



HAL
open science

ERASMUS+ Chaise project - Module 2: Regulation, legal aspects and governance of Blockchain systems - Lecture 5: Blockchain governance

Frédérique Biennier

► To cite this version:

Frédérique Biennier. ERASMUS+ Chaise project - Module 2: Regulation, legal aspects and governance of Blockchain systems - Lecture 5: Blockchain governance. INSA Lyon; LIRIS - Laboratoire d'InfoRmatique en Image et Systèmes d'information. 2022, pp.37. hal-04915310

HAL Id: hal-04915310

<https://hal.science/hal-04915310v1>

Submitted on 27 Jan 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0
International License

Module 2: Regulation, legal aspects and governance of Blockchain systems

Lecture 5: Blockchain governance

Frédérique BIENNIER

Univ Lyon, INSA Lyon, CNRS, UCBL, Centrale Lyon, Univ Lyon 2, LIRIS, UMR5205, F-69621 Villeurbanne, France



TABLE OF CONTENTS

1	INTRODUCTORY PARAGRAPH	3
2	LECTURE NOTES	4
2.1	GOVERNANCE AND REGULATION: KEY CONCEPTS AND REQUIREMENTS	ERREUR ! SIGNET NON DÉFINI.
2.1.1	<i>Key definitions.....</i>	Erreur ! Signet non défini.
2.1.2	<i>Blockchain context</i>	Erreur ! Signet non défini.
2.1.3	<i>Regulation requirements</i>	Erreur ! Signet non défini.
2.2	COLLABORATIVE DISTRIBUTED ORGANISATIONS	ERREUR ! SIGNET NON DÉFINI.
2.2.1	<i>Collaborative and distributed organisation: key models</i>	Erreur ! Signet non défini.
2.2.2	<i>Governance and regulation requirements</i>	Erreur ! Signet non défini.
2.3	TRANSACTIONS-BASED MODELS	ERREUR ! SIGNET NON DÉFINI.
2.3.1	<i>Key definitions.....</i>	Erreur ! Signet non défini.
2.3.2	<i>Agreements in a blockchain context</i>	Erreur ! Signet non défini.
2.4	CONCLUSION	ERREUR ! SIGNET NON DÉFINI.
3	PRACTICAL EXERCISES	15
4	CASE STUDIES.....	17
5	QUESTIONS AND ANSWERS.....	18
6	MULTIPLE-CHOICE QUESTIONS.....	19
7	REFERENCES	22



1 INTRODUCTORY PARAGRAPH

In this second module, we focus on the way blockchains are governed and regulated. In this fifth lecture, we focus the blockchain governance, i.e. identify the rules controlling the way actors of a blockchain ecosystem interact and the way decisions are taken in such a distributed ecosystem. This lecture takes advantage of the knowledge provided in the previous lectures, i.e. defining the blockchain context (lecture 1), the governance background (lecture 2) and the organisation of the blockchain ecosystem (lecture 3).

Governing complex systems, as blockchain systems, is not so obvious. This requires defining what is really addressed by the governance process, the different kinds of decisions and the way these decisions are controlled. According to your best knowledge, can you define the perimeter addressed by the blockchain governance rules? Which kinds of decisions are concerned? Is there a unique decision organisation? How are decision processes implemented? To sum up, who decide what to fit which goal impacting which system. Let's think and brainstorm together.

Understanding and setting a blockchain governance is not so simple. In this lecture you will learn how to characterize blockchain governance challenges and requirements, identify key decision and governance organisations and learn the way on-chain and off-chain governance rules are organised thanks to a blockchain governance framework

To sum-up, this lecture addresses different learning objectives regarding

1. Governance and decision organisation: focusing on blockchain context, you will get the necessary knowledge to identify key requirements and the decision system organisation, comparing centralised to decentralised organisation
2. Blockchain governance rules and processes regarding operational and tactical/strategical decisions. This includes on-chain and off-chain governance rules introduced to govern the distributed ecosystem and to manage the technologic side of the blockchain system
3. A blockchain governance framework, providing a guideline to set or analyse governance system organisation



2 LECTURE NOTES

According to the learning objectives, this lecture is organised into three main parts. We will first introduce the blockchain governance organisation, identifying key requirements and presenting the centralised / decentralised decision strategies. Then we will focus on the blockchain governance principles, identifying on-chain and off-chain processes before characterising operational, tactical and strategical governance processes and organisations through the presentation of a blockchain governance framework.

2.1 Blockchain governance organisation

2.1.1 Governance system organisation

First of all, let's introduce governance and its multiple definitions. As presented in lecture 2, there are different definitions associated to the governance perimeter: organisations, technical and socio-technical systems, enterprise... For all cases, governance means setting rules and processes to control interactions between entities composing the global system. These decision rules are set to meet the system objectives. As far as enterprises and other socio-economic organisations are concerned, these decisions also include performance management so that strategy adjustment can be made. As a decision support system, the governance system manage interactions of members of the ecosystem and set clear decision regarding the ecosystem development strategy as well as more operational decisions.

Focusing on the way decision are managed, let's come back to the decision definition. According to Cambridge dictionary, a decision is "a choice you make about something after thinking about several possibilities". This means that a decision is associated to a precise scope, including the decision time frame (operation, tactic, strategic) and to a decision context. As far as operation decisions are concerned, decision rules can be set to support a semi-automated decision process. Each decision rule is described precisely, i.e. defines the decision workflow supports the decision process. It defines precisely the actors involved in the different tasks, such as preparing the decision or approving it. For short, a generic decision process encompasses three main steps: decision preparation, decision approval and decision deployment:

1. The decision preparation defines the different choices to face a given event / context and their associated time frame. Of course, depending on the decision time frame, it may be more or less complex to capture the potential effects and consequences. This is why the activities developed at this step have to provide the necessary analysis and evaluation regarding the associated scenarii before setting the decision that will be submitted for approval.
2. The decision approval step consists in submitting the pre-selected decision to the decision approval board. This approval process can vary from a simple adoption / rejection vote to the development of a more complex workflow leading to decision adjustment to get the approval of all parties. During this approval negotiation step, extra analysis on the decision impact as well as decision adjustments can be made.



