

Factom Inc. Development Grant Proposal

VERSION	DATE	CHANGED BY	CHANGES
0.1	May 30, 2018	Paul Snow	First version
0.1.0.1	June 4, 2018	Paul Snow	Grammar issues only. No material changes.
0.2	June 7, 2018	Paul Snow, Brian Deery	Grant is now 3 months instead of 6 months. Update Indemnity Clause

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Executive Summary

Factom Inc. started as a project to explore the possibilities of creating a blockchain implementation focused on providing data integrity. In 2015, Factom, Inc. was incorporated. For Factom Inc. the Factom protocol has been our mission and our passion, as we have steadily moved the protocol from a great idea to a fully deployed reality. We first deployed the protocol in September of 2015, deployed the novel multileader consensus protocol in January of 2017, and now have distributed the control of the protocol world wide in May of 2018.

At this time, we have some major accomplishments to highlight:

- Factom is the only multileader consensus algorithm in production.
- Factom is the first and only major public blockchain with a mint and burn architecture, which enables:
 - Enterprise access to Factom's utility without tradable tokens
 - Stable, real-world pricing of Factom's utility
 - Implementation of Sharding without a compromise of the security of the Factom Blockchain.
- Factom is the only pure-data, integrity layer leveraging the security of Bitcoin.
 - Data is organized in chains created by users and applications
 - This organization fits exactly into the needs of Digital Identity
 - Factom's Digital Identity structures are central to Factom's multileader protocol, which has been running in production since January of 2017
 - Data models business processes that cannot be easily modeled by coins or smart contracts
 - Allows blockchains to add value to existing business applications

The development of the Factom protocol is entering into a new phase. We need to improve the performance and reliability of the protocol. This involves:

- Analysis and restructuring of the code
- Network layer improvements
- Database improvements
- New lightweight client modes
- Better, more flexible second layer solutions

Factom as a protocol is competing with other blockchains with vast community resources. We need to jump start the protocol with more resources to build and maintain the code, the community, and the market. This proposal will detail much of what we would like to accomplish with a grant from the protocol.

Type of grant

This grant will have several components:

- Software Development
- Protocol and Technical Support to the ANOs and Guides
- PR for the protocol

Project description

This project is a general grant to enhance and promote the Factom protocol to Increase:

- Reliability and performance of the code
- Efficiency and effectiveness of projects in the broader ecosystem
- Visibility of the protocol in the market.

The protocol will face a rapid need to increase stability and capacity. Likewise, for the protocol to remain competitive and relevant in the marketplace the development of new features and enhancements will be required. To that end, these are some goals that are currently on the roadmap. Tech goals with lower numbers in parenthesis have higher priority.:

1. Restructuring, enhancing the current factomd code:
 - 1.1. Standing Party support ([Section 6 of the Factom Governance](#))
 - 1.1.1. Define Protocols
 - 1.1.1.1. Voting Protocol using Categories of Standing (1)
 - 1.1.1.2. Define Digital Identity protocols for Standing (1)
 - 1.1.1.3. Define the registration of Standing Parties (1)
 - 1.1.1.4. Assigning/Calculating Entry Credit Standing (1)
 - 1.1.1.5. Assigning/Calculating Factoid Staking Standing (Retrospective) (1)
 - 1.1.1.6. Assigning/Calculating Guide Standing (2)
 - 1.1.1.7. Assigning/Calculating Authority Node Standing (2)
 - 1.1.1.8. Assigning/Calculating Efficiency Standing (1)
 - 1.1.1.9. Assigning/Calculating Grant Success Standing (4)
 - 1.1.2. Better Database performance (3)
 - 1.1.3. Restructure package use to allow messages to contain their own logic (3)
 - 1.2. Improve the gossip network:
 - 1.2.1. Reduce message traffic (1)

