

OFA Symposium 2023

Annotated Programme with Abstracts and Bios

Julia Ferraioli & Juniper Lovato

Keynote

Bios

<p>Julia Ferraioli</p>	<p>Julia Ferraioli is an independent open source strategist, researcher, and practitioner with a decade of experience in launching, managing, and optimizing open source projects at scale. Her current research centers around open source sustainability, history, and governance. Her community work includes co-leading Open Source Stories, a community-led effort with the goal of making the people of open source and their lived experiences more visible. Julia is a fierce supporter of LaTeX, the Oxford comma, and small pull requests.</p>
<p>Juniper Lovato</p>	<p>Juniper Lovato (pronouns: she/her) is an educator and researcher in the field of complex systems and data science. Her current research focuses on data ethics, group privacy, complex systems, the science of stories, and open source ecosystems. She is the Director of partnerships and external programs at the Vermont Complex Systems Center at UVM where she organizes Complex Systems programs and thinks about data ethics. She is also a Ph.D. candidate in Complex Systems & Data Science, at the University of Vermont! Previously, she was the Director of Education for the Santa Fe Institute in Santa Fe, New Mexico where she was born and raised (on a rural family compound (in the Village of Tesuque) populated by hippies and Spanish/Swedish folk musicians, yup they had a dance pavilion). In her free time, she makes/supports makerspaces and open source/open science programs</p> <p>She is the inaugural Vermont regional partner with Code.org and the co-founder of the Vermont CSTA and the Vermont Computer Science Alliance. She serves on the board of the Network Science Society and the NE Chapter of the Complex Systems Society. She has created over 80 STEM education programs worldwide. She is the founder of the makerspace Make Santa Fe.</p>

Jérémie Haese

Entry into Open Source: Evidence from Web Browsers

Abstract

Big tech companies are increasingly dominating essential parts of technology, including open source software (OSS). While initially governed by crowdsourced projects like Linux and Apache, private companies such as Google, Meta, and Microsoft now invest heavily in OSS. Examples include Chromium, Tensorflow, and React. OSS is also incorporated into products in operating systems and cloud computing industries.

The motivations behind firms' OSS strategies have been explored, but there is limited knowledge on the consequences of a firm's participation in an OSS project for both the firm and the project. OSS can provide access to state-of-the-art technology and motivated developer teams, leading to higher productivity. However, the "privatization of OSS" raises concerns like potential crowding out of individual contributors or underinvestment in cybersecurity.

This paper studies the effects of Microsoft's decision to switch from a proprietary to open source kernel for Edge by adopting Chromium. The study examines how this decision affects product quality, Microsoft's market share in web browsers, and the open source community behind the Chromium project.

We use a difference-in-differences approach, comparing Chromium to non-Chromium browsers/projects. We find that Microsoft reached the technological frontier but became similar to competitors, giving up most functionalities previously developed. Chromium adoption disrupted software development at Microsoft, adopting fast release cycles. Page load speeds decreased for Edge, converging to the same (slower) speed as most other browsers.

The new Chromium-based Edge increased Microsoft's market share by 8 percent. More contributors joined to report security vulnerabilities, benefiting all Chromium participants. However, there was a decrease in external developer contributions to the Chromium project, partially compensated by increased efforts from Microsoft.

The findings have important managerial and policy implications. Entering an existing open source project presents challenges. There is no evidence of crowding out of contributors following Microsoft's entry, but rather a crowding-in effect concerning security vulnerabilities. Policymakers should note that firms' entry into existing projects leads to increased concentration, potentially resulting in market inertia and concerns about long-term innovation. However, the reduction in the number of technologies can also provide standardization and compatibility between products.

The study contributes to the OSS literature by adding quantitative evidence on how entry from for-profit firms affects open source contribution, and the dynamics in the web browser market, which affects more than half of the world population. The browser engines studied in this paper are among the largest OSS projects, with over 2 million individual contributions on GitHub.

Bio

I am a PhD Student in Management in the Strategy Department at HEC Lausanne. My research focuses on the economics and strategies of innovation as well as the competitive dynamics on platform markets.

I completed my undergraduate studies in Economics and Management at Ecole Normale Supérieure de Paris-Saclay and University Paris 1 Panthéon-Sorbonne. I hold a master's degree in Network Industries and Digital Economics from University Paris Dauphine - PSL and a master's degree in Corporate

Finance from University Paris 1 Panthéon-Sorbonne.