3. The decision deployment is the last step of the decision process workflow. It consists in broadcasting the decision to the actors in charge of implementing it. Some deployment preparation tasks can be added to define exactly the implantation process.

All these macro-tasks can be achieved by one or several predefined actors. Their associated process can be defined formally to improve the decision process replication and to allow decision tracking. Informal processes can also occur as well for some tasks / activities. Similar to “manual operations”, these informal processes are described and tracked simply by identifying the actors in charge of them, their inputs / outputs.

Before detailing blockchain governance requirements, we must keep in mind that blockchain projects are often similar to open-source projects: first, lots of public blockchain use an open source software so we can consider the blockchain as a particular instance of Open Source software. Open-source software development often rely on voluntary contributors and users, establishing a community sharing the same product development vision. This collective action during the software development step leads to a collective innovation process. Regarding governance, at this step there’s a community enactment and de Laat refers to a “spontaneous governance”. At this step members join more or less freely the community and there’s mostly informal interactions between contributors.

The software product development grows while extending its community of users and contributors. At this implementation step, informal interaction rules are no more sufficient. This leads to establish rules to organize internal interaction and community management, leading to set up “internal governance” to organize the distributed community.

Lastly, when the software product reaches maturity and its development is more or less stabilized, the associated community is institutionalized and interaction with external parties are regaled thanks to new governance rules.

Focusing on the open-source software governance strategy, Red-hat identifies different models.

First, the initial community is often regulated by a simple rule: who works on the project can participate to the decision. It means that people get authority from the job they achieve, related to the time investment they made on the project. It may be difficult to join the community.

Second, the initial contributors, the founders, manage and have a fully control on the project. Their decisions are related to the project vision, to core modification and can also impact the community organisation.

Third for larger projects and communities, it may be difficult for a reduced set of individuals to manage the community and the project development, keeping its consistency and making the appropriate strategic evolution choices. To this end, different groups can be associated to the different kinds of decisions. This is a way to “share” and organise formally the governance.

Fourth, governance can also be set as a democracy: voting activities can be set to approve the way the decision organisation, to approve changes... This involves pre-defining who can vote and who can submit a proposal for a votation.

The 2 last models (corporate backed and foundation-backed) refer to more classical governance organisation. In both cases, the open source software project is managed by companies or a foundation in charge of organising the development and managing the project life cycle.

2.1.2 Blockchain governance requirements

Identifying the blockchain governance perimeter is heavily related to the blockchain ecosystem. As seen in lecture 3, a blockchain ecosystem is not limited to technological components. It gathers multiple complementary and sometimes competing actors. Moreover, due to the variety of potential usages, of expected benefits... partners and blockchain users may have different priorities.

Setting a consistent governance aims at regulating the partners and users interactions to achieve a common and consistent objective. Governing the blockchain involves setting different internal regulation rules, accepted by all parties to manage decisions regarding the technical implementation evolution, blockchain operation as well as tactical and strategical development of the blockchain ecosystem, including the regulation of the blockchain ecosystem evolution.

So, let's first investigate the way the blockchain ecosystem is organized to identify the characteristics of the decision and governance organisations. Similar to Open source Software communities, we can split the ecosystem into 2 main groups:

1. Core members are those involved in the blockchain business definition and operation. It includes
 - a. Leaders, i.e. those who create the project and invest to support it. As a consequence, they are the major beneficiaries of the system if the system succeeds. Consequently, these members can fix the tactical and strategical vision of the system
 - b. Core active members control and optimize the operation activities and manage the community. As a consequence, they are mostly concerned by operational decision.
 - c. Active members are primary participants and can contribute to the governance workflow
2. Peripheral group consists in
 - a. Users who can benefit from the blockchain project, manage their own data BUT are not involved in the blockchain governance
 - b. Service providers who bring support services or usage-oriented services for the project. Their contribution is connected to the blockchain project but they are not involved in the blockchain ecosystem governance.

To identify the role each party plays in the blockchain ecosystem, we define 2 classes of activities

1. Technology related activities are developed by the core developers according to the requirements set by the leaders / core members. Developments refer to the core blockchain



structure and governance workflow. Block validators / miners are in charge of the block validation activity. Support service providers may be managed by dedicated actors, focused on the operational infrastructure.

2. Usage oriented activities are mostly defined by investors who agree to finance the project. Usage oriented service providers can develop value-added services so that the blockchain catchment area can be improved. Lastly users pay n(directly or indirectly) to get the blockchain services. They can accede to their own data but are not involved in the governance organisation.

Let's focus now on the way the blockchain organisation is set. As seen in previous lectures, distributed organisations are set either in a centralised or in a decentralised way.

At the operation level, blockchains have been designed to support P2P trusted transactions. There's no trusted tier to certify the transaction. Trust is provided by the distributed replicated ledger which provides an immutable trace of the P2P approved transaction. Compared to traditional transaction authentication organisations, blockchain appears as a decentralised implementation of the validation process.

