

Open Source as a Strategic Tool

Bosch Software Innovations GmbH

Dr. Steffen Evers

Head of Open Source Services

June 3rd, 2016



Bosch Group

Active in four business areas

Bosch Group

Active in four business areas



Mobility Solutions

€ 33 Billion



Bosch Group

Active in four business areas



Mobility Solutions

€ 33 Billion



Industrial Technology

€ 7 Billion



Consumer Goods

€ 4 Billion



Energy and Building

€ 5 Billion



Bosch Group

Active in four business areas



Mobility Solutions

€ 33 Billion



Industrial Technology

€ 7 Billion



Consumer Goods

€ 4 Billion



Energy and Building

€ 5 Billion



Bosch as a software company

Researchers and developers across the globe



94 research and development locations
in 25 countries

45,700
associates in
research and development

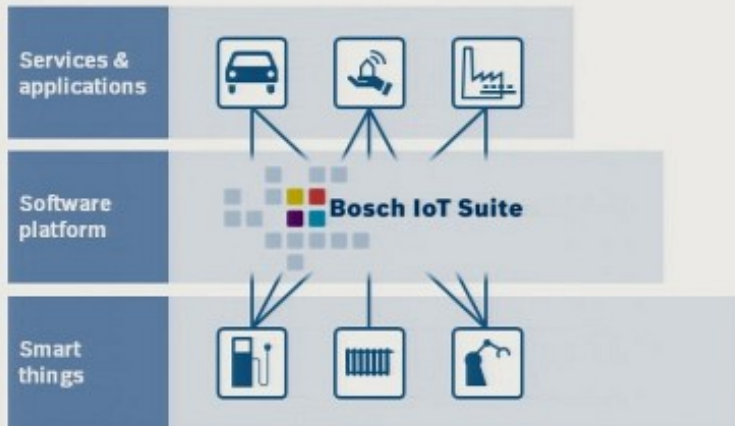
15,000
software engineers

3,000
developers for the
Internet of Things

*Locations with 50 or more associates as per December 31, 2014

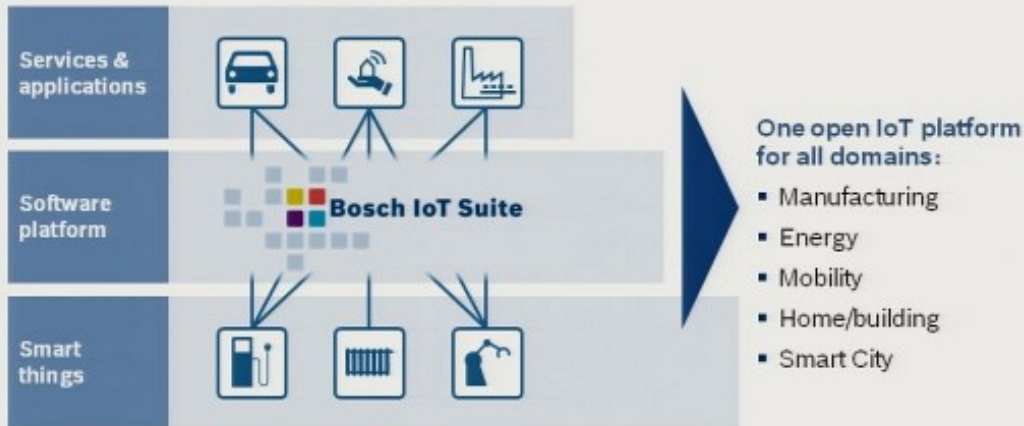
The three layers of the IoT

A software platform converts information provided by smart things into services.



The three layers of the IoT

A software platform converts information provided by smart things into services.



At a glance

= 600 associates

Milestones since 2008

Shanghai

2008 Bosch acquires Innovations Software Technology

Germany

2011 Change of name to Bosch Software Innovations

Chicago

2011 Bosch acquires inubit

Sofia (ProSyst)

2012 Opening of the Bosch IoT Lab at the University of St. Gallen

Singapore

2013 Launch of the Bosch IoT Suite

Berlin

2014 First Bosch ConnectedWorld

Cologne (ProSyst)

2015 First European testbed for the Industrial Internet Consortium

Waiblingen

Immenstaad

2015 Bosch acquires ProSyst Software

The software and systems house emerged out of the two earliest acquisitions in the IoT space

Open Source is ...

... a method for

- component based software development
- internet-based scalable collaboration
- requirements engineering for complex situations

... software representing

- a gigantic pool of available software technologies
- a huge collection of de-facto standards on code level
- the largest supplier for many software developers & companies

... community of IT specialists

- Foundations
- Independent Projects on OSS Hosters like GitHub, GitLab, Sourceforge
- Millions of software engineers

Using Open Source to Reach Business Goal

- **De-facto Standardization:** When the majority uses it is a standard
- Partnerships for **Collaboration:** Fast, efficient, focused, reliable
- **Minimize Dependency** on Suppliers : Having alternatives to your software suppliers
- **Viral Marketing** for software technologies: Make them try, embrace, use and like it and spread the news!
- **Establish a New Market** in Technology: Reduce the entry barrier to the minimum!
- Break/Prevent a **Proprietary Monopoly:** Keep your independence and get your share of the market!
- **Reduce Costs:** Share costs for commodity without losing influence
- **Increase Quality:** Increase quality by broad testing reviews, skilled attention, broad expertise

How Big is FOSS?

