

Jur

The bridge between the blockchain and real economy

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"Does he not know that I can take the mill away from him by virtue of my royal power without paying one groschen for it?" Whereupon the miller is supposed to have replied: "Of course, your majesty, your majesty could easily do that, if – begging your pardon – it were not for the Supreme Court in Berlin."

legend of The Miller of Sanssouci, Vie de Frédéric II by an anonymous Author, about 1787

1 Executive Summary

Businesses suffer when contract obligations are not met. Current dispute resolution systems are costly and slow. Smart contracts can only partially solve the problem because code can't evaluate subjective elements of agreements.

Jur is a consensus-based dispute resolution system for enforcing agreements and resolving disputes quickly at zero cost. The flexible base layer can be used for all types of simple agreements. On top of the base layer, we'll develop several applications to support increasingly complex agreements and create well-qualified voluntary communities to deliver dispute resolution for specialty markets.

JUR contract and dispute resolution system's base cost of zero and ease of use make it accessible to even the smallest business for deals of absolutely any size.

Jur basic layer allows parties to enter into contracts with collateral deposited into escrow in the form of JUR (or other tokens). In the event of a dispute, the Oracles (the members of the community of Jur token holders) are called upon to settle the dispute by voting with their tokens for the party they consider to be right. The winning voters receive the tokens of the losing voters.

The voting system is the core of Jur project and it is based on game theory. Oracles will choose just, rational, and socially optimal outcomes, motivated by the desire to earn tokens and the aversion to losing them.

According to the rules of the voting “game” and the math on which it is based, the individual is economically motivated to vote for the party they believe to be right.

The party that has the most JUR tokens staked on their proposed resolution wins the dispute.

In the event of a mistake or bad faith by one of the parties to the contract, the community will always strive for justice.

The vote counting method is decentralized, making corruption nearly impossible. To speed up the process, the judgment takes place within a time limit of 24 hours. Rapid voting is encouraged by paying winning voters on a first come, first served basis.

Votes are stacked chronologically. Token holders that voted for the winning side are paid for their effort, first come first serve, with tokens that were voted for the opposite side until all tokens voted for the side that did not prevail are paid out. Remaining owners of tokens on the winning side just recover their tokens without further payment.

Upon completion of the vote, the contract is executed automatically with secure blockchain technology and the tokens deposited in escrow are released in accordance with the prevailing position. Oracles then receive their compensation.

This core of Jur project can be used as a dispute resolution layer by many third parties such as crypto exchange platforms and digital platforms for buying and selling services. Third parties can build new Apps for specific industries on this layer.

The Jur Team is developing a Platform that will make it easy to create agreement templates that will be useful for particular communities and sell them. We call them Smart Agreements, flexible, easily customized, and enforceable on the blockchain. The Platform will allow people to create “Hubs” with guiding principles for interpreting contracts used within the hub. Users can select a Hub when they select a contract. The platform will also allow groups of experts to create some specific Apps that impose some kind of limits on voting.

2 The Problem

It doesn't matter who you are, whether you are a large business or an individual consumer, the problem of slow, costly, and uncertain Justice affects you. When you make agreements to buy or sell, you cannot expect an effective solution if a dispute arises. You can attempt to enforce agreements through courts or other existing dispute resolution systems, but these methods are expensive and slow.

2.1 Costly and ineffective enforcement of agreements

Today legal expenses to close the right agreement are high. The blockchain will have a significant impact on the legal systems of multiple jurisdictions. So far, there have been very few blockchain applications for the legal industry. Attorneys who have begun to deal with the subject have been more focused on the certification function of the blockchain.

In addition, there has been speculation over the possibility of using smart contracts in place of legal contracts. However, analysis and projects undertaken to date have not taken into consideration the essential need for enforcement of contracts.

The economic health of a given community is dependent on legal and bureaucratic efficiency. According to the Organisation for Economic Co-operation and Development's (OECD) 2016 report "the ability to make and enforce contracts and resolve disputes is fundamental if markets are to function properly. Good enforcement procedures enhance predictability in commercial relationships and reduce uncertainty by assuring investors that agreements will be upheld promptly by local courts".¹

The OECD also observes that: "when procedures for enforcing commercial transactions are bureaucratic and cumbersome or when disputes cannot be resolved in a timely and cost-effective manner, traders depend more heavily on personal and family contacts; banks reduce the amount of lending due to the ability to collect on debts or obtain control of property pledged as collateral to secure loans; and transactions tend to be conducted on a cash-only basis. This slows down trade, investment, economic growth and development".

The data provided by the OECD on this subject are very clear. The world-wide average time in to resolve a contract dispute is between one and a half to three years. And that is only for a first judgment; appeals can lengthen the total process. The legal cost can reach 50% of the amount at stake.

Economy	Time (days)	Cost (% of claim)
Region		
East Asia & Pacific	560	49,1
Europe & Central Asia	485,9	26,6
Latin America & Caribbean	749,1	31,3
Middle East & North Africa	653,3	25
OECD high income	553	21,3
South Asia	1098,5	30,6
Sub Saharian Africa	655,2	44,3

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3 Prior Solutions

To cope with these problems various other types of solutions are currently available.

3.1 Traditional Solutions

3.1.1 Traditional Alternative Dispute Resolution (ADR)

¹ Cfr.

<https://www.oecd.org/investment/toolkit/policyareas/investmentpolicy/contractenforcementanddisputeresolution.htm>. See also: The World Bank: <http://www.doingbusiness.org/data/exploretopics/enforcing-contracts/why-matters#1>

² Data based on "Doing Business - Enforcing Contracts," The World Bank, 2016

Traditional ADRs (mediators or conciliators and arbitrations) can be divided into two categories³. On the one hand, mediation or conciliation: they are voluntary instruments (not compulsory), so the parties spontaneously choose to ask for help from someone who helps them resolve their differences. As a rule, the mediator or conciliator does not offer enforcement of any kind if one of the parties refused to abide by their ruling. Arbitrators, on the other hand, render binding decisions that can be enforced by civil authorities. Usually arbitration is specified in the initial contract. It is often very expensive and therefore inaccessible for those contracts involving small and medium enterprises.

Problems:

1. Mediators do not offer an enforcement mechanism, so they are only effective where there is adequate good faith.
2. Current arbitral tribunals are very expensive and therefore unsuitable for small or medium-sized contracts. Enforcement of an arbitral award can require intervention by the public authorities, which takes time.

3.1.2 Third-party guarantee systems: Online or Offline Escrow Systems, Bank Letters of Credit

Entities entering into agreements that involve payments can deposit money with a third party who agrees to hold it and release it when certain conditions are met. The conditions are verified by third parties like on Escrow.com which is an example of an online escrow platform.

Problems:

1. These services have high fees;
2. They are not particularly flexible in operating structure. They can only be used for specific categories of contract unless a very large sum is involved.

3.2 Digital Solutions

3.2.1 Platforms and Marketplace

Let's consider for example www.freelancer.com or www.fiverr.com. They create a trusted environment using reviews as well as guarantees provided by the central body. Here we have some basic agreements between people made interactive thanks to a specific platform. Many other similar platforms offer similar features. These platforms make it possible to find service providers among those registered on the platform. The counterparty risk is mitigated by the reviews that the various service providers have received from previous users. The knowledge that a provider with a good reputation will be averse to getting a bad review creates trust. These platforms offer a helpful approach for those looking for a supplier for one-off services. But:

1. They charge fees, often in the form of a percentage of all work performed;
2. The review system does not guarantee quality. You can get bad service from a well-established vendor with good reviews;

³ https://en.wikipedia.org/wiki/Alternative_dispute_resolution

3. It is a buyers' market, and "justice" on the platforms reflects this. They do not create a true balance between supplier and buyer. The buyer's ability to give negative reviews gives them negotiating power that the sellers cannot offset;
4. Online platforms are only available for certain industries.

As we have shown, classic Alternative Dispute Resolution solutions are either ineffective or too expensive. The solutions of third party guarantors represent the pinnacle of costly and inflexible centralization. Online platforms are excellent solutions in some cases, but for many others, they cannot be used.

3.3 Blockchain Solutions

3.3.1 Smart (Legal) Contracts

Self-executing decentralized smart contracts will revolutionize contract settlement for simple transactions. Imagine, for instance, a smart contract that uses a locating sensor as an external oracle to know when to deliver payment from escrow to the seller when a package is delivered. By adding terms and conditions we can incorporate an external legal order, in case something goes wrong with the oracle.

This approach offers several benefits:

- Costs are low for most users - who don't have to resort to external legal order;
- Decentralized distributed ledger is very secure;
- Simple way to guarantee trust between parties.

But this approach has two significant limitations:

1. Every smart legal contract will need a reliably accurate and secure external source of data - an Oracle. For some simple contracts, for example package delivery contracts, it may be feasible to create an automated or algorithmic external Oracle that works *enough of the time* to be useful, backed by some secondary system (see limitation 2 below). For other types of contracts, the external events to which the contract refers are consistently too complex to be evaluated by sensors, algorithms, or machine intelligence.

Let's take an example: could a web agency rely on a smart contract with an automated external oracle to make fair payment for work where there is a dispute about quality? Certainly not! How will a sensor or software judge the work of drafting a site, the seo, the copywriting, or the choice of colors? Any work that involves subjective properties cannot be evaluated fairly by automated oracles.

2. Even where we can imagine a simple smart contract with a simple external oracle - for instance, a delivery with an RFID tag in the package and detector system in the recipient's box, complications can arise that will be beyond the capability of the system to make a decision. Knowing that the sensor reports the presence of the RFID tag cannot always tell us whether payment is due. For instance, how can this system decide whether to deliver payment when there is a claim of damaged, missing, or incorrect items in the package, or tampering with the RFID tag or detector? For even the simplest of transactions that rely on an external automated Oracle, there is always a possibility of technical failure, tampering, or an unforeseen "Act of God" delivering an incorrect result.

