Phase I: Micro Lab Questions and Answers

Below is a list of questions that were generated before and during the Phase I Micro Lab. Responses/comments have been added by the Lab organizers. These questions and responses are also available on the KIstorm platform. [Note: The numbering matches the numbering on the KIstorm platform.]

12: What are the permitting and scoping considerations?

Comments:

All NEPA assessments and permits (and stakeholder inputs) will need to be completed, and therefore paid for. As these costs are part of operations, and WHOI will continue to be the Pioneer Array operator, NSF will work with the OOI facility on such matters.

13: Atlantic vs pacific location-- is there a priority?

Comments:

No. All options are on the table, which is why NSF/OOIFB are conducting this process.

14: Should we be building upon existing OOI Arrays?

Comments:

Addressed in Plenary -- this will depend on the science drivers and considerations of the site.

20: Overview of the intentions for the full process (including both phases) and the goals/criteria that are being used by OOI and NSF to guide decision making in this process

Comments:

Selection of a new OOI Pioneer Array location, or decision to maintain the Array at its current location, will be driven by community input on the important science questions that can be addressed with observations from a new Array location. Phase I Lab Goal is to inform the selection of the Pioneer Array location, and the Phase II Lab Goal is to optimize the science and educational potential of the Pioneer Array at the new location/new configuration or at its current location. Additional details can be found here: https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/process-and-goals-for-selecting-the-next-location-of-the-pioneer-array/

21: Duration of the next Pioneer Array deployment, long-term funding outlook

Comments:

Addressed in Plenary- we envision 2024-2029. We expect funding for the OOI Facility to remain flat for the foreseeable future, contingent upon Federal budget support.

22: NERACOOS is especially interest in meeting users needs and data delivery, so I would be interested in delving into those issues as they relate to the Pioneer Array.

Comments:

The general topics of OOI user needs and data delivery are within the purview of the OOIFB and the OOIFB Data Committee, and interactions between NERACOOS and the OOIFB are encouraged. The focus of the Innovation Lab will be on the science drivers, and potential partnerships with entities like NERACOOS are certainly relevant

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23:

I'd like to gain an understanding of the criteria for relocating and how those fit into NSF Geoscience objectives more broadly. Also, are partnerships with other agencies like NOAA, ONR, and state agencies encouraged and how does that work? Are any socioeconomic considerations taken into account for the relocation?

Comments:

The intention has always been to have the Pioneer Array be the movable component of the OOI Facility, and because the OOI is a Major Facility, involvement of entities from the National Science Board to the Advisory Committee for Geosciences has been in place for two decades now. While no NSF proposals are involved with the Innovation Lab, NSF will instruct the panel to consider both Broader Impacts and Intellectual Merit- in essence the panel will be making a recommendation to NSF as to the best science location for the Array for years 2024 to 2029. Partnerships are potentially important under both the Broader Impacts and Intellectual Merit criteria. State and Federal agencies with interest in the process are encouraged to reach out to NSF about how they might participate in the process. Socioeconomic considerations could be relevant under Broader Impacts.

24: Is it possible to keep a piece of Pioneer (let's say 1 mooring) at the current location and move the rest? Would a new location have to rely entirely on the existing suite of moorings, sensors and vehicles or could some different technologies be incorporated? And a related question: do all of the existing technologies have to be used at a new site (e.g. would it be feasible to leave out the vehicles if their operation weren't suitable for the new location's environment and/or science questions)?

Comments:

There are several questions here. 1) Yes, a partial re-location could be considered within budget constraints, and to the extent successfully motivated by science drivers and broader impacts. 2) Some different technologies could be incorporated. However, the expectation is for incremental change, not wholesale re-design. Also, since the budget is fixed, it may be that existing elements must be dropped for new ones to be incorporated. 3) The goal is to effectively use the existing infrastructure. However, there need not be an exact one to one match if the science arguments are compelling for a slightly different mix of platforms. See also #26, #28, #29, #36, #49, #50, #65

25: The range of data collection opportunities currently facilitated by existing Pioneer Array sensors and those anticipated in the re-deployment for 2021+

Comments:

Addressed in Technical Considerations <https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/technical-considerations-for-relocating-the-pioneer-array/> and other program documentation.

26: Inclusion of new sensors during relocation

Comments:

Including new instruments and altering the mix of instruments is possible. There will be budget constraints for both procurement and operation, and new acquisitions will need to be proposed, approved and procured through existing OOI program processes and procedures. There may also be power limitations, space limitations, or other engineering considerations (also #65).

27: Depth constrains for the mooring.

Comments:

Addressed in Technical Considerations: https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/technical-considerations-for-relocating-the-pioneer-array/.

28: Possibility of more than one site (e.g. nearshore and offshore nodes).

Comments:

Yes, in principle, within budget constraints, and to the extent successfully motivated by science drivers and broader impacts. See also #24.

