Moving Automotive Software to an Open Source Development Model:
Some Unexpected Challenges, Some Interesting Solutions

John Lehmann

Embedded Automotive Solutions
Mentor Graphics

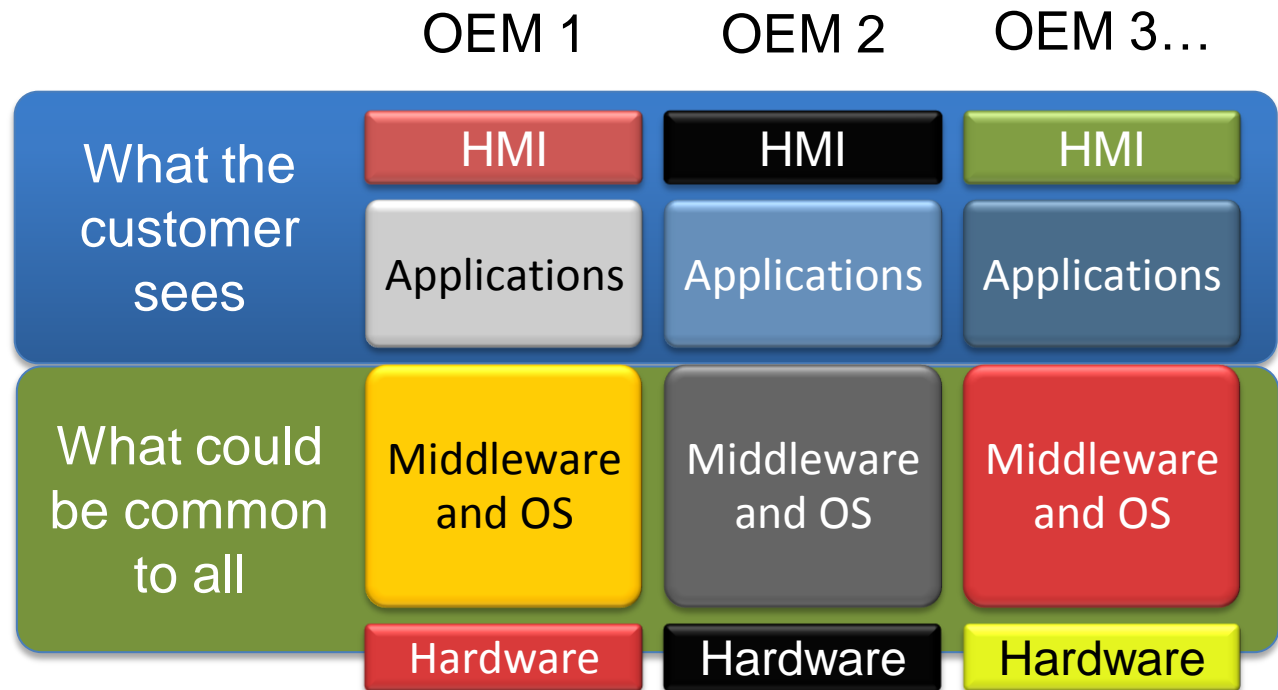Member, Board of Directors
GENIVI Alliance

Mentor Graphics®

A bit of background…

IVI challenges for automakers: 2009

- Smartphones and consumer electronics setting the standard, not cars

- Seamless connectivity expected with every device

- Tiered offerings across multiple models and model years

- Overcome driver distraction restrictions

- Control and enhance the driver and passenger experience

- Reinforce (never dilute) the brand

Where automakers add value

Why Linux looked attractive

- A natural fit for multiple automakers "sharing" a middleware specification across the industry

- Linux has a strong pedigree in consumer electronics and enterprise networking

- Rather than adding consumer features to a traditional "automotive OS"…
  - Take advantage of a vibrant ecosystem
  - Active communities of world-class developers
  - Mountains of pre-existing open source code to be adopted and/or modified for automotive use