- 1.2.2. Reduce missing message requests (1)
- 1.2.3. Better connection management (2)
- 1.3. Additional transaction type support by adding
 - 1.3.1. Multisig support (1)
 - 1.3.2. Atomic Swap support (4)
 - 1.3.3. Lightning support (4)
 - 1.3.4. Prospective FCT staking (3)
- 1.4. Visibility and Usability
 - 1.4.1. UI for Coinbase Cancel (1)
 - 1.4.2. Blockchain side of vote counting (1)
 - 1.4.3. Coinbase Tracking of Grants (2)
 - 1.4.4. Add node monitoring infrastructure (grafana container) (3)
 - 1.4.5. Reliability monitoring system (3)
- 1.5. Authority Node management
 - 1.5.1. Add ability to change lower level identity keys (3)
 - 1.5.2. Add a network reboot protocol to allow resetting of Factom networks (2)
 - 1.5.3. Guard nodes in p2p network (2)
 - 1.5.4. External monitoring of coinbase for overinflation (2)
 - 1.5.5. Improved node management
 - 1.5.5.1. Better brain swap (3)
 - 1.5.5.2. Easier code updates (3)
- 1.6. API Improvements
 - 1.6.1. API calls for node health monitoring
 - 1.6.1.1. fed/audit feedback (1)
 - 1.6.1.2. Report Running/stalled/faulting status (1)
 - 1.6.1.3. Report the current minute (1)
 - 1.6.1.4. Bandwidth usage/peer counts (3)
 - 1.6.2. Fix pending transactions API (3)
 - 1.6.3. Expose fct temp balance vs block balance (3)
 - 1.6.4. Get receipts for Directory Blocks, not just entries. (2)
 - 1.6.5. Improve reading throughput of API (2)
- 1.7. Improve 2p2 download time (2)
- 1.8. Fix DBSig replacement when faulting (1)
- 1.9. New Light Client: (4)
 - 1.9.1. Create server and mobile clients that can provide data integrity checks for a wide range of applications
 - 1.9.2. Update the factomd code to understand chains interesting to a light client, and minimize data to be sent to such a client. (Subscriptions)
 - 1.9.3. Integrate Digital identity support to validate data in light clients.

2. Internal Sharding
 - 2.1. Modify the protocol to implement sharding.
 - 2.1.1. Modify some messages (3)
 - 2.1.2. Possibly add some changes to block structures (3)
 - 2.1.3. Build network connections between shards (3)
 - 2.1.4. Add a protocol router (3)
 - 2.1.5. Add missing chain requests for cross shard communication (3)
 - 2.1.6. Modify the gossip network to manage shards and cross shard communication (3)
3. Testing
 - 3.1. Improve continuous test/build/deploy technology (2)
 - 3.2. Unit testing for new code (3)
 - 3.3. Simulation Testing for development, performance, and sanity checks (2)
 - 3.4. Network Testing with development sandboxes (2)
 - 3.5. Devnet Deployments (2)
 - 3.6. Testnet Deployments (2)
4. Public Relations, Developer Outreach, and Education
 - 4.1. Arrange sponsorships of blockchain oriented conferences
 - 4.2. Arrange speaking slots focused on the protocol and community
 - 4.3. Arrange hackathons focused on the Factom protocol and secondary layer solutions built on Factom
 - 4.4. Increase thought pieces in publications focused on cryptocurrency and enterprise blockchain technology (beyond mortgage)
 - 4.5. Videos production
 - 4.5.1. Introduction Videos to the protocol
 - 4.5.2. Introduction Videos to the Authority Nodes
 - 4.5.3. Introductions to use cases
 - 4.5.4. Educational Videos for the protocol
 - 4.5.5. Educational Videos for use cases
 - 4.6. Social Media
 - 4.6.1. Bring on a community/technical director for Europe/Asia
 - 4.6.2. Bring on a community/technical director for the Americas and Pacific
 - 4.7. Develop teaching materials for blockchain courses
 - 4.7.1. Develop a set of Development examples with solutions

5. Community Support (for Authority Nodes, Grantees, Community)
 - 5.1. Add monitoring to ensure questions are answered quickly
 - 5.1.1. Develop a database of quick answers to common questions
 - 5.1.2. Develop a response process to ensure high priority issues are resolved quickly, while low priority issues do not fall through the cracks.
 - 5.2. Provide support for onboarding developers into Factom Core
 - 5.3. Open Source sample applications
 - 5.3.1. Simple Apollo mobile apps
 - 5.3.2. Simple Apollo desktop apps
 - 5.3.3. Simple Apollo server apps
 - 5.4. Open Source
 - 5.4.1. Build sample applications
 - 5.4.1.1. Mobile Applications using Factom Inc. Auditing solutions
 - 5.4.1.2. Mobile Applications using Factom Inc.

