



Infotainment Systems – the growing software challenge

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→ QNX Overview

- ▶ Background
- ▶ Markets and References
- ▶ Automotive Ecosystem
- ▶ New “Hybrid” Business Model

→ Trends in Automotive and “Ease of Mind” Technologies

- ▶ Increasing S/W Complexity – Adaptive Partitioning
- ▶ Instant Response – Instant Device Activation
- ▶ Audio/Video Media – Multimedia Suite
- ▶ Custom HMI – Graphics
- ▶ Voice Handling – Acoustic Processing

QNX at a Glance



- **A Global Leader in Real Time Embedded Technologies**
- **Thirty Years of Innovative Operating System Design**



- **A Universe of Proven Applications**
- **Technologies Anticipating Tomorrow's Demands**

What Do We Do?



**QNX
Neutrino**
the *most reliable* OS

Middle Ware
the *most advanced* components

QNX Momentics
the *most productive* IDE

Support & Services
the *most satisfied* customers

QNX Software Systems
the company *you can count on* now and in the future

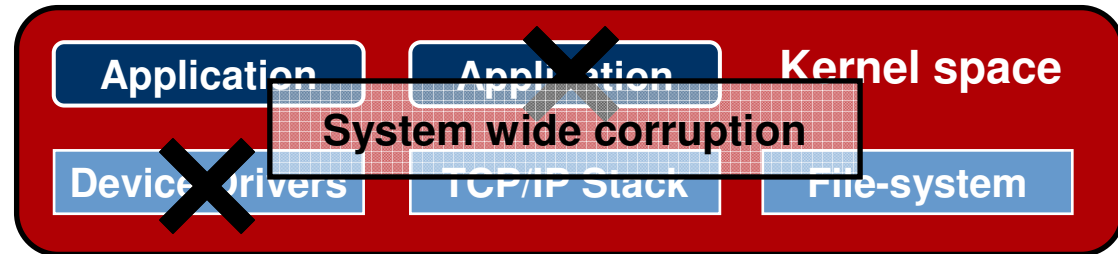


**ISO
Certification**

QNX – “It’s the architecture”

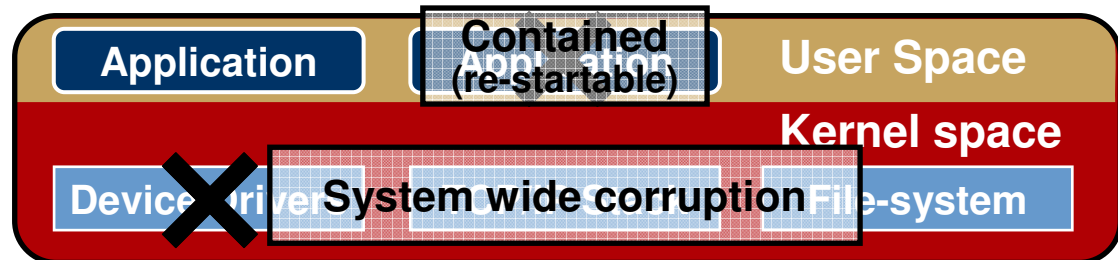
Realtime Executive

- > No MMU and no protection
- > Applications, drivers, and protocols are all in Kernel space



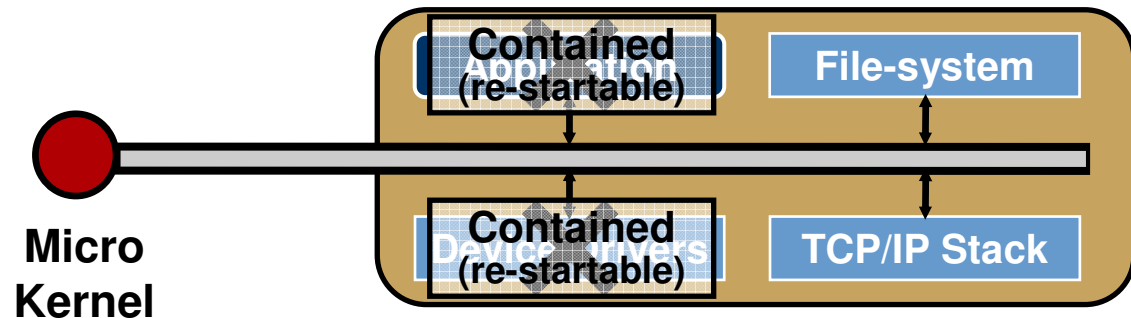
Monolithic Kernel (Microsoft / Unix / etc)

