Space Mission Activation Process

Rules and Guidelines

Change Log

Version	Description	Date
1.0.0	New document	9/19/2018
1.0.1	Updates to calendar and proposal length	11/01/2018

1. Introduction

1.1. Process Summary

The Space Mission Activation Process (SMAP) is the pilot system for selecting the first missions to be endorsed by Space Decentral. While any idea proposed in the Space Decentral forum can be developed as a collaborative project with the community, the missions activated through this process will obtain an “official” status. This means they will be peer reviewed, vetted, and dedicated teams will actively work on the design of these missions with the goal of accomplishing the defined objectives. While we seek to make this process as open as possible, we need to implement some constraints to ensure outcomes are equitable and that they help accomplish our vision of enabling the globe to participate in space exploration.

By submitting a proposal, each team enters a linear process aiming to activate the proposal as one of three[1] pilot Space Decentral missions. Albeit a competitive process, the intent of the SMAP is for the community to collaborate and come up with as many great proposals as possible, creating a nice pool of feasible projects to choose from.

After proposals are filtered and validated by a group of *evaluators*, a subsequent *Mission Activation Vote* will occur. Up to three proposals with the most votes will become activated and the community will form new *design teams* that will lead the design and development. Any Space Decentral member can join the design teams, with priority given to the original proposal team to lead the project, and to community members with relevant skills or expertise to take on additional leadership responsibilities.

If a proposal was not chosen at this time, it can be resubmitted in a future SMAP.

1.2. Participation

1.2.1. Participation and Registration

Members of Space Decentral may participate in the SMAP as either Proposers, Evaluators, Voters, Designers, or Organizers. Proposers propose missions, Evaluators review and vet proposals, Voters select top missions from a pool of vetted proposals, Designers work on activated missions, and Organizers help coordinate the SMAP.

[1] The number of selected missions may vary based on the number of valid proposals received. See section 2.2.7 for more information.

1.2.2. Proposers

A Proposal Team can be either an individual or a group, and must include at least one Space Decentral member. Each member of a team is a “Proposer”. In this initial SMAP, Space Cooperative and its members/or advisors may not be a member of any proposal teams.

Proposal Teams are recommended to register their Notice of Intent by September 30th, 2018 although it is not required. This is helpful for planning, to ensure we recruit the proper subject matter experts for the evaluation committee. Additionally, teams who submit one will receive early feedback from our network of experts. The Notice of Intent requires a 500 to 750 word abstract.

1.2.3. Evaluators

Evaluators compose an Evaluation Committee, which will be composed of a team of experts, which can include members and advisors of Space Cooperative. Evaluators are individuals who evaluate, filter and vet the proposals to ensure that they are technically sound and that proposal requirements have been met. Space Decentral members can apply to join the evaluation committee by filling out this application by December 9th, 2018. To avoid conflict of interests, Proposers must recuse themselves from being Evaluators. Once admitted, Evaluators become included in the process of vetting new evaluators.

1.2.4. Voters

Voters are Space Decentral members with a Voting Share and are eligible to participate in the *Mission Activation Vote*. Any Space Decentral member is eligible to become a Voter, even if they also hold the roles of Proposer or Evaluator.

Beginning in October of 2018, tasks in Space Decentral’s Github repo will be allocated with “points” on a monthly basis, including previously completed tasks. To earn a Voting Share and become a Voter, a member must collect a total of 80 points from tasks that are completed up until May 31st, 2019. Some examples of projects where points can be collected are the Coral program, the Space Decentral Network, and the systems engineering python project, but any project in the Space Decentral repo will be eligible.

1.2.5. Designers

Design teams are groups working on the design and development of the activated missions. Design teams can be composed of Space Decentral members, including Space Cooperative, and any invited experts. Members of Design Teams are known as “Designers”. Any member willing to be part of the design team can join individually through the Space Decentral platform, after the missions are activated.

1.2.6. Organizers

Organizers are members of the SMAP Organization Committee and responsible with maintaining the rules and guidelines, coordinating the community on open source tasks to earn Voting Shares, and providing updates on the SMAP, amongst other tasks. Organizers can include members of Space Cooperative or Space Decentral. Organizers must not be Proposers, but they are allowed to be Voters and Evaluators.

Space Decentral members can apply to join the Organization Committee by filling out this application on a rolling basis. Once admitted as an Organizer, you can help with the management of the SMAP.

1.3. Rewards

The Proposal Teams of activated missions will each be awarded with 20,000 SDN (Space Decentral Network) tokens[2], which is the token in the Space Decentral ecosystem used to transparently attribute contributors and enable network privileges.

