

Metis Protocol Whitepaper

A Governance and Collaboration Implementation Framework for the
Distributed Autonomous Company (DAC)



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Table of Contents

Abstract.....	3
Company and DAC.....	4
Metis Protocol.....	8
Meta Staking Contract	13
ComCo Management Framework.....	19
M Token, Token Economics and Reputation Power.....	23
Use Case Example of Metis Protocol	25
Team Topologies – the Extension of Metis Protocol.....	28
Developing Stages of Metis Protocol	29
Risk and Mitigation Responsibilities of Governance	31

Abstract

Metis Protocol is a layer 2 protocol on Ethereum leveraging the Optimistic Rollup mechanism to provide the governance and collaboration implementation framework for the Distributed Autonomous Company (DAC, a subclass of the DAO).

The blockchain applications, internet communities, sharing economy, or gig economy, etc., are all within the spectrum of the DAC, which is constituted by distributed collaborators coordinating to pursue economic returns. Most of these collaborations are conducted distributedly, multidisciplinary, in random occurrence, and without a trust basis. However, it is these “Complex Collaborations” that form the fundamental layer of building up a community or application in the Web 3.0 era.

The traditional governance and management principle in the Company is not suitable for governing cross-boundary collaborations. DAO (Decentralized Autonomous Organization) is a great idea, but it is still confined in a small circle, which are mainly composed of blockchain fanatic and experts. It is of high stake for the general internet communities or distributed business to launch a DAO. For most governance protocols of DAO, they are focusing on various algorithms of voting, and the governance stops after voting or funds allocation.

While for the general internet communities or distributed business, voting is only a small fraction of all the business scenarios, they are more caring about how to enable trustless distributed collaborators to build up the collaborations and get the work done, and how to protect the interest for all the collaborators. So, there is a big gap between the current DAO governance protocols and real business needs.

Synergizing the merits from the Staking Economy, Optimistic Rollup, Smart Contract, and Microservice Framework, Metis Protocol defines the Meta Staking Contract (MSC) and leverages staking to act as the governance mechanism, Metis Protocol also designs the

ComCo Management Framework, which places the collaboration management onto the Optimistic Roll sidechain to bridge the gap between off-chain value creation activities and on-chain governance.

Metis Protocol will help to foster a simplified, fair, protectable, practical, and high-privacy environment to boost the distributed collaborations in various communities, which is going to open a new chapter for the Web 3.0 era.

Company and DAC

Company and Collaborating Across Boundaries

Founded in 1602, Dutch East India Company was the world's first formally listed public company. By widely issuing bonds and shares of stock to the general public, shareholders were organized together to accomplish the goal of earning excess profits. While to better regulate and coordinate the relationship among shareholders and the operation team, the governance structure of shareholders and the board of directors was formulated.

This classic design of governance structure defines the boundary of a company and organizes the stakeholders of different interests to collaborate to accomplish the business goal in a centralized way. According to the collaboration efforts, the stakeholders can gain incentives by sharing the profit of a company. As a result, the company has become the primary value creation entity and dominated the dynamic running of the social economy.

After over 400 years of development, the Company has already built-up a well-established management paradigm, such as the hierarchy management structure, project management, KPI management, etc. It's highly efficient for people to form a company and collaborate within the company.

However, a lot of business scenarios require distributed parties from different background to collaborate across the traditional boundaries of companies, independent teams and professional individuals, such as some large and complex projects in multidisciplinary consulting, M&A, trans-border supply chain management, or some innovative frontline interdisciplinary study, or crowdsourcing, crowdfunding, social community economy, volunteers, makers, etc.

The emerging of the Internet has solved the issues of information gathering and distribution via various collaboration tools or platforms, which has promoted collaboration efficiency among these distributed parties. While as to the core problems of governance and management of these distributed collaborations, the internet platform didn't offer any solutions.

The traditional governance principle is not suitable for collaborations among multidisciplinary parties, as in this scenario, the boundary of a company has been broken, and these distributed parties are not the shareholders, nor in the employment relationship.

The cost is also super high or impossible for distributed parties to connect their isolated information systems, even in the internet era. The in-transparency of information will cause the inefficient of traditional project management or KPI management, which is prone to create the "black box" in the process control and the failure in turning out high-quality deliverables.

The emerging of DAO and its problems

Since 2008, blockchain technology has gone through rapid development with the emerging of Bitcoin and Ethereum. A brand new organization structure also has been created, which is DAO¹ (Decentralized Autonomous Organization) . DAO lives on the internet and leverages Smart Contract to execute the terms of the traditional offline contract on the blockchain,

¹ <https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/>

which entitles distributed protocols and algorithms to automatically run, audit and implement the contract terms. After the implementation, tokens will be issued as the incentives.

As every distributed collaboration parties can join without permission, DAO breaks the boundaries of traditional organizations. The rights of every contribution can be validated via the underneath blockchain technology, and Token Economics is used to incentivize the contributors. So, DAO makes it possible for distributed collaboration parties to govern the cross-domain collaborations.

However, DAO is still confined in a small circle, which are mainly composed of blockchain fanatic and experts. It is of high stake (wallet, tokens, systems or DApps development needed) for the general internet communities or distributed business to launch a DAO.

Most DAOs rely on smart contract to act as the trust machine and do the on-chain governance job. However, in business scenarios, it is unrealistic to convert all the complex contract terms into the codes of smart contracts, the complexity of coding might cause some severe bugs or issues and relies heavily on the experience of a programmer. It is also costly and unrealistic to get the full consensus for every operation conducted by the smart contract. The execution of a smart contract depends on the input from the physical world, so if the source of data has been manipulated, the cost of the mistakes would be irreversible. And it's a lack of flexibility or options to deal with disputes or contract breaching if the smart contract will execute according to the pre-defined terms mandatorily.

And for most governance protocols of DAO, they are focusing on various algorithms of voting, and the governance stops after voting or funds allocation.

While for the general internet communities or distributed business, voting is only a small fraction of all the business scenarios, they are more caring about how to enable trustless distributed collaborators to build up the collaborations and get work done, and how to protect

the interest for all the collaborators. So, there is a big gap between the current DAO governance protocols and real business needs.

Metis–The improvement of DAO

Metis project is born to solve all the above problems.

Metis confines the scope of DAO within the Business Organization that is pursuing economic returns, which is the counterpart of a Company in the traditional business scenario. Thus, Metis defines DAC², Distributed Autonomous Company, which is the subset of DAO.