Enter the GENIVI Alliance

- A non-profit organization of now over 180 of top automotive OEMs and their suppliers

- Driving adoption of open source in IVI

- Addressing automotive/cultural concerns

- A collaboration environment for IVI middleware

  - members to contribute and maintain jointly

  - software infrastructure of essential but non-differentiating elements

A few of the **180 GENIVI members**

OEMs
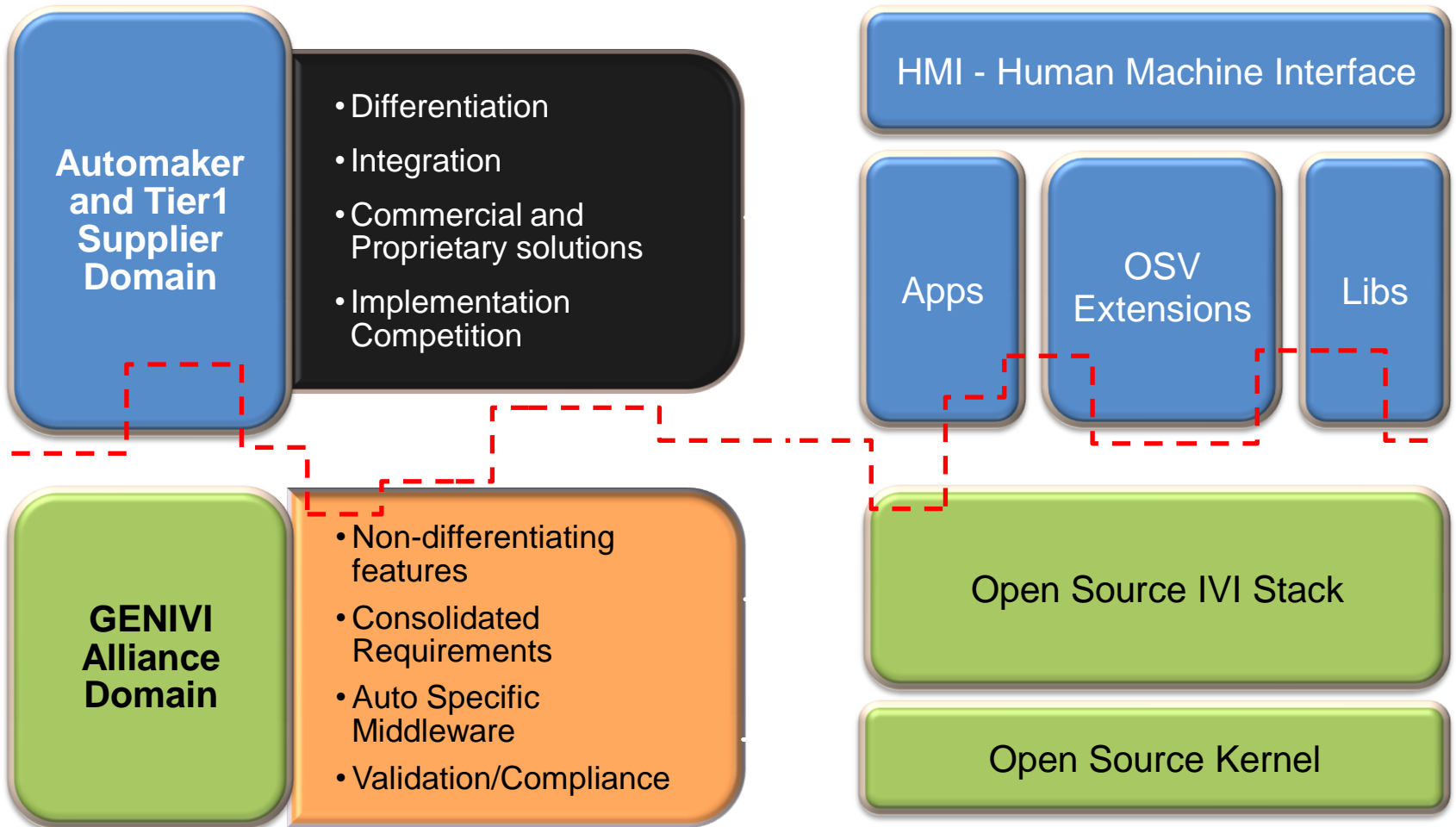