- GitHub: 4,751,000 repositories
- SourceForge: 324,000 projects
- Ohloh: 550,000 projects

BIG

© 2012 Ohloh

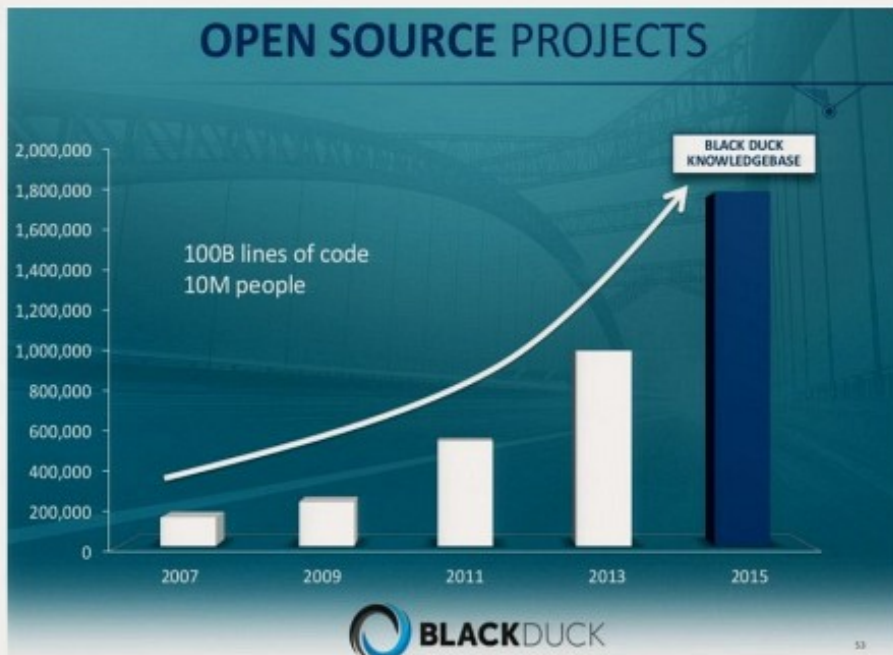
ohloh

Open Source by the Numbers

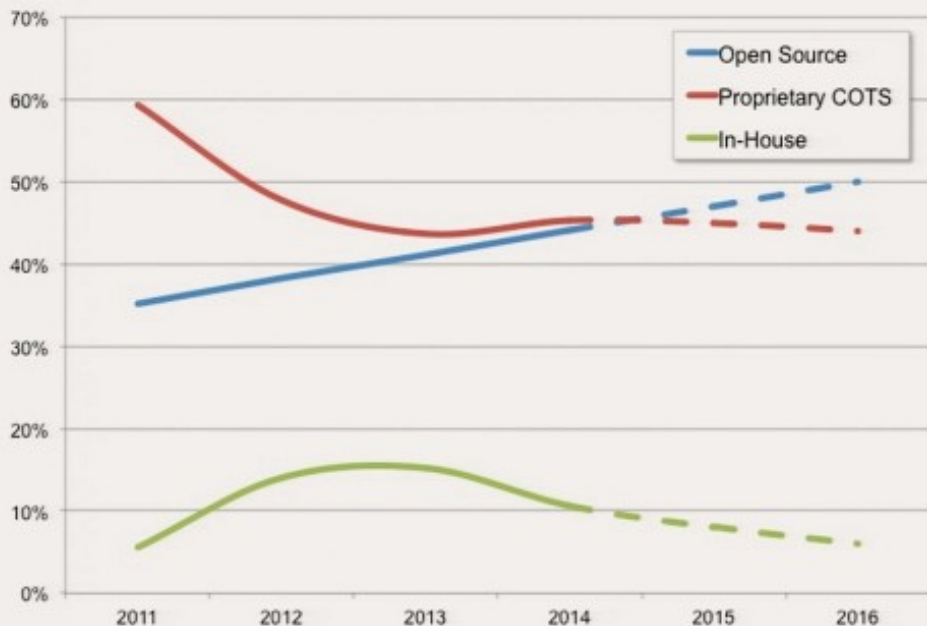
- Only a small fraction of all the projects ever started gain long-term traction.
- Less than 5% of all projects on Ohloh are "live": a commit in the past year, and more than 1 committer, ever.
- The larger the code base, the less contributors and activity.
- "Famous" projects are mostly Java and C-family, and these older, established languages retain their dominant mindshare.
- New live projects trending towards Python, PHP, JavaScript and away from C-family languages.
- The "most likely to succeed" new projects:
 - Have big backers and marketing behind them.
 - Are still small enough for people joining them to have an impact.



