



Operational Psychology In Practice: NASA's Behavioral Health and Performance Operations Overview

Rachel Passmore, PsyD, ABPP
KBR, NASA Johnson Space Center
BHP Operations Group 2026



Behavioral Health and Performance Operations



- ❖ BHP is a component of the Space Medicine Operations Division at JSC
 - Comprises operational psychologists, psychiatrist, applied psychologist, industrial/organization psychologist, and behavioral health specialists
 - Comprehensive behavioral health and performance services to astronauts throughout their active astronaut career
- ❖ *Optimize behavioral health, well-being, and performance*
 - Ensure that crew members are psychologically prepared for the rigors of long duration spaceflight
 - Provide individualized behavioral health and psychological support services directly to crew members and their families before, during and after each mission
- ❖ Our ultimate objective is to enable a safe, productive, and enjoyable spaceflight career



BHP Services for Active Astronauts



- ❖ Multifaceted, career spanning, behavioral health program
 - Astronaut candidate (ASCAN) selection
 - ASCAN and crew training
 - Annual, preflight, inflight, & postflight BHP evaluations
 - Inflight neurocognitive assessments
 - Inflight psychological support services for astronauts & families
 - Elective BHP services for astronauts and their families (e.g., coaching & consultation)

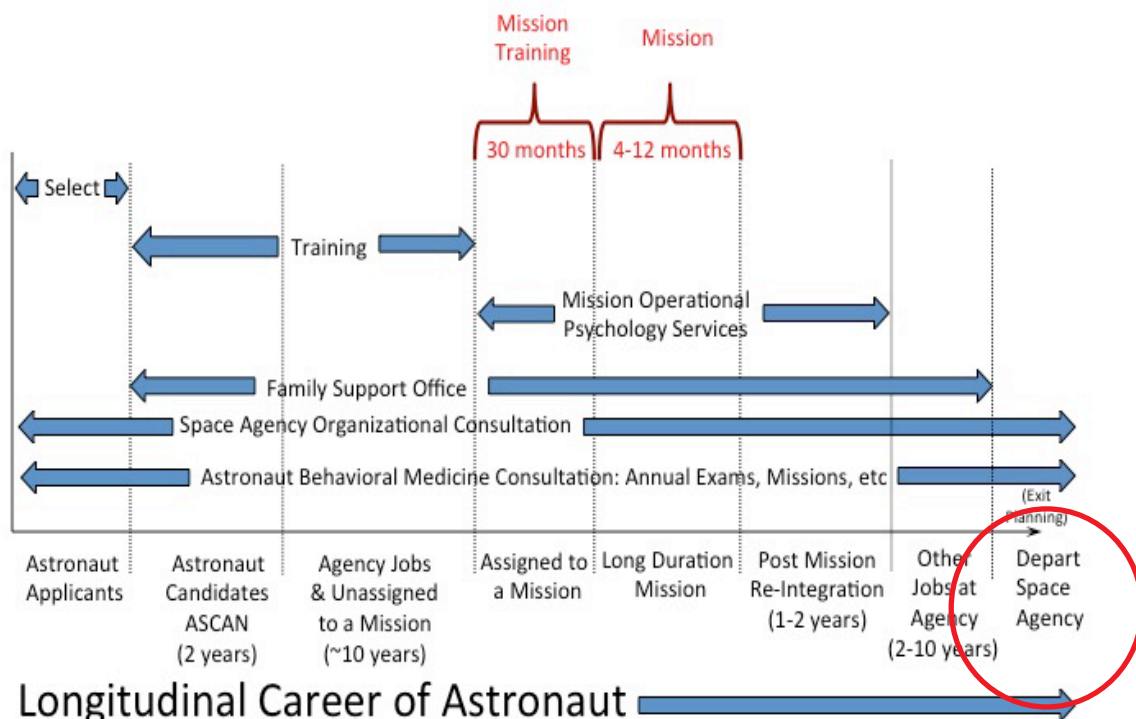


Long Term Behavioral Health Surveillance of Former Astronauts at the NASA Johnson Space Center



Integrated Behavioral Health Services for US Astronauts

- ❖ No dedicated behavioral health evaluation of former astronauts
- ❖ How does a career as an astronaut, and spaceflight in particular, affect behavioral health and wellness until the end of life?