BMW Group*

General Motors

Honda

Hyundai

Jaguar Land Rover*

John Deere

Nissan

PSA Peugeot Citroen*

Renault

SAIC Motor

Volvo Cars

Other Board Members

Bosch*

Continental*

Delphi*

Magneti Marelli*

Visteon*

Intel*

ARM*

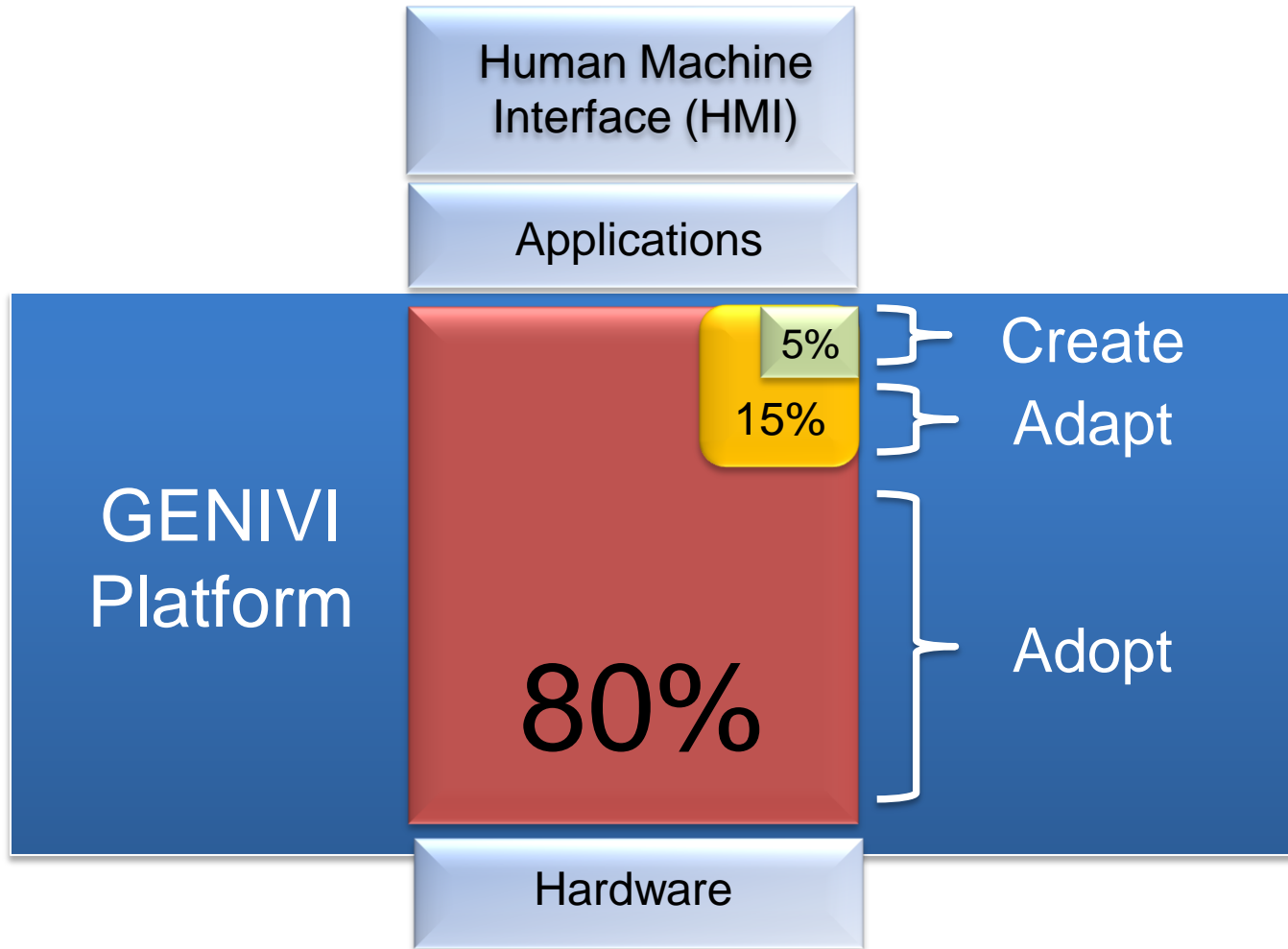Mentor Graphics*

Pelagicore*

Symphony Teleca*

XS Embedded*

* GENIVI Board Members

GENIVI targets **non-differentiating elements** of solution stack

