

Jessica A. Gaskin (Study Scientist, MSFC)

On Behalf of the X-Ray Surveyor Community

X-RAY SURVEYOR – THE PATH FORWARD

X-ray Surveyor Goals

Scientifically Compelling

Frontier science from Solar system to first accretion light in Universe;
revolution in understanding physics of astronomical systems

- Gather broad Science Community Support
- Maintain steadfast science requirements over Program lifetime

Leaps in Capability

Large area with high angular resolution with orders of magnitude gains
in sensitivity, large field of view with subarcsec imaging, high resolution
spectroscopy for point-like and extended sources, other?

- Allow for multiple technology paths
- Formulate a strong plan for achieving requirements
- Invest in technology development and proof-of-concept testing

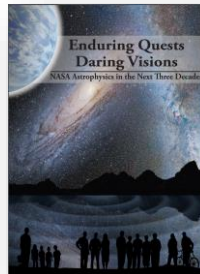
Feasible

Chandra-like mission for cost and complexity

- Embrace Chandra Heritage and lessons learned
- Utilize previous studies when possible (IXO, Con-X, AXSIO, etc...)

Consistent with:

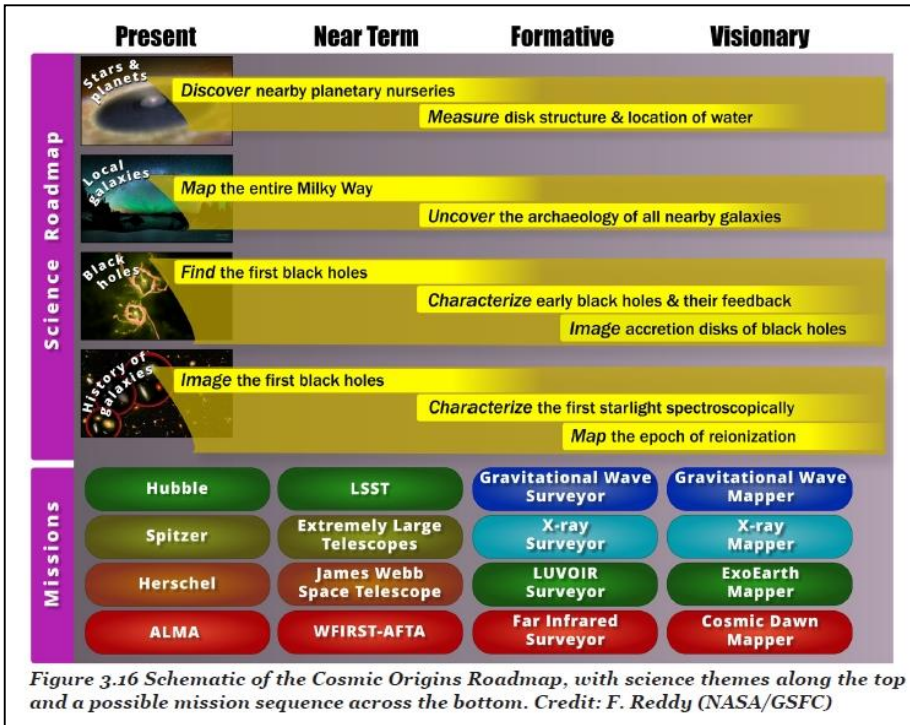
**NASA Astrophysics Roadmap:
Enduring Quests, Daring Visions**