Black Duck: 2014 Future of Open Source Survey Results

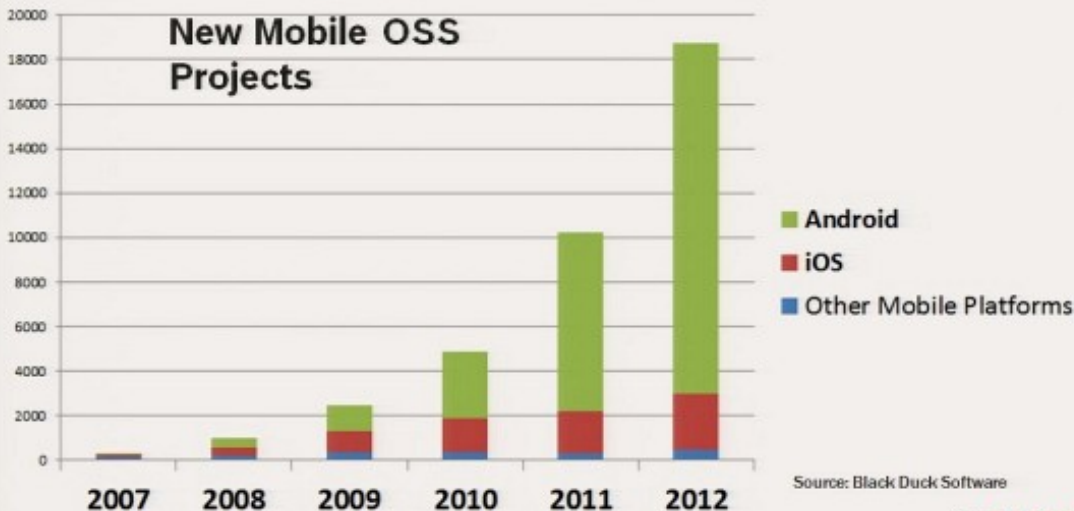


Black Duck Consulting: Trends in device OSEs

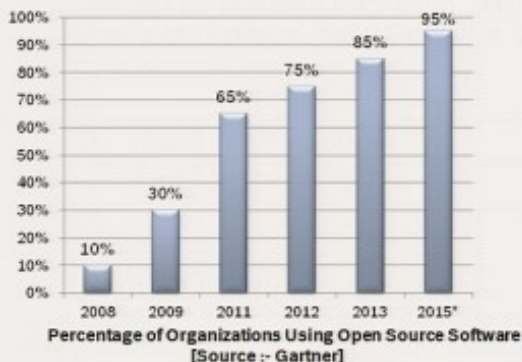


Black Duck Statistics 2014: Mobile Open Source Projects Trend

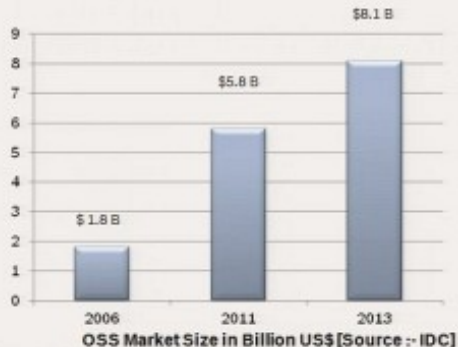
- New Android-related open source projects continue to gain momentum, dramatically overtaking iOS related open source projects.
- New Android projects grow 96% Y/Y while new iOS project grow 32% Y/Y.



OSS Market Trend



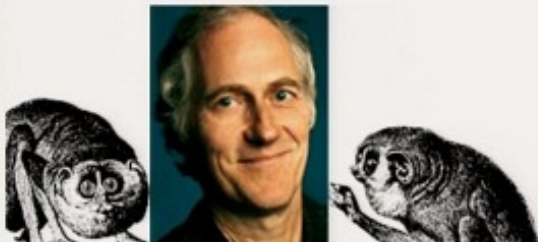
• By 2015 at least 95% of mainstream IT organizations will leverage open source solutions within mission critical software deployments.



• Open source growing at an average yearly growth of 22%

In 2012, Gartner reported that on average, 29% of the total deployed code was open source

The Open Source Paradigm Shift



Tim O'Reilly

Open source is an expression of three deep, long-term trends:

- The commoditization of software
- Network-enabled collaboration
- Software customizability (software as a service)

Picture Source: <http://cdn.oreillystatic.com/images/people/tim-2010.jpg>

Source: Tim O'Reilly: "Open Source Paradigm Shift", 2004, http://www.oreilynet.com/pub/a/oreilly/tim/articles/paradigmshift_0504.html

Software is Eating the World



2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0

90% of automotive innovations are realised by software

CAN Class B

- Regelventil- und Ventilsteuereinheit
- Wahlverriegelung und -relais von (P44338)C
- Regelventil- und Ventilsteuereinheit
- Wahlverriegelung und -relais von (P44338)C
- Steuerungs-EV (S20)
- Steuerungs-EV (S21)
- Transporter von links (T50)
- Transporter von rechts (T50)
- Transporter links vorne (T50)
- Transporter rechts vorne (T50)
- Transporter hinten (T50)
- Transporter hinten rechts (T50)
- Getriebebremse (T50)
- Ursache Schalter (S20)
- Ursache Schalter (S21)
- Elektronischer Zusatzschalter (S20)

- Anteilnehmer (S20)
- CSM (S20) - Auto (S20) - Auto (S20) - S20
- Parallelschaltung (S20)
- Antriebsbremse (S20)
- Multifunktionssteuerung - Sonderanfertigung (S20)
- Steuererzeugung
- Hersteller (S20) - S20 - S20
- Hersteller (S20) - S20 - S20
- Hersteller (S20) - S20 - S20
- Hersteller (S20) - S20 - S20

CAN Class C

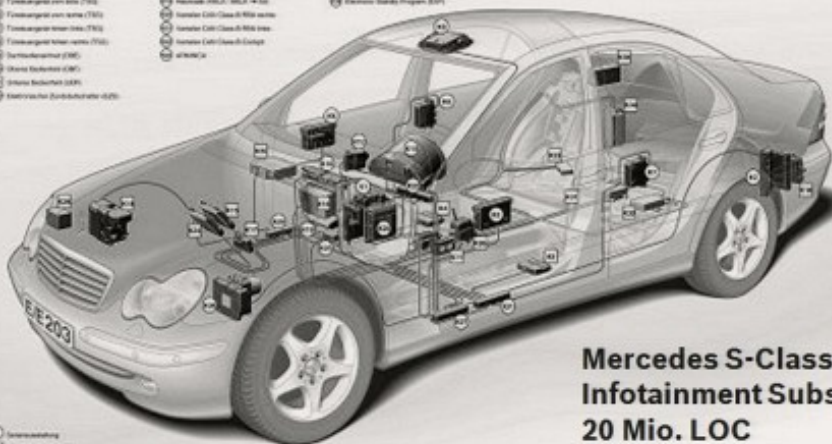
- Elektronischer Zusatzschalter (S20)
- AC/DC (S20)
- Elektronische Betriebsbremse (S20) von (S20)
- Wahlverriegelung (S20)
- Elektronische Motorbremse (S20)
- Variable CAN Class C (S20) von (S20)
- Elektronische Steuererzeugung (S20)

Unvernetzte SG

- AC/DC
- Tri-Tone

optical

- CSM (S20) - Auto (S20) - Auto (S20) - S20
- Elektronische Betriebsbremse (S20) von (S20)
- Ursache (S20)
- Hersteller (S20) - S20 - S20
- Steuererzeugung
- CSM (S20)



