

INF5750

Open Source Licensing



University of Oslo
Department of Informatics



**The lecture is
being recorded**

Outline

- Intellectual property rights - copyrights and patents
- Creative Commons license
- Software licenses
- Open source and Open APIs

Disclaimer

- Intellectual property rights, copyright, patents, licensing is complicated and food for lawyers
- If doing this for real it can be a good idea to involve lawyers to understand all the details
- The goal of this lecture is to give an understanding of the domain and some of the challenges

Rivalness and Excludability

| | Non-rival | Rival |
|----------------|---|---|
| Non-excludable | <p>Public goods abundant natural resources; goods funded by public institutions (scientific knowledge, free roads/ infrastructure, policing); goods produced by CBPP</p> | <p>Common-pool goods finite national resources; water for irrigation; atmospheric CO2 levels</p> |
| Excludable | <p>Toll/subscription goods newspaper subscriptions; toll roads; intellectual goods controlled by conventional intellectual property rights</p> | <p>Private goods clothes, books, CDs; private land</p> |

Intellectual Property

- Tangible assets:
 - properties, currencies, equipment...
- Intangible assets:
 - knowledge, experience, (social) networks, brand loyalty...
 - more formalised: copyrights, patents, trademarks...
- Intellectual Property Rights are rights to *intangible assets*

Intellectual Property

- Intellectual property:
 - "Non-physical property that is the product of original thought".
Stanford Encyclopaedia of Philosophy
 - "[IP] refers to creations of the intellect for which a monopoly is assigned to designated owners by law".
Wikipedia
- Intellectual property **rights** do not address the abstract idea, but the physical manifestation or expression of ideas
- Covered by international treaties (e.g. Bern convention from 1886) and national law in most of the world, but laws differ

Why IPR?

- Three (philosophical) arguments for IPR:
 - Intellectual property is an expressions of ones personality, thus it should be possible to protect
 - People have the rights to the results of their labour, also for intellectual property rights
 - Granting rights of ownership necessary to incentivise creation of intellectual works

IPR protection

- Protection of IPR are mainly through:

- Copyrights

- Patents

- Trade secrets

- Trademarks

Copyrights and Patents

- Patents and copyrights are the main instruments of IPR law
- History and purpose are different:
 - Patents are issued by authorities to regulate use of **inventions and ideas** for commercial uses
 - Copyrights applies to the **expression of works** like printed material, sound recordings, software - not ideas

Copyright

- Protection of original works of authorship "fixed in any medium of expression"
- Can be applied to literature, music, photography, architecture, maps, **software etc**
- Must be original, produced by the author
- Must be "non-utilitarian" and "non-functional"
- Do not cover abstract ideas themselves

Copyright

- Copyright laws address *use* of material - not a means to control access
- Use of content includes:
 - distribution of unaltered content
 - distribution of content in a collection
 - distribution of adaptations and derivative work
 - performing and distributing produced work

Rights of copyright holders

- Copyright owners can:
 - reproduce the work
 - adapt or derive other works from the original work
 - distribute copies of the work
 - display the work publicly
 - perform the work publicly

Copyright limitations

- Copyright is time bound - normally a number of years (70) after death of author
- Two general limitations:
 - Fair use - limited use of copyrighted work is allowed, for commenting, news reporting, research, teaching etc
 - First sale - copyright holders who have sold copies of a work cannot interfere with subsequent sales of those copies

Moral rights

- Granted to copyright owners under most jurisdictions
- Copyright owner can object to derogatory treatment of their work, i.e. treatment that is prejudicial to the honour or reputation of the author

Patents

- Concrete solution to a practical problem - processes, products, medicines, applications
- Must be applied for to national patent authorities, and specifics varies by country/legislation
- Types of patents include *inventions* and *design*
- Requirements
 - Useful
 - Novel
 - Non-obvious

Patent holder rights

- Patent holders can:
 - make the patented item
 - use the patented item
 - sell the patented item
 - authorise others to sell the patented item
- No-one can patent or market the same process or item while the patent is valid, even if it was invented independently
- Patents are time bound - normally 20 years

Software patents

- Patentability of software is disputed, and varies across the world:
 - Europe: "programs for computers" are excluded
 - US: software is patentable
 - In general: *limitations* on software patents are common
- Many are critical of software patents and its growth

Balancing act

protecting rights of
author/inventor to
incentivise creation



making works and
inventions available
to the benefit of the
public

- IPR law aims to strike balance between incentivising creators and making sure society benefits from creations

Balancing act

- First copyright law: 14 years from work was created
- Current (US) law: up to 120 years
- Gradual expansion of IPR over time



Licensing

- IPR grant rights to authors of their work - including authors of software
- Providing content without license information is legal, but can create confusion
- To use intellectual property written by someone else a *license* is required - including for software in binary or source code format

Creative Commons

- Established 2001 - charitable US-based organisation
- Goal: make it easy for creator to "configure" appropriate licenses to share their work
- Standardised way to grant permissions to the commons
- Not recommended for software, hardware or databases



Creative Commons

- All CC licenses share some basic properties:
 - disclaimer of warranties
 - everything not explicitly restricted is allowed
 - CC licenses are *non-revocable*
 - CC licenses are *non-exclusive*
 - all versions allow licensee to share the content



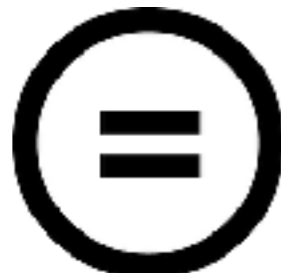
BY Attribution

Always applied. Sharing is allowed. Author/licensor must be attributed.



NC NonCommerical

Commercial use of the content is not allowed.