Does this decentralised ledger implementation mean that the blockchain is organised in a decentralised way? In fact, the ledger implementation does not reflect the distributed organisation of the blockchain system. Each blockchain project and its related distributed organisation are designed separately, requiring IT development and infrastructure and leading to a complex distributed ecosystem. As for other IT projects, a blockchain project provides a service that can be used by end users or by other IT components. The initial investments used to support the project development (and infrastructure) is provided by initial investors (who may be blockchain developers). Similar to production system, a dedicated organisation is set and investments supporting the project development are decided paying attention on the Return On Investment showing the profitability of the project. This means that the core active members invest continuously (time, money) to maintain the blockchain or to make it evolve according to the current requirements (up-grading, scaling...). This may lead to extend the core active members community. This this end, co-optation rules and mechanisms can be set to accept or reject the application of a new active member in the blockchain core community.

As this core community share risks and profits, it is in charge of tactic and strategic decisions. Such decisions are not so formalised as operation ones. This may require informal off-chain exchanges between core community members to prepare and set a decision for approval, evaluating the potential impact of the decision according to their own objectives.

So, it means that the blockchain provides a decentralised service BUT is organised in a rather centralised way.

To evaluate the governance perimeter, we propose to consider the blockchain governance according to 2 main dimensions:

1. Considering then blockchain as a technological object, different kinds of decisions should b considered



- a. Obviously, the trusted block validation process holds a major part in the operational governance. This strategy is chosen from the early creation of the blockchain by the initial investors and core developers and impacts the block validator community enactment. In an opened organisation, this block validation strategy defines the cost/benefits rule associated to the block validation. The block validation can be trusted as the validator “invests” (i.e. pays) for the validation. This investment is a guarantee that the job is done properly. As the blockchain integrity and availability is a major stack, threats cannot be ignored. This leads to identify “from the early design steps” rules to manage decisions regarding hacking: how to stop the process, isolate the chain, have a fork, manage the induced losses
 - b. Operation and tactic decisions regarding core software evolution may also occur to improve blockchain core software efficiency and efficacy, add some features or correct some bugs. These kinds of decision and the decision process must be defined from the early design, including the scope of the decision, its motivation and the decision process (voting...). Potential forks must also be considered as a result of the decision process.
2. Considering the blockchain ecosystem rather than a technology, blockchain governance is mostly devoted to control
- a. The potential usage. This refers to strategic decision to identify the catchment area and as a consequence of the catchment area development to performance scaling decision. The catchment area is first defined by the leaders who invest for a given project and other core members can participate to the catchment area development tactical decisions
 - b. The way the blockchain community is set and evolve. The first decision is related to the distributed organisation community: is it an opened or a closed community? How are enrolled parties?... As said previously, there are different kinds of members of the ecosystem, each of them having dedicated roles and rights. Core members are in charge of the first strategic decision (closed or opened). They also establish rules for co-opting new core members. Note that if core members can approve the ecosystem evolution, a reduced set can fix the strategy to manage the core ecosystem. In other words, a leader can decide to lock the ecosystem governance for strategic or tactic decisions.

2.2 Blockchain governance principles

As just stated, different kinds of governance rules are introduced. In this part of the lecture we will present the different decision levels governing a blockchain project before discussing the way they can be implemented as on-chain / off chain governance processes.

2.2.1 Key decisions

Setting a governance policy or understanding a governance policy requires identifying the different decisions, their consequences and the way risks associated to these decisions are managed. Similar to



other projects / systems, blockchain governance decision may be analysed as strategic / tactic and operation decisions. Strategic decisions are the “most risky” decisions as they have long term and non-reversible consequences. These decisions are related to the system generation and evolution. Defining the blockchain project scope, catchment area, target network community as well as the potential users are key strategic decisions. As such, these decisions are made by the blockchain project founders. Similar to other business project, the associated foundation community also control its strategic evolutions, sharing risks and potential benefits of each of their decisions. Most of the time, this foundation community set rules to control the way other investor can join this project and participate to these strategic decisions. Of course, these decisions are complex and cannot be automated.

Once defined, the blockchain project must be implemented. Tactical decisions regarding the way the system is implemented must be set. As a distributed IT system, key decisions are related to the source-code access, the development community management and the way new releases are controlled. These decisions impact the blockchain project on a mid/long term basis as some development choices may have an important impact on the way the project can evolve / manage forks or reversal transactions. This is why a particular attention must be paid on the technological project risks analysis to reach the “best decisions”, balancing risks and technological development constraints / costs. Tactical decisions are also necessary to manage community development as well as project scaling decisions. Even if some “best practices” are often available, these decisions are hardly automated due to the uncertainty of the information they rely on.

Once the project is implemented, operation decisions are set continuously to support the “blockchain service consumption”. These decisions are mostly related to the way transactions (at the core of the blockchain service) are automatically validated. As a distributed system, a particular attention must be paid on the way operation conflict management can be solved and signalled to upper layers in case of troubles (for example identifying undue transaction requiring to set transaction reversal decisions).

These different kinds of decision are made by different communities: founders, developers, network participant... each of them having their own decision mode adapted to the risk they have to manage.

Setting blockchain governance can worthy adapt IT governance models. AS a technological IT object, blockchain systems considered as technological IT objects share similar challenges with complex IT project as decision rights and decision accountability management, project incentives... This leads to identify “technology related” decisions achieved mostly by the development community according to the requirements provided by the project founders, paying a particular attention on the way transactions and blocks are defined and validated. As blockchains rely technologically on distributed ledgers, a particular attention must be paid on the way the distributed organisation (i.e. the associated networked community) is set and organised. This network governance is in charge of identifying the different roles and rules allowing to join (or not) a given role.

Nevertheless, blockchain systems are not only technologic IT objects, they are also distributed organisations, integrating various communities, providing different services. Focusing on the way socio-technical decisions are made, we can note that some decisions are “hard-coded” in the blockchain protocol. These decisions refer mostly to the blockchain operation, i.e. the core block validation process.



