Association of Universities for Research in Astronomy

WFMOS PROJECT

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Version: 3

WFMOS to Software

ICD

Version:	3	**Date:**
Issued by:	Scot Kleinman	8May08
Approved by:	Subaru Manager:	
	Gemini Manager:	
	Gemini Engineering:	

90.00.00.01_80.10.40.00_ICD, Revision Control

Revision: 1, Scot Kleinman, 3Apr08

Revision: 2, Scot Kleinman, 15Apr08
Added data reduction contract references. New SimCam manual. Minor format edits.

Revision: 3, Scot Kleinman, 8May08 – added SOSS <-> TCS latency.

Contents

1. Introduction

This document describes the interfaces between WFMOS and Subaru and Gemini software systems. Some of the interfaces described here may change during the course of WFMOS's design/construction, but for the purpose of the CoD, we will treat this document as final.

2. Related Documents

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Document Number	Document Name
80.10.40.01_REF	TIKI Manual
80.10.40.02_REF	OPE Manual
80.10.40.03	SIMCAM.py
80.10.40.04_REF	SOSS Overview Presentation
80.10.40.05_REF	Gemini DataFlow Project Overview
80.10.40.06_DWG	SOSS Schematic
80.10.40.07_REF	SimCam Manual
80.50.11.00_REF	Acronyms and Glossary

3. Data Archive

Both Gemini and Subaru Observatories maintain an archive of Observatory data. They both archive standard FITS format data and there is very little the developer has to do for their files to be compatible with and entered into the archive. The data will be archived to both the Subaru (STARS) and Gemini (GSA) archives.

3.1 Gemini Archive, GSA

Gemini will take care of getting the data from STARS into the GSA. The data files must comply with the FITS and WCS standards as described in document 80.10.40.05_REF. The FITS headers in the data files should completely describe the state of the telescope and instrument during the time the data were taken, including the optical and electronic configuration of the instrument and positions of all movable mechanisms in the instrument.

3.2 Subaru Archive, STARS

GSA-compliant FITS files will be satisfactory for STARS as well. Archiving into STARS takes place automatically by SOSS, so beyond making compatible files and interfacing properly to SOSS, no more has to be done to get the data to STARS. STARS currently works by reviewing developer-submitted files for compatibility with their system and working on the server code or with the developer to correct any incompatibilities. Thus, some format iterations may be necessary with the Subaru STARS staff.

4. Data Reduction

The data reduction system requirements are contained in the CoD contracts. Each team should propose its own solution with enough detail so its implementation can be properly evaluated during the review. Document 80.10.40.05_REF describes PRS, the Pipeline Reduction System of Gemini's new DataFlow project. This facility is available, but not required, for use with WFMOS.

5. Observation Planning Tool

It is unlikely that either the existing Gemini PIT, or Subaru's planning tools will be sufficient for WFMOS use. The instrument teams should propose their own solution in a way that can be integrated with Subaru's SOSS and/or the instrument OBCP as necessary.

6. Subaru Operations System Software, SOSS

Drawing 80.10.40.06_DWG, reproduced below, shows a block diagram of the Subaru telescope software environment. There are currently three defined interfaces between the Instrument and SOSS at Subaru. Both the TIKI and the SimCam interfaces (described below) are acceptable for WFMOS. Working directly with DAQtk is not.

OCS is the current version of the SOSS while Gen2 is a new version currently in active development at Subaru. Subaru plans to have Gen2 operating in place of the OCS by WFMOS's deployment.

