The CFHT WIRCAM Near Infrared Camera

Document [WIRCAM-1-CFHT]

The WIRCAM Project and Management Scope

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1. Overview:

The goal of the WIRCAM project is to provide CFHT with a wide field near infrared camera at the Cassegrain focus. The camera is to be commissioned for science use by the year 2004 and will use at least 4 Rockwell or Raytheon 2k x 2k detector arrays.

The WIRCAM Project is a project managed by CFHT. CFHT has overall responsibility for work package definitions and assignments, for budgets and for schedules. The project will involve several vendors and participating agencies who will be responsible for the bulk of the development work as defined through contracts with CFHT.

This is a project and is not a subproject of another development effort.

2. Scope of work for the WIRCAM project

The WIRCAM project is responsible for delivering a completed, operational, fully tested and documented camera system to the telescope, for its commissioning, and for the resolution of issues arising during these stages. The project will be completed once the instrument is commissioned by CFHT for science on the telescope and all related support documents are available at CFHT, at which point the camera will be transferred to an operational status.

2.1 WIRCAM will contain the following systems

- camera cryovessel and related internal, support and test hardware
- cryogenic systems
- detector arrays
- camera optics
- an image stabilizing system and its control electronics
- a fast guiding and focus sensor and associated control electronics and software
- detector array control electronics, the detector controller software and the detector host computer
- auxiliary electronics systems hardware and function control software
- science user interface software and engineering user interface software
- computing hardware and data storage
- documentation
2.2 Systems and developments excluded from the project include:

- development of specialty data handling or data reduction software
- computer hardware on which to run the User’s interface software
- network facilities required to operate the camera or its subsystems
- slow guiding and autofocus control of the telescope
- TCS control software to support observing modes
- the development of clean room facilities for camera maintenance

These excluded efforts, if needed, will be provided by other means.

2.3 Involvement of CFHT and CFHT staff

CFHT will assign a Project Scientist and a Project Engineer, one of whom will be the Project Manager.

The Project Scientist will be responsible for general scientific oversight of the project and in particular will work with the Project Manager to ensure that requirements identified by the WIRCAM Steering Group are implemented and that this group’s overall guidance is well considered.

The Project Engineer will co-ordinate and guide the technical development of the project and will work with Project Manager to develop budgets and schedules.

The Project Manager is responsible for maintaining a coherent project development plan. The Project Manager develops, with the assistance of others, global project budgets, development schedules, staffing plans and contracts. The Project Manager is responsible for keeping the Executive, SAC, participating contractors and the CFHT staff informed of project status.

2.3.1 CFHT Project staffing.

Apart from the PS, PE and PM, a WIRCAM Project Group will be defined within CFHT by the Project Manager. The Project Group will be consist of:

- staff tasked with completion of specific work packages accepted by CFHT
- staff who are expected to participate in preparations for and discussions associated with design reviews, acceptance and familiarization tests. This latter group will consist of most senior engineers, astronomers associated with WIRCAM, and identified specialists.

Resource and scheduling conflicts within CFHT will be resolved by respective project and operational managers, the DE and if necessary the Executive Director.
3. **Scope of work for the Project Development and Management workpackage**

3.1 CFHT will manage the WIRCAM project and assist in resolving technical and management issues, especially between subcontractors. CFHT will define and develop contracts, global budgets and project schedules and is solely responsible for reporting progress to the CFHT staff, to SAC and to the CFHT Board of Directors. CFHT is also responsible for developing the funding for this project. Science requirements for the project will be developed by the WIRCAM Steering Group, which is a subcommittee of SAC. Science and technical requirements will be communicated to contractors through their contracts with CFHT.

CFHT will develop

- work package contracts
- a global development schedule which integrates subproject schedules
- a global project budget
- a web page highlighting project progress
- a correspondence directory and document file system

The development schedule and budget will be updated on an as-needed basis at least annually. Subcontract budgets will likely be shared only with the corresponding subcontractor while the global project budget will be provided to the CFHT Board of Directors.

