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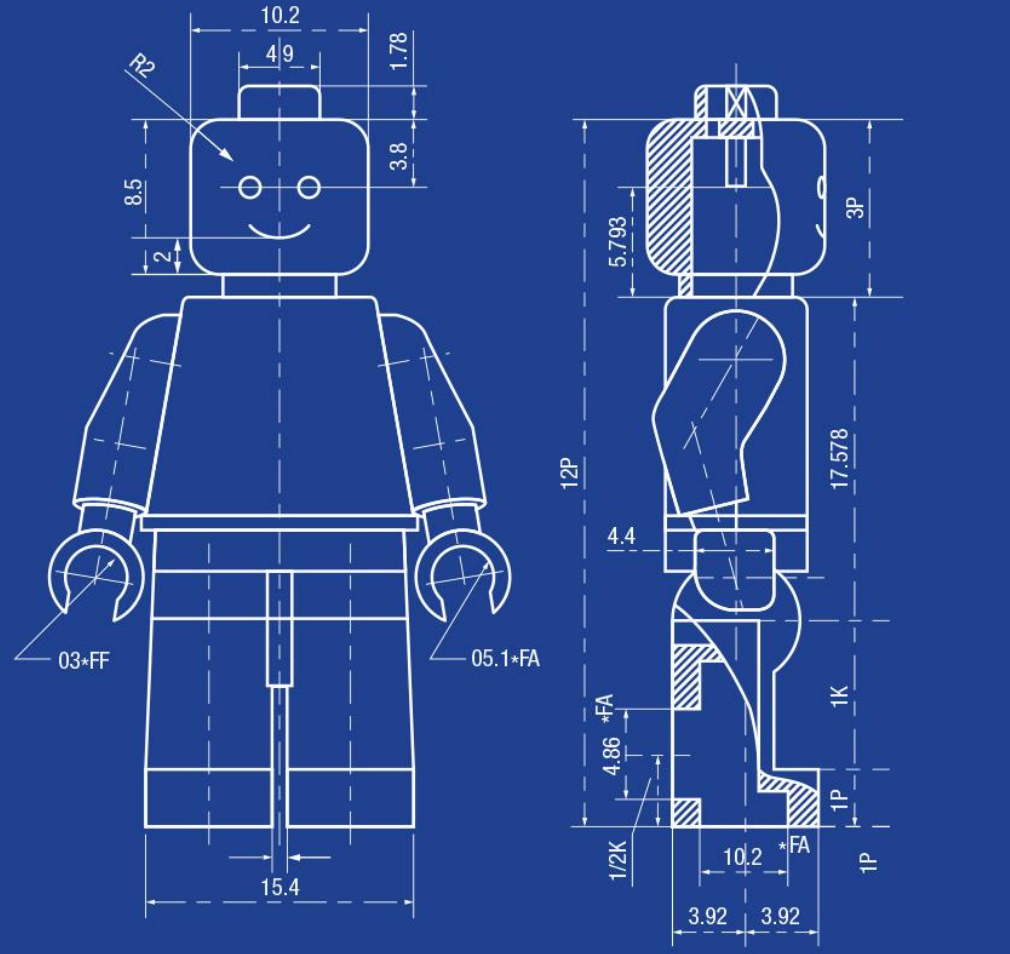
JOHAN LINÅKER

Open Source Software And Requirements Engineering

About Johan



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TOY FIGURE

PUBLICATION NUMBER	USD253711 S	PUBLICATION DATE	DEC 18, 1979
PUBLICATION TYPE	GRANT	FILING DATE	FEB 14, 1978
APPLICATION NUMBER	US 05/877,800	PRIORITY DATE	AUG 29, 1977

What is Open Source Software?

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Liberally Licensed, Collaboratively Developed Software

Photo by Billy Huynh | https://unsplash.com/photos/v9bnfMCyKbg

Open Source Software (OSS) today

- Approximately…
  - 90+ % of all software contains OSS
  - 75% (2020) of companies' code bases consists of OSS (up from 36% 2015)
  - 56 million developers collaborate on OSS projects on GitHub. Estimated to increase > 100 million 2025
  - Collaboration in and between verticals, including Energy, Automotive, Telco, Health

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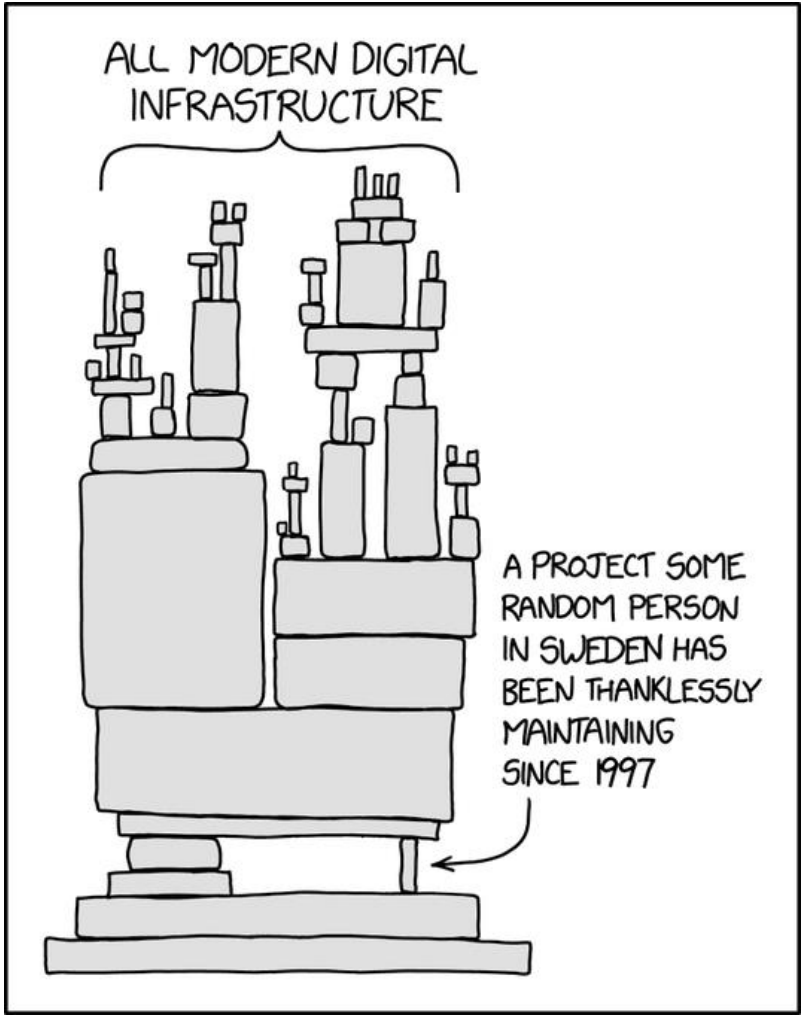
In other words, it’s everywhere



