Nov, 2021

Infotainment & Clusters

Author

KPIT's Infotainment & Cluster Experience

1000+	15+	60+	19+
People with passion	Active engagements	Vehicles programs	Years of experience

Services At Glance

HMI & Application Development

14 Production Programs
11+ years of experience

Middleware Component Development

6 Production Programs
7+ years of experience

Lead Software Integrator

3 Production Programs
5+ years of experience

Validation & Automation Testing

30 Production Programs
16+ years of experience

Production Sourced Solutions & Tools

KIVI	KONNECT	KITE
Infotainment Platform	**Connectivity Framework**	**Test Automation Framework**
In production since Jun-17	In production since Mar-17	In production since Jan-17

Production Intent Platforms under Development

KIVI Android – Infotainment Platform based on Android
CTS compatible enriched Android for Automotive Platform with long term support

KIVI Cluster – POSIX based Cluster + HUD Platform
Purpose built full digital Cluster Platform optimized for Safety, Security and Performance

KONFLUENCE – eCockpit Platform with Containers or Hypervisor
eCockpit Platform with IVI (Linux or Android), Cluster, HUD, ADAS Domain support

Key Customer Engagements

Infotainment

Involvement-> For Customer	Engagement No of years	Peak Team Size	Operating System	Architecture / Design	HMI & MW Development	OSS Update & Mgmt.	SW Verification	Functional Validation	Sub-System Testing	SW Integration
OEM	6+ years	30+		✓		✓	✓	✓		
OEM	5+ years	30+		✓				✓	✓	
OEM	1+ year	10						✓	✓	
OEM	1+ year	10				✓				
Tier-1	4+ years	70+	GNX	✓	Qt QML			✓	✓	
Tier-1	6+ years	170+		✓	Qt QML		✓	✓		
Tier-1	5+ years	270+		✓	altia		✓	✓	✓	✓
Tier-1	2+ years	300					✓	✓	✓	✓

With over 19 years of software engineering experience in automotive IVI, Clusters, HUD, RSE and eCockpit, KPIT is a partner to the world's leading automotive OEMs and Tier1s

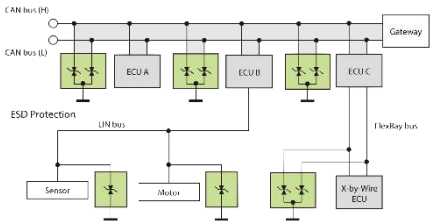
Our production proven platforms & solutions, domain expertise and rich experience in end-to-end software development and integration, helps our customers to accelerate and realize their engineering goals reliably.

Clusters & HUD

Involvement-> For Customer	Engagement No of years	Peak Team Size	Operating System	Specs Dev & Mgmt	Architecture / Design	HMI / Modelling	SW Verification	Functional Validation	Sub-System Testing	SW Integration
OEM	4+ years	15+	AUTOSAR				✓	✓	✓	
OEM	10+ years	20					✓	✓	✓	✓
Tier-1	11+ years	50	OSEK	✓	✓		✓	✓		
Tier-1	7+ years	25	AUTOSAR INTEGRITY	✓	✓	altia KANZI	✓			✓
Tier-1	19+ years	150+	OSEK			altia	✓	✓	✓	
Tier-1	7+ years	60	OSEK	✓	✓	EB	✓	✓	✓	✓
Tier-1	1+ years	10	AUTOSAR			CGI STUDIO	✓	✓	✓	
OEM (CV)	< 1 year	7				KANZI	✓	✓		

Digital Cockpit Platform Overview

KPIT Digital Cockpit Platform - Introduction



ASIL B

OEM Specific Vehicle Network Interface

RTOS / AUTOSAR

Cluster & HUD Application

Infotainment HMI & Applications

RSE/Passenger HMI & Applications

Camera Applications

KPIT Cluster Middleware Stack

KPIT IVI Platform (Linux / Android)