50 – 100
networked
ECUs

Mercedes S-Class
Infotainment Subsystem
20 Mio. LOC

2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0



GE CEO Jeff Immelt

“Every industrial company will become a software company”

http://www.ge.com/ar2013/pdf/GE_AR13_Letter.pdf

2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0

...and every software company is an open source company

 InfoWorld

Most Popular: 

 |  |  | 

Home > Application Development > Microsoft .Net

Microsoft .Net's execution engine goes open source

 ZDNet



White Papers

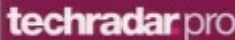
Hot Topics

Downloads

Reviews

Newsletters

SAP supports open source Cloud Foundry and OpenStack for cloud

 techradar pro IT INSIGHTS FOR BUSINESS

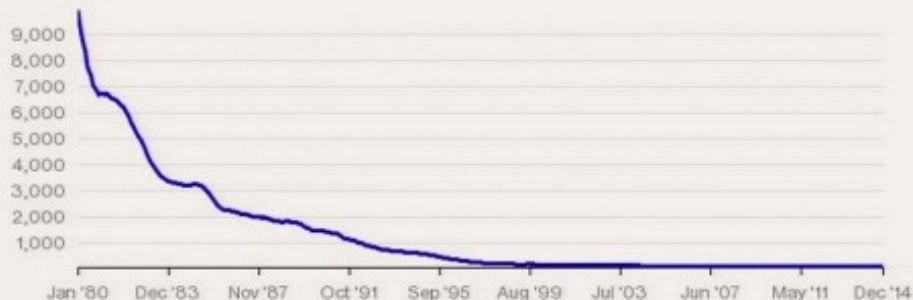
Microsoft's open source ambitions pick up speed

2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0


The Price of Software

Computer software is now 0.7% of its price in 1980

■ Computer software price index



Source U.S. Bureau of Economic Analysis

Bloomberg 

Source: <http://www.bloomberg.com/news/articles/2015-02-05/six-things-technology-has-made-insanely-cheap>

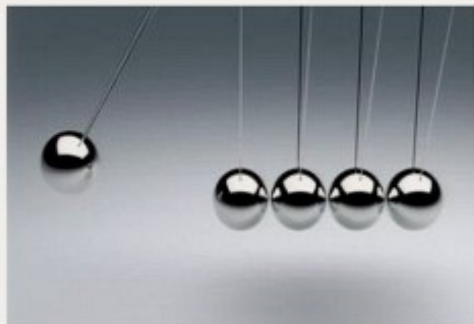
2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0

Every Thing Is a Service: Website, Apps, Cloud



Picture ©
Shutterstock

Major change in doing business for established industries



Value chain



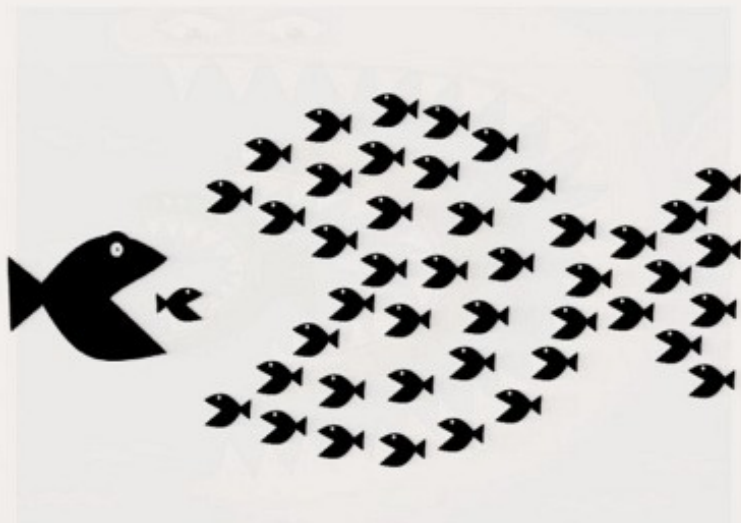
Business ecosystem

Big fish eat small fish



Source: http://img03.deviantart.net/e8bb8/2010/255/3/b/big_fish_eat_little_fish_by_fizzylinks-d2ylybh.jpg by fizzylinks (Catherine Swenson)

... but small fish can build swarms ...



Source: http://static.nextbigwhat.com/wp-content/uploads/2011/05/bigfishlittlefish_thumb.gif

Big fish eat small fish



Source: http://img03.deviantart.net/e8bb8/2010/255/3/b/big_fish_eat_little_fish_by_fizzylinks-d2ylybh.jpg by fizzylinks (Catherine Swenson)

The New Kingmakers

The New Kingmakers is the new book by RedMonk co-founder Stephen O'Grady chronicling the rise of the developer as the decisive force in the technology industry and sectors beyond.

Stephen O'Grady

The New Kingmakers

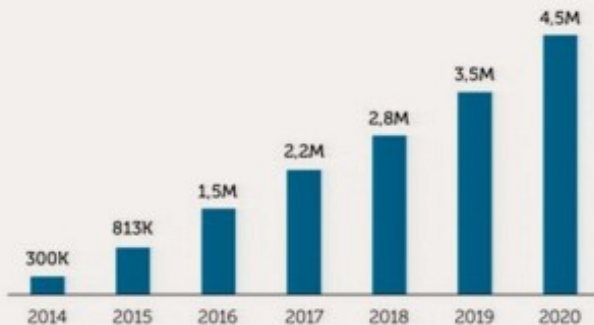
How **Developers**
Conquered the World

O'REILLY

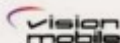


Developer Recruitment is Strategic

THE NUMBER OF IOT DEVELOPERS 2014-2020



Source: VisionMobile estimates, 2014



Report: IoT: Breaking Free From Internet And Things | vmob.me/IoT
©VisionMobile | June 2014 | Licensed under CC BY ND

2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0

The Community is the Capacity



2-Nov-2015 Copyright (c) 2015, Eclipse Foundation, Inc. Made available under the Eclipse Public License 1.0

The Myth of the Ant Queen

- How do termites build their hills?
- Do they have a master plan and know beforehand what they are building?
- Is there really a queen telling all her workers what to do?
- What is the alternative?

