

Open Source Software and Public Policy

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2019

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Professorship of Open Source Software

- Professor of Computer Science
 - For software engineering and open source software
 - At the computer science department of the engineering faculty
- Previously held research positions at ...
 - SAP Labs (Silicon Valley) leading the open source research group
 - UBS (Swiss Bank, Zurich) leading the software engineering group
- Previously worked in development at ...
 - Skyva Inc. (supply chain software, Boston) as software architect
 - Bayave GmbH (on-demand business software, Berlin) as CTO
- Ph.D. from ETH Zurich, M.B.A. from Stanford GSB









Software is eating the world

WSJ, 2011-08-20



The Impact of Software / Digitization

- Software is a core component of digitization
 - Software radically changes existing businesses and business models
 - Software creates wholly new businesses and business models
- Software radically improves innovation speed
 - Deployment (when new program code delivers economic value) can be nearly instantaneous
 - Existing products are changed to take advantage of software innovation speed

Rank	2019, first quarter		2018, first quarter		2017, first quarter ^{[1][note 1]}		2016, first quarter ^{[1][note 1]}	
1		Microsoft ▲904,860 ^[1]		Apple Inc. ▼851,317		Apple Inc. ▲753,718		Apple Inc. ▲607,465
2		Apple Inc. ▲895,670 ^[2]		Alphabet Inc. ▼715,404		Alphabet Inc. ▲573,570 ^[5]		Alphabet Inc. ▲535,660 ^[5]
3		Amazon.com ▲874,710 ^[3]		Microsoft ▲702,760 ^[2]		Microsoft ▲508,935		Microsoft ▲439,734
4		Alphabet Inc. ▲818,160 ^[4]		Amazon.com ▲700,672 ^[3]		Amazon.com ▲423,031		ExxonMobil ▲350,991
5		Berkshire Hathaway ▼493,750 ^[5]		Tencent ▲507,990 ^[6]		Berkshire Hathaway ▲410,880 ^[8]		Berkshire Hathaway ▲349,740 ^[6]
6		Facebook ▲475,730 ^[6]		Berkshire Hathaway ▲492,019 ^[8]		ExxonMobil ▲339,897		Johnson & Johnson ▲300,604
7		Alibaba Group ▲472,940 ^[7]		Alibaba Group ▲470,930 ^[9]		Johnson & Johnson ▲337,947		General Electric ▼295,546
8		Tencent ▲440,980 ^[8]		Facebook ▼464,189 ^[7]		Facebook ▲334,552		Amazon.com ▼281,888
9		Johnson & Johnson ▲372,230 ^[9]		JPMorgan Chase ▲377,410 ^[10]		JPMorgan Chase ▲313,761		Facebook ▲259,192
10		Visa ▲353,710 ^[10]		Johnson & Johnson ▼343,780 ^[11]		Wells Fargo ▲278,516		Wells Fargo ▼246,035