Over the past years, I have lived and worked in four countries (France, Colombia, Ireland and Switzerland) gathering experience in different industries, from the financial department of a waste management company to investment banking.

I am member of the [Data Economy Project](#).

Jorge Benet

A Cooperative Model for Digital Infrastructure and Recommendations to Adopt It

Abstract

Cooperatives have provided essential goods and services through sustainable management of natural resources, and in recent years they have maintained complex technological infrastructure such as solar and wind energy distribution networks. Another type of technological infrastructure that is essential are telecommunications networks. These networks are not only made up of hardware, but also of software such as source code libraries, modules and development tools for programming. This software infrastructure or digital infrastructure (DI) enables the operation of millions of Internet websites and platforms for public and private services. However, part of this infrastructure is frequently at risk because it lacks both organizational support and financing, since in many cases it exists thanks to the voluntary work that programmers do in their spare time.

Regarding the contributions that cooperatives can provide to help solve these problems, we can say the following: CICOPA reported in 2017 that 2,063 cooperatives provided ICT services. Although the types ICT services provided by these cooperatives are many, we know that part of them are dedicated to software development, especially the development of Free and Open Source Software. This type of software is one of the essential characteristics of DI since it has the licenses to be used and adopted publicly.

The main question of our research was to know how cooperatives produce and sustain DI and to propose a cooperative model to help produce and maintain DI. At the end of our research we found 21 DI projects developed and/or maintained by 12 cooperatives located in 7 countries: Argentina, Canada and India, Spain, USA, France and England. All these projects have external contributors forming a development community. These cooperatives participate in the 3 stages of the software production value process (creation, proposal and capture). They are made up of teams with a diversity of skills necessary for planning and establishing workflows. They also generate and share knowledge with the development community. Finally, they bring decision-making methods to the development of DI and in most cases cooperatives are open to participation in the technical direction of the project. Based on these findings, we propose a model that places the cooperative in both the community and market settings and locates the activities they perform in the 3 stages of the software value process. From this model, we suggest other skills that are needed and some of the democratic practices that cooperatives can provide to the management of DI.

Bio

Jorge Benet, 1982, Mexico City. Master on Political and Social Studies from Universidad Nacional Autónoma de México (UNAM). Researcher on cooperativism and Free Libre Open Source Software. Cooperativists and long time FLOSS supporter and promoter.

Elçin Yenişen Yavuz

User-led Open Source Foundations

Abstract

Open source (OS) foundations can be categorized based on the leading roles of their participants. When a community of volunteer individuals within a legal entity develops open source software for their personal use within a legal entity, it is referred to a community-led open source software consortium or foundation.

With the involvement of organizations in open source software development projects, further two distinct types of foundations have emerged: vendor-led OS foundations and user-led OS foundations. In the vendor-led OS foundation, the leading members are from the software industry, collaborating with the goal of developing open source software components. Conversely, in user-led OS foundations, the leading members are organizations from non-software industries, collaborating on software development to use in their internal processes.

The first examples of user-led OS foundations, such as Kuali Foundation and Sakai Foundation, emerged in the higher education industry in the early 2000s. Over the years this approach gained recognition across various industries, leading to the establishment of user-led OS foundations by competitive companies to develop non-differentiating software. Their main motivations are influencing the development of open source software regarding their expectations on functionality and reducing vendor dependency.

In this presentation, I will discuss the different categories of open source foundations, with a primary focus on user-led OS foundations. I will show some examples of user-led OS foundations and explain their ecosystems. Furthermore, I will explain the potential challenges encountered in these types of collaborations, drawing from the findings of a case study.

Bio

Elçin Yenişen Yavuz, M.Sc., is a researcher and doctoral student at the Professorship for Open Source Software at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany. She received her master's degree of International Information Systems from the FAU, Germany. Before joining academia, she led various projects in the automotive, healthcare and pharmaceutical industries. Her areas of interest are open innovation, open source software development, collaborative software development, and digital transformation

Wayne Wang

Open-Source Commons Made in China: A Case Study of OpenAtom Foundation and Mulan-series Licenses

