



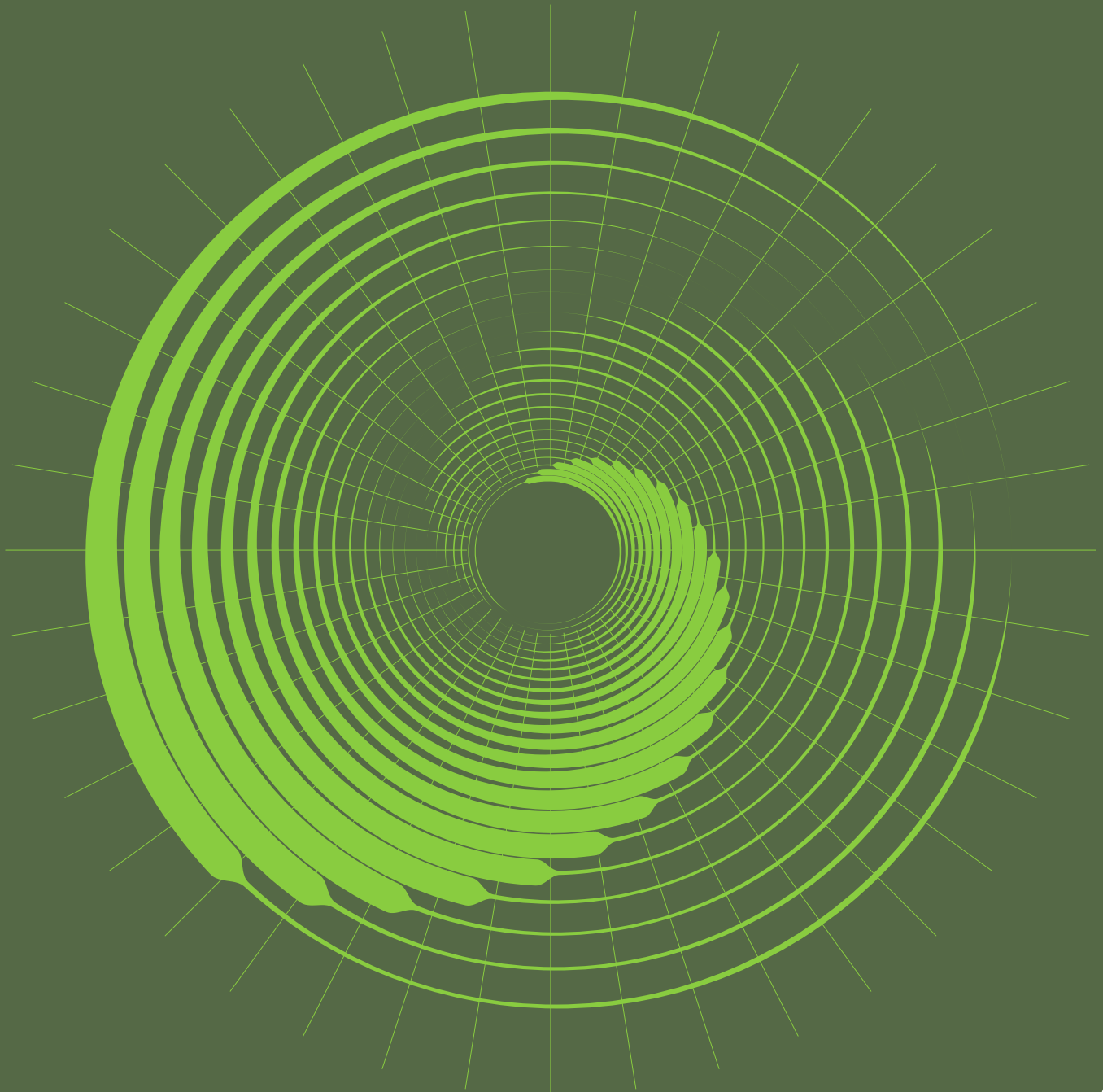
GFiN

GLOBAL FINANCIAL INNOVATION NETWORK



Open Source in the field of SupTech and RegTech

GFIN SupTech Special Unit



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Introduction - Open Source Software

“Open source software” (“OSS”) is software and/or application code that is designed to be publicly accessible such that anyone can inspect, modify and enhance the software or code. “Source code” is the code computer programmers can manipulate to change how a piece of software - a “program” or “application” - works. Programmers who have access to a computer program’s source code can change that program by adding or removing features or fixing features that don’t always work correctly. When the public has a “view only” access to software or code, individuals can suggest bug fixes, improvements or updates, but the only entity permitted to make changes in the source code is the original code writer or the organizations responsible for the source code. With OSS, programmers can use OSS, fully or partially, either on a stand-alone basis or as a modification to other software (either OSS or proprietary). By removing barriers to access and use, OSS can promote a free exchange of ideas within a community to drive creative technological advancement.

