Ground-based O/IR System Roadmap Committee Community Survey
Summary of Results from U.S. Based/Sponsored Respondents

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January 31, 2012, V1.5
We will be posting updated versions of this document as we make progress in analyzing the survey responses.

In November of 2011, the U.S. Ground-based O/IR System Roadmap Committee[1] undertook a survey of the astronomical community to inform our assessment of the current state of ground-based O/IR observing facilities and the community's use of these facilities. We also asked the community to provide us with their plans for using existing facilities to pursue the science highlighted in the reports of the National Academy decadal surveys (New Worlds, New Horizons (NWNH) and Vision and Voyages for Planetary Science in the Decade 2012-2022 (VVPS).

We received a total of 1,178 responses to our web-based survey. Of these, 962 were from individuals based at U.S. or U.S. sponsored institutions. In this initial report we present results and summaries of the responses from only the U.S. based respondents. For reference, the American Astronomical Society currently has 6279 members (as of 1/31/2012; as provided by Kevin Marvel, Executive Officer of the AAS, personal communication). In subsequent reports we will summarize the results from those respondents based at non-U.S. institutions.

The Survey had four parts containing a total of 22 questions. Part 1 collected basic demographic information about the responders and asked responders to tell us which facilities they actively use (broadly defined) in their research. Part 2 asked responders to assess the the ability of the current state of ground-based facilities, both in the U.S. and abroad, to enable them to achieve their science goals. Part 3 asked responders to identify which of the decadal survey science goals/themes/priorities they would be actively pursuing in the years ahead. Finally, in Part 4 we asked the community to identify/describe the observing capabilities they would require in the next decade.

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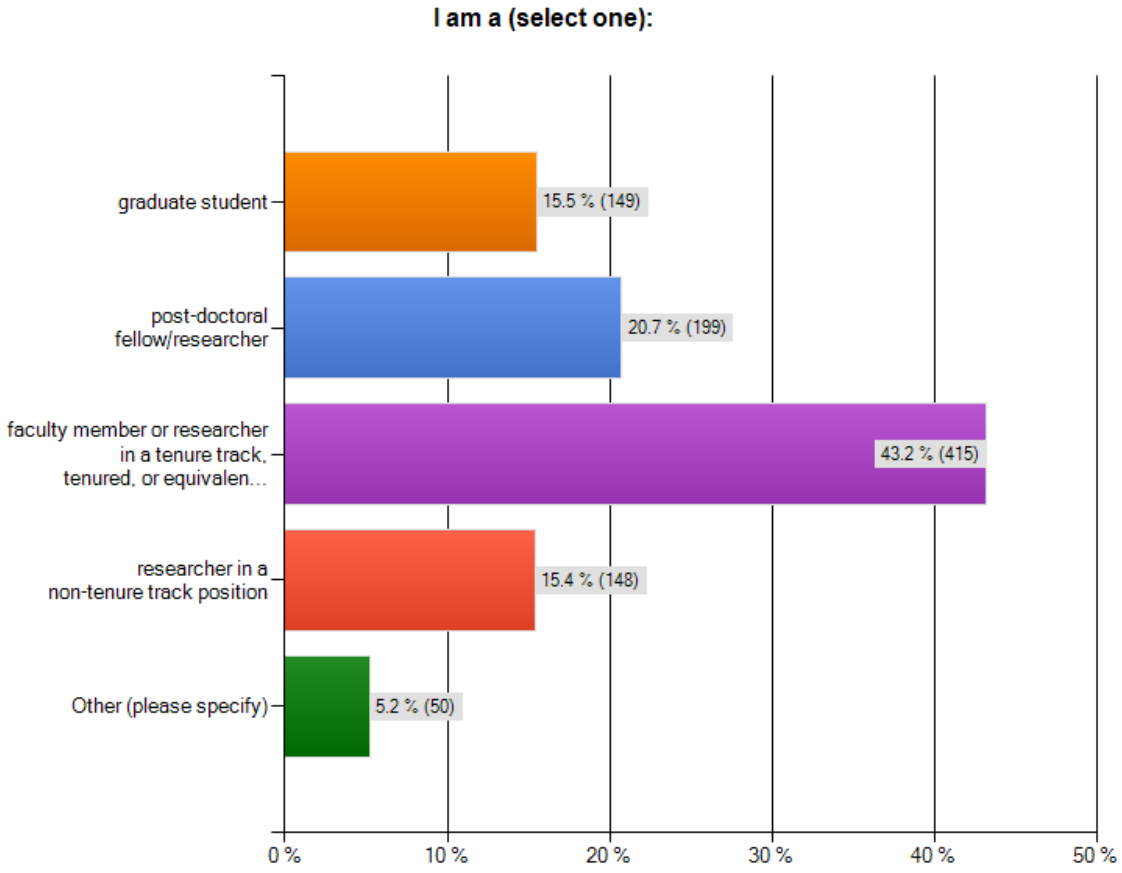
[1] The U.S. Ground-based O/IR System Roadmap Committee is a standing advisory committee charged by NOAO to assess annually the state of the ground-based optical/near-IR system of observing facilities (i.e. all ground-based optical/IR telescopes operated by US institutions, including both federal and non-federal facilities) and to make recommendations regarding which capabilities are needed by the community on near and long term timescales. We are a successor to the past ALTAIR and ReSTAR Committees that performed valuable one-time assessments of the state of the U.S. ground-based system. The System Roadmap Committee has representation from the entire U.S. community that uses the system of ground-based federal and non-federal O/IR facilities. Our objective is to help the community and funding agencies that support us maximize the scientific return of the whole system.

In the remainder of this document we present the survey questions along with prose and graphical summaries of the responses from the 962 U.S. based/sponsored respondents. As is clear from the responses to the first few questions, the input we received is remarkably broad and representative of the large U.S. community that uses ground-based O/IR facilities to pursue their research.

