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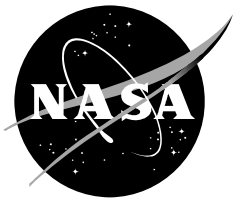

International Space Station Human Behavior & Performance Competency Model

Volume I

Mission Operations Directorate
ITCB HBP Training Working Group

Loredana Bessone[1], Emily Coffey[1], Natsuhiko Inoue, Maureen Gittens[3], Chiaki Mukai[2], Sharon O'Connor[3], Leena Tomi[3], Victor Ren[4], Lacey Schmidt[5], Walter Sipes[5], Steve Vander Ark[5], and Alexander Vassin[4]

[1]European Space Agency, [2]Japan Space Agency, [3]Canadian Space Agency, Gagarin Cosmonaut Training Center[4] and [5]NASA

April 2008

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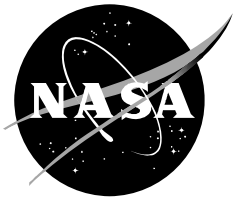

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Preface

This document was developed in response to action items assigned by the Multilateral Crew Operations Panel to the International Training Control Board (ITCB) and Multilateral Medical Operations Panel Spaceflight Human Behavior and Performance Working Group. The Human Behavior and Performance (HBP) competencies presented in this document were developed by the ITCB Human Behavior and Performance Training (HBPT) Working Group (WG) based on the work of the ITCB supported DACUM (Developing A CurriculUM) Group. The membership of the ITCB HBPT WG consists of representatives from all the international partner agencies, including astronauts/cosmonauts, HBP specialists, and training specialists.

1.0 INTRODUCTION

1.1 PURPOSE

This document defines Human Behavior and Performance (HBP) competencies that are recommended to be included as requirements to participate in international long duration missions. They were developed in response to the Multilateral Crew Operations Panel (MMOP) request to develop HBP training requirements for the International Space Station (ISS). The competency model presented here was developed by the ITCB HBPT WG and forms the basis for determining the HBP training curriculum for long duration crewmembers.

1.2 SCOPE

This document lists specific HBP competencies and behaviors required of astronauts/cosmonauts who participate in ISS expedition and other international long-duration missions. Please note that this model does not encompass all competencies required. For example, outside the scope of this document are cognitive skills and abilities, including but not limited to concentration, memorization, perception, imagination, and thinking. It is assumed that these skills, which are crucial in terms of human behavior and performance, are considered during selection phase since such professionally significant qualities of the operator should be taken into consideration in order to ensure sufficient baseline levels that can be further improved during general astronaut training. Also, technical competencies, even though critical for crewmembers, are beyond the scope of this document. It should also be noted that the competencies in this model (and subsequent objectives) are not intended to limit the internal activities or training programs of any international partner.

1.3 SUPPORTING DOCUMENTS AND INFORMATION

This document describes an organized competency model, which evolved from the more general requirements outlined in the document, “HBP Competencies and Behaviors”[1]. The history of the development of both documents is provided in Appendix A.

For those interested in the application of this competency model in training or evaluation, please refer to “Volume II, Human Behavior and Performance Competency Model Guide” (TM-2008-214775-b).

2.0 HBP CATEGORIES

2.1 SELF-CARE SELF MANAGEMENT

Competency	REF	Behavioural Marker
Refine accuracy of self image	SCSM1	Identifies personal tendencies and their influence on own behaviour.
	SCSM2	Identifies factors for personal successes or failures
	SCSM3	Seeks formal and informal feedback to understand impact of own behaviour on others
	SCSM4	Assesses own skills knowledge and abilities against task requirements
Manage stress	SCSM5	Identifies symptoms and causes of personal stress
	SCSM6	Takes action to prevent and mitigate stress, negative mood, or low morale
	SCSM7	Uses calm and flexible approach in dealing with unfamiliar situations
Care for oneself	SCSM8	Uses mistakes as learning opportunities
	SCSM9	Maintains social relationships
	SCSM10	Maintains personal goals for satisfaction and motivation and to maximize performance
	SCSM11	Maintains balance of work, personal time and rest
Maintain efficiency	SCSM12	Sets challenging and attainable goals
	SCSM13	Uses time efficiently
	SCSM14	Keeps items organized

