G: Ground Study		**Early Start**		**6) Technology**	
F: Flight Study		**Task To Be Determined After Decision Point**		**7) Countermeasure**	
L: Lunar		**Major Milestone/Event/Accomplishment**		**8) Information To/From other Elements**	
NSBRI		**1) Risk Characterization**		**9) Information to HSRB**	
DA&M: Data Analysis & Modeling		**2) Task↓↑Task**		**10) Requirements**	
FP: Flight Prep		**3) Standards - New**		**11) Study**	
AO: Add on to another study		**4) Standards - Update**		**Stop**	
Planned/unfunded		**5) Tools**		**Major Decision Point**	

Task Name

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

ISS and other vehicles

a b c d e f g

▲a: 6 Crew Capability; ▲b: Shuttle Retired; ▲c: EFT1; ▲d: MPCV CDR; ▲e: EM1; ▲f: EM2; ▲g: End of US Commitment to ISS

ISS as Mars analog

Space Human Factors Engineering (SHFE)

RISK OF INADEQUATE DESIGN OF HUMAN AND AUTOMATION / ROBOTIC INTEGRATION

SHFE-HARI-01: What guidelines and tools can we develop to enable system designers and mission planners to conduct systematic task/needs analyses at the appropriate level of detail to allocate work among appropriate agents (human and automation)?

Space Human Factors and Habitability MIDAS-FAST: Development and Validation of a Tool to Support Function Allocation (Sebok-NRA)

G

1, 5

▲:Demonstration of a Software Tool (OMB); ↑1: MIDAS-FAST: Development and Validation of a Tool; ↑5: Tool

Work Allocation Tools: Needs Assessment and Work Allocation Tools for Mission Operations and Procedures (Directed - In Review)

a G b 1, 5

↑1: Final report; ↑5: Work Allocation Tool

▲a: Conference proceedings/journal article submission; ▲b: Interim report

Review Gap status

Automation in Procedures: Guidelines for Allocating Tasks for Performance (NSBRI, Schreckenghost)

G: NSBRI

Final report

1

Review of Gap Status

Review Gap status

Task Name

ISS and other vehicles

Space Human Factors Engineering (SHFE)

RISK OF INADEQUATE DESIGN OF HUMAN AND AUTOMATION / ROBOTIC INTEGRATION

SHFE-HARI-02: How can performance, efficiency, and safety guidelines be developed for effective information sharing between humans and automation, such that appropriate trust and situation awareness is maintained?

Advanced displays for Efficient Training and Operation of Robotic Systems (NSBRI, C. Oman) (SM11 & SM12)