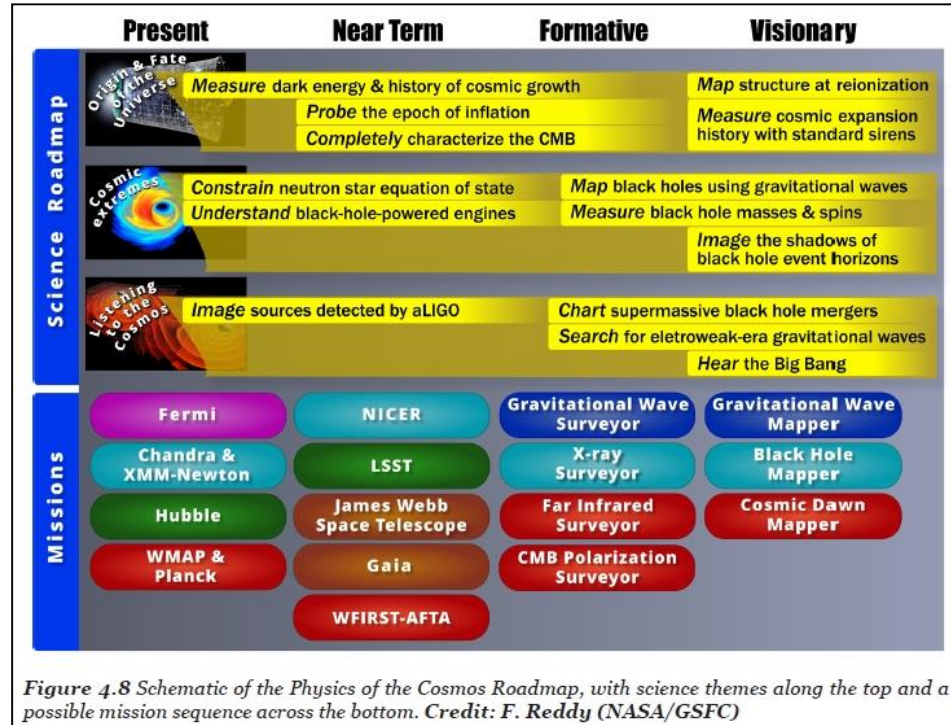
http://science.nasa.gov/media/medialibrary/2013/12/20/secure-Astrophysics_Roadmap_2013.pdf

Scientifically Compelling - Roadmap

How Did We Get Here?



How Does The Universe Work?



Key topics that will be addressed include:

- 1) *The Origin and Growth of the First Supermassive Black Holes*
- 2) *The Physics of Feedback and Accretion in Galaxies and Clusters*
- 3) *Galaxy Evolution and the Growth of Cosmic Structure*
- 4) *The Physics of Matter in Extreme Environments*
- 5) *The Origin and Evolution of the Stars that make up our Universe.*

THE MISSING PIECE

ASTROPHYSICS

Decadal Survey Missions



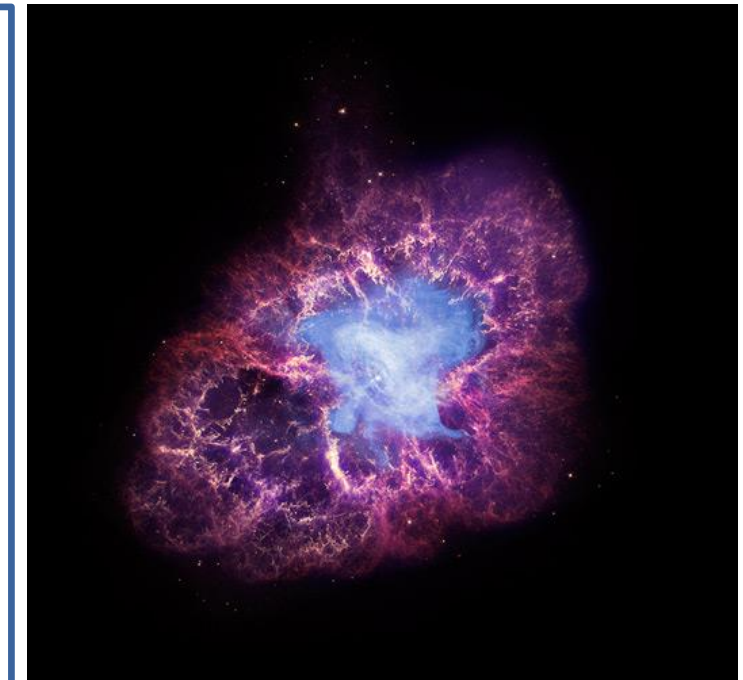
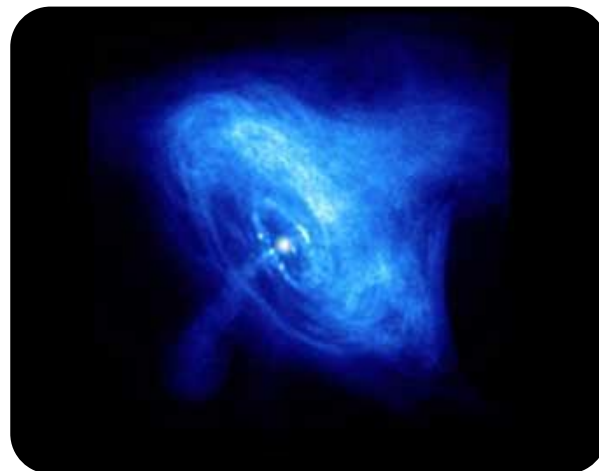
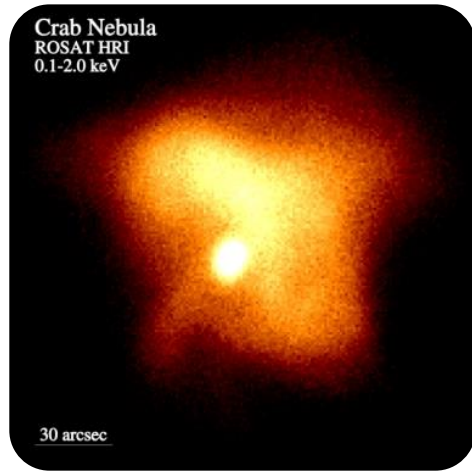
-Thirty Meter Telescope will have 144 times the collecting area of Hubble and more than 10x better spatial resolution at near-infrared and longer

