

***Space Environment Testbed Pre-NRA Workshop
Goddard Space Flight Center
January 25-26, 2001***



**The Living with a Star Program
Space Environment Testbed**

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Space Environment Testbed Implementation



Living With a Star Space Environment Testbeds

Objective

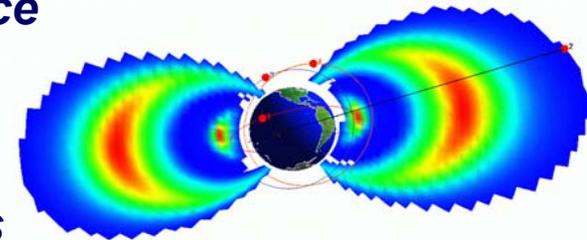
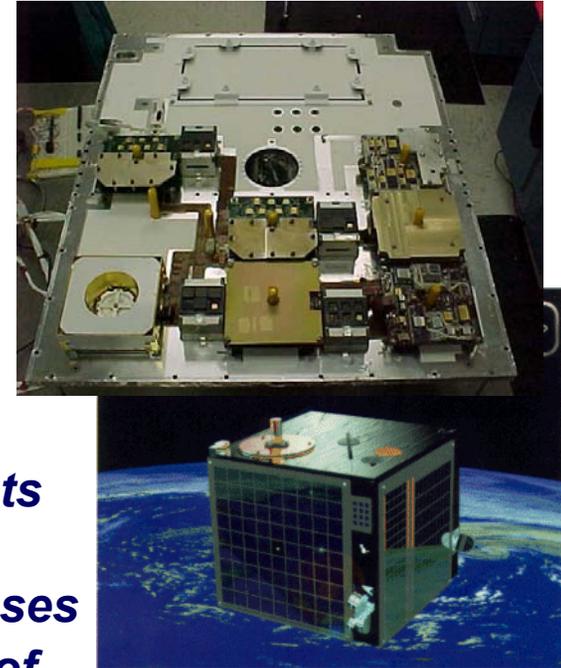
Improve the engineering approach to accommodate and/or mitigate the effects of solar variability on spacecraft design & operations

Approach

- Collect data in space to validate new & existing ground test protocols for the effects of solar variability on emerging technologies & components***
- Develop & validate engineering environment prediction & specification models, tools, & databases***
- Collect data in space to validate the performance of instruments for LWS science missions & new space technology***

Scope

Spacecraft hardware & design /operations tools whose performance changes with solar variability





Objective

Improve the engineering approach to accommodate and/or mitigate the effects of solar variability on spacecraft design & operations

- ***Systems must perform in complex Sun-Earth environments which vary with solar activity***
 - *Long term solar cycle*
 - *Events on the Sun*
- ***Variable environments pose challenge for system developers***
 - *Design phase*
 - *Operational phase*
- ***Engineering models, databases, guidelines are used to assure performance of systems***
 - *Inputs*
 - *Estimates of environment levels*
 - *Results of ground test protocols*
 - *Inaccuracy in Engineering Tools – Design Margins, Reliability Issues*
- ***Large uncertainties in accommodation/mitigation techniques preclude reliable use of environmentally sensitive technologies***
- ***Engineering tool development & validation efforts have not kept pace with technology changes***