29: Acoustic sampling capability

Comments:

See Technical Considerations <https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/technical-considerations-for-relocating-the-pioneer-array/> for what is available. Enhancing acoustic sampling is possible. There may be budget, engineering and permitting constraints. See also #24

30: Does the new location have to address a similar set of science questions as those being addressed by the current array, which is focused on continental shelf/slope exchange processes and impacts?

Comments:

No, they do not have to be the same set of science questions. The science drivers should be compelling science questions that can be addressed using the Pioneer Array at a specific site. The science questions should be consistent with the OOI Science Plan and Themes: https://ooifb.org/ooi-science-plan/.

31: How are ideas input to the first Innovation Lab? Do people come with prepared presentations? Will any community input other than at the "lab" be acquired? Will a single science plan be created from scratch during the lab, or will the plan(s) be based on previously prepared white papers? Will multiple science plans be developed, or is the location to be completely determined by the NSF Panel by the end of the first Innovation Lab?

Comments:

Addressed in Plenary. Individuals apply for the lab, and will be answering questions as part of the application process. Innovation Labs work best when participants come armed with ideas, but also a willingness to listen and learn from others at the lab. There are no team applications, white papers, call for proposals etc. More details about the outcome of the first Innovation Lab have been described in answers to other questions. As an aside, if you are interested in being a Panelist rather than a participant, please reach out to NSF.

32: Have the instruments been periodically upgraded/replaced over the past few years, or are they the ones originally purchased in 2015?

Comments:

While the make and model of the instrument suite has not fundamentally changed, except when no longer available from the manufacturer, the equipment has been meticulously maintained and upgraded where necessary.

33: Is the Gulf of Maine the fastest warming body of water in the world? If so, that seems like it merits some consideration.

Comments:

The Gulf of Maine merits consideration and could be part of the discussion during the deliberations of the Innovations Lab.

34: I agree with the comment I have seen here regarding the Gulf of Maine, but previously the OOI team mentioned that the array must be moved within the US EEZ. Please clarify if this is a requirement.

Comments:

Correct, the new location would have to fall within the U.S. E.E.Z. Consideration will be given to international partnerships.

35: Hi, I have question regarding not having "sub-awardees". I assume there will be multiple universities involved, with a single lead University. Will non-lead participants have sub-awards, or should the multiple universities be part of a single consortium that receives the award?

Comments:

Hopefully, over the course of the Micro Lab participants have come to realize that this is not a call for proposals and/or new partners to the WHOI OOI award. This is a call for individuals to come with their ideas and willingness to listen and learn and to collectively help pick and optimize the next location for the OOI Pioneer Array. Operation and management of the OOI Facility is not being competed at this time.

36: Pursuant to comment #29, I would like to explore expanded acoustic capabilities for the array, e.g., detection and classification of signals - biological and non

Comments:

This can be addressed during the Innovations Lab.

37: Is there a summary of which platforms and sensors have been most consistently successful in lasting and producing usable data throughout their full deployments?

Comments:

All of the existing platforms function well in the typical environmental conditions described in the Technical Considerations presentation, and all instruments deliver usable scientific data. Statistically, data delivery is typically at 80% of potential. Performance details vary. A temperature sensor will be far more robust than a pumped chemical-reagent pH sensor. Further information can be presented and discussed at the Innovations Labs. Also relevant for #41 and 54

38: For future configurations, how feasible is it to consider a profiler design that can sample in the surface layer?

Comments:

Surface piercing profilers were part of the original Pioneer design but were technically problematic. Many of those issues were solved for Endurance ... it would be valuable to revisit making them part of Pioneer 2.0
Organizer: As noted, Coastal Surface Piercing Profilers (CSPPs) were problematic at the Pioneer Array but are being used in the Endurance Array. So, this technology is feasible. But it needs to be recognized that the Endurance-type CSPP will have more restrictive environmental constraints than those listed for the current Pioneer Array platforms.
Adding my enthusiastic encouragement to revisit the feasibility of surface-piercing profilers for Pioneer 2.0, in whatever location it ultimately ends up.

39: Is maximum glider depth constrained by "crush" depth or ability to remotely transmit data?

Comments:

Crush depth is 1000 m. Buoyancy engines are tuned to different operating depths: 200 m or 1000 m.

40: I suggest that before the Phase 1 Lab someone assemble maps of climatological Significant Wave Height and nominal max velocity (by some percentile criterion) to show regions where these environmental conditions limits would rule out deployment.

Comments:

Thank you for your suggestion. Break down by month would be useful too. Perhaps someone would like to share that information if available.

41: How functional is current array - are changes needed with relocation?

Comments:

Comments: Please see #37

42: What are opportunities ($) for upgrades?

