# Open Source Explained

**Prof. Dr. Dirk Riehle, M.B.A.**

Univ. Erlangen / Bayave GmbH

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# Agenda

1. Open-source software
2. Using open-source software
3. The individual perspective
4. The community perspective
5. The commercial perspective
6. The country perspective
7. Digital sustainability

# 1. Open-Source Software

# Software (Computer Programs)

## Software

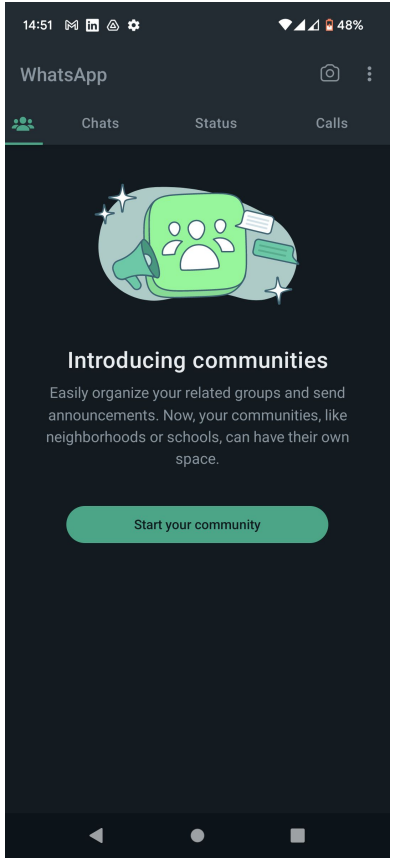
- Is often distributed in binary form
- With defined (limited) usage rights

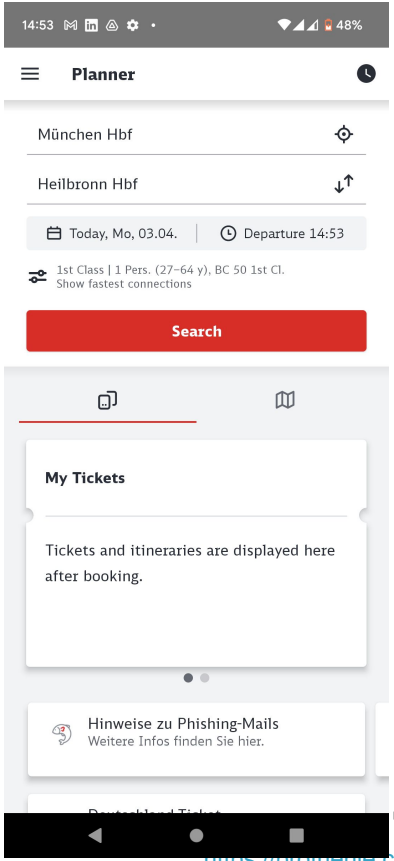
## Source code

- Is the blueprint for programs
- Is the source for binary code

## Software vendors

- Sell usage rights to the software
- Usually withhold the source code



# What's Wrong With Closed-Source Software?

The consequences of (strong) **vendor lock-in**

1. Costs / fee increases
2. Innovation blockage
3. Operational risk

And many more

# Open-Source Software

**Open-source software** is

- Software given to you under an open source license

An **open source license** is

- A software license that grants you the right to
  - **Use,**
  - **Modify, and**
  - **Distribute (modified or not) the software free-of-charge**

This is the legal (license) definition [1]

[1] https://opensource.org/osd

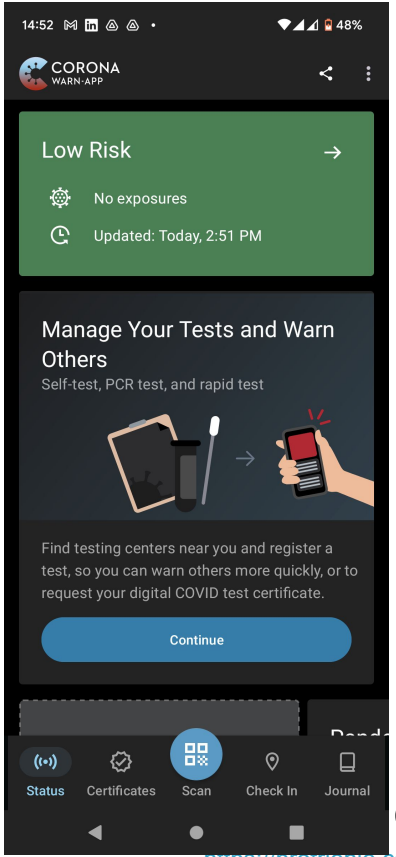
# A Minimal History of Free/Libre, and Open Source Software

1. Originally, software was bundled with hardware, by-loaded
2. In the 70ties, by court ruling, software had to be unbundled
3. Frustration over closed-source software led to free software
4. Frustration over free software rhetoric led to open source software
5. Since then, open source has been commoditizing software

