



SORCE

Solar Radiation and Climate Experiment

2020 Sun-Climate Symposium

Jan. 27-31, 2020

SORCE, Management in a Civilized Time **Tom Sparn, Bill Ochs, Rob Fulton**

LASP/University of Colorado

NASA GSFC

Orbital Sciences Corporation





True Partnership

A true Partnership between; Government, University and Industry existed on SORCE

partnership noun

part·ner·ship | \ 'pärt-nər-,ship also 'pärd- \

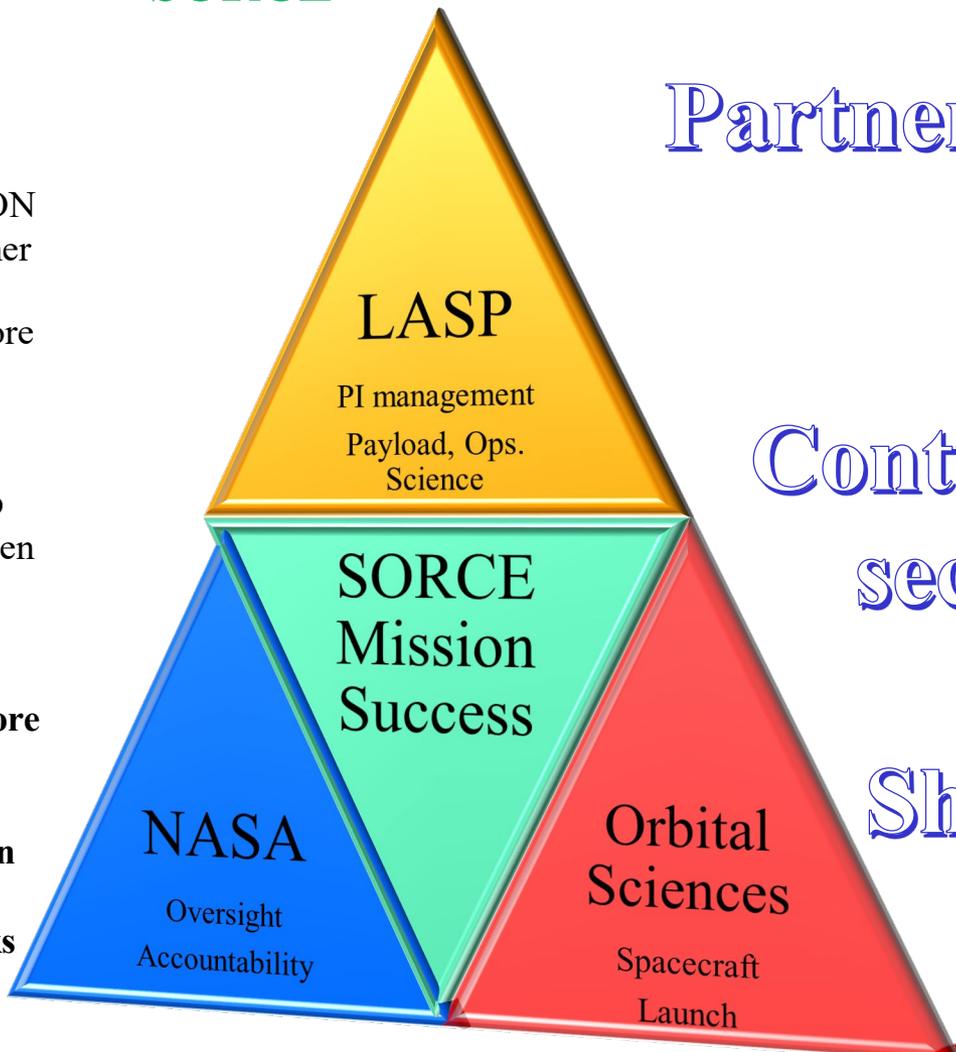
Definition of partnership

1: the state of being a partner : PARTICIPATION
scientists working in partnership with each other

2a: a legal relation existing between two or more
persons contractually associated as joint
principals in a business

3: a relationship resembling a legal partnership
and usually involving close cooperation between
parties having specified and joint rights and
responsibilities

4: a type of organization in which two or more
organizations pool money, skills, and other
resources, and share success and failure in
accordance with terms of the agreement. In
a partnership the participants in an
enterprise agree to share the associated risks
and rewards proportionately.