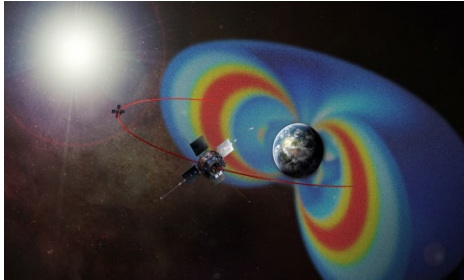




Threats to Behavioral and Cognitive Health in Space Flight



- ❖ ***The spaceflight environment is filled with risk factors that can have a negative impact on behavioral and cognitive health***



Radiation

Workload

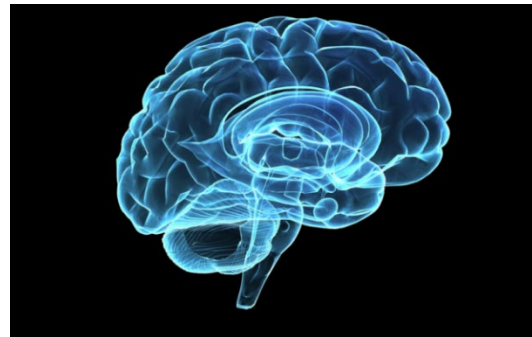
Head Injury

Fluid Shifts



Hypoxia

Atmospheric Toxins



Circadian Disruption/Fatigue

Decompression



Isolation

Elevated CO₂



- ❖ ***Risks may increase in severity, and new threats may emerge for longer duration exploration missions***



BHP Risk Countermeasures



- ❖ Our primary focus is *prevention and mitigation of the risk of behavioral health problems*
 - Selection
 - Screen out vulnerable applicants at front door
 - From remainder, select adaptable, resilient candidates with certain capabilities
 - Training
 - Train capabilities and skills to deal with the unusual environment of Spaceflight
 - Operational Support
 - Monitor behavioral and cognitive health
 - Provide info, advise crewmembers on orbit
 - Provide rest, medications, day off as needed
 - Import “sustaining” conditions



Key Psychological Competencies of Astronauts



❖ Multiple astronaut job analyses have identified a number of key competencies that emerge for astronauts across multiple mission types

- *Performance under stress (adaptability)*
- *Group living skills*
- *Motivation and self-direction*
- *Teamwork skills*
- *Communication skills*
- *Judgement and decision-making skills*



BHP Competencies for 2025 Astronaut Selection



Competencies	Descriptors
Self-regulation	Aware of emotion and able to modulate the experience and expression of emotion
Resilience	Utilizes psychological resources to positively adapt to a stressor or challenge
Teamwork	Develops and maintains effective working relationships with others in order to accomplish team goals
Small Group Living	Appreciates and respects others' cultural, social, living, and personal needs
Operational Problem-solving	Reasons through novel situations and solves problems in an operational environment in real time
Leadership/Followership	Moves flexibly between leader and follower roles to accomplish mission goals



BHP Astronaut Selection



- ❖ Selection is a critical countermeasure for mitigating behavioral risk for long-duration spaceflight
- ❖ BHP efforts comprises two complementary but different processes
 - Psychiatric Qualification
 - According to current NASA medical standards
 - Recommendation to Aerospace Medical Board
 - Psychological Suitability for Space Missions
 - Accommodate multiple, varied design reference missions
 - Advisory information to Astronaut Selection Board (ASB)



Multi-form Procedures Resulting in a Holistic Assessment of Suitability



- ❖ Multiple different methods look at each suitability competency (e.g., psych testing, team tasks, groups tasks, individual tasks, structured interviews)
- ❖ Multiple different assessors observe each applicant
 - Use of experienced psychologists and psychiatrists with operational experience
- ❖ Trends appearing in the data streams (holistic vs. mechanistic/statistical)



Psychological Competencies for Future Missions



❖ As vehicles/habitats get smaller, missions get longer, and communications get delayed, specific competencies become much more important:

- *Small Group Living*
 - Tolerance of others' differences
 - Awareness and respect for others' personal needs and boundaries
 - Respect for common living areas
- *Autonomy and Independence*
 - Competence in solving *technical* issues independently and with limited resources
 - *Working autonomously* and solving problems without dependence on ground or crewmates
 - Emotional independence





BHP Training Involvement



- ❖ Training serves as another important countermeasure for ensuring the psychological health and effectiveness of crew
- ❖ Training specifically targets the important nontechnical skills needed for living and working with others in a confined setting for an extended duration
- ❖ BHP relevant training provided at two critical junctures
 - ASCAN period
 - Pre-flight training period



BHP ASCAN Training



❖ Expeditionary Skills Training

- Non-technical skills for long-duration spaceflight
 - Self-Care, Team Care, Teamwork and Group Living, Communication, and Leadership/Followership
- Classroom and operational training to train and practice expeditionary skills and debrief method
- Direct observation of performance and feedback in team exercises (e.g., expeditionary trips, Extra Vehicular Qualification training)

❖ Didactic Training

- Cross Cultural Skills Training
 - Provides insight into the influence of culture on thought, behavior, and communications
 - Provides practical information and strategies to build effective cross-cultural work relationships
- Stress Management
 - Focus on models of resilience and strategies and techniques for enhancing resilience and managing stress
- Conflict Management
 - Short and long-term conflict mitigation strategies



BHP ASCAN Training



❖ Individual Competency Meetings

- Personality and performance feedback provided from astronaut selection process
- Developmental goals established
- Quarterly follow up on competency development

❖ Performance Psychology Skills Development

- Didactic and Hands-on/experiential training

❖ Professional Coaching

- Personal and professional goal setting



Pre-Flight Training and Preparation



❖ Psychological factors in Spaceflight

- Individual training with each crewmember (preferred in a group)
- Basic principles such as adaptation to the environment, prevention versus repair, active pacing, maintaining reserves, and balanced connectivity with earth emphasizing mitigation strategies and lessons learned

❖ Topics

- Process of adapting to the psychological and environmental demands of long duration spaceflight
- Environmental, interpersonal, and programmatic factors that can adversely impact health and performance in extended confinement.
- Manifestations of adaptive difficulties within the individual, crewmates, and in the interactions among crew and with ground personnel.
- Available self-care strategies, resources, and countermeasures available for enhancing adaptation and well-being.



❖ Principle pre-flight evaluation topics:

- Training issues including perception of mission readiness
- Training workload and fatigue levels
- Family or personal relationship issues
- Crew-crew training interactions, familiarity, and concerns
- NASA management issues or concerns
- Mood and anxiety
- Mission goals, desires, challenges, and risks
- Post mission rehabilitation or family concerns

– *Note: All active astronauts are also seen annually in the Flight Medicine Clinic for a BHP eval throughout their careers*



BHP ISS Mission Support



❖ Behavioral Medicine Services

- Pre-flight Readiness interviews
- Inflight Private Psychological Conferences (PPCs)
- Inflight Cognitive assessment
- Post-flight interviews and re-adaptation support

❖ Inflight Operational Psychology Support Services

- Import sustaining conditions to “normalize” the environment and keep crews connected while isolated in space
 - movies, music, family contacts, special events, care packages, etc.



inflight Private Psychological Conference (PPCs)



- ❖ The Russians developed the PPC as a standard psychological countermeasure beginning with Salyut 6 and continued to use them on Salyut 7 and Mir
- ❖ NASA began using PPCs during Shuttle-Mir in 1995
- ❖ Performed every two weeks during ISS expeditions (all crew members)
 - Private video conference between the ISS astronaut and the NASA psychiatrist or psychologist
 - Typically lasts 15-20 minutes, depending on subject matter discussed and mission phase
 - Contents are non-recorded private and confidential medical events



Private Psychological Conferences



❖ The following topics reflect the main clinical/operational concerns:

- Sleep (duration and quality) and sleep shift issues
- Workload and pace of work
- Individual and crew morale
- Crew relationships
- Crew-ground relationships
- Mood
- Cognition
- Family and personal relationships
- Environment and habitability issues, including food
- Operational psychology issues or requests
- Preparation for important tasks, such as EVAs