ND NoDerivatives

Derivative works are not allowed.



SA ShareAlike

Require that derivative works are released under the same license. Inspired by GPL software license.



CC0 Zero license

All copyrights are waived - work is dedicated to the public domain.



PDM Public domain

Not a license, but a way to label work as belonging to the public domain.

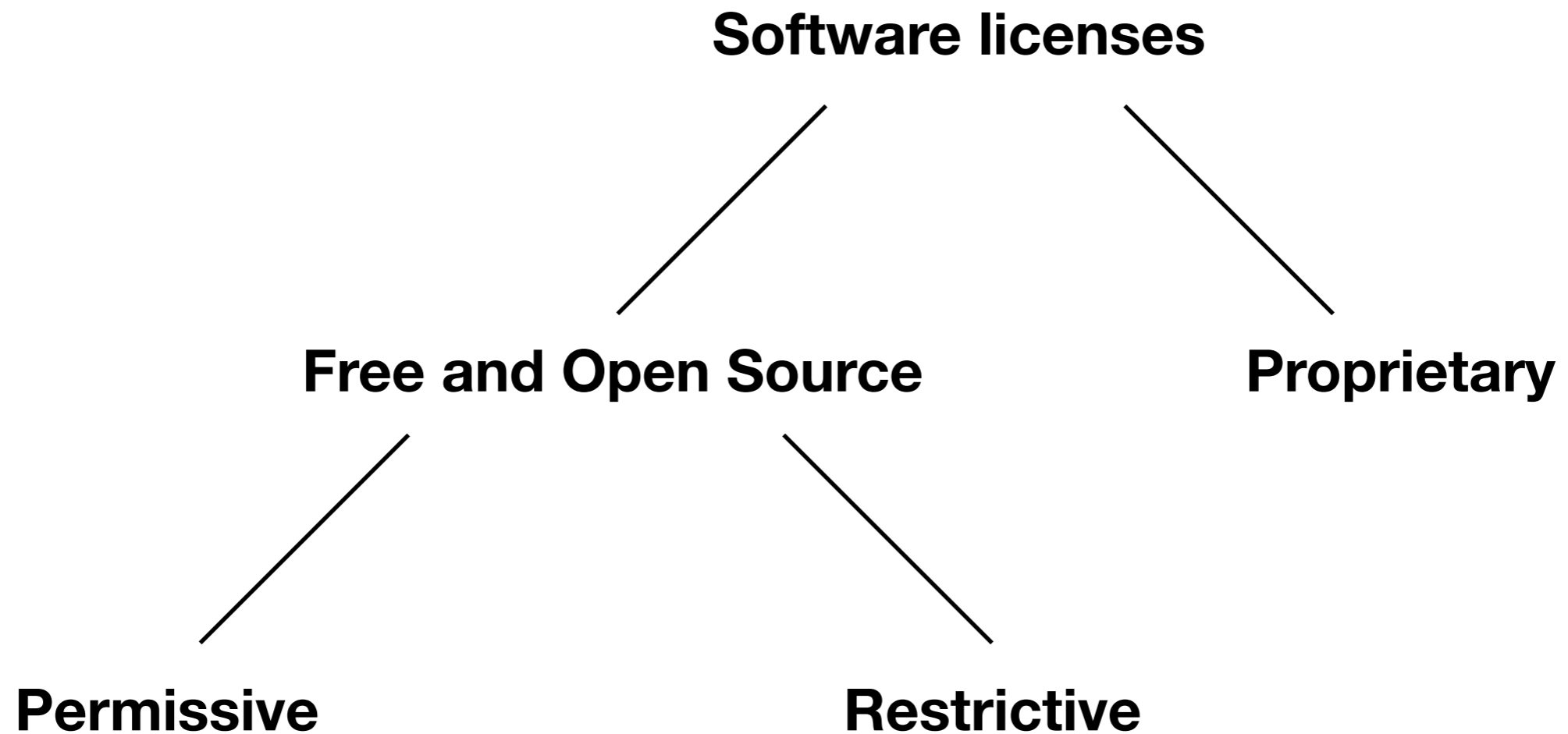
3 layered license

- CC licenses have three layers:
 - traditional legal code (layer readable)
 - human readable version
 - machine readable version

Public Domain

- Works for which IPR have expired or been waived are in the **public domain**
- Works in the public domain are free of any restrictions and can be used by anybody in any way

Software licenses



Software licenses

Rights in Copyright



Restrictive vs Permissive

- Permissive licenses *allow* distribution of source code, but only *require* attribution - "minimal restrictions on future behaviour" (FreeBSD)
- Restrictive (copyleft) licenses *require* source code to be distributed along with binary code - aim to keep software free in the future

Source and object code

- We distinguish between two concepts:
 - source code - human/programmer-readable and editable software
 - object code - compiled, binary software
- Distinction is relevant for licensing
- Some languages are never distributed in compiled form

Free vs Open

- Goes back to philosophical differences between *free* and *open*
- Free software refers to freedom, not cost - "free speech", not "free beer"
- Based on promoting social solidarity and sharing
- *Free* software meets the 10 criteria for open source
- *Open source* software does not necessarily adhere to the requirement of *free software* licenses (e.g. GPL) that require derivative work to also be open source

Four freedoms for software

0. The freedom to run the program, for any purpose.
1. The freedom to study how the program works, and change it to make it do what you wish.
2. The freedom to redistribute copies so you can help your neighbour.
3. The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes.

Copyright - all rights reversed

GNU is not in the public domain. Everyone will be permitted to modify and redistribute GNU, but *no distributor will be allowed to restrict its further redistribution*. That is to say, proprietary modifications will not be allowed. I want to make sure that all versions of GNU remain free.

