GENIVI goes Open Source

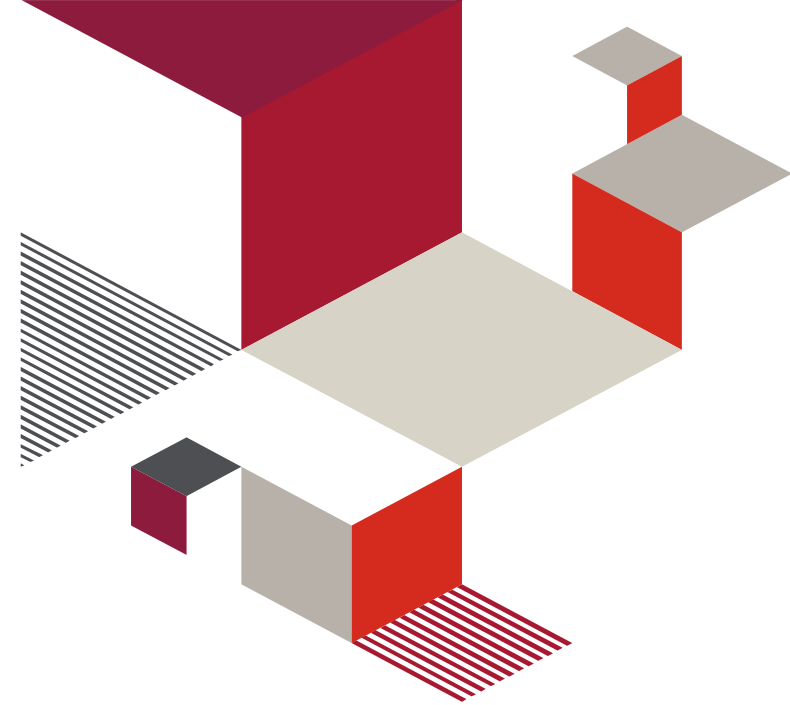## Motivation and Challenges

Claus-Peter Wiedemann

Sr. Manager, FOSS Management, BearingPoint

FOSS CON Korea

Seoul, December 5, 2013

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Agenda

- **Introduction to GENIVI**

- **GENIVI's Journey**

- **Going Open Source: Some Drivers**

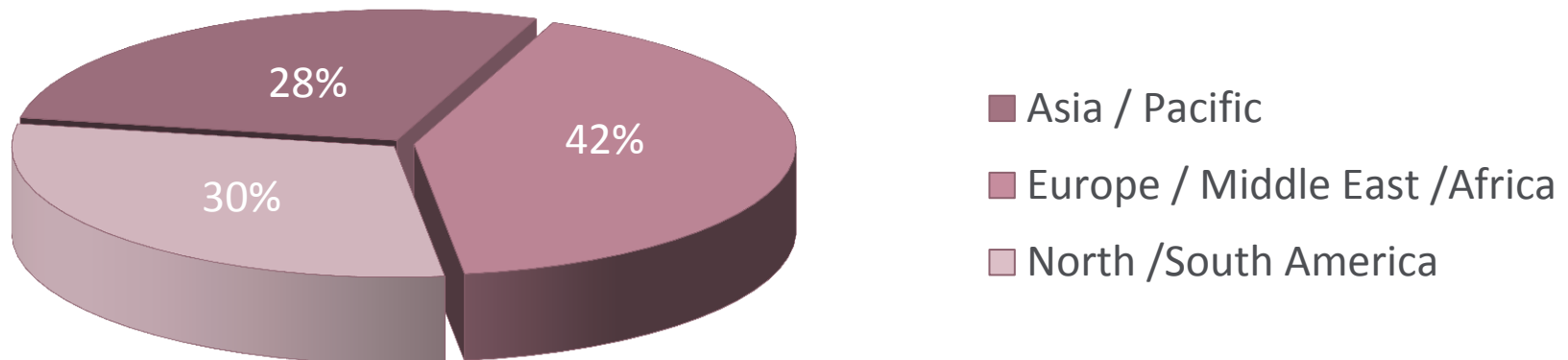- **Going Open Source: Some Challenges**

- **Summary**

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THE ROAD AHEAD **Open Source IVI**

GENIVI Alliance: Mission

- **GENIVI is a non-profit industry alliance:**

  - committed to driving the broad adoption of an In-Vehicle Infotainment (IVI) reference platform

  - aiming to align requirements, deliver reference implementations, offer certification programs, and foster a vibrant open-source IVI community.

  - delivering reference implementations, offering compliant registration programs and fostering a vibrant open source IVI community

  - educating members on FOSS license compliance and successful deployment of FOSS in their products

  - helping organizations new to FOSS become educated and equipped to leverage FOSS in their automotive software

