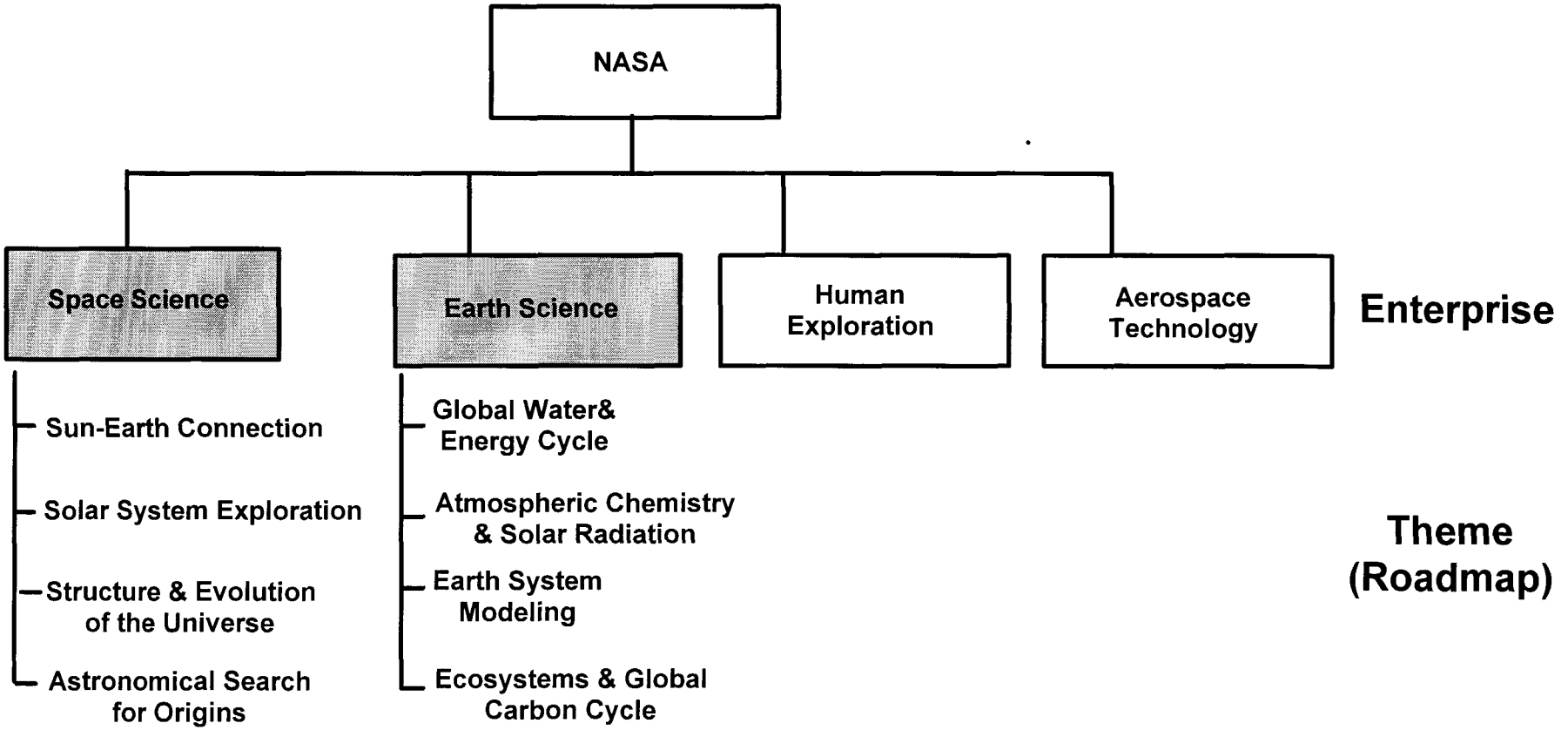
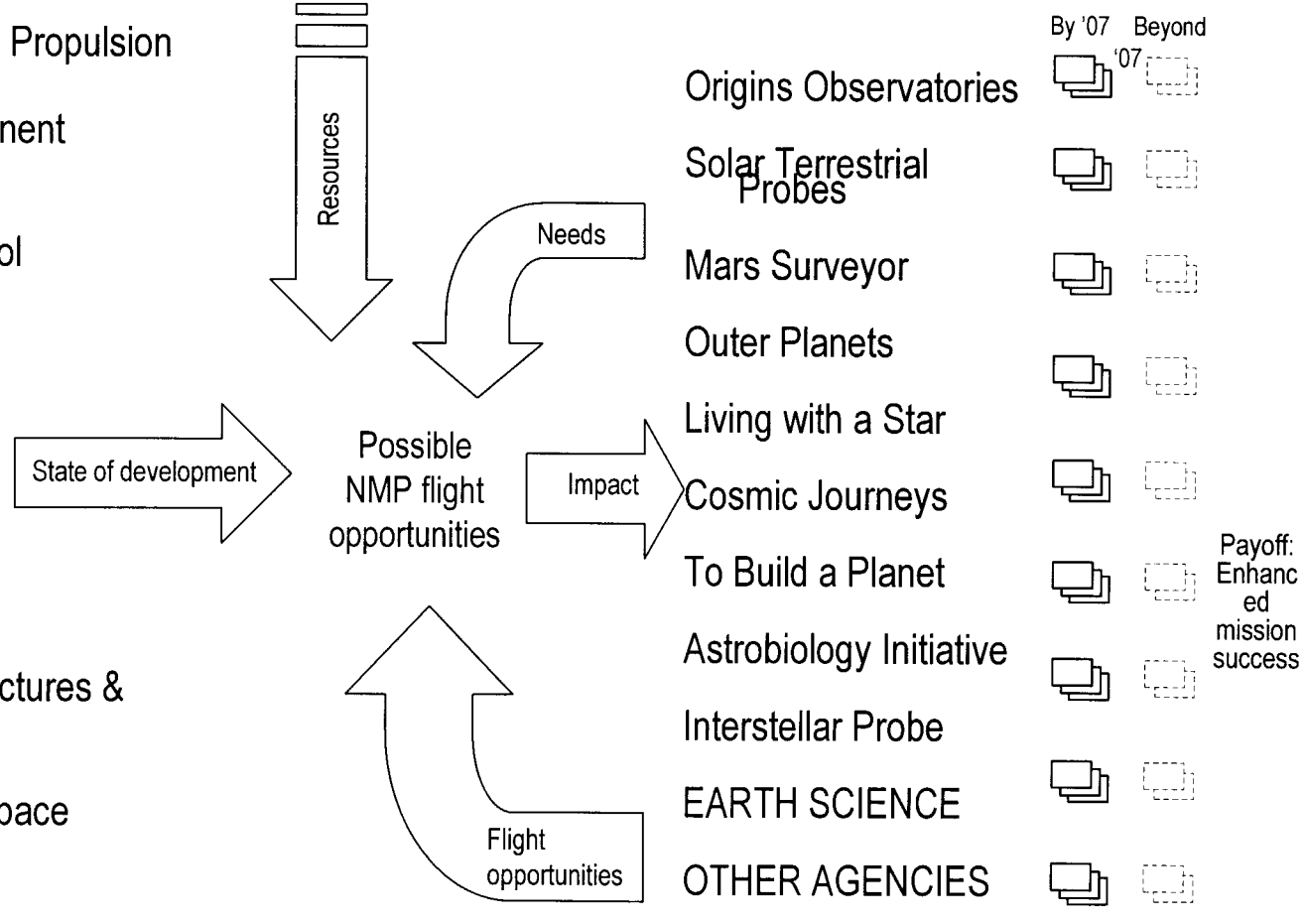
Richard Pomphrey
Jet Propulsion Laboratory
December 5, 2002