KPIT Digital Cockpit Core Platform

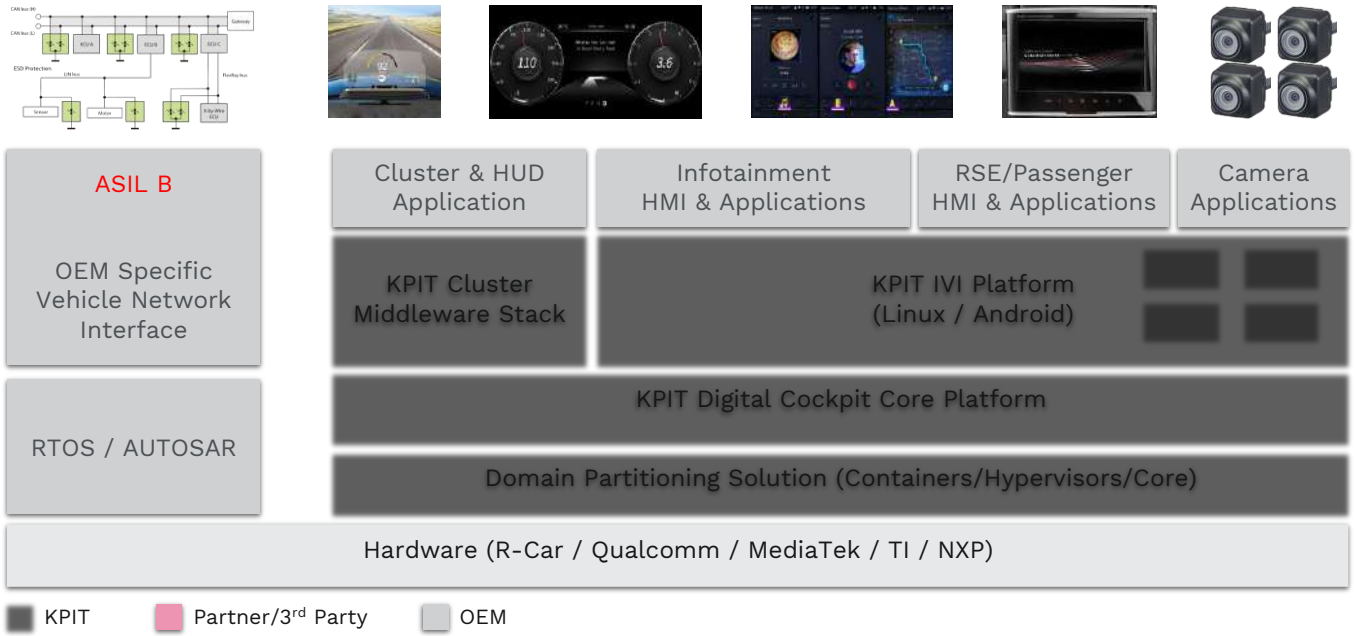
Domain Partitioning Solution (Containers/Core/Hypervisors)

Hardware (R-Car / Qualcomm / MediaTek / TI / NXP)

KPIT Partner/3rd Party OEM

KPIT Digital Cockpit Platform - Key Highlights

- Pre-Integrated Production grade Platform leveraging proven KIVI assets
- Compatible with wide set of SoC platforms
- Flexibility to integrate / replace SW components with minimal impact
- Predefined system configurations for Entry, Mid and High end segments
- Support for Hypervisor based as well as Container based solution
- ASIL B Ready addressing safety functions
- Hardened for security through TARA
- Fully updatable with support for OTA
- Built in support for Early functions