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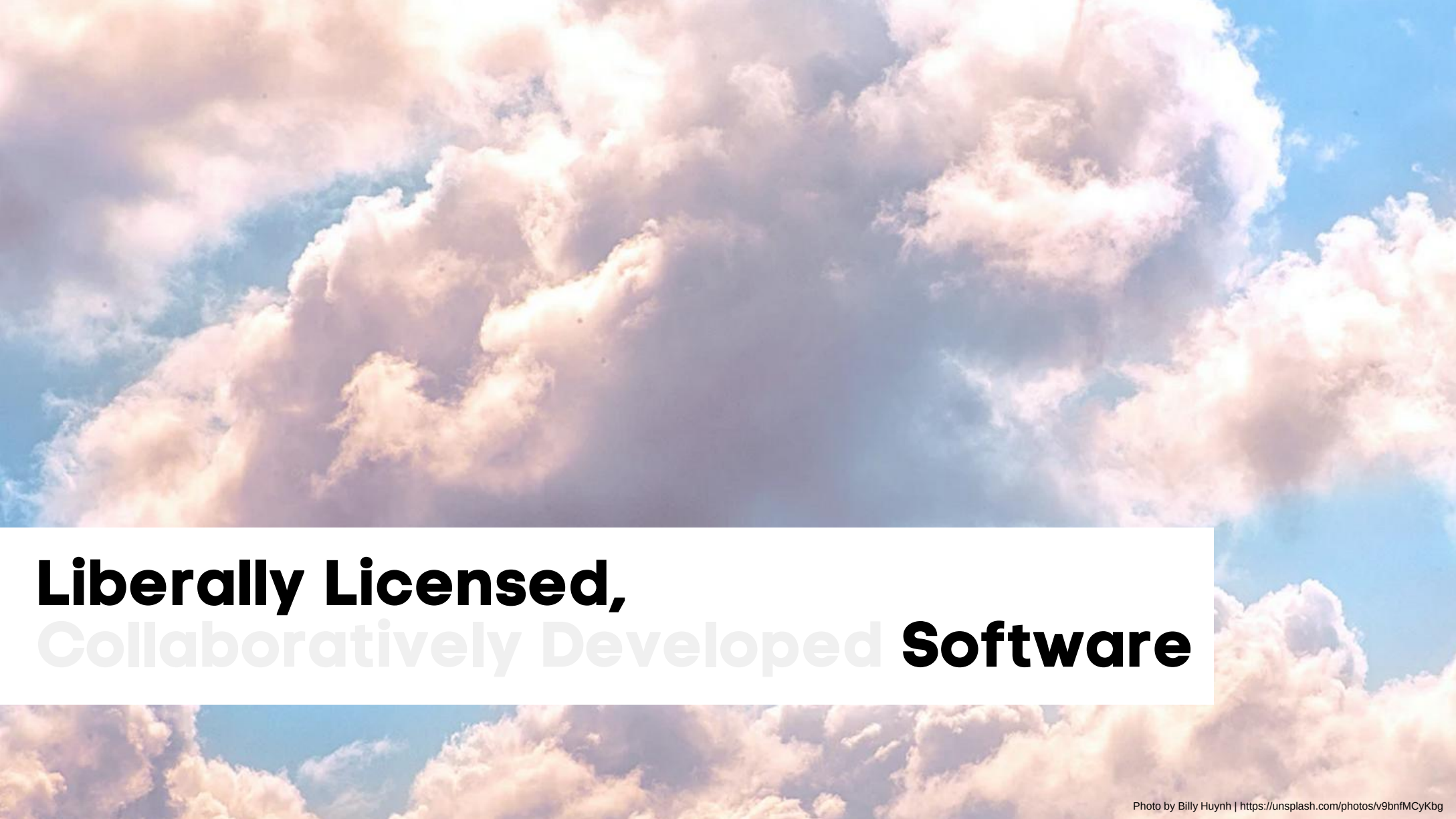

Liberally Licensed, Collaboratively Developed Software

Photo by Billy Huynh | https://unsplash.com/photos/v9bnfMCyKbg

Liberally licensed software

- Software available under an OSS license
- License follows the Open Source Definition and approved by Open Source Initiative (http://opensource.org)
- Who ever, for what ever reason may inspect, use, modify and redistribute the software
- Further conditions may vary between licenses

Photo by Fabian Fauth | https://unsplash.com/photos/1_EedIBc6jY

Permissive vs. Copyleft licenses

- Permissive licenses – do whatever you want, as long as you recognize the copyright holder
  - E.g., MIT, BSD, Apache
- Copyleft licenses – Above + share any modifications, additions and connecting code under same license.
  - GPL 2, GPL 3, AGPL
- Permissive common for standardiszations and collaboration on non-differentiating software
- Copyleft common when copyright holder wants to capture value back

Photo by Fabian Fauth | https://unsplash.com/photos/1_EedIBc6jY

Liberally Licensed,

Collaboratively Developed Software

Photo by Billy Huynh | https://unsplash.com/photos/v9bnfMCyKbg

Collaboratively Developed Software

- Software developed as projects by networks of individuals and organizations, aka. Open Source Communities
- ”Members” of the community commonly both users and developers
- Are united by a common vision and goal around the Open Source Software.

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Incentives for going open source

- Individuals:
  - Sense of belonging,
  - Recognition for contributions,
  - Solves paintpoint,
  - Build CV
- Organizations:
  - Lower costs,
  - Increased innovation,
  - Branding and PR,
  - Strategic tool

