

## **ISIM Team and Prime Contractor Activities During Phase A**

### Top level vision:

The phase A work products and Prime Contractor implementation phase proposal will demonstrate a project plan that yields the lowest practical lifecycle cost with adequate reserves. To this end, each component of the project team (Prime, GSFC, and STScI) will carry out and deliver a phase A study of their anticipated phase B/C/D work. This approach will promote team building and working relationships leading to a smoothly running team at the start of phase B. To this end, the Prime Contractor phase A RfP should portrait our current vision of roles and responsibilities among these three parties. The following top level SoW for the GSFC ISIM IPT is provided to facilitate formulation of this vision.

### The ISIM team phase A SoW:

The ISIM team will develop and cost two separate ISIM designs corresponding to each phase A Prime Contractor architecture. These designs will incorporate an instrument capability that fully enables the science mission described by the revised NGST DRM. De-scope options will also be identified. The Yardstick ISIM instrument capability will be the point of departure for the phase A science instrument complement subject to revision by NASA/ESA/CSA instrument allocation and NASA instrument AO planning processes. The technical capability and cost of these two ISIM designs will be measured against the Yardstick ISIM to derive an ISIM quality ranking factor for each Prime Contractor architecture.

The ISIM team will formulate a development schedule and detailed I&T plan for each ISIM design and its science instruments. This plan will identify key facilities and include both ISIM GSE to be provided by the ISIM team and GSE to be received by the ISIM team from the Prime Contractor and STScI.

The ISIM team will produce ICDs for the science instruments and other technical documentation in support of the science instrument AO solicitation.

The ISIM team will provide technical guidance in support of ESA, CSA, and US community science instrument concept development.

### ISIM and Prime Contractor System Interfaces:

The ISIM, to be delivered to the Prime Contractor by GSFC, is a distributed system encompassing the cold instrument package, its thermal control system (radiators and mid-IR instrument cryo-coolers if needed), science instruments, and other subsystems located in the SSM. ISIM elements located in the SSM include:

- Flight science processors & software
- FPA control electronics
- ISIM mechanism electronics
- Cryo-cooler electronics
- ISIM power supplies

The OTA, to be developed by the Prime Contractor, includes the following subsystems located in the ISIM cold instrument package:

- tertiary mirror (M3)
- deformable mirror (DM)
- fast steering mirror (FSM)

The ISIM will provide environment for the M3, DM, and FSM, and support structure for these elements as required by the Prime contractor OTA architecture.

It is currently envisioned that the NIR wide field camera will provide wavefront sensing and fine guidance sensing. The ISIM system will provide data to the OTA system for operation of the DM and FSM. Single point responsibility for image quality and image stability rests with the Prime Contractor.

The NIR camera and other science instruments are considered part of the GFE ISIM system. Early in 2000, responsibility for development of the ISIM science instruments will be allocated among NASA, ESA, and CSA. The baseline instrument complement used to guide Phase A ISIM development may be revised when this allocation is completed. Instruments allocated to NASA will be procured through an AO solicitation during late phase A. It is expected that the baseline instrument complement will be further revised when this solicitation is completed. The Yardstick NIR camera will serve as an engineering model to guide phase A development of the Prime Contractor DM/FSM system until an alternate instrument is selected by the above processes.

The Prime Contractor will provide flight vehicle accommodations and environment for the ISIM system. Cold instrument package volume and other requirements must be sufficient to enable the science capability of the Yardstick. The GSFC ISIM team will develop an ISIM design consistent with the Prime Contractor architecture and instrument requirements evolved by the above instrument definition processes. The technical capability and cost of this ISIM design will be measured against NGST mission requirements to derive a quality ranking factor for the Prime Contractor architecture accommodation of the ISIM.

Yardstick ISIM Science Instruments					
Instrument	$\lambda$ ( $\mu\text{m}$ )	Bandwidth	FPA (type / number / format)	Plate Scale ( $10^{-3}$ arc-sec/pix)	Aperture Control (arc-min)
NIR Camera	0.6 – 5	R = 2, 5 fixed filters, R = 50 - 200 tunable filters	InSb / 4 / 4096 x 4096	29	quad-beam divider: four 2 x 2 fields
NIR Spectrometer	0.6 – 5	R = 300, 3000 gratings	InSb / 1 / 4096 x 4096	100	reflective slit mask: 2048 x 2048 micro-mirror array, 100 $\mu\text{m}$ pixels
MIR Camera/Spec	5 – 28	broad-band filters, grisms, cross-disperser	Si:As / 1 / 1024 x 1024	230	slit selection + 2 x 2 camera

The ISIM cold instrument package will be integrated and flight qualified at GSFC and delivered to the Prime Contractor as GFE. The ISIM/OTA interface must enable ISIM I&T independent of the OTA and prior to observatory level I&T.

The Prime Contractor will develop hardware and software ICDs for ISIM/OTA and ISIM/SSM interfaces.

The Prime Contractor will work with the ISIM team and STScI to produce a detailed system level development schedule and I&T plan that incorporates the ISIM, the ground system, key facilities, and all GSE. It is desired that ISIM delivery be as late in the observatory level I&T flow as possible to allow maximum time for science instrument development and to avoid early freeze of science instrument technologies.