Partnership
first.

Contracts
second.

Shared
risk.

Was SORCE a SUCCESS?

- SORCE mission was delivered under budget and on schedule
- All Science objectives were achieved and exceeded
- SORCE returned \$3M and never used any NASA reserves
- SORCE received 8 major achievement awards and many individual awards



The 2005 OMB assessment of NASA management, listed SORCE in the top 5 of the best managed programs at NASA

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SATELLITE MISSION TEAM MEMBERS RECEIVE PRESTIGIOUS NASA AWARDS

Team members for NASA's Solar Radiation and Climate Experiment, or SORCE, satellite that was designed, built and currently is controlled by the University of Colorado at Boulder have received two major awards from the agency.

Gary Rottman, a senior research associate at CU-Boulder's Laboratory for Atmospheric and Space Physics and the SORCE mission's principal investigator, accepted NASA's Group Achievement Award on behalf of the SORCE team Aug. 24. The award is made for outstanding contributions to the success of NASA's overall mission.

In addition, SORCE Program Manager Tom Sparr of LASP received NASA's Public Service Award for outstanding leadership and distinguished contributions to the SORCE mission. The prestigious medal is awarded to non-NASA employees for exceptional contributions to NASA's overall mission.

Launched in January 2003 to study how and why variations in the sun affect Earth's atmosphere and climate, the spacecraft has performed flawlessly, according to NASA officials. The two awards follow a successful 18-month evaluation by NASA, a milestone used to determine mission success.

A NASA evaluation in June 2003 ranked the SORCE mission as excellent in all categories, including quality, timeliness, cost and leadership. Less than 4 percent of all NASA missions receive excellent ratings in all categories.

Scientists and students at CU-Boulder are using data from SORCE and information from other satellites to understand climate change, climate prediction, atmospheric ozone and ultraviolet-B radiation. LASP researcher Tom Woods is the project scientist for the SORCE team.

For more information on the SORCE mission, visit the Web site at: <http://lasp.colorado.edu/sorce>.

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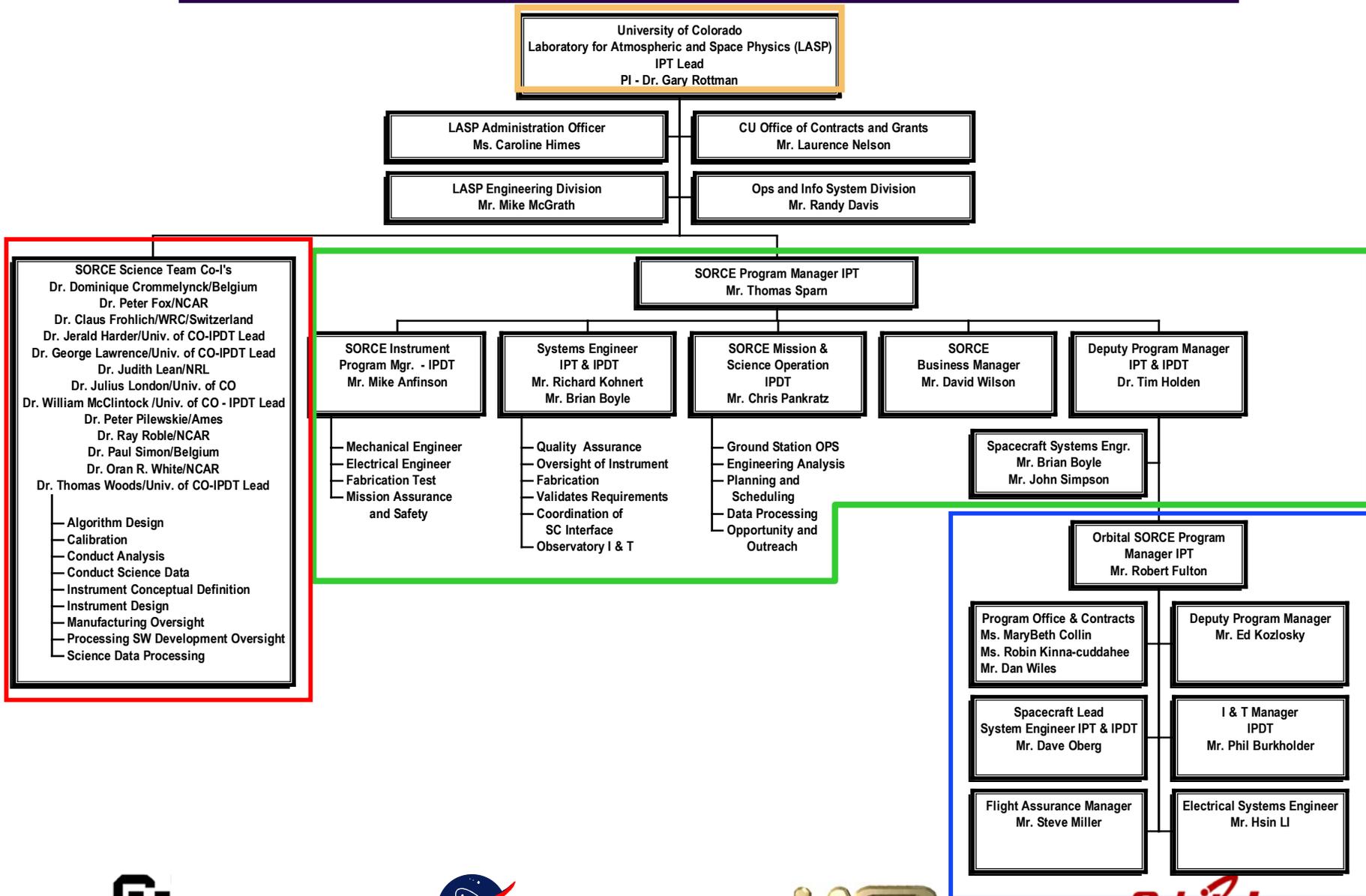


