



The Joint Task Force for SMART Cables
Science Monitoring And Reliable Telecommunications
*Harnessing telecommunications infrastructure for
ocean monitoring and disaster mitigation*



14 November 2021

Toste Tanhua and Anya Waite
Co-Chairs, Global Ocean Observing System (GOOS) Steering Committee

Dear Toste and Anya,

The ITU/WMO/UNESCO-IOC Joint Task Force (JTF) for SMART Cables requests the GOOS Steering Committee consider the attached application for the JTF SMART Cables to be affiliated as a GOOS Project.

The International Telecommunication Union (ITU), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC), and the World Meteorological Organization (WMO) established the Joint Task Force on SMART cable systems in late 2012 after Workshops in Rome (2011) and Paris (2012). Chris Barnes and David Meldrum were selected as the first Chair and Vice Chair, respectively, of JTF in December 2012. Bruce Howe and Nigel Bayliff currently fill these positions.

The JTF mission is to implement telecom plus sensing SMART subsea cable systems on a global scale, to support real-time climate, ocean circulation, sea level monitoring, and tsunami and earthquake early warning and disaster risk reduction. This will be a 1st order addition to the ocean and earth observing system, partnering with the \$5B/y 170-year-old industry in the Blue Economy.

After a long gestation, we are just at the birthing stage. A few examples: The Government of Portugal is committed to a 3700 km SMART cable ring system connecting Lisbon, Azores, and Madeira, to be installed in 2025 at an approximate cost of €120M. The Governments of Vanuatu and New Caledonia are committed, with detailed planning starting (with ~10% committed funds). The MEDUSA system spanning the entire Mediterranean is in the process of raising funds for the SMART increment. The US National Science Foundation is seriously considering a SMART cable to Antarctica to provide essential connectivity services to the continent while at the same time obtaining critical data from the Southern Ocean. New Zealand Ministry of Business, Innovation, and Employment is considering a SMART cable to the Chatham Islands. We are looking to GOOS to help facilitate funding for these and other future systems.

JTF SMART Cables has just been endorsed as a UN Decade Project, to be attached to GOOS, and we see that as being complementary to this request.

We look forward to a positive reply from you and contributing a new component to the Global Ocean Observing System over the next decade.

Sincerely,

Bruce Howe
Chair, JTF SMART Cables



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JTF SMART Cables Request for Affiliation as a GOOS Project

We follow here the document “GOOS Projects: principles for affiliation, Document version 4 (25 May 2015).”

Being a “GOOS Project” will help engage funders and energize all the SMART cable stakeholders. This is a major reason for this request for Affiliation.

We understand that “GOOS Projects” are separate from the “Observing elements/networks” defined by the requirements-setting and evaluation processes of the Panels. As the SMART Cables Project matures and individual SMART systems come on-line we see being assimilated into the latter as a natural evolutionary step.

Principles for GOOS Projects

Advantages of affiliation as a GOOS Project

The SMART Cable Project will benefit from the recognition that it is contributing to the larger programme and larger global context of GOOS. Benefits include:

- Increased opportunities for interaction with GOOS programme structures and the ocean observing community. This specifically includes coordinating with the GOOS Decade Program UN1 Ocean Observing Co-Design - Evolving ocean observing for a sustainable future. This will include working with GOOS as it begins the process of continuous evaluation and improvement, especially running Observing System Experiments (OSEs) and Observing System Simulation Experiments (OSSEs) for the existing and future systems. These will be especially important and necessary for evaluating relative strengths and weaknesses of existing and candidate observing systems such as SMART.
- Recognition that the legacy of the project should be incorporated into GOOS where possible – in the long-term SMART cables will just become another component of GOOS like Argo, GO-SHIPS, DBCP, OceanSites and others.
- Increased visibility through website links and other communications will help entrain new stakeholders and funders. Working with the telecom industry (really the sole user of the deeper seafloor for 170 years, \$5G/y) will help us gain access to nontraditional (for oceanography) funding, e. g., ministries of communication and information, and multilateral development and investment banks, as well as international and national climate, ocean, and disaster risk reduction agencies.

Principles for association as a GOOS Project

GOOS Projects are aimed at filling identified gaps in the system. For SMART cables, the OceanObs19 white paper (Howe et al., 2019) describes this along with a host of other publications. SMART Cables is both a Development Project with a broad scope covering requirements, observations, and data systems relevant to GOOS and a collection of Pilot Projects (pilot for the next few years) focused on specific areas or systems to improve readiness for sustained observations. SMART Cables as it stands now contains elements of both – working towards global implementation, incrementally now through regional pilot project

Proposed principles for the association of a Project with GOOS are that it:

[basic GOOS principles]

