GNAOI
RFP No. NB3880C

Proposers Conference

4th October 2019

AURA, Tucson, Arizona,
Teleconference + Video conference

Welcome and Introductions

David Henderson

Gemini North
Adaptive Optics Imager

GNAOI

Questions

QUESTIONS???

Ask Early, Ask often

Aim of the GNAOI Project

This Phase: Complete a Preliminary Design of Gemini North Adaptive Optics Imager instrument.

Next Phase: After this Preliminary Design: Complete design, build, test and commission instrument.

Aims of the GNAOI Proposers Conference

- To communicate and clarify aspects of the RfP.
- To answer your questions.

Conference Guidelines

Request for Proposals is a competitive process, hence:

- The same information will available to all
- A recording of this session will be hosted on our website
- We will document questions and answers that are not in RfP material.
- Q&As will be posted on the website
- No discussion of the RfP during breaks or lunch

Conference Guidelines

Things to remember:

- Feel free to ask for clarifications or ask us to slow down.
- We intend to repeat any questions asked.
- Mute when not speaking, to eliminate feedback
- Cell phones on vibrate or silence

- Send any future questions to gnaoi_rfp_submit@gemini.edu (not to individuals)
- Subscribe to our broadcast email gnaoi_rfp+subscribe@gemini.edu
- Some slides contain links to our webpages for further information.

Agenda

09:00	Welcome and Introduction
09:15	Gemini Instrumentation Program Overview
09:30	Project Summary
10:00	Proposal Submission Process
10:45	Break
11:00	GNAO intro, Science Cases and Requirements
11:30	Statement of Work Review
12:15	Lunch
13:15	Proposal Content
13:45	Evaluation and Selection Process
14:15	Final Questions and Answers
16:00	End

Each presentation is planned so as to leave some time for questions and answers.

Questions / Discussions encouraged

Welcome and Introduction

AURA GNAOI Team

Scot Kleinman
Associate Director of Development

Stephen Goodsell
Project Sponsor

David Henderson
Project Manager

Trent Dupuy
Project Scientist

Andrea Blank
Project Coordinator

Communicate through gnaoi_rfp_submit@gemini.edu

GNAOI Team

Gaetano Sivo
GNAO PI

Jeff Radwick
Project System Engineer

Barbara Peterman
Contracts Officer

Tito Agbayani Jr.
Lead Buyer / Contracts Administrator

Communicate through gnaoi_rfp_submit@gemini.edu

Introductions

Round 'virtual table' introductions

- Name,
- Institute,
- What you would like to get from today's conference?

http://www.gemini.edu/gnaoi-rfp

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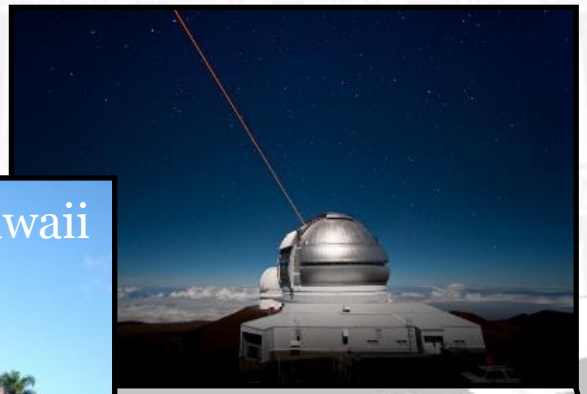
Any further questions on this topic?