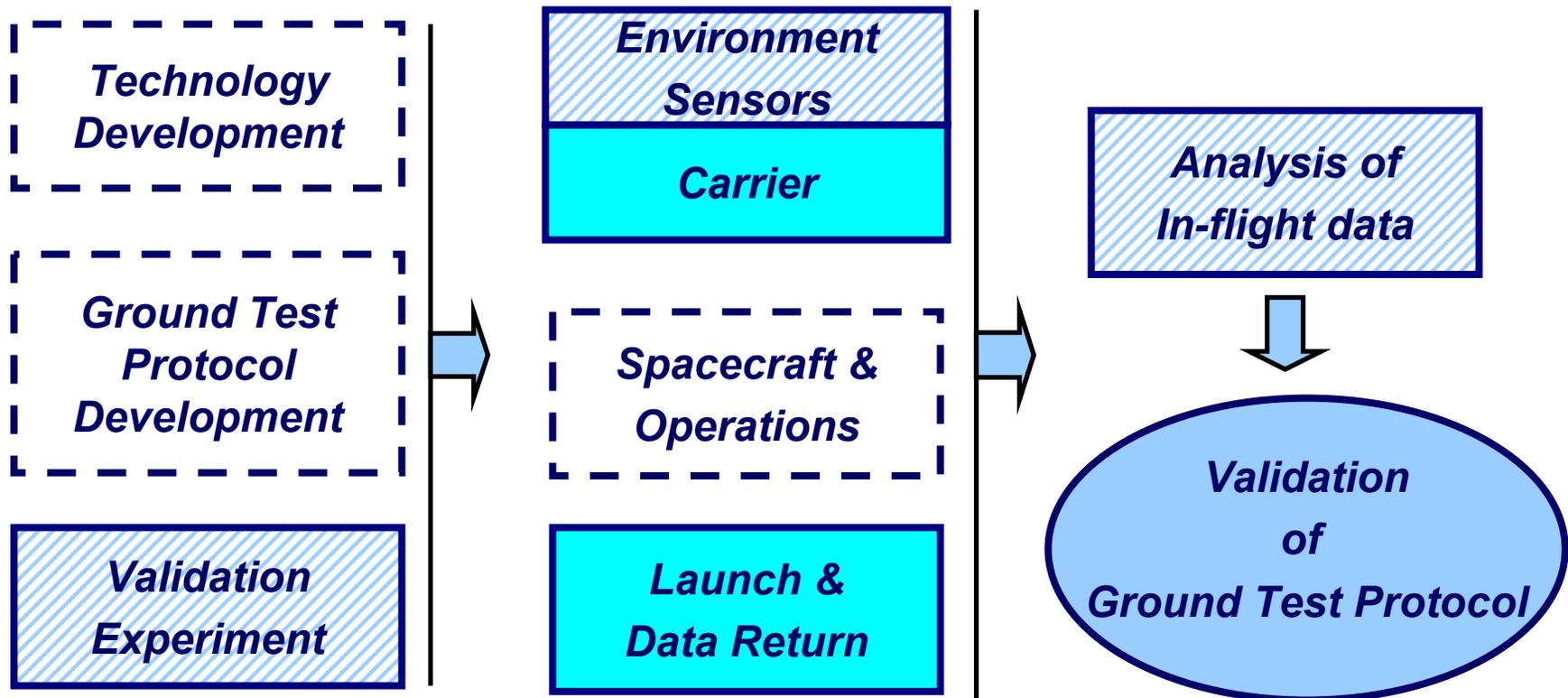
Changes in System Design Environment

- ***Demise of environment hardened market***
- ***Commercial demand for electronics***
- ***Short mission development times***
- ***Smaller, lighter spacecraft***
- ***More demanding mission requirements***
- ***Desire to operate in more severe environments***

- ***Consequences***
 - ***Use of commercial off the shelf (COTS) components***
 - ***Use of emerging technologies***
 - ***Higher environment specifications***
- ***Result***
 - ***Risk avoidance → Risk management***
 - ***Accommodations in Design Phase → Accommodations in Flight***
 - ***Capability is eroded with environment accommodation overhead***

Task 1

Collect data in space to validate new & existing ground test protocols for the effects of solar variability on emerging technologies & components