In considering the use of OSS it is worth evaluating the potential advantages and disadvantages of such use. Some of the potential advantages of OSS are:

- ✓ **Peer Review** - OSS is freely accessible. The open source community typically is very active; OSS typically is actively checked and improved upon by peer programmers.
- ✓ **Transparency** - OSS allows the public and industry to review source code for changes.
- ✓ **Reliability** - OSS typically is updated through active open source communities.
- ✓ **Flexibility** - OSS can be used to address problems that are unique to a specific business or community.
- ✓ **Standardization** - OSS can enable a disparate community from multiple organisations and backgrounds to form and coalesce around a standard.
- ✓ **Public good** - Some OSS can be seen as a public good where research projects¹ and / or alternatives to existing commercial software (for example Linux vs. Windows) are made free to the public to use.

¹ <https://www.genome.gov/research-at-nhgri/Data-Tools-and-Resources>

Introduction - Open Source Software

- ✓ **Shared Specifications** - OSS can provide opportunities for industry stakeholders to adopt shared code and build directly to regulatory specifications.
- ✓ **Collaboration** - OSS can enable external collaboration and signal to advanced financial technologists that regulators understand modern development.
- ✓ **External Support** - OSS can support advocates, academics, students, and researchers by offering free and open access to regulator developed software and design work.
- ✓ **Security** - Since OSS can be inspected by anyone, it allows the community to contribute security fixes as well as encourages good security hygiene (but see below).

Some potential disadvantages are:

- ✗ **Forwards Compatibility** - When attempting to program proprietary hardware with OSS, there is often a need for specialized drivers that are typically only available from the hardware manufacturer.
- ✗ **Liability** - Unlike commercial software, which is fully controlled by the vendor, OSS rarely contains (and often disclaims) any warranty, liability, or infringement indemnity protection. This leaves the consumer of the OSS responsible for maintaining compliance with legal obligations.
- ✗ **Maintenance** - Similar to the previous point, it's up to the organisation using the OSS to ensure that they are keeping up to date with any release/fixes that have been made.
- ✗ **Security** - Can be a major issue with OSS, because of the number of contributors, and the semi-decentralized governance/accountability of the code review processes, it's possible for security issues to creep into the code and/or malicious actors to hide vulnerabilities.
- ✗ **Backwards Compatibility** - Major changes can cause huge/severe impacts on the entities using the OSS and its own consumers/customers. (For example, 'hard forks') (backwards incompatible changes) in the Bitcoin source code have huge implications to users of the prior version of the protocol.

Introduction - Open Source Software

The advantages and disadvantages listed do not constitute an exhaustive list but rather raise some issues for consideration.

Much of the software that we use and rely upon every day is composed of or adapted from OSS. Examples of this include web browsers, web server operating systems, and many databases. Google's Android operating system, which powers 86% of smartphones worldwide², is shared and adapted as OSS. While OSS is most commonly used in the software industry, professionals utilize OSS licenses in many other industries including biotech, electronics, fashion, robotics and teaching to name a few.

Although OSS is most often available for free, in some cases users of the software may be required to pay a license for using the code, especially if it is being used at an Enterprise level.

Another benefit of OSS with respect to commercial companies (in addition to efficiencies gained from a community of free developers reviewing, developing and updating the code) is that such OSS may become standard across the industry, making such commercial company the leading expert in this field, which can contribute to selling its products and services (including enterprise versions of the code), consultancy or support services, etc.

² <https://www.idc.com/promo/smartphone-market-share>

Regulators / public sector / financial institutions and open source

Some are calling for financial regulators to adopt new regulatory systems that will accommodate the digital age, in which big data is collected by regulated bodies, having certain data standards and requiring advanced analytics³.

Regulators may benefit from sharing source code between them. For example, if one regulator has developed code that addresses or solves for a particular regulatory concern, it may be beneficial for other regulators sharing that concern to use or build on this code rather than starting from scratch. Some examples could be a web-crawler that searches social media platforms for false advertising or other illicit activity or a chat bot to receive and prioritize consumer complaints or licenses applications.

It is important to stress the difference between using OSS and sharing software between organizations. An organization can use OSS for its own use. In this case, the original source code remains open to the public, and is subject to additional improvements, updates or fixes. Sharing software between organizations is different. An organization can choose to share its software with another organization (subject to licensing and other agreements). In this case, the shared software is not necessarily OSS (with all that implies) and for the purposes of this report shared software is not considered OSS.

