

How to model fair ecosystems?

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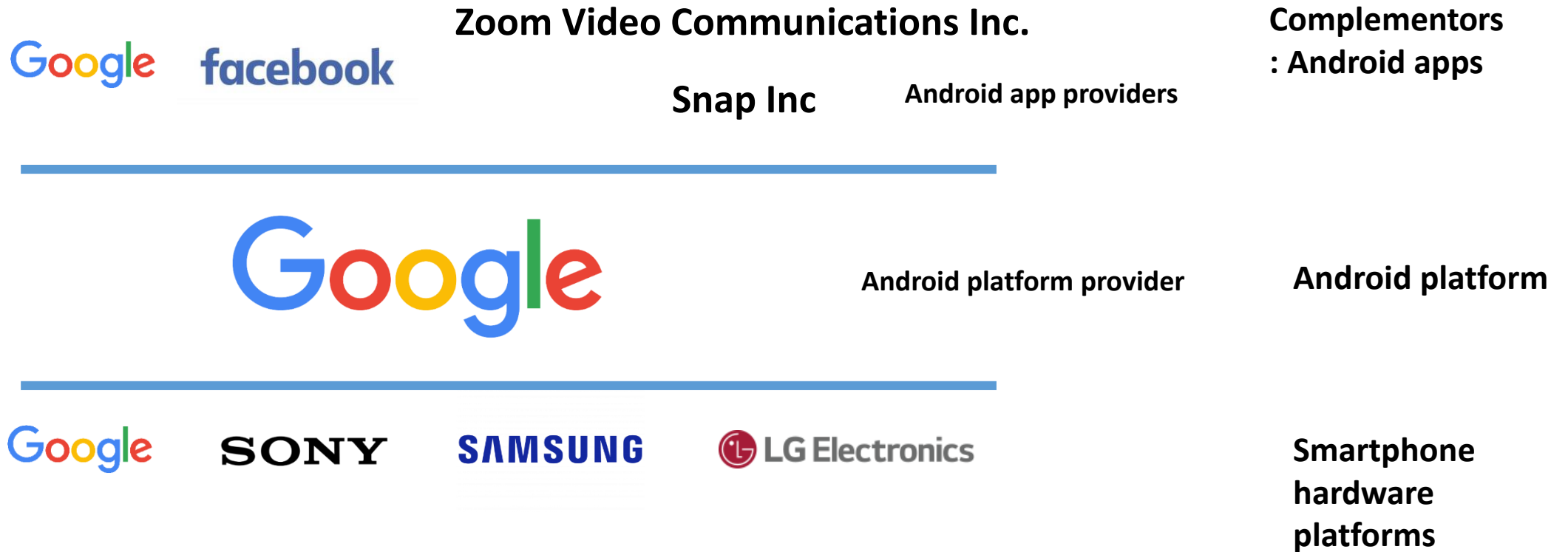
Ecosystems are ...

- An **ecosystem** is system of economic actors that **depend** on each other for their **economic survival and well-being**.
- Examples
 - Apple iOS ecosystem
 - Hardware OEMs (Foxconn), Back-end providers (e.g. SAP), developers, media industry, retail partners, official accessories manufacturers, Apple users, Apple user groups, competitors (e.g. Microsoft, Google), schools & universities, governments, the EU, regulators, ...
 - Automobile ecosystem
 - Car manufacturers, component manufacturers, oil companies, governments, road infrastructure, petrol stations, repair shops, retailers, second-hand dealers, driver interest groups, manufacturing organizations, lobbyists, regulators, standardization organizations, ...
- Often, the notion of '**digital ecosystem**' is used. In such an ecosystem, the **process** of selling and/or delivering products/services is (partly) digitized, and/or the **products/services themselves** are intrinsically digital.

