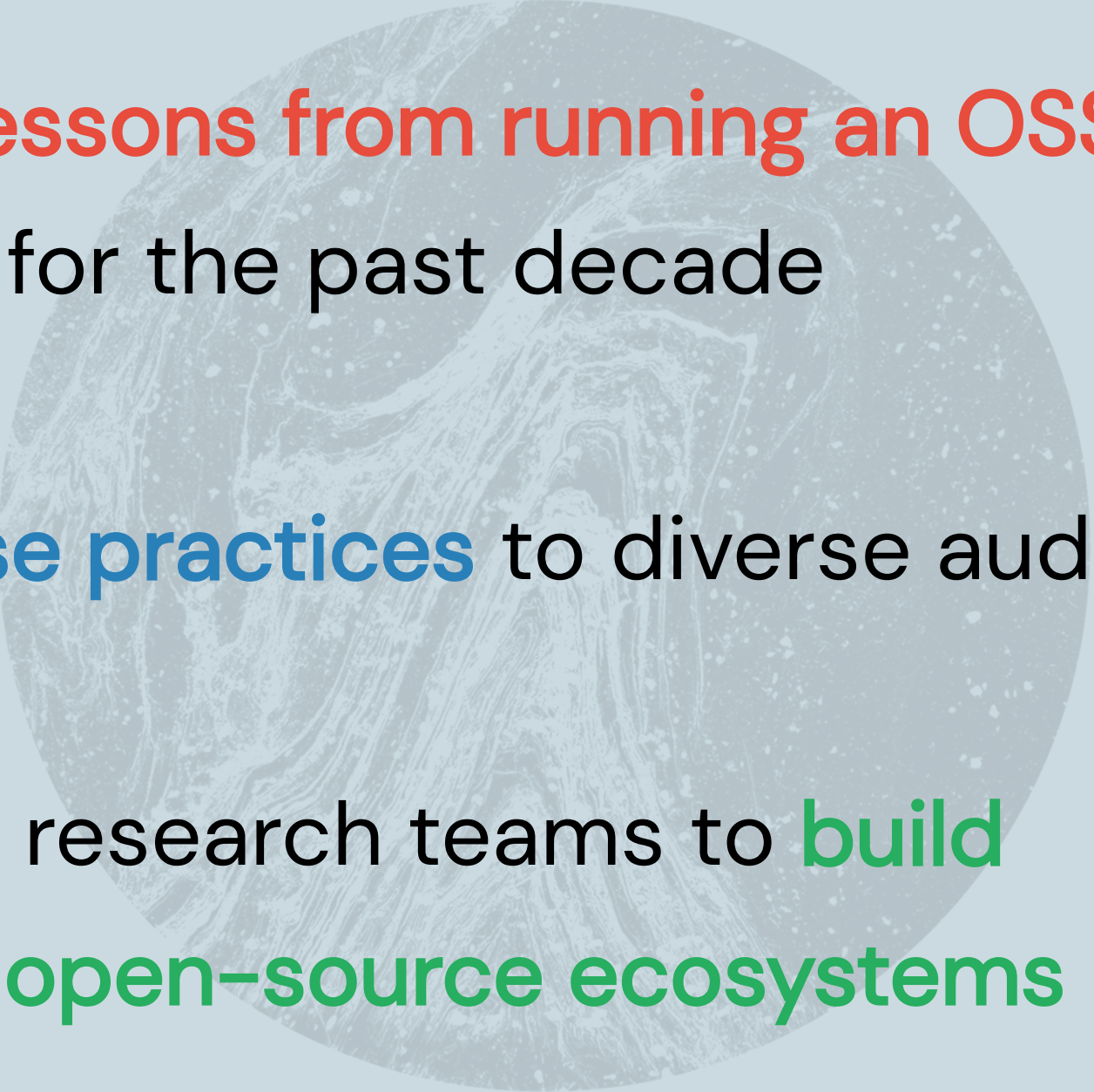




The Challenges & Opportunities of Sustaining Open Source Ecosystems

Open Innovation for Earth Observation Programmes
2-4 November 2022 | ESA-ESRIN | Frascati (Rm), Italy





Reflect on **lessons from running an OSS community** for the past decade

Scaling those practices to diverse audiences

and training research teams to **build sustainable open-source ecosystems**



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Berkeley Institute for Data Science
University of California, Berkeley

OpenSci

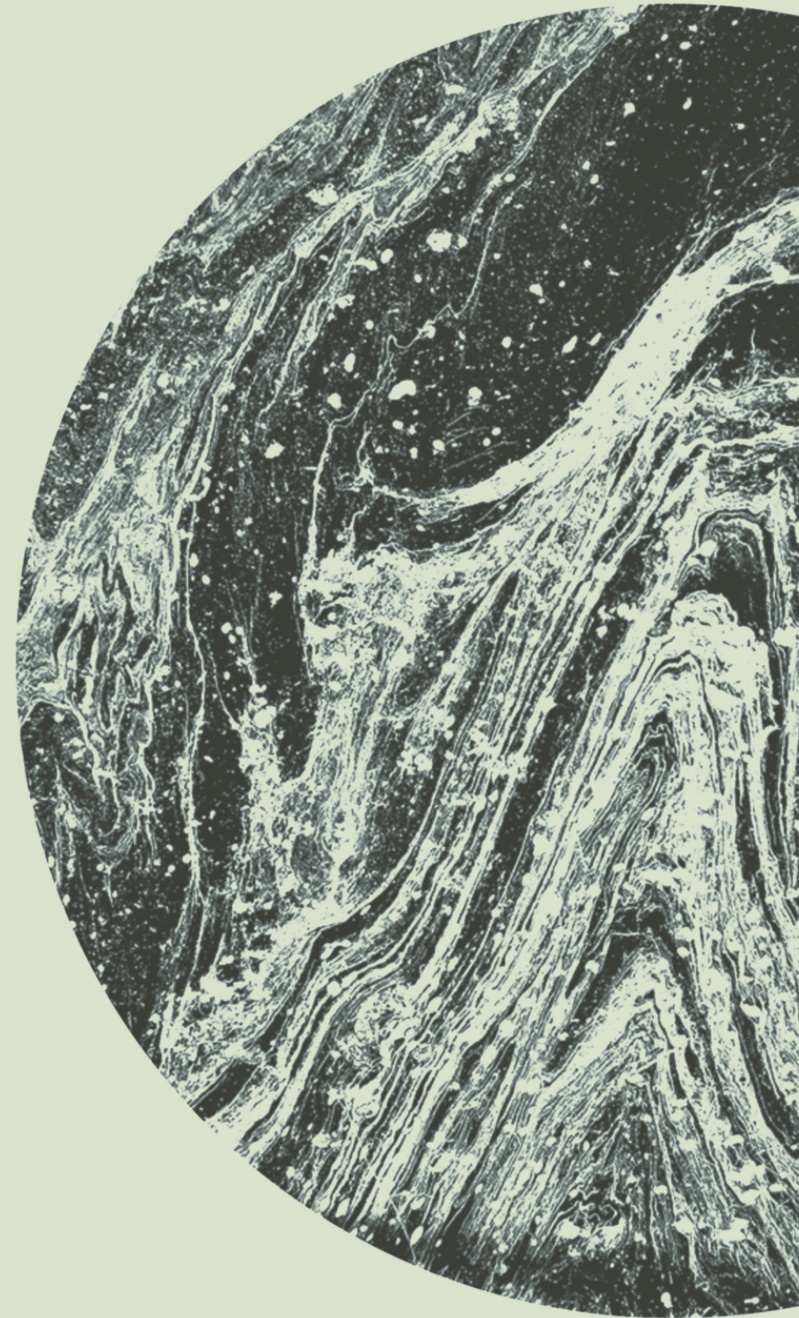
US
Research
Software
Sustainability
Institute