- > MMU with partial protection
- > Applications are protected



TRUE Microkernel (QNX Neutrino)

- > MMU with full protection
- > Applications, drivers, and protocols are protected



Our Markets



Automotive

Industrial Automation

Medical

Consumer

Defense

Networking



Automotive Sub-Segments

QNX
QNX SOFTWARE SYSTEMS



Extensive Automotive Experience



Silicon relationships



Suppliers



QNX

Middleware



Auto OEMs



QNX is in over 180 Vehicle Models

A Better Choice



Hybrid Software Model Company & Community

Commercial Advantages

Open Source Advantages



- Customers have a direct influence on the supplier
- Quality product management and release process
- Intellectual property protection
- Investments in focused technology innovation & published roadmaps

- Low barrier to entry for development and research groups
- Feeling of security and ability to adapt source to meet one's needs
- Communication directly with other developers in community
- Ability to leverage substantial code base



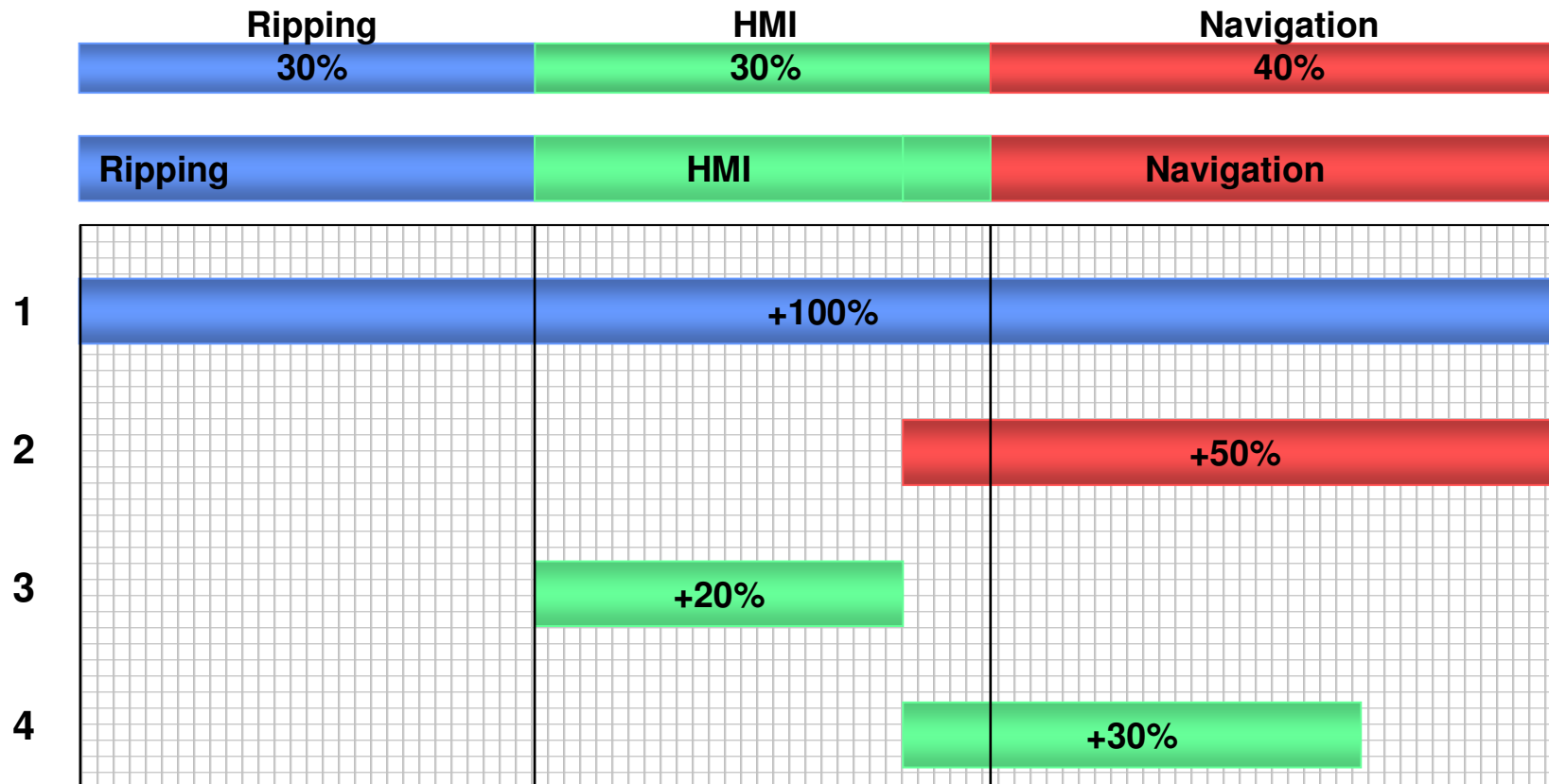
Increasing S/W Complexity – QNX Neutrino Adaptive Partitioning