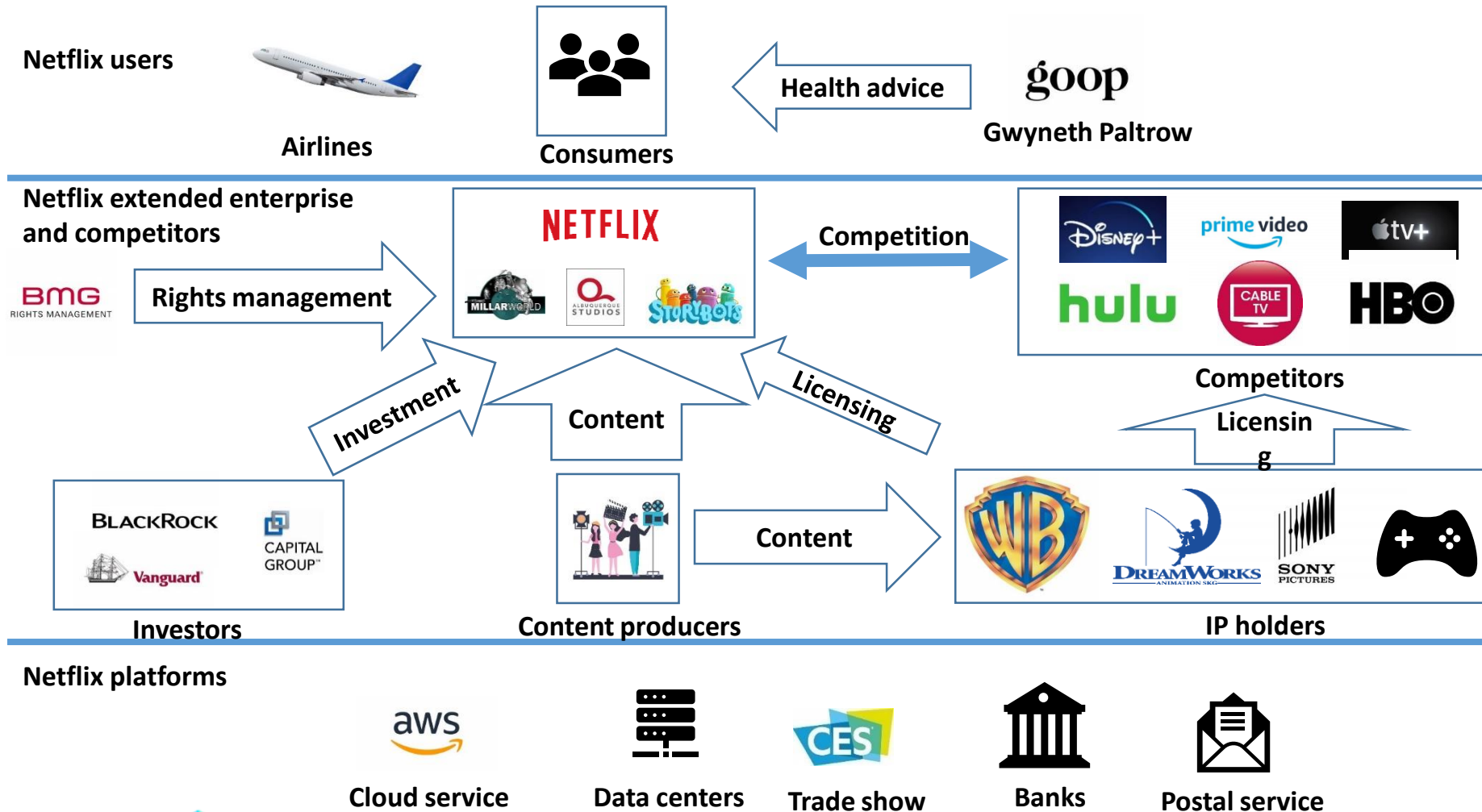
Platforms are ...

- A **platform** is an **infrastructure** for actors in an ecosystem.
- The actors using the platform are called its **complementors**
- Digital platforms have two kinds of functions
 - **Abstraction**: Provide an abstraction layer on top of which ecosystem actors can define useful services
 - E.g. operating systems, game platforms.
 - **Interaction**: provide mechanisms for communication and interaction among ecosystem actors.
 - E.g. social media, app stores.
- A platform is a **specific case** of an ecosystem

The Android platform



The Netflix platform

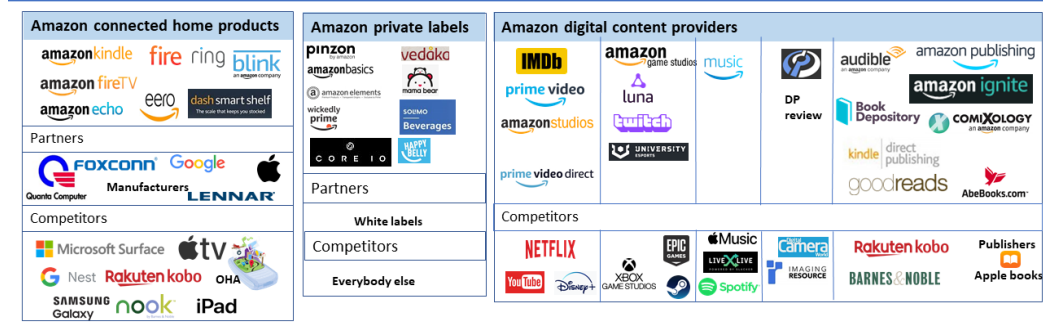


What is precisely the problem with these platforms?

