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Dialogues with Industry on harmful algal blooms

Organizing Committee

MTS: Hans VanSumeren, Caisey Hoffman, Zdenka Willis, Tim Moltmann
GOOS/IOC: Emma Heslop, Yun Sun, Henrik Oksfeldt Enevoldsen, Maggie Broadwater
NOAA/IOOS: Marc Suddleson, Greg Doucette, Maggie Broadwater, Tiffany Vance, Laura Brenskelle, Zach Baize, Felix Martinez

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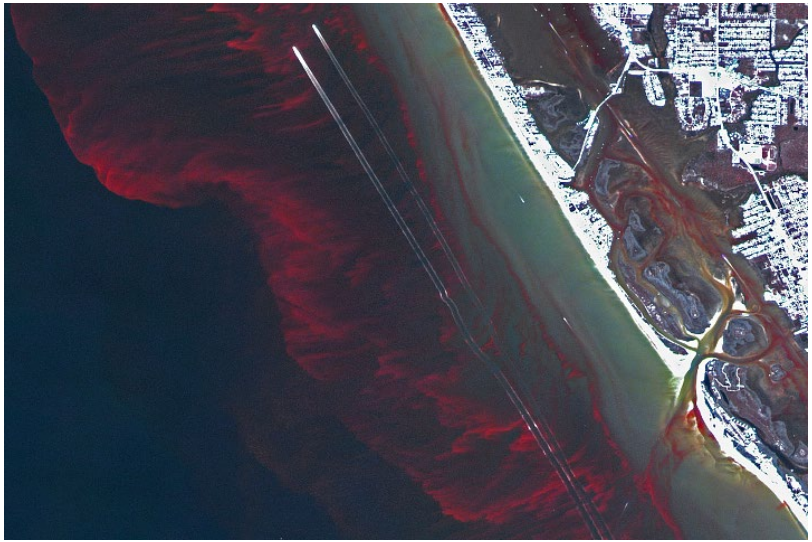
Dialogues with Industry on Harmful Algal Blooms

Dialogue 1 | January 15, 2025
Instrument Provision: Challenges and Opportunities for sensor and platforms for detection and early warning and achieving a Multi-Sectoral Ocean Architecture

Dialogue 2 | January 29, 2025
User-Driven Ocean Information: Downstream Services and Growing the Market through Impact and increasing the Demand

Dialogue 3 | February 12, 2025
Advancing Control Technologies



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Entities

Activities

- Infrastructure and capacity for ocean observation
- Measurement
- Forecasting
- Operational ocean information products and services

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Empowering a Sustainable Blue Future

Unleashing Innovation, Collaboration, and Economic Growth Across the Ocean Enterprise

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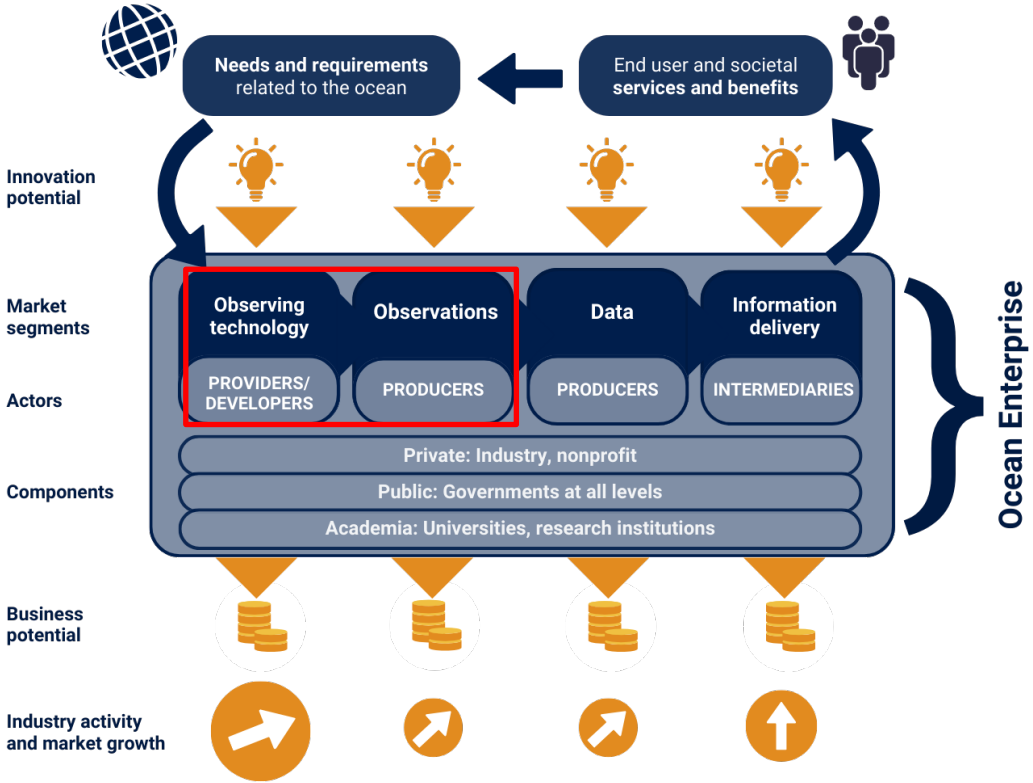
Ocean Value Chain



