



**HRP Integrated Research Plan (IRP) - Revision D**  
**Human Health Countermeasures (HHC) - Multisystem**  
**Risk of Crew Adverse Health Event Due to Altered Immune Response**  
**Legend**



**G: Ground Study**



**Early Start**

**F: Flight Study**



**Task To Be Determined After Decision Point**

**L: Lunar**



**Major Milestone/Event/Accomplishment**

**NSBRI**



**1) Risk Characterization**

**DA&M: Data Analysis & Modeling**



**2) Task↓↑Task**

**FP: Flight Prep**



**3) Standards - New**

**AO: Add on to another study**



**4) Standard - Update**

**Planned/unfunded**



**5) Tools**



**6) Technology**



**7) Countermeasure**



**8) Information To/From other Elements**



**9) Information to HSRB**



**10) Requirements**



**11) Study**



**Major Decision Point**



**Stop**





Task Name

ISS and other vehicles

Multisystem Portfolio

Risk of Crew Adverse Health Event Due to Altered Immune Response

(IM1) Does spaceflight alter immune function?

Integrated Immune (Sams Directed Study)

Microbial Risk (Ott Directed Study) - refer to Microhost Risk, Gap AEH9

Immune Dysregulation Missions >6mos (Solicited, TBD)

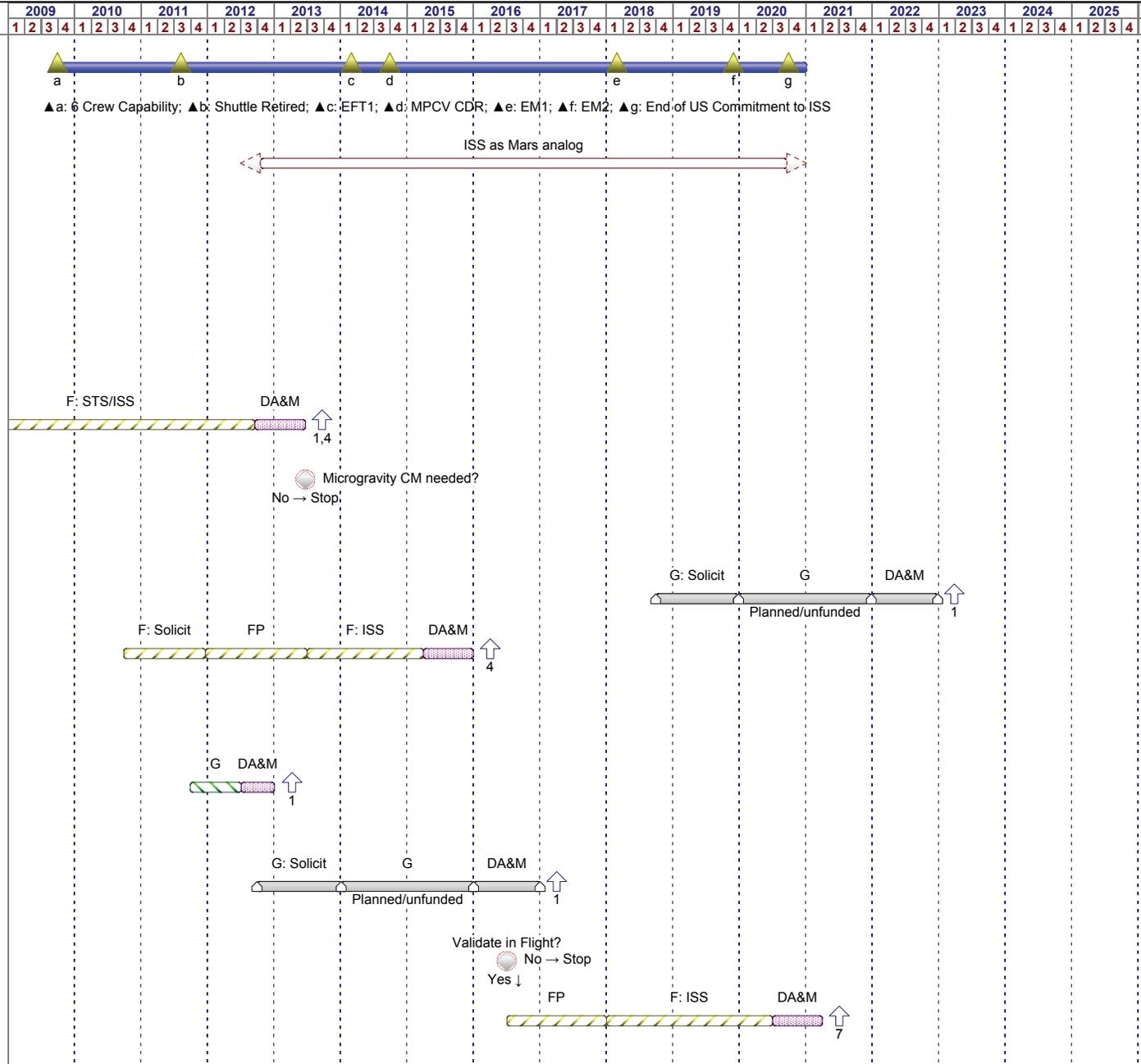
Salivary Markers (Simpson NRA)