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GENIVI Membership

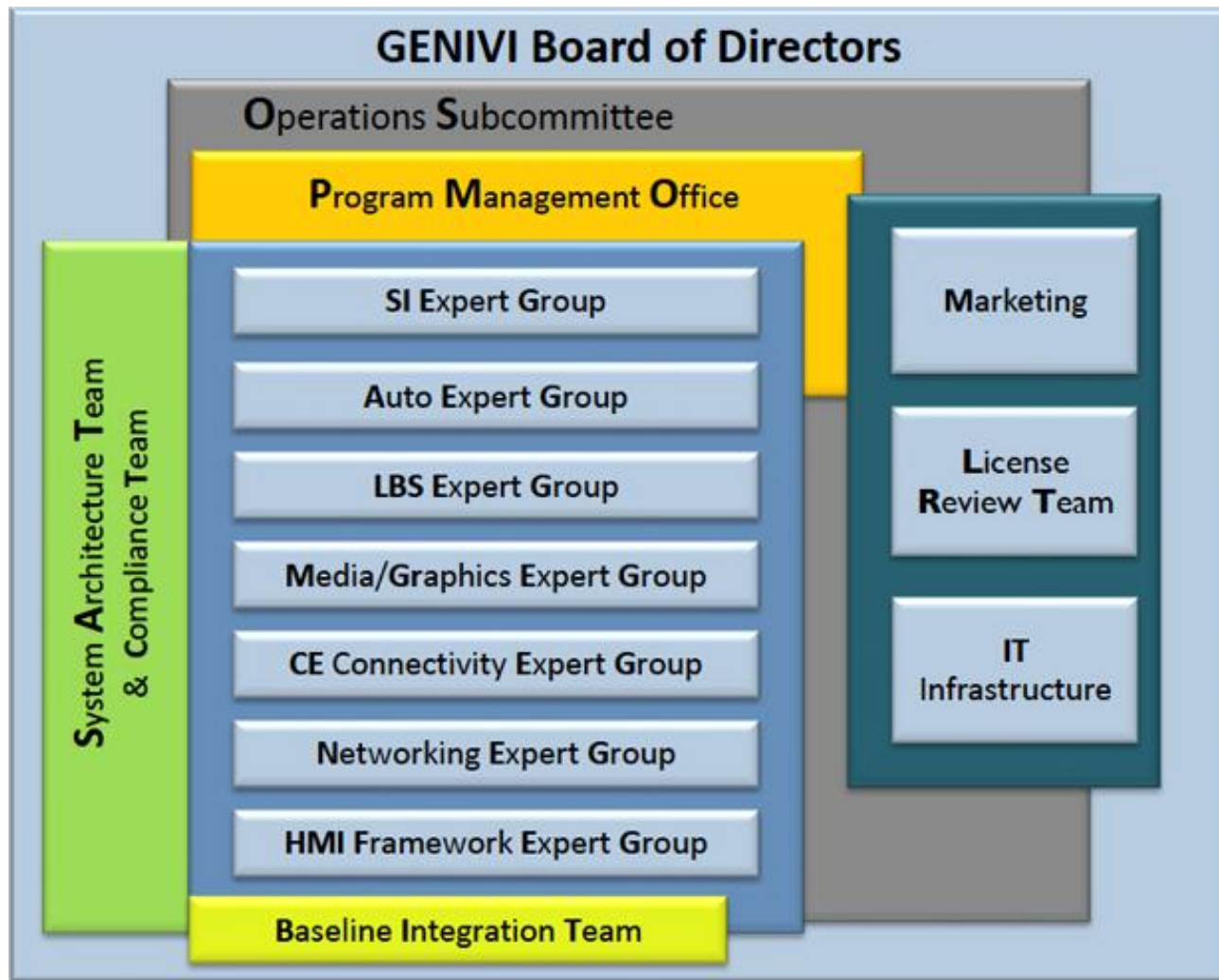| Region	Oct 31, 2013
Asia/ Pacific	49 (28%)
Europe/ Middle East/ Africa	73 (42%)
North/ South America	52 (30%)
Total Member Companies	174

Legend:
- ■ Asia / Pacific
- ■ Europe / Middle East /Africa
- ■ North /South America

Pie chart: 28%, 42%, 30%

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OEMs

BMW Group · BMW · MINI · FAW · GM · HONDA The Power of Dreams · HYUNDAI · JAGUAR · LAND ROVER · JOHN DEERE · LOCAL MOTORS · NISSAN · PSA PEUGEOT CITROËN · RENAULT · SAIC MOTOR · 上汽集团 · VOLVO

First Tiers

AISIN AW CO.,LTD. · ALPINE Mobile Media Solutions · ALPS · BOSCH Invented for life · clarion · Continental · DELPHI · DENSO · DESAY · HARMAN · Johnson Controls · LEAR CORPORATION · LG · MAGNETI MARELLI · MITSUBISHI ELECTRIC Changes for the Better · HYUNDAI MOBIS · MyAssist · PATEO · peiker menschen. entwickeln. nähe. · Pioneer · Valeo · Visteon

OSV, Middleware, Hardware, and Services Suppliers

abinsula · accenture High performance. Delivered. · ACCESS · Advanced Driver Information Technology · aicas realtime · Airbiquity · akhela · AllGo embedded · ALTEN · ALTERA MEASURABLE ADVANTAGE · alticast · ALTRAN PRAXIS · Aptina IMAGING · ARBITRON

Arkamys · arynga · Atos · ATP · ATX · AutoNavi 高德 · BearingPoint · BLACKDUCK FORGING SMART CONNECTIONS · BSQUARE · CANONICAL · CETECOM · cinemo changing the embedded entertainment world · CISCO

Codethink · Collabora · COMARCH · CTAG Centro Tecnológico de Automoción de Galicia · CYBERCOM GROUP · digia · dts · electric CLOUD · LARSEN & TOUBRO It's all about Imagineering · ERICPOL i-EVOLUTION · ESG · ERICSSON

ETRI Electronics and Telecommunications Research Institute · Fraunhofer ESK · GARMIN · GlobalLogic · GNSD · Green Hills SOFTWARE · GTS GTSYSTEM Green Technology & System Inc · HCL · HI CORP. · Hi-Q · HITACHI Inspire the Next · HMS HITEC MICRO SYSTEM · FORYOU automotive engineering · IAV

IBM · iGATE patni iTOPS for Business Outcomes · infobank · Infosys · intecs the Brainware company · IVIS AUTOMOTIVE SOLUTION · Ittiam · IXONOS · jambit WHERE INNOVATION WORKS · JUNGO · K2L CONNECTING NETWORKS · klocwork

KPIT · Livio Radio · LUXOFT Engineering Business Performance · MAGELLAN · Mahindra Satyam · mapscape · mds technology · Mentor Graphics · MiTAC 神通電腦 · mobica · MTA Advanced Automotive Solutions

muRata · navmii · NesT · Neusoft · NOMOVOK · OpenCar · Open Kernel Labs · openmobile · OPENSYNERGY · OTSL Inc. · PARASOFT EMBEDDED

