Milky Way
Magnetic Field
Mapping
Mission

SMEX Program: Opportunities & Constraints

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Outline

- Welcome
- Meeting Goals
- Meeting Structure
- NASA's Small Explorer Program for 2000
- Timeline/Schedule for this Announcement of Opportunity (AO)
- Odd, Ends, & Technomagerialbabble
- Proposal Document Contents & Constraints
- Cost - M4's 900lb gorilla

Meeting Goals

- Highest Priority
  - Identify and describe the best science program which can be accomplished by M4 given SMEX program constraints
  - Identify and describe the most cost effective M4 implementation which will deliver the data required by the science program within SMEX constraints
  - Identify and deputize key individuals who will take responsibility for contributing components of the M4 proposal
  - Identify and describe a management plan for M4, including naming individuals in all key project positions

Meeting Goals II

- Priority
  - Identify trade studies and calculations which must be performed to support the M4 proposal
  - Identify individuals/units who will perform the trade studies and calculations
  - Identify high risk items in the instrument, S/C, operations, data processing/analysis, and management
  - Recommend alternatives or mitigations for high risk items
- Important
  - Build a strong team spirit and have some fun along the way
  - Identify ground-based or airborne studies which would help leverage M4 and vice-versa
  - Recommend potential reviewers to NASA
  - Gain increased understanding of space-based astrophysics mission elements and capabilities.

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Meeting Structure

- Two, overlapping meetings:
  - Science meeting - designing the best M4 science
  - Techniques meeting - designing the best M4 satellite
- Science First
  - Describe SMEX program
  - Describe M4/1997 Science, Implementation
  - Recent Science update (ISO, JCMT, etc.)
  - Revisit M4 Science Plan
- Hardware & Operations Second
  - Detectors
  - Dewars, Instrument
  - Spacecraft (S/C)
  - Operations
- Firm Writing Assignments
  - Red Team meets in 4 weeks

NASA's SMEX Program

- Part of the Explorer Program

Class	Cost	Frequency
UNEX	7.5M$	1 / yr
SMEX	75M$	1 / yr
MIDEX	150M$	1 / yr

- Last two SMEX calls for proposals (AOs)
  - 1997: M4
  - 1993: PIREX
- Rapid design, development, launch
- This year's AO specifies two launch dates:
  - prior to July 2003
  - prior to July 2004