This NRA



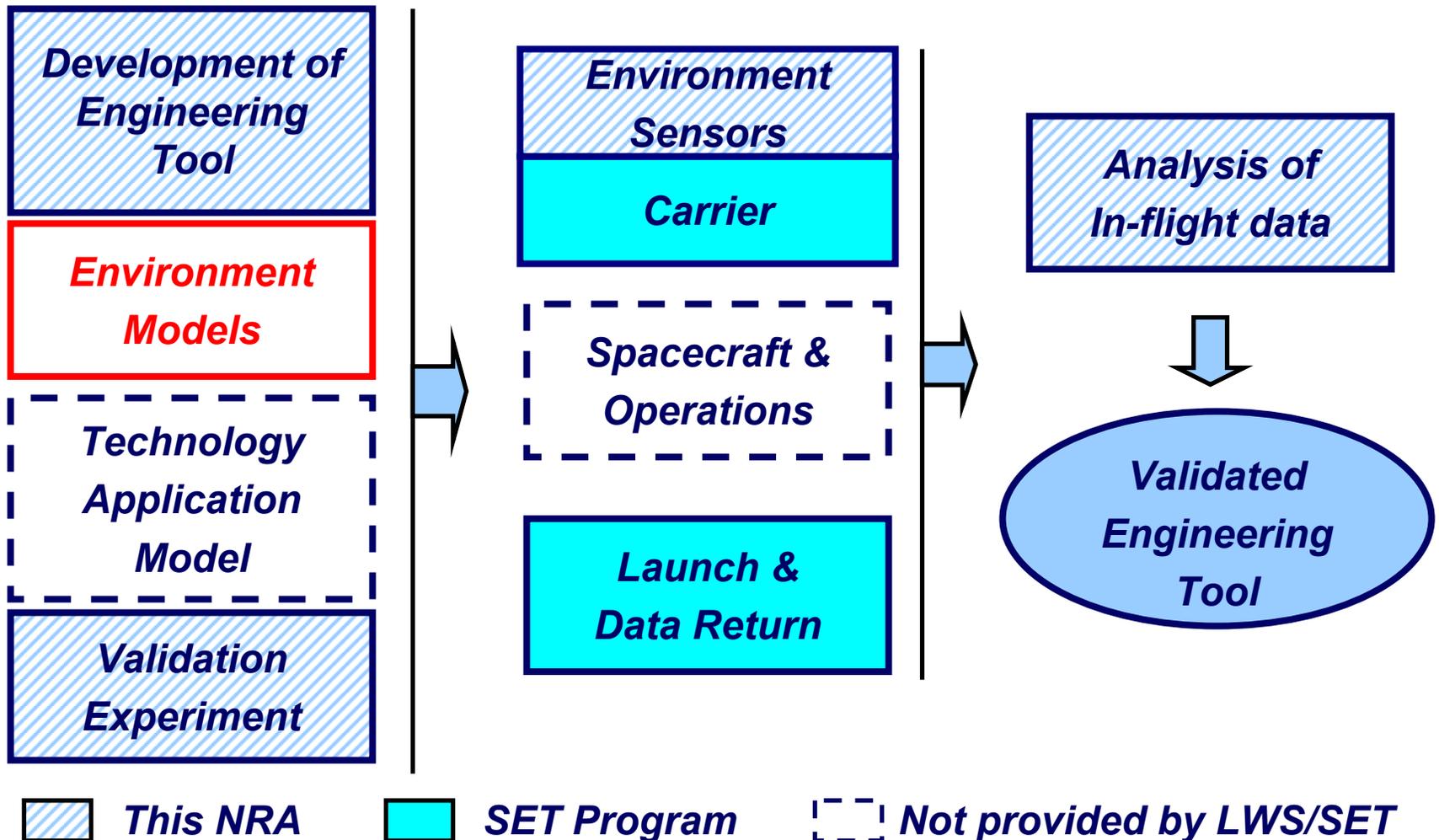
SET Program



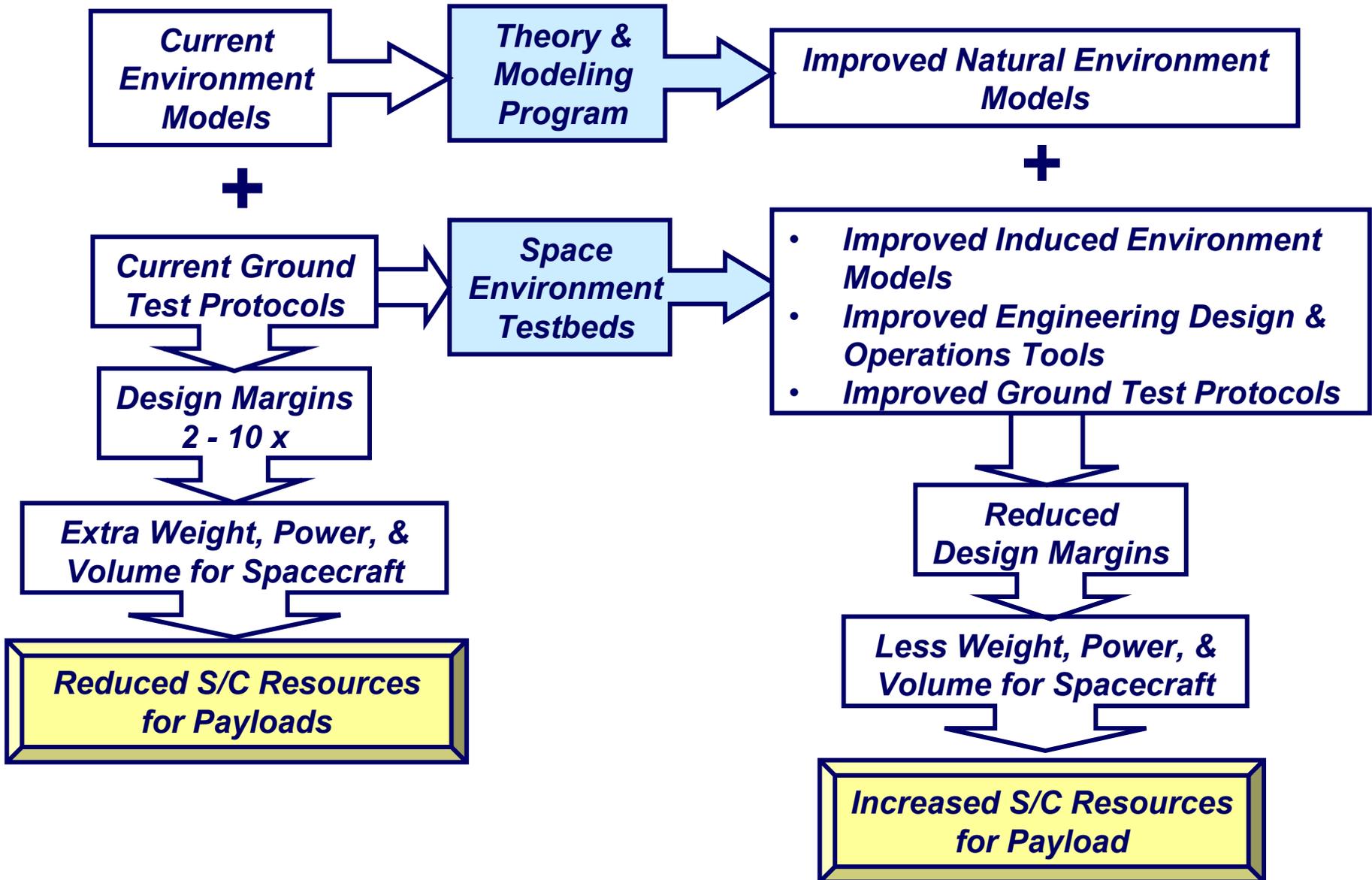
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Task 2

