

Flight Crew Integration International Space Station Life Sciences Crew Comments Database: A Tool for International Space Station Post-mission Debrief Data

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At the completion of each International Space Station (ISS) expedition, the ISS Program office schedules a series of intensive debriefs with returning U.S. crew members and International Partner crew members (when available) to determine individual observations and concerns related to working and living on board the ISS. An estimated 20 to 25 post-mission debriefs are conducted after each expedition; these debriefs address topics related to specific disciplines and systems, including habitability and human factors, logistics and maintenance, payloads, stowage, food, procedures, etc.

The Flight Crew Integration Operational Habitability (FCI/OpsHab) team, within the NASA Johnson Space Center (JSC) Space and Life Sciences Directorate SF3 Habitability and Human Factors Division, participates in all public ISS post-mission debriefs. Team members collect, identify, and analyze data from each of the crew debriefs. Data collected during the debrief process are maintained within the FCI ISS Life Sciences Crew Comments Database in a secure and searchable SQL [structured query language] platform with a versatile SharePoint interface. The database provides advanced search capability across, and within, all ISS expeditions via an advanced “Google”-like search capability and SQL reporting capabilities. The database includes a comprehensive data set of post-mission debrief data from Expedition 1 to present (more than 38,000 crew comments). These comments are categorized and sub-categorized based on topics such as architecture, environment, habitability, human computer interaction, etc. All comments are de-identified to preserve crew privacy. As debrief data contain crew members’ personal observations, opinions, and experiences, policies are in place to protect crew member privacy. These policies are established and agreed on by the FCI/OpsHab team, the NASA JSC Crew Office, and the NASA JSC Legal Office. Based on these agreements, the FCI/OpsHab team maintains strict data protection and handling policies to ensure that the data generated do not attribute comments to specific crew members and individual comments are not incorporated improperly.

Based on existing privacy and legal restrictions for crew comments data, the database can only be directly accessed by the FCI/OpsHab team; however, limited access to a controlled data SharePoint site can be granted to NASA civil servants and contractors. The SharePoint site allows these users to view existing data summary products generated from the database and also to request new data summaries tailored to their specific needs.

Gathering, trending, and analyzing the post-mission debrief data within the database allows the OpsHab team to generate products that document the trends and lessons learned observed over the life of the ISS. Advanced search functions give the team the ability to search across all comments for those related to a particular category, sub-category, keyword, mission, or debrief topic. Data summary products provide a broad perspective on topics regarding all aspects of habitability, systems, and operations on board ISS by assessing and integrating debrief data across all disciplines and expeditions. Data summaries are reviewed and approved by the crew office prior to distribution to requestors or posting to the database SharePoint site. Existing data summary topics include: habitable volume, waste and hygiene, labeling, robotics, procedures, planning, human computer interaction, extravehicular activity, hardware, and government-furnished equipment, Crew Health Care System, acoustics, training, tools, multipurpose logistics module, galley, food and dining, communications, architecture, restraints and mobility aids, water sampling, sleep stations, stowage, Soyuz, exercise, radiation, and European Space Agency operations and payloads. New data summaries are continually in development, and existing data summaries are often updated to include the most recent crew debrief data.

The FCI ISS Life Sciences Crew Comments Database provides the most complete and searchable archive of ISS crew debrief data known to exist. The data and related products provide a valuable resource for current and future space flight programs and also support design and development of vehicles, systems, hardware, requirements, standards, procedures, and processes. Debrief data content

is developed and relevant to each system, and allows system managers, hardware owners, and other interested parties a cumulative glimpse at feedback related to their systems. For example, data have been provided to support ongoing efforts with the ISS training group and the crew office to understand training lessons learned and make necessary improvements to both training protocol and the crew time necessary for training on the ground and on orbit. Data have also been applied to the design and development of the ISS crew quarters, waste and hygiene compartment, medical hardware, and flight software. This allows for the use of valuable debrief information to affect the development of requirements and standards and inform human-centered design.

It is imperative that we learn from past efforts of human space flight to improve future missions. As the most complete and searchable archive of ISS debrief data, the FCI ISS Life Sciences Crew Comments Database enables the FCI/OpsHab team to create products that support various project teams and ensure the crew member feedback and lessons learned are applied to future designs, training, operations, planning, operations nomenclature, stowage, habitability, etc. Maintaining a secure site and de-identifying comments adheres to crew member privacy and confidentiality agreements, while allowing the comprehensive products to be distributed to those teams and individuals with a need to know. The FCI ISS Life Sciences Crew Comments Database is designed to allow the FCI/OpsHab team to quickly and efficiently create useful products applicable to current ISS requirements, and to the development of future space programs.