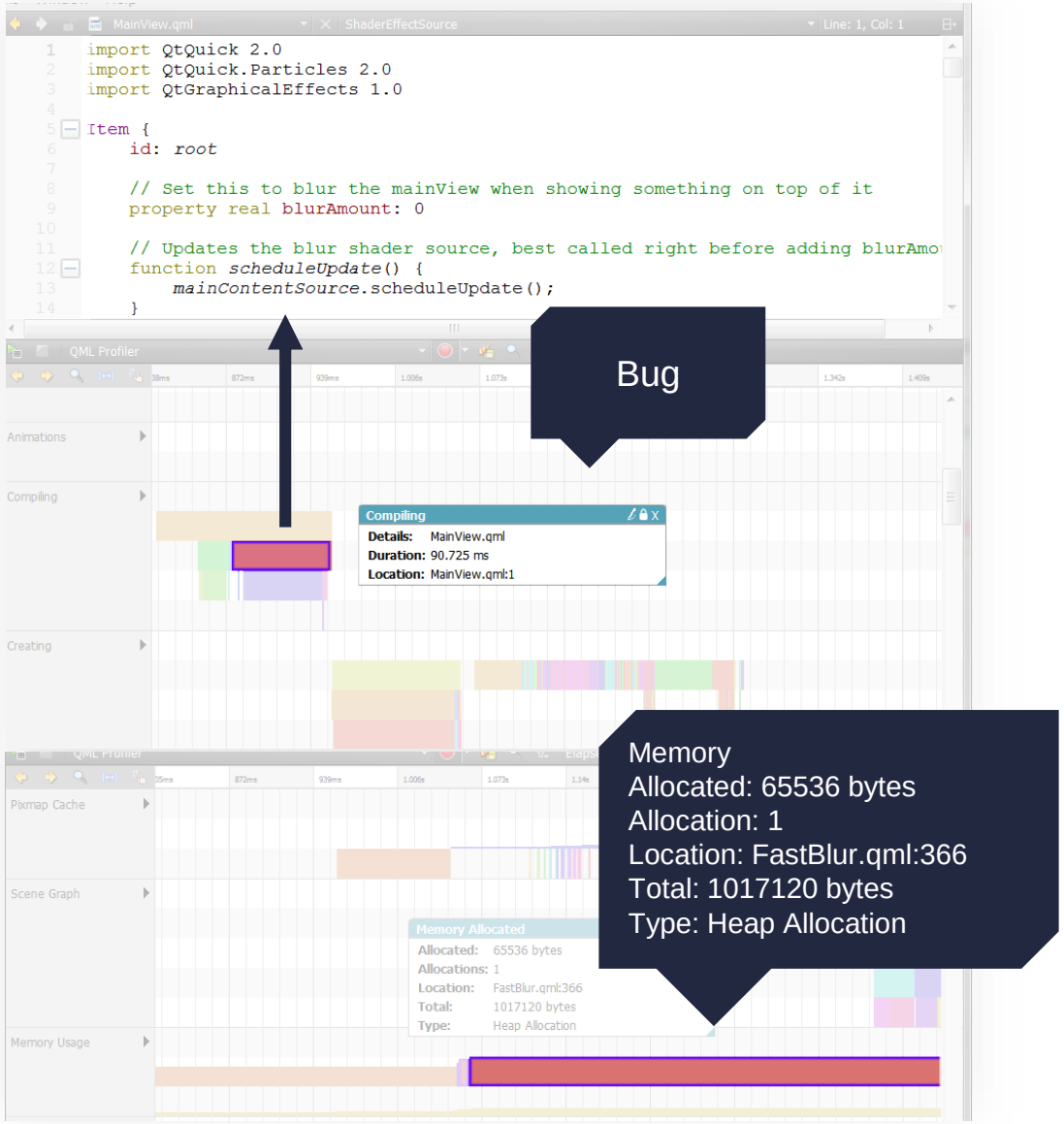
- Live reloading of QML code
- Instantly see UI changes on target
- Develop locally and simultaneously display and modify the UI on one or more local and/or remote clients
- Facilitates rapid iterations of design and development
- Faster iterations -> better HMI