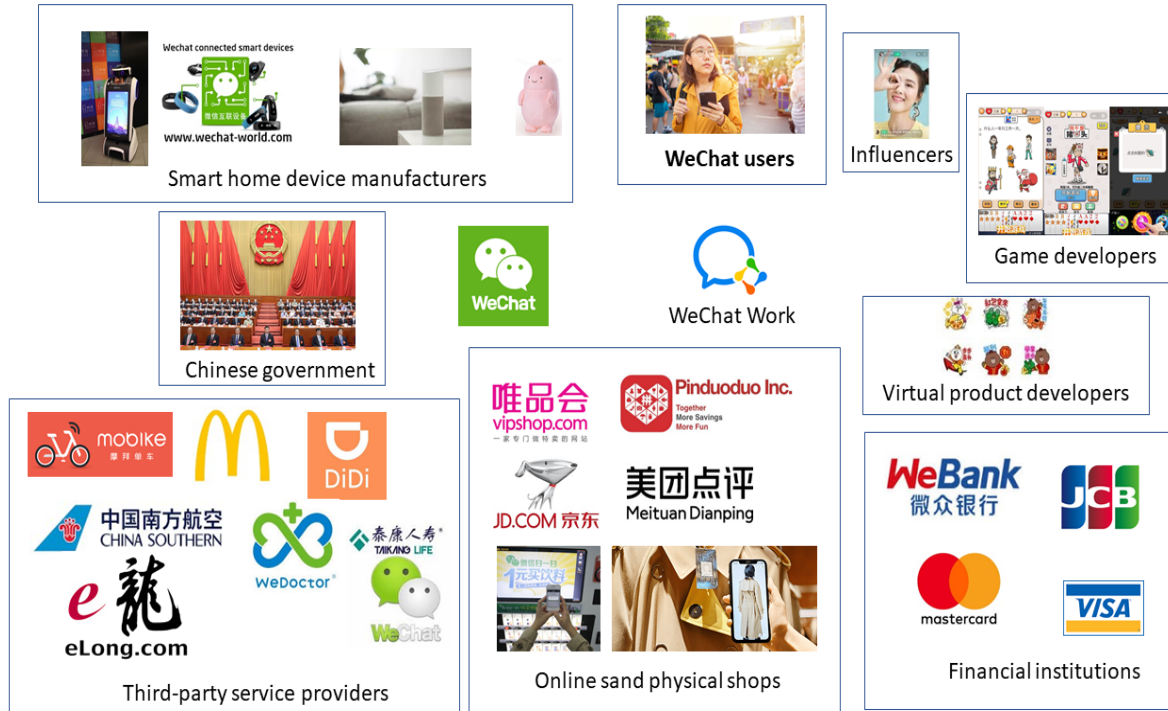
The Amazon ecosystem

- This is only the tip of the ice-berg of the Amazon imperium!

Source: Roel Wieringa.
<https://www.thevalueengineers.nl/download/the-amazon-ecosystem-and-its-business-models/>



The We-chat ecosystem

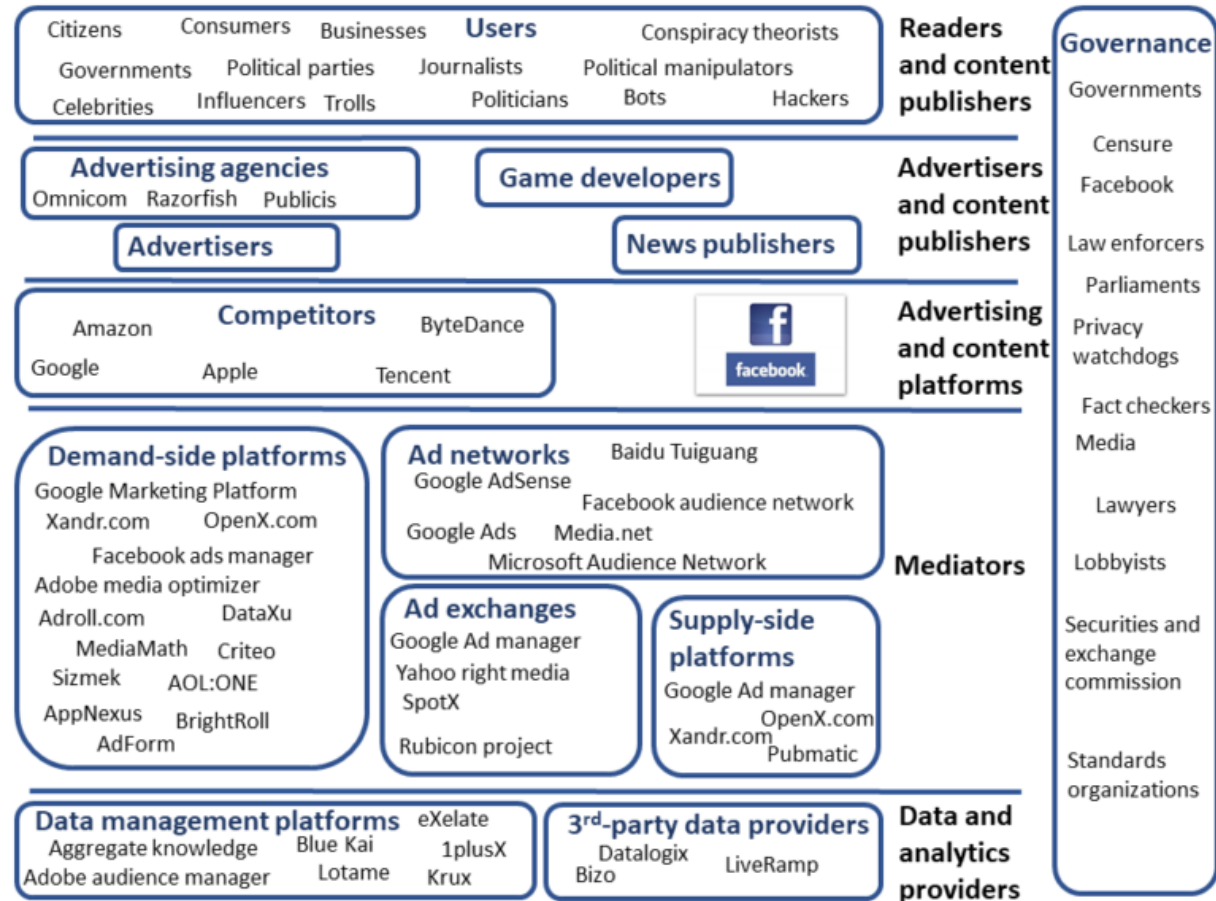


Source: Roel Wieringa.
<https://www.thevalueengineers.nl/download/the-business-models-of-wechat/>



The Facebook ecosystem

- Excluding other initiatives such as the Libra



Source: Roel Wieringa
<https://www.thevalueengineers.nl/a-business-model-of-the-facebook-ecosystem/>

There is a pattern ...

