Implementing 2007 NRC Portals of the Universe Report

Chandra X-ray Center
Recommended Best Practices

Roger Brissenden and Belinda Wilkes

25 April 2012

Basic Parameters

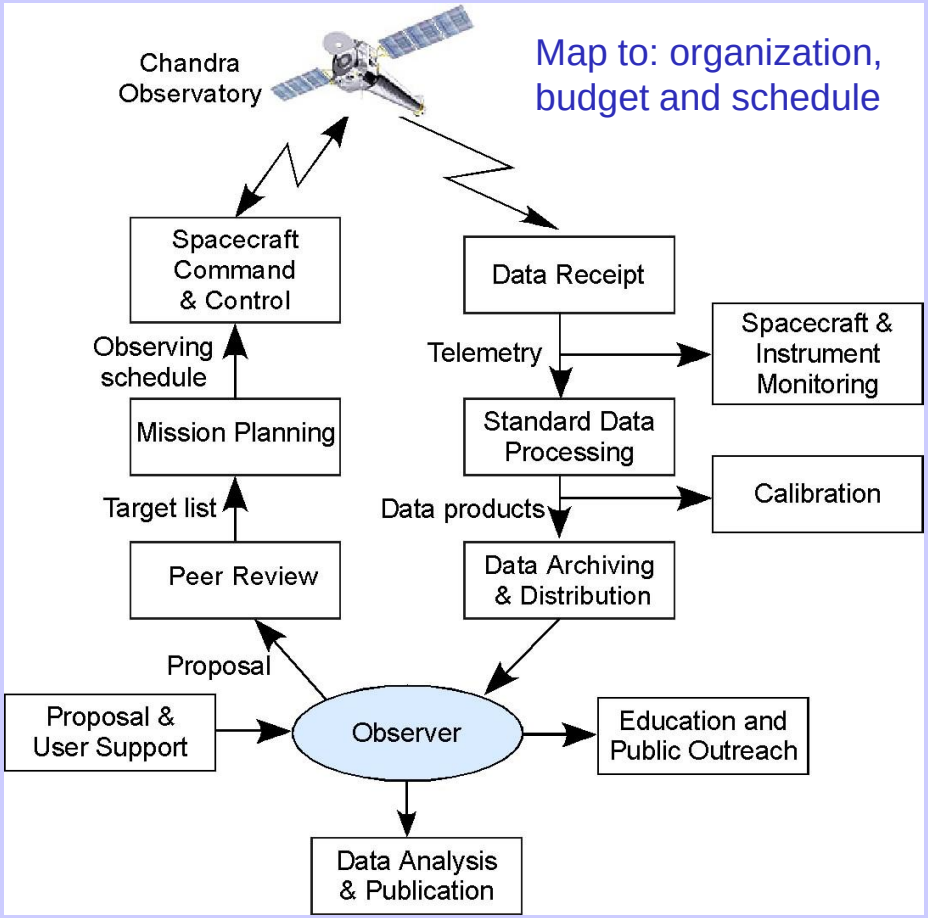
Mission duration	1999 →
Userbase	International
Archive data volume	9 TB
Instruments	Imaging/timing and spectroscopy
Wavelength coverage	0.1-10 keV
Program model	General Observer
Proposals/cycle	~700
Users/cycle	~200 PIs/cycle (50 new)
Funding model	Grants (separate grant per institution)
Proprietary data period	1 year (VLP/XVP none)

Science Center Management

CXC

- Develop and maintain **primary thread**
- Organization
  - **Synergy**: integrate science and mission operations
  - Involve scientists: includes **active research**
  - Plan for organizational evolution by Program phase
- Develop and utilize metrics to drive performance
  - Time from observation to data delivery to user (E2E)
  - Science productivity (papers, citations, use of archive data)