– Richard Stallman

Restrictive licenses

- Weak restrictive/copyleft license:
 - If software with weak copyleft is used *that module/library's source code must be distributed/made available*
- Strong restrictive/copyleft license:
 - If software with strong copyleft is used *the entire software's source code must be distributed/made available*

Viral licenses

- Strong copyleft is *viral*
- When used they force the entire application to be released under strong copyleft license



Common licenses by type

- Permissive/attribution licenses - compliance is easy:
 - MIT, BSD, Apache
 - ASF applications, React, Angular, DHIS2...
- Weak copyleft licenses:
 - Mozilla, EPL, CDDL, LGPL
 - Firefox, Jetty, Eclipse, OpenMRS, LibreOffice...
- Strong copyleft licenses - compliance can be hard:
 - GPL, AGPL
 - Linux kernel, MediaWiki, Audacity, GIMP...

Example: MIT

- Example of permissive license
- Grants license permission to use the software in any way, with only one condition:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

Example: GNU GPL

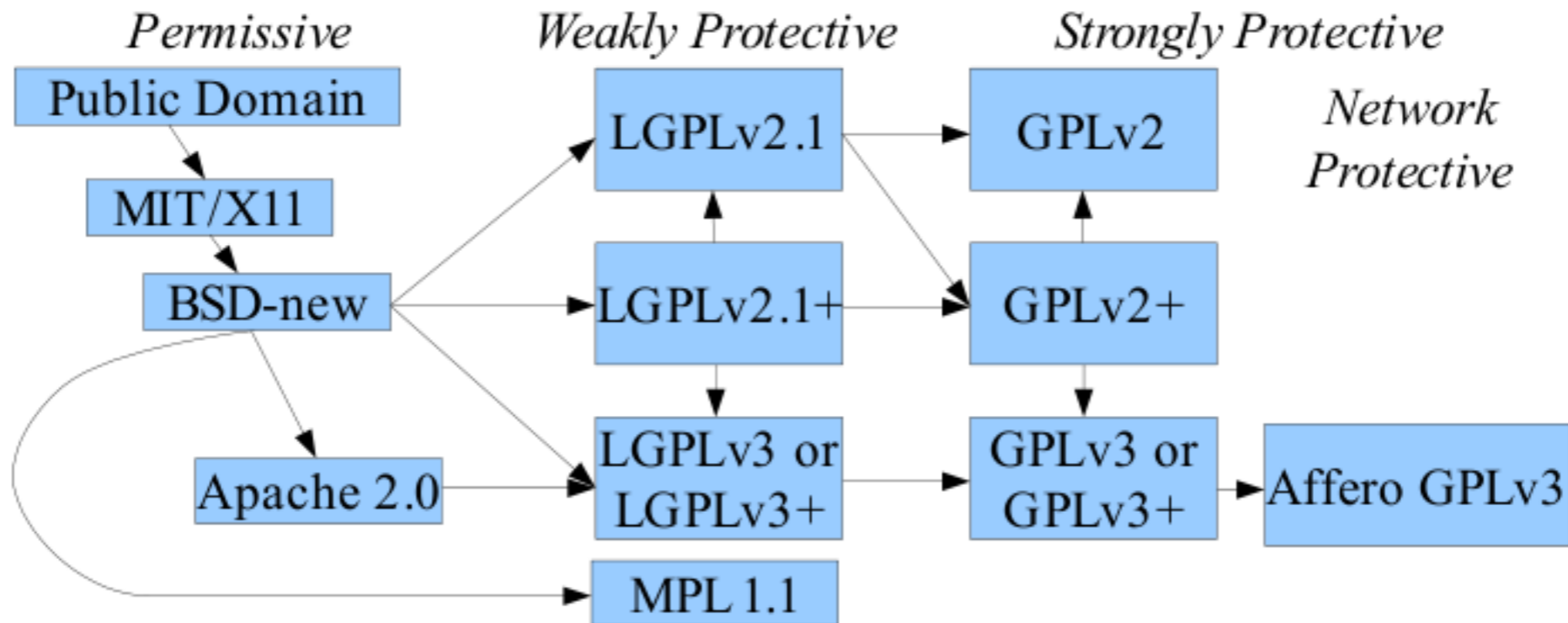
- General Public License - primary example of copyleft
- Several versions:
 - GPL (currently v3)
 - Lesser GPL - weak copyleft license
 - Affero General Public License (AGPL)

Example: Affero GPL

- Designed to address perceived loophole in the GPL, in cases where GPL-licensed software is used to provide cloud services
- Based on GPL, but with an added provision that address *use of software over a network*
- Requires source code to be made available to *users* that access the software over a network

License compatibility

- Not all licenses are compatible
- Compatible here means that source code under one license can be part of software distributed under another license