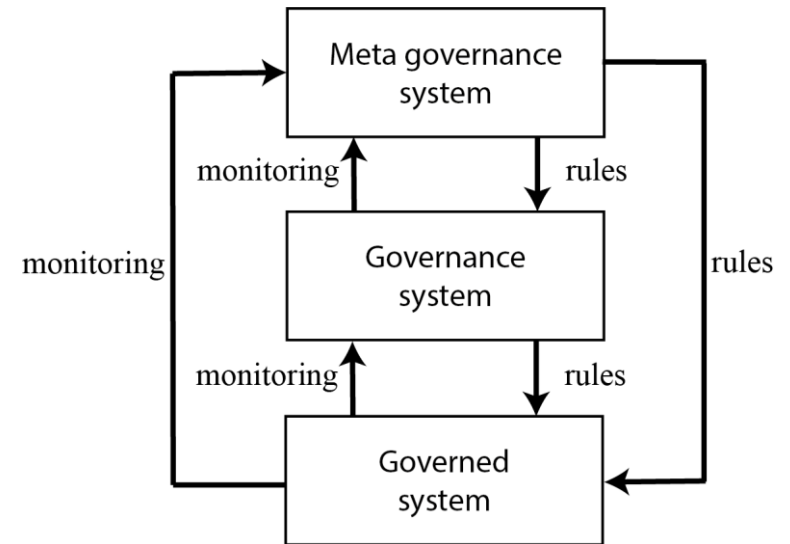
- The platform/ecosystem is **dominated** by one party: Amazon, Google, Apple, Facebook, Netflix, Spotify, WeChat, Uber, Airbnb, Booking.com, We call this **centralized ecosystems** (monopolistic orientation)
- Often, **substantial investments** are needed upfront to create the market and to increase market share
 - Initially, Uber subsidized taxi-rides to create a pool of taxi-drivers and potential customers
 - Netflix heavily **invests** in television production to remain attractive (e.g. in comparison to Disney)
- Often, offering of services/products for very competitive prices to gain market share, while **increasing prices** once substantial market share is achieved
- Often, **very high profit margins** (> 30 %) for the dominating actor
- Often **unfair treatment** of other parties in the ecosystem:
 - **US workers continue unionization fight – but will Amazon prevail?** (The Guardian, May 9th, 2021)
 - **Uber 'willing to change' as drivers get minimum wage, holiday pay and pensions** (bbc.com, March 17th, 2021)
 - **Booking.com adjusted bonus rules for millions in reward top** (Netherland News Live, May 27th, 2021)
 - **Facebook sued over Cambridge Analytica data scandal** (bbc.com, October 28th, 2020)
- Centralized ecosystems lead to **value-extraction** (exceptional high revenue in relation to the provided service) and/or **digital colonialism**

About fairness

- Centralized ecosystems lead very often to **unfair treatment** of parties in the ecosystem:
 - Employees (low wages, bad labor conditions)
 - Suppliers (low prices)
 - Customers (high prices)
 - Countries/continents (tax avoidance, pollution)
- This is, from a societal perspective, not desirable
- **Fining** (EU commission) is a **short-term** approach; better is to **build-in fairness** in ecosystems by design
- There is a need for **fair ecosystems**, and corresponding technological solutions, cf. the original ideas of the inventors of the Internet

How to establish fair ecosystems: Via fair governance

- **Governance:** ‘the set of rules a system has to obey, and which are set by another system’
See “Exploring governance in a decentralized energy trading eco-system”, Fadime Kaya, Jaap Gordijn, Roel Wieringa, Marc Makkes. 2020 Proceedings of the 33RD BLED e-conference.
- A system can be **operationalized** as a person, a group, a company, ... , or an ecosystem
 - *Governed* system: The electricity energy ecosystem
 - *Goverance* ecosystem: The (EU) parlement which imposes rules and regulation regarding (green) energy)
 - *Meta goverance* ecosystem: In a democracy: citizens who vote for a representative in the parlement



- Assumption 1: Ecosystems with a **fair governance system** result in **fair governed system** too
 - Governance in ecosystems: “**The set of rules an ecosystem has to obey, and which are set by another ecosystem**”

How to establish fair governance: Via *decentralized* governance

- Many platforms are **very centrally led** platforms
 - Amazon, Uber, Google, AirBnb, NetFlix, Spotify.
 - By **concentrating** decision power **value extraction** becomes possible (charging an unreasonable high compensation for services)
 - There are also **counter examples**: National Healthcare System (NHS) in the UK, Transmission System Operator (TSO), Music Intellectual Property Clearing in NL; However, all these examples are subject to strong government regulation
 - Platforms, and specifically **decision power** (governance!) should **decentralized**; to create a balance of powers, e.g. by conflicts of interest, decision procedures, etc.
 - **Crypto's** (although, ..., to be discussed)
 - Blockchains with **on-chain governance**: Tezos
 - **Decentralizes Autonomous Organizations** (DOAs): Uniswap (exchange), LoA (venture capital)
 - Counter examples: Bitcoin? Downloading music via peer-to-peer networks? Fake news?
- Assumption 2: **Fair governance can be accomplished by decentralized governance ecosystems**
 - Perhaps: there are other ways, and it is not a guarantee. But it might help

How to realize decentralized *fair* governance in ecosystems

- Fairness in decentralized governance [1,2]:
 - Fair governance requires active **participation** in the **decision-making** process of all who are affected and other interested parties
 - All participants should be treated equally and fairly by obeying the **rule of law**
 - Fair governance fulfils societal needs by incorporating **effectiveness** while utilizing the available resources **efficiently**
 - Information on matters that affect their participants and whom they may concern must be **freely, transparently, available** and **accessible**.

