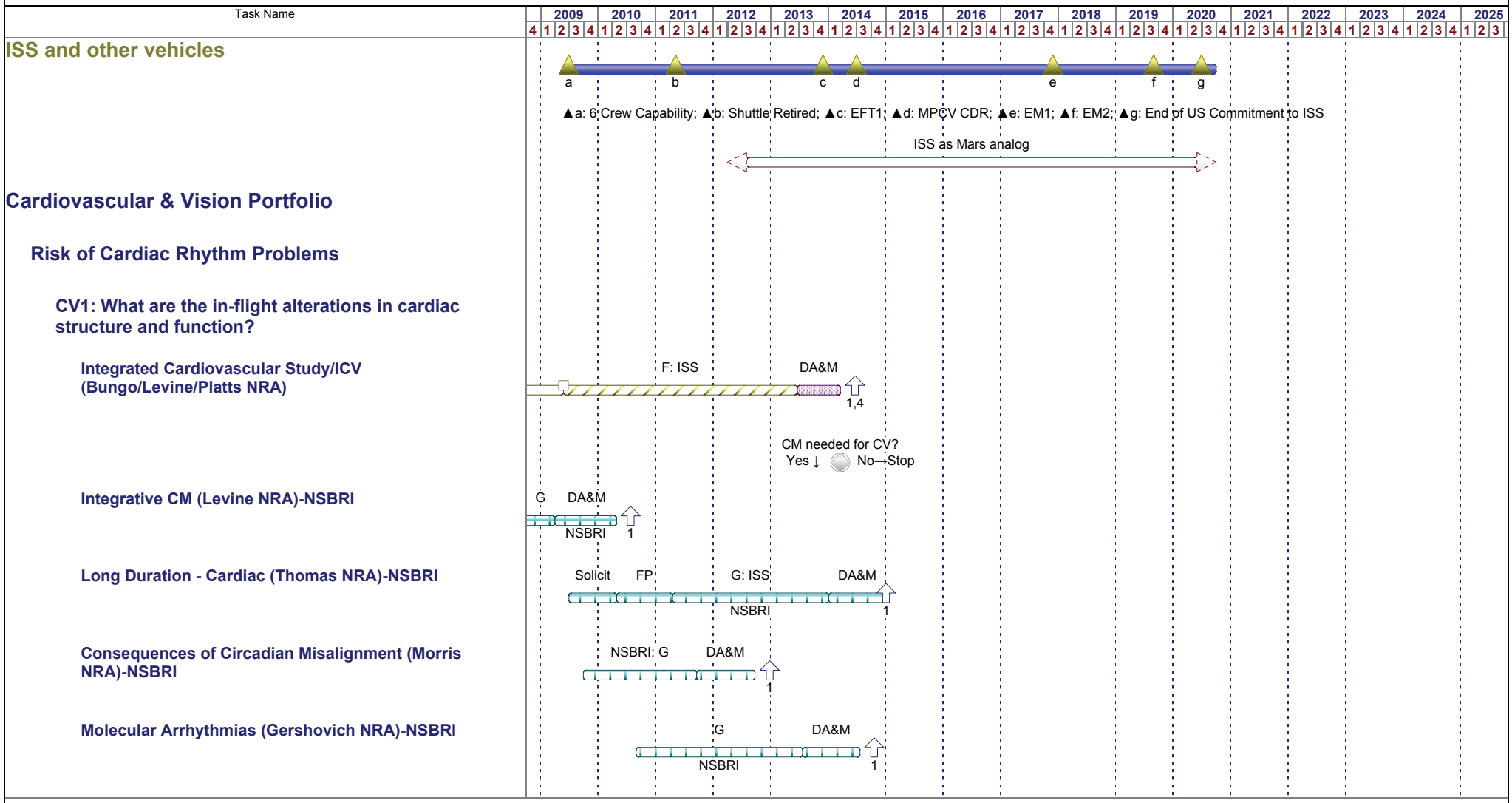
G: Ground Study	**Early Start**	**6) Technology**
F: Flight Study	**Task To Be Determined After Decision Point**	**7) Countermeasure**
L: Lunar	**Major Milestone/Event/Accomplishment**	**8) Information To/From other Elements**
NSBRI	**1) Risk Characterization**	**9) Information to HSRB**
DA&M: Data Analysis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