Part 1: Tell Us About Yourself
Question 1: I am a (select one):



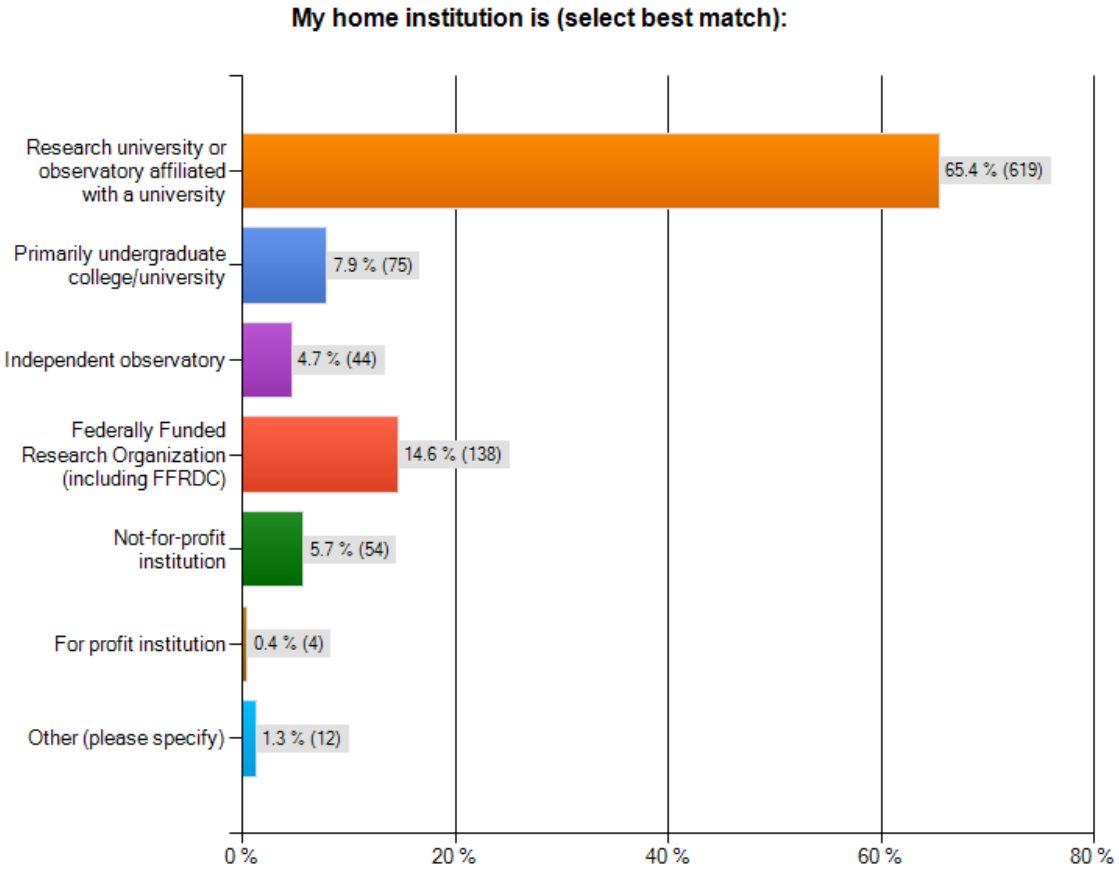
There were 50 respondents who chose “other” and self-identified as follows:
Emeritus Professor/Retired Researcher - 11
Staff at astronomical facility -- 7
Support Astronomer/Researcher - 5
Administrator - 4
Faculty Renewable/fixed Term - 4
Post-bachelors Researcher - 3
Undergraduate - 2
Astronomy Educator - 2
Unemployed Astronomer - 2
Engineer - 2
Planetarium Astronomer - 1

Purchasing Agent - 1
Computer Systems Engineer - 1
CFO (Chief Financial Officer) - 1
Telescope Technologist - 1
Visiting Scholar - 1
Software Engineer -1
“TBD” - 1

Part 1 - Question 2: My home institution is (select one)

in the U.S. (or operated/funded by a U.S. based Institution) or
not in the U.S. (and not funded by a U.S. based institution)
We received a total of 1,172 survey responses, of whom 962 respondents indicated their home institution is in the U.S or funded by a U.S. based institution.

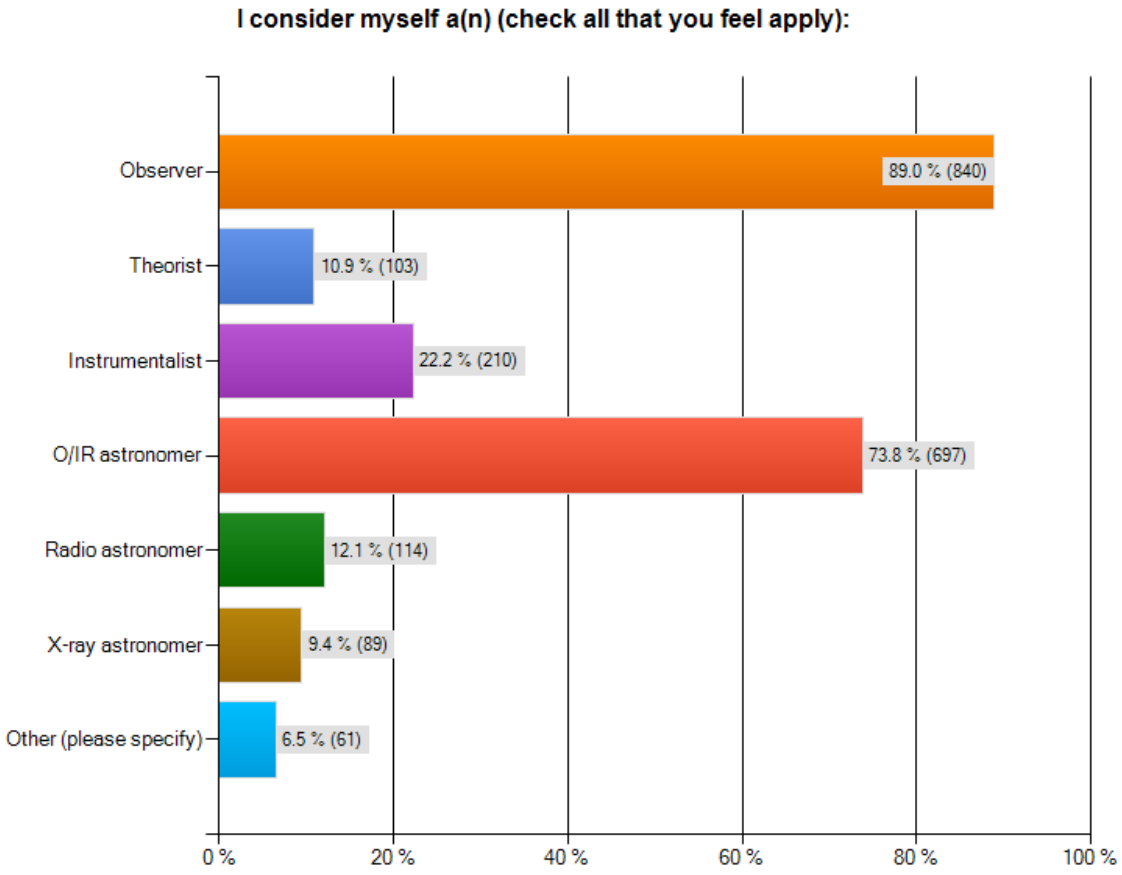
Part 1 - Question 3.)



