Teaching Old Dogs
New Tricks
Open Source in Traditional Industries

20 September 2012
OSW Erfurt, Deutsche Bahn

Hans-Jürgen Kugler
Teaching Old Dogs New Tricks
Open Source in Traditional Industries

Open Source Software is often seen as a hobby for nerds (positive) or the training-ground for would be hackers (negative.) In the traditional engineering product oriented industries few - maybe too few - executives have understood that open source does stand for a new business approach. Many of these executives are still dealing with the repercussions that software, their own proprietary software, caused in their organisation when it "infected" their products. Most of these executives are not aware that open source maybe just what they need to tame the resource hungry software development in their own organisation. There is hope, however. Even in automotive, one of the more conservative industries, key players begin to see that not all is threat, but that there is opportunity.
Who are these “Old Dogs”? "traditional" industries
"traditional" industries

pre-software
Software – ein sehr spezieller „Werkstoff“

- kein Gewicht - keine Oberfläche
- nicht direkt sichtbar - Fata Morgana
der Einfachheit und Eleganz

jeder kennt Software
(glaubt sie zu kennen –
„... hab ich doch zuhause …“)
keiner beherrscht sie

ist „ansteckend“ – epidemische Proportionen
90% of Innovations are software determined
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Paradigms of the industrial Revolution

Efficiency = Control
Fast = Central
Bigger = Better
Hierarchy = Fast
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“Sociology beats Technology”? 

- ICSE 2007 panel
  - Tim Lister (co-author of Peopleware”)

- “The major problems of our work are not so much technological as sociological in nature.”

- Focus less on new ASE tools and more on management / sociological factors

- E.g. More important than “software tools”
  - Any one of 1,2,3,4,5,6,7,8
  - Any two of 10,11,12,...,22

- So, is there a business case for automated software engineering?

Relative impact on development effort. Regression analysis of 161 projects. Boehm et al. 2000
Paradigms of the *industrial Revolution*

Efficiency = Control
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... and then ...
RDTN crowdsources radiation levels across Japan

By Mark Brown  |  22 March 11

RDTN was set up in 72 hours from concept to launch.
Is "traditional" and "new" that different?

<table>
<thead>
<tr>
<th>market</th>
<th>ecosystem</th>
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<tbody>
<tr>
<td>push</td>
<td>pull</td>
</tr>
<tr>
<td>product</td>
<td>platform</td>
</tr>
<tr>
<td>competition</td>
<td>coopetition</td>
</tr>
<tr>
<td>private interfaces</td>
<td>open interfaces/source</td>
</tr>
<tr>
<td>protect IP</td>
<td>co-innovate</td>
</tr>
<tr>
<td>cost of ownership</td>
<td>value creation</td>
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<tr>
<td>OP (linear)</td>
<td>purposeful systems (living systems)</td>
</tr>
<tr>
<td>central</td>
<td>networked</td>
</tr>
<tr>
<td>hierarchy</td>
<td>flat</td>
</tr>
<tr>
<td>vertical authority</td>
<td>meritocracy</td>
</tr>
<tr>
<td>external control</td>
<td>internal purpose</td>
</tr>
<tr>
<td>selfish</td>
<td>emphatic</td>
</tr>
</tbody>
</table>
Community based Development as enabler to cope with innovation extent and speed.
Managing Complexity.
Reuse of Base Knowledge to Enable Innovation.

1. Store / Import Process and Development achievements
2. Concentrate on innovations
Community enables teams to concentrate on real innovations.

Exploit the community approaches:
→ Ecosystem for application development!

Perceived value for customer
AUTOSAR fact 1.
An Overview.
AUTOSAR fact 2 - Methodology and Tooling areas.
System view and ECU view.
AUTOSAR development process.
Intrinsic feature of Methodology_enabler to handle reusable designed and developed SWC.

Innovations
- Existing Functions (with Variants)

Infrastructural Requirements

Functional Requirements

AUTOSAR Methodology

- SW Component Description
- Component API Generator
  - Component API e.g. app.h
- System Configuration Description
  - ECU Configuration Description
  - AUTOSAR ECU Configuration Generator
  - ECU extract of System Configuration
- AUTOSAR System Configuration Generator
  - ECU extract of System Configuration

ECU Configuration Description
- list of SW Components
- RTE Extract of ECUConfig
- OS extract of ECUconfig e.g. OIL

AUTOSAR RTE Generator
- Generator for OS, COM, ...
- Other Basic SW Generator
- MCAL Generator
Open Source means Open Review. Continuous open enhancements lead to high quality.

