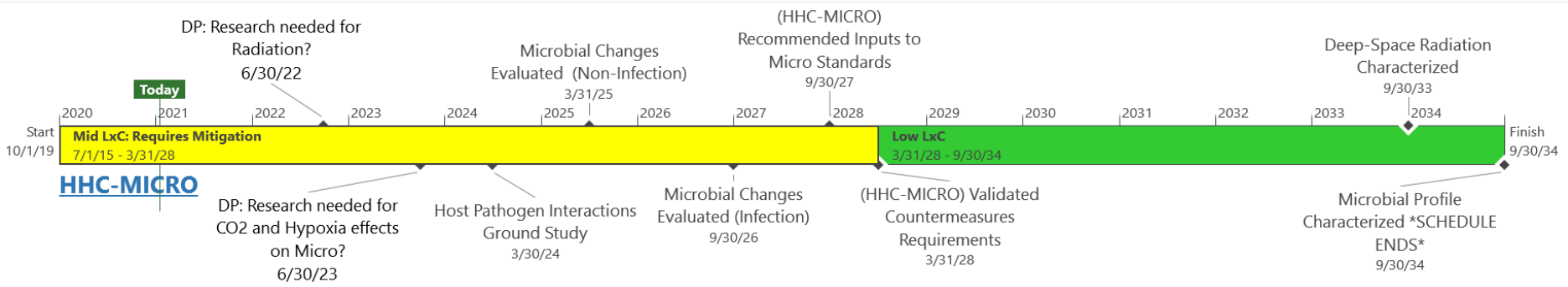
Microhost Risk Approach Plan



	Risk Characterization / Formulation	CM Development / Evaluation	CM Integration/Validation
HRR Gap: research logic description	Micro-101: Evaluate the effects of **isolation, confinement and weightlessness** on changes in the vehicle microbiome, the human microbiome, and microbial virulence SB Micro-102: Evaluate whether **deep-space radiation** has an additive or synergistic effect with weightlessness/isolation/ confinement on microbial types, numbers, and virulence. SR Micro-103: Evaluate whether **atmospheric composition**, such as elevated CO_2 levels or mildly hypoxic exploration atmospheres, are a significant contributor to changes in the microbial profile of spaceflight. Micro-201: Evaluate the contribution of changes in microbial numbers, types, and virulence on the likelihood and consequence of adverse health events **(infection), during the mission**. Micro-202: Evaluate the contribution of changes in microbial numbers, types, and virulence on the likelihood and consequence of **non-infection-based effects on health and performance**, including: decrease in cognition/mood/performance/BBB function related to the change in the gut's microbiome and gut-brain axis (collaboration with HFBP), increase in cardiovascular health risks, effects of change in gut microbiome on metabolism of nutrients, correlation with inflammation HFBP Microbial Changes Evaluated	Micro-301: Identify, develop, and implement **in-flight** microbial monitoring/diagnostic tools for support of research and crew health during Gateway, Lunar, and Mars missions	Micro-401: Test, optimize and validate existing terrestrial or novel technologies that can maintain in-flight microbial counts, types, and virulence at terrestrial equivalent levels.
External Deliverables	Inputs to Standards		Validated Countermeasure Requirements

Note: Milestone (◆) and Gap Closures (⬢) are Program reviews with defined entry/exit criteria.

Legend: Analog; Flight environment; Cross Element Integration; Anticipated PRR Color Change