



**Bringing European Research Innovations to
the World Through Open Source Collaboration**



Enabling European Research, Development, and Innovation

European research teams constantly make important advances in their areas of study. But, there's often no clear path or opportunity to disseminate, build on, or fully exploit the results of their research in a way that creates value for industry and society. As a result, there's a risk their discoveries will never be adopted by the industry or be evolved into products and services that benefit the world.

The Eclipse Foundation works with European researchers and academics to help them create, evolve, and sustain open source software projects and diverse communities that capture the results of their research so they can be disseminated and commercialized to solve real-world challenges. Researchers can build an open, entrepreneurial ecosystem that enables global industry players and technology adopters to collaborate and build on the research results to benefit companies and the public.

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– Philippe Krief

Gaël Blondelle is vice president of European ecosystem development at the Eclipse Foundation. He explains that research projects at the Eclipse Foundation are the fastest and easiest way for research teams to establish international collaboration at industry scale. “With the vendor-neutral governance and legal framework we provide, everyone interested in using and contributing to further the research results can collaborate without the significant complexity and costs of setting up multiple contracts and license agreements,” he says.

Using Public Funding to Make Research Publicly Available

Philippe Krief, research relations director at the Eclipse Foundation, notes that European research projects and the Eclipse Foundation are a natural fit. “The research projects are publicly funded,” he says. “And the Eclipse Foundation is dedicated to building and supporting vibrant open source communities that make software innovations available to the public.”



Research projects at the Eclipse Foundation are funded by several organizations, including:

- Horizon 2020, the largest research and innovation program in the European Union.
- ITEA 3, the transnational, industry-driven research, development, and innovation program for software innovation.
- The Electronic Components and Systems for European Leadership (ECSEL) Joint Undertaking, the public-private partnership that funds research, development, and innovation projects in electronic components and systems.
- Bundesministeriums für Bildung und Forschung (BMBF), the Federal Ministry of Education and Research in Germany.

A Collaborative, Open Source Approach Benefits a Diverse European Ecosystem

According to Krief, everyone who participates in an Eclipse Foundation research project benefits from a diverse ecosystem that fosters open collaboration among academics, researchers, funding organizations, industries, and software vendors to enable sustainable innovation at industry scale.

“All ecosystem members can leverage their involvement to further their own goals, take advantage of new opportunities, and deliver benefits to their stakeholders – whether they’re motivated by commercial profits, return on investment, scientific advancement, or societal impact,” he says.

These broad benefits are possible because the open source software acts as a catalyst for technology transfer and commercialization (Figure 1):

- Industries bring their requirements
- Academics and researchers innovate to develop solution prototypes that meet industry needs
- Software vendors industrialize these innovations to deliver products to the industry sector

This kind of collaboration is greatly facilitated by open source best practices and business models.

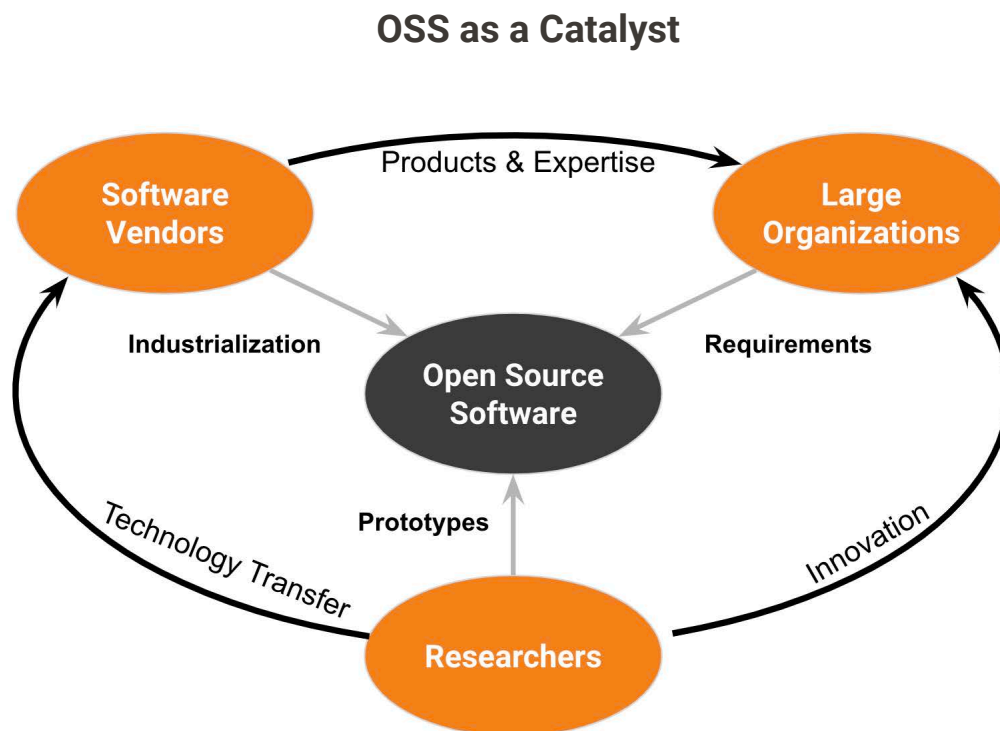


Figure 1: Open Source Software as a Catalyst for Technology Transfer and Innovation