Because reality will remain more complex than our algorithms to describe it, human intelligence will be required to resolve some disputes. We can refer our smart contracts to existing legal systems, but these, as we have noted, are slow, uncertain, and costly.

Thus we see, while smart contracts can simplify many transactions in some markets much of the time, transactions involving subjective criteria cannot use smart contracts. Furthermore, even the types of agreements that are the best suited to smart contracts are susceptible to complications that a smart contract cannot resolve.

4 Market size

The potential market is very large. In theory, anyone who needs a commercial contract could benefit greatly from a system that assures and delivers dispute resolution and enforcement swiftly and reliably.

To get an idea of the size of the reference market, we can refer to the market overview provided by Amit Zavery (Senior Vice President of Oracle Cloud Platform) and Harvard Business Review. According to their research, the Blockchain will be the technology that will impact the nature of business relationships the most by making them more efficient and transparent, reaching, in 2027, a value of around 10% of world GDP⁴.

If the blockchain grows to around 10% of world GDP in a decade, you can imagine the demand for a system on the blockchain that allows people to create and enforce contract, transfer value, and resolve disputes rapidly and fairly, all at negligible costs.

From another perspective the size of yearly USA Legal Services Market is **437 Billion**⁵ US dollars and this doesn't take into consideration all the remaining part of the World nor the value of the judging system which can lift up the size as much as the sum above.

Data on arbitration illustrate a trend towards wider use of arbitration systems. For example a report provides significant data for 2016 regarding the caseload at the eleven most important international arbitration institutions, including the International Chamber of Commerce, International Center for Dispute Resolution, China International Economic and Trade Arbitration Commission, London Court of International Arbitration and Singapore International Arbitration Centre⁶. In particular, Global Arbitration News points out that the eleven institutions in the report alone show a caseload of over 5600 new cases in 2016. ICC shows a 20% increase of new cases filed in 2016. CIETAC confirms again over 2000 new cases in 2016 for a total amount in dispute over USD 8.5 billion.

5 Our better solution: JUR

We can resolve the problem of trust with by offering JUR - a new way to create agreements and resolve disputes through a decentralized system on the blockchain that uses economic incentives to motivate people to choose the most fair resolution. We can enhance this simple system by creating the tools for users to develop customizable agreements and create communities and guidelines for writing and interpreting contracts.

5.1 Jur - Consensus-Based Dispute resolution Layer

⁴ [World Economic Forum: Deep Shift—Technology Tipping Points and Societal Impact - September 2015](#)

⁵ Data provided by Thomson Reuters Legal Executive Institute, see <http://www.legalexecutiveinstitute.com/the-size-of-the-us-legal-market-shrinking-piece-of-a-bigger-pie-an-lei-graphic/>

⁶ See <https://globalarbitrationnews.com/international-arbitration-statistics-2016-busy-times-for-arbitral-institutions/>

The common characteristic of all the systems described is inefficiency: the existence of a centralized single subject entrusted to decide that involves long waiting times (in the case of ordinary justice) and / or high costs (in the case of professional arbitrators).

To solve these problems, we will create a decentralized system that will allow communities of people to determine the outcome of disputes in the context of business relationships, analysing the dispute and expressing their opinion. This basic feature technically speaking is a multi-purpose oracle which can be used in a lot of different ways. The basic version of this Oracle includes an escrow so that the decision of the Oracles is applied to the disbursement of the escrowed sum.

Jur basic layer with escrow allows parties to enter into contracts with collateral deposited into escrow in the form of JUR (or other tokens). In the event of a dispute, the Oracles (the members of the community of Jur token holders) are called upon to settle the dispute by voting with their tokens for the party they consider to be right. The winning voters receive the tokens of the losing voters. The voting system is the core of Jur project and it is based on game theory. Oracles will choose just, rational, and socially optimal outcomes, motivated by the desire to earn tokens and the aversion to losing them.

According to the rules of the voting “game” and the math on which it is based, the individual is economically motivated to vote for the party they believe to be right. The party that has the most JUR tokens staked on their proposed resolution wins the dispute.

The vote counting method is decentralized, making corruption nearly impossible. To speed up the process, the judgment takes place within a time limit of 24 hours⁷. Rapid voting is encouraged by paying winning voters on a first come, first served basis.

Votes are stacked chronologically. Token holders that voted for the winning side are paid for their effort, first come first serve, with tokens that were voted for the opposite side until all tokens voted for the side that did not prevail are paid out. Remaining owners of tokens on the winning side just recover their tokens without further payment.

Upon completion of the vote, the contract is executed automatically with secure blockchain technology and the tokens deposited in escrow are released in accordance with the prevailing position. Oracles then receive their compensation.

This core of Jur project can be used as a dispute resolution layer by many third parties such as crypto exchange platforms and digital service brokerage platforms. People can build additional Apps for specific industries on top of the base layer.

This basic Layer will be implemented with some features for making the voting system more stable like Master Oracles which we discuss further below.

JUR will develop and offer a version of the smart contract and dispute resolution functions without the escrow requirement and with some variations to allow third parties generalized use of the system as a decentralized oracle.

This Layer has many different Applications:

- Get a free decentralized dispute resolution system: for third party platforms that want to add a dispute resolution layer at 0 cost for their customers
- Build App enforced on the blockchain: developers, lawyers or Companies could build up their own Apps for specific sectors;
- Get a decentralized Oracle for your smart contract: back up smart contracts with JUR for cases where the smart contract algorithm cannot deliver a good ruling (tampering, technical failure, or Act of God, for instance).

⁷ That is the initial period of judgment set as the standard at the beginning. In the future the period of judgment will be freely set up by the parties within certain limits.

5.2 Jur - Smart Legal Platform and other Apps

The basic layer of Jur will be free and flexible enough to apply for many purposes. Game theory shows that for contracts that users can clearly understand, the system will produce fair results reliably. In order to resolve disputes fairly, it is essential that contracts are clear. The JUR team will develop an App on the basic layer to make it easier to create agreements. The JUR team will also create a platform with a legal editor App to allow experts to create contract creation templates with wizards to assist users in customizing the contract. JUR will create a marketplace for buying and selling such contract templates and wizards. We will also create a platform to allow users to create Hubs, communities that can have entry requirements and guidelines for interpreting contracts and evidence, to better serve specialized and complex markets. Use of the Jur basic layer will be always free. Use of additional layers may involve very small fees contract creators and Hub administrators choose to charge.

Create and use feature-packed Smart Legal Agreements	Quickly create smart agreements on the blockchain using ready made templates & wizards, escrow money, and make payment or file a dispute and get justice in 24 hours, all for almost free
Develop and sell Smart Legal Agreement Creation Wizards	Anyone (lawyers, developers, designers etc...) can create a Smart Agreement template and a wizard to guide users to complete it. Templates can be attached to a Hub, incorporating guidelines for ruling on disputes.
Create your own Judging Hub for complex contracts	Anyone can create a Hub and create requirements for voting in the hub (for instance, professional certification, or selection by a trusted centralized authority that administers the Hub). Hub creators can also indicate guidelines for writing and ruling on contracts and disputes. These hubs will be needed for specialized markets where participants need a system where only experts are allowed to vote on disputes and where a clear consensus on the best way to interpret complex matters is provided.

6 How JUR basic layer works

JUR relies on the action of a decentralized community. To ensure this community delivers justice, we have created a system of incentives that give stability to the system and generates a virtuous cycle.

6.1 The JSC

Consider the basic ecosystem of JUR composed of:

1. Contractual counterparties who enter into a JUR Smart Contract (JSC);
2. Token holders who become oracles by voting in disputes that are opened.

The JSC (JUR Smart Contract) allows two parties to upload an agreement to be hashed. A hash of that agreement is stored in the JSC so that the contents of the contract can be verified in the future. The parties deposit the sum of money specified in the agreement in the form of JUR tokens into the JSC. The tokens are bound in the JSC until the parties concur that their agreement has been fulfilled or until the community of Jur Oracles rules on a dispute initiated by one of the parties.

In the absence of agreement, one of the two parties opens a dispute by proposing a resolution and staking a minimum percentage of the value of the contract. The other party has 24 hours to propose an alternative solution. The community of Oracles, everyone who holds Jur tokens, can vote for either proposal. At the end of the voting period (24 hours⁸) the smart contract executes the proposal that received the most votes by paying the money out.

The Oracles more specifically have three possible choices available.

They can vote in favor of one of the two parties (each party proposes a resolution for the dispute). But they also have a third choice - "Reject." If they consider that the contract is clearly illegal or grossly unethical, they can vote "Reject" indicating they believe JUR should not rule on the dispute and should simply return the escrowed tokens to the parties that deposited them.

Each vote has to be greater than a minimum raise equal to the 1% of the total previously voted tokens. This prevents a battle of tiny votes indefinitely postponing the resolution.

The Oracles have a strong incentive to vote for justice provided by a very direct system of economic incentives based on Game Theory: those voters who choose justice earn tokens at the expense of the unjust voters.⁹

6.2 Example: Alice and Bob on Jur

We can explain the basic functioning of Jur with an example. Alice wants to get three articles from Bob for her new blog. Alice and Bob agree on details (deadline, remuneration, how the article should be done etc...). This can be done regardless of where Bob and Alice reside.

They load a hash of that agreement into a JSC (Jur Smart Contract). Alice deposits 300 JUR that will go to Bob after he finishes the job into the smart contract.

There are three possible results for the execution of the JSC:

⁸ The judgment Period of JUR MVP will be set in 24 hours. After some tests we may allow the Parties the freedom to establish their own preferred judgment period so that some agreements could have 48h or 72h for example as Judgment Periods.

⁹ The voting system will be explained in detail in the following paragraphs. We also have a special Paper dedicated to the Game Theory supporting the voting system.