DAC is an autonomous business organization built on blockchain technology and token economics model. DAC has no predefined boundary as it is open, trans-boundary, and flexible. All the participants are autonomously organized together to collaborate on some business projects, create value, and get incentives. (Yes, work has changed to a privilege that you could decide for yourself on which project you are willing to spend time).

With the deepening of the collaboration, a consensus community will be formed. And this community lives in the cyber world, so all the business activities and data generated could be recognized, verified, and confirmed.

An excellent token economics model could continuously drive the community members to contribute and attract even more members to join the community. As a result, the “boundary” of a DAC will be enlarged, and a self-evolution platform will be established.

A DAC has three key elements: Blockchain, Token, and Consensus Community.

² Steven Guo, Kevin Liu, The Models and Practices of Token Economy: The Formation and Two Dimensions Value Representative of the DAC, Jan 2020

Token: the value symbol of the DAC business activities. Anyone who involved in these activities could obtain Tokens via trading or contributing time or resources, and by getting involved, the participants become the Members of this DAC.

Consensus Community: composed of the DAC stakeholders, and formed by competitive collaboration. Community Members (holding DAC Tokens) are granted with the power of community operation, governance, and the rights to possess and use the data generated by the Community.

Blockchain: the technology to guarantee the mechanisms will operate openly and transparently with the witness from all validation nodes.

DAC is focusing on the scenarios of cross-domain collaborations, which is the supplement to the traditional centralized company. At the same time, the Company could be the community member of a DAC, and DAC could also provide services or products to companies. We anticipate that DAC will co-exist with Company and jointly build up the essential value creation entities in the future.

As DAC is the counterpart of a traditional company, we can build a systematic governance and management framework by referring to the mature paradigm in conventional companies and combining them with the blockchain and token economy. And that's why we introduce Metis Protocol.

Metis Protocol

Based on Metis Protocol, anyone can build up a DAC, to establish and govern the collaboration relationship within the DAC with other distributed parties to achieve a business goal. Metis Protocol also provides a framework to support and management the implementation of the collaborations transparently and efficiently.

Metis Protocol defines Meta Staking Contract (MSC) for DAC governance, which is acting as the traditional Company Law. Referring to the algorithm of Optimistic Rollup³, Meta Staking Contract leverages the staking deposit as the commitment for each collaboration party to perform as their promise. To protect the interest of all the collaboration parties, Meta Staking Contract has an essential mechanism of pullback and arbitration to punish the party who couldn't fulfill its promise. Thus, Meta Staking Contract enables every distributed party to establish a collaborative relationship with another party quickly and permissionlessly.

Metis Protocol defines the ComCo Management Framework to facilitate the construction of various microservice tools and to manage the collaboration implementation. Within the ComCo Management Framework, Transactions Statement Contract (TSC) is used to describe the milestones that each party has agreed on, Microservice Tools Pool (MTP) is used to provide templates or APIs of various tools (wallet, wiki, chatroom, collaboration, compliance, etc.) for distributed collaborators to execute business activities. DAC members can negotiate and confirm the collaboration details off the chain, then record the critical milestone information into the Transactions Statement Contract (TSC, deployed on the side chain) as the witness. The execution result will be confirmed off the chain, and the updated state of the TSC will be synchronized to the main chain, which will trigger the MSC to allocate budget/incentives or call arbitration.

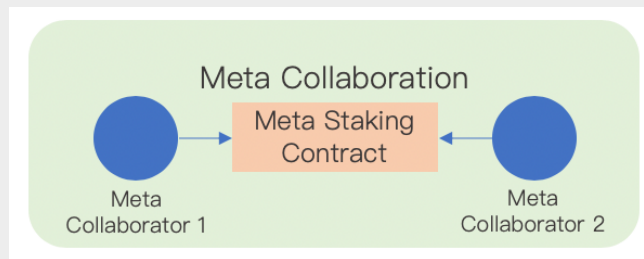
Key considerations in the design of the Metis Protocol.

- Metis Protocol defines Meta Collaboration as the essential factor of collaboration as the confirmation of collaboration relationship in the DAC would be high frequency, multiple times, or temporary.
 - In traditional companies, the collaboration relationship usually only needs one-time confirmation and will remain unchanged for a long time, such as the Articles of Association, Shareholders Contract, Employment Contract, etc.

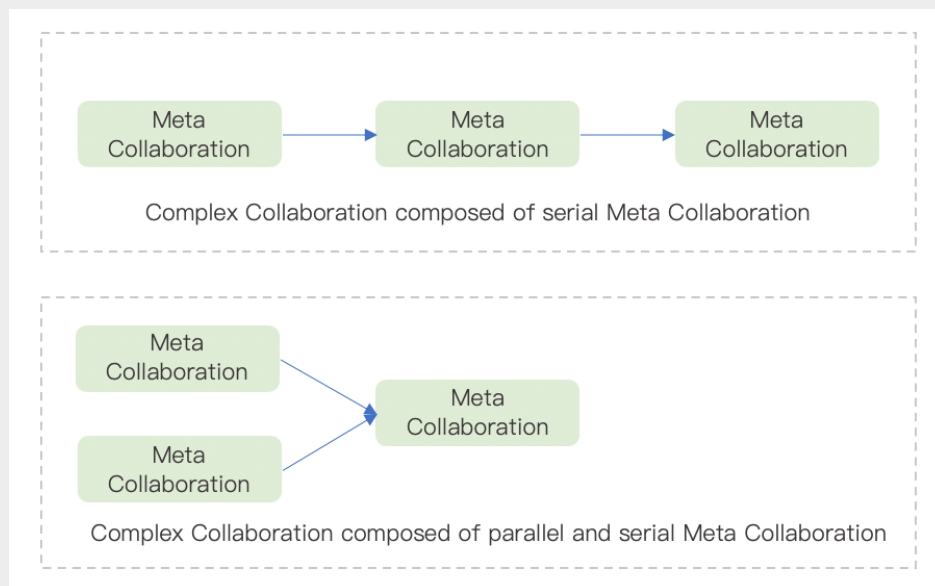
³ <https://medium.com/plasma-group/ethereum-smart-contracts-in-l2-optimistic-rollup-2c1cef2ec537>

- While in the DAC, the distributed collaborators might join or quit at any time, so in any specific time, it would have multiple collaborations relationship under confirmation, such as the formation of a team, the publishing of a project, the undertaking of a job or Arbitration.
- Metis Protocol decomposes these complex collaborations among many distributed parties into multiple peer-to-peer collaborations, which is called Meta Collaboration. Meta Collaboration has three states: Establishment, Termination, and Suspension.