POSE

Pathways for Enabling Open
Source Ecosystems

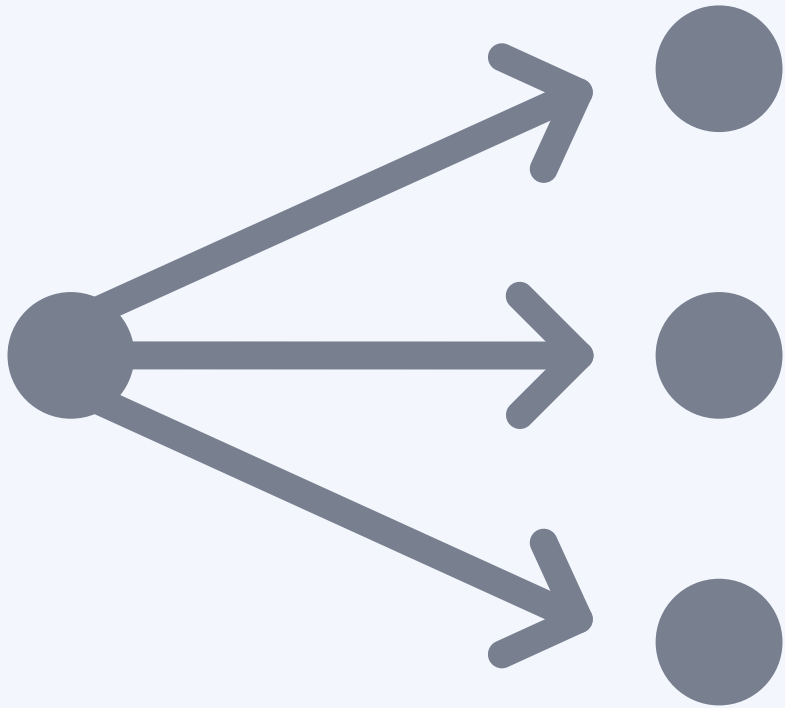
01

Lessons from a decade of OSS community building



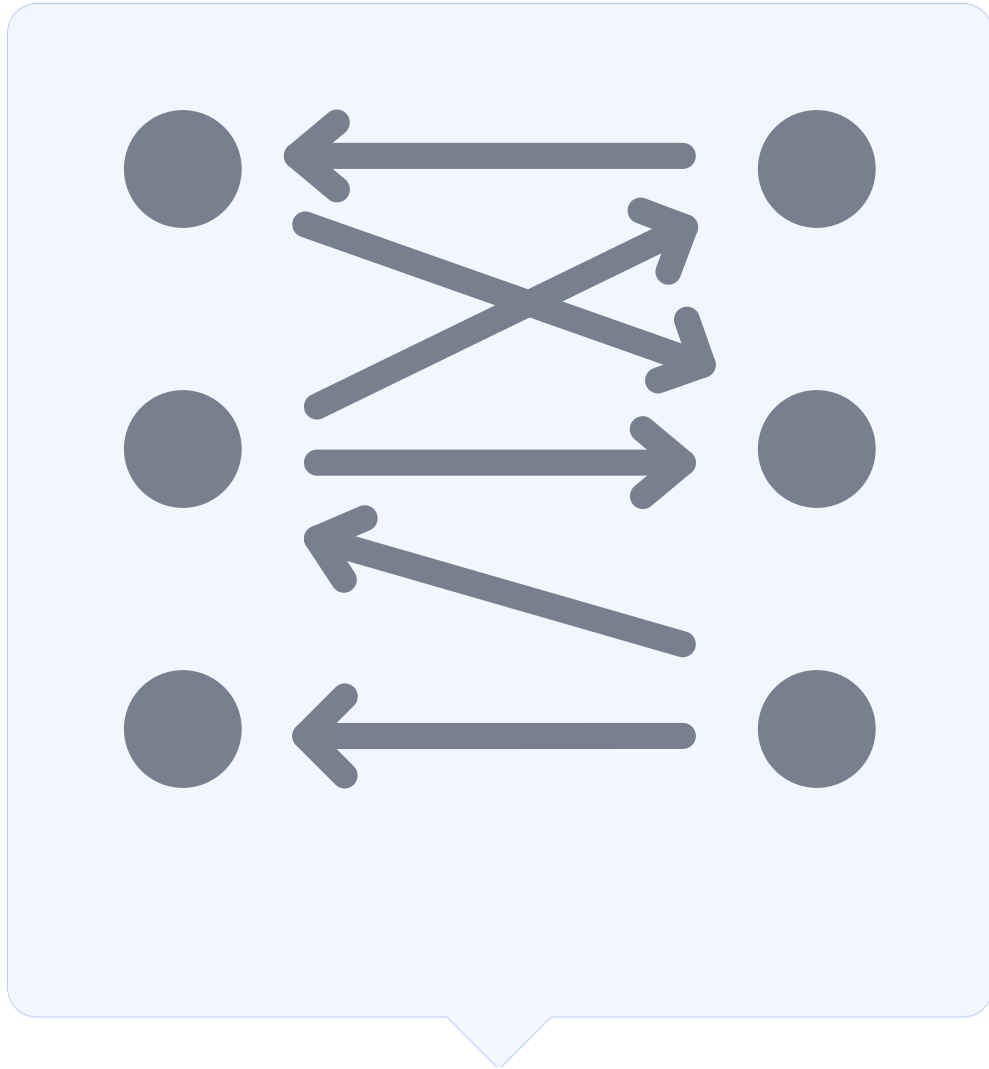
R**penSci**
ESTD 2011


Early days of engaging with our community



In the early days, our
core team **built**
software for
researchers

Inbound Contributions

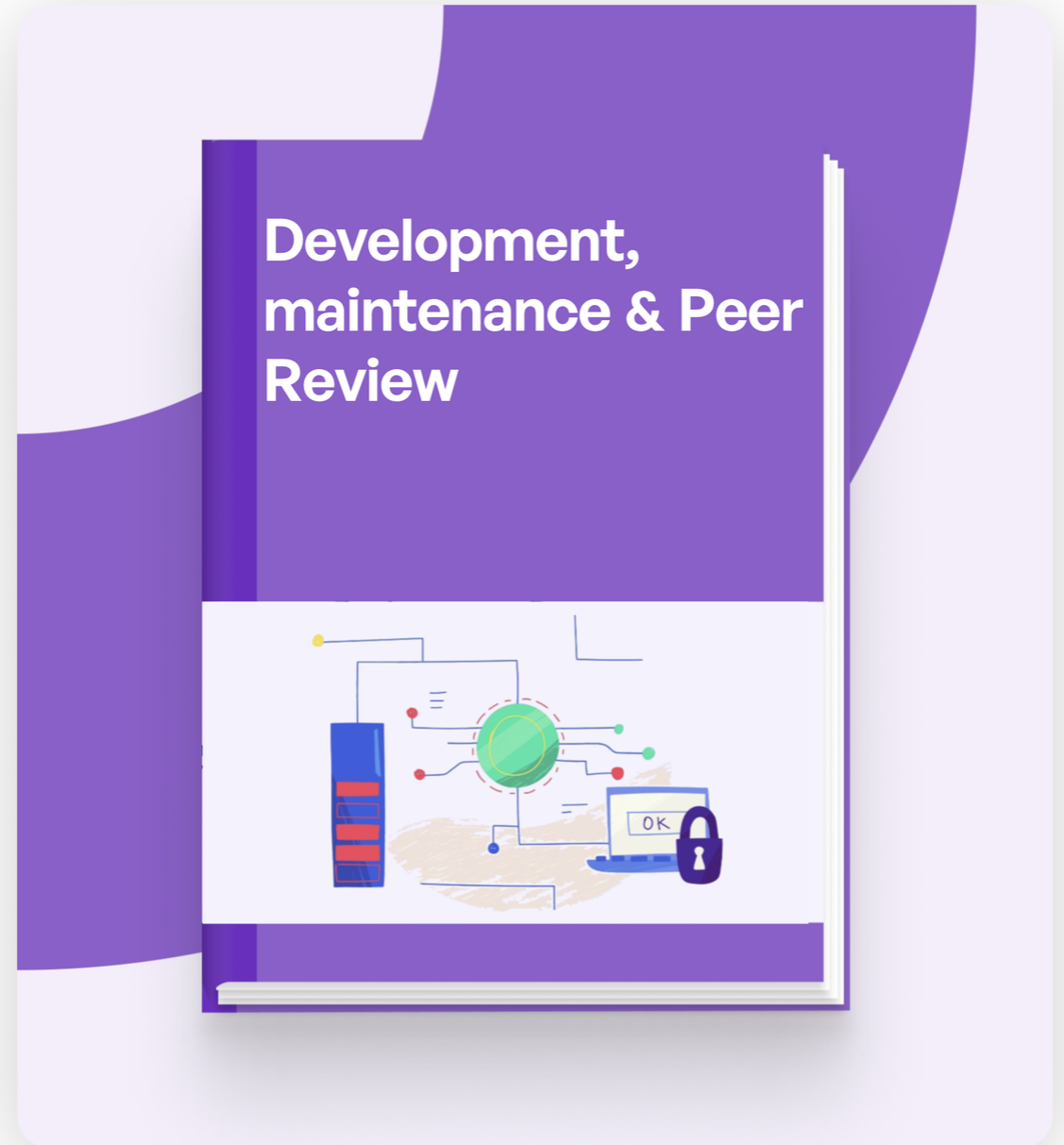


Then we began
accepting
contributions. **But 1:1
took a lot of time &