Twelve people indicated “other”. Their responses were the following:
Both FFRDC and University - 1
(FFRDC = Federally Funded Research and Development Center)
National Observatory - 2 (Should be added to the FFRDC group)

Federally Funded Observatory - 1 (should be added to the FFRDC group)
Planetarium/Research Museum - 2
Independent Research Institutions - 1
Government - 1
Undecided - 1
Gemini Observatory (International Partnership) - 1
Both Research and Undergraduate Teaching Position - 1
Harvard-Smithsonian (university plus federal) -1

Part 1 - Question 4:



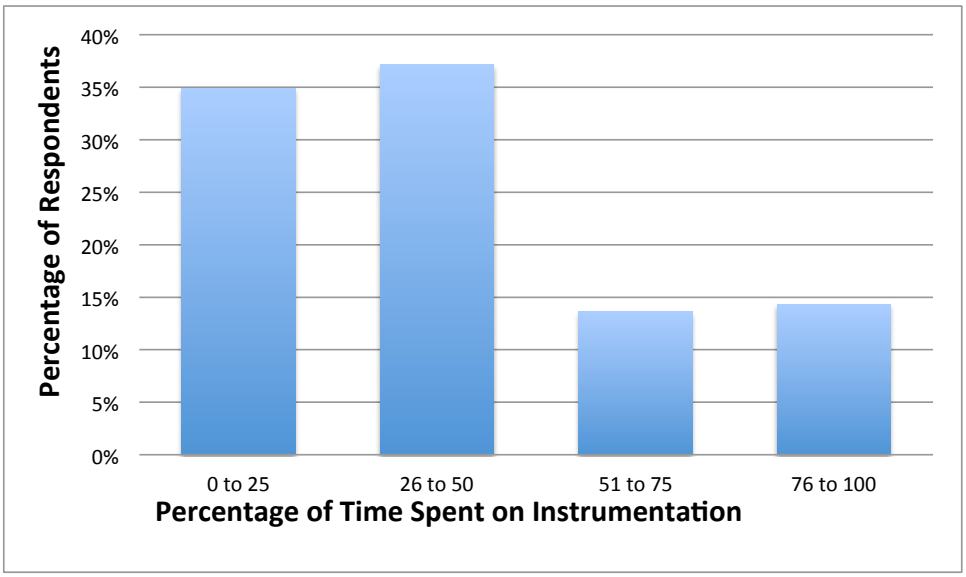
There were 61 respondents who indicated “other” and specified the following:
O/IR/UV - 2
UV - 8
FIR/mm Astronomer - 1
Physicists/Experimental Physicists - 3
astro-informatics -1
Planetary Scientist - 2
Jack of all trades, master of none - 1
Gamma-ray astronomer -4
Modeler - 2
Project Manager - 2

CFO - 1
Instrumentalist - 1
Computer Scientist/Software - 5
multi-wavelength - 1
observer and theorist - 1
support staff - 3
Simulator - 1
lab staff - 1
Engineer - 1
Astronomy Fan - 1
Data management processing expert - 2
phenomenologist - 1
Manager/Administrator - 3
Historian of astronomy and physics - 1
Survey Scientist -1
Educator -2
Data analyst - 3
Gravitational Wave Astronomer - 2
All of the above - 1
Experimentalist - 1

Part 1 - Question 5:
Is developing and/or building astronomical instruments and/or telescopes a significant fraction of your research effort?
Yes 26.4% (249) No 73.6% (694)
(19 did not answer this question)

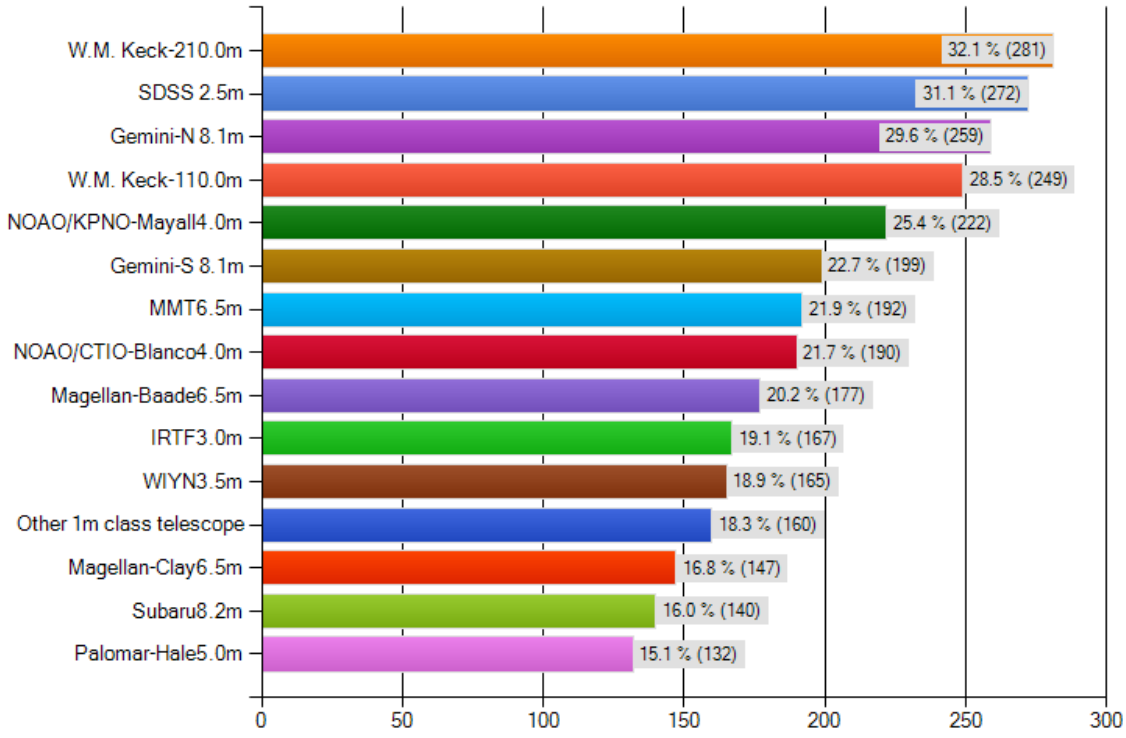
If you answered yes, what fraction of your research is focused on instrumentation?

Fraction of time responses were provided by 244 of the 249 people who responded to this question. Their answers are summarized in this bar graph.



Part 1 - Question 6:

Which facilities from the U.S. Ground-based O/IR System have you used in the past three years (e.g. published a paper with data from, proposed for time from, obtained data from)? Some facilities below are joint US/non-US facilities, but if you obtained access through the time available through the US partner (or US time-trade), select it below.



Shown in the bar graph above are the top 15 facilities identified used by the respondents based at U.S. institutions over the past three years. The responses for all of the facilities are shown below.

A spreadsheet/table containing all of the responses to this question can be found at http://ast.noao.edu/sites/default/files/TelescopeUseCrossTabOnlyUSResponsesV5.xls

The number of responses for each telescope, not just the top fifteen shown above, are listed on the following pages.