1. **Agreement.** Both parties agree to execute the contract as it was originally written. For instance, Bob delivers the articles on time so Alice authorizes the JSC to pay the 300 escrowed tokens to Bob and the agreement is completed.
2. **Friendly resolution.** There is a dispute but it is settled between the parties: Bob is only able to complete a single article due to unexpected commitments. Alice and Bob agree that Alice should only pay 100 JUR to Bob for his services. Alice and Bob authorize the JSC to pay 100 tokens to Bob and refund 200 tokens to Alice.
3. **Dispute.** A dispute is resolved by JUR token holders (Oracles): Bob is only able to deliver a single article. Alice feels she has been harmed by Bob's failure to deliver the other two articles and only want to pay 50 JUR tokens, but Bob wants to be paid 100. Since they cannot agree, Bob opens a dispute, staking 3 tokens on his proposal. Alice uploads her proposal to the JSC. Then any Jur token holder can act as an Oracle and vote their tokens for either proposal. If Alice's proposal gets the most votes, the JSC will refund her 250 tokens and pay 50 to Bob. If Bob's proposal gets the most votes, the JSC will pay Bob 100 tokens and refund 200 to Alice. Either way, both parties pay nothing to the Oracles to have their dispute resolved - the incorrect Oracles pay the Oracles who vote sufficiently early with the majority.

The Jur voting system allows anyone with Jur to vote for Alice or Bob. Everyone is free to vote as many Jur tokens as they wish. Voted tokens are deposited in smart contracts.

At the end of the Period of Judgment (24hr is set as the initial standard) the proposal that receives the most voted tokens wins.

Holders of tokens who voted for the minority side forfeit the tokens that they voted. Holders of tokens voted for the majority side are compensated with for their effort with the tokens of those who voted for the minority side, until those tokens are exhausted. Matching reward tokens are allocated only to those tokens that were voted soon enough to have been required to establish the minority.¹⁰

6.2.1 Example with Alice and Bob

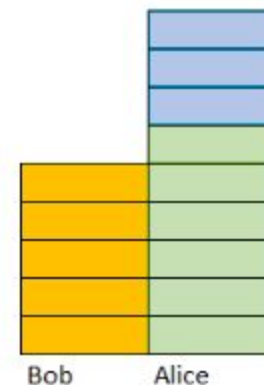
In a dispute between Alice and Bob the majority establish that Alice is right.

Each box represents a token that is voted. The lower tokens are the ones that were voted first.

The distribution of winnings is as follows:

- The 6 green tokens win the 5 yellow. Each green token is then remunerated with approximately 0.85 tokens;
- The blue tokens do not win anything because they are not needed for the establishment of the majority.

Most disputes will probably not involve a reject vote, so this simple scenario represents most cases. Here, we have assumed that the minimum vote is 1 token for the sake of simplicity. In our next example, we will include the reject vote and the actual minimum vote of 1% of previously voted tokens.



6.2.2 Example with reject vote

¹⁰ For simplicity sake we do not consider the very small cost in GAS on Ethereum, as long as that blockchain will be used.

In a dispute between Alice and Bob the majority establishes that Bob is right. All the voter that voted for Alice or Reject lose their tokens. The grey and yellow token form the paid majority. The red tokens are in the majority but have no reward.

Each box represents a voted token. The lower tokens are the ones that were voted first.

The distribution of winnings is as follows:

- **double match tokens** (grey): the 82.4 grey tokens earn the 80 blue tokens and the 80 green tokens (160 tokens in total). Each grey token earn 1.94 tokens;
- **single match tokens** (yellow): the 30.3 tokens earn the 30 orange tokens. Each yellow tokens earn 0.98 tokens;
- **no match tokens** (red): the red tokens have no reward (just refund token to the oracle).

Note that Voter_7 put 100 tokens on Bob. The number of his tokens that are in the double match group are calculated as the difference between the 80 token put on reject (Voter_4, 5, 6 and 8) and the tokens put on Bob before those of Voter_7 (the 30 tokens of Bob, Voter_1 and Voter_2) more the minimum raise calculated as the 1% of the number of tokens put on reject multiplied for 3.

			Voter_7ter 17,0
	Voter_3bis 30		Voter_7bis 30,6
Voter_3 60		Voter_8 50	Voter_7 52,4
		Voter_6 10	Voter_2 10
Alice 20	Voter_5 10	Voter_1 10	
	Voter_4 10	Bob 10	
Alice	Reject	Bob	

The number of Voter_7's tokens that are in the single match group are calculated as the difference between the total tokens voted for Alice (110) and the total token in the double match group (grey tokens) plus the minimum raise calculated as the 1% of the total tokens put on reject plus twice the number of tokens voted for Alice.

6.3 Fully decentralized voting system and counterweights

In many cases, there may be a clear majority at some point in the voting process. At the time they are voted, tokens voted for the majority (in all cases) will not have a matching opposition token as a potential reward. Votes that are unmatched at the time of casting may still be rewarded, if a sufficient number of additional tokens are voted on the other side but the majority position is not overturned. If not, those correct votes will not be rewarded because majority side tokens are rewarded with forfeit minority side tokens in the order received until the supply is exhausted. A vote that remains unmatched at the end of the voting period will not be rewarded; all the forfeit tokens of the minority will be paid out to people who voted sooner.

Consequently, the incentive to take the effort to examine the case carefully when there is a clear majority that a voter suspects they agree with is low. Oracles with large pools of money to invest would have a greater incentive to examine the case carefully, even if they suspect they will agree with the majority, because if they discover an opportunity on the minority side, they can vote accordingly and have a good chance of winning. In contrast, an Oracle with a single JUR has less incentive to search for injustice in cases of a large majority because even if they find it, it may be difficult to overwhelm the majority with the power of the chat room alone.

In such cases it is important to generate the conditions for someone to engage full-time in the voting activity.

This condition is important to ensure that the flow of votes is continuous and consistent. But it is also essential to balance another problem that could occur: the whale attack. An owner of a large amount of Jur – a whale – could attempt to vote on the unjust side to gain tokens, hoping that staking a very large number of tokens will allow them to “buy” an unjust verdict. In reality, the system should react by itself, as the community steps up to profit from this type of “problem,” especially when it has reached a high level of maturity.

The whale will merely create a super-incentive for many holders of smaller amounts of Jur to vote for justice and acquire the forfeit tokens of the whale. It is worth pointing out that in a crypto community, the news of a gigantic amount voted on a dispute would not go unnoticed.

We think it will be easy for community members to alert others and intervene not only to stop the attack, but to gain from it. We believe it is likely that ad-hoc Apps will be developed to alert Oracles of anomalous voting cases. Another decisive aspect that makes an attack of this kind totally illogical is linked to the loss of value that the big whale would suffer due to the loss of value of the JUR.

A situation of this type could in fact generate a lack of confidence in the functioning of the decentralized voting system, it would result in a loss of users and a potential decrease in the value of JUR.

Just in case the community response (not to mention the whale's self interest as a holder of JUR tokens) might not be sufficient to defeat a whale attack, we think it is advisable to allow Jur token holders to pool and delegate tokens to expert voters, thus providing a consistent and continuous supply of well-considered votes.

6.3.1 How the MasterOracle feature works

We believe that both these problems can be addressed by introducing the Master Oracles.

The Master Oracles are Oracles that offer to vote on behalf of others. Jur token holders may choose to lend their tokens to self-professed expert voters with an agreement to share the rewards (and losses) earned by voting the tokens. This feature facilitates the creation of a "proxy" based on merit expressed numerically. This system does not generate a negative centralization, but a potential positive oligarchy made by good whales.

The revenue distribution values and the related periodicity will be decided by the individual Expert. This function will be integrated after a certain period of time of the operation of the Beta and shaped according to the analysis of the data expressed in the judgments. We expect that expert voters will be professionals who dedicate a substantial amount of time to analyzing disputes in their area of expertise. These voters will participate in cases where complexity and ambiguity discourage ordinary voters, allowing the system to support more difficult agreements.

Jur may lock some portion of tokens gained by expert oracles using delegated tokens for a specified amount of time they are received to ensure the expert has a clear interest in the long term value of the tokens to discourage any possibility of voting for an unjust outcome.

6.3.2 The reject vote

Because Jur is decentralized, two parties could use it for an illegal contract or something manifestly contrary to their own individual rights. We have considered this delicate ethical problem for the crypto-economy.

Consider an example. What if two parties enter a contract to commit murder? If a dispute arises, the Jur oracles would be faced with the possibility of voting for one or the other parties to this unethical contract.

We do not want JUR dispute resolution to be used for unethical purposes. Fortunately, we can rely on the same economic incentive system to guide our Oracles to reject unethical disputes by introducing a special vote value for these rare circumstances.

To respond to this type of situation, Jur offers a third type of vote for these special cases called "Reject." A reject vote indicates the Oracle believes the contract is too unethical or outright illegal to receive any ruling. If the reject votes prevail, the reject voters earn the tokens of the voters who selected either of the two proposed resolutions and the escrow amounts are simply returned to whoever paid them in. If the reject voters do not prevail, they forfeit their tokens to those who voted for the winning proposal.

6.4 Competitive Advantage of Jur basic layer

The table below summarizes the characteristics of the current market solutions compared to those of JUR Protocol. Everyone will be able to use the Jur Basic Layer directly or use Apps designed by third parties or by our Team that access the Jur Basic Layer.

