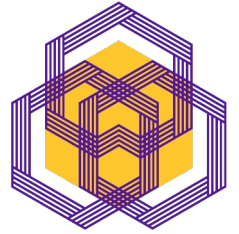


3Os and IP awareness raising for collaborative ecosystems



**ZOOM**

# THE ZOOM FRAMEWORK BUSINESS ASPECTS OF FOSS AND BEYOND

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# OUTLINE

## Introduction

## Case Studies

Cases Academic and Professional Literature

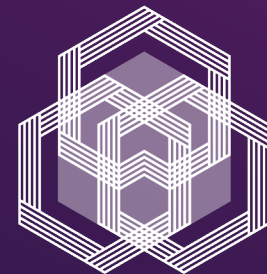
ZOOM Cases

## Interviews Data

Motivations for Engaging in the 3Os

Challenges and Risks

## Business-Legal Framework



**ZOOM**

# INTRODUCTION

59 companies as case studies: **best practices**, **challenges**, and **risks** relating to the 3Os

- **First category**: Literature review to single out companies often cited in management and legal studies
- **Second category**: EU-based companies the activities of which relate to the 3Os

Special attention to emerging technologies: AI, Blockchain, Quantum, Robotics

→ Building a **Legal-Business Framework**

→ Developing a **Toolkit** for companies

# LITERATURE CASE STUDIES

OS	OD	OH	Case	Source
OS		OH	Arduino	Blind, Knut et al. (2021)
OS			Cendio	Dahlander & Magnusson (2008)
OS			CentOS (Red Hat, Linux)	Blind, Knut et al. (2021)
OS		OH	Embedded Linux	Gruber & Henkel (2006)
	OD		ESS-CSDL	Runeson et al. (2021)
	OD		Facebook	Temiz et al. (2022)
	OD		Google	Temiz et al. (2022)
OS			IBM	Watson et al. (2008)
	OD		Jobtech	Runeson et al. (2021)
OS			LibreOffice	Blind, Knut et al. (2021)
		OH	Makerbot	Viseur & Jullien (2022)
OS		OH	MyriadRF	Blind, Knut et al. (2021)

OS	OD	OH	Case	Source
OS			MySQL	Dahlander & Magnusson (2008); Rajala et al. (2012)
OS			Netscape-Mozilla	Dell'Era et al. (2020)
OS			Nextcloud	Blind, Knut et al. (2021)
OS		OH	Open Compute Project (FB)	Blind, Knut et al. (2021)
OS			OpenOSX	Watson et al. (2008)
OS			OpenStack	Teixeira et al. (2015)
	OD		OpenStreetMap	Runeson et al. (2021)
OS			OW2	Blind, Knut et al. (2021)
		OH	Prusa	Viseur & Jullien (2022)
OS			RedHat	Dell'Era et al. (2020); Watson et al. (2008)
		OH	RepRap	Blind, Knut et al. (2021)

OS	OD	OH	Case	Source
	OD		Road Datalab	Runeson et al. (2021)
OS			Roxen	Dahlander & Magnusson (2008)
		OH	SiFive (RISC-V)	Blind, Knut et al. (2021)
OS			Software Heritage	Blind, Knut et al. (2021)
OS			SOT	Dahlander & Magnusson (2008)
		OH	Sparkfun	Li & Seering (2019); Moritz et al. (2016)
	OD		Structural Genomics Consortium	Temiz et al. (2022)
		OH	Ultimaker	Moritz et al. (2016); Viseur & Jullien (2022)
		OH	WhiteRabbit (CERN)	Blind, Knut et al. (2021)
OS	OD		X-Road	Blind, Knut et al. (2021)
OS			Yocto (Red Hat, Linux)	Blind, Knut et al. (2021)

# ZOOM CASE STUDIES

OS	OD	OH	Case	AI	BC	QN	RB
OS			Alps Blockchain (Italy)		BC		
OS			Atuin Media (Austria)	AI			
OS			Blumatix (Austria)	AI			
OS	OD		Cognify (Austria)	AI			
OS	OD	OH	Company X (anonymized, Switzerland)				RB
OS			Company Y (anonymized, Italy)		BC		
OS	OD		Datafund (Slovenia)	AI	BC		
OS	OD		Dedagroup (Italy)				
OS	OD		Georesearch (Austria)	AI			
OS			lovavum (Austria)	AI			
OS			Nethesis (Italy)	AI			
OS			Notarify (Italy)	AI	BC		
OS	OD		Openmove (Italy)				