# (Community) Open Source Projects

An open source (software) project is a

- Software component together with a
- Project community of people

# History of Traditional Community Open Source Projects

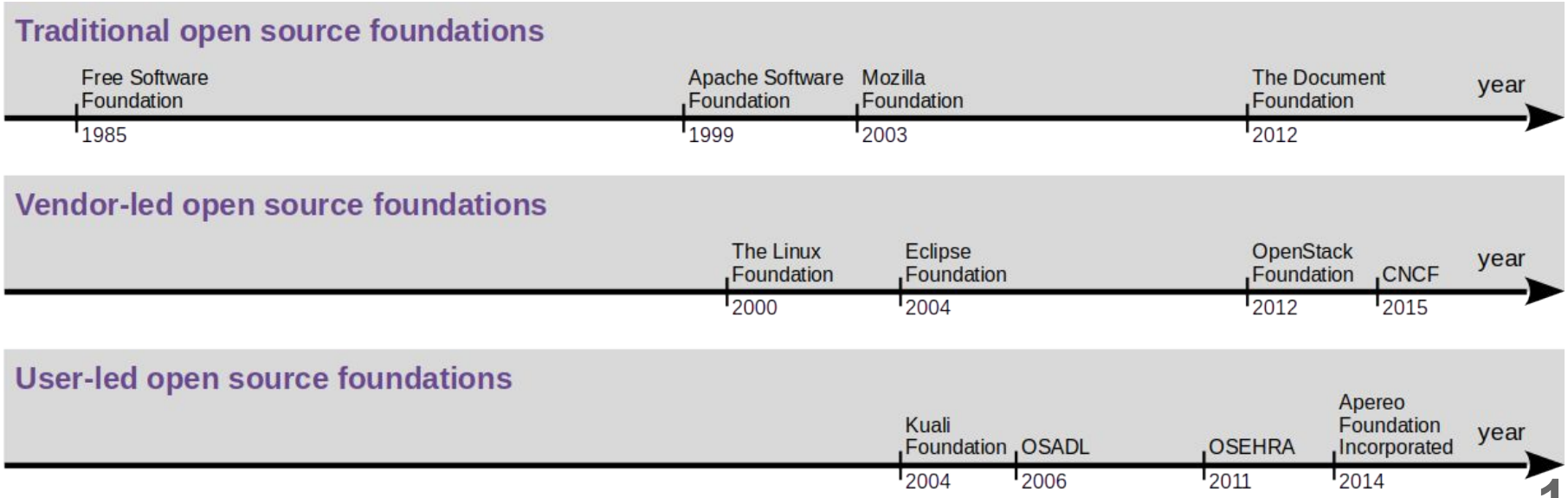
Traditional community projects are

- Unincorporated community open source projects

# History of Open Source Software Foundations

Open source foundations are

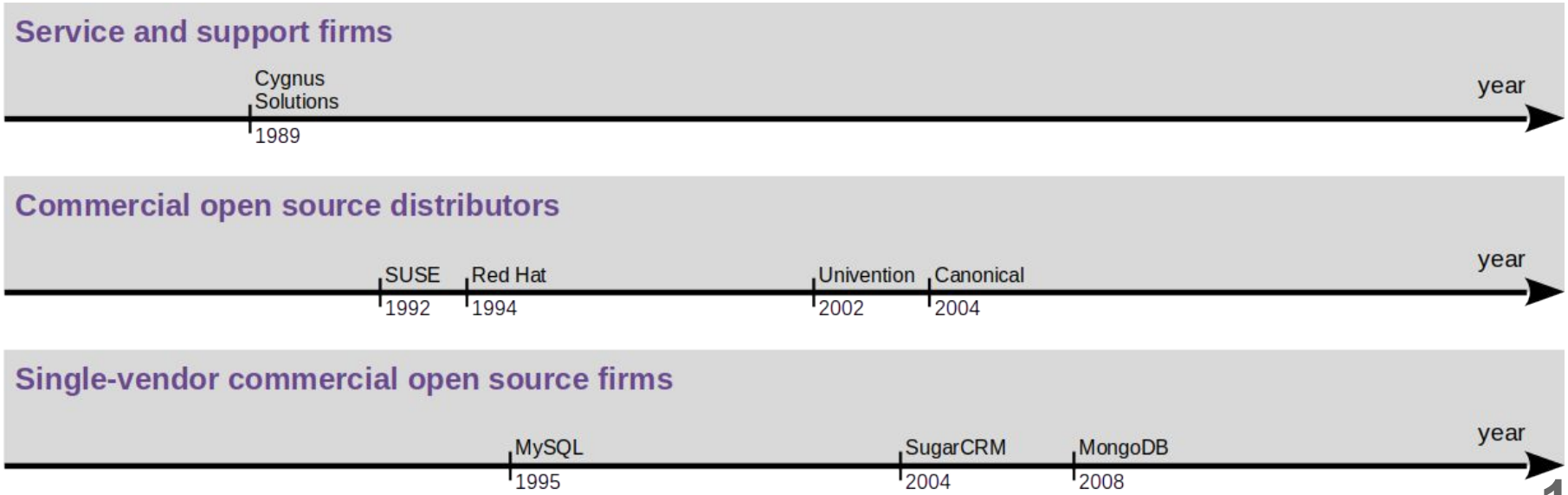
- Organizations set-up to manage community open source projects



# History of Commercial Open Source Software

Commercial open source software is

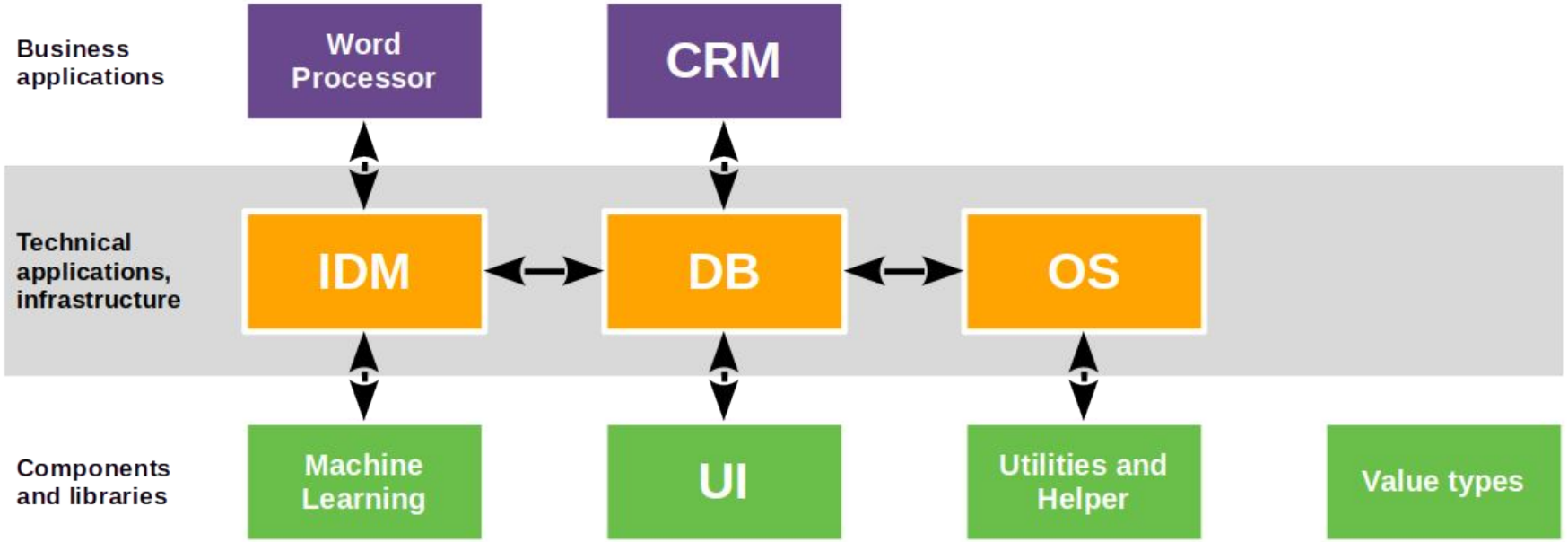
- Software developed by one or more vendors for commercial exploitation



# 2. Using Open-Source Software

**(Software Engineering)**

# All Software is Built From Software Components



# U.S. Whitehouse Executive Order 2022-05-12 [1]

U.S. Whitehouse Executive Order on Improving the Nation's Cybersecurity [1]

- Sec. 4. Enhancing Software Supply Chain Security
  - **A purchaser must be provided a software bill of materials**

U.S. Cybersecurity & Infrastructure Security Agency

- Software bill of materials: https://www.cisa.gov/sbom

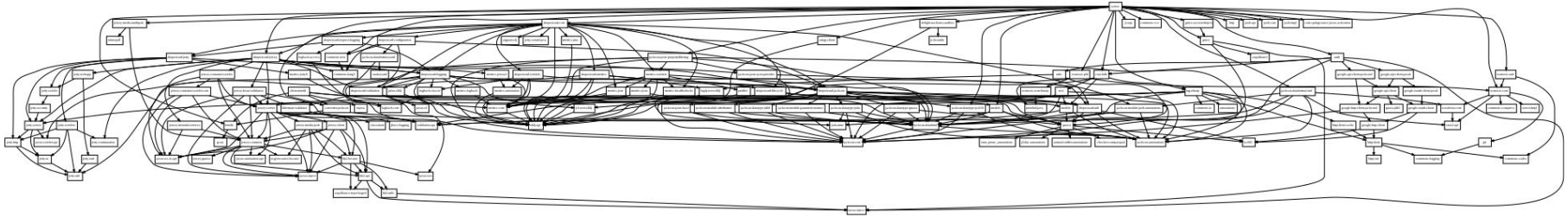
National Telecom and Infrastructure Administration

