

# CosmoQuest: A Virtual Facility for Learning and Doing Science

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## Abstract

CosmoQuest is a new online citizen science project designed to bring to the public the facilities typically enjoyed by professional researchers working in academic environments. Research is enabled through a series of online interfaces that guide individuals through tasks that professional collaborators need completed. Seminars, star parties, and other professional development is conducted through online video conferencing using the Google Hangouts on Air technology. Additional learning materials are maintained online using wiki software, and social interactions and collaboration are facilitated via online forums and social media.

## 1. Citizen Science

CosmoQuest citizen science projects are built using the Citizen Science Builder (CSB) software. This open-source code base supports the creation of image and video marking projects. Science teams can select from a wide variety of image annotation tools, including: variable-sized circle and ellipse tools, a segmented line tool, and a variety of ways to mark point features and regions, including flags with associated drop-down menus.

At the time of this writing, CSB has been used primarily to develop “mapper” projects for mapping features on rocky surfaces and “investigator” projects for annotating images of planetary environs and the outer solar system. Current projects include: MoonMappers using LRO data, PlanetMappers: Mercury using MESSENGER data, AsteriodMappers: Vesta using Dawn data, IcelInvestigators using ground-based data to support New Horizons, and PlanetInvestigators using HST data. Future projects that include a real-world observing component are also in the works.

## 2. Google Hangouts on Air

In the fall of 2011, Google released their Google+ social networking platform, including Google Hangouts on Air. This new way to “hangout” online allows up to 10 people to appear via a video connection to an unlimited audience on both Google+ and via the popular YouTube interface, both of which allow two-way communications via commenting systems. The live video feed can be embedded on any webpage. All broadcasts are automatically saved to YouTube for replay.

This new technology allows CosmoQuest to provide a number of weekly video programs that mirror activities professional research facilities often support. Just as many universities offer public star parties, CosmoQuest uses Hangouts on Air to stream eyepieces views to the public. These events are hosted by Fraser Cain of UniverseToday. Through this virtual technology CMs can catch a glimpse of a global sky without leaving their living room. Weekly seminars are also offered using this technology, allowing CMs to hear discussions about cutting edge research from scientists all over the world. Called the “Weekly Science Hour,” these discussions are hosted by Emily Lakdawalla of the Planetary Society and Pamela Gay of Astrosphere New Media Association. Weekly roundups of the latest journal articles and science breakthroughs – similar to a journal club – are facilitated through the Weekly Space Hangout, which is also hosted by Fraser Cain.

## 3. Educational Content

One of the fundamental goals of CosmoQuest is to create a community of people bent on advancing our understanding of the universe together; a community of people who are participating in doing science, who can explain why what they do matters, and what

questions they are helping to answer. In order to achieve this goal, we provide educational scaffoldings to all our projects. This includes at a minimum, an interactive tutorial and content pages describing each project's science goals and the mission or telescope that provided the data being used. In many cases, additional content that provides a richer scientific overview is also present, such as an image-based lunar surface features glossary accompanying MoonMappers. During the summer of 2012, team educators will be creating classroom materials that facilitate teachers using citizen science to teach mathematics, science, and technology to middle-level students (ages 11 to 15).

#### **4. Social Media**

To have a true community, two-way (and sometimes twenty-way!) conversation is required. The same is also true of scientific collaboration. Throughout history, major breakthroughs have pivoted on the right people meeting, talking, and combining great ideas. This ideal of collaboration is facilitated in CosmoQuest through the forums that allow community-wide discussion. Information is also pushed out via a weekly newsletter and through

social media, including Twitter, Facebook, and Google+. Our goal is to allow people to communicate with one another and with projects educators, scientists and programmers through whatever media they feel most comfortable using.

#### **5. Summary**

They say it takes a village to raise a child. At CosmoQuest we believe it takes a global community to raise our understanding of the Universe. CosmoQuest is a community of citizen scientists, professional scientists, programmers, educators, and communicators. Each individual provides different skills and resources to this community, and together the community strives to learn and do science.

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