Problem Statement

The Factom protocol is designed to solve fundamental problems with the reliability of data faced by nearly all enterprises. Because of the very broad applicability of the Factom solution we fully expect the volume of use of the protocol to scale up very rapidly.

For the Factom protocol to succeed it must become a trustworthy utility on which enterprises around the world can depend and feel comfortable relying on for core business processes. If the protocol is not reliable or is unable to scale to meet the demands of enterprise users, Factom will be abandoned once early adopters run into significant issues.

There exists a narrow window between the base protocol being made fully autonomous and the ramp up of early adopters for the Factom protocol code to be fully industrialized to be able handle the needs of large enterprises.

A key issue that must be fully resolved quickly is sharding. The Factom protocol was designed to be directly compatible with sharding but there is work yet required to fully implement this functionality. Without sharding, even with our parallel consensus approach the network is likely to be quickly overrun as enterprise customers with large transaction volumes spin up applications on Factom. It would not take very many stories of clients being unable to transact their business because Factom network congestion for Factom to be abandoned in the marketplace.

Besides implementing sharding there are many improvements in the Factom code which need to be implemented to insure a stable, reliable and fast network. Like any complex system moving to production brings lessons and learnings and Factom is no different. Many lessons have been learned while implementing the testnet and moving the protocol to fully distributed operation.

As the victory of VHS over technically superior Betamax demonstrates, having the best technology is not a guarantee of success. For the Factom protocol to thrive, there will need to be continued marketing of the advantages of the protocol. Without an active voice promoting the Factom protocol the likes of IBM will dominate the blockchain conversation with inferior products simply through the weight of their marketing.

A source of ongoing protocol technical support for the guides and the Authority Node Operators is required to ensure the smooth and reliable functioning of the protocol. As with any complex software system there will be issues and unanticipated use cases with the potential to interfere with the smooth operation of the protocol and reliable delivery of services to users.

Factom Inc. through rhw resources provided by shareholders will drive adoption of the Factom protocol through the adoption of our SaaS solution built on the Factom protocol. One of the problems we are addressing with this proposal is the promotion of the Factom protocol to the projects, organizations and tool makers planning to implement by writing directly to the Factom protocol. The white paper can be downloaded and used as a guide to building applications directly on the Factom protocol with no interaction with Factom Inc. and we at Factom Inc. support this wholeheartedly. The adoption of the Factom protocol outside of the Factom Inc. SaaS solution will not happen without active promotion of the protocol. We, through the resources provided by this grant, will provide the resources to promote the adoption of the Factom protocol by the many projects that are not likely to be Factom Inc customers.

Goals

- Strengthen the software against consensus failures. (unfortunately this is hard to measure)
- Increase capacity of the network.
- Improve Networking
 - Add intelligence to reduce network load, and increase coverage of “gossip” messages (messages the whole network needs to see).
 - Improve recovery paths, i.e. missing messages, syncing with blocks
- Build infrastructure for automated governance
 - Work with TFA and community to provide on chain voting
 - Build support for protocol visibility of governance
- Refactor the internal code into neat, compartmentalized processes that model how Factom will execute upon sharding.
 - Restructure messages to support better maintenance
 - Restructure the packages to put code defining message behavior
 - Implementation of a router for messages to the proper VMs
 - Implement internal sharding.
 - Fix, clean up, simplify, reduce code paths
- Support other Grantees, Authority Node Operators, Developers, Users
- Increase the awareness and promote the adoption of the Factom protocol.