Parrot · PATHPARTNER · pelagicore · protecode · Red Bend Software · SW · s1nn · sasken · Savari · 羙行科技 乐导航 唯羙行 · SIERRA WIRELESS · SIRIUS XM SATELLITE RADIO

SPANSION · Suresoft We peck your code · Suntec · swedspot · SYBASE · symbio · symphony teleca · TATA · TATA ELXSI · TechniSat DAS ORIGINAL · TeleChips · Telemotive AG

TELENAV · neta · TomTom · T-Systems · TUXERA · TWEDDLE GROUP · UNWIRED TECHNOLOGY · vestec · Videon CENTRAL · WIND RIVER · WIPRO · Xchanging Inspiring Innovation · XSe

Silicon

ANALOG DEVICES · ARM · csr · freescale semiconductor · FUJITSU · intel · ISSI · MARVELL · MICREL · NVIDIA · NXP · QUALCOMM · RENESAS · ST · TEXAS INSTRUMENTS · Vitec · VIVANTE · XILINX

GENIVI Alliance: Organization

GENIVI Alliance: Korean Regional Expert Group

- **Founded in 2011**

- **Collaboration of Korean GENIVI Members**
  - Regional requirements
  - Region specific contributions

- **Current Projects**
  - Car Data Logging
  - Vehicle Web API

- **Current Focus Topics**
  - Multiple profile for Clustertainment
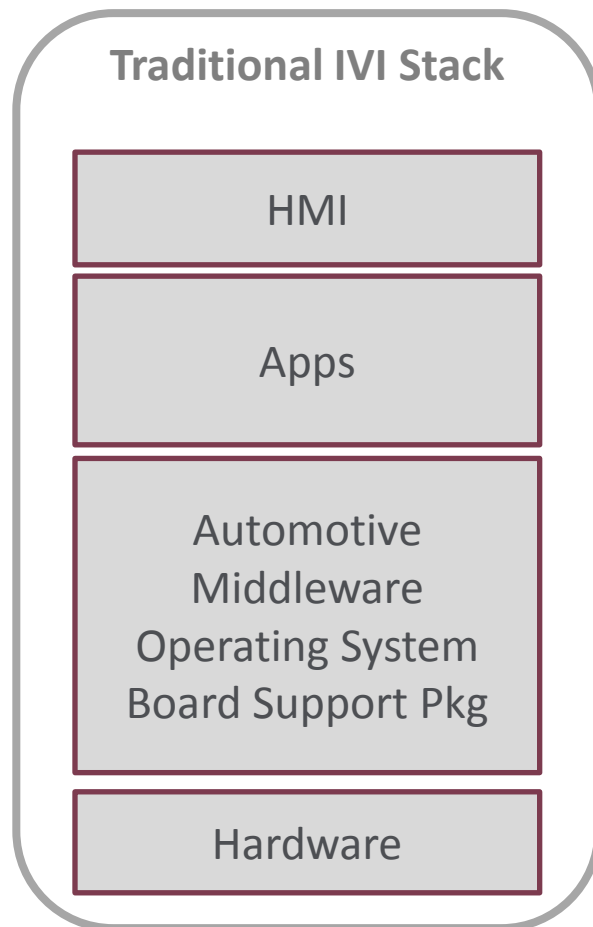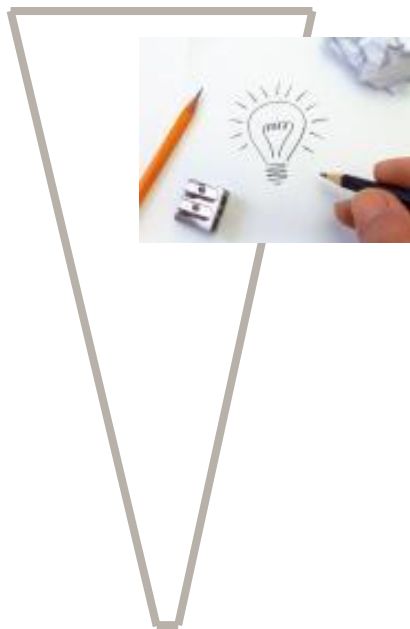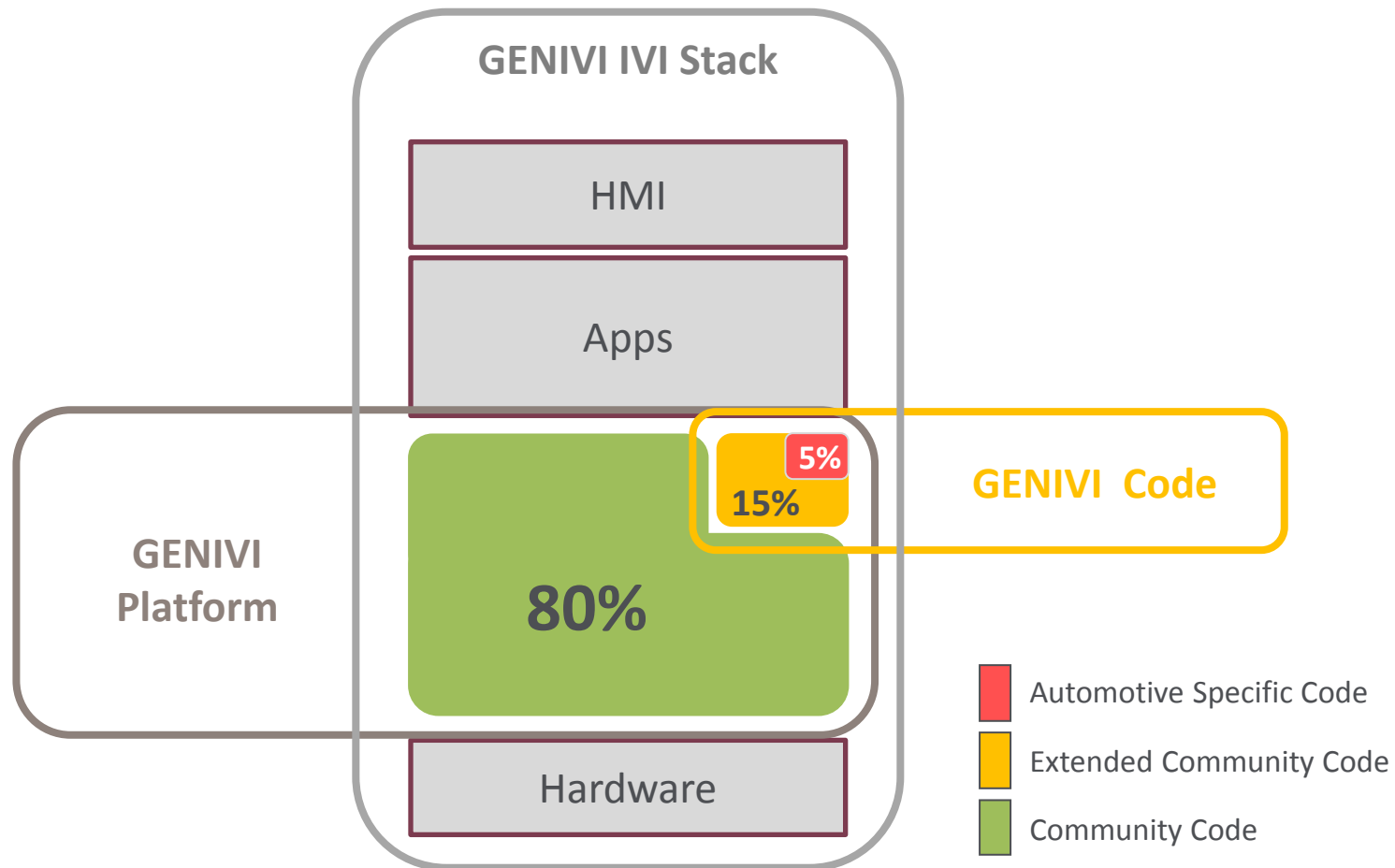 - Extensions to Vehicle Web API (radio tuner, navigation)