Automaker and Tier1 Supplier Domain

- Differentiation
- Integration
- Commercial and Proprietary solutions
- Implementation Competition

GENIVI Alliance Domain

- Non-differentiating features
- Consolidated Requirements
- Auto Specific Middleware
- Validation/Compliance

HMI - Human Machine Interface

Apps

OSV Extensions

Libs

Open Source IVI Stack

Open Source Kernel
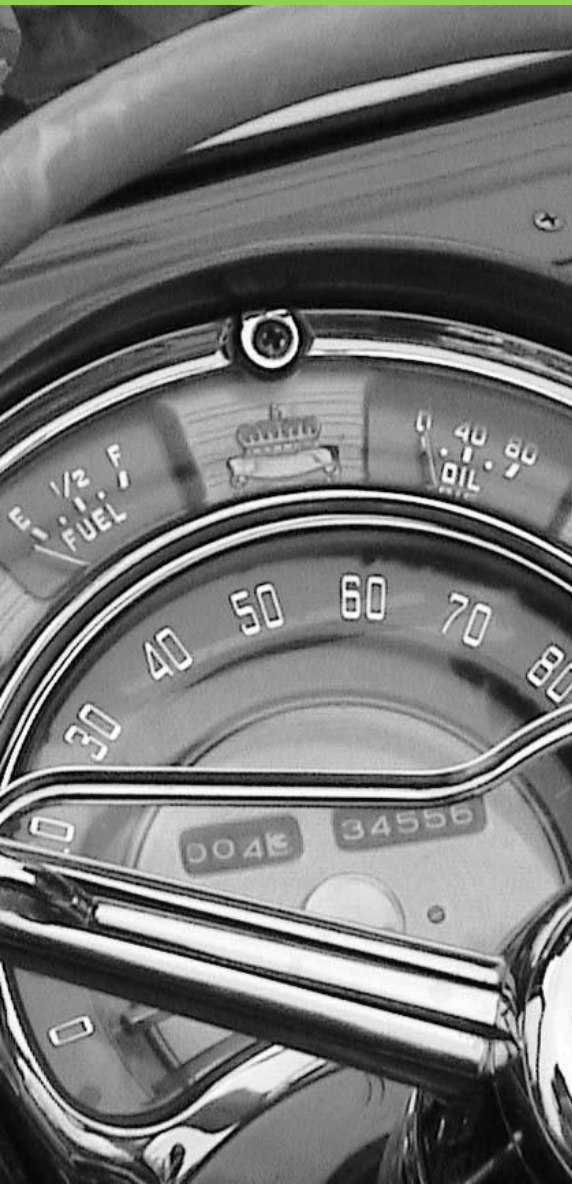
Adopt, adapt, create model