Photo: Copyright 2005 by Bengt Olof ÅRADSSON licensed under [CC-BY-SA-3.0-migrated](https://creativecommons.org/licenses/by-sa/3.0/); published on http://commons.wikimedia.org/wiki/File:Somalia_termilstack_B%C3%85n.jpg



Open Source Is a Proven Method to Establish an Ecosystem around a Technology

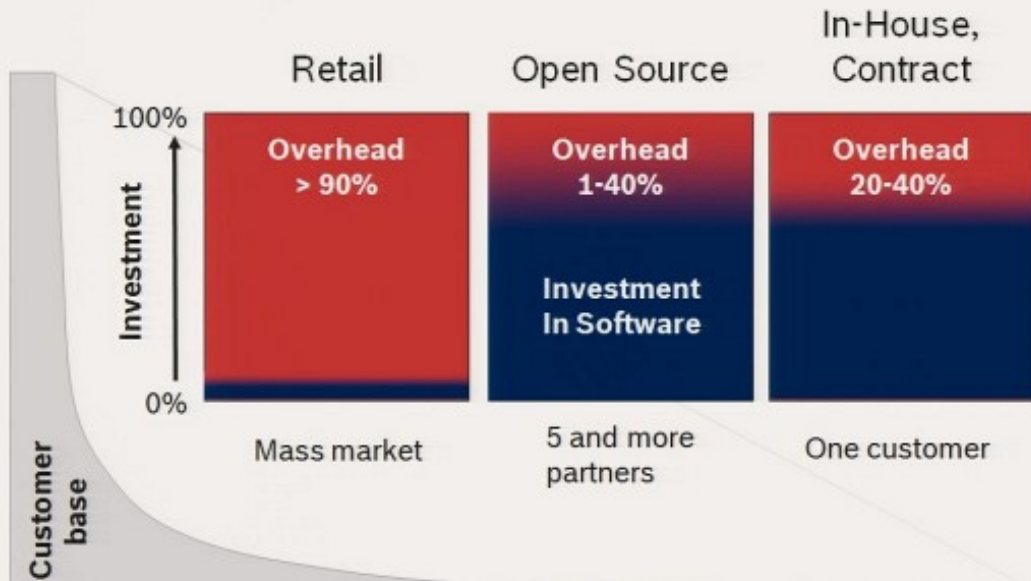
How to do Open Source?

- Use
- Contribute
- Participate
- Lead your own open source project

Using Open Source: Vendor vs. Download

- Using OSS from vendor instead of proprietary software in general is a plus
- No security by obscurity
- No escape from OSS: proprietary software contains a lot of OSS anyway
- OSS vendors provide a service
- Vendor vs. download: complete, careful TCO analysis
- OSS means: first choose technology then choose vendor service

Open Source Software Economics



Source: Bruce Perens: "The Emerging Economic Paradigm of Open Source", 2005, <http://perens.com/Articles/Economic.html>

Lead: Starting Your Own Open Source Project

- Where?
 - Foundations: Eclipse, Apache, Cloud Foundry, Linux, OpenStack, KDE, GNU, ...
 - Open Source Host: GitHub, GitLab, Sourceforge, ...
 - Company Website
- License?
 - AGPL
 - Strict Copyleft
 - Weak Copyleft
 - No Copyleft
- Governance Structure
- Contribution Policy/Contribution Policy
- Partnering
- Marketing
- Compliance Rules and Processes

50 Shades of Openness

- Patents
- Trademarks
- Source code drops for releases only
- No contributions accepted
- Missing crown jewels
- No or delayed security fixes
- ...