Selected proposals become activated missions, are featured on spacedecentral.net and enabled for open source, community collaboration using blockchain-based crowdsourcing tools that provide a provenance of contributions on the project.

Through the use of crowdsourcing tools and processes, the broader community will be able to collaborate with the original Proposal Teams to participate in the design, development and launch of these missions. This affords the entire network the opportunity to participate in a real space mission, present at conferences, or co-author numerous technical papers.

The Space Decentral community will also promote the selected missions to seek crowdfunding (or help fund it), although there is no guarantee that activated missions will receive funding.

[2] For more information on SDN, review the Governance Paper.

2. The Space Mission Activation Process (2018-2109)

2.1. Timeline

The following timeline outlines the main steps and procedures of the 2018-2019 SMAP.

1. Team Formation	-
2. Submit Notice of Intent	September 30th, 2018
3. Evaluator Application Deadline	December 9th, 2018
4. Proposal Submission Deadline	January 6th, 2019
5. Proposal Evaluation	January 7th to March 15th, 2019
6. Announcement of Valid Proposals	March 17th, 2019
7. Mission Activation Vote	April 1st to 12th, 2019
8. Announcement of Selected Missions	April 14th, 2019
9. Mission Planning	April 22nd to June 28th, 2019
10. Project Manager Assignment Deadline	May 6th, 2019
11. Authorization to Proceed	July 1st, 2019

2.2. Detailed Procedure

2.2.1. Team Formation [1]

Who: **Proposers**	When: **-**

During the team formation step, community members post ideas in the forum, including the roles/skill sets they are looking for (if any), to have a well-rounded composition of subject matter experts for proposal development.

2.2.2. Submit Notice of Intent [2]

Who: **Proposers**	When: **September 30th, 2018**

The Notice of Intent is an application that describes the the team plans on developing a proposal or is in the process of developing one. It should include an abstract and a list team members.This step is not required, but helps gives us a sense of the types of expert reviewers

necessary. If this step is completed, the submitted abstracts will be reviewed, with feedback provided.

2.2.3. Evaluator Application Deadline [3]

Who: **Evaluators**	When: **December 6th, 2018**

To become a proposal Evaluator, an application must be submitted to the organizers (see section 1.2.3.). To avoid conflict of interests, members who propose missions must recuse themselves from being Evaluators.

2.2.4. Proposal Submission Deadline [4]

Who: **Proposers**	When: **January 6th, 2019**

Proposal Teams must submit their proposal by the deadline to be considered for the next step. Proposals must include descriptive documentation, references, and an optional 5 minute video (see section 4.3. for detailed proposal requirements)

2.2.5. Proposal Evaluation [5]

Who: **Evaluators**	When: **January 7th to March 15th, 2019**

Submitted proposals will be reviewed and vetted by the Evaluation Committee to ensure that they are technically sound and that proposal requirements have been met. This results in the Mission Activation Vote having a pool of potentially feasible missions (“valid proposals”), allowing Voters to participate in the final choice without requiring subject matter expertise.

The vetting process consists of five steps:

a. **Pre-screening**
   To be considered eligible and move on to the next vetting step (b), proposals must meet the following requirements:

   - Be of the team’s authorship
   - Meet all submission requirements and deadlines
   - Be released under an open source license
   - Meet the open source Space Decentral Model

b. **First Review** *(Jan 7th to Feb 8th)*

The Evaluation Committee will begin by performing peer review of the proposals, based on the Evaluation Criteria (see section 4.4.)

c. **Feedback** *(Feb 11th)*
Evaluators will provide feedback and recommendations for changes or additional information that is required for the proposal to be considered valid.

d. **Revision Period** *(Feb 11th to 25th)*
There will be up to 2 weeks to update proposals after receiving feedback.

e. **Final Review** *(Feb 26th to Mar 15th)*
After the revision period, the Evaluation Committee performs a final review to determine which proposals are considered technically sound and thus valid for the Mission Activation Vote.

2.2.6. Announcement of Valid Proposals [6]

Who: **Organizers**	When: **March 17th, 2019**

Proposals considered valid for the Mission Activation Vote will be announced to the community on March 17th.

2.2.7. Mission Activation Vote [7]

Who: **Voters**	When: **April 1st to 12th, 2019**

The Mission Activation Vote will select the first missions to be endorsed by Space Decentral, and will help define Space Decentral's reputation in the space industry. The vote will be held on the Aragon platform, where each Voter (see 1.2.4.) will be able to distribute 100 points freely amongst the valid proposals, regardless of category.