- **Members**

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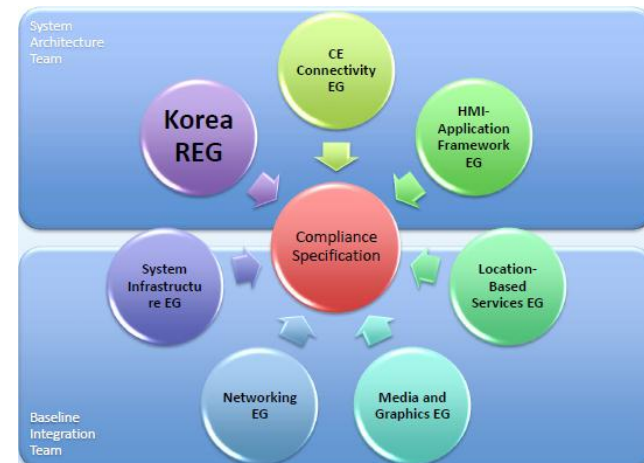
GENIVI Alliance: Deliverables

- **GENIVI delivers**

  - Aligned IVI requirements across a broad base of OEMs

  - Code that "satisfies" the requirements and "demonstrates" the compliance statements

  - A compliance program against which commercial offerings can be certified and ISVs can develop

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Traditional IVI Stack: Non-Differentiating Functionality Eats Up Most of the Money

Differentiation

Traditional IVI Stack

HMI

10%

Apps

30%

Automotive Middleware Operating System Board Support Pkg

60%

Hardware

Cost

10

GENIVI Solution Stack:
Adopt – Adapt – Create Model

GENIVI IVI Stack

HMI

Apps

GENIVI Platform

5%

15%

GENIVI Code

80%

Hardware

Automotive Specific Code

Extended Community Code

Community Code

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Implementation Models Change for IVI

- **Blue:** Code created by the 1st tier.
- **Yellow:** Licensed code from eco-system partners pre-integrated in the platform.
- **Red:** User interface logic and graphics (HMI)
- **Green:** Open Source Kernel / Open Source Packages
- **Purple:** Code created to make the platform automotive compliant.
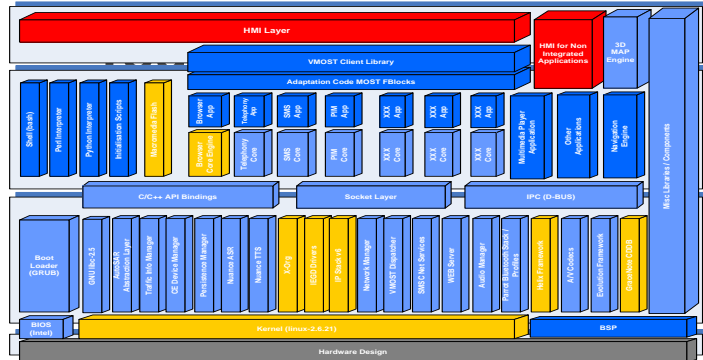
Classic implementation model

GENIVI based model

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GENIVI's Journey

March
2009
Launch

October
2010
Opened
Groups to
all
Members

April 2012
Largest
AMM
(450+)

