**Principles to Guide Reformulation of IOOS OTT**

1)   $2.9M is a modest sum for technology development, thus fewer, focused, larger investments are warranted.

2)   High value-add toward technology transference comes from demonstrating technical reliability, management capability AND the existence of markets, thus solicitations for investment should examine a spectrum of technology maturation/commercialization objectives.

3)   Projects and programs that are supported by, and serve the interests of, the RAs are encouraged as they provide IOOS specificity and relevance to in-the-water customers.

4)   Inclusion of partners, who commercialize technologies, as co-applicants is important and should be incentivized whenever possible.

5) Cost factors should be addressed in propositions toward readiness maturity and commercial success.

6)   Funding mechanisms that allow for a focus on projects over the extended time cycles are required to demonstrate reliability can be converted into market uptake.

7)   Mechanisms that support these principles are encouraged and may not necessarily include a classic FFO.

8)   Fast failures are preferable, thus proposals should examine fatal flaw technical and market considerations early.

**Benchmarks of Multi-stakeholder Technology Transfer and Development Programs**

The IOOS FAC offers the following synopses for consideration in how the OTT program may reformulate its solicitations. While each case differs from OTT in varied ways, each also offered insights into successful programs which led technologies to become more mature and or viable commercially.

**STTR**

STTR is an important small business program that expands funding opportunities in the federal innovation research and development arena. Central to the program is expansion of the public/private sector partnership to include the joint venture opportunities for small business and the nation's premier nonprofit research institutions. STTR's most important role is to foster the innovation necessary to meet the nation's scientific and technological challenges in the 21st century.

STTR is a highly competitive program that reserves a specific percentage of federal R&D funding for award to small business and nonprofit research institution partners. Small business has long been where innovation and innovators thrive. But the risk and expense of conducting serious R&D efforts can be beyond the means of many small businesses.

Conversely, nonprofit research laboratories are instrumental in developing high-tech innovations. But frequently, innovation is confined to the theoretical, not the practical. STTR combines the strengths of both entities by introducing entrepreneurial skills to high-tech research efforts. The technologies and products are transferred from the laboratory to the marketplace. The small business profits from the commercialization, which, in turn, stimulates the U.S. economy.

STTR are managed at agency levels and the individual agencies set topics and phased funding criteria . Funds are typically managed over three phases of funding allocation. Agencies have discretion as to the amounts awarded in the first two phases (typically 50-100K in first phase and 300K to 700K in second phases). Third phase efforts have optional involvement and generally considered commercial introductions which involve some purchase or programmatic uptake.

**CICEET**

[**http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/pubs\_specs\_info/ciceet\_program\_brief.pdf**](http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/pubs_specs_info/ciceet_program_brief.pdf)

**(Note: CICEET may no longer be active)**

 The Cooperative Institute for Coastal and Estuarine Environ­mental Technology (CICEET) translates the problems of coastal management into the research priorities of scientists at the leading edge of their fields. Through competitive funding pro­grams and strategic partnerships, CICEET develops innovative tools and methods that are affordable, effective, and available to coastal managers nationwide.

CICEET works nationally, bridging academia, government, and industry. CICEET-sponsored researchers are committed to collaboration with coastal management and scientists in other fields to provide the tools necessary to resolve issues of common concern. CICEET makes these tools available to coastal managers through training, outreach, and an active, evolving technology utilization program.

The Institute is a partnership between the University of New Hampshire and the National Oceanic and Atmospheric Administration. Though the administrative offices are located at UNH, CICEET-sponsored research takes place at the 27 reserves in the National Estuarine Research Reserve System.

Grant allocations tended to result from very focused solicitations requiring real solutions in support of NEERS. Historically these have involved a high level of interaction among the stakeholders during execution of the projects.

**Environmental Security Technology Certification Program (ESTCP)**

<https://www.serdp-estcp.org/>

ESTCP is DoD’s environmental technology demonstration and validation program that promotes transfer of innovative technologies that have successfully established proof of concept to field or production use. ESTCP demonstrations collect cost and performance data to overcome the barriers to employ an innovative technology because of concerns regarding technology, programmatic or regulatory risks, or the so-called “Valley of Death” between concept and commercialization. The aim is to demonstrate innovative AND cost-effective environmental technologies, particularly those with a record of past investments and in need of help to insert into markets. OF course, as a DoD program the targets stem from known needs of military installations. Each annual round of solicitation focuses bidders toward prioritized DoD needs.

ESTCP relates to OTT’s mission in that it funds demonstrations designed to properly assess the cost and performance of the technology. Demonstrations are intended to accelerate commercialization and broader adoption. A proponent’s capability and readiness to transition from prototype to commercial market is addressed explicitly in proposal reviews. Projects are funded to conduct formal demonstrations at DoD facilities and sites in operational settings to document and validate improved performance and cost savings. To ensure the demonstrated technologies have a real impact, ESTCP collaborates with end-users and regulators throughout the development and execution of each demonstration. Transition challenges are overcome with rigorous and well-documented demonstrations that provide the information needed by all stakeholders for acceptance of the technology.