Abstract

China, as a consistently entrepreneurial state, exemplifies an economic rationale characterized by both centralized and decentralized planning — the notion of state-directed grassroots self-governance, which has also been evidenced in open-source strategies enabled by state policy commands. However, China's modern Intellectual Property System, significantly patterned after the treaties of the World Intellectual Property Organization (WIPO) and Trade-Related Aspects of Intellectual Property Rights (TRIPs), underscores the pivotal role of private entrepreneurship — an organically emergent, grassroots meta-governance model — in invigorating the knowledge market and engendering an innovative national landscape. The combination of both public and private powers in open-source communities creates an increasing demand for drawing an institutional design of intellectual commons involving both state and non-state actors. By comparing the institutional exchange between actors and regulations in the Socialist Market Economy with their global equivalents, such as those involved in Creative Commons and OSI Approved Licenses, the article/talk uses the Chinese AI industry as a case study to investigate the functionality of open source in governing emerging technologies and facilitating interpretable innovation within/beyond the borders. This approach, structured within a historical overview of China's open-source campaigns and a modern retrospective of recent incentive tactics, including forming OpenAtom Foundation and Mulan-series (variant) Licenses, navigates the complexities, homogeneity and heterogeneity inherent in prototyping a sustainable ecosystem for open-source commons in China.

Bio

Wayne Wei Wang is now a PhD Candidate in Law and Technology at the University of Hong Kong (HKU) where he served as a part-time Technology and Intellectual Property Officer (Trainee) at Technology Transfer Office, Teaching Assistant (Tutor) in Chinese Law and Economy for its Common Core Curriculum as well as Research Associate at Law and Technology Centre. Wayne is a qualified Associate Fellow of the UK Higher Education Academy (Advance HE). Trained in Engineering and Law, Wayne focuses his research interests on Intellectual Property, Data Protection and Algorithmic Governance, with a focus on Law, Innovation, Technology and Entrepreneurship in the Automating Global South. Wayne (has) held the DERN/GSAN Resilience Scholar Fellowship at University of Essex (UK), Global Visiting PhD Fellowship at Singapore Management University (Singapore) and Frédéric Bastiat Fellowship in Law, Public Policy and Political Economy at George Mason University (USA). Wayne has also worked as an Associated Scholar, and since 2020, Fellow-in-Rio at Fundação Getúlio Vargas Rio Law School (Brazil). Since visiting University of Warsaw (UW) in 2023, under the PROM Scholarship Program funded by the Polish National Agency for Academic Exchange and European Social Fund, he has been Guest Lecturer in Intellectual Property, Antitrust, E-Commerce and Platform Governance at the School of Law and Economy of China at the UW, Poland. As Research Sprint Fellow at the Alexander von Humboldt Institute for Internet and Society (HIIG) in Germany, by examining AI and algorithmic content moderation, Wayne participated in the interdisciplinary project - "Ethics of Digitalisation", launched by the Federal President of Germany and conducted by Global Network of Internet and Society Research Centers. Wayne has engaged as an Administrative and Research Officer for Creative Commons Hong Kong. He also conducted the Simplified Chinese translation of Public Domain Manifesto. He has been Alternative Dispute Resolution (ADR) Young Member at World Intellectual Property and Member of Dynamic Coalition on Data and Artificial Intelligence Governance (DC-DAIG) at the United Nations Internet Governance Forum. Prior to his PhD studies, Wayne completed his LLM in Intellectual Property with Dean's Scholarship jointly conferred by World Intellectual Property Organization (WIPO) and Queensland University of Technology (QUT) in Australia. He also worked as Data Analyst at a legal technology start-up in Shenzhen. Wayne graduated with his

Double Bachelors in Engineering and Law as well as MPhil from Huazhong University of Science and Technology (China), with a China National Scholarship from the Ministry of Education of P.R.China and a University Outstanding Graduate Award.

Magnus Buggenhagen

Managing Open Source and Intellectual Property: An Empirical Analysis on the Effects of Open Source Contributions on Patents Behaviour and Quality