effort**

The rOpenSci Dev Guide

Best practices for
software development
documented in a living
book

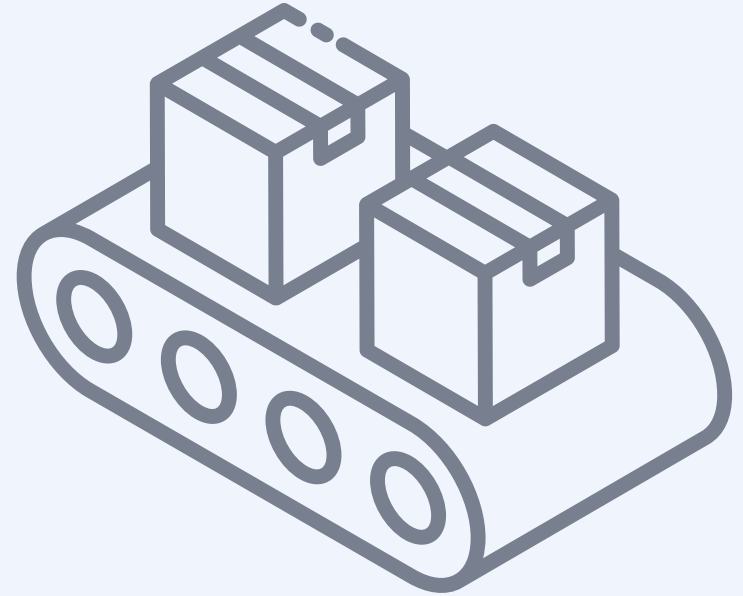
devguide.ropensci.org

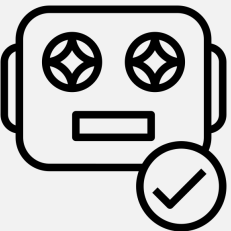


Creating a process for standardized peer-review

Created a system to
peer-review software

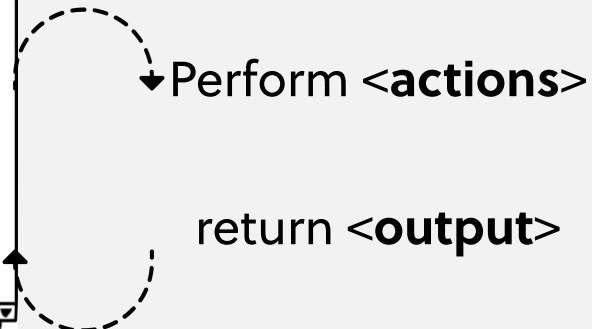
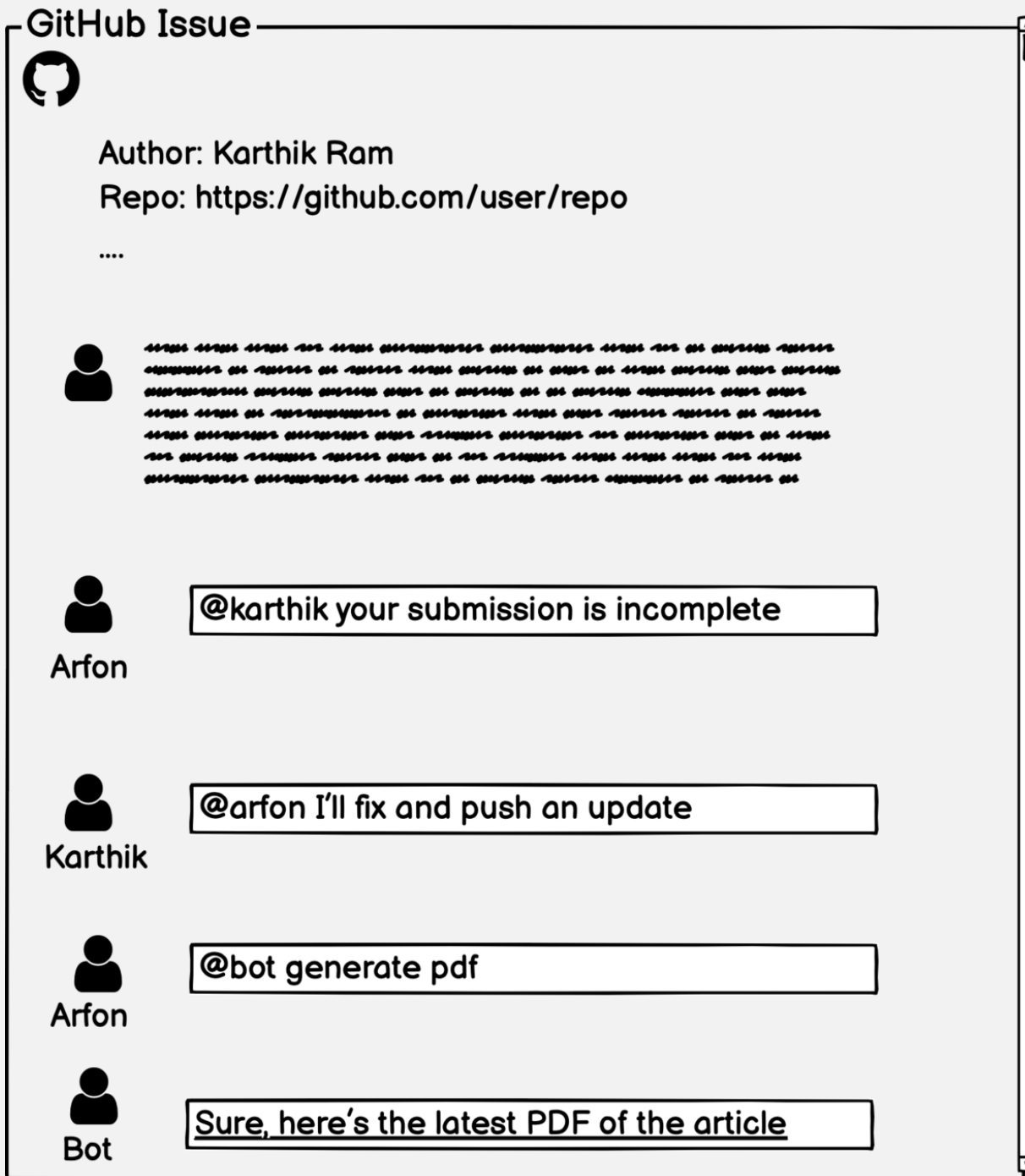
Became inspiration for
**The Journal of Open
Source Software &
PyOpenSci**