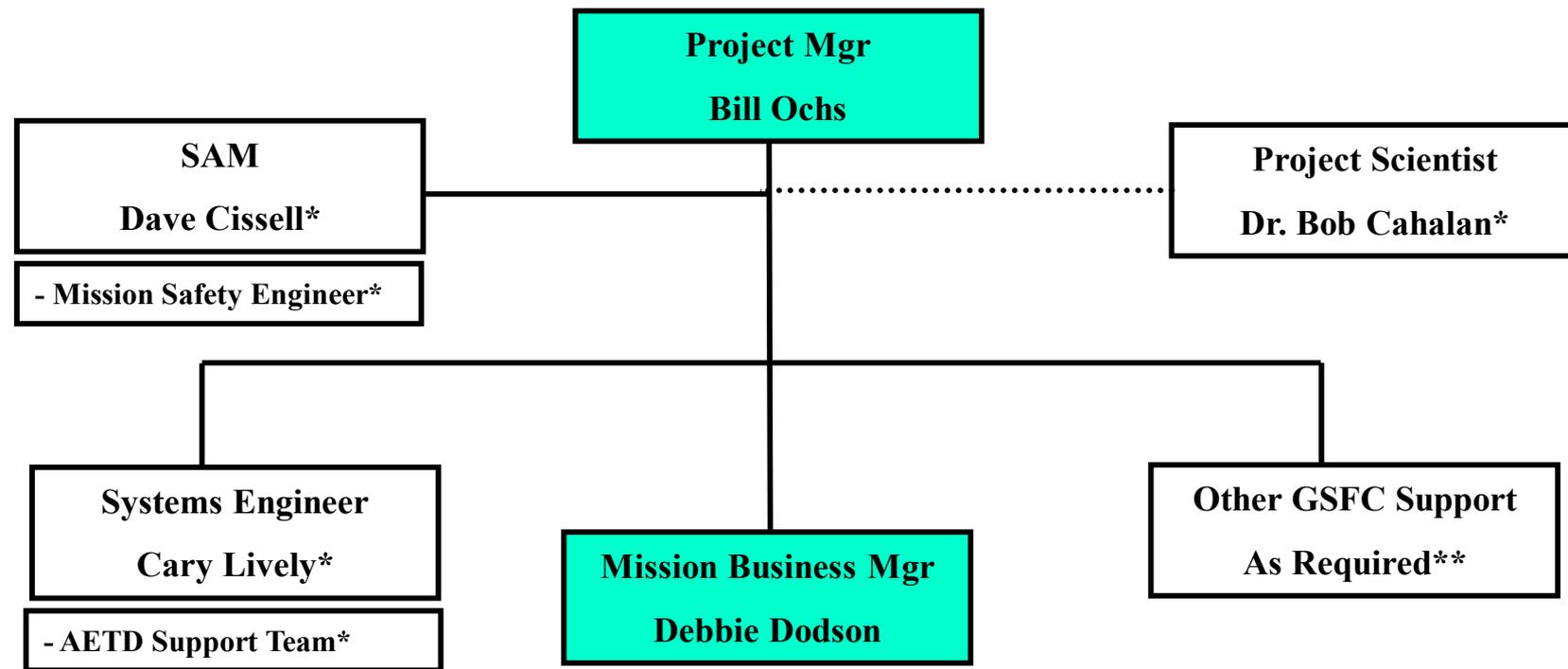
Scope of SORCE mission inflated to 2020 Dollars.