Abstract

Whereas technology development in artificial intelligence has highlighted the importance of Open Source projects and their strategic use, we shift attention to exploiting an accompanying intellectual property strategy via patenting and their reciprocal impact. In particular, we explore how companies' participation in Open Source projects – i.e., their contribution behaviour – affects their related patent filings and quality. Analysing data about Open Source participation in the repository GitHub using data mining techniques and worldwide patent filings, we identify 1127 GitHub contributors actively filing patents. We divided this group into 3 clusters differentiated by the patent and GitHub activity intensity. Therefore, one group tends to have a high patent activity and a lower GitHub activity. One group has a high GitHub activity and a low patent activity. One group is in the center and uses both strategies more balanced. The clustering allows us to understand whether the particular inventor is more involved in developing new knowledge in the patent system or more likely to share knowledge on Github. We find support that knowledge from the Open Source activity in Github influences the quality and number of patents of the respective inventors. The quality indicators are based on patents of inventors active on Github and also reference Github and Open source in the patent document. Our results show that Open Source contributions are used to create patents leading to technical relevant and novel inventions compared to peer patents of the control group. Overall, we can conclude three results. First, the patent inventor cluster relying more heavily on patenting than contributing to GitHub creates much more technically relevant patents, suggesting that knowledge disclosed in the GitHub community is used to develop technical breakthrough patents. Second, inventors who use patenting and GitHub to a concomitant extent tend to transfer radical new knowledge from the Open Source domain into patenting, suggesting that the concurrently intense exposure in both communities enables rapid knowledge transfer. Third, we find support for a positive correlation between average annual patent filings and GitHub contributions. However, we cannot determine a causal relationship between both activities. Our study has several limitations. First, we only focus on the Open Source platform GitHub and cannot cover the whole Open Source area fully. Second, our data analysis could not yet determine causal effects regarding the impact of patenting on opensource activities or vis versa. Third, the relationship between Open Source and patenting is still little researched, and the data is only improving step by step. Subsequent studies should generate further analysis to support the results shown in this paper.

Bio

How do new technologies emerge and spread? How does this influence the economy? I am committed to answering these questions. I studied economics in Berlin, Madrid, Istanbul, and Mexico City and focused on the digitalization of the old economy in the era of Industry 4.0. I am gaining practical experience in economic policy and in the venture capital sector, especially in the search for new investment opportunities and fundraising. Currently, I am a Researcher at the Technical University Berlin, where I do research topics like technology leadership and knowledge spillovers. Furthermore, I am a Senior Manager at IPLytics.

Cailean Osborne

Public-Private Funding Models in Open Source Artificial Intelligence: A Case Study on scikit-learn OR Why Do Companies Donate Open Source Software? An Empirical Analysis of Software Donations to the LF AI & Data Foundation

Abstract

Open source software (OSS) plays a crucial role in machine learning (ML) and artificial intelligence (AI) more broadly by facilitating the distribution of and access to algorithms, accelerating scientific discovery, and promoting innovation. The ML/AI OSS ecosystem has grown significantly in the last two decades, with thousands of libraries, repositories, and models available. However, most OSS libraries are developed by major software companies, raising concerns about the feasibility and sustainability of community-led projects that lack the resources to compete with the private sector. Despite this, scikit-learn, a community-led project that builds a Python library for ML algorithms, remains the most downloaded library in this landscape. It operates under a mixed public-private funding model, combining corporate sponsorship and government funding from INRIA and the French National AI Strategy. Contributing to the literature on OSS funding models, this study focuses on scikit-learn as an instructive case study to examine the effect of both public and private funding on the trajectory and sustainability of OSS projects. While money has long been a divisive subject in OSS, today there are numerous funding models to support developers and projects. However, funding is often ad-hoc and sponsors' interests do not always align with OSS communities. Previous research has primarily focused on corporate sponsorship and the role of "boundary organisations" as intermediaries between OSS developers and companies. However, little attention has been given to the state as a sponsor or co-sponsor of OSS. While the private sector has historically been the largest funder, government interest in funding OSS has grown. This paper bridges this gap by conducting 25 qualitative interviews with the core developers of scikit-learn, its corporate sponsors, and French government officials. It investigates how public and private funding has supported and influenced scikit-learn, and how the developers have managed the diverse interests of their community and sponsors. While public and private sponsors have different objectives, they are not mutually exclusive. Corporate sponsors typically support new feature development and maintenance, while the government focuses on policy goals, including digital sovereignty and ML/AI adoption across the economy. The results underline the importance of diversifying funding sources and establishing governance structures to reduce reliance on any one sponsor or their disproportionate influence. Overall, while there is no one-size-fits-all approach to funding OSS, this study suggests that tailored and diversified funding models are an effective approach to sustaining OSS projects in the common interest.

