TALLINN UNIVERSITY OF TECHNOLOGY

School of Business and Governance

Ragnar Nurkse Department of Innovation and Governance

Simon Perdrisat

CASE STUDY OF SOCIOTECHNICAL IMAGINARIES IN THE MAKING: KLEROS DECENTRALIZED DISPUTE RESOLUTION PROTOCOL

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Supervisor: Veiko Lember, PhD

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Simon Perdrisat  (signature, January,3,2021)

Student code: 194366HAGM

Student e-mail address: perdrisat@gmail.com

Supervisor: Veiko Lember, PhD

The paper conforms to requirements in force

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(signature, date)

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ABSTRACT

In the current context of growing uncertainty about the future, researchers began investigating how future visions shape the present; how sociotechnical imaginaries actively shape our society. Today, the performativity of imagined futures is well understood. However, how particular visions come about and why they become performative is understudied. Using the theoretical framework of "technique of futuring" and "dramaturgical regimes", this case study analyzes how Kleros stakeholders articulated and communicate discourse about the Kleros technology's potentialities to better understand how imaginaries emerge. Exploratory research and participatory observations with dramaturgic analysis reveal that Kleros captures attention and financial capital, as well as builds communities using future narratives and imaginaries rather than the actual capabilities or practical usage of the technology. Specific discourse structures allow this imagined future to become authoritative while the technological artifact primarily serves the staging of this imagined future.

Keywords: sociotechnial imaginary, kleros, blockchain, technology policy

INTRODUCTION

This thesis explores how future imaginaries emerge and why they become performative through the case study of Kleros, a blockchain-based decentralized dispute resolution protocol. I examine narratives produced by relevant actors to influence the perception and promote the development of specific technological solutions. Future narratives leverage culture, norms, and symbols tied to a specific worldview in order to tell a story about a future in which the technology has a predominant role in new social orders (Lösch et al. 2019, 1). These sociotechnical futures are therefore important elements in the governance of innovation and technology (Konrad and Böhle 2019, 1) as they influence the present (Lösch et al. 2019, 1).

In recent years, a predominant concept to describe and understand the co-production of technoscientific projects, social constellations, and politics (Mager and Katzenbach 2021, 2) has been *sociotechnical imaginaries* (Jasanoff and Kim 2009; 2015). The main criticism of this concept, though, is its restricted focus (Mager and Katzenbach 2021, 2) as it was initially used primarily in relation to nation states (Jasanoff and Kim 2009). Jasanoff herself, among others, now argues that sociotechnical imaginaries "are not limited to nation states as implied in our original formulation" (Jasanoff and Kim 2015, 4) but that they can be articulated by various actors and organized groups, including corporations and civil society. Therefore, today, Jasanoff broadens the definition of sociotechnical imaginaries as (Jasanoff and Kim 2015, 4):

> *"collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology."*

How sociotechnical future images influence present processes has been a topic of Science and Technology Studies (STS) and Technological Assessment (TA) for some time (Lösch et al. 2019, 2). STS's social construction of technology and society framework conceptualized sociotechnical futures as one of many aspects of social groups and focused on deconstructing negotiation

processes. Meanwhile, TA methodology intends to provide a framework to postulate different future as possible scenarios.

Recent works concerned with the "function, power and performativity of future visions and how to relate it to the making and governing of digital technology" further advance the multiple, contested, and commodified nature of contemporary sociotechnical imaginaries (Mager and Katzenbach 2021, 2). At the outset, the analysis of sociotechnical images of the future focused on the legitimacy or plausibility of future visions as anticipation. However, recently, researchers began investigating how future visions shape the present; for example, how policymaking processes, societal debates, and technology development are actively shaped through sociotechnical imaginaries (Lösch et al. 2019, 1).

The case in question, Kleros, is a blockchain-based decentralized dispute resolution protocol (Coopérative Kleros 2021; Lesaege, George, and Ast 2020). It is a multi-purpose, peer-to-peer dispute resolution system that makes use of crypto-economics-based incentives to provide decentralized arbitration services where members are automatically selected as jurors (Kleros Contributors 2020). Dylag and Smith named this type of platform "*cryptocourt"* (2021, 2). Succinctly, Kleros acts as an ad hoc decentralized arbitration system where two parties can submit a claim to a crowdsourced jury where the fairness of the jury is ensured by financial incentives.

Kleros is a multifaceted project with various actors and interactions to study. As blockchain is an emerging and controversial technology, taking a small and well-delimited blockchain-based project carried out by a new company allowed me to study sociotechnical imaginaries in the making. Several important institutions supported Kleros, such as the European Commission and the French public investment bank Bpifrance. This allows studying sociotechnical imaginaries in the Kleros context at diverse levels, as well as sociotechnical imaginaries interactions and diffusion.

As we saw, the primarily monolithic, linear, and almost consensual picture of sociotechnical imaginaries is disputed notably in regard to digital technology. Kleros being an emerging digital technology, this thesis presupposes that, indeed, sociotechnical imaginaries are multiple, contested, and commodified. Notably, technology companies diffuse imaginaries of new socioeconomic orders to erect and consolidate monopolistic platform-based business and specific commercial interests (Srnicek 2017).

This thesis uses the concept of sociotechnical imaginaries as an analytical framework that "merges the study of the affective, meaning-making power of the imagination with the guiding role of expectations and visions in a culturally sensitive way" (Oomen, Hoffman, and Hajer 2021, 5). To investigate how actors actively bring the future into the present, I use the 'technique of futuring" and dramaturgical analysis proposed by Oomen, Hoffman, and Hajer (2021, 3).

I do not examine how the technology is made nor what the technology is. Instead, I analyze how discourses are articulated and communicated by the actors regarding Kleros technology's potentialities to understand how imaginaries emerge. These discourses are found in the gray literature[1] and relevant materials published by the project's team and actors in the ecosystem, including white papers, videos, blog posts, academic literature, and a 300-page handbook self-published by Kleros. This analysis will be supported by interviews, participatory observation, and on-chain data of the Kleros smart contracts[2] and PNK token[3], and first-hand experience[4] with the technology.

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[1] "Grey literature is material and research produced by organizations outside of the traditional commercial or academic publishing and distribution channels. Common grey literature publication types include reports (annual, research, technical, project, etc.), working papers, government documents, white papers and evaluations." https://en.wikipedia.org/wiki/Grey_literature

[2] Smart contract are programs stored and that execute on a blockchain computing infrastructure (for Kleros Ethereum).

[3] Kleros use what they call "Pinakion" (PNK) Token as the internal currency of the system. PNK tokens were initially sold to the public to raise fund for the project.

[4] I propose a summary of key elements of the current state of the technology in the following chapter, to allow the reader to build their own critical expectations about Kleros. I encourage the reader to experiment and try the technology for themselves. The technologies and their documentation are open and freely accessible. Acquiring a first-time experience by engaging with the technology by using the tools and services it offers requires only a few hours and provides solid insights which are otherwise impossible to acquire.

1.1. Technology Definition and Theoretical Perspective

While technology is a commonly used term, it resists a broadly accepted definition (Bijker, Hughes, and Pinch 2012, xliii). To take one example demonstrating the polymorphic nature of the term, according to MacKenzie and Wajcman (1985) the meaning of technology can be divided in three parts: artifacts or physical objects, processes and activities, and knowledge or 'know-how' around technology. Considering these multiple facets, I adopt here a definition of the technology that encompasses both "a body of organized knowledge concerned with a solution to a practical problem […] and also the tools and artifacts which are used to achieve those solution" (Monck 1988).

This thesis is grounded in the belief that technology and society are entangled together. This approach of a social construction of technology can be opposed to technological determinism or essentialism but also to a linear model of technological innovation (Giotitsas 2019, 66).

For the technological determinism perspective, "social progress is driven by technological innovation, which in turn follows an 'inevitable' course" (Smith and Marx 1994). Technology is seen as the central cause of social change. In soft determinism, as opposed to hard determinism, technology interacts with socio-political situations and societies have a chance to influence the outcome, while the notion of technology as the driving force remains. The linear model of technology is an early framework that postulated that "innovation starts with basic research, is followed by applied research and development, and ends with production and diffusion." (Godin 2006). Interestingly, although the linear model of innovation has been very influential in political rhetoric and as an industrial perspective – and in the early 1960s appropriated by economists – the source of this model remains unclear, and it was developed over time (Godin 2006). By the early 1960s, it had numerous critics. Yet, this model continues to inform public discourses and academic analyses, even when they acknowledge linearity is a fiction (Godin 2006).

For the social constructivism perspective of science and technology, both scientific knowledge and technological artifacts are socially constructed (Pinch and Bijker 1984; Bijker, Hughes, and Pinch 2012). The term *co-production* highlights this symmetrical dynamic: "that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. Knowledge and its material embodiments are at once products of social work and constitutive of forms of social life" (Jasanoff 2004, 2). In turn, sociotechnical

imaginaries acknowledge the co-produced nature of technology and society, as well as emphasize the relationships of science and technology to culture and normative dimensions.

1.2. Research Question

This thesis explores future imaginaries in order to understand how they emerge and why they become performative. Sociotechnical imaginaries in the making can serve to form interest around a technology or be an instrument of legitimization (Beck et al. 2021, 49). For this purpose, future images may be carefully tailored to promote the technology to specific actors. Furthermore, future images can be constitutive, they can frame and crystallize the policy focus (Beck et al. 2021, 49), sometimes in simplistic utopian or dystopian *clichés* reducing the scope and areas of political intervention. Pointing towards the multidimensional nature of co-production, Beck et al. (Beck et al. 2021, 49) argue that "emergence and enactment of alternative vision are objects of research in their own right".

Considering this, the research question can be segmented in four lines of inquiries:

- What are the sociotechnical imaginaries developed around Kleros?
- How do those future visions emerge and gain traction?
- How do sociotechnical imaginaries become performative in the case of Kleros?
- How do they compare with material evidence gathered through a technology assessment based on Kleros current design and usage?

My hypothesis is that projects such as Kleros capture attention and financial capital, as well as build communities using future narratives and imaginaries rather than the capabilities or practical usage of the technology. In this context, the technological artifact primarily serves the staging of this imagined future. This type of narrative – that combines visions of the future embodied in a technological prototype – seems effective and may impact the present, notably in the governance of technology. Expectations for future technology capacity are entangled with a specific vision of social organizations and may obscure broader political discussions. As technical progress seems inevitable, the social vision may be seen as a natural consequence and a form of determinism.

Anticipation about future technology may exclude alternatives for addressing a given social issue. For example, an alternative could be to use current technologies, another to limit the use of technologies avoiding "technological fix" or "technological first" approach. Furthermore, uncertainty may also emphasize discussion on the future technology – as the development of this technology is perceived as a necessity. Yet they may be no certainty on when and if the technology could work as expected. In other words, a technological fix based on future technology ignores the systemic nature of complex problems and drives attention to a technological level.

As a methodology, I undertook a thematic discourse analysis, which was structured following the theoretical framework developed by Oomen, Hoffman, and Hajer (2021). Based on initial participatory observation, the dramaturgical analysis of discursive techniques and staging study how images of the future arise and become performative.

The body of this thesis is organized into five parts. The first section explores existing literature in social theory concerned with the structuring effect of an imagined future, with an emphasis of technology development. The second section presents the methodology introduced above. The third section discusses blockchain and Kleros' future imaginaries. The fourth section analyzes how those imaginaries become performative through a dramaturgical analysis of techniques of futuring. The fifth section is an assessment of Kleros technical capabilities and usage. Lastly, the results are discussed and conclude by opening on the significance of future imaginaries for governance against the background of growing uncertainty about the future.

2. MOBILIZING THE FUTURE FOR SOCIOTECHNICAL TRANSITIONS

Today, the future seems an urgent matter and the concept re-emerged on the academic agenda (Oomen, Hoffman, and Hajer 2021, 2; Beckert 2016; Lösch et al. 2019; Urry 2016). Uncertainty about the future, in the context of environmental disaster leading to the programmed societal collapse, inequalities (Piketty and Goldhammer 2020) and technological risk (Zuboff 2019), steer the public imagination and views about what the future may become or should become (Oomen, Hoffman, and Hajer 2021, 2).

An important aspect in social sciences is that "history matters", notably in political science and sociology, which have traditionally insisted on explaining the current state of the world with reference to past events (Beckert 2016, 35). This is a central premise of important social theory such as "path-dependency". Swell (1996, 262) summaries the ideas of the past affecting the present: "what happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time". For example, Anderson (1983) studied how social imaginaries related to national identity were past and present-based, and not about future imaginaries.

Bell and Mau (1971) stress the difficulty in sociology to study things that have not yet happened and which have not taken material form in the present time. Bell and Mau address this difficulty in recognizing the future is real "in so far as social actors produce representations of the future which have an effect on others' actions in the present" (Tutton 2017, 5). Similarly, the sociology of expectations points out the significance of future-oriented abstractions in technology innovation as they are "fundamentally 'generative', they guide activities, provide structure and legitimation, attract interest and foster investment" (Borup et al. 2006, 285).

2.1. Sociotechnical Imaginaries

The concept of sociotechnical imaginaries provides an analytic framework to investigate the relationship of technology development to culture, as well as for exploring normative issues surrounding technological design (Jasanoff and Kim 2015; Jasanoff, Kim, and Sperling 2007). It was initially used to explain development variation and regulation of nuclear power in the US and South Korea (Jasanoff and Kim 2009). It was first aimed at cross national comparisons on policies for example energy policies (Jasanoff and Kim 2013), the governance of the sharing economy (Y. Hassan 2020) or smart grid (Ballo 2015). It was notably used on subjects associated with high future uncertainty and future thinking, such as environmental policy for example, to evaluate the performativity of European gas targets (Dignum et al. 2018) or to expose neglected issues in the governance of sustainability (Beck et al. 2021).

Previous research has studied blockchain imaginaries and recently Kleros[5]. In the context of blockchain technology, Reijers and Coeckelbergh (2018) demonstrate that our "understanding of blockchain technologies is not merely a technical matter, but that it strongly relates to the ways in which we normatively construct […] our social world". Sociotechnical imaginaries of governance in blockchain-based technologies were examined (Golding, Reinhart, and Paganelli 2020) and how inside the blockchain community imaginaries are used between actors to identify their differences, negotiate and reach points of crystallization (Kow and Lustig 2018).

One of the main sociotechnical imaginaries shared in bitcoin communities but also understood outside (not without contestation) is that "the currency will become the de facto international currency and will weaken the power of governments" (Lustig 2019, 4). As a result, on the one hand bitcoin will empower people in oppressive governments and failed states, and on the other hand bitcoin will facilitate tax evasion in stable states. This imaginary is in the spirit of libertarian

[5] The research on Kleros imaginaries were published as I was working on this thesis. As a result, I pivoted from the description of the imaginaries only to focus on the technique of futuring. Furthermore, their research focus on the viability and desirability of such system regarding the function of the current justice system.

positions intending to escape state coercion, but also compatible with the classical liberal tradition regarding the free market and property right (van der Vossen 2019).

Lusting (2019) shows how the blockchain open source community's vision of blockchain, as a decentralized autonomous system, emerged from the intersecting imaginaries of autonomous systems with distributed networks. Those pre-existing imaginaries about autonomous systems can be separated in: first, autonomous technologies as things, which relates to the original vision of the Internet of Things (IoT) that place technology in the background to create seamless human-to-human interactions; second, autonomous technologies as purely objective mathematical rules, which relate to corporate depictions of algorithms that are free of human intervention and appear "natural" and objective; and third, autonomous technologies as an artificial manager, where algorithms are often portrayed as a replacement for humans, even though they rely on human interventions and act as manager (Lustig 2019, 8–9). Similarly, imaginaries of distributed networks as offering freedom from centralized control or distributed networks as a new form of production can be distinguished (Lustig 2019, 9–13). Those preexisting imaginaries are the foundation of an imaginary supported by most blockchain community members: "Decentralized autonomous systems as freedom from centralized governance, replaced with math and artificial managers of material objects to form new means of production" (Lustig 2019, 15).

Those imaginaries are not uncontested. For example, we can find three distinctive visions[6] of governance in blockchain-based project promoted by leading figures of the Ethereum project: Gavin Wood advocates for a fully automated algorithmic governance; Vlad Zamfir promotes a techno-social approach that emphasizes the importance of human participation; lastly, Vitalik Buterin promotes a radical liberalist approach inspired by the book Radical Markets by economists Glen Weyl and Eric Posner (Golding, Reinhart, and Paganelli 2020, 149). The radical liberalists envision radical free markets that "would create greater competition and equality by a greater use of auctions and commonly owned property" (Buterin 2018) but favor the status quo of informal

[6] Exploring blockchain governance vision is not in the scope of this thesis. If you are interested to further explore those debates see https://medium.com/@VitalikButerin/liberation-through-radical-decentralization-22fc4bedc2ac and https://vitalik.ca/general/2019/04/03/collusion.html or https://medium.com/cryptolawreview/the-wood-zamfir-governance-debates-80e92436a457

and ad-hoc governance (Golding, Reinhart, and Paganelli 2020, 164). However, Atzori (2017) examined the coherence of blockchain normative claims and demonstrate that "decentralization through algorithm-based consensus is an organizational theory, not a stand-alone political theory" and concluded that the State is necessary as a "central point of coordination in society".

Imaginaries are not only a strategical instrument for the promotion of a certain vision of the future, they also integrate aspirations about how "collectives want that world to be" (Beck et al. 2021, 147).

2.2. Governance as a Performance

Sociotechnical imaginaries emphasize the co-produced nature of political order and technology development. Today, future visions are often commodified as "imaginaries are increasingly dominated by technology companies that not only take over the imaginative power of shaping future society, but also partly absorb public institutions' ability to govern these very futures with their rhetoric, technologies, and business models." (Mager and Katzenbach 2021).

As seen in the introduction, sociotechnical imaginaries are not limited to nation states but may apply to various groups. Yet, to capture sociotechnical imaginaries "in the making" that are not yet stabilized, Hilgartner (2015, 34) introduced the concept of "sociotechnical vanguard". He argues that we should distinguish visions from such relatively small vanguard groups from the stabilized sociotechnical imaginaries of larger groups:

> *"Sociotechnical vanguards formulate and act intentionally to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives, such as the nation. These vanguards and their individual leaders typically assume a visionary role, performing the identity of one who possesses superior knowledge of emerging technologies and aspires to realize their desirable potential."*

Vanguard groups can deploy considerable efforts to promote their vision and play a key role in the emergence of new sociotechnical imaginaries. Furthermore, they take concrete action in building prototypes and engaging with sometimes large communities in practices that demonstrate their visions, literally realizing their ideas (Hilgartner 2015, 35).

Policy practices are always a performance, yet in "situations in which there is an absence of clear and generally accepted rules and norms, and where the very locus of politics is unclear, the performative becomes the dominant force" (Hajer 2009, 72). Similarly, vanguard groups can take advantage of unstable settings, as in such settings "performing co-determines which rules are followed in the process, which definition of reality is followed […] and what constitutes legitimate intervention" (Hajer 2009, 72). Expectations based on development of emerging technology and future usages of technology in general are political and uncertain settings by nature. We should avoid in such dynamic fields analyses that "focus on strategy not ritual, interests not performance" (Hajer 2009, 60) and investigate practices. Consequently, to understand how future visions emerge and gain traction, analyzing technology governance as performance can be instrumental to understand technological transition and governance of emerging technologies.

A dramaturgic approach (see below) can be used to analyze – as a performance – the strategy and practices of small groups promoting specific sociotechnical visions. This approach allows for an analysis of emerging imaginaries in the making that consider the intertwined and dynamic aspects of technological and society, online communities, technical prototypes, and media in a networked and contested environment.

2.3. Technique of futuring and Dramaturgy: How Sociotechnical Imaginaries Become Performative

Future visions are recognized as being performative since they express the realms of possibilities "by guiding the making of things and services to come, imaginations of the future are co-producing the very future they envision" (Mager and Katzenbach 2021, 1). Today, the dynamic and performativity of future visions is well understood, notably how "the future" structures decision-making and social organizations (Beckert 2016; Bell and Mau 1971; Oomen, Hoffman, and Hajer 2021, 2; Borup et al. 2006; Hilgartner 2015; Jasanoff and Kim 2013). Oomen, Hoffman, and Hajer (2021) acknowledge that the performativity of imagined futures is well understood. However, they argue that how particular visions come about and why they become performative is understudied and propose a theoretical framework using the concepts of "technique of futuring" and "dramaturgical regimes".

In order to understand the actual process of constructing the future, Hajer and Pelzer (2018) introduce the concept of techniques of futuring defined as "practices bringing together actors around one or more imagined futures and through which actors come to share particular orientations for action". The notion of techniques of futuring was first introduced to understand how social groups constructed the future in the context of renewable energy. In this context, they emphasize how scholars rarely approach the construction of the future as something that needs to be explained, but rather as something that explains a situation (Hajer and Pelzer 2018, 222).

As an analytical tool, techniques of futuring allows the examination of practices that attempt to render imagined futures performative. While many scholars studied various effects of discourses, techniques of futuring tackle "what in the interaction of people makes some imaginaries make people see the future differently" and "what makes people act upon those insights, individually or collectively" (Hajer and Pelzer 2018, 224). They developed a dramaturgical framework to examine techniques of futuring and address these questions structured in three parts: storylines and narrative structure, sequential dramaturgy, and the navigation of structural constraints (Oomen, Hoffman, and Hajer 2021, 13). An overview of the dramaturgical regime framework and these three parts interplays is proposed in (

).

In summary, the first aspect of this dramaturgical framework, *storylines,* is concerned with the presentation of the future using discursive genres and narrative structures through which actors can collectively envision possibilities for action. These storylines "have the functional role of facilitating the reduction of the discursive complexity of a problem" (Hajer 1997, 63). A key element of those storylines is the *discursive genre* that relies on recognized authority and narrative structure (Oomen, Hoffman, and Hajer 2021, 11). The second aspect, the *staging of performance*, is a sequential process "that enacts an imaginary of the past, present and future" (Oomen, Hoffman, and Hajer 2021, 14) through which visions of the future become performative. The final aspect, *structural constraints*, is concerned with dramaturgical conventions and analysis of the existing structures – imaginaries, discursive and material – that allow imagined futures to become persuasive (Oomen, Hoffman, and Hajer 2021, 12).

Storylines are used to reduce the complexity (Hajer 1997, 63) and the unknowability of the future, and to facilitate the creation of a shared orientation (Oomen, Hoffman, and Hajer 2021, 10). In

turn, discursive genres make storylines persuasive to their audience. The discursive genres imply and rely on specific forms of imaginative authority and determine if and how an audience will engage with the future (Oomen, Hoffman, and Hajer 2021, 10). For example, the appeal of quantitative presentation relies on what Porter (2020) call "trust in number" and assumptions about "objectivity" and "scientific rigor" but also find its root in political motivation: "a decision made by number […] has the appearance of being fair and impersonal". Blockchain is a protocol-based mode of control (Galloway 2004, 27) and appeals to trust in mathematical rules, impregnable cryptography, and algorithm determinacy rather than fallible humans and institutional authority (Brekke 2019, 124).

Table 1 Dramaturgical Framework to Examine Techniques of Futuring.

Techniques of futuring	**Dramaturgical regime**	**Contribution to shaping possibilities for action**
Storylines: Presenting the future	Choice of discursive genres: Presented form (in combinations of words, numbers, images) narrative structure (internal logic of the 'story')	Creates a projective structure through which actors can envision possibilities for action. Draws upon particular cultural sources of authority (e.g. 'trust in numbers'). (Affective) engagement of audiences.
Dramaturgy: Staging the performance	Staging of events Sequential logic that enacts an imaginary of the past, present and future.	Performance of imagined futures, attracting a coalition to performed visions across organizational boundaries. Constitutes a sequence of performances: 'visions or 'imagined futures' through which the future can be understood and acted upon.
Structure: Navigating dramaturgical convention	Competencies, meanings, dispositions, material elements. Organizational structure, (political) access, and geographic dispersion of practitioners. Imaginaries, cultural norms, and widely shared imaginations of the future.	Negotiates performed visions of the future with existing practices around visualizing the future. Allows imagined futures to become persuasive and travel politically and socially Reifies or disrupts cultural norms, expectations, and imaginaries, based on cultural resonance of discursive carriers and dramaturgical performance.

Source:(Oomen, Hoffman, and Hajer 2021, 14) "Analyzing structurally bounded agency in the formation of future imaginaries", reproduced with minor adaptations.

The dramaturgy is concerned with how "social interactions take place in particular settings that co-determine the social process and effects of interactions. The setting of such interactions is crucial because settings and stages imbue interaction with certain meanings, often based on

imaginative understandings of how particular settings and configuration 'are supposed to' work." (Oomen, Hoffman, and Hajer 2021, 11). The persuasiveness of imagined futures depends on the "sequential process of interaction between people and place" and on how performance is staged in general but also "how presentations are 'scripted' and performed by their organizers" (Oomen, Hoffman, and Hajer 2021, 12).

Not only do techniques of futuring exist through a discursive vehicle and staging practices, they are supported by existing structures and conventions in which "assumptions about their value and appropriateness are held and enacted." (Oomen, Hoffman, and Hajer 2021, 12).