6. Which facilities from the U.S. Ground-based O/IR System have you used in the past three years (e.g. published a paper with data from, proposed for time from, obtained data from)? Some facilities below are joint US/non-US facilities, but if you obtained access through the time available through the US partner (or US time-trade), select it below.

Create Chart Download

	Response Percent	Response Count
Large Binocular Telescope (2x8.4m) 11.9m	8.6%	75
Grand Telescope of the Canaries 10.4m	3.2%	28
W.M. Keck-1 10.0m	28.5%	249
W.M. Keck-2 10.0m	**32.1%**	**281**
Hobby-Eberly Telescope 9.2m	9.5%	83
Southern African Large Telescope 9.2m	3.7%	32
Subaru 8.2m	16.0%	140
Gemini-S 8.1m	22.7%	199
Gemini-N 8.1m	29.6%	259
MMT 6.5m	21.9%	192
Magellan-Baade 6.5m	20.2%	177
Magellan-Clay 6.5m	16.8%	147
Palomar-Hale 5.0m	15.1%	132
SOAR 4.2m	10.6%	93
NOAO/CTIO-Blanco 4.0m	21.7%	190
NOAO/KPNO-Mayall 4.0m	25.4%	222
UKIRT 3.8m	5.8%	51
CFHT 3.6m	12.3%	108

WIYN 3.5m		18.9%	165
ARC 3.5m		14.2%	124
IRTF 3.0m		19.1%	167
Lick-Shane 3.0m		10.1%	88
AEOS 3.5m		0.5%	4
McDonald-Smith 2.7m		4.9%	43
DuPont 2.5m		5.8%	51
SDSS 2.5m		31.1%	272
Hiltner 2.4m		4.7%	41
Bok (Steward Obs) 2.3m		5.3%	46
WIRO 2.3m		1.9%	17
UH-88-inch 2.2m		5.1%	45
McDonald-Struve 2.1m		3.4%	30
NOAO/KPNO-2.1-meter 2.1m		12.9%	113
LCOGT Faulkes-N 2.0m		5.3%	46
LCOGT Faulkes-S 2.0m		3.3%	29
VAT 1.8m		1.7%	15
UofArizona Spacewatch 1.8m		0.5%	4
Lowell Observatory 1.8m		3.7%	32
PanSTARRS-1 1.8m		4.0%	35
Kuiper (Steward Obs) 1.5m		1.4%	12
Harvard-Oak Ridge 1.55m		0.6%	5
Harvard 1.52m		1.0%	9
Palomar 1.52m		4.5%	39
FLWO 1.52m		5.5%	48
Steward Obs-60in 1.52m		0.9%	8
USNOFS 1.3m		1.1%	10

NOAO/CTIO 1.3m		7.3%	64
McGraw-Hill 1.27m		2.6%	23
PTF 1.2m		6.1%	53
Lick 1m		3.7%	32
Las Campanas 1m		2.6%	23
WIYN 0.9m		8.2%	72
Other 1m class telescope		18.3%	160
		Other(s) (please list) Show Responses	131

Notable among the facilities submitted under “other” were CHARA (the optical interferometer) (1%) and the NOAO/CTIO/SMARTS 1.5m (2%).

On the next page we show a figure that graphically displays one of the many things we can learn from these data, how many users facilities have in common, the connectedness of facilities that comprise the system. We used the responses to question 6 above as the data that guided the construction of the figure, see the figure caption for details. We omitted from display telescopes that were not listed by at least 3% of the respondents (see above). We expand the names of those telescopes in the table above or in the figure that might be hard to identify from the brief acronyms we have used for space reasons here:
AEOS 3.5m = Advanced Electro-Optical System Telescope
PTF 1.2m = Palomar Transit Factory 1.2m