-European Extremely Large Telescope will have images 16x sharper than Hubble

-Giant Magellan Telescope will have a resolving power 10 times greater than the Hubble

Scientifically Compelling – The Crab Nebula

Imagine a
Universe without
Chandra-Vision



New Discovery Space

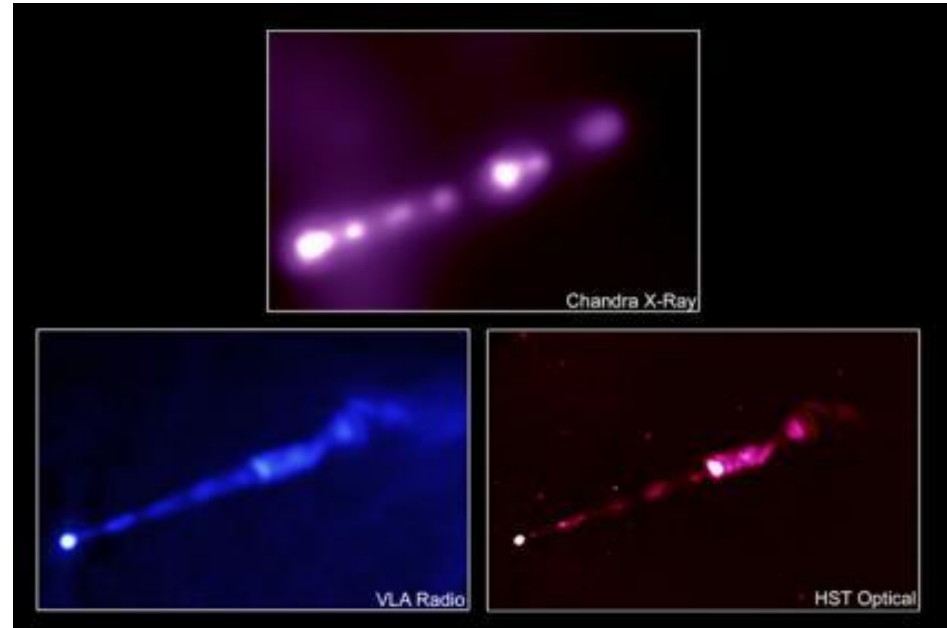
We are now in the process of defining the successor to Chandra.

30 Doradus – The Tarantula Nebula



Credit: X-ray: NASA/CXC/PSU/L.Townsley et al.; Optical: NASA/STScI; Infrared: NASA/JPL/PSU/L.Townsley et al.

M87 Jet



Credit: X-ray: NASA/CXC/MIT/H.Marshall et al. Radio: F. Zhou, F.Owen (NRAO), J.Biretta (STScI) Optical: NASA/STScI/UMBC/E.Perman et al.

We need your input!