Gemini Instrumentation Program Overview

Scot Kleinman

http://www.gemini.edu/sciops/instruments/

Gemini Observatory:
Operating twin 8m telescopes
on Maunakea and Cerro Pachon:
providing access to the entire sky



We are Here

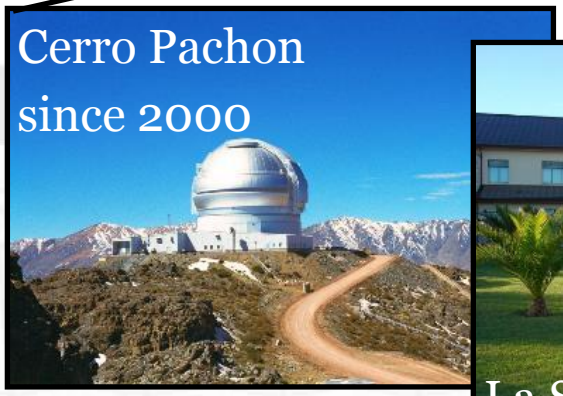
We are Here

We are Here

We are Here

We are Here

We are Here



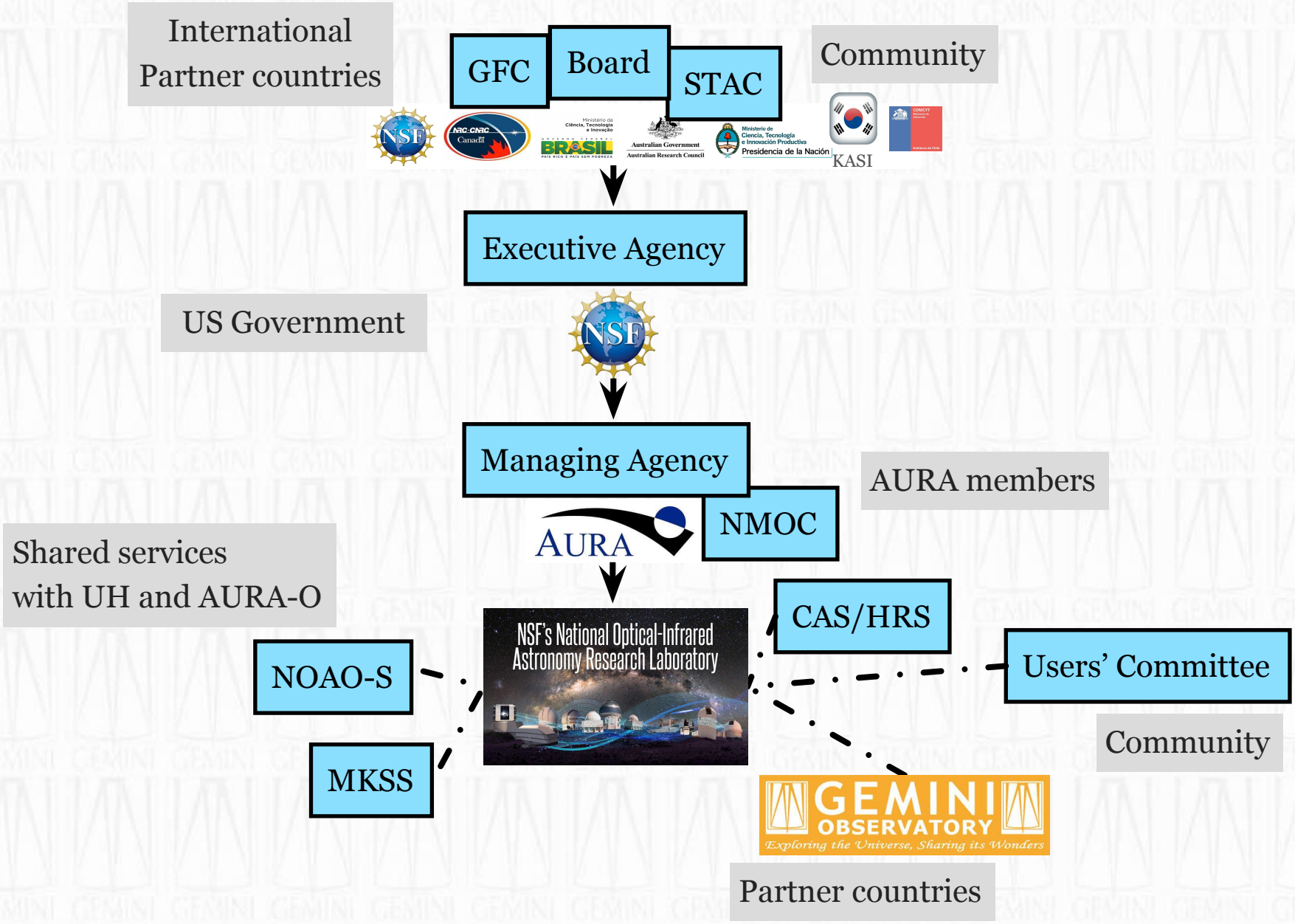
Gemini is an International Partnership

International Agreement *2016-2021* includes as partners:
USA, Canada, Korea, Brazil, Argentina, and Chile

Shares **2016-2021:**
(Budget ~27+x $M/year)

US 67 %
CA 18 %
BR 7 %
KOR 5%
AR 3%

The Governance



Why Gemini?

Gemini serves a broad partnership and strives to meet their diverse needs by hosting a variety of instrument capabilities, stressing efficiency and operational flexibility.

Operations

Obtain time 4 ways

- Standard TAC
- Long and Large
- Fast Turnaround
- Director's Discretion

Observe how you like

- Queue
- Classical
- Priority Visitor
- Base Facility Operations

Why Gemini?

Gemini serves a broad partnership and strives to meet their diverse needs by hosting a variety of instrument capabilities, stressing efficiency and operational flexibility.

Instrumentation

Facility Instruments (4 + AO)