Glossary: Meta Collaboration and Complex Collaboration



Meta Collaboration



Complex Collaboration

- Metis Protocol refers to the Optimistic Rollup mechanism to protect the interest of both collaborators from the lack of trust.
 - Traditional companies are gardens with a protected wall, and it is highly trustful to collaborate within the boundary. While in a DAC, distributed collaborators may not have any mutual trust. How to protect the interests of all the collaborators to establish Meta Collaboration is the first problem to solve.
 - DAO leverages blockchain and Smart Contract to build up the consensus and put all the collaboration activities on the chain, which is unrealistic, highly risky, and costly.
 - Referring to the algorithm of Optimistic Rollup, Metis Protocol leverages the staking deposit as the guarantee for each Meta Collaborator to act as their promise. Both Meta Collaborators should stake deposit into the escrow account of the Meta Staking Contract to establish the Meta Collaboration. In the collaboration process, by default, both Meta Collaborators are acting coordinately and as their promise, and the deposits will be automatically returned when the Meta Collaboration is finished. However, if any collaborator (aka "Bad Party") broke its promise, the other collaborator (Good Party) can apply for Arbitration service right away, the to-be-allocated deposits will be revoked, the Meta Staking Contract will be suspended. According to the arbitration result, the Bad Party will be punished. The revoking and Arbitration mechanism of the Metis Protocol enables every distributed collaborator to establish a collaborative relationship with another collaborator quickly, protectively, and without any permission.
- Metis Protocol defines the ComCo Management Framework to provide the management mechanism for the implementation of the DAC collaborations.
 - Traditional companies use various tools and project management systems to dismantle the collaboration process into different roles, stages, and milestones.

- DAO leverages Smart Contract to implement all the collaboration activities, which faces severe oracle issues and the limitation in scalability and flexibility.
- Metis Protocol defines the ComCo Management Framework, which places the collaboration management onto the Optimistic Roll sidechain (high scalability, low cost, high privacy) to bridge the gap between off-chain value creation activities and on-chain governance. ComCo Management Framework includes two complementary components, Transactions Statement Contract (TSC) and Microservice Tools Pool (MTP).
- Transactions Statement Contract converts the milestones information in the collaboration process into a structured contract template, which includes seven factors, Context, Boundaries, Goals, Measurable Results, Input, Activities, and Output. The template enables all the Meta Collaborators to coordinate in the same framework, which is very easy to record, validate, and propagate. All the information confirmed in the Transactions Statement Contract is the consensus reached by both Meta Collaborators, and the TSC will be deployed on the sidechain.
- Microservice Tools Pool is set to provide the templates or APIs of various microservice tools for implementing specific activities. Based on the consensus defined in the Transactions Statement Contract, microservice tools are leveraged to execute various Activities to achieve Measurable Results. The Output of the microservice tools will be recorded on the MediaWiki, and the Wiki linkages will be recorded onto the side chain. The deliverables will be audited off the chain by the related party. If the result complies with the requirements, the ComCo Management Framework will call Meta Staking Contract to do the incentives allocation. If there are any disputes in the collaboration process, the ComCo Management Framework will call Meta Staking Contract to do the governance job.

- Based on the contribution from different collaborators, Metis Protocol will generate M Token and Reputation Power to represent the rights and interests of DAC and act as the incentives.
 - The DAC is composed of pairs of Meta Collaborators, who execute different jobs to contribute to the growth of the DAC. M Token will be minted and Reputation Power will be accumulated accordingly to incentivize the DAC community members, who could take part in the operation, governance of the DAC, and gain the rights of using data assets in the DAC by holding M Tokens and Reputation Power.

Meta Staking Contract

For Meta Collaborations, staking is the guarantee that both collaborators will fulfill his commitments, Meta Staking Contract is used to define the states of Meta Collaboration and the related actions. The DAC collaborations are composed of multiple ongoing and dynamic Meta Collaborations.

Meta Collaboration has three states: Establishment, Termination, and Suspension. And Meta Staking Contract (MSC) has three corresponding states: Creation, Destroy, and Suspension.

- The Creation of Meta Staking Contract: When both Meta Collaborators stake M Token into the MSC contract address, the MSC is created, the Meta Collaboration is established.
- The Destroy of Meta Staking Contract: By default, both Meta Collaborators are complying with the contract, and the MSC will be destroyed after the Challenging Period if both Meta Collaborators have accomplished all the milestones. The Meta Collaboration is terminated thereafter.
- The Suspension of Meta Staking Contract: Any Meta Collaborator can seek for Arbitration. In the Arbitration process, the Meta Collaboration and the MSC are

suspended, the to-be-allocated deposits will be revoked and re-allocated after the results of Arbitration is announced. The MSC will be destroyed thereafter.

Technical Mechanism

As staking is the foundation to establish the collaborative relationship in the Metis Protocol, the contract in the main chain will be used to preserve all the staked deposits, with a link directed to the states of the Meta Collaboration, and the states are cryptography protected Merkle trees with Account, Balance and other related information.

Two roles are defined in this mechanism: Meta Collaborator (MC) and Arbitrator (AT). And every operation from the wallet conducted by the Meta Collaborator is called a Transaction. The Arbitrator is not centralized but distributed, in theory, every community member could become the Arbitrator after staking the required deposits (in practice it will have a lot more requirements, such as the professional background, reputation power, etc.).

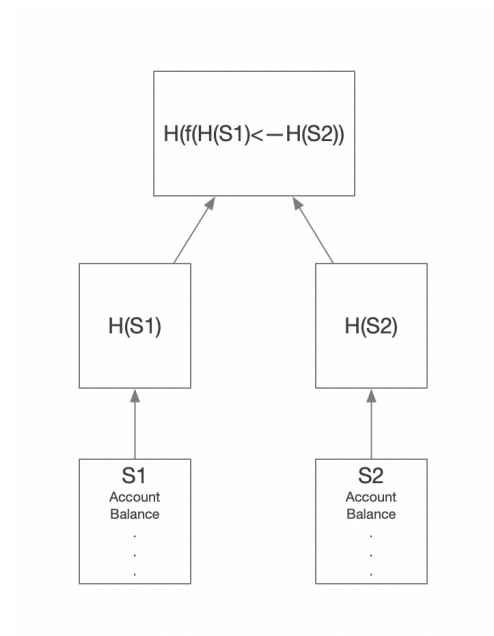
Each transaction will be composed of two Meta Collaborators and one distributed Arbitrator. The Arbitrator will only be “visible” if one Meta Collaborator applies for Arbitration service to the transaction. And the state of the Merkle tree is maintained by these Meta Collaborators and Arbitrators (usually offline).