Develop & validate engineering environment prediction & specification models, tools, & databases

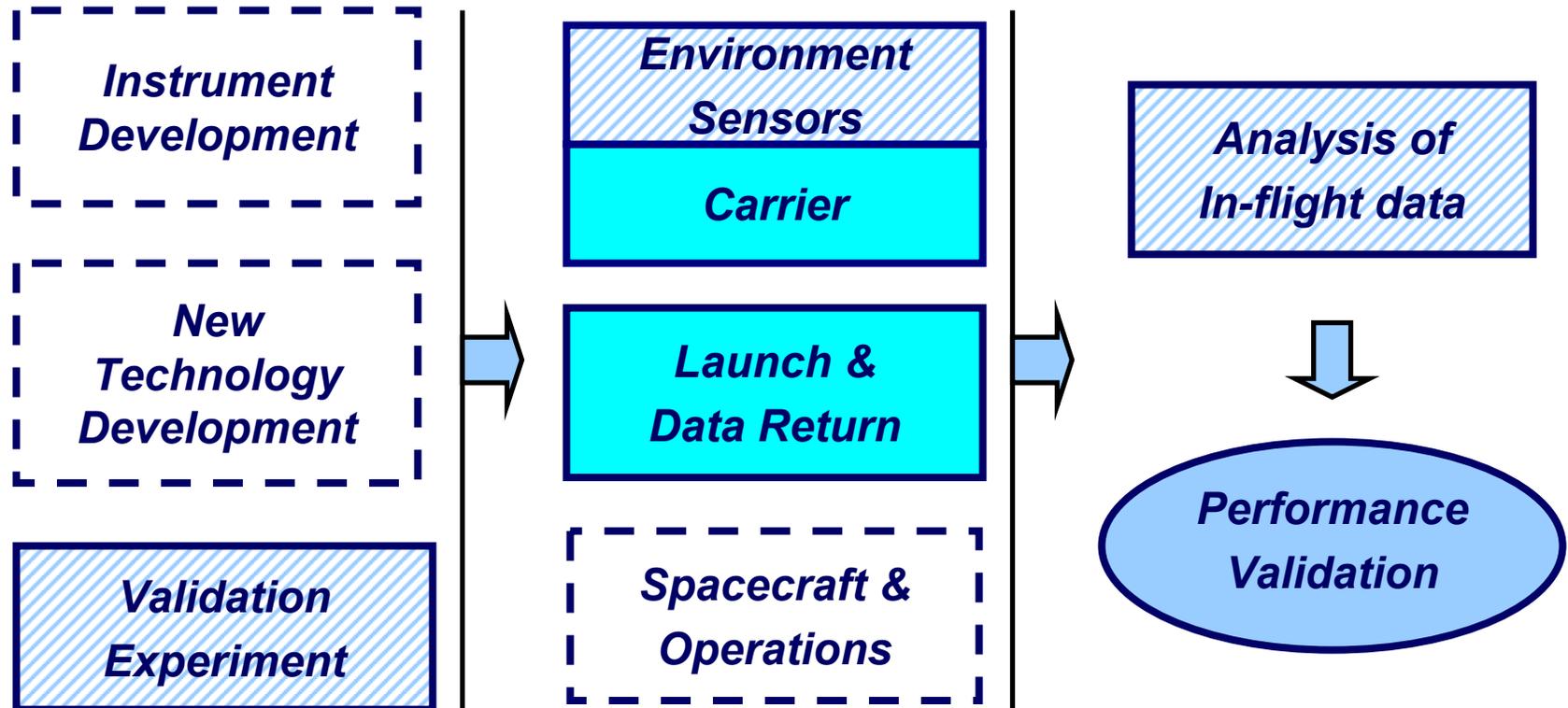


Reduced Design Margins for Increased Payload Capability, Lower Risk



Task 3

Collect data in space to validate the performance of instruments for LWS science missions & new space technology



