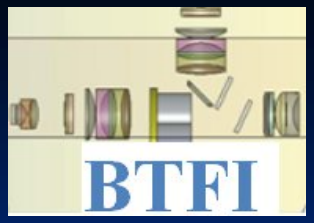


Brazilian Tunable Filter Imager (BTFI) Conceptual Design Review (CoDR)

Management

Peter Gray

Version 1

USP-IAG Universidade de São Paulo

24-25th September 2007

Project Management

- Use of modern project management approach.
- Scaling large project techniques to small projects.
- Structured management. Visibility & accountability
- Distributed project. Communications important.
- Lessons learnt. Why other instrument projects have trouble. What can we do differently.
- Success of instrument not just technical. Delivery to telescope in timely & cost-effective way.

Work Breakdown Structure (WBS)

- Important key project document.
- Simple numbering system to allow all aspects of project to be organized in a consistent way.
- Uses two digit number 00-99 with division into major aspects of project & instrument systems.

00- General	50 - Fabry-Perot
10 -Management	60 – Structure & Mechanisms
20 - Science	70- Detector System
30 -Optics	80 - Software
40 - iBTF	90 – Integration, Test & Operations

Documentation Management

- Organization & distribution of documents is an important project tool.
- Two types of documents will be generated:
  - Controlled Project documents BTFI_XX.YY etc
  - Information, emails, technical reports, drawings, etc.
- Doc#: BTFI_XX.YY_*description*_vZZ

where XX – wbs, YY – sequence number, ZZ – version number

- BTFI wiki (See: www.astro.iag.usp.br/~btfi)

Core Project Documents

- Management Plan (BTFI_10.01_ManagePlan_v01)
- Requirements (BTFI_11.01_Requirements_v01)
- Schedule (BTFI_12.01_ProjSched_v03)
- Budget (BTFI_13.01_Budget_v01)
- WBS List (BTFI_14.01_WBSList_v01)
- Document List (BTFI_14.02_DocumentNumber_v01)

Requirements Document

- Core project document, particularly important in early stages. Instrument definition & design.
- Can be a working document. Frequent revision but under orderly change control.
- Lists both top-level science requirements as well as derived detailed technical specifications.
- Limits scope-creep from "bells and whistles" by the science users and over-design by engineers.

BTFI Instrument Requirements
BTFI_11.01_Requirements_v01

(www.astro.iag.usp.br/~btfi/doku.php?id=management:requirements_specifications)

REQ-60.00	**STRUCTURE & MECHANISM**		
REQ-60.01	Instrument Rotator	None required. Mounted only on SAM port. If BTFI is mounted in its backup location on the Nasmyth IR port it will utilise the existing instrument rotator.	.
REQ-60.02	Instrument Guider	None required. Mounted only on SAM port. If BTFI is mounted in its backup location on the Nasmyth IR port it will utilise the existing instrument guider	KT: NB: No OIWFS - is this OK?
REQ-61.01	Maximum instrument weight	100kgs (on SAM visitor port).	(including local instrument control system), we can quote Steve as saying that the 100kg limit was not firm.
REQ-61.02	Maximum instrument dimensions	must be contained within a swept radius of ~1.9m from centre of Instrument Support Box (ISB)	KT: Supllementary details supplied by Scherter (SOAR)
REQ-62.01	Focal Plane Aperture Slide	Four position manual slide. Diameter aperture masks 85mm. First aperture mask matrix 100 micron pinholes on 10mm pitch for distortion mapping. Second aperture mask 4 holes 1mm dia on 50mm dia circle for image plane paralelllism test. Third clear position.	Email from Keith Taylor 20070914. KT: Maybe a 4th position for a focal-plane filter - sorry! Also, the whole question of "manual" mechanisms is not clear to me - let's discuss.
REQ-62.02	SIFS Pickoff Mirror	Possible provision for small pickoff mirror on Focal Plane Aperture Slide. SIFS fibre bundle input would need to be removed from SIFS input assembly. Could utilise BTFI for acquistion and guiding. Enables simultaneous FP/iBTF imaging and IFU 2D spectroscopy.	TBC. Tentative discussion with KT 20070913. KT: Interesting thought - let's talk to the SIFS folks.
REQ-62.03	FP#1 Etalon Exchange Mechanism	Three position manual slide with manual lock. Clear, Etalon in-Beam and Etalon-Load positions. Ability to easily access the load position from outside the instrument during the night.	
REQ-62.04	FP#1 Etalon Tilt	Manual adjustment of etalon tilt. One axis. 0-5deg range, ±0.5deg accuracy.	
REQ-62.05	FP#1 Etalon Inspection Port	Ability to inspect visually the etalon in the load position. Monochromatic flat field light source, manually switched. Ability to manually adhjust LAM etalon control lerwhile observing etalon inspection port visually.	
REQ-63.01	Fold mirror supports	See also REQ-33.01. Above collimator, two mirrors in a paired configuartion for folding optical path to keep instrument with space envelope. One mirror above iBTF Camera to fold beam from iBTF before entering camera. All mountings can be fixed and aligned once wiht shimming if necessary.	
REQ-64.01	Collimator Optics Mounting	Collimator optics mounted together in cylindrical tube assembly.	