A Collaborative, Open Source Approach Benefits a Diverse European Ecosystem *(continued)*

Business-Friendly Open Ecosystems

Krief also makes it clear that all open source ecosystems at the Eclipse Foundation are business-friendly. “We work with ecosystem members to help them understand how they can leverage open source business models and software to develop commercial products, grow revenues, and drive market adoption,” he says.

Krief explains the relationship between collaboration and competition among ecosystem members this way: “The Eclipse Foundation provides the building blocks needed to enable collaborative development of commercial-grade, open source software. Ecosystem members can then customize and enhance the open source software with their own innovations to bring competitive, value-added products, and services to market.” (Figure 2)

Most Eclipse Foundation code is made available under the Eclipse Public License, a commercial-friendly open source license approved by the Open Source Initiative. The Eclipse Public License provides a level playing field for all while facilitating commercial distribution of open source software. The Foundation also accepts projects under three other business-friendly licenses: Apache 2.0, BSD, and MIT.

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Krief also notes the Foundation helps businesses understand the implications around other types of licensing for open source code to ensure they're aware of the protection, restrictions, and capabilities that each licensing type provides.

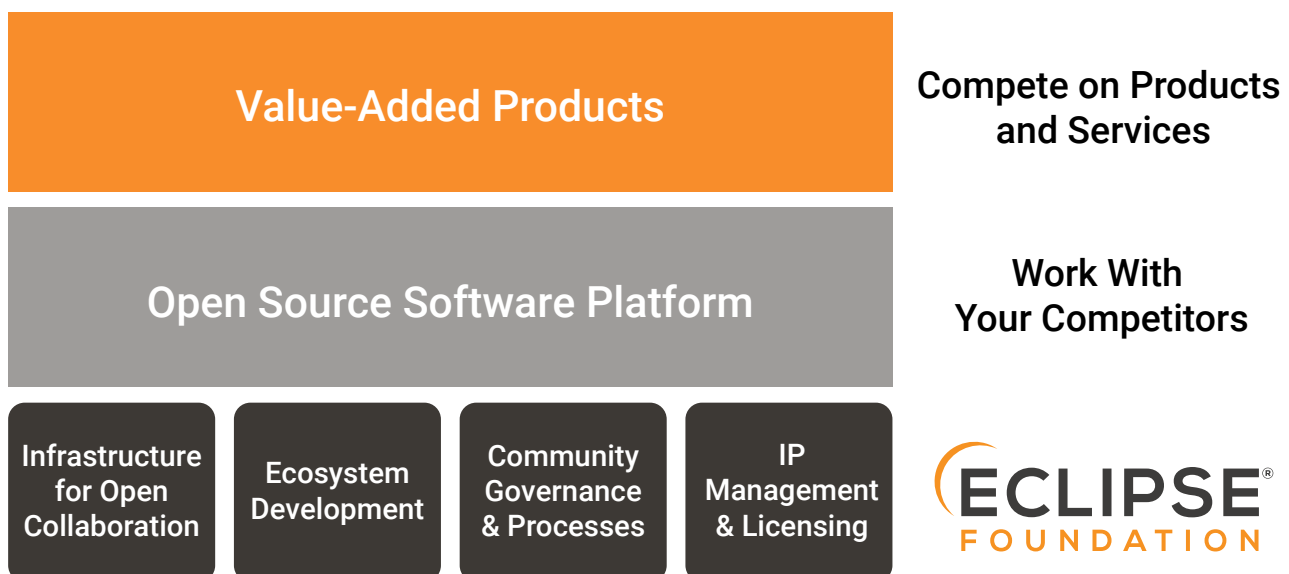


Figure 2: Open Source Business Models Provide a Strong Foundation for Innovation

Real-World Success Stories

The Eclipse Foundation assists research partners throughout the complete project life cycle by providing:

- A vendor-neutral governance model that encourages collaboration among community members
- Proven processes and best practices for open source software development
- Intellectual property (IP) services that ensure IP is tracked and properly managed
- Mentorship, guidance, and expertise in creating and managing open source projects and in community building and support
- Marketing support to increase project visibility within the broader Eclipse ecosystem and beyond

Krief points out this support has helped a number of European research projects attract major commercial players and become very successful.