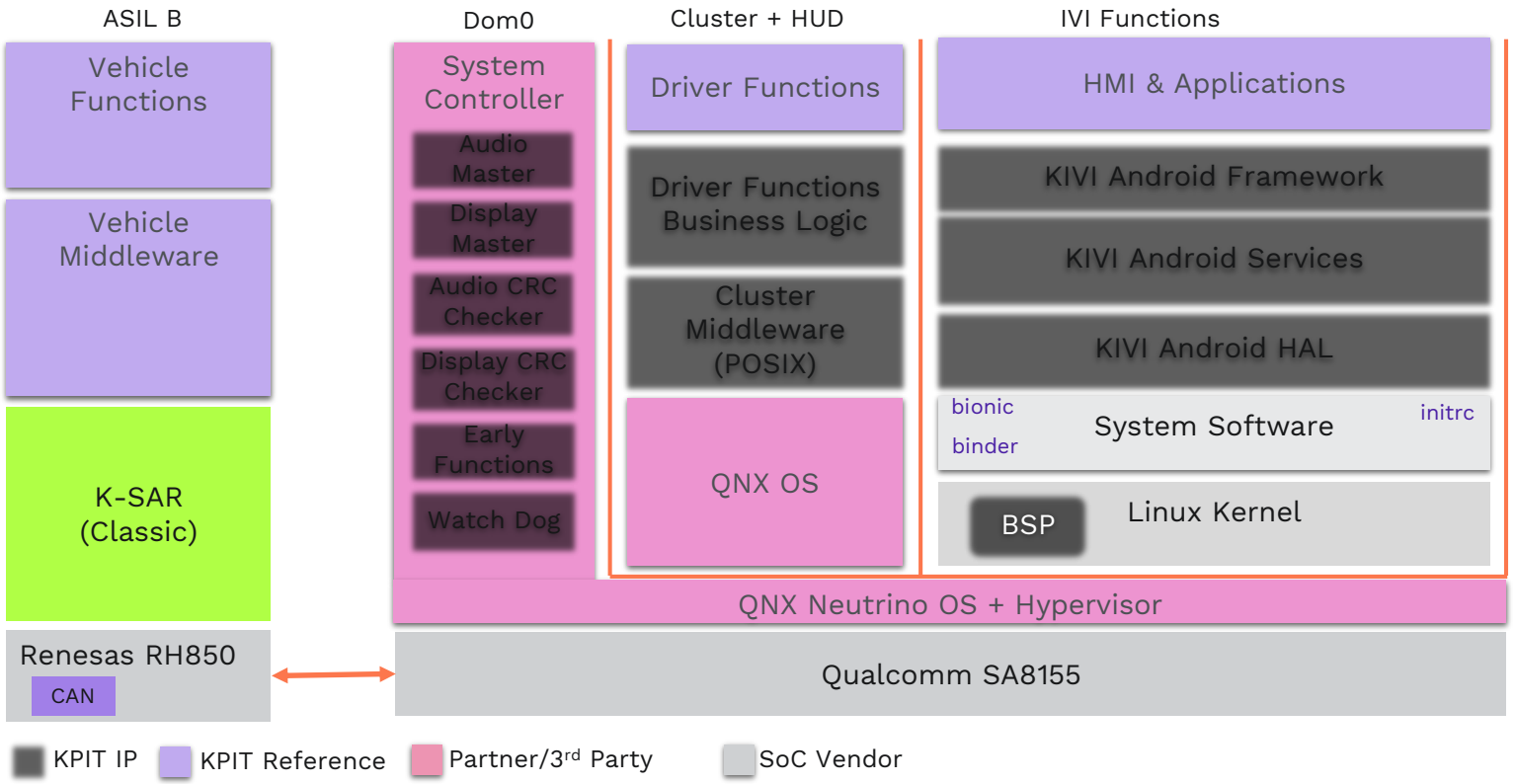
- Choice of KIVI Linux / KIVI Android for Infotainment domain
- Purpose built Cluster Middleware stack for full digital clusters
- Automotive SPICE Level 5 development processes

KPIT Digital Cockpit Platform - Ecosystem

Category	Partners
SoC Platforms	Qualcomm, MediaTek, Renesas R-Car
HMI Technologies	Qt, unity, RIGHTWARE
Hypervisor Vendors	QNX, Green Hills Software
Middleware	cinemo The Future of Infotainment, BdSound, A&W 智瀚科技股份有限公司 Advanced & Wise Technology Corp
Navigation	TomTom
Voice Recognition	amazon alexa