In the context of blockchain, existing conventions and structures have already been examined using other approaches. Across the West, those structures emerge in the context of challenges against centralized regulatory authorities, notably the aftermath of 2008 crisis, exacerbated a growing anti-government sentiment (Müller 2014, 2). Yet criticism of the centralization of power is not new. Centralization and bureaucracy allow coordination at scale but may create a risk of abuse of power. This is notably a central concern for libertarians that are "skeptical of political authority and state legitimacy" (van der Vossen 2019) and favor a minimal state. Other mechanisms of coordination such as free market mechanisms with strong property rights are considered more efficient. Activists such as cypherpunk groups advocate for the protection of individual privacy and "sought to develop cryptographic technologies to empower the individual over the State" (Jarvis 2021). The idea of self-sufficient peer-to-peer (P2P) decentralized networks where users interact in a free market controlled by algorithms takes its roots in such ideology (Atzori 2017, 46). For blockchain advocates, the breakdown of the state represents "the final victory of free markets and self-interested individuals over public institutions, in a process of economic liberalization which can be more properly defined as anarcho-capitalism" (Atzori 2017, 49).

Some values of the blockchain industry such as transparency and a collaborative spirit can be linked to the Open-Source Software movement, early personal computer hobbyists, or do-it-yourself and hacker subcultures. A major difference is that blockchain is self-financing its projects. This led to some specific conventions and "best practices" that most blockchain projects follow. Blockchain projects start with a community around a "story" where open-source projects organize around the source code. Alternatively, blockchain projects can arise from prototypes published directly on the blockchain which attract massive interest that will sediment as a community. In the

first case, blockchain projects will communicate their goals and create an inspirational story. From day one, communication channels will be open so that the community can gather. These kinds of belief of organization that put individual autonomy as the center are compatible with the libertarian ideology but is also an expression of technological utopianism and effort to develop, "social technology to save us". Mechanism design[7] is a form of technical solutionism where "neatly defined problems with definite, computable solutions or as transparent and self-evident processes that can be easily optimized—if only the right algorithms are in place!" (Morozov 2013, 13).

[7] Mechanism design is a "field in economics and game theory that takes an objectives-first approach to designing economic mechanisms or incentives, toward desired objectives, in strategic settings, where players act rationally. Because it starts at the end of the game, then goes backwards, it is also called reverse game theory." (Wikipedia contributors 2021). See https://en.wikipedia.org/wiki/Mechanism_design

3. METHODOLOGY

To investigate how imagined futures become performative, I undertook a thematic discourse analysis, which I structured by using the theoretical framework developed by Oomen, Hoffman, and Hajer (2021). Using the concepts of "technique of futuring" and "dramaturgical regime" described above, they propose a dramaturgical analysis of technique of futuring, notably on specific imaginative interventions (2021, 10). Techniques of futuring are defined as "practices bringing together actors around one or more imagined futures and through which actors come to share particular orientations for action" (Hajer and Pelzer 2018, 222). This concept of techniques of futuring provides an analytical tool to explain how future visions emerge and gain traction.

The discourse analysis was carried out on relevant material published by the project's team and actors in the ecosystem (white papers, chat groups, forums, videos, Twitter, blog posts, academic literature, and the self-published handbook); in-depth interviews; as well as the gray literature. The discourse analysis pays special attention on how actors characterize blockchain and Kleros. To better understand how future imaginaries emerged, specific imaginative interventions were analyzed using the three core aspects of the dramaturgical framework seen above which "determine the dynamic relationship between dramaturgy and the structuring of imagined futures" (Oomen, Hoffman, and Hajer 2021, 12).

3.1. Exploratory Research & Participatory Observation

Jasanoff (2015, 24) identifies comparison as a key method for studying sociotechnical imaginaries. In this thesis, sociotechnical imaginaries are compared with the current technical capabilities of Kleros and tangible usage of the platform. This has the benefit of engaging with the technology at a material and concrete level, something that more prevalent comparisons – such as ones across social or political structures – may lack.

A participatory observation approach was used during the exploratory phase. This exploratory phase was instrumental in identifying broad patterns and general actors' intentions in discourses.

This led to identifying sociotechnical imaginaries as a valuable theoretical tool in this context. Throughout the research, participatory observation remained an essential approach to consider Kleros' technical capacities and current usage.

Identification of important actors and discourses was done by following the actors and observing what they do, following to what actor–network theory (ANT) literature proposes (Pouloudi et al. 2004, 706). However, according to Pouloudi et al as well (2004, 706), practical guidance is limited. Therefore, as a guiding principle to identify human actors, we use Bryson's (2018, 27) definition of stakeholders: "A stakeholder is defined as any person, group, or organization that can place a claim on an organization's attention, resources, or output or is affected by that output". In the context of Kleros, "organization" must be understood more broadly as both an open-source project carried by the Kleros company and a P2P network supporting a cryptocourt platform, as well as Kleros' immediate and larger community.

Participant observation as a research methodology enables "researchers to learn about the activities of the people under study in the natural setting through observing and participating in those activities" (Kawulich 2005, 2). This method is widely practiced by anthropologists, sociologists and communication studies to conduct qualitative research. Furthermore, the participant observation method can be adapted to study online communities where participation in human activities is supplemented with machine activities (Hjorth et al. 2017, 25). Exploration is an adequate methodological approach when a situation "has received little or no systematic empirical scrutiny, has been largely examined using prediction and control rather than flexibility and open-mindedness […]." (Stebbins 2001, 13).

Participant observation with an ethnographic mindset allows the assessment of Kleros as community-driven open-source project. This type of project relies on specific platforms, tools, and communication channels. Accessing these projects' organizational and management tools is necessary to explore their social structures and to retrieve information. Communities rely on culture and rituals. Thus, outsiders may have a hard time to understand their meaning and function. Furthermore, blockchain technologies are P2P networked sociotechnical systems that are designed around incentives to sustain their operation. Observing those social networks in both the technical and social aspects requires to participate to the network in some degree.

The same reasoning is in line with Pacey's work (1999), who noted that academic and professional comments on technology tend to avoid discussions of personal experience, as it may seem too subjective. However, if you have never ridden a bicycle nor saw one, determining, "what it feels like" to ride one by reading about it or asking around is going to be much harder than giving it a try. Trying is a shortcut, a starting point to have an informed discussion on personal experience. Though, networked digital technology is not a bicycle: you join a network mediated through technology, which is a full-on social experience. When it comes to digital technology, "knowing-how" is the "knowing-what". Trying is the only way to conduct a direct observation of that experience, rather than interpreting the "(social) effect" of the "technical object" as the experience. As McCarthy and Wright (2004, 2) put it "We don't just use or admire technology; we live with it."

3.2. Concrete Activities

As part of the participatory observation, I tried out the Kleros technology. This active participation also involved exchanging with project owners and the community, challenging preconceptions and internal discourse. This process was facilitated by my previous personal experience with blockchain projects from 2015 onward, including decades-worth of involvement in open-source project and online communities.

My robust experience in engaging with internet communities made this research possible. Decades of professional consulting services in the web industry related to software development and project management led me to interact daily with open-source project communities. I have been part of software communities, in particular Drupal, a leading CMS where I published a plugin installed on more than 100,000 websites and created a Capistrano extension for Drupal deployment. I additionally participated in hundreds of projects either by personal interest or to resolve specific issues for Firefox, MacPorts and GNU/Linux, for instance. I have had an active engagement in projects such as Wikipedia since 2005, stemming from my strong interest in Linux and the free software movement as a teenager. I have thus formed a deep understanding of the culture, politics, and governance of those projects. I also developed a strong command of the tools required to engage with the communities and, for example, propose code or organizational changes. Today, I support my clients in developing their strategy regarding open-source licensing, participation on digital platforms, and strategic positioning in the open-source ecosystem and this regularly led me

to assess open-source projects based on their community strength, culture, business model, and technical capabilities. This tacit knowledge and high digital literacy were instrumental in the exploration and participatory observation of Kleros.

Important activities of the participatory research include:

- Joining the communication channels (Telegram, Discords Twitter, GitHub), participating in discussions and asking questions.
- Learning through video tutorials (Kleros 2019b) and documentation how to become a juror (Kleros 2019a).
- Assessing the project "as a user" by reading the project presentation of the website, medium article, and white paper.
- Evaluating the PNK token price evolution on coingecko.com and coinmarketcap.com and the community sentiment about the price in chat/Twitter.
- Buying PNK tokens: buying ETH in Kraken exchange and transferring them to my ETH address; exchanging ETH to PNK through decentralized exchanges (DEXs) using the MetaMask Firefox Plugin swap service; buying PNK directly on OKEx exchange and transferring them to my ETH address.
- Staking[8] 1764 PNK in the "onboarding court"[9] in order to become a juror.
- Identifying and following Kleros usage metrics (number of cases, jurors, stakes, …) from on-chain data using klerosboard.com and etherscan.io.
- Assessing Kleros smart contracts on etherscan.io and github.com and identifying the developers.
- Verifying the openness of the licenses used by Kleros for all their code.
- Following community voting (PNK holders) on snapshot.org.

[8] Stacking is the process of locking crypto assets into a smart contract.

[9] According to court.kleros.io interface the onboarding court "Allow new jurors to get a feel of Kleros by solving a variety of small disputes. Allow projects considering Kleros use to have some disputes solved with Kleros in order to compare Kleros results with other methods.". The min stake to enter this court is 700 PNK.

- Exploring the ecosystem of services that leverage the Kleros smart contract such as Proof of Humanity, Escrow, Curate, Tokens, Linguo, Dispute Resolver, and the integration in service like Omen, Reality, Gitcoin and more.
- Closely following the project launch of Proof of Humanity and how the project connects to Kleros.

3.3. Case Study

I engaged in an exploratory use of case study with the goal of hypothesis generation and to gain concrete knowledge on a specific technology. A case study mixed approach with multiple data sources and mixed methods, such as interviewing stakeholders and participating in the subject of research, was necessary to explore potential gaps between discourses surrounding blockchain and the reality. Ridder (2017, 289) provides from the work of Burawoy (2009) Stake (2005) and Yin (2014) a condensed and consensual definition: “Case study research scientifically investigates into a real-life phenomenon in-depth and within its environmental context. Such a case can be an individual, a group, an organization, an event, a problem, or an anomaly.”

According to Treiblmaier (2019, 1), case studies are a suitable approach to transfer blockchain industry experience to a research agenda. For him, case study research is a “far wider-ranging and more powerful approach than many researchers might realize.” (Treiblmaier 2019, 7). I favored a constructivist approach in conducting the case study. I distance myself from Treiblmaier’s “industrial use cases” approach where he suggests transferring blockchain industry experience to research agenda or Yin’s positivism. Yin primarily pursues positivism and a realist perspective, even though he mentions a constructivist as a valid alternative: “By pursuing a relativist perspective, you might pursue a constructivist approach in designing and conducting your case study—attempting to capture the perspectives of different participants and focusing on how their different meanings illuminate your topic of study.” (Yin 2018, 47).

3.4. Limitations

Sociotechnical imaginaries have the advantage of focusing on cultural meanings and shared narratives. They also reject political determinism and beliefs of permanent rationality of actions

(Sovacool and Hess 2017, 719). The theory highlights the performative element of technology: “unlike mere ideas and fashions, sociotechnical imaginaries are collective, durable, capable of being performed; yet they are also temporally situated and culturally particular” (Jasanoff and Kim 2015, 19).

Those characteristics comes with some acknowledged limitations and drawbacks. Research can be limited to descriptive cultural analysis in omitting other aspects of sociotechnical change. It can be especially difficult to capture the dialectics between past and future, separating various imaginary spatially and by social group or identify collective stories from individual experience, making those differences not always evident (Sovacool and Hess 2017, 20).

During the participant observation, testing was constrained by fees required by each transaction on the Ethereum networks (from 30 up to 200 USD) and by the low level of activity on Kleros courts. However, both aspects reveal the limitations of the platform and relatively low concrete usage.

Choosing a project backed by a small enterprise – at a microlevel – allows empirical technology assessment and direct observation of the community with limited resources. But solid generalization is out of the scope of this study. Only in the light of other studies can the dynamic of imaginaries and their role in technology development and policies be understood better.

Participatory observation “on the internet” poses specific ethical challenges (Allen 2017, 1096). Obtaining informed consent may be difficult, if not impossible, as a result of the connectivity and dynamic nature of the medium. However, due to the public nature and because participants expect that their behavior might be observed, informed consent can be less salient depending of the type of community (Willis 2019). I was vigilant not to cross the line and keep my investigation in settings that were public in nature, text based and pseudonymous. Informed consent was obtained for interviews and Kleros owner were made aware of my research.

4. KLEROS FUTURE IMAGINARIES

4.1. The Kleros Project

As seen in the introduction, Kleros is a blockchain-based decentralized dispute resolution that makes use of crypto-economics-based incentives to provide decentralized arbitration services where members are automatically selected as jurors. In practice, Kleros acts as an ad hoc decentralized arbitration system where two parties can submit a claim to a crowdsourced jury where the fairness of the jury is ensured by financial incentives.

Kleros development is coordinated by Coopérative Kleros, Société Coopérative d'Intérêt Collectif (SCIC) incorporated in France (Guérin 2019, 2). A "Coopérative" is, in the French legal system, a venture made for a specific project, in this case the Kleros project. Kleros is made as reusable components that can be used in other smart contracts that become "arbitrable" (Lesaege 2021). This allows various kinds of integration and services to be built on top of this system.[10] Kleros developed a number of showcases to illustrate the flexibility of the system such as Kleros Escrow (https://escrow.kleros.io), Curate (https://curate.kleros.io) or Kleros Court (https://court.kleros.io).

Kleros cryptoeconomic[11] model attempts to coordinate users while preventing attacks by malicious parties (Kleros Contributors 2020). Game theorist Thomas Schelling introduced the focal point concept (or Schelling point): "People can often concert their intentions or expectations with others

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[10] General and technical documentation regarding integrations can be found at: https://kleros.gitbook.io/docs/integrations/overview

[11] Cryptoeconomics attempts to solve participant coordination problems in digital ecosystems through cryptography and economic incentives. This emerging field draws on ideas and concepts from economics, game theory and related disciplines in the design of peer-to-peer, cryptographic systems. See https://policyreview.info/open-abstracts/cryptoeconomics or https://academy.binance.com/en/articles/a-beginners-introduction-to-cryptoeconomics.

if each knows that the other is trying to do the same". Extending on this idea, Vitalik Buterin has proposed the creation of the SchellingCoin a token that aligns telling the truth with economic incentives (Buterin 2014; Lesaege, George, and Ast 2020): “If we wanted to know if it rained in Paris this morning, we could ask every owner of a SchellingCoin: Has it rained in Paris this morning? Yes or No. Each coin holder vote by secret ballot and after they have all voted, results are revealed. Parties who voted as the majority are rewarded with 10% of their coins. Parties who voted differently from the majority lose 10% of their coins.”. The incentives design underlying Kleros is based on similar mechanisms (Lesaege, George, and Ast 2020).

After developing in-house proof-of-concept, Kleros is now working on attracting other projects[12] which may integrate in their system (Lesaege 2021). A recent and notable partnership is the Proof of Humanity (PoH) registry. This online registry of individual profiles linked to an Ethereum address aims to prove that every individual behind a profile is both unique and a human. Users can self-register, but other users may challenge their submission using Kleros. Kleros also introduced a curated token list system that is now used notably by Uniswap and other Defy project. Kleros is also used to settle various prediction markets such as Polkamarkets or more general information market platforms like Omen (Figure 1).

[12] Projects officially integrated with Kleros can be found at https://kleros.io/integrations/

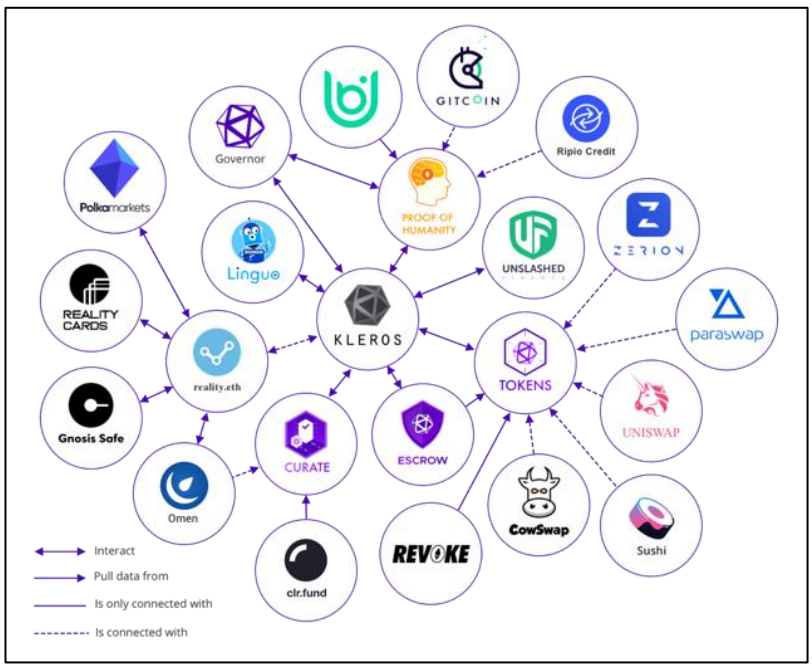

Figure 1 Overview of product integration as presented by Kleros in their documentation. Source: (Coopérative Kleros 2021), Kleros Documentation Overview https://kleros.gitbook.io/docs/integrations/overview

The Kleros team manages many communications and social networks channels (Table 2)[13]. Those channels are the backbone of the project and gather a large number of participants. This loosely tied group of participants may be referred as the "Kleros community". Kleros team members maintain a high level of activity through announcements and reactions, while the level of activities of other participants varies greatly. The structure of the discourse and how it may affect future imaginaries will be developed below in the analysis of Technique of Futuring.

[13] Throughout the thesis when referring to a Kleros communication platform if no other mention it refers to the account in this table (i.e., Kleros Telegram or Kleros YouTube).

Table 2 Kleros Main Communication Channels and Social Network Accounts.

Platform	**Description & Users**	**Link**
Main Website	Official Website	https://kleros.io
Blog	Regular posting about recent developments of Kleros	https://blog.kleros.io/
Telegram (Kleros)	4'900+ members, ~500 online at any given time. Constant posting.	https://t.me/kleros
Telegram (Proof of Humanity)	7'300+ members, ~300 online. Constant posting. Substantial growth rate of members.	https://t.me/proofhumanity
Twitter	14'500+ followers, main official communication channel.	https://twitter.com/Kleros_io
Slack	1'300+ members.	https://kleros.slack.com
Forum	Community and developer forum	https://forum.kleros.io/
Github	Public development repository, daily activity.	https://github.com/kleros
Linkedin	2700+ followers. Around one post a month until 6 months ago (no recent post). Allows knowing who works at Kleros.	https://www.linkedin.com/company/kleros/
Youtube	1'500+ subscribers. Regular posting with limited views for most videos.	https://www.youtube.com/channel/UCEjwygFVVrSXhPNEKfweypA
Reddit	700+ members. Low but constant activity.	https://www.reddit.com/r/Kleros/
Soundcloud	<10 followers. In total 8 videos posted in the last 8 months.	https://soundcloud.com/cooperative-kleros
Facebook	700+ followers, low activity, last post in November 2020.	https://www.facebook.com/kleros.io/
Medium	Long-form posts, but no recent activity, last entry from 2018.	https://medium.com/kleros

Source: Author's research

Kleros generates a substantial amount of diverse documentation and research activities. This includes white papers, videos, blog posts, academic literature, and activities on social networks. Furthermore, Kleros published a digital book of 460 pages made by 35 contributors from academia, developers, designers, lawyers, and various people close to the project (Kleros Contributors 2020). This book also presents some research made through the fellow program. The Kleros 6-month-long "fellows" remote program provides the opportunity for participants to conduct research on topics connected to Kleros and decentralized justice. To date, about 36 individuals participated; Kleros offers no grant for that program. According to Kleros, the Kleros

project “has a very active research team in cryptoeconomics, computer science, business and law” (Kleros 2021a).

Notable institutional supports can be highlighted. Kleros received support from the Banque Publique de France for “a total of €718,017, of which €478,678 is a non-refundable grant, and €239,339 is a refundable loan under the terms and conditions of the program.” (Ast 2020a). The European Innovation Council (EIC) Prize on Blockchains for Social Good awarded €5 million to six winners, including €500,000 to Kleros (European Commission 2020b). The EIC had the idea of a prize in 2017 as a way to promote blockchain projects with strong social goals, but the prize concretely materialized in 2019 (Sestini 2021). Thomson Reuters hosted Kleros in its incubator program dedicated to early-stage start-ups (Kleros 2018). Kleros often refers these supports in their communication material as a proof of the validity of their product (Ast 2020a).

Financially, Kleros makes a significant amount of money from their assets kept in crypto currency, notably ETH. This is not an isolated case in this field, but rather the norm, as crypto projects get primarily funded through token sales (Kleros returns on their token is on the low end), and then enjoy the general crypto market growth[14] with returns of several thousand percent a year. Kleros made several PNK token sales, the last of which, in January 2020, generated 7,790 ETH or about €1 million, while the first generated 5,800 ETH. In March 2020, Kleros’s assets included 9,156 ETH and 0.3 BTC. In May 2020, ETH price reached its then all-time high of about €2,450. This brought Kleros assets valuation at over €20 million. It is probably even higher as, in interviews, the founders mentioned active management and their participation in decentralized finance (DeFi)[15] with some of their funds (Lesage 2021). DeFi went from a market valuation of a few million USD in 2019 to a $128 billion USD in April 2020 (Dale 2021). Yet, according to Kleros

[14] To gain a better sense of the amount of value moved into the crypto industry refer to the 2021 Gecko Quarterly Cryptocurrency Report: https://www.coingecko.com/buzz/q1-2021-quarterly-cryptocurrency-report.

[15] DeFi is a type of finance where financial services (assets exchange, lending, derivative, …) are provided by smart contract often connected to offer more advance systems and services.

community update of April 2021 they "only" held a treasury "in the vicinity of €26 million euros – of which around €12 million were held in PNK" (Ast 2021a).

In terms of governance, from December 2020 onwards "any changes made to core contracts powering the Kleros ecosystem will need to be voted on and executed via community vote using PNK" (Ast 2020d). Users can create proposals and vote (on snapshot) by allocating their PNK tokens.[16] Kleros publishes annual transparency reports (Ast 2020b). They list their notable activities in chronological order and contain the following sections: research activities, development activities, marketing and communications activities, future developments, financial and burning rate, token allocation, and future funding.

4.2. Exploration of Kleros Imaginaries

The exploration of Kleros imaginaries leads to sociotechnical imaginaries similar to those found in the current literature on Bitcoin and blockchain. Kleros imaginaries are deeply entangled with those of blockchain. Kleros broad imaginary envisions cryptocourts as "more open, trustworthy, transparent, and democratic system of justice" (Dylag and Smith 2021). Kleros imagines "that juror honesty, and in turn the production of juridical truth, can be governed by immutable cryptoeconomics laws and correct incentive structures that cryptocourts can provide." (Dylag and Smith 2021).

Several major themes emerge from the discourses. One deals with democratization and decentralization, in effort to have a system where anyone can participate. Kleros is also presented as a renaissance of "true democracy" with constant references to Ancient Greece democracy but also medieval Law Merchant. Lastly, the inevitability of a system such as Kleros, depicted as necessary for the "internet age", is a recurring topic.

[16] Snapshot is a decentralized online voting system that use off-chain signing technics to avoid blockchain network fees (Snapshot 2021). Project owners can create their own "space" where users can connect with their wallet to prove token holding and sign their vote with their key.

4.2.1. Democratization and Decentralization

Kleros is presented as a platform with "crowdsourced jurors" where anyone can participate and earn money. According to the Kleros team, Blockchain "fosters financial inclusion by exploring decentralized economic structure" and cryptocurrencies are "helping millions achieve financial inclusion" (Lesaege, Ast, and George 2019, 15; Lesaege, George, and Ast 2020, 41). Kleros is typically referred as "honest" and "fair" (Lesaege, Ast, and George 2019, 8).

Furthermore, the Kleros team assert that Kleros is more than a technology, it's a "movement" that will "democratize access to justice" (Lesaege, Ast, and George 2019, 15; Lesaege, George, and Ast 2020, 41). Kleros has the potential to bring "justice for the unjusticed" (Lesaege, Ast, and George 2019, 15; Lesaege, George, and Ast 2020, 41).

Similarly, according to the European Commission (EC), "the potential of [distributed ledger technologies] DLTs to generate positive social change by decentralizing and disintermediating processes related to local or global sustainability challenges is still largely untapped." (European Commission 2018). The EIC Horizon Prizes in which Kleros participated in was conducted as part of the Next Generation Internet (NGI) initiative and funded by the European Innovation Council (EIC), which today has a €10 billion budget from the €95 billion within Horizon Europe (European Commission 2020a). Using a prize instead of classic call for research proposals limits the risk for EC of having no tangible result, as the prize was limited to working prototypes (Sestini 2021). Congratulating the winning projects, Maria Gabriel, Commissioner for Innovation Research, Culture, Education, and Youth commented that the blockchain can "create[s] positive social change" while for Thierry Breton, Commissioner for the Internal Market the participants demonstrated the blockchain can address, "local and global challenges" (European Commission 2020).

The EC envisions that blockchain can (and should) be used for "decentralizing and disintermediating processes" that could enable "a more even distribution and sharing of information and resources which respect privacy while providing levels of transparency" (European Commission 2018). The EC pursues a clear and assumed normative stand: blockchain financial applications are under development, but we need to foster social good (European Commission 2018). The definition of what a social good is remains unclear. However, some examples are given such as: raw material origin, transparency in public spending, participative

democracy, managing property or land or any public record, or financial inclusion. Monetary applications were excluded (Sestini 2021).