STDT Members



Steve Allen, Stanford



Megan Donahue, MSU



Laura Lopez, Ohio State



Alexey Vikhlinin, SAO
(Chair)



Feryal Özel, Arizona
(Chair)



Mark Bautz, MIT



Ryan Hickox, Dartmouth



Piero Madau, UCSC



Mike Pivovarov, LLNL



Eliot Quataert, Berkeley



Niel Brandt, Penn State



Tesla Jeltema, UCSC



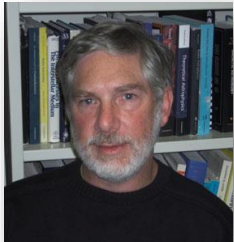
Rachel Osten, STScI



Dave Pooley, Trinity



Chris Reynolds, UMD



Joel Bregman, Michigan



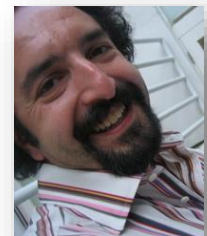
Juna Kollmeier, OCIW



Frits Paerels, Columbia



Andy Ptak, GSFC



Daniel Stern, JPL

Ex-Officio Non-Voting Members Of The STDT



**Daniel Evans, NASA HQ
(Program Scientist)**



**Ann Hornschemeier,
PCOS Program
Office Chief Scientist**



**Rob Petre,
GSFC X-ray Lab
Branch Chief**



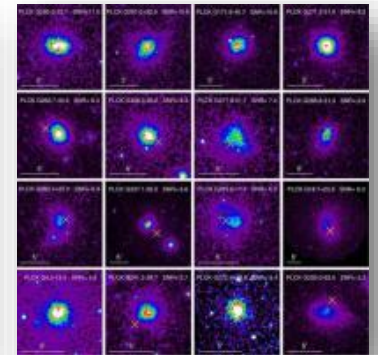
**Randall Smith,
Athena liaison**



**Paul Nandra
DLR-Appointed
Observer**



**Brian McNamara
CSA-Appointed
Observer**



**Gabriel Pratt
CNES-Appointed
Observer**

MSFC AND SAO STUDY TEAM LEADERSHIP



Smithsonian Astrophysical Observatory



Alexey Vikhlinin,
SAO, STDT Chair



Jessica Gaskin,
MSFC, Study Scientist



Gregg Gelmis
MSFC Study Manager



Harvey Tananbaum
SAO Senior Scientist



Martin Weisskopf
MSFC Senior Scientist



Doug Swartz, USRA/MSFC
Deputy Study Scientist

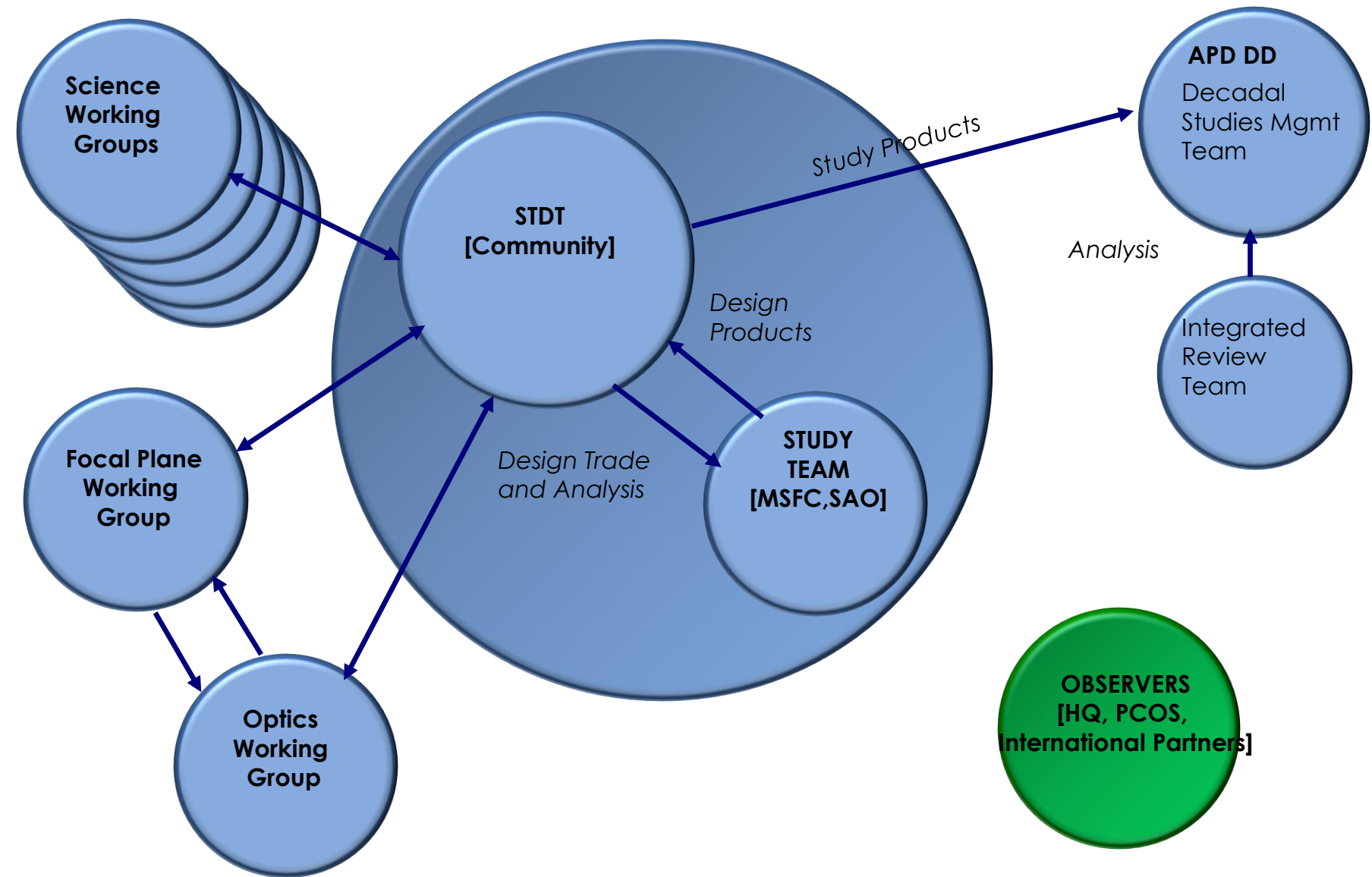
STDT Deliverables

Study output will provide the Decadal Survey Committee with:

1. A **science case** for the mission
2. A **notional mission** and observatory, including a report on any tradeoff analyses
3. A **design reference mission**, including strawman payload trade studies.
4. A **technology assessment** including: current status, roadmap for maturation & resources
5. A **cost assessment** and listing of the top technical risks to delivering the science capabilities
6. A **top level schedule** including a notional launch date and top schedule risks.