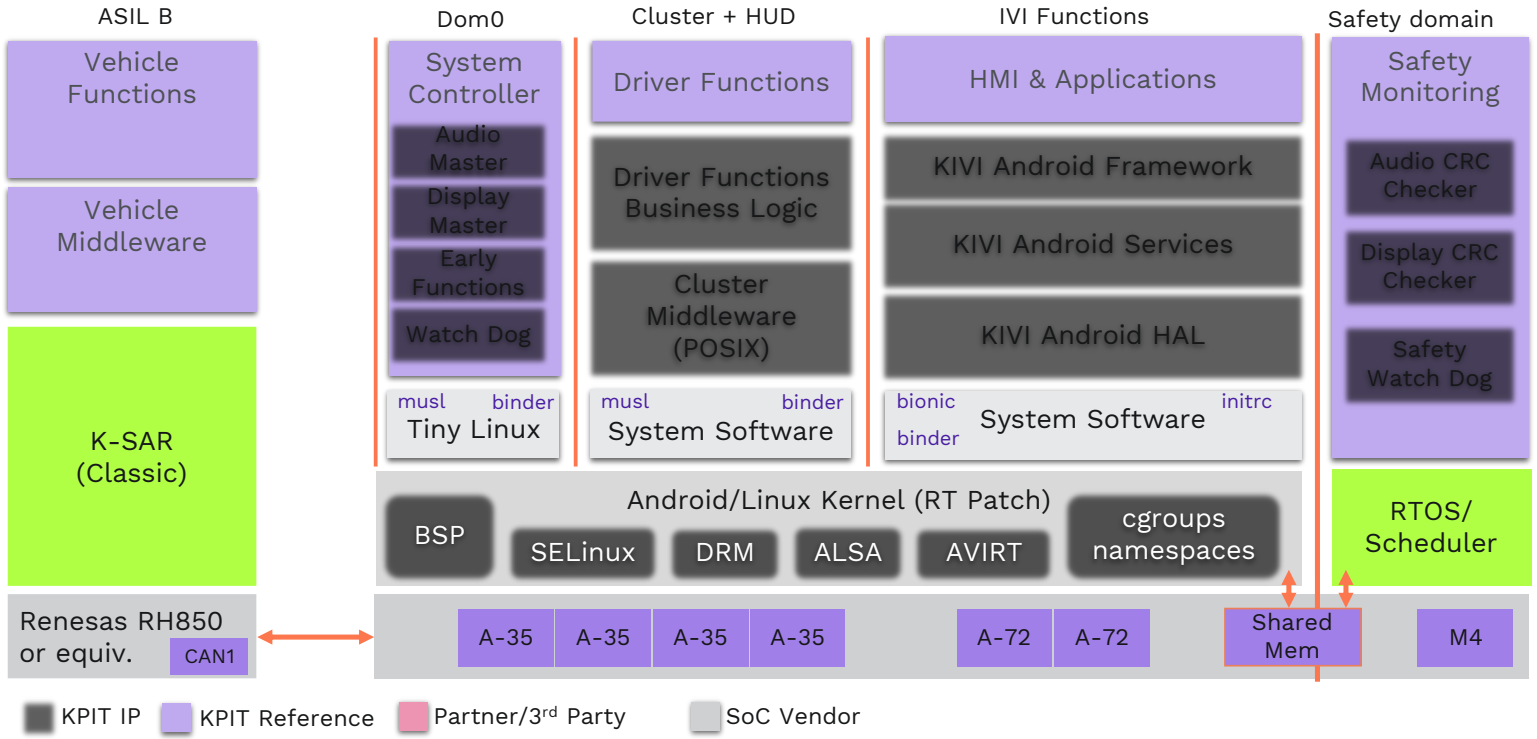
KPIT Digital Cockpit Platform - Hypervisor based (SA8155)

- Reference platform based on Hypervisor using the 8155 ADP. Leveraging QNX Hypervisor and QNX OS to cater to safety requirements on an non ASIL hardware
- Reuse Common Platform Software on Cluster as well as Infotainment
- Reuse the KPIT AUTOSAR solution on RH850 hosted on the ADP