- https://www.ntia.gov/SBOM

[1] See https://whitehouse.gov/briefing-room/presidential-actions/2021/05/12/executive-order-on-improving-the-nations-cybersecurity/

# Example Dependency Graph

Number of components in transitive closure of graph = 145 for JValue ODS v0.4.0



# Software Composition Analysis (SCA)

Software composition analysis (SCA) is the

- **Detailed creation of a software bill of materials** often including
- **Extraction of license compliance artifacts** (copyright notices, license texts)

SCA can be performed to different degrees of detail and purpose

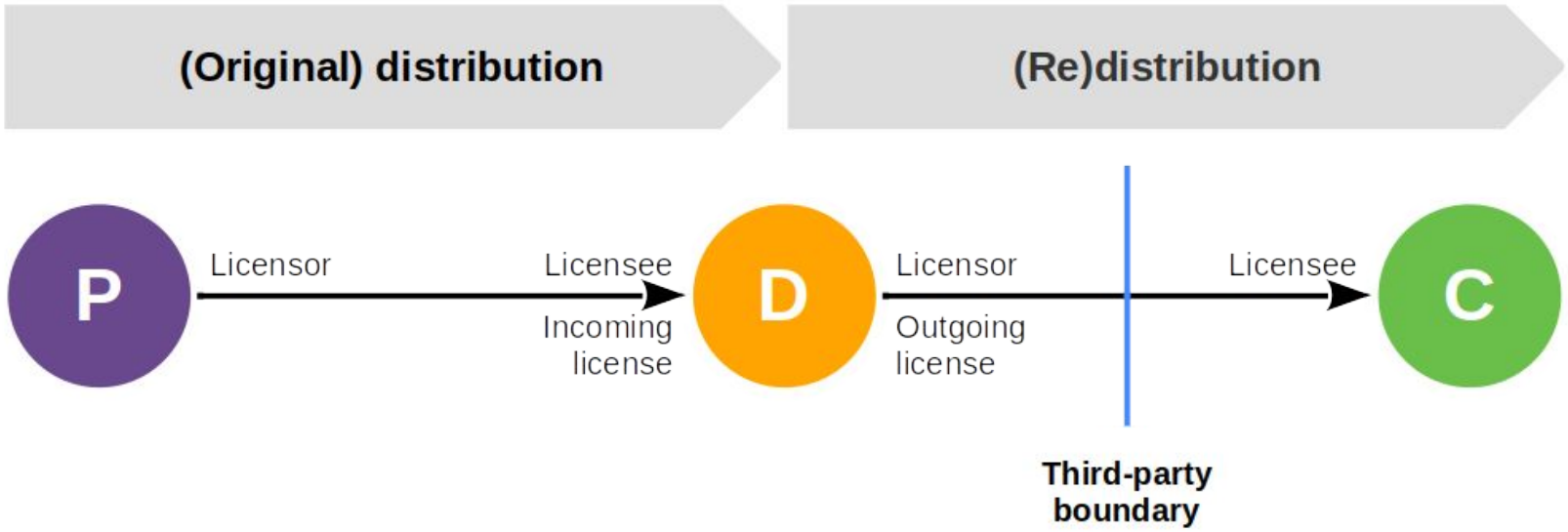
- License text and copyright notice extraction
- Source code snippet matching
- Due diligence

