



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

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
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

Advanced Food Technology (AFT)

Risk of Performance Decrement and Crew Illness Due to an Inadequate Food System

AFT1: How can the food system deliver the required level of nutrition throughout the mission?

Suited Contingency Ops Food (Directed Study)

Stability of Pharmacotherapeutics and Nutrition Compounds (SMO) (Directed Study by HHC-M (Multisystem Portfolio))

Effects of Processing and Subsequent Storage on Nutrition

Pass data to HHC-M (Multisystem Portfolio Gap N1) Are nutrients in food are stable during space flight?

Understanding Kinetics of Nutrient Degradation in Foods (NRA)

Suited Contingency Ops Food-2

Nutritional Risk Factor Mitigation

Technical Integration of Gap 1 Activities

Understanding Kinetics of Nutrient Degradation in Foods-2

ISS as Mars analog

DA&M

G

EVA Food Delivery System (EVA Suit1 CDR) to CxP

Are commercially available foods and delivery systems available?

Yes → Stop

No ↓ Development of in-suit foods

Pass Data to AFT Gap 2

F DA&M

Pass data to AFT Gap 2 -Integration of Product, Package Process, and Environment3

Are nutrients stable in LEO?

No ↑ 8

Yes → Stop

G: Nutrition and Processing

Assess whether adequate nutrition remains after processing, 1 year, and 3 years to determine adequacy of food system for 6 month and longer missions

No ↓

Yes → Stop

Pass data to Understanding Kinetics of Nutrient Degradation in Foods (NRA)

↑8: Pass data to "Understanding Kinetics of Nutrient Degradation in Foods (NRA)"