QML Profiler

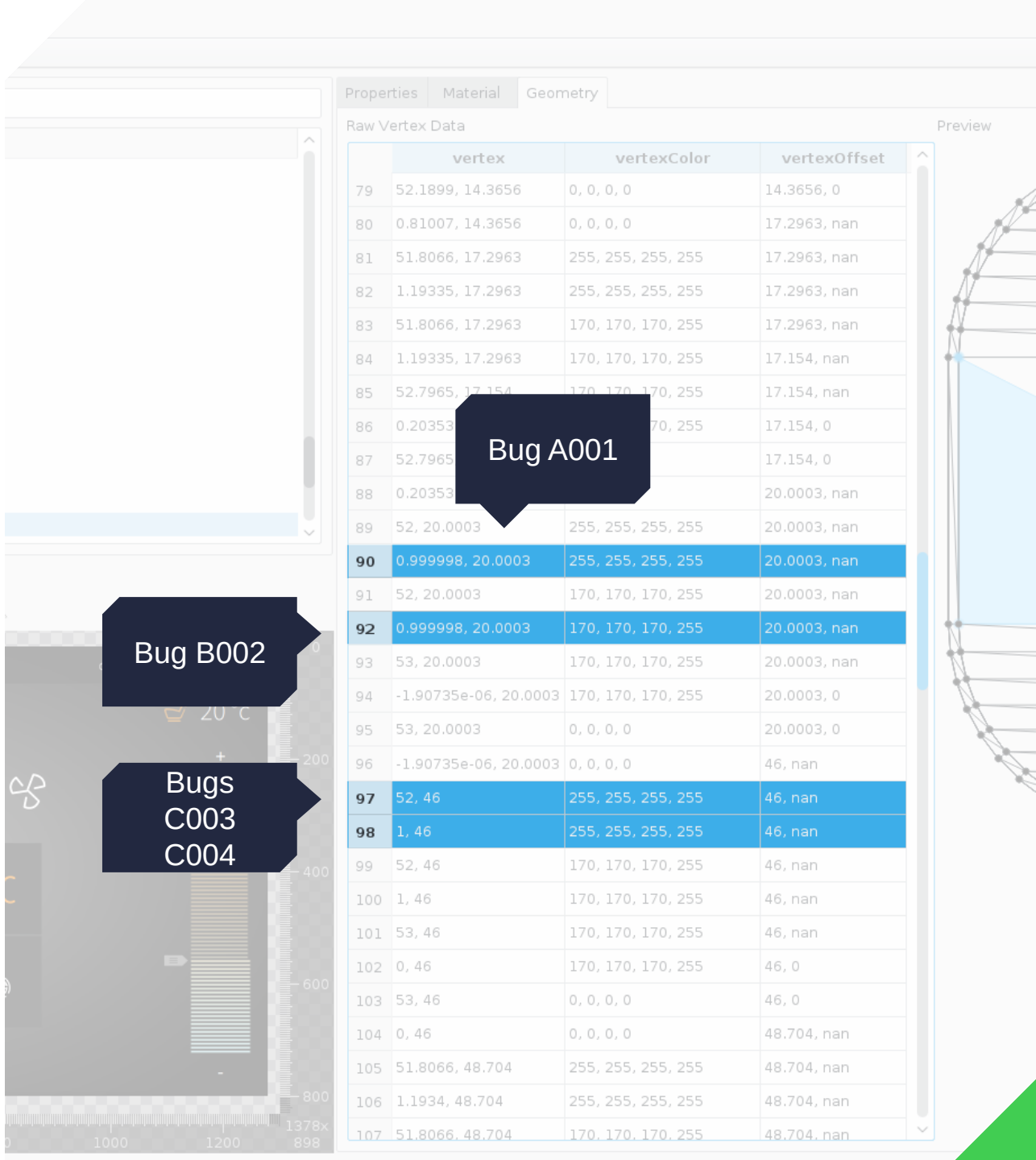
Debug performance issues in Real-Time

- Typical causes
  - Too much JavaScript
  - Unnecessary workload in GUI thread for invisible items
  - Heavy QML items to compile and create
  - Long-running C++ functions
- Easy to use
  - Collecting data (2 options)
    - Start a profiler from launching the application
    - Attach to the running application
  - Analyze Data
- Analyze different aspects of performance e.g.
  - Pixmap cache - Size of a memory allocation info per image
  - Scene graph - Graphic rendering status information
  - Memory usage - Memory usage profile of QML engine
  - Input events - User input data profile
  - CPU Usage Analyzer - CPU usage profile on embedded devices