Nutrition SMO (Smith Directed Study) - refer to Nutrition Risk, Gap N3

Examination of Splenic and Thymic Immune Function in Mice (STS-135 Mouse Tissue Sharing Pilot Study) (Crucian Directed Study)

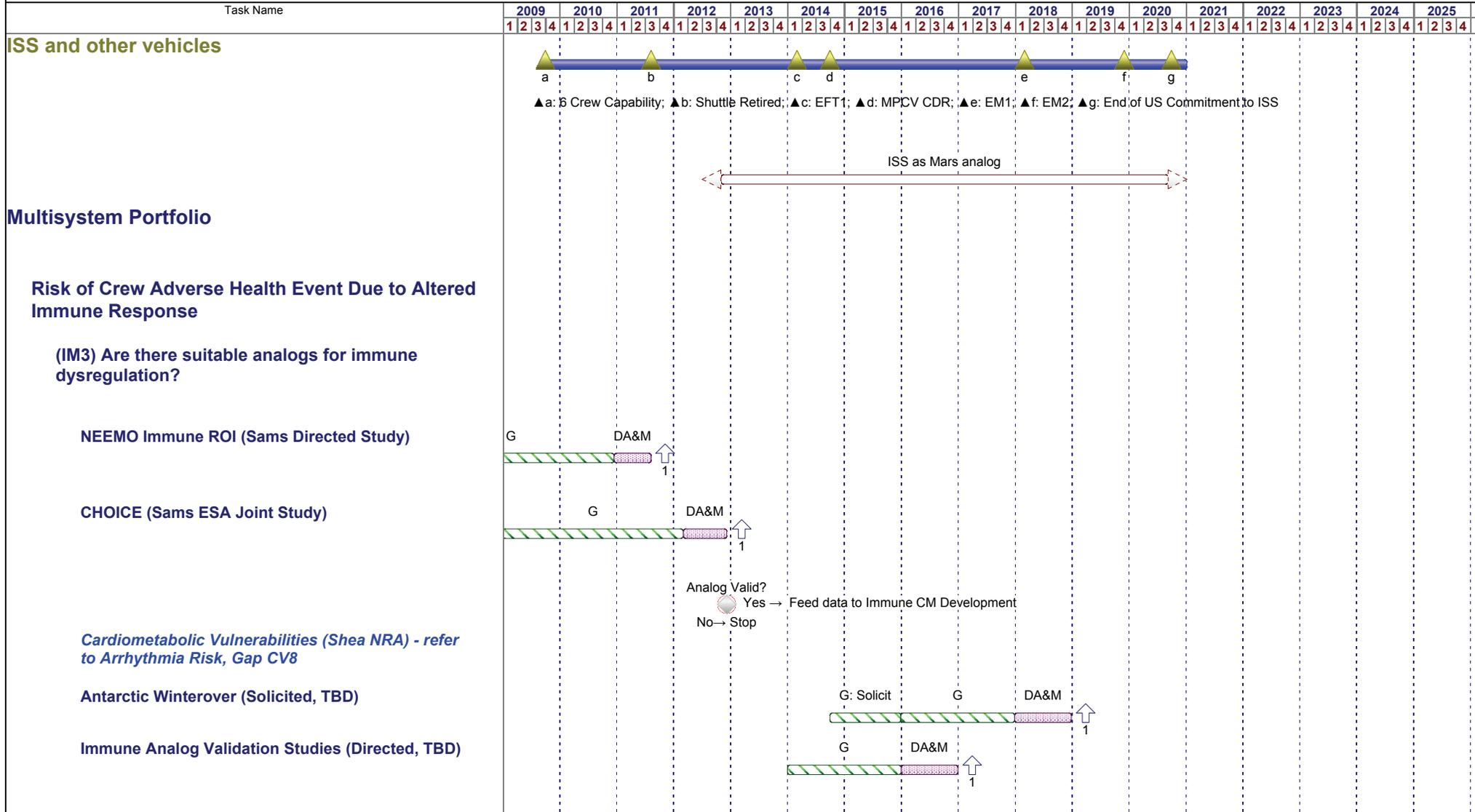
Immune Countermeasures Development (Solicited, TBD)