- Typically broad capability or appeal
- Internal and external upgrade programs

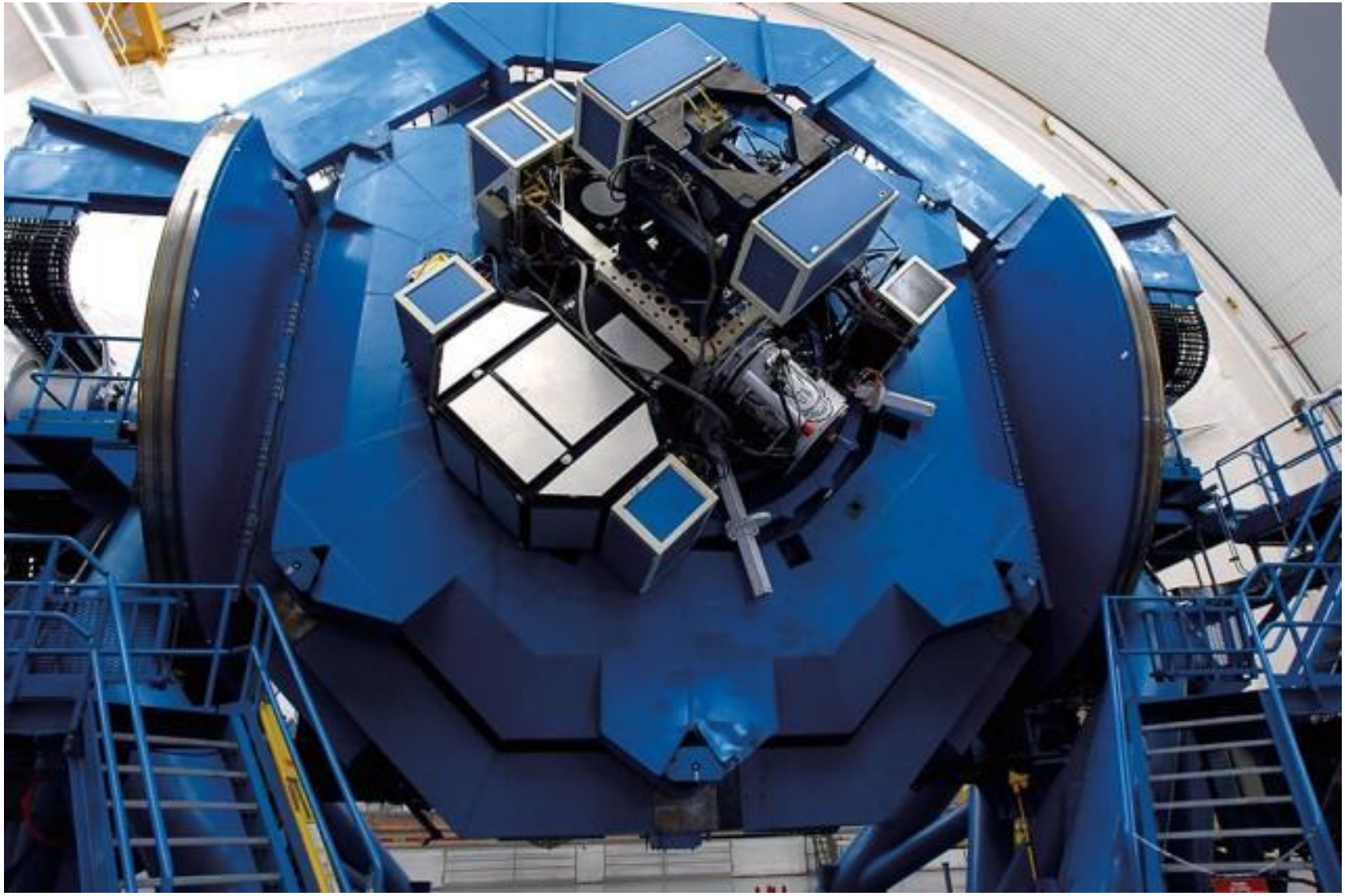
Visitor Instruments

- Initial technical assessment
- Apply through standard channels
- Observe once (typically PV) or
- Come back again and offer to the community

Funding

- Can compensate in cash and telescope time
- Can support funding efforts

Gemini Instruments



Instrumentation 2019+

Site	Instrument	Spectral Range	FoV, Mode, Resolution	AO Support
Gemini N up to 2019	GMOS-N	360-940 nm	Img 5.5'x5.5', LS, MOS, IFU 5"x7", R: 600-4,000	(ALTAIR)
	NIRI	1-5 μm	Img 20"x20" - 120"x120"	ALTAIR
	NIFS	950-2,400 nm	IFU 3"x3", R: 5000	ALTAIR
	GNIRS	1-5 μm	LS/XD, R: 1,800-18,000 (+Img)	ALTAIR
Gemini S up to 2019	GMOS-S	360-940 nm	Img 5.5'x5.5', LS, MOS, IFU 5"x7", R: 600-4,000	(GeMS)
	GSAOI	950-2,400 nm	Img 85"x85"	GeMS
	FLAMINGOS-2	950-2,400 nm	Img 6.1' ⌀, LS, (MOS 2'x6'), R: 1,200-3,000	(GeMS)