Neurocognitive Assessment with WinSCAT

(Space Flight Cognitive Assessment Tool for Windows)



❖ The Spaceflight Cognitive Assessment Tool for Windows (WinSCAT) has been used onboard the ISS since Expedition 1

- Designed to be a brief screening assessment of cognitive functions
- Five subtests from the Automated Neuropsychological Assessment Metrics (ANAM)
- Completed every 30d by astronauts while onboard the ISS
- Provides immediate, objective clinical feedback to the astronaut and medical personnel post-event

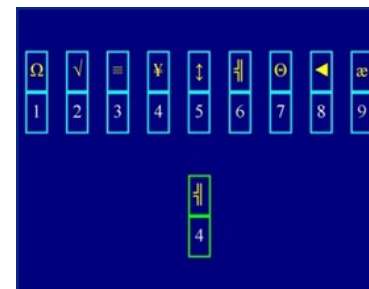
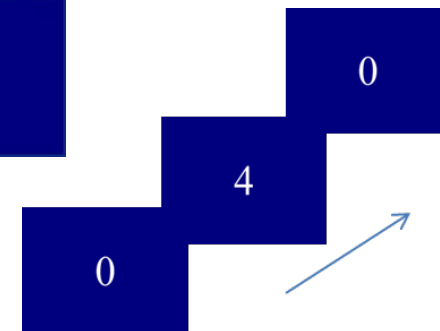
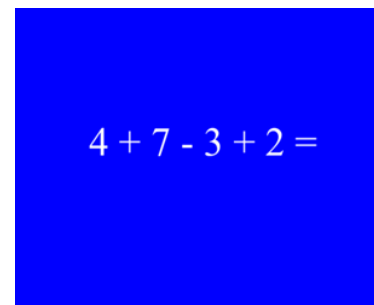
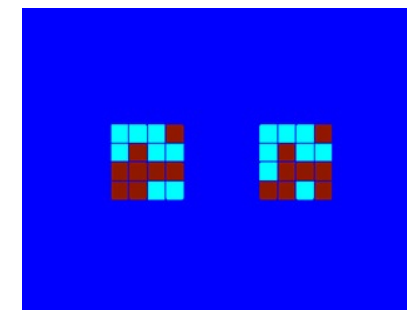
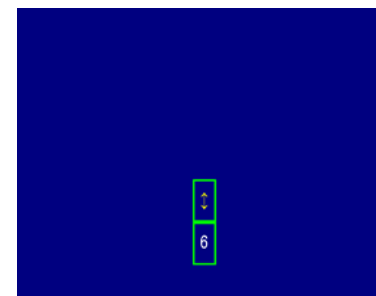
Activity	Duration	Preflight	In Flight	Postflight
Training	60 minutes	L-120 days		
Neurocognitive Assessment Baseline (MAT)	60 minutes	L-100 days		
	45 minutes	L-90 days		
	30 minutes	L-60, L-30, L-7 days		
Routine Monitoring	30 minutes		Every 30 days	
Postflight	30 minutes			R+14*, R+30 days * If clinically indicated



WinSCAT Automated Cognitive Tests



- ❖ CDS – Code Substitution
 - Learning
- ❖ CPT – Continuous Processing Task
 - Sustained attention and concentration
- ❖ MTH – Mathematics
 - Verbal working memory
- ❖ MTS – Matching To Sample
 - Visual short-term memory
- ❖ CDL – Code Substitution Delayed
 - Delayed recall





ISS BHP Mission Support Team



- ❖ 5 BHP Operations personnel assigned to each ISS crew member

- ❖ Specific and separate team for each ISS crew member
 - 2 BHP Providers (either operational psychologist or psychiatrist)
 - 1 Psychologist for WinSCAT neurocognitive test training and analysis of inflight results
 - 2 Psychological Support Coordinators—prime and backup



BHP Operational Psychology Support Services



- ❖ Direct psychological support services for ISS Crews and Families
 - Objective is to mitigate the psychological and social consequences of isolation and confinement in spaceflight
- ❖ All products are optional, private, personalized and provided via individualized, concierge-like service
- ❖ Meetings and briefings with crew member and family begin just after assignment