Dispute Resolution Options
Traditional Alternative Dispute Resolution <i>Expensive (arbitration)</i> <i>Or slow and ineffective (mediation)</i>
Systems of third-party guarantees in the relationship: Escrow System online, offline escrow systems, bank letters of credit <i>High fees</i> <i>Availability only for certain kinds of services</i>
Platforms and marketplaces that offer limited dispute resolution are limited to certain industries and products. <i>Centralized fees</i> <i>Available only for certain kinds of services</i>
JUR Basic Dispute Resolution Layer Cost zero 24h resolution of a dispute Available for all markets Easy to Use



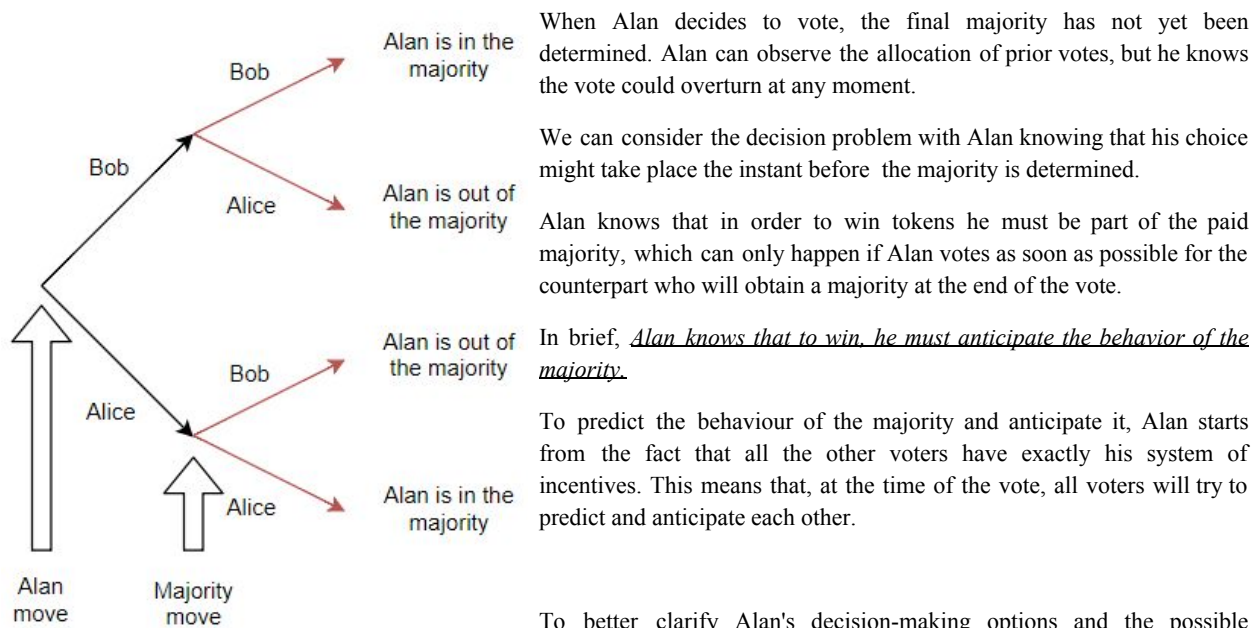
7 Game theory

In this chapter we analyze the system of incentives in the Jur environment. We will use game theory and mathematical modelling to demonstrate that the JUR voting system leads to justice and fairness.

Readers who can not interpret the mathematical equations can still read the accompanying text, which explains all the relationships described in the equations.

7.1 A formal model to represent the tendency to Justice of the Jur System

We start by describing the behavior of a generic token holder who is preparing to vote: Alan.



To better clarify Alan's decision-making options and the possible strategies that he can follow, we can represent the possibilities with a

Dynamic Entry Game in Extensive Form, widely used in game theory.

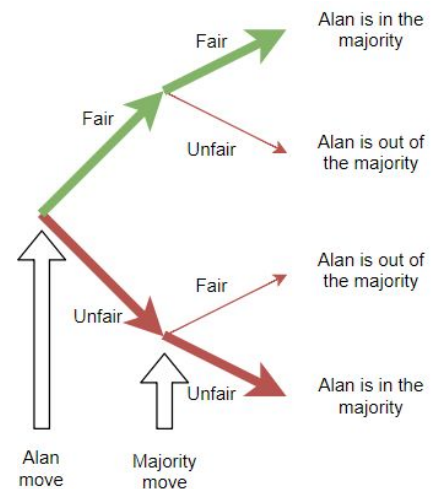
Alan chooses first without knowing what the outcome of the vote will be. Reading the contract gives an idea of which of the two contractual counterparties is right.

Alan will only be able to earn if the majority make the same choice.

7.1.1 Why does the system lead to justice?

The incentive mechanism of voters ensures that each of them seeks to understand and anticipate the behavior of the majority. It is therefore guaranteed that the mass tends towards a balance.

In this section we will show how this balance is fairness.



It makes sense to ask this question because, given the system of distribution of earnings which provides that those who are part of the remunerated majority earn the minority tokens, implies that the green combination (Fair, Fair) shown in the scheme produces for Alan exactly the same gain of the red combination (Unfair, Unfair).

Alan earns if he anticipates the majority regardless of whether the verdict is actually right.

The same result can also be observed in the normal form.

Outcome Grid - Majority Choice vs Alan Choice

	Majority - Fair choice	Majority - Unfair choice
Alan - Fair choice	Alan earns: αT_A Majority earns: αT_M	Alan earns: $-T_A$ Majority earns: αT_M
Alan - Unfair choice	Alan earns: $-T_A$ Majority earns: αT_M	Alan earns: αT_A Majority earns: αT_M

Where:

- ❖ T_M and T_A : Value in fiat currency of the voted tokens by the Majority or by Alan;
- ❖ α : multiplier of the amount vote in case of victory, value is close to 1.

However, there is a reason why the system definitely tends towards fairness.

In fact, as we said before, to predict the behaviour of the majority and anticipate it, Alan starts from the fact that all the other voters have exactly the same system of incentives as he does. This means that, at the time of the vote, all voters will try to predict and anticipate each other.

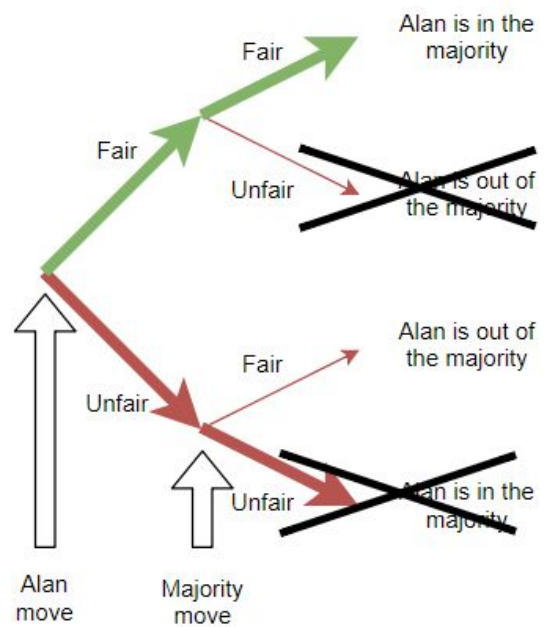
In game theory this is a classic situation in which you have to study the joint behavior of all players in a game characterized by:

- lack of communication;
- symmetry of payoffs (i.e. gains and losses).

Thomas Schelling (1960) studies and resolves this situation in his main work "The Strategy of Conflict", in which he elaborates the concept of the focal point.

The Focal Point is a solution of the game "that people will tend to use in the absence of communication, because it seems natural, special, or relevant to them".

So our main question now is: what is the focal point for a JUR dispute?



The answer is very simple: the Jur focal point is the fairest of the two propositions. All the voters who judge a dispute are asked to choose the most fair of the two propositions. Having to predict the behavior of the other voters, they will all vote for the party that they believe will be chosen by the majority. The payoff to stake ratio will be the same for both propositions; there is no differential that could affect voter behavior. Having no reason to assume the other voters are ignoring the instruction to choose the most fair proposition, an individual voter will try to predict which proposition the other voters will consider the most fair.

If so, Alan's best strategy is always to acquire information to understand which proposal is the most fair and vote for that one, or abstain if he is uncertain. It is worth noting that the scenario for the Jur system is slightly different from the hypothetical conditions under which Shelling explains the Focal Point because, in Jur, voters do not act simultaneously. Moreover, each voter has the opportunity to see how prior votes have been allocated.

Despite these differences, we believe JUR voters will still be drawn to the Schelling Point in the form of a fair outcome. The JUR voters' ability to see past votes allows them better insight into the view of the evolving majority. We see a slight risk that an early majority could discourage voters from supporting the underdog, but this is only a slight distortion in the system's ability to find fairness, not a difference in the participants' sincere motivation to seek it out. Furthermore, our system of Master Oracles (discussed below) will help mitigate the risk posed by voters' awareness of other votes.

In games of chance and betting markets, low probability events carry higher reward to stake ratios. In JUR, the reward to stake ratio is the same for both propositions. There is no advantage in selecting a "long-shot" proposition that the majority is unlikely to think is fair. Because the reward to stake ratio (in the case of winning) is the same for both propositions, voters will select the proposition with the highest perceived probability of being supported by the majority. They will choose the side that they believe most people will perceive as fair.

Game theory confirms what our intuition suggests: when asked to try to pick the most fair proposition to earn a reward for voting with the majority, voters will honestly choose the proposition that they believe is most fair.

7.1.2 Wisdom of the crowd and "beauty contest effect"

We can explain the beauty contest effect with a parable of sorts.

There is a beauty contest among ten girls. There are ten strangers who are promised a reward of \$ 100 only if they vote for the girl most voted by the others. They may have their own personal feelings about beauty, but they will try to anticipate the other judges' opinions rather than following their own. So for example, if judges were to choose between Marilyn Monroe and an anonymous woman that they thought plain by conventional standards but uniquely beautiful in a way that transcends the beauty of her famous competitor, some or all of them who otherwise would have chosen the other girl, may pick Marilyn Monroe.

In the case of Jur there are two differences. Jur voters must put their own token at risk if they want to vote. If they perceive an uncertain outcome, due to the fact that dispute revolves around an excessively subjective judgment, they will be unlikely to risk tokens. Moreover, we think users will be careful to submit agreements with clear Key Performance Indicators and avoid reliance on subjective criteria as much as possible.

When users submit unclear agreements, if they come to a dispute they will discover the results are unpredictable. We imagine most users can learn from the examples of others to avoid the pitfalls of vague agreements. Some will no doubt need to learn on their own. In general, we expect users to become increasingly adept at recognizing what agreements can work on JUR (and it's Hubs) and how to explain agreements clearly.