2.2 COMMUNICATION

Competency	REF	Behavioural Marker
Optimize communication	COM1	Communicates information clearly and concisely
	COM2	Shares information
	COM3	Communicates intentions before taking action
	COM4	Communicates task status and completion
	COM5	Provides constructive feedback
	COM6	Adjusts time and/or style of communication to fit the situation
	COM7	Communicates concerns; persists until acknowledged
	COM8	Establishes atmosphere for open and constructive communication
	COM9	Briefs and debriefs behavioral and technical issues with team members
Ensure Understanding	COM10	Listens “actively”
	COM11	Addresses barriers to communication
	COM12	Seeks answers in proactive manner
	COM13	Verifies information
	COM14	Acknowledges confusion or misunderstanding
	COM15	Resolves discrepancies, confusions, and misunderstandings

2.3 CROSS CULTURAL

Competency	REF	Behavioural Marker
Demonstrate respect towards other cultures [national, organisational, professional]	CC1	Demonstrates respect and appreciation for team members' culture[s] and viewpoints
	CC2	Respects differences in gender role expectations, behaviours, and attitudes
Understand culture and cultural differences [national, organizational and professional]	CC3	Uses understanding of cultural factors and circumstances to interpret team members' behaviours
	CC4	Acknowledges the impact of cultural dominance on crew interaction
	CC5	Mitigates the impact of cultural stereotypes and prejudices on group interaction
Build and maintain social and working relationships	CC6	Demonstrates tolerance of cultural differences and ambiguities
	CC7	Develops strategies to clarify ambiguities created by own behavior
Intercultural communication and language skills	CC8	Communicates respectfully with people from different cultural and linguistic backgrounds
	CC9	Makes an effort to learn and use the languages of colleagues
Commitment to multicultural work	CC10	Puts a common "space-faring culture" ahead of one's own national organizational and professional cultures

2.4 TEAMWORK AND GROUP LIVING

Competency	REF	Behavioural Marker
Active team participation	TW1	Acts cooperatively rather than competitively
	TW2	Takes responsibility for own actions and mistakes
	TW3	Puts common goals above individual needs
	TW4	Works with teammates to ensure safety and efficiency
	TW5	Respects team member's roles, responsibilities, and task allocation
Interpersonal relationships	TW6	Demonstrates patience, respect and appreciation for crewmembers
	TW7	Provides emotional support to crewmembers
	TW8	Encourages participation in team activities
	TW9	Develops positive relationships with team members
Group living	TW10	Adapts living and working habits to improve team cohesion
	TW11	Volunteers for routine and unpleasant tasks
	TW12	Offers and provides assistance if accepted
	TW13	Balances own needs with those of crewmembers
	TW14	Shares attention and credit for achievements with teammates

2.5 LEADERSHIP

Competency	REF	Behavioural Marker
Execution of designated leader's authority	LD1	Accepts leadership responsibilities
	LD2	Assigns tasks according to capabilities and individual preferences
	LD3	Assigns tasks with clearly defined goals
	LD4	Adapts leadership styles to situation
	LD5	Responds to information, suggestions, and concerns of team members
	LD6	Maintains team cohesion in adverse and uncertain circumstances
Mentoring skills	LD7	Provides direction, information, feedback, and encouragement and coaching as needed
	LD8	Leads by example
Followership	LD9	Supports leader
	LD10	Reacts promptly to situations requiring immediate response
Workload Management	LD11	Plans and prioritizes tasks
	LD12	Adapts plans according to progress and changing conditions
	LD13	Ensures team members have the appropriate tools and authorization to complete tasks

2.6 CONFLICT MANAGEMENT

Competency	REF	Behavioural Marker
Conflict prevention	CM1	Addresses potential sources for conflict
	CM2	Prevents disagreements from influencing personal and professional relationships
Conflict resolution	CM3	Reviews causal factors of a conflict with all involved team members
	CM4	Adapts conflict management strategies to resolve disagreements
	CM5	Exchanges views and positions
	CM6	Seeks resolution
	CM7	Keeps calm in interpersonal conflicts
	CM8	Focuses on what is wrong rather than who is wrong
	CM9	Mediates between conflicting parties
	CM10	Defines agreement and positive closure