**CPU guarantees for greater security
and faster software integration**

→ The Problem?

- ▶ **Conflicts over CPU cycles**
- ▶ **Difficult system integration process when pulling together elements**
 - **from widely dispersed teams**
 - **from 3rd parties**
- ▶ **Difficult to design, develop and debug complex systems when resource issues come to light**
- ▶ **Lack of control of the user experience with many alternative OS solutions**

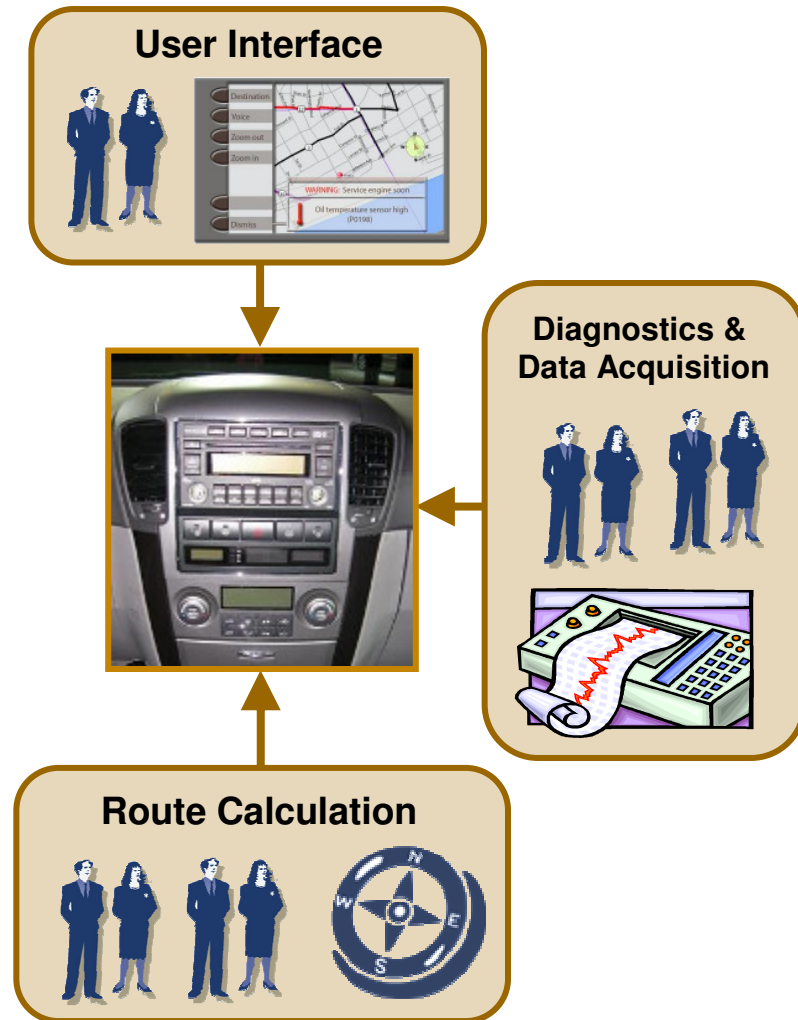
Adaptive Partitioning



1. Ripping is the only operation running and consumes 100% of the CPU.
Dynamic allocation of spare CPU cycles guarantees plus 100% CPU utilization
2. Navigation requests 50% of the CPU.
3. HMI requests 20% of the CPU. Ripping partition has hardened.
4. HMI requests another 30% of the CPU. At this point all partitions have hardened.

Partitioning for Faster Integration

- **Large, multi-site teams**