From startups to multinational corporations, open source software (OSS) is often cited as a tool to "democratise" artificial intelligence (AI) by enhancing accessibility and creating a level playing field for research and innovation. However, the discourse of democratisation obscures commercial incentives for companies to open source their software. While an extensive literature exists on why companies contribute to or release OSS, the commercial practice of donating software to non-profit foundations has hitherto received limited attention by the research community. Filling this gap, this study investigates the motivations for software donations through a mixed-methods analysis of ten software donations to the LF AI & Data Foundation, a non-profit foundation that fosters collaboration on OSS projects for data science and AI. To uncover these motivations, we conducted questionnaires and twelve interviews with two staff members from the LF AI & Data Foundation and ten OSS technical leads representing various companies, from startups to multinational corporations. The findings were taxonomised using Bonaccorsi and Rossi's (2006) framework of social, economic, and technological motivations for OSS engagement at the micro-level (individual) and the macro-level (company). The findings reveal a range of motivations for OSS donations. At the micro-level, employees donate software to leverage the foundation's expertise in managing OSS projects, due to management

decisions to discontinue internal software projects, or out of personal interest to contribute to the open source community, among others. At the macro-level, companies donate software to gain access to developer and user communities, to showcase their commitment to OSS values, to establish their brand as a prominent player in the competitive AI landscape, and to aid recruitment and retention of sought-after technical talent, among others. Additionally, this paper highlights tensions between the commercial interests of companies and the expectations of the OSS community, particularly regarding proprietary control and intellectual property rights. In these instances, non-profit foundations like the LF AI & Data Foundation serve as crucial intermediaries, which require companies to comply with standardised onboarding procedures, as they transfer the business governance of OSS projects to the foundation. Overall, this paper provides novel insights into the diverse motivations driving companies' OSS donations and identifies areas for future research. By shedding light on this phenomenon, this paper contributes to a deeper understanding of the dynamics between companies, non-profit foundations, and the OSS community, paving the way for future exploration and analysis.

Bio

Cailean is a PhD Candidate in Social Data Science at the Oxford Internet Institute, University of Oxford. His research interests concern the political economy of open source software (OSS) and the digital commons at large. Alongside his PhD, Cailean is a Researcher at the Linux Foundation, where he contributes to diverse research projects on OSS. Prior to his PhD, Cailean worked as the International Policy Lead at the UK Government's Centre for Data Ethics & Innovation and studied at the University of Oxford, University of Edinburgh, and UC Santa Barbara. Cailean's PhD research is funded by the UK's Economic and Social Research Council.

Stephen Impink

Tradeoffs of open source participation for AI startups

Abstract

The project asks whether and how AI entrepreneurship benefits from open source. On the one hand, startups need initial resources (Stuart et al., 1999), and the ability to access open-source code may enable them to develop code that would otherwise be difficult to build from scratch. Using open source code and standards reduces technological lock-in, reducing the chance of investing in an “orphaned” technology (Varian & Shapiro, 1999).

Open source enables collaboration and co-development with other firms, lowering the cost of development compared with fully proprietary programming and promoting knowledge flow across firms. On the other hand, these benefits are weighed against potential rents that startups could extract from proprietary or internally developed code.

In this presentation, we will explore what mix of proprietary and open-source resources is most beneficial for startup performance, especially these high-tech startups that are developing sophisticated AI products (Henkel, 2006; Varian & Shapiro, 1999; West, 2003). Using data on open source contributions, we examine 1,785 startups from 2015 to 2021 with a corporate presence on the GitHub platform.

We find a positive correlation between open-source activity and measures of startup performance: 73% of startups have funding, so we look at other measures (VC backed, Higher Reputation VC, Follow on Funding). However, there is substantial heterogeneity in performance across firms. First, having a higher proportion of original posts versus forking (increased intensity of engagement) is related to higher performance. Second, having a higher proportion of employees per total reported employment in CB/PB (increased intensity, increased firm-level use of GitHub) is related to higher performance. And third, having more rivals collaborate on your repo is related to higher performance.

These findings contribute to an entrepreneurial strategy literature trying to understand which level of open-source usage is optimal to save startups time while enabling adequate product differentiation.

Bio

Michael Impink is a doctoral candidate in Strategy at New York University Stern School of Business. His research focuses on digital entrepreneurship and the impact of digitization on organizational structure. He will be joining HEC Paris as an assistant professor in the Strategy and Business Policy department in July 2023.