	GPI	900-2,400 nm	IFU 2.8"x2.8" contrast: 10^7 at 0.4"	XAO
2020	GHOST	360-1,000 nm	2 IFUs in 7' ⌀, R: 50,000-75,000	(None)
2023	SCORPIO	385-2,300 nm	Img 3'x3', LS, R: 4000	no AP
2023	IGRINS-2	1450-2,500 nm	XD R: ~45,000	TBD
Visiting Current	TEXES (GN)	5-25 μm	LS R: 4,000 - 85,000	no AO
	Phoenix (GS)	1-5 μm	LS R: 50,000 - 80,000	no AO
	GRACES (GN)	400-1000 nm	XD R: ~45,000, see CFHT/ESPaDOnS	no AO
	Alopeke/Zorro (GN/GS)	400-1000 nm	Img 7" Dual EMCCD, Speckle 20 mas resolution@650nm	no AO
	POLISH2 (GN)	optical	High precision polarimetry	no AO
	IGRINS (GS)	1450-2,500 nm	XD R: 45,000	no AO
	GASP	optical	Fast polarimetry	no AO
2020	MAROON-X (GN)	~500-1000 nm	Precision radial velocity	no AO
2025	GIRMOS (G?)	1,100-2,400 nm	MOAO, deployable IFUs	GeMS or GNAO

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Project Summary

David Henderson

Project

This RFP is for a Preliminary Design

At the conclusion of this PD, we intend to select a team to complete the project.

