

Abstract for SpaceOps 2018 – Topic 3 Ground Systems Engineering & Data Management

Marrying Social Media Approaches and Space Flight Control - Eight Years at SpaceOps

D.W. Scott¹, H.S. Cowart², A.J. Nichols³, R.L. Roy⁴, and C.M. Albers⁵ PhD. CAPM

¹ NASA/MSFC, Huntsville, AL, 35812, USA, scotty@nasa.gov

² Teledyne Brown Engineering, Huntsville, AL, 35813, USA hugh.s.cowart@nasa.gov

³ NASA/MSFC, Huntsville, AL, 35812, USA, andrew.j.nichols@nasa.gov

⁴ COLSA Corporation, Huntsville, AL, 35806, USA, robert.l.roy@nasa.gov

⁵ QTEC Aerospace, Huntsville, AL, 35805, USA, cerese.m.albers@nasa.gov

Three previous SpaceOps papers - 2010, 2012 (honored by the Conference as a “Best Paper”), and 2014 - have discussed the path to using social media concepts and techniques to enhance space flight controller effectiveness by a) reducing clutter of non-verbal communications (e.g., visual flow with minimal headers and shared content instead of multiple copies), b) moving some voice communication to non-verbal transmission (virtually eliminating “say again” requests because non-verbal comm can be re-read), c) thus making remaining voice comm easier to focus on and d) reducing short-term and long-term stress. There’s a thumbnail synopsis of the three papers at the end of this abstract.

This paper shows how Marshall Space Flight Center’s (MSFC) ISS Payload Operations Integration Center (POIC) is realizing the above goals via a) enhancements to the Console Log Tool (CoLT) first deployed in 2012 and b) the Communications Dashboard (CommDash) software suite deployed in 2017. In addition to technical discussion, the paper chronicles CommDash’s role in emergence of an Agile development process and a Human Factors community of practice within MSFC’s Payload Mission Operations Division (PMOD).

Highlights of this environment and its associated operations concepts include:

- Console Log Tool (CoLT) now has a shared log (in addition to position-specific logs) for posting snapshots of position log entries of potential interest to the entire cadre, thus improving situation awareness (SA). A position log and the shared log may be viewed and searched or (visually) merged.
- Payload Status tool summarizes, at a glance, Payload Developer (PD) team and voice-data-video system status and readiness to support POIC-managed activities for the current time plus and minus 8 hours. The tool autonomously harvests JSC’s Operations Planning Timeline Integration System (OPTIMIS) tool to identify and group activities. Remaining fields are a sort of status trading post for appropriate cadre positions and PD teams.
- To Do List can be used to define/assign tasks not managed by other systems, show all tasks a console position is working (Flight Notes, Timeline Reviews, etc.), store/display comments, and show completion status. Front-room and back/prep-room awareness of everyone’s tasks improves communications timing and supervisors’ effectiveness.
- IMREADY, which is similar to JSC’s IMGO system (Green-Red status indicator for each position) used for coordinating reviews or documenting readiness status, supports multiple concurrent polls.
- Text chat supports position-specific channels (analogous to dedicated voice loops), created-on-the-fly streams for specific conversations, and push/pull content to/from CoLT entries. Users may work concurrently in multiple chats.
- A dashboard to launch and manage CommDash tools and to display many of them in a single window with user-configurable frames. For ergonomic reasons, some functions require independent windows.
- Some applications provide display output specifically designed for POIC’s video wall. i.e., layout and content is similar but not identical to what’s displayed on desktop monitors.
- In the current releases of CommDash and CoLT, much of the input is by humans. As operations mature, increased content generation from ground systems (e.g., Exception Monitoring (EM) messages, via operator selection, EM prompt with operator confirm/cancel, or automatic for pre-defined situations) is a distinct possibility.

Synopsis of the earlier papers:

- Using Web 2.0 (and Beyond?) in Space Flight Operations Control Centers (2010) introduced fundamental ideas for applying social media concepts to control room challenges:
 - ✓ Web 2.0 primer, including: “Social” means relationships among organisms rather than recreational friendship; Data vs. Information vs. Knowledge; Self-documenting nature of social media
 - ✓ Large-scale NASA engineering support efforts with social media capabilities; Small-scale instances of Twitter and IM use for flight ops support
 - ✓ Concepts for adapting blogs for log keeping (position specific or common across the control team) and using wikis to maintain informal working documents (e.g., team-internal guidelines and “cheat sheets”)
 - ✓ Overcoming barriers to concept consideration and implementation
- Simplify ISS Flight Control Communications and Log Keeping via Social Tools and Techniques (2012, a SpaceOps “Best Paper”) presented three developmental log keeping systems:
 - ✓ Console Log Tool (CoLT) – A web-based tool deployed at POIC in 2012 that, with a log owner’s permission, supports real time viewing and/or commenting across operator/discipline logs by both on-duty and off-duty personnel, and links to other processes;
 - ✓ Cross-Log Communication via Social Techniques - A concept for using microblog syntax (e.g., @targetid, #hashtag) to enable text conversation among MCC-H’s Microsoft Word® based logs themselves (only portions of the log that the console operator wishes to share would be viewed)
 - ✓ Communications Dashboard (CommDash) - A concept for a web-based dashboard that would access and manage a CoLT log, text chat streams for certain types of conversations, status updates of general and discipline-specific interest, and some other coordination aids.
- Simplifying Operations Communication Through Application of Social Concepts (2014) discussed:
 - ✓ Lessons learned from two years of CoLT operations
 - ✓ How visibility across CoLT logs could work as a force multiplier
 - ✓ CommDash prototype development status
 - ✓ Social graphs for the flight control environment and how a second-generation CommDash might behave