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
Cardiovascular & Vision Portfolio
Risk of Cardiac Rhythm Problems
CV1: What are the in-flight alterations in cardiac structure and function?
Integrated Cardiovascular Study/ICV (Bungo/Levine/Platts NRA)
F: ISS
DA&M
1,4
CM needed for CV?
Yes ↓
No→Stop
Integrative CM (Levine NRA)-NSBRI
G
DA&M
NSBRI
1
Long Duration - Cardiac (Thomas NRA)-NSBRI
Solicit
FP
G: ISS
DA&M
NSBRI
1
Consequences of Circadian Misalignment (Morris NRA)-NSBRI
NSBRI: G
DA&M
1
Molecular Arrhythmias (Gershovich NRA)-NSBRI
G
DA&M
NSBRI
1

Task Name

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 202

ISS and other vehicles

a b c d e f g

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ISS as Mars analog

Cardiovascular & Vision Portfolio

Risk of Cardiac Rhythm Problems

CV7: How are fluids redistributed in flight?

Brazelet Dulchavsky (Dulchavsky NRA)-NSBRI

FP G DA&M

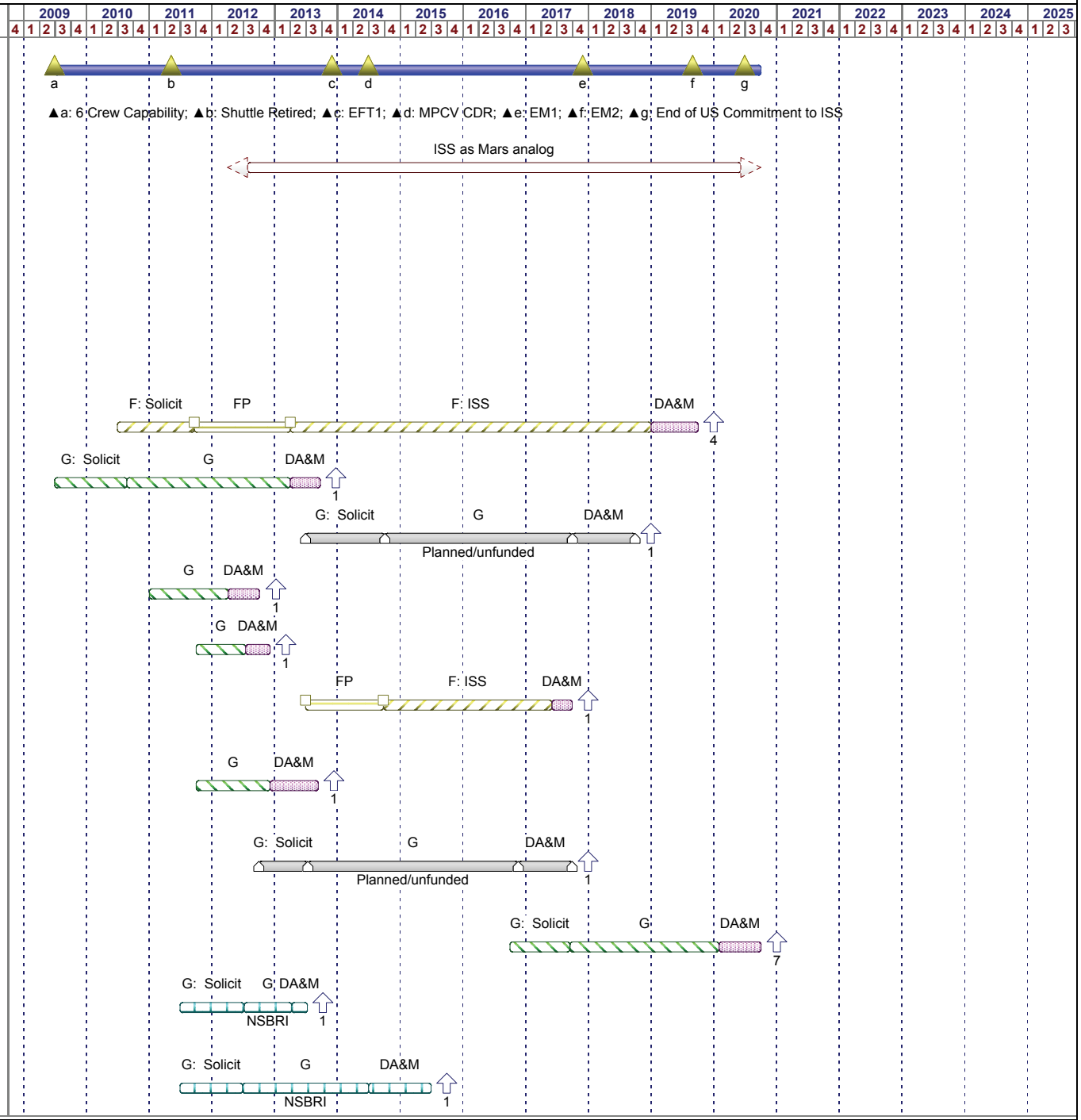
NSBRI 1

Animal fluid study (Solicited, TBD)

Solicit G DA&M

Planned/unfunded 1

Integrated Fluid Volume (NRA, Hargens/Dulchavsky/Stenger) -refer to VIIP Risk, Gap CV7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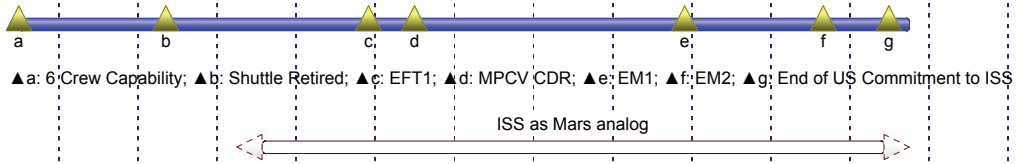
ISS as Mars analog