Eclipse BaSyx: Industry 4.0

Eclipse BaSyx is actively supported by the BaSys 4.2 research project funded by the German Bundesministerium für Bildung und Forschung (BMBF) and has also attracted a number of industry players from across Europe.

BaSyx is an open source platform for next-generation automation. It provides common Industry 4.0 components and an extendable software development kit (SDK) to accelerate development of Industry 4.0 solutions. With the Eclipse BaSyx platform, developers can address challenges such as:

- Changing production to enable profitable lot sizes and respond to new market demands
- Exploiting big data analytics

- Connecting heterogeneous devices and systems while minimizing downtime and other associated costs

Eclipse Kuksa: Automotive

Eclipse Kuksa is a software platform and ecosystem for Vehicle-to-Cloud (V2C) applications that was initiated within the publicly funded ITEA3 project, APPSTACLE — the Application Platform for Cars and Transportation Vehicles.

Kuksa breaks down the silos among software-intensive automotive systems to provide a standard for car-to-cloud scenarios. It provides a single, cohesive environment that includes:

- An in-vehicle platform that provides a controlled environment to execute new vehicle functionality as well as secure, standardized access to vehicle data.
- A cloud backend that provides an app store that features a user-focused management interface and automated deployment of in-vehicle apps.
- An open source integrated development environment (IDE) that automates in-vehicle app development.

Kuksa ecosystem members, including Bosch, Ericsson, and Otokar have already demonstrated real-world apps based on the Kuksa technology.

Eclipse APP4MC: Embedded Systems Engineering

Eclipse APP4MC is an open platform for engineering embedded multi- and many-core software systems. The project is based on the work done in the AMALTHEA and AMALTHEA4public research projects funded by ITEA 2.

Real-World Success Stories *(continued)*

The APP4MC platform enables the creation and management of complex tool chains including simulation and validation. The platform has been used by Bosch and its partners in the automotive sector and is proven to provide interoperability and extensibility and to unify data exchanges in cross-organizational projects.

This project is a typical case where research project results have been used in real-world projects, beyond the research community.

Eclipse OpenCert: Assurance and Certification Management of Cyber-Physical Systems (CPS)

Eclipse OpenCert is a customizable safety assurance and certification tool environment that integrates into manufacturers' development and safety assurance processes and tooling. It integrates contributions from multiple open source projects, including the AMASS open platform and reference tool architecture.

The OpenCert tools support the following activities for safety-critical product development:

- Standards and regulations information management
- Assurance project management
- Architecture-driven assurance
- Assurance case management
- Compliance management

Eclipse SCAVA: Open Source Software Decision-Making

Eclipse SCAVA is a result of the European project CROSSMINER, and received funding under the European Union's Horizon 2020 Program.

SCAVA extracts metrics from open source components, including code version management systems, issue trackers, continuous integration systems, and discussion forums in natural language, qualitatively analyzes the data, then stores the information in a knowledge base.

Developers can use this knowledge to select and reuse the best existing software to develop new systems. Selected open source components are monitored to raise alerts related to quality, and to suggest ways to reduce development effort and increase the quality of new software products.

Take Research Results to the Next Level at the Eclipse Foundation

Gaël Blondelle notes the Eclipse Foundation has been a partner in many publicly funded European research projects since 2013. "The successes described here, and the benefits Philippe has outlined, confirm the Eclipse Foundation gives research teams and industry players the framework and collaborative approach needed to help stimulate innovation and accelerate dissemination."

"We encourage researchers, academics, and businesses of all sizes to get involved with the research projects at the Eclipse Foundation so they can benefit from the many advantages of community-based and vendor-neutral open source collaboration."

For more information, please email: research@eclipse.org.



About the Eclipse Foundation

The Eclipse Foundation provides its global community of individuals and organizations a mature, scalable, and business-friendly environment for open source software collaboration and innovation.

The Foundation is home to the Eclipse IDE, Jakarta EE, and more than 375 open source projects, including runtimes, tools, and frameworks for cloud and edge applications, IoT, AI, automotive, systems engineering, digital ledger technologies, open processor designs, and many others.

The Eclipse Foundation is a not-for-profit organization supported by more than 300 members, including industry leaders who value open source as a key enabler for their business strategies.

To learn more, follow us on Twitter [@EclipseFdn](#), [LinkedIn](#), or visit [eclipse.org](#).