High Profits in the Software Industry Through Vendor Lock-in

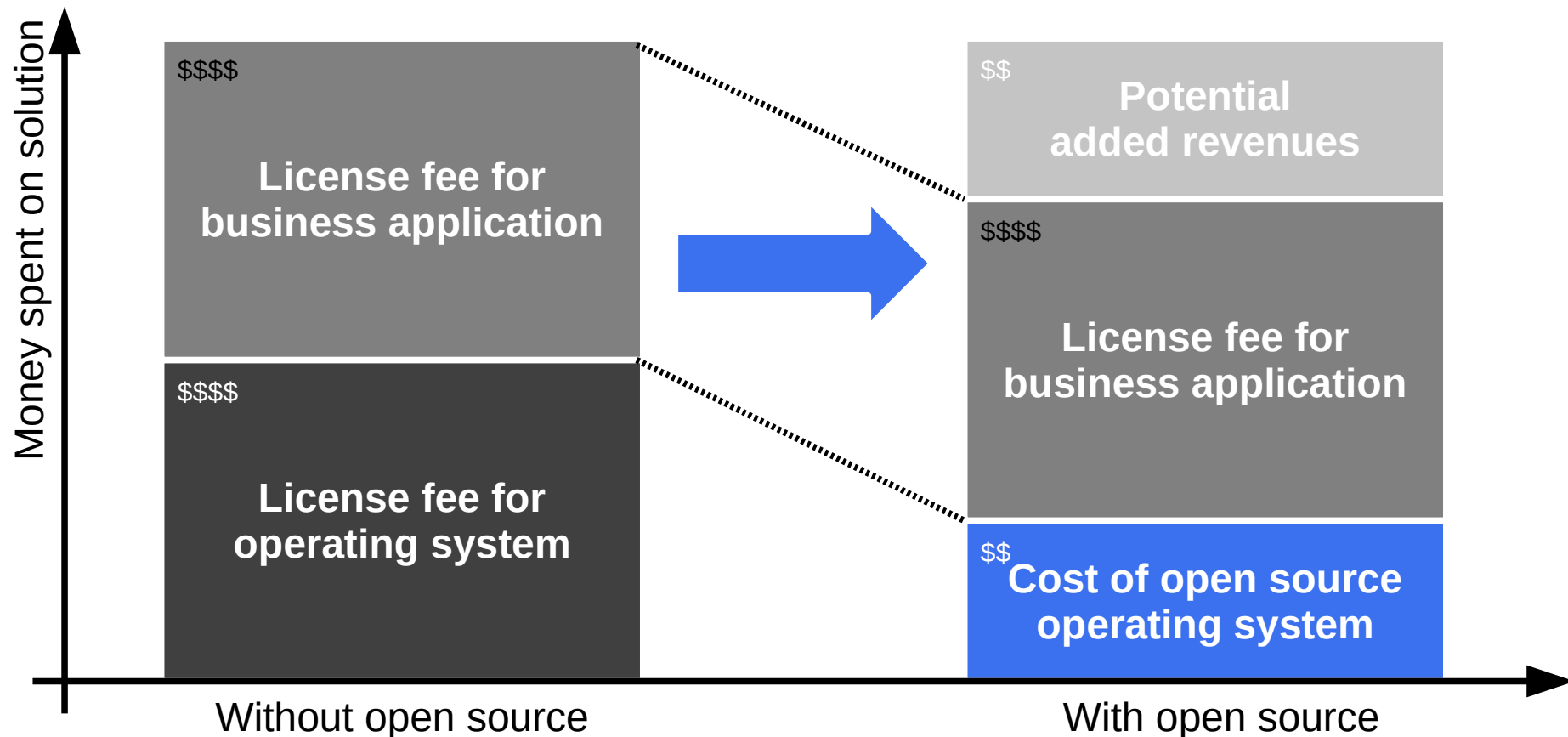
- Definition of vendor lock-in
 - The degree of switching costs to an alternative solution
 - Infinite, if there is no alternative solution (monopolist)
- Consequences for customers
 - **High license / subscription fees**
 - Innovation blockage
 - Operational risk
- Many forms of lock-in
 - Microsoft was the poster child for **software** vendor lock-in

Open Source Software

- Open source software is software that (by way of a license)
 - Gives users the rights, free-of-charge, to
 - Use the software
 - Modify it for their own use
 - Pass on the modified version
 - Cf. Open Source Initiative, <https://opensource.org>
- Open source is also a new model of collaboration in software development



Why Software Vendors Develop Open Source Software 1 / 2 [1]



[1] Riehle, D. (2010, January). [The Economic Case for Open Source Foundations](#). Computer vol. 43, no. 1, pp. 86-90.

Why Software Vendors Develop Open Source Software 2 / 2



How to Develop Open Source Software

- Jointly and collaboratively
 - Because for any single person or vendor it would be too risky, too expensive
 - But sometimes a strong vendor can go it alone (for other reasons)
- Under the rules of a foundation
 - Because without defined equal and fair playing field, vendors would not come
 - Also: Creates legal and personnel safety, removes unnecessary hurdles