A mature market across the value chain would:

- Have more **clarity** and **planning capacity**; **growth** and more industrial **engagement**
- Show enhanced manufacturing **efficiency**
- Foster demand for technological/service and spur faster **innovation**
- Lead to a **drop in cost** for data and more **targeted** products
- Power of **aggregated demand**
- More efficient and **sustained ocean observing** system capacity globally
- Enhance the **data flow** and enable **information products**

Dialogues with Industry, Background Paper and Roadmap, https://oceanenterprise.com/

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Exchange of information

Participant experiences and perspectives

Actionable recommendations
targeted to different stakeholder groups, that will enable to transition these conversations into real advancements toward maturing the markets for ocean observations

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Who participated?

	Participants (Countries)	Private	Gov/ Intergov	Academic	Observers (Countries)
D1: Instrument Provision January 15, 2025 Mod: Chris Ostrander (MTS)	24 (8)	50%	29%	21%	116 (16)
D2: User-Driven Ocean Information January 29, 2025 Mod: Hans VanSumeren (OEI)	22 (6)	50%	36%	14%	74 (7)
D3: Advancing Control February 12, 2025 Mod: Hans VanSumeren (OEI)	15 (4)	33%	40%	27%	79 (9)

IPHAB Participants: Philipp Hess, Leonardo Guzman, Dave Clarke, Clarissa Anderson, Yasmine Bottein, Cynthia McKenzie, Don Anderson

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Challenges & Opportunities for Sensors and Platforms to Achieve Multi-Sectoral HAB Systems

- **Section 1: Challenges and Commercialization of HAB Sensors and Platforms**
  - Lab-based, point-of-use, and *in-situ* systems, and integration of sensors into uncrewed mobile/fixed platforms
  - Sufficient geographical scales to support decision-making
  - Demand for ubiquitous, cost-effective, reliable, easy to use, multitargeted sensors. Supply not yet realized.
  - Understanding end user needs is critical to design successful sensors and data services
  - Data must be timely and accessible. Partnerships and grants are essential to capitalize on sensor development and for data interpretation (e.g., shellfish industry partnerships with public/academic sectors)
  - Diversifying HAB data collection is key to expanding monitoring efforts
  - Regulatory and governance structures are localized and hinder market integration
  - Market service models – data as a service, industry reliance on 3rd party sensors, shared/distributed observing platforms
  - Public sector's role in making the case to fund monitoring – is this market failure? Science questions vs. business decisions.
  - Remote communities are increasingly impacted by HABs (e.g., subsistence)
- **Section 2: Understanding the Demand for HAB Technologies (Supply Side)**
  - Integration with uncrewed vessels has a low "readiness level" for HAB sensors
  - Broad market – lacks depth for commercial sustainability. E.g., Aquaculture markets vary significantly in size and production methods. Demand is driven by the "pain" of the customer (e.g., incurred costs, lost product)
- **Section 3: Building Multi-Sectoral Systems for HAB Observing and Monitoring**
  - Roles for blue tech clusters, incubators, and accelerators
  - Post-COVID supply chain issues continue
  - Is there a sustainable market for rapid test kits (e.g., shellfish toxin testing)?
  - FAIR data, standardized collection and observation methodologies