\$288M

Orbital







***Part Time Support**

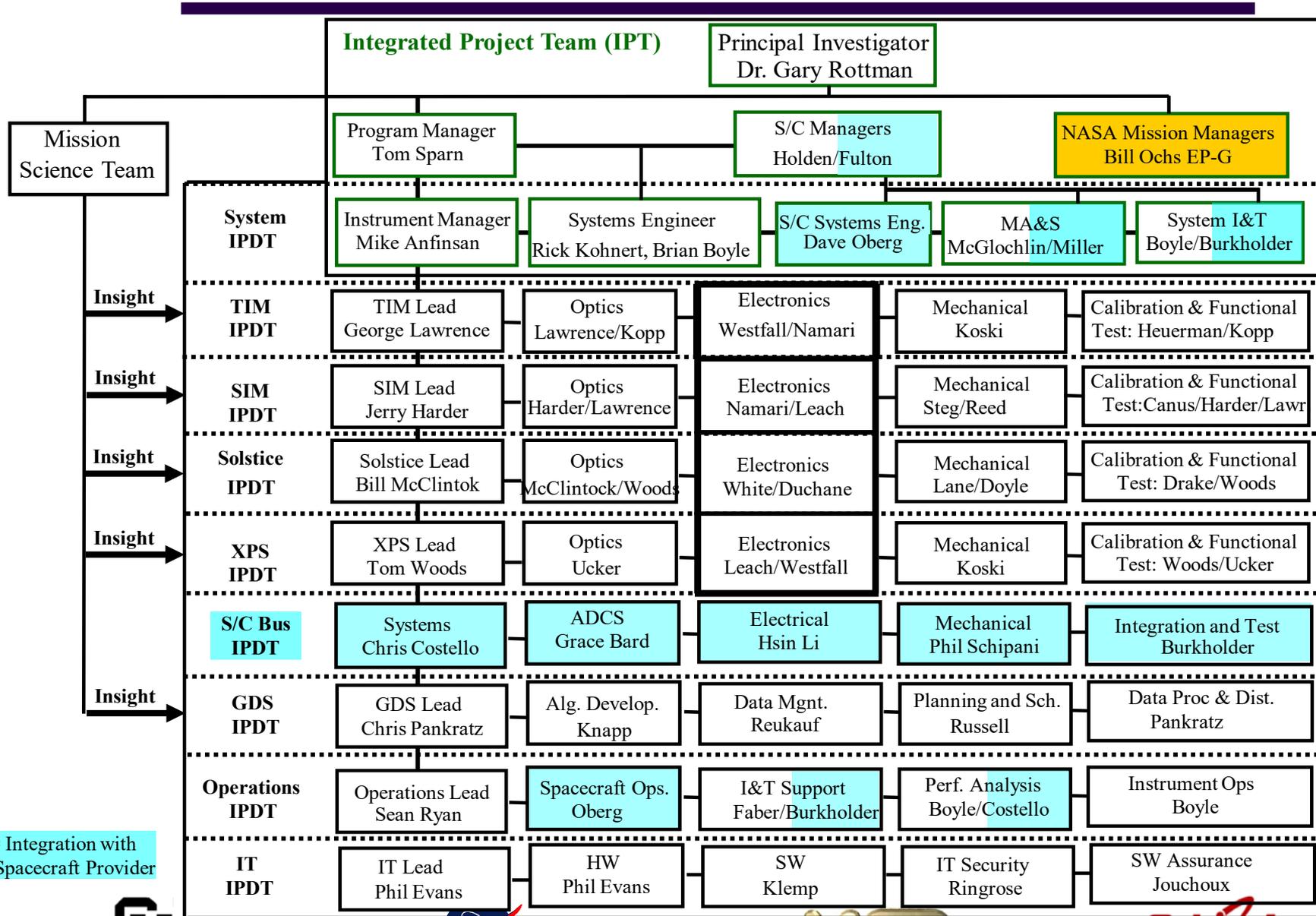
Full Time Support

**** Engineering support requested by the PI**

Workforce

	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Civil Servants	4	6	5	1	1	1	1	1
GSFC Support Contractor	1	1	1					
LASP (Professionals)	40	32	17	14	14	14	14	10
LASP (Students)	12	15	9	8	6	6	6	4
Orbital	37	33	19	1				
total	94	87	51	24	21	21	21	15

- Notes:
 - All workforce numbers are in FTEs
 - Civil Servant FTEs include only 2 full time - Mission Mgr. & Mission Business Mgr
 - All other Civil Servants include System Engineering, Disciplined Engineering, Project Scientist, System Review Support, and Contracts Support
 - LASP FTEs include Mission & Science
 - Orbital (Spacecraft) Phase C is fixed price. FTEs are estimated from proposal and include Phase D & E estimates



= Integration with
Spacecraft Provider



Flight Development Schedule

	• <u>Independent Development efforts</u>	<u>3/1/99</u>	<u>9/28/01</u>
TRL 2	• TIM	4/1/99	4/15/01
TRL 1	• SIM	4/1/99	4/25/01
TRL 5	• SOLSTICE	4/1/99	5/8/01
TRL 6	• XPS	4/1/99	1/23/01
TRL 2	• MICROPROCESSOR UNIT	4/1/99	3/13/01
TRL 1	• GCI	3/1/99	3/15/01
TRL 1	• Optical Bench I & T	3/1/01	9/28/01
TRL 5	• S/C Bus Development	3/1/99	9/7/01
	• Sub-System Development	3/1/99	6/30/00
	• Bus Procurement & Fab	1/10/00	3/9/01
