Convergence Approaches for OSS Sustainability

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What Is OSS Sustainability?

From OSS Sustainability Forum 2023, @Internet Archive

- Process persisting over time
- A trajectory
- Learning from successful examples
- Having a plan for success
- Reacting to downturns and adjusting trajectory





Who Cares/Should Care About Sustainability?

- Individual OSS developers
- OSS Projects
- Ecosystems
- Foundations
- Organizations (companies, non-profits, universities)
- OSPOs
- Local/national governments

Multi-level constituencies, possibly contrasting goals!



Relevant Work: Software Development and DevOps



Zhao et al., 2017

Continuous Integration/ Continuous Delivery or Deployment (CI/CD)

Relevant Work: Recruiting





- Importance of having a steady supply of minority contributors
- Project popularity is an attractor
- Group cohesion increases willingness to join and contribute
- **Responsiveness** of the project maintainers and the friendliness of the community discussions help
- Women are in the minority, special efforts needed to attract them
- It pays back: more gender diverse teams are a bit more productive
- Unfortunately, **women disengage at higher rates**, likely due to differential effect of social capital
- OSSs must stay vigilant on that issue, work is never done



Trinkenreich et al, 2022

Relevant Work: Individual Engagement and Productivity









Sarker et al., 2019



Relevant Work: Projects vs Communities

- Social interactions rule over technical ones, engagement is key
- Discussions are key to changes that go over well
 - Eg, toolchain changes, tool adoption, governance changes, etc
- Transparency, transparency, transparency
 - If it's not on the mailing list it did not happen
- Healthy vs unhealthy (eg, toxic) interactions: filtering tools can help!



Gharehyazie et al, 2013

Relevant Work: Governance, Projects vs Foundations

a) Projects governance in **governance.md** files

- Governance type sets the stage
- Always important:
 - (1) identify the positions people play on the project;
 - (2) specify the requirements needed for people to step into these positions; and
 - (3) establish clear guidelines for how people both enter and exit those positions
- Evolving focus:
 - (4) Initial concentrated focus on resources and beneficiaries diversifies over time

b) Foundations have Manuals/Policies

- amount of policy on a topic doesn't correlate with increased governance but correlates w/ greater internalization by community members.
- alignment of project operations with foundation governance has limited association with project

		BENEFIT		TOTAL
		PROJECT	ASF	
Cost	project	101	60	161
	ASF	59	39	98
Total		160	99	259

Sen et al., 2022

From Chakraborti et al, 2024

Convergence Approaches for OSS Project Sustainability

- Cross-disciplinary modeling with convergent goals
 - Software engineering + social science + governance + policy
- Socio-Technical Nets + Institutional Analysis and Design (Ostrom Workshop)
- Instrumenting OSS for Sustainability
 - Metrics + actionables





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Outcomes:

- Individual developer level: reactions to events
- Nascent project level: self-reflection, trajectory adjustment, building governance
- Project level: reactions, governance adjustment
- Foundation level: benefit calculation, policy adjustment
- OSPOs: Store knowledge and triage







- Comprehensive metrics
- Analytics using Al
- Automatic detection of downturns
- Matching downturns to actions

ASFI Project Explorer (APEX) Project Selector Graduation forecast Current Reviect: Abdeen Current Barlad: Jun 06 2006 -- Jul 06 2004 Project Abdera (gradu 1) Range Slider Α his of 2006 -- hit of 2006 Month 1 Ends: Nov 08 200 Project Details Technical Network Social Network oject: Abdera 🗌 Circular Graph Lavou Current Project: Abder Project Name: Abdera Service North Banaisar Morla File Type About: An implementation of the elias torres elias torrea Atom Syndication Format and Aton Publishing Protocol. parrett rooney 24% garrett rooney ellas torres AbderaServerExcept Status: Graduated gav 1% gav 33% iames m snell Sponsor: Incubator 3% joe kim ioe kim entor: Garrett Rooney, Paul Q AtomConformanceTer 4% martin cooper artin cooper 2% peul quema paul querna iames m. snell .CoreTest.java mbert save 3% robert sayre mbart unter 1% robert vales 19% stephen duncer stephen duncan .FeedParserTest.jav Project Reports upp cei 1% upp cei Link to Actual Report: Link Current Period: Jun 06 2006-Jul 0 Continued work on the code, wr Contributed work on the code, working towards a 01.0 release Added twi new committees to the projec (Stephen Duncan and Gamett Roomer Stephen is still in discussions with his Technical Network Nodes Social Network Nodes G н his CLAR reployer regarding 232 12 19 410 2 205 Number of Email Senders Emails Per Sende Number of Commits Commits Per Committee

Ramchandran et al, 2022

• Project Governance/Foundation Policy



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Ramchandran et al, 2022

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Yin and Filkov, 2021



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- Comprehensive metrics BENEFIT Analytics using Al PROJECT ASF Cost project 101 60 Automatic detection of downturns ASF 59 39 Matching downturns to actions Total 160 99
- **Project Governance/Foundation Policy**

Sen et al., 2022

TOTAL

161

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References



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