OS	OD	OH	Case	AI	BC	QN	RB
OS			Pimcore (Austria)				
OS			Polycular (Austria)				
OS	OD		Propertune (Finland)	AI			
OS			Qt Group (Finland)	AI			
OS	OD		Quanscient (Finland)	AI		QN	
OS	OD		Semantum (Finland)	AI			
OS			Solbytech (Austria)				
OS			Sproof (Austria)				
OS	OD		Src (Slovenia)	AI			
		OH	ThinkIn (Italy)	AI			
OS	OD		U-Hopper (Italy)	AI			
OS			Wurth Phoenix (Italy)				

**OS:** Free/Open-source Software  
**OD:** Open Data  
**OH:** Open Hardware  
**AI:** Artificial Intelligence / Machine Learning  
**BC:** Blockchain  
**QN:** Quantum  
**RB:** Robotics

Among 25 companies:

- 4 large organizations
- 13 SME's
- 8 micro/startups

# INTERVIEWS DATA

In-depth **interviews with 25 companies**:

- role of 3Os in activities and value creation/capture
- company's approach to IP management
- motivations for adoption of/contribution to 3Os
- challenges, risks, and opportunities
- role in their ecosystem

3Os: A powerful force driving **competitive advantage** and **innovation**

**Social & Ethical motivations**: In some cases, prioritized over the “make-profit” imperative  
→ emergence of new ways of doing business

# MOTIVATIONS: SOCIAL & ETHICAL ASPECTS

**Security:** Community-reviewed solutions are perceived as more secure and reliable, offering them greater confidence in the integrity of their products

**Social value:** Open source is not merely a pragmatic choice but “a cultural one”, which reflects a set of values (**transparency, collaboration, democratization of knowledge**)

**Reciprocity:** Contributing to open assets is appealing to give something back to the community

→ **Branding effects:** Companies that align themselves with these values are better positioned to attract consumers who prioritize **social responsibility** and **sustainability**

# MOTIVATIONS: STRATEGIC ADVANTAGES

**Standardization & Flexibility:** Open-source solutions are well-suited for **customization**. Companies can adapt them to their specific needs and interfaces. This accelerates **innovation** and **responsiveness** to market demands

**Collective Intelligence:** External developers/contributors become virtual extensions of the company's R&D team, **enhancing code quality**, addressing bugs, and improving OSS. Exposure to the latest developments and emerging trends

**Indirect Value-capture Mechanisms:** Contributions to open-source projects (plugins, tools, data formats) **set the stage for future services**. E.g., companies providing OSS and OD services for the Pas: improve existing platforms for the potential that this will have for future projects, rather than for immediate economic possibilities



# MOTIVATIONS: FINANCIAL ASPECTS

**Costs Saving:** Open-source enables companies to tap into a vast repository of ready-to-use solutions, thereby bypassing the **resource-intensive** path of developing products **from scratch**

**Avoiding Vendor lock-in**, i.e., the dependence on a single vendor's proprietary solutions which can limit innovation and flexibility

- Businesses can customize and extend their offer, avoiding reliance on one vendor
- Customers can switch vendors, integrate third-party offerings, avoid services interruption

# CHALLENGES AND RISKS

Businesses must navigate a variety of challenges at both legal and economic levels:

**Intricate Value-capture Dynamics:** Compared with proprietary solutions, 3Os often lack ad-hoc assistance (concerns about the availability of dedicated support when critical issues arise)

**Influence of Major Players:** In industries where proprietary models dominate, transitioning to open source can disrupt established value chains and revenue streams. E.g.,

- Additive manufacturing: shift toward open source can disrupt the intricate network of raw material suppliers and software vendors that drive revenue
- Big firms (e.g., Microsoft, IBM, Amazon) and influential organizations (FSFE, Apache) can **direct software developments in specific directions**. Small companies need to evaluate risk of engaging in a community or refocusing their attention on different projects

# CHALLENGES AND RISKS

**Security Concerns:** Open source is often valued for its community scrutiny to mitigate vulnerabilities, but the diverse codebase of open-source projects can harbor security gaps