Primary Thread

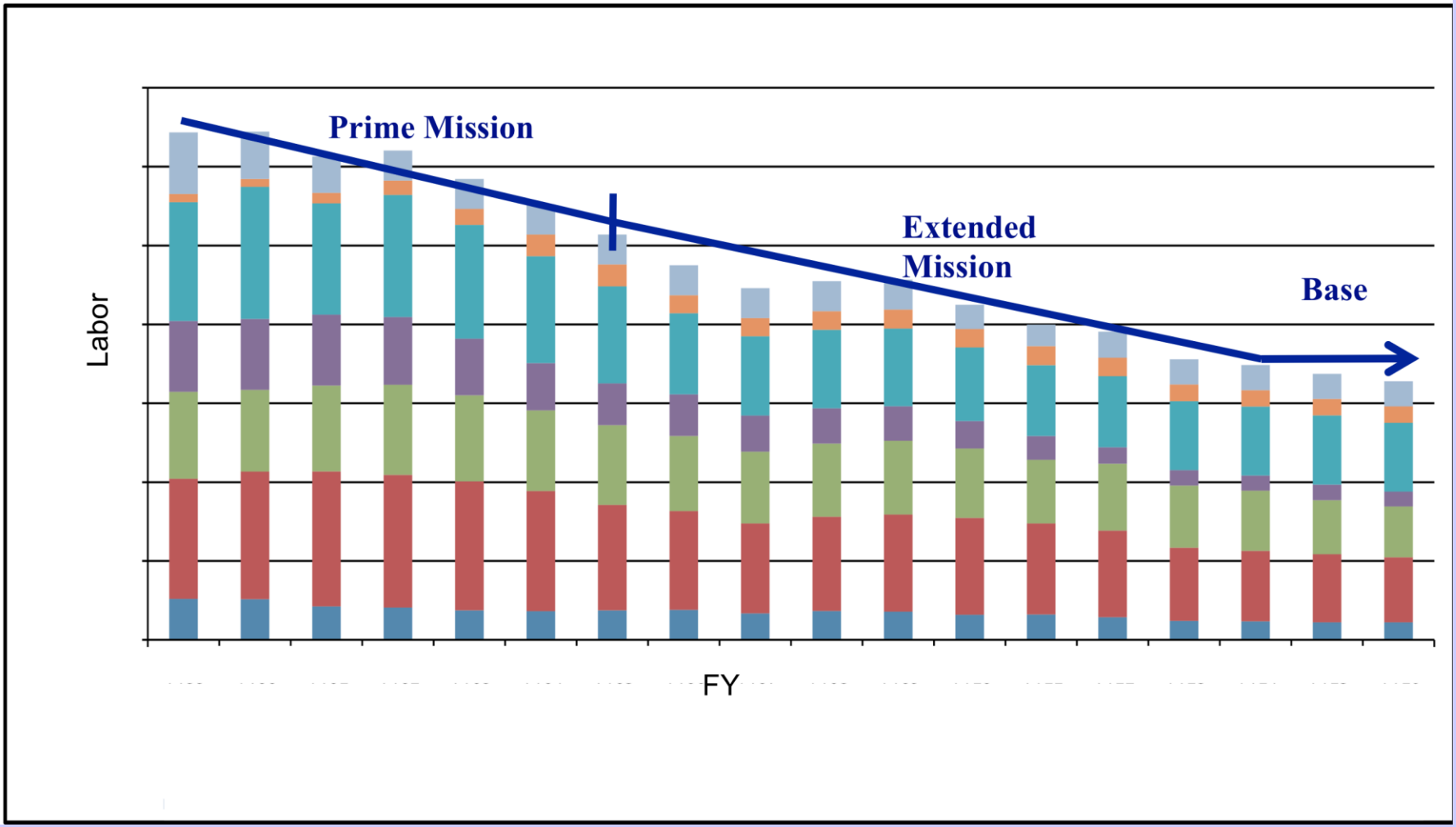


Science Center Management

- Long-term:
  - Invest in automation and process improvement
  - Plan for evolving hardware and software
  - Emulators valuable (mission operations)
- Budget: ~75% labor, 20% grants, 5% other
- Budget (=**staff**) profile evolution
  - Prime mission (initial reduction): automation, time dependent factors, stable software, stable science and mission operations
  - Extended Operations: increase process efficiency, users trained
  - Base: minimum required to support base infrastructure, threshold for science loss
- Develop model linking budget to science return
- All Programs have a **base** level of infrastructure that varies based on size