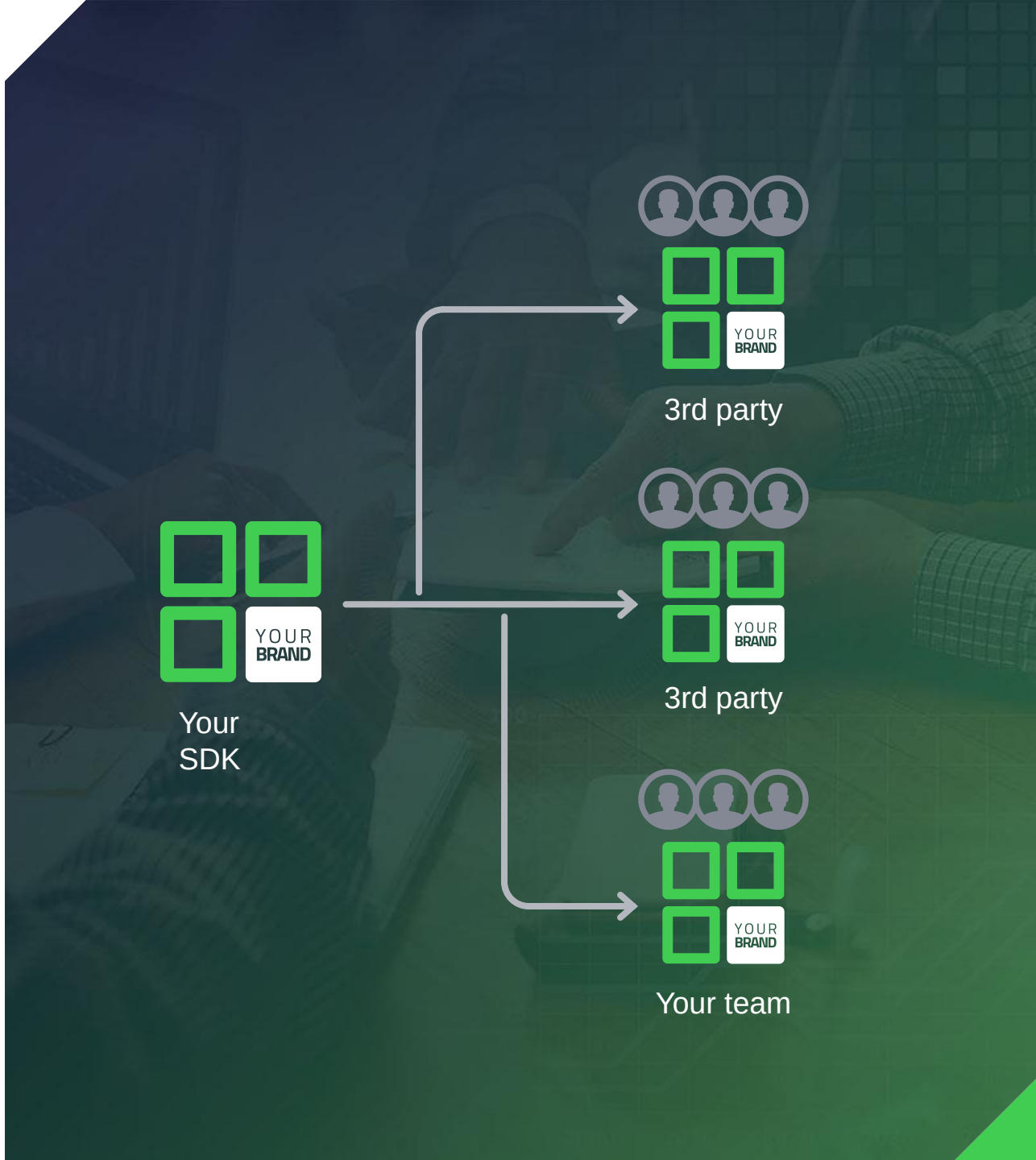
Maximize performance & uptime with GammaRay

- Maximize uptime by finding & fixing bugs faster with high level debugger
- Optimize your code with performance profiling
- Visualize, Access and Modify properties of Qt objects at runtime
- Over 20 Qt Objects Supported (Qt Quick, state machines, text layout, model/view, timers, etc)
- No runtime agent



SDK Creation

- Create a branded SDK with project UI and software assets
- Enable 3rd party app development and services
- Ensure conistent look and feel of HMIs/apps with ready made components and style guide
- Reduce risk and save time with a single preconfigured install with all necessary tools
- Qt SDK + Program's HMI components + Program's software components → Program Branded SDK