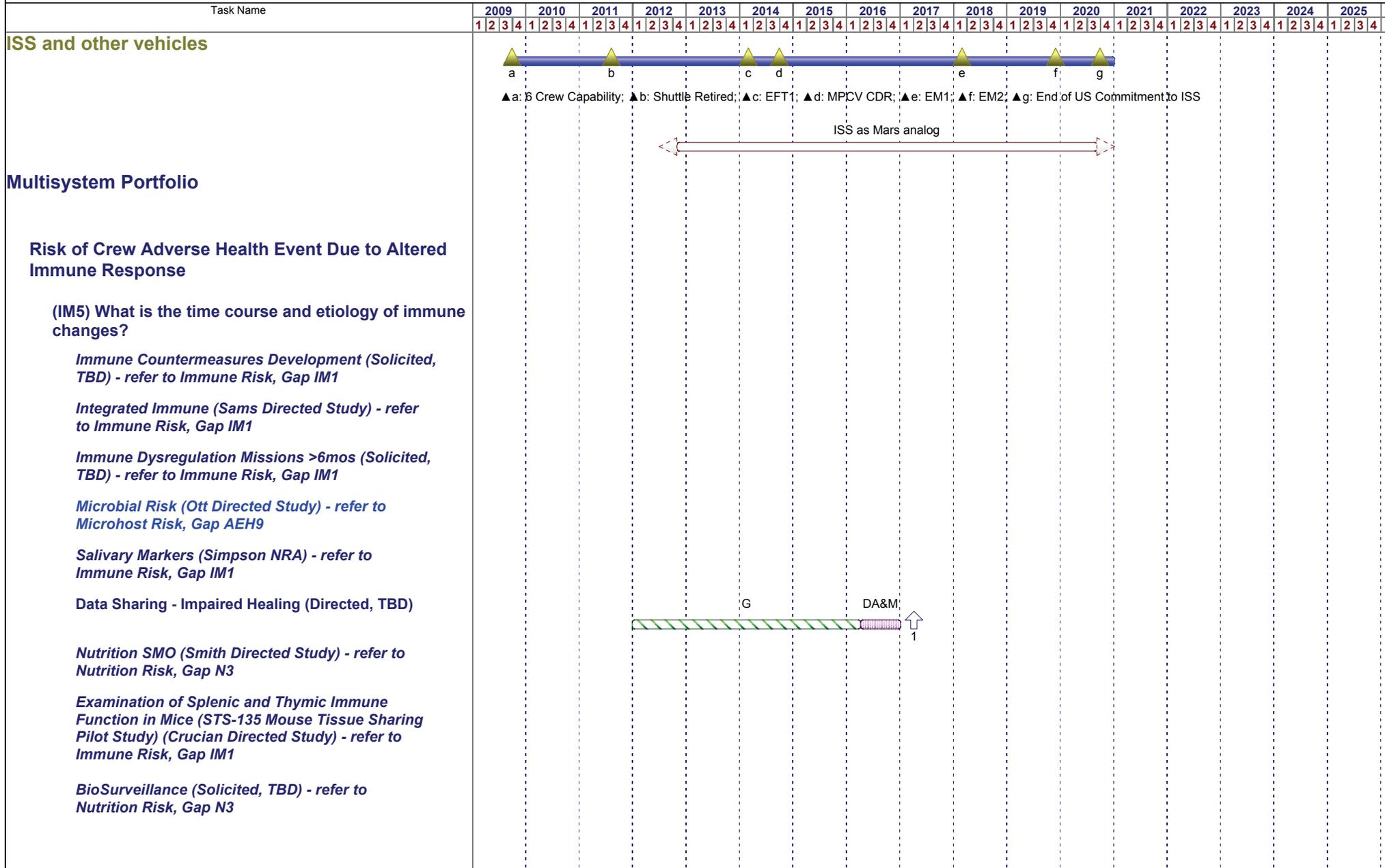
Immune Countermeasures - Flight Validation (Directed, TBD)