 - ▶ Working in different time zones and locations
- **Division of responsibilities, functional areas, and expertise**
 - ▶ Differing skill sets
- **Need to integrate third-party technologies to reduce development costs**
 - ▶ Lack of control over third-party technology
- **Parallel development, followed by system integration & verification**





Instant Response – QNX Neutrino Instant Device Activation

Instant response – even from cold boot. A BOM saving technology

→ The Problem?

- ▶ **Full-featured OS requires 100s of milliseconds to boot**
 - **Applications can take even longer (seconds)**

- ▶ **Automotive bus specs require response within ~60 milliseconds of power ON**

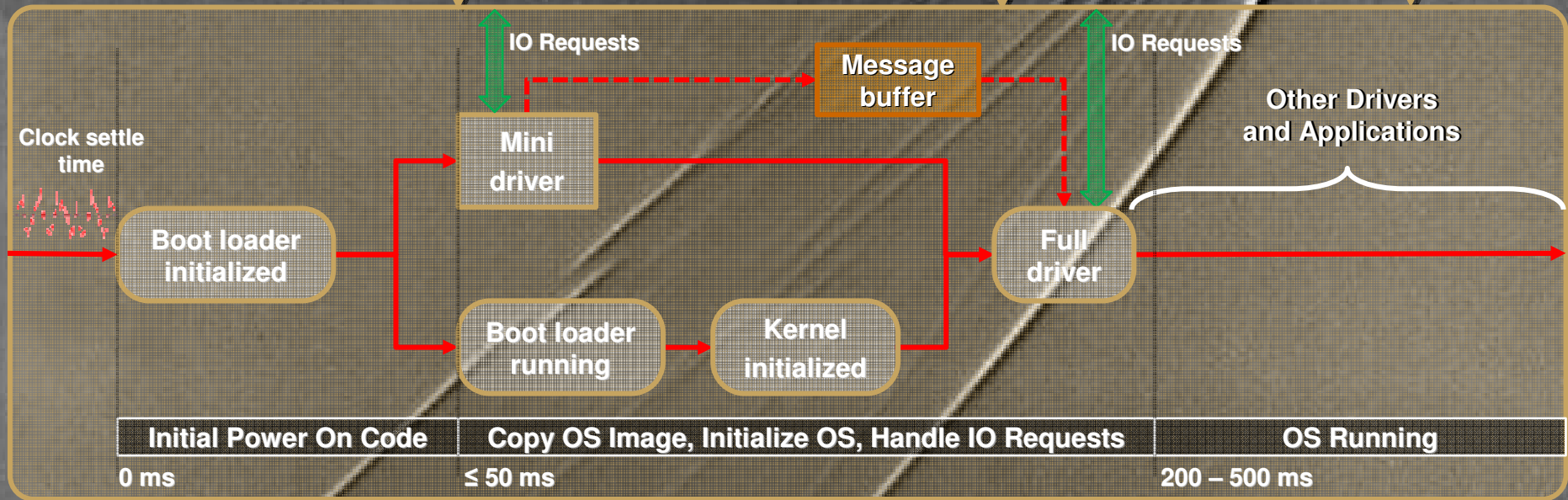
- ▶ **Current designs utilize dedicated processor**
 - **Removing the extra silicon will save \$\$\$**

Fast Boot and System Startup

Early startup of time critical drivers.