RFP Documentation

- **GNAOI-01 RFP Main Document**
- **GNAOI-02 Instructions to Offerors**
- **GNAOI-03 Contract Main Document**
- **GNAOI-04 Statement of Work**

- **Interface Control Documents and Specifications**

GNAOI RfP Announcement: https://www.gemini.edu/gnaoi-rfp

GNAOI Home Page: http://www.gemini.edu/sciops/future-instrumentation/gnaoi

Guiding Principles

From the following guidance received from Gemini Governance and the Gemini Science and Technology Advisory Committee:

- *We prioritize meeting the schedule and budget constraints over extra capabilities beyond our baseline and plan to make decisions that, in order of priority:*
  - *Meet the core science requirements*
  - *Reduce cost and schedule risk*
  - *Employ currently available technology*

Events

2019 Events	Date / Deadline
Release RFP	Sep 17
Notice of Intent due	Oct 1
Proposers Conference	Oct 4
Proposal due	Nov 1
Evaluation Process starts	Nov 15
Contract Negotiations start	Dec 6
2020 Events	**Duration**
Preliminary Design	Jan-Jun

Project Deliverables

Described in the SoW

NAOI-01 Project Management Plan

NAOI-02 System Engineering Management Plan

NAOI-04 Science Cases

NAOI-05 Concept of Operations Document (ConOps)

NAOI-06 Requirements Document

NAOI-10 Preliminary Design Document

NAOI-11 Instrument Interface Control Documents

Contract and Statement of Work Amendment Exceptions

Key Points

- Will consider design proposals that incorporate the GNAOI functionality into a new instrument, an existing instrument, or one currently under development.

- Fixed Price up to $150k

- Selected teams to receive GNAO Conceptual Design documents, which will include core science cases and a list of derived core science requirements.

- Preliminary Design study starts in January 2020, completed within five months.

Key Points

- Selected PD teams will receive Gemini South Adaptive Optics Imager (https://www.gemini.edu/sciops/instruments/gsaoi/) design documents that they may use in their work.

- One team down-selected at the end of the Preliminary Design Stage, to proceed with the remainder of the design, build, test, and commissioning (the “Post-Preliminary-Design”) work.

- We are not providing a maximum budget for the complete instrument, but desire a low-cost, low-risk instrument, and will highly consider overall cost in the final Post-Preliminary-Design downselect.

Key Points

- In order to expedite the delivery of this instrument, Gemini, unlike on previous projects, discourages potential design and build teams from seeking partnerships with other institutions.

- Schedule critical. Instrument must be ready by March 2023 for post delivery acceptance testing at Gemini North with the GNAO facility.

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Proposal Submission

Barbara Peterman

Instructions

Request for Proposal NB-38880C Gemini North Adaptive Optics Imager (GNAOI-01 Project Details)

1. Proposers should read the entire GNAOI RFP Documentation Set before submitting a proposal.
2. Proposals must be received by **Friday 1 November 2019** at 15:00 Mountain Standard Time.
3. Specific details for submittal are contained in **INSTRUCTIONS TO OFFERORS (GNAOI-02)**, Section II and Section III
    a. Proposal Submission Process (Section III 1. Proposal Content and 2. Proposal Format and Submission)
    b. Evaluation and Selection Process and Criteria (Section III 3. Proposal Evaluation and Selection Process and Criteria)

4. Representations and Certifications (Section IV, GNAOI-02) must be submitted with the proposal. A proposal may be deemed non-compliant if the entire submission package is not received by the closing date.