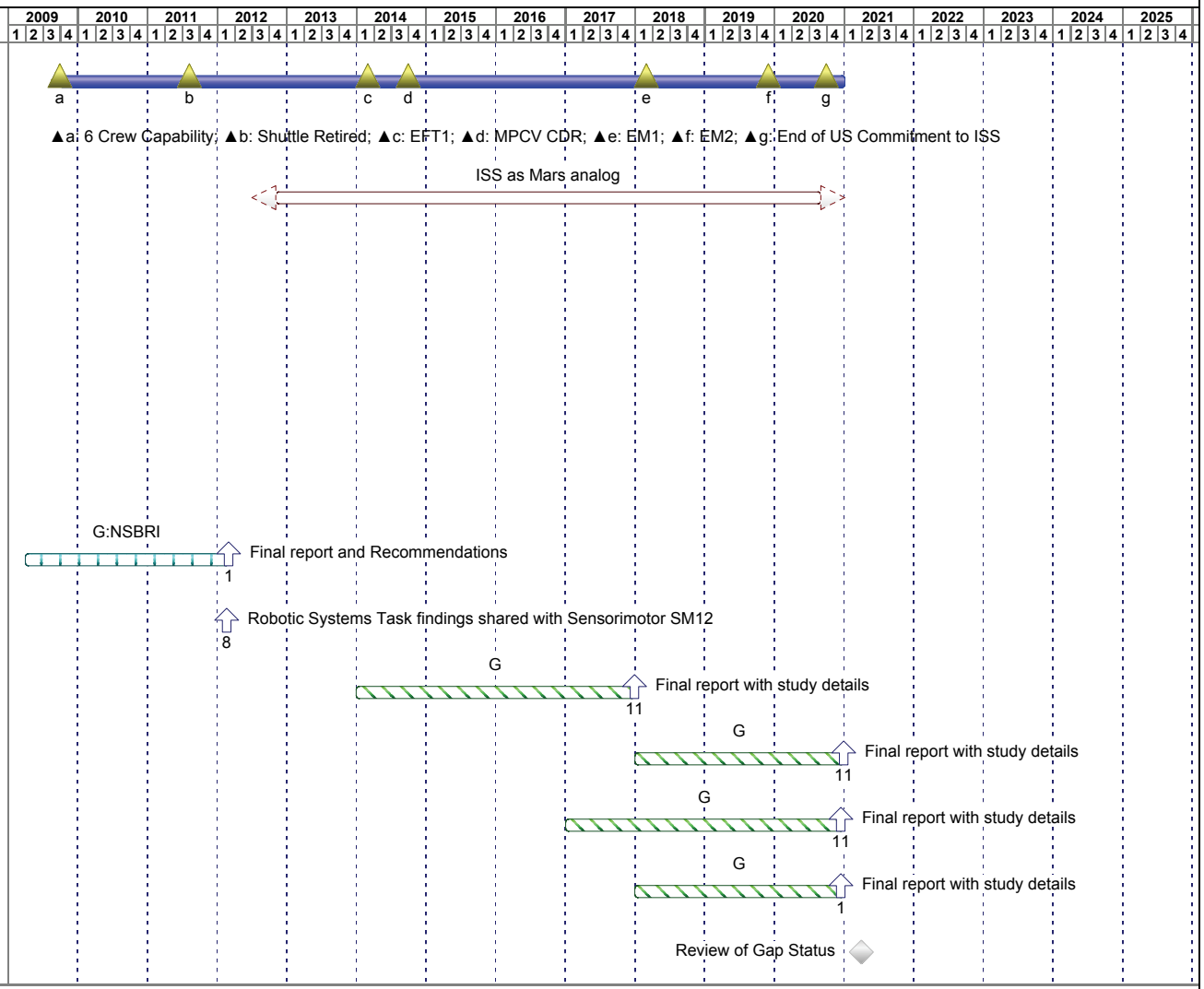
Robotic Systems Task findings shared with Sensorimotor SM12

Automation Trust and Complacency (Solicit)

Design tools for automation architectures in support of distributed control teams (Solicit)

Verification Tools for successful Human-Automation Integration in Operational Space Systems (Solicit)

Information Visualization and Controls for HRI (Solicit)



Task Name

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

ISS and other vehicles

a b c d e f g

▲a: 6 Crew Capability; ▲b: Shuttle Retired; ▲c: EFT1; ▲d: MPCV CDR; ▲e: EM1; ▲f: EM2; ▲g: End of US Commitment to ISS

ISS as Mars analog

Space Human Factors Engineering (SHFE)

RISK OF INADEQUATE DESIGN OF HUMAN AND AUTOMATION / ROBOTIC INTEGRATION

SHFE-HARI-03: How can performance, efficiency, and safety guidelines be developed for appropriate task automation and the effective allocation of tasks between humans and automation?

Automation Interface Design Tool (AIDT) (Directed)

G

▲: Delivery of Interim Report to ADCO; ↑4: Delivery of Toolkit Phase II to ADCO

4

HRI Eval: Assessment, evaluation, and development of methodologies, metrics, and tools available for use in multi-agent (human and robotic) teaming. (Directed - In Review)

G

Project Final Report

▲a: Lit. review; ▲b: Final Report on Video Overlays; ▲c: Final Report on Camera Views

a b c 1

Review of Gap Status

Human-Automation interactions and performance analysis of Lunar Lander supervisory control (NSBRI, K.Duda)

G:NSBRI

Model based simulation tool

5

Development of safety and efficiency metrics for human-automation systems (Solicit)

G

Final set of safety and efficiency metrics

11

Review of Gap Status

Task Name

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

ISS and other vehicles

a b c d e f g

▲a: 6 Crew Capability; ▲b: Shuttle Retired; ▲c: EFT1; ▲d: MPCV CDR; ▲e: EM1; ▲f: EM2; ▲g: End of US Commitment to ISS

ISS as Mars analog

Space Human Factors Engineering (SHFE)

RISK OF INADEQUATE DESIGN OF HUMAN AND AUTOMATION / ROBOTIC INTEGRATION

SHFE-HARI-04: What are the effects of the delays typical of different mission regimes on teleoperations and how do we mitigate these effects?

Teleops: Assessing and Mitigating the Impact of Transmission Delays on Teleoperations (Directed)

G

a b 1,11

▲a, b: Report to HRP and HET project; ↑1: OMB Milestone ↑11: Final Project Report\Update

Review of Gap Status