- Applications
- Platforms
- Operating System
- Subsystems
- Drivers

Open review increases quality

Improve and build open standards

automotive apps

review & merge

automotive additions

review & merge

merge & integration

selection

review & merge

review & merge

review & merge

review & merge

testing & review

wireless networking

linux - next sound x86 Linux mainline testing & review

merge & integration

review & merge

review & merge

review & merge
Innovation Development and Community Sources.
The survival strategy.
New procedures will open up new business.
Open Source Software in Old Industry

Wikinomics bei Bosch: Bosch Internal Open Source - BIOS

3 Projekte in unterschiedlichen Entwicklungphasen

- Projekt 1: 40 Beiträgerin aus 12 GB
- Projekt 2: 7 Beiträgerin aus 3 GB
- Projekt 3: 4 Beiträger aus 3 GB

Beiträge Freiwilliger in heterogenen Communities

- Projekt 1: 40 Beiträge aus 12 GB
- Projekt 2: 7 Beiträge aus 3 GB
- Projekt 3: 4 Beiträge aus 3 GB

Revolutionäre Art der Zusammenarbeit bei Bosch
Leitprinzipien: Offenheit, Freiwilligkeit, Meritokratie, Selbstbestimmtheit

BIOS Framework
- Steuerungsmethoden
- Infrastruktur
- Incentives & Motivation
- Produktarchitektur
- Rechtliche Rahmenbedingungen
- Projektbetreuung
GENIVI Alliance Mission

GENIVI is a non-profit industry alliance committed to driving the broad adoption of an In-Vehicle Infotainment (IVI) reference platform.

GENIVI will accomplish this by aligning requirements, delivering reference implementations, offering certification programs and fostering a vibrant open source IVI community.
Open Source Software in Old Industry

Situation in Automotive Infotainment

Classic/Proprietary
- Code created by the 1st tier.
- Licensed code from eco-system partners pre-integrated in the platform

GENIVI/Open Source
- Open Source Kernel / Open Source Packages
- Code created for automotive compliance
- User interface logic and graphics
Open Source Software in Old Industry

Internet – The Driver of Change

Number of devices

1,000,000,000,000

1,000,000,000

1,000,000

1,000

1995

Web 0

Web 1.0

Web 2.0

Web 3.0

Connecting Documents

Connecting Companies

Connecting People

Web Service

Java, XML

Internet of Things and Services

Linking the physical and virtual worlds

Connecting Business Models

Business Services

1995

2000

2005

2020

Bosch Software Innovations

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We want to connect the virtual and the physical world

Throughout its 126-year history, the one thing that Robert Bosch GmbH has always done is make things. We produce injection systems and sensors, semiconductors, refrigerators, hammer drills, and much more. As a supplier of technology and services, Bosch primarily manufactures technical products and provides traditional services to go with them – and we will continue to do so. However, we realize that our business models are confronted with fundamental change. Networking over the internet is one of the most powerful global trends, but it is one that many companies still vastly underestimate. We must all come to terms with the fact that we stand before a paradigm shift and that the internet of things and services will bring root and branch changes to the world of business. While this presents huge opportunities, it also poses substantial challenges – and not just for Bosch.
TOPCASED project – initial members

Industries
- AIRBUS
- CNES
- EADS Astrium
- Continental
- CS Communication & Systems
- Thales
- Turbomeca
- Sopra Group
- Rockwell Collins
- Atos Origin
- AKKA Technologies
- SOGETI
- Origin

SMEs
- Tectosages
- Anyware Technologies
- Sodifrance
- Micouin
- AdaCore
- Elidiss Technologies
- Clearsys
- BEO
- Greensys

School/Universities
- INP Enseignes
- ENSIETA
- ESEO
- Université Paul Sabatier
- Telecom ParisTech
- Université de Toulouse Le Mirail
- Université de Rennes 1
- Université Paul Sabatier

Laboratories
- INRIA
- ONERA
- LIP
- IRISA
- Atlas
- Triskel
- Cesta
- LIST
- LAAS
- CERIST
Military Open Source Community Growing

By Kane McLean, RTRC Technology Research Corporation

- Information Assurance & Security: One of the biggest values of open source development is enabling wider community access to software source. In this manner all bugs become shallow and more easily found. Wider access to software source code also is key for forming and maintaining a software security posture from being able to review software source code to seeing what is actually present within that software.
Creating an "openETCS Ecoystem"

Qualified Trusted Developers

EN 50128 Procedures

Qualified Source Code

openETCS.org

Trusted Repository

openETCS Source Code

Opened Source Code

Bug Reports

Development Community

Source Code

System Integrators OE

Distributor

openETCS

Distributor

openETCS

Integrator

openETCS

API

HW

EVC

ETCS Onboard Unit

NSA

NoBo

Users
(Railway Operators)

Support

Qualified

Developers

API

Users
(Railway Operators)

Support
Kontrolle ist gut,
Vertrauen ist besser.

Lenin
Danke für Ihre Aufmerksamkeit.

Fragen? Anregungen?

Teaching Old Dogs New Tricks