Full kernel functionality is available so quickly you may not need Mini-drivers.

A Microkernel design lets you control the order in which drivers, sub-systems and applications start.





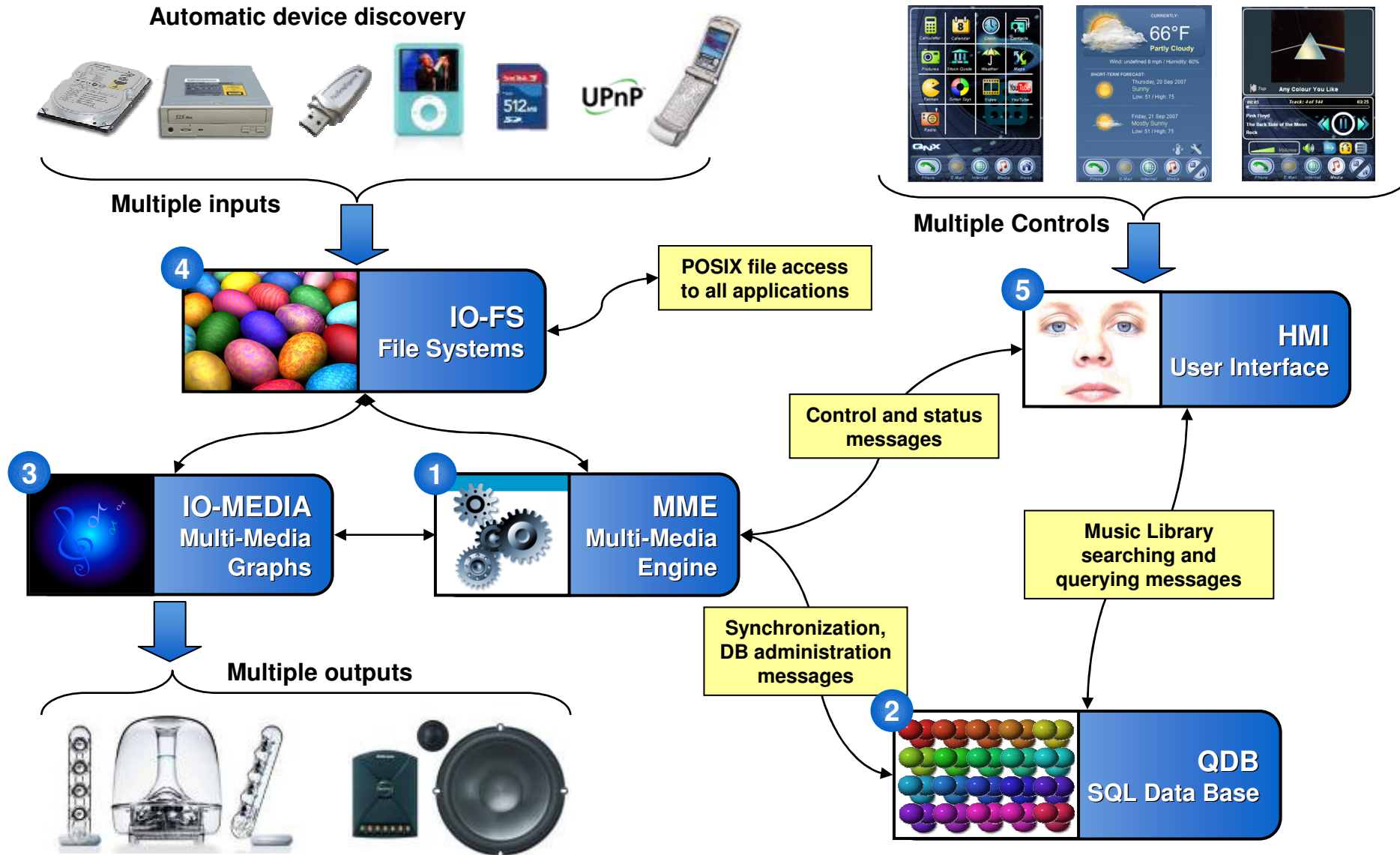
Audio/Video Media – QNX Aviage Multimedia Suite

**Addressing today's media requirements while
providing the flexibility to handle future challenges.**

→ The Problem?