# The JQuery License [1] (Based on MIT License Template)

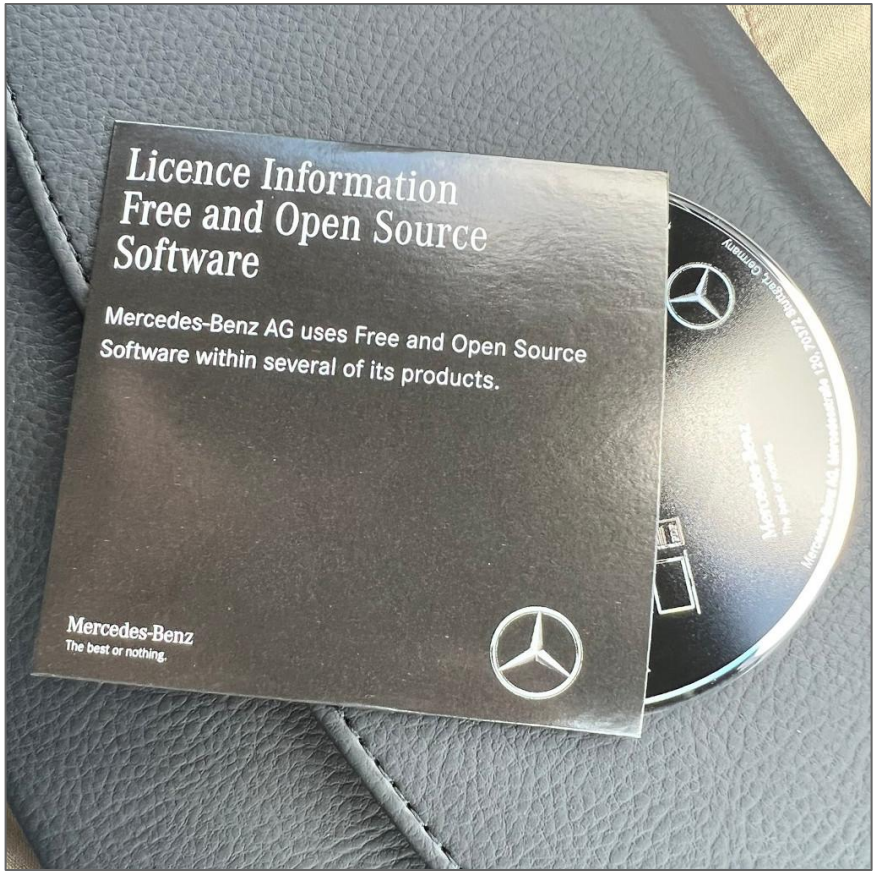


[1] https://github.com/jquery/jquery/blob/main/LICENSE.txt

# Open Source Use in Projects and Products



# Open Source Legal Notices for an Infotainment Stack

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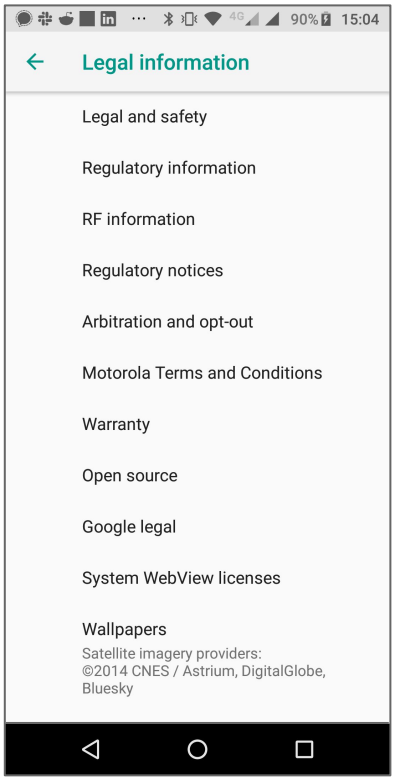
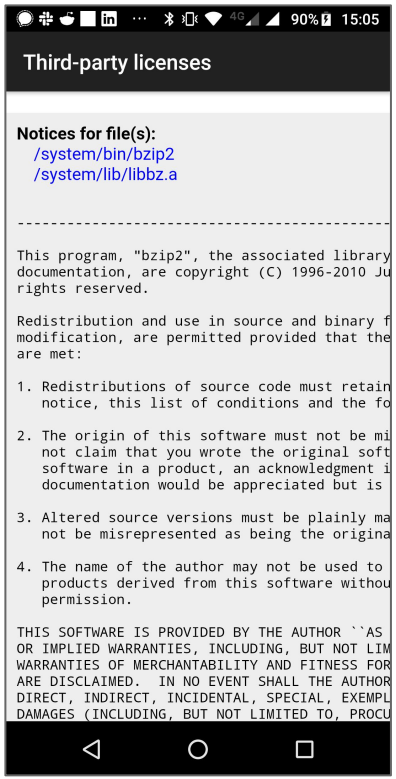
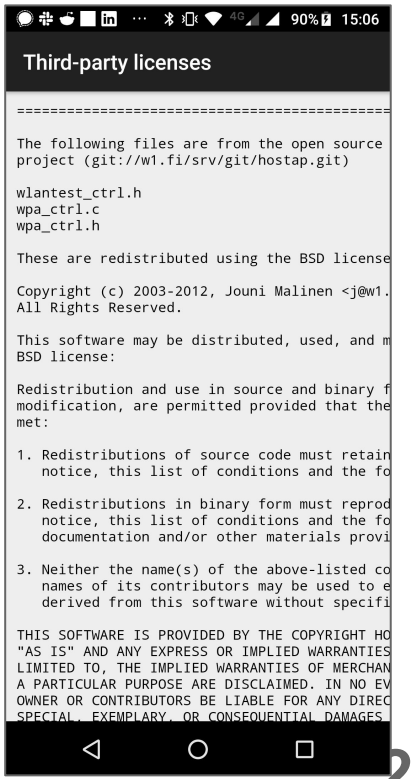
# Android Open Source Legal Notices