5. After the Bidders Conference, technical staff must cease all discussions with vendors and vendors may only ask questions through the Contracts Officer or Buyer. (GNAOI-02 Section III, 4. Communication and Questions)

6. Questions shall be submitted to **gnaoi_rfp_submit@gemini.edu**, reviewed and answered within 24 hours. Both questions and answers will be posted to the Gemini Website at **http://www.gemini.edu/gnaoi-rfp** for all to see.

7. A “draft” or “sample” contract document has been provided with this RFP. Terms and conditions shall be finalized upon notification to the winning bidder.

8. Once the selection process has concluded, AURA will notify each team of its status. The selected organizations will enter a period of contract negotiations.

Contact Information:

Barbara A. Peterman Contracts Officer, Central Administrative Services Tel: 520-318-8383	Tito Agbayani Jr. Buyer II – Lead (Hawaii), Central Administrative Services Tel: 808-974-2506

Email: **gnaoi_rfp_submit@gemini.edu**

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GNAO Introduction, Science Cases and Requirements

Trent Dupuy & Gaetano Sivo

GNAO: an MCAO facility for Gemini North

1. Provide uniform near-diffraction limited correction in the NIR on a 2' FoV

2. Simulated performance achieved is 60 mas in K band over 85x85 arcsec^2

3. Designed to feed imaging and spectroscopic instruments

Design

- 4 (maybe 5) sodium LGSs for high-order correction
- 1 (up to 3) visible-light NGSs for low-order correction
- 2 DMs conjugated to 0 km and 11.6 km (and maybe a third at 4 km)
- Retractable ADC for throughput purposes

GNAO

- The Gemini North Adaptive Optics (GNAO) upgrade project will deliver the first queue-operated multi-conjugate adaptive optics (MCAO) system on Maunakea.
- Built on experience with the Gemini Multi-conjugate System (GeMS) at Gemini South.
- Employs the latest technologies for improved performance in support of the next generation of AO-assisted instruments at Gemini North.
- Corrected field-of-view of about 2 arcmin and spatial resolution similar to that of *JWST*.
- Will take advantage of Maunakea's outstanding conditions for AO performance and establish GN as the premier ground-based facility for wide-field AO studies.
- Completed Conceptual Design Review end Sep 2019. First light testing planned for 2024 Q2.

Core Capabilities / Requirements

The GNAOI Instrument will be used with both the in-progress Gemini North Multi-Conjugate Adaptive Optics system (GNAO) and a planned Ground Layer Adaptive Optics (GLAO) system.

1. GNAOI shall use a single 15-micron pixel HAWAII-4RG detector as its primary science detector.

2. GNAO will provide an f/32 beam to the instrument. GLAO will provide an f/16 beam. A single set of camera optics in GNAOI shall give a field-of-view of 85 arc seconds square with GNAO (which will correct a 2-arcminute diameter circular field) and 170 arc seconds square with GLAO (or in natural seeing).

Core Capabilities / Requirements

3. Beyond re-imaging the field onto the detector, GNAOI shall also incorporate two interchangeable cold stops appropriate to the f/32 and f/16 beams to block background thermal flux.

4. For alignment purposes, GNAOI shall provide a means to image the pupil onto the detector.

5. GNAOI shall operate between the 0.9 um cut-on of the GNAO beam splitter and 2.4 um.

6. GNAOI shall optimally Nyquist sample the corrected f/32 beam at 1.65 um within a field that circumscribes the detector. (We expect the scale to be ~20 miliarcsec/pixel.)

Core Capabilities / Requirements

7. The f/16-pixel scale will be double the f/32-pixel scale, a single set of camera optics shall be used for both.

8. GNAOI shall generate a root mean squared (RMS) wave front error of < 65 nm.

9. GNAOI shall provide a means for measuring non-common-path wavefront errors at the GNAOI imager detector.

10. GNAOI shall contain a complement of broad-band and narrow-band filters, TBD, to support a broad range of science applications.

Core Capabilities / Requirements

11. GNAOI shall have an optical throughput exceeding 50% for all wavelengths within the range 0.9 - 2.4 microns, excluding the detector.