- ▶ **Trend to very complicated multimedia environments**
 - **Filesystems**
 - **Many different codecs required**
 - **DRM**
 - **Updateable**
 - **Multiple Zones**
 - **Integration with portable / consumer devices**
 - **Metadata management**
 - **Ease of use enablement in an automotive interior (multimodal – speech, etc.)**

Multimedia Components





Custom HMI – QNX Aviage Graphics Suite

**Bringing the core values of QNX technology
to high-performance graphics applications**

→ The Problem?

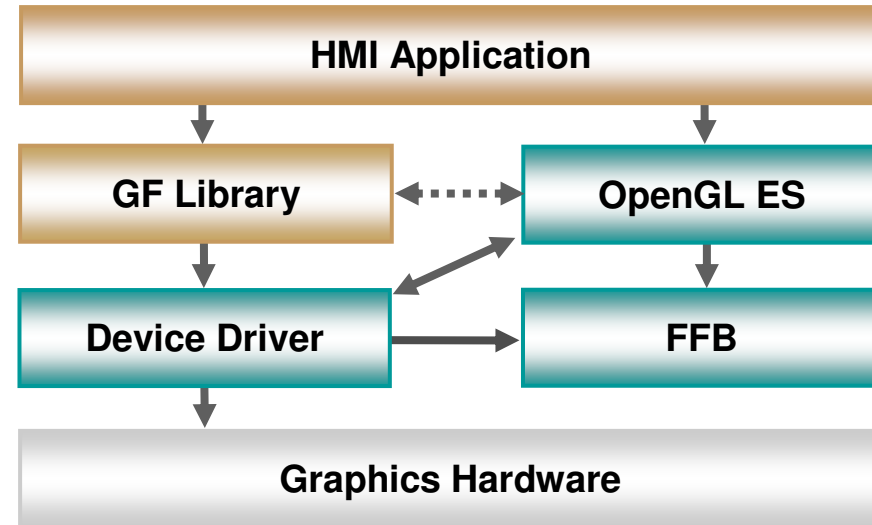
- ▶ **Increasing graphics complexity**
 - **2D, Rotation, etc.**
 - **3D Navigation / Games**
 - **Layering**
- ▶ **Font rendering / scaling / rotation requirements**
- ▶ **Limited “Auto Grade” Hardware**
- ▶ **Requirements by OEMs and Tier 1s for standards based solution**
- ▶ **Most graphics environments are heavy (RAM, ROM, etc.)**
- ▶ **Requirement to be customizable and skinnable**
 - **For brand differentiation**
 - **For Tier 1, OEM and even End user customization**
 - **Reduce time from HMI layout to deployment or updates**