- New Millennium Program Context
- Information System Architecture
- Program Engineering Workbench
- Flight Option Analysis
- Mission Reference List / Database


NASA
Space Science
Earth Science
Human Exploration
Aerospace Technology
Enterprise
Sun-Earth Connection
Solar System Exploration
Structure & Evolution of the Universe
Astronomical Search for Origins
Global Water& Energy Cycle
Atmospheric Chemistry & Solar Radiation
Earth System Modeling
Ecosystems & Global Carbon Cycle
Theme (Roadmap)

Key Enabling Technology Capabilities	New Millennium Program	Mission Lines

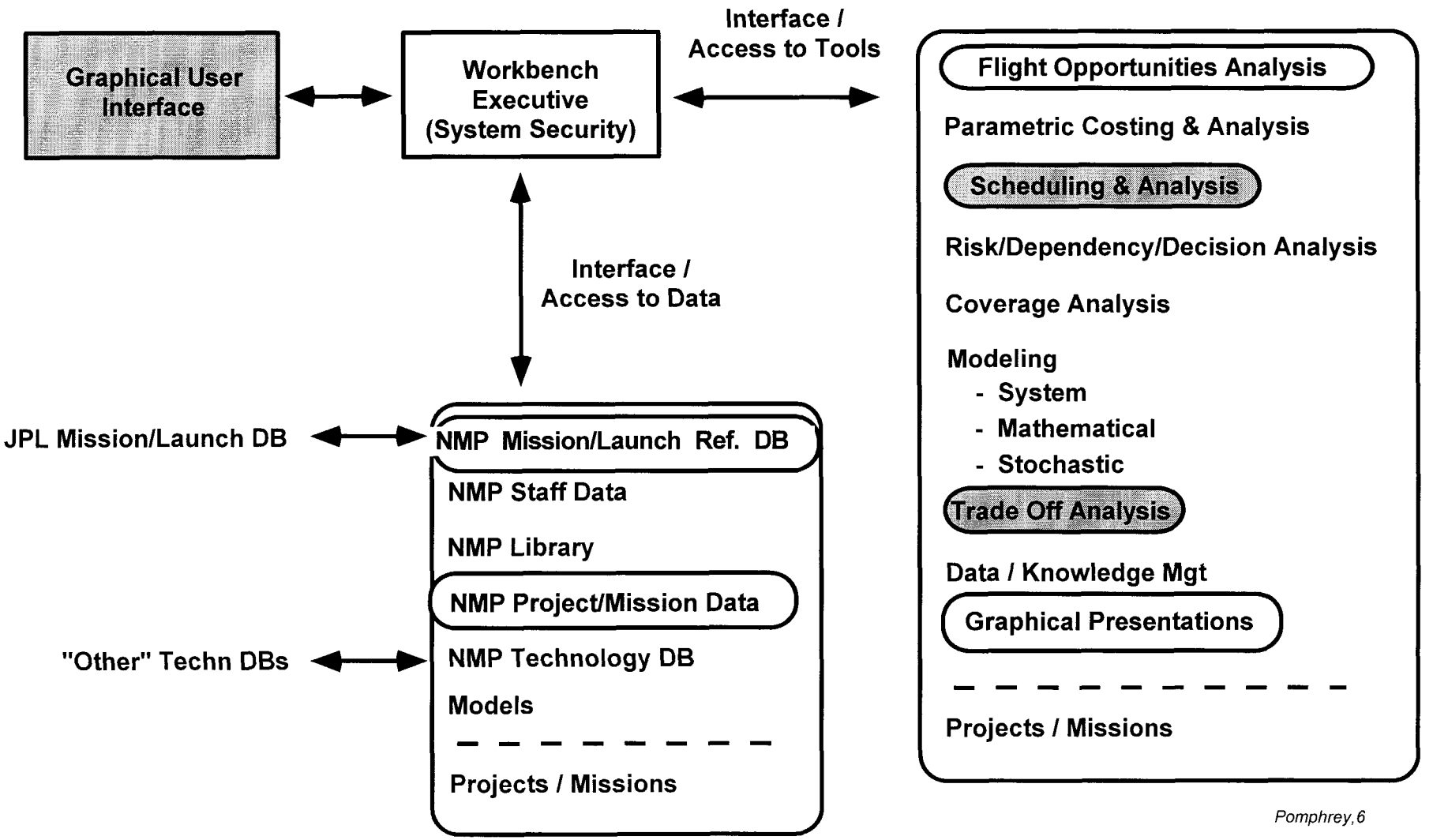
- Advanced Power & Onboard Propulsion
- Sensor & Instrument Component Technology
- Distributed Spacecraft Control
- High Rate Data Delivery
- Integrated Space Systems
- Micro-/Nano-Sciencecraft
- Surface Systems
- Ultra Lightweight Space Structures & Observatories
- Atmospheric Systems & In-space Operations
- Next Generation Infrastructure



- Program Objective: Reduce risk to NASA future missions by flight validating advanced technologies which enable / enhance future missions.