2.7 SITUATIONAL AWARENESS

Competency	REF	Behavioural Marker
Maintenance of an accurate perception of the situation	SA1	Monitors people, systems, and environment
	SA2	Monitors self and others for signs of stress, fatigue, complacency, and task saturation
	SA3	Reduces distractions while performing operational tasks
	SA4	Maintains awareness of the environment while focusing on a task or problem
	SA5	Maintains the required level of vigilance for low and high workloads
	SA6	Uses the two-person approach to execution of critical tasks and procedures
Processing of information	SA7	Analyzes information to determine operational relevance
	SA8	Assesses impacts of actions, plans, and decisions on others
	SA9	Anticipates potential problems
	SA10	Verifies team readiness to meet operational demands
	SA11	Communicates when situations “feel” wrong
	SA12	Identifies and resolves discrepancies between conflicting data or information

2.8 DECISION MAKING AND PROBLEM SOLVING

Competency	REF	Behavioural Marker
Problem solving and decision making methods	DM1	Adopts a problem solving method to meet situational demands
Preparation of decision	DM2	Involves team members in the process as applicable
	DM3	Assembles **F**acts
	DM4	Considers different **O**ptions
	DM5	Evaluates **R**isks and benefits
	DM6	**D**ecides on an option
Execution of decision	DM7	**E**xecutes decision
	DM8	**C**hecks results of decision, and if necessary reapplies process

Crewmember = onboard crew

Team member = crewmember or ground personnel

APPENDIX A

COMPETENCY MODEL BACKGROUND

In July 2004, the Multilateral Crew Operations Panel (MCOP) asked all the international partners to assign representatives among their astronauts/cosmonauts, HBP specialists and training specialists to develop HBP training requirements for long duration ISS missions. Specifically the action items were:

1. To establish a set of requirements (HBP Competencies).

2. Integrate and translate the requirements into skills, knowledge, and attitudes; identify suitable training environments, contents, and methods; and, evaluate all of the existing HBP training against these comprehensive requirements.

These requirements were to help ensure that crewmembers possess the intra- and interpersonal skills that are critical for success on long-duration missions.

The overall goal of training on the HBP competencies was to:

- Increase awareness of the impact of HBP skills on space missions (and preparation for the mission).

- Develop HBP strategies and skills contributing to success and well-being during long-duration space flight.

DACUM

The initial HBP competency development was performed by the ITCB sponsored DACUM (Developing A CurriculUM) Group. The membership of this group consisted of astronauts/cosmonauts, HBP specialists, and training specialists form all the ISS Partner Agencies.

The primary purpose of the DACUM meetings was to establish a set of requirements for professional astronauts and cosmonauts living and working during long-duration missions (i.e., MCOP action “1” listed above).

The DACUM Group completed their work in February 2006, producing a document identifying 8 skill categories and corresponding competencies and behaviors that apply to all long-duration missions. The work completed by the DACUM working group is documented in “HBP Competencies and Behaviors”[1] . The content of the document JSC-63372[1] is the basis for the present document.

HBPT WG

In May 2006, the ITCB established a HBPT WG to continue the work of the DACUM Group. This WG was to complete the work assigned by the MCOP (especially the MCOP action item number two as listed above), with the goal of developing an international HBP training curriculum based on the requirements described in the document "Human Behavior and Performance Competencies and Behaviors" [1] produced by the DACUM group.

The first task of the HBPT WG was to further develop the competencies and behaviors described by the DACUM group into an organized competency model. This task was completed and the competency model is outlined in this document. In addition, the HBPT WG developed an accompanying "Volume II, Human Behavior and Performance Competency Model Guide" that provides behavioral examples, details, and cognitive (knowledge) and affective (attitudes) teaching points to aid in future applications of the model.

HBPT WG Membership

The HBPT WG consists of participants from all the international partner agencies, and represents astronauts/cosmonauts, Human Behavior and Performance (HBP) specialists, and training specialists.