**2013 –
Delivery
of First
GENIVI
Headunit**

January
2010
Reached
100
Members

May 2011
Launch of
Compliance
Program

October 2012
Introduction
of Open
Projects

CLOSED

OPEN

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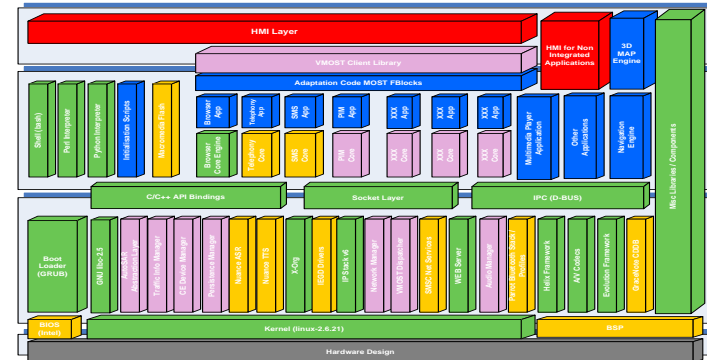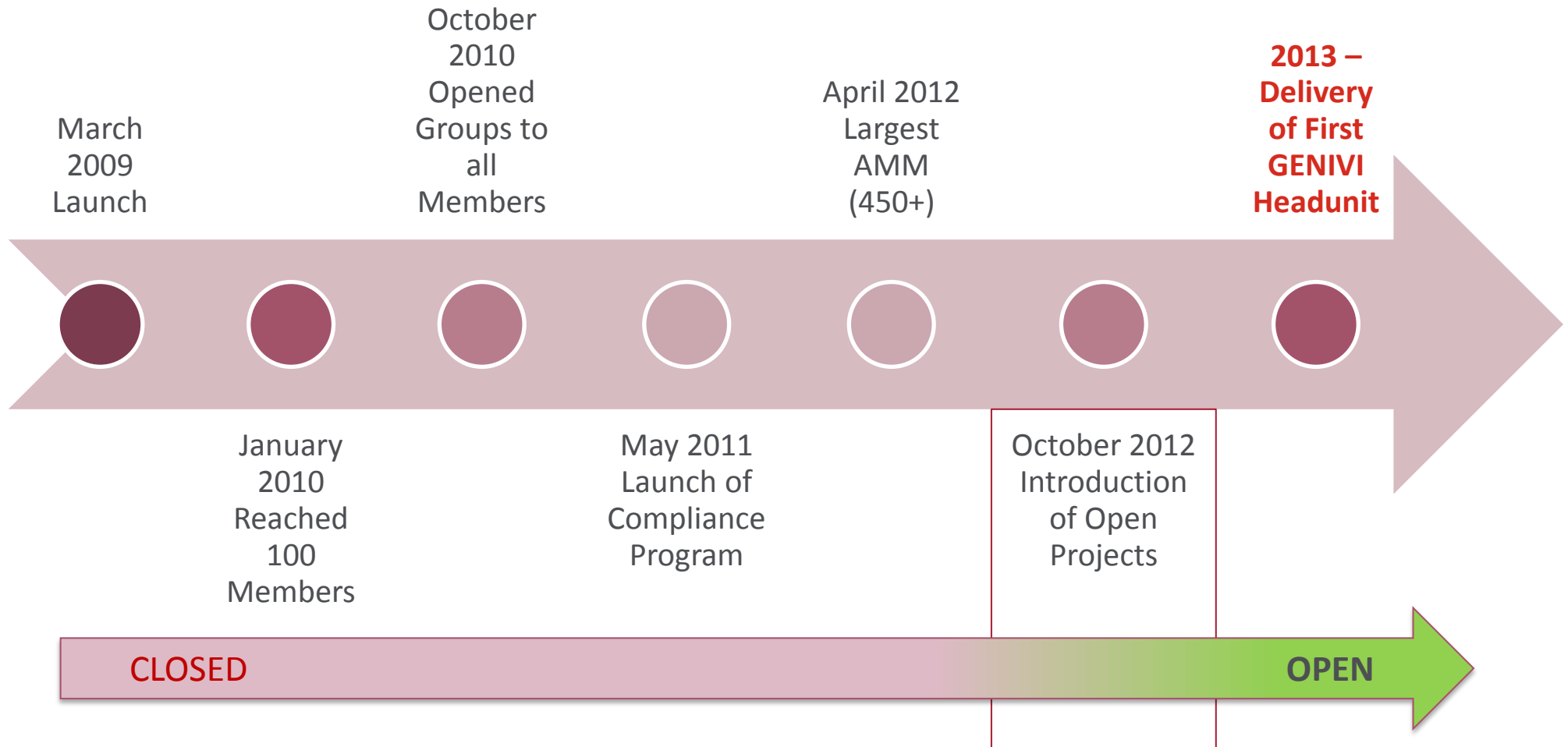
Going Open Source: Some Drivers

- Ignite a vibrant ecosystem for IVI related functionality

- Drive adoption of open source in IVI

- Create and facilitate an active communities of world-class developers to develop IVI related functionality in an open and collaborative manner

- Be consistent with the best practices of other successful FOSS communities and projects

- Evolve the development methodology of automotive software delivery

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All GENIVI development is now in the Open Source Community

- AF_BUS D-Bus Optimization
- Audio Manager
- Browser Proof of Concept
- Diagnostic Log and Trace
- IVI Layer Management
- IPC CommonAPI C++
- IVI Radio
- LXCBench
- Node Startup Controller (NSC)
- Node State Manager (NSM)
- Persistence Client Library
- Point Of Interest POC
- SmartDeviceLink
- WebAPI Vehicle
- Yamaica Toolset