 *This NRA*

 *SET Program*

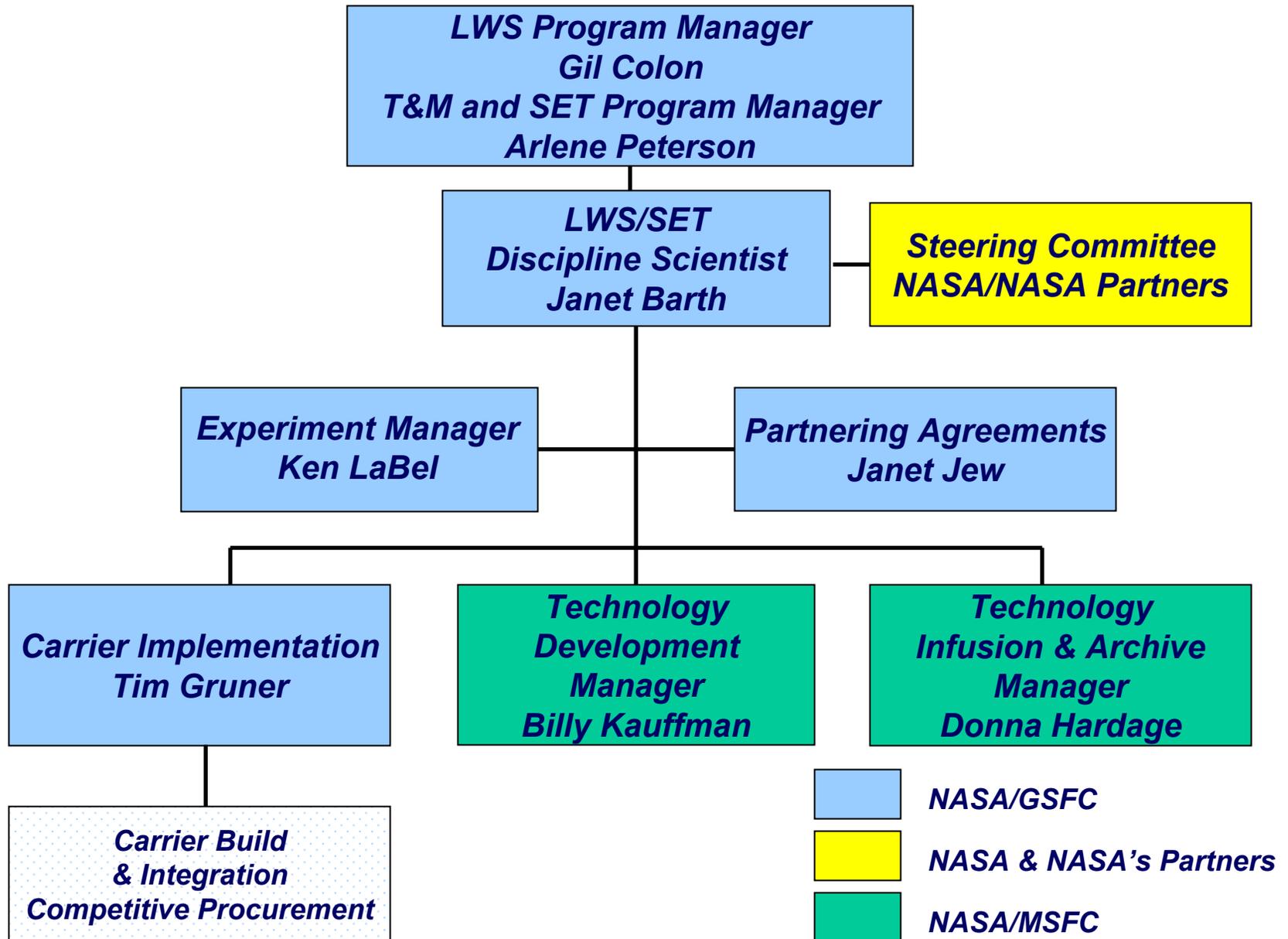