Photo by Annie Spratt | https://unsplash.com/photos/QckxruozjRg

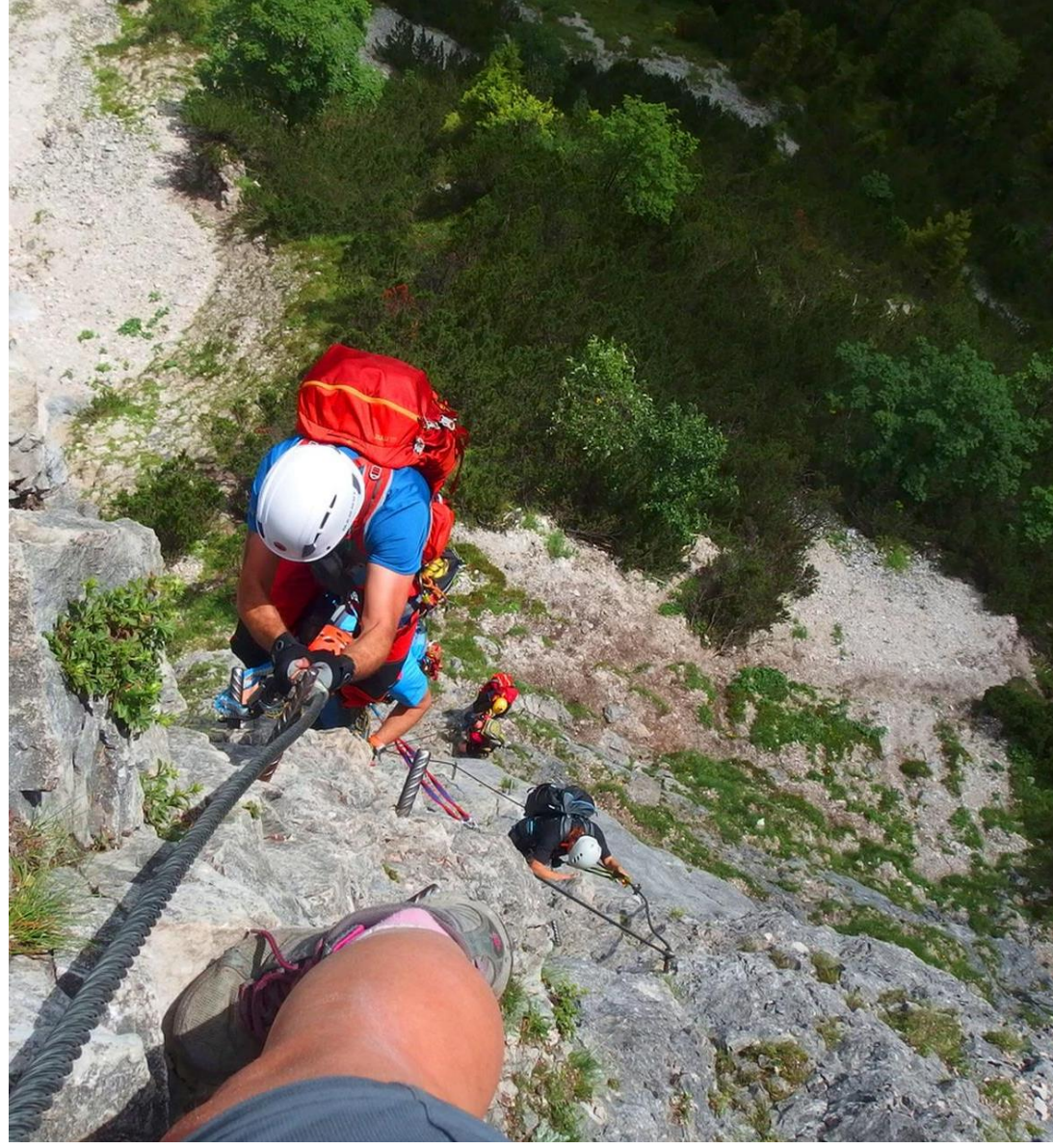
Incentives for going open source

- Public policy:
  - Transparency
  - Competition
  - Economic growth
- Researchers:
  - Disseminate research outputs
  - Sustain OSS development between project
  - Collaborate with partners and scientific community
  - Enable reproducibility

Photo by Annie Spratt | https://unsplash.com/photos/QckxruozjRg

Risks, costs and complexities

- Companies:
  - Differentiating functionality, competitive edge and commoditization
  - Sensitive IPR and patents
- Public administrations
  - Compete with industry
  - Ethical aspects and responsibility
  - Integrity and confidentiality
- General:
  - Internal budget and resource constraints
  - Modularity and technical architecture



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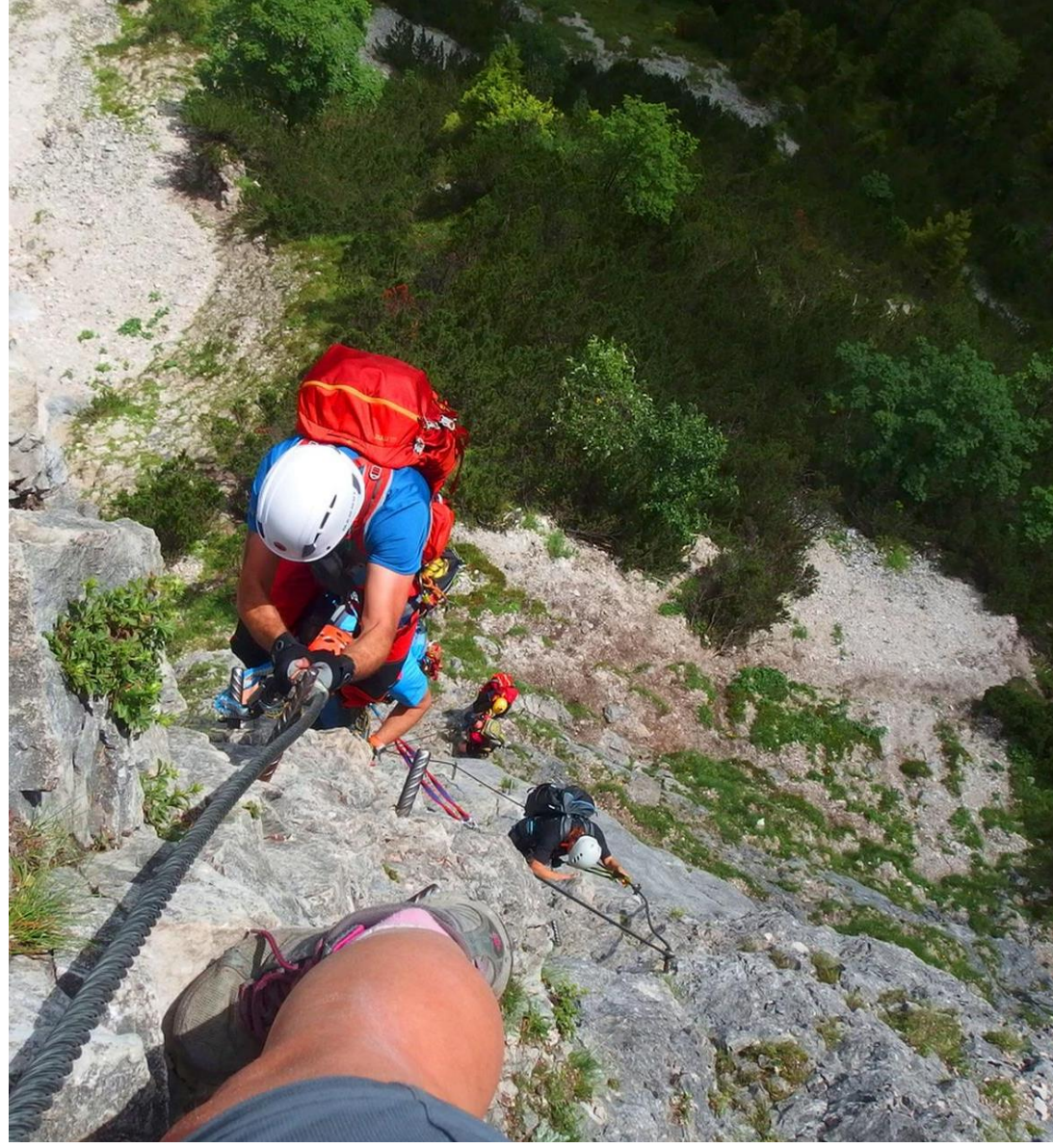