http://genivi.org/projects
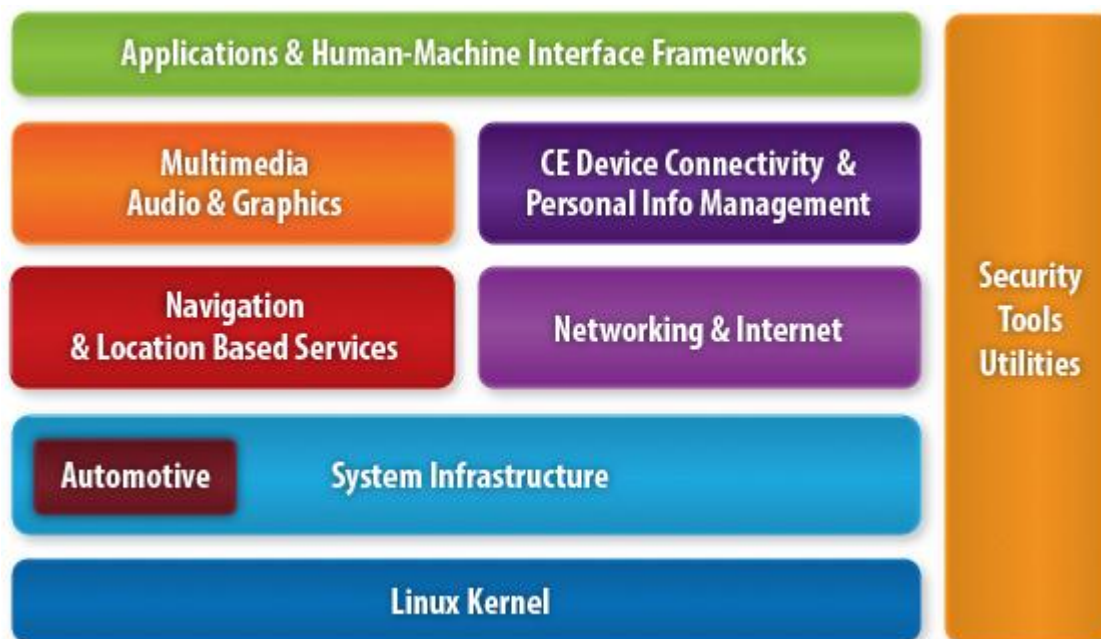
Going Open Source: Some Challenges

- How to make it easy to contribute?

- How to manage license compliance efficiently?

- How to develop software "the Open Source way" and address cultural concerns^?

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GENIVI Contribution Options

1) Entity Contributors License Agreement

- License agreement between contributor and GENIVI
  - Patent and Copyright license
  - Right to relicense
- Based on the Harmony Agreement (http://harmonyagreements.org/)

2) Open Source License + Certificate of Origin (COO)

- License must be compatible to project license and in-line with License Policy
- COO similar to that of the Linux Kernel
  - Track the "Source of the Source"

Preferred

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GENIVI Licensing Policy

- **Green Light Licenses**
  - MPL V2.0 (**default project license**)
  - BSD 2-/3-Clause
  - MIT/X11
  - Apache V1.1/V2.0
  - Artistic License V1.0/V2.0

- **Orange Light Licenses**
  - (L)GPL V2(.1)
  - Academic Free License
  - Open Software License
  - Public Domain
  - OpenSSL

- **Red Light Licenses**
  - (L)GPL V3
  - LGPL V2.0

Public Policy for GENIVI Licensing and Copyright Version 1.0

http://docs.projects.genivi.org/License/Public_Policy_for_GENIVI_Licensing_and_Copyright_v_1.0.pdf

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Is it practical to just say "no GPLv3"?

at least for the mid term

- The GENIVI platform has been kept GPL V3-free without problems

- Recent GENIVI based IVI systems have successfully been built without using any GPL V3 licensed components

- No overhead (e.g. re-implementation) or workarounds (e.g. use older versions) were required to avoid GPL V3

- GPL V3 licensed components are used for development but they do not end up on the head unit

GENIVI's "No-GPL V3" policy is sustainable

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How to deal with GPL V3 in the long term? *Under Discussion*

- One possibility is: treat the software in the car in the same way as the hardware: free to change but under regulatory control

- This might work as follows (depending on the jurisdiction):
  - All software is free to modify for everyone
  - Approval required by certification authority for all safety relevant software (same as for rims, tires, light bulbs,…).
  - If uncertified software is used, the car is no longer allowed to be operated on public streets and insurance coverage is void.
  - If uncertified software is detected during the mandatory safety inspection or a Police stop, the driver may have to pay a fine, lose the license, or even face criminal charges.

- Many details will have to be worked out
  - How to define safety relevant?
  - Who can certify software
  - How can uncertified software be detected reliably?
  - How would manufacturer updates work
  - ….

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License Compliance in the Automotive Supply Chain

- Different formats for license information
- Unpredictable quality
- Duplicate efforts
- No trust

Compliant?

Inefficient, ineffective

High Risk

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The Fantec Case

Landgericht Hamburg

Az.: 308 O 10/13

Verkündet am 14.06.2013

Sannmann, JHS'in
als Urkundsbeamter/in der Geschäftsstelle

- **GPL violation discovered**
  - Source code was made available, but not the "corresponding" version

- **Fantec argues**
  - Chinese supplier asserted that delivered source code was complete
  - Effective verification of completeness only possible by copyright holder
  - Source code assessments are costly but no warranty that results are complete and correct

- **The Court says**
  - Fantec was required to ensure the GPL obligations are fulfilled for their delivery
  - Fantec acted negligently by relying on its suppliers
  - Fantec was required to assess, the software by themselves or by a competent 3rd party, even if this meant additional cost

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License Compliance Management must change fundamentally

- **Standardized format for license data (e.g. SPDX)**
  - File based license data
  - Information about how the data was created

- **Quality standards for the license data**
  - Defined creation process and rules
  - Verification requirements

- **Standardization of license obligations fulfillment**
  - Who does what when and how

- **Collaboration**
  - Qualified FOSS management experts work together beyond company boundaries
  - License data is jointly developed