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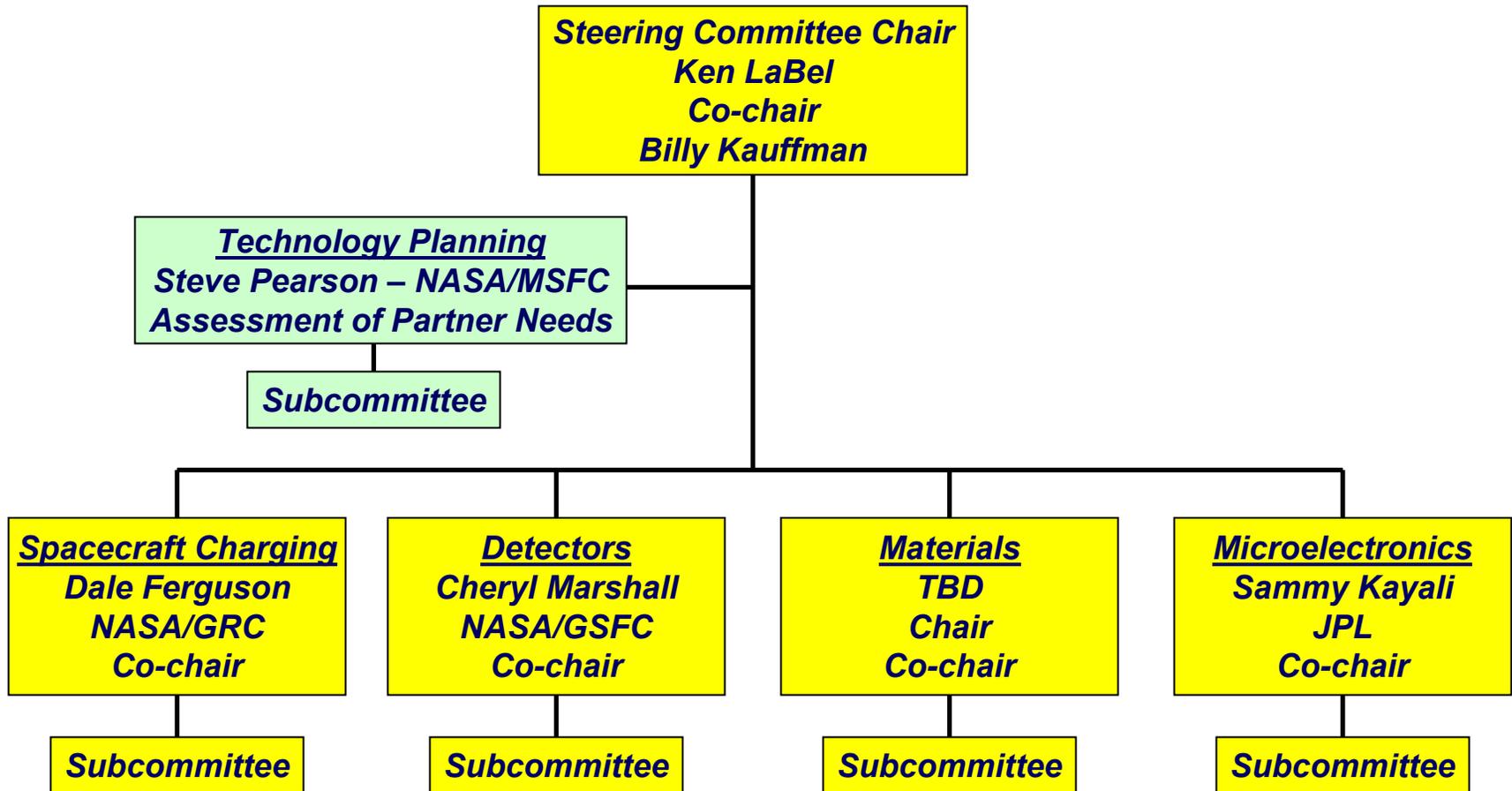
SET Implementation

