Final Results
European Commission Open Source Study
(SMART 2019/0011)
Agenda

13:15 - 13:35  **Economic Impact**  
Knut Blind

13:35 - 13:45  **Policy Recommendations**  
Sachiko Muto

13:45 - 14:15  **Panel**  
Knut Blind
Mirko Boehm
Andrew Katz
Sachiko Muto
Luc Soete
Tasks and their relations

- Task 1: Analyse the economic impact of OSS and OSH in EU
- Task 2: Assess current EU policy actions related to Open Source
- Task 3: Analyse key policy actions related to Open Source worldwide
- Task 4: Case study analysis
- Task 5: Provide recommendations on the strategic role of Open Source to future policies and Programmes
Relation of methodological approaches
Overall approach

Country level: investment in OSS per EU country

Cost-benefit ratios

Company level: investment of top contributors to OSS complemented by stakeholder and other surveys and case studies

Validation

Cost-benefit ratios

Company level: results from stakeholder and other surveys and case studies

Validation

Benefit assessment
Data sources

● Open Source Software
  ○ 1.3 billion commits at GitHub
  ○ 32 million users at GitHub with 1.5 million organisational affiliations and 2.5 million country codes
  ○ almost 700,000 organizations

● Economic Data
  ○ OECD
  ○ Eurostat
  ○ European Patent Office
  ○ Crunchbase, Amadeus, Worldbank, ILO, ...
Commits by EU Member States

Source: GitHub
Cost-based impact assessment

- Two cost-based impact assessments to generate baseline of economic impact of OSS based on two pillars:
  - efforts by the Member States of the EU
  - efforts by the most active companies located in the EU Member States
- Findings only present lower bound of economic impact
- Basic assumption beyond this approach is that benefits, i.e. OSS in the public domain, derived from these investments will at least outweigh invested costs
The cost of investing in OSS in the EU: the Member State level

- more than 3 millions employees in computer programming in the EU
- in 2018 more than 260,000 contributors to GitHub, i.e. on EU average 8.2% of employees in computer programming
- average personnel cost of all contributors based on full time equivalents of more than Euro 14 billion in 2018
- in 2018 more than 30 million commits to GitHub representing an effort of more than 16,000 FTEs based on Constructive Cost Model
- almost Euro 1 billion invested personnel cost in the EU in 2018
The cost of investing in OSS in the EU: the company perspective

- **most active companies** in GitHub in 2018 responsible for >12% of contributors and one third of commits **employing > 1 million employees**

- high share of **small companies** among most active companies participating in **OSS**, i.e. > 75% have < 100 employees

- **the smaller the companies, the more contributors** are listed, **the more commits they provide**, i.e. almost 50% by companies < 50 employees, **and the more efforts they invest**, e.g. those between 11 and 100 employees invest > 5% of their FTEs

- **validity of company and Member State based cost-based approach confirmed**
Quantification of economic benefit based on European growth model

- elasticity of 0.04, i.e. the **10% increase of commits** as from 2017 to 2018 contributed to GitHub is **contributing 0.4% of GDP** in the EU

- in 2018, 0.4% of the total GDP of Euro 15,900 billion in the EU is a contribution of more than **Euro 63 billion** per year

- an **10% increase in the number of contributors** would increase EU GDP by 0.6%, i.e. **Euro 95 billion** per year

- in summary, EU economy is significantly benefiting from global pool of OSS

- if EU can increase in the future both of them only marginally, additional GDP of > **Euro 100 billion per year** in the EU is possible in the future
Cost-benefit ratio at the macro level

- Contributions of OSS to GDP based on current and historical code
- Considering additionally hardware costs
- Overall, we derive **cost-benefit ratio of at least 1:4**
- Cost of one FTE to contributing to OSS generates additional GDP of four times the cost
- Result consistent with similar studies on ICT hardware and innovation expenditure
Stakeholder Survey

● Objectives
  ○ Gather and analyse views of stakeholders on impact of OSS and OSH
  ○ Complement insights from literature, data base and case studies to assess impact of OSS and OSH
  ○ Create robust empirical representation of opinions and issues at stake

● All together, this whole body of empirical evidence used to derive policy recommendations