- Key Takeaways
  - Disparity in market size and diversification
  - Disaggregation of regulatory demand is an impediment to scaling up
  - Need for market analysis and sharing technological innovations
  - Advancing operational HAB observing systems will accelerate research and unlock new opportunities for public-private partnerships
  - New market models can create demand
  - Establishing standards is crucial to transform data into user-friendly services
  - Sustainable investment in operational HAB observing systems will benefit impacted industries
- Potential Pathways Forward
  - Focus groups to resolve challenges in scalability, cross market reach, and regulatory regimes (via MTS, intergovernmental programs, e.g., IOC, GOOS, UN Decade, ISSHA)
  - Development of market studies
  - Interchange of information for requirements, available technologies, funding opportunities, etc.
  - Incubator/accelerator development
  - Communicate the impact of not sustaining funding for HAB observing networks (e.g., NHABON, GlobalHAB)

Downstream Services and Growing the Market through Impact and increasing the Demand

- **Downstream Service Delivery – A Hybrid Solution?**
  - Balance between public and private sectors – what is inherently governmental?
  - Needs of insurance and financial sectors
  - How to catalyze research and innovation to advance market opportunities for downstream services? Role of government grants in early-stage collaborations (short term solution)
  - Alternative business/licensing models
- **Aggregation of the primary market, and consideration of secondary markets for data collected to increase demand for sensors and platforms**
  - Challenges include (FAIR) data availability, cost, scale (regional vs. site),
  - Integration of HAB sensors with physical/chemical data to improve EW/forecasting systems – regional differences in value (e.g., no change in Gulf of Maine vs. ↑ Scotland's west coast)
  - Different models for different purposes – forecasting vs. source attribution – implications for types of data collected and how they are used
  - Aggregate demand – services should meet common user needs within a region
- **Workforce Development: Balancing specialization & generalization**
  - Need: taxonomists, chemists, ecologists, engineers
  - "Blended" team approach (e.g., software engineering, taxonomy)
  - AI applications & importance of standards for use (training and validation)
  - Micro-credentials, short courses, partnerships with First Nations and indigenous peoples
  - Citizen science

- Key Takeaways
  - Governments have a key role in setting requirements, data standards
  - We don't know the size of the HAB market for downstream services
  - Flexible startups can create new business/licensing models
  - HABs need to be "mainstreamed" into broader environmental monitoring programs
  - Explore: New business and licensing models through flexible start-ups, Workforce shifts (specialist/generalist expertise), Sensors that can be tuned (e.g., spectral absorption, sample processing)
- Potential Pathways Forward
  - Catalyze early stage collaborations through grants (pairing private sector innovators with government and academic research institutions) – sustain and grow functional partnerships though persistent investment
  - "Blended" finance approaches for sustaining services/products
  - Increased use of end user licensing agreements for downstream HAB services
  - Focus on preparedness – use response to severe events to plan for the future – enhanced coordination
  - Provision of operational observing/forecasting is an inherently governmental function – private sector more agile and capable of creating derived information products
  - Market research – Define regional, national, international markets for downstream HAB services

Advancing Control of Harmful Algal Blooms

- Market Use Cases
  - Optics and perception: Demand for technologies that are scalable, sustainable, and don't harm the environment
  - Controls need to extend beyond HABs – there is a disconnect between market drivers (aquaculture, local authorities, coastal industries) and push for implementation
  - Challenges: Data, information, automation, insurance industry buy-in, identifying correct metrics, understanding best control strategies
- Landscape of Control Technology Innovations
  - Lengthy permitting approval is the largest barrier
  - Metric of success – cell/toxin reduction – what is sufficient, how to test?
  - Remote sensing to direct control methodologies
  - Modernization of the regulatory environment
- Public/Private Partnership - Strategies for Implementation
  - Role of policy/regulