

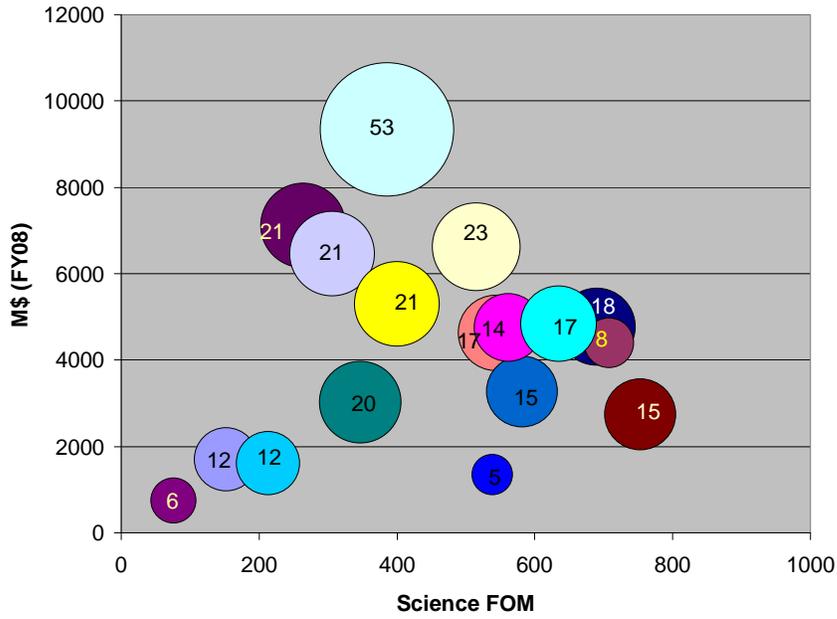
Using Science, Cost, and Technology Readiness to Evaluate Low Concept Maturity Mission Elements and Architectures for a Venus Flagship Mission

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NASA's Planetary Science Division recently commissioned a Science and Technology Definition Team to design a potential Venus Flagship mission. The team developed a list of various mission elements that could serve as part of an overall mission architecture, including orbiters, balloons at various altitudes, and landed platforms of varying number and lifetime. In order to determine the mission architecture that provided the best science within the desired cost range, teams of scientists developed priorities for the science investigations previously detailed by the Venus Exploration Assessment Group (VEXAG). By categorizing the suitability of mission elements to achieve the science investigations, it was possible to construct a Science Figure of Merit (FOM) that could be used to rate the mission elements in terms of their overall science capability. Working in parallel, a team of technologists and engineers identified the technologies needed for the different mission elements, as well as their technology readiness. A technology FOM was then created reflecting the criticality of a specific technology as well as its technology readiness level. When the Science and Technology FOMs were combined with a rapid costing approach previously developed, it became possible to rapidly evaluate not only individual mission elements, but also their combinations into various mission architectures, accelerating the convergence on a flagship mission architecture that provided the best science within the flagship mission budget, as well as reducing reliance on unproven technology.

Selected Venus Architectures



Bubble size is the relative amount of new technology required.

- Flagship Venera like
- Venus Mobile Explorer
- Seismic Network
- Hi-lo Balloons
- Mid-level Balloons
- Mult. Short Lived Landers plus
- Coord. Atmos. Platforms
- EVE-like concept
- Pioneer-Venus plus
- Pioneer-Venus w. landers
- Long-Lived Lander
- EVE-Variant
- New Frontiers VISE like
- STDT Flagship
- Geology Choice
- Atmosphere Choice
- GeoChem Choice