Qt SCXML

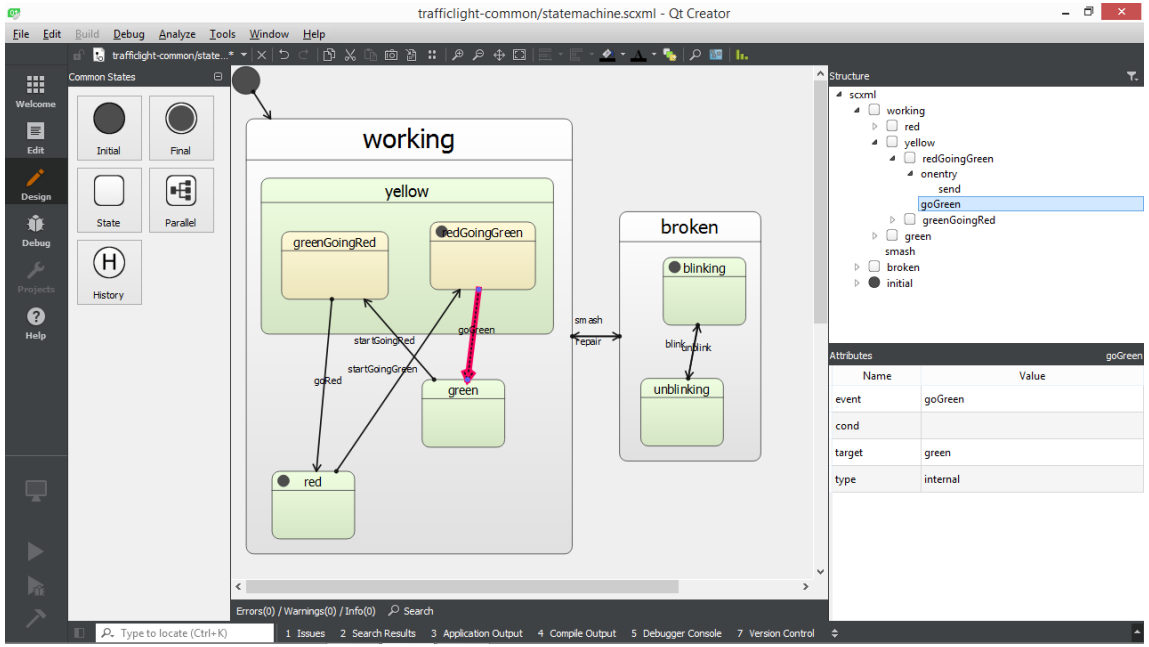
Reduce risk of unexpected system behaviour with fast & easy state chart integration

Ultimate Performance, Reliability and Stability

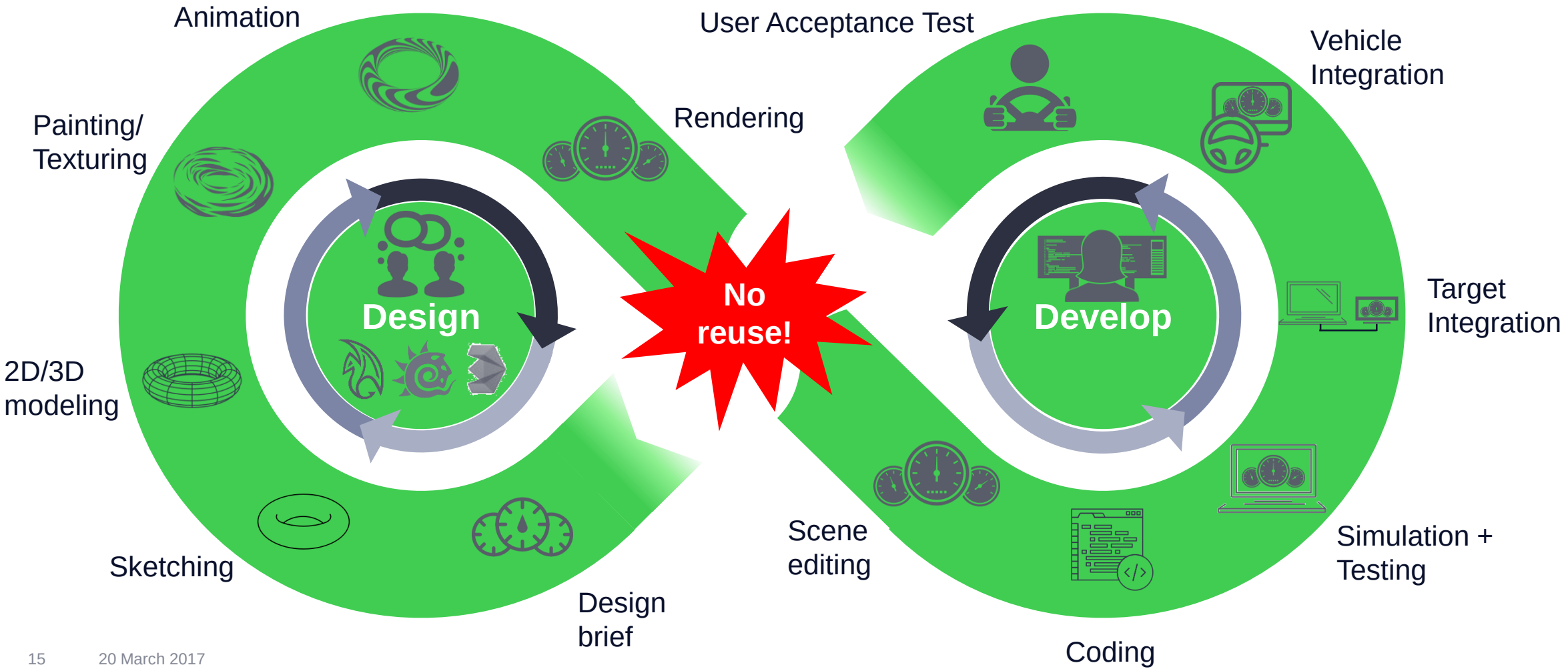
- Reduce risk of unexpected behavior
- Ensure maximum uptime
- Fast and easy integration
- Concise representation of business logic