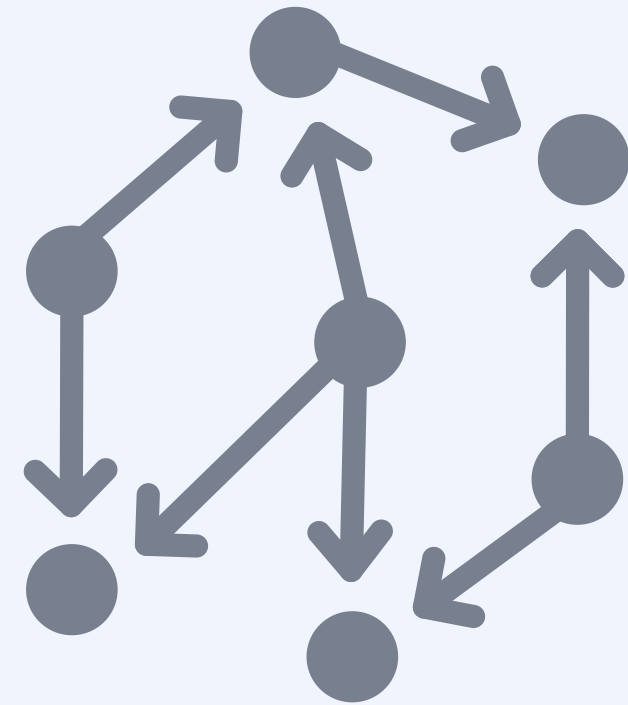
Ignores
conversations
between
humans

Jump in
when
called

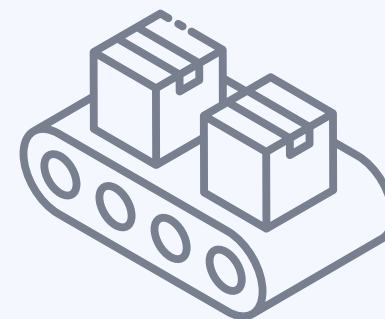
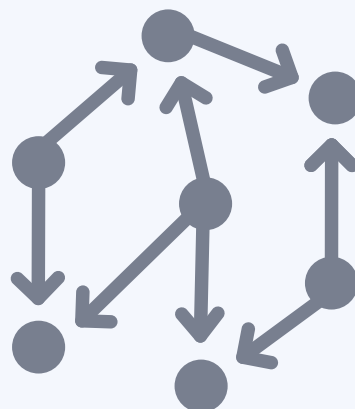
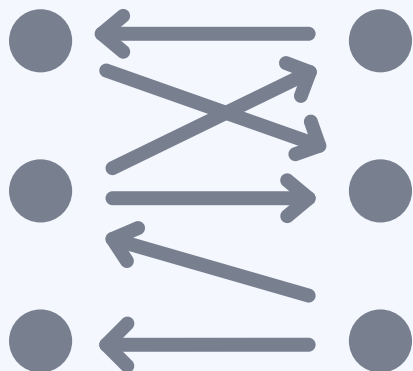
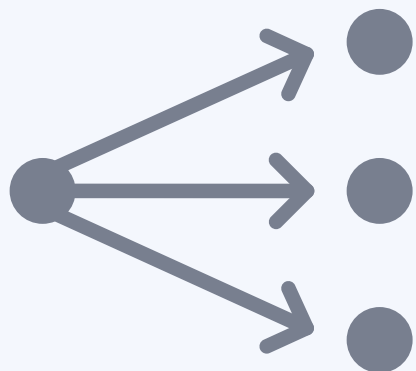


Enabling others to set up & host their own communities

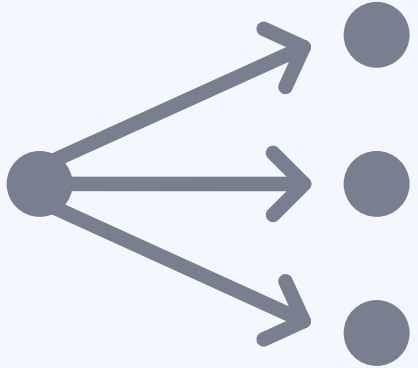
Built **r-universe**, a system that allows any community to **easily set up their own rOpenSci**