The objective is to select three missions to be activated. However, depending on the number of valid proposals, the SMAP might select as little as 1 mission, or the call for proposals might be extended to a later date in order to attract more valid proposals. The top proposals which received the most points will become activated missions. The following table relates the maximum number of activated missions based on the number of valid proposals:

# of Valid Proposals	Maximum # of Activated Missions
15 or more	3
7 - 14	2
6 or less	1

2.2.8. Announcement of Selected Missions [8]

Who: **Organizers**	When: **April 14th, 2019**

The missions selected for activation will be announced to the community on March 18th. The proposal teams of activated missions will each be awarded with SDN tokens. For teams that have more than one person, the percentage of the pot that each individual proposal team member will receive needs to be specified in the proposal submission.

2.2.9. Mission Planning [9]

Who: **Designers**	When: **April 22nd to June 28th, 2019**

After a mission is activated, community members can join the mission Design Team. The new team will define a plan for the mission design phase, with a work breakdown structure (WBS), and tasks will be defined in an open source repository.

2.2.10. Project Manager Assignment Deadline [10]

Who: **Designers**	When: **May 6th, 2019**

If the mission does not have a designated project manager from the Proposal Team, community members can nominate themselves for the role. If more than one person wants to be the project manager, there can be multiple, but there must be one designated lead. An election can occur to determine the lead if the nominees cannot come to consensus.

2.2.11. Authorization to Proceed [11]

Who: **Designers**	When: **July 1st, 2019**

Now that the project plan, tasks, and initial team members have been defined, missions can officially become greenlit to begin task development. The Design Team can proceed to actively develop the mission and move forward with mission design.

Team members will earn SDN tokens as they assist with the work. This provides a provenance of contributors to the projects, so if it ever does materialize into a real world mission or business, the ownership is transparent. Through this new model of crowdsourcing, Space Decentral aims to open up global collaboration in space exploration to expand into the cosmos as is our destiny.

3. Proposal Topics

As a decentralized space agency, Space Decentral seeks to support the state-independent exploration, use and settlement of space by engaging internationally all members of the human community who share a vision of a continual flourishing of both human and non-human life both on the Earth itself and spreading into the cosmos. The missions selected in the SMAP will be closely aligned with this goal. Teams may submit proposals of varying complexity, such as but not limited to:

- A process to grow food in underwater domes;
- A demonstration of artificial gravity technology;
- A design of a self-sustaining and futuristic city on Earth; or
- A reconnaissance mission to Calisto.

In the future, this process will also be used for educational initiatives or technology-specific projects, but at the moment the goal is to select projects with an expected launch or break-ground date.

3.1. Mission Categories

Proposals that fit into the three categories of Robotic, Human Spaceflight, and Expansion will be considered. These categories are defined in the next sections.

3.1.1. Category 1 — Robotic

These mission concepts include but are not limited to uncrewed, satellite, and rover missions. They should comprise fairly near-term missions with the potential for prompt applications that may produce a commercial product or achieve some other scientific or technology development objective quickly. They will be relatively low cost, make use of currently available technology or technology that is well advanced up the technology readiness scale. The timeframe for realization is “short-term” - on the order of less than a decade.

3.1.2. Category 2 — Human Spaceflight Payload

These mission concepts will support crew activities in space such as crew transport vehicles on orbit or beyond, on the ISS, at the future Lunar Orbital Platform-Gateway, or on the lunar surface. The scope may range in size and complexity from a small instrument package to a whole module. To support crew activities means engaging with the main purposes or functions of the host spacecraft and the missions they can make possible. The timeframe for realization is “mid-term” - from one to two decades.

3.1.3. Category 3 — Expansion

An expansion mission would be an idealistic, forward-looking mission with innovative ideas that pave the way for future human settlements. The Expansion mission could include an orbital space settlement, the Moon Village, or LunaCity within the Earth-Moon system. It might also extend to the human exploration of the Mars system, including the planet and its moons Phobos and Deimos or stay within the our current boundaries proposing new forms of settlements here on Earth. The timeframe for realization is “long-term,” both in terms of time until launch and duration of the commitment to a permanent human presence, on the order of one to three decades.

3.2. Domains

Each proposal for a mission should convey a reason for doing it that provides a utility function, or some form of usefulness. The purposes fall into five types of domains, of which the mission proposal should clearly advocate one or more, and explain its purpose within the context of its domains. A proposal may advocate another domain, but with the caveat that it can explain the function and the utility as described the Value Proposition section.