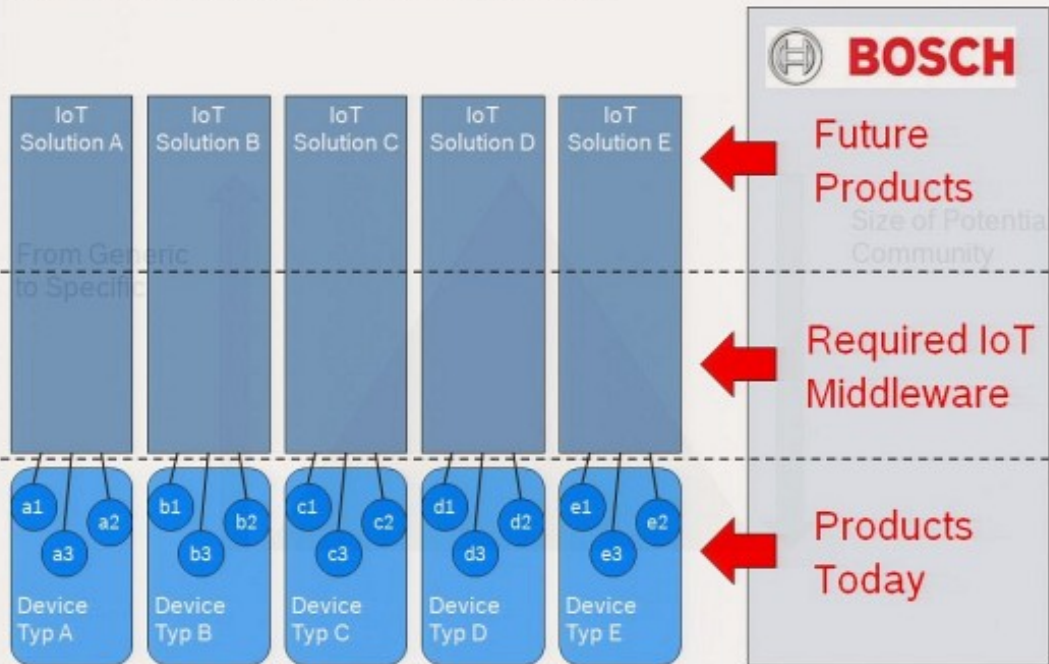
Suitability for an Open Source Approach

From Generic
to Specific

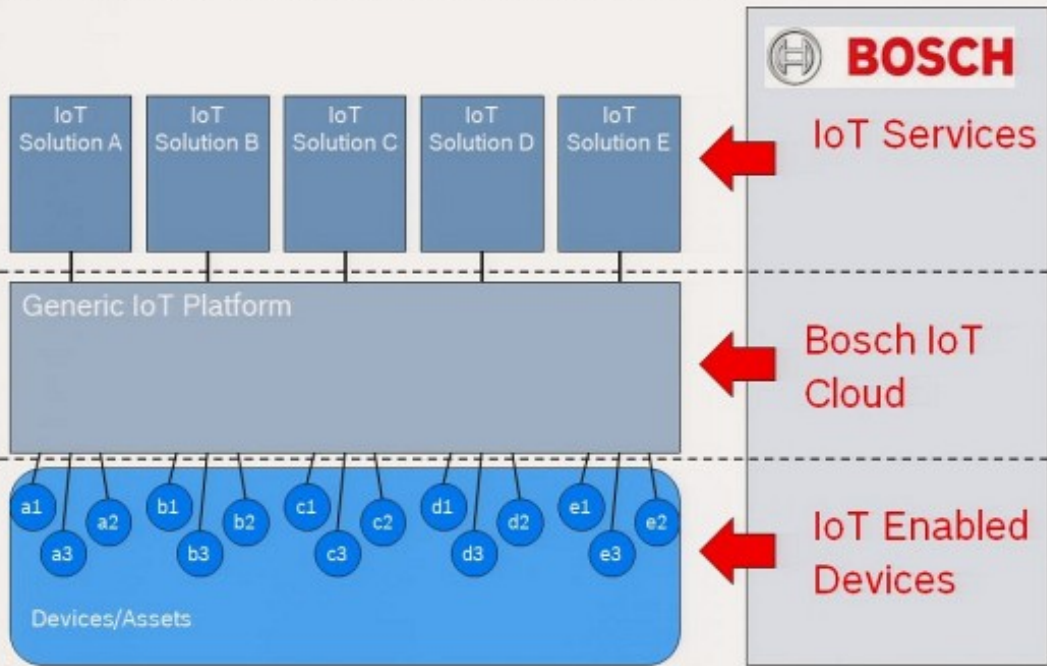


Size of Potential
Community

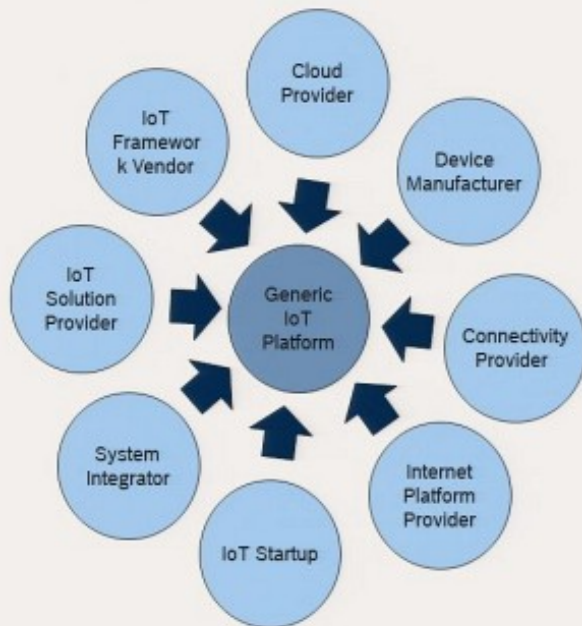
Current IoT: Isolated Solutions



IoT Vision: Cross Vendor, Cross Domain



Expanding Business in the IoT Market



Black Duck: 2014 Future of Open Source Survey Results

INTERNET OF THINGS

IMAD SOUSOU, VICE PRESIDENT AT INTEL
AND GM OF THE OPEN SOURCE TECHNOLOGY CENTER



"Open source is the foundation of several key operating systems and software components, and many key data center customers are running open source. Whatever you do on the Web, you are connecting to open source code. Intel believes it only makes sense that open source will power the future of computing, mobile connectivity, and the coming Internet of Things."

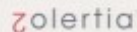
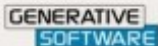
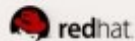
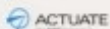
01 Intel® Open Source Technology Center

64

Open IoT Platform With OSS

- Overall goal:
 - **Business Success** for Bosch Group in IoT with **Products** and **Services** in the **Verticals** Mobility, Industry, Energy, Building
 - **Interconnections** and **Interoperability** of Devices/Services (therefore Bosch should “back on the right (platform) horse”)
- Assumption:
 - **2-5 major IoT platforms** (in next 5-7 years)
 - At least one of them will be **Open Source**
 - Bosch **not able** to develop one of these **proprietary platforms** and **customers/partners** would **not accept** it
 - **No risk/dependency** on **proprietary 3rd party platform**
- Conclusion
 - Open Platform strategy with OSS

Eclipse IoT Working Group



eclipse OSS Software Development Consortium

- Industry's best model for vendor-neutral collaboration on innovation
- Industry collaboration requires:
 - Licensing model for sharing co-developed innovation
 - IP management to maximize commercialization opportunities and reduce legal risk
 - Project model for coordinating investments and activities
 - Governance model to ensure a level playing field for all participants