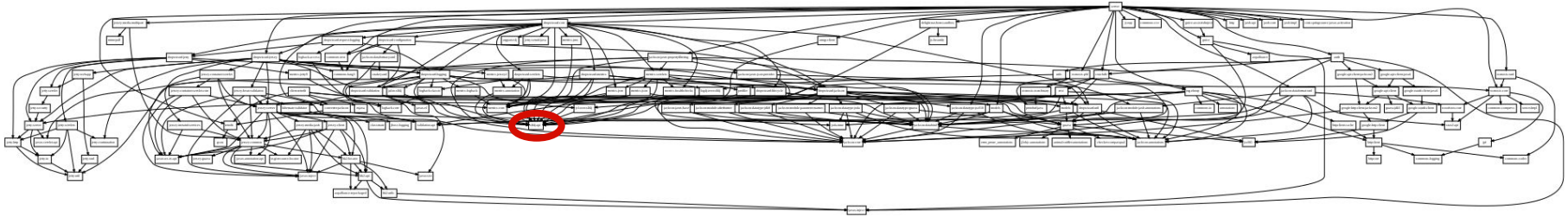




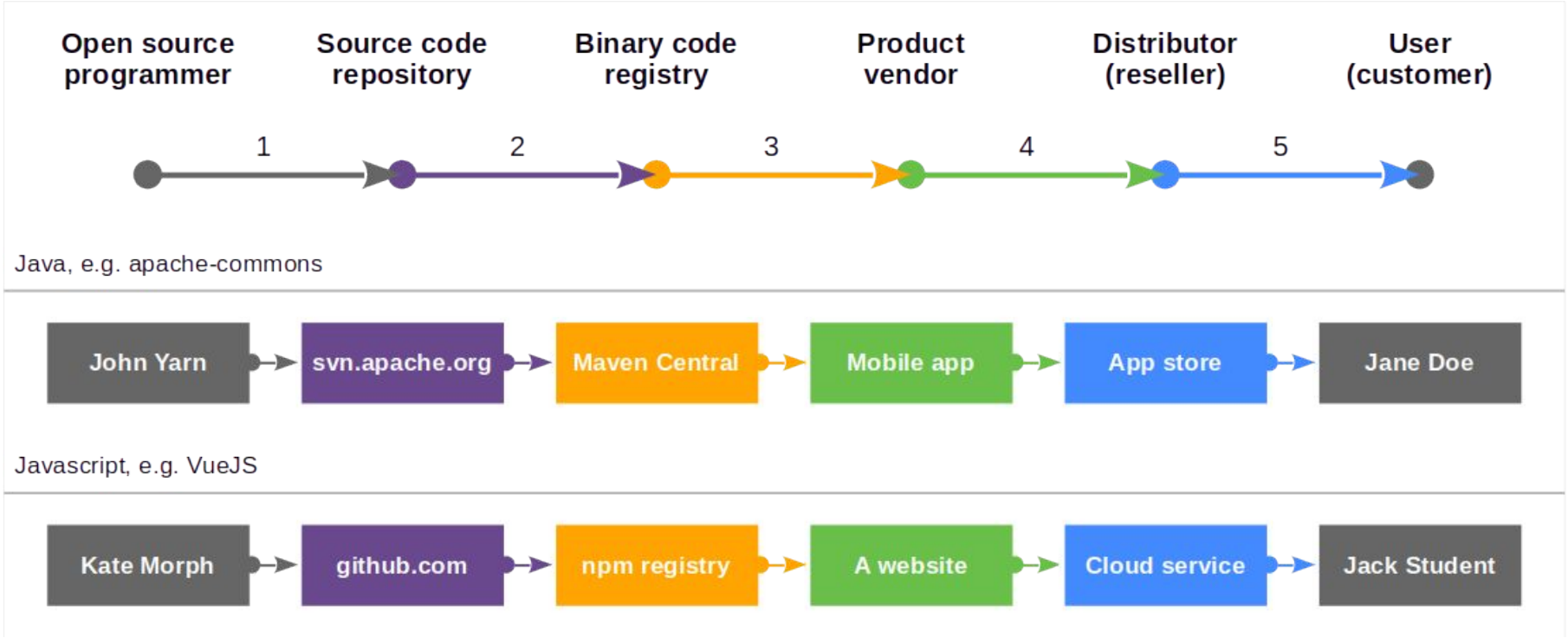



# Where Log4J was Hiding

Log4J was hiding behind a configuration parameter for slf4j-api



# The Software Supply Chain



# 3. The Individual Perspective

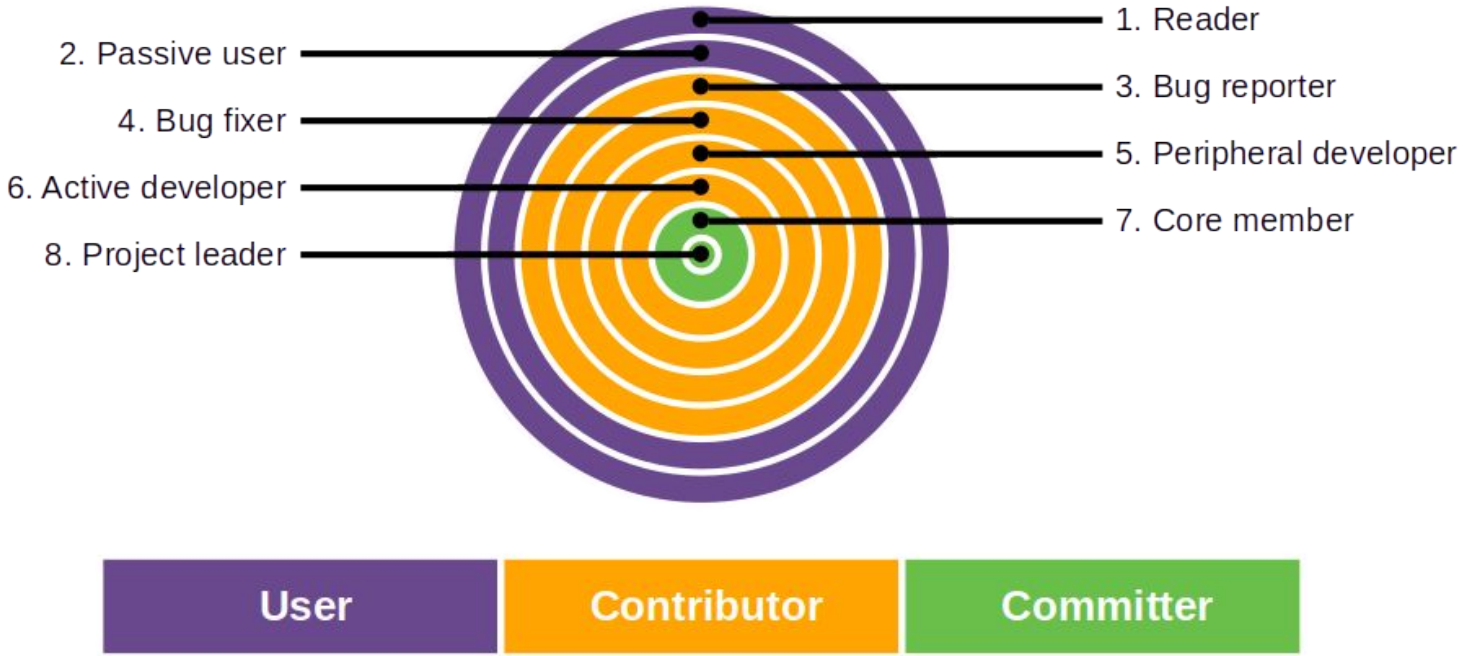
**(Labor Economics)**

# Reasons for Participating in Open Source Projects

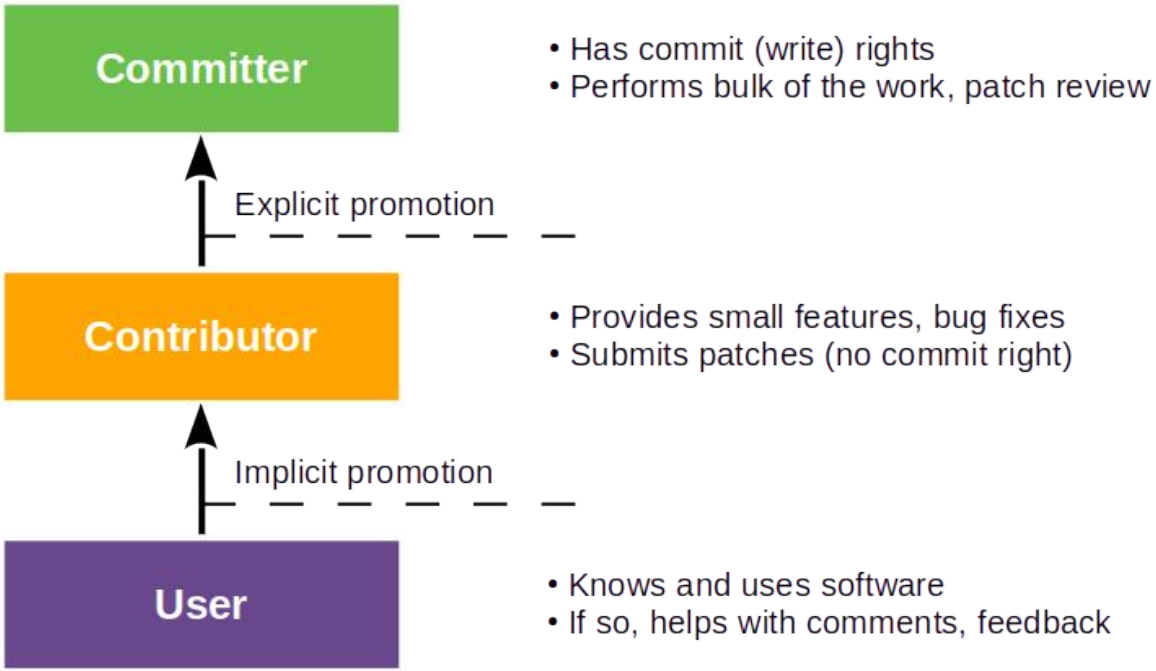
Traditional reasons

- Fun
- Help others
- Do something useful
- Learn new skills

# The Onion Model of Project Immigration



# The Basic Career Ladder of Open Source



# Economic Value of Committer Position

| Type of work | Signal to employer | Value to employer |
|---|---|---|
| Using the software | Technical skills | Lower hiring risk |
| Contributing to project | Verified skills | Lower hiring risk |
| Leading the project | Peer validation | Lower hiring risk |
| Leading the project | Leadership | Marketing, recruiting |
| Leading the project | Position of power | Influence |

# Benefits to Employee / Open Source Programmer

1. Higher salary
2. Higher job security
3. Richer job experience

# 4. The Community Perspective

**(Open Source Software Foundations)**

# Community vs. Vendor-Owned Open Source Software

**Community open source software** is open source software that

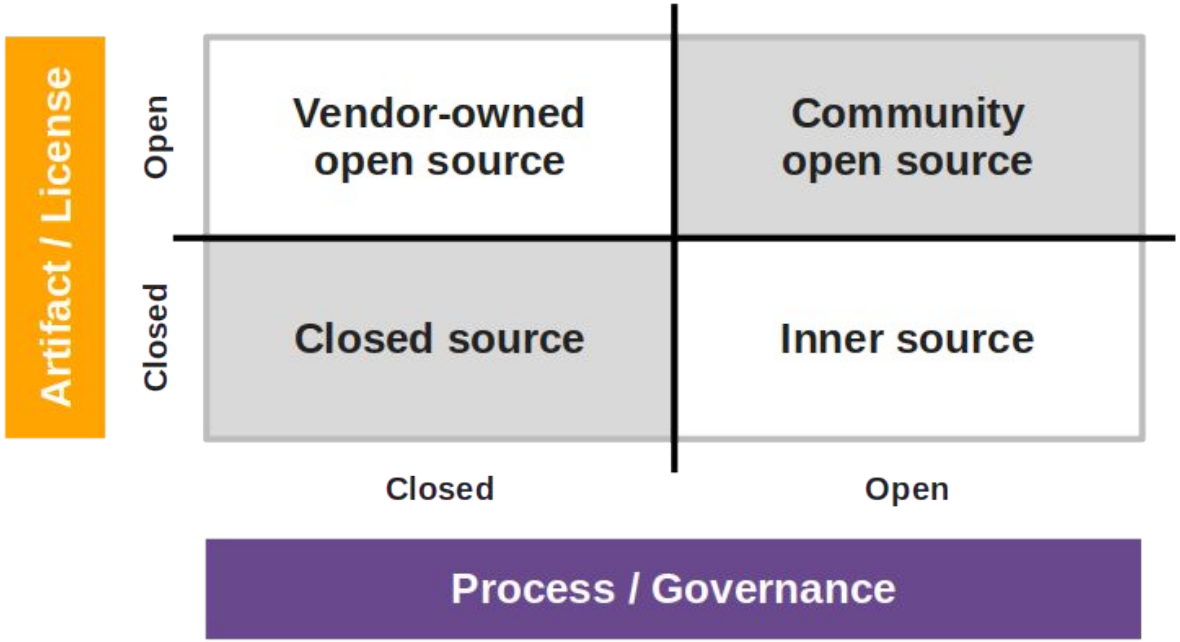
- Has an open governance process
- Is competitively non-differentiating
- Is communally owned (shared copyright)