Phases of Program Reduction

CXC



Ops Model linked to Science

CXC

Function	2008 Budget	Possible Reduced Budget	Time Loss (Ms)	Extended Mission Budget	Time Loss (Ms)
Science and Mission Operations					
- Observing Efficiency (max ~ 70%)	65%	50-60%	~3.0	65%	
- ACIS CTI Increase	4%/year	>15%/year		4%/year	
- Coordinated and Constrained Observations	30-35%	≤10%		25%	
- Data Recovery	99.99%	90%	~1.6	>99%	~0.2
- Shift Coverage	3	1		3	
- Anomaly response: s/c and Science Instruments	≤8 hours	≤24 hours		≤8 hours	
- Zero Value Observations due to Observer	<<1%	5%	~1.0	≤1%	~0.3
- Instrument config. Errors due to Observer	<<1%	10-20%		≤5%	
- Science time lost due to s/c & SI config. Errors	<<1%	≤5%	~1.0	≤1%	~0.3
- Safe modes due to s/c & SI config. Errors	0 in 8 years	1-2/year		≤1/year	
- Fast Target of Opportunity Response	1 day	10 days		≤2 days	
Calibration					
- Maintain full instrument and telecope cal.	yes	limited and not timely		high priority items on timely basis	
Science Software and User Support					
- Software updates track s/c and SI changes	yes	no		high priority items on timely basis	
- Suported CIAO Platforms and OS	6	1-2		4	
- Maintain Chandra Source Catalog	yes	no		yes but fewer releases	
- Re-process archive with updated calibration	yes	no		yes but fewer releases	
EPO Program	yes	no		yes except reduced formal Ed	
GTO Science Program	yes	no		yes	
Total Science Time	20.4 Ms	13.8 Ms		19.6 Ms	

Data Systems and Archive

- **Involve scientists** from requirements definition to test. Include beta testing by external scientists.
- Create **integrated operations development** schedule with incremental full system test milestones
- Progressive **data challenges** for community: provide users with early release of tools and simulated data
- Support **contributed** software and tools developed by scientists (and engineers) – migrate to supported system
- Plan for **re-processing** of archive to take advantage of updated calibration, algorithms, analysis techniques
- Plan for cost of ongoing **FISMA*** certification
- Ongoing partnership with **HEASARC** with focus on common standards and long term archive

* Federal Information Security Management Act

User Support

- **User interface with scientists covering full range of expertise**
- **Documentation: multiple levels, interlinked via web:**
  - Documents (CfP, Proposers' Observatory Guide)
  - Webpages, memos, reports
  - Threads for proposal preparation, data analysis etc.
- **User Interface to ensure "correct" observation**
- **Helpdesk**
  - Fast turnaround during work week
  - Access to all levels of expertise
  - Extended hours at deadline times
- **Fully processed and verified, science-ready data delivery, within 1-2 days of observation**
- **Analysis software**
  - Mix of existing, in-house and user software, no licenses needed
  - Evolve platform support in response to demand
- **Ability to reprocess "on-the-fly" with user-specified options**

Proposal Process

- **Involvement of scientists with range of expertize**
- **Peer review:**
  - Scientifically focused, diverse topical panels
  - Confidential
  - Unconflicted
  - Secret ballot
  - Provide review reports
  - Post results quickly
- **Joint programs with other facilities**
- **Evolving proposal categories as mission evolves:**
  - Large Projects, Very Large Projects, X-ray Visionary Projects
- **Funding (US-based teams) awarded within 2-3 weeks of 1st observation**

Community Interaction

- **Involvement of scientists**
- **Users' Committee:**
  - Independent, representative, no insiders
  - Sounding board when major/minor changes contemplated
- **Science workshops: tailored to hot topics**
- **Communication at several levels:**
  - Newsletter, e-Bulletins, chandra-users mail group
- **CIAO software and training workshops**
- **Chandra catalog in google-earth (public and community)**
- **VO interface**
- **AAS, HEAD, ADASS meeting exhibit**

Monitoring Performance

CXC

- **Involvement of scientists**
- **Helpdesk response statistic**
  - Feedback into plans for software/threads/bug fixes
- **Grants: time to award**
- **Bibliography a**
- **Data utilizatio**
- **Proposal submi**
  - Monitor in c
- **Community sta**
- **Scientist trainin statistics**