A PI's View of Discovery Program Missions

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Background

- Presentation is not by NASA
  - Based on my personal experience as a PI
  - I started with negligible real mission experience
  - Thoughts are aimed primarily at PIs with limited experience
- All Discovery Program missions are different
  - Different hardware
  - Different mission profiles
  - Different partners and personalities
  - Different management structures
- What is the same?
  - PI is in charge
  - PI is responsible to NASA
  - For NASA and for a center, your mission may be just one of many - for you, its success is your primary goal
  - Goal is scientific return with public dissemination of results

Proposal & CSR Phases

- Competitive situation inhibits some activities
- Pay attention to scientific requirements and how they flow down to engineering requirements
- Pay attention to heritage
  - Build to print is great heritage
  - Much other heritage is a selling point but don't count on it for controlling cost
- Better is the enemy of good enough
- Be there
  - Face-to-face communication is better
  - Engineers ask questions that affect design if you are there but they won't call you to ask the same question

Communication

- Pay attention to language - every institution has its own language
  - Scientists vs. engineers, NASA centers vs. aerospace corporations, even one NASA center to another
  - Misunderstanding the detailed meaning of words can lead to major errors in costing
- Pay attention to both personal and institutional philosophy
  - Different design philosophy can cause serious problems if not recognized and resolved very early
  - Different risk tolerance can cause serious problems if not recognized and resolved very early

Implementation Phase (B/C/D/E)

- Relationship to NASA
  - Constraints due to competition no longer apply and NASA is no longer trying to decide whether you should be allowed to fly
  - NASA will be almost as embarrassed as you if you fail after selection
  - Work closely with program scientist and program executive so they know in advance what you are likely to come asking for.
    - They should be your advocates within HQ.
    - They also are in a position to advise on center and partner issues

Implementation Phase (B/C/D/E)

- Continuity is important
  - If a key person is performing well, don't let NASA or the center or the corporate partner re-assign him/her to another project
  - Key personnel include project manager, systems engineer, subsystem leads, and so on
  - If a key person is not performing well, act early, whether to improve performance or to replace the person
  - Proposal and CSR set a philosophy for the project and key players need to be on with that philosophy from the beginning
- Document everything in case personnel changes become unavoidable

Implementation cont.

- Avoid Requirements Creep
  - Don't try to make the science better if it costs money
  - Increasing risk aversion has costs - be alert to unfunded mandates related to risk mitigation
- PI & PM
  - Don't try to do each other's jobs, but!
  - Understanding each other's jobs is crucial because decisions by one affect the other
  - Understanding each other's strengths and weaknesses is also very important
  - Must work very closely and intensively together
  - PM should report regularly to PI, but!
  - PI needs to be present to the engineers, but without undercutting the PM

Reserves

- Reserves are for things that can't be anticipated
- Things will go wrong where you least expected them to do so
- Don't spend reserves early just because you have them, e.g.
  - Trade studies are not a use for reserves unless something went wrong
  - Adding hardware is not a use for reserves unless something went wrong