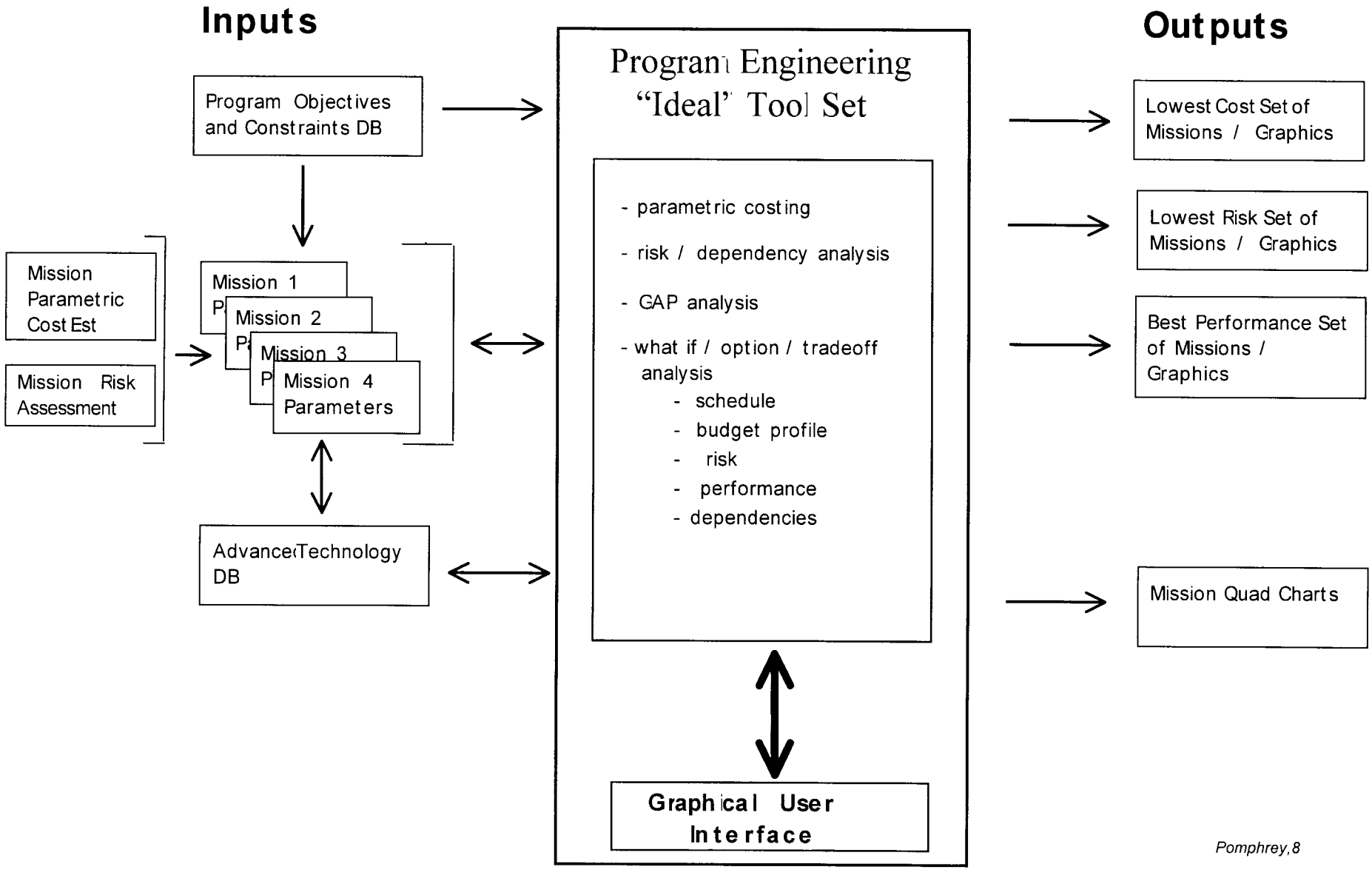
- Program Issues:
  - Multiple NASA customers
  - Multiplicity of Advanced Technology Candidates
  - Limited budget
  - Need to avoid duplication
  - Need to find rides / partnerships
  - Need standard means to track / report program and project status
    - budget
    - schedule
    - risk

- Program Engineering Products
    - Information System Architecture
    - NMP Program Engineering Workbench
    - NMP Flight Option Analysis
    - NMP Mission Reference List / Database