4.2.2. Kleros as the Renaissance of True Democracy

The Kleros team references Ancient Greece democracy repeatedly as part of their narrative (Lesaege, George, and Ast 2020; Lesaege, Ast, and George 2019; Kleros Contributors 2020). However, they demonstrate limited historical knowledge, despite constant attempts to fit themselves into a historical narrative of democracy and justice, and to present their platform as a revolution and complete break from current systems. For instance, "The concepts of judges and juries and laws arose at the same time as the nation state. But there are older ways of resolving problems that may be a better fit with the way the Internet works. These older approaches don't rely on governments, jurisdictions, and legal regimes. They aren't imposed from above by some powerful enforcement body. In fact, the majority of the world's population still uses these approaches to resolve disputes and provide fairness, even though they get far less attention than the formal justice system we hear about every day in the media" (Kleros Contributors 2020, 18). Similarly, Primavera de Filippi (2020, 23) uses reference to history (Lex Mercatoria) and the lack of democratic governance of online service providers to justify Kleros and blockchain-based systems via self-regulation. She calls this potential new normative system "Lex Criptographia" (De Filippi and Wright 2018).

Kleros claims to have a cutting-edge approach that "fundamentally rethink[s]" arbitration processes rather than making existing ones better or more efficient (Ast 2018). In the handbook published by Kleros, Ast Kleros Founder and CEO insists on the necessity to convince people that Kleros works, with the stated goal to communicate the vision for the future of courts to "motivate the right minds to think about the future of the legal industry and law as a whole" (Kleros Contributors 2020, 2).

4.2.3. Kleros as Crucial Mechanism in Future Democracy in the Internet Age

Kleros is positioned in this communication material as the central organization for the future of democracy: "Kleros as a Supreme Court for the Internet" (Kleros Contributors 2020, 2). This is presented as an inevitability: "the world is rapidly changing and law will have to adapt to this rising tide". The handbook itself aims to be a full account "of the emerging field of decentralized justice" (Kleros Contributors 2020, 2). For Siri (2020, 22), the founder of Democracy Earth

Foundation, Kleros enables the very origins of the idea of democracy (referring to Ancient Greece) to be "reborn" away of the current democracy that can be corrupted.

In an article for Thomson Reuters, Ast (2018) argues that "cryptocurrency may become the pillar for building the institutions of the Internet Age". Using appeal to authority, the BPI France Innovation Grant is framed as a confirmation of the value of Kleros "bringing the future of justice a step closer to reality". Kleros is compared with the most successful digital services such as Wikipedia, Uber, Airbnb, or Yelp, and names such as Aaron Schwartz, Julian Assange, and Edward Snowden are listed to establish a link between their activism and the Kleros project (Kleros Contributors 2020, 450).

According to Kleros, Proof of Humanity (a recent major project integrating with Kleros) has the potential to enable "democracy online" (Malbašić 2021). The technology will "deploy democracy" as only technology can suppress voting and election manipulations (Malbašić 2021).

Kleros team describes Proof of Humanity as a "fantastic opportunity to structure completely new governance mechanisms on the basis of efficiency and transparency" and uses terms such as "open-source", "free", and "censorship-resistant" as values rather than technical characteristics (Malbašić 2021). According to Kleros, Proof of Humanity enables the creation of "social blockchains allowing the creation of efficient democratic mechanisms" (Malbašić 2021).

The relation between Proof of Humanity and the Universal Basic Income (UBI) token is unclear. This token is continually distributed (one UBI by hour) to all people registered on Proof of Humanity. In their general presentation, Proof of Humanity presents their "universal basic income" as "your right as a human". The costs of registering are unclear, various uses are presented but never explained. A blog post on Kleros website explaining how to register and use the platform states that "there are all sorts of amazing use cases and reasons to be on the Proof of Humanity" (James 2021) but without explaining further, using humor, and memes to make the process appear friendly.

4.3. Synthesizing Kleros Imaginaries

The Kleros team defines Kleros as “a decision protocol for a multi-purpose court system able to solve every kind of dispute” (Lesaege, Ast, and George 2019). In the discourse, Kleros is often presented as a renaissance of the true spirit of democracy and a remedy to the centralization of current institutions as well as abuse of power. Blockchain technology provides the underlying security and transparency, and offers “decentralized, trusted and transparent solutions” (Kleros and Next Generation Internet 2019). Thanks to blockchain, Kleros rulings are “automatically enforced” (by smart contracts) and the system guarantees that no party can “tamper with the evidence nor manipulate the jury selection” (European Commission 2020b).

Imaginaries presented by Kleros can vary depending on the context. For example, Kleros was presented to the ECI award as a solution to resolve “small consumer disputes” in e-commerce or collaborative economy “in a cheap, fast and fair way” (Ast and Lesaege 2018), but not as a contributor to the replacement and leapfrogging of democratic institutions.

Nevertheless, we can synthesize the sociotechnical imaginaries found by other research and in my own research as follows: Kleros is the future of justice. Current institutions are deeply flawed and do not serve the people. Kleros is open to everyone. Kleros is a universal, self-sufficient, efficient dispute resolution service, which is transparent, decentralized, and automatically enforced thanks to blockchain.

5. KLEROS TECHNIQUES OF FUTURING

As seen above, futuring is the "the active engagement with the future" and refers to the "activity of actors-in-contexts trying to stabilize or destabilize shared notions of the future" (Hajer and Pelzer 2018, 224). Hajer and Pelzer (2018, 224) argue that "particular understanding of what alternative future may be conceivable […] depends of enactment". This part explores what in the social interactions and chronology of events makes the imaginaries found in the discourse transformative.

Kleros deploys a large spectrum of interrelated techniques of futuring. It may be arduous to find an explicit coherent agenda and logical sequence of events required for a clear dramaturgical analysis. To overcome this difficulty, in addition to a broad analysis, specific focus on the upcoming Kleros 2.0 – the next version of Kleros – allowed a chronological approach of events. Kleros 2.0 is an effort to address scalability limitations of the current version due to transaction costs. Kleros 2.0 new cross-chain architecture allows arbitrable contract to live on other chains while the core will likely be on an EVM-compatible rollup[17].

Additionally, analysis of the launch of Proof of Humanity and the Kleros participation in the European Commission Award offered additional insights. Together, these should provide an understanding of the dynamics at play.

[17] Rollups are technical solutions that offer a scalability gain by performing transaction execution outside the main Ethereum chain and only save post transaction data the main Ethereum chain. See https://ethereum.org/hr/developers/docs/scaling/layer-2-rollups/

5.1. Storylines

A described above, *storylines* concern the presentation of the future, using discursive genres and narrative structures through which actors can collectively envision possibilities for action.

Kleros main storyline is explicit in the introduction of Kleros White paper and Yellow papers: "The world is experiencing an accelerated pace of globalization and digitalization. An exponentially growing number of transactions are being conducted online across jurisdictional boundaries. […] Existing dispute resolution technologies are too slow, too expensive, and too unreliable for a decentralized global economy operating in real time. A fast, inexpensive, transparent, reliable, and decentralized dispute resolution mechanism that renders ultimate judgments about the enforceability of smart contracts is a key institution for the blockchain era." (Lesaege, Ast, and George 2019; Lesaege, George, and Ast 2020; 2021). This storyline is similar to Kleros' one page presentation: "As the use of Internet platforms keeps growing, a large space will keep opening for dispute resolution. Blockchain can provide the security and transparency for this key part of infrastructure for the digital economy. We need to democratize access to justice with a decentralized court system for the Internet Age" (Kleros 2020c).

We can rephrase the storyline in a shorter and more general form: "The digital age requires a global and accessible to all, blockchain-based, decentralized justice system independent from governments and legal regimes". The Kleros team semi-implicitly suggests that Kleros can disrupt the current justice system and "just as Bitcoin brought 'banking for the unbanked', Kleros has the potential to bring 'justice for the unjusticed'" (Lesaege, George, and Ast 2021, 41). The narrative structure creates a rupture between the past and the future. The old government system is framed as irrelevant for a society that is presented as entering a new age. The temporal rupture supports the ideas of new social systems that must be independent from current governances.

According to Kleros, the first step towards Kleros 2.0 was the publication of the Kleros Yellow Paper (Kleros 2021d). Its introduction is identical to the original Kleros White Paper and has the same underlying storyline as the main Kleros storyline. Yet, the upcoming Kleros version 2.0 is also supported by a specific storyline that was made explicit in a recent blog post (Kleros 2021d): "A long time has passed since the launch of the current version of Kleros. That version was good enough to start testing the concept of decentralized justice and to reach our first 1,000 cases. Now, the challenge is different: scaling Kleros from its first 1,000 to its first billion cases.". In May

2021, months before this blog post, the Kleros Twitter account posted a thread titled “the road to Kleros scalability” which described prior and future technology improvements. The Twitter thread concluded as if Kleros 2.0 had already been released, with the following statement: “Kleros is now the scalable dispute resolution protocol for the multi-chain ecosystem” (Kleros 2021b). Yet six months after this Twitter post, Kleros 2.0 developments had only just begun and nothing had yet been deployed.

Storylines are not always explicitly found in the project’s descriptions. For example, the Proof of Humanity registry storyline is convoluted: “A common problem on the internet is the lack of sybil-resistant[18] identity systems. Users can create multiple accounts to receive rewards multiple times, bias votes, write multiple fake reviews, etc. Proof of Humanity, a system combining webs of trust, with reverse Turing tests, and dispute resolution to create a sybil-proof list of humans”. This storyline itself is not very alluring, as it proposes to its users to become part of a public registry where their personal information and a video of themselves are saved forever. This registry could lead to “one person one vote” system on a blockchain distributed autonomous organizations (DAO)[19], but it is not directly engaging as users may have to wait for the DAO they are interested in to require an account on Proof of Humanity to register.

The storyline with real traction comes from a complementary product of Proof of Humanity, the Universal Basic Income token (UBI). The UBI provides a stronger, more immediate, storyline: “Universal Basic Income is your right as a human” (Proof Of Humanity 2021). UBI was launched

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[18]“A Sybil attack is a type of attack on a computer network service where an attacker subverts the service's reputation system by creating a large number of pseudonymous identities and uses them to gain a disproportionately large influence.” https://en.wikipedia.org/wiki/Sybil_attack One way to mitigate such attack is by enforcing a Proof of Personhood (PoP) mechanism “in which each unique human participant obtains one equal unit of voting power and associated rewards.” https://en.wikipedia.org/wiki/Proof_of_personhood

[19] According to Hassan and Filippi (2021, 4) a DAO is “a blockchain-based system that enables people to coordinate and self-govern themselves mediated by a set of self-executing rules deployed on a public blockchain, and whose governance is decentralized (i.e. independent from central control)”.

in parallel to Proof of Humanity and was certainly the main driver for user attention and registrations by providing a sense of “free money”.

5.1.1. Choice of Discursive Genre

In Kleros, the “White Paper” discursive genre is the foundation of the legitimacy and trust in Kleros proposed future and Kleros solution. Their White Paper and Yellow Paper borrow the esthetics of academic literature, specifically as documents produced with LaTeX[20]; an application typically used in academia when writing complex mathematical expressions is necessary. Providing this type of White Paper is a convention followed by most blockchain projects. This convention can be traced back to the original Bitcoin paper (Nakamoto 2008). Outside of blockchain, White Papers were initially government documents but since 1990s commonly used in business-to-business (B2B) as sales tools or to attract private investments. Yellow Papers are research documents that are not yet published in academic journals. Yet White Papers and Yellow Papers have a rather a loose definition and no established strict form. However, providing a White Paper is a tacit requirement in the blockchain industry to demonstrate the seriousness of the project and to attract “investors”, users buying the project’s tokens.

Kleros follows and combines diverse discursive genres depending on the communication channel and intended audience. Those discursive genres can be separated in two categories. One category is static content, such as the White Paper, presentation posters, a self-published book about Kleros and decentralized justice, and various blog posts. The second category is dynamic and platform-based such as discussions on Twitter, Telegram, Discord, Facebook, or Reddit. Furthermore, Kleros follows some conventions of Open-Source projects, such as having the source code repository on GitHub and using it to report bugs. The next section will address how this multi-genre and multi-channel communication plays out in the staging of the future.

[20] LaTeX is a software system for document preparation originally written in the early 1980s. According to the Kleros White Paper meta-data the PDF was produced with LaTeX.

5.2. Dramaturgy

Kleros main storyline allows Kleros to present itself as the forefront of the "decentralized justice research", developing a concrete technical solution that everybody can try. This section focuses on the dramaturgy and how this imagined futures become performative by analyzing the *staging of performance*, a sequential process "that enacts an imaginary of the past, present and future" (Oomen, Hoffman, and Hajer 2021, 14).

"Static content" such as the White Paper are expected markers and viewed as constitutive of blockchain projects (Burret and Perdrisat 2020, 309). The White Paper is made accessible on a promotional website in an effort to attract members and build a community on social networks. Kleros frequently publishes on its social network channels[21], creating a feed of information mixed with users' reactions, comments, and questions. This community materializes as followers and participants in those various dynamic channels of communication. This allows for a sustained performance of constant progress supported by the interest of the community and legitimized by documents such as the White Paper, giving a sense of a social movement on a mission. This self-reinforcing dynamic is drastically expanded by the project's tokenization and financialization that introduce speculation on the price of the token. The price of the token is highly dependent on the perceived popularity of the project. In turn, price raising, and volatility may attract attention. Therefore, the capacity to capture attention is the success of the project. This is especially true as most blockchain projects are social technologies and compete in environment where attention is a scare resource (Simon 1971) and correlated with access to capital.

Despite the chronological nature of feeds, this networked social dynamic has no factual linearity. The notion of a sequential process is expressed through documents that imply causality and linearity. For example, the Kleros Timeline – a stylized poster presenting Kleros history and

[21] Depending on the nature of the social network channel, Kleros may or may not have an official account. On chats (Telegram, Discord), Kleros team uses their personal accounts on the channel. On channels such as Twitter or YouTube, Kleros has an official account, but members also interact with their personal account.

achievement – reduces the complexity to a seemingly smooth and logical timeline that demonstrates successful steps following each other. Similarly, annual transparency reports or semestrial community updates[22] create a benchmarked history.

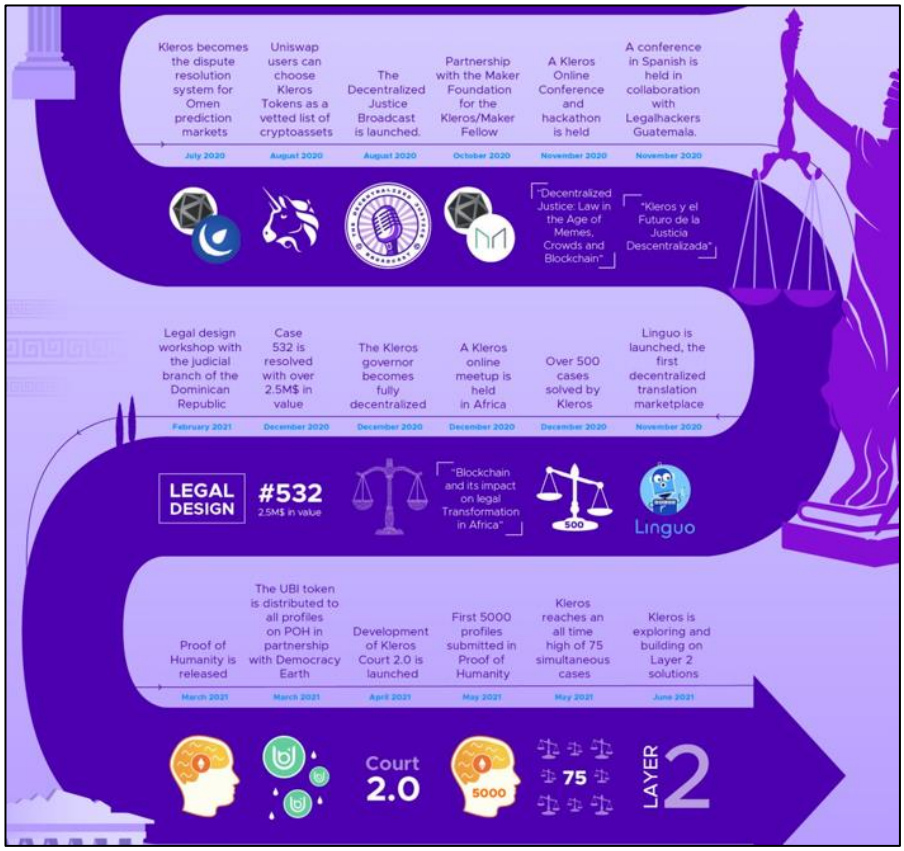

Figure 2 Detail of the Kleros Timeline (full image in Appendix 9, see as well Appendix 8 for an earlier timeline).

Source: Twitter post (https://twitter.com/Kleros_io/status/1404461197198508032) "A visual

[22] Community update and transparency report are in the form of blog post published on Kleros blog. From the first community update in august 2019 https://blog.kleros.io/kleros-community-update-august-2019/, they was published every six months https://blog.kleros.io/kleros-community-update-post/, https://blog.kleros.io/kleros-community-update-july-2020/, https://blog.kleros.io/kleros-2021-update/ Transparency reports are published annually. As of today, 2019 https://blog.kleros.io/kleros-transparency-report/ and 2020 https://blog.kleros.io/kleros-annual-transparency-report-2020/ are available.

recap of Kleros through the ages. Four years is an eternity in crypto, here's what happened in the evolution of decentralized justice" (Kleros 2021c).

Last, prototyping and the production of technical artifacts plays an essential role in the performance of imagined futures and can be understood as a specific discursive genre. This practice is consistent with the concept of sociotechnical vanguard groups, "as part and parcel of the process of innovation and change such groups do not just articulate visions but they also take action on the ground actually to prototype, build and configure practices that should – literally – realize their ideas." (Hilgartner 2015, 35). Kleros prototypes are made of smart contracts deployed on blockchains and web interfaces to interact with those smart contracts. Because of the nature of distributed blockchains, anyone can use the system. This creates a history of usage as smart contract instantiation are saved in the blockchain. Kleros imagined futures can be performed through the usage of the system. This process demonstrates the team's technical competencies and allows the imagined future to find coalition around its perceived accuracy (Oomen, Hoffman, and Hajer 2021, 14). Stacking PNK tokens in the smart contract gives a chance to be drawn as a juror. Kleros further encourages stacking by providing monetary rewards. Stacking provides a low effort and low-risk way to participate in the system even when there is no intention to use Kleros for arbitration. The existence of the prototype and staged usage create a dialectic relation with the storyline. The prototype brings the imagined future in the present and opens the possibility to experiment this future. Kleros further illustrates use cases by developing new services with partnerships or in-house projects built on top of the Kleros system.

5.3. Existing Structure and Convention

In this section, I focus on some structural bounds that allow Kleros imagined futures to become persuasive (Oomen, Hoffman, and Hajer 2021, 12). Existing structures and conventions may be a factor to the polymorphic nature of Kleros discursive genres and occasional temporary adaptations of their storylines. For example, the EC storyline is that « blockchain for social good » is untapped and needs to be promoted (implicitly by public institutions such as the EC). Therefore, when Kleros participates to the EC blockchain award, they adapt their discursive genre to a conventional mission-driven startup pitch deck and emphasize a storyline where Kleros is a solution for small consumers disputes. Yet, those are mostly superficial and temporary adaptations to specific settings.

Kleros claims to be an open-source project. Their code is freely accessible on a GitHub repository using the permissible MIT license.[23] They also maintain a sense of work done "in public" by using public platforms like Telegram. Yet, their project management is more akin to that of blockchain projects than of open-source projects. As mentioned above, Blockchain projects start with a community around a "story" where open-source projects organize around the source code. A code repository for Kleros V2 was opened only in November 2022[24], months after it was announced on Twitter and promoted with mockups. Furthermore, there is almost no discussions on Discord or Telegram around technology development[25]. Browsing their repository shows an extremely low level of external contributions. For instance, there are only four contributors to Kleros V2, all of them Kleros employees.[26] Therefore, Kleros relies on few open-source attributes more than an open-source project style and values, but this approach is common in the blockchain industry and arguably a convention of this particular ecosystem.

[23] Each Kleros code repository contain a license (i.e. https://github.com/kleros/kleros-v2/blob/master/LICENSE)

[24] First commit in November 10 2021 https://github.com/kleros/kleros-v2/commit/23356e70ae12978db991279b66d115fd922680f2

[25] Discord has a #report-bug channel with only a couple of messages and no serious technical discussions. On telegram searching for "https://github.com/kleros/kleros-v2/" return only tree result and any discussion around an issue or code but only a promotion for a bug bunty program.

[26] Information can be found on the Insights tab on GitHub https://github.com/kleros/kleros-v2/graphs/contributors .GitHub user profile were also cross search with LinkedIn to check employee.

6. KLEROS TECHNICAL CAPABILITIES AND USAGES

Kleros platform was tested empirically on three main aspects during the participatory observation and exploration. Firstly, the service capabilities were tested empirically "as a user". Secondly, the technological stack was unpacked and assessed in term of capabilities. Lastly, current usages and community behaviors were explored using on-chain data and by engaging with the community on their various communication channels and development platforms. Giving a full account of those experiments is out of the scope of this thesis. Instead, a selection of representative examples and situations are laid out to illustrate key aspects of Kleros technical prototype.

Web3 applications are static JavaScript applications loaded in a standard web browser that use blockchain as a backend. Such services are extremely slow because they must read information stored on the Ethereum blockchain, a process that is slow, cumbersome, and prone to error. When the application needs to write on Ethereum, it needs to wait 10-20 seconds for a new block to be created and verified. Furthermore, to avoid potential fraud, most web3 applications must wait 10 additional blocks. Technical workarounds and extra cache services are commonly used as optimization, but web3 applications do not have the performance of standard web applications. They are much more error-prone, and having to reload and restart an operation and even restarting the web browser is sometimes necessary.

6.1. Becoming a Kleros Juror

Anyone can join a court and get a chance to be randomly selected as a juror for each new case. Incentives to join take the form of monetary rewards: jurors are rewarded for (correctly) ruling a case, and they additionally receive PNK tokens each month, proportionally to the amount of tokens they have staked.

Kleros provides video tutorials (Kleros 2019b) and documentation explaining how to become a juror (Kleros 2019a), which were used as a reference and guide. The process encompasses several preliminary steps, notably adding the browser extension MetaMask wallet (Appendix 4).

MetaMask is required to interact with the Ethereum blockchain from a website. You also need to create an account on a crypto exchange, transfer money to it from your bank, buy some PNK (1PNK ≅ $0.25)[27] on the exchange, and, finally, transfer them on your MetaMask wallet and deposit them on the court of your choosing. You will also need to transfer some Ethereums to pay for the transaction fees. This process is presented as a few simple steps in Kleros documentation.

There is no registration process comparable to ordinary web platforms, and no email or any personal information is required. Instead, to participate, users must deposit (stake) PNK token on a court. This is done through the Kleros web interface (https://court.kleros.io), which looks like a regular website. However, technically, it uses specific code to interact with the MetaMask wallet. In turn, MetaMask interacts with Kleros smart contracts through Ethereum API. Therefore, MetaMask acts as a bridge between the website – which is only a user interface – and the blockchain. Each time an action on the website requires to write on the blockchain, such as transferring tokens or executing a smart contract, MetaMask prompts the user for a confirmation before execution. This is a necessary security measure to prevent a web3 application from executing actions on the blockchain without the user's consent.

[27] PNK price is constantly changing, the current price can be found on https://etherscan.io/token/0x93ed3fbe21207ec2e8f2d3c3de6e058cb73bc04d#readContract

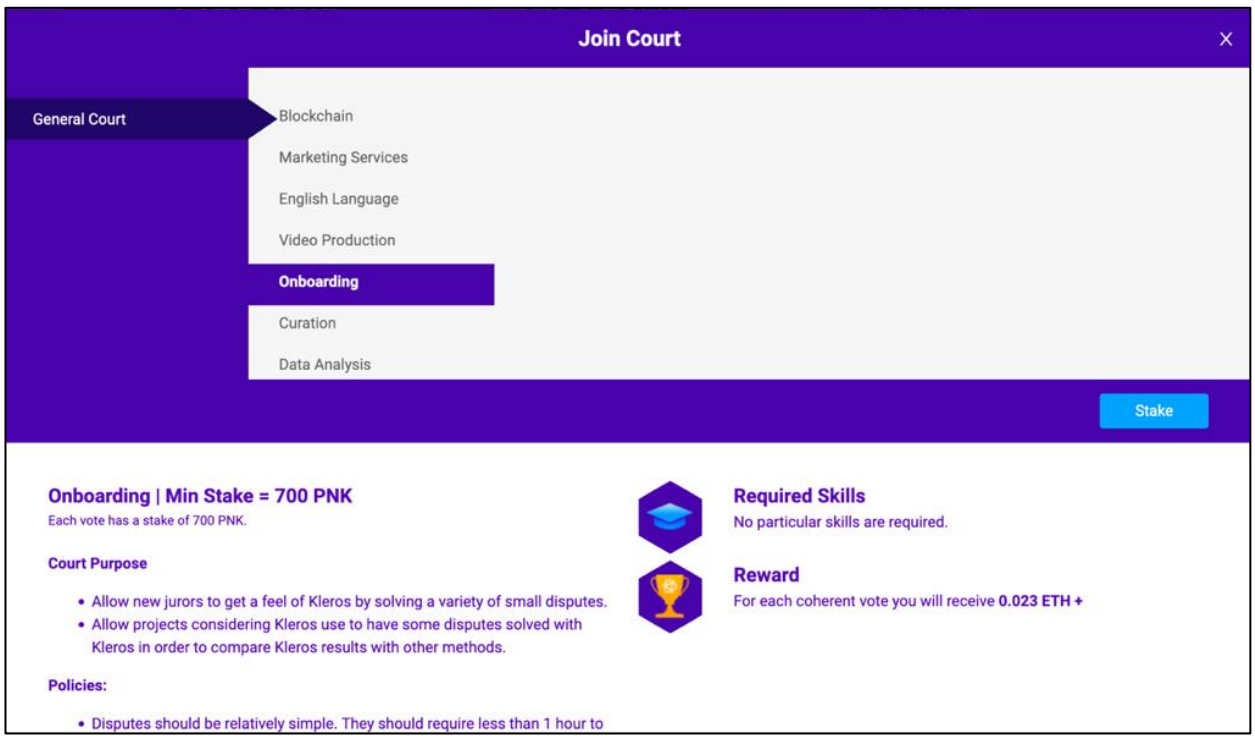

Figure 3 Interface to Join a Court. You first select the court in the hierarchy, the click "Stake". Source: Autor's catpure

Any Ethereum transaction requires to pay a network fee called gas. The Kleros platform itself does not require to pay a fee but the Ethereum network does.[28] The amount of the fee depends on the complexity of the transaction. For this particular transaction, it is currently about 30 to 100 USD.