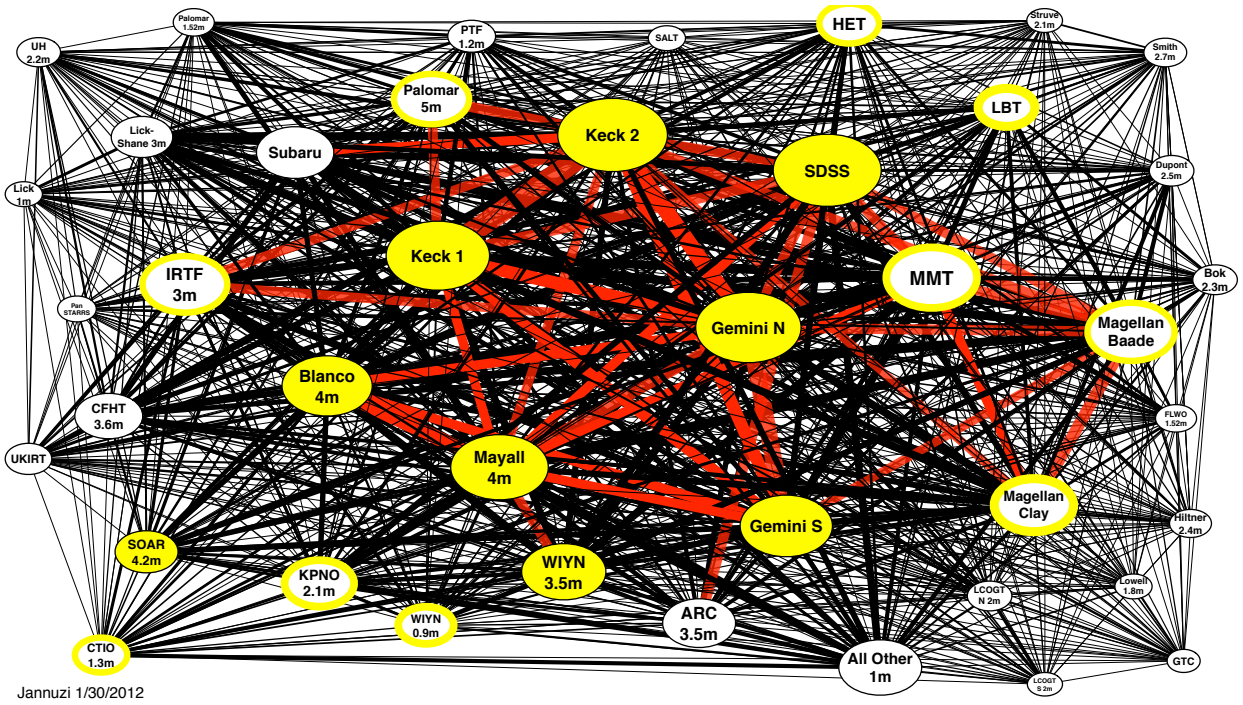


Figure 1: The U.S. has a diverse and capable set of ground based O/IR observing capabilities enabled through the combined efforts of the NSF, DOE, NASA, and non-Federal observatories and institutions. Shown are all the U.S. telescopes (these facilities are run by U.S. institutions, or have a U.S. partner, i.e. some fraction of the observing time for each of these facilities is allocated by a U.S. run institution) used by more than 3% of U.S. based respondents to our November 2011 survey of the astronomical community. This survey received responses from 1,178 individuals, 962 based at U.S. institutions. Shown are results from U.S. based respondents. Each telescope is shown as an ellipse whose area is proportional to the fraction of the respondents that reported using that telescope in the last three years. The thickness of lines between the telescope ellipses is proportional to the number of people that used both of the linked telescopes. The largest lines (representing more than 7% of respondents each) are in red to clearly show the strongest connections. While this manner of displaying the survey responses does not adequately show how many people used multiple telescopes, it does graphically demonstrate that the most frequently used telescopes (largest ellipses) are used by astronomers that are also using multiple other facilities. Those using the less frequently used telescopes are also heavy users of the most used facilities. As other portions of the community survey revealed, this is because a diverse combination of capabilities are required to pursue the Decadal Survey Science Priorities (e.g. programs needing both imaging and spectroscopy to study a large samples of objects). A table showing the data that were used to generate this figure and details regarding the telescopes shown (and those not shown because they were not used by more than 3% of the respondents) can be found at this link (**http://ast.noao.edu/about/committees/system-roadmap**). The most heavily used facilities (used by more than 20% of respondents), were W. M. Keck II 10.m (32.1%), SDSS 2.5m (31.1%), Gemini North 8m (29.6%), W. M. Keck I 10m (28.5%), NOAO/KPNO Mayall 4m (25.4%), Gemini South 8m (22.7%), MMT 6.5m (21.9%), NOAO/CTIO Blanco 4m (21.7%), and Magellan-Baade 6.5m (20.2). These core facilities have all received significant NSF funding (operations funding or funding for instrumentation, through the NSF MRI, ATI, TSIP, PREST, and ReSTAR programs) in the last decade. Past TSIP awards can be found at **http://ast.noao.edu/system/tsip/more-info/funding-summary**. Telescopes that have received, on average, more than $1M per year of support from the NSF for the last 10 years have their ellipses filled in yellow. Facilities that we are aware of having received NSF operations or other support from NSF/AST facilities, TSIP, ATI, MRI, PREST, and ReSTAR at a lower, but still significant, level are shown with a yellow boundary. This figure is reproduced from our submission to the NSF Portfolio Review.

Part 1 - Question 7:

7. Do you use non-US (i.e. not funded or operated by a U.S. institution, federal or non-federal) O/IR ground-based facilities in support of your research? Indicate the non-US facilities you used below (some facilities below are joint US/non-US facilities, but if you obtained access through the time available through the non-US partner, select it below).

Create Chart Download

		Response Count	Percentage
	LBT 11.9m	14	1.5%
	HET 9.2m	16	1.7%
	SALT 9.2m	26	2.7%
	GTC 10.4m	24	2.5%
	Subaru 8.2m	91	9.5%
	VLT(1-4) 8.2m	231	24.0%
	Gemini-S 8.1m	73	7.6%
	Gemini-N 8.1m	65	6.8%
	WHT 4.2m	43	4.5%
	VISTA 4.1m	15	1.6%
	UKIRT 3.8m	47	4.9%
	TNG 3.6m	29	3.0%
	NTT 3.6m	44	4.6%
	ESO 3.6m	31	3.2%
	CFHT 3.6m	85	8.8%

	Calar Alto 3.5m	24	2.5%

The U.S. based respondents use primarily the facilities of the U.S. O/IR system, but a significant fraction also make use of data from the ESO VLT.

Part 2 - The State of the O/IR System

Question 8:

PAGE: PART 2: THE STATE OF THE O/IR SYSTEM

8. Indicate the importance of the following types of facility to your current research. Create Chart Download

	critical	important	used, but not important	not used	Rating Average	Response Count
Non-federal O/IR observing facilities accessed through institutional access.	**43.0% (370)**	32.6% (281)	8.1% (70)	16.3% (140)	2.02	861
O/IR facilities supported (fully or partially) by the NSF (e.g. facilities at KPNO, CTIO, WIYN, SOAR, Gemini, and time obtained on other facilities through the TSIP and ReSTAR programs) and accessed through proposals to the NOAO TAC.	**50.2% (435)**	32.9% (285)	6.1% (53)	10.8% (94)	2.22	867
NASA supported (fully or partially) ground-based O/IR observing facilities (e.g. IRTF and Keck), accessed through NASA run TAC.	22.7% (192)	28.3% (239)	9.7% (82)	**39.4% (333)**	1.34	846
Other federally supported ground-based O/IR facility (e.g. Smithsonian Institution, DOE, Air Force, etc.) accessed through institutional access.	11.1% (94)	18.2% (154)	10.3% (87)	**60.4% (511)**	0.80	846
				answered question		878
				skipped question		84

More than 75% of the survey respondents viewed the first two categories (O/IR facilities supported through institutional access and O/IR facilities whose access is through the NOAO TAC) as critical or important.

CONTINUED ON NEXT PAGE

Part 2 - Question 9:

PAGE: PART 2: THE STATE OF THE O/IR SYSTEM (CONTINUED)

9. Please rate how important the following ways of obtaining ground-based O/IR data have been to your research program over the past three years. Create Chart Download

	critical	important	used, but not important	not used	Rating Average	Response Count
Data you obtain directly (observations made by you or through queue observing)	**76.4% (662)**	15.1% (131)	2.3% (20)	6.2% (54)	2.62	867
Data you obtain from a facility (e.g. Gemini Observatory) data archive	13.7% (116)	**33.7% (286)**	20.8% (176)	31.8% (270)	1.29	848
Data you obtain from a public coherent data set (e.g. 2MASS, SDSS)	**45.1% (386)**	34.2% (293)	10.2% (87)	10.5% (90)	2.14	856
Other	12.8% (32)	10.8% (27)	5.2% (13)	**71.2% (178)**	0.65	250
				Please specify Show Responses		43
				answered question		**874**
				skipped question		**88**

Being able to obtain their own data is a critical capability to the vast majority of respondents, but data from public coherent data sets and data archives also play important roles in enabling their research.