The developer experience with productivity at its core

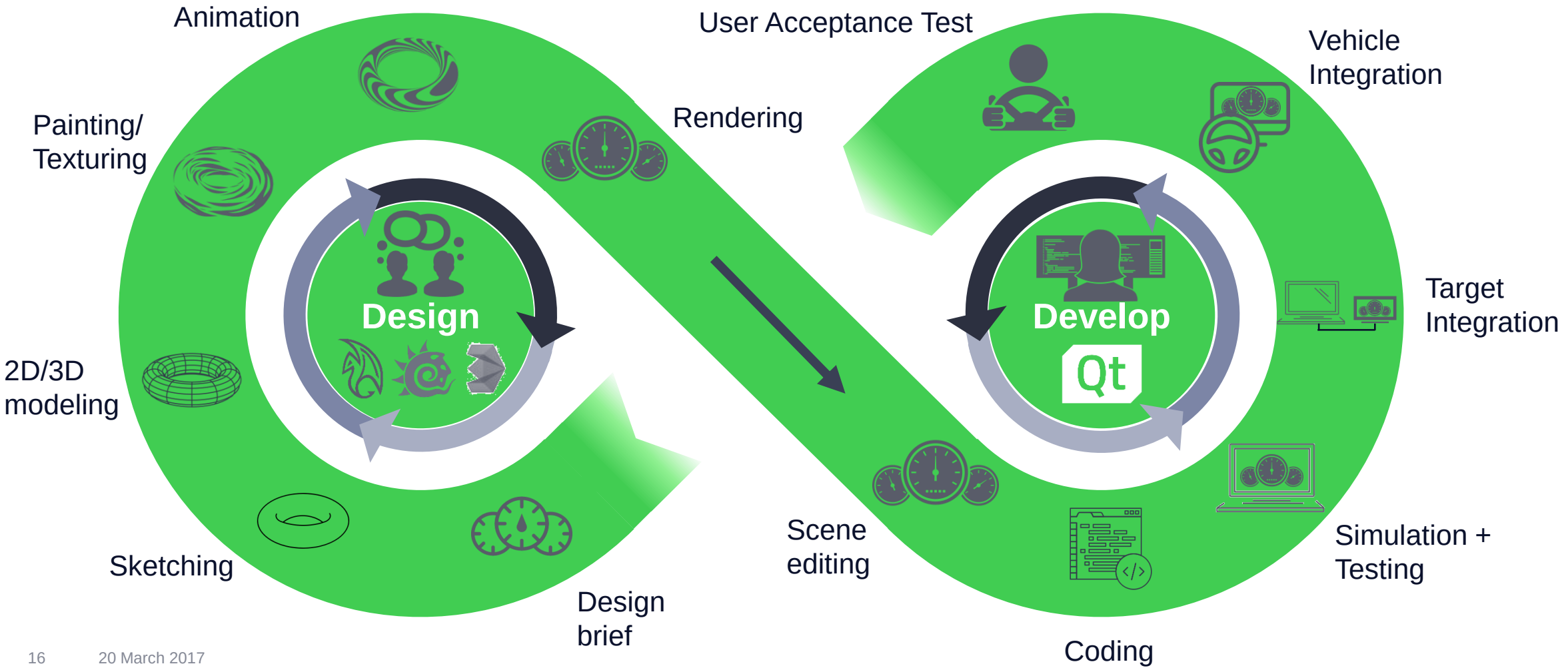
- Formalize applications & validate workflows with SCXML to define state machines
- Easily drive your state machine from a state chart rather than business logic expressed in C++ or QML
- SCXML docs can be compiled into C++ and readily integrated into any Qt application
- SCXML can also be dynamically loaded and interpreted at runtime