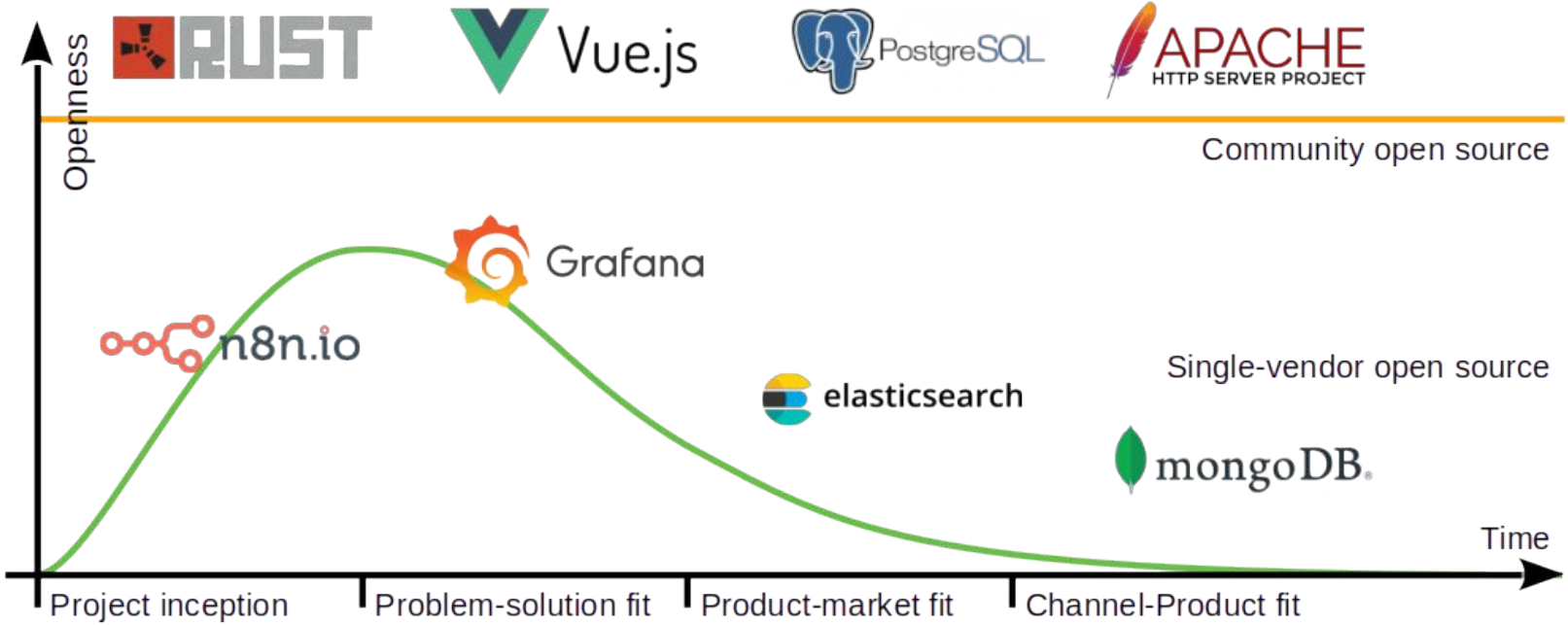
**Single-vendor open source software** is open source software that

- Has a closed governance process
- Is exploited by a single vendor
- Is owned by that single vendor


# Open Source License vs. Governance



# Openness Over Time



# Open Source Foundations

An **open source foundation** is

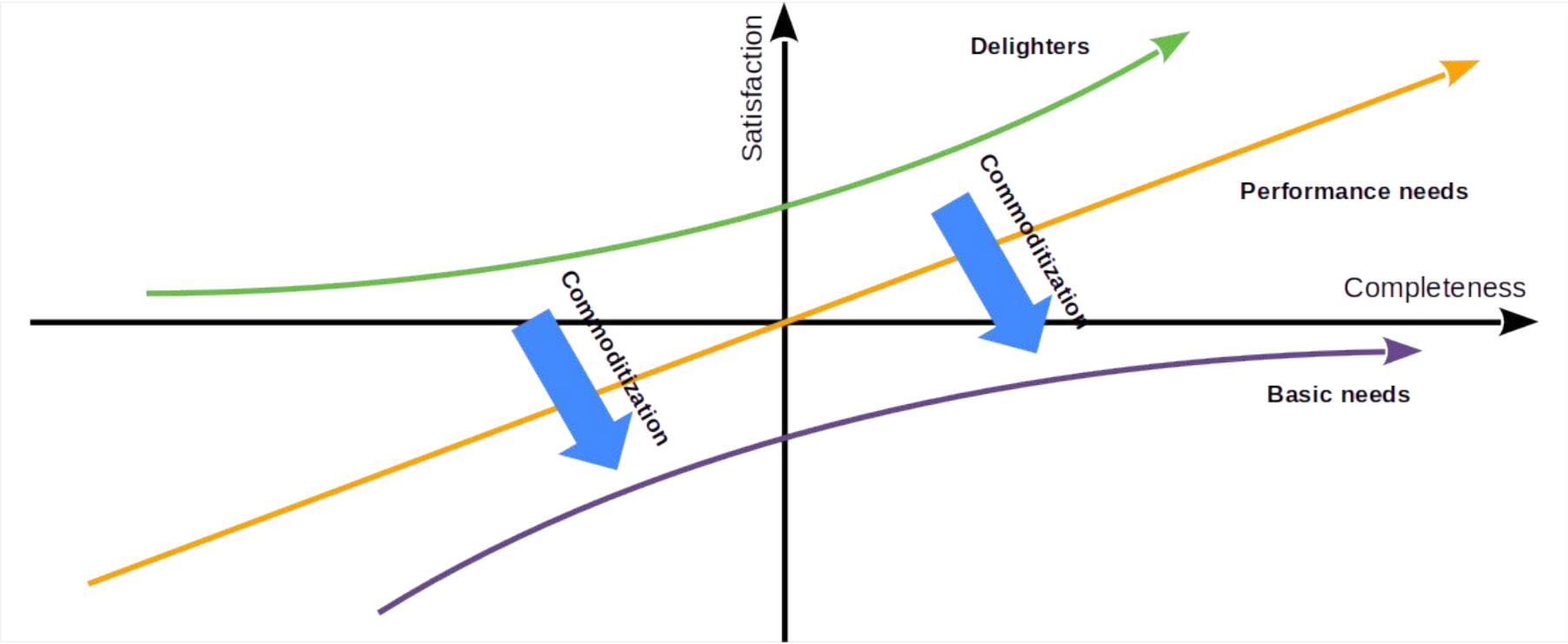
- A **non-profit** organization (foundation, consortium) [1]
- With the mission of **managing** / sponsoring / developing the development of
- **Competitively non-differentiating software**
- Made available to the public as **open source software**

