OPPORTUNITIES TO ENGAGE AND PARTNER WITH THE PUBLIC IN A HISTORIC SCIENCE ENDEAVOR: MARS SAMPLE RETURN. S. Klug Boonstra[1] and A. Heward.[2], [1]Arizona State University, Mars Space Flight Facility, P.O. Box 8763045 Moeur Bldg. Rm. 131, Tempe, AZ 85287-6305, sklug@asu.edu. [2] Europlanet 2020 RI. Anita.heward@europlanet-eu.org

Introduction: The Mars Sample Return Campaign (MSRC) offers planetary science the prospect of an historical leap forward in the understanding of the geology and habitability of the red planet. In addition to this important science return, MSRC also offers an unprecedented opportunity to engage the citizenry of this planet in one of the enduring questions of humanity, "Are we alone?"

MSRC will involve a set of complex steps that will occur over a long timeframe and will necessitate the development of outreach strategies that will enable the public to fully engage, dialogue, and meaningfully participate with the science community during this endeavor.

Exploration of Mars to date, from orbit and from the surface, has given us incredibly valuable insights into many aspects of Mars. These insights have allowed us to pose new, far more detailed, questions that could not have been asked before. A certain set of scientific objectives can only be achieved with samples in a laboratory. For Mars, we are at the point where the scientific logic implies this should be done next. Results are expected to be profound "civilization-scale" science[1].

The 2nd International Mars Sample Return Conference[2] took place from 25-27 April 2018 in Berlin, Germany. The conference aimed to establish a better understanding of the options for a possible International Mars Sample Return campaign in the next decade, given the 2018 context, to highlight recent accomplishments in Mars exploration that feed forward to Mars Sample Return, and to share international agency and private industry preparatory plans for future Mars missions relating to Mars Sample Return.

Around 200 participants attended the conference, including international representatives of space agencies, the international science community, industry and outreach providers, to discuss the objectives of MSR, and associated topics such as engineering design stages, planetary protection issues, curation and analytical facilities, and public outreach strategies.

At the ILA Berlin air show, which took place in parallel to the MSRC Conference, Dr. Thomas Zurbuchen, NASA's Associate Administrator for Science, and Dave Parker, Director of Human and Robotic Exploration at ESA, signed a letter of intent to explore concepts for missions to bring samples from Mars to Earth.[3]

At the end of the meeting, opportunities and motivations for carrying out MSR on an international basis were identified in the following four categories:

Science:
- *Civilization-scale science*
- *Samples: the gift that keeps on giving*
- *Definitive scientific results*
- *Only way to advance critical sectors of planetary science & astrobiology*

Engineering:
- *Unique technical challenges drive unprecedented innovation*
- *Advances will benefit future robotic and human missions.*
- *Crucible for engineering as a discipline.*

Preparation:
- *Prepare for humans to Mars*
- *Inform planetary protection policy evolution to enable future missions*

Inspiration:
- *Inspire and train the next generation*
- *Magnet for international cooperation*

Conference recommendations for developing an outreach strategy for MSR: During the outreach session at the 2nd International MSR Conference, the following recommendations for MSR public engagement strategies were presented and discussed: [4,5]
- Begin formulation of key MSR elements that will be of public interest and assess any related existing opinions, misconceptions (risk communication), and needs that could be relevant to our planning and communication;
- Beginning ***now***, in getting ready for M2020, prepare a long-term plan for MSR education and public outreach strategies that will be inclusive of multiple audiences, will leverage technologies available, and be participatory in nature;
- Prepare a timeline and depository that will include major mission milestones, related scientific activities (e.g., curation preparation, analogue field trips, discoveries, spinoffs), and MSR outreach events;
- Identify synergistic groups that we can engage to expand our reach;
- Identify evaluative program mechanisms to assess impact; and

- Involve the MSR team as our "faces of exploration" and expert advisors as we take on this amazing challenge.

Preparing and Engaging the Public as Participants in the Mars Sample Return Campaign: In the last decade, NASA has successfully designed and implemented a wide range of outreach strategies to grow public interest. With the likelihood of technology advances continuing, new strategies must keep pace to capitalize on ways to engage broad audiences in participatory exploration.

A multi-decade strategy to engage the public in Mars missions was proposed [6] in 2009 and included ways for the public to participate through multiple pathways. In this framework, individuals could "level-up" - taking on more complex projects by attaining more skills, knowledge, and providing reliable science return to the science community from mission data analysis.

Citizen science activities such as this and The Mars Student Imaging Project [7,8,9] are valuable models for sustaining long-term interest of participants. This type of activity provides strong interfaces with the mission science, interaction with Mars community scientists, and provide meaningful learning through deep, authentic science experiences.

With the considerable timeline available prior to a return of Mars samples estimated to be in the mid-to- late 2020s, MSRC has the lead time to develop innovative and effective plans to involve the public as partners for this remarkable time in Human history.

Summary: MSR will involve a set of complex steps that will occur over a long timeframe and will necessitate the development of outreach strategies that will enable the public to fully engage, dialogue, and meaningfully participate with the science community during this endeavor. As was mentioned previously, the return of historic "civilization-scale science" gives rise to engage audiences globally to help enrich our species' journey to unlock the civilization-relevant questions relating to our place in the universe.

References:

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