12. GNAOI shall include optics for viewing its internal cold stop, that can be inserted without disturbing the nominal imager optics.

13. GNAOI shall be able to position and readout an on-detector guide window anywhere on the HAWAII-4RG for use as an on-instrument wavefront sensor.

Science Cases

Science case	Spectral range	Field of view	Astrometric accuracy	Photometric accuracy
Extragalactic and Cosmology				
High z galaxy dynamics	0.9-2.4 um	3"	<100mas	~10%
Galaxy metallicity maps	0.9-2.4 um	3"	<100mas	~10%
Nuclear star clusters & disks	0.9-2.5 um	20"x20"		
Central parsecs around AGN	0.9-2.5 um	<~ 10"x10"		~10%
Cosmological Constraints from Strongly Lensed, Multiple-source Systems	1.2 -2.5 um	30"	1 mas	~10%
Follow-up and Monitoring Gravitationally Lensed Transients	0.7-2.5 um	2'	10 mas	2%

Science Cases

Science case	Spectral range	Field of view	Astrometric accuracy	Photometric accuracy
Galactic and nearby extragalactic				
Galactic young massive star clusters	1-2 um	>2'	<0.3mas	few %
Globular clusters	1.5-2.4 um	4"	<10mas	<20%
Galactic Nucleus	1-2.9(-5) um	>2'	<0.2 mas	few %
Galactic young massive star clusters (Arches, Quintuplet, central pc) in Galactic center	1-2.9 um	~0.5'		yes
Brown dwarfs, solar system				
The lowest-mass products of star formation (astrometric orbits & resolved spectra)	1-2.5 um	~1" | ~10'	n/a | ~1 mas	n/a
Giant Planet Atmospheres and their Disks	1-5 um	1'	<1mas	few %

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Any further questions on this topic?

Statement of Work Review

David Henderson

Statement of Work GNAOI-04

Reiterates Priorities

1. Capability
2. Schedule
3. Cost

Lists PD Schedule, Requirements, ICDs

Describes Communication

- Kickoff meeting
- Monthly reports and meetings
- Roles of Contracts Officer and Technical Rep

Statement of Work GNAOI-04

Describes the Scope of the PD work

and

The PD Documentation Products

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Proposal Content

David Henderson

Proposal Content in GNAOI-02

- No longer than 40 pages, excluding any of the optional named Appendices.
- Proposers may provide relevant information they may already have or can reasonably produce within these Appendices. Appendices are an opportunity to highlight pre-existing mature elements of the proposal.
- Must include the following named sections (in boldface in the following slides) that each include the information requested in the bullet points
- Must be consistent with the Preliminary Design Statement of Work
- Directly address the evaluation criteria described in GNAOI-02.

Proposal Content in GNAOI-02

Executive Summary: a one-page summary of the proposal highlighting the instrument capabilities, project schedule, and budget.

Scientific Motivation: A brief summary of the relevant scientific work of the proposing team and the science they expect to do with GNAOI once commissioned.

Technical requirements, functionality and instrument design:

- A top-level description of envisaged operating modes.
- A top-level description of the proposed instrument's design and functionality.
- A list of performance/error budgets.
- Any additional top-level instrument requirements derived from the science cases
- Brief descriptions of the instrument's major subassemblies.
- Brief descriptions of the instrument's optical, opto-mechanical, electrical and software designs.
- Relevant and available layouts of the instrument's major subassemblies.
- Identify areas of technical risk and describe intended approaches to reduce risk
- Identify technical trades to be considered during the preliminary design stage.

Proposal Content in GNAOI-02

Project and Technical Management:

- Summary of the project schedule
- Summary of the budget
- Rough order of magnitude absolute of cost of the delivered proposed imager with basis of estimate.
- Summary of the work breakdown structure
- A project organizational chart.
- Identify key personnel roles, areas of expertise, home institutes, and responsibilities in the project.
- Outline of the project's communication plan.
- A description of the project's overall risk management approach.
- A summary of the project's key risks and mitigation plans
- A description of the systems engineering methodology approach for the project.
- A description of the project management methodology and tools for the project.