BHP Inflight Psychological Support Services



- ❖ Suite of countermeasures for dealing with isolation and confinement
 - IP phones on ISS (can call anyone)
 - Private Family Conferences (weekly)
 - Crew Care Packages (on re-supply vehicles)
 - Private Special Conferences (one per month)
 - Crew Discretionary Events (two per mission)
 - Crew recreation (morale, welfare, relief) options: music, movies, sports, news, TV, musical instruments, holiday celebrations



Internet Phone (IP Phone)



- ❖ The IP Phone runs on a software program that is dependent on KU-Band satellite coverage
- ❖ There are currently 8 units on ISS
- ❖ Can be used as non-scheduled communication
- ❖ Using the IP Phone, ISS crewmembers can dial any number in the world but cannot receive calls



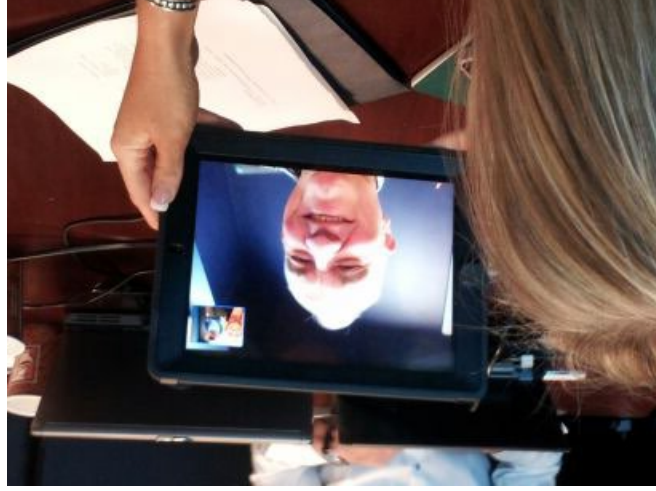
Expedition 4 Flight Engineer, Carl Waltz, using the IP Phone.



Private Family Conferences (PFC)



- ❖ Video Private Family Conferences (PFCs) are scheduled on a weekly basis
- ❖ Laptop or tablet with video camera in use since ISS 28



Equipment in the home



Astronaut Clay Anderson
conducting a PFC onboard ISS



Crew Care Package (CCP)



- ❖ Items and ideas provided by family friends and co-workers
- ❖ About 18 kgs per crewmember
- ❖ Delivered via cargo vehicles



Astronaut Jeff Williams, Expedition 13, opening a CCP on-orbit.



Private Special Conference (PSC)



- ❖ Private conference with extended family, friends, or co-worker
- ❖ One per month



Expedition 5 – Peggy Whitson talks with friends in the NASA offices in Star City, Russia