Part 2 - Question 10:

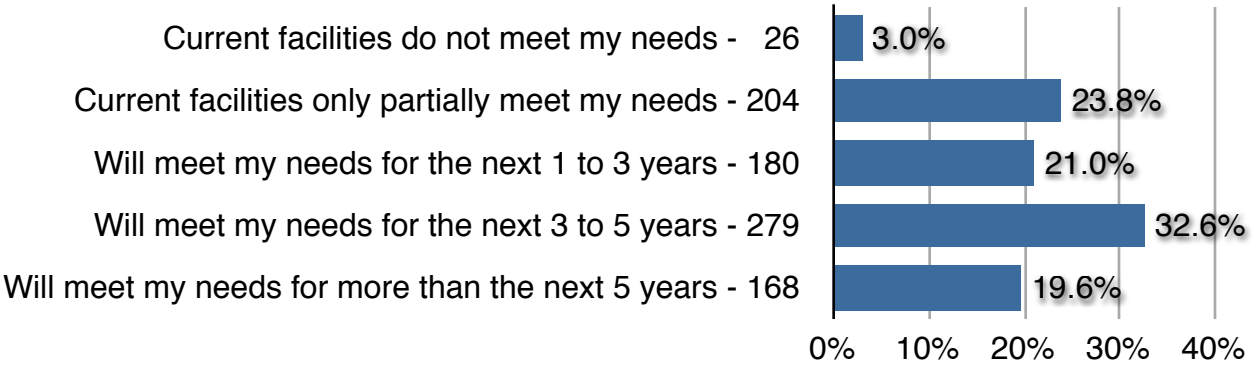
PAGE: PART 2: THE STATE OF THE O/IR SYSTEM (CONTINUED)

10. How do you get access to the ground-based O/IR facilities that you use? For each method that you use please rank how important the capabilities that you are able to use from that method are to your research. Create Chart Download

	critical	important	used, but not important	not used	Rating Average	Response Count
Institutional access	**52.1% (437)**	23.1% (194)	6.1% (51)	18.7% (157)	2.09	839
Publicly available time (through open proposal process)	**52.1% (439)**	28.5% (240)	5.2% (44)	14.1% (119)	2.19	842
Through a collaborator's access to the facility/capability/data set	26.2% (221)	**46.5% (392)**	12.2% (103)	15.1% (127)	1.84	843
Through purchase (by researcher) of the observing time or data access	4.3% (35)	4.7% (38)	4.8% (39)	**86.1% (694)**	0.27	806
Other	4.2% (12)	1.4% (4)	0.7% (2)	**93.7% (267)**	0.16	285
				Please specify Show Responses		16
				answered question		**864**

While there are still significant fractions of the community that depend solely on publicly available time or their institutional access to a facility, the vast majority of U.S. based astronomers use both classes of facilities and find them both to satisfy critical components of their research programs.

Part 2 -- Question 11:
Select the choice below that best describes how long the current telescope/ instrumental capabilities within the U.S. ground-based O/IR system (using either federally funded or non-federally funded facilities) will be able to satisfy your pursuit of decadal survey science priorities.
(857 answered this question, 105 skipped question)

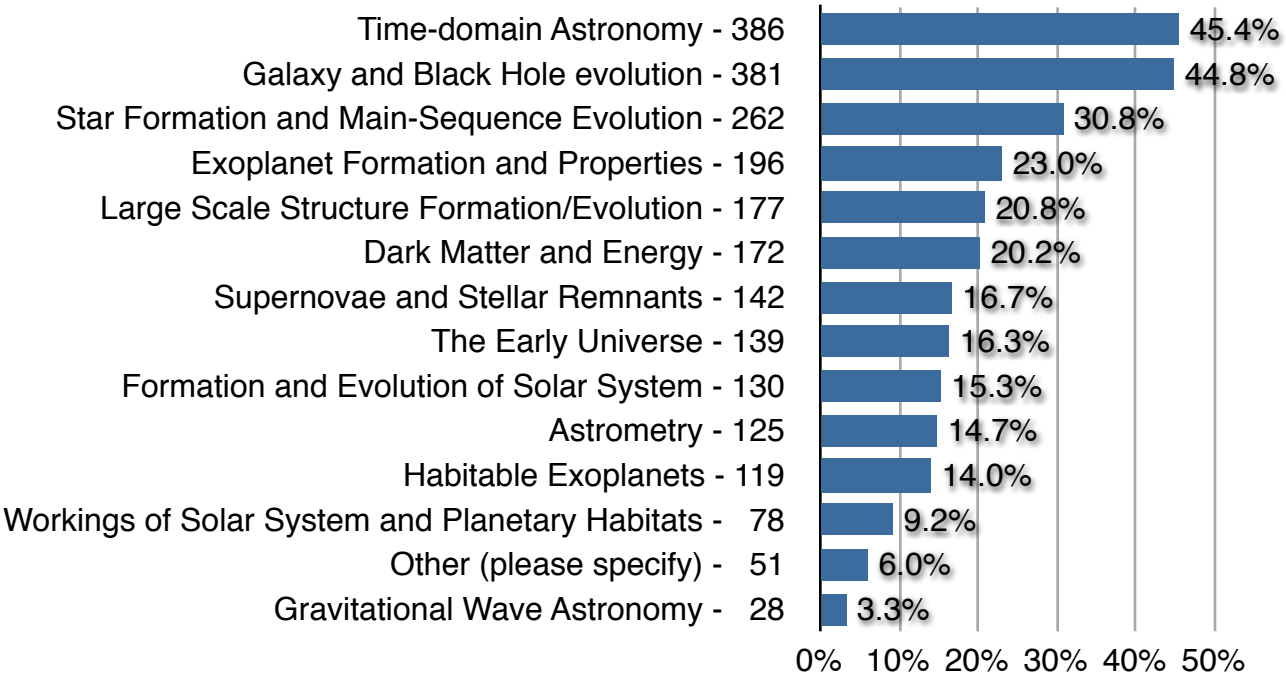


The great majority of respondents (73.2%) find the current U.S. ground-based O/IR system will be able to satisfy their pursuit of decadal survey science priorities for at least the next three years. The percentage that anticipates being satisfied for the next five years decreases to 52.6% and to 19.6% percent beyond five years.

Part 3 - Question 12:

12. Tell us about your research interests in the context of the Astro2010 Decadal Survey Report, New Worlds, New Horizons in Astronomy and Astrophysics (NWNH) and the Planetary Science Decadal Survey Vision and Voyages for Planetary Science in the Decade 2013-2022 (VVPS). The choices below are drawn from the science questions and topics highlighted in NWHN (chapter 2; Table A.1) and VVPS (Section 3). We have grouped similar topics together for simplicity. Please indicate which of these are most closely aligned with your planned areas of research for the next decade. You may select as many of the choices that you feel match your plans, but please try to focus on the areas that are most important to you and limit your choices accordingly. *(you might need to scroll down to get to the "Next" and "Previous" buttons)*

We show the results in the following summary chart and the subsequent table, which has complete topic descriptions. In the table, the first two columns are the number and fraction of people who selected each topic out of the 851 people who responded to this question (111 survey respondents did not respond to this question).