3.2.1. Commercial Mission (COM)

A commercial mission focuses on providing a direct return on investment, usually by offering a service such as tourism, communications, or Earth observation. The key factor is revenue-generation, and hence a business model is a critical part of a commercial mission.

3.2.2. In Situ Resource Utilization (ISRU)

ISRU refers to extracting, processing, and using resources for a body or object in space, for example producing oxygen from lunar regolith, water from subsurface ice on Mars, or precious metals from an asteroid. It may incorporate or display characteristics of science, technology demonstration, or commercial exploitation, but the central theme is making beneficial use of off world resources. ISRU can scale as an experiment, a payload, or as an entire mission.

3.2.3. Operations Demonstration Mission (ODM)

This domain is usually a component of a larger mission during which it attempts and tests experimental space operations. An operational demo may include innovative attempts at maneuvering or navigating in space.

3.2.4. Science Application and Advancement (SAA)

While not necessarily a mission in and of itself, an SAA may provide an important experiment, instrument, or payload that creates the raison d’etre of a mission or part of a mission. An SAA may range widely from an external instrument that observes or measures a target in space or that conducts a life science or materials experiment inside a pressurized spacecraft.

3.2.5 Technology Demonstration Mission (TDM)

This function tests a new technology in the space environment, raising its Technology Readiness Level. Some TDMs are advantageous at a relatively low TRL, say from *TRL-2 Concept Formulation* to *TRL-3 Proof of Concept* where it is necessary to prove that a process will function or operate in microgravity. More often, a TDM takes a concept from *TRL6—System test in a relevant environment* to *TRL7—System (prototype) test or demonstration in a space environment*. Some TDMs take the technology further to *TRL8—Actual system completed and "flight qualified"* through test and demonstration in the space environment.[3] [4] [5]

3.3. The Value Proposition of a Space Mission

Each space mission proposal must explain its Value Proposition. This Value Proposition is a statement that explains clearly:

a. State of the Art
What are the precedents or the existing state of the art in the domain that this mission concept addresses? (Do your homework!)

b. Purpose
What is its purpose? Does it solve a problem? What problem? If so, why is it worth solving?

c. Benefit
What is the benefit, service, offering, product, or expected result of the mission?

d. End Users
Who needs the mission and why? Who are the end users (e.g. mission controllers, astronauts, scientists, consumers) that will utilize the technology; or potential customers (e.g. a company, government, university, or some other entity) that would pay for it or its benefit? If the proposer is the main customer, explain the basis of need or motivation.

e. Platform
Is there an existing, ongoing, or planned platform in space that this concept complements or supports?

f. Enterprise
Is there an existing, ongoing commercial, scientific, or government space enterprise that this mission complements, improves, supports, or completes in some way?

[3] https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt_accordion1.html
[4] https://www.nasa.gov/pdf/458490main_TRL_Definitions.pdf
[5] https://esto.nasa.gov/files/trl_definitions.pdf

g. Improvement in the State of the Art

Is this mission an improvement over prior ways of doing X, or, is it a way to do something completely new?

h. Competition

If a commercial mission: Who or what is the competition and why is this mission concept better? What advantages does this mission concept present over its competition?

i. Market

If a commercial mission: Is there a market for this mission? If so, what is the market opportunity? What is the relationship between technical fit and market fit? (e.g. is the technical capability within the price range of the market)?

4. Rules

4.1. Open Source and Intellectual Property

Space Decentral aims to engage the community's willingness to contribute innovative, useful ideas to our collective cause. With this in mind, all of our community participants acknowledge and agree that the intellectual property ("IP") they contribute to this ecosystem must be open source. This means something very specific: Any contributions of IP must be available with an open source license (such as the GPL) so that such IP (a) can be used freely by the Space Decentral ecosystem's Participants and (b) will not in any instance be used to directly or indirectly obstruct, block or interfere with the use of the IP in projects, innovations and/or projects that this ecosystem was designed to promote and protect.

4.2. Proposal Team Restrictions

At this early stage in Space Decentral's development, proposals directly associated to existing for-profit entities cannot be supported. Since activated projects become open for volunteer-driven crowdsourcing, it adds legal complications when this type of labor is used to bootstrap an existing for-profit entity, without proper legal agreements and protections in place[6].

Note that this does not preclude an unaffiliated group of individuals, that all may work for existing for-profit entities from proposing a commercial mission. The natural progression for the use case of a proposal for a commercial mission is that it can eventually evolve into a new, independent for-profit entity, such as a spin-off decentralized autonomous organization.