Kleros courts are organized in a hierarchy of courts or "court tree" (Figure 4). The idea is that users join a court according to their skills (Lesaege, George, and Ast 2021, 8). Each court may also have different policies such as arbitration fees or a minimum token requirement to join as a juror. Parties can also appeal when not satisfied with the ruling. For each appeal, the number of jurors double (and therefore fees). Appeals are held in the same court as the initial ruling until reaching a predetermined number of jurors, at which point they move to the parent court.

[28] Historically network fees were going to the miners that executed the transactions. Today these fees are destroyed (burned), reducing the total amount of Ethereum available.

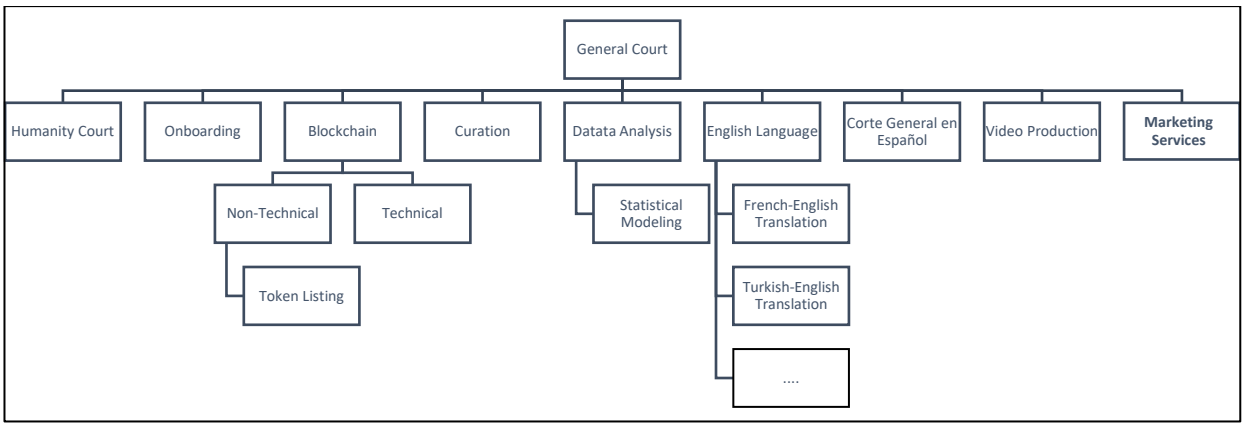

Figure 4 Kleros Courts Hierarchy
Source: Autor's design

As a juror, I selected the "Onboarding" court. After confirming the transaction on MetaMask, I was registered on court with 1765 PNK (about $200) stacked (Figure 5) after paying 0.022738176 ETH as network fees[29]. Yet, with this amount of PNK token stacked, the chance to be drawn as a juror is extremely low. First, the court has an extremely low level of activity with a total of 62 disputes that happened all in 2020 (mostly tests). There was no activity at all in 2021 in the Onboarding court. Jurors are selected randomly but the "chances to be drawn as a juror depends on the amount of PNK you stake" (Kleros 2019a). The odds to be drawn is linearly proportional to the amount of stacked tokens on the court relatively to other users.

[29] This particular transaction details and data saved on chain be visualized at https://etherscan.io/tx/0x6f6907c666eb59c0905d62fe4ca1e912866ff7d103fbce2ca0da77e126c0e24e

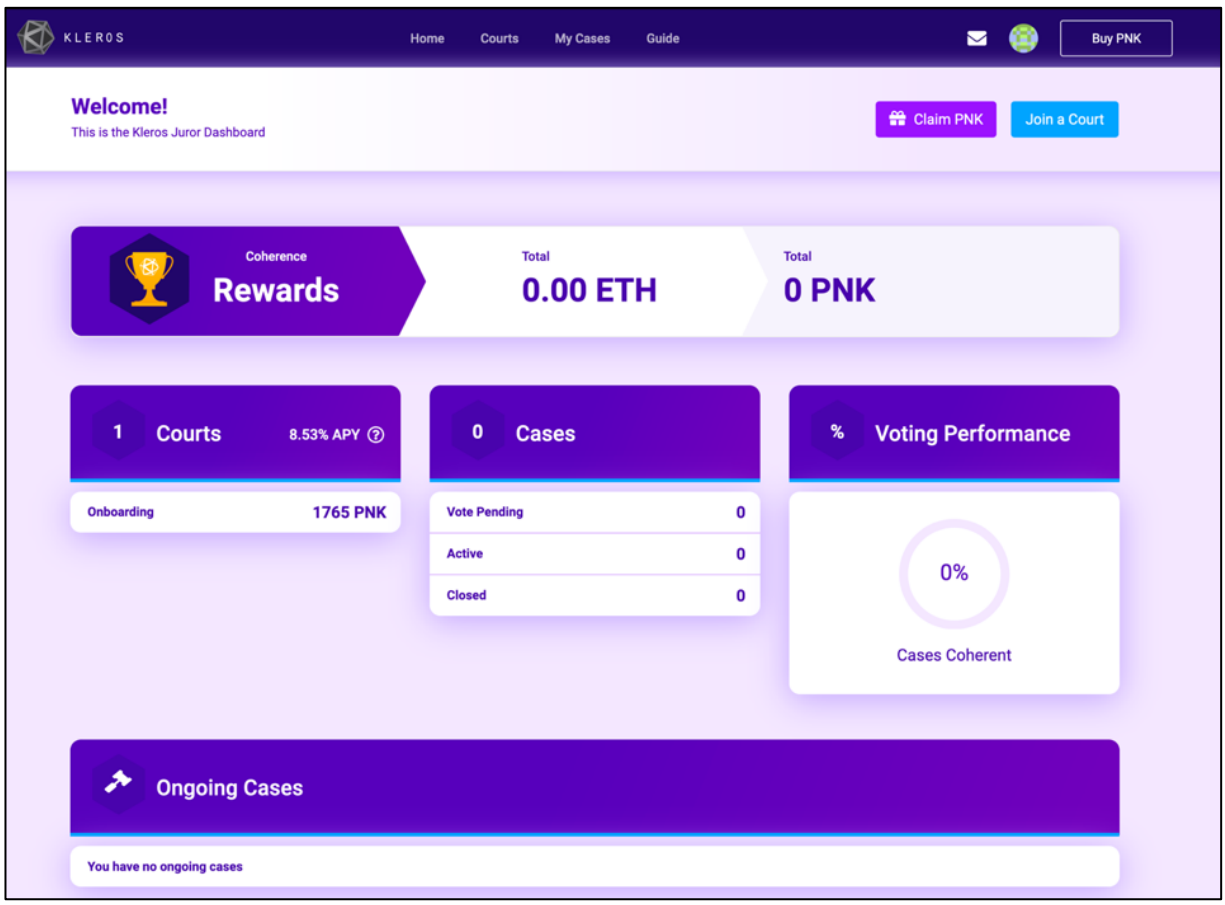

Figure 5 The Kleros Court front page with stacked PNK in the "onboarding" court.
Source: Autor's capture

The repartition of stacked tokens between users is extremely unequal in all courts. The court with most recent activity is by far the Humanity Court, opened in March 2021. This court has a growing number of cases with a total of 457 cases and 57 just in October 2021. There are 226 Jurors in the Humanity Court with 22'601'955 staked PNK, making an average of 306'194 by jurors. Someone who stacks 1200 PNK (the minimum) in the Humanity Court has 0.01% to be drawn.[30] On the Onboarding Court, the odds are only slightly better with 0.04% chance to be drawn for each case

[30] The odds for a given amount of token can be retrieved on https://klerosboard.com/odds/

for the 212 jurors with 1000 PNK. [31] With virtually no chance to be drawn, I was never selected as a juror in over six months and was therefore unable to test a ruling myself.

In each court, the very top token holder has dramatically better odds to be drawn. In the Humanity Court, the top holder has over 3 million tokens, and as result over 13% odds of being drawn (Table 3). This contrasts starkly with the median amount of tokens, which is 14000 and gives the jurors' odds of 0.06%. There are only 4 jurors with over 1 million tokens, which gives them odds of 4.42% of being drawn. In some courts, the situation is even worse, such as the General Court where the top owner has 22 million PNK (2 million €). Therefore, the very top owners have virtually all the odds stacked in their favor while most of the users have none. This has security implications as the jurors' selection become predictable and collusion easy. Furthermore, the idea that a reward of 0.028 EHT (~100€) in a correct ruling or a penalty of 600 PNK (~58 €) in an incorrect ruling is an adequate incentive for someone owning 1 million PNK (97'470 €) is questionable. Lastly, it should be noted that one individual can make multiple accounts, and that for each case a juror can be drawn multiple times, giving them multiple votes and increasing further the inequality and opacity.

Table 3 Breakdown of the Humanity Court

PNK Staked	**Number of Accounts**	**Sum of PNK (Total for this range)**	**% PNK in this court (For this range)**	**Individual User Odds (At this range. Calculated at the center of the range)**
0 to 10'000	104	296'815	1%	0.02%
10'000 to 50'000	48	1'129'582	5%	0.13%
50'000 to 100'000	20	1'394'015	6%	0.33%
100'000 to 500'000	42	7'983'172	35%	1.33%
500'000 to 1'000'000	7	5'302'572	23%	3.32%
1'000'000 to 2'000'000	3	3'247'716	14%	6.64%
2'000'000 to 4'000'000	1	3'225'000	14%	13.29%

Source: Author's calculation based on the data from klerosboard.com

[31] To access such on-chain information, klerosboard.com offers an easy-to-use interface.

When asked about it on Telegram (see annex X), Kleros founder acknowledged this situation. He argued that the issue will be organically solved when cases become more numerous and will trickle down to all jurors, while jurors with the most tokens will not be able to take on all the cases for which there are drawn. However, the mechanisms to ensure this appear nonexistent, including in the many documents and references he pointed to in his answers.

6.2. The Ruling of a Case

Kleros "Dispute Resolver" is a web interface designed for Kleros ruling. This web interface facilitates the interaction with arbitrable smart contract. The ruling is a linear process in which juror must answer a question on a web form based on attached evidence.

Below is a brief overview of the steps of a Kleros ruling (Coopérative Kleros 2021; Kleros Contributors 2020; Aouidef, Ast, and Deffains 2021; Lesaege, George, and Ast 2020; Lesaege, Ast, and George 2019):

- Arbitrable smart contracts:
    - Designate Kleros as their arbitrator.
    - Specify settlement options in case of a dispute (full or partial refund, allowing more time, etc.)
    - Specify the corresponding domain court (general, e-commerce, token listing, etc.).
- Raising a Dispute:
    - The arbitral contract determines under which circumstance dispute can be raised.
    - Parties can provide evidence.
- Drawing Jurors:
    - Candidates need to stack PNK tokens on a court to participate as a juror.
    - Candidate jurors are randomly selected, proportionally to their staked tokens.
- Arbitration Fees:
    - The arbitrable contracts determine how fees are paid when created.
- Voting:
    - Jurors assess evidence.
    - Jurors commit their vote to one of the options.
    - Until all jurors have voted, vote are not visible to parties and other jurors.

- Incentive System:
    - Users are incentivized to become jurors because they can collect arbitration fees.
    - Jurors may lose some of their tokens if their vote is different than other jurors (and thus deemed incorrect).
    - Confiscated tokens are redistributed to the more coherent jurors.
- Parties can appeal if not satisfied.

The Dispute Resolver front page (Figure 6) list all dispute in their various stages. The details of a dispute (Figure 7) provide all the information and historic of a dispute including the juror decision.

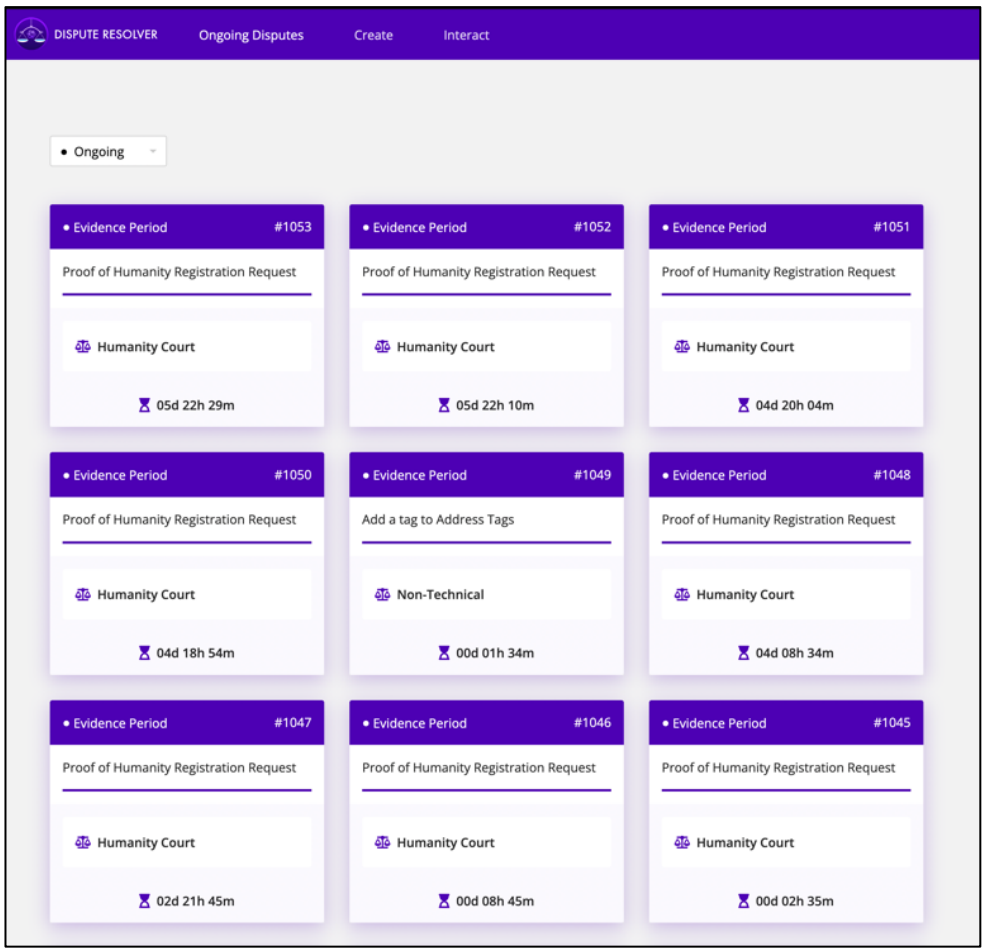

Figure 6 Kleros Dispute Resolver listing disputes

Source: Autor's screenshot from https://resolve.kleros.io

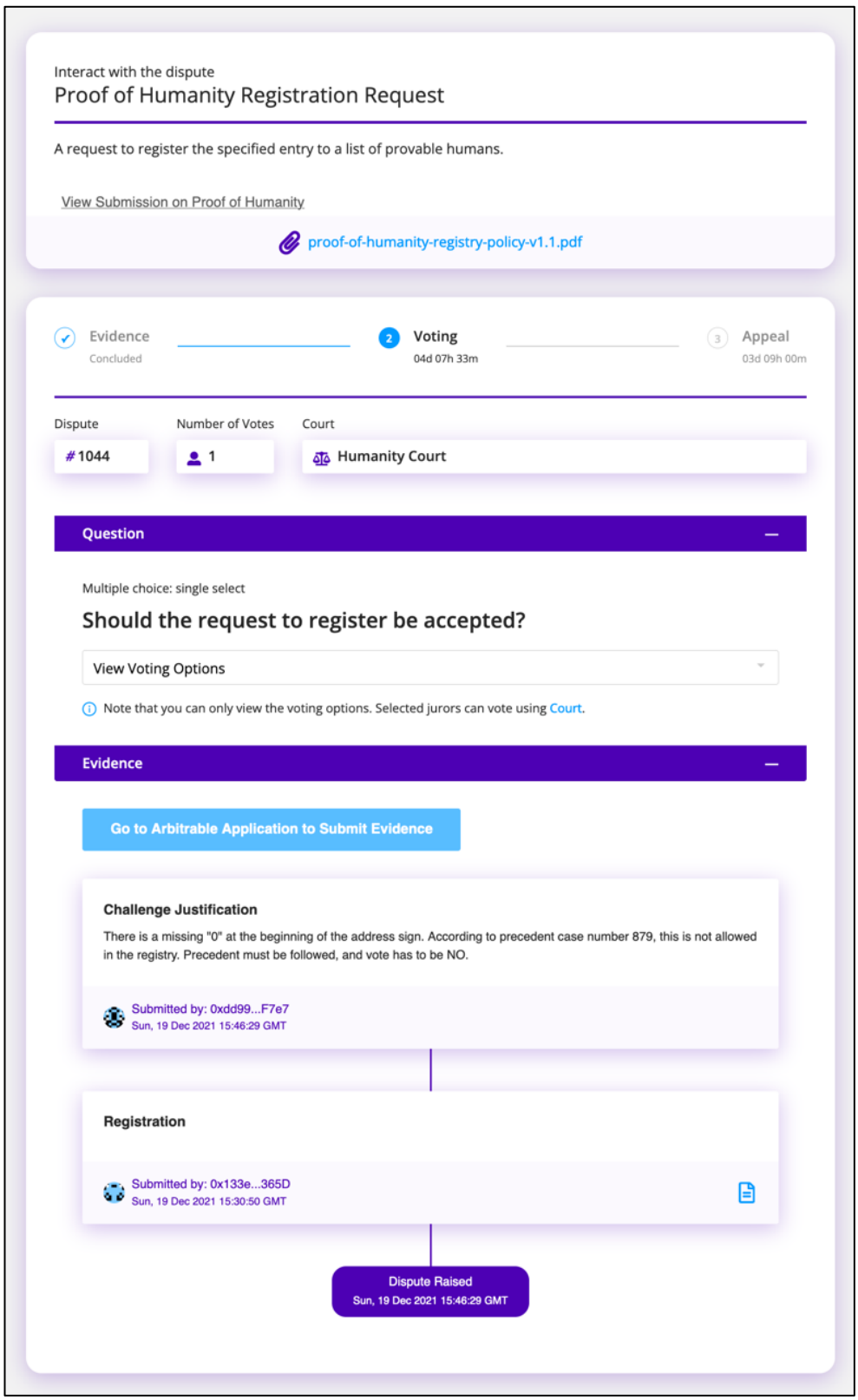

Figure 7 An ongoing dispute on Kleros

Source: Autor's screenshot from https://resolve.kleros.io/cases/1044

In this example, the dispute 1044 (Figure 7) challenges a profile (Figure 8) submitted on the proof of humanity register for failing to follow mandatory requirements specified during the submitting process (guidelines). The problem in that case is a missing "0" at the beginning of the Ethereum address wrote on the paper shown in the video.

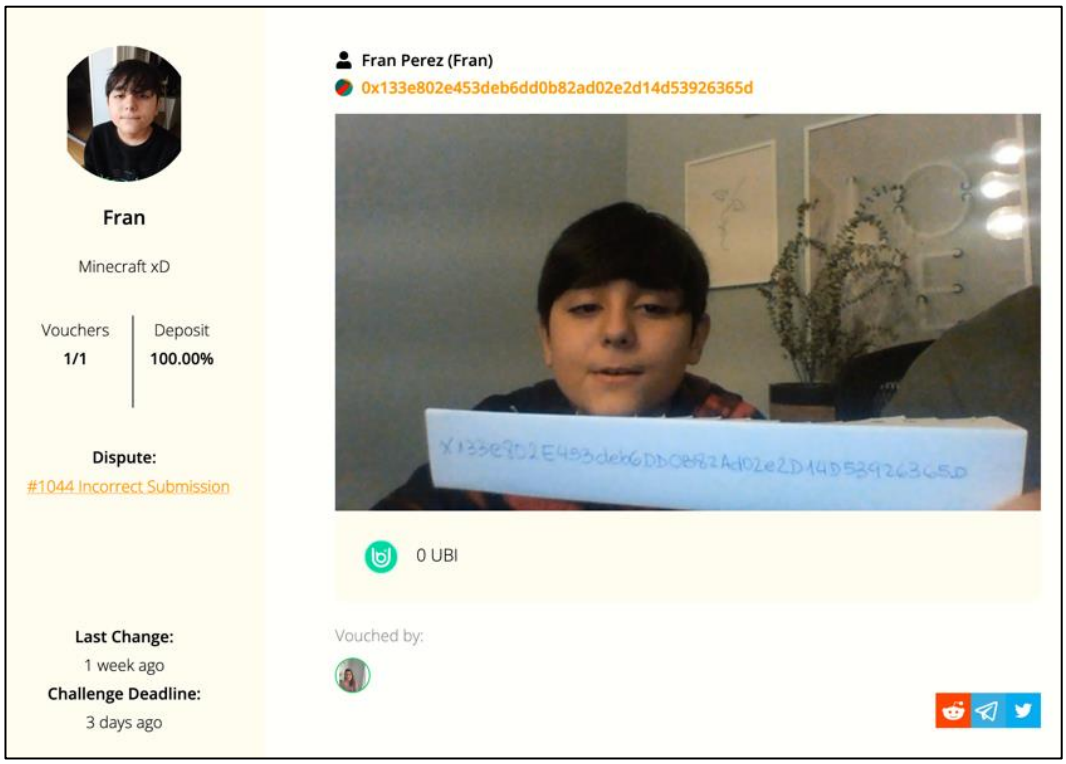

Figure 8 Challenged profile on Proof of Humanity based on the Proof of Humanity guidelines. The dispute section on the left links to the dispute on Kleros Dispute Resolver
Source: Author's screenshot from https://app.proofofhumanity.id/profile/0x133e802E453deb6DD0B82Ad02e2D14D53926365D

6.3. Current Usages

Of a total of 1054 disputes created in all courts since March 2019[32], two types of cases are predominant and represent around 80% of the cases: "Curation" and "Humanity Court". By

[32] As of 26 December 2021.

opening a curation case, someone can challenge a token that was added on a token list but does not correspond to the list's criteria. The Humanity Court was made to challenge "Proof of Humanity" registrations that do not follow the guidelines (i.e., a person closing their eyes in the profile picture or not holding a sign with their full Ethereum address in their video). It should also be noted that in other courts, many disputes appear to be tests from the Kleros team. Another team made Proof of Humanity independently of Kleros, while the token listing was made by Kleros by extending the original smart contract, but the actual token lists are created and used by other blockchain applications.

This kind of integration demonstrates the interoperability and composability capacities of blockchain-based platforms. This is possible for two main reasons: open state and open execution. Open state means all data stored on the Ethereum blockchain is accessible by anyone, including wallet balance and smart contract bytecode. Practically, this means that people can access the data and analyze them with all sorts of applications. For example, the Kleros Board (https://klerosboard.com) was not created by Kleros team[33]. Similarly, Etherscan (https://etherscan.io) provides tools to explore Ethereum on chain data and did not have to ask for permission to do so. There are countless similar examples. Open execution means that smart contracts deployed on Ethereum can be executed freely directly or by others smart contracts. This functionality allows combination or "composability" of smart contracts. The owner of a smart contract can restrict access to some (or all) functions of a smart contract to certain addresses, but as the states are accessible, this will be public information. A practical limit of composability is cost, as network fees will rise as the "chain of contracts" becomes more complex.

These usages also shows that Kleros is used predominantly inside the Ethereum ecosystem and virtually never used for disputes outside of it. Furthermore, systems such as Proof of Humanity create situations that generate Kleros cases. This seems to be artificially amplified, in the case of Proof of Humanity, by a lack of care in the design, instructions which are hard to follow and a lack of safeguards such as checking that the video format complies. Here, Proof of Humanity

[33] Furthermore, the readme in the code repository indicates the Dashboard was "inspired by the tool kleroscan developed by Marc Zelle". See https://github.com/salgozino/KlerosJurorDashboard/

supposedly answers news needs that emerge because of blockchain and in symmetry Kleros does the same. But it is unclear where value is created outside this echo chamber.