Cardiovascular & Vision Portfolio
Risk of Cardiac Rhythm Problems
CV8: Can manifestations of sub-clinical or environmentally-induced cardiovascular diseases during spaceflight be predicted?
Cardiovascular Oxidative Damage (Platts NRA)
F: Solicit FP F: ISS DA&M 4
Cardiometabolic Vulnerabilities (Shea NRA)
G: Solicit G DA&M 1
Stress and CV Health (Solicited, TBD)
G: Solicit G DA&M 1
Planned/unfunded
Radiation Pilot (Directed, Westby)
G DA&M 1
Radiation/Iron CVD (Directed, Westby)
G DA&M 1
Vascular Head/Neck (Solicited, TBD)
FP F: ISS DA&M 1
Atherosclerosis DM (Directed, Platts)
G DA&M 1
CVD Combination Factors (Solicited, TBD)
G: Solicit G DA&M 1
Planned/unfunded
Atherosclerosis CM (Solicited, TBD)
G: Solicit G DA&M 7
Proteomic Heart (NRA, Bowles)-NSBRI
G: Solicit G DA&M 1
NSBRI
Endothelial Dysfunction SR (NRA, Natarajan)-NSBRI
G: Solicit G DA&M 1
NSBRI

Task Name

ISS and other vehicles



Cardiovascular & Vision Portfolio

Risk of Cardiac Rhythm Problems

N7: What are the potassium, magnesium, and phosphorus changes in relation to cardiovascular issues and bone loss?

Pro-K (NRA, Smith) -refer to Nutrition Risk, Gap N14

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

BioSurveillance (Solicited, TBD) -refer to Nutrition Risk, Gap N3