Graphical User Interface
Workbench Executive (System Security)
Interface / Access to Tools
Flight Opportunities Analysis
Parametric Costing & Analysis
Scheduling & Analysis
Risk/Dependency/Decision Analysis
Coverage Analysis
Modeling
- System
- Mathematical
- Stochastic
Trade Off Analysis
Data / Knowledge Mgt
Graphical Presentations
Projects / Missions
Interface / Access to Data
JPL Mission/Launch DB
NMP Mission/Launch Ref. DB
NMP Staff Data
NMP Library
NMP Project/Mission Data
"Other" Techn DBs
NMP Technology DB
Models
Projects / Missions

- - An integrated set of processes and tools.
- To assist human expertise in the creation, analysis, and management of Program data.

- Reflects major constituent elements of the NMP
- Provides means to identify & track interdependencies
- among major program elements.
- Provides capability to conduct architectural trade-off
- and “what-if” studies.
- - Provides access to and visibility into high level data.


Inputs
Program Objectives and Constraints DB
Mission Parametric Cost Est
Mission Risk Assessment
Mission 1
Mission 2
Mission 3
Mission 4
Parameters
Advance Technology DB
Program Engineering "Ideal" Tool Set
- parametric costing
- risk / dependency analysis
- GAP analysis
- what if / option / tradeoff analysis
- schedule
- budget profile
- risk
- performance
- dependencies
Graphical User Interface
Outputs
Lowest Cost Set of Missions / Graphics
Lowest Risk Set of Missions / Graphics
Best Performance Set of Missions / Graphics
Mission Quad Charts

Virtual PC "Windows 2000 Professional"

NMP 021011: Analysis Date=<12/02/2002>

File Tools Preferences Configuration

Current Object:

Space Science

Program Heading

Objects
- NMP
  - Earth Science
    - EO-3
  - Space Science
    - ST5
    - ST6
    - ST6-New
    - ST7
    - ST8
    - ST9
    - stj
      - flt exp
    - STN
      - Access to Space
      - Flt Exp
    - STX
      - Access to Space
      - Flight Exp
    - STY
      - Access to Space
      - Carrier
      - Flight Experiment