APPENDIX B
ACRONYMS USED IN THIS DOCUMENT

CC	Cross-Cultural
CM	Conflict Management
COM	Communication
DACUM	Developing A CurriculUM
DM	Decision Making
HBP	Human Behavior and Performance
HBPT WG	Human Behavior and Performance Training Working Group
ISS	International Space Station
ITCB	International Training and Control Board
LD	Leadership
MCOP	Multilateral Crew Operations Panel
MMOP	Multilateral Medical Operations Panel
SA	Situational Awareness
SCSM	Self-care Self-Management
SHBP WG	Spaceflight Human Behavior and Performance Working Group
TW	Team Work

APPENDIX C
GLOSSARY

Active Listening	Giving undivided attention to a speaker, using verbal and nonverbal techniques to ensure an accurate understanding of the speaker's message.
Assumption	Something taken for granted or accepted as true without proof; a supposition.
Attitude	A complex mental state involving values, beliefs, and feelings, which predisposes an individual to act in a certain way.
Barriers to Communication	Anything that prevents information, thoughts, messages, and/or ideas from exchanging among people. These obstacles can be environmental (e.g., background noise, danger, etc.), language differences, lack of active listening, and other factors.
Behavioral Marker	Observable, non-technical behaviors that contribute to performance within a work environment. Usually structured into a set of categories that contain sub-components, called competencies.
Category	A group of competencies.
Coaching	Improving another person's performance through technical direction and motivation.
Competency	A set of behavioral markers and the ability to apply them to new situations and environments within the context of human space flight.
Complacency	A feeling of satisfaction with the status quo; generally associated with a lack of diligence and lack of motivation to take action.
Constructive Feedback	Information about the result of an action or process that points out strengths and weaknesses, and suggests improvements in a helpful and tactful manner.
Culture	Behavioral patterns, expectations, and beliefs (e.g., religious, political) that are characteristic of a nation, organization, profession, or individual group.
DACUM	Developing A CurriculUM (DACUM) is a process used to determine the training requirements and lesson flow for a given job. The process involves an analysis of duties, tasks, skills, knowledge, and attitudes required for effective job performance.

Designated Authority	The power to enforce policies, to make decisions, to command, or to judge.
Followership	The act or condition of following a leader.
FOR-DEC Method	An acronym for a decision-making process containing the following steps: 1 – Assembles **F**acts; 2 – Considers different **O**ptions; 3 – Evaluates **R**isks and benefits; 4 – **D**ecides on an option; 5 **– E**xecutes decision; 6 – **C**hecks results of decision.
Gender Role Expectation	A term representing a set of behavioral expectations that accompany a given gender status in a social group or system.
Human Behavior and Performance	Non-technical factors and issues that impact individual's ability to perform a variety of tasks effectively. They include both interpersonal (e.g., teamwork, communication) and intrapersonal factors (e.g., motivation, stress).
Human Behavior and Performance Specialist	Professionals with expertise in the field of human behavior and performance; e.g., psychologists, psychiatrists, anthropologists, operational psychology personnel, etc.
Intercultural Communication	How people from different cultural backgrounds communicate.
Interpersonal	Factors impacting interactions or relations **between** persons.
Intrapersonal	Thought processes and emotions occurring **within** a person.
Leadership	The act of influencing and directing others to accomplish an objective.
Lesson	A single continuous session of formal instruction (on a subject) which may have theoretical and/or practical content
Operational Relevance	Ideas or actions directly applicable to a mission task; practical rather than theoretical in nature.
Self-Care	Taking actions necessary to maintain one's psychological and physical well-being, which is critical for effective performance, especially under difficult or stressful circumstances.
Space Faring Culture	Behavioral patterns, beliefs, values, and a common purpose shared by people involved in space exploration.
Stereotype	Generalities or judgments about groups applied to a specific person that disregards characteristics of that individual. They may

	create false assumptions about that individual that impact thoughts, behavior, emotions, and expectations.
Stress	A set of conditions that lead to emotional, physiological, and psychological reactions. Excessive stress often has negative physiological and psychological effects.
Task Saturation	When a person is overloaded by a task or set of tasks to the point that he/she cannot complete the task. Under these circumstances, the person may ignore important external stimuli and make mistakes.
Team Cohesion	The extent to which a group works harmoniously.
Training Program	A set of training courses and lessons.
Training Specialist	Professional with expertise in training design, development, and/or delivery; e.g., instructional designers, curriculum developers, educational technologists, instructors/facilitators, etc.
Two/Multiple-Person Approach	Using one or more additional persons for critical tasks that can be performed by one person. The second person verifies that the task is performed correctly. This approach reduces the chance that human error will occur.
Vigilance	To be continuously ready to act; staying watchful and alert.

REFERENCES

[1] "HBP Competencies And Behaviors", JSC-63372, Available from the NASA/JSC Scientific And Technical Information Center.

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