³ <https://regulationinnovation.org/regtech-manifesto/>

Regulators / public sector / financial institutions and open source

Below are listed a few examples of the use of OSS by significant financial institutions and in the public sector:

- **J.P. Morgan Chase** released code on GitHub for multiple initiatives, e.g. its Quorum blockchain project;⁴
- **Financial Intelligence Unit of Italy** relies on, inter alia, an open source layer that was developed by the bank of Italy, which can analyze large amounts of data and combine data from different sources;^{5,6}
- **Deutsche Bank** open-sourced multiple projects, like Plexus Interop (from its electronic trading platform Autobahn) or Waltz (IT estate management);⁷
- **Capital One's DevOps** dashboard, Hygieia - Hygieia's dashboards enables DevOps engineers and executives to monitor the health of code commit to deployment in final production;⁸
- **Goldman Sachs's Legend** - A flexible platform that offers solutions to explore, define, connect, and integrate data into businesses' processes;⁹
- **PayPal** has open sourced its data processing framework, a card scanning utility for mobile apps, and several web application tools.¹⁰
- **The Israel Securities Authority** implemented and integrated some features from the Blockchain Ethereum technology in its information systems. This implementation adds an additional layer to the security of information conveyed by the ISA to supervised entities and to the voting system which allows investors to remotely participate in investors meetings;

4 https://www.finextra.com/blogposting/18378/banks-are-finally-embracing-the-open-source-movement?force_isolation=true

5 Suptech applications for anti-money laundering by Rodrigo Coelho, Marco De Simoni and Jermy Prenio (August 2019)

6 However, it was mentioned that a few authorities are also looking to use public cloud, but data residency requirements as well as data security concerns prevent them from doing so

7 See footnote 4

8 <https://github.com/hygieia/hygieia>

9 <https://developer.gs.com/discover>

10 <http://paypal.github.io/>

Regulators / public sector / financial institutions and open source

Below are listed a few examples of policies relating to OSS by significant global authorities:

- The Consumer Financial Protection Bureau (United States) uses and develops open source software as a policy;¹¹
- The Central Digital and Data Office of the United Kingdom called on the public to Publish codes and use open source (not necessarily in the financial field);¹²
- In August 2016, the United States government announced a new federal source code policy. This policy mandates that at least 20% of custom source code developed by or for any agency of the federal government must be released as open-source software.¹³
- In a 2010 study on government open source policies,¹⁴ it was found that there are 364 open source initiatives around the globe. One main example stated the case of the republic of Korea, which most of its public administration and digital governance systems are based on open source tools.

11 https://www.consumerfinance.gov/about-us/blog/the-cfpbs-source-code-policy-open-and-shared/?force_isolation=true

12 https://www.gov.uk/guidance/be-open-and-use-open-source?force_isolation=true

13 Scott, Tony; Rung, Anne E (8 August 2016). Federal Source Code Policy: Achieving Efficiency, Transparency, and Innovation through Reusable and Open Source Software — Memorandum for the Heads of Departments and Agencies — M-16-21

14 World Bank. 2019. Open Source for Global Public Goods. Identification for Development;. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/33401> License: CC BY 3.0 IGO

Initiatives linked to OSS

Below are listed a few examples of organizations whose aims are promoting the field of OSS from several aspects and scopes:

FINOS

Fintech Open Source Foundation (nonprofit organization) whose purpose is to accelerate collaboration and innovation in financial services through the adoption of open source software, standards and best practices.¹⁵ In its initiative “Open Regtech”, FINOS aims to create open source solutions for regulatory and compliance issues in financial services by bringing together all parties of the financial services ecosystem (financial institutions, tech firms, vendors, and regulators) in order to deliver open source software and standards.

OSI

Open Source Initiative, a non-profit organization which aims to raise awareness and adoption of open source software.¹⁶

FSF

Free Software Foundation, a non-profit organization with a mission to promote computer user freedom.¹⁷

Mozilla Foundation

The Mozilla Foundation works to ensure the internet remains a public resource that is open and accessible to all. Mozilla empowers internet consumers to demand better online privacy, trustworthy artificial intelligence, and safe online experiences from Big Tech and governments.¹⁸

Linux Foundation

The Linux Foundation enables companies to drive global innovation by growing open technology ecosystems that transform industries.¹⁹

¹⁵ https://www.finos.org/open-regtech?force_isolation=true

¹⁶ <https://opensource.org>

¹⁷ <https://www.fsf.org/>

¹⁸ <https://foundation.mozilla.org/en/>

¹⁹ <https://linuxfoundation.org/>

Initiatives linked to OSS

To conclude, OSS can contribute to laudable regulatory goals. However, there may be several disadvantages as well, which are manifested significantly regarding SupTech solutions. For example, as we can find out from the results of the survey conducted by the Global Financial Innovation Network, 87% of the respondents answered that they do not share source code externally (due to cybersecurity risks (74%) and confidentiality risks (72%)), but 37% of the respondents answered that they are open to sharing source code. The findings above are not surprising – each regulator acts upon the regulations in its own jurisdiction, and the different set of rules in each jurisdiction makes it harder for the other regulators to adopt. Nonetheless, some aspects of the SupTech activity are similar between most, if not all, the regulators. Identifying such joint elements may contribute to the willingness to share source code and the effectiveness of such sharing (including the adoption in each jurisdiction).

GFIN Secretariat – Financial Conduct Authority

12 Endeavour Square

London

E20 1JN

+44 (0)20 7066 1000

www.fca.org.uk

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