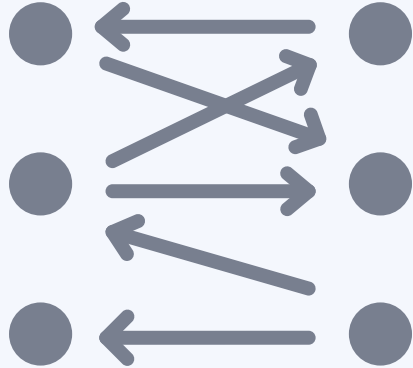
r-universe.dev



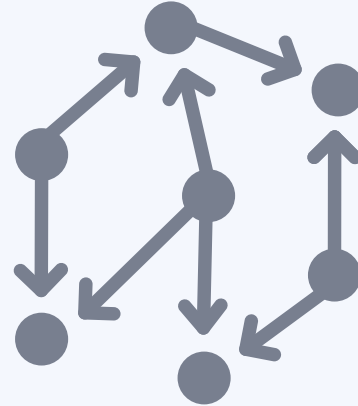
CSCCE Collaboration Model



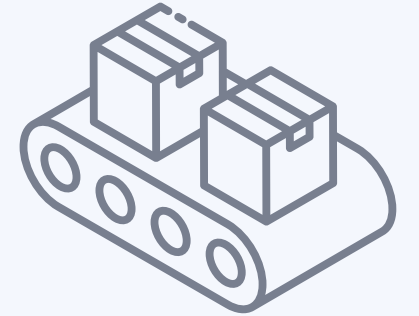
**Convey,
Consume**



Contribute



Collaborate



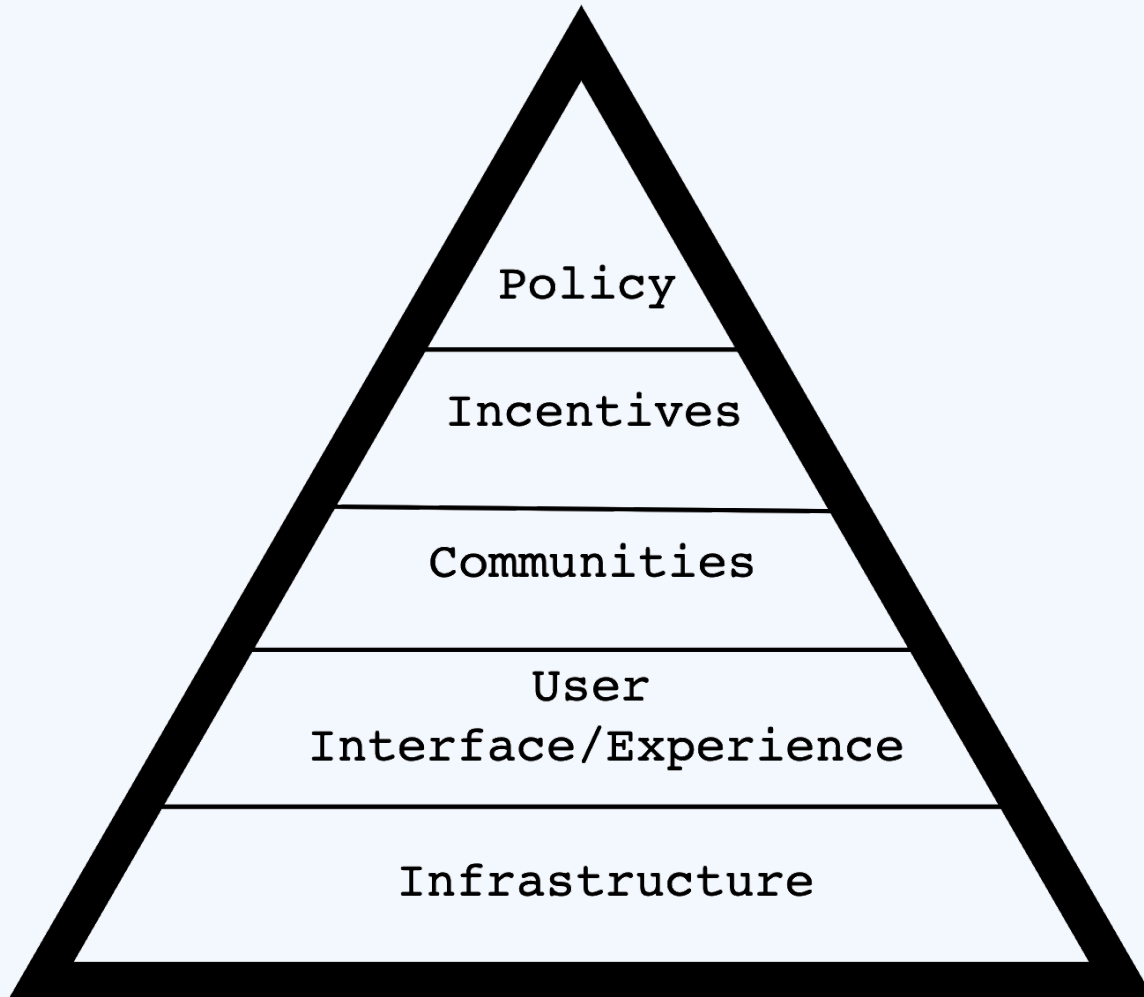
Co-Create

Theory of Change

Mechanism

Incentive

Software



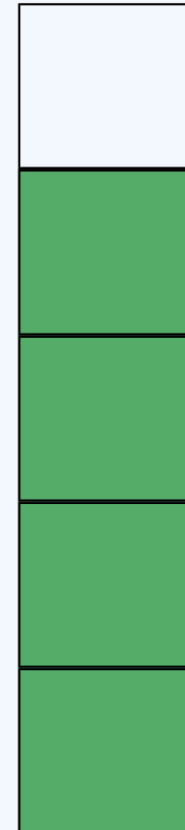
Required

Rewarding

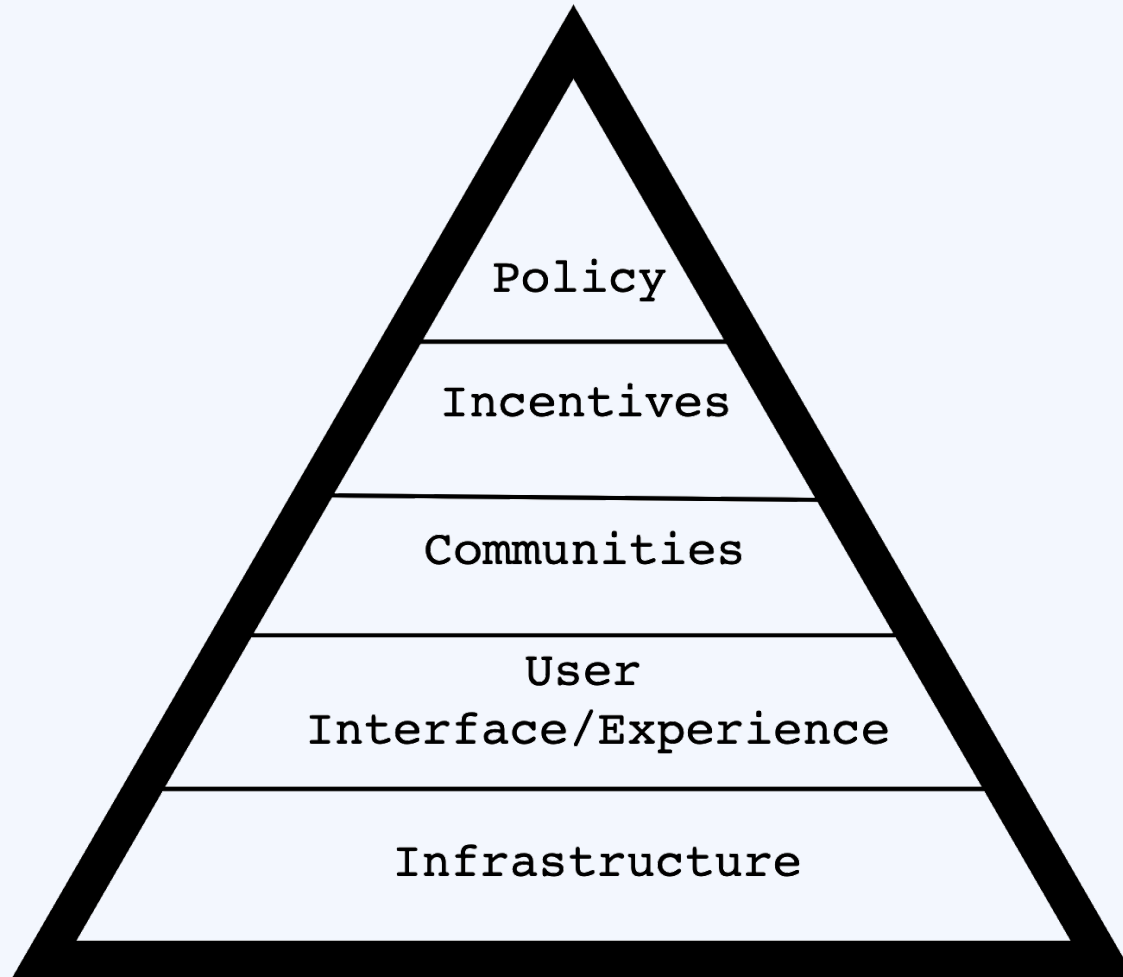
Normative

Easy

Possible



Mechanism



— OSPOs & Open Source Policy

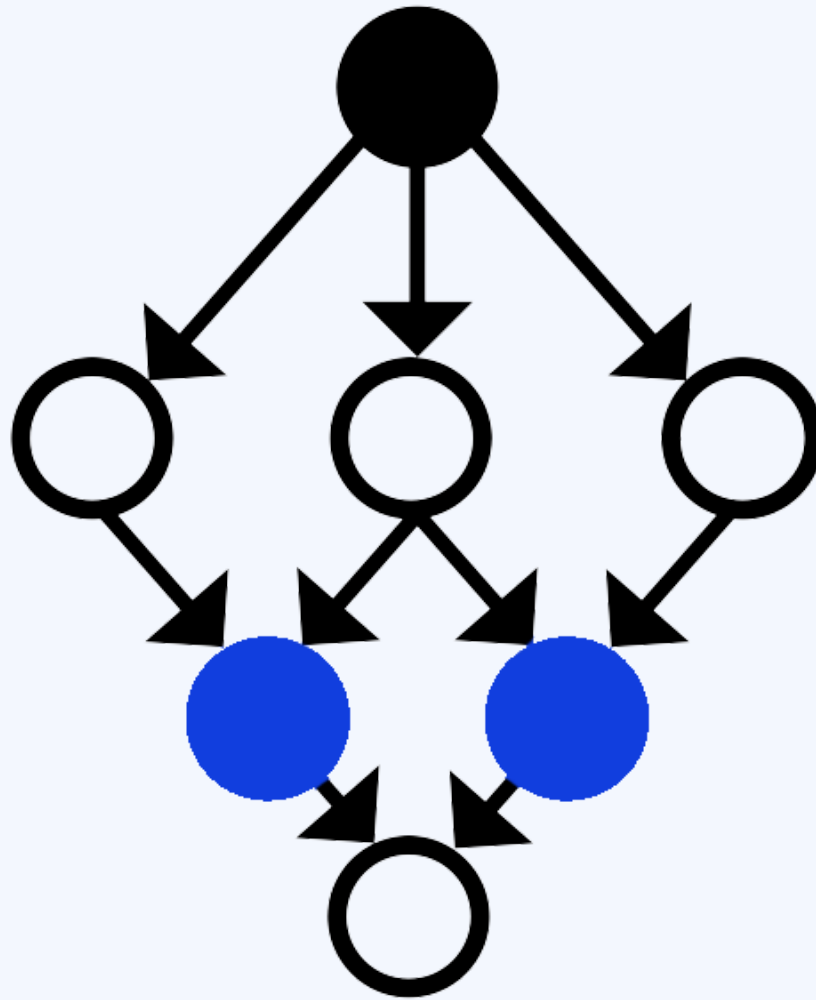
— Credit e.g. JOSS

— COPs emerged

— UX became better

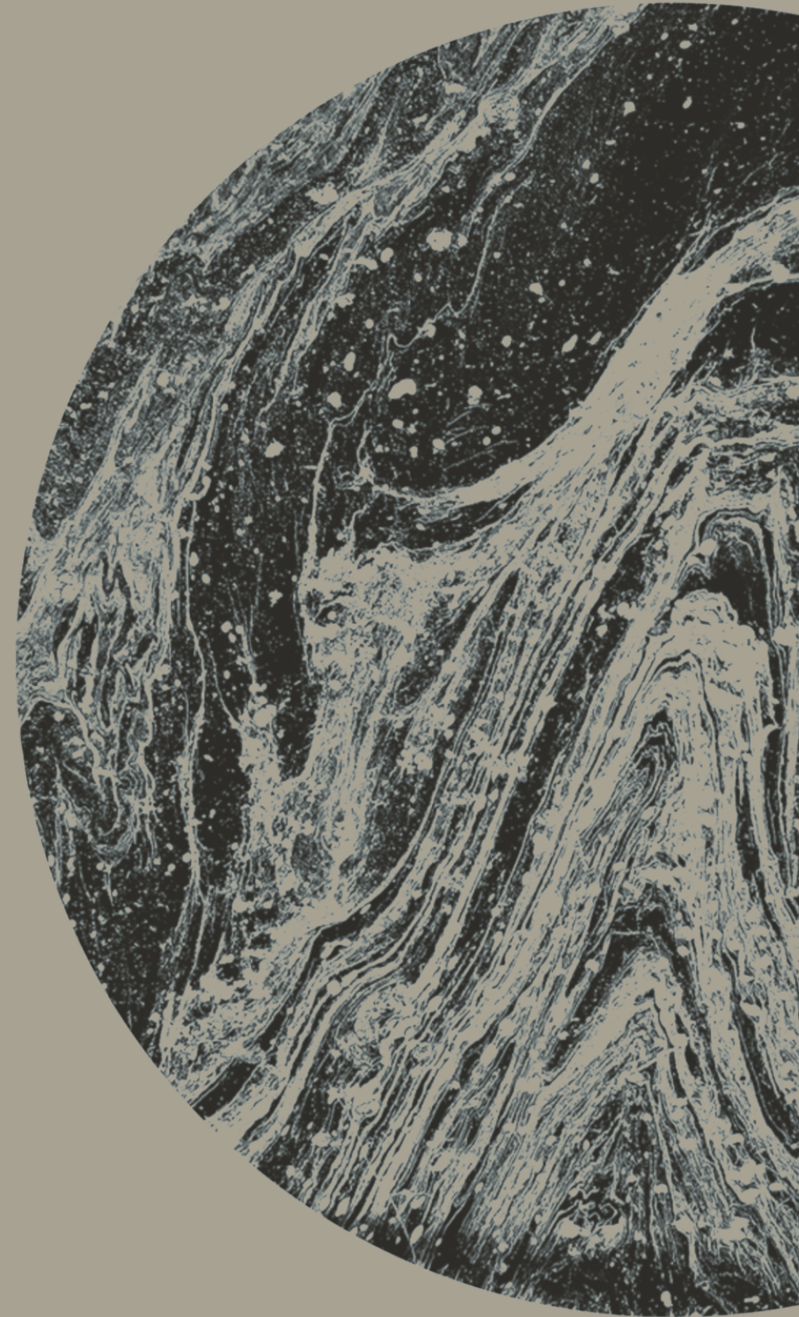
— Open source was hard