| | | I want to license my code under: | | | | | |
|--------------------------------|-------------------|---|---|--|---|---|---|
| | | GPLv2 only | GPLv2 or later | GPLv3 or later | LGPLv2.1 only | LGPLv2.1 or later | LGPLv3 or later |
| I want to copy code under: | GPLv2 only | OK | OK [2] | NO | OK: Combination is under GPLv2 only [7] | OK: Combination is under GPLv2 only [7][2] | NO |
| | GPLv2 or later | OK [1] | OK | OK | OK: Combination is under GPLv2 or later [7] | OK: Combination is under GPLv2 or later [7] | OK: Combination is under GPLv3 [8] |
| | GPLv3 | NO | OK: Combination is under GPLv3 [3] | OK | OK: Combination is under GPLv3 [7] | OK: Combination is under GPLv3 [7] | OK: Combination is under GPLv3 [8] |
| | LGPLv2.1 only | OK: Convey copied code under GPLv2 [7] | OK: Convey copied code under GPLv2 or later [7] | OK: Convey copied code under GPLv3 [7] | OK | OK [6] | OK: Convey copied code under GPLv3 [7][8] |
| | LGPLv2.1 or later | OK: Convey copied code under GPLv2 [7][1] | OK: Convey copied code under GPLv2 or later [7] | OK: Convey code under GPLv3 [7] | OK [5] | OK | OK |
| | LGPLv3 | NO | OK: Combination is under GPLv3 [8][3] | OK: Combination is under GPLv3 [8] | OK: Combination is under GPLv3 [7][8] | OK: Combination is under LGPLv3 [4] | OK |
| I want to use a library under: | GPLv2 only | OK | OK [2] | NO | OK: Combination is under GPLv2 only [7] | OK: Combination is under GPLv2 only [7][2] | NO |
| | GPLv2 or later | OK [1] | OK | OK | OK: Combination is under GPLv2 or later [7] | OK: Combination is under GPLv2 or later [7] | OK: Combination is under GPLv3 [8] |
| | GPLv3 | NO | OK: Combination is under GPLv3 [3] | OK | OK: Combination is under GPLv3 [7] | OK: Combination is under GPLv3 [7] | OK: Combination is under GPLv3 [8] |
| | LGPLv2.1 only | OK | OK | OK | OK | OK | OK |
| | LGPLv2.1 or later | OK | OK | OK | OK | OK | OK |
| | LGPLv3 | NO | OK: Combination is under GPLv3 [9] | OK | OK | OK | OK |

Distributing OSS

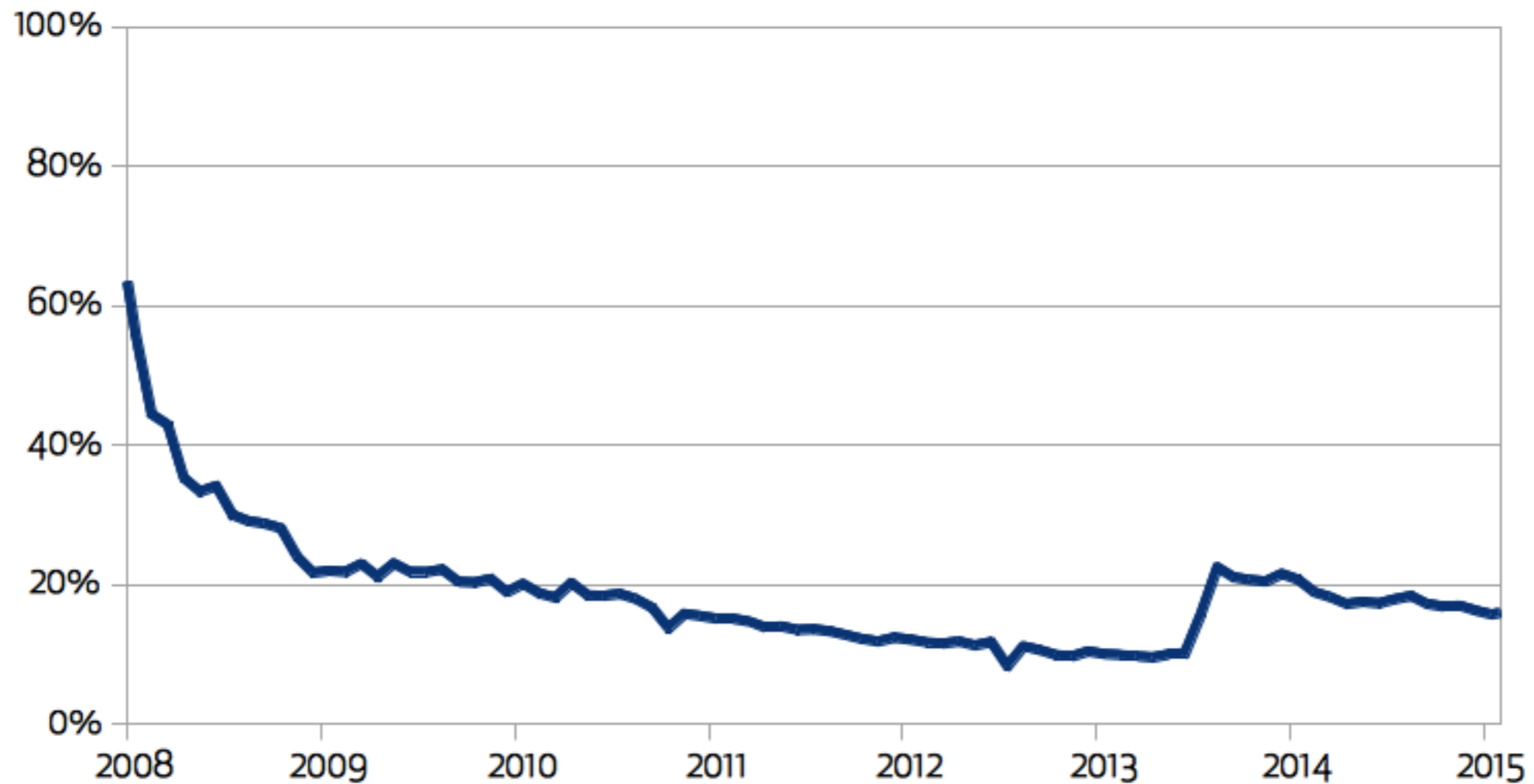
- Requirement to distribute source code in open source licenses is linked to distribution of object/binary code
- *Internal* modification and use of OSS software does not usually trigger requirement to publish modified code
- Businesses may (should) have a list of accepted OSS licenses and used OSS modules - example