Technical and non-technical contributions

- Development of new functionality and bug fixes
- Requirements identification, analysis, and prioritization
- Testning and quality assurance
- Documentation, marketing and community management
- Financial and infrastructural support
- ...

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Open development process

- Informal structure, dependent the community
- Focus on openness
  - Whomever can contribute
  - Influence through merit
  - Self-appointment of tasks
- Traditional development
  - Structured in silos
  - Influence through hierarchy
  - Appointed tasks

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Open development process

- Meaning, you cannot...
  - Expect quick and professional support
  - Expect to get your feature requests implemented
  - Order individuals to act according to your agenda

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Open development process

- Transparent and open discussions on bug reports, features, and road map
- Conversations and information persisted in an open infrastructure
- Requirements fragmented and decentralized in various ”informalisms” (Scacchi), e.g., bug reports, mail threads, code commits, etc.
- Formality typically dependent on corporate interest
- Community full of (un)known stakeholders, all with their own agendas

Photo by Leon | https://unsplash.com/photos/Oalh2MojUuk

Governance for OSS projects

- Means and processes for
  - Deciding on requirements, i.e., the technical direction of the OSS project, and
  - How the collaboration should be coordinated to enable this direction.

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Community Structure and Governance

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Community Structure and Governance

Leadership

Maintainership Maintainership Maintainership

Committers Committers Committers Committers
Committers Committers Committers Committers

Contributors Contributors Contributors Contributors Contributors
Contributors Contributors Contributors Contributors Contributors

Users Users Users Users Users Users Users Users Users Users
Users Users Users Users Users Users Users Users Users

@johanlinaker | https://linaker.se

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Governance structures

- Autocratic governance
  - Centralized steering where roles assignment and influence over development is decided top-down
  - Usually the actor(s) that founded the project
- Democratic governance
  - Decentralized steering where roles assignment and influence over development is decided collectively, and gained through active engagement and contributions
- Transitions and combinations common

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Governance structures

- Centralized governance
  - Formal steering and maintenance through a single or collective organization
  - Commonly pooled ownership of copyright
- Decentralized governance
  - Informal steering and maintenance through existing community
  - Distributed ownership of copyright
- Commonly transitions from decentralized to centralized structure

Photo by Leon | https://unsplash.com/photos/Oalh2MojUuk

Type of community

- Developer-driven community
  - Steering and maintenance typically performed by those who contribute to the development of the project
- User-driven community
  - Steering and maintenance typically performed by the end-users of the project.
  - Development performed through acquired resources

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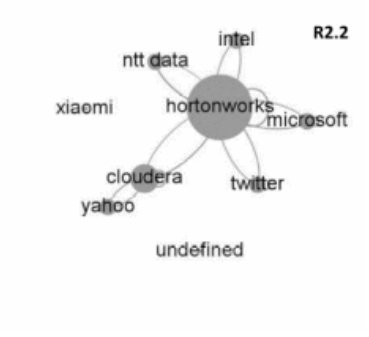
Communities evolve constantly



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Relationship with community

- Symbiotic
  - Win-win for both firm and community
  - Contributing to influence projects according to internal agenda and improve health to mitigate security risks
- Commensalistic
  - Gain for firm, community indifferent
  - Use project and doing lighter contributions. Project in line with internal agenda and healthy with others already supporting it.
- Parasitic
  - Firm free-riding on community.
  - Using as is not giving anything back. Worst case expecting free work for nothing in return. Looked down on from communities.

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OSS Project health

- The OSS project’s capability to stay maintained to a high quality, long-term without interruptions
  - Productivity: There is an active development of the project
  - Robustness: The development is open and spread out on several (independent) individuals
  - Openness: Users of the project can influence and contribute to the development of the project

OSS and our Digital Infrastructure

- Open Source Software makes up a vitale building block in our digital infrastructure
- Needs maintenance as with physical infrastructure to stay secure and robust