Think about your stack as an OPSO



02

Challenges to sustainability



**What does success look like
for an open source project?**

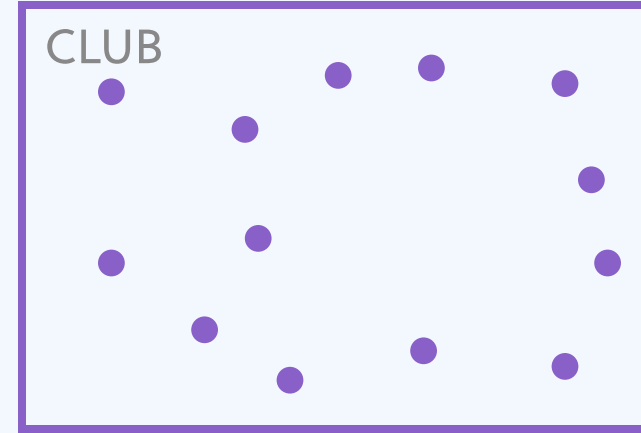
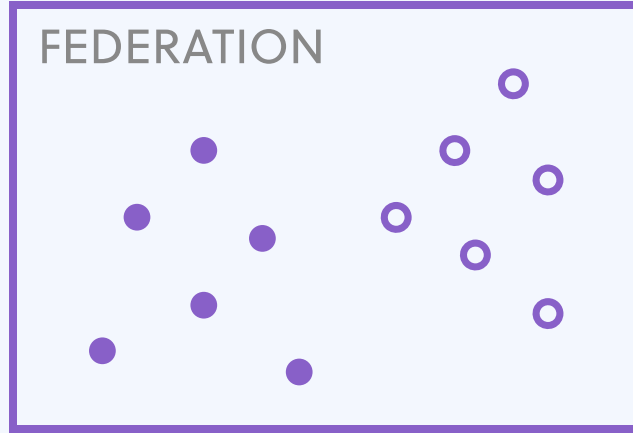
It depends

Do you support a user community, developer community, or both?

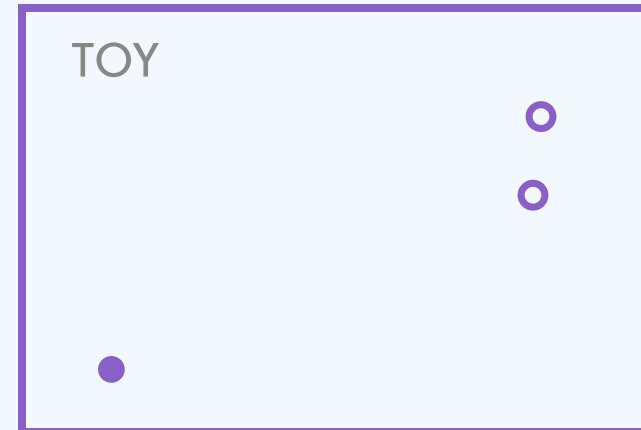
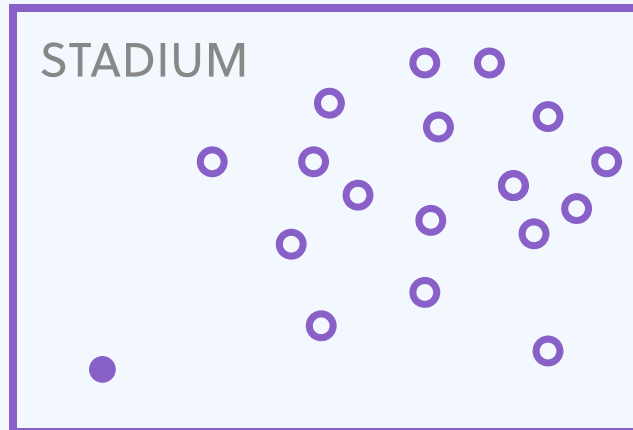
High user growth

Low user growth

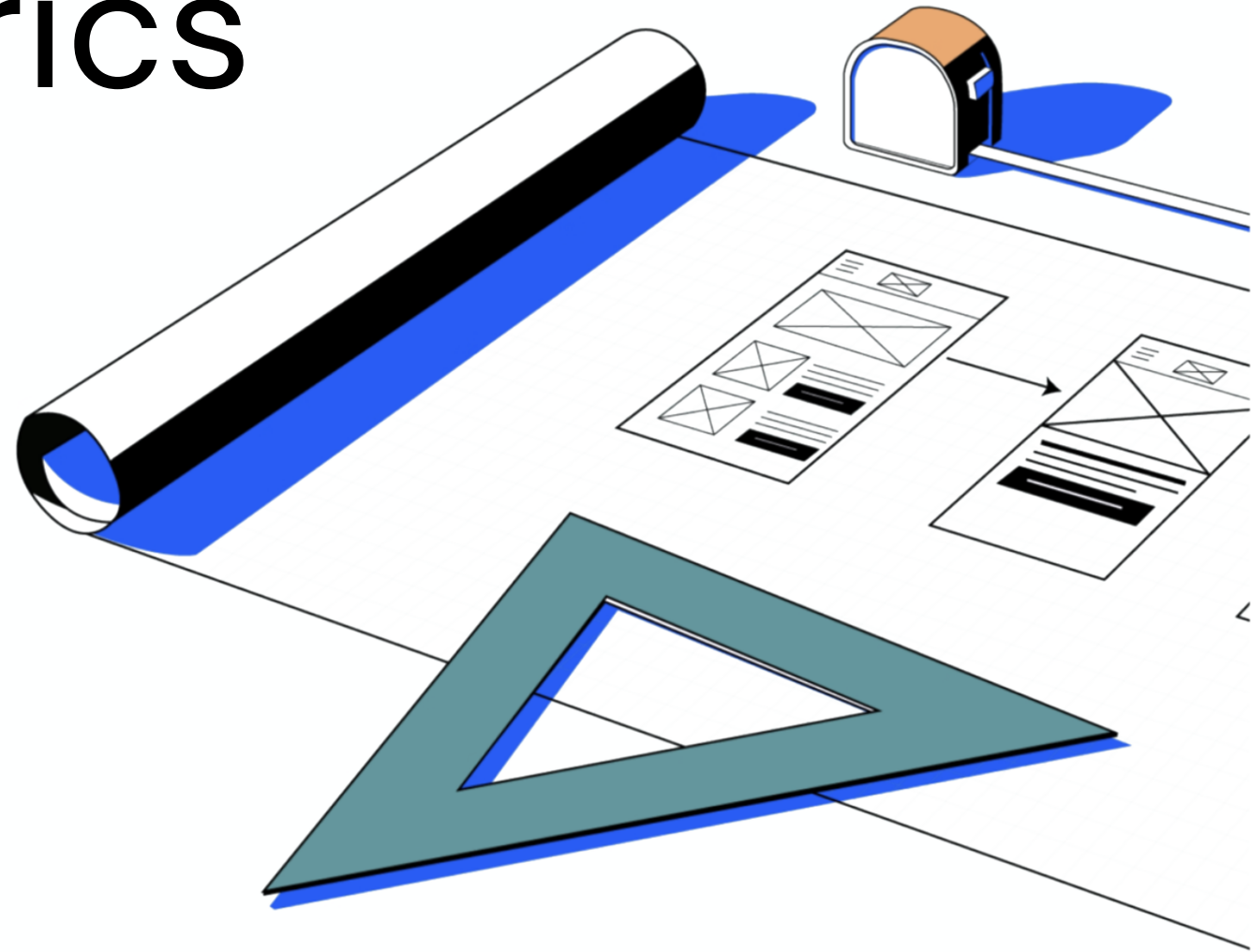
High
contributor
growth



Low
contributor
growth



CHAOSS Metrics



CHAOSS.community

CHAOSS Metrics

Success

Contributors,
Users, Developers,
Diversity, Growth
and social
diversity,
openness index...