Other “simple” decisions can be submitted for approval for example, allowing a new participant to join the network. These decisions are governed by the infrastructure, i.e. are defined as rules in the blockchain protocol.

Of course, this governance by the infrastructure questions the way the protocol is defined, i.e. the way the infrastructure is governed. This governance of the infrastructure is first directed by the strategic decisions derived into tactic decisions before being implemented by the developers. Similar to other IT project, this governance of the infrastructure defines the development strategy, the way the development project is coordinated and the way the evolutions are decided and validated.

This leads to split the blockchain governance into different governance functions in charge of managing the community, the development and the operation protocol.

To sum-up, governing a blockchain means organising a complex decision process to manage several kinds of decision.

- First of all, the way key business requirements and their evolution are defined and managed: these decisions impact the project enactment and its strategy. These decisions define both the provided service, the catchment area as well as the potential communities that will be set to support and use the new blockchain project. A particular attention must be paid on the project initial scaling and the potential evolution as this affect directly the block validation strategy. These business requirements are then turned into system specification to manage the required development projects
- Focusing on the core blockchain technological choices, the way blocks are validated and stored are key technological decisions. These decisions related to the block authenticity are heavily connected to the business requirements, leading to define the validation protocol (PoW, PoS, reputation-based...) according to strategic choices regarding the validators community management and the target “Quality of Service” associated to the block validation
- As other IT project, core development may evolve, managing bug correction, improving code performance... As the new release may impact the previously-validated blocks, core development evolution must be negotiated and decision must be taken collectively, especially when they lead to a hard-fork of the system.
- Paying attention to “functional” risks, we can note that due to the block validation delay, ownership dispute may occur. Listening blocks to be validated allow access to public not-yet validated transactions so that payment can be re-directed to other account by proposing a new transaction with much higher validation fees. Organising processes to solve these ownership disputes is a key issue for safe transaction management. This may also involve transaction reversal processes to restore ownership.
- Intrinsic blockchain corruption risk cannot be neglected as trust depends on the block validation process. When enough malicious block validators corrupt the blockchain itself, this byzantine fault cannot be corrected immediately and requires a hard-fork or a transaction reversal mechanism as well.

Based on these key decision, setting a consistent blockchain governance involves identifying precisely:

- The blockchain project scope and context
- The blockchain community organisation, paying attention to the different roles, incentives to develop the community and to the membership rules
- The blockchain decision system, paying attention to the way actors communicate and to the way decision processes are set

2.2.2 On-chain vs off-chain governance

There are different strategies to implement blockchain governance functions. On-chain governance refers to decisions that can be managed “online”. These automated decisions are derived from the blockchain protocol: registering a validated block, implementing the block validation reward mechanism, managing voting mechanism to approve a submitted decision... We can note that setting a voting mechanism is not so simple as the protocol must define rules to identify precisely who can vote and the precise “weight” of each vote. As these decisions are precisely described, the decision process is well formalized and fully transparent. Nevertheless, only “simple” decisions such as “approving / rejecting a proposal” (even if the proposal is complex) can be managed on line.

As we’ve seen previously, tactic and strategic decisions are more complex and may use uncertain information. This leads to set an off-chain decision system. Actors involved in the blockchain community can take advantage of formal and informal relationships to exchange information, negotiate... to prepare a decision and reach a consensual position. We can note that this decision process may include discussion, negotiation, voting and even legal dispute before reaching a consensus. As most of these processes are informal, off-chain governance decision may lack of transparency.

While the blockchain ecosystem grows, mixing on-chain and off-chain governance can be seen as an opportunity to develop “blockchain democracy”. It takes advantage of the off-chain informal process to prepare decisions and then to transparently submit them for voting according to the on-chain governance protocol. By this way, off-chain negotiations can occur while preparing complex strategic and tactic decisions, evaluating the different choices. Then the different actors of the blockchain community can take a part in the collaborative governance by voting to accept / reject the submitted proposal.

2.3 Blockchain governance framework

While initiating a blockchain project or intending to use an existing one, it is important to understand the way a blockchain system governance policy is set, either to create an adapted governance policy or integrate the blockchain governance policy as a criterion to decide whether or not to participate in a blockchain project. As mentioned previously, the governance policy is heavily coupled to the blockchain ecosystem management and to the blockchain project development strategy. Strategic and tactic project decisions are reflected in governance rules. These rules are set and their evolution are controlled by a reduced community, mostly the project owners (initial investors and / or founding developers).

Creating a blockchain project involves defining precisely who “owns” the project and rules regulating this project’s owners community. Integrating an existing project, questions also for project ownership in a similar way as integrating open-source code in an IT project. It is necessary to evaluate the impact of any changes in the blockchain system governance on the IT system using it. Focusing on the project life-cycle, a particular attention must be paid on the way the ecosystem is organised and developed: which incentives are used, how participants are recruited, how can they take part in the ecosystem operation and decision. This leads to provide adapted answers to key decisions listed in the governance challenges.

Inspired by enterprise architecture and IT frameworks, introduced to “industrialise” IT development, Pelt has proposed a blockchain governance framework, guiding the enactment of a blockchain governance policy or the evaluation of the governance practices of an existing blockchain ecosystem. This framework manages different governance dimensions related to the blockchain community organisation and to the on-chain / off-chain decision organisation.

	Off-chain community	Off-chain development	On-chain protocol
Roles			
Incentives			
Membership			
Communication			
Decision making			
Formation and context			

Figure 1. Pelt’s blockchain governance framework

Figure 1 presents the way the governance framework is organised. For people already involved in Information System and Enterprise Architecture, it is quite similar to Zachman’s framework organisation.