What works for code can also work for license data…

License Compliance maintained by a Community

- **Members maintain FOSS management maturity**
  - Adequate policies, processes, tools
  - Active FOSS supplier management
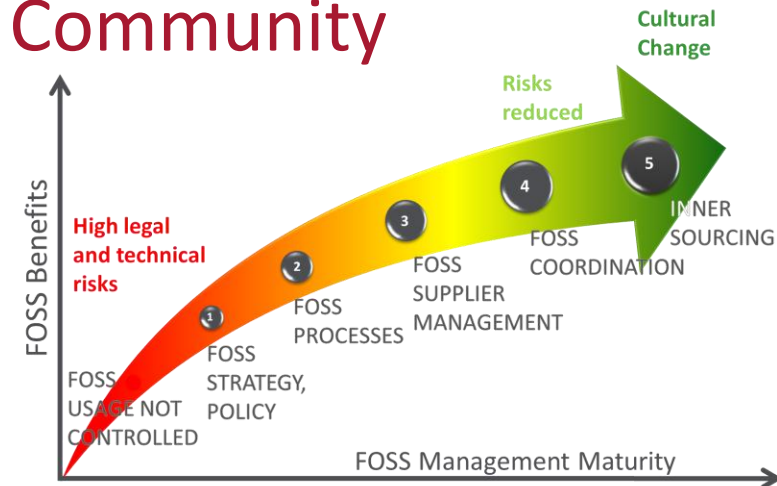
- **Members jointly create a growing pool of reliable and reusable license data**
  - Members share the license data they have created for their deliveries (source or binary, components or complete works) by uploading it to a repository
    - License data provided AS-IS, no warranty, liability
  - Whenever code delivered by a member is reused in the supply chain, the associated license data can be retrieved from the repository and reused, too
    - Duplicate efforts can be avoided

License compliance becomes built into the supply chain

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So …

FOSS licensing is the biggest challenge?

NO!

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The Biggest Challenge is ….

... fundamentally changing the way how software is being developed in the automotive industry
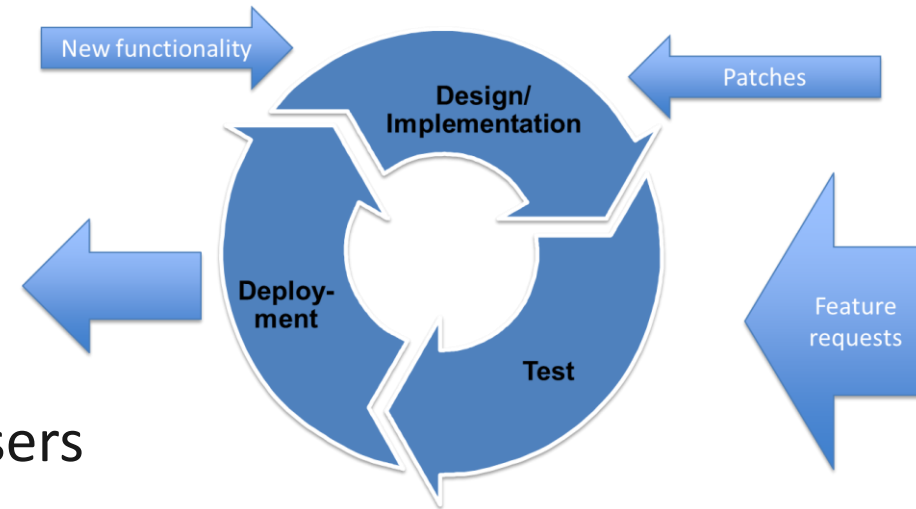
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Traditional Automotive Software Development

- Defined process with milestones

- Design, code freeze

- Agile implementation (sometimes)

- External requirements on development, e.g. safety

- Planning, planning, planning,…

  - Development following a fixed plan (well, sort of)