Sustainability

Quality model,
Development base,
size of niche,
financial resources,
resilience,
relationships
among people

Risk

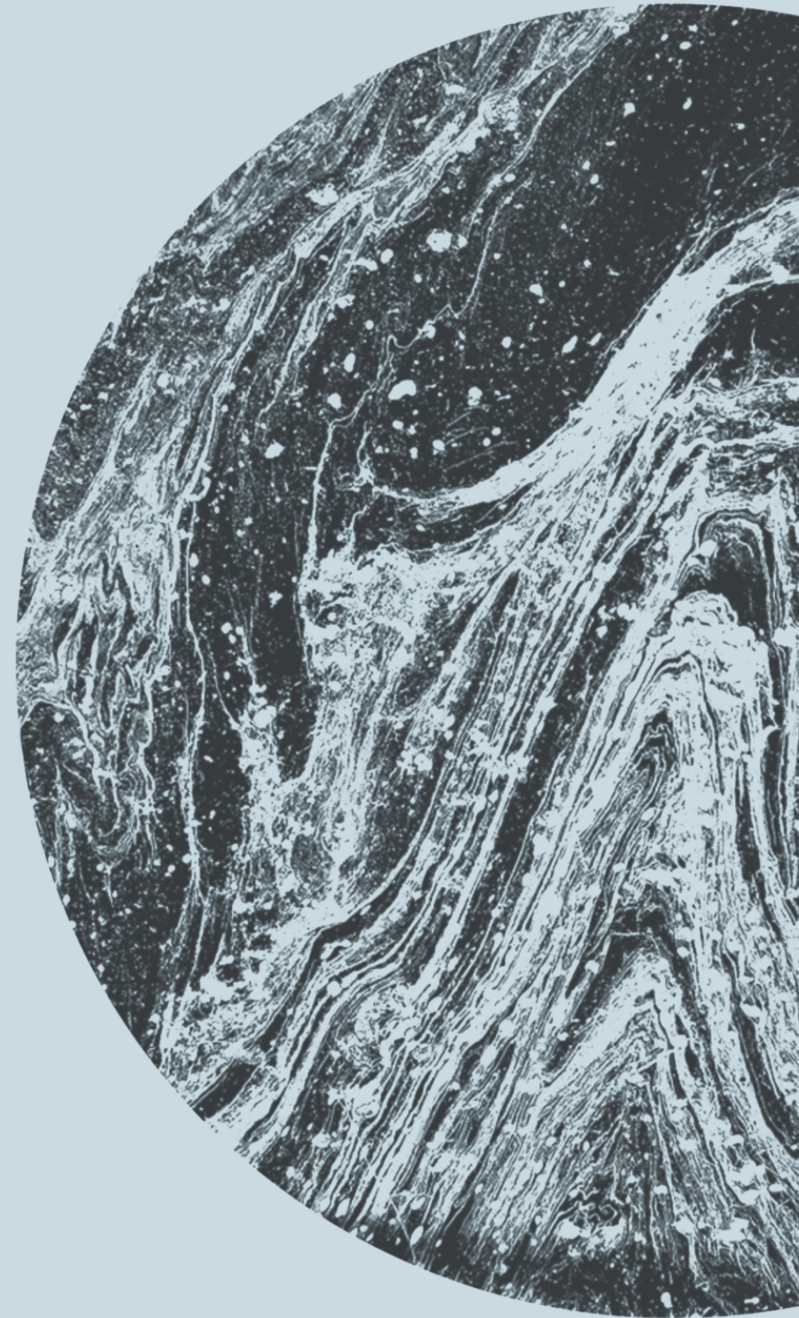
Bus factor, Truck
factor, Elephant
factor...

Health

Social health,
Gender bias,
Positive
experience,
Robustness,
Productivity

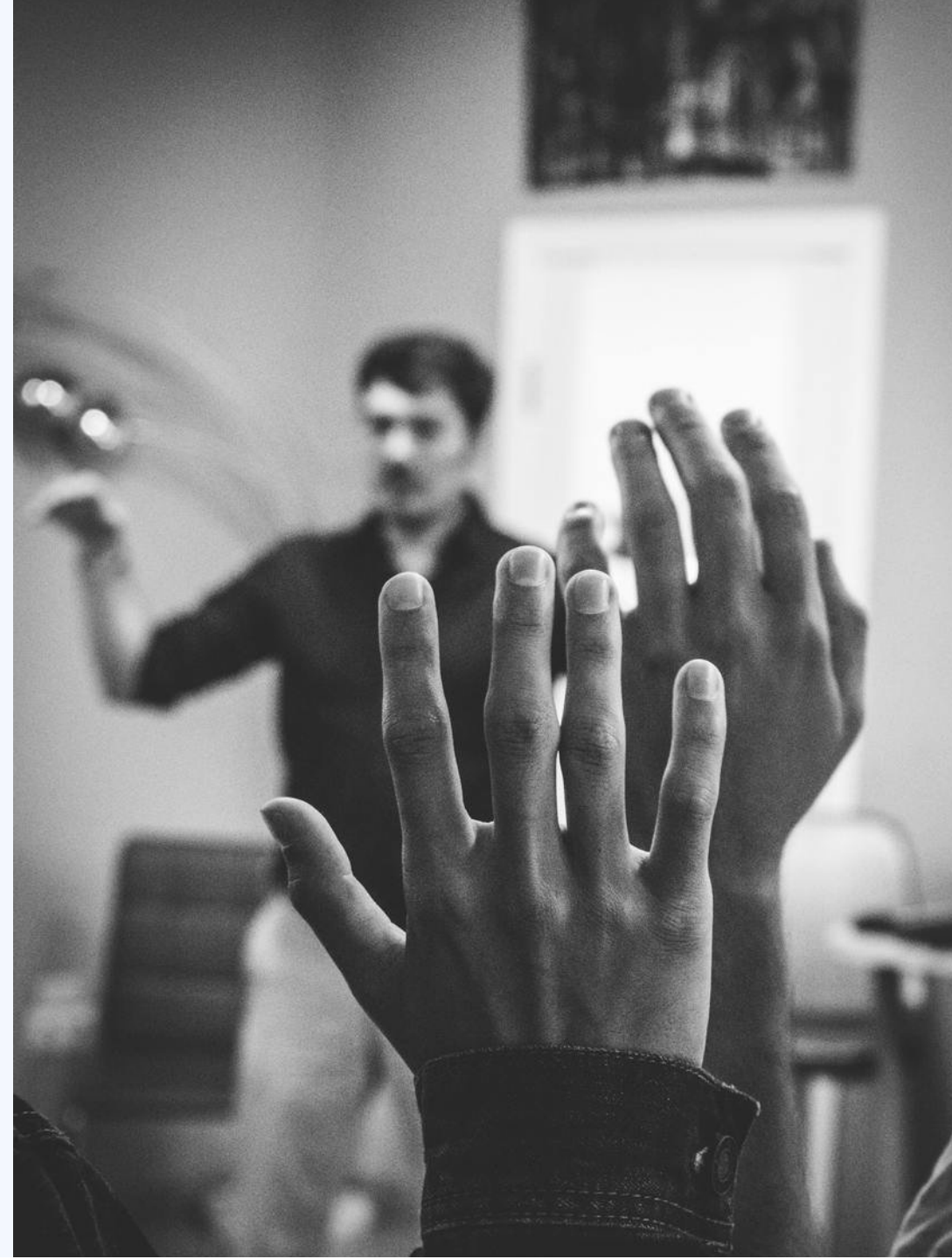
03

Enabling Open Source Ecosystems (OSE)



Governance

Having a robust process
around decision making
and managing social
collaboration





Organizational Management

The need to establish a
managing organization
from which to guide
their growth

Community Management

Processes around
building relationships
within & across
communities





Systems Health Considerations

Issues around OSS
security &
vulnerabilities, potential
harm to communities

Business perspectives

Having a clear picture
around invisible
infrastructure costs and
resources (funding and
otherwise)



Business plan

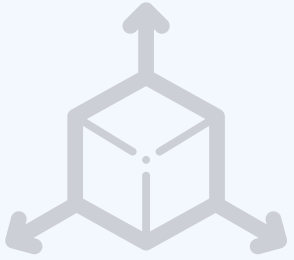
Governance

Sys Health

Community

Security

Various factors enable
open-source projects to
become sustainable
OSEs



R_{OpenSci}

Modest **federation**
supporting software
development in
environmental sciences
and statistics