Nicolo Zingales

Liability for Open-Source Licensing of Generative AI: A Critical Assessment of the Brazilian Approach

Abstract

Open AI has raised substantial controversy for its approach to releasing the source code of the model used to train its generative AI. The company launched in 2015 with the commitment to research “to advance digital intelligence in the way that is most likely to benefit humanity as a whole, unconstrained by a need to generate financial return.” In that spirit, it announced that researchers would be encouraged to share “papers, blog posts, or code, and that its patents (if any) will be shared with the world.” However, when it launched its ChatGPT-2 in 2019 it did not immediately release the source code of the training model, citing concerns of misuse. With the release of Chat-GPT3 in 2020, the company decided to release the code to the public, whilst giving an exclusive license to Microsoft. Finally, with Chat-GPT4, the code of the model is only available through an API, in exchange for a fee.

Open AI’s swinging between openness and closeness in this respect does not merely stem from the search for an appropriate monetization strategy, but is motivated by a concern of liability for the use of its generative AI tools. This is related to the liability for the use of these tools, which can give rise to potential claims of defamation, data protection, misuse of private information, and copyright infringement. There is some discussion regarding the company’s liability for the information generated through user prompts, but the legal treatment of this is far from clear even under the most advanced framework on the responsibility of digital platforms for third-party content (i.e., the EU’s Digital Services Act). The situation varies significantly in Brazil, however: the bill on digital platforms that is currently pending in Congress (PL 2630/20) largely follows in the footsteps of the Digital Services Act, whilst at the same time reinforcing the application of a broad safe harbor from liability for third-party content. Furthermore, its most recent version would explicitly carve out from its scope platforms dedicated to the development and sharing of open-source software, with the aim to exonerate the latter from far-reaching duties of care and transparency that are imposed on other providers. This paper discusses the mixed results that this generates, by incentivizing providers of generative AI to present themselves as open-source platforms, whilst at the same time hindering the meaningful transparency and due diligence that laws like the DSA and PL 2630 are promoting.

Bio

Nicolo Zingales is Professor of Information Law and Regulation at the law school of the Fundação Getulio Vargas in Rio de Janeiro. Fascinated by the interaction of law, technology and markets, he researches on a range of issues revolving around the roles and responsibilities of digital platforms and intermediaries in the online ecosystem. He published several articles in scientific journals on competition law, intermediary liability, Internet governance and data protection law. His research has been cited, among others, by the UN Special Rapporteur for the Protection and Promotion of Freedom of Opinion and Expression, the UK House of Lords, and the European Parliament. He is founder and co-chair of the Internet Governance Forum’s Dynamic Coalition on Platform Responsibility, a founding member of the MyData Global Network and lead of its Brazilian Hub, and editor of Medialaws. He is also currently a Research Associate at the Tilburg Institute for Law, Technology and Society and an Extramural Fellow at the Tilburg Law and Economics Center. Prior to establishing his academic home at FGV, he worked for three years in the United Kingdom (Leeds and Sussex University), and for two years in the Netherlands (Tilburg Law School). He held visiting appointments at the law schools of the University of Western Australia, the Graduate Institute of Geneva, New York University, Harvard University, and at the Max Planck Institute for Competition and Innovation. He was a Google Policy Fellow at Research ICT Africa, a consultant on Internet freedom for APC and CIPESA, and practiced law with two international law firms, the European Commission and the European Court of Justice. He holds a JD from the University of Bologna and a PhD in international law and economics

from Bocconi University.

Thomas Streinz

Keynote

Bio

Thomas Streinz is the Executive Director of Guarini Global Law & Tech, Adjunct Professor of Law at NYU Law, and Fellow at the Institute for International Law and Justice (IILJ). He works on Internet governance (ICANN), regulation of the global data economy (MegaReg), and global data/tech law with a particular focus on digital infrastructures and their governance. He teaches the Guarini Colloquium: International Law of Global Digital Corporations (with Benedict Kingsbury and Joseph H. H. Weiler), the Global Data Law course (with Angelina Fisher and Benedict Kingsbury), and the Global Tech Law seminar (with Benedict Kingsbury and David Stein).

Knut Blind

Open Source in the Context of Innovation (Indicators)

Abstract

Open Source Software (OSS) has been found to contribute significantly to countries' GDP (Blind et al., 2021; Blind and Schubert, 2023), but also to the growth of start-ups (Wright et al. 2023). However, the role of OSS related to innovation is rather ambiguous.