Distributing OSS

- Choice of license important for the open source project - affects economic and growth potential
- Topic of research, e.g. Hoffman et al (2013) - correlate choice of license with growth of project
- <https://choosealicense.com>

Distributing OSS

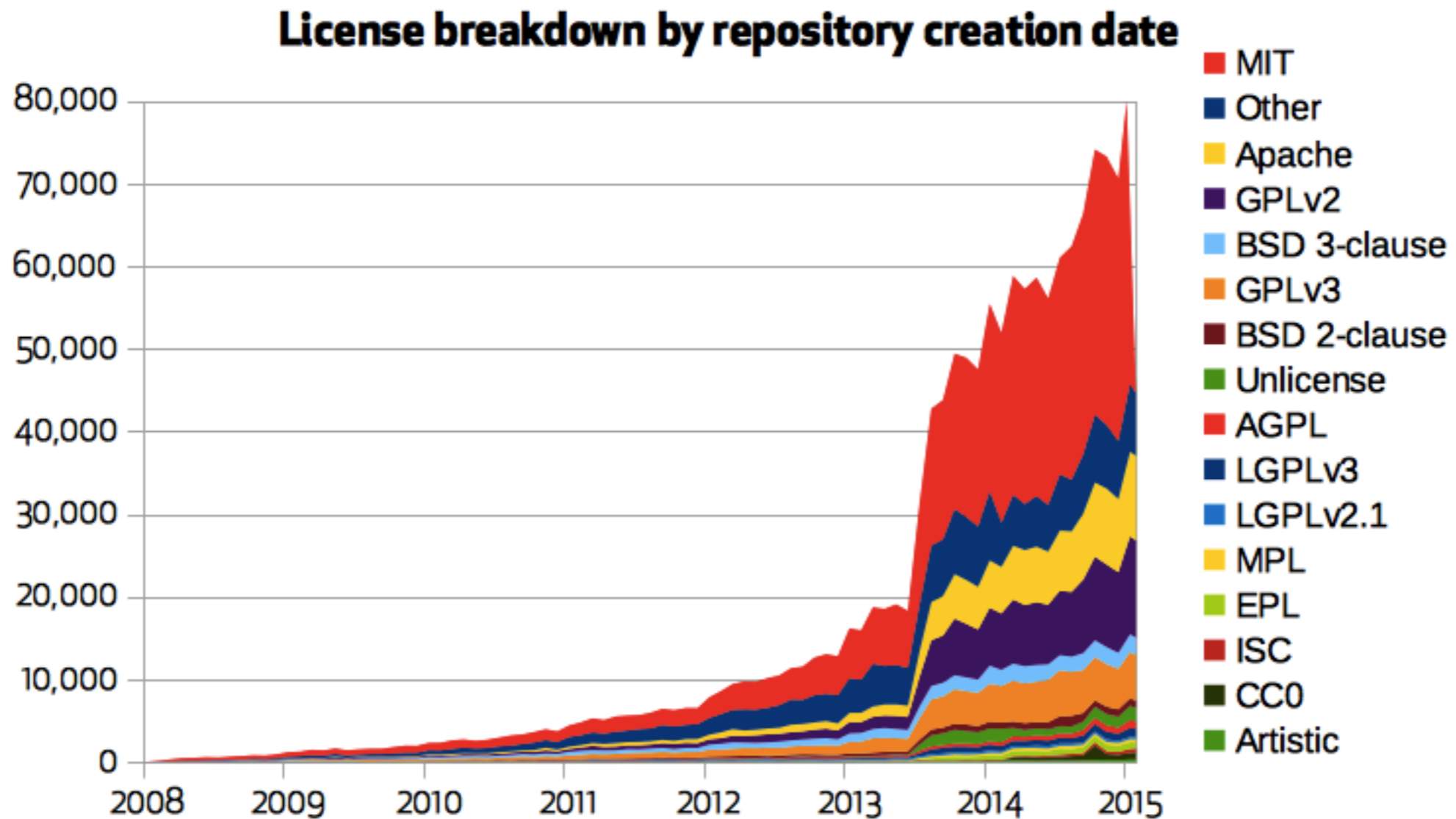
Percentage of repositories licensed



Distributing OSS

| Rank | License | % of projects |
|------|--------------|---------------|
| 1 | MIT | 45 % |
| 2 | Other | 16 % |
| 3 | GPLv2 | 13 % |
| 4 | Apache | 11 % |
| 5 | GPLv3 | 9 % |
| 6 | BSD 3-clause | 5 % |
| 7 | Unlicense | 2 % |
| 8 | BSD 2-clause | 2 % |
| 9 | LGPLv3 | 1 % |
| 10 | AGPLv3 | 1 % |

Distributing software



Source: <https://github.com/blog/1964-open-source-license-usage-on-github-com>

License violations

- Automated tools can be used for detecting licensing issues
- Review of source code (including licenses) would typically be part of "due diligence" in the sale of a company
- With violations of open source (copyleft) licenses, you could be taken to court and forced to release the source code
- Topic of research, e.g. We et al (2017) on inconsistencies of licensing within OSS projects

Case: Linux

Contamination

GPL Code...

```
static int init_ring_init(void)
{
    int rc;
    struct special_dev *sp_dev;
    init_MUTEX(&ring_open);
    special_for_each_dev(sp_dev){
        if(sp_match_dev...
```

Proprietary Code...