Defining the project scope and the precise context is the base of the model. Then the governance system is defined integrating on-chain and off-chain governance. Focusing on the decision scope, off-chain governance is split into two sub-categories in charge of governing the ecosystem and the software project development. For each type of governance, key decisions are identified according to two main categories of governance function: governance related to the ecosystem management (roles, incentives



and membership) and governance of the decision process, paying attention to the way actors communicate and to the means used for that. In what follow we detail the different parts of this framework.

Key questions used to define the blockchain project formation and context are related to:

1. The identification of the blockchain project perimeter. The project field and the precise value-added service are defined precisely as well as the catchment areas. This project perimeter specification is necessary to identify the potential users and the project scaling constraint. By this way, regulation and Quality of Service constraints will be taken into account while choosing the appropriate protocols.
2. Blockchain system organisation which is heavily related to the initial project organisation strategy. Identifying the “project owners” and its formative ideology is necessary to capture key decisions such as the way investment are made, which investors participate to the decisions, defining the software licensing model or the way the ecosystem will be managed.

Focusing on the ecosystem off-chain governance, questions are set to capture:

1. the ecosystem community organisation. First, borders are identified by questioning the community organisation in terms of roles, of relationships between these different roles and questioning for accountability checking. Second, community development refers to the development of incentives, paying a particular attention to monetary and non-monetary rewards, encouraging actors to join and actively participate to the ecosystem. Lastly, membership definition allows defining community borders as well as identifying rules to allow a new actor join the community and play a given role.
2. The way the ecosystem decision process is supported. This involves paying attention to the way participants communicate, identifying the media used to support community discussion, and achieve an agreement. These questions allow identifying formal and informal exchanges between members, understanding the way the decision system is built. Key decisions impacting technical choices are also considered, paying attention n to functional risks such as ownership dispute resolution or signalling systems

As blockchain is a software supported technology, governing this blockchain system involves also paying attention to the way the software development is organised and managed. The development community organisation must be defined precisely, including the different roles, hierarchical relationships and responsibilities. The identification of incentives depends on the developers’ status (hired or paid for the development vs volunteer contribution leading to rewards or funding arrangement). This organisation is central while defining the project ownership. It impacts the source code licensing model, the source’s code access control... This organisation impacts the project modularization and the global strategy to ease (or not) the integration of new developers.

Focusing on the development decision process, key tactic decisions are related to release validation, hard-fork... whether other development decisions are focused on the ay conflicts are managed, on the way decision are prepared and implemented. This development community decision system is also



supported by key communication function, supporting development discussion and coordinating and tracking development tasks to maintain the system consistency.

Focusing on operation governance, on-chain governance rules are set in the blockchain protocol. Regarding the community operation governance, the protocol defines different rules to control participant admittance conditions and voting mechanisms can be set to control additional nodes. Different roles, that may be organised hierarchically are also set to manage participant access rights and their associated responsibility area. The protocol implementation also integrates participant incentives, monetary or non-monetary rewards mechanisms to ensure the community development.

Focusing on the decision system, communication media can be used to allow informal communication between participants in order to exchange information before voting. Communication channel with other layers are also necessary to manage system evolution. Focusing on the core operation decision, the consensus mechanism is “hard coded” in the protocol as the core of the blockchain system. Voting mechanisms can be set to accept or reject a software evolution proposed by the development community. Decision process regarding potential conflicts can also be defined to manage them efficiently

2.3.1 Conclusion

Governing complex socio-technic systems such as Blockchain involves defining adapted rules to control both the IT technologic side of the blockchain system and the associated ecosystem. As an IT system, blockchain “technologic governance” is rather similar to other IT system governance, paying attention to technologic choices and to its socio-technic impacts. This IT governance also fits well the Blockchain software development requirements.

As a distributed organisation, blockchain governance is in charge of developing and managing the different communities involved in the blockchain ecosystem.

These governance functions are split into off-chain and on-chain governance. Either precisely formalised in the blockchain protocol or relying on informal exchanges between ecosystem members, these governance functions can be designed or analysed thanks to a multi-dimension and multi-layer blockchain governance framework.



3 PRACTICAL EXERCISES

This practical exercise shows how you can identify some blockchain regulation and governance challenges. The case study used in the different exercises from this module is based on a supply-chain / industry 4.0 case study.

Let's consider the organisation of a "producer to consumer food supply-chain". Different producers are involved in the food procurement and transformation. Each member of the supply-chain ecosystem can integrate its own suppliers in a "sub-supply chain". In order to eliminate wastes, the supply chain is managed in a Just in Time strategy. Increasing the product quality and the production transparency leads to track each product / transformation process so that consumers can be called in case of trouble.

Identify a governance strategy for this ecosystem.

To solve this problem, you need to identify

- The ecosystem organisation and the way it impacts the blockchain ecosystem organisation
- The core governance strategy
- The different on-chain / off-chain governance rules

For each topic you need to ask some Who / What / For What / From where / Why / How questions

- The business-oriented ecosystem relies on the collaborative networked production organisation. As seen in lecture 3, this is a partner-centred organisation. Focusing on the blockchain organisation, identify some blockchain genesis hypothesis and their impact on the founding members / decision system
- Focusing on the blockchain organisation, identify acceptable block validation protocols
- Identify potential decisions including decisions impacting the project perimeter and operation decisions
- Based on the different types of participants identified in the Lecture 3 exercise, identify how they can take part in the decision system
- Provide some on-chain and off-chain governance rules.