We want any project requiring the trusted data capabilities delivered by blockchain technology to choose the Factom protocol as their implementation strategy. Factom Inc. will continue to push adoption through our SaaS implementation on top of the Factom protocol but we also want projects that want to write directly to the protocol to also choose the Factom protocol and the goal of this proposal is to promote the advantages of the base protocol to the projects, organization and tool makers in need of a blockchain protocol. The Factom protocol, with its unique two token approach addresses the three

big problems cited by blockchain critics. Factom's ability to shard solves scaling problems, its approach of not using a coin to write data to the blockchain eliminates constraints on data complexity and likewise the entry credit provides a rational and consistent cost model. These three advantages made the Factom protocol a superior solution to solve most business use cases with the following specific goals:

- Our goal, through the activities supported by this grant, is to build awareness both within the blockchain industry and within the broader technical community of the unique advantages of the Factom protocol. Our goal is to increase the representation of the Factom protocol at key industry events.
- Our goal is to publish white papers and use cases promoting uses of the Factom protocol in key industries.
- Our goal is to publish tutorial materials to make it easy for developers to integrate the Factom protocol into existing and future projects.
- Our goal is to assign resources specifically to promoting the Factom protocol to the blockchain community as well and the broader technical community.

Success Criteria (measurable)

Criteria	Measurement
Refactored Code	50% increase in tps in stress tests 80% reduction of missing messages in stress tests from original M3 code
New APIs	Added APIs for network diagnostics
Factomd recognizes voting	The blockchain side of the standing parties votes are counted.
The Factom protocol will support internal sharding.	Code supporting internal sharding in test.
Coinbase Cancel UI	Allow ANOs the ability to cancel problematic outputs.

Increased marketing in the blockchain industry.

Regular attendance and participation in key cryptocurrency and blockchain industry events by Factom Inc. staff. Addition of marketing staff focused on promotion of the Factom Protocol.

Increased awareness of the advantages of the Factom protocol in the broader technical community

Attendance and participation in technical industry events to promote awareness and adoption of the Factom protocol. Delivery of Factom protocol tutorial and training materials.

Infrastructure is in place to support the Factom Guides and ANOs.

Guides and ANOs are able to request support and get a response within appropriate timeframes.

Budget

Due to the complexities of managing currency risk and balancing the priorities over such a wide range of tasks, we believe the grant should cover 3 months.

The monthly token issue for the first 3 months 30,000 fct, for a total payout of 90,000 fct.

Sponsors

The Governance document allows for the selection of Sponsors for a grant. Sponsors are selected from the from the standing parties, and/or persons with support from the standing parties or for now the community. Sponsors provide insight into the internal processes and challenges of working on a grant, and to the quality of the results.

Factom Inc. is happy to say that longtime community leader Dominic Luxford (88mph, D-lux) has been willing to sponsor this grant. We will pick at least one other additional sponsor TBD.

Organization or Person info

Factom Inc. is the organization responsible for creating the Factom protocol. The primary author and inventor of Factom protocol and network is Paul Snow, CEO of Factom Inc.. He continues to provide technical direction to Factom protocol development efforts and will play a key role in the promotion of the protocol to the blockchain community and across the broader technical community.

The engineers responsible for the creation of the Factom protocol code, as well as the test personnel responsible for maintaining a suite of test cases for the protocol are Factom Inc. employees and will be part of and provide guidance to the team implementing the new protocol capabilities called for in the grant application.

Indemnification

By submitting a grant proposal or participating in the grant proposal process, the submitter indemnifies and holds harmless all Guides, Authority Set Members, and Standing Parties, as it strictly relates to the grant, against any loss or expense incurred, but which in no case will exceed the total dollar amount of the grant as issued, by accepting or conducting the work of a grant award by reason of the fact that the Guides, Authority Set Members, and Standing Parties including, without limitation, any judgment, settlement, attorneys' fees and other costs or expenses incurred in connection with the defense of any actual or threatened action or proceeding, provided the loss or expense resulted from Good Faith Errors or from action or inaction taken in good faith for a purpose which the Guides, Authority Set Members, or Standing Parties reasonably believed to be in, or not opposed to, the best interests of the Factom Protocol.

Note: Please see [Governance](#) for proper definitions of Guides, Authority Set Members, and Standing Parties.