[1] Graham, J., Plumptre, T., Amos, B., on Governance, I., Canada, P.: Principles for Good Governance in the 21st Century. Policy brief. Institute on Governance(2003)

[2] Sheng, Y.: What is good governance (2009) United Nations Economic and Social Commission for Asia and the Pacific.

How to realize decentralized *fair* governance in ecosystems cont'd

- Fairness in decentralized governance:
 - A **responsive** fair governance structure reacts appropriately and within a reasonable time frame towards its participants.
 - Fair governance considers the different participants' viewpoints to reach **consensus**
 - **Participants** are accountable for their actions

Some examples of so-called 'fair' ecosystems

- Bitcoin
- Ethereum
- Tezos

- Are they **really** fair?
- Answered by means of **model-based analysis** of their governance processes
 - Note: These models did not exist on beforehand and were constructed using informal documents, discussion groups, etc.



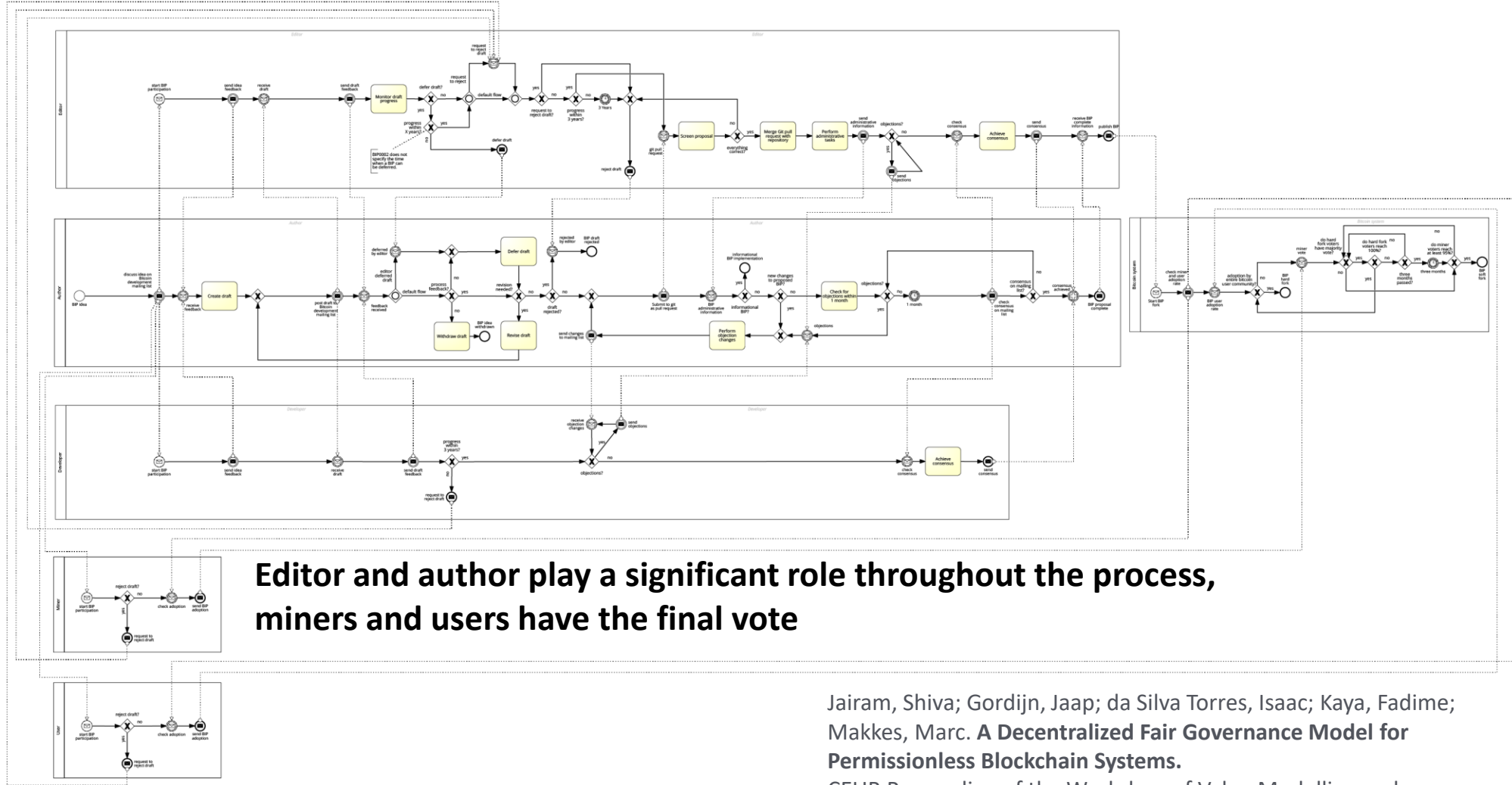
Editor

Author

Developer

Miner

User