**Corporate Frameworks for Science & Technology Development and Internal Research**

Technology development corporations use internal programs to foster development of ideas and identification of promising innovations which may achieve market success. The dimensions which private corporations examine relative to a promising technology may be instructive to OTT because nowhere are the “Valley of Death” risks more aggressively mitigated than within a private enterprise which must maximize return on the investment of its funds. So how do private corporations examine transferability of a prospective technology into commercial success? The short answer is that the evaluations probe a wide spectrum, beyond simple technology performance, ranging from customer awareness to cost realism, competitiveness, and the landscape of business interests which must align to generate sustainable revenue. OTT does not necessarily need to answer every one of these considerations; nonetheless the spectrum is revealing.

One exemplar technology development and commercialization framework offers lessons to OTT based on its four dimensions. (1) Unmet Need, Fitness and Maturity; (2) Vision & SWOT Credibility; (3) Competitive Assessment; and (4) Soundness of Business Model. While technology performance is readily discussed in OTT communities, the actual customers and their acknowledgement of unmet needs are often addressed inadequately, particularly with respect to the cost position which such a technology would have to conform. Investors quickly look beyond the technology in order to assess the reliability and trustworthiness of the staff. OTT should give consideration to soliciting evidence of realism with regard to the technology team’s strengths, weaknesses, opportunities and threats. SWOT items reveal actual factors, and offer indications of andor. Promoting technologies further up the readiness levels should be driven, in part, based on accurate assessments of competitiveness. OTT solicitations should consider the value of collaboration amongst proponents to include some measure of market awareness, both demand and likelihood of success. Finally, OTT should invite technology developers to explain how their solutions could, at least conceptually, be manufactured, marketed, sold, delivered, warrantied and maintained, at a price which fits favorably within the business models of active enterprises.

**NOPP**

**http://www.nopp.org/**

The National Oceanographic Partnership Program (NOPP) is an innovative collaboration of Federal agencies that supports and coordinates ocean research partnerships among state and tribal governments, academia, private industry, and non-governmental organizations (NGOs). Under the interagency guidance of the NOPP, these sectors are able to form partnerships that more efficiently pursue the Nation's most pressing research needs on ocean science and technology priorities. NOPP investments encompass a broad range of issues in oceanographic research and exploration, education, maritime safety, data- and sampling-technologies, and marine resource management. These focus-areas have led to a variety of advances, among them global ocean observation systems, enhanced weather forecasting technologies, continental shelf surveys, ecosystems mapping, renewable energy exploration, and successful marine science education programs. Since 1997, NOPP has provided an effective forum to leverage Federal investments that foster the development of interagency research initiatives which are able to transcend single-agency mandates and resource limitations in the common pursuit of wise use of the ocean, coasts and Great Lakes

Every year topically focused solicitations – generally with champion agencies setting the topics – are sent out. Solicitations cover 1-4 topical subjects with multi year awards ranging from low hundreds thousands to over $1M. Over the years NOPP topics have sponsored a wide diversity of efforts, ranging from specific sensor programs for sustained measurements of the ocean, to Air-Ocean-Land-Ice Global Coupled Prediction on Emerging Computational Architectures , to creation of IOOS.

The common denominator is partnership of stakeholders across academic/agency/corporate boundaries.

**Advisory Committee Working Group – draft Recommended Topics to Help OTT**

1. (from 2 below) Examine the technology selection and transition process followed 2013-2015, in light of the 2011 Project Plan, in order to identify its rationale, strengths, and weaknesses, and to recommend adjustments and mitigation options.
2. (from 3&4 below) Examine opportunities to improve efforts to engage new co-sponsors for OTT projects and technologies. Co-sponsors need to be recruited more effectively from across federal partners, state governments, and private industry. Among the possible improvements, examine if/how OTT and IOOS constituents can make themselves available to help industry quantify their O&M cost-benefits.
3. (from 5 below) Recommend methods OTT should employ to identify emerging technologies to target with OTT support. Should needs come from RAs? Should needs be compiled by harvesting plenary addresses and user statements from marine science meetings? Other needs assessments?

**Original OTT Questions for IOOS Advisory Committee Working Group to Consider**

1. OTT has utilized co-operative agreements to fund its projects. Should OTT continue to utilize co-operative agreements or utilize contracts, grants, or a combination of those vehicles?
2. The 2011 OTT Project Plan outlined a technology selection process (see page 10 of the 2011 OTT Project Plan, ‘Marine Sensor Innovation Program Flow Chart section) for 1) identifying technology types or themes and 2) the process for selecting projects for transition to operations. Since the OTT project began in 2013, the IOOS Office developed a Federal Funding Opportunity for OTT projects aligned with Ocean Acidification Program and for general technologies. The process outlined in the 2011 OTT Project Plan was not followed for the majority of funded projects. Should OTT utilize the process outlined in the 2011 document or is there another recommended approach for selecting technology ‘niches’ and funding awards?
3. OTT recognizes that the identification of project sponsors to co-fund and eventually transition OTT projects into their operations is imperative for the success of the project? What should the OTT Project do to bring more sponsors to the table? And should these sponsors be Federal and State agencies or other organizations?
4. OTT believes private sector involvement and engagement is critical for the overall success of the OTT Project. Does this panel concur? If so, how can OTT strengthen the involvement of the private sector?
5. What are the emerging technologies that exist at the TRL 6-8 level which can be used to address emerging ocean, coastal, and marine issues?
6. Would a market valuation be beneficial to increase engagement with OTT? If so, what methodologies can be employed to value OTT projects?