Analysing the requirements shows that:

- The business-oriented ecosystem relies on the collaborative networked production organisation. As seen in lecture 3, this is a partner-centred organisation. Focusing on the blockchain organisation, we can identify different strategies depending on the project genesis:



- a. The main stakeholder may be the unique owner: this happens if the main stakeholder provides the full blockchain infrastructure and constraints its partner to register their production in the blockchain
 - b. The project may be launched as a common answer of all participants to regulation constraints / quality processes / main clients requirements... In such case, all partners involved in the supply chain are founding members. Paying attention to their initial investment, voting parameters may be adjusted (1 partner = 1 vote, 1 vote provided for a given investment level...)
- Focusing on the blockchain organisation, we can identify that a permissioned blockchain may be set. In such a blockchain, block validators are well identified so a PoS or a reputation-based validation strategy can be set. Of course, PoW can also be set but it consumes lots of energy so it leads to a poor sustainable system that may have a negative impact on members "sustainability" reputation
- Governance decisions can be related to
 - a. The ecosystem organisation: co-optation rules must be defined clearly to allow new members joining the supply chain and / or the blockchain project. Voting rules may be adapted depending on the way they "contribute" to the blockchain project.
 - b. Security risks: in case of blockchain corruption, fork decisions must be taken
 - c. System perimeter adjustment: some extra information from external entities / more precise information may be registered in the blockchain. This leads to define scaling impact and associated decisions
- Depending on the project genesis:
 - a. The main stakeholder can define decisions and submit them for approval to the other participants
 - b. A steering board can be set to prepare key decision that are later submit for approval to other participants
 - c. For co-optation processes, a partner can propose a ne member and ask the other to approve or not
 - d. As they are technologic experts, developers may propose blockchain services evolution
- On chain governance refer to operation decisions and to approval process organisation. Off-chain decisions refer for example to the board organisation, to the approval system definition, to the ecosystem management



4 CASE STUDIES

Agri-food NFT Case study

A group of agri-food enterprises want to set a NFT based loyalty program associated to the product they sell. Each company will provide some “loyalty score” depending on the customer activity. These loyalty scores are managed by a dedicated entity. Each customer can apply for a given NFT attached to a rare “real product” provided that he gets enough validated loyalty score. These NFT are used to grant access to the product ordering. Identify the key characteristics of the associated blockchain project governance organisation.

or

Choose an example of blockchain project and analyse it in a similar way as what was done in the exercise.



5 QUESTIONS AND ANSWERS

Description

Question and Answer No.1

Q: What does blockchain governance mean?

A: Blockchain governance defines the set of rules controlling the internal interactions of blockchain ecosystem's members.

Question and Answer No.2

Q: What is the key difference between a do-ocracy and a founder leader governance strategy?

A: Do-ocracy refers to an informal and opened governance where decisions are managed by those doing the job whereas founder-leader governance allows only founding members and initial developers to manage decision.

Question and Answer No.3

Q: Is blockchain governance a centralised or decentralised governance?

A: Blockchain governance involves core members. That is why the blockchain governance is rather centralized.

Question and Answer No.4

Q: What do on-chain and off-chain governance mean?

A: On-chain governance refers to decisions such as voting decision or automated decisions that can be taken on-line whereas off-chain governance refers to decisions / processes that can be hardly automated, including the way decision are prepared, informal decision processes.

Question and Answer No.5

Q: Can you provide some challenges of off-chain community governance related to community organisation?

A: Different challenges can be associated to off-chain community governance related to community organisation such as the identification of the different roles, incentives including monetary and non-monetary rewards as well as membership rules defining the community borders and rules to join some dedicated roles.



6 MULTIPLE-CHOICE QUESTIONS

Content example Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Multiple Choice question No. 1

Q: Blockchain governance defines rules controlling

A: The interactions between blockchain ecosystem participants

- The interactions between blockchain ecosystem participants
- The interaction of the blockchain ecosystem with its environment
- The self-adaptation of the core blockchain algorithms to optimize it depending on the context

Multiple Choice question No. 2

Q: Organising decision processes is governed by

A: Off-chain governance

- Off-chain governance
- On-chain governance

Multiple Choice question No. 3

Q: On-chain governance can manage decision regarding

A: Block validation consensus

- Business objective identification
- Block validation consensus
- Core development evolution

Multiple Choice question No. 4

Q: Informal decision process are managed in

A: Off-chain governance

- Off-chain governance
- On-chain governance

Multiple Choice question No. 5

Q: Decision concerning monetary / non-monetary rewards is managed by

A: Off-chain community management



- Off-chain development governance
- Off-chain community management
- On chain governance protocol

Multiple Choice question No. 6

Q: Decision concerning ownership dispute resolution is managed by

A: Off-chain community management

- Off-chain development governance
- Off-chain community management
- On chain governance protocol

Multiple Choice question No. 7

Q: Decision concerning the organisation of the development discussion

A: Off-chain development governance

- Off-chain development governance
- Off-chain community management
- On chain governance protocol

Multiple Choice question No. 8

Q: Decision concerning the development funding arrangements is managed by

A: Off-chain development governance

- Off-chain development governance
- Off-chain community management
- On chain governance protocol

Multiple Choice question No. 9

Q: Decision approving a new member for a given role is managed by

A: On chain governance protocol

- Off-chain development governance
- Off-chain community management
- On chain governance protocol

Multiple Choice question No. 10



Q: Decision concerning consensus are associated to

A: On chain governance protocol

- Off-chain development governance
- Off-chain community management
- On chain governance protocol