Both the original proposal team and new collaborators will collect SDN tokens after the mission is activated. By submitting to the SMAP, the proposal teams accept that should the project spin-off into a new entity, that each individual's stake in the project will be measured by the amount of SDN tokens collected for the project, which will be transparently tracked on the Ethereum blockchain. Hence if it one day materializes into a fully funded mission or business, the ownership is transparent. Through this new model of crowdsourcing, Space Decentral aims to open up global collaboration in advancing space exploration and make our path towards the stars be one of united humans.

4.3. Proposal Submission Requirements

4.3.1. General Format

All proposal documentation, except when stated otherwise, shall be submitted as a PDF file on standard 8.5"x11" layout. Text shall be between 10 and 12 point standard Arial font, with 1.5

[6] In the future, the SMAP will support proposals from existing for-profit entities. Right now it adds too much administrative overhead, costs, and legal risks to support it.

minimum spacing. Margins shall be no smaller than 0.75” left and right and no smaller than 1” top and bottom.

4.3.2. Required Deliverables

The proposal should be between 8 to 15 pages long, and contain the following information:

- Abstract (1 page max)
    - Include the Mission Category and Domain(s) (see sections 3.1. and 3.2.)
- Technical Description
- Value Proposition (see section 3.3.)
- References (2 pages max)
- Proposal Team (2 pages max)
    - Include biography, role and commitment levels
    - Specify whether any of the team members will be the project manager
    - Specify percentage of SDN tokens each member shall receive (see section 3.6)

4.3.2. Optional Deliverable

While this is not required, a video may also be submitted,which can be helpful for participants in the Mission Activation Vote and will be the main publicity of your proposal to the greater public.

The video should be up to 5 minutes maximum, and in .mov, .mp4, or .avi format. It can be a film, slideshow, animation, or similar that summarizes and explains the proposal.

4.3.3. Document Submission

All documents/videos are expected to be uploaded to the Missions repository on Github, by 11:00pm PST on January 6th, 2018. More step-by-step instructions will be provided in December for those unfamiliar with Github.

4.4. Evaluation Criteria

The evaluation community will vet proposals based on the following criteria.

a. **Mission Category**
   Does the proposal fit into the indicated category?

b. **Domains**

Are the indicated domains relatable to the proposed mission? Does the proposal advocate a utility function or purpose relevant to the domain?

c. Value Proposition
Concerns the relevance and validity of the value proposition. Does the proposal clearly, feasibly and satisfactory answer the questions posed by the value proposition?

d. Technical Merit
The proposal should demonstrate sufficient technical understanding of the subject area. Are the underlying assumptions of the proposal supported by well established scientific theory or experimental data?

4.5. Media Authorizations

In participating on the SMAP, all participants agree to the following statements:

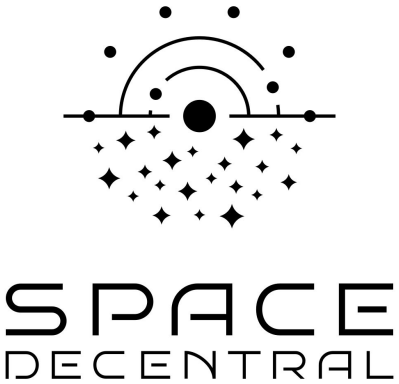
a. Space Decentral reserves the right to publish the names of the participants and the full content of the proposals without the expressed written permission of the authors. Such content may be used in publications or other media material produced, used or contracted by Space Decentral including but not limited to: brochures, invitations, books, newspapers, magazines, television, websites, etc.

b. Space Decentral reserves the right to use any image/ photograph/ video provenient from the proposals without the expressed written permission of the authors. Such content may be used in publications or other media material produced, used or contracted by Space Decentral including but not limited to: brochures, invitations, books, newspapers, magazines, television, websites, etc.

c. Space Decentral reserves the right to use any photograph/video taken at any event, presential or online, sponsored by Space Decentral or its partners, without the expressed written permission of those included within the photograph/video. Such content may be used in publications or other media material produced, used or contracted by Space Decentral including but not limited to: brochures, invitations, books, newspapers, magazines, television, websites, etc.

4.6 Cancellation and Delays

Unforeseen circumstances may result in the delay or cancellation of the SMAP. For such a case, an email will be sent to each proposal team which includes details of cancellation or updates to the timeline.



https://spacedecentral.net

Questions and comments can be sent to smap@spacedecentral.net.

You can also reach out to us on Riot and the Space Decentral forum.