Expectation:
The biggest obstacle to moving to open source is software licensing

Reality:
The biggest obstacle is adopting a new development methodology

Open source is not a verb

- Don't develop code by yourself then try to push it upstream
- Develop the code in the upstream project, then pull it back down
- If you really can't find an appropriate open source project, you can start one yourself
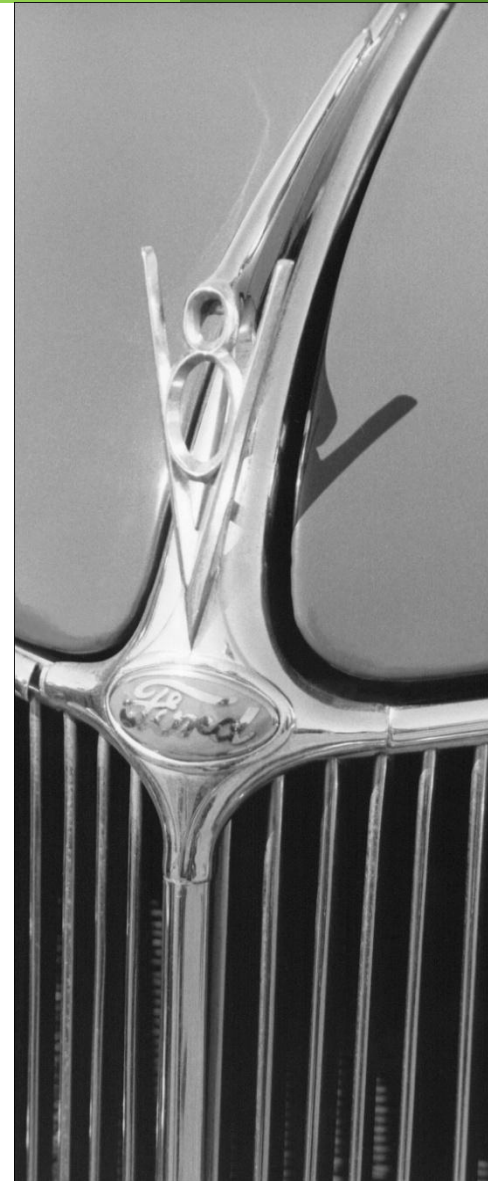
GENIVI and Open Source community

- GENIVI component development moving completely to alliance-sponsored public open-source community projects
- New projects created and hosted by GENIVI
- The first projects:
  - AF_BUS D-Bus Optimization
  - Audio Manager
  - Diagnostic Log and Trace
  - IVI Layer Management
  - LXCBENCH
  - Node Startup Controller (NSC)
  - Node State Manager (NSM)
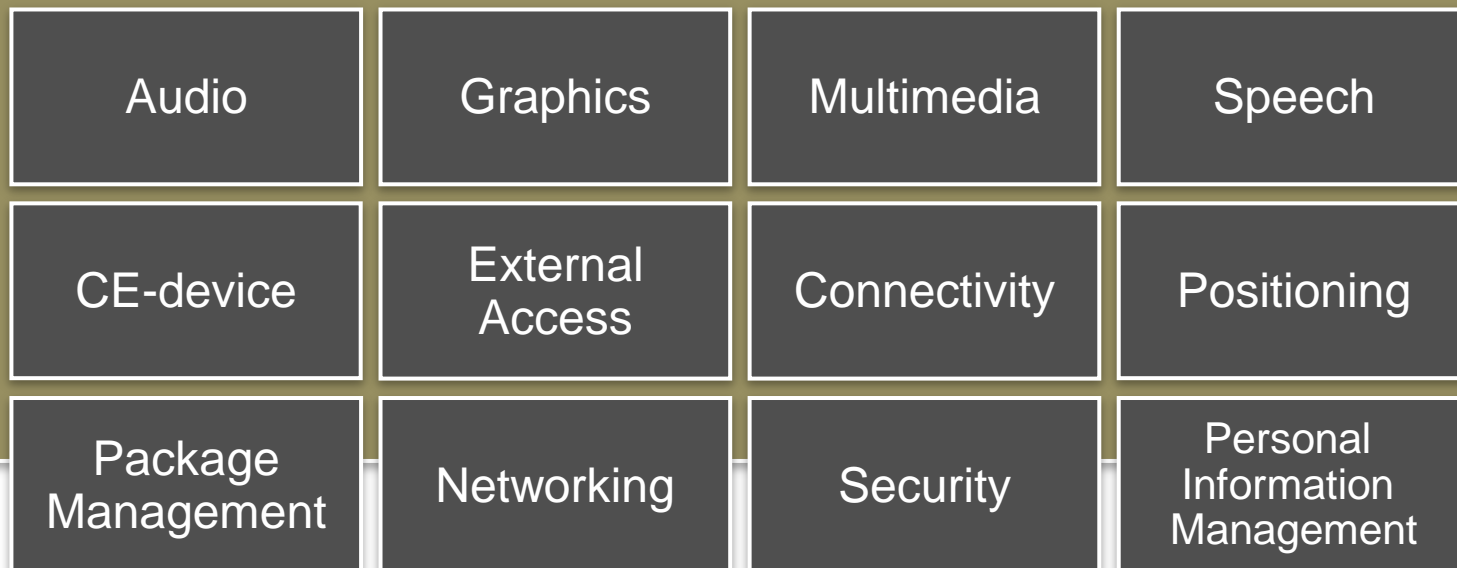 - Persistence Client Library
  - SmartPhoneLink