**Communicating Open Source:** Challenging to convince customers of the value of open source when free alternatives exist:

- Overcoming the perception that open-source equates to “free”: businesses need to effectively communicate the value, security, and support that open-source provides
- OSS can be perceived by customers as risky in terms of lock-in with their company (little awareness of lock-in effects with proprietary software)

**Community Management:** Companies may become reliant on services provided by the community, exposing them to risks if these services are disrupted or discontinued

# BUSINESS-LEGAL FRAMEWORK

ZOOM organized **legal**, **economic**, and **social** aspects in a comprehensive framework

→ Intersection between such aspects in the “**journey**” of a company at different stages of development, depending also on its **structural characteristics** and internal organization

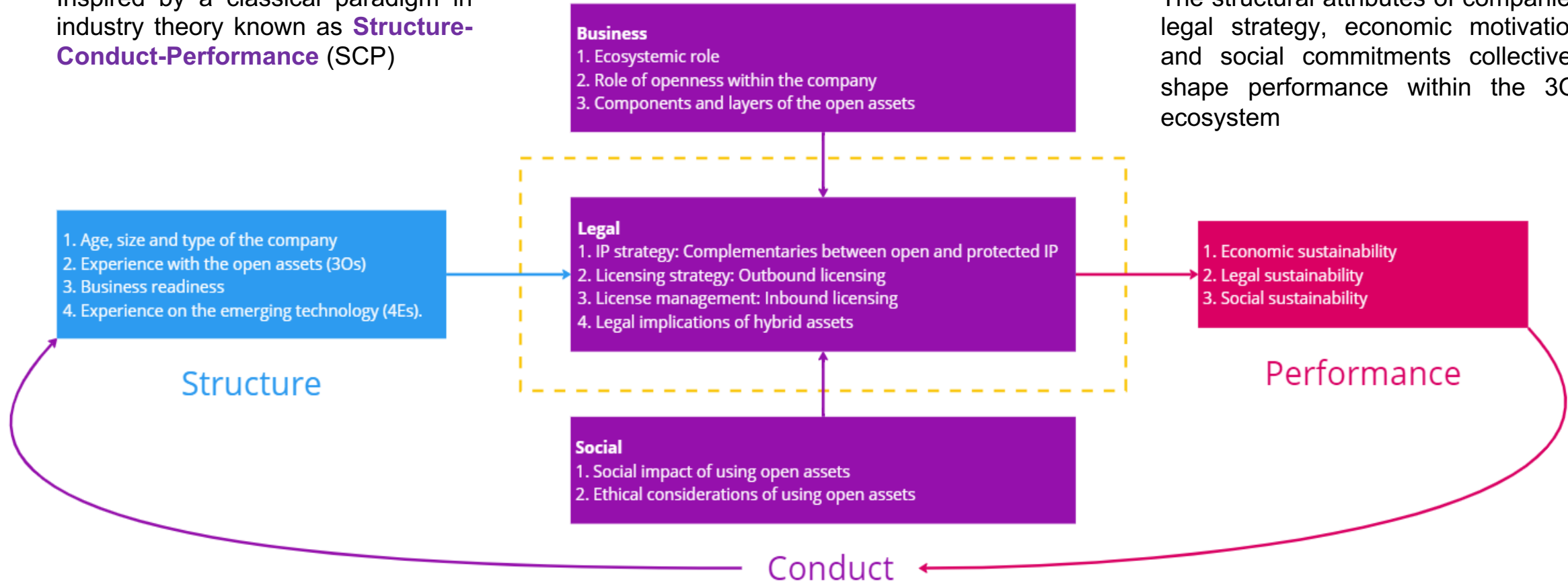
**Key questions** that stakeholders need to consider in the use of the 3Os:

- How to create/capture value from OSS, OH, and OD?
- How to manage IP given the business aims of a company, in relation to both the technologies developed by others and the company’s own products?
- What are the OSS-OD-OH interactions (peculiarities, differences, complementarities)?

# ZOOM Licensing framework

Inspired by a classical paradigm in industry theory known as **Structure-Conduct-Performance (SCP)**

The structural attributes of companies, legal strategy, economic motivation, and social commitments collectively shape performance within the 3Os ecosystem





**THANK YOU FOR LISTENING!**