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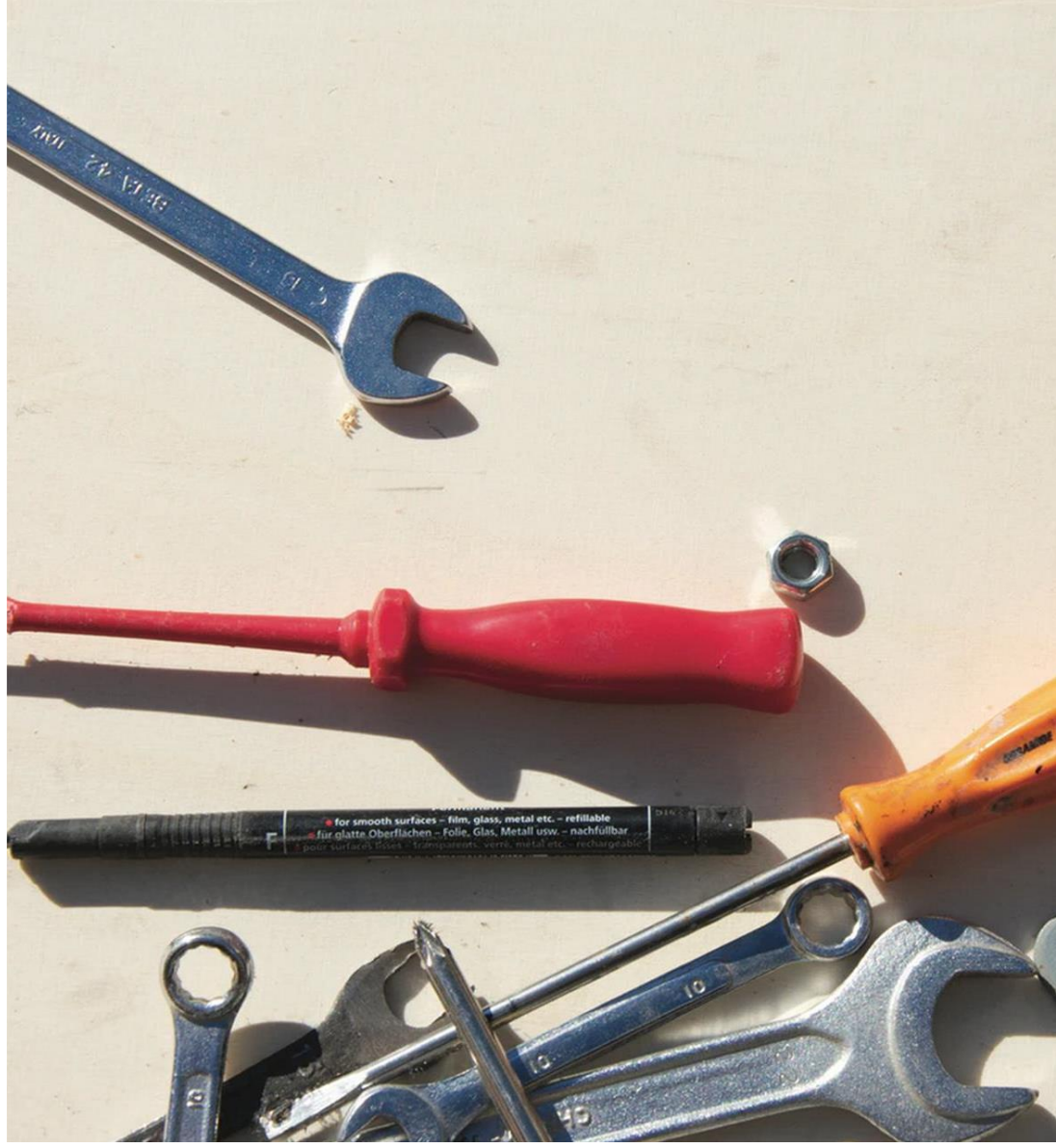
The Dualism of Quality

- Open Source Software is...
  - full of, or receptible to, vulnerabilties ready to be exploite
  - always more secure than proprietary alternatives



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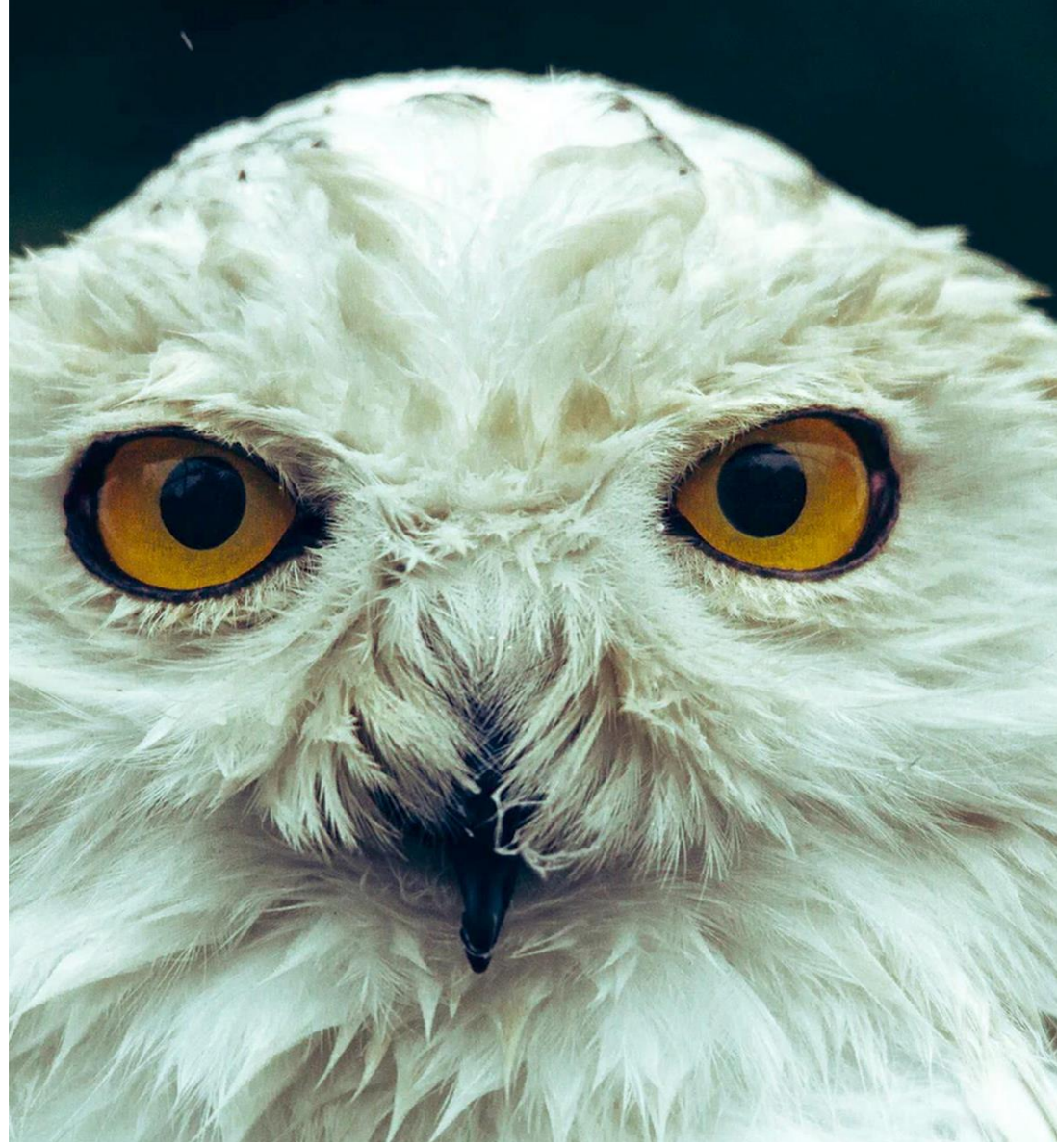
The ”Many-Eyes” effect

- Also known as Linus’ law →
  - ”Given enough eyeballs, all bugs are shallow”
  - Requires that enough eyeballs actually reaches the codebase



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Development Resources are Depletable

- Maintainers are humans, not robots
  - Burnout, changed family or working conditions
- Companies must adapt to stay competitive
  - Refactorization, new products, changed business model

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Who’s responsible for the SW quality?

- Maintainer(s)?
- Developer community?
- User community?
- Individuals vs. Companies vs. Government?