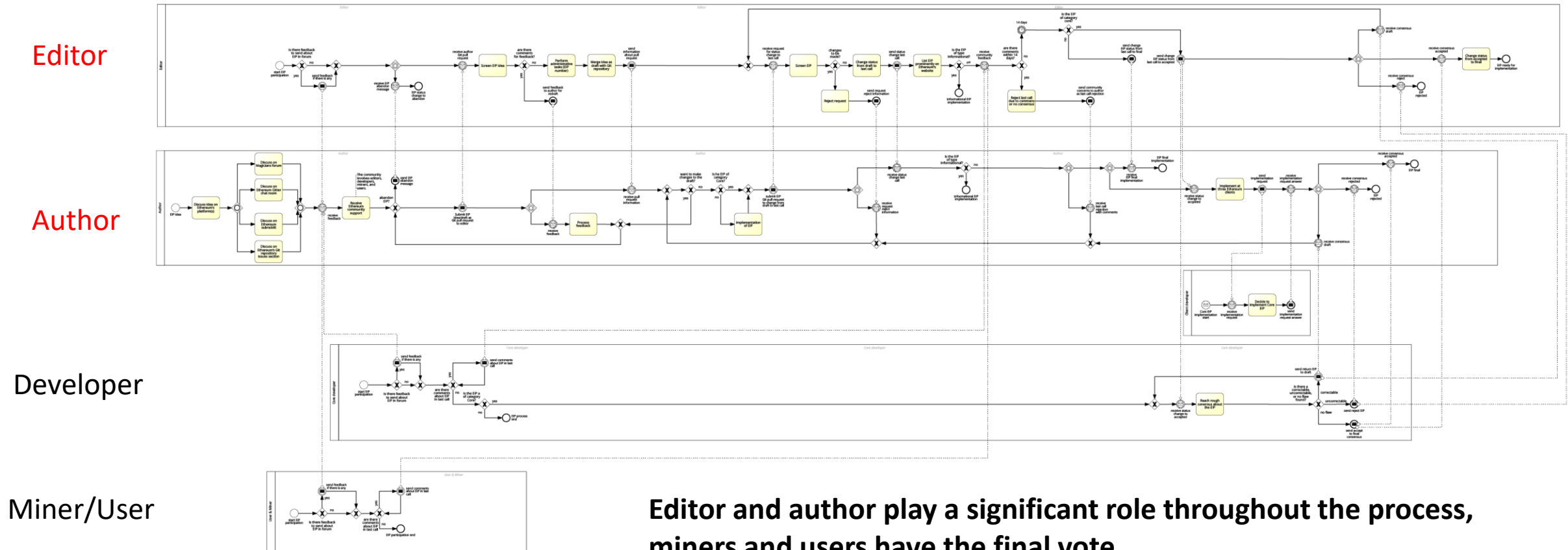


Editor and author play a significant role throughout the process, miners and users have the final vote

Jairam, Shiva; Gordijn, Jaap; da Silva Torres, Isaac; Kaya, Fadime; Makkes, Marc. **A Decentralized Fair Governance Model for Permissionless Blockchain Systems.** CEUR Proceeding of the Workshop of Value Modelling and Business Ontologies, vol. 2835, CEUR, 2021.

Ethereum:

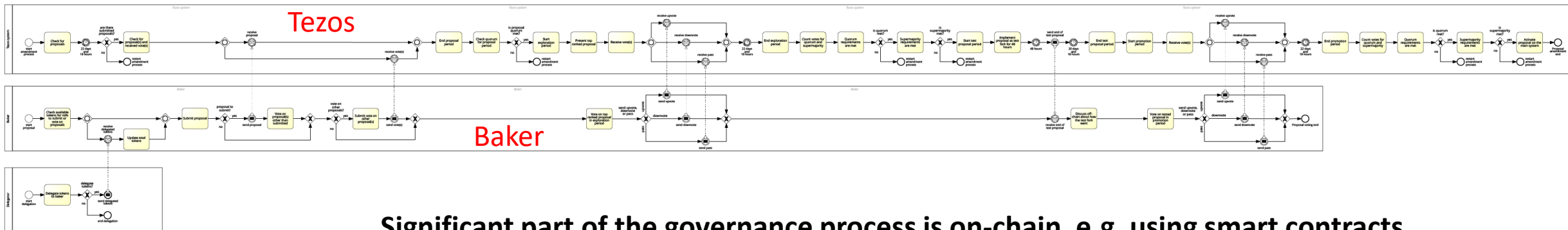
Ethereum EIP Process



Editor and author play a significant role throughout the process, miners and users have the final vote

Tezos

Tezos Amendment Process



Delegator

**Significant part of the governance process is on-chain, e.g. using smart contracts.
But: Who decides on the smart contracts that implement governance?**

Jairam, Shiva; Gordijn, Jaap; da Silva Torres, Isaac; Kaya, Fadime; Makkes, Marc. **A Decentralized Fair Governance Model for Permissionless Blockchain Systems.** CEUR Proceeding of the Workshop of Value Modelling and Business Ontologies, vol. 2835, CEUR, 2021.