Metis Protocol places each Meta Collaboration onto a segmented side chain, which is connected with the main chain. Since the Meta Collaboration is peer-to-peer, the two Meta Collaborators will negotiate the collaboration content off-chain, which does not need permission or consensus from a third party. Metis Protocol does not care about the detail collaboration content or business logic but cares about if the two Meta Collaborators will reach consensus in the pre-defined milestones, which will avoid the issue of Oracles. The Wiki linkage of crucial information will be recorded onto the side chain for validation. When the two Meta Collaborators have reached consensus with all the milestones, the side chain will inform the main chain that the state of Meta Collaboration has been changed.

A specific smart contract in the Metis Protocol will be in charge of the deployment, exiting, and mistakes proof of the Optimistic Rollup mechanism.

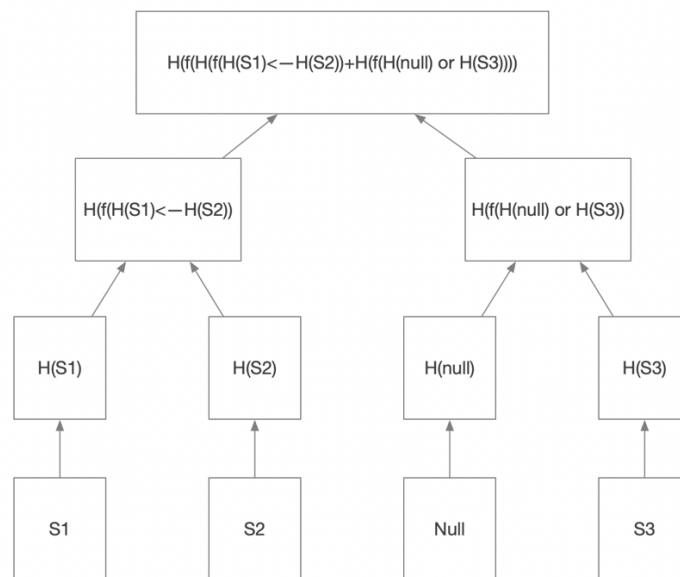
State of the Merkle Tree and the Challenging Period

We assume that both Meta Collaborators are honest and coordinately. Hence, every state change is supposed to be right, i.e., the state changes from S1 (the establishment of the Meta Collaboration) to S2 (the termination of the Meta Collaboration). So relationship information with the new state (S2) directed to the old state (S1) of the Merkle tree will be generated and encrypted. The hash of the information will be uploaded to the Meta Staking Contract of the staking deposits on the main chain, and then the two Meta Collaborators will enter a Challenging Period of 14 days to wait for the funds to be allocated.



- If both Meta Collaborators have no disagree and do not execute any operations, or only one party of the Meta Collaborators confirms to quit the collaboration, the Meta Staking Contract will execute the balance of S2 Merkle tree in the 14th day.

- If both Meta Collaborators have no disagree and both parties confirm to quit the collaboration, the Meta Staking Contract will execute the balance of the S2 Merkle tree immediately.
- If any Meta Collaborator raises a dispute, this party can choose to activate the Arbitration in 14 days, the allocation status between the two Meta Collaborators will be suspended until the Arbitrator has resolved.
- The Arbitrator will negotiate with the Meta Collaborators off the chain, and the result will be shown as 0 or 1. For 0, it means the balance will be executed as S2; for 1, it means a new balance of S3 will be executed, which is the staking deposits of the Bad Actors will be confiscated and allocated to the contract keeper after deducting the required fees.



Rangers

The state of the Merkle tree will be packaged onto the blockchain. In order to avoid the malicious changing of the state of the Merkle tree in the process of packaging, which might cause the wrong allocation of the budget from the Meta Staking Contract, Metis Protocol designs a mechanism called Rangers.

Rangers is a program process, which will do a snapshot of the block hash of the Merkle tree and recorded on the main chain. Rangers will compare the block hash in the snapshot with the packaging block hash of the Merkle tree uploaded onto the main chain.

- If the validation result is the same, Rangers will notify the Meta Staking Contract to execute according to the final state of the Merkle tree.
- If the validation result is not the same, Rangers will automatically execute the rollback and generate a correct block with the same hash in the snapshot to replace the invalid block, and notify the Meta Staking Contract to execute according to the correct block, or notify the main chain operator to operate manually. In this scenario, the deposit of the malicious miner will be confiscated, or the qualification for producing blocks will be suspended under the help of the main chain operator.

Non-interactive Fraud Proof⁴

Non-interactive Fraud Proof is used to avoid the chain congestion attack, which an attacker floods the main chain with exits in an attempt to steal all funds from the Meta Staking Contract. Since the Ethereum main chain is censorship-resistant, we only have to consider how to protect the Optimistic Rollup mechanism. In Optimistic Rollup, the validity of a block is calculated off the chain, and the non-interactive fraud proof can be used to prove its invalidity. Only a single non-interactive fraud proof is needed to orphan any number of invalid optimistic rollup blocks (per side chain), making the system resilient to chain congestion. And the proof is happening in real-time, no need to wait for a long time for loop validation.