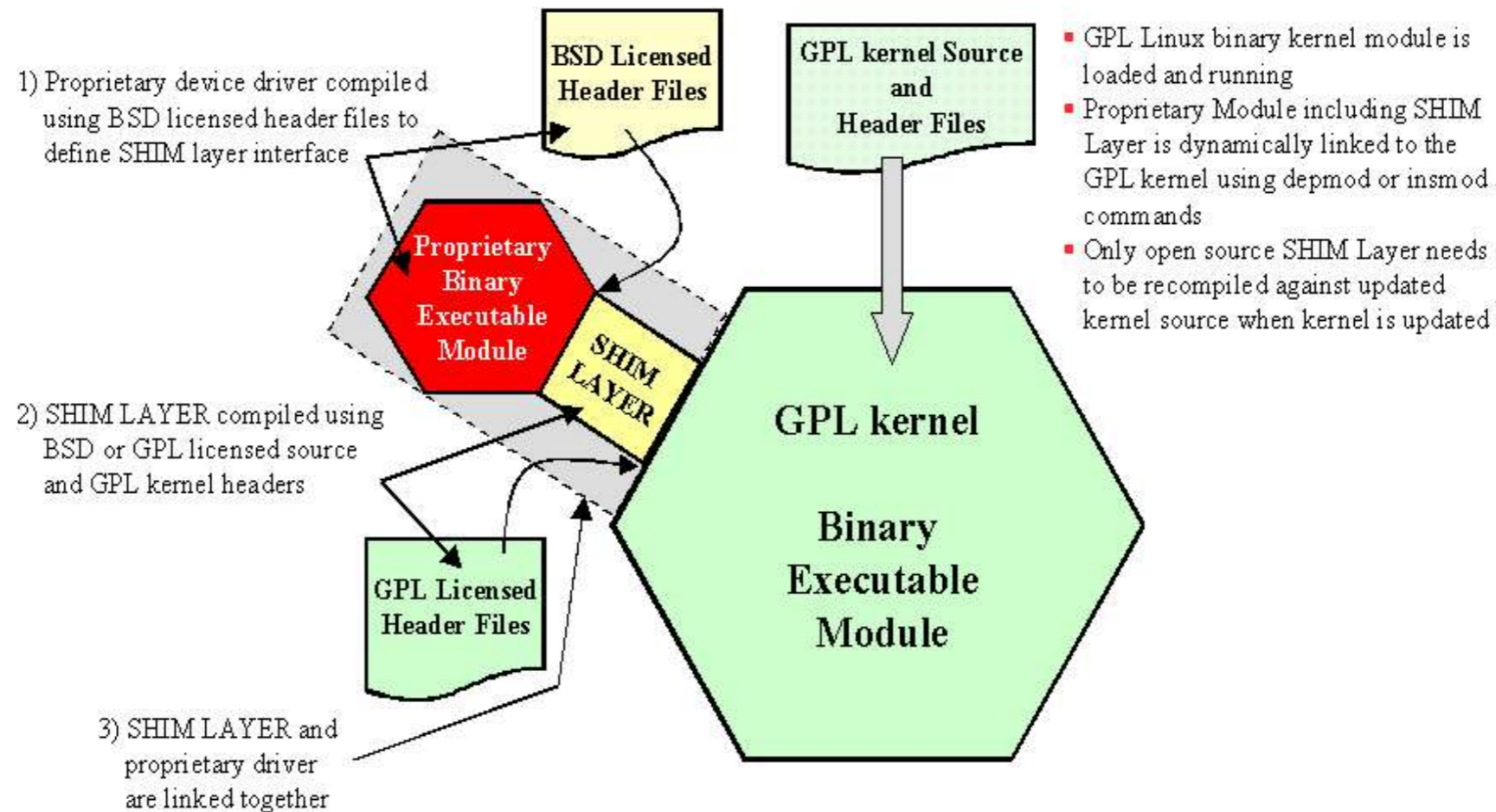
```
if(search_item & hw_status){
    hw_status = RNG_ENABLED;
    printk(hw_status "Ring Enabled\n");
} else if(ring_mem == NULL){
    printk(hw_status "Ring Error\n");
    goto ring_error_processing;
}
```

- Do not let employees work concurrently with proprietary and open source
- Red Hat does not permit its engineers to see proprietary code
- “Cubical wall rule”
- Shim layer especially important