Project Management & Project Organization

- A good Project Manager (PM) is essential for a successful project. Key full-time position (≥3day/week)
- Substantial time & effort to organize & follow-up.
- Responsibility to deliver on-time & in-budget
- There needs to be >4 senior engineers or technical staff working full-time as the project core
- Dividing project into Work Packages. Assigning and delegating responsibility to senior staff.

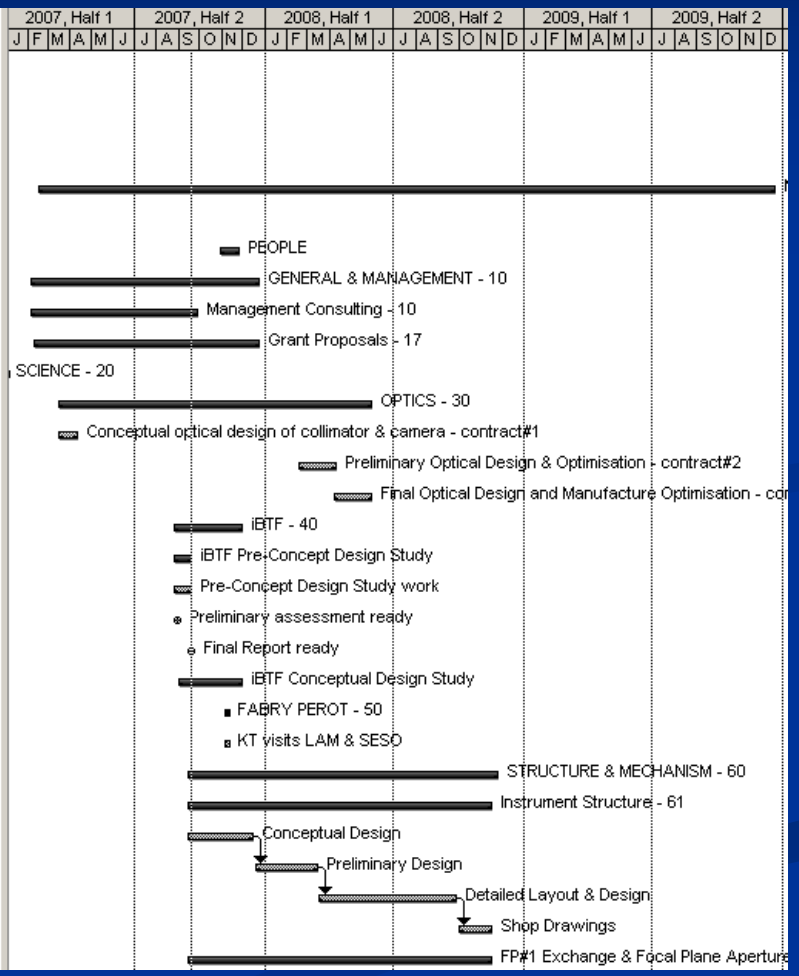
Schedule & Milestones

- Simplified use of MS Project. Effective PM tool.
- Agreed list of fixed Project Milestones (MS).
- Frequent use of schedule to revise task dates and work coordination to achieve fixed MS dates.
- Avoid temptation to over-utilize MS Project bells-whistles. Avoid complex linking of tasks and resource leveling, etc. This is a small project.
- Use frequently and effectively.