The low level of activity on Kleros courts (Table 4) contrasts with the important level of PNK trading and community activities on social networks. The PNK supply totals 764 million and, according to CoinGecko, there is about 523 million PNK in circulation with a daily trading volume on popular exchanges of about € 2 million. [34]

Table 4 Kleros Court Overview (change PNK/€ = 0.1 and ETH/€ = 3550)

Name	Total Dispute	Dispute October 2021	Jurors	Min. Stake (PNK)	Vote Stake (PNK)	Vote Reward (ETH)	Vote Reward (in €)	PNK Stacked (PNK)	PNK Stack (in €)
TOTAL	1052	59	966	116'000	51'608	1.311	4654.05	142'812'173	14'281'217
General Court	43	0	261	700	700	0.03	106.5	80'220'769	€ 8'022'077
Humanity Court	457	57	226	1'200	600	0.028	99.4	22'601'955	€ 2'260'196
Non-Technical	352	1	54	2'500	1'250	0.028	99.4	10'782'497	€ 1'078'250
Curation	105	0	33	3'100	1'550	0.028	99.4	889'340	€ 88'934
Onboarding	62	0	213	700	700	0.023	81.65	2'626'230	€ 262'623
Token Listing	15	0	6	14'000	7'000	0.14	497	1'278'061	€ 127'806
Technical	6	1	17	17'000	8'500	0.14	497	4'139'536	€ 413'954
Turkish-English Translation	4	0	2	3'900	1'677	0.031	110.05	448'004	€ 44'800
Spanish-English Translation	3	0	9	3'900	1'560	0.028	99.4	64'235	€ 6'424
English Language	2	0	27	3'900	1'950	0.036	127.8	540'113	€ 54'011
Chinese-English Translation	2	0	7	3'900	1'677	0.031	110.05	105'730	€ 10'573
Marketing Services	1	0	14	14'000	4'550	0.1	355	541'294	€ 54'129
Blockchain	0	0	10	2'100	1'050	0.034	120.7	253'710	€ 25'371

[34] Market data found on https://www.coingecko.com/en/coins/kleros. Goingecko attempts to remove fake trading done by the exchanges themselves. Goingecko takes into account centralized (off-chain) exchanges and decentralized on-chain exchanges.

Video Production	0	0	7	14'000	4'550	0.1	355	16'182'988	€ 1'618'299
Data Analysis	0	0	19	700	350	0.1	355	275'321	€ 27'532
Statistical Modeling	0	0	9	2'200	1'100	0.23	816.5	829'950	€ 82'995
Curation (Medium)	0	0	8	3'100	1'550	0.028	99.4	370'358	€ 37'036
French-English Translation	0	0	4	3'900	1'560	0.028	99.4	11'206	€ 1'121
Portuguese-English Translation	0	0	1	3'900	1'560	0.028	99.4	1'495	€ 150
German-English Translation	0	0	9	3'900	1'560	0.029	102.95	90'689	€ 9'069
Russian-English Translation	0	0	5	3'900	1'560	0.029	102.95	29'938	€ 2'994
Korean-English Translation	0	0	0	3'900	1'677	0	0	0	€ -
Japanese-English Translation	0	0	5	3'900	1'677	0.031	110.05	110'701	€ 11'070
Corte General en Español	0	0	20	1'700	1'700	0.031	110.05	418'053	€ 41'805

Source: Author's calculation based on the data from https://coingecko.com, https://klerosboard.com and https://etherscan.io.

7. DISCUSSION

The primary objective of this thesis was to examine future imaginaries to better understand how they emerge and why they become performative, through the case study of Kleros. To achieve this goal, the thesis focused on answering four main questions.

First, what are the sociotechnical imaginaries developed around Kleros? A thematic discourse analysis revealed that Kleros sociotechnical imaginaries are similar to those found by previous research on imaginaries about blockchain or bitcoin. Those imaginaries imply that decentralized blockchain-based technology could challenge the traditional state authority, citizenship, and democracy. Stemming from those themes, Kleros develops specific imaginaries, notably envisioning their technology as sustaining the renaissance of "true democracy" inspired by Ancient Greece and Medieval Private Law. However, they inject ideals of individual autonomy and self-organization into the past, forcing parallels between their own imaginaries and mythicized versions of historical justice systems.

The concept of sociotechnical imaginary permitted to search and compare similar studies. Except for a few studies engaging not with the concept but with the branding, other studies were consistent in their approach and findings. This permits systematic reviews, replicability, and comparisons. Yet this concept alone mostly describes those imaginaries, making evident the co-produced relations between culture, technology, and society. Recent studies expanded its initial relatively narrow focus, but at the cost of necessary definitions and a high level of interpretative flexibility, at the expense of precision.

The dynamic and interconnections between stabilized sociotechnical imaginaries and emerging ones required a theoretical framework that encompasses both phenomena. The concept of sociotechnical imaginaries was expanded in academic literature to encompass imaginaries from various actors, notably smaller organized groups. Hilgartner's (2015) concept of sociotechnical vanguards who seek to advance their visions and sociotechnical imaginaries may be more appropriate to study emerging sociotechnical imaginaries. Because sociotechnical imaginaries were built using historical cases, they may have missed at first that politics of the 21st century is

not as stable and that institutions alone struggle to tackle current issues. Hajer (2009, 64) rightly highlighted the dramaturgic aspect of politics and the role of "discourse coalition" that lacks unity but can create partially shared defined as an "ensemble of particular storyline, the actors that employs them, and the practice through which the discourse involved experts its power". This points toward a much more networked political and societal landscape, where evolving discursive structures are the basis of politics and change.

There is certainly a place in constructivism for a comprehensive and generalizable framework to study the co-production of future imaginaries related to technology, both emerging or stabilize, in a culturally sensitive approach and to trace their interactions. In this effort, the concept of discourse and dramaturgy elaborated by Hajer (2009, 64) seems a promising starting point.

Second, how does Kleros sociotechnical imaginaries emerge and gain traction? The participant observation revealed that Kleros actively diffuses sociotechnical imaginaries. The dramaturgic analysis of Kleros techniques of futuring exposed a discursive structure through storylines and discursive genres that rely on existing structures and conventions. Kleros builds upon existing imaginaries, notably those of blockchain, and the expectations of both communities and governing bodies surrounding these Kleros temporarily adapts its storylines and genres to specific audiences. It relies on open-source values, blockchain imaginaries, and academic discursive genres to support its own future visions. In turn, this reinforces the impression that Kleros is part of those different spheres. This has concrete effects as it structures interactions and can make people act upon those insights.

The dramaturgic analysis is a promising framework to investigate "the subtle form of agency that allows for imagined future to become performative" (Oomen, Hoffman, and Hajer 2021, 15). Discussion with Oomen, one of the authors of the framework (Oomen 2021), and further research did not reveal any other study based on this new framework. As the framework is so recent, it is impossible to know whether it will become more widely used. This makes its application more difficult, as there are no examples yet outside of the initial paper, even if it is grounded is conventional discourse analysis.

Third, how Kleros sociotechnical imaginaries become performative? The combination of the techniques of futuring's internal logics present Kleros sociotechnical imaginaries in a persuasive way. The dramaturgical analysis framework highlighted the importance of a staging of "sequential

process of interaction between people and place" (Oomen, Hoffman, and Hajer 2021, 12) to allow imagined futures to find coalitions. Contrary to this framework, with Kleros, social interactions between actors happen on social networks and online chats in a chaotic fashion and do not follow a logical sequence. Kleros stands within norms of projects leveraging online communities by reclaiming a participatory and open-source culture that follows the so-called bazaar model (Raymond 1999), in which developments happen over the internet in view of the public. Yet, open source may only be the first recognized situations following this model. Projects built over the internet by online communities may be inclined to follow the "bazaar model" as a form of organization.

However, interestingly, Kleros crafts narratives a posteriori featuring an artificial but logical linear sequence of events (i.e., in the Kleros Timeline). Interestingly, although there is no sequence of events, Kleros organizes events periodically (weekly community calls, annual transparency report, six-month fellowship program organized by "batch" and biannual community update). This recurrence of "stylized repetition of acts" (Butler 1988, 519) create a temporal logic and routine that with "other structural elements, co-determines the dramaturgical regimes that allow ToFs to present and perform imagined futures in persuasive ways" (Oomen, Hoffman, and Hajer 2021, 14). Therefore in the case of Kleros, a posteriori craft sequence and recurring events in perpetual loops or spirals give a reality effect and make Kleros imaginaries persuasive.

Fourth, how do they compare with material evidence gathered through a technology assessment based on Kleros current design and usage? The participant observation revealed that there is a stark discrepancy between the stated ambitions of Kleros and the actual usage of the platform. It is mitigated by crafting of a narrative, which moves the goalposts along to fit what has been achieved, and by establishing the future as the solution to existing issues without putting in place actual mechanisms to ensure their resolution (i.e., when stating the number of cases will solve issues of dramatic economic inequality between jurors and the associated security risks, but how the increase in cases will be achieved and how they will solve inequality rather than reinforce it is not addressed).

Indeed, the imaginaries gain traction and actively serve Kleros while mobilizing a growing community and attracting capital. They are yielded through the community and token valuation and allow them to successfully capture attention and monetary capital. The imaginaries therefore become the de facto commodity and takes over in importance over the actual technology. They are

harnessed to establish Kleros as the future of justice, while circumventing the very real issues of their current model and prototypes. They are furthermore used specifically to obfuscate the stark weaknesses of the technology and its currently highly limited usages.

In summary, Kleros dedicates substantial effort to build and diffuse specific imaginaries. With the help of online communication platforms, Kleros succeeds in gathering a sizeable group of interested people, as well as significant capital. Through the four research questions, the main hypothesis of this thesis can therefore be confirmed in the case of Kleros: although Kleros technical capabilities and concrete usage are limited, the project capture attention and financial resources by using the technological artifact to stage their imagined future.

Projects such as Kleros can appear marginal and even innocuous due to their lack of concrete usage and limited reach in society at large and outside of their specific communities. However, as this case study demonstrates, they can develop the capabilities to become performative and thus contribute to shaping the present, and therefore the future, independently of their actual usage, or even despite a plain lack of traction as an actual technology.

Technological artifacts, embodied by a prototype or "proof-of-concept" associated to sociotechnical imaginaries, can exert fascination. This fascination affects our capabilities to assess technical aspects and the desirability of its claimed potential contributions. The materiality of technical artifacts is compelling and offers a demo effect. Presented as working prototypes, they turn the attention away from technical shortcomings but at the same time place technical improvement as the main issue to solve. Trust in technological improvement gives a certain sense of inevitability and the connected sociotechnical imaginaries seem therefore expected. However, technological fixes based on yet unproven future technology ignore the systemic nature of complex problems and focus the attention to the technological level. As a result, technological solutions take precedence and exclude alternatives for addressing a given social issue through technology-free approaches.

This may have destabilizing effect on current social systems and structures. When Kleros claims that incorruptible technology can "deploy democracy" and suppress human manipulation and corruption, they throw discredit on voting processes in current democracies, while voter fraud is exceedingly rare in functioning administrations and not the cause but a consequence of failing states (Christensen and Schultz 2014; Cottrell, Herron, and Westwood 2018; Ahlquist, Mayer, and

Jackman 2014). Entertaining such claims competes with the notion that a more open and accessible justice system could certainly be achieved by improving current institutions, instead of developing a new technology to address their shortcomings (Dylag and Smith 2021).

The disturbing fact is that some public institutions adhere to the Kleros narratives and materially supported the project. It could be argued that indeed this can put their expertise in question, especially as a public institution in democratic countries has a responsibility to act for the common good. In their defense, Kleros presented quite a different project to obtain its grants. But we can question a governance that makes its decisions on the basis of startup-styled brief PowerPoint presentations within the format of awards and holds its grantees to very limited accountability. In total, Kleros receives more than 1 million from public institutions but more importantly as Kleros itself put it "a prestigious recognition for its quest of decentralized justice" (Ast 2020c). Furthermore, as seen technology such as blockchain are "strongly relates to the ways in which we normatively construct or rather configure our social world" (Reijers and Coeckelbergh 2018, 127). In this perspective, even though the European Innovation Council aims to identify and support breakthrough technologies their support to blockchain is not only participating in technology research and development but also diffusing specific social norms.

Similarly, academia seems also vulnerable to technological fascination. In the case of Kleros and blockchain, leading academics may have interesting theoretical comments, but they are primarily based on the imaginaries rather than the technical capacities. Their contributions participate to the co-construction, legitimization of the sociotechnical imaginaries. Furthermore, they play a significant role in the dissemination of the imaginaries in various governance sphere. Kleros appears to understand their importance and therefore actively seeks to involve academics through various programs and collaborations. This creates a problematic self-reinforcing dynamic where academics advise governments and other public institutions while not realizing the extent of their

role in the construction of what they describe.[35] One way to avoid fascination may be to further develop an academic culture in social science where a strong digital literacy and command of technology are fostered.

Furthermore, there is an even greater need for further research from researchers who are not only able to analyze the discourses with a framework or another, but also able to put the technology to the test and assess it, in order to understand its actual function within a project such as Kleros. An ethnography mindset is necessary for the first part. Additionally, a strong digital literacy and command of technology are necessary for the second one and allow an exploration of practices at technical level and make sense of data trace. These can also be found in interdisciplinary research team which should include experts outside of academia when necessary.

Persuasive storytelling about the future should not be underestimated. It can lead society but should be politicized. Discussions about the future need to be better structured when it may concern the future of society at large. On the one hand, there may be a need to develop stronger accountability for those promoting specific future visions by deconstructing their imaginaries and making the proposed futures and the social orders embedded in those narratives explicit. On the other, I also argue that we should embrace bottom-up politics and networked governance. In the current context of growing uncertainty about the future, we urgently need to adapt our governance and democratic processes, to be able to take sociotechnological turns emancipated of path dependency but without losing legitimacy and core democratic values.

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[35] See for example Dr Rossana Deplano's Written Evidence that she send to the UK parliament promoting Kleros when answering a question about how technology can "enhance democracy" (Deplano 2019). Dr Rossana Deplano is a contributor of the Kleros handbook and participated in the Kleros Fellowship. Another example - introduced in the thesis - is Primavera de Filippi, who contributed in the Kleros handbook and promoted the link between Kleros "Lex Criptographia" and the historical Lex Mercatoria. According her bio on The Berkman Klein Center for Internet & Society at Harvard University "She was a founding member of the Global Future Council on Blockchain Technologies at the World Economic Forum, and co-founder of the Internet Governance Forum's dynamic coalitions on Blockchain Technology (COALA)." (Berkman Klein Center 2021).

8. CONCLUSION

With the aim of examining future imaginaries, their emergence and impact, this thesis was articulated around the case of a specific project with a technology in the making, Kleros, a recent blockchain-based decentralized dispute resolution protocol. The thesis's central hypothesis was that such projects are able to capture attention and financial capital, as well as build communities, by using future narratives and imaginaries more than actual capabilities or usage of the technology.

In order to verify this hypothesis, this thesis first explored existing literature in social theory concerned with the structuring effect of imagined futures, with an emphasis of technology development. Its methodology was based on the concepts of sociotechnical imaginaries, techniques of futuring and dramaturgical regime. The third section discussed the specific future imaginaries of blockchain and Kleros. The fourth section analyzed how those imaginaries become performative through a dramaturgical analysis of techniques of futuring. The fifth section assessed Kleros technical capabilities and actual usage in order to compare it with Kleros imaginaries.

The thesis's main findings are how Kleros is able to successfully promote their technology by staging future visions associated to a technical prototype. Kleros has raised significant interest and funding around a technical solution and the staging of the development of this technology. The association of a technological artifact and a future vision communicated across networked platforms seems in this case highly persuasive. I was therefore able to verify my main hypothesis: indeed, despite limited technical capabilities and concrete usage, Kleros does captures significant attention and financial resources and achieves this by using the technological artifact to stage their imagined future.

This thesis concludes by opening on the larger significance of future imaginaries for governance, against the background of growing uncertainty about the future.

SUMMARY

In the current context of growing uncertainty about the future, researchers began investigating how future visions shape the present; how sociotechnical imaginaries actively shape our society. Today, the performativity of imagined futures is well understood. However, how particular visions come about and why they become performative is understudied.

With the aim of examining future imaginaries, their emergence and impact, this thesis is articulated around the case of a specific project with a technology in the making, Kleros, a recent blockchain-based decentralized dispute resolution protocol. The thesis's central hypothesis is that such projects are able to capture attention and financial capital, as well as build communities, by using future narratives and imaginaries more than actual capabilities or usage of the technology

Using the theoretical framework of "technique of futuring" and "dramaturgical regimes", this case study analyzes how Kleros stakeholders articulated and communicate discourse about the Kleros technology's potentialities to better understand how imaginaries emerge. Exploratory research and participatory observations with dramaturgic analysis reveal that Kleros captures attention and financial capital, as well as builds communities using future narratives and imaginaries rather than the actual capabilities or practical usage of the technology. Specific discourse structures allow this imagined future to become authoritative while the technological artifact primarily serves the staging of this imagined future.

The thesis's main findings are how Kleros is able to successfully promote their technology by staging future visions associated to a technical prototype. Kleros has raised significant interest and funding around a technical solution and the staging of the development of this technology. The association of a technological artifact and a future vision communicated across networked platforms seems in this case highly persuasive.

Projects such as Kleros can appear innocuous due to their lack of concrete usage and limited reach in society at large and outside of their specific communities. However, as this case study demonstrates, they can develop the capabilities to become performative and thus contribute to shaping the present, and therefore the future, independently of their actual usage, or even despite a plain lack of traction as an actual technology.

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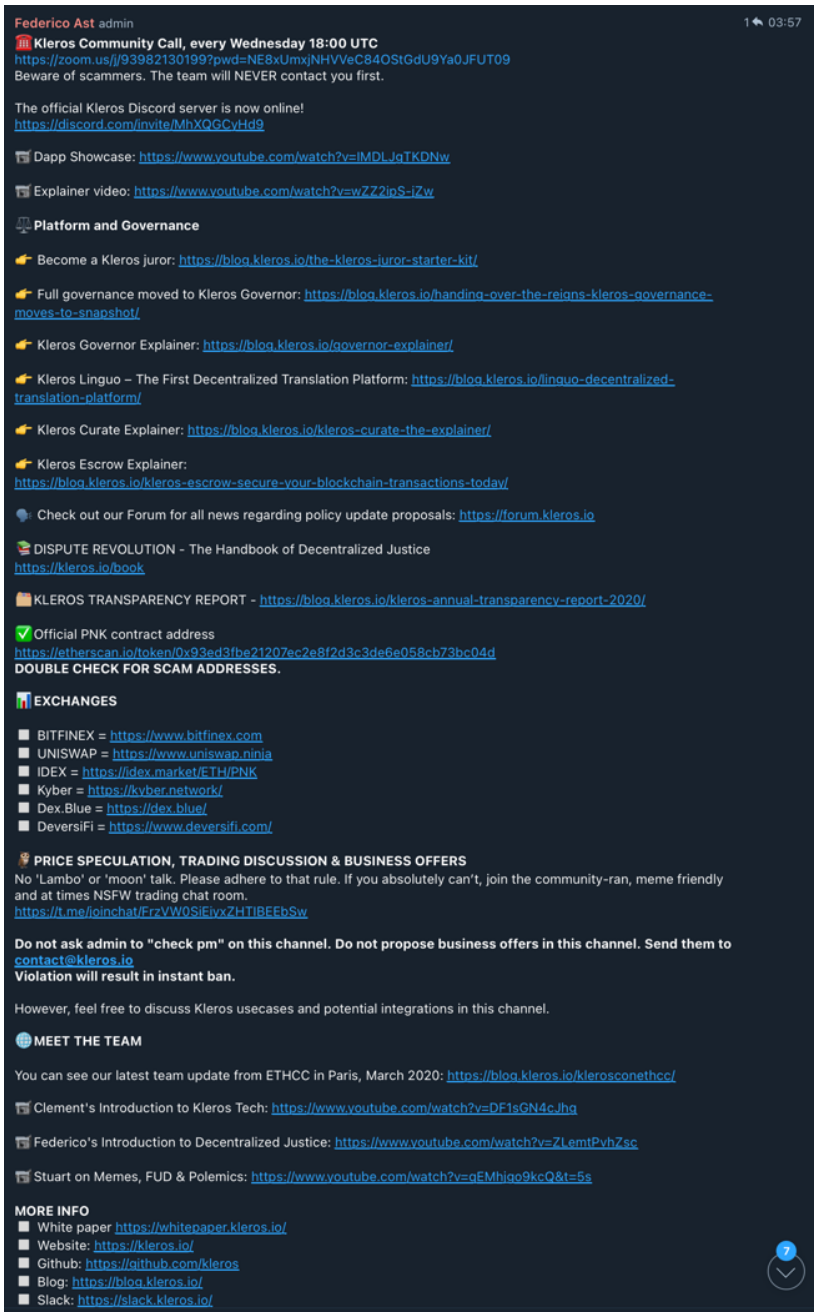
ANNEXES

Appendix 1 Telegram Message Announcing a Weekly Community Call



Federico Ast admin 1 03:57

Kleros Community Call, every Wednesday 18:00 UTC
https://zoom.us/j/93982130199?pwd=NE8xUmxjNHVVeC84OStGdU9Ya0JFUT09
Beware of scammers. The team will NEVER contact you first.

The official Kleros Discord server is now online!
https://discord.com/invite/MhXQGCvHd9

Dapp Showcase: https://www.youtube.com/watch?v=IMDLJgTKDNw

Explainer video: https://www.youtube.com/watch?v=wZZ2ipS-jZw

Platform and Governance

Become a Kleros juror: https://blog.kleros.io/the-kleros-juror-starter-kit/

Full governance moved to Kleros Governor: https://blog.kleros.io/handing-over-the-reigns-kleros-governance-moves-to-snapshot/

Kleros Governor Explainer: https://blog.kleros.io/governor-explainer/

Kleros Linguo – The First Decentralized Translation Platform: https://blog.kleros.io/linguo-decentralized-translation-platform/

Kleros Curate Explainer: https://blog.kleros.io/kleros-curate-the-explainer/

Kleros Escrow Explainer:
https://blog.kleros.io/kleros-escrow-secure-your-blockchain-transactions-today/

Check out our Forum for all news regarding policy update proposals: https://forum.kleros.io

DISPUTE REVOLUTION - The Handbook of Decentralized Justice
https://kleros.io/book

KLEROS TRANSPARENCY REPORT - https://blog.kleros.io/kleros-annual-transparency-report-2020/

Official PNK contract address
https://etherscan.io/token/0x93ed3fbe21207ec2e8f2d3c3de6e058cb73bc04d
DOUBLE CHECK FOR SCAM ADDRESSES.

EXCHANGES

- BITFINEX = https://www.bitfinex.com
- UNISWAP = https://www.uniswap.ninja
- IDEX = https://idex.market/ETH/PNK
- Kyber = https://kyber.network/
- Dex.Blue = https://dex.blue/
- DeversiFi = https://www.deversifi.com/

PRICE SPECULATION, TRADING DISCUSSION & BUSINESS OFFERS
No 'Lambo' or 'moon' talk. Please adhere to that rule. If you absolutely can't, join the community-ran, meme friendly and at times NSFW trading chat room.
https://t.me/joinchat/FrzVW0SiEiyxZHTIBEEbSw

Do not ask admin to "check pm" on this channel. Do not propose business offers in this channel. Send them to contact@kleros.io
Violation will result in instant ban.

However, feel free to discuss Kleros usecases and potential integrations in this channel.

MEET THE TEAM

You can see our latest team update from ETHCC in Paris, March 2020: https://blog.kleros.io/klerosconethcc/

Clement's Introduction to Kleros Tech: https://www.youtube.com/watch?v=DF1sGN4cJhq

Federico's Introduction to Decentralized Justice: https://www.youtube.com/watch?v=ZLemtPvhZsc

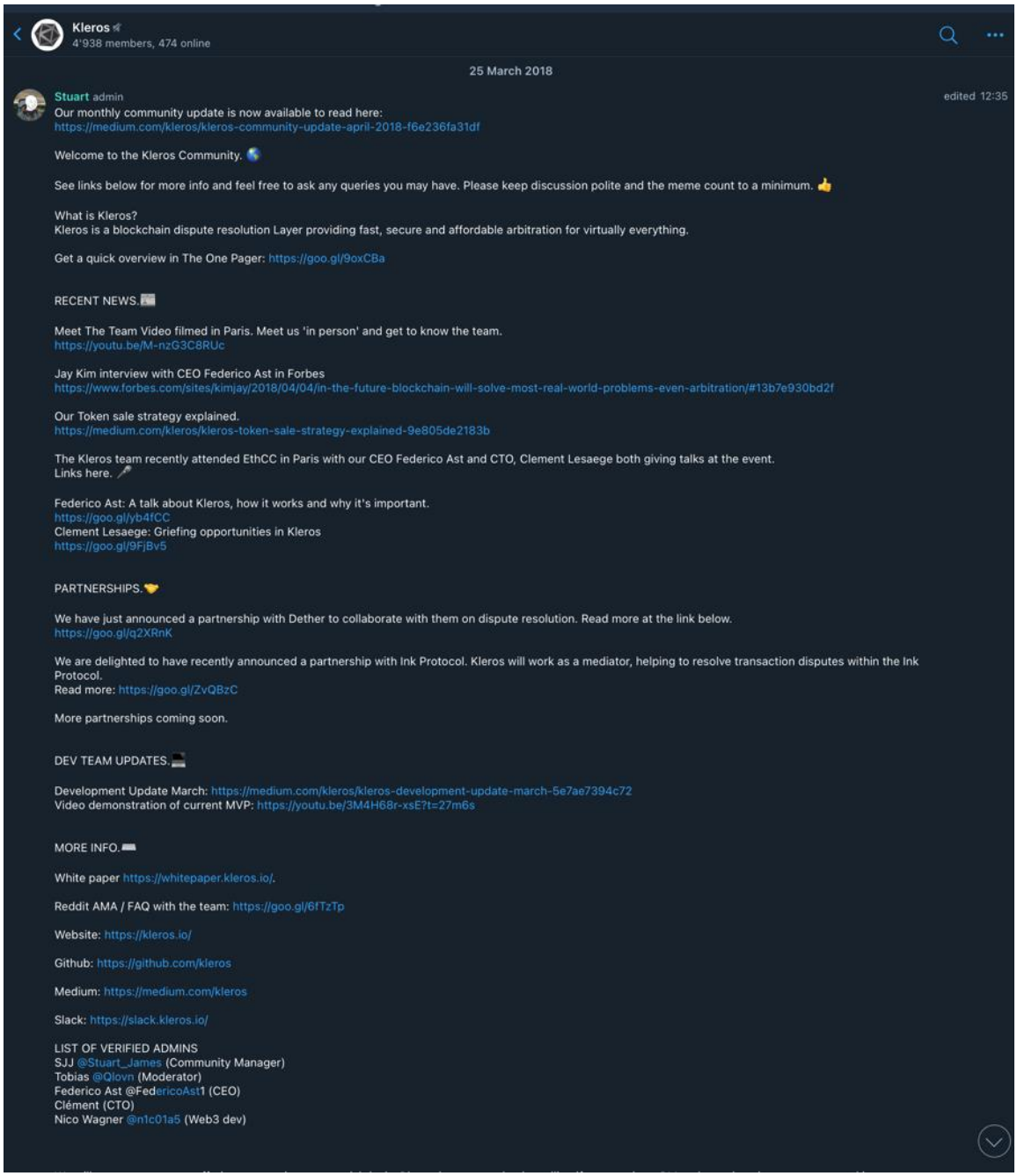
Stuart on Memes, FUD & Polemics: https://www.youtube.com/watch?v=qEMhjqo9kcQ&t=5s

MORE INFO

- White paper https://whitepaper.kleros.io/
- Website: https://kleros.io/
- Github: https://github.com/kleros
- Blog: https://blog.kleros.io/
- Slack: https://slack.kleros.io/

Sources: Kleros Telegram Channel. March 17 2020 https://t.me/kleros/115736

Appendix 2 Community update (initially monthly, but then every six months).