1. Supports GOOS Principles, in particular related to:
 - a. being designed to meet defined objectives on the basis of user needs – community based workshops, reports and whitepapers have described the broad and specific objectives for SMART Cables
 - b. intent to sustain observations over the long term – submarine cable systems have design lives of 25 years – far in excess of any other oceanographic observing system. We certainly hope that having the basic capability will emphasize even more the need for deep rated, long-lived multi-disciplinary sensors, and catalyze the further development thereof. Further, we see SMART cables – integrating sensors into the repeaters of commercial telecom systems, as evolving as well (after solidly underway) to include more capability, such as including branches that can support more ambitious infrastructure services and elements, e.g., “observatory nodes”, docking stations for autonomous undersea vehicles, and acoustic geo-positioning and tomography.
 - c. addressing the range from data capture to end products and services – SMART Cables is focused primarily on “data capture”, while at the same time assuring that existing organizations are committed to using the data. For example, this is reflected in SMART Cables explicitly being part of the IOC Tsunami Programme that includes the direct users – the Warning Centers – as well as the entities that issue civil alerts.
 - d. commitment to timely, free and unrestricted access to data and associated metadata – while SMART Cables advocates for this, we also recognize that ultimately data policies are governed by the governments of the cable landing countries and/or who is paying for the capability/ We will be relying on IOC and GOOS to help in this respect, and this may include “turning on” the “legal departments” much as Argo did to resolve issues of data availability.
 - e. commitment to adhering to internationally-recognized standards and best practices for observations and data management – The telecom industry provides the one of the most reliable artifacts of human engineering, and we expect this to apply equally to SMART systems (though perhaps recognizing the less than stellar reputation of oceanographic sensors). Again, we advocate the FAIR principles.
2. Uses the *Framework for Ocean Observing* and associated tools such as the Strategic Mapping and EOVS / observing network specification sheets.

SMART Cables will be measuring EOVS Subsurface Temperature (at the seafloor) and has been leading the effort to make Ocean Bottom Pressure an EOVS (it is close to being an “emerging” EOVS per OOPC). If there were equivalent geophysical EOVSs, acceleration would be one. SMART Cables and these variables are both impactful and feasible. They will address draw more attention to the much ignored ocean bottom boundary condition, hopefully motivating better modeling, including a bottom boundary layer!

[goals]

3. Is aimed at increasing the readiness of requirements, observing networks, data systems, and/or information-generation activities;
Yes, SMART Cables has these same goals.

[context]

4. Identifies and manages interfaces with existing GOOS structures and projects, as well as other existing national and international networks, systems and organizations where appropriate; - This again is a major reason to be GOOS Project, to firm up interfaces with existing networks, and use their resources for mutual benefit.

5. maintains communication and develops a strategy to leave a legacy with a GOOS- related structure;
This is an integral part of SMART planning;
and
6. Is independently managed.
The JTF SMART has been operating for the last decade independently, with the benefit of ITU, WMO and IOC sponsorship. We expect the latter to grow as steps we are taking to obtain full member state recognition in these agencies come to fruition in the next year. Further, we are awaiting a funding decision on a proposal to a private foundation that if positive will support a full-fledged project office.

Ideal characteristics of Projects

- Focus on developing long-term sustained infrastructure (new or redeveloped) they leave behind to GOOS
 - human capacity / community including coordination mechanisms
 - funding support and interest of agencies
 - technical infrastructure
 This is the whole purpose of the JTF.
- Clear objectives and expected results within a sufficient, but limited period of time. (GOOS Projects are not a substitute for routine ongoing GOOS elements/activities)
A (very) tentative implementation plan was laid out in the Howe et al. (2019) whitepaper, giving a 10 year ramp-up to several systems per year, reaching steady state in 15 years.
- Milestones, dates, costing (realizable within a specified period)
The initial pilot systems will demonstrate feasibility and impact and set precedents re cost, permitting, legal, security, etc.
- Fundable:
 - engages potential sponsors early in the planning process, and
 - has a strategy to prove value – identifies impact and societal benefit, immediate or longer-term – use of information gathered

We are engaging possible sponsors including multilateral development banks and regulators (and indirectly telecom and finance ministries in affected countries). For instance, an ITY circular was sent to all member states with an annex describing SMART Cables, and what suppliers, over-the-top providers (e.g., Google), regulators, and banks could do to facilitate forward progress. This letter was forwarded to the four major organizations in each category as well as the complete UN hierarchy for climate and disaster risk reduction (you should have seen this letter, trickly down from IOC and WMO Secretary Generals.).

We fully expect that GOOS will help in address impact through the process of continual evaluation that it is implemented.

- Potential to be repeatable / scalable / reusable
By definition, SMART has these attributes. The submarine cable industry has been in existence 170 years and all indications are (physics of communications) is that it will continue on as an indispensable – now shared – infrastructure element of our society, fundamentally providing power and communications for both society and the subset of ocean observing
- Engages developing countries

Submarine cables are more and more connecting all developing countries together – SIDS in the South Pacific (if the aforementioned proposal is funded, it will include science and operational support for the Vanuatu-New Caledonia system).

Interface with GOOS

- GOOS projects will communicate with appropriate GOOS body (e.g. the SC and/or its Panels, GRAs) as defined in the Project prospectus.
The JTF is sponsored by two of the same UN agencies that sponsor GOOS – IOC and WMO. We already have formal liaison personnel from these two organizations: Albert Fischer (GOOS) and Bernardo Aliaga (Tsunami) from IOC and Champika Gallage (DBCP) and Enrico Fucile from WMO. For the most part these staff have been active and supportive, though we will need to strengthen the communication with GOOS. We hope that the fact we are now “attached” to the UN Decade “UN1. Ocean Observing Co-Design - Evolving ocean observing for a sustainable future” with Albert Fischer and Emma Heslop designated liaison staff, these ties will strengthen over time.
- Communications shall be kept to efficient minimum, and full use of web page updates and other electronic media will serve to update the community on progress
Full concurrence!