7 REFERENCES

- <https://watsonlaw.nl/blockchain-governance-what-is-it-what-types-are-there-and-how-does-it-work-in-practice/>
- https://www.researchgate.net/publication/339132766_Blockchain_Governance_What_We_Can_Learn_From_the_Economics_of_Corporate_Governance
- https://www.researchgate.net/publication/340224778_Blockchain_Governance-A_New_Way_of_Organizing_Collaborations
- Rowan van Pelt, Slinger Jansen, Djuri Baars & Sietse Overbeek (2021). Defining Blockchain Governance: A Framework for Analysis and Comparison, Information Systems. Management, 38:1, 21-41, DOI: 10.1080/10580530.2020.1720046
- de Laat, P. B. (2007). Governance of open source software: State of the art. Journal of Management & Governance, 11 (2), 165–177. doi:10.1007/s10997-007-9022-9
- <https://watsonlaw.nl/en/blockchain-governance-what-is-it-what-types-are-there-and-how-does-it-work-in-practice/>

8 Slides





2. REGULATION, LEGAL ASPECTS, AND GOVERNANCE OF BLOCKCHAIN SYSTEMS		
Explain blockchain-related regulations, legal aspects, governance, and their impact in the public and private sectors.		
Knowledge	Skills	Responsibility and Autonomy
Knows / Aware of: - Implications of blockchain technology for society, regulators, policy makers, governments, law professionals.	Able to: - LO2.5: Explain implications of blockchain technology for governments, policy makers, law professionals, regulators and society. - LO2.6: Illustrate the impact of the blockchain governance on policy effectiveness.	Capable to: - Take responsibility when deciding about the blockchain, cryptocurrencies and use of smart contracts. - Participate in discussion regarding blockchain technology impact and blockchain governance decisions.
EQF level	EQF Level 5	

chaise
blockchain skills for Europe

How is set blockchain governance?

- Which perimeter is concerned by blockchain governance?
- Which kinds of decisions are controlled?
- Who will decide?
- How should decision processes be implemented?



How is set blockchain governance?

- In this lecture you will
 - Learn key elements to characterise blockchain governance challenges
 - Identify key governance organisation
 - Learn the way on chain and off chain governance rules are organised



Learning objectives

Governance and decision organisation

Key requirements
Centralised vs
decentralised decisions

Blockchain governance

Strategic / tactic /
operation governance
On-chain vs off-chain

Blockchain governance framework

Key dimensions
Governance analysis
guideline



Table of Content



- ▶ Blockchain governance organisation
 - Governance system organisation
 - Blockchain governance requirements
- ▶ Blockchain governance principles
 - Key decisions
 - Off-chain vs on-chain governance
- ▶ Blockchain governance framework
- ▶ To conclude

Governance?

- Governance perimeter
 - The way in which an organization is managed at the highest level and the system for doing this (Cambridge dictionary)
 - System governance including approved set of rules and processes to regulate system component interaction
 - Enterprise governance including organization governance and performance management
- Decision system
 - Manage interactions
 - Global strategy



Decision mechanisms

- Decision rules
 - Decision scope
 - Decision condition
- Decision workflow
 - Who prepare the decision
 - Who can approve
- Key organisation
 - Formal process
 - Informal process



Open-source software governance

- Open source product life-cycle
 - "Innovation step"
 - Software product definition and core development
 - Reduced community
 - "Spontaneous governance"
 - Development step
 - Software full development and continuous improvement
 - Increasing community members
 - "Internal governance"
 - Product maturity
 - "Extra services"
 - Community is recognised
 - "Governance towards outside parties"
- Different governance requirements and governance rules



Corporate-backed
Foundation-backed

chaise
blockchain skills for Europe

Open-source governance strategy

- Do-ocracy
 - Who do the job make decision
 - No formal governance
- Founder-leader
 - Initial contributors managed decisions
 - Full control on vision and code modifications
- Self-appointing council / board
 - Different groups to manage different kinds of decision
 - Clear division of the governance topics (architecture, technical committee, steering committee)
- Electoral
 - Election for candidates to set organisation decisions
 - Election for software changes
- Corporate-backed
 - Open source project managed by a company or consortia
 - The company / consortia manage the decision process and governance rules
- Foundation-backed
 - Similar to corporate backed BUT managed by a dedicated foundation

chaise
blockchain skills for Europe

Blockchain?

- Complex ecosystem
 - Technical part
 - Multiple actors
 - Multiple usages
- Different decisions
 - Technical implementation
 - Basic ecosystem operation
 - Tactical and strategical development



Blockchain ecosystem organisation

- Ecosystem organisation
 - Core members
 - Leaders
 - Active members
 - Peripheral group
 - Service providers
 - Users
- Key roles
 - Technology
 - Core developers
 - Miners
 - Support service providers
 - Usage
 - Investors
 - Usage oriented service providers
 - Users



Decentralised vs centralised?

- Blockchain appears as a P2P and decentralised organisation
 - P2P
 - No trusted tier
 - No centralised organisation for the ledger
- Centralised organisation
 - Major decisions achieved by the blockchain core members
 - Developers?
 - Initial investors
 - Co-optation mechanisms
 - Informal exchanges



Blockchain ecosystem governance perimeter

- **Technology**
 - Trusted block validation
 - Block validation strategy
 - Decision regarding hacking
 - Core software
 - Performance and evolution
 - Forks
- **Organisation**
 - Usage
 - "Catchment area"
 - Performance scaling
 - Community
 - Open vs closed communities
 - Enrollment of parties

Table of Content



- ▶ Blockchain governance organisation
 - Governance system organisation
 - Blockchain governance requirements
- ▶ Blockchain governance principles
 - Key decisions
 - Off-chain vs on-chain governance
- ▶ Blockchain governance framework
- ▶ To conclude





Operation / tactic / strategic governance

- Different decision layers
 - Strategic
 - Long term consequences
 - Project perimeter
 - Reduced community
 - Tactic
 - Development / scaling
 - Community development
 - Operation
 - Consensus management
 - Operation conflict management
- Different communities
 - Different impacts of the risks
 - Different decision modes