	• Bus Integration & Test	3/12/01	9/7/01
	• <u>SORCE Integrated Development efforts</u>	<u>9/28/01</u>	<u>7/31/02</u>
	• Observatory Integration & Test	9/28/01	5/31/02
	• Operations System Development	1/2/01	5/2/02
	• Science Data System Development	6/2/00	5/2/02
	• Ship To Campaign location	7/15/02	7/15/02
	• Launch Vehicle/Payload Processing	7/16/02	7/31/02
	• <u>SORCE Launch Date</u>	<u>7/31/02</u>	<u>7/31/02</u>

- SORCE was initiated **prior** to:
 - Earned Value Management:
 - We did financial management the old fashion way
 - We managed the money to the required budget
 - We understood the details of the cost of technical implementation
 - Independent Verification and Validation (**IV&V**)
 - We followed the fundamental practices of software engineering for imbedded flight systems
 - Well documented software code
 - Continuous testing and formalized configuration control
 - Early release to flight system to allow many hours of run time
 - Independent Review Team (IRT)
 - The review team was formed from known experts and experienced reviewers who participated through the entire program, from start to finish. They had buy-in and truly believed in contributing to the success of the mission
 - Full Cost Accounting at NASA
 - Uncontrolled application of TRL
 - TRUST being considered outmoded