- Managed top-down by the corporate hierarchy
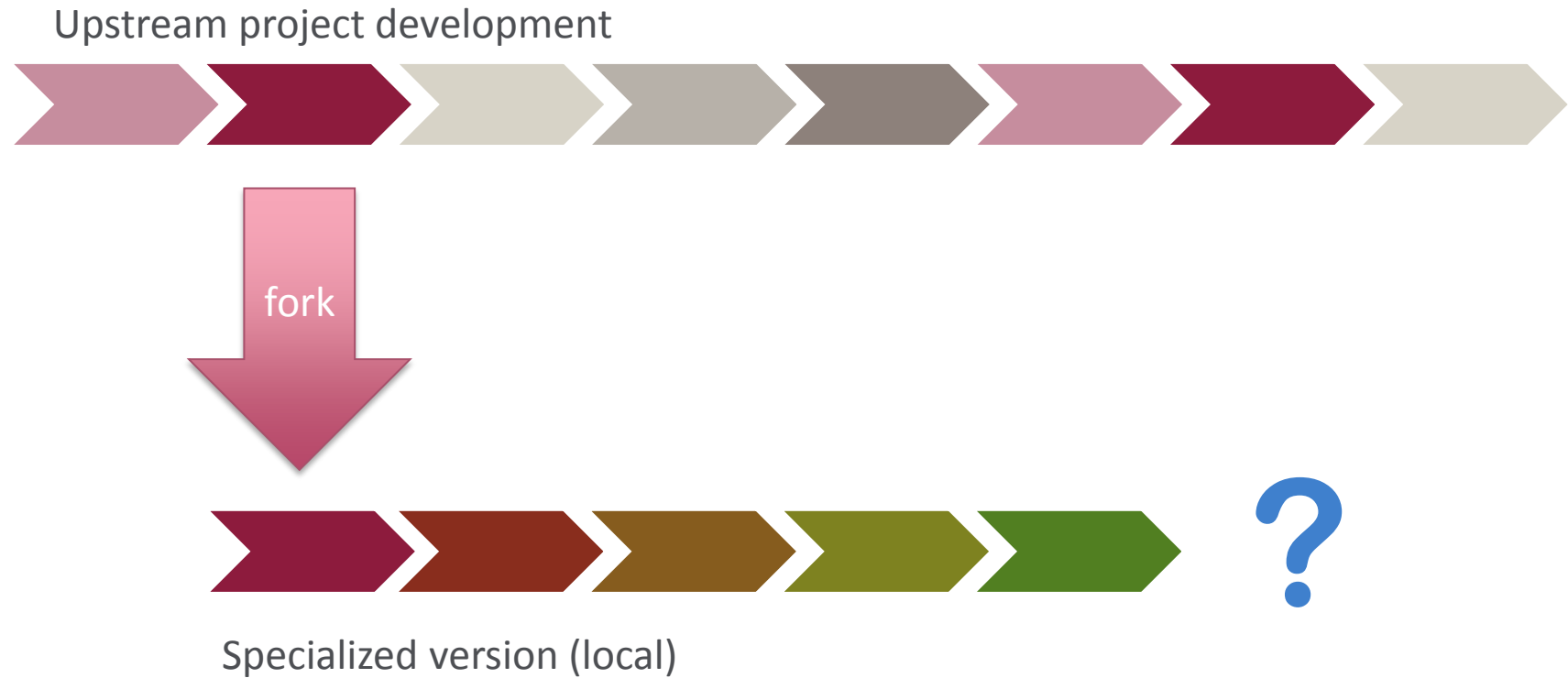
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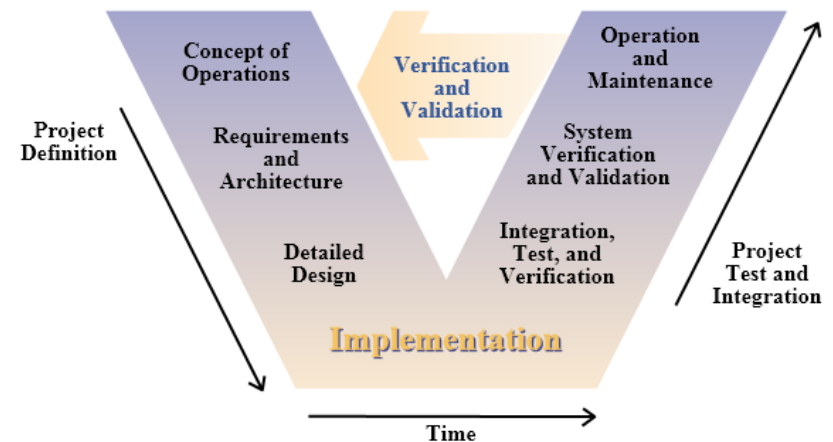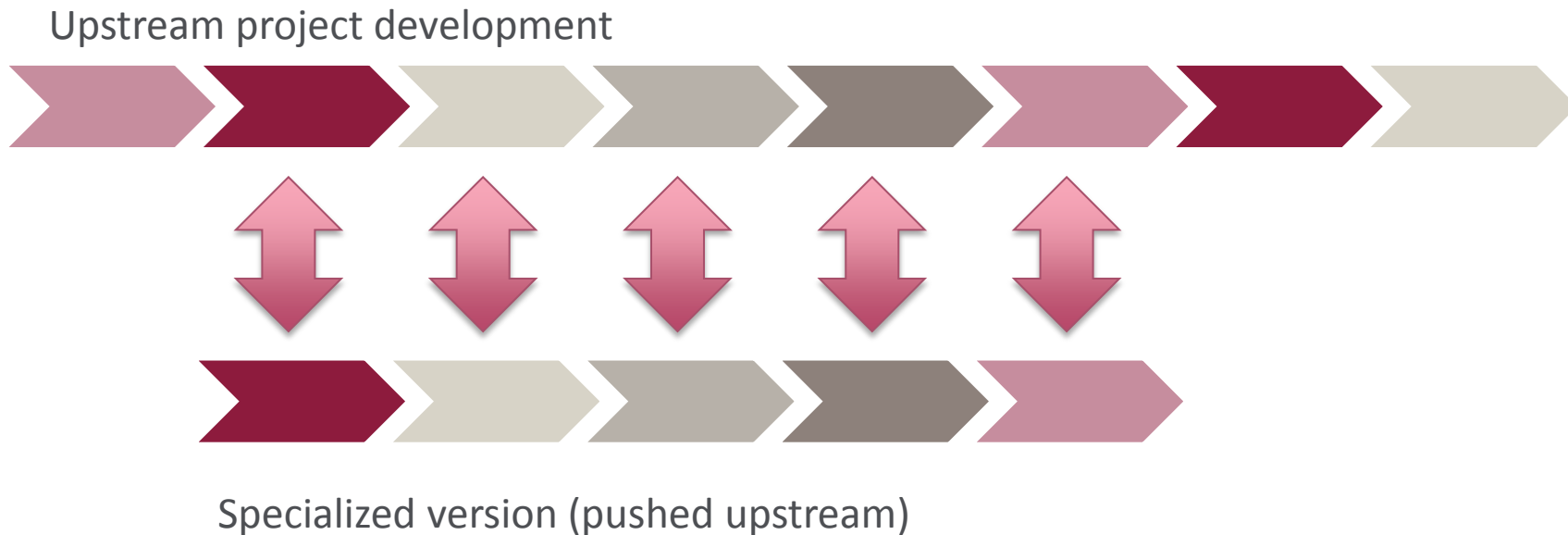
Open Source Software Development

- Release early, release often

- Tests done partially by community or users

- Unwritten rules, no formal requirement for joining a project

- No dedicated nor controlled resources

- No F2F meetings or discussions, everything happens on the mailing list

- Self organizing teams

- Meritocracy

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Old Style: Use FOSS

Upstream project development

fork

Specialized version (local)

?

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New Style: Work with the FOSS Community

Upstream project development

Specialized version (pushed upstream)

- Don't keep code by yourself, "open source" it and push it upstream

- Develop the code in the upstream project, then pull it back down

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Summary

- GENIVI is fueling a vibrant FOSS community of world-class developers to develop IVI related functionality in an open and collaborative manner

- GENIVI is fundamentally changing the way software is being developed in the Automotive ecosystem

- GENIVI is fundamentally changing the way license compliance is managed across the Automotive supply chain

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Contact

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Claus-Peter Wiedemann
Senior Manager

BearingPoint   T +49 89 54033 6367
Erika-Mann-Str. 9   F +49 89 54033 7940
80636 München   M +49 172 2757415
Germany

                                    www.bearingpoint.com

claus-peter.wiedemann@bearingpoint.com

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