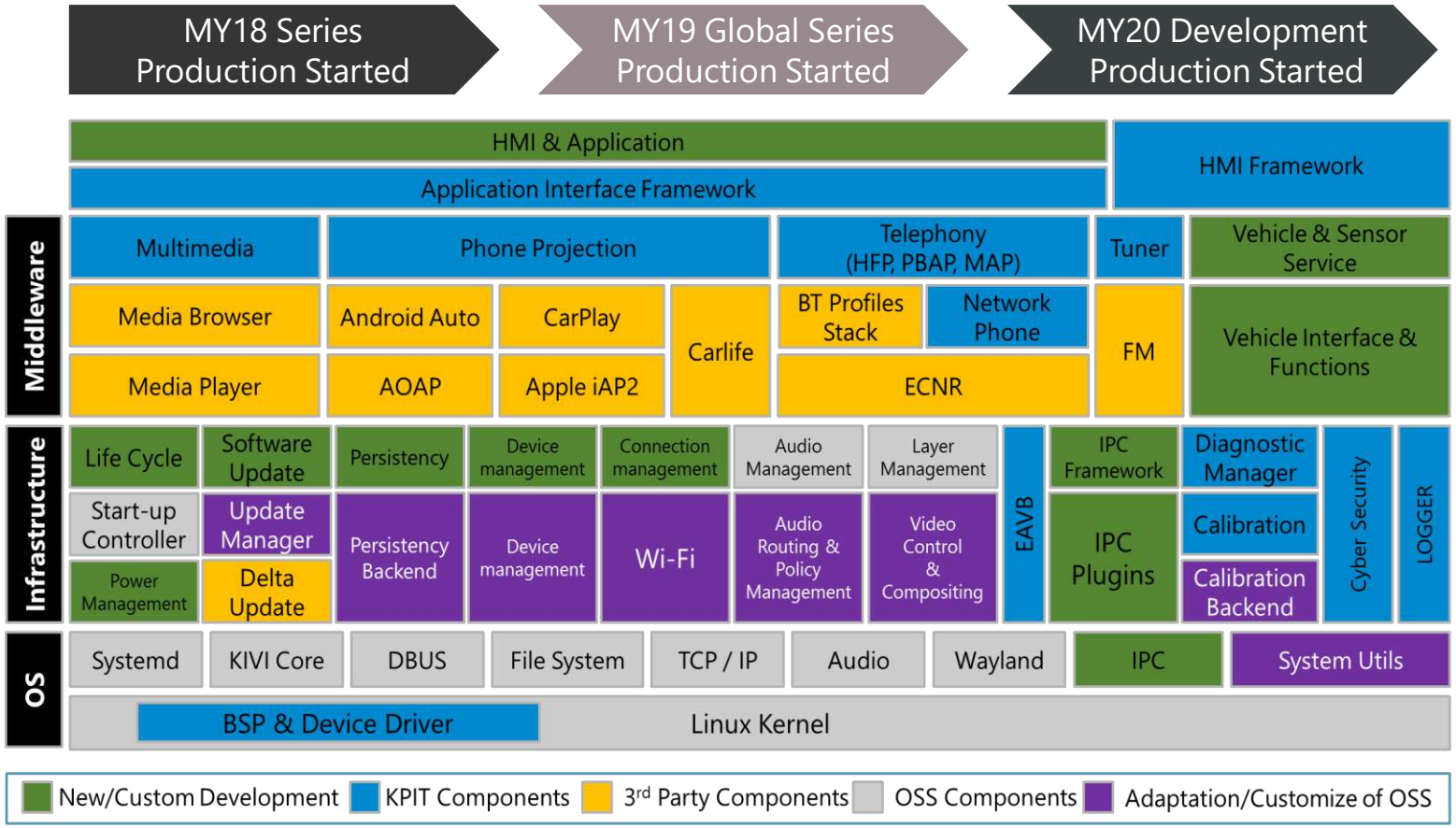
KPIT Digital Cockpit Platform On Containers (MT2712)

- Reference platform using Containers on MediaTek MT2712 EVB. Leveraging Containers for light weight isolation. Safety monitoring delegated to an independent M4F core.
- Reuse Common Platform Software on Cluster as well as Infotainment
- Reuse the KPIT AUTOSAR solution on RH850/NXP MPC5748G/Traveo II
- Support for Software Defined Audio(DSP on ARM core) to further optimize the BoM cost

