Session 3 Summary
Mission Design: Getting There and Back

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Session 3 Summary: Findings

- Mission opportunities proliferate according to HSF capability and NEO characteristics
- Impulses comparable to a lunar orbit mission require NEO mission duration > 1 year
- Flexible exploration requires sustained access to progressively more interesting targets
- Missions to NEOs bridge HSF capability gap from orbiting the Moon to orbiting Mars
- A reasonable IMLEO limit of ≈ 300 mT greatly restricts future mission opportunities to currently known NEOs
- Even at > 100 mT IMLEO per launch, multiple launches are required for NEO missions
- Close Earth/NEO encounters are necessary for discoveries *and* for low Δv / low duration HSF mission opportunities
- There are 18 NEOs for which mission opportunities with IMLEO < 200 mT and duration < 180 days were available near their discovery epochs
- Practical, affordable missions result from visiting the most accessible NEOs
- Short mission duration reduces habitation/consumables/shielding/trash mass & volume
- Bigger near-term ROI is obtained from better NEO survey/tracking than from better HSF capability
- Multiple launches and orbit assembly prior to HSF Earth departure incurs significant risk
- Risk reduction via infrastructure is more costly than via launch optimization
- An architecture that involves redesignated NEO destinations or reused elements must not require departure from LEO

Session 3 Summary: Recommendations

- Thoroughly catalog, characterize, and track NEOs down to 100 m diameter or less
- Identify key HSF technologies and architectures relating to NEO mission opportunities
- Survey NEOs from deep space vantage to find the best mission opportunities in advance
- Target initial HSF missions at the most accessible NEOs with conventional technology
- Minimize the number of launches and assembly complexity required for crewed Earth departure
- Utilize metrics such as IMLEO, reflecting mission duration and performance for all mission phases, and accounting for launch ascent performance as driven by Earth departure asymptote declination; this requires the adoption of a baseline mission architecture for use in computations but is much more useful than a simple Δv tally subsequent to Earth orbit insertion