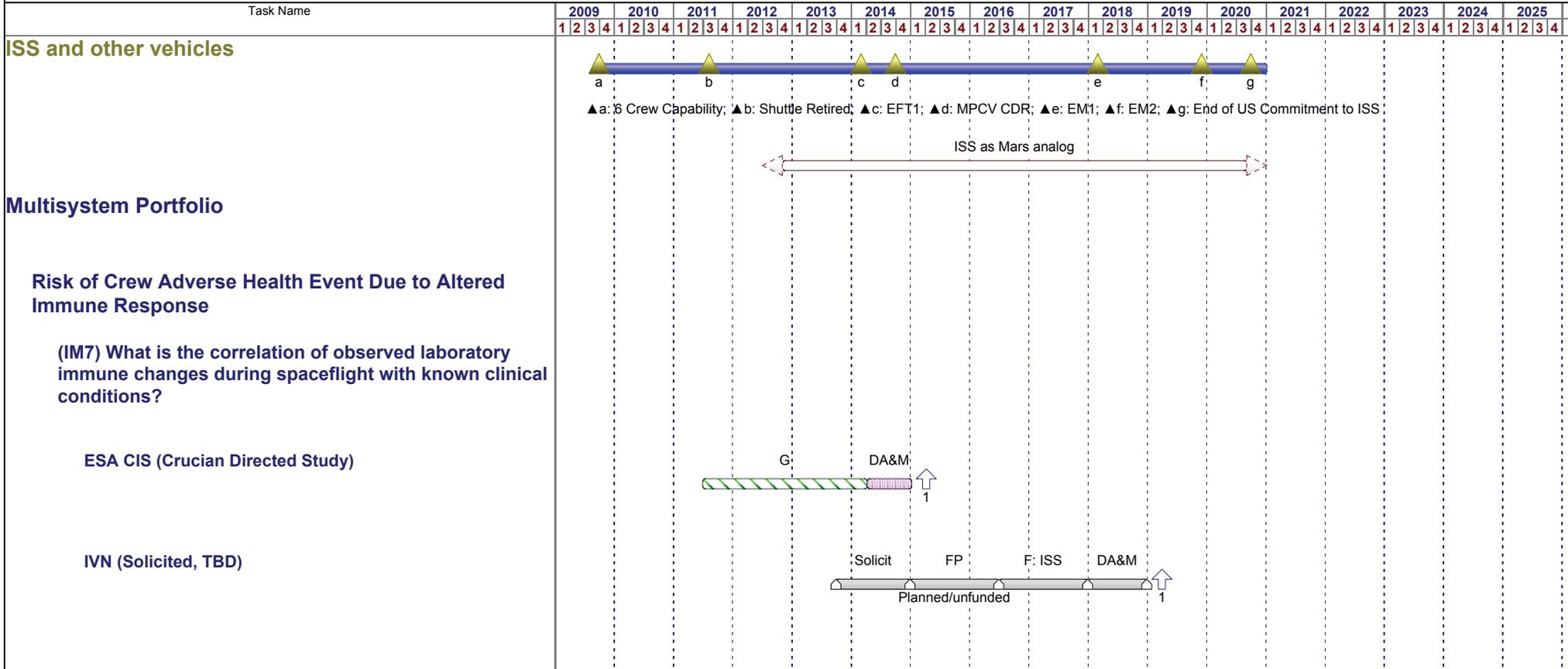
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<p><b>ISS and other vehicles</b></p> <p>▲ a: Crew Capability; ▲ b: Shuttle Retired; ▲ c: EFT1; ▲ d: MPCV CDR; ▲ e: EM1; ▲ f: EM2; ▲ g: End of US Commitment to ISS</p> <p>ISS as Mars analog</p>																																																																				
<p><b>Multisystem Portfolio</b></p> <p><b>Risk of Crew Adverse Health Event Due to Altered Immune Response</b></p> <p>(IM2) Is an improved immune standard needed?</p> <p><i>Immune Countermeasures Development (Solicited, TBD) - refer to Immune Risk, Gap IM1</i></p> <p><i>Microbial Risk (Ott Directed Study) - refer to Microhost Risk, Gap AEH9</i></p> <p><i>Immune Dysregulation Missions &gt;6mos (Solicited, TBD) - refer to Immune Risk, Gap IM1</i></p> <p><i>Integrated Immune (Sams Directed Study) - refer to Immune Risk, Gap IM1</i></p> <p><i>Salivary Markers (Simpson NRA) - refer to Immune Risk, Gap IM1</i></p> <p><i>Nutrition SMO (Smith Directed Study) - refer to Nutrition Risk, Gap N3</i></p> <p><i>Examination of Splenic and Thymic Immune Function in Mice (STS-135 Mouse Tissue Sharing Pilot Study) (Crucian Directed Study) - refer to Immune Risk, Gap IM1</i></p> <p><i>BioSurveillance (Smith Directed Study) - refer to Nutrition Risk, Gap N3</i></p>																																																																				