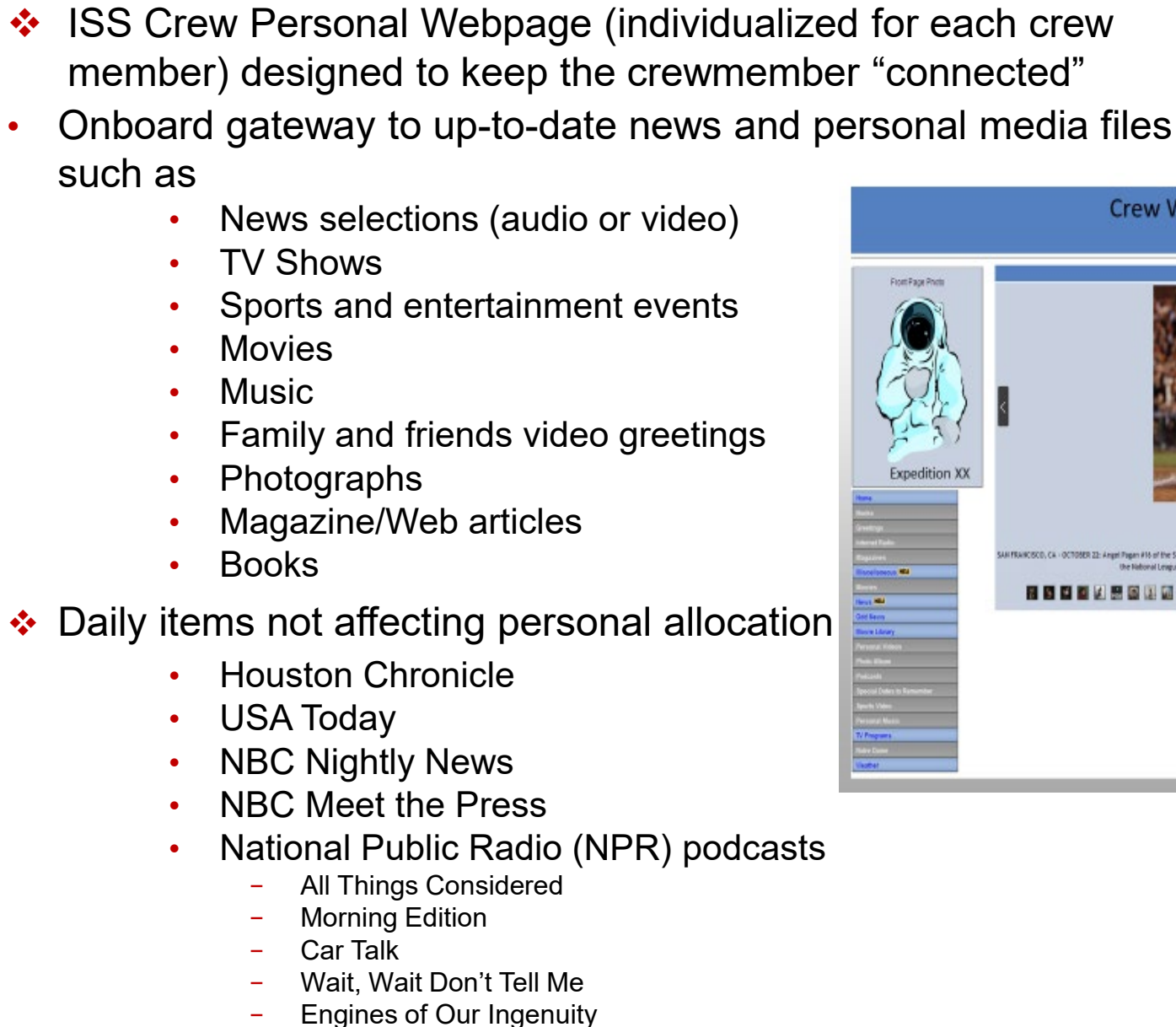
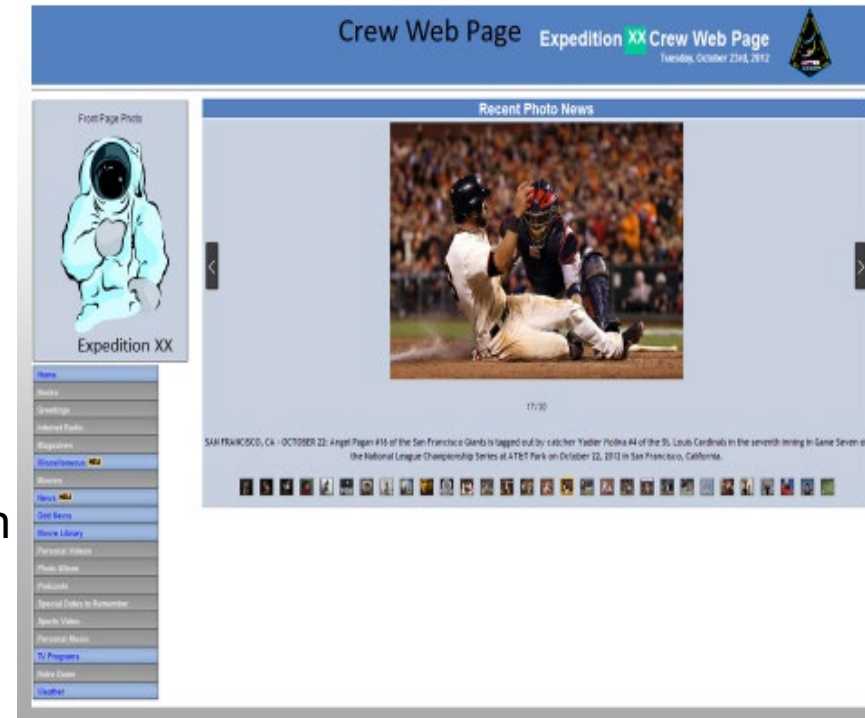