Comments:

The operations budget is envisioned to be flat ($8 million/year) but we should think creatively inside the box. Money could be freed up by doing business differently, following the formalized procurement process already in place for the OOI.

43: Is array robust to land-falling hurricane or nor'easter?

Comments:

The array has met its design criteria and successfully operated through hurricanes and nor'easters. However, these environmental conditions are near the design limits - see Technical Considerations information and presentation, https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/technical-considerations-for-relocating-the-pioneer-array/.

44: How do servicing logistics (proximity to WHOI, for example) and budget constrain location?

Comments:

Logistics and budget will be part of the discussions at an appropriate point. As mentioned during the Micro Lab, budgetary issues could be addressed in creative ways within the funding box

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45: What is potential value - long-term obs - of leaving it where it is?

Comments:

Can 1-2 moorings remain in same location if rest of array leaves...providing long term data set, while expanding the spatial data collection?

The option of maintaining the current location, potentially with “tuning” of the configuration to better meet science needs, is expected to be among the options considered at the Innovation Lab. See also response to #49.

46: We suggest that prior to March 15-19, people interested in particular regions/sites/dynamics be able to come together virtually to discuss issues and formulate coordinated pitches for their priorities.

Comments:

While you are welcome to meet and discuss with each other in advance of the Lab and discuss your priorities for intellectual merits and broader impacts any given location/configuration, we emphasize that you apply for the Lab as an individual, not a team.

47: Can it be reconfigured to sample more in shallower water? (Could be relevant to HABS, SAV, blue C, etc.)

Comments:

The existing infrastructure is not likely to be effective in addressing science questions in significantly shallower water depths, and at very shallow depths the platforms simply won't function. So, this is a question for further discussion. What platforms, how shallow is shallow, and what is meant by "reconfigured"?

48: Can/will location of array be leveraged by local observational resources?

Comments:

This is a possibility if determined important by the Innovation Labs participants. Also relevant to #71.

49: Is there consideration of splitting the Pioneer array between its current location and a new location? This might provide a greater likelihood of maintenance by WHOI and allow for usual scientific comparisons between two locations.

Comments:

This could be up for discussion at the Innovations Lab. These ideas will be assessed within budget constraints. See also #24

50: Potential to expand array towards more biological work (e.g. sediment water interactions)?

Comments:

Yes, possibly. The technical requirements, instrumentation, and sampling would need to be discussed and feasibility/cost/maintenance issues addressed. See also #24.

51: Transition areas may be of great areas (e.g. OBX)

Comments:

Yes, transition areas may be of interest. There are many examples of transition areas along US coastlines. Indeed also California central coast as a transition between southern and northern climate and ecosystems.

52: How robust is the array design to tropical cyclones? Will this be a constraint on the choice of new location?

Comments:

See above and also Technical Considerations.

The array has successfully operated through hurricanes in its current location. See also #43.

53:

How is data being used now (e.g. assimilation into coastal models)?

Comments:

The data are all freely available on the OOI site, with a subset of meteorological data available from NDBC and glider data available on the IOOS GDAC. The time lag is a few hours. How those data are used for data assimilation is up to the research and forecasting community.

54: Can we be debriefed on what is currently working and not working on the instrumentation, program, and processes?

Comments:

See #37.

55: What are broader impacts from current array?

Comments:

The award abstract for the entire OOI is available on line. There are also components of the updated Science Plan (to be posted on the OOIFB website (ooifb.org)) that will be relevant.

56: BREAKOUT Group 1

Participants

Andrew McConnell, U Alaska
Lynn Leonard (and 7 others) from UNC Wilmington
(Participant in IOOS SECORA)
Alex Harper, CeNCOOS
Jeff Paduan, NPS

Main questions

Andrew: what is the possibility of the array coming to, for example, AK
(Jeff: similar questions for Monterey Bay region)
Since it was designed as a moveable array
Lynn: similar question about the feasibility issue
SE Coast has a lot of locations for which the array is not feasible
Jeff: How is the location decision going to be made?
Alex: question submitted during the registration:
What are the societal applications or issues that are priorities?
e.g., what are the critical Broader Impacts?
Lynn: what about leveraging observations closer to shore from IOOS and other programs?
Alex: how about expanding upon the OOI Endurance Array? Is there any connection?
Sensor question: what is the process to suggest sensor additions or expansions

Comments:

The main geographic constraint is the Array must be within the US EEZ. Technical considerations will also constrain location as discussed. For the case of an Alaskan deployment the Pioneer Array was not designed for ice-covered waters, but not all Alaskan waters are ice-covered, and those that are usually not ice-covered year round. In short, possibilities will be assessed within budget and technical constraints. We look forward to engaging discussion at the Innovation Labs. As with location, the NSF does not have a prioritized list for Broader Impacts. Broader Impacts will be carefully considered as part of the Innovation Labs process.