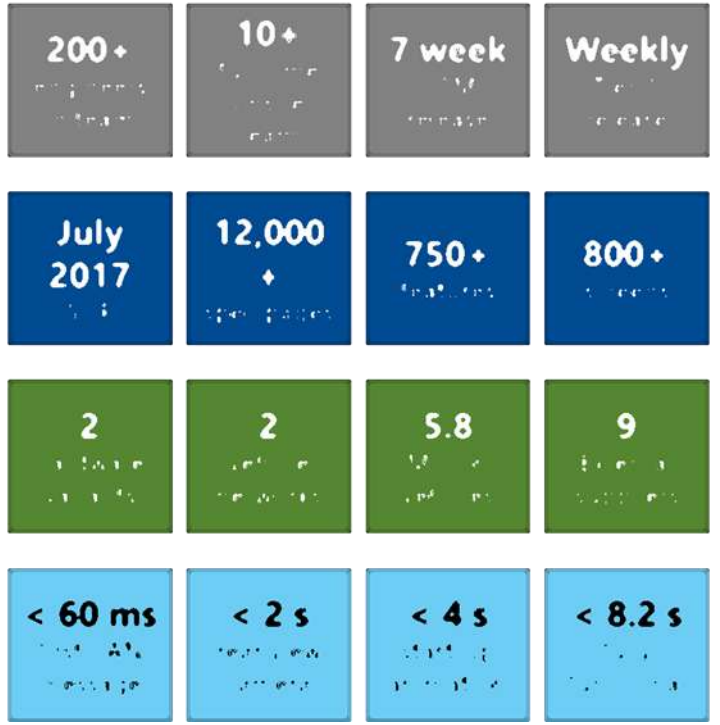


Solutions & Services Experience Summary

KIVI - Production Sourced IVI Platform For Entry/Mid

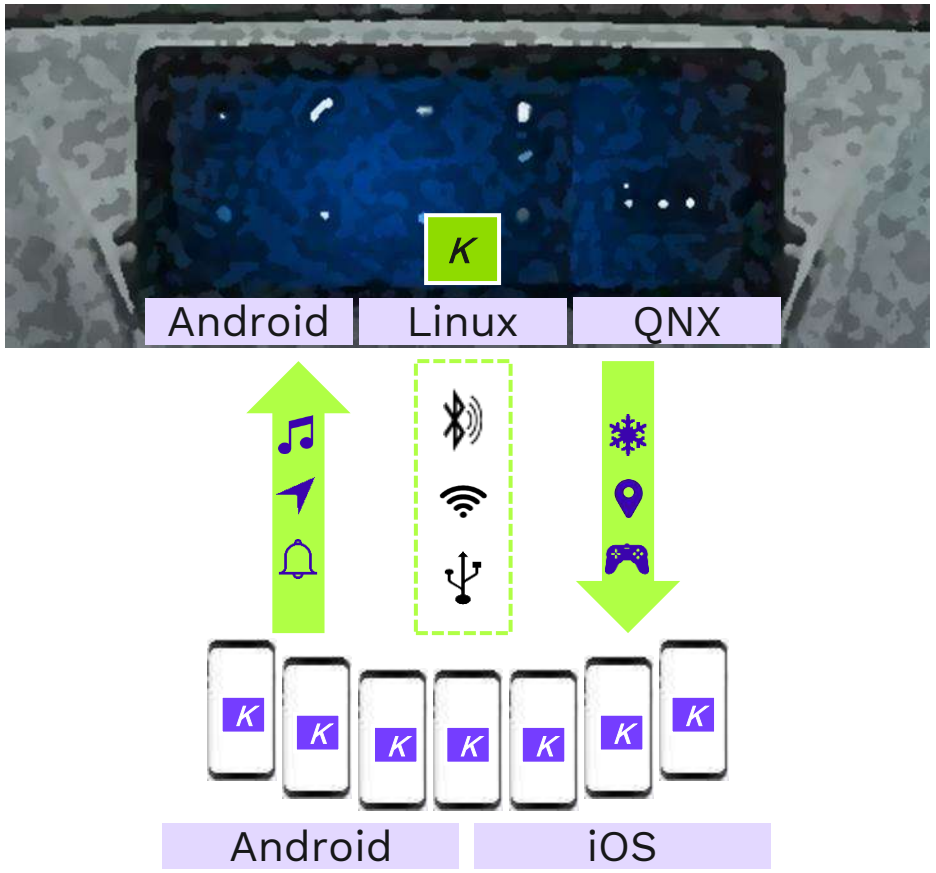


All SOPs on time. Lowest IPTV in launch year. Highest Quality Achieved.