Crew Discretionary Events (CDE)



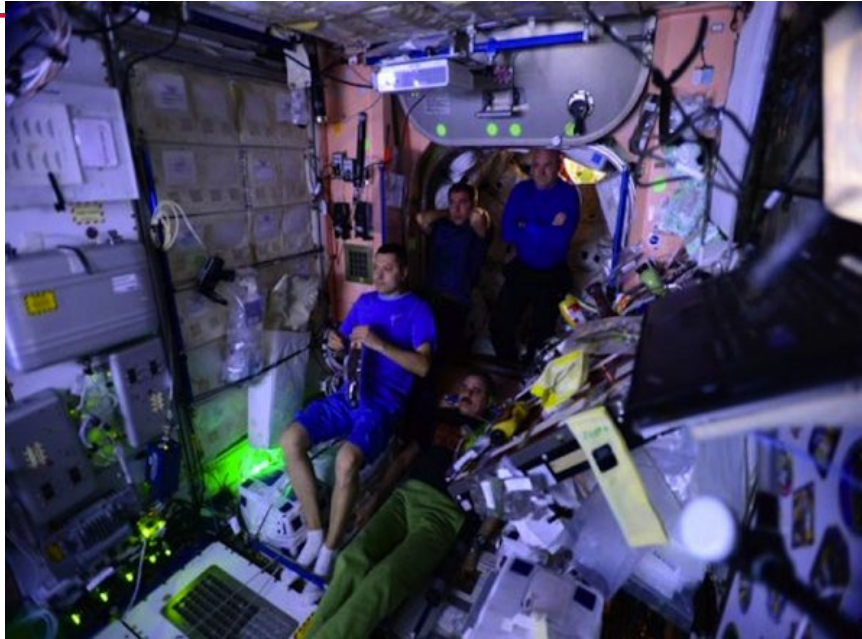
- ❖ Private video contacts with a person of interest such as celebrities, professional athletes, authors, comedians, etc., for the purpose of building morale. These are private events and not publicized.
- ❖ 2 allotted per mission



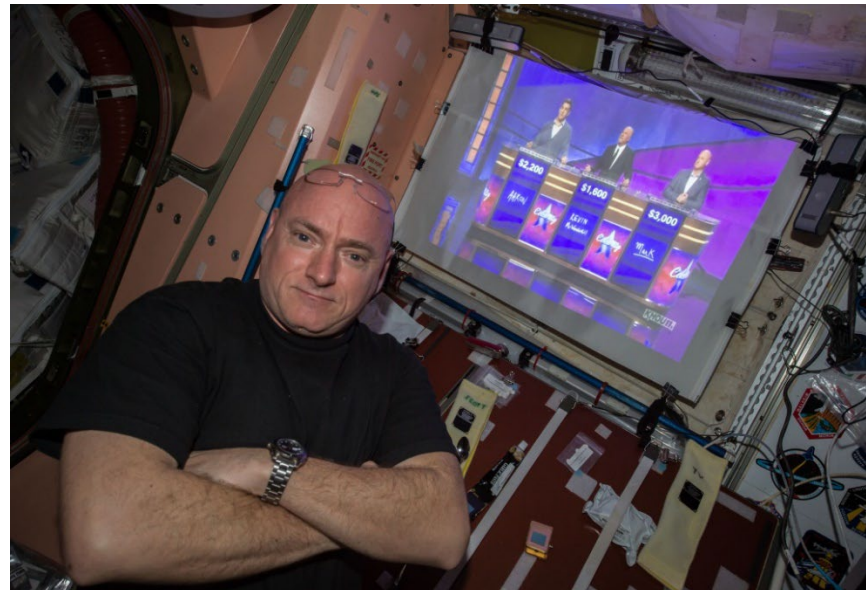




Entertainment in Space



- Movie and TV library (over 850 titles)
- Electronic Keyboard – Yamaha PSR-282 (61 keys)
- 2 Guitars
- Projector and big Screen (62') for movie nights or sporting events
- Weekend viewing of Dish Network can be coordinated through BHP