Partnership

Trust

Mutual Support

Leadership

Focused Goals

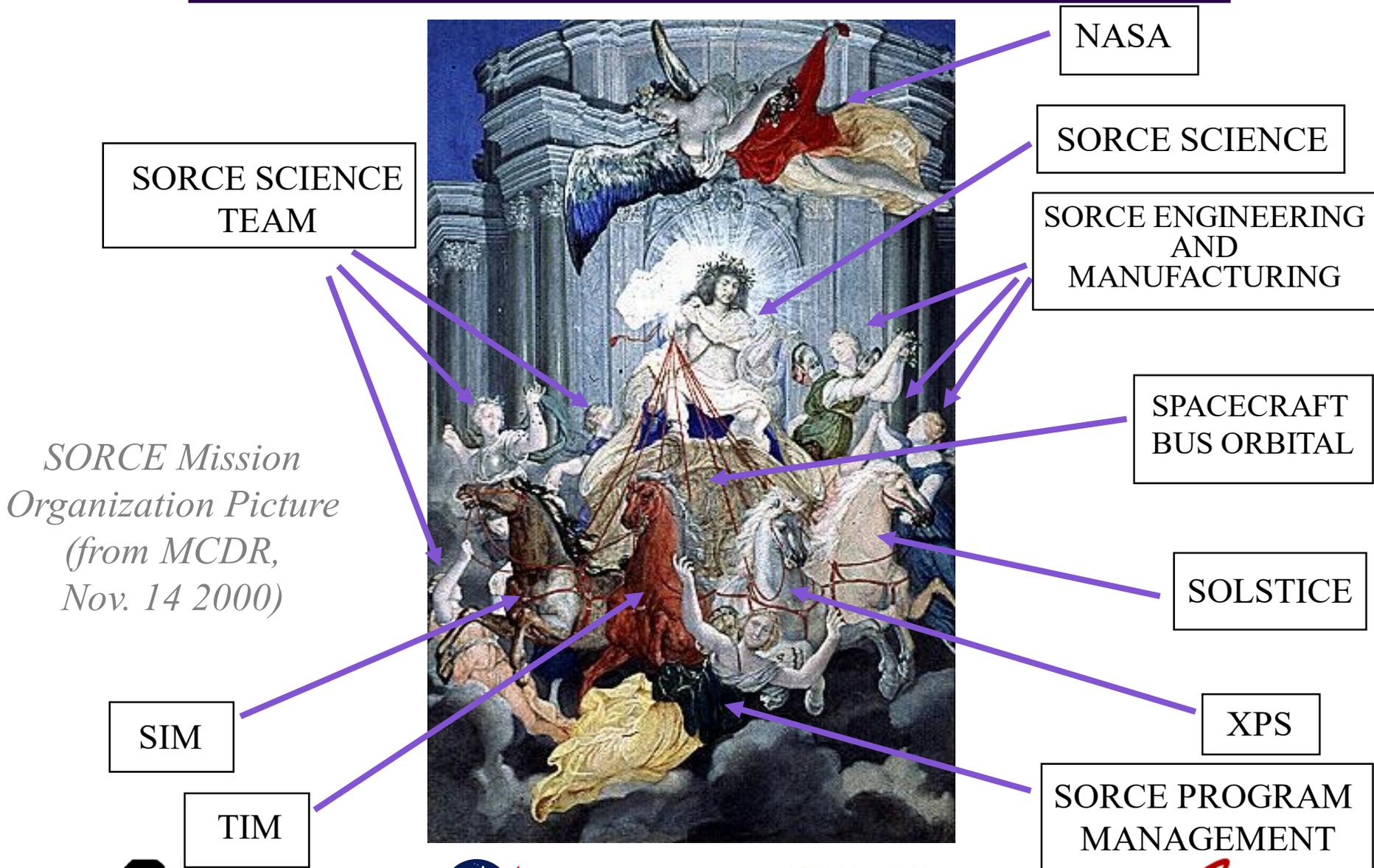
Defined Requirements

Science Buy-in

Consistent Financial Support



The Summary of the SORCE Partnership



SORCE SCIENCE TEAM

NASA

SORCE SCIENCE

SORCE ENGINEERING AND MANUFACTURING

SPACECRAFT BUS ORBITAL

SOLSTICE

XPS

SORCE PROGRAM MANAGEMENT

SIM

TIM

SORCE Mission Organization Picture (from MCDR, Nov. 14 2000)