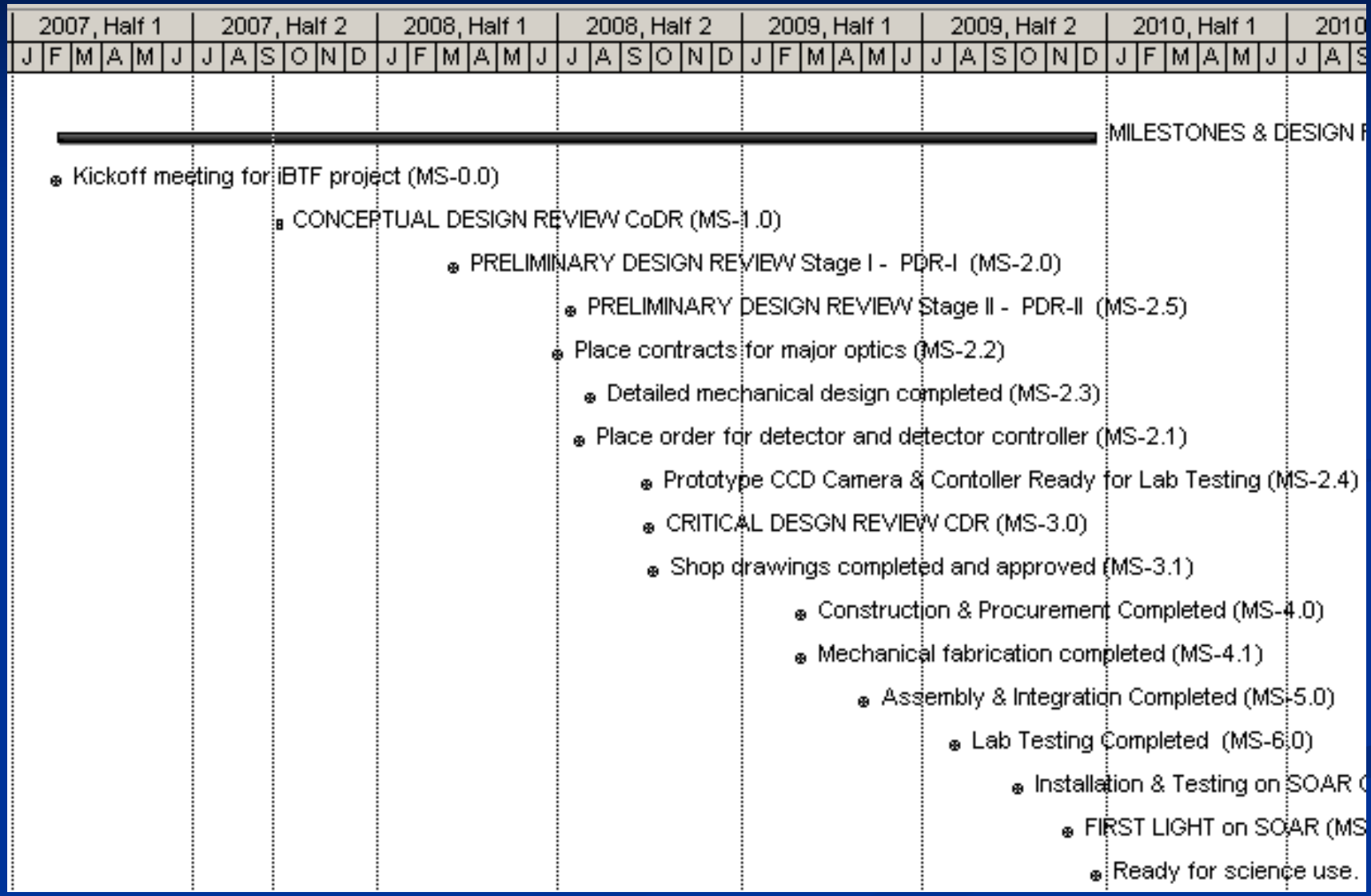
BTFI Project Schedule
BTFI_12.01_ProjSched_v03