Library | Wizards | Contacts | General | Categories | Spending

Milestones | **Budget** | Schedule | Objectives | Dependencies | Risk

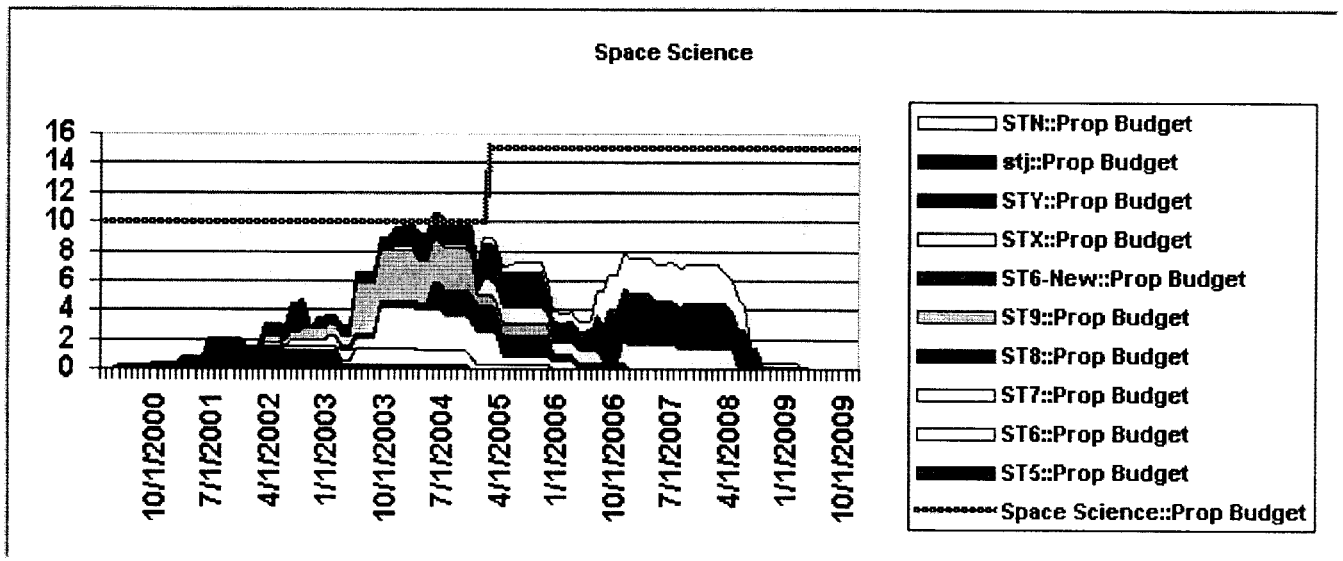
Budget

Phase	Time Period	Prop Budget ($M)
Total		
	2/1/2000	
	3/1/2000	
	4/1/2000	
	5/1/2000	0.24
	6/1/2000	0.24
	7/1/2000	0.24
	8/1/2000	0.24
	9/1/2000	0.24
	10/1/2000	0.24
	11/1/2000	0.36
	12/1/2000	0.36
	1/1/2001	0.36
	2/1/2001	0.36

Funding Cap

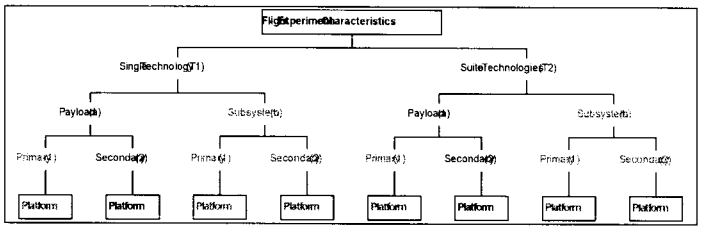
Phase	Time Period	Cap ($M)
Total		1500.
Approved	1/1/2000	10.
Approved	2/1/2000	10.
Approved	3/1/2000	10.
Approved	4/1/2000	10.
Approved	5/1/2000	10.
Approved	6/1/2000	10.
Approved	7/1/2000	10.
Approved	8/1/2000	10.
Approved	9/1/2000	10.
Approved	10/1/2000	10.
Approved	11/1/2000	10.
Approved	12/1/2000	10.
Approved	1/1/2001	10

Save Cap Data & Update Plot

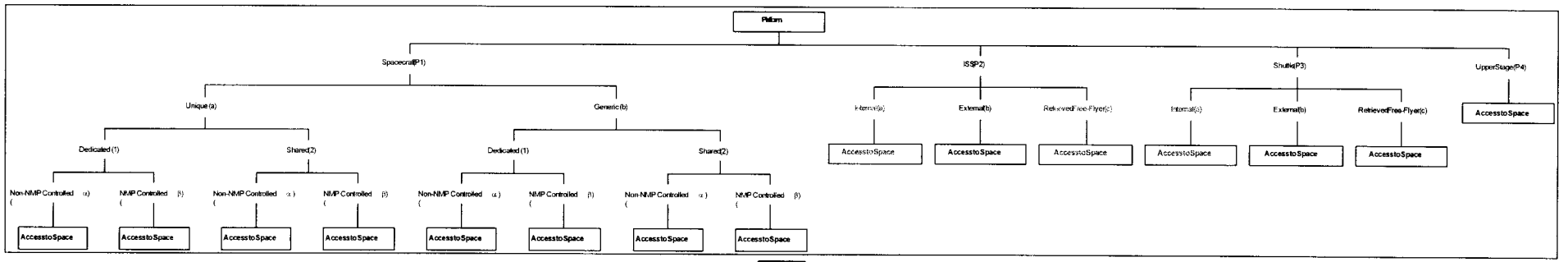


- A Tool that identifies, parameterizes and compares
- - costs
- - risks
- - benefits
- of flight options
- for validating NMP Advanced Technologies