Inflight Psychological Support Services for Expeditionary Missions



- ❖ Our support services depend on resources that will be unavailable or at a premium for expeditionary missions
 - satellite bandwidth
 - real time communications capability
 - re-supply vehicles
 - mass and volume (e.g., projectors, screen, instruments)
- ❖ What can we use to replace these or re-fashion these countermeasures to effectively mitigate isolation and keep astronauts connected to their families and culture here on Earth?
- ❖ What about vehicle design issues (e.g., viewing windows, private spaces)?
- ❖ Can virtual reality technology assist?



ISS Post-flight Assessment



- ❖ Occurs at Return (R) + 3d ; R+14d; R+30-45d
- ❖ Principle post-flight evaluation topics:
 - Mission in retrospect—level of personal satisfaction
 - Greatest challenges, frustrations, joys during the mission
 - Retrospect review of fatigue level prior to critical events such as EVAs
 - Family reintegration issues
 - Post-flight mood, anxiety and cognition
 - What are short and long-term career plans?
 - What worked and didn't work from a BHP standpoint?
 - What BHP services need improvement or change?



Sample Events Occurring During Long Duration Missions over past 46 years (Russian & US)



- death of family members and friends
- depressed mood
- crew friction
- excessive sleep shifting
- hot or noisy cabins
- mixed/same gender crews
- dark and crowded station
- work underload/overload
- anger with ground team
- periods of low motivation
- mild anxiety
- delayed return to Earth
- onboard fire (Mir)
- depressurization (Mir)
- over scheduling and insufficient timeline control
- physical reactions to stress
- frustration
- conflict with ground control
- language difficulties
- isolation
- cultural misunderstandings
- persistent system and comm failures
- terrorist activities (9/11)
- aged and frail parents, near death
- but for the most part--
excitement, contentment,
exhilaration, fulfillment...



“Spaceflight Asthenia”

Initially noted during later Salyut missions



- ❖ Russian psychologists have identified a behavioral syndrome afflicting cosmonauts during previous long duration missions called “spaceflight asthenia”
- ❖ Asthenia has included the following characteristics:
 - Physical and emotional fatigue or weakness
 - Hypoactivity
 - Irritability and tension
 - Emotional lability
 - Appetite and sleeping problems
 - Attention and memory deficits
 - Withdrawal from others and territorial behavior
- ❖ Not thus far objectively identified in US ISS crewmembers. The question remains open as to whether or not asthenia occurs and, if so, whether or not its manifestations are affected by cultural factors



“Space Fog”



- ❖ Anecdotally reported, subjectively experienced, cognitive decrement during spaceflight (long and short duration)
 - Not yet objectively measured
 - No clear operational impacts noted/measured
 - Reported by a minority of short and long duration crew members
 - Primarily noted during period of spaceflight acclimatization
 - Problems with concentration, short-term memory, multitasking abilities, organizational skills forcing need to ultra-concentrate and perform tasks slowly and deliberately
 - Not generally reported on ISS during period of mastery (after 4-6 weeks)
- ❖ Not consistently experienced by crewmembers and no specific etiology



What has not been reported as occurring during space flight...



- ❖ Physical confrontation/aggression
- ❖ Major depression or suicidality
- ❖ Mania
- ❖ Delusions
- ❖ Delirium (anoxia, head injury, illness)
- ❖ Panic attacks
- ❖ Use of psychiatric medication (e.g., antipsychotics or antidepressants)
- ❖ Intoxication or withdrawal
- ❖ Any other major psychiatric disorders (panic disorder, obsessive compulsive disorder, etc.)



BHP Worst Case inflight Scenarios for Expeditionary Missions



❖ What we worry about:

- Death of family member on earth (especially that of a child)
- Illness or injury on orbit leading to behavioral instability
- Mishap during space operations due to human error caused by extreme fatigue or insufficient sleep
- Development of depression, anxiety, or other significant behavioral health symptoms on orbit
- Significant crew-crew interpersonal conflict
- Significant crew-ground conflict that turns into an overt “us against them” scenario