The GENIVI Compliance Program

- A specification for open source IVI middleware

    - Developed by GENIVI expert groups

    - Refreshed and enhanced every 6 months

- Now more than 50 GENIVI compliant platforms offered by GENIVI members

- Compliant products from full range of membership: Tier Ones, OSVs, semis, service providers...

- Members build compliant products (based on the spec) for automakers to develop next generation IVI head units

The GENIVI compliance specification

GENIVI members build and integrate compliant products, and add their differentiating features, tools, services

Audio	Graphics	Multimedia	Speech
CE-device	External Access	Connectivity	Positioning
Package Management	Networking	Security	Personal Information Management

System Infrastructure

Linux operating system, drivers and libraries

x86 or ARM-based Processor

Why join the GENIVI Alliance

- Full access and insight into all work in process, providing a head-start competitive advantage.

- Influence on the technical direction of the alliance, including the development of specifications, reference architectures, implementation guidelines, test suites, and compliance/certification programs

- Access to GENIVI test specifications and compliance/certification programs

- Networking through the vast alliance membership community for key contacts, partnerships, and business opportunities

- Opportunities to showcase your technology and competencies at GENIVI global promotional events

Mentor Graphics and the GENIVI Alliance

- Mentor Graphics is a GENIVI core member and serves on the Board of Directors
- Mentor is active in both business and technical initiatives
  - Technical leadership
  - Code contribution
  - GENIVI Compliance Program
  - OEM and Tier One migration to Open Source
  - New member recruiting
  - Marketing council
- Mentor Embedded Automotive Technology Platform and IVI Base Platform registered GENIVI compliant
- Mentor Embedded Services engaged in major projects with key GENIVI members