DA&M

G: Nutrient Kinetics

Pass data to AFT Gap2 DoD Collaboration

G: Cont Food-2

10

G: Nutrition Mitigation

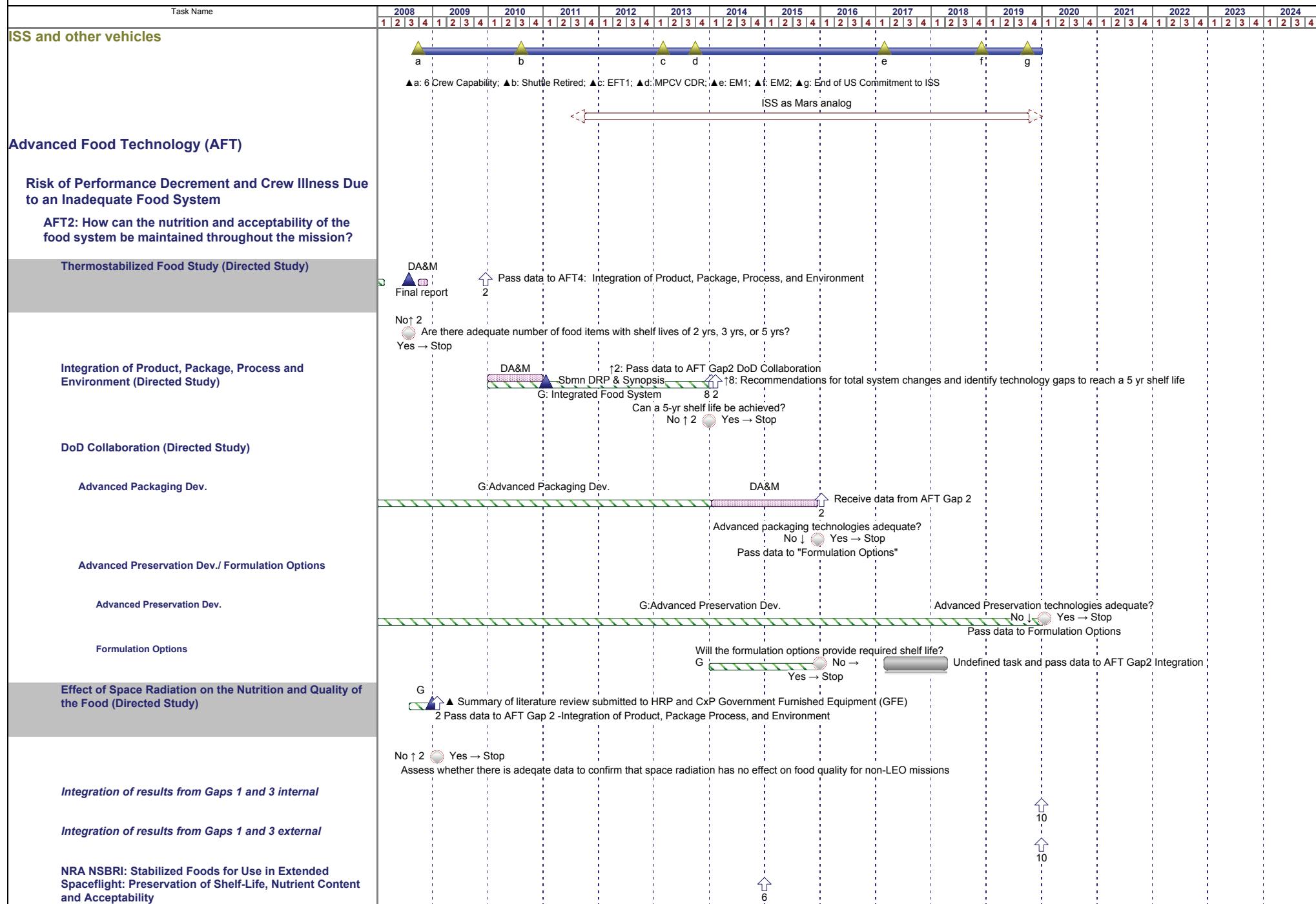
6

DA&M

6

G

10





The figure is a Gantt chart illustrating the timeline of space exploration activities from 2008 to 2024. The horizontal axis represents time, with vertical dashed grid lines for each year. Milestones are marked by yellow triangles and labeled a through g. A red bracket spans from approximately 2013 to 2018, labeled 'ISS as Mars analog'. Below the chart, several research projects are listed with their descriptions and associated milestones.

Task Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
ISS and other vehicles	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Milestones:

- 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 (Red bracket from ~2013 to ~2018)

Advanced Food Technology (AFT)

Risk of Performance Decrement and Crew Illness Due to an Inadequate Food System

AFT3: How can the acceptability of the food system be maintained throughout the mission?

Hunter: Effects of Retronasal Smelling, Variety, and Choice on Appetite and Satiety (NRA)

Vickers: Factors Contributing to Food Acceptability and Consumption, Mood, and Stress on Long Term Space Missions (NRA)

Understanding the Effects of Microgravity on Taste (Directed Study)

Technical Integration of Gap 3 Activities

Validation of Sensory Metrics during Exploration Missions

Timeline details:

- G: Appetite in Space
- 2: Pass data to BHP Team BMED1
- Final Report to AFT
- F: Improving Mood
- 8
- Final Report to AFT
- Pass data to BHP Team BMED1
- FP
- F
- DA&M
- Taste in Microgravity - ISS Flight Expt
- 10
- DA&M
- G
- 7



Task Name

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1
ISS and other vehicles																	

Advanced Food Technology (AFT)

Risk of Performance Decrement and Crew Illness Due to an Inadequate Food System

AFT4: What technologies can be developed that will efficiently balance appropriate vehicle resources such as mass, volume, and crew time during exploration missions with the safety, nutrition, and acceptability requirements?

Comparative Packaging Study (Directed Study)

Elasti Glass Barrier Film for the 3 to 5 Year Shelf-Stable Food Package (SBIR)

Dual Use Packaging (SBIR)

Flexible High-Barrier Polymers for Food Packaging (SBIR)

Packaged Food Mass Reduction Trade Study (Directed Study)

Packaged Food Mass Reduction Technology Development (Directed Study)

Analyses of the NASA Food System Using a Total Systems Approach (Directed Study)

Bulk Overwrap Packaging System (Directed Study)

Legend:

- 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