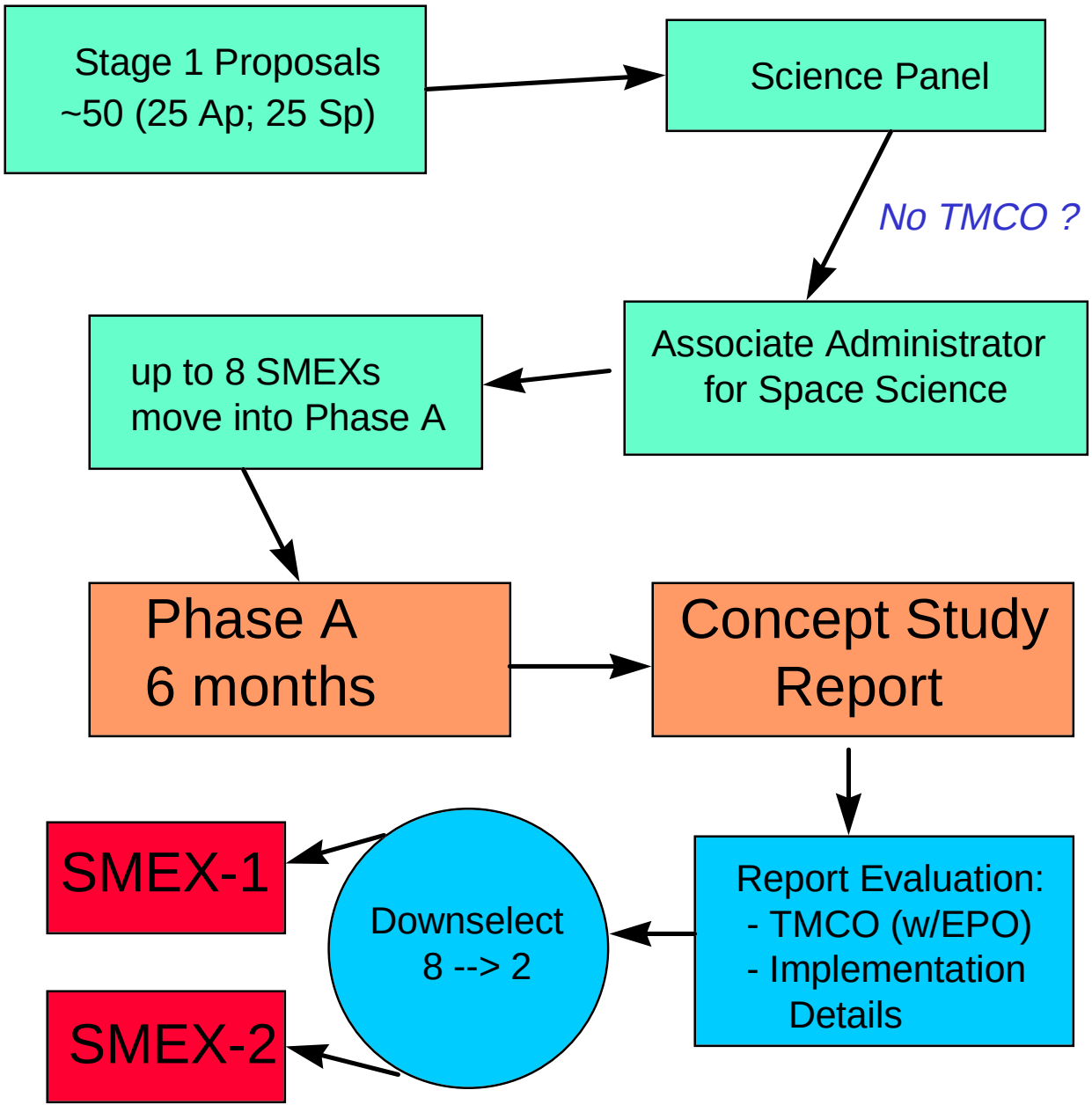
NASA Nomenclature Primer

- Project Phases:

Phase	Name	Notes
A	Concept Study	CSR; 6mo.; 0.45M$
B	Definition/Preliminary Design	PDR
C	Detailed Design	CDR
D	Development to Launch	L+30
E	Mission Operations & Data Analysis	PI retirement

- Launch Vehicles
  - (S)ELV - expendible launch vehicle (e.g. Pegasus)
  - LDB - long duration balloon (9-21 days)
  - Shuttle

SMEX 2000 Selection Process



Selection Timetable

AO Release	mid-October
Preproposal Conference	mid-November
LOI due	mid-November
Proposals due	mid-January 00
Phase A selections	April 00
Contracts awarded	May 00
Concept Study Reports due	November 00
Downselection	February 00