Kleros
4'938 members, 474 online

25 March 2018

Stuart admin edited 12:35

Our monthly community update is now available to read here:
https://medium.com/kleros/kleros-community-update-april-2018-f6e236fa31df

Welcome to the Kleros Community.

See links below for more info and feel free to ask any queries you may have. Please keep discussion polite and the meme count to a minimum.

What is Kleros?
Kleros is a blockchain dispute resolution Layer providing fast, secure and affordable arbitration for virtually everything.

Get a quick overview in The One Pager: https://goo.gl/9oxCBa

RECENT NEWS.

Meet The Team Video filmed in Paris. Meet us 'in person' and get to know the team.
https://youtu.be/M-nzG3C8RUc

Jay Kim interview with CEO Federico Ast in Forbes
https://www.forbes.com/sites/kimjay/2018/04/04/in-the-future-blockchain-will-solve-most-real-world-problems-even-arbitration/#13b7e930bd2f

Our Token sale strategy explained.
https://medium.com/kleros/kleros-token-sale-strategy-explained-9e805de2183b

The Kleros team recently attended EthCC in Paris with our CEO Federico Ast and CTO, Clement Lesaege both giving talks at the event.
Links here.

Federico Ast: A talk about Kleros, how it works and why it's important.
https://goo.gl/yb4fCC
Clement Lesaege: Griefing opportunities in Kleros
https://goo.gl/9FjBv5

PARTNERSHIPS.

We have just announced a partnership with Dether to collaborate with them on dispute resolution. Read more at the link below.
https://goo.gl/q2XRnK

We are delighted to have recently announced a partnership with Ink Protocol. Kleros will work as a mediator, helping to resolve transaction disputes within the Ink Protocol.
Read more: https://goo.gl/ZvQBzC

More partnerships coming soon.

DEV TEAM UPDATES.

Development Update March: https://medium.com/kleros/kleros-development-update-march-5e7ae7394c72
Video demonstration of current MVP: https://youtu.be/3M4H68r-xsE?t=27m6s

MORE INFO.

White paper https://whitepaper.kleros.io/.

Reddit AMA / FAQ with the team: https://goo.gl/6fTzTp

Website: https://kleros.io/

Github: https://github.com/kleros

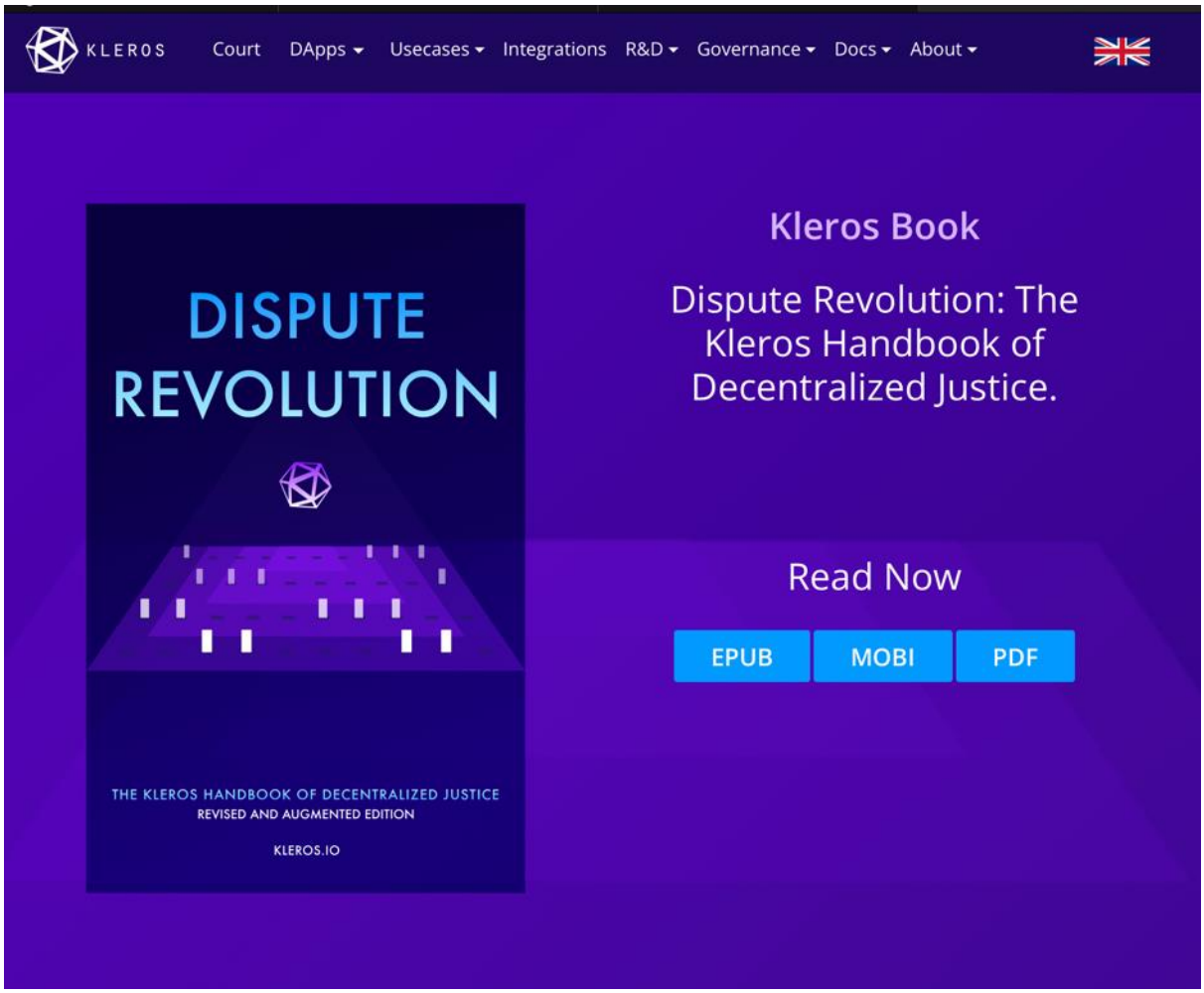
Medium: https://medium.com/kleros

Slack: https://slack.kleros.io/

LIST OF VERIFIED ADMINS
SJJ @Stuart_James (Community Manager)
Tobias @Qiovn (Moderator)
Federico Ast @FedericoAst1 (CEO)
Clément (CTO)
Nico Wagner @n1c01a5 (Web3 dev)

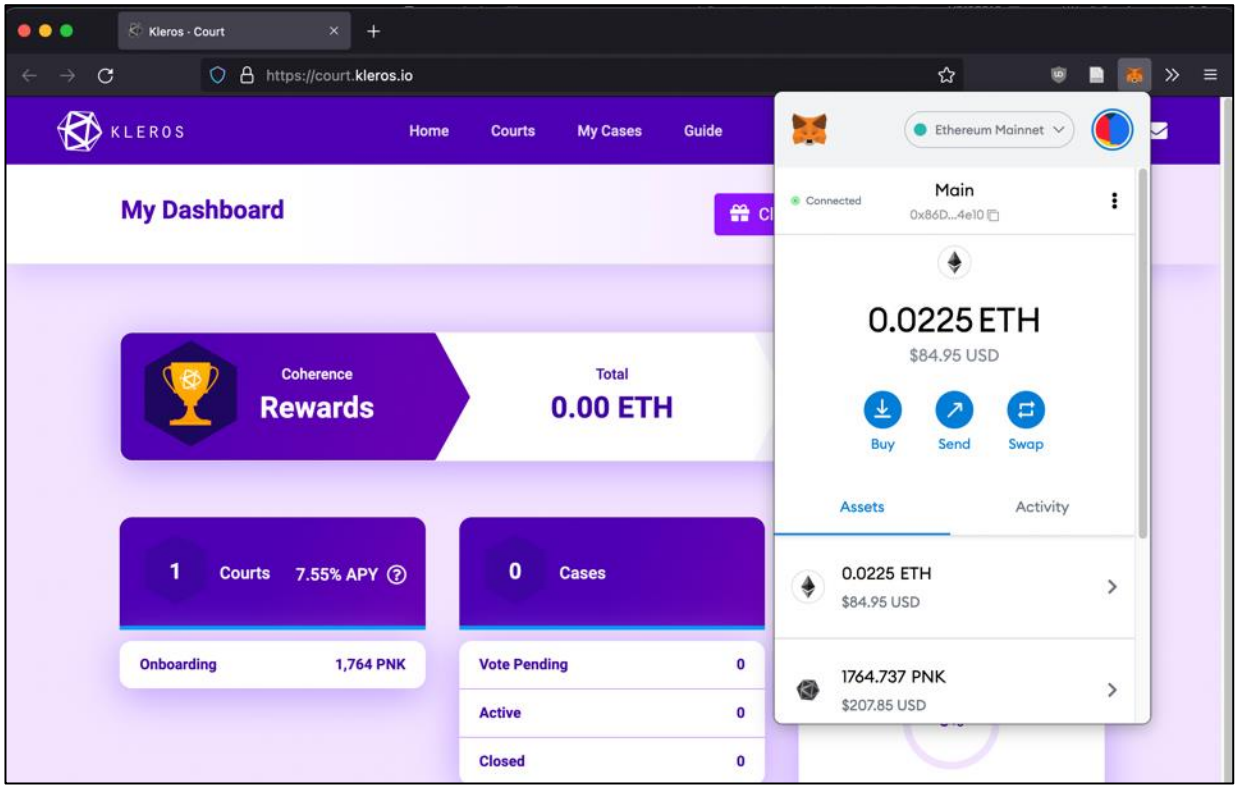
Source: Kleros Telegram Channel March 25 2018 https://t.me/kleros/95

Appendix 3 Kleros Handbook Download Page



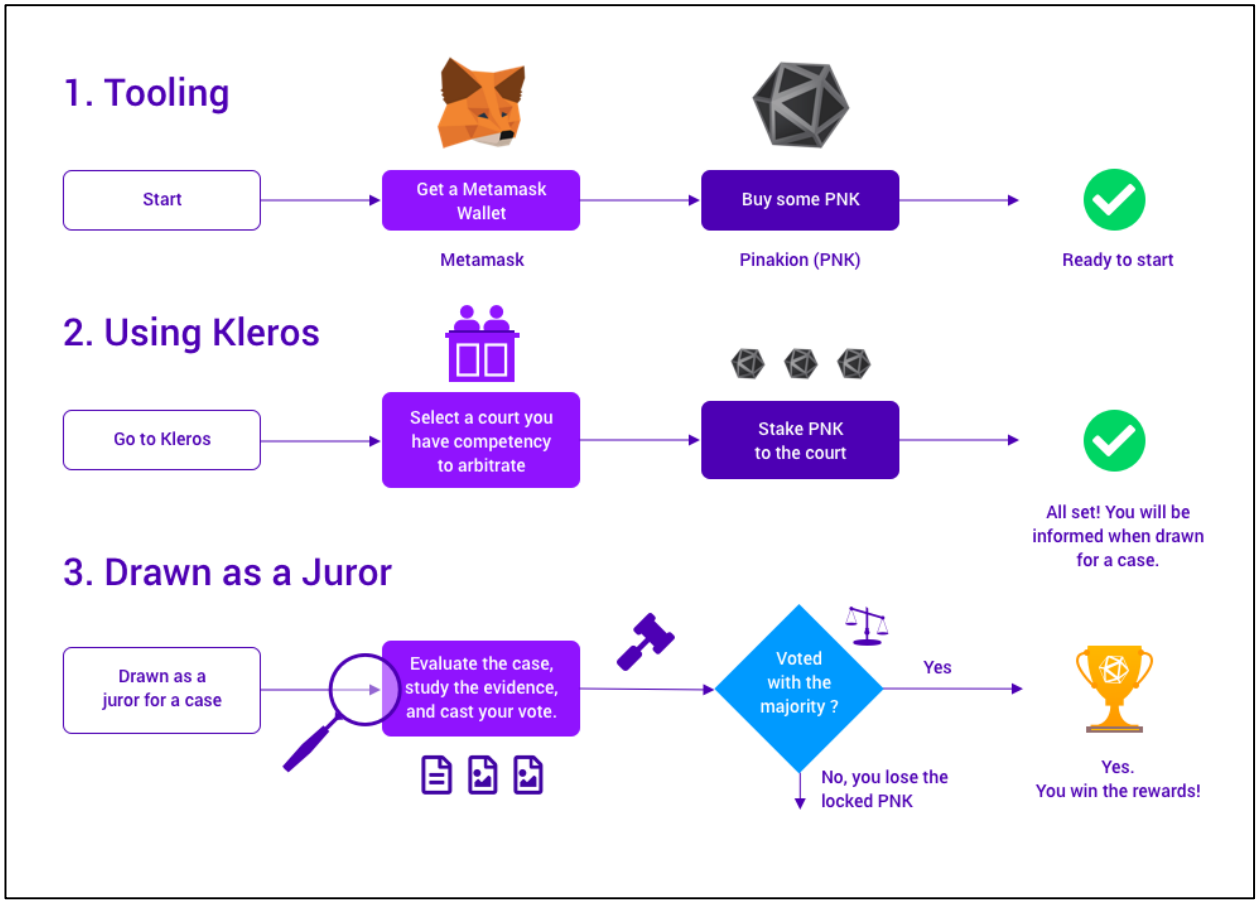
Source: Kleros Website (https://kleros.io/book/) (Kleros 2020a)

Appendix 4 MetaMask Plugin on Kleros Court



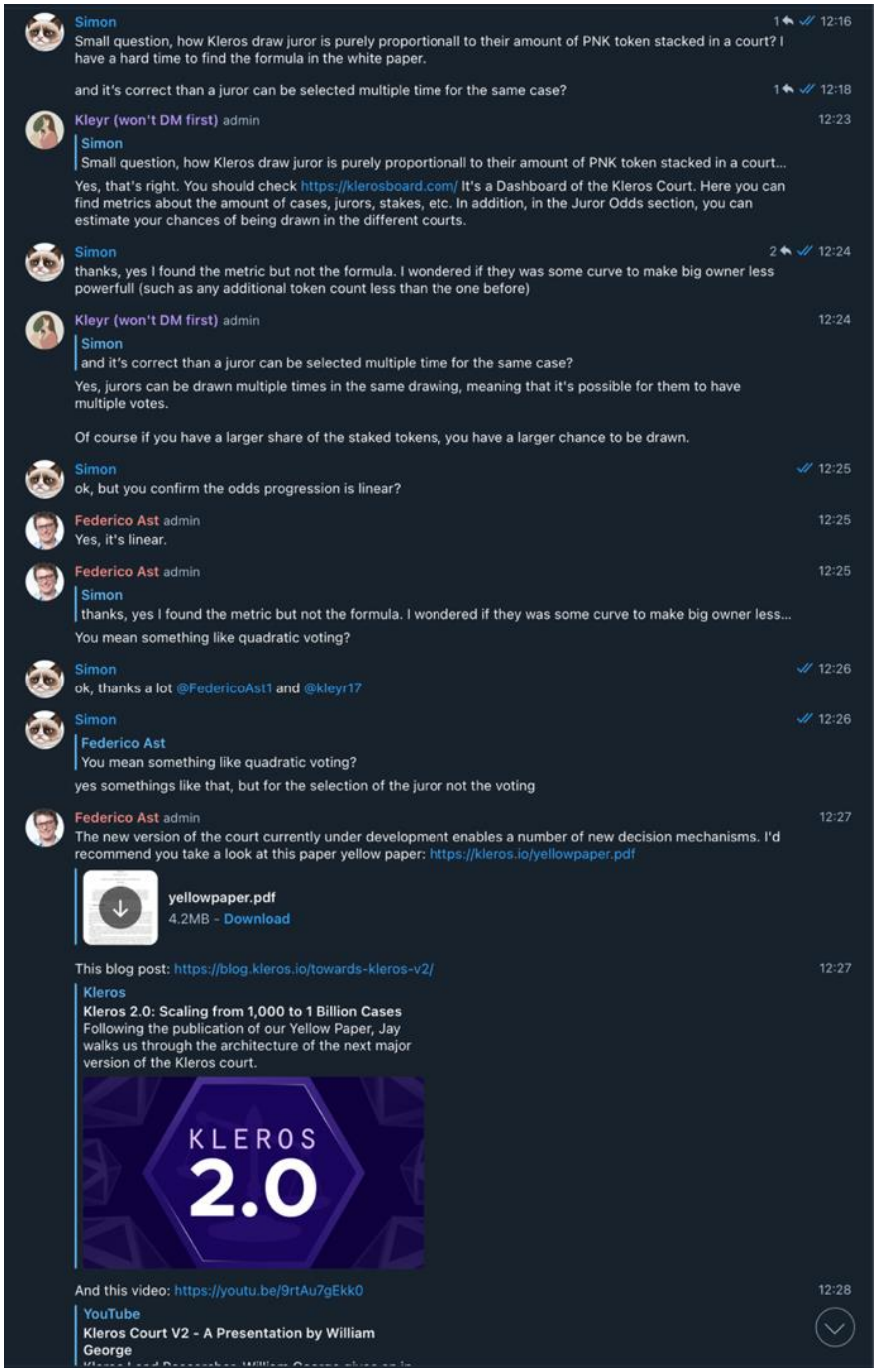
Source: Author's screenshot, Kleros court with MetMask connected showing the PNK token and Ethereum after stacking PNK the Onboarding Court.

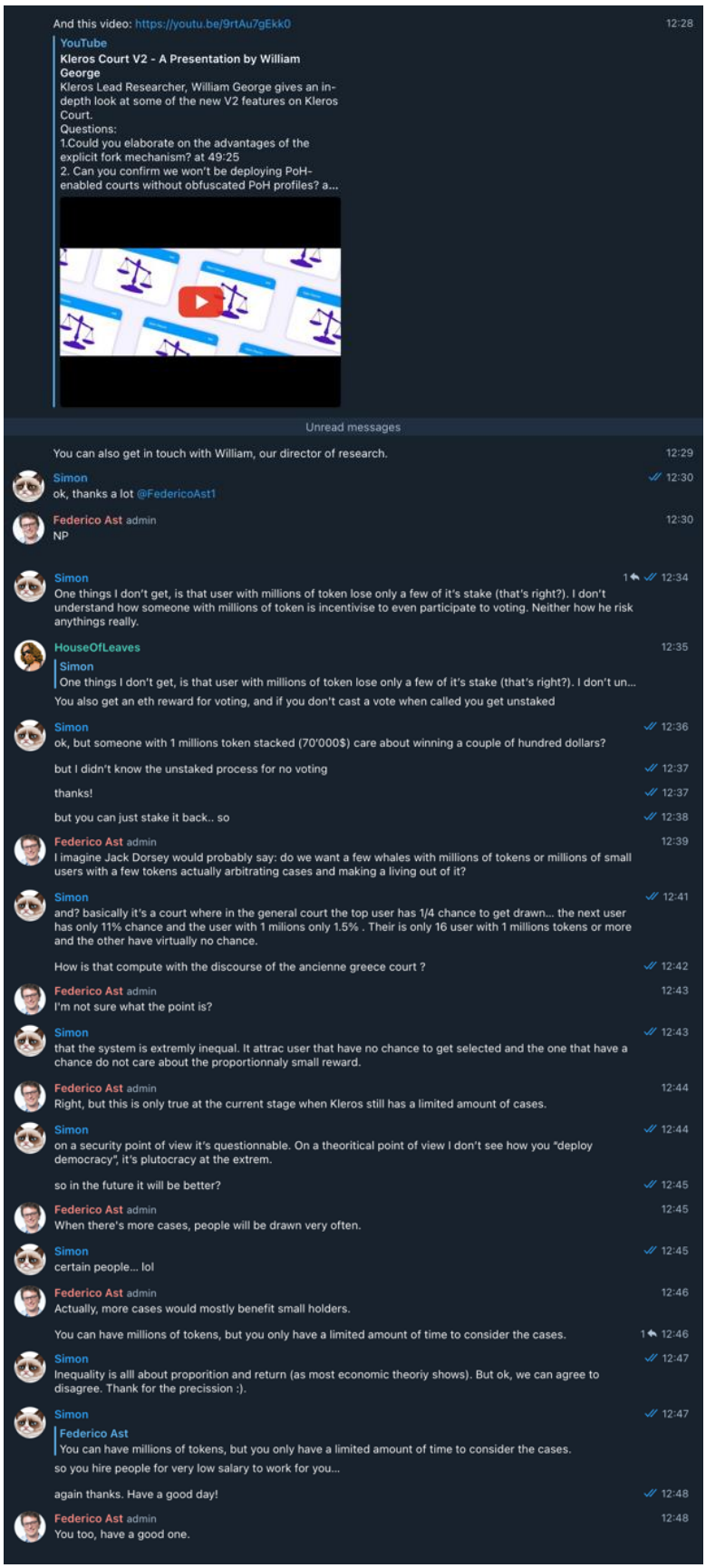
Appendix 5 Kleros outline "of how to become a Kleros juror"



Source: Blog post (https://blog.kleros.io/the-kleros-juror-starter-kit/) "The Kleros Juror Starter Kit", (Kleros 2019a).