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Importance of growing a healthy community

- Collectively grow and communicate a common vision for the project
- Be responsive and helpful in communication
- Grow an open, inclusive, and supportive culture
- Enable on-boarding and self-support through
  - detailed documentation,
  - standardized tooling
  - clearly defined development and governance processes

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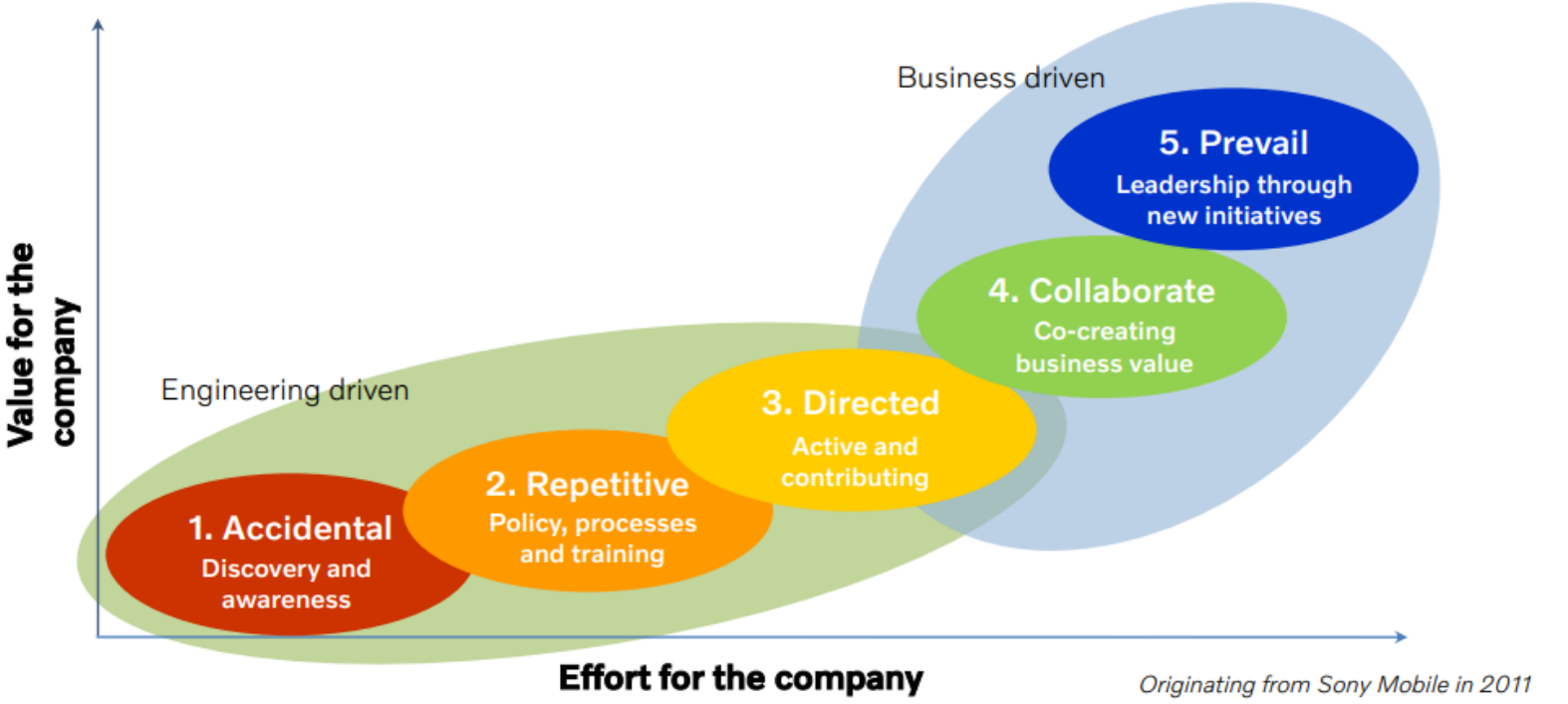
Maturing from consumption to leadership



Originating from Sony Mobile in 2011
/ Adapted by Carl-Eric Mols 2023

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Open Source Program Offices (OSPOs)

- Center of competency and support
- Drives organizational readiness and maturity forward on open source
- Designs and executes an organization’s overarching open source strategy
- Provides voice of reason and objectivity on the benefits, risks, and costs of open source and how to balance between
- Supports use, development, and collaboration on open source

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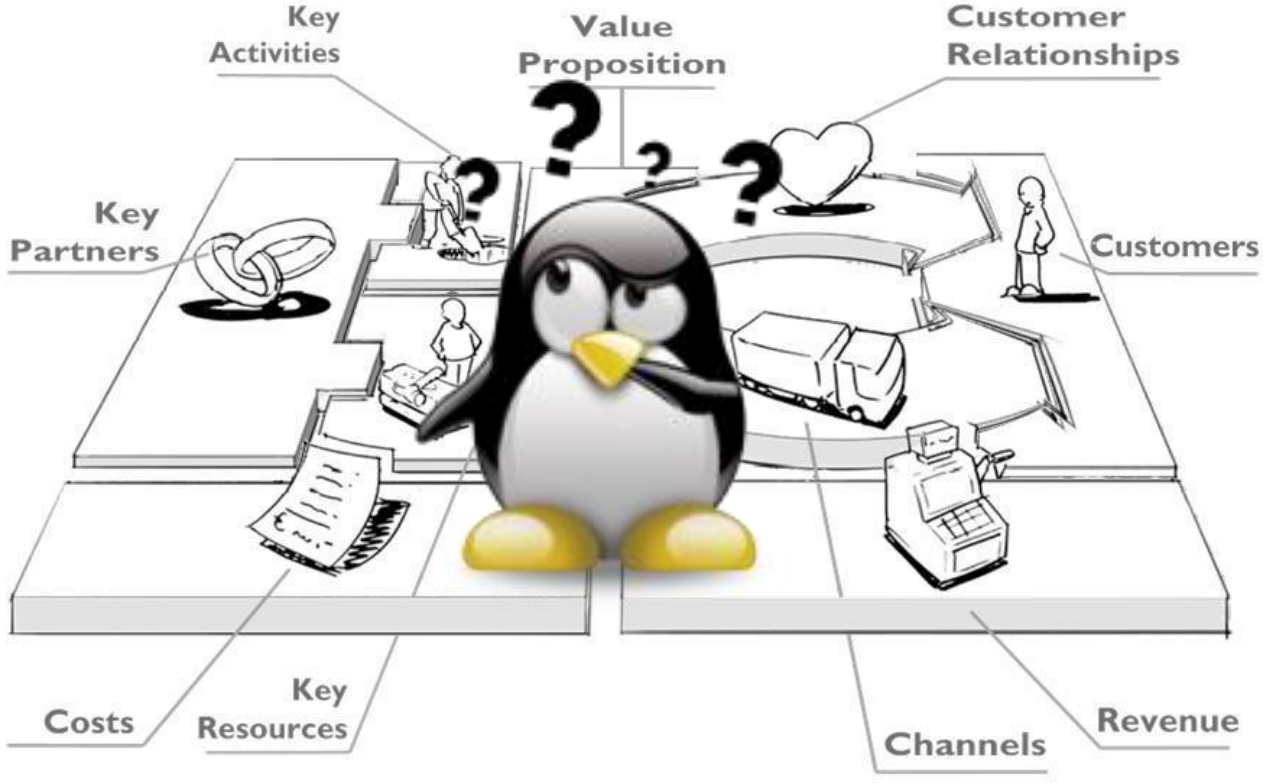
Open Source and Business models