Case: Linux

Kernel Example

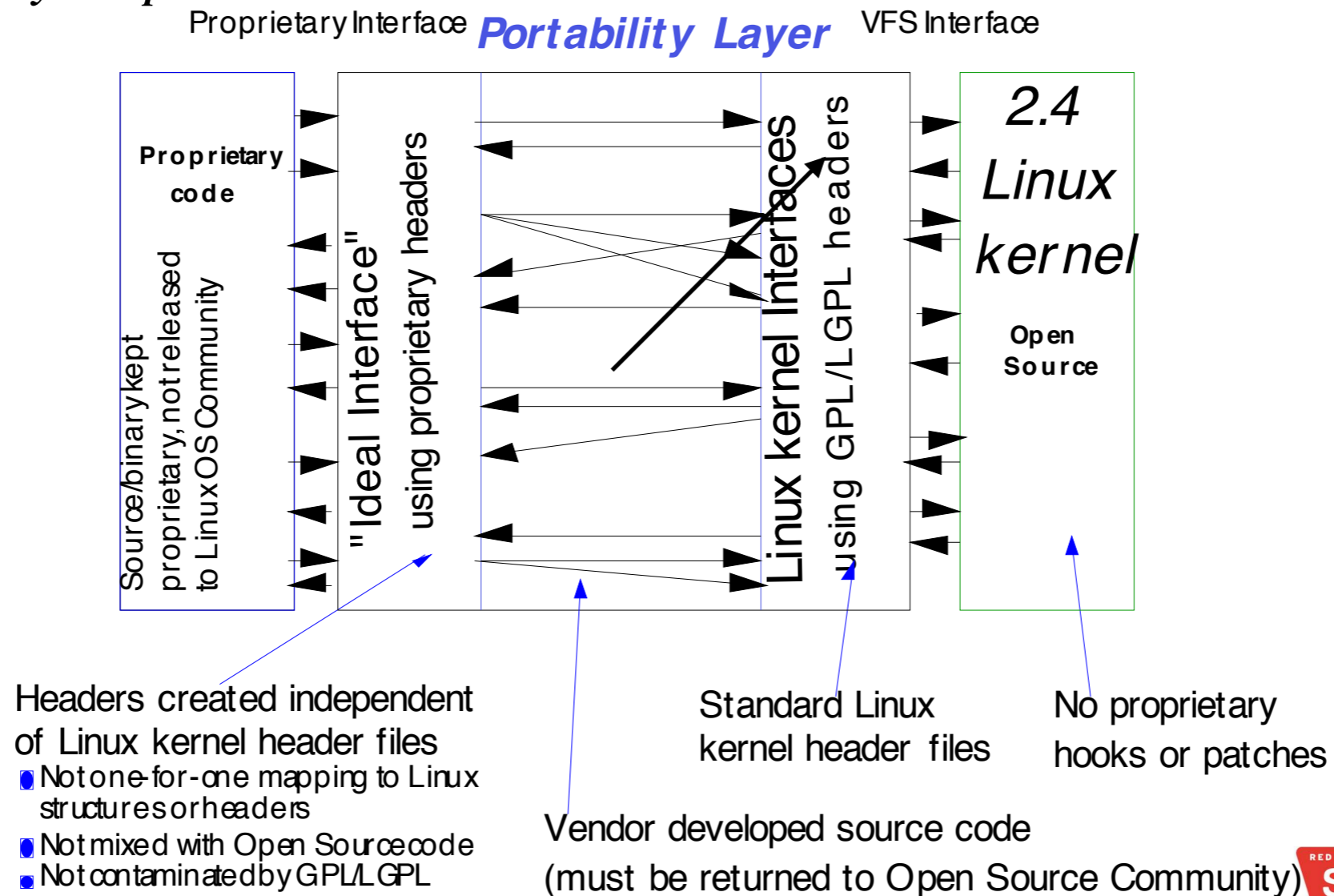


Prudent posturing rather than legal precedent

Case: Linux

Example of Isolation Technique

Layer Explanation



Case: React

- Initially developed and used internally at Facebook
- Open Sourced in 2013 under a permissive BSD license, but with a patent clause (BSD+patents)
 - Source code is released under permissive BSD license
 - Licensees are granted right to any Facebook patents in the software

Case: React

The catch:

“The license granted hereunder will **terminate**, automatically and without notice, if you [...] initiate directly or indirectly, or take a direct financial interest in, any Patent Assertion: (i) against Facebook or any of its subsidiaries[...].”

Case: React

- Increasing concern about the implications of the patent clause
 - ASF put the BSD+patents license on their Category X list
 - Automattic (wordpress developer) decided to drop React
- Perception was that companies relying on React would be at Facebook's "mercy"

Patent Retaliation Clauses



Company A



Company B



Blocked

Patent Retaliation Clauses

Open source +
patent clause



Company A



Company B

Patent Retaliation Clauses

Open source +
patent clause



Company A



Company B

Licensee for pencil

Case: React

- React 16 released with MIT license and no patent clause
- Facebook still argues the BSD+patent license is a good solution that can reduce the amount of software patent lawsuits in general

Open APIs

- Open API is an API that is open and freely available for anyone to use
- APIs are not new, but that they are *open* and *online* is new
- Concerns of business aspects of opening APIs

