

**RFI Solicitation Title:** Flagship Technology Demonstration RFI  
**RFI Solicitation Number:** NNH10ZTT003L  
**RFI Section:** 10 – Participatory Exploration  
**Synopsis:** The application of open source approaches to the development of technologies and sub-systems relevant to the FTD program can significantly enhance public engagement.  
**Responding Organization:** DevelopSpace Initiative, Inc.  
**Company Address:** 2502 Grand Summit Road  
Torrance, CA 90505  
**Point of Contact:** Paul Wooster  
**Telephone:** 617-448-5684  
**Potential Partnership:** Non-profit, tax-exempt US corporation  
**Availability for Site Visit:** See <http://developspace.net/>

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This document is submitted by DevelopSpace Initiative, Inc., a non-profit, tax-exempt corporation dedicated to supporting open source space endeavors, in response to Section 10: Public Outreach and Participatory Exploration of the NASA Flagship Technology Demonstration RFI.

We suggest that the application of open source approaches to the development of technologies and sub-systems relevant to the Flagship Technology Demonstration program, and NASA’s exploration and technology programs more generally, can significantly enhance public engagement in NASA’s activities.

Particular means by which NASA can enhance public engagement include:

- Releasing relevant information in an open source manner, including items such as software source code, hardware CAD models, system design documentation, and test data, to enable public use of said information and broader public understanding of the work put into and information derived from FTD projects
- Allowing open source contributions from developers external to NASA (including the general public) to be integrated, where appropriate, into NASA’s activities under the program
- Establishing broad-based university class projects and extracurricular activities relevant to the technical areas of interest, in order to encourage the development of concepts and designs based upon—or which could be rolled into—the formal program development activities drawing on the methods described above
- Assisting in the development of an open source community revolving around the human exploration and development of space, in order to provide a forum for public engagement in the FTD program’s activities

### **Introduction**

Exploring and expanding humanity into space is a fascinating but challenging endeavor; many intertwined obstacles must be overcome in order to make this happen. Some of these barriers are financial in nature, in terms of being able to provide sufficient resources to both initiate and sustain human activities in space. Some are political or public in nature, revolving around gaining and maintaining public and political support to allow such activities to move forward. Others are primarily technical in nature, involving the design, development, and operation of the systems required to transport humans into space and support them there. NASA’s participatory exploration effort can aid in overcoming all of these barriers, although perhaps most effectively the ones related to public participation and interest.

The open source concept can engage a large community of individuals and organizations interested in the human exploration and development of space in a participatory fashion. This approach will reduce some of the aforementioned obstacles by making use of the contributions of the many interested individuals all around the world.

### **The Open Source Concept and Its Benefits to Participatory Exploration**

The open source paradigm has caused major shifts in the way that software is developed, tested, used, maintained, and enhanced. A significant fraction of the infrastructure underpinning the Internet is based upon open source software, and a number of major commercial open source software projects exist for creating a wide variety of professional software applications. As just one example, SourceForge.net, a major open source software portal, has over 1.5 million registered users and over 230,000 projects. The open source concepts fostered in the software realm are also transitioning to a variety of other fields. One example is Wikipedia, a free encyclopedia, which features user-generated content under a free/open source license; Wikipedia has grown to include several million articles in over a hundred languages and serves as a major source of reference material for people around the world.

For NASA's participatory exploration program, benefits of the open source approach include (1) the creation of and access to a diverse (both in terms of education as well as age and experience of its members) and potentially worldwide community interested and/or engaged in NASA's human space exploration activities; (2) a mechanism to disseminate information and knowledge to this community for the benefit of its members as well as further engagement and enlargement of the community; (3) the ability to harness the creativity and expertise within the community for defining new missions, suggesting revolutionary technologies, and/or proposing new ways of using knowledge and data gained from NASA's exploration missions; and last, but not least, (4) an opportunity to actively engage the next generation of explorers by nurturing their interest in human space exploration, providing them with opportunities to actively participate in the design or operations of a mission at an early age (i.e. while in school or college), and establishing a personal connection and mentoring relationship with current explorers, engineers, and scientists at NASA and in the broader space development community. This approach will also greatly expand the educational opportunities offered by the FTD program, by providing a resource-base which can be used to learn more about the technical challenges involved and how they are being overcome via the demonstration missions.

### **Creating an Open Source Space Community**

Information technologies are advancing rapidly and can enable space development-related collaboration. Systems can be readily developed to enable the sharing of models, tools, methods, results, designs, and other knowledge. Doing so enables an individual or group to more directly build upon earlier work and provides greater focus as to what work is worth engaging in. This enables more progress to be made within existing resources, and also tends to make additional resources available due to the increased support engendered by increased participation.

The overall goal of DevelopSpace is to build up the technical foundations for human space activities by promoting and providing the infrastructure to support open source space activities. DevelopSpace is a non-profit, tax-exempt corporation chartered to engage in scientific and educational endeavors with a focus on open sharing of relevant technical resources and fostering related technical activities and innovations. DevelopSpace intends to enable a wide variety of individuals and groups to participate in the exploration, development, and utilization of space and thus build a sustained community working toward human expansion into space. The goals of DevelopSpace are well-aligned with the goals of NASA's participatory exploration effort, suggesting an opportunity for mutual benefit through cooperation.

The focus for this open source space development community is DevelopSpace.net. DevelopSpace.net provides a platform to host open source space projects and serves as a knowledge base on space-related technical topics. Projects taking advantage of the DevelopSpace.net platform are able to make use of a common set of functionality and utilities to enable a wide variety of individuals to contribute effectively to the project's goals. The capabilities of this platform—which are expanding as time goes on—allow project members to focus on the space technology challenges at hand, rather than the creation and administration of the tools required for broad-scale collaboration. Similarly, the knowledge base and library amassed on DevelopSpace.net, built out of the open contributions of individuals and groups, is also intended to provide valuable information sources for those seeking to learn more about and contribute to further human expansion into space. As lessons and techniques are learned, they can be incorporated into this knowledge base for further use by others. Additionally, through the DevelopSpace community and the needs presented by various projects, potential contributors can learn where their skills are needed or what skills they should be gaining, in order to focus their efforts toward making meaningful contributions in progressing humanity into space.