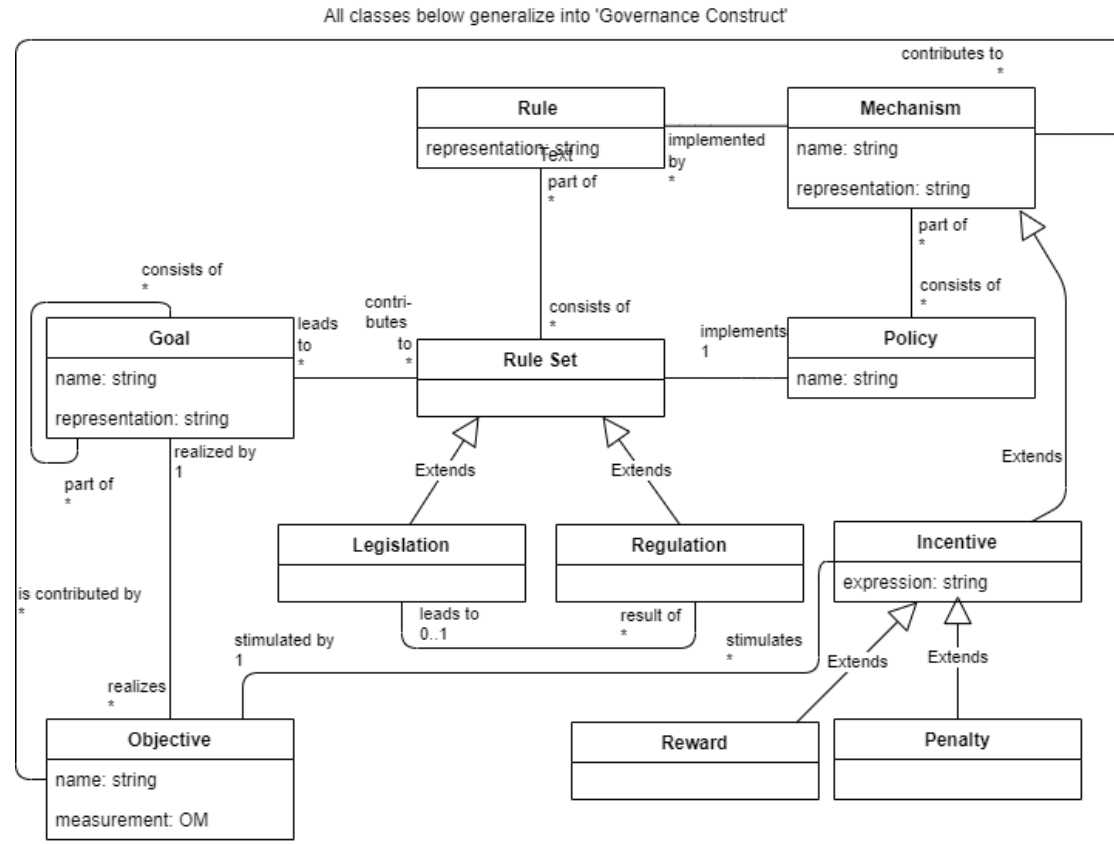
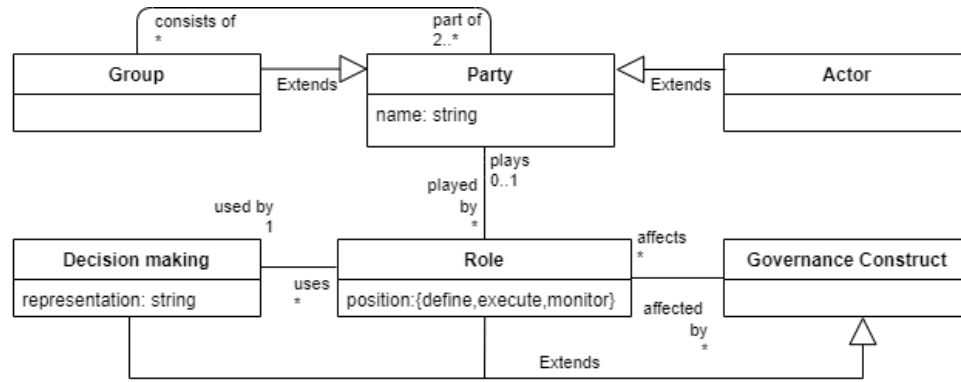
Fairness of governance in Bitcoin, Ethereum and Tezo

	Bitcoin	Ethereum	Tezos
Participation	All parties can have a role, although not equally important	Not all participants are actively involved in the governance process	Only bakers (miners) are admitted to taking an active role in the governance process.
Rule of law	BIP 0001/0002	EIP 1	Goodman, L. M. (2014). Tezos—a self-amending crypto-ledger
Effectiveness & Efficiency	Forks (that really happen) demonstrate lack of effectiveness	Forks (that really happen) demonstrate lack of effectiveness	Emphasis on fork avoidance
Transparency	BIP mechanism offers some form of transparency	EIP mechanism offers some form of transparency	Amendment is fully transparent
Responsiveness	Significant parts of the BIP process lacks time constraints	Significant parts of the EIP process lacks time constraints	Significant parts of the EIP process lacks time constraints
Consensus-oriented	Voting for forks	Voting by a restricted number of actors	Voting by a restricted number of actors
Accountability	Miners are accountable for protocol changes	Only a restricted group is accountable	Only a restricted group is accountable

Bonus: Conceptualizing decentralized governance (DECENT)

- What is needed is:
 - a **conceptualization** and
 - **machine processable** formalization
 - of the notion of **decentralized governance**
 - such that governance can be performed by an **independent yet not centralized party** in a **computational way**: The ecosystem as first class citizen.
- This precisely the long term goal of the DECENT ontology