7.1.3 Expected earnings of voters and incentive to vote as soon as possible

In order to earn tokens, Alan and the Oracles comprising the majority must vote early enough that their votes are required to determine the majority. If they vote after the majority is established, there are no minority tokens left for them to win, and their voted tokens are simply refunded without reward.

Let's now demonstrate what we said starting from the evaluation of expected earnings of an Oracle.

The profit/loss of a generic voter is defined as follow:

- $G = -T$, in case of losing
- $G = \alpha T$, in case of voting with the majority

Where:

- G : is profit / loss of the oracle
- T : amount of votes tokens
- α : multiplier in case of voting with the majority

In other words, in the event of a defeat, T tokens voted are lost. In the case of a victory the voter earns T and an additional percentage of T is earned as reward for taking the time and care to vote correctly.

We can model the expected value of the token payout for a generic oracle as¹¹:

$$E(G) = \alpha T p - T \cdot (1 - p)$$

Where :

- $E(G)$: expected value of the variable "net gain" G calculated by the voter;
- T : amount of voted tokens;
- p : subjective probabilities that the voter assigns to "Win" (or more accurately "earn" events);
- α : multiplier in case of victory.

Given his risk aversion, the oracle requires a risk premium and so he participates in the votation only if the expected value of its gain is sufficiently higher than zero¹².

$$E(G) = \alpha T p - T \cdot (1 - p) > 0$$

This condition is only true if:

$$p > \frac{1}{1+\alpha}$$

The variable α represents the multiplier in the case of winning and may assume the following values:

- $\alpha = 0$ for the tokens that are in the no match part of the majority. Is the part of the majority that is not rewarded;
- $\alpha \approx 1$ for the tokens that are in the single match part of the majority;

¹¹ In this case, capital gains from the change in price from currency pairs will not be considered a result of the performance of the voting system.

¹² Given the practical purpose of this document, we make reference to utility theory and to utility preferences of individual voters. The expected value of the net gain has to be sufficiently higher than zero because the voter, given his risk aversion, requires a risk premium sufficiently higher than zero to motivate him to act.

- around 2 for the tokens that are part of the double match group¹³;

Note that:

1. If $\alpha = 2$ then $p > \frac{1}{3} \rightarrow$ the voter thinks that, as the voting has just begun, the reward will be 2 so is rational for him to vote if he think that the probability to win is higher than $\frac{1}{3}$. Note: this only occurs with rare "reject" votes.;
2. If $\alpha = 1$ then $p > \frac{1}{2} \rightarrow$ the voter thinks that, as the voting has just begun, the probability to win matching vote on only one of the two other possible sides is high (the common case when no reject voted is expected) so is rational for him to vote if he think that the probability to win is higher than $\frac{1}{2}$.
3. If $\alpha = 0$ then $p > 1 \rightarrow$ the voter thinks that a lasting majority has already been created so is impossible to take part of the paid majority no matter how certain he is in his prediction, so he does not vote because the expected earnings amount to zero.

It is clear that the incentive to vote is higher if the voter is among the first to discover and vote in the dispute.

7.2 Optimal conditions for the functioning of JUR dispute resolution

The formal model in the previous section has demonstrated two fundamental incentives

1. Vote well: the majority is likely to select the most fair outcome and you must vote with the majority to win;
2. Vote swiftly: you are only rewarded for voting correctly if you vote soon enough that your vote was necessary, in the order received, to create the majority.

So the best strategy for the oracles is to study the dispute, carefully choose the proposition that seems to be the most fair, and vote as soon as possible to maximize the possibility of a reward.

The system will work best under a particular set of optimal conditions. In particular, clear agreements and a clear understanding of commonly held best practices will help ensure that Oracles can vote confidently and choose fair outcomes consistently.

We can help create clear contracts by supporting the development of third party platforms to offer customizable contract templates and interactive services for developing more complex and precise agreements. Clear contracts will reduce uncertainty and allow voters to select confidently.

We can also help create communities of Oracles that focus on particular sectors of business and types of contracts, allowing them to establish and share relevant best practices for interpreting disputes. These will not be centralized authorities, but rather voluntary associations that any qualified individual may join. We envision Oracles creating voluntary unions that agree to understand and abide by certain guiding principles in judging disputes. Users could choose to create their contracts under the rules of such a union and specify that their dispute would be resolved by members of the union.

This feature will direct the wisdom of the crowd towards more effective and efficient decision-making models to cover specialized situations.

In general all this will result in wider applicability of the dispute resolution system and, consequently, greater adoption of Jur as a system for making agreements.

7.3 Further clarification

¹³ It is worth nothing that the double match group only exists in the rare case of a reject vote.

7.3.1 Why corruption is not possible

In our system, corruption is not possible because the number of tokens being staked by the jury could be much higher than the underlying number of tokens being disputed by the parties.

Let's give an example. Assume Bob and Alice have a dispute for payment of 1000 USD. Is it possible that one of them will try to corrupt the Oracles to win the dispute?

Is it possible that Bob or Alice would pay an amount equal or greater than 1000 USD to unfairly gain 1000 USD?

The answer, of course, is no. No one will pay more to create corruption than they can gain from that unethical act. The number of tokens the Oracles might stake (theoretically, up to as much as all existing tokens not committed elsewhere) is potentially vastly higher than the amount in dispute.

So corruption is not possible. Conspiring to gain by voting for an unfair result in exchange for sharing the proceeds of an unfair result is just giving away tokens to Oracles eager to gain by delivering a fair verdict.

7.3.2 Does the Jur System Require Unfair Votes to Work?

If the preceding analysis is accurate, there is never an incentive for anyone to vote Unfairly. Oracles will only vote on the Unfair side if their perception of Fair and Unfair does not match that of the broad market for JUR tokens. This gives rise to two questions.

Why should someone vote on the wrong side? And what happens if no one does vote on the wrong side?

Most likely, the first to vote on the wrong will be one of the two parties who will vote in favor of their own resolution, seeking to benefit from Unfair payment of the contract, or, blinded by ego, misunderstanding what is Fair and what is Unfair.

On the other hand, other voters who are not party to the contract choose sub-optimal Unfair choices will not do so out of bad faith but because they fail to apprehend which side is likely to prevail. This effect will systematically involve some voters (weak voters) and marginally all other voters, on occasion.

If there are no votes on the wrong side, does the system work?

In each scenario, the system works. In fact, if following the first vote there are no dissenting votes, the party who opened the claim and voted in favor will take back what they voted and will get it back at zero cost, just anticipating a small sum.

If the other party (proposing the Unfair choice) votes in their own Unfair favor, their choice will trigger the response of neutral Oracles who will enter the vote as soon as possible to vote on the side of Fairness, in order to acquire the Unfairly voted tokens.

7.3.3 Incentives for weak voters

In light of this, what will be the behavior of the uncertain token holder?

The best strategy for them will be to abstain from voting. In the case of more complex contracts, only those who are able to really understand them will vote first.

If the weak voter votes, he risks losing his tokens in favor of the prevailing voters. This leads to a natural selection mechanism within the popular Jur that will result in juries composed only of voters who sincerely believe that they are capable.

In summary, the weak voter will have three choices:

1. Continue to lose tokens in favor of those who vote correctly. In this case the system will tend to naturally select the most capable voters;
2. Sell their tokens to other people who want to start or increase their voter activity within the Jur;
3. Deposit their own tokens within specific master oracle that will take care of managing tokens. Their operation will be similar to that of an investment fund that collects capital and then issues dividends to token holders. This feature will

only be available if and when rigorous study of Jur operation convincingly demonstrates that such funds cannot corrupt the system.

7.3.4 Oracles Activity: Reward, no Gambling

Jur does not provide a platform for “gambling on justice.” Jur simply provides a clear incentive to make a fair assessment, and to make it as rigorously and rapidly as possible. We can more accurately say that Oracles *earn* tokens for studying the case and delivering a just verdict rather than say that Oracles *win* tokens for participating in a ‘game of chance.’

The rational person will choose the more likely event that coincides with the highest probability of success because there is no incentive to vote on an unlikely event. Voting on low probability outcomes does not lead to a higher return.¹⁴

There is no incentive to try to earn tokens by voting unjustly. When an Oracle notices that someone has voted on the wrong side, he can easily vote against him and take his tokens.

Jur allows those who make the right decisions in a timely manner to acquire tokens voted by those who make the wrong decision. Such a system results in immediate accountability for each participant.

Unlike other previously proposed online Jur systems, Jur - at the layer of the Protocol - does not require anyone to determine the fitness of an Oracle, other than the Oracle himself. The Oracle himself will be reluctant to vote on matters that he is not confident in, or on topics in which he lacks expertise, because of the risk of token loss. Consequently, competent Oracles will self-select.

¹⁴ Jur Legal team will analyze jurisdictions laws on gambling and strive to show Jur does not involve gambling because: 1. An Oracle gets a reward that is a payment for doing useful work, a “success fee.” The fee is not aleatory; 2. The money that a minority position Oracle loses is a fee for failing to deliver "work well made"; 3. The system’s game theory and accompanying rhetoric discourage chronic losers from continuing; they should realize they are not well qualified to judge after a few losses, recognizing there is no random element, only their ability (or lack thereof) to rule justly with the majority 4. Significant work is required to examine and rule, discouraging compulsive behavior. 5 Jur does not offer the thrill of higher returns for greater risks.

8 Minimum Viable Product Specifications

The following chapter explains the MVP under development by Jur. It has the core features of the Jur basic layer with some simplifications.

8.1 Initialising the Jur Smart Contract

In order to initialise a Jur Smart Contract, two parties (Party A and Party B) must agree on the following matters:

- . Party A (identified by an ETH address)
- . Party B (identified by an ETH address)
- . Agreement (details of the contractual agreement between Party A and Party B, encoded on-chain as a hash of arbitrary data stored off-chain)
- . Dispersal (encoded as a pair [*disperseA*, *disperseB*] denominated in JUR, where *disperseA* / *disperseB* are the amounts returned to Party A and B respectively on completion of the contract)
- . Escrowed Funds (encoded as a pair [*fundingA*, *fundingB*] denominated in JUR, where *fundingA* / *fundingB* are the amounts to be funded by Party A and B respectively)

Once the JSC has then been funded by Party A and Party B (as specified in Escrowed Funds) it is considered to be initialised, and funds are locked. Until this time, either Party may withdraw from the agreement.