URSI

Virtual **institute** to
support best practices
& community for
research software
development

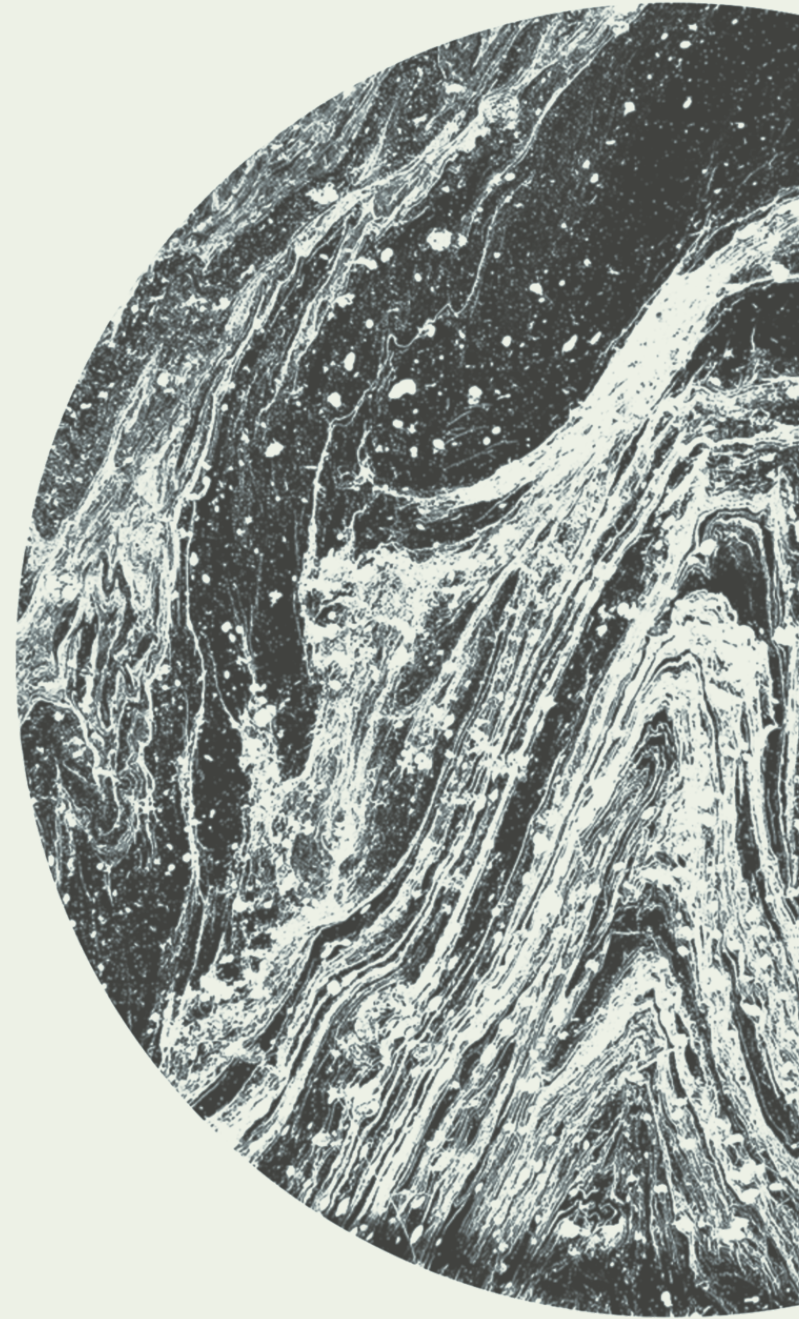
POSE

Pathways for Enabling Open
Source Ecosystems

Training to **enable open**
source ecosystems to
become more
sustainable

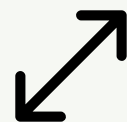
04

Some takeaways



i

SCALING



Scaling impact of
our open source
activities was
hard



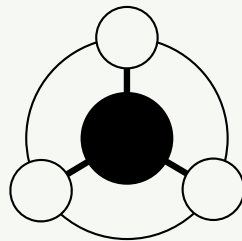
An abstract illustration featuring stylized human figures in various poses, interacting with digital elements like a laptop and a tablet. The figures are composed of geometric shapes in shades of blue, pink, orange, and green. The background is white with scattered geometric shapes and lines, suggesting a dynamic and collaborative environment.

ii Co-creation

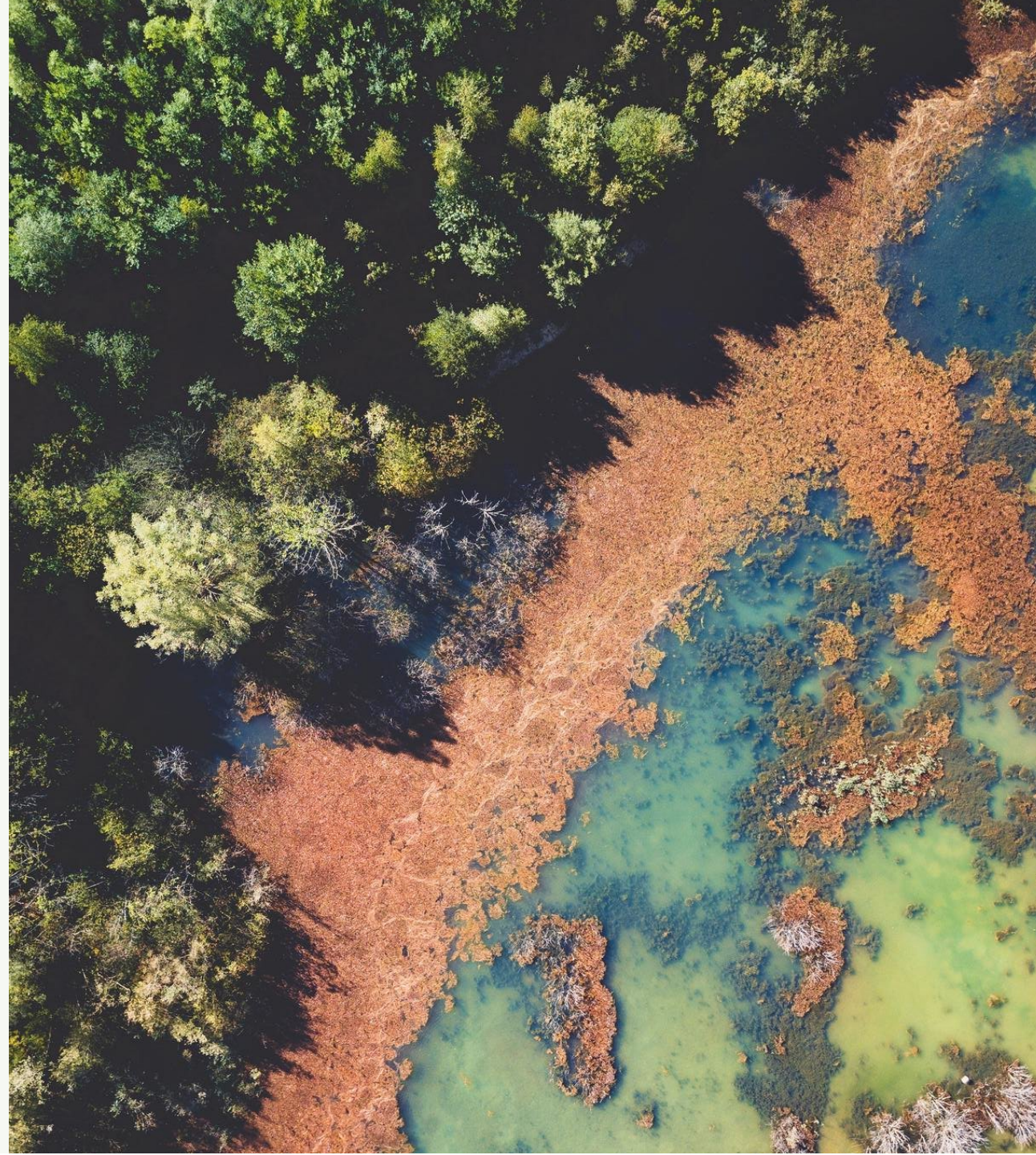
Supporting the
community in
co-creating
tools was the
way forward



Ecosystem level support



Support your OSS
developers in
creating
sustainable
ecosystems



Challenges, solutions, & recommendations

01

CHALLENGES

Scaling of our
activities was
hard

02

SOLUTIONS

Enabling the
community to co-
create

03

RECOMMENDATIONS

Build a community
of practice and
enable OSS
ecosystems to
thrive

bit.ly/esrin



bit.ly/esrin-pdf