The three classic open source foundations

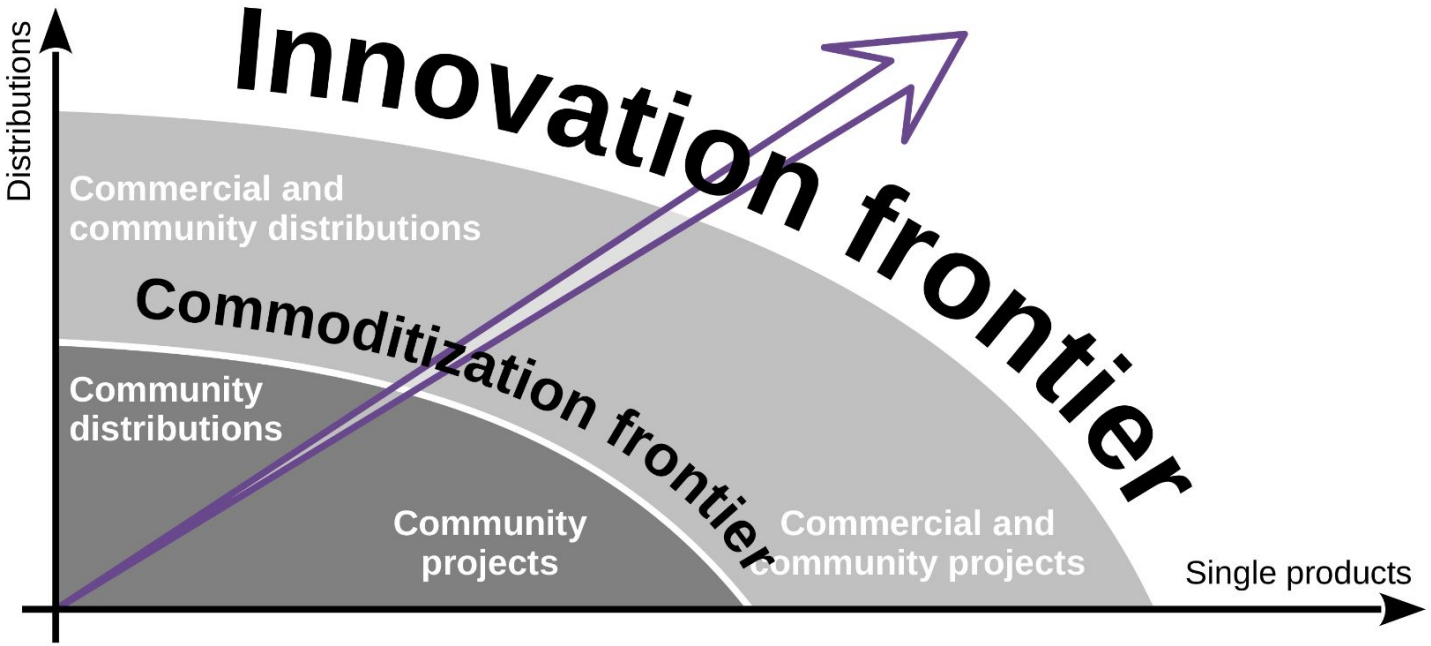



[1] I'm using the terms foundation and consortium synonymously

# Not-Competitively Differentiating



# Innovation vs. Commoditization

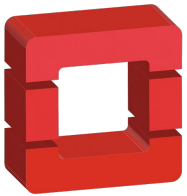


# Benefits of an Open Source Foundation

A (well-designed) open source foundation provides

- A fair and equal playing field for its members
- With clear governance and intellectual property rules





# Components For Use in Products

Needed by **product vendors**




Also **developed** by these vendors

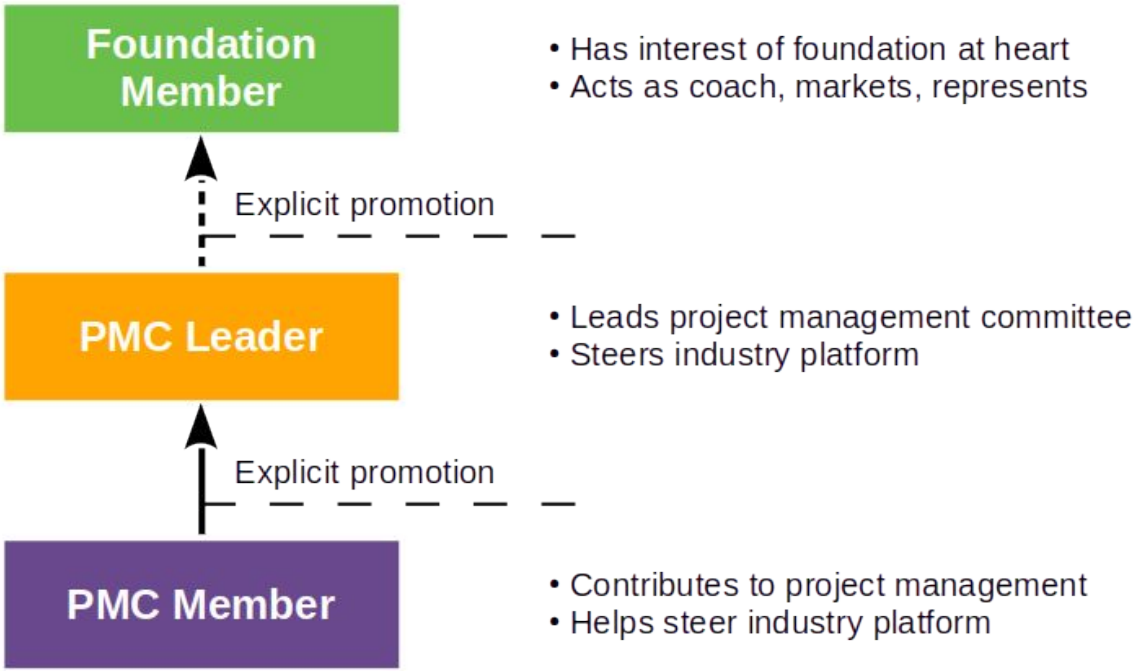
# Applications For Use in Business Operations

Needed by **everyone** (in the business domain)




Sometimes **developed**, more often **sponsored** by using businesses

# The Extended Career Ladder of Open Source



# 5. The Commercial Perspective

**(Commercial Open Source Firms)**

# How to Make Money with Open Source? 1 / 2

You can’t make money with something that is free.

There is no open source business model.

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Open source is a business strategy with many benefits.

You can make money with a closed complement.