Graphics Suite at a Glance



→ Graphics Suite

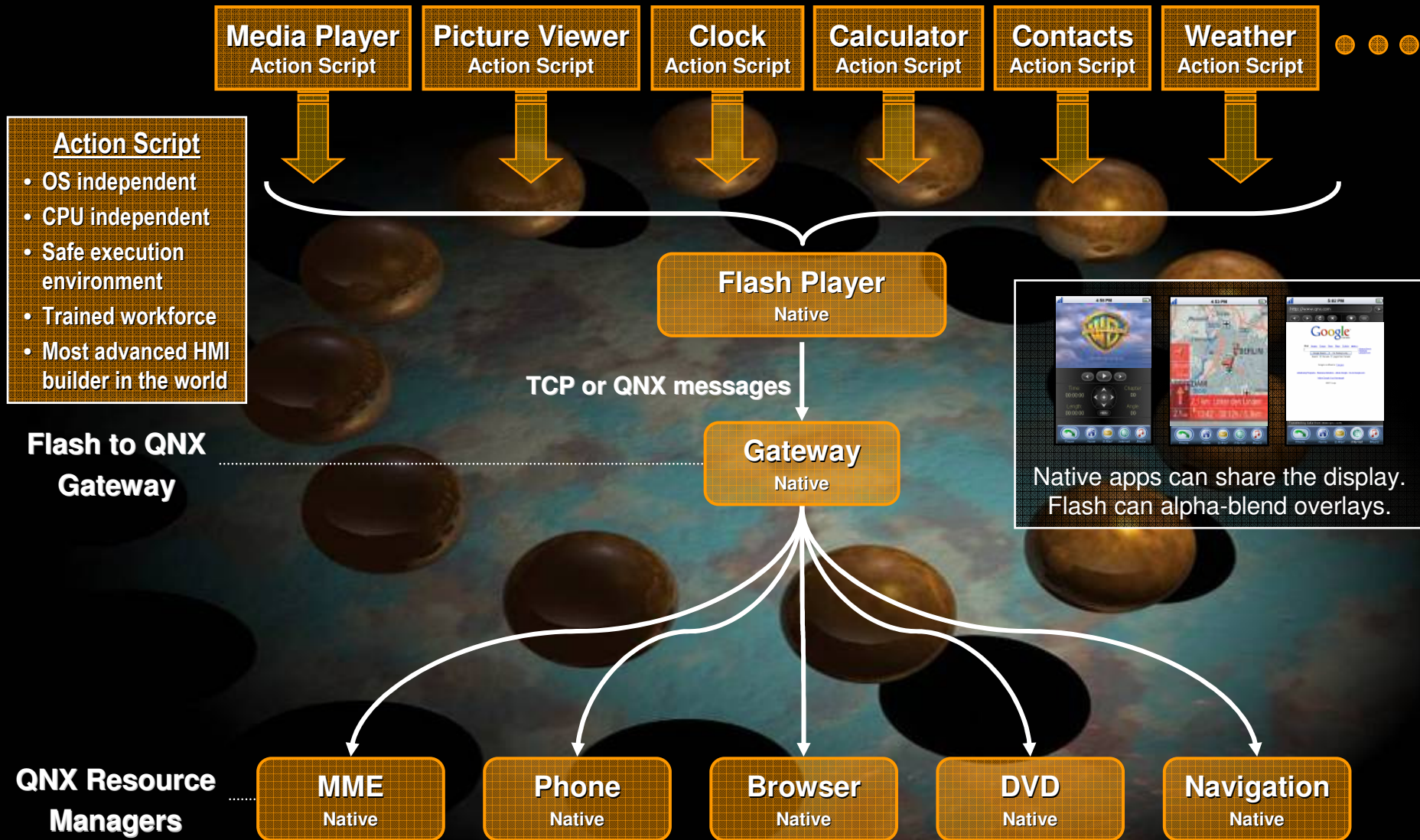
- ▶ Simple, lightweight interface to the device driver layer
- ▶ Certified, clean-room OpenGL ES API for 3D
- ▶ Small, fast 2D environment
- ▶ Multi-layer graphics
- ▶ Video capture