In 2018, the OECD and Eurostat considered Open Source under "Inward knowledge flows (the counterpart to some of these examples can capture outward knowledge flows)" as the item "Made use of open source or other freely available IP". This suggestion has been implemented within the German edition of the Community Innovation Survey (Rammer 2020) and revealed that OSS and OSS communities are an important source of knowledge for companies irrespective of their size. However, this perspective focuses just on OSS as knowledge source for companies' innovation activities, meaning it ignores the contributions of OSS to innovation as outflows. Since each individual contribution to OSS usually only embodies only a small, incremental inventive step (e.g. Boehm and Eisape 2021), they are considered as marginal. In contrast, patents require a significant inventive step. However, Boehm and Eisape (2021) also claim that on the aggregate level OSS communities can drive innovation in computing in a rather radical process of creative destruction. This illustrated the tension between the incremental steps on the micro level of single OSS contributions and the macro effects for radical innovations and widespread use, e.g. surveys today indicate that open source software makes up 96% of a given software stack (Synopsys 2023). However, indicators related to open innovation in general are not very sophisticated, which is also reflected in the only emerging literature on indicators about OSS. Consequently, the review by Dziallas and Blind (2019) do also not mention "open source".

Therefore, innovation indicators related to "Open Source" have to be put into the context of established innovation indicators, in order to establish relationships, e.g. complementarities or overlaps, but also to apply possible success factors, e.g. in the case of patents, but also to consider problems, e.g. in the case of standards, for their successful establishment in the portfolio of innovation indicators.

Consequently, the paper will address the following list of questions:

- What types of innovation do contributions to Open Source repositories represent?
- How can the different types of innovation be measured? How can commits, new projects and other types of contributions be characterized within taxonomies of innovation?
- How can the innovativeness of contributions to Open Source repositories be assessed?
- What are similarities and differences of Open Source based innovations related to other types of innovations, like scientific publications, patents, standards, trademarks and others?
- What are possible synergies, e.g. cross references, with these other types of innovation?

Bio

Knut Blind studied economics, political science, and psychology at Freiburg University. In the course of his studies, he spent one year at Brock University (Canada), where he was awarded a BA. Finally, he took his Diploma in Economics and later his doctoral degree at Freiburg University. Between 1996 and 2010, he joined the Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Germany, as a senior researcher and at last as head of the Competence Center "Regulation and Innovation". In April 2006, Knut Blind was appointed Professor of Innovation Economics at the Faculty of Economics and Management at the Berlin University of Technology. Between 2008 and 2016, he also held the endowed chair of standardization at the Rotterdam School of Management of the Erasmus University. From April 2010 to September 2019, he was linked to the Fraunhofer Institute of Open Communication Systems in Berlin. Since October 2019, he has been head of the business unit "Innovation and Regulation" at the Fraunhofer Institute for Systems and Innovation Research. In 2012, he initiated both the Berlin Innovation Panel and the German Standardization Panel. Besides numerous articles on

patents, he published further contributions on standardization and further innovation aspects in refereed journals.

Nataliya Wright

Open Source Software and Global Entrepreneurial Growth

Abstract

Does open-source software (OSS) spur entrepreneurial growth? While open source might make it more difficult for firms to appropriate value from their innovations, it also makes it easier to find and coordinate with team members and customers. This study is the first to assess the relationship between OSS contributions and entrepreneurial growth globally. It assesses whether participating on the GitHub OSS platform impacts the performance of software ventures, and in what contexts. We do so by using novel data matching GitHub accounts to venture-backed software firms, allowing us to track how changes in GitHub contributions map with changes in entrepreneurial performance over time. The study first explores which software firms are likely to participate on GitHub relative to the universe of venture-backed software firms captured in PitchBook. Conditional on participating, firms that increase GitHub contributions—in terms of the number of lines of code and number of users contributing—see an increase in their valuation, funding, employees, revenue, and probability of achieving a successful exit (getting acquired or an initial public offering) in the following year, particularly in country contexts with higher GDP per capita. To help add weight to a causal interpretation of the results, we utilize plausibly exogenous changes in government policies related to OSS that encourage OSS participation in different countries at different times, and our results remain consistent. Together, this research reveals that OSS can be a lever for entrepreneurial growth around the world, with implications for policy and entrepreneurial strategy.

Bio

Nataliya Langburd Wright is an Assistant Professor in the Management Division at Columbia Business School. Her research explores how technology startups from around the world scale and why there are international differences in scaling. Her research draws inspiration from her prior policy work as a senior consultant and staff economist at the World Bank and White House and startup work as a co-founder, adviser, and board member. She completed her BA at Yale University, MPhil at the University of Cambridge, and PhD at Harvard Business School.