# How to Make Money with Open Source? 2 / 2

| | Open-source software | Closed complement |
|---|---|---|
| **Hardware** | **Google Tensorflow** | Google's **Tensor Processing Units** |
| **Software** | **Apache Lucene** | Elastic's **Enterprise Search** |
| **Operations** | **PostgreSQL** | Credativ **PostgreSQL operations** |
| **Consulting** | **Wordpress** | **Web Design Berlin** |
| **Support** | **gcc** | **Clever Solutions** |

# Open Source, Vendor Lock-in, and Return on Investment

| Complement | Lock-in | Lock-in Base |
|---|---|---|
| **Hardware** | **High** | (Exclusively owned) **intellectual property** |
| **Software** | **High** | (Exclusively owned) **intellectual property** |
| **Operations** | **Medium** | **Mixed (IP, Capital, Position)** |
| **Consulting** | **Low** | **Knowledge** |
| **Support** | **Low** | **Knowledge** |

# Types of “Open Source” Businesses

1. Consulting and service firms
2. Open-source distributor firms
3. Single-vendor open source firms

# Three Generations of Single-Vendor Open Source Firms

The first generation (199x-2002)

- MySQL, Sleepycat Software (BerkeleyDB), TrollTech (Qt), …
- Focus: Trailblazing / the pioneers

The second generation (2002-2008)

- SugarCRM, MuleSoft, Jaspersoft, …
- Focus: **On-premise business applications**

The third generation (since 2008)

- MongoDB, Confluent, Redis Labs, …
- Focus: **Cloud-based infrastructure components**

# Benefits of Open Source Strategy by Business Function

| Business function | Benefits that accrue |
| --- | --- |
| Marketing | Generate leads faster, better, cheaper |
| Sales | Sell more effectively and efficiently |
| Business development | Identify partner opportunities better |
| Product management | Identify new market needs faster, better, cheaper |
| Software development | Build a superior product faster, cheaper |
| Product support | Support product at lower cost |

# Intellectual Property Strategy

Intellectual property rights imperative (of single-vendor open source)

- “Always act in such a way that you, and only you, possess the right to provide the open source project under a license of your choice.” [1]

Use contributor assignment to maintain ownership

- Almost all single-vendor open source firms require copyright transfer for any contributions to maintain full IP ownership [2]

[1] Riehle, D. (2009). The Intellectual Property Rights Imperative.
[2] All you really need is a relicensing right though

# Licensing Strategy for On-Premise Applications [1]

For the commercial product

- A commercial license for on-premise use

For the open source software

- An aggressive copyleft license e.g. AGPLv3


[1] Mostly used for on-premise business applications of the second-generation firms

# IP Strategy for Cloud Components [1]

For the commercial product

- A subscription-based license for use of the cloud service

For the open source software

- A weak copyleft license e.g. LGPL or APGLv3 + MIT


[1] Mostly used for cloud infrastructure components of the current third-generation firms

# Enter the Hyperscalers

Hyperscalers can meet and beat the vendor’s value proposition

- Cost efficiency
- Quality of service




# Source-Available Licenses

A license that is like an open source license except that

- The licensee loses the usage rights if they compete with the licensor

Example source-available licenses:

- Business Source License (BSL) 1.1 by MariaDB Corporation Ab (2017) [1]
- Server-side Public License (SSPL) by MongoDB Inc. (2018)
- Redis Source Available License (RSAL) by Redis Ltd. (2019)

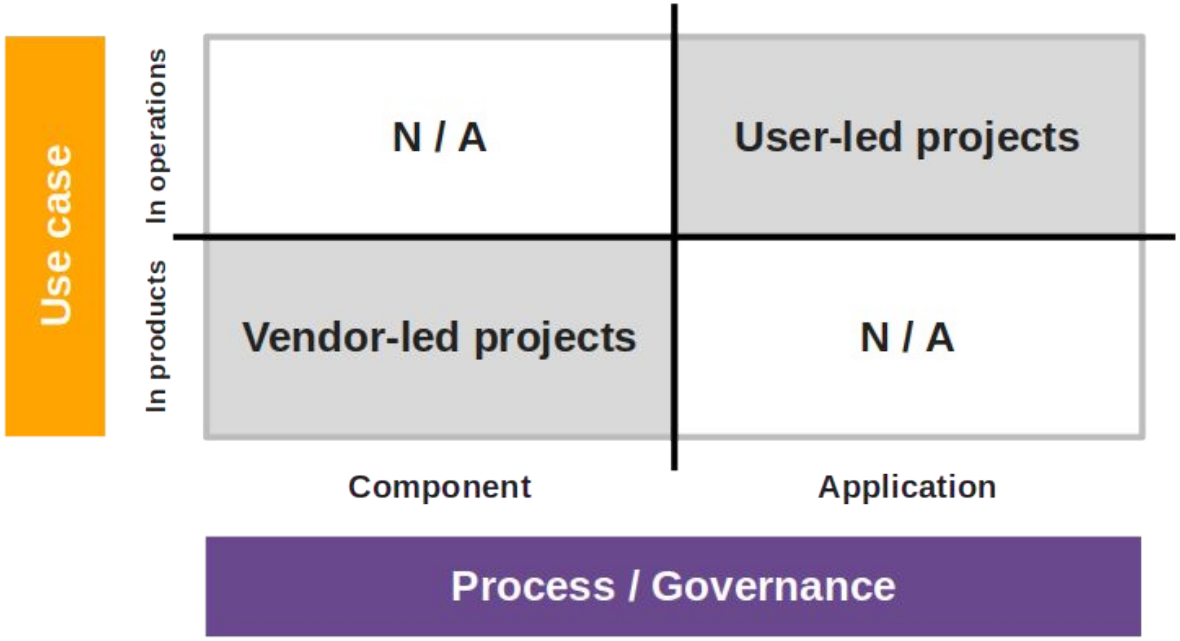
Also see the Polyform project for a license creation toolbox [4]

[1] See https://mariadb.com/bsl11
[2] See https://www.mongodb.com/licensing/server-side-public-license
[3] See https://redis.com/redis-source-available-license
[4] See https://polyformproject.org/

# 6. The Country Perspective

**(Country-Level Competitiveness)**

# Vendor-led vs. User-led Open Source Projects



# Example 1: Academy Software Foundation

The Academy Software Foundation is

- A **Linux Foundation collaboration project**
- **Adopting,** managing, and sponsoring open source
- For the production of movies

Premier members are both movie studies and vendors

ASWF /* ACADEMY SOFTWARE FOUNDATION





...

# Example 2: Open Logistics Foundation

The Open Logistics Foundation is

- A user-led open source foundation that is
- Managing and developing open source
- For the operations of logistics companies

Members are primarily German logistics firms (for now)

open logistics
foundation

...

# Country-Level Competitiveness

Benefits of homogeneity and co-location

- More effective understanding and collaboration
- Short communication paths, information flow
- Faster diffusion of best practices by person

Joining forces in a user-led open source consortium

- Lifts the boats of everyone in the core cluster
- Relative to those who are not in the cluster

A country should help its industries get organized

- To strengthen the countries competitiveness

# 7. Digital Sustainability

# Digital Sustainability and Sovereignty

Benefits of reducing vendor lock-in (recap)

- No / less price pressure
- No innovation blockage
- Lower operational risks

These benefits repeat each other on different levels

- The individual
- Single companies
- Whole consortia
- The country

# Summary

1. Open-source software
2. Using open-source software
3. The individual perspective
4. The community perspective
5. The commercial perspective
6. The country perspective
7. Digital sustainability

# Thank You! Any Questions?

**Prof. Dr. Dirk Riehle, M.B.A.**

dirk.riehle@fau.de, https://oss.cs.fau.de

dirk.riehle@bayave.com, https://bayave.com

dirk@riehle.org, https://dirkriehle.com

**Twitter: @dirkriehle, @profriehle**

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