(www.astro.iag.usp.br/~btfi/doku.php?id=management:schedule)

	Name	Days	Start	Finish
1	**BTFI INSTRUMENT PROJECT SCHEDULE**	1d?	2011-04-10	2011-04-10
2	Doc#: BTFI_12.01_ProjSched_v04	1d?	2011-04-24	2011-04-24
3	2007-09-20	1d?	2011-04-10	2011-04-10
4				
5	**MILESTONES & DESIGN REVIEWS**	1040d	2007-02-14	2009-12-20
23				
24	**PEOPLE**	28d	2007-10-28	2007-11-25
28	**GENERAL & MANAGEMENT - 10**	323d?	2007-02-03	2007-12-23
29	**Management Consulting - 10**	236d?	2007-02-03	2007-09-26
37	**Grant Proposals - 17**	318d?	2007-02-08	2007-12-23
45	**SCIENCE - 20**	1d?	2007-01-01	2007-01-01
46	**OPTICS - 30**	443d?	2007-03-15	2008-05-30
47	Conceptual optical design of collimator & camera - contract#1	28d	2007-03-15	2007-04-11
48	Preliminary Optical Design & Optimisation - contract#2	56d?	2008-02-15	2008-04-10
49	Final Optical Design and Manufacture Optimisation - contract#3	56d?	2008-04-05	2008-05-30
50	**iBTF - 40**	99d?	2007-08-24	2007-11-30
51	iBTF Pre-Concept Design Study	27d?	2007-08-24	2007-09-19
52	Pre-Concept Design Study work	27d?	2007-08-24	2007-09-19
53	Preliminary assessment ready	0d	2007-08-31	2007-08-31
54	Final Report ready	0d	2007-09-19	2007-09-19
55	iBTF Conceptual Design Study	93d?	2007-08-30	2007-11-30
60	**FABRY PEROT - 50**	5d	2007-11-05	2007-11-09
61	KT visits LAM & SESO	5d	2007-11-05	2007-11-09
62	**STRUCTURE & MECHANISM - 60**	438d?	2007-09-13	2008-11-23
63	**Instrument Structure - 61**	430d?	2007-09-13	2008-11-15
64	Conceptual Design	94d	2007-09-13	2007-12-15
65	Preliminary Design	91d?	2007-12-16	2008-03-15
66	Detailed Layout & Design	196d?	2008-03-16	2008-09-27
67	Shop Drawings	49d?	2008-09-28	2008-11-15
68	**FP#1 Exchange & Focal Plane Aperture Slides - 62**	431d?	2007-09-13	2008-11-16



Major Project Milestones



Budget

- Bottoms-up total cost = US$722,586
- Hardware cost = US$644,586
- Estimate In-house Labor = US$2,559,600
- BTFI Equivalent TOTAL COST= US$3,282,186
- Budget detailed costing will continue as instrument design evolves and refines.
- Linked spreadsheets allow continuous updates.
- Use by project management to track expenditures.

BTFI_13.01_Budget_v01

BTFI Project Project Budget - Hardware & Manpower					
Doc# BTFI_13.01_Budget_v01					
2007-09-20					
Exchange Rate US$ = Real	2.00				
		Cost	*Cost*	*Manpower*	
Item	*WBS*	*US$*	*Real*	*hrs.*	*Comment*
Total Hardware Costs - Optics	30	414,500	829,000		
Total Hardware Costs - Detector System & Electronics	70	133,086	266,172		
Total Hardware Costs - Control Electronics	60	25,500	51,000		
Total Hardware Costs - Mechanical	60	71,500	143,000		
Manpower Costs - Management	10	15,000	30,000	300	
Manpower Costs - Optical	31,44	14,800	29,600	180	
Manpower Costs - Mechanical	60	15,000	30,000	700	
Manpower Costs -Electronics	78	33,200	66,400	920	
In-house Manpower hrs. - Management	10			5,184	
In-house Manpower hrs. - Science	20			9,720	
In-house Manpower hrs. - Mechanical	60			3,888	
In-house Manpower hrs. - Electronics	60,70			6,912	
In-house Manpower hrs. - Software	80			6,048	
TOTAL Hardware Cost		644,586	1,289,172		
TOTAL Manpower Cost		78,000	156,000	2,100	
TOTAL US$		722,586	1,445,172		
EQUIVALENT In-House Effort		2,559,600		31,752	
TOTAL EQUIVALENT INSTRUMENT COST US$		3,282,186			

Funding & Grant Applications

- FAPESP Design Phase Grant ~US$70K
- Submitted FAPESP Request for US$510,000. Will know in Nov 2007 if approved.
- Intention to submit new FAPESP proposal after PDR to cover full costs of construction after detailed costing of final instrument design.
- Issue: Do we build-to-cost or a properly costed technically competitive modern instrument?