- SW Architecture, integration, release & testing
- HMI and application development
- KIVI middleware porting and adaptation
- Linux BSP tuning and optimization, Cybersecurity, Fast Boot, FOTA
- Platform Development Kit (PDK) for suppliers

KONNECT - A Secure, Multi-device Connectivity Framework



In production for a leading OEM, for 800K vehicles

7 Phones can be connected simultaneously

Works over Bluetooth, WiFi & USB

Bi-directional, secure data exchange

3rd party security audited for cyber threats

Supports Android, Linux & QNX on the IVI & iOS, Android on the phones

Phone Features on IVI	IVI control Features
• Telephony • Music • Navigation • Notifications • Projection Mode	• Remote Control – AC, Music • Navigation – POI • Shared Music • Parental Control • Gaming

KITE - KPIT's Integrated Test Environment

HMI Operations & Capture	Software Solution	Frame Grabber	Robot & Camera	Diagnostic Command
Software Solution Available For	Android	LINUX	QNX	
Supports CAN / LIN Adapters	NeoVI	Vector CANCaseXL	PeakSYS	

USB (Insert / Remove)	Smart Image Comparison
Audio & VR	OCR – Language Testing
Relay Switch for Hard Keys	Programmable Power Supply

Infotainment, Cluster, HUD, RSE, Mobile Phone Apps & Connected Services

Comprehensive Solution for Independent & Integrated Validation of Cockpit ECUs & Connected Services

Android and eCockpit Experience

HMI & Apps Development

- 2D/3D graphics & widget dev as per style guide, form & behavior specs
- Technologies - Kanzi, Android, Unity 3D

Framework & AOSP

- Extending AOSP framework for automotive functions
- Complete AOSP maintenance
- CTS & VTS maintenance

Middleware

- Porting and integration - Bluetooth, Wi-Fi, etc.
- Intg of Diagnostics, Persistency and automotive specific functions

Drivers & Firmware + HAL

- HAL development
- HAL tuning and performance improvement

System / Kernel & Boot

- Performance tuning of runtime parameters – memory, boot time, frame rate, etc.
- Fast Boot

Android - CES 2019

Key Engagements

- SW Engineering Partner to Tier 1 for RSE Development
- Validation Partner to Tier 1 for RSE Development
- Validation Partner to OEM for Android based Head Unit
- SW Partner to Tier 1 for Hypervisor based eCockpit development
- SW Partner to OEM for Container based eCockpit Development

eCockpit - CES 2020

HMI / Application Experience Overview

HMI Screen Development → Interface Development → State Handling → Simulation + Prototyping → KPI Tuning

Tools/ Technology Experience

Qt, QML, altia, populus, RIGHTWARE, KANZI, CGISTUDIO, Elektrobit, HTML 5, unity, android, IBM Rhapsody Rational software, MATLAB SIMULINK, YAKINDU, Embedded C, C++ 11/14, OpenGL

Program Experience

- Reference Android IVI Platform - 50 engineers, 200 screens, Kanzi Unity 3D & Android (15)
- MY19 EU OEM IVI program – 50 engineers, 550 screens, Populus & C++ (140)
- MY18/MY19 US OEM IVI program – 200 engineers, 800 screens, Altia & Rhapsody(45)
- MY18 US OEM IVI program – 60 engineers, 300 screens, Qt/QML & C++ (60)
- MY16/MY17 EU OEM IVI program – 180 engineers, 450 screens, Qt/QML & C++ (60)
- MY13 US OEM IVI program – 40 engineers, 200 screens, Populus & C++
- US OEM Cluster program – 15+ engineers, 800 screens, Altia & C
- EU OEM Cluster program – 15+ engineers, Kanzi/EB GUIDE & C++

Validation Experience Overview

Test Strategy Development → Test Design → Test Automation → Test Execution → Test Reporting

System Group (SYS)

- SYS.1 Requirement Elicitation
- SYS.2 Requirement Analysis
- SYS.3 Architecture Design
- SYS.4 Integration & Test
- SYS.5 Qualification

Software Group (SWE)

- SWE.1 Requirement Analysis
- SWE.2 Architecture Design
- SWE.3 Unit Construction
- SWE.4 Unit Verification
- SWE.5 Integration & Test
- SWE.6 Qualification Test

As an independent "V & V" partner, KPIT has strong experience in all layers of V model