57: Can move of array expand capacity building in new location?

Comments:

Certainly capacity building that can be leveraged by the needed facility operations and management, inclusive of open data associated with all OOI Arrays in new and innovative ways is an important part of Broader Impacts. There will not be money for new investments (e.g. new hires, new outreach projects) under the OOI Facility budget that we have been focused on. Such efforts would require separate proposals to the NSF or elsewhere.

58: Will the Gulf of Mexico be in play? Hurricanes used to be an excuse, but recent weather in the Pioneer Array area would seem to make that moot.

Comments:

See #52.
The array has successfully operated through hurricanes in its current location. See also #43.

59: Will students be involved in the Pioneer transition process?

Comments:

Early career participation is encouraged during the Innovation Lab process. There will be some opportunities for student participation during transition and operation, e.g. as participants on mooring service cruises.

60: Break out room 8

Large investment to use the data set. Is there a possibility of getting programs to analyze the data sets?

Comments:

The OOI Facility award does not include any support of science being done with the OOI data. NSF OCE welcomes proposals to the core OCE programs, as well as OTIC and Ocean Education that make use of the OOI data to address meaningful science questions. Other Federal agencies and even other countries have funded science that uses the OOI Facility. Of note, OOI has recently launched the Data Explorer to improve access to and analysis of data. Please visit and explore.

61: Could a component of the current PA be modified to survive in the Gulf Stream (as in CLIMODE) to investigate processes associated with the WBCs.

Comments:

The current mooring design is not suitable for deployment in the Gulf Stream, nor was it anticipated that the gliders and AUVs would be used in such an environment. There are examples of both moorings and gliders being deployed in the Gulf Stream, so it is possible. The relative merits and risks of such an approach could be discussed, recognizing that it would be in the context of a significant array redesign.

62: are students welcome to apply to participate in the innovation lab discussion?

Comments:

Yes. A reminder that the number of participants will be limited to 25-40.

63: Seems like a major constraint here is to have the location within a day or two steam for a global class research vessel. Yes?

Comments:

This is a notable consideration (as pointed out in the Technical Considerations presentation), but not a hard and fast restriction. The description of how the current array is serviced is intended to convey the scope of the operation. Other approaches may be possible.

64: With 2021 - 2030 being the UN Decade of Ocean Science for Sustainable Development, it seems that additional funding will be available rather than budgets staying flat. For instance, Jeff Bezos has created a $10B Earth Fund that people can submit grants to.

Amazon, Google and Microsoft are the leading cloud computing platforms and they are looking at ways to put those platforms to work and ocean data seems like a tremendous opportunity. And combined they have cash in excess of $200B.

Comments:

Great observations. NSF welcomes partnerships and would explore all viable options to increase the number of partners funding the OOI Facility. As a reminder, the OOI data are freely available so anyone can use them

including making proposals to non-Federal funding entities. We are aware of some successful partnerships using OOI data between universities and the cloud computing platforms you mention.

65: How much flexibility will there be to alter the mix of instruments and platforms? For example, could the REMUS be replaced over a year or two with a different type of AUV that might provide technical advantages for addressing different science questions.

Comments:

See #24.

66: Will the Gulf of Mexico be in play? Hurricanes used to be an excuse, but recent weather in the Pioneer Array area would seem to make that mute.

Comments:

The array has successfully operated through hurricanes in its current location. See also #43.

68: Instead of letting OOI budget limit plans, can there be coordination with NOAA IOOS so that science-driven questions are not constrained by NSF $$?

Comments:

See #64

This possibility could be proposed and discussed at the Innovations Lab within the budget and operations constraints mentioned several times. .

69: Based on the narrow technical design limitations defined, are there locations in the US EEZ that you can immediately rule out?

Comments:

We have chosen to only define the technical constraints at this point so as to maximize possible options within the technical constraint box.

70: What is the likelihood it doesn't move at all?

Comments:

All options are on the table, which is why NSF/OOIFB are conducting this process.

71: Can the PIONEER array be reconfigured to include a shallow water mooring? (~20 - 30 m)

Comments:

See 47.

72: Will this list of notes be available following this meeting and as we develop our application?

Comments:

Yes. You will continue to have access to this KIstorm site during the application process. Additionally, a link to the Micro Lab to this list of questions/responses will be posted on the OOIFB website at: https://ooifb.org/meetings/apply-to-select-the-next-location-of-the-pioneer-array/

73: Could the array be modified to work in the Gulf Stream, or at least on the edge of it?

Comments:

The current mooring design is not suitable for deployment in the Gulf Stream, nor was it anticipated that the gliders and AUVs would be used in such an environment. There are examples of both moorings and gliders being deployed in the Gulf Stream, so it is possible. The relative merits and risks of such an approach could be discussed, recognizing that it would be in the context of a significant array redesign.