- ***Establish Steering Committee***
- ***Design modular carrier concepts to capitalize on launch opportunities***
- ***Fly orbiting testbed every 2 years – First in late 2003 - early 2004***
- ***Hold bi-yearly workshops***
 - ***Requirements definition & partnering***
 - ***Presentations of results***
- ***Fund NASA Research Announcements***
 - ***Technology Development***
 - ***Database, Engineering Tools, Guidelines***
 - ***Sensor development for testbeds***
 - ***Support for experiment build for technologies of interest to NASA/Industry***
 - ***Analysis of testbed data/Data Mining***
 - ***Validation of ground test protocols and prediction techniques***
- ***First solicitation anticipated in February/March 2001***
- ***Leverage off other programs***

LWS/SET Organization



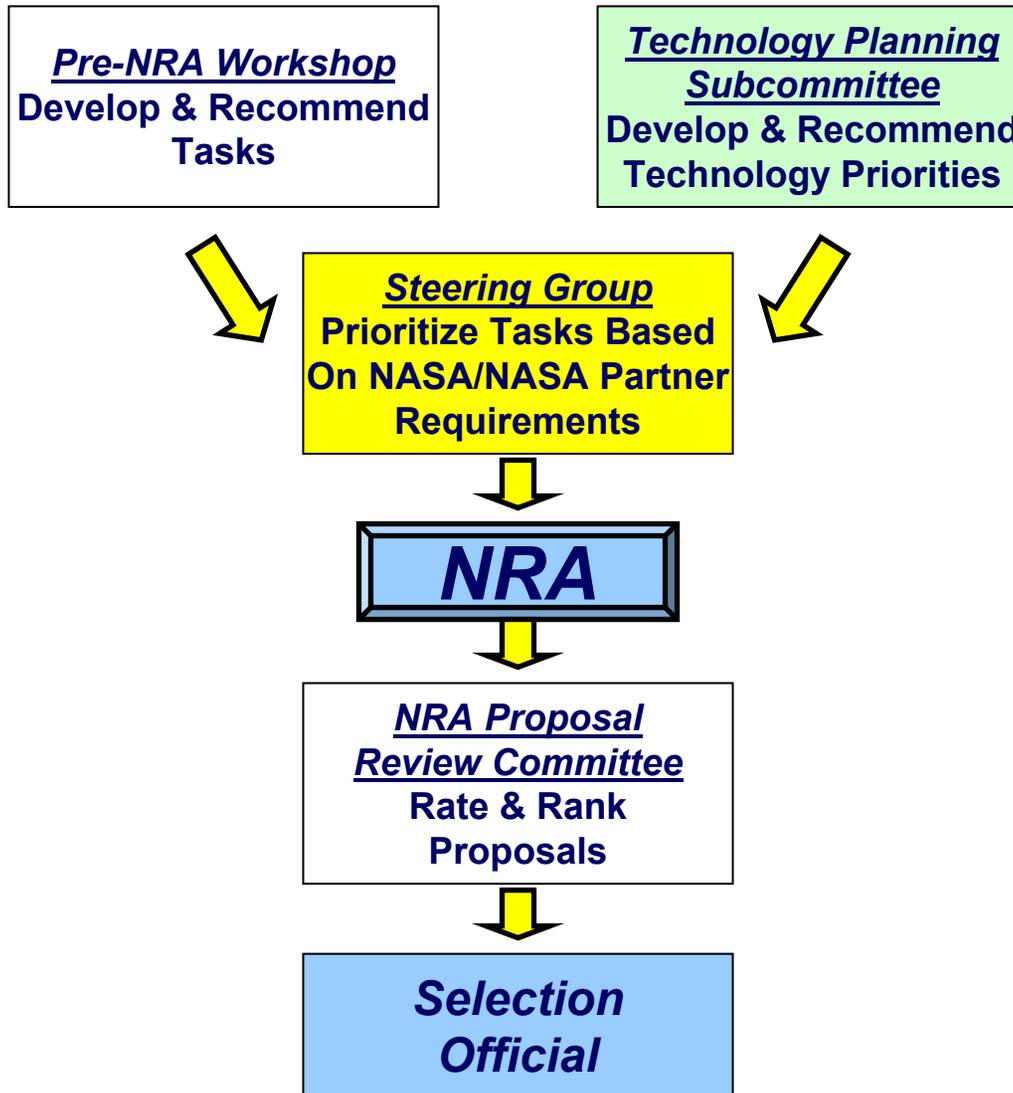
LWS/SET Steering Committee Structure



Subcommittee – Organizations make integrated recommendation through their subcommittee representative.



NRA Task Prioritization

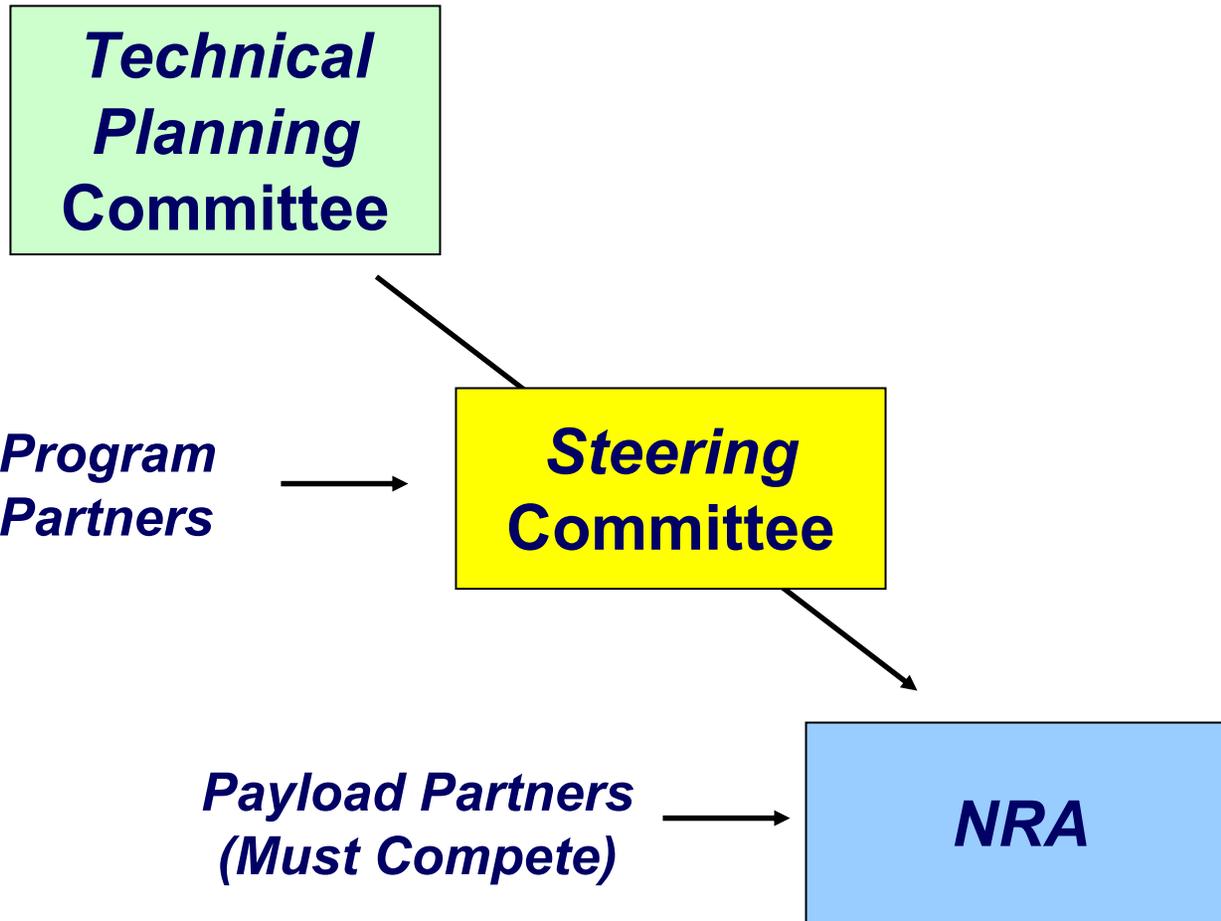




Three Options for Partnering

- ***SET Partners: Partners contribute to the success of the LWS/SET Program***
 - *Agree on objectives and requirements*
 - *Participate in all Program aspects*
- ***SET Carrier Partners: Partners contribute to the success of the Carrier***
 - *Retain separate requirements & objectives*
 - *Obtain allocation of spacecraft resources to achieve objectives*
- ***Payload Partners: Partners contribute “payloads” in exchange for on-orbit operation, launch, & data return***
 - *“Payload” includes ground test data if appropriate, on-orbit data after reduction, & funding for integration and on-orbit operations*
 - *Variations in definitions of “payloads” are negotiable; “funding” can include in kind exchanges*

How to Partner





NRA Details

- ***NASA Contribution – \$5M***
 - *\$1M - Data mining & Engineering tool development*
 - *\$4M - Superior proposals for experiments & experiment concepts & Collateral environments measurements*
- ***Partnering/Leveraging on NRA Proposals is strongly encouraged***
- ***Estimated length of award***
 - *2 years - Data mining & Engineering tool development*
 - *3 years - Others*