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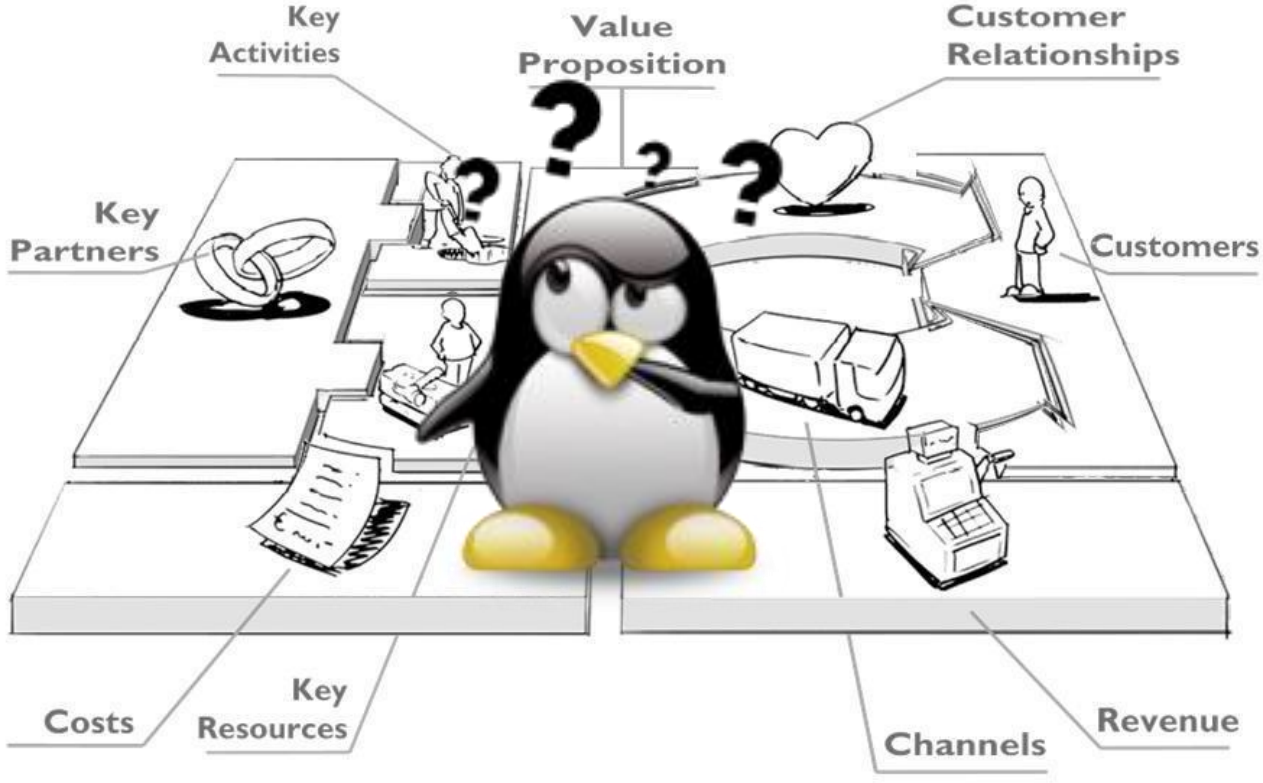
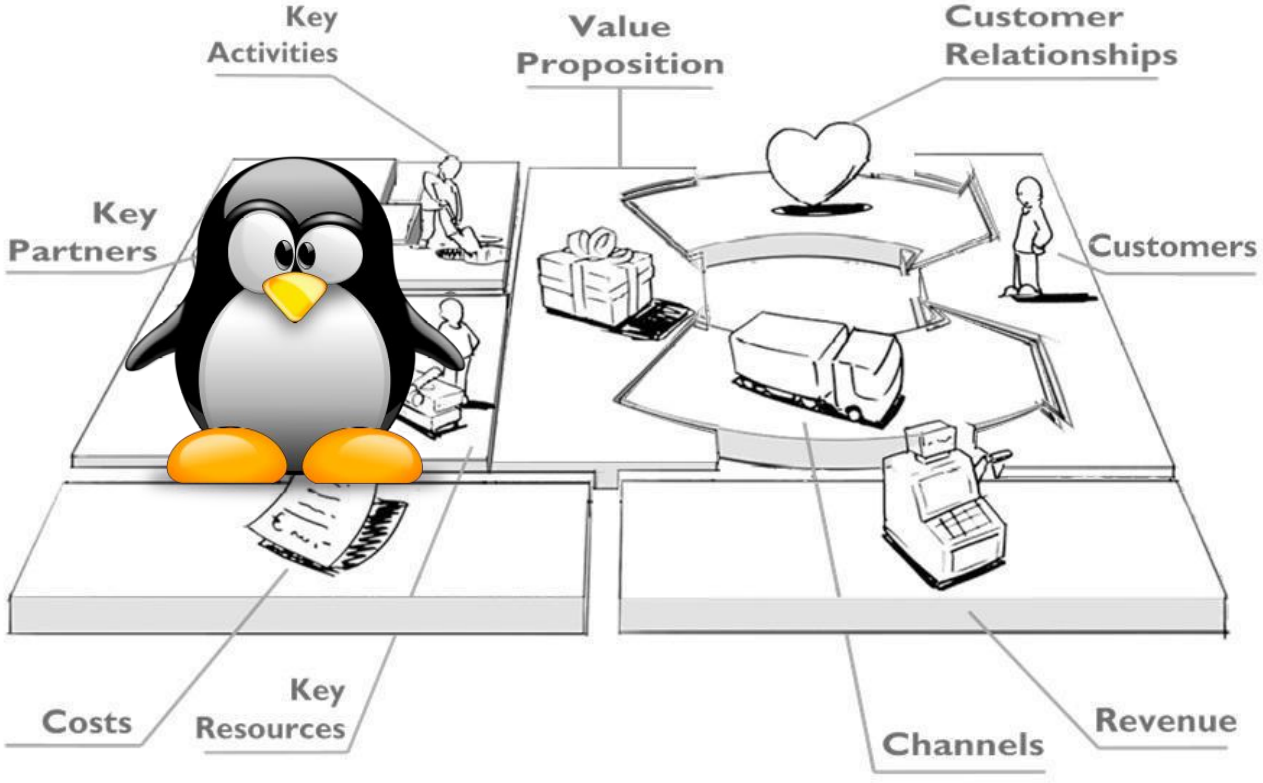
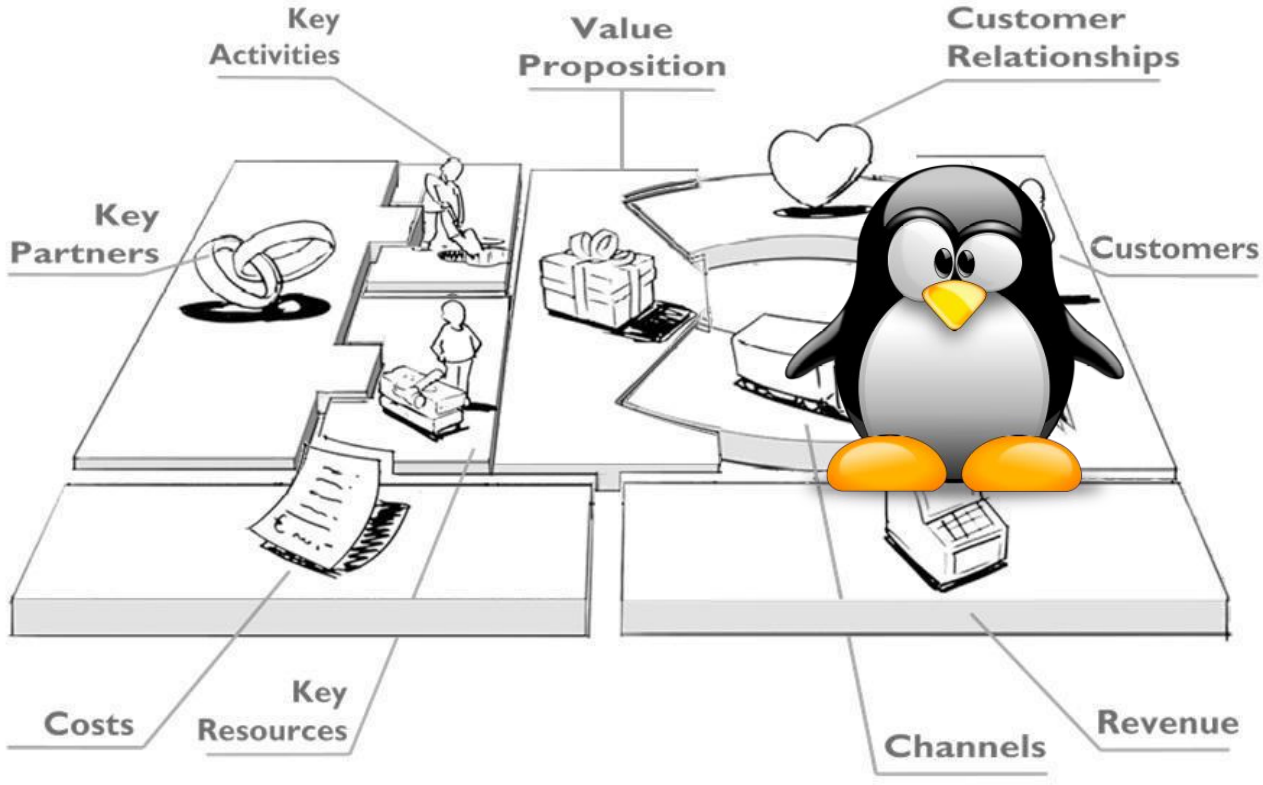