To prove a block to be invalid, one must prove one of the three following properties:

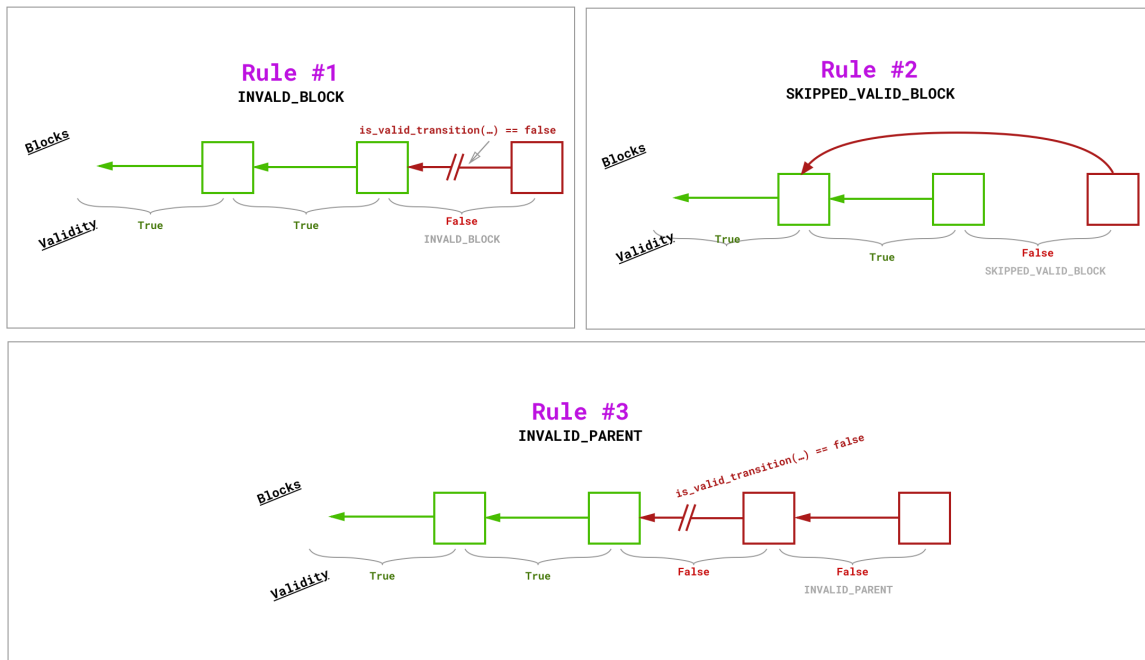
- `INVALID_BLOCK`: The committed block is `*invalid*`.

This is calculated with ``is_valid_transition(prev_state, block, witness) => boolean``

⁴ If Optimistic Rollup chain is mature, we don't have to consider this non-interactive fraud proof mechanism as it is the protection scheme provided in the Optimistic Rollup chain.

- SKIPPED_VALID_BLOCK: The committed block "skipped" a valid block.
- INVALID_PARENT: The committed block's parent is invalid.

These three state transition validity conditions can be visualized as:



Liquidity Providing

Withdrawal latency seems like another issue at first glance, but is actually not. In the usual case, Meta Collaborators won't have to wait until their withdrawals are finalized. In fact, that feature mostly exists for cryptoeconomics security, which should never be used under normal circumstances. The easy way to instantly withdraw funds is to atomic swap with a liquidity provider (or other user wanting to deposit into the rollup chain) on the main chain or another chain.

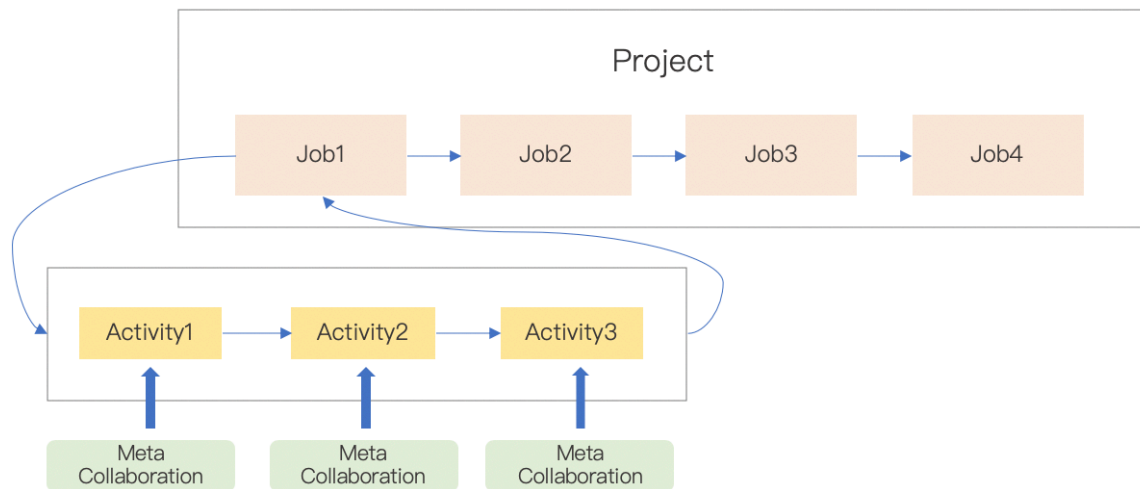
ComCo Management Framework

ComCo Management Framework is set to provide the tools and management of the DAC collaboration. ComCo Management Framework includes two key factors, the Transactions Statement Contract (TSC) is used to define the milestones in the process that each party has agreed on, and the Microservice Tools Pool (MTP) is used to provide the templates and APIs of the microservices tools for executing specific activities.

Glossary: Project, Job, Activity and the Meta Collaboration

To accomplish the business goal of a DAC, the DAC community members collaborate to implement **Projects**, and a Project can be decomposed into different **Jobs**, which are performed by **Meta Collaborations** to execute various **Activities**.

Connected **Activities** constitute the **Job's** process, and connected **Jobs** constitute the **Project's** process.