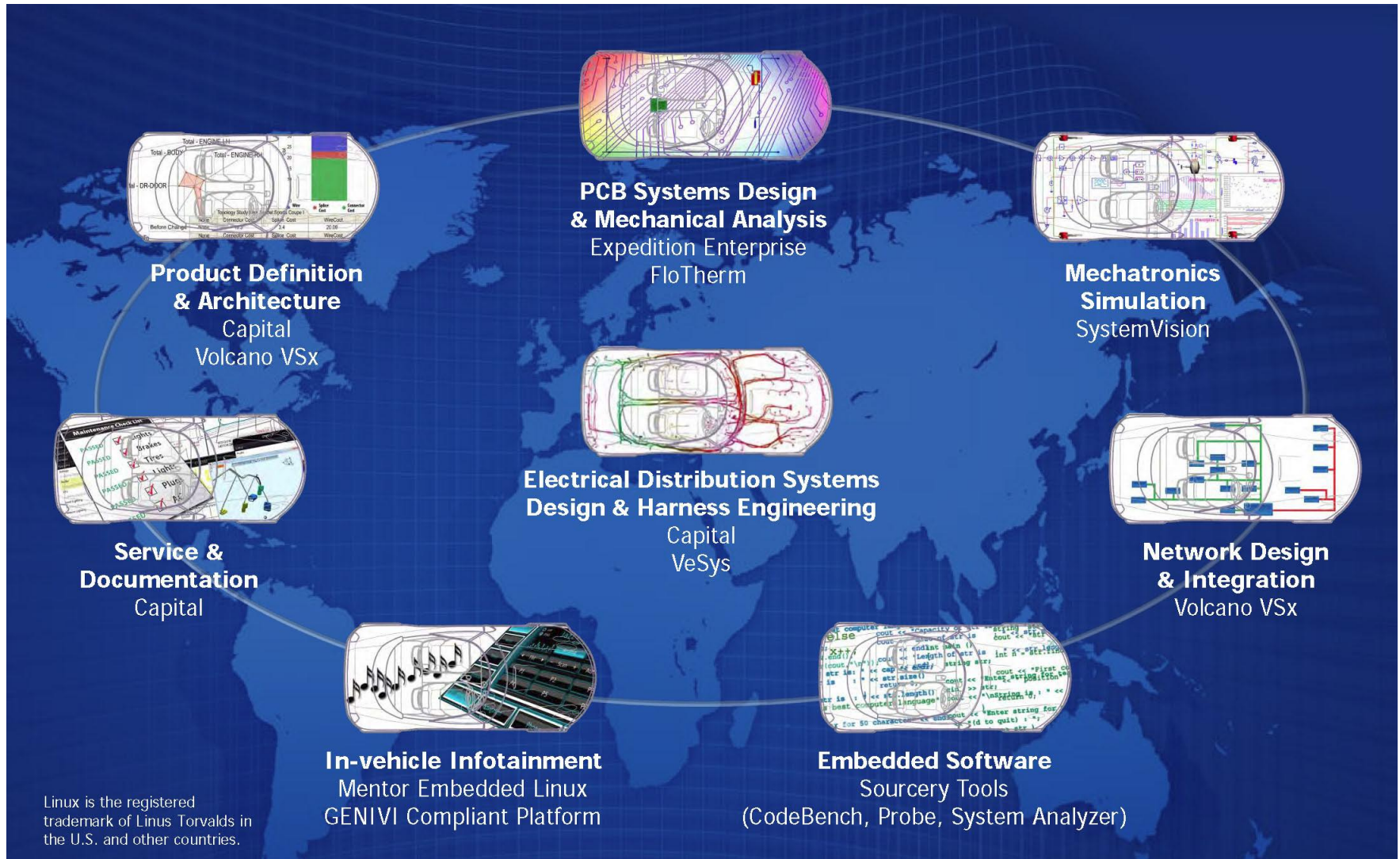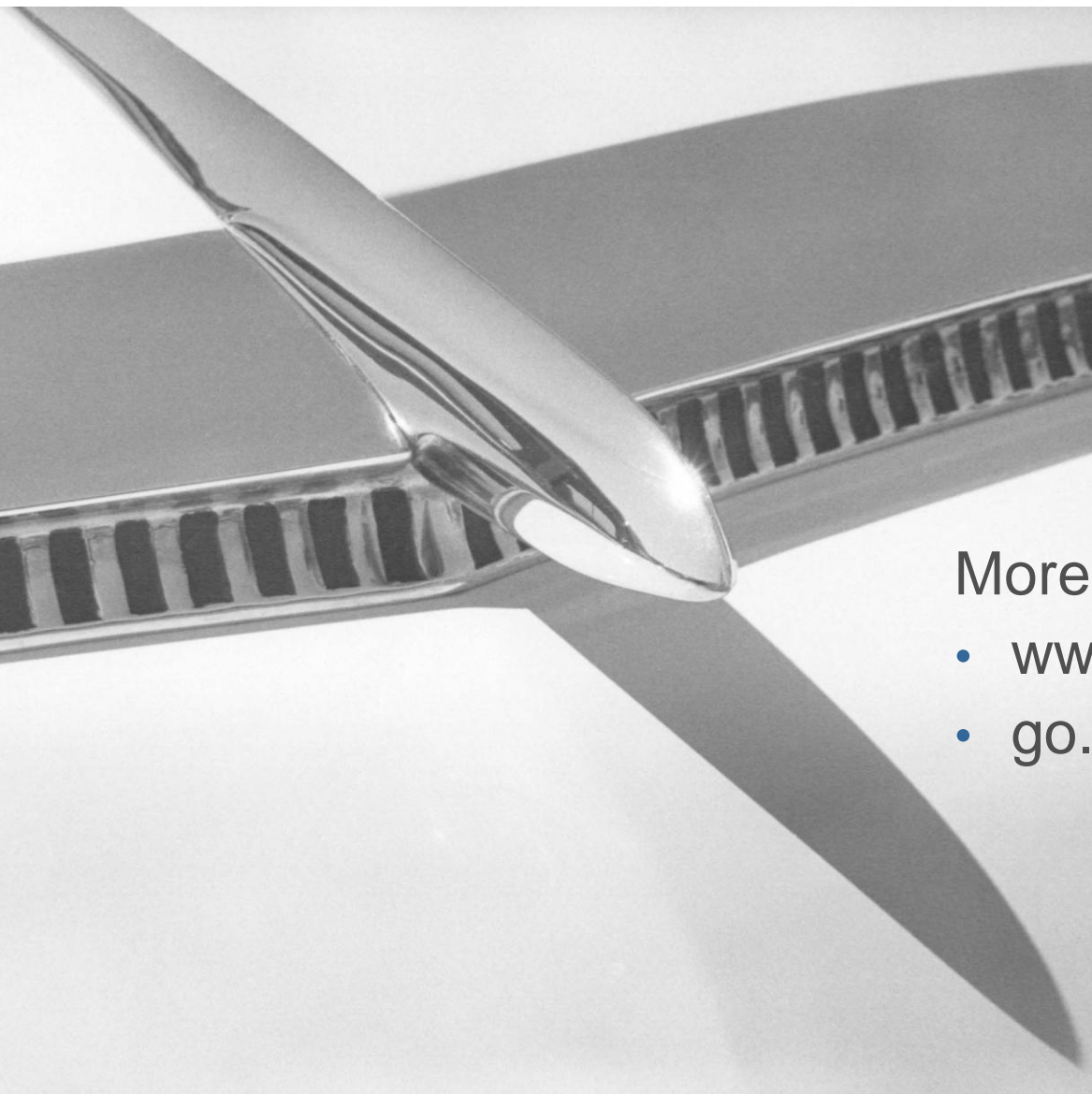
When going to production...

It's very important to choose the right software partner

- Integration, testing and documentation
- Kernel/BSP hardening and support for custom boards
- Commercial-grade product
- Risk mitigation
- On-going support and maintenance
- Knowledge transfer
- Architecture and code reuse

Mentor Graphics: A long history in automotive

Product Definition & Architecture
Capital
Volcano VSx

PCB Systems Design & Mechanical Analysis
Expedition Enterprise
FloTherm

Mechatronics Simulation
SystemVision

Service & Documentation
Capital

Electrical Distribution Systems Design & Harness Engineering
Capital
VeSys

Network Design & Integration
Volcano VSx

In-vehicle Infotainment
Mentor Embedded Linux
GENIVI Compliant Platform

Embedded Software
Sourcery Tools
(CodeBench, Probe, System Analyzer)

Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.

Thank you

More information:
- www.genivi.org
- go.mentor.com/iviplatform