The JSC enforces the following initial constraints:

- . Both Party A and Party B must have both have signed off on the Agreement and Dispersal.
- . The amount of Escrowed Funds must match the agreed Dispersal, i.e. (*fundingA* + *fundingB*) == (*disperseA* + *disperseB*).

At any time, following initialisation, if both parties sign off, the JSC will respect the agreed Dispersal, and distribute its escrowed funds accordingly.

8.2 Changing the Dispersal

At any time, following the initialisation of a JSC, either party can propose an Amended Dispersal, encoded as a pair [*amended_disperseA*, *amended_disperseB*].

Alongside the proposed Amended Dispersal, the party proposing the Amended Dispersal must also submit a proposed amount of Amended Escrowed Funds, encoded as a pair [*amended_fundedA*, *amended_fundingB*]. This is to account for any possible excess or deficit in the current Escrowed Funds held by the JSC relative to the new Amended Dispersal.

For a proposed Amended Dispersal to be considered finalised, both parties must agree to the Amended

Dispersal, and the contract must be funded according to the amount of the Amended Escrowed Funds.

In order to maintain fairness, all deficits in funding must be paid into the JSC, before any excesses in funding can be withdraw. At any time before a proposed Amended Dispersal is finalised, either party that has funded a deficit in the new Amended Escrowed Funds, can withdraw this funding.

Example 1:

Suppose that Alice has originally agreed to pay Bob 300 JUR tokens, and the originally agreed Dispersal was [0, 300], Alice has paid 300 JUR tokens into escrow in the JSC, so the originally agreed Escrowed Funds was [300, 0].

Bob is now only delivering half of the agreed services, so he proposes a new Amended Dispersal of [0, 150] with an Amended Escrowed Funds of [150, 0].

Alice agrees with this Amended Dispersal, and withdraws 150 JUR tokens from the JSC. At this point the Amended Dispersal / Amended Escrowed Funds are considered finalised, and recorded as the new Dispersal and Escrowed Funds of the JSC.

Example 2:

Suppose that Alice has originally agreed to pay Bob 300 JUR tokens, and that Bob has agreed to stake 300 JUR tokens against this as a bond. The original Dispersal is then [0, 600] and the original Escrowed Funds is [300, 300].

Bob and Alice have now agreed that Alice will pay a further 100 JUR tokens, and furthermore that Bob's bond should be reduced to 200 JUR tokens. So the Amended Dispersal is [0, 600], and the Amended Escrowed Funds is [400, 200].

In this case, Alice will need to fund the JSC with an additional 100 JUR tokens, at which point Bob can then withdraw 100 JUR tokens. After this, the Amended Dispersal / Amended Escrowed Funds are considered finalised, and recorded as the new Dispersal and Escrowed Funds of the JSC.

This process maintains JSC invariant of:

$$(\mathit{fundingA} + \mathit{fundingB}) == (\mathit{disperseA} + \mathit{disperseB})$$

8.3 Entering into a Dispute

At any time, following the initialisation of a Jur Smart Contract, either party can unilaterally move the JSC into a Dispute state.

To move a JSC into a Dispute state, the disputing party must provide a Dispute Dispersal. This Dispute Dispersal will be respected by the JSC if the disputer wins a majority of votes.

For example, suppose, as above, that Alice had agreed to pay Bob 300 JUR tokens, but Bob has only completed 50% of the work. Alice can place the JSC into a Dispute state, with a Dispute Dispersal of [150, 150]. If she then wins the majority of votes, the JSC will disperse 150 JUR tokens to Alice, and 150 tokens to Bob.

Following a JSC being placed into a Dispute state by a given party, the other party then has 24 hours to respond with their Dispute Dispersal. If no response is received in 24 hours, the default Dispute Dispersal for a given party is to send all funds to that party.

For example, as above, Alice places the JSC into a Dispute state, with a Dispute Dispersal of [150,150]. After 10 hours, Bob responds with his Dispute Dispersal of [100, 200] (as he feels his work is actually 66% complete, not 50% complete). If Bob were to not respond within 24 hours, his defaulted Dispute Dispersal would be [0, 300].

A JSC which has been in a Dispute state for 24 hours, therefore has the following state:

- . Party A (encoded as identified by an Ethereum address)
- . Party B (encoded as identified by an Ethereum address)
- . Agreement (details of the contractual agreement between Party A and Party B, encoded as a hash of arbitrary data stored off-chain)
- . [Original or Amended] Dispersal (encoded as a pair [*disperseA*, *disperseB*] denominated in JUR)
- . Party A Dispute Dispersal (encoded as a pair [*partyA_dispute_disperseA*, *partyA_dispute_disperseB*] denominated in JUR)
- . Party B Dispute Dispersal (encoded as a pair [*partyB_dispute_disperseA*, *partyB_dispute_disperseB*] denominated in JUR)

The smart contract will enforce that for both Dispute Dispersals, the total of each Dispute Dispersal is equal to the amount of Escrowed Funds.

i.e. $(\mathit{fundingA} + \mathit{fundingB}) = (\mathit{partyA_dispute_disperseA} + \mathit{partyA_dispute_disperseB})$ and
 $(\mathit{fundingA} + \mathit{fundingB}) = (\mathit{partyB_dispute_disperseA} + \mathit{partyB_dispute_disperseB})$.

Once both parties have provided a Dispute Dispersal (either explicitly within 24 hours, or if not by default after 24 hours), voting begins.

In addition to the above, when a party puts the JSC into a dispute state, they must additionally vote on their own Dispute Dispersal. They can determine how much, or how little to vote, but the vote must be at least 1% of the Escrowed Funds.

8.4 Dispute Resolution

Once a JSC enters a Dispute state, JUR token holders will vote on one of three options:

- . Party A Dispute Dispersal
- . Party B Dispute Dispersal
- . Reject the agreement

If either of the first two options ends up with a majority of votes, the JSC will disperse funds according to the respective Dispute Dispersal. If the Reject option ends up with the majority vote, then the JSC will disperse funds back to Party A and Party B in amounts that match the Escrowed Funds (so Party A will receive *fundingA* and Party B will receive *fundingB*).

8.5 Voting Process

In the following sections, a vote is defined to be a JUR token staked to the JSC contract, and associated with one of the three above options. For example, if a voter stakes 20 JUR tokens to the Reject option, they are considered to have placed 20 votes on the Reject option.

The first vote in a dispute resolution, is always placed by the party (either Party A or Party B) who triggers the dispute, and as above, this must be at least 1% of the current Escrowed Funds (i.e. $\text{Initial Vote} \geq 0.01 * (\text{fundingA} + \text{fundingB})$).

Within the Voting Period, any holder of JUR tokens can vote on one of the above three options. The rules governing the voting process are:

- . any new voter must stake at least 1% of the total amount of votes accrued during the voting process so far.
- . the Voting Period lasts 24 hours from the Dispute Dispersals being finalised, unless extended.
- . the Voting Period is extended if, at the end of the Voting Period, either of the following is true. In both cases, the Voting Period is extended by a further 30 minutes, after which this logic is reapplied recursively:
 - more than 5% of the total votes placed during the Voting Period occurred in the last 30 minutes; or
 - there is no option with a clear majority.
- . a clear majority is considered to be when one single option has 0.1 votes or more, than any other option.

8.6 Rewarding Voters

In order to incentivise JUR token holders to participate in resolving JSC disputes through voting, the JSC

enforces a voter reward scheme¹⁵.

At the end of the Voting Period, there will be one majority option (the option which received most votes), and two minority options.

Any votes placed on either of the two minority options are lost to the voters who placed them.

Any votes placed on the majority option are refunded back to the voters who placed them, and those voters may receive an additional reward calculated as below.

Note - if no votes are placed on minority options (i.e. all votes are placed only on the majority option), then there will be no additional reward for voters, and all voters would receive back their votes.

The reward for a majority voter, at the end of the Voting Period, is calculated as follows. At the end of the Voting Period, we define:

Let *majority_option* be the option that receives most votes at the end of the Voting Period.

Let *minority_option_best* be the option that receives the second most votes at the end of the Voting Period (if both minority options receive equal votes, this is chosen arbitrarily between the two minority options).

¹⁵ The rewarding mechanism of the MVP is slightly simplified for the reject vote.

Let $sum_votes_all_minority$ be the sum of all votes placed on the two minority options. Let $sum_votes_best_minority$ be the sum of all votes placed on $minority_option_best$. Let $sum_votes_majority$ be the sum of all votes placed on $majority_option$.

Let $reward_multiplier$ be $sum_votes_all_minority / (sum_votes_best_minority + 0.1)$. For our specific majority option voter we define:

Let $user_start_votes_majority$ be the sum of all majority option votes before this voter placed their votes.

Let $user_votes_majority$ be the amount of votes placed on the majority option by this voter. Then, our voter is rewarded as follows:

If $user_start_votes_majority + user_votes_majority \leq sum_votes_best_minority + 0.1$ then the voter receives $user_votes_majority * reward_multiplier$.

If $user_start_votes_majority \geq sum_votes_best_minority + 0.1$ then the voter receives no reward.

If $user_start_votes_majority < sum_votes_best_minority + 0.1$ and $user_start_votes_majority + user_votes_majority \geq sum_votes_best_minority + 0.1$ then the voter receives $(sum_votes_best_minority + 0.1) - user_start_votes_majority * reward_multiplier$.

In all cases, the voter receives back all of their voted tokens, plus any additional reward calculated as above.

Voters who placed votes on either of the two minority options lose their voted tokens, and receive no additional reward.

For voters who voted on the final majority option, they are eligible to withdraw their original votes (as JUR tokens) plus an additional reward.