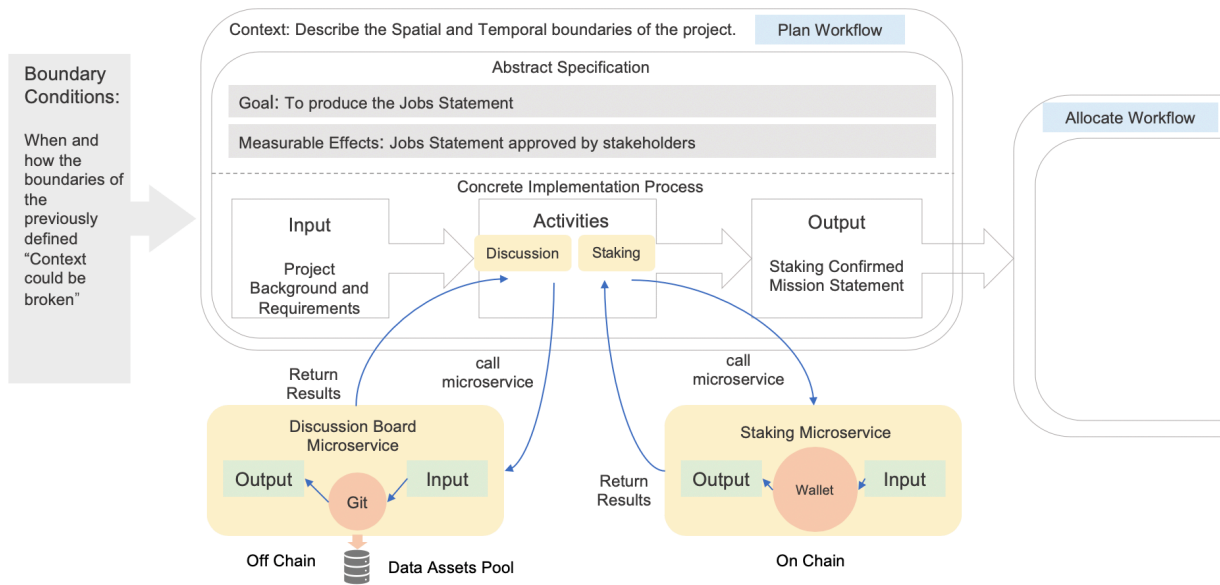
Transactions Statement Contract (TSC)

Transactions Statement Contract is a structured, result-oriented, referable smart contract template, which is an improvement to the current smart contract. A Transactions Statement Contract includes seven factors⁵:

- Context: Describe the Spatial and Temporal boundaries of the Job;
- Boundary Conditions: When and how the boundaries of the previously defined "Context could be broken.";
- Goals: The detailed problems to solve, and can be decomposed into small goals in different stages;
- Measurable Results: The quantitative or measurable results in every stage;
- Input: The resources needed to execute the activities;
- Activity: The detailed execution process, conducted by microservice tools;
- Output: The value output and related implementations (such as allocate budgets or incentives) to be the Input of the next step;

A series of connected Transactions Statement Contracts constitute the execution process of a project. With more and more projects going on, industry-tailored templates will be formed, which is easy and highly efficient for a similar project to refer to the template to deploy.

⁵ Ben Gu, i-Center of Tsinghua University, Cognitive basis beyond disciplines, Nov,2019



An example of the Transactions Statement Contract

Microservice Tools Pool (MTP)

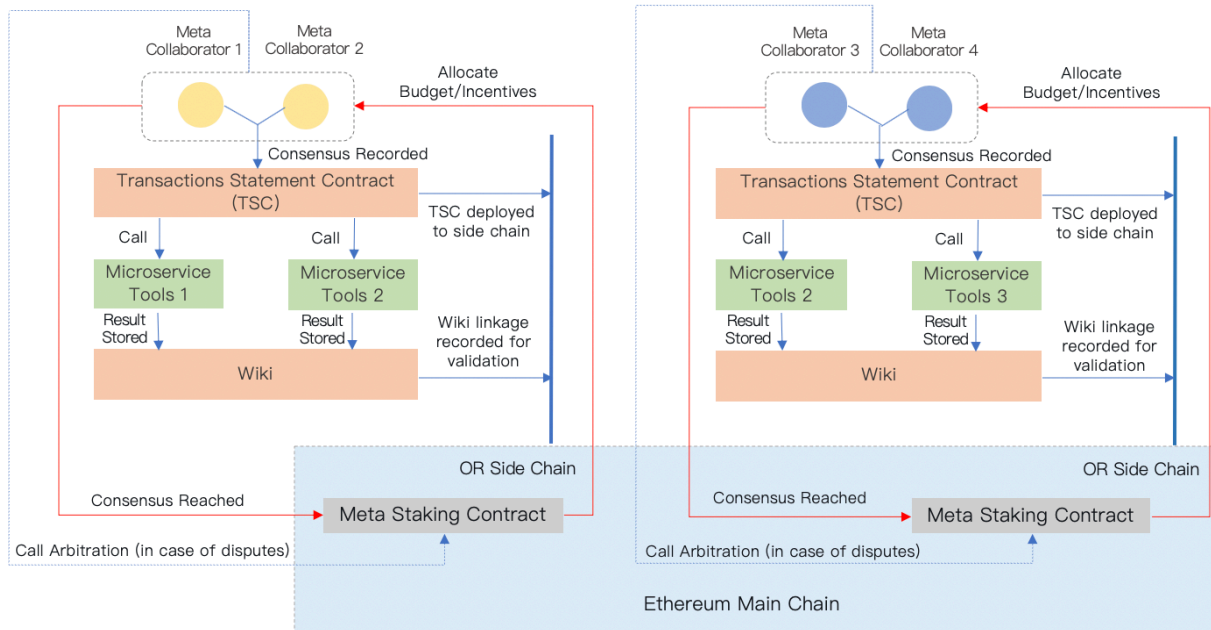
DAC is constructed on top of the Internet and Blockchain. When Meta Collaborators execute Activities, the data generated will go onto the Internet and the side chain, which needs a set of standard templates and APIs of the microservice tools, including:

- Infrastructure: Wallet, Transfer, Stake, etc.;
- Compliance: DAC Registration and validation, User Registration, Tax, etc.;
- Data Input and Management: Wiki templates, Chatroom, etc.;
- Collaboration Tools: Slack, Git, etc.;

DAC members can build their business-related microservice tools based on the templates and APIs provided by the ComCo Management Framework. The Microservice Tools Pool will be curated and updated by the DAC community members, who will get the subscription fee split in return. DAC members can develop various applications with the support from the Microservice Tools Pool, including Knowledge Management, Events Management, Tasks Allocation, Chat, e-Commerce, Crowdfunding, DeFi, ID Verification, Tax, Arbitration, etc.

The Mechanism of the ComCo Management Framework

ComCo Management Framework buildup a mechanism to bridge the on-chain smart contract with the off-chain microservice tools, and convert the mechanism into instances with templates and APIs to facilitate the application development.



Leveraging the side chain mechanism of the Optimistic Rollup, ComCo Management Framework places every pair of Meta Collaboration onto an independent side chain.