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<p><b>Multisystem Portfolio</b></p> <p><b>Risk of Crew Adverse Health Event Due to Altered Immune Response</b></p> <p>(IM6) What are the cumulative effects of chronic immune dysfunction on missions greater than six months?</p> <p><i>Immune Dysregulation Missions &gt;6mos (Solicited, TBD) - refer to Immune Risk, Gap IM1</i></p> <p><i>CHOICE (Sams ESA Joint Study) - refer to Immune Risk, Gap IM3</i></p> <p><i>Immune Countermeasures - Flight Validation (Directed, TBD) - refer to Immune Risk, Gap IM1</i></p> <p><i>Antarctic Winterover (Directed, TBD) - refer to Immune Risk, Gap IM3</i></p>																																																																				





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<b>Multisystem Portfolio</b>	<p><b>Risk of Crew Adverse Health Event Due to Altered Immune Response</b></p> <p>(IM8) What is the correlation of immune risks with other risks, particularly psychological stress, physical deconditioning, nutrition and/or radiation? -BHP and/or Rad</p> <p><i>Nutrition SMO (Smith Directed Study) - refer to Nutrition Risk, Gap N3</i></p> <p><i>Cardiometabolic Vulnerabilities (Shea NRA) - refer to Arrhythmia Risk, Gap CV8</i></p> <p><i>Microbial Risk (Ott Directed Study) - refer to Microhost Risk, Gap AEH9</i></p> <p>Radiation/Iron: Immune Analysis (Crucian Directed Study)</p> <p><i>BioSurveillance (Smith Directed Study) - refer to Nutrition Risk, Gap N3</i></p>																																																																			
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