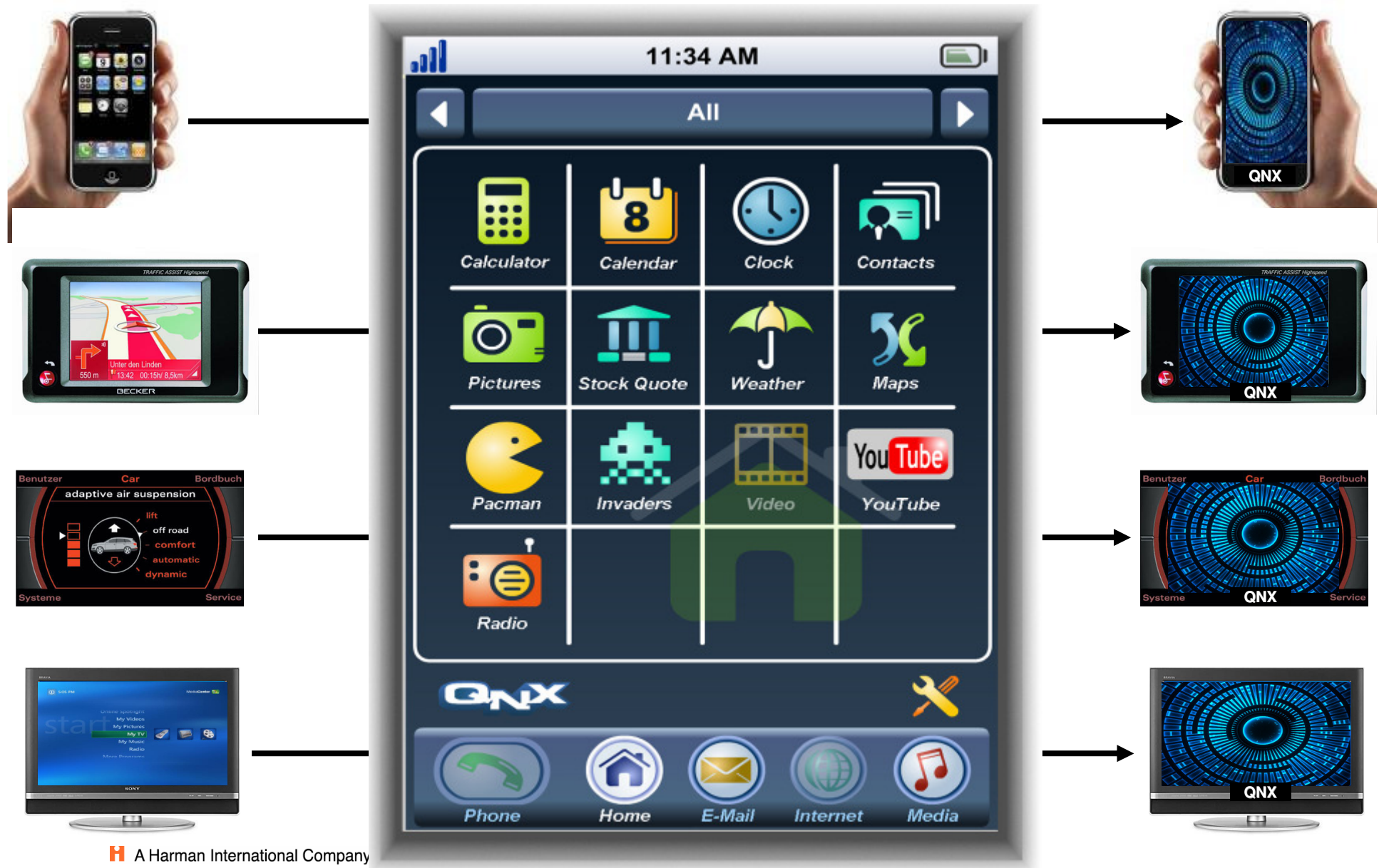
→ High performance

- ▶ Multiple 2D and 3D programs can render directly to hardware at the same time
 - Maximum utilization of available hardware
 - Ideal for resource-constrained systems

Adobe Flash Lite 3 Support



What is Kaleidoscope?





Voice Handling - QNX Aviage Acoustic Processing Kit

**Lower BOM costs & increased design flexibility
for handsfree and speech recognition systems**

→ The Problem?

- ▶ **Automotive environment is challenging**
 - **Wind Noise – Vents; windows; etc.**
 - **Road Noise**
 - **Wipers and other interior noise**
 - **Enclosed environment with speakers close to the mic**
- ▶ **Cost and complexity of system design with specialized AEC / NS hardware**
- ▶ **Tuning requirements per vehicle is high: Often 1 – 2 weeks / vehicle**

Acoustic Processing at a Glance



- **Acoustic echo cancellation and speech enhancement solution designed specifically for automotive environments**
- **Enhances clarity and accuracy of hands free and speech recognition systems**
 - ▶ **Extracts voice from noise created by road surfaces, HVAC systems, engines, wind, rain, other vehicles, construction, etc.**
- **Eliminates the need for dedicated hardware**
 - ▶ **Lower production costs and increased design flexibility**
- **Low tuning requirements**
 - ▶ **Approximately 1/2 to 4 hours per vehicle platform**
- **Modular library of field-proven algorithms**
 - ▶ **Scalable, C-callable, floating point, and fixed-point library**

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Besten Dank!