Total 30 production programs

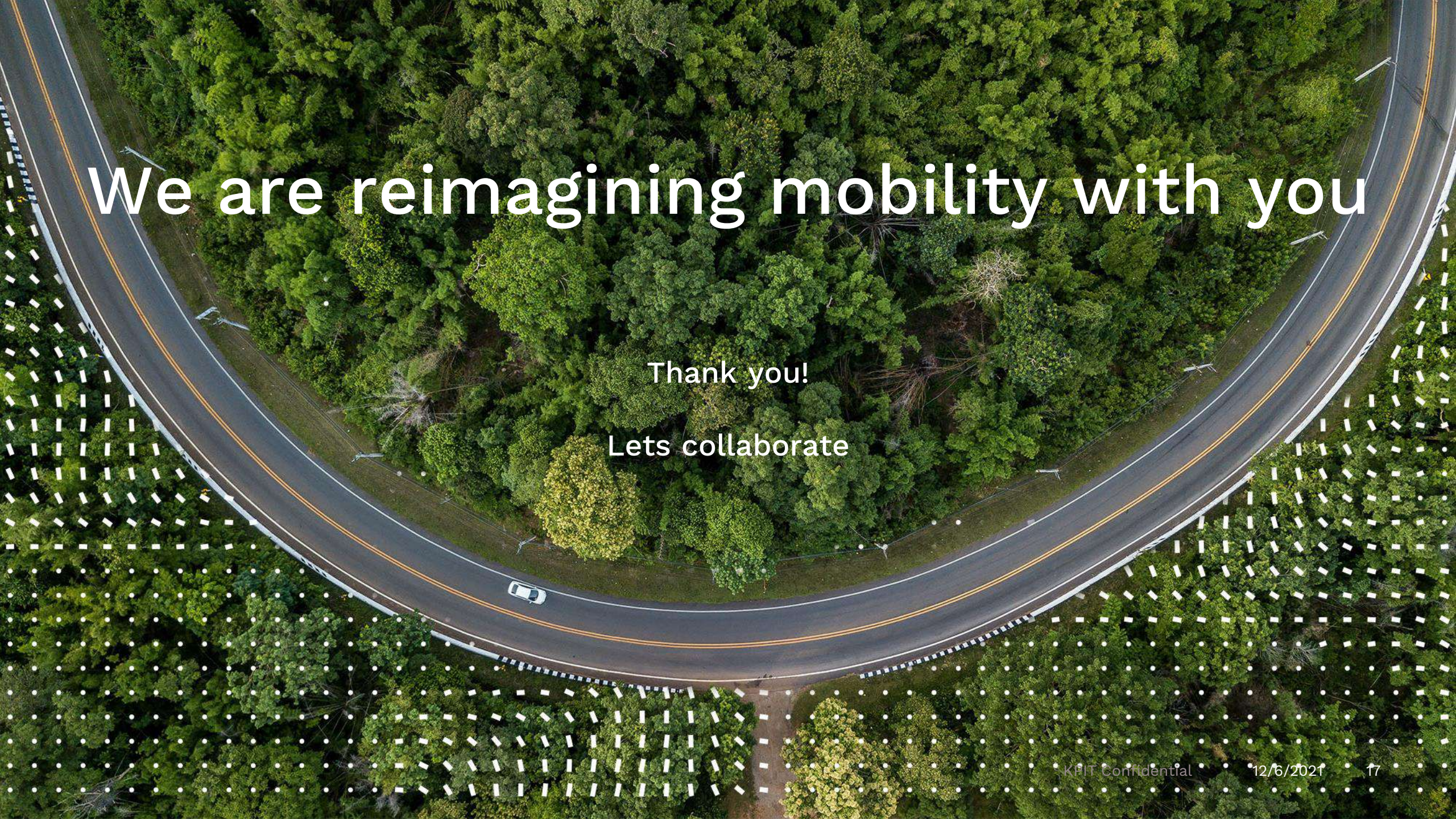
12 IVI	11 Cluster	5 HUD	2 RSE

KITE 20 production programs

10 IVI	4 Cluster	4 HUD	2 RSE

Experience in all types of testing

Sanity, Functional, Stability, Reproduction, Regression, etc.


We are reimagining mobility with you
Thank you!
Lets collaborate