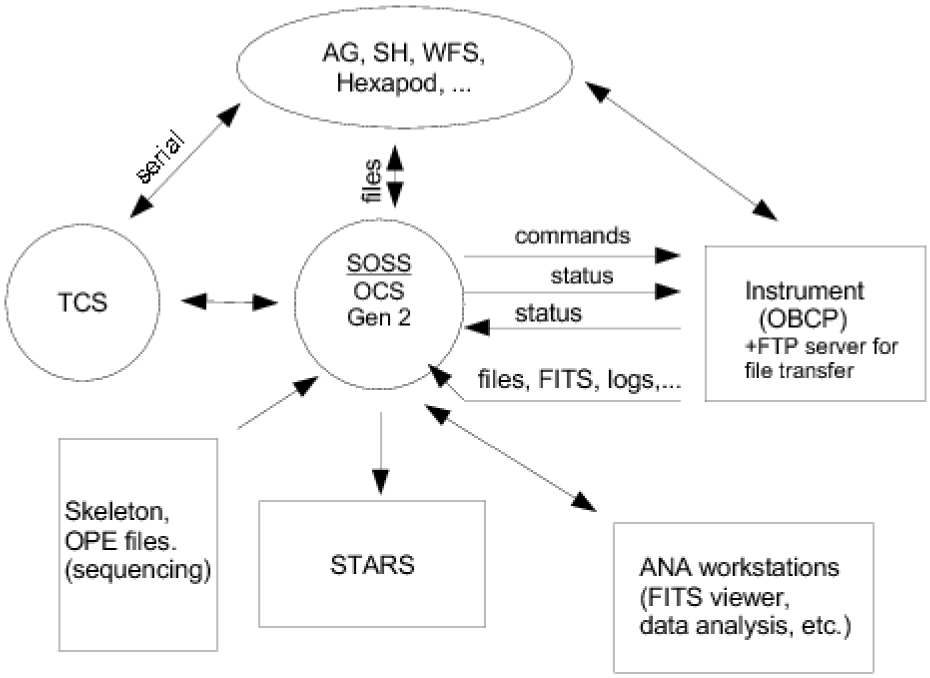

Figure1: Schematic of the Subaru telescope software environment. 80.10.40.06_DWG.

6.1 DAQtk

DAQtk is Subaru's original instrument<->SOSS interface. It is not well documented in English, lacks a few important modern capabilities, and is not suitable for WFMOS use.

6.2 TIKI

TIKI is C wrapper around DAQtk which some new Subaru instruments (HiCIAO, for example) are using. Unlike DAQtk, and like SimCam (below), it is concurrent as well as thread and re-entrant safe. Document 80.10.40.01_REF describes the TIKI interface in more detail. TIKI handles command parameter parsing significantly differently than does SimCam, leaving most of the parsing to the Instrument-side software. TIKI runs within Sun Solaris and Intel Linux environments.

When Gen2 is installed at Subaru, DAQtk will disappear, but its functionality will be ported to the new system so the switch should be transparent to the TIKI user.

6.3 SimCam

SimCam is the new Gen2 instrument interface at Subaru. It is written in python (compatible with versions 2.3 and higher). FMOS and AO188 at Subaru are using the SimCam interface. Document 80.10.40.07_REF describes the SimCam interface in more detail. Product Tree entry 80.10.40.03 is SIMCAM.py, a sample SimCam interface for a simulated camera. SimCam runs within Sun Solaris and Intel Linux environments.

SimCam documentation is sparse, but functionality-wise, we can the capabilities described in the TIKI documentation can be assumed (with some additions), but through a python, rather than C interface. SimCam functions quite differently than TIKI, however. Whereas TIKI takes over the interface and once initiated, calls routines on both the SOSS and OBCP as necessary. SimCam routines are called by the OBCP directly. SimCam provides complete command parameter parsing.
Since SimCam/Gen2 is the current development environment at Subaru, there is a possibility of some parallel development depending on WFMOS needs.

6.4 Development and Testing

Both TIKI and SimCam have a developer simulation environment which can be run stand-alone to test and develop code. The full operations environment cannot be simulated outside of Subaru, but status, command, and file transfers can be. Both TIKI and SimCam allow only one process per instrument to interface with it. Any other instrument processes must be handled internally, with the single external interface to the SOSS.

Status values are polled when requested and are delivered immediately by the SOSS. The status and file channels are asynchronous. The SOSS expects a prompt response to each issued command which means, for example, commands should be structured as: start_integration, then end_integration, both of which can be enacted and responded to immediately, rather than expose_for_900seconds which cannot. Command logging is built into the SOSS.

6.5 OPE and Skeleton Files

OPE and Skeleton files contain instrument control commands used for observation. They are described in the OPE Manual, document 80.10.40.02_REF. OPE files contain the sequence of observing commands needed for a given observation. They are executed manually at the telescope either individually or selected as a group. The instrument team is responsible for building an OPE-file generator (which would probably include an observation planning tool). Skeleton files are hierarchical and allow parameter filling at the time of execution; OPE files are generally flat in practice, but some hierarchical capability does exist (see the OPE manual).

A remote X environment can be used for additional instrument configuration and communication.

6.6 TCS

The SOSS handles all communication with the TCS except for tasks where absolute speed is crucial, like guiding and acquisition. No other direct connections to the TCS are allowed. These connections are shown in the SOSS block diagram, Figure 1. A direct connection between the AG/SH/WFS systems and the TCS can be run up to 10Hz. The AG/SH/WFS to TCS connection is over a serial line; the file transfer to the SOSS happens over an Ethernet connection.

The typical SOSS<->TCS latency is ~1s, although it can be as high as 5s. There are ways to talk directly to the TCS if this latency is too high, but doing so is discouraged by Subaru unless absolutely necessary.

6.7 Data Quicklook

Quicklook data software should be included as part of the instrument software itself. A basic FITS viewer, however, is part of the ANA workstations and works within the SOSS environment.

6.8 Communications

Data transfers within SOSS typically take place along 100/10 Ethernet connections. It is likely that bandwidth capability will be increased for HSC, so WFMOS teams should specify their bandwidth requirements once they are known for discussion with Subaru as a Subaru-provided element.

6.9 Timing

Subaru has a GPS receiver for time-keeping and an internal ntp server for time distribution.