The design and development cycles for digital cockpit systems are often disconnected



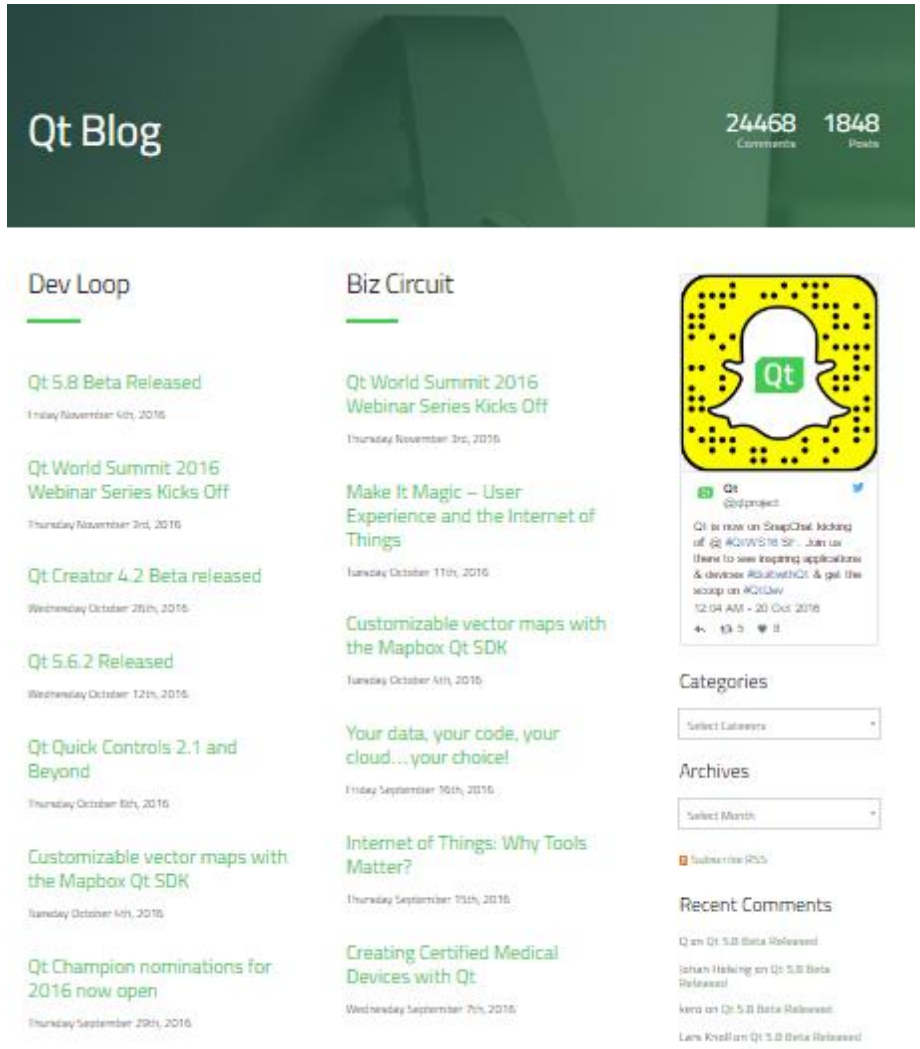
Qt Automotive Suite closes the gap to allow for rapid prototyping and quick iteration of design and development



Thank You!

www.qt.io

Check out our Blog at blog.qt.io



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Qt is what you make of it!