N	%	Complete Topic Description
386	45.4%	**Time-domain astronomy** (includes phenomena such as variable stars, binary stars and compact objects, episodic accretion and outbursts, high proper motion objects, gamma ray bursts, supernovae, Kuiper Belt objects)
381	44.8%	**Galaxy and BH Evolution** (How do baryons cycle in and out of galaxies and what do they do while they are there? How do black holes grow, radiate, and influence their surroundings? What are the flows of matter and energy in the circumgalactic medium? What controls the mass-energy-chemical cycles within galaxies? What is the fossil record of galaxy assembly from the first stars to the present?
262	30.8%	**Star Formation and Main-Sequence Evolution** (How do stars form? How do rotation and magnetic fields affect stars?)

N	%	Complete Topic Description
196	23.0%	**Exoplanet Formation and Properties** (How do circumstellar disks evolve and form planetary systems? How diverse are planetary systems?)
177	20.8%	**Large Scale Structure Formation/Evolution** (How do cosmic structures form and evolve? What are the connections between dark and luminous matter?)
172	20.2%	**Dark Matter and Energy** (What is dark matter? What are the properties of neutrinos? Why is the universe accelerating?
142	16.7%	**Supernovae and Stellar Remnants** (What are the progenitors of Type Ia supernovae and how do they explode? How do the lives of massive stars end? What controls the mass, radius, and spin of compact stellar remnants?
139	16.3%	**The Early Universe** (How did the universe begin? What were the first objects to light up the universe, and when did they do it? Epoch of reionization)
130	15.3%	**Formation and Evolution of Solar System** (What were the initial stages and conditions and processes of solar system formation and the nature of the interstellar matter that was incorporated? How did the giant planets and their satellite systems accrete, and is there evidence that they migrated to new orbital positions? What governed the accretion, supply of water, chemistry, and internal differentiation of the inner planets and the evolution of their atmospheres, and what roles did bombardment by large projectiles play?)
125	14.7%	**Astrometry** (the measurement of the motion of stars)
119	14.0%	**Habitable Exoplanets** (Identification and characterization of nearby habitable exoplanets. Do habitable worlds exist around other stars, and can we identify the telltale signs of life on an exoplanet?)

N	%	Complete Topic Description
78	9.2%	**Workings of Solar System and Planetary Habitats** (What were the primordial sources of organic matter, and where does organic synthesis continue today? Did Mars or Venus host ancient aqueous environments conducive to early life, and is there evidence that life emerged? Beyond Earth, are there modern habitats elsewhere in the solar system with necessary conditions, organic matter, water, energy, and nutrients to sustain life, and do organisms live there now? How do the giant planets serve as laboratories to understand the Earth, the solar system, and extrasolar planetary systems? What solar system bodies endanger and what mechanisms shield the Earth's biosphere? Can understanding the roles of physics, chemistry, geology, and dynamics in driving planetary atmospheres and climates lead to a better understanding of climate change on Earth? How have the myriad chemical and physical processes that shaped the solar system operated, interacted, and evolved over time?)
51	6.0%	**Other** (please specify)
28	3.3%	**Gravitational Wave Astronomy**

Part 4 - Question 13:

This next question was one of the more important and interesting of the survey. Respondents were able to fill out a table that characterized the capabilities that they will need to pursue their research over the next decade. For each specific science area(s) they propose to study, they detailed the observing capabilities that they would need (telescope aperture size, type of instrument, type of observing mode). We have reviewed the responses and used this information to inform our submission to the NSF/ AST portfolio review committee, but we are still working on a summary of these response for a future version of this report. Following the question, we present a few additional summary statements. We will expand on this discussion over the next few weeks.

13.) Considering the science you do and expect to do in the future, **please tell us what general capabilities you would need to carry out your research.** In the table below you may detail the observing capabilities you would use to pursue the research topics you identified in question 12. Enter as many rows as necessary for each science topic. Column one choices are shortened versions of the topics listed in question 12. Imaging observations require options from columns 4 (field of view) and 5 (pass bands). Spectroscopic observations require entrees from columns 4, 6 and 7. If both imaging and spectroscopy are required from the same size scale of telescope and wavelength range, you will select options for all columns in that row. If you need observations with more than one size of telescope you would fill out a separate row for each aperture required. You may select more than one science topic, but we are interested in your main (highest priority) research area(s), not a comprehensive list of everything

that you do. We have not included an option for telescopes larger than presently available, as we are focusing on identifying which capabilities you want to use in the coming decade (i.e. they exist or will be available in the next 10 years). This link will take you to an example of how to fill out this table.

Note in the drop-down menus below: AO HiCon = High Contrast Adaptive Optics; Precise RV = Precise Radial Velocity
If polarimetry (imaging or spectroscopy) or other additional options for your observing (e.g. optical interferometry, etc.) are required, you may indicate this in the text box below the drop-down menus. You may also use this space to further describe the scope and type of observing capabilities you require.

This link, http://www.noao.edu/system-roadmap/communitysurvey/questions.html, will take you to the survey questions so that one can see the possible choices that could have been submitted by each respondent for each science topic they plan to study.

Some items calculated from the responses to question 13:

75% of the respondents indicated they would need access to an observing capability currently provided by a small or medium telescope (<6.6m diameter aperture) during the next 10 years (alternatively, one could say 25% indicated they would only need access to a large telescope).

16% indicated they needed telescope from all three size groups in our survey (Small, Mid-sized, and Large).
40% indicated they needed a telescope with <3m aperture in their listing of future needs.
60% indicated they needed a telescope in the mid-size range 3.1m to 6m.
74% indicated they needed a telescope in the large category (>6.5m).

The majority required both imaging and spectroscopy, at optical and near-IR wavelengths. As we anticipated, the diversity of required observing capabilities is high.

We will be providing additional characterization of the responses to this question soon.

Part 4 - Question 14:

14. If your research requires or would significantly benefit from being able to use observing capabilities in a Target of Opportunity mode (rapid scheduling, interrupting previous schedule) for a significant period of time, please check the box below and give us additional information about your needs in the text box.

143 respondents (15%) indicated that ToO mode is required or would significantly benefit their research. 96 individuals submitted additional information to describe their needs. These will be made available separately on our System Roadmap Committee web pages in the near future.

Part 4 - Question 15:

15. If your research requires or would significantly benefit from being able to use observing capabilities in monitoring mode (prescheduled, multiple observations of the same target(s), for significant period of time) please check the box below and give us additional information about your needs in the text box.

275 respondents (29%) indicated they require or would significantly benefit from access to a monitoring mode of observing with the necessary capabilities. Over 175 of these respondents provided additional details on what they would need. These submissions will be made available separately on our System Roadmap Committee web pages in the near future.

Part 4 -- Question 16:

16. During the next decade (2011-2020), how important do you anticipate future large ground-based O/IR data sets (products of large observing programs or surveys) will be to your research?