Numbers

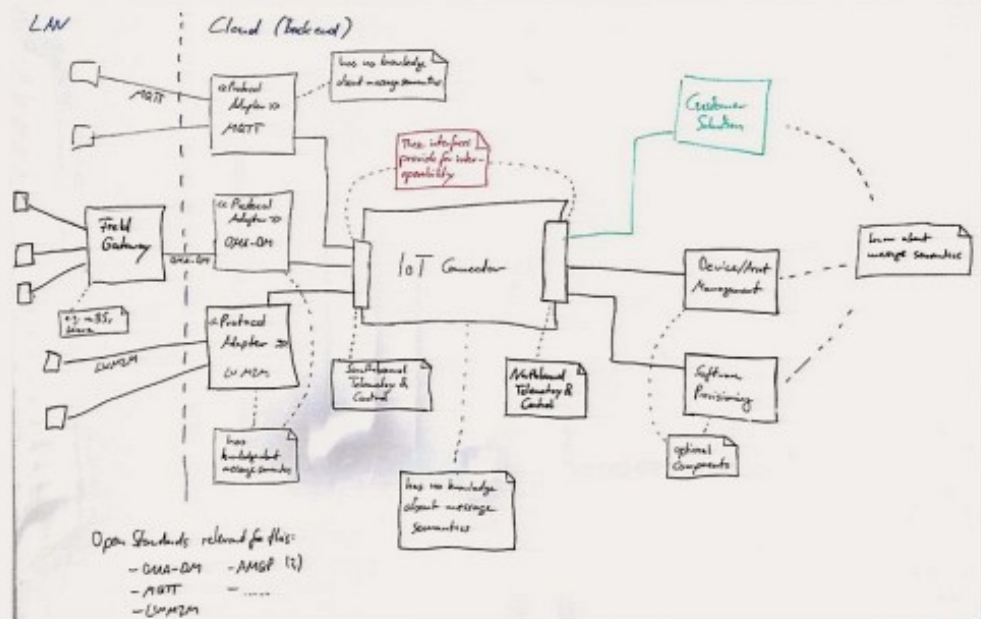
- 261 projects (46 new in past 12 months)
- 130 MLOC/year code change velocity
- 1069 committers from 100+ organizations
- 9 million active users of Eclipse IDE
- 1.5 million downloads/month (average)
- 2 million unique visitors/month
- \$5.0 million annual budget / 24 staff
- 75 events per year
- 7 collaborative working groups

Members

- 240 members
- 14 strategic members:

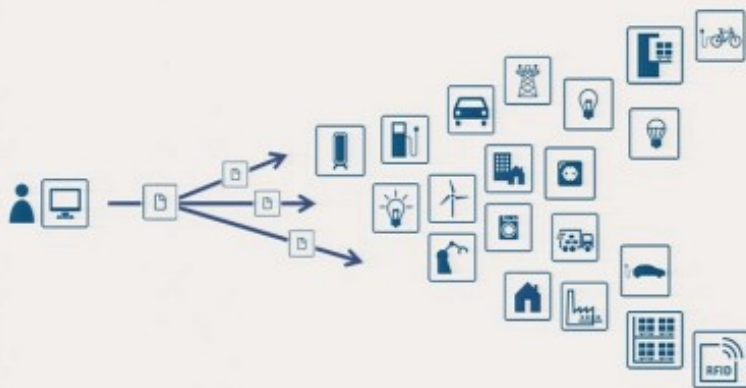


Connecting Devices to an IoT Cloud Platform



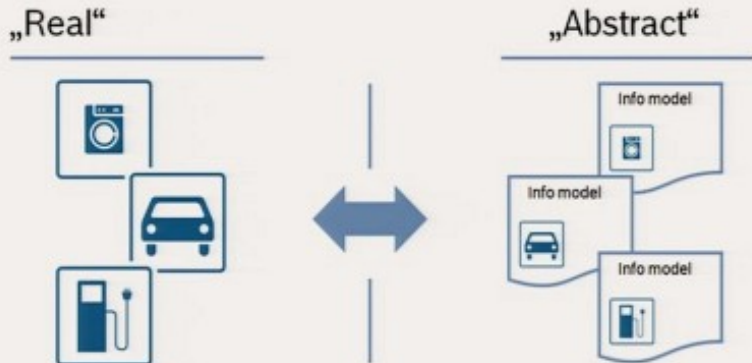
Eclipse Hawkbit

- Project hawkBit aims to create a **domain independent back end** solution for rolling out **software updates** to constrained edge **devices** as well as more powerful controllers and gateways connected to IP based networking infrastructure.



Eclipse Vorto

Vorto is an open source tool that allows to create and manage technology agnostic, abstract device descriptions



Eclipse LWM2M Projects

Eclipse Leshan

- an OMA Lightweight M2M (LWM2M) implementation in Java.

Eclipse Californium (Cf) CoAP Framework

- an open source implementation of the Constrained Application Protocol (CoAP).

Eclipse Wakaama

- LWM2M client written in C for POSIX Environments.

APPSTACLE

open standard APplication Platform for carS and
TrAnspotation vehICLEs

Project Outline for the German Sub Project



ITEA2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT








Open Connected Car Ecosystem: Securely interconnect In-Car
Platform with an IoT Cloud Platform

Tooling for Automotive Embedded Software

Open Source as enabler for automotive development cooperation

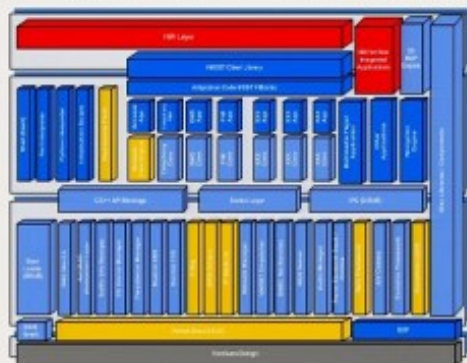


Automotive @ Eclipse

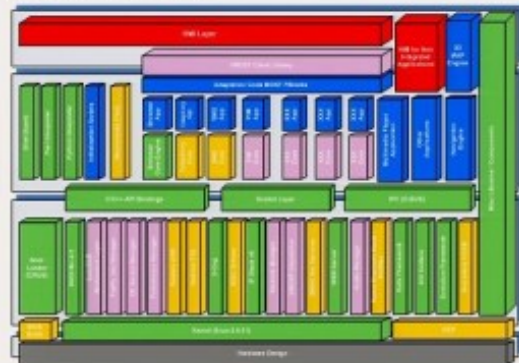
Logo	Name	Description
	Automotive BMW, Bosch, itemis	As automobile systems become increasingly complex, an open developer tool workbench that extends throughout the supply-chain is a must for the industry.
	Long-Term Support	provides a set of services to Eclipse Foundation Members who need to support and maintain commercial products based on Eclipse projects.
	Internet of Things	where you can learn about the technologies developed at Eclipse to make Internet of Things (IoT) development simpler.
	OpenMDM AUDIAG, BMW Group, Daimler AG	wants to foster and support an open and innovative ecosystem providing tools and systems, qualification kits and adapters for standardized and vendor independent management of measurement data in accordance with the ASAM ODS standard.
	Polarsys	created by large industry players and by tools providers to collaborate on the creation and support of Open Source tools for the development of embedded systems.