Distributed Project

- BTFI will be an international instrument:
  - Brazil (USP/LNA) – BTFI Project Headquarters
  - Canada – iBTF & detector controller & science
  - France – Fabry-Perot & science
  - UK – detector engineering
  - Chile – SOAR telescope, SAM & science
  - USA/Australia – instrument science & management
- Project management challenges. Communications
- Document archive. Wiki. Meetings. Video/Skype.

Staffing & People

Item	WBS	FTE	Durn. mnths
Management - Project Manager - tbd	10	0.75	30
Management/Science - Principal Investigator - Claudia Oliveira	20	0.1	30
Management/Science- Project Scientist - Keith Taylor	20	1	24
Instrument Scientist#1 - Bruno Quint	20	1	30
Instrument Scientist#2 - tbd	20	1	24
Mechanical Engineer#2 - Rene Laporte	60	0.75	18
Mechanical Engineer#3- 2nd INPE person	60	0.75	18
Electronics Engineer#1 - Luis Cavalcanti	70	1	24
Electronics Engineer #2- tbc	70	1	24
Software Engineer#1- Giseli Ramos	80	1	30
Software Engineer#2 - tbc	80	1	12
	FTE-Yrs.	18.38	

Project Mechanical Engineering

- BTFI opto-mechanical design represents a significant engineer challenge to achieve a compact stiff instrument which meets the SOAR-SAM weight budget.
- Project needs:
  - Senior Mechanical Engineer - capable of leading this effort and who has experience with complex instrument projects.
  - Senior Mechanical Designer – for detailed mechanical design and drafting of instrument structure and mechanisms
  - Mechanical Drafting Services (contracted) – for drafting shop drawings suitable for mechanical fabrication.

Design Reviews

- Conceptual Design Review CoDR (Sept 2007)
  - purpose of the CoDR is to gather together the information that has been discussed and collected during the project kickoff .
  - to freeze the project scope, concept and plan into clear set of documented requirements, information, schedule and budget.
  - proceed to PDR with design investigations in more detail based on a defined choice or more limited set of choices.
- Preliminary Design Review PDR (March/July 2008)
  - purpose of the PDR is to report on the project progress during the design phase
  - present a detailed design of the optics, mechanics, controls and software.
  - design should be essentially ready to proceed to construction with sufficient detail to obtain accurate costings of staff time, materials and procurements.
- Critical Design Review CDR (Oct 2008)
  - purpose of the CDR is to provide a final review of the instrument design and project plan before proceeding to construction.

Two-Phase PDR

- Two-Stage PDR is planned for 2008.
- PDR-I in March 2008 - covering the majority of the instrument opto-mechanical work, Fabry-Perot modules, electronic controls and software.
- PDR-II in July 2008 – iBTF detailed design and L3CCD photon-counting detector system.
- Advantages:
  - Maintains project momentum. Simpler aspects.
  - More time to work on higher risk technically advanced sub-systems of iBTF and L3/EMCCD.

ICDs & Systems Engineering

- System Engineering & Interface Control will be an important aspect of project management.
- BTFI will be designed and constructed as a distributed project with parts from several places.
- Important mechanical ICDs for telescope interfaces and space constraints for SAM.
- A person needs be assigned soon to be responsible for systems engineering and interface control.
- Priority will be to develop ICD documents for important mechanical and software interfaces

Some Issues

- Need to find a Project Manager.
- Challenging multi-national project management.
- Opto-mechanical design team needs people.
- “Build-to-cost” versus “Build-to-ambitious”.
- The aggressive schedule needs BTFI core project team in-place as soon as possible.
- Will the funding match the budget?