Security Architecture for Connected Vehicles

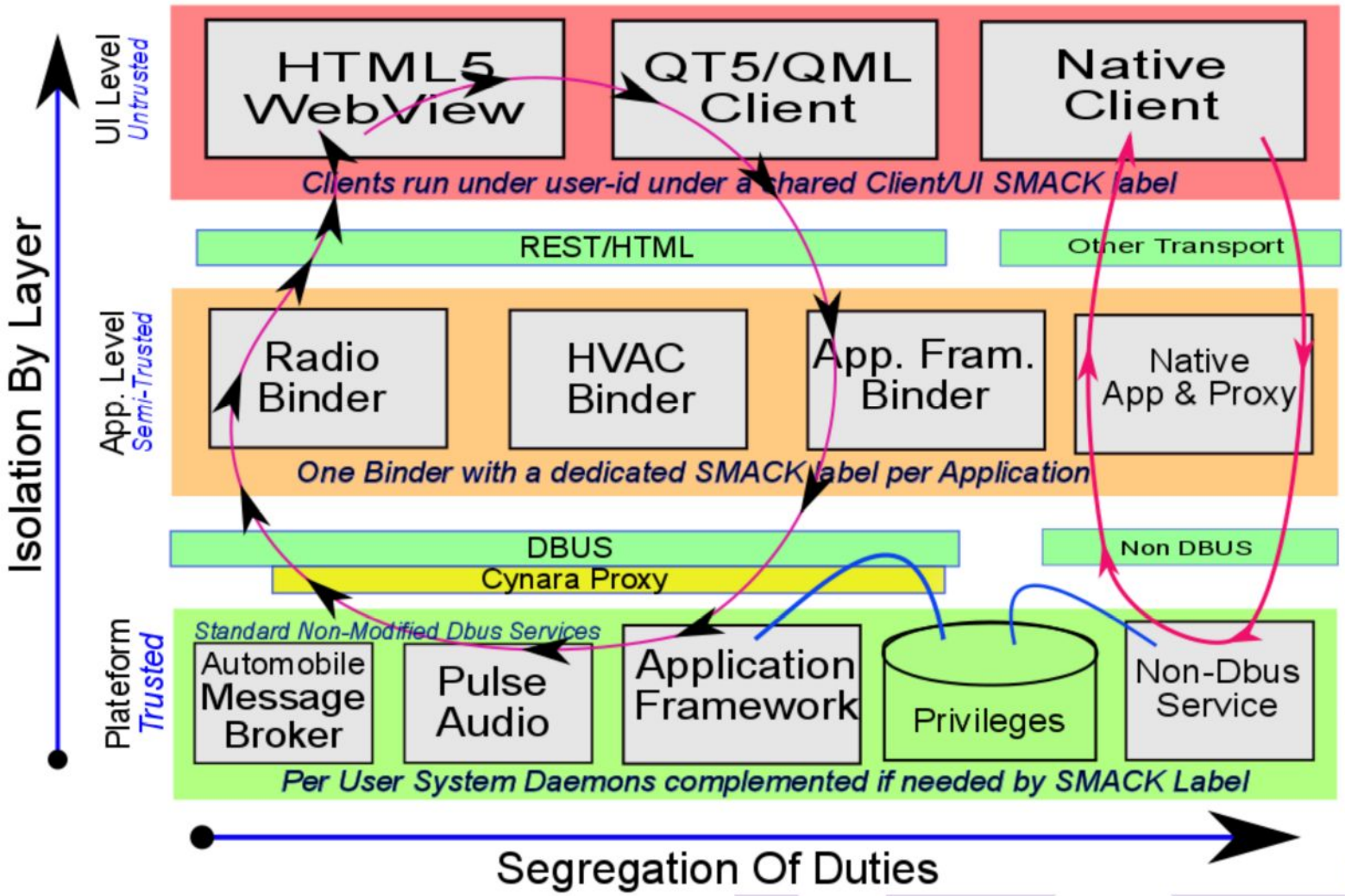
Architecture proposal for AGL-2.0

January-2016

Isolation & Segregation

- **Client/UI (untrusted)**
  - Risk of code injection (HTML5/QML)
  - UI on external devices (Mobiles, Tablets)
  - Access to secure service APIs only [REST]
- **Applications & plugins (semi-trusted)**
  - Unknown developers & Multi-sources
  - High grain protection by Linux UserID & SMACK labels.
  - Run under control of Application Framework: need to provide a security manifest
- **Platform & System services (trusted)**
  - Services started by DBUS
  - Fine grain privilege protection by Cynara
  - Part of baseline distribution and certified services only