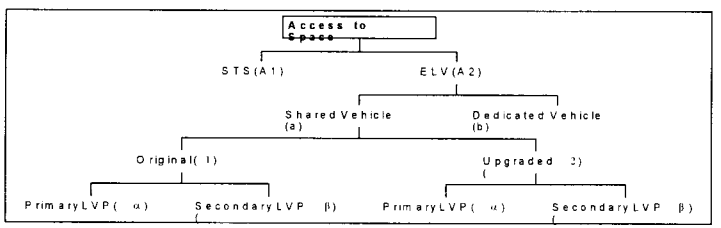
Flight Experiment Characteristics



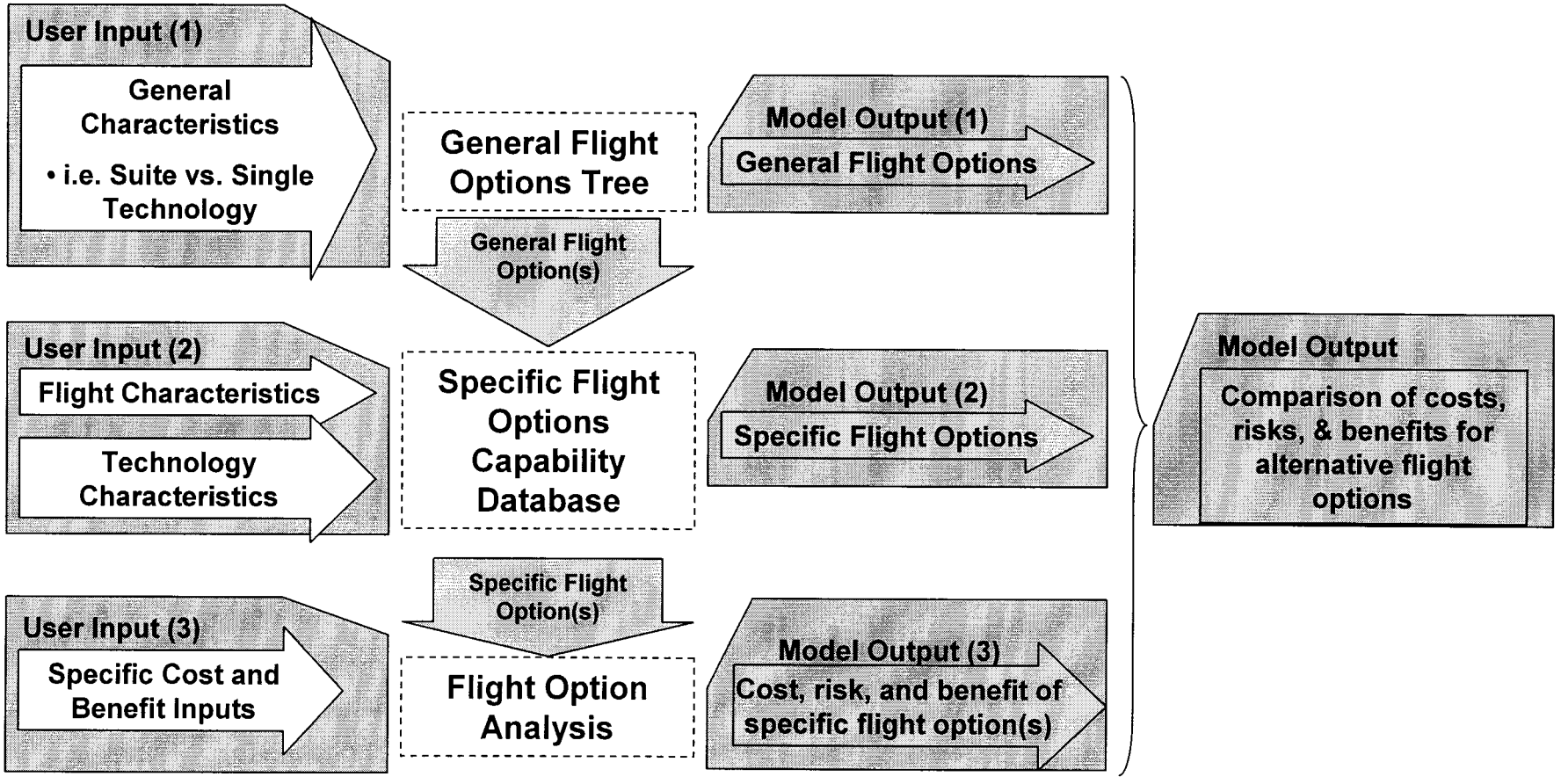
Platform



Access to Space



Excel Model

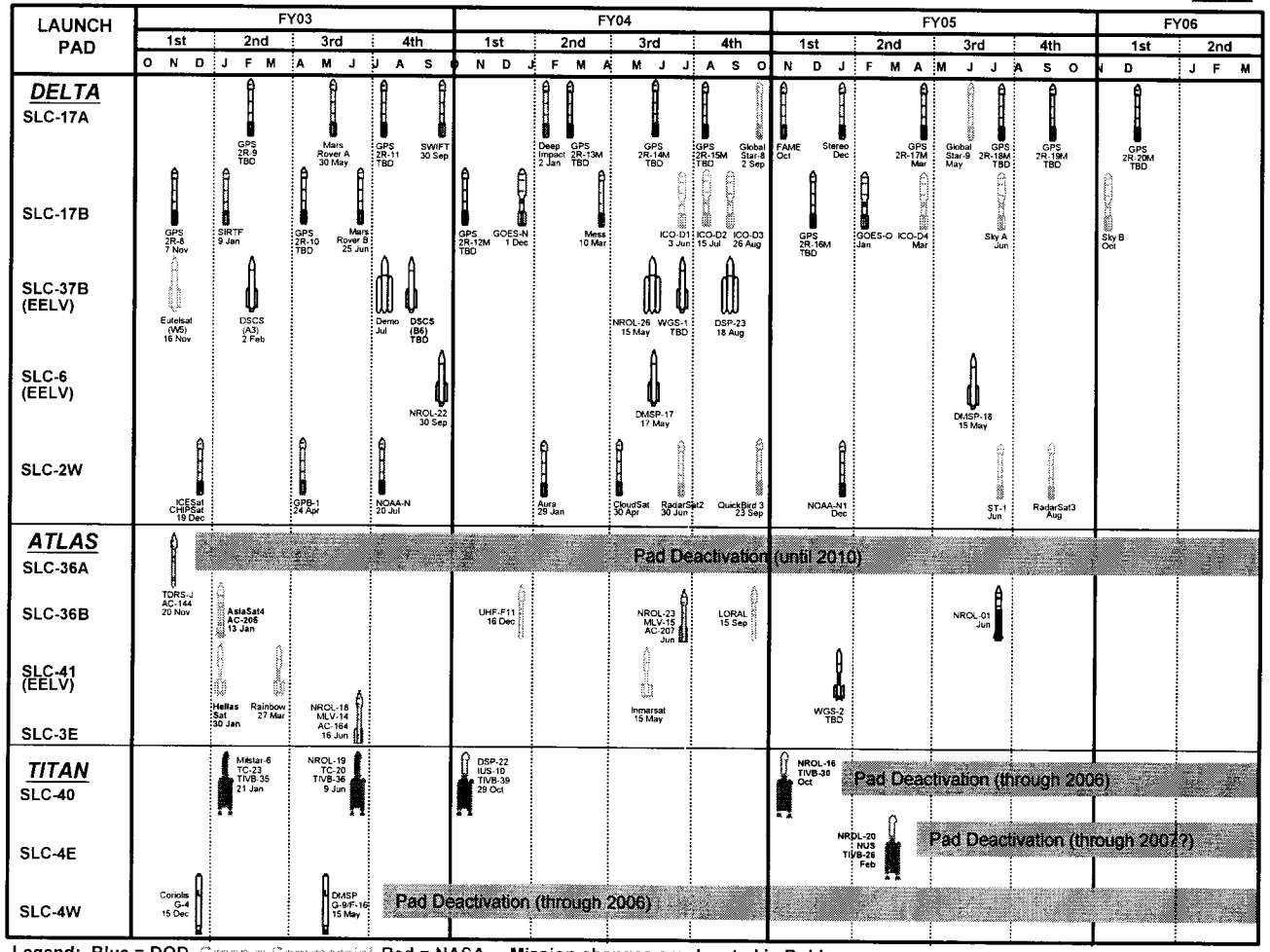

User Input (1)
General Characteristics
• i.e. Suite vs. Single Technology
General Flight Options Tree
General Flight Option(s)
Model Output (1)
General Flight Options
User Input (2)
Flight Characteristics
Technology Characteristics
Specific Flight Options Capability Database
Model Output (2)
Specific Flight Options
Specific Flight Option(s)
User Input (3)
Specific Cost and Benefit Inputs
Flight Option Analysis
Model Output (3)
Cost, risk, and benefit of specific flight option(s)
Model Output
Comparison of costs, risks, & benefits for alternative flight options

FOR OFFICIAL USE ONLY

Delta/Atlas/Titan

14-Quarter Launch Forecast

Chart shown in local time



Legend: Blue = DOD, Green = Commercial, Red = NASA Mission changes are denoted in Bold

As of: 21 OCT 2002