However they can only withdraw their tokens 24 hours after the Voting Process completes.

8.7 Voting / Staking

To vote on the outcome of a dispute, a JUR token holder must stake their tokens to the smart contract. This ensures that the same token can't be used to vote on multiple outcomes (since the voting token holder loses control of their tokens for the duration of the Voting Process).

The number of votes cast is equal to the number of JUR tokens that the voter stakes to the smart contract. To transfer tokens to the JSC we will use the ERC223 *tokenFallback* method.

9 Jur Platform

The base layer described above only provides functions for the parties to the contract and the oracles who vote. This basic system is extremely flexible and can be used by any application that needs a consensus-based dispute resolution mechanism with contracts, escrow and payment. Anyone will be free to build on top of this layer and connect it to other platforms, providing custom versions of decentralized dispute resolution.

Our goal is to build a flexible, easy-to-use decentralized platform - a “legal ecosystem” where communities of people and businesses can grow their own secure and fair environments for fast and inexpensive contracts and enforcement.

This platform represents a new category:

- the place where experts can easily create and sell agreements with an easy to use wizard-creating wizard that non-developers can use to build contract creating wizards;
- a place where users can create guidelines for writing contracts and ruling on disputes to provide clear direction and context for the wisdom of the crowd.

9.1 Core Feature of the Platform

The Jur Platform, built on top of the Dispute Resolution Layer, is a decentralized ecosystem for Communities to enable anyone to contribute to and expand the system. The Platform will allow users to create rules and functions that other users can choose to apply, allowing the system to serve disparate sectors and use cases.

The main features of the Platform will be:

Smart agreement - including escrow followed by payment or voluntary revision or dispute	The definitive tool for business. Every business, large or small, can choose a contract, complete a wizard, sign and escrow funds, then choose to pay or get dispute resolution. All fast and almost free.
Contract Marketplace	Easy to use tools allow experts to create contract templates with wizards to guide users in filling in details. Contract authors can sell their templates & wizards in the marketplace.

Hub Creation and Management	The Platform allows users to act as administrators and create Hubs. Hubs can create rules for allowing Oracles to vote (for instance, requiring engineering certification for a Hub focused on such services) types of contracts to consider, chat rooms, privacy settings for contracts, and can suggest guidelines that members should understand and follow in order to predict the fair choice of the majority in the context of the hub rules. Hubs are, obviously, voluntary.
Decentralized System for Dispute Resolution	A user area where Oracles can: <ol style="list-style-type: none"> 1. see open disputes and vote; 2. join a Hub, participate in the Hub Community, vote in disputes reserved for Hub members

9.2 Focus: The Judging Hub

Our game theory shows how the simple incentives in JUR will motivate the community to try to select fair resolutions. For simple agreements, the basic version of the system will provide reliably fair results from the start. But some agreements will require Oracles with specialized knowledge or analytical skills to resolve disputes correctly. Users could merely hope that Oracles would wisely self-select - that those with insufficient knowledge or skill would abstain from voting. But since anyone with JUR can choose to vote in the open base layer, users cannot be confident that all voters will be well-informed. JUR will offer a better solution for users who want to limit voting to experts - voluntary associations created and administered by users that we will call “Judging Hubs.”

The Hubs are consistent with the principle of decentralization in that any user can create a Hub and Hub use is strictly voluntary. Users wishing to create a contract can choose to create it on the free and open base layer or on any closed or open Hub where such a contract is allowed. A Hub may be open or it may specify requirements for voting. For instance, a Hub to provide contracts and resolve disputes in the area of engineering services might require engineering certification. A Hub might also require voters to lock tokens to show their commitment to the long term health of the system, or limit voting by parties to contracts. A Hub can also provide a set of guidelines and best practices for judging disputes, to create a clear definition of justice for Hub users. By making the smart agreement in the Hub, you choose to abide by its rules. This is analogous to the way conventional legal contracts specify the jurisdiction in which they should be interpreted.

A Hub can include several elements.

1 guidelines for ruling on disputes;

2 requirements for voting (skills, professional certification, token lock, etc.);

3 the characteristics that the smart agreements must have to be accepted on the Hub. For example, a Hub might only accept complex (long) contracts, only contracts belonging to specific economic sectors, only contracts between members of a defined group, only contracts above a certain value, etc. ;

4 required formats for agreements, including formats available on the marketplace;

5 Chat Rooms where users can discuss disputes in progress.

6 a Hub may charge fees.;

The best Hubs will flourish as users seek reliable justice dispensed by experts at a low price. Hubs that do not function well or provide unreliable or expensive results will be abandoned in favor of better choices. Market-based evolution will drive the development of our legal ecosystem.

There will be two main categories of Hubs - Open Hubs, and Closed Hubs. An open Hub allows everyone access to disputes, just like any other dispute on the base layer. An Open Hub can offer guidelines for the analyzing the dispute and the evidence that has been submitted for contracts created in the Hub.

JUR will also offer the option to create closed hubs, in which voters are selected by a decentralized method, such as community voting, or requiring professional certification. After careful consideration, we have decided to be open to being closed: we will also allow Hubs to select members with a centralized method, allowing the Hub administrator to specify partners. We believe it is more in keeping with the spirit of our decentralized open source project to allow all to use it, even if they want to centralize their corner of JUR

While creating subsets of the Oracle community carries some risk, we believe corruption within Hubs will be very uncommon for two main reasons.

Hubs are self organizing entities. The administrators are motivated to ensure the Hub operates well so that it can grow and they can make money. The Oracles working as voters in the Hub are also motivated to support fair outcomes on the Hub, so it will grow and they can have more opportunities to earn rewards by ruling on disputes. Conversely, users will not choose a Hub that produces unjust outcomes. Hubs that are susceptible to corruption will not be used, rendering them harmless.

While a Hub community is smaller than the entire JUR community, it will still be large. We envision communities of hundreds of voters rather than simply a dozen or so, as we see in conventional juries or some fledgling decentralized systems. JUR may specify a minimum number of voters required for a Hub to operate. With so many actors waiting to earn rewards by voting against injustice, attempting to corrupt the vote is very risky.

9.3 Example of an Open Hub

Let's consider a practical example. John is an American Lawyer and Mary is a graphic designer who knows all the practical problems of working with clients in her field.

John and Marie create an Open Hub on Jur Platform. They establish some settings such as:

- Place of the parties: USA
- Typology of Hub: Open, no pre-selection of voters
- Admin Proof of Stake: ratio between value of contracts linked to the Hub and Jur token locked= 1-10000
- Language of the Hub: English
- Transaction Fee for using the Hub-create contract: 0.3% of the value of contract
- Individuation of rules of Admin the Hub: John and Marie jointly
- Hub Code of Rules: not linked to any specific Jurisdiction - best practices
- Moderated debating Rooms: yes, cost 0,5% of the value of the dispute on the side of the loser - deposit from both side of the contract required as a guarantee
- Privacy level on the disputes: can be seen only by people who own Jur tokens

John and Marie will use the legal editor to build up an interactive contracts creator for graphic designers and their clients. John will insert a redirect of his Law Firm Website to the Hub page to provide graphic designers a new tool for their business. Marie who is already owner of a 20k Facebook group for graphic designers will recommend this new tool to her community. Marie will help by drafting a lot of contracts for practical cases based on her experience.

Marie will write in the best practice base code for the Hub. John will implement them with an application in the USA legal framework. John will add a legally binding arbitration clause for allowing the Parties to settle any disputes according to the decentralized oracle provided on the blockchain by Jur.

Some Oracles will follow the Hub and will receive a notification of every dispute that arises. They will be aware of the Hub best practices, which will inform their voting decisions as they seek to match the majority. John and Mary will implement also some additional feature such as Chat Rooms to allow the parties and their community to explain their position.

For every dispute, John and Mary can vote and explain their opinions in the Hub's Chat rooms. Their recommended contracts will steer the community towards clear agreements. Their guidelines and best practices for evaluating evidence and ruling fairly on disputes will provide a clear context for predicting the majority, and predictably fair outcomes. The more reliable results they deliver, the more businesses and individuals will choose their hub.

9.4 Smart Agreements on Jur Platform

Smart Agreements on JUR offer users the ability to easily make agreements, pay/receive money without worries, and resolve any disputes that might arise, all at a tiny cost.

JUR represents an evolution in the creation of digital agreements. We can separate currently available digital agreements into Do It Yourself Legal Contracts, Smart Contracts, Smart Legal Contracts, and Smart Agreements.

JUR is a special new type of Smart Agreement that can be used to provide a sort of "court of appeals" for all the other types of agreements when they fail to deliver a resolution.

Let's consider several categories of agreements, beginning with traditional legal contracts.

1. **Legal Contracts:** conventional legal contracts, signed in paper or virtual form. Conventional legal contracts are often expensive to draft and may require consultation with lawyers. In the case of a dispute, courts provide slow and costly resolution.
2. **DIY Legal Contracts:** "Do It Yourself" Legal Contract services, such as LegalZoom¹⁶ and Rocket Lawyer¹⁷, have been available in the U.S. for many years. These companies prepare interactive contract templates and sell them online. The user can fill out a wizard and get a sufficiently precise contract, saving a lot of money. While the customized template innovation saves users a lot on contract creation expenses, it does nothing to resolve the issue of slow and costly dispute resolution;
3. **Smart Contract:** "Self-enforcing" smart contracts that use an external Oracle to decide when to move funds are available on the blockchain. This type of contract has limited applicability. An external oracle cannot assess subjective information. Even in situations where the contract seems to depend on a single condition that an external Oracle can report, technical failure or other unforeseen complications can render the smart contract unable to deliver a smart resolution. If a smart contract does not include a legal contract by reference to back it up, the legal status of the agreement may be ambiguous.
4. **Smart Legal Contract:** A smart contract that incorporates a legal agreement and meets criteria by including those elements defined as "essential" for the type of contract. These required elements vary between countries and are to be interpreted under the laws of a specific jurisdiction. The smart legal contract has a reliable backup system in case it fails. The bad news is that the reliable backup system is reliably costly and slow.
5. **Smart Agreement:** An agreement created with an automated mechanism with access to a consensus-based dispute resolution layer. Such agreements will not be suitable for every type of business relationship - at least not until the sophistication to judge every type of dispute is available in the dispute resolution layer.

