UCB Symposium on Management of NASA Science Experiments

Program Management

from the Perspective of a Proposal Reviewer

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The Technical, Management & Cost Evaluation

The purpose of the Technical, Management & Cost (TMC) evaluation is to determine the level of risk in accomplishing the scientific objectives of the proposed investigation on time and within cost.

Management Factors Considered in Proposal Evaluations

- **Key Personnel**
- **Program Organization / Teaming / International Participation**
- **Program Control**
- **Risk Identification / Management / Mitigation**
- **Schedule**
- **Cost**
- **Past Performance**

Key Personnel

The key personnel, the PI, PM and Systems Engineer, are critical to the success of the project.

Key personnel should have the following attributes:

- Commitment - Key personnel other than the PI are nominally expected to be full time, depending on the size of the program. An explanation & justification of time commitments should be provided.
- Experience – Inexperienced key personnel should have mentors and additional institutional support resources. Commitment and availability of mentors should be evident.
- Involvement – At a Phase A site visit for example:
  - The PM & SE should demonstrate their knowledge & accountability, a good working relationship with the PI, effective leadership of the project team, and coordination with the science team and domestic & foreign partners.
  - The PI should demonstrate a good understanding of and commitment to the program implementation.
- Competence – At the end of Phase A, key personnel should demonstrate their selected "tools of the trade" and with evidence of implementation, that will enable them to maintain control of the program.

Program Organization / Teaming / International Participation

Successful proposals will demonstrate effective communication, efficient organization & cooperative interfaces.

- Organization - The program organization should be simple with clean lines of authority & responsibility.
- Program Support – The involvement of key consultants, mentors, review teams and institutional support organizations should be clearly identified.
- Resources - Staffing & facility resources should be detailed, be appropriate in scope, and be applied consistent with the project schedule & cost.
- Commitments - Science team and partner & subcontractor commitments for cost, schedule & key deliverables should be evident.
  - Foreign partner commitment should be demonstrated at the most significant level possible.
  - Backup plans for risky foreign contributions should be identified.
  - An appropriate level of launch vehicle provider interface should be evident.
- ITAR - Full understanding of ITAR requirements should be demonstrated and a plan presented that achieves ITAR milestones in support of the technical development.

Program Control

Program control is grounded in tools & processes that are appropriate for the scope and complexity of the project and easily utilized by the team.

Successful program control achieves the following objectives:

- Insight – Processes to identify risks, track development progress, and incorporate heritage & lessons learned.
- Oversight – Processes & protocols to assess risks, solve problems, close trade studies and efficiently manage the program direction.
- Follow-up – Processes to manage & resolve failures & anomalies and demonstrate compliance with the project requirements.
- Forecasting – Tools & metrics to facilitate the timely forecasting of resource needs, and schedule & cost performance.
- Reporting – Processes & standards to consistently communicate technical, schedule & cost status at the program, institution & NASA levels.
- Data management & dissemination – Tools to collect & organize documents, manage revisions, protect privacy and ensure availability to the team.
- Tailoring –Tools & processes should be tailored to support the program's unique challenges.

Risk Identification, Management & Mitigation

Successful proposals will demonstrate REALISTIC risk assessments, and effective plans for risk management, and risk retirement.

- Risk Identification – Top risks should be identified at a credible level of detail with realistic assessments of impact & likelihood.
- Risk Management – A responsibility accepted by the entire team with key personnel leading the effort. It should not be relegated to institutional support organizations.
- Risk Mitigation – A clearly defined approach to risk retirement includes the proposed strategy, resources, schedule milestones, & alternative options with trigger points.
- Analyses & Trade Studies – Scope should be focused to address risk; closure criteria and schedule must be clearly defined, and with verification requirements specified.
- Adequate Resources – Cost, schedule & technical resource margins should be consistent with the mitigation plan, and the availability of necessary external resources such as vendor support should be evident.
- Assessment & Closure – Appropriate procedures are necessary to capture & disseminate information and ensure that all impacts & revisions to the baseline plan are accounted for.
- Technology Development – TRL assessments must have justification; development plans must be consistent with available resources; credible backup options that maintain baseline science significantly reduce the risk concern.

Project Schedule

Project schedules are not just a timeline. Schedule quality is an important measure of the management's understanding of the project and provides confidence in the management plan.

Quality is assessed by:

- Completeness – By the end of Phase A, subsystem level elements and deliverables should be identified. A Phase B/C/D/E baseline should be established to provide support for the cost estimate.
- Consistency – The schedule should be integrated with the master plan and demonstrate correlation with the staffing plan, the technical development plan and unique project challenges.
- Control – Evidence of the capability and commitment to accurately assess progress against the baseline.
- Critical Path – Pacing items should be clearly identified and discussed in the context of risk and risk mitigation.
- Margin & Slack – Regardless of what formulas are used, supporting explanation and justification should be provided; too much can be as bad as too little.
- Risk acknowledgement – Special accommodations to manage known risks should be accounted for; i.e. ATLO processing of multiple spacecraft in parallel.

Proposed Cost

The credibility of the proposed cost benefits significantly from relevant detail and thoughtful explanation.

- Realism – Confidence in the accuracy of the proposed cost comes from recent actual costs on similar efforts, grass-roots estimates by an experienced organization, vendor quotes, and evidence of careful consideration of the scope and complexity of the project.
- Consistency – There should be good correlation with the work breakdown structure, the schedule, the scope of the technical development, the risk mitigation plan and the anticipated funding profile.
- Heritage – Good rationale should be provided for the claimed cost savings, especially where variances in the implementation are obvious.
- Descopes / Recovery Options – To be considered viable risk mitigators, descopes must be clearly quantified, both in terms of the resource savings at the trigger points considered, and in terms of the science impact.
- Reserves – Aside from meeting the AO requirements, rationale and justification for reserves should be discussed and must be consistent with the program plan.
- Control – Processes & tools should be in place by the start of Phase B.
- Independent Estimates – Significant variances should be explained.

Past Performance

Past performance issues must be addressed in new proposals.

Positive steps to overcome a stigma of past performance include:

- Analysis – A clear discussion and open-minded approach to understanding the causes of previous problems will strengthen the proposed project.
- Solution – A path of corrective action, both within the proposed project and within the institution, if necessary, is important.
- Implementation – The corrective measures should be clearly demonstrated in the proposed project.
- Follow-up – Internal and independent assessment of the effectiveness of the corrective action can confirm that the problem is solved.

Problems in past performance won't undermine the TMC evaluation if it's clear that the problems have been addressed and corrective measures are evident in the proposed project.

Some Parting Thoughts on Proposal Evaluations

The best proposals demonstrate clarity, consistency, & common sense.

- The proposed project must demonstrate traceability and consistency, from the science objectives, to the instrument requirements and concept design, down to the mission & spacecraft accommodation.
- Unusual approaches in any area need sufficient explanation & rationale.
- Processes should be appropriate for the complexity of the project and be understood and usable by all members of the team. “Is it good enough and are they using it?”
- Detailed discussion of specific risks and mitigations reflects the proposer’s depth of understanding and provides confidence in the mitigation plan.
- Incomplete information on key proposal elements, for example, traceability from science to implementation, the project schedule, or cost basis of estimate can be perceived as risk. If the information isn’t available be sure to explain the situation.
- Successful proposals avoid repetitive and “boilerplate” information and give priority to fully explaining the project’s benefits and risks.
- Provide the best information you can.
- Space science is difficult, all missions have challenges, and critical self assessment is the best way to establish credibility and confidence with the TMC.