- **Deploy Transaction Statement Contract onto the side chain:** The consensus reached by both Meta Collaborators will be input into the Transactions Statement Contract and be deployed onto the side chain before implementing the collaboration. At this time, the state of the Transactions Statement Contract is set as alpha, and the state of the side chain is defined as R1, which will be rolled up and synchronized to the main chain;
- **Call the templates or APIs of the microservice tools:** In implementation, Meta Collaborators will call various tools via the templates or APIs in Microservice Tools

Pool to conduct the collaboration off the chain, and the execution result will be stored in MediaWiki;

- Synchronize the state of the side chains to initiate incentives or arbitration:
 - Meta Collaborators will audit, communicate, edit and confirm the implementation result off the chain. After the reaching of the consensus, the content in the MediaWiki will not be able to change. The state of the Transactions Statement Contract will be changed to finished, and the state of this side chain will be defined as R2. The Wiki linkage and the state of R2 will be packaged, encrypted and synchronized to the main chain as the witness;
- If there are no disputes, Meta Staking Contract on the main chain will allocate the budget according to the rules defined in the Transactions Statement Contract, and the staked deposit will be returned after challenging period; In case of any disputes, Meta Staking Contract will be suspended and trigger the Arbitration service.

M Token, Token Economics and Reputation Power

Various DACs in different fields will emerge from the foundation of the Metis Protocol. And Metis DAC is the first DAC building on Metis Protocol.

All the DACs will call the Meta Staking Contract and stake deposit to establish the Meta Collaboration. Every transaction of the deposit staking will generate a certain amount of M Token, which is a proportion of the deposit value.

Token Economics

- No pre-mining tokens, all the M Tokens are generated based on the contribution from every DAC member, even for the Metis Lab core team and other founding DAC members in the Stone Age. All the DAC members should submit proposals, stake

deposits, execute according to the schedule of Transactions Statement Contract, and gain M Tokens as the incentives of their contribution.

- The value of M Token is backboned by the data assets generated from microservice tools and secured by the staking deposits of establishing the Meta Collaboration. For any staking transactions, M Token will be created, whose value is a proportion of the staking value.
- With more and more DACs stake deposit to establish the collaboration and create values, Metis Protocol will not charge the transaction fees but levy the tax over the value created to generate revenue for Metis DAC.
- Every DAC member's aspiration for incentives (according to the contribution) will foster the overall value of M Tokens, and every DAC member can get benefit either by holding M Tokens or by contribution to gain more M Tokens.
- The overall value of M Tokens equals the market value of Metis DAC. M Token holders can participate in the operation, governance of Metis DAC, and also have the right to use the data assets in Metis DAC.

The Rights of M Token Holders

- Involvement of the DAC operation: DAC community members can participate in the project publishing, jobs application, joining the project team, apply to be the Arbitrator after staking M Tokens.
- Governance: DAC community member can obtain the voting rights and participate in the major decisions-making process by staking M Tokens.
- Use of Data Assets: DAC community members can get access to the data assets of the DAC after staking M Tokens.

Staking is the prerequisite for obtaining these rights, and M Token holders will gain the revenue sharing of Metis DAC.

The Consumptions of M Token

- Staking, such as joining a DAC, joining a team, referring to the data assets, voting, etc.
- Use of DAC services, such as project publishing, deploying the Meta Staking Contract and ComCo Management Framework, applying for Arbitration, etc.

Reputation Power

Reputation Power is an important index to evaluate the contribution of a DAC member. At the current stage, the algorithm of Reputation Power includes three indicators⁶: the amount and token days of the staked deposits, the number of finished collaborations and the appraisal of collaboration quality.

In a DAC, Reputation Power represents the ranking of a member. A higher Reputation Power means more exposure to different collaboration opportunities.

Use Case Example of Metis Protocol

Project to register a DAC

The project could use the DAC Generator (a microservice tool) to register its identity. A unique Ethereum wallet address will be created after the registration, just like a traditional company to register in a government office and open an account in the bank.

Project Publishing

Within the DAC, a Project can use its wallet address to publish the Jobs via Publisher (a microservice tool), Publisher has different kinds of template to help with the publishing, including Context, Boundaries, Goals, Measurable Results, Time, Criteria for the application,

⁶ More indicators will be added into the algorithm of Reputation Power.

Budgets, etc. With help from a third party, all the milestones of these Jobs will be input into Transactions Statement Contract. A complex Project may have different stages of Transactions Statement Contract to be connected one after another, i.e., when Job A finished, Job B and C will be followed to be published. When a Job published, the Project needs to stake the required budget into the escrow account of the Meta Staking Contract.

Apply for a Job

If a DAC member (an individual or a team) hopes to apply for the Job and clicks "Apply," the ComCo Management Framework will call Application (a microservice tool) to send the profile of this member to the Project, which includes the projects this member has collaborated, the appraisals, the Reputation Power, etc. When a Project accepts the application from one member, both the Project and the member need to stake the required amount of M Tokens into the Meta Staking Contract. After the staking, the Project (MC1) and the member (MC2) are becoming two Meta Collaborators, and a Meta Collaboration is created.

Execution of the Job

The leader in MC2 can use Job Allocation (a microservice tool) to decompose the Jobs into Activities and allocate to its team members, who could find his/her Activities list and other information related to the Jobs in his/her account. Team members in MC2 could call different microservice tools to execute their activities.

In every milestone, the team members in MC2 need to upload their deliverables onto the required address of MediaWiki. The leader in MC2 collects, confirms the deliverables and submits to the Project for evaluation, which will trigger the ComCo Management Framework to check the current states of the Transactions Statement Contract and see if the deliverables comply with the requirements defined (it is checked manually at the present stage), or if a new Job should be published.

All the jobs executed, all the deliverables submitted, a one-week Negotiation period will start. The two Meta Collaborators could negotiate off-chain and make the required adjustment to the deliverables.

Closing and Appraisal

When both Meta Collaborators agree, the Closing and Appraisal stage will start. Both Meta Collaborators should appraisal each other using the marks stated in the template. After Appraisal, if both Meta Collaborators agree, the status of the Budget will change to "To Be Allocated," and the Meta Collaboration enters the Challenging Period.

Challenging Period

By default, the Challenging Period is two weeks. If no Meta Collaborator disagrees, the Budget will be allocated automatically according to the terms defined in the Transactions Contract after the Challenging Period, and the Meta Staking Contract will be destroyed after the allocation. If there is any dispute arising, any Meta Collaborator can call the "Arbitration" service in the Challenging Period, and the Meta Staking Contract will be suspended, the "To be Allocated" Budget will be revoked.