Organising blockchain governance

- Adaptation of IT governance to blockchain economy
 - Decision rights
 - Accountability
 - Incentives
- Different kinds of decision
 - Technology governance
 - Network governance
- Socio-technical governance organisation
 - Governance by the infrastructure (via the protocol)
 - Governance of the infrastructure (by developers...)
- Different governance functions
 - Community governance
 - Blockchain development
 - On-chain protocol



Key governance challenges

- Key decision
 - Identify key business requirements
 - Block authenticity (validation and persistency)
 - Core development evolution
 - Ownership conflict
 - Transaction reversal
- Key governance dimensions
 - Context
 - Roles
 - Incentives
 - Membership
 - Communication
 - Decision process

On chain vs off chain governance

- On chain = online decision
 - Automated decision
 - Based on the protocol
 - Submission for approval
 - Voting
 - Who votes
 - "Weight" of each vote
 - Formalised and transparent
- Off chain
 - "Informal" or formal relationships
 - Decision preparation
 - Decision process
 - Discussion / negotiation / voting
 - Formalisation?
 - Transparency?
- Mix
 - Off chain preparation of the decisions
 - On chain voting
 - Strategy mostly related to off chain decision



Table of Content



- ▶ Blockchain governance organisation
 - Governance system organisation
 - Blockchain governance requirements
- ▶ Blockchain governance principles
 - Key decisions
 - Off-chain vs on-chain governance
- ▶ Blockchain governance framework
- ▶ To conclude

Setting a governance policy

- Ecosystem X blockchain project development strategy
 - “Project ownership”
 - Ecosystem development strategy
 - Key decisions
- Blockchain governance framework
 - Inspired by IT frameworks
 - Key questions associated to
 - Governance dimensions
 - Governance layers
 - Used for
 - Setting a governance policy
 - Analysing existing blockchain system



Pelt's Blockchain governance framework

	Off-chain community	Off-chain development	On-chain protocol
Roles			
Incentives			
Membership			
Communication			
Decision making			
Formation and context			

Formation and context

- Blockchain project perimeter
 - Purpose
 - Target field
 - Proposed service
 - Catchment area
 - Potential users
 - Project scaling
- Blockchain organisation
 - Initial project organisation strategy
 - Formative ideology
 - Key decisions
 - Investment
 - Licensing model
 - Ecosystem management...



Off-chain community governance

Community organisation

- Roles
 - Key roles in the ecosystem
 - Hierarchical relationships
 - Accountability checking
- Incentives
 - Incentives identification
 - Monetary vs non monetary rewards
- Membership
 - Community borders
 - Community management processes
 - Rules to participate and join roles

Decision system organisation

- Communication
 - Community discussion
 - Community agreement
- Decision making
 - Inputs on development decision
 - Signalling systems
 - Ownership dispute resolution



Off-chain development


Community organisation

- Roles
 - Key roles related to development
 - Hierarchical relationships
 - Accountability and responsibilities
- Incentives
 - Developers status (hired / paid for development)
 - Incentives for development roles / funding arrangements
- Membership
 - Rules to participate
 - Training and indoctrination
 - Source code's access
 - Project modularization

Decision system organisation

- Communication
 - Development discussion
 - Coordination and tracking systems
- Decision making
 - Decision generation proposal / decision execution and implementation processes
 - Conflict resolution
 - Release authority
 - Hard fork coordination processes





On-chain protocol



Community organisation

- Roles
 - Types of network participant
 - Hierarchical structures
 - Accountability associated to roles
- Incentives
 - Incentives for participants
 - Monetary vs non monetary rewards
- Membership
 - Rules to enable new participants in the network
 - Structure or voting mechanisms to control additional nodes


Decision system organisation


- Communication
 - Communication between network participants
 - Communication with other layers
- Decision making
 - Consensus mechanism
 - Signalling systems
 - Voting mechanisms
 - Conflict resolution with transactions

Table of Content

- ▶ Blockchain governance organisation
 - Governance system organisation
 - Blockchain governance requirements
- ▶ Blockchain governance principles
 - On-chain / Off-chain rules
 - Operation / tactic / strategic governance
- ▶ Blockchain governance framework
- ▶ To conclude





Co-funded by the
Erasmus+ Programme
of the European Union



To conclude

- Similar to IT project governance
 - Technologic choices
 - Socio-technical impacts
- Distributed system
 - Different communities
 - Different kinds of decisions
 - On chain
 - Off chain
- Blockchain governance framework
 - Guideline to analyse governance organisation
 - Key governance layers
 - Off-chain community
 - Off-chain development
 - On-chain protocol



Resources

- <https://watsonlaw.nl/blockchain-governance-what-is-it-what-types-are-there-and-how-does-it-work-in-practice/>
- https://www.researchgate.net/publication/339132766_Blockchain_Governance_What_We_Can_Learn_From_the_Economics_of_Corporate_Governance
- https://www.researchgate.net/publication/340224778_Blockchain_Governance-A_New_Way_of_Organizing_Collaborations
- Rowan van Pelt, Slinger Jansen, Djuri Baars & Sietse Overbeek (2021). Defining Blockchain Governance: A Framework for Analysis and Comparison, *Information Systems. Management*, 38:1, 21-41, DOI: 10.1080/10580530.2020.1720046
- de Laat, P. B. (2007). Governance of open source software: State of the art. *Journal of Management & Governance*, 11 (2), 165-177. doi:10.1007/s10997-007-9022-9
- <https://watsonlaw.nl/en/blockchain-governance-what-is-it-what-types-are-there-and-how-does-it-work-in-practice/>





Get In Touch

Social Media

@ CHAISE.EU

Website

chaise-blockchainskills.eu

Email