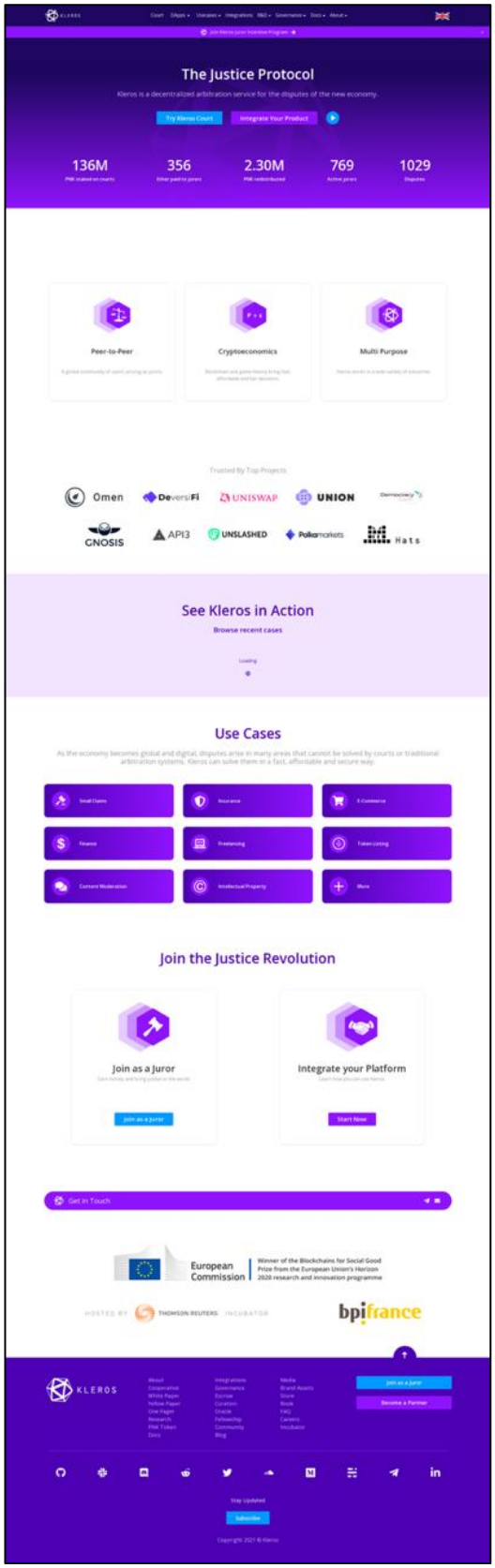
Appendix 6 Telegram Discussion





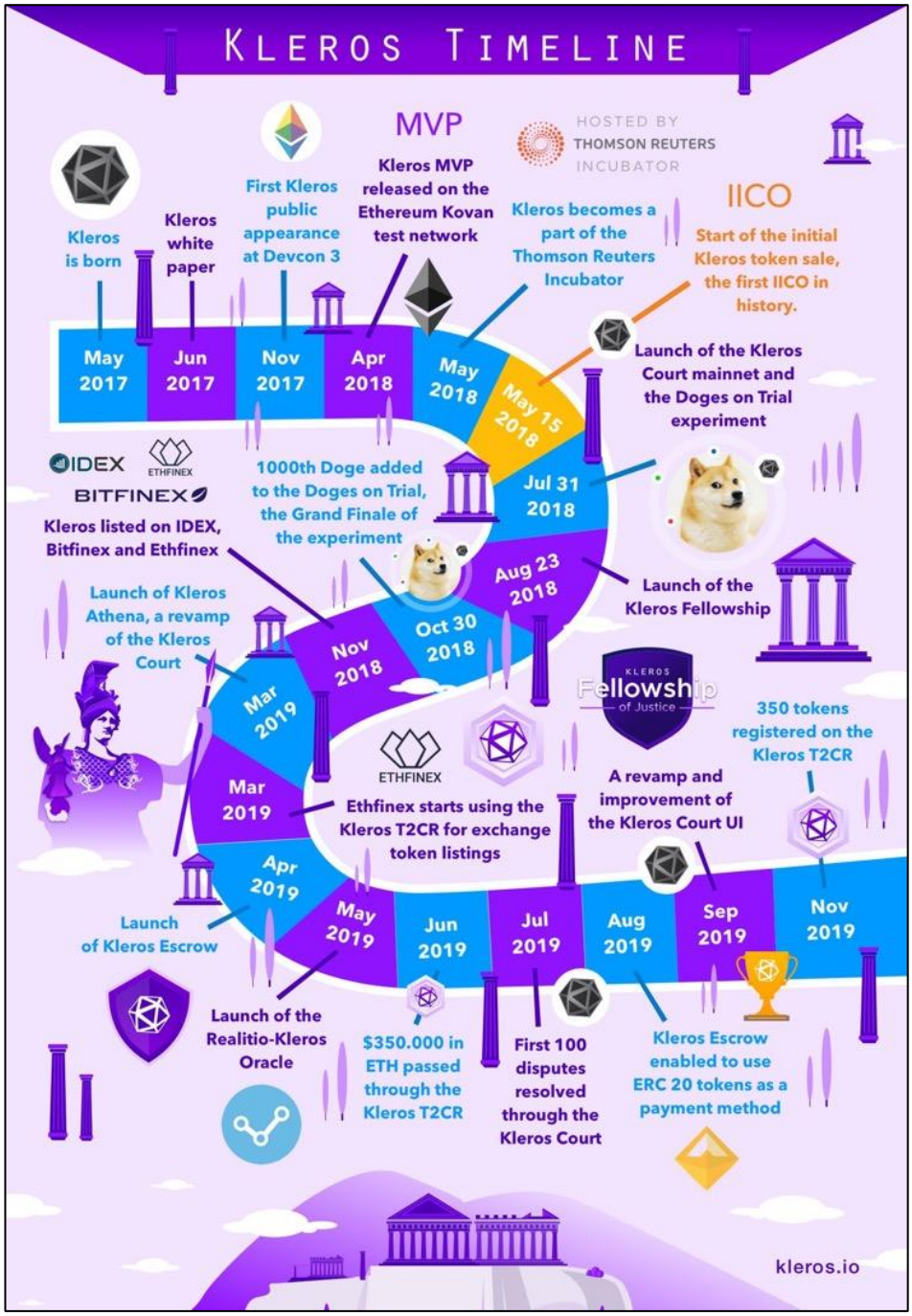
Source: Kleros Telegram Channel (https://t.me/kleros/139112)

Appendix 7 Kleros Main Website Frontpage



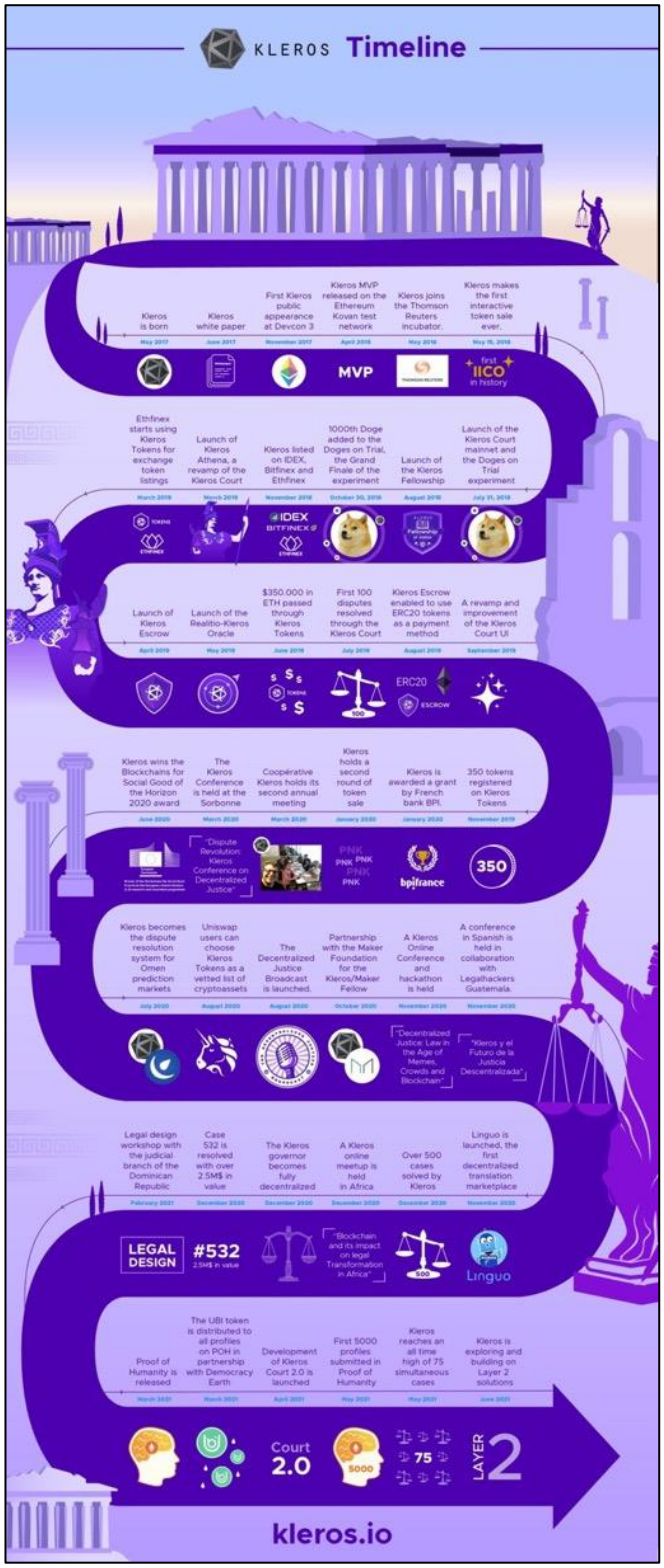
Source: Kleros Website https://kleros.io (Kleros 2020b)

Appendix 8 Kleros Timeline 2019: “second round of the Kleros token sale”



Source: Twitter Post (https://twitter.com/Kleros_io/status/1210313099057782796) “Coming up in less than a month is the second round of the Kleros token sale. We've created so much and we keep building more. Check out our visual roadmap until December 2019 right here” (Kleros 2019c).

Appendix 9 Kleros Timeline 2021: “A visual recap”



Source: Twitter post (https://twitter.com/Kleros_io/status/1404461197198508032) “A visual recap of Kleros through the ages. Four years is an eternity in crypto, here's what happened in the evolution of decentralized justice” (Kleros 2021c).

Appendix 10 The Road to Kleros Scalability

Source: Twitter post (https://twitter.com/Kleros_io/status/1389559338805649410) “THE ROAD TO KLEROS SCALABILITY Let us navigate together the few steps the Kleros Court will go through to transition from being the go-to Ethereum arbitration protocol to becoming a fully-fledged, scalable, and interoperable Justice system for the crypto world.” (Kleros 2021b).

Appendix 11 Discourse Exploration

Name	Dimension	Context	Description	Blockchain Characterisation	Kleros Characterisation	Date	Source
Kleros Pitch Deck for "Blockchains for Social Good"	Kleros	EIC Award	- Kleros Pitch Deck (5 slides). - For The European Innovation Council (EIC) Prize on Blockchains for Social Good finalist day. - Presented by Kleros Founders Dr. Federico and CEO and Clément Lesaege CTO.		Kleros is a blockchain platform that uses crowdsourced jurors for resolving small consumer claims in a cheap, fast and fair way.	2/16/2020	https://www.ngi.eu/wp-content/uploads/sites/48/2020/02/10.-CKH2020-Kleros.pdf
"Blockchain for social good" event page	EU Commission	EIC Award	- Blockchains for Social Good' Finalists' Day. - Lists 23 finalists and project description. - Award description. - Describes how the winner was selected.			Event date: February 10, 2020	https://www.ngi.eu/event/blockchains-for-social-good/
Kleros project short description for "Block-chains for Social Good" event	Kleros, EU Commission	EIC Award				12/20/2019	https://www.ngi.eu/blockchainsforsocialgood/2019/12/20/kleros-the-blockchain-dispute-resolution-layer/
The Com-mission's European Innovation Council awards €5 million to blockchain solutions for social innovations	EU Commission	EIC Award		- Creates positive social change. - Supports fair trade. - Increases transparency in production and e-commerce. - Fosters financial inclusion by exploring decentralised economic structures. - Addresses local and global challenges. - Offers decentralised, trusted and transparent solutions.	- A platform for resolving consumer disputes in e-commerce or collaborative economy. - Guarantees that no party can tamper with the evidence nor manipulate jury selection and that rulings are automatically enforced by smart contracts.		https://digital-strategy.ec.europa.eu/en/news/commissions-european-innovation-council-awards-eu5-million-blockchain-solutions-social-innovations

Kleros (marketing presentation)	Kleros	Marketing & Communica-tion	General presentation of Kleros	- Provides security and transparency for key parts of the digital economy.	- Secure. - Transparent. - Anyone can participate and earn money. - Democratizes access to justice. - Is a movement: "Join Kleros Movement".		https://kleros.io/static/onepager_en-3165e4676c4ed1529064608a83967c23.pdf
Short Paper v1.0.7 - White paper	Kleros	Marketing & Communica-tion		- Financial inclusion: "Cryptocurrencies are helping millions achieve financial inclusion." (p.15)	- Definition : "Kleros is a decision protocol for a multipurpose court system able to solve every kind of dispute." - Definition:"Ethereum autonomous organization that works as a decentralized third party to arbitrate disputes in every kind of contract" (p.1). - Honesty (p.8). - Fairness (p.8). - Democratisation of access to justice: "Kleros has the potential to bring “justice for the unjusticed” (p.15). - References Ancient Greece democracy often (white paper, yellow paper, interviews) as part of their narrative (going from Ancient Greece democracy system to Kleros).	09.01.19	https://kleros.io/static/whitepaper_en-8bd3a0480b45c39899787e17049ded26.pdf
Long Paper v1.0.0 - "Yel-low paper "	Kleros	Marketing & Communica-tion		- Speaks in the future: “disputes will arise” for things that have existed for a long time (disputes on eBay for instance). - Financial inclusion: "Cryptocurrencies are helping millions achieve financial inclusion." (p.41)	- "Provides judgments in an inexpensive, reliable, typically fast, and decentralized way." (p.1) - "Kleros leverages the technologies of crowdsourcing, blockchain and game theory to develop a justice system that produces true decisions in a secure and inexpensive way." (p.2) - Incentive-based system (for the jurors). - The "Schelling Point is honesty and fairness." (p.18) - Democratisation of access to justice: "Kleros has the potential to bring “justice for the unjusticed” (p.41) - References Ancient Greece democracy often (white paper, yellow paper, interviews) as part of their narrative (going from Ancient Greece democracy system to Kleros).	03.01.20	https://kleros.io/static/yellowpaper_en-28d8e155664f3f21578958a482f33bd1.pdf
Introducing UBI: Univer-sal Basic In-come for Humans	Kleros, Proof of Humanity	Proof of Humanity		- UBI: "democratic DAO and the future of income in the blockchain age." - UBI: extensive use of words like "democratic", "future", "first". - Blockchain as an age: the Blockchain age.	- UBI Is the first application to be built on top of the Proof of Humanity registry, an anti-Sybil attack tool designed by Kleros.	03.12.21	https://blog.kleros.io/introducing-ubi-universal-basic-

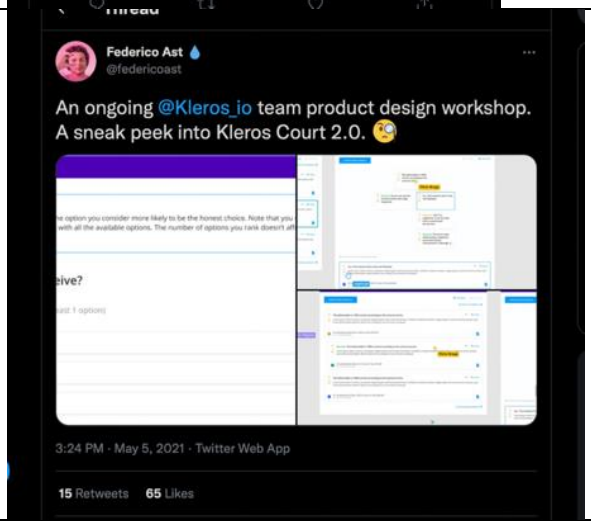
				- UBI: "innovative fair distribution system based on human time".			income-for-humans/
Humans on the Block-chain	Kleros, Proof of humanity	Proof of Humanity	Blog post by Damjan Malbašić	- Has the potential to enable democracy online. - Article uses the words "open-source, free and censorship-resistant" almost as values rather than technical characteristics. - Technology will "deploy democracy" and only technology can suppress voting/election manipulation > throwing discredit on voting processes while voter fraud is estimated to be very limited in functional democracies. - Blockain = democracy "Proof of Humanity enables the creation of social blockchains, allowing the creation of efficient democratic mechanisms, universal basic income, portable credits and many other wild social ideas."	- "represents a fantastic opportunity to structure completely new governance mechanisms on the basis of efficiency and transparency".	1/27/2021	https://blog.kleros.io/kleros-online-conference-report-the-fundamental-importance-of-humans-on-the-blockchain/
Kleros Receives BPI France Innovation Grant	Kleros	Bpifrance	Blog post by Federico Ast		- Went through a thorough vetting process. - Prize = proof of value of Kleros: "prize is more than just a material reward - it is also a confirmation of our effort invested in developing the first working decentralized court and bringing the future of justice a step closer to reality."	1/22/2020	https://blog.kleros.io/french-bank-grants-subsidy-to-kleros/
Cryptoeconomics: Can blockchain reinvent justice systems?	Kleros	Thomson Reuters	Article by Federico Ast for Thomsons Reuters	- "Cryptoeconomics may become the pillar for building the institutions of the Internet Age."	- References Ancient Greece democracy often (white paper, yellow paper, interviews) as part of their narrative (going from Ancient Greece democracy system to Kleros). - Kleros as a cutting-edge approach: "fundamentally rethinking" arbitration processes rather than making existing ones better/more efficient. - Comparison with Wikipedia, Uber, Yelp!, Airbnb.	8/27/2018	https://blogs.thomsonreuters.com/answerson/cryptoeconomics-blockchain-reinvent-justice-sytems-kleros/
Proof of Humanity - An Explainer	Kleros, Proof of humanity	Proof of humanity	Blog post by Stuart James		- "There are all sorts of amazing use cases and reasons to be on the PoH registry" (not explained further). - Uses humor and memes to make the process appear simple and friendly.	03.12.21	https://blog.kleros.io/proof-of-humanity-an-explainer/
The Internet of Humans	Proof of humanity	Proof of humanity	General presentation		- "Universal Basic Income is your right as a human." - Costs of registering unclear: UBI presented as free and providing a steady income. - Various uses presented but not explained. - Proof of Humanity and UBI's relations and differences not clearly explained.	04.01.21	https://www.proofofhumanity.id/

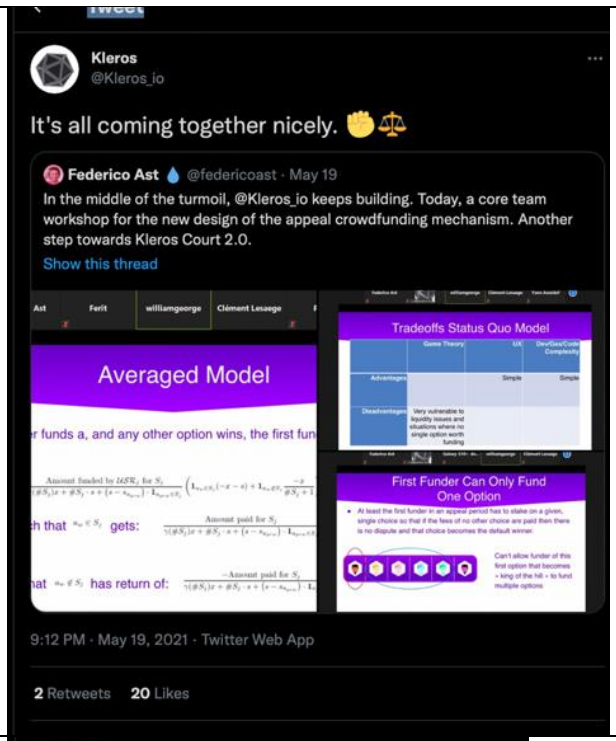
Foreword by Federico Ast	Kleros, Kleros Handbook	Marketing & Communica-tion		- Insists on the necessity to convince people that Kleros can work. - Goal: clearly communicate Kleros vision for the future of courts. - "Attempt to share our vision and motivate the right minds to think about the future of the legal industry and law as a whole. The world is rapidly changing and law will have to adapt to this rising tide."	- Positions Kleros as more than one platform among others but as the central organisation for the future of democracy, justice, etc. The first edition of the book was a "full account of the different aspects of the emerging field of decentralized justice, a place to learn about the history of the discipline, about cryptoeconomics, legal implications, business opportunities" (p.2) - "Kleros as a Supreme Court for the Internet" (p.2) - Limited historical knowledge, despite constant attempts to fit themselves in a historical narrative of democracy and justice and to present their platform as a revolution and complete break from current systems. For instance: "The concepts of judges and juries and laws arose at the same time as the nation state. But there are older ways of resolving problems that may be a better fit with the way the Internet works. These older approaches don't rely on governments, jurisdictions and legal regimes. They aren't imposed from above by some powerful enforcement body. In fact, the majority of the world's population still uses these approaches to resolve disputes and provide fairness, even though they get far less attention than the formal justice system we hear about every day in the media. " (p.18)	04.06.20	https://kleros.io/book.pdf
"A Necessary (R)evolution? Sophie Nappert " - The Kleros Handbook	Kleros, Kleros Handbook	Academia			- "Kleros is a breath of fresh air" (p.20). - Decentralised, transparent (p.20). - Justice served by "lay peers, people just like the users" or "like-minded" jurors which builds trust. - Strange connection with the pandemic: Kleros brings stability during the pandemic (p.21). - Relies on humans and thus builds trust with its users (p.21).	04.06.20	https://kleros.io/book.pdf
The Kleros Handbook"Kleros and the Future of Democracy By Santiago Siri, Founder, Democracy Earth "	Proof of Humanity, Kleros Handbook	Proof of Humanity			- More references to Ancient Greece and Kleros enabling the very idea of democracy to be "reborn" (p.22) vs. the current democracies that can be corrupted.	04.06.20	https://kleros.io/book.pdf
"From Lex Mercatoria to Lex Criptographia Primavera de	Academia, Kleros Handbook	Academia			- More references to history (Lex Mercatoria) to justify Kleros project and system via self-regulation.	04.06.20	https://kleros.io/book.pdf

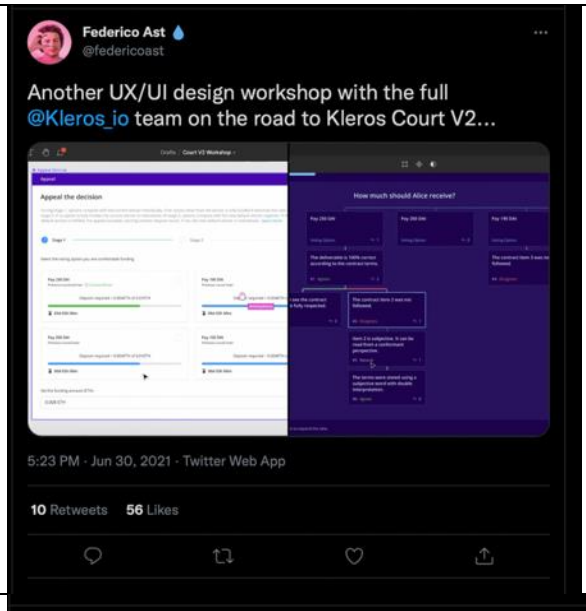
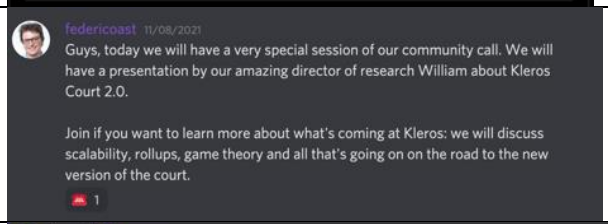
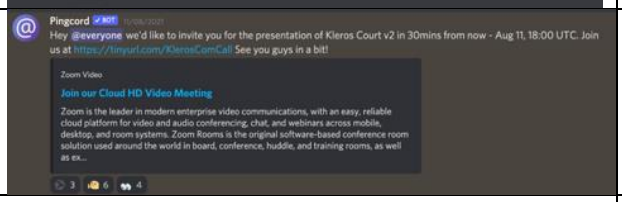
Filippi" - The Kleros Handbook							
Introduction - The Kleros Handbook	Kleros, Kleros Handbook	Marketing & Communica-tion			- More references to history and Ancient Greece betraying a limited command of the history of law besides the notion of "kleroterion to randomly select jurors and help avoid manipulation of the system." which is repeated very frequently in communication material from Kleros. (p.25). - Kleros is not a development based on existing systems but stems from "fundamentally rethinking justice from a first principles perspective" and is a "pioneer" (p.26). - "As Bitcoin was the first example of cryptocurrency, Kleros is the first working system of a new technology, industry and field of research we may call decentralized justice.2 It leverages the wisdom of the crowd to resolve a large number of disputes in which existing methods fall short: e-commerce, crowdfunding and many types of small claims are among the early adopters." (p.26) - The authors see themselves as "as researchers creating a new field" and as "social reformers" (p.27).	04.06.20	https://kleros.io/book.pdf
Conclusion - The Kleros Handbook	Kleros, Kleros Handbook	Marketing & Communica-tion	Conclusion		- Envisions the future with gendered clichés: Women buy dresses! Men design them! (p.447). - More references to history with very limited grasp of history. (p.447) - Lists the names of Aaron Schwartz, Julian Assange and Edward Snowden to establish a link between their activism and the Kleros project (p.448). - Lists models of democracy and governance (liquid democracy, futarchy, etc.) and align the Kleros project with them by presenting it as "another form of government for decentralized organizations", "based on the old concept of demarchy, the Athenian idea of random selection of representatives for government and courts, enhanced by the collective intelligence concepts of the Internet Age." (p.450)	04.06.20	https://kleros.io/book.pdf

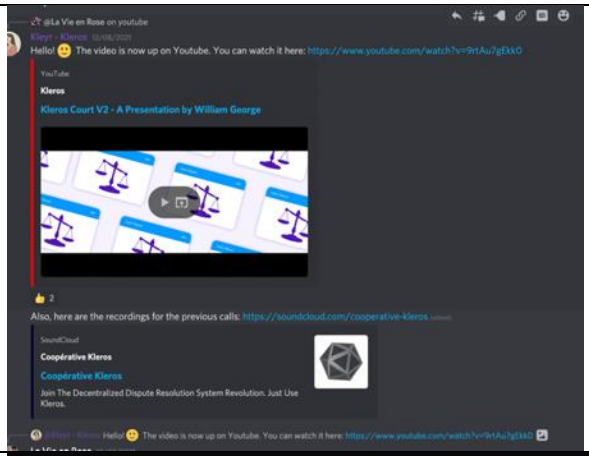
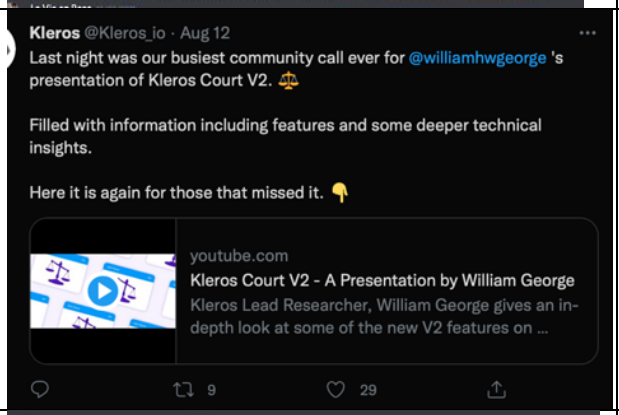
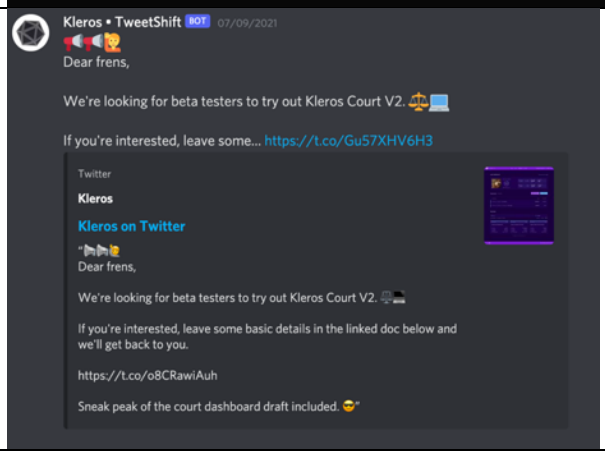
Source : Author Discourse Exploration around Blockchain and Kleros Characterization.