¹⁶ www.legalzoom.com

¹⁷ <https://www.rocketlawyer.com/>

But many agreements will be suitable, providing they are explained clearly. This approach has the advantages of the previous categories, low cost and efficiency, leveraging of blockchain technology to provide low cost escrow and payment. Where an arbitration clause and / or additional elements required are inserted in the text of the agreement, such agreements could also be considered to be Smart Legal Agreements, since they would also have legal validity.

	Legal Contracts	DIY Contracts	Smart Contract	Smart Legal Contract	Smart Agreement
Legal Validity	x	x		x	x
Quick Enforcement			x		x
Flexible	x	x			x
Inexpensive		x	x	(x)	x
Widely applicable	x	x			x
Dispute resolution included?					x
Easy to draft		x			x
Simplified Set of Rules					x

10 JUR crypto-economy

The definition of the crypto-economy of Jur begins with the definition of the Jur token functions:

1. **Means of payment:** JUR tokens can be used to escrow funds for the Jur contract and dispute resolution system. JUR can also be used to pay for third party services (eg. freelancer platform) on JUR;
2. **Directing Voting:** JUR is the only token individuals can use to vote on disputes in the JUR system;
3. **Indirect Voting:** JUR is the only token that can be delegated to a Master Oracle to profit by voting indirectly.
4. **Jur Platform token:** Jur token will be used to pay fees for using special features on the platform and its Hubs.

10.1 JUR as a method of payment

As noted above, in order to enter into a contract on Jur, the buyer must deposit the stipulated amount of JUR (or other cryptocurrency Ethereum compliant) into escrow for eventual payment to the seller, assuming there is no dispute. Thus JUR can be used as a real means of payment for transactions between buyers and sellers using JUR smart agreements.

10.2 JUR as a utility token for voting directly - the Oracles

The JUR token holders can become Oracles of JUR simply by voting some or all of their tokens for the proposal they believe is the fairest in any dispute. Tokens remain locked in the voting process for as long as necessary to issue a verdict (typically 24 hours, but the time may be extended if the pace of voting accelerates at the end).

Each JUR can only be committed to vote in one dispute at a time. We believe Oracles, token holders who vote, will tend to be long-term token holders. To be an effective Oracle requires well-timed attention in order to select and vote correctly in disputes and do so early enough to earn a reward.

In order to maximize opportunities for profit, Oracles need to have JUR available to allow them to vote when they choose to do so. The more tokens they have in reserve, the greater their chance to profit when they feel confident about a voting opportunity. This will result in demand for tokens to ensure the ability to vote when potentially profitable opportunities arise.

10.3 JUR as utility token for voting indirectly - Master Oracles

We have introduced the concept of Master Oracles to serve the needs of token holders who, not having enough time available or lacking good judgment, would not otherwise vote their tokens. Token holders can lend their tokens to Master Oracles who will vote on their behalf and share a portion of their gains (or losses).

The Master Oracle will allow a broader audience of token holders to participate, albeit indirectly, in voting activities. From a market point of view, the Oracle Masters amplify the effects referred to in the previous paragraph, ie they create a demand for tokens by indirect Oracles that want to participate in voting.

10.4 JUR as a mean of payment for the Jur Platform

Users can buy contracts on the Jur Platform and pay fees to Hub Administrators or chat room moderators using JUR as the means of payment. Some Hubs may require voters to pay JUR into escrow as a guarantee of responsible behavior.

11 Jur use areas

11.1 Jur Basic Layer

Jur Basic Layer can support many use cases:

- Direct use for custom Agreements made by the Parties (MVP);
- Dispute Resolution system for Crypto Platforms;
- Decentralized Oracles for Smart Contract;
- Decentralized Oracles for Smart Legal Contracts;
- Decentralized Dispute Resolution for Custom App;
- Dispute resolution system for Marketplaces.

11.2 Jur Platform use Area

Here are just a few examples of possible use areas for JUR smart agreements. Users can create agreements on the base layer or create or choose existing hubs that serve these markets with special sets of rules and guidelines for interpreting disputes and other special features.

Intangible services: one to one	Crypto-related and ICO service Contracts
<ul style="list-style-type: none"> • Service contracts, for instance: • Software development contracts; • Graphic Design Contracts; • Design development contracts; • Data entry contracts; • Document processing; • Technical graphics; • Consulting contracts. 	<p>We believe that service contracts in the crypto/ICO fields are likely to be among the first use cases for Jur, because in phase one, people accustomed to crypto currency exchange rate risk will be more willing to adopt Jur.</p> <p>For instance, the marketing contract for an ICO could be created on Jur, since such contracts are frequently paid in ETH or BTC. In general, any parties that are already willing to denominate contracts in ETH or BTC are more likely to use Jur.</p>

<p>ICO Governance contract</p> <p>Private sale investors may enter into a JSC with ICO issuers with a different expiration for each investment round when certain milestones are reached.</p> <p>Agreements of this type are already standard in the market (you decide the total amount of the sale, but the amounts are unlocked with time as the project goes on) setting high penalties for both counterparties in the event that there is default by either one of the two.</p> <p>The speed and impartiality with which the eventual dispute would be resolved would shorten the negotiation times considerably (which would be spent to a large extent to define the milestones) and would give reliable guarantees to both contractual counterparties.</p>	<p>Ensure transfers of registered mobile goods (e.g. Cars, Boats)</p> <p>The system could be used not for the full payment of the motor vehicle but for a percentage as a deposit. In this way, the parties will proceed with the purchase in fiat currency, but will set a hypothetical 20% as buyer-side deposit. Or, they can establish that the seller also will pay 10% in the smart contract to guarantee the sale at a predetermined time.</p>
<p>Guarantee real estate transfers: deposits</p> <p>In the short term, users may not wish to guarantee full purchase price transfers. It is more likely that some will use the system for good faith deposits.</p> <p>Real estate agents could suggest JUR contracts in order to secure a certain sale under certain terms. The tool is extremely flexible. It could be used for the buyer's down payment or a sum representing the seller's guarantee of availability for sale.</p> <p>The tool may be particularly useful in countries where the sale process is fraught with peril and uncertainty.</p>	<p>Ensure performance marketing contracts</p> <p>The system could be used to ensure performance marketing contracts by including a numerical KPI on which the payment depends that Oracles can easily verify.</p>
<p>Ensure sales of web domains, with no intermediate platforms and related fees</p> <p>Jur could be used to swap web domains securely between individuals. A specific client could be developed that makes the process easier.</p> <p>In the meantime, the parties could insert a certain web domain into the hash as an agreement and its price, and indicate the subject that will become the owner of the same in a given time span, which can be seen on a certain site (which preferably also shows the transfer history).</p>	<p>Guarantee the purchase of intellectual property</p> <p>Provide, with client specifications, the transfer of intellectual property when filed with Public Registers viewable by anyone. In this case, it is necessary to consider the technical time header notation of a trademark, patent, design or a software application. For each jurisdiction there will be a reasonable minimum and maximum wait time for the transfer .</p>

12 Token Distribution

6% Angels

10% Seed Round

24% Team, Advisors and Partners

5% Adoption Drop

15% Company Reserve

40% Public Sale

Tokens of the Team and Advisors are locked for 20 months with weekly releases.

13 Legal Setup

Jur's legal setup will include Jur AG - a Swiss company based in Zug, as a holding company that will hold the Jur Protocol and take care of its implementations and advances. Jur AG will set up an Operating Company to carry out the Applications and the Platform which present fees to be paid by members of the Community.

Glossary

Jur Basic Layer: The platform that provides the core functions of Jur: contract creation, escrow, and the Jur voting and dispute resolution system.

Jur Voting System: A simple system for determining fair outcomes by pairing the wisdom of the crowd with economic incentives. Voters who side with the majority are rewarded for their work in finding justice with the tokens of the minority, but only if they vote early enough that their vote is needed to create the majority, so the incentive is to vote for justice and vote swiftly. The system depends on clear agreements with clear Key Performance Indicators to allow fair resolution of disputes. JUR will make a basic version of the voting system that does not include escrow requirement available as a generic decentralized oracle characterized by a granularity (suitable to provide data even on small events) for use in any application where a decentralized consensus-based oracle is needed.

JSC: Acronym for Jur Smart Contract, including the smart contract, the escrow and payment system, and the connection to the consensus-based dispute resolution system. The JSC is patent pending.

Jur App: generic term for applications developed to work on the Jur Basic Layer

Jur Platform: the generic Jur application created to allow Communities to develop their regulatory frameworks, automated agreements and aggregate oracles according to voting guidelines.

Oracles: Jur token holders who choose to vote.

Master Oracles: Oracles who can vote tokens that they do not own on behalf of the token owners, who will share in the profits or losses of the delegated voting.

Hub: A user-created, user-administered voluntary association and virtual environment that can add guidelines for interpreting disputes, contract format requirements, membership requirements, chat rooms and more to the JUR base layer and allow other users to voluntarily choose the Hub to create their contracts and resolve their disputes. Hubs allow users to expand JUR to more complex and specialized markets.

Legal Contracts: conventional legal contracts, signed in paper or virtual form. Conventional legal contracts are often expensive to draft and may require consultation with lawyers. In the case of a dispute, courts provide slow and costly resolution.

Template Contracts or DIY Legal Contracts: “Do It Yourself” online Legal Contract services, such as LegalZoom and Rocket Lawyer, have been available in the U.S. for many years. These companies prepare interactive contract templates and sell them online. The user can fill out a wizard and get a sufficiently precise contract, saving a lot of money. While the customized template innovation saves users a lot on contract creation expenses, it does nothing to resolve the issue of slow and costly dispute resolution;

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