	Response Percent	Response Count
Critical	**47.9%**	**376**
Important	28.0%	220
Helpful	19.4%	152
Not Needed	4.7%	37
	answered question	**785**
	skipped question	**177**

Part 4 -- Question 17:

17. If you envision that undertaking your own large scale observing program (i.e. on order hundreds of observing nights or large fractions of a particular observing capability) is needed to support your research, briefly describe what you will need in the box below.

	Response Count
	130

130 of the respondents took the time to submit descriptions of the large scale programs that they would undertake, and what they would need. We have reviewed these responses, and it helped inform our committee's submission to the portfolio review. The responses will be made available separately on our web site at this link in the near future.

Recurring topics included large imaging (optical and near-IR) and spectroscopic surveys. Desired new instruments were mentioned, including Dark Energy Camera and BigBOSS (massively multiplexed spectroscopy).

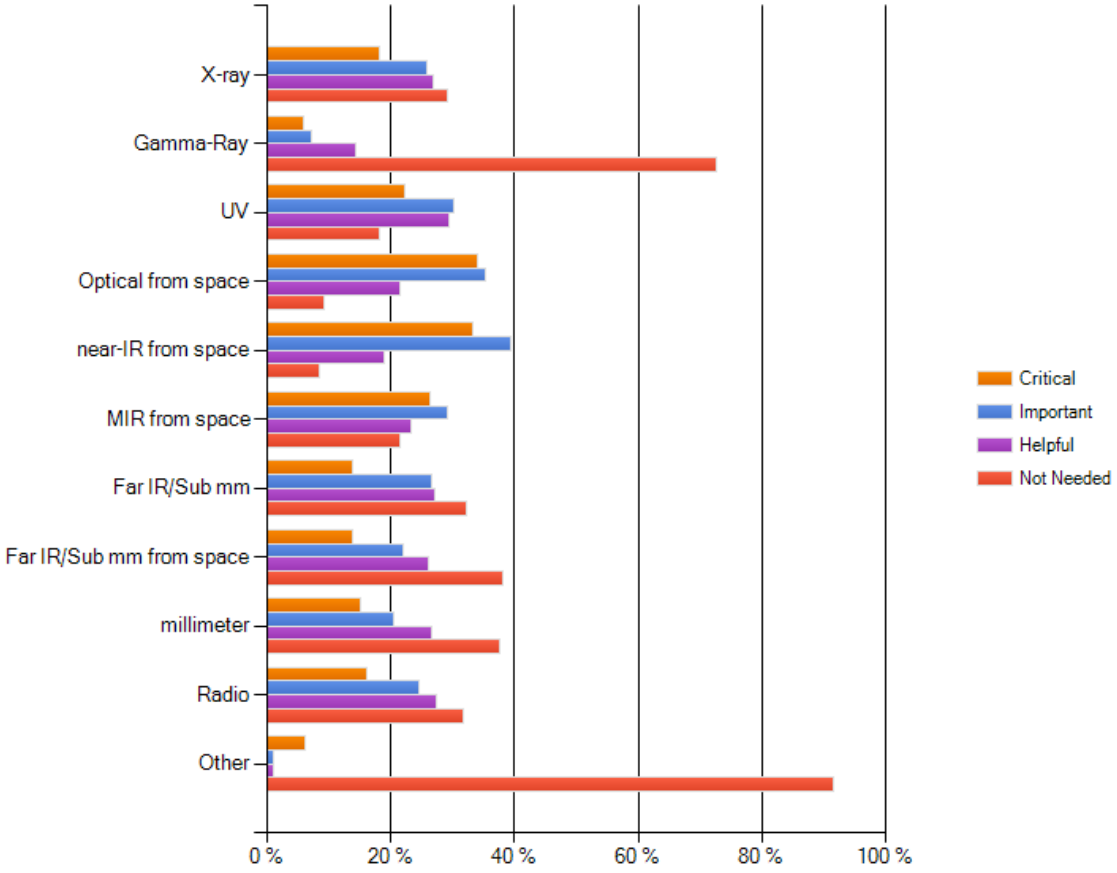
Part 4 -- Question 18:
We also were interested in the role non-O/IR data would play in the research of those using the ground-based O/IR facilities. This led to the following question.

18. In the coming decade (2011-2020), will the research you are pursuing with ground-based O/IR facilities make use of data from non-O/IR and/or space-based facilities? Indicate how important these other facilities will be to your research program.

	Critical	Important	Helpful	Not Needed	Rating Average	Response Count
X-ray	18.1% (116)	25.9% (166)	26.9% (173)	**29.1% (187)**	2.33	642
Gamma-Ray	5.8% (33)	7.2% (41)	14.3% (82)	**72.7% (416)**	1.46	572
UV	22.3% (146)	**30.1% (197)**	29.4% (192)	18.2% (119)	2.57	654
Optical from space	34.0% (242)	**35.4% (252)**	21.5% (153)	9.1% (65)	2.94	712
near-IR from space	33.2% (234)	**39.4% (278)**	18.9% (133)	8.5% (60)	2.97	705
MIR from space	26.4% (164)	**29.1% (181)**	23.2% (144)	21.4% (133)	2.60	622
Far IR/Sub mm	13.9% (84)	26.7% (161)	27.2% (164)	**32.3% (195)**	2.22	604
Far IR/Sub mm from space	13.9% (83)	21.9% (131)	26.0% (155)	**38.2% (228)**	2.12	597
millimeter	15.2% (91)	20.6% (123)	26.6% (159)	**37.6% (225)**	2.13	598
Radio	16.2% (100)	24.6% (152)	27.5% (170)	**31.8% (197)**	2.25	619
Other	6.1% (11)	1.1% (2)	1.1% (2)	**91.7% (165)**	1.22	180
				Other (please specify)		22
				answered question		**772**
				skipped question		**190**

Part 4 - Question 18 (continued):

The responses to question 18, shown in the table above, are shown graphically below.



Under “other”, common responses included being able to detect/study gravity waves (LGIO) and particles (cosmic rays, neutrinos).

Part 4 -- Question 19:

19. In the coming decade (2011-2020), if you will be pursuing a research topic that primarily relies on observations made with space-based or non-O/IR facilities, how important will your ground-based O/IR data be to that research?

	Response Percent	Response Count
Critical	**47.7%**	**355**
Important	23.8%	177
Helpful	5.0%	37
Not Needed	1.6%	12
N/A	22.0%	164
answered question		**745**
skipped question		**217**

Part 4 - Question 20:

20. How important do you believe on-going instrument development is to the health of the ground-based O/IR System?

	Response Percent	Response Count
Critical	**73.9%**	**573**
Important	23.0%	178
Helpful	2.7%	21
Not Needed	0.4%	3
answered question		**775**
skipped question		**187**

The last two questions (21 and 22) were opportunities to submit additional comments and to request a summary of the survey report. We are preparing a summary of the submissions made by the 90 people that chose to make additional comments and might post all of the submissions. This document will continue to be updated over the next few weeks.