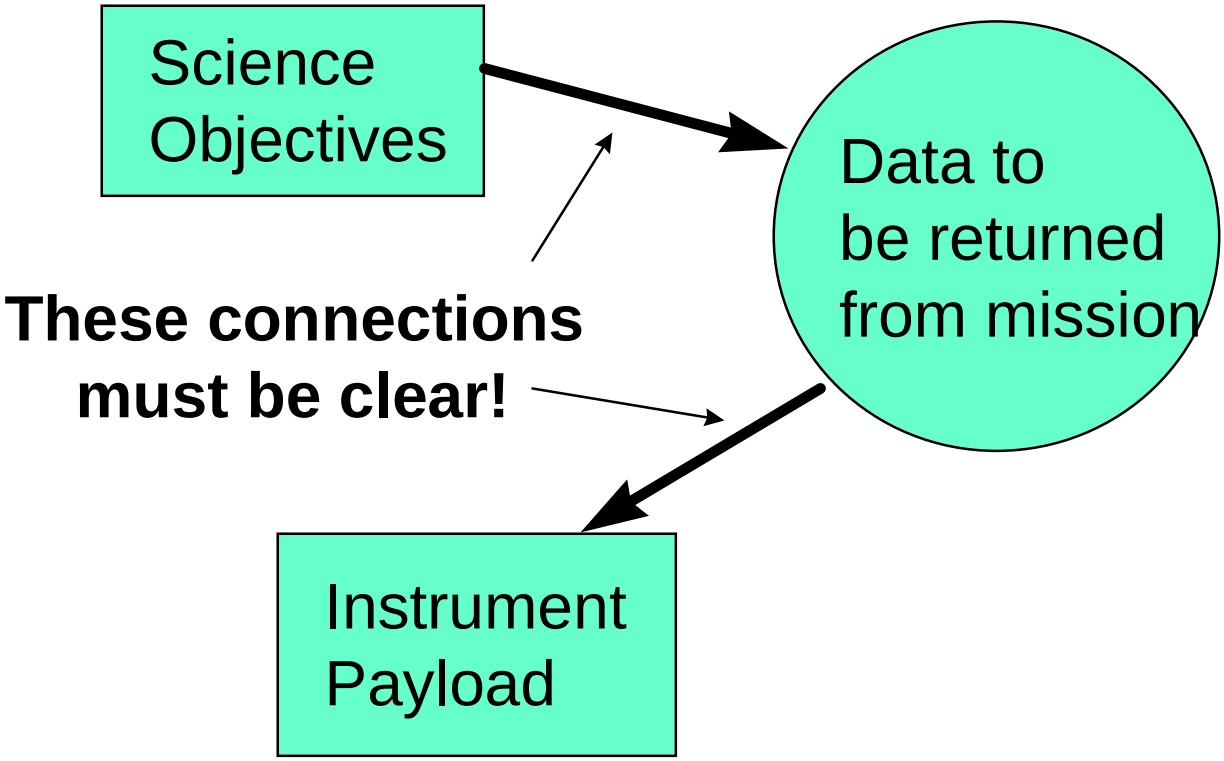
SMEX Goals, Components

- *"Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life"* (Nov '97 NASA pub.)
- Modest programmatic scope
  - focussed investigation
  - complement major flight missions
  - prove new science concepts
  - must *require* flight
- Innovative, streamlined, efficient management approaches
- Reduced cost
  - mission lifecycle costing
  - cost limits
  - full cost accounting
  - control processes (business, technical)
  - new technology

PI & Team

- Responsibility for implementing investigation
- Large degree of freedom to accomplish objectives
- Only essential NASA oversight (GSFC provided)
- Responsible for designing in and managing margins, reserves, and resiliency

Science Requirements & Data



- Team must:
  - Perform initial data analysis
  - Deliver data to NASA archive
  - Publish findings
  - Implement EPO program
  - Communicate results to public

Technical Approach Buzzwords

- Technical approach must be consistent with NASA Handbook NHB 7120.5 A *"Management of Major Systems Programs and Projects"*
- Product assurance consistent with ISO 9000 series
- Explorer Project Library
  - Library of on-line manuals, tables, and reports relevant to Explorer Program
  - SMEX Library separate from UNEX and MIDEX Libraries (why? dunno…)
  - http://explorer.larc.nasa.gov/explorer/epl.html

Odds and Ends

- Single PI leads Team
- "Co-Investigators" are paid to work on the project
  - directly by project
  - or, by home institution
    - must include such contributed costs in budget, as per "full cost accounting"
- Each project must have a Project Manager
  - selected by PI/Team (not NASA)
  - oversees technical implementation of mission
- *"Participation by non-US individuals and/or institutions as team members or contributors to Explorer investigations must be endorsed by the institutions and/or governments involved."*
- E&PO plan deferred until Phase A
  - expect to allocate 1-2% of budget (minus launch)
  -

Odds & Ends II

- Phase E (MO&DA) has no time constraint.
- SMEX/2000 cost cap is 75M$ in Y2000 $
  - "in year" $$ are going to be somewhat higher
- Can distribute funds across project phases and elements as best suits investigation
  - Gives more flexibility
  - Puts Phase E (MO&DA) at extreme risk
    - Instrument+S/C eat entire budget w/o controls
- "Total Mission Cost" can exceed "NASA Mission Cost"
  - contributions welcome
  - full cost accounting will add non-NASA costs
  - limit is 2x NASA Cost (e.g., 150M$)

Proposal Elements & Limits

- 30 page limit (with some exclusions)
  - including no more than 2 fold-outs
- TOC - 2 pages
- Science Investigation - 20 pages
  - Science Goals & Objectives
  - Science Implementation
    - Instrument
    - Mission
    - Data Analysis & Archiving
    - Science Team
- Mission Design - 8 pages
  - includes management, schedule, cost
  - also E&PO and SDB statement of compliance
- Appendices
  - Statemenst of Work (SOW)
  - Letters of Endorsement
  - Resumes
  - Acronyms List
  - Reference List

Milky Way Magnetic Field Mapping Mission

Cost - M4's 900lb gorilla

M4 Budget Overview - 1997 and 1999 (Costs in $1000)						
Category	1997			1999		Delta
			Ball ROM			
Science Team (inc. EPO)	$9,254			$9,000		-$254
Instrument	$18,577		*$19,689*	$18,500		-$77
S/C	$11,804		*$13,961*	$11,900		$96
Contingency (as % of Inst+S/C)	$3,529	11.62%		$6,080	20.00%	$2,551
(as % of non-launch total)		8.01%			13.85%	
I&T and Ground Sys.	$4,448			$4,500		$52
Launch (Pegasus)	$19,000			$25,000		$6,000
Total FY97 Dollars	$66,612					
Total FY00 Dollars				$74,980		