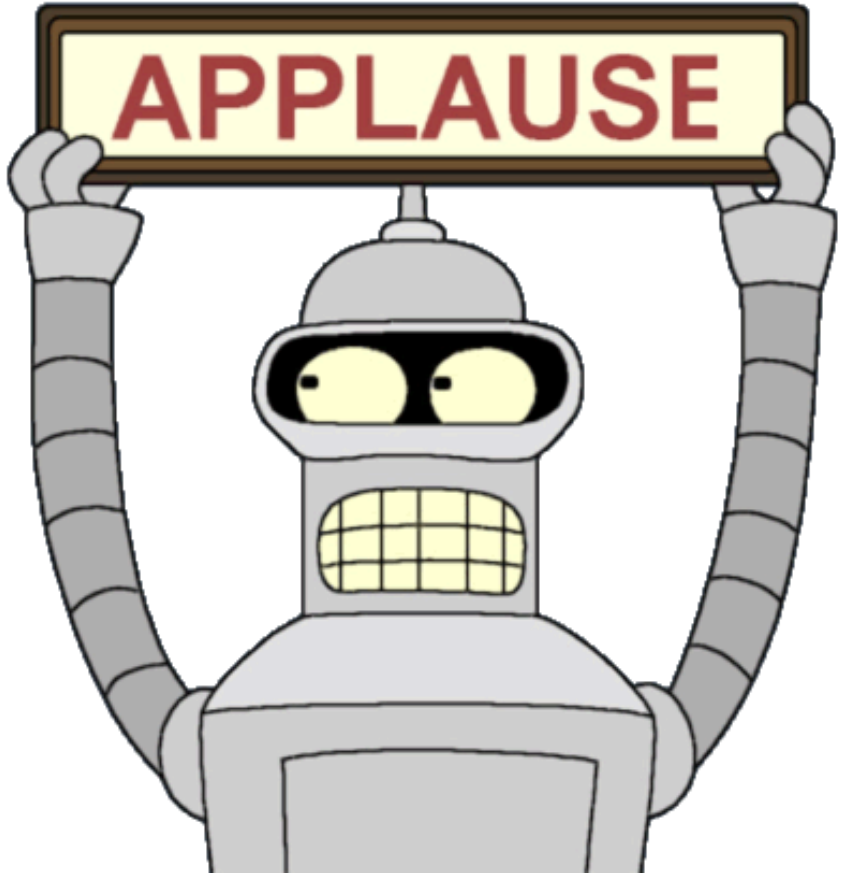


Building block and complement



Distribution, CRM, Sales funnel





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