3.2 CFHT will assign a Project Manager, through and to whom all WIRCAM correspondence should be routed. Each institution working on WIRCAM shall also assign a local project manager responsible for all communications with other groups and with CFHT and who will have responsibility for the assigned work packages.

3.3 Contractors and groups within CFHT developing WIRCAM workpackages are required to provide the following documents on a timely basis as defined by CFHT. Design review documents must be provided by the work package contractor to all review participants at least one week in advance of these meetings.

- system budgets
- development schedules
- concept design documents
- preliminary design documents
- final design documents
- as built documents
- test and verification plans
- commissioning plans
Contractors and workpackage development groups within CFHT will be required to provide the CFHT Project Manager with a Project Status and Prospective Report which includes budgets, development schedules and staff plans at least twice a year, normally timed to be received at CFHT one month prior to SAC meetings, or in their absence, by the first day of May and the first day of October for the duration of project contracts.

The CFHT Instrument Design Specifications (IDS - rev. 1.1 - January 20, 1992) summarizes the general requirements for workpackage development not specifically called out in workpackage contracts.

3.4 At least the following three design reviews and their associated design review meetings will be organized by the contractors for each work package in consultation with CFHT. Design reviews via video conference or direct meeting are encouraged. Telephone-based design reviews are not as productive and are discouraged.

• a concept design review
• a preliminary design review
• a final design review

At the concept design review sufficient detail will be provided so that physical layouts and design philosophies are clear. In particular, mechanical interfaces are located and volumes available for associated subsystems are defined. However, sufficient leeway is left that significant changes in direction are still possible.

The preliminary design is the first and most important review of detail. Major component locations have previously been established and the design philosophy has been agree upon. Interactions between systems and internal and external interfaces are a major point of interest in these reviews.

At the final design review major changes in direction are almost impossible to make. Most comments are limited to the details of functional implementations. Fabrication drawings can be finalized very shortly after this review.

3.5 Acceptance/familiarization tests shall take place before system delivery to CFHT.

Acceptance/familiarization tests are distributed in time starting near the time of final subsystem assembly. The familiarization tests provide CFHT staff with an opportunity to interact with subsystems before they are fully integrated and operational. They also offer the contractor the opportunity to have equipment validated by external future users at an early enough stage that problems can be addressed without serious disruption to the delivery schedule. Acceptance tests
ensure that the workpackage requirements are met. Both the familiarization and acceptance stages of these tests take place at the contractors site before delivery to CFHT, possibly over several distinct test periods. Subsystesm will not be delivered until acceptance tests have been passed to CFHT’s satisfaction.

3.6 Project Development

CFHT has reviewed three concepts showing possible optical and mechanical layouts for the camera. The next steps, in concert with interested groups, will be the selection of a design approach, the selection of the detector arrays and the definition and assignment of work packages. Each work package Scope and Requirements definitions will be developed by CFHT in concert with all interested groups. Budget and Schedule documents will be developed jointly by CFHT and the group responsible for the work packages. The Scope and Requirements documents will be made available to all participants, discussions of which will form the basis for a KickOff Meeting, and at the conclusion of which work package assignments will be made. Contracts will then be developed on a per group basis. CFHT will, with the advise of participating groups and the WIRCAM Steering Group, define and allot work packages and will select the baseline design concept.

CFHT will develop global project budgets and schedules which will be updated at least annually in preparation for the CFHT Board of Directors meeting in December. Work package schedules and budgets will be submitted by the respective group on a periodic basis several times a year as requested by CFHT and will be the primary basis for global project planning.
Appendix 1  WIRCAM Work Packages

1. Camera body and cryogenic systems
2. Field corrector
3. Camera optics and mechanical mounts
4. Auxiliary systems controller
5. IR filter procurement
6. IR array detector procurement
7. IR array subsystem mounting, integration and control
8. Image stabilizer and local servo control electronics
9. Guide and focus sensor and control system
10. Guider signal processing and control software
11. System integration and pre-delivery testing
12. On-site testing at CFHT and Commissioning
13. Science user interface software
14. Engineering user interface software
15. Computing hardware and data storage
16. Heat extraction and system external thermal control
17. Project Management