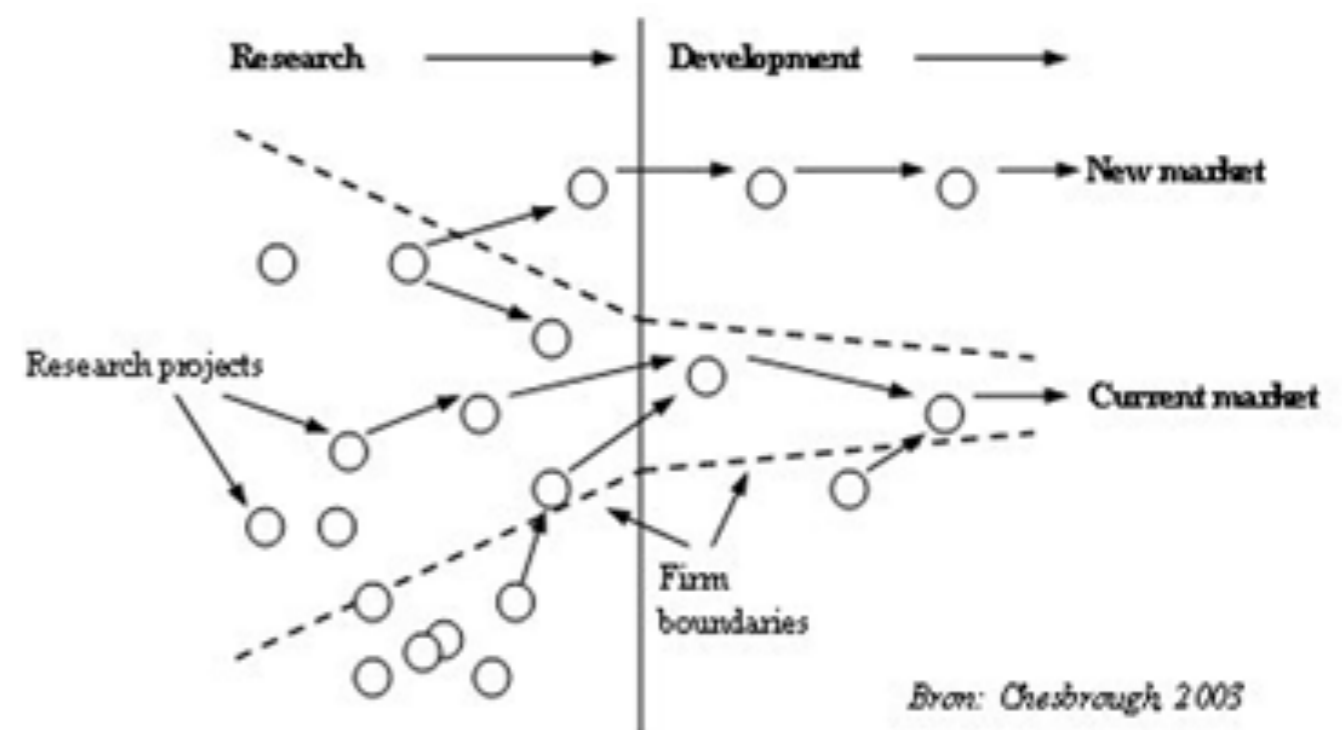
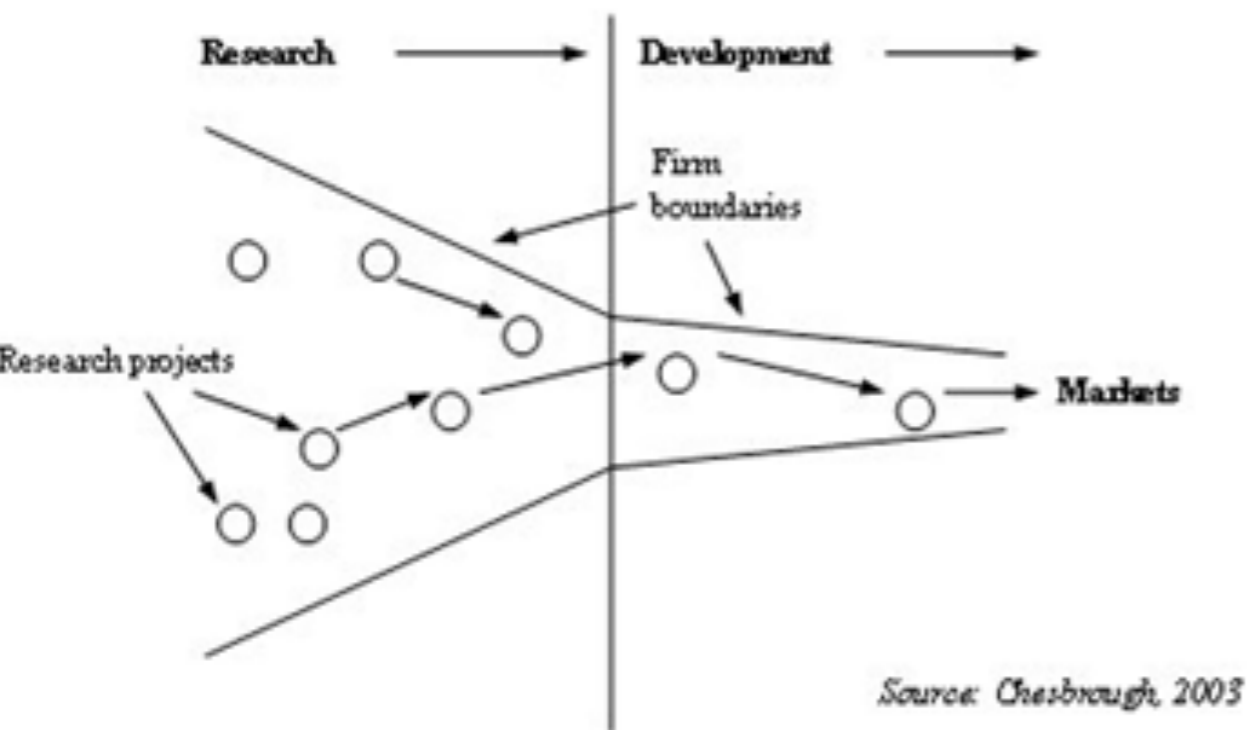
Open Source vs Open APIs

- Argument:
 - Companies rely increasingly on Open APIs, and OSS becomes less important
 - Open APIs are "open enough"
 - Similar to growth in OSS popularity in early 2000s
- Counter-argument:
 - Using Open APIs gives you very little control - vendor lock-in
 - Control lies with API owners, who benefit from growth of ecosystems

More Open...

- Open Data - related to Open APIs. What and how comes under IPR protection
- Linked Open Data - publishing data in a way that allows them to be linked
- Open Innovation - opening up innovation processes

Open Innovation



Sources

- <https://plato.stanford.edu/entries/intellectual-property/>
- <https://www.patentstyret.no/tjenester/patent/hva-kan-du-soke-patent-pa/>
- https://en.wikipedia.org/wiki/Intellectual_property
- <http://www.uio.no/studier/emner/matnat/ifi/INF5750/h13/lecture-presentations/inf5750---lecture-11---open-source-licenses-and-ipr-protection.pdf>
- http://publications.nr.no/1439981439/Compendium_INF5780H15.pdf
- https://en.wikipedia.org/wiki/Permissive_software_licence
- https://en.wikipedia.org/wiki/Affero_General_Public_License
- <https://github.com/blog/1964-open-source-license-usage-on-github-com>
- <https://medium.freecodecamp.org/facebook-just-changed-the-license-on-react-heres-a-2-minute-explanation-why-5878478913b2>
- <https://openedreader.org>
- + course curriculum