● Response
  ○ Wide distribution supported by EC and several Open Source organisations
  ○ Feedback: more than 900 responses, who at least partly answered the questionnaire
Stakeholder Survey: Main Results

- **Incentives**
  - most important are **finding technical solutions** being linked to **carrying forward the state of the art of technology** ranked on third position
  - **avoiding vendor lock-in** of second relevance
  - on the fourth position of relevance **knowledge seeking** ahead of **knowledge creation**

- **Benefits**
  - highest benefits in the form of **supporting open standards and interoperability**
  - improved **access to source code**
  - independence from proprietary providers of software

- **Costs**
  - **overall less relevant**
  - **assuring stability and reducing error susceptibility** followed by **cost for skilled labour**

- **Cost-benefit ratio**
  - 80% perceive at least high benefits and only medium cost related to OSS and OSH
  - **mode of estimated cost-benefit ratio 1:10**, a similar ratio calculated for the macro level
Summary of results about impacts of OSS

- **Significant investment** by EU countries and EU located companies into Open Source of **Euro 1 billion in 2018** at minimum only for labour costs.

- **Significant contribution of OSS to GDP** of the EU, i.e. an increase of 10% would generate additional **Euro 100 billion in EU GDP per year** in the future.

- Significant contribution of OSS to foundation of start-ups, i.e. an increase of 10% would generate around **additional 1,000 ICT start-ups per year**.

- **Savings in Total Cost of Ownership in the public sector**, but more important **avoidance of vendor lock-in** and contributing to **digital autonomy**.

- **Further benefits** of Open Source mainly **related to openness, incl. standards** and **independence**, and **labour cost savings**, but less to additional revenue.
Policy Recommendations
Policy Recommendations

1. **Building Institutional Capacity**
2. **Knowledge Creation**
3. Knowledge Diffusion and Networking
4. Entrepreneurial Activities
5. Financial Capital Development
6. **Regulatory Environment**
7. Market Creation
8. **Creation of Legitimacy**
9. **Human Capital Development**
10. Strategic Intelligence
11. Domain-specific recommendations
    - a. Open Source Hardware recommendations
    - b. AI, HPC, software defined infrastructures, sustainability
Building institutional capacity

- Economic value of Open Source ➔ European institutional capacity
- Leverage the Commission’s unique position as guide and coordinator
- **Recommendation**: EC OSPO to facilitate a European OSPO Network
  1. Giving the EC OSPO an external networking component
  2. Encouraging and building 20 OSPOs through funding programme
  3. Creating and funding a semi-formal network of these OSPOs (share best practices, processes, work toward common policy goals)
  4. Fostering a European Open Source culture enabled by the EC OSPO
Knowledge Creation: Research & Startup funding

- **Ecosystem**: Further supports both R&D and private sector, increasing the ecosystem as a whole.
- **R&D Funding**: Increased Public Open Source R&D funding leads to increase of available code basis.
- **Virtuous Open Source Funding Cycle**: Increases number of SMEs and Startups, further increases available code basis.
Human Capital Development

- Lack of skilled labour prevents companies from using and contributing to OSS
- Development of software skills important factor in long term development and performance
- **Recommendation**: Open Source in curricula and professional training programs by academia and local software industry, Open Source in the European Qualifications Framework (EQF)
- **Recommendation**: Entrepreneurial skills and diversity for Open Source companies
Creation of Legitimacy

- Legitimacy is fundamental for the breakthrough of an emerging technological system

- **Recommendation**: elaborate role of open technologies in achieving digital autonomy

- **Recommendation**: Integrate OSS and communities in European research and innovation policies and into general policy frameworks, such as European Green Deal and European industrial strategy - similar to SDOs
Regulatory Environment

- Liability risks of OSS components hamper innovation: clarify liability of developer while protecting users
- **Recommendation:** Support funding/incentives for security of OSS components
- **Recommendation:** Consider OSS in future revision of European public procurement directive
Summary

- Today, large economic impact of OSS and potential impact of emerging OSH
- Utilise public policy to further scale and incentivise production of OSS for the benefit of the European economy
- Comprehensive and coordinated policy approach needed based on institutional capacity in the various layers of the public sector
Thank You