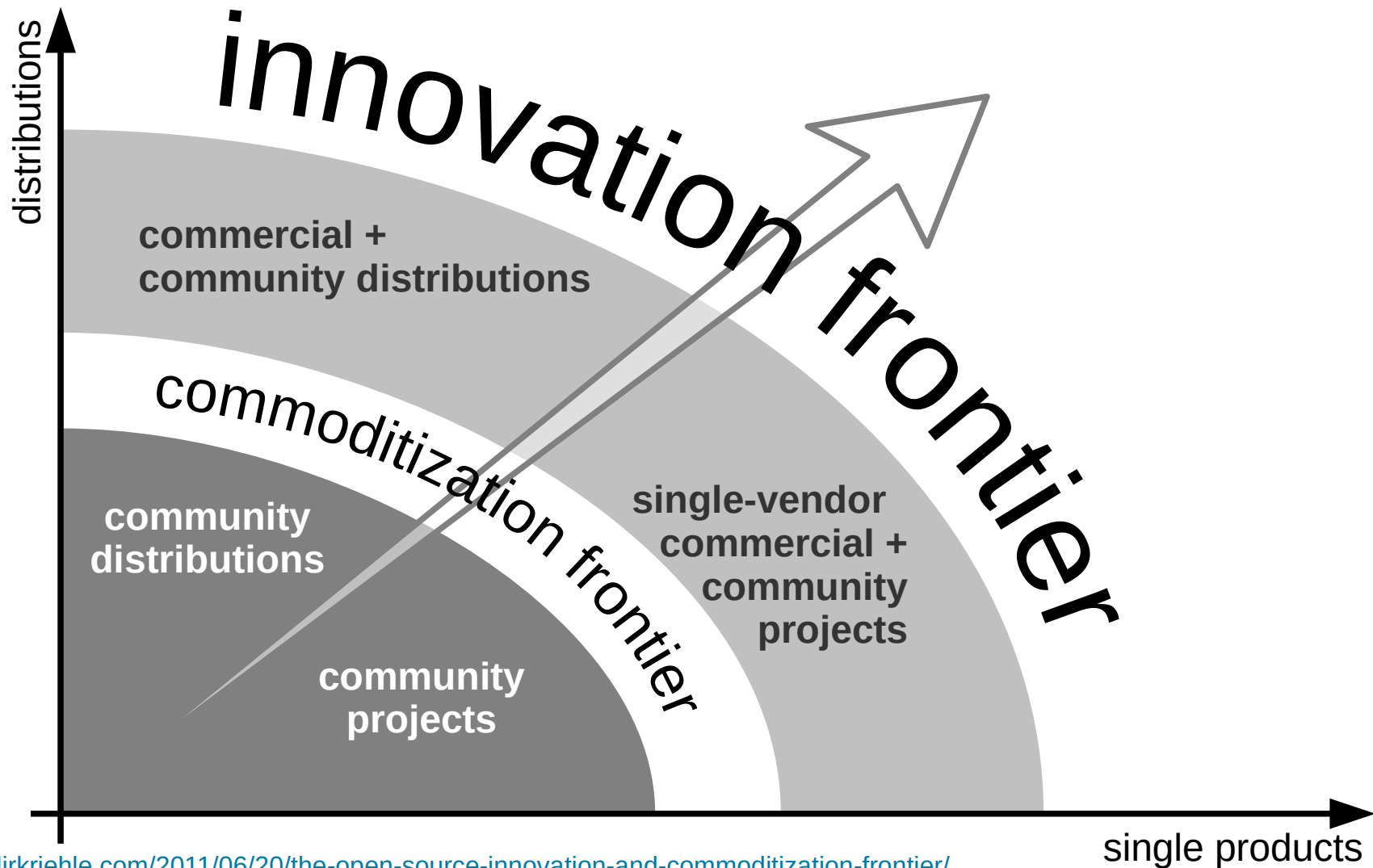
Primary Complement to Open Source Software

- **Service and support** for the open source software
 - For example, IBM Global Services
 - **Any local consulting firm**, really
- Service and support has low barriers to market entry
 - Knowledge lock-in is possible, but much less severe
 - Usually not venture capital funded
- Open source and local services → part of digital sovereignty

Other Complements to Open Source Software

- Exclusion-rights-based complements
 - Closed (proprietary) **software**
 - Almost all software vendors
 - Generic **computing resources** for cheaper execution
 - For example, **Amazon Web Services**
 - **Specialized hardware** for superior execution
 - For example, **Google's Tensorflow Processing Units**
 - **Data** for superior models / decision making
 - For example, **Facebook Advertising**
- Vendor lock-in all over again
 - As indicated by venture capital funding

Create and support **openness,
where your economy is lagging
(compared with the competition)**