Proposal Content in GNAOI-02

Organization, Infrastructure, and Heritage

- An introduction to the main organization named in the proposal.
- The institutional motivation behind submitting this proposal.
- The available facilities relevant to executing this project.
- The relevant experience, knowledge and strengths of the organization, especially demonstrated past successes in similar projects.
- The relevant experience, knowledge and strengths of each key member, especially demonstrated past successes in similar projects.
- Summarize key relevant scientific and technical publications for key team members.
- How the organization is structured with respect to project management and systems engineering functions.
- Organization's procurement process, including such factors as complexity, levels of approval, and departments involved.
- A description of other organizational project support including accounting, contracts, finance, and travel.

Proposal Content in GNAOI-02

Proposal Appendices: NO Page limits

- **Appendix A:** Performance and Error Budgets
- **Appendix B:** Requirements
- **Appendix C:** Schedule
- **Appendix D:** Cost Breakdown
- **Appendix E:** Work Breakdown Structure (WBS)
- **Appendix F:** Risk Register

Proposal: Format Requirements

Format requirements

- Paginate entire proposal as one document. Do not paginate each section individually

- Use .75” margins minimum, single-column format, minimum 12pt font.

- Combine all sections and documents into one PDF. You can save space by saving it as PDF/Reduced.

Proposal: Format Requirements

- Signatures may be electronic or signed as hard copy and scanned to PDF.

Submit one copy via email to

gnaoi_rfp_submit@gemini.edu

No later than November 1, 2019, 15:00 MST (Arizona time)

Lead Institution

Each proposal must have a lead institution. AURA will only accept proposals from a single contractor. A group of institutions may not submit a joint proposal in which they are all listed as equal partners. The only way for a group of institutions to submit a proposal is for one institution to submit a proposal as lead institution with the other institutions listed as subcontractors.

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Evaluation and Selection

David Henderson

Evaluation Criteria

Each member of the Evaluation Panel will evaluate each received proposal against the evaluation criteria. They will identify relative strengths and weaknesses of each proposal based on the science, technical and management considerations.

The Evaluation Panel will write a report making recommendations to the Gemini Observatory.

- **Membership in Gemini Partnership [Weighting 30%]**
- **Technical Competency**: **[Weighting 25%]**
- **Meeting Schedule: [Weighting 25%]**
- **Cost & Budget: [Weighting 20%]**

The evaluation scores will provide a guide to the Evaluation Panel.

Site Visits

Gemini may choose to make a site visit to the proposing team.

The purpose of the site visit would be to obtain clarification regarding: Proposal content, Contract objections, Proposed Statement of Work changes, Facilities and infrastructure planned to be used for the project.

Selection

Gemini will make a selection after considering the following: contract objections, the Evaluation Panel report, and proposed statement of work changes.

Once the selection process has concluded, the selected organizations will enter a period of contract negotiation. If all differences can be resolved within 21 days, AURA will submit the negotiated contracts for approval. If differences cannot be resolved with the preferred teams, AURA may begin the process with another team. To ensure fairness and ease scheduling of the design review, AURA intends to start the Preliminary Design Work of all selected teams at the same time.


Any
questions?

Thank you for attending

Remember:

- Send any future questions to gnaoi_rfp_submit@gemini.edu (not to individuals)
- Subscribe to our broadcast email gnaoi_rfp+subscribe@gemini.edu
- GNAOI RfP Announcement: https://www.gemini.edu/gnaoi-rfp
- GNAOI Home Page: http://www.gemini.edu/sciops/future-instrumentation/gnaoi

Redactions to the presentation:

- Typos corrected
- Edited page numbers
- Added GNAOI Home page details
- Updated email addresses
- Added contact details of Tito Agbayani
- Amended 'Selection Committtee' to 'Evaluation Panel' (slide 63)