Arbitration

The hidden Arbitrator in the Metis Protocol will be activated. The Arbitrator will conduct the arbitration and negotiation job off-chain. After the decision made, the Budget will be allocated accordingly, the Bad Party will be punished by confiscating its staked deposits, downgrading its Reputation Power, or being expelled from the DAC. After the Arbitration, the Meta Staking Contract will be destroyed.

Meta Collaboration Terminated

Meta Collaborators are encouraged to buildup long term cooperation relationships with each other, so by default, the Meta Collaboration is maintained if no one initiates to terminate it. However, if one Meta Collaborator hopes to quit, and clicks "Termination," the Meta Collaboration will be terminated after the Challenging Period.

Team Topologies – the Extension of Metis Protocol

It is very complicated in the project practices for the cross-domain collaborations. Metis Protocol integrates the Team Topologies to clarify the roles for every distributed collaborator and to facilitate the collaborations.

The execution of a project requires collaborations from the teams that play different roles. It might be changed in the content of the collaborations in various projects, but the functions or types of the team will be similar. Based on Team Topologies, Metis Protocol defines four teams: Stream-aligned Team, Enabling Team, Complicated-Subsystem Team, and Platform Team.

- Stream-aligned Team: The primary value creation team in the DAC community undertaking the execution of a single, valuable stream of work. Other teams should help the Stream-aligned team to reduce the cognitive load so that it could work smoothly and efficiently.
- Enabling Team: Composed of professional members with vertical industry background. Enabling team will research, share, and train the new framework, tools, or trending to assist other teams in the adoption. i.e., Training team, Project Management team, etc.
- Complicated-Subsystem Team: A team dealing with the subsystems that require specialized knowledge, such as Audition, Arbitration, Tax, etc.
- Platform Team: A team focusing on developing API, Tools, and Services to support the Stream-aligned team to build and deliver.

Every type of team will be composed of multiple Meta Collaborators, which will have a specific process, rules, templates, and set of microservice tools. Teams with similar types or backgrounds will form a specialty community.

Developing Stages of Metis Protocol

Stages	Milestones	M Token Generated
Stone Age	Building up the cornerstone for Metis Protocol with the Genesis version of White Paper, Meta Staking Contract, the POC ComCo Management Framework, and other related jobs	100 Million
Bronze Age	Cold launch, founding members join and use Metis Protocol to govern and manage for their projects manually	100 Million
Iron Age	Developing and Innovating the Optimistic Rollup mechanism, core functions and microservice framework in ComCo Management Framework, Test Net Operation	200 Million
Firearm Age	Officially launch and start to develop the DAC ecosystem	150 Million
Discovery Age	Various DACs grow out of the Metis Protocol to form the basic shape of the ecosystem. Voting for the Ecosystem Development Committee	450 Million
		Total: 1 Billion

Metis Lab, initiated by the founding partners, is the first member of Metis DAC. In the Stone Age and Bronze Age, Metis Lab will be the main contributor to advance the development and application of the Metis Protocol. With more members joining the Metis DAC, Metis Ecosystem Development Committee will be elected to manage and operate the Metis DAC.

Founders of Metis Protocol:

Steven Guo: Initiator of the Token Economy Practical Alliance, Veteran VC investor in Blockchain and High Tech. Steven used to be the VP of 21Vianet Group in charge of strategic innovation, VP of CIBN, and Partner of the Strategic Emerging Industry Fund of the Development and Reform Commission. He was a participant of early internet companies InfoHighWay and Stone Richsight, and a resident tutor for i-center in Tsinghua University.

Kevin Liu: MBA of UCAS. Global business leader of the BUMO public chain and the initiator of the BUMO Global Ambassador Project. An active researcher and practitioner of the Token Economy, DAO and the governance protocols. Used to work at IBM, China SuperTV (NYSE: STV), Analysys Capital, and StarsChina.

Metis Lab Core Team:

Elena Sinelnikova: Co-Founder & CEO

Elena leads the overall management and community development of Metis Lab. She is the Co-Founder of CryptoChicks, managing to involve hundreds of women who became blockchain evangelists, blockchain developers, blockchain entrepreneurs themselves. Elena developed a series of community collaboration projects in Canada, US, Russia, Pakistan, and the Bahamas, with support from Royal Bank of Canada, Deloitte, Microsoft, IBM, etc. Elena holds the Master of Computer Science degree.

Kevin Liu: Co-Founder & Product

Lead the product line of Metis Lab.

Yuan Su: Co-Founder & Tech Lead

Yuan leads the framework designing and building of the Metis Protocol. Yuan has 15 years of hands-on development experience, ranging from machine learning model research, big data to blockchain applications. Yuan used to lead the design of the data system and the tech

structure of blockchain projects in IBM. Yuan has been involved in various blockchain projects as key framework designers, developers, or advisors. Yuan holds an MBA degree from the University of Toronto.

Risk and Mitigation Responsibilities of Governance

A lot of potential risks exist during the development, deployment, and operation of Metis Protocol. And it is highly necessary to take steps to mitigate these risks. Some of those risks are identified below, each followed by a mitigation plan.

A malicious attack on the smart contract infrastructure by a bad actor.

One of the greatest risks to the Metis Protocol is a malicious actor—a programmer, for example, who discovers a vulnerability in the deployed smart contracts, and then uses it to break the Protocol or steal from it.

In the worst-case scenario, all decentralized digital assets held as collateral in the Protocol are stolen, and recovery is impossible.

Mitigation: The Metis Ecosystem Development Committee's highest priority is the security of the Metis Protocol, contracted security audits by the best security organizations in the blockchain industry, third-party (independent) audits, and bug bounties are part of the Protocol's security roadmap.

These security measures provide a strong defense system; however, they are not infallible. The mathematical modeling of intended behaviors may be incorrect, or the assumptions behind the intended behavior itself may be incorrect.

The mature of Optimistic Rollup algorithm

Optimistic Rollup is a construction which enables autonomous smart contracts on layer 2 (L2) using the OVM. The construction borrows heavily from both Plasma and zkRollup designs and builds on shadow chains as described by Vitalik. Several projects are working on this algorithm, and some test nets have been launched. However, we cannot anticipate when the Optimistic Rollup algorithm will become mature.

Mitigation: The goal for Metis Protocol is to enable distributed parties to collaborate quickly and worry-free. So, Metis Protocol refers to and innovates the Optimistic Rollup. However, Optimistic Rollup is not the only one that can realize this target. We will continue to monitor new technologies or mechanisms.