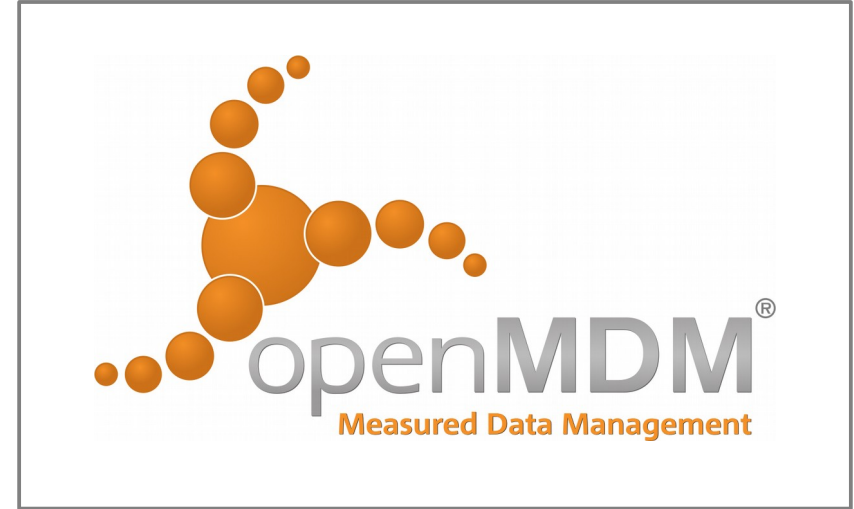
How to Support Open Collaboration

- Educate companies
 - Companies often don't understand the need for and the processes of open collaboration
- **Support foundations**
 - Define a fair and equal playing field and remove bureaucratic and financial hurdles
- Educate the workforce
 - Open collaboration processes are different from traditional work

A Tale of Two User-led Open Source Foundations



Energy



Automotive

Sample of Current User-led Open Source Foundations

Name	Domain	Name	Domain	Name	Domain
3MF	3D printing format	Karuta	Education	openIMIS	Health and Insurance
Apereo OAE	Higher Education	KOHA	Library	OpenJustitia	Law
Arches	Cultural Heritage	Kuali Core	Higher Education	openKONSEQUENZ	Energy
Automotive Grade Linux	Automotive	Kuali Financials	Higher Education	OpenLMIS	
Bahnmi	Healthcare	Kuali Research	Higher Education	openMAMA	Finance
Bedework	Neutral	Kuali Student	Higher Education	OpenMDM	Automotive
BioJava	Bioinformatics	Laboratory Information System (O	Healthcare and Biomedical	OpenMRS	Healthcare
BioPerl	Bioinformatics	LF Energy	Energy	openPASS	Automotive
BioPython	Bioinformatics	LocationTech	Geospatial technologies	openSDS	
Canvas (LMS)	Higher Education	Mifos	Microfinance	OpenVDB	Content Creation
Central Authentication Service (CA	Neutral	O3-DPACS	Healthcare	OSADL	Machine, Machine Tool, Automatic
Civil Infrastructure Platform	Infrastructure	Open Container Initiative	Technology	PillarOne	Risk Management
CloudNativeComputing/Prometheus		Open EQUILLA	Neutral	Polarsys/Capella	Systems and Software Engineering
DHIS2	Healthcare	Open Library Environment	Higher Education	Polarsys/Papyrus IC	Systems and Software Engineering
Digital Square / DigitalSQR	Healthcare	Open Travel Initiative	Tourism	popHealth	Healthcare
Eclipse IoT		OpenAirInterface	Software Engineering	RailML	Railway
ELMS Learning Network (ELMSLN	Higher Education	openBMC		ReqIF Implementor Forum (ReqIF IF)	
Evergreen	Library	Opencast	Higher Education	Sakai	Higher Education
Finos	Finance	openCourseWare	Education	Thalamus	Healthcare
Genivi Development Platform (GD	Automotive	OpenELIS/Global	Health informatics	Unitime	Higher Education
GNU Health embedded	Healthcare	OpenELIS/US	Health informatics	uPortal	Higher Education
Hospital Management Information	Healthcare	openETCS	Railway	vistA	Healthcare
Hospitalrun	Health	openGIS	Geographic Information Systems	X-road	e-Government
iHRIS (Open Source Human Reso	Healthcare	OpenHIE		Xerte	Education

Open Collaboration Status Going into 2020

- Open collaboration for and by the tech industry
 - Mostly understood, sufficiently financed
- Open collaboration for the other industries
 - Open source software [1]
 - Some increasing understanding
 - Open hardware
 - Lagging to software
 - Open data
 - Barely on the radar screen
- **The less technical an industry, the more help it needs**

[1] <https://dirkriehle.com/2018/07/30/the-open-source-pitch/>

**If unhappy,
go open wherever
you want to be sovereign**

Thank you! Questions?

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