Layered Security Architecture



HTML5, QML & Native Apps

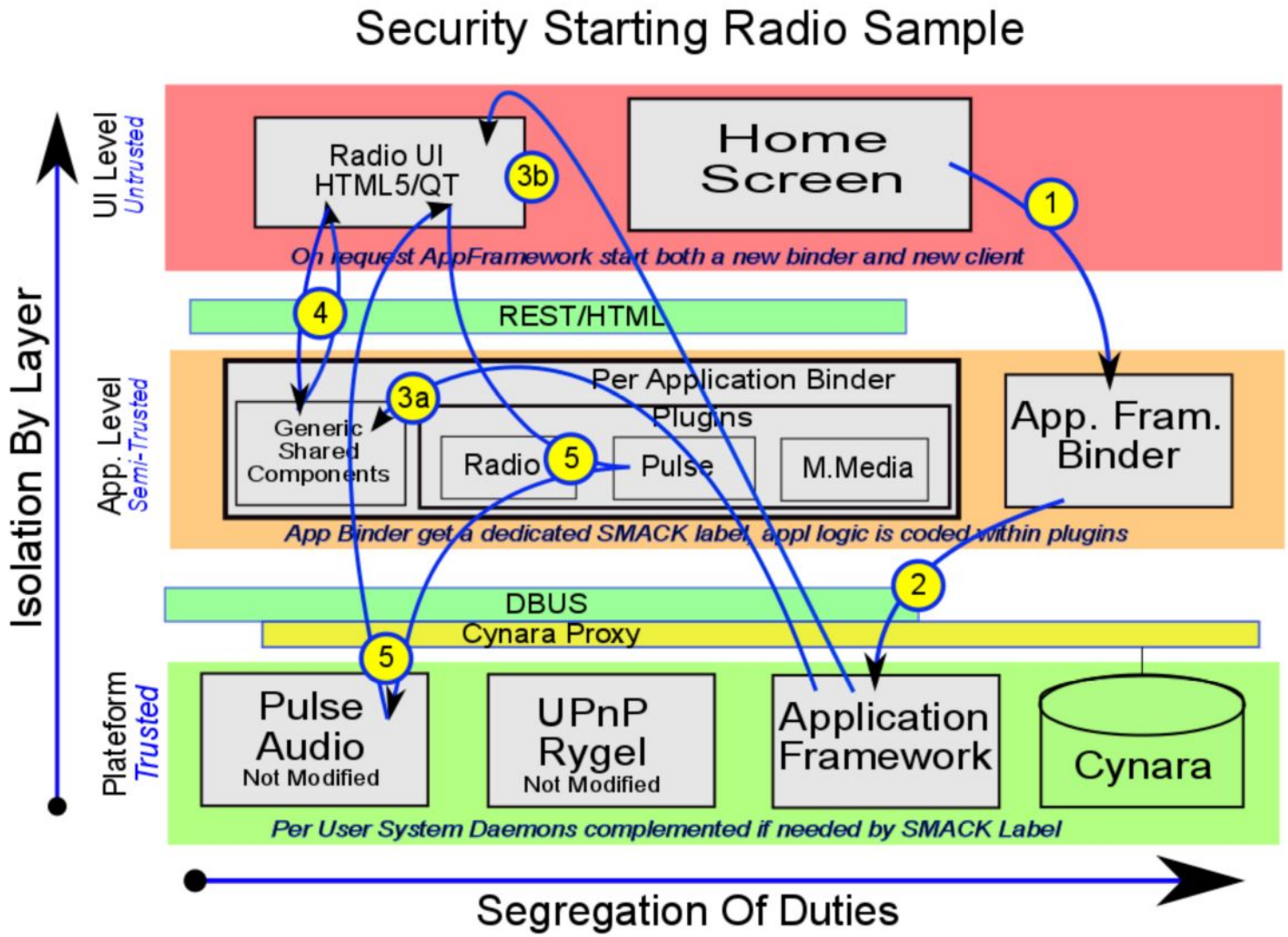
Security framework should make standard operations simple, while keeping complex operations possible.

- Standard Model
  - UI under HTML5 or QML or external device running in the untrusted zone.
  - Application plugins accessed through REST APIs and control by authentication token provided by the application framework.
  - Platform services unmodified, Cynara control is handled transparently at DBus level.
- AdHoc Model *(when standard approach is not possible)*
  - UI and Application logic run directly at App-Level
  - Direct access to platform services bypassing DBus
  - Fine grain privileges accessed directly from a modified service daemon.

Sample Radio Application Startup

- (1+2) Home screen sends an “App Start” request through the corresponding binder to App. Framework service
- (3a+3b) App. Framework starts two processes with a shared secret.
  - Application Binder in charge of presenting Radio, Pulse & Multi-Media APIs
  - Radio UI in HTML5/QML running in a local webview or a remote HTML5 browser.
- (4) Radio client UI connects onto its binder and exchanges initial authentication secret as provided by App. Framework
- (5) Radio UI sends requests to PulseAudio through its binder API.
  - Pulse audio is unmodified and nevertheless under Cynara protection.

Sample Radio Application Flow



Conclusion

- **Stong isolation**
  - Untrusted client can only access services through a network interface and never have access to direct library mapping.
  - Application Binders in charge of presenting APIs to clients are constrained with a private SMACK label and run with userID rights.
  - Platform Services are protected by DBUS Cynara proxy and only receive permitted requests.
- **Native apps and shortcuts remain possible**
  - Services not compatible with a full isolation model, can bypass part of the security framework while still benefiting partially of it.
- **Reduce costs of development**
  - Compliant with external devices
  - Plugins are independent of Web Engine (browser) or Graphical Toolkit (QT and others)
  - DBUS platform services don't need to be changed.
  - Compliant with standard Web/Mobile UI toolkit as Angular/Foundation.