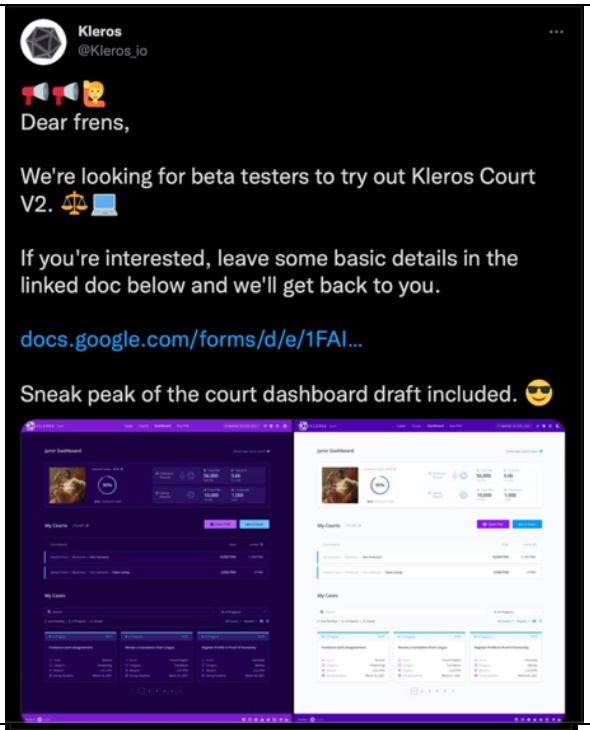
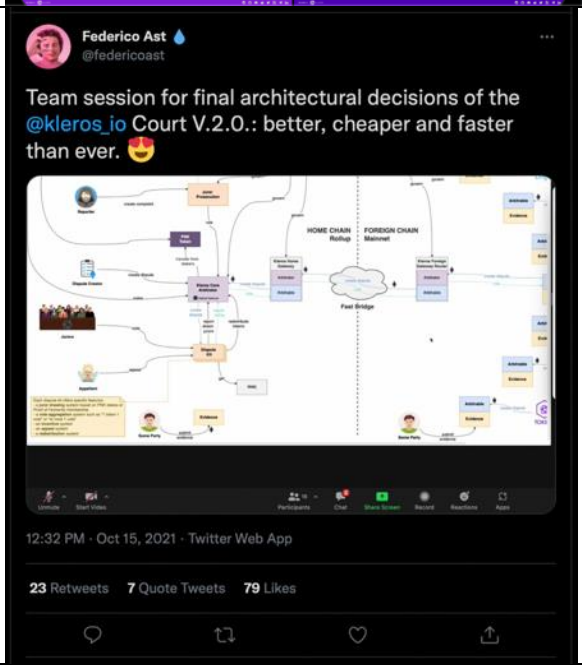
Appendix 11 Kleros 2.0

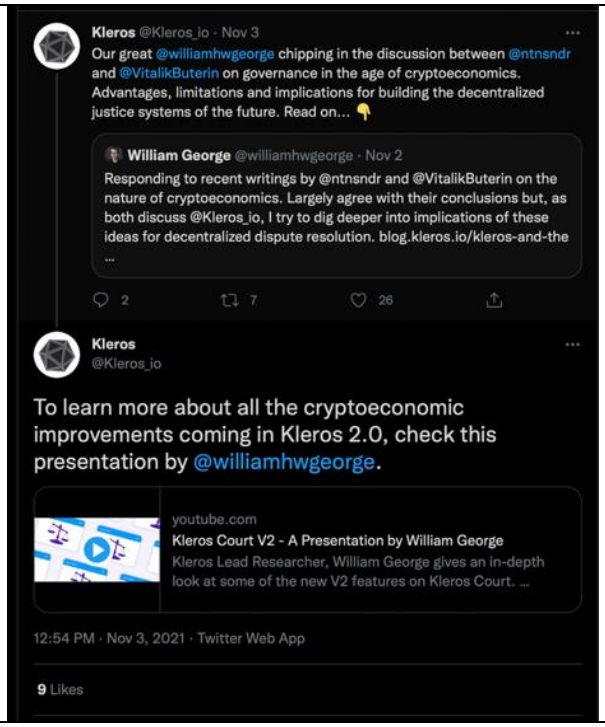
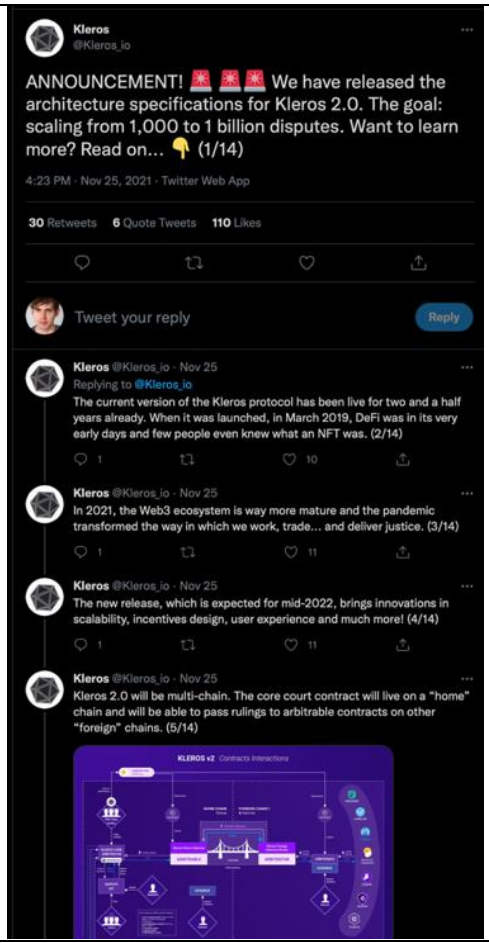
Name	Date	Attachments	Source (URL)	Type
The Road to Kleros Scalability	May 4, 2021		https://twitter.com/Kleros_io/status/1389559338805649410	Twitter
An ongoing @Kleros_io team product design workshop. A sneak peek into Kleros Court 2.0	May 5, 2021		https://twitter.com/federicoast/status/1389934120470564865	Twitter

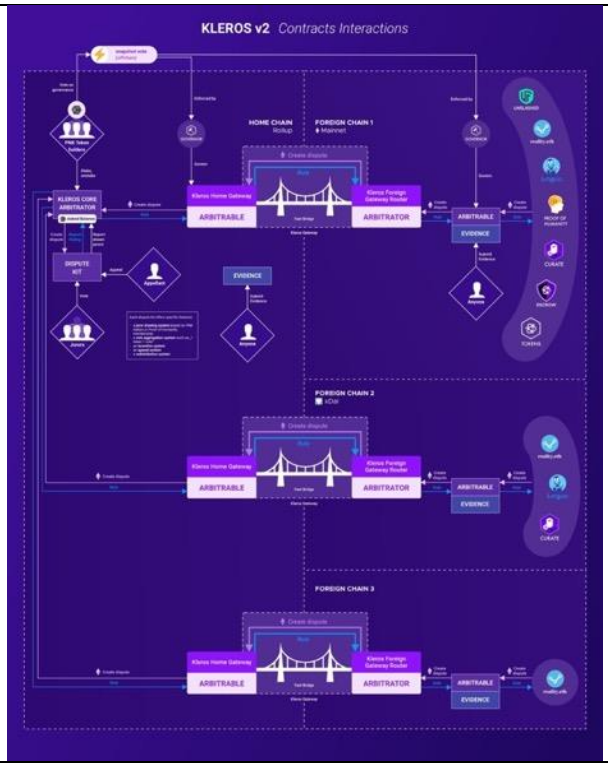
It's all coming together nicely. ✊⚖️	May 19, 2021		https://twitter.com/Kleros_io/status/1395095039223767041	Twitter
Yellow paper Update	June 5, 2021		https://twitter.com/Kleros_io/status/1411987177425231878	Twitter

Another UX/UI design workshop with the full @Kleros_io team on the road to Kleros Court V2...	June 30, 2021		https://twitter.com/federicoast/status/1410257730208686090	Twitter
Our Lead researcher @williamhwgeorge will be giving a presentation about Kleros Court V2 this Wednesday (11th August) at 18:00UTC in our community call.	August 9, 2021		https://twitter.com/Kleros_io/status/1424751414081990666	Twitter
Communicate Call Announcement on Discord	August 11, 2021		https://discord.com/channels/805775179442683904/805783976320303115/875590341003182090	Discord
Pingcord (bot) send reminder to join the Community Call	August 11, 2021		https://discord.com/channels/805775179442683904/805783976320303115/875590341003182090	Discord
Community Call: Kleros Court V2 - A Presentation by William George	August 12, 2021		https://discord.com/channels/805775179442683904/805783976320303115/875590341003182090	YouTube

Announcing video is on YouTube and recording on soundcloud	August 12, 2021		https://discord.com/channels/805775179442683904/805783976320303115/875590341003182090	Discord
Last night was our busiest community call ever for @williamhwgeorge 's presentation of Kleros Court V2.	August 12, 2021		https://twitter.com/Kleros_io/status/1425766871253540866	Twitter
We're looking for beta testers to try out Kleros Court V2	September 7, 2021		https://discord.com/channels/805775179442683904/805779675962933248/884858098563563550	Discord

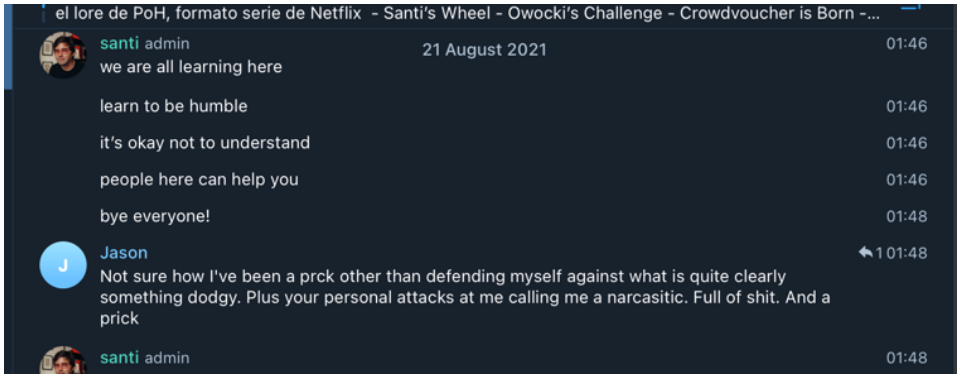
We're looking for beta testers to try out Kleros Court V2	September 7, 2021			https://twitter.com/i/web/status/1435299314901921796	Twitter
Team session for final architectural decisions	October 15, 2021			https://twitter.com/federicoast/status/1448959908926431234	Twitter

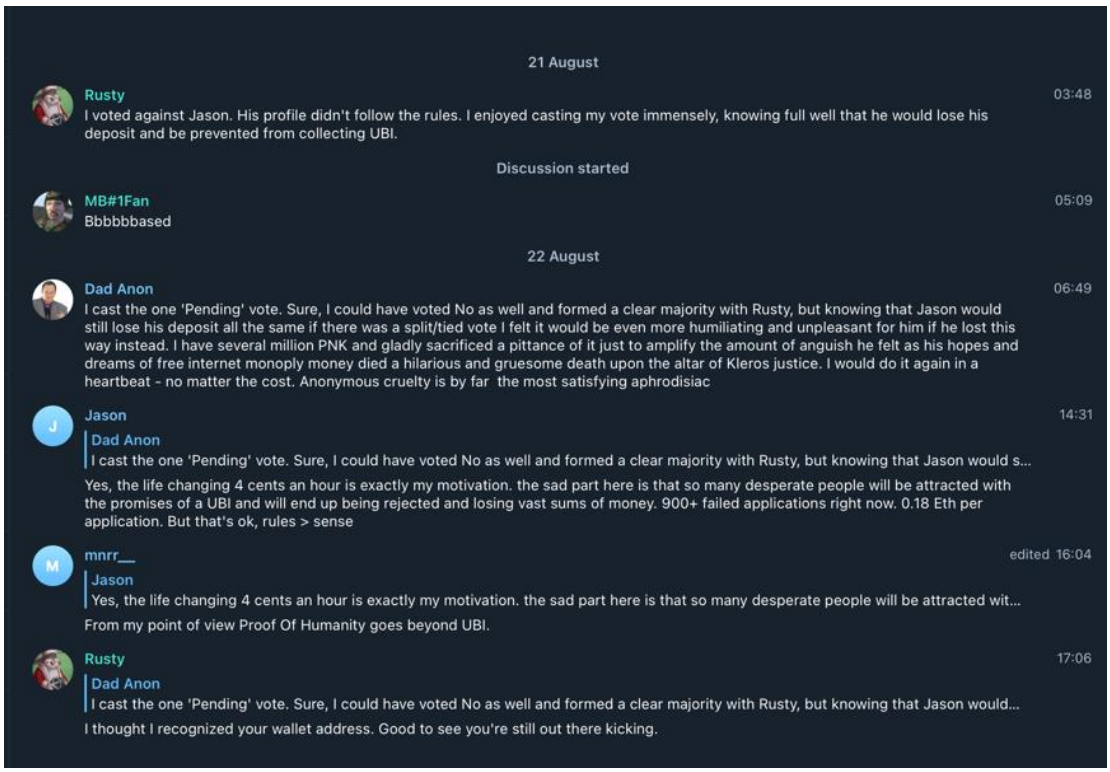
To learn more about all the cryptoeconomic improvements coming in Kleros 2.0, check this presentation by	November 3, 2021		https://twitter.com/Kleros_io/status/1455865893880311809	Twitter
Kleros 2.0: Scaling from 1,000 to 1 Billion Cases	November 24, 2021		https://blog.kleros.io/towards-kleros-v2/	blog
ANNOUNCEMENT! We have released the architecture specifications for Kleros 2.0. The goal: scaling from 1,000 to 1 billion disputes. Want to learn more? Read on...	November 25, 2021		https://twitter.com/Kleros_io/status/1463891101484470274	Twitter

Source: Author's Exploration of Kleros 2.0 "launch".

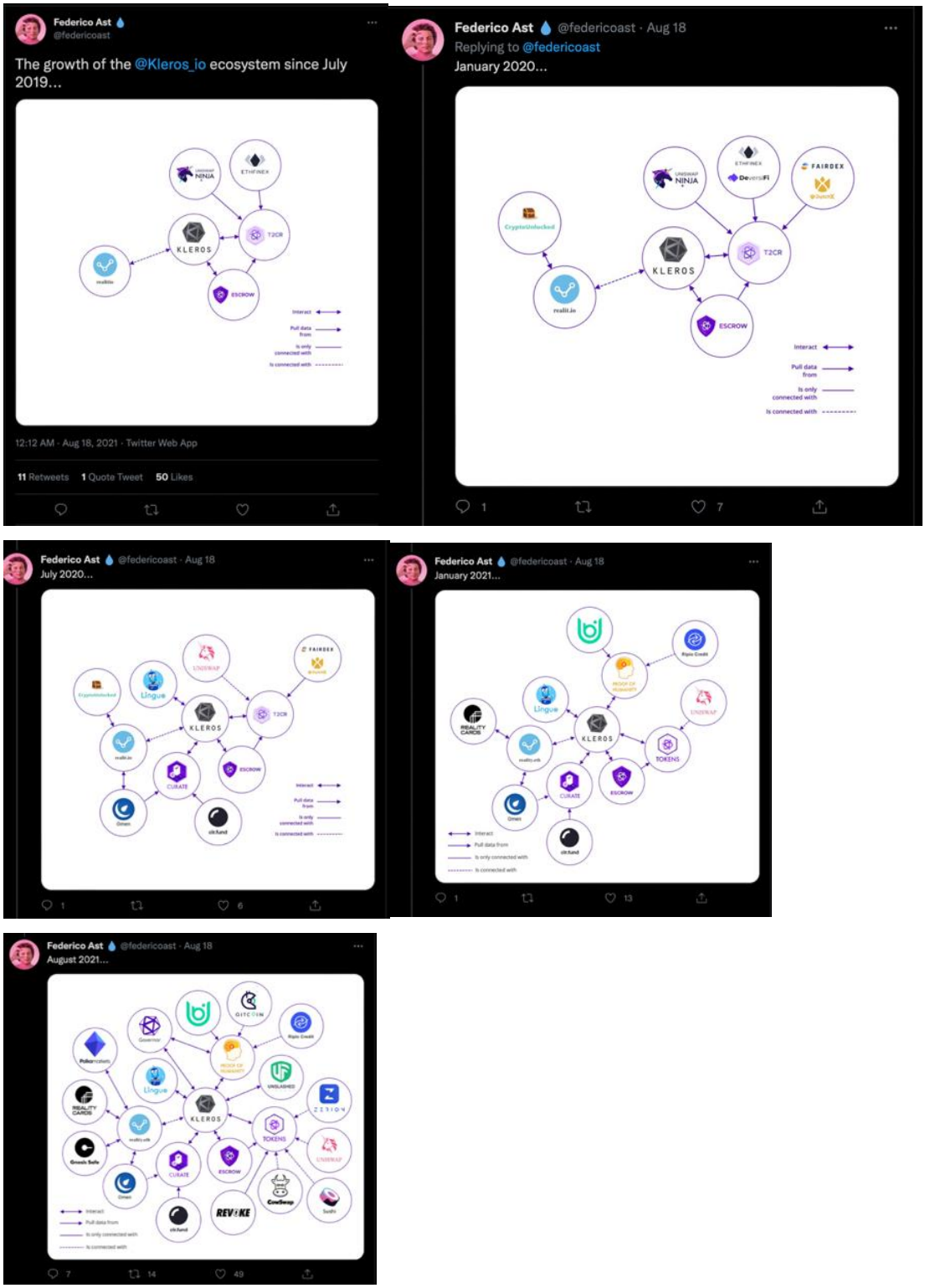
Appendix 12 Telegram Discussion





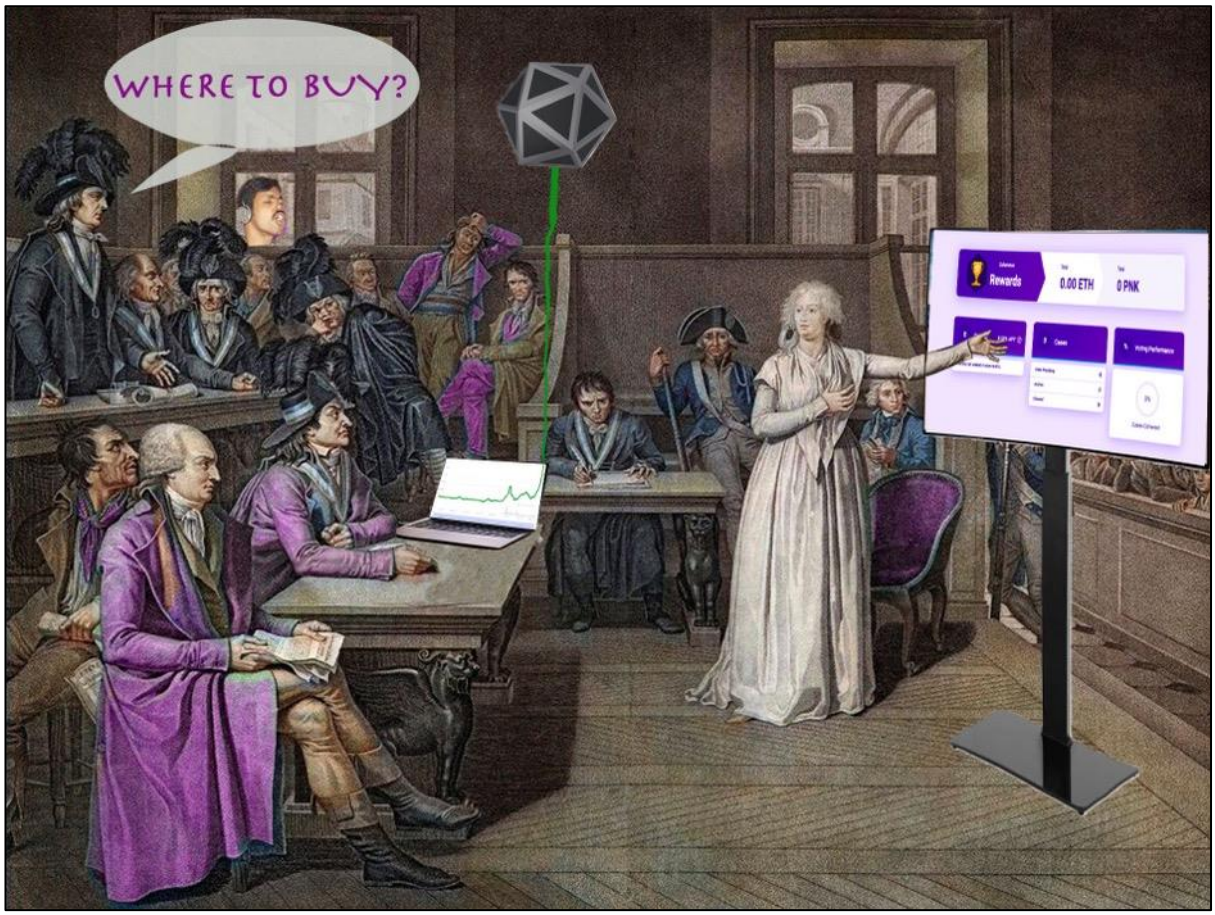
Source: Proof of Humanity Telegram Channel (https://t.me/proofhumanity/43914)

Appendix 13 “The growth of the Kleros ecosystem since July 2019...”



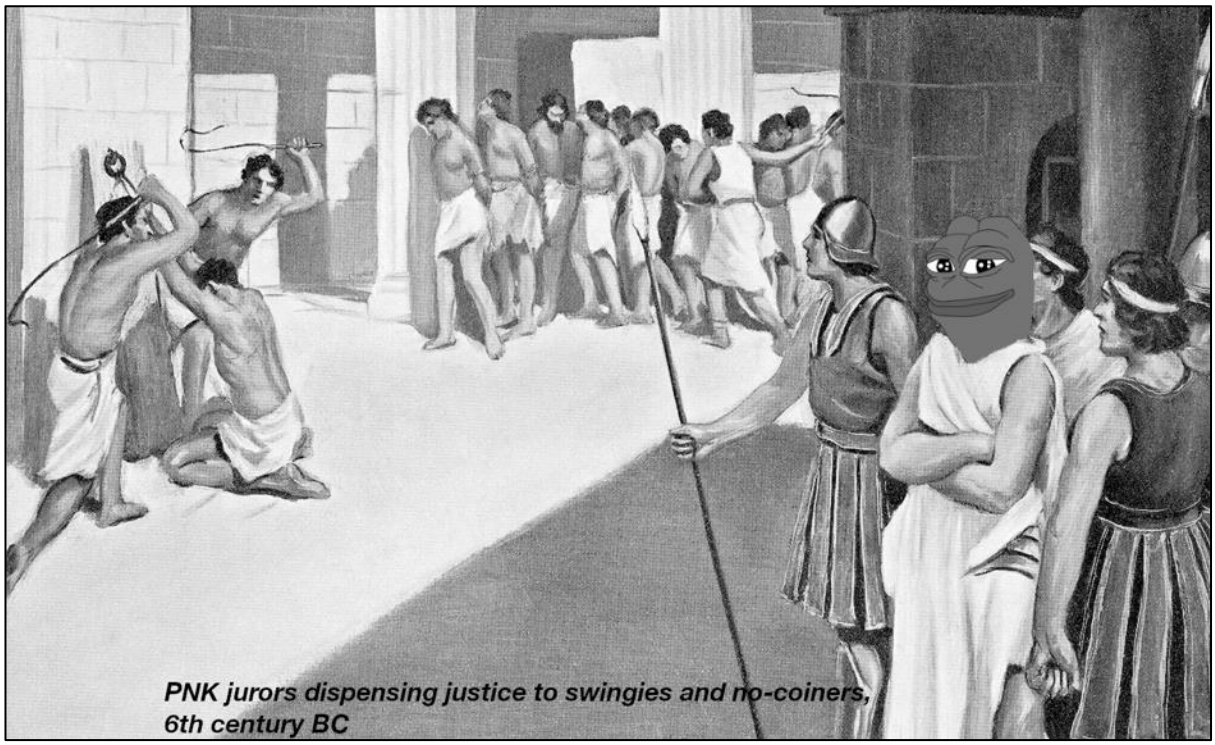
Source: Twitter Post (https://twitter.com/federicoast/status/1427755151612338179) “The growth of the @Kleros_io ecosystem since July 2019...” (Ast 2021b)..

Appendix 14 Kleros Meme



Source: Discord post on Kleros #memes channel (https://discord.com/channels/805775179442683904/805779962099269673/840199971970351105)

Appendix 15 Kleros Meme



Source: Discord post on Kleros #memes channel (https://discord.com/channels/805775179442683904/805779962099269673/842043115182751774)

Appendix 16 Kleros Meme

Source: Discord post on Kleros #memes channel (https://discord.com/channels/805775179442683904/805779962099269673/897970062839922688)

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