THE COSMOQUEST VIRTUAL RESEARCH FACILITY FOR THE PUBLIC. P. L. Gay[1, 2], N. Gugliucci[1], G. Bracey[1], C. Lehan[1], and S. Lewis[2], [1]Southern Illinois University Edwardsville (Campus Box 2224, Edwardsville, IL 62026), [2]Astrosphere New Media Association (PO Box 804, Edwardsville, IL 62025).

Introduction: The CosmoQuest virtual research center is working to create a community of people – members of the public - bent on together advancing our understanding of the universe; 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. Working with NASA's Dawn, LRO, MESSENGER, and STScI teams, this facility is developing citizen science projects that accomplish needed tasks for mission science teams. It also provides a rich educational context through online classes, virtual star parties, community collaboration areas, and the development of classroom curriculae.

Virtual Infrastructure: Certain characteristics exist uniformly across almost all kinds of research centers: Individuals come together within a shared environment to work on research, participate in seminars that keep them current in their field and related fields. They share special experiences (such as star parties, key speakers), and brainstorm among one another around some proxy for a water cooler. These types of environments generally allow limited public access, such as through special events. At the same time, the fields of astronomy and planetary science are of great interest to the public, who will flock to any public event such centers offer. Given the chance, these members of the public will even flock to opportunities to contribute to science. At CosmoQuest, we seek to provide the public with an experience that parallels the experiences of scientists within research facilities, and in this way create a community of science within the public.

Citizen Science. Central to all research centers is research. At CosmoQuest, scientific research takes the form of guiding members of the public through image annotation tasks. Using LRO, MESSENGER, and Dawn surface images, people work to map scientifically interesting geomorphological features, aiding mission scientists in mapping surface ages and identifying crater blanks, faults, and other features. Using Hubble Archive and New Horizons KBO Search Team data, community members work to identify transient objects, and for the Hubble Data, they also correct coordinates and flag cosmic rays and false cosmic ray masks. Each of these projects is coordinated under a team of scientists who work to verify data quality, and publish results (see posters by Mutcher etal. Schmidt et al. Antonenko et al.)

Communication and Collaboration Environment. Science is at its heart a collaboration process, where learning is fostered in social collaboration, and advances are made through community dialogues. Within CosmoQuest, an environment of content sharing, questioning, and support is fostered through forums, social media, and Google Hangouts / Hangouts on Air real time video streaming. This allows users to, as closely as is possible through virtual media, replicate the combination of asynchronous and synchronous communications that drives collaboration within classic research centers. As of December 2012, the CosmoQuest forums had over 160,000 registered users, and typically had 300 or more logins per day.

Educational Enrichment. Science is constantly advancing, and with our changing understanding of the universe comes the need for professionals to constantly update their knowledge. This is typically achieved through attending seminars and by reading journal articles. Within CosmoQuest, the model of regular seminars is replicated using the Google Hangouts on Air; however, discussions are moderated, with a science communicator or educator facilitating the dialogue to make sure real time questions are conveyed from the digital audience to the speaker (in this case, more like an interview subject), and to ask additional questions to make sure information is clarified to the appropriate level for mainstream audiences as needed. In addition to seminars, blog and social media posts summarize relevant science papers and announcements, and link the public to open access resources.

CosmoQuest is also working to foster the next generation of scientists and scientifically literate citizens by creating standards-based classroom curriculae to accompany its citizen science projects, allowing teachers to bring current NASA data, new NASA discoveries, and authentic science experiences directly to their students. CosmoQuest's first educational unit, *TerraLuna*, lets students explore the processes involved in the formation of the earth's and Moon's surfaces, leading up to their participation in real lunar science as they map the Moon's surface with *MoonMappers*. Designed for middle-school students and aligned to US and EU teaching models, *TerraLuna* guides students through lessons on cratering processes, surface age dating, differences in the surfaces as a function of the rocky body's physical characteristics (e.g. surface gravity), and solar system evolution. The unit is cur-

rently in the piloting phase and is undergoing NASA Product Review.

Star Parties. Few interactions are as inspiring as a person's first view of Saturn through a telescope, and even professional scientists find themselves captivated by views of nebulae and star clusters through a high-quality eyepiece. Using Google Hangouts on Air, CosmoQuest is able to bring live eyepiece views from telescopes around the world to community members' desktops. These shows typically garner audiences of several hundred people.

Content Repositories. The online nature of CosmoQuest allows it to act as a clearinghouse for resources that reach far beyond what might normally be found in a research center at a single geographic location. Housed within its digital walls, side-by-side with the above interactives, are also repositories of video and images for open source planetarium shows ("Science on the Half Sphere"), data reduction guides ("The Image Miner's Codex), and educational materials for a variety of different age levels including the *TerraLuna* curriculum. Informal classes for adults (with fee), provide community detailed short courses on topics directly related to the various citizen science projects concepts.

Community: The CosmoQuest facility seeks to recruit a community of people who consistently work to learn and do science through long-term interactions within the site. After 1 year, we find that 57% of the citizen scientist analyzed more than 10 images, 30% of came to the site multiple times, and 32% have participated in more than one science project. The most efficient way to drive citizen science traffic has thus far been Twitter posts about citizen science. We also find that 34% of the people who visit the site in relation to Google Hangouts are transformed into registered community users. Over the next year, a major research effort will be working to understand what motivation factors effect initial engagement and mitigate prolonged engagement.

Acknowledgments: CosmoQuest is funded through mission support from Dawn, LRO, MESSENGER, &New Horizons, through HST-EO-12142.07, & NASA ROSES NNX09AD34G.