Concept Maturity Level 4 should be achieved by the end of the study

STDT And Management Structure



STDT Near-Term Plan & Task Summary

STDT Kickoff Meeting was held March 30, 2016

Near-Term STDT tasks include:

1. Deciding on the structure and mechanics for the Working Groups
2. Sketching out high-level science prioritizations and a path forward
3. Determining potential technology gaps for input into SAT and APRA
4. Outlining a Study Plan for the next couple of years

Community Participation

Informal X-Ray Optics Working Group

- Workshop March 28-29, 2016, University of Maryland
- Participants included a mix of government, university, industry:
 - MSFC
 - GSFC
 - Harvard-SAO
 - Ames
 - MIT
 - LLNL
 - Reflective X-Ray Optics
 - University of Maryland
 - Izentis, LLC
 - Northwestern University
 - Other

X-Ray Vision Science Workshop

- Workshop October 6-8, 2015, Washington DC
- Participants included ~100 participants from multiple universities and institutions
- http://cxc.harvard.edu/cdo/xray_surveyor/

Presentations and Brainstorming session white paper “X-ray Surveyor Discussion Session Results from the X-ray Vision Workshop” (*Editors: G. Fabbiano, M. Elvis*) are available on the website.

Community Participation

Your participation is fundamental to the X-Ray Surveyor mission top prioritization in the 2020 Decadal Survey

- Science Working Groups (formal and informal)
- Technology Working Groups (formal and informal)
- Workshops and Conferences
- Public Website (questions/suggestions-distribution list/newsletter)
- Requests for Information (RFIs) regarding relevant technologies
- Outreach (web-based Q&A, AAS "Future in Space" series of Hangouts-May 20)

Public Website: <https://science.msfc.nasa.gov/xrs> (under construction)

RFI: FedBizOpps.gov (<https://www.fbo.gov/>)
Solicitation # [NNM16ZPS002L](#)

THANK YOU!