GENIVI: In-vehicle Infotainment Reference Platform

Situation in Automotive Infotainment



Classic/Proprietary

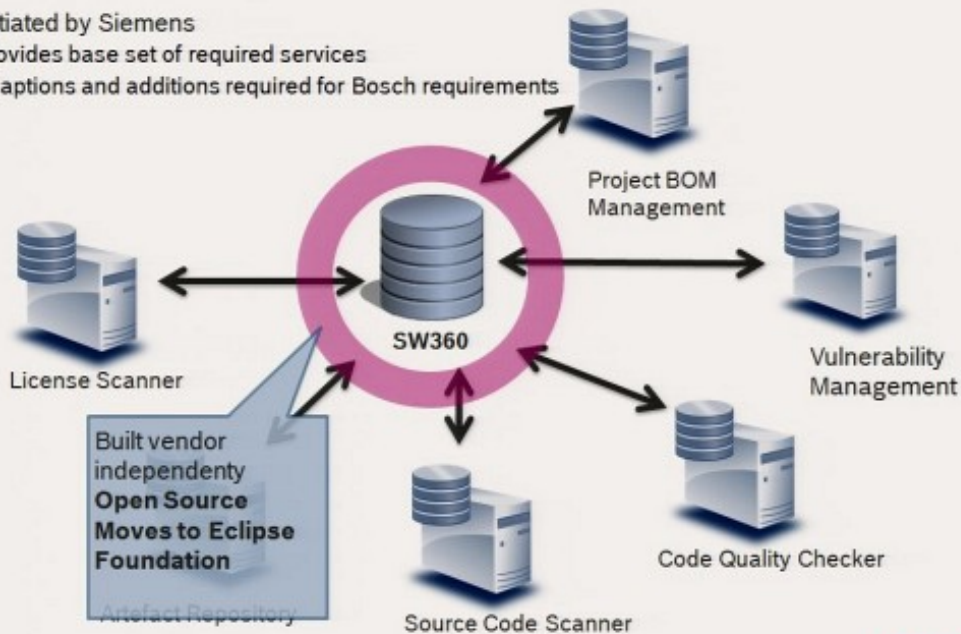


GENIVI/Open Source

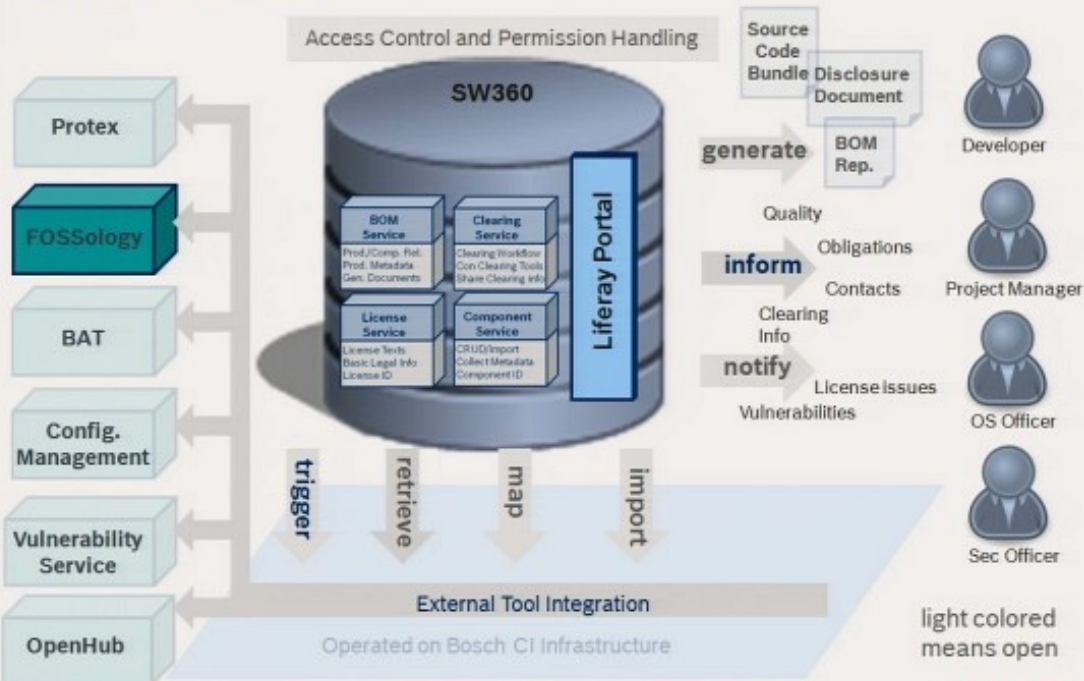
- Code created by the 1st tier.
- Licensed code from eco-system partners pre-integrated in the platform
- Open Source Kernel / Open Source Packages
- Code created for automotive compliancy
- User interface logic and graphics

Open Source Tool SW360

- (1) Initiated by Siemens
- (2) Provides base set of required services
- (3) Adaptions and additions required for Bosch requirements



SW360 Functionality



Thank you for your attention!

Q & A

Dr. Steffen Evers

Head of Open Source Services

steffen.evers@bosch-si.com, Tel +49 (30) 726112-171



Simply.
Connected.

Follow us on:



Bosch ConnectedWorld Blog

@BoschSI

 **BOSCH**

SW360 Functionality