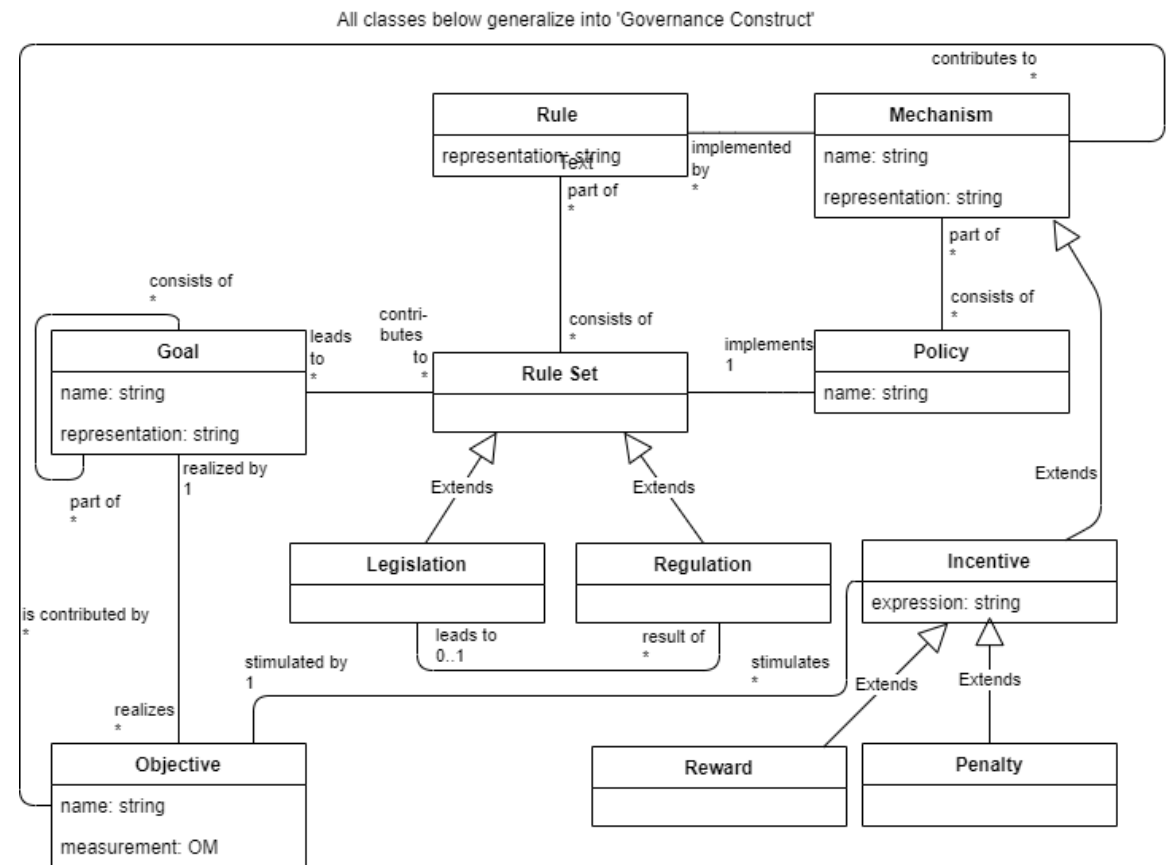
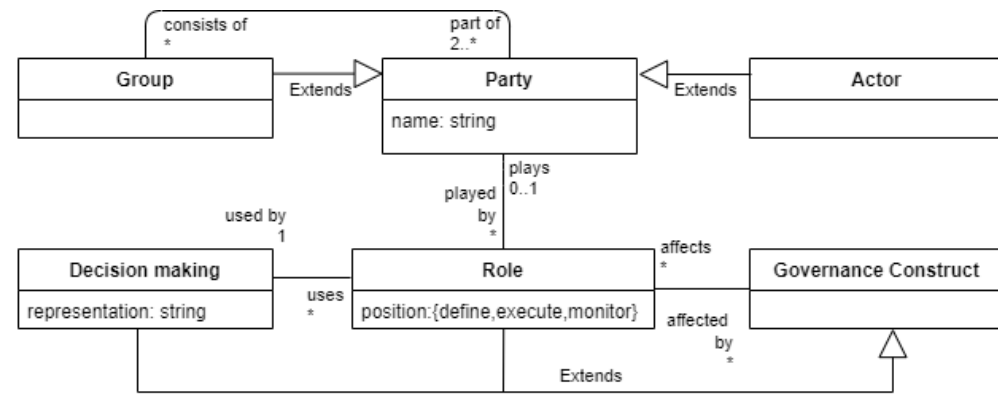
The DECENT ontology



Source: Kaya, Fadime; Gordijn, Jaap
DECENT: An Ontology for Decentralized Governance in the Renewable Energy Sector
 In: Almeida, Joao Paulo A.; Guizzardi, Giancarlo; Montali, Marco; Proper, Henderik A. (Ed.): Proceedings - 2021 IEEE 23rd Conference on Business Informatics, CBI 2021, pp. 11-20, IEEE, 2021.

Example: Meta governance

- Voters (**group**), namely all citizens (**actors**) of a country monitor (**role: 'define'**) CO2 reduction (**goal**) of x ton/year (**objective**)
- Voters (**group**) appoint (**role: 'define'**) parliament (**group**) members (**actor**) to define and (**role**) a law (**legislation**) with the obligation (**rule**) to reduce CO2 emission reduction (**goal**) of x ton)/year) with subsidies (**reward**) and fines (**penalty**)



In conclusion ...

- The current, well-known, **centralized platforms show value extraction** and other societal misbehaviour
- Fining is only part of the solution; better to include **fairness by design** in an ecosystem
- This requires **a notion of fairness**
- Fairness can be reached by **balancing power** in an ecosystem, by means of **decentralized fair governance of ecosystems**
- Many decentralized ecosystems, such as **Bitcoin** and **Ethereum** are **not really fair**
- Fair blockchain decentralized governance can be supported by **on-chain implementation**
- This requires a **sound understanding** of the concept of **decentralized fair governance**, which is the aim of the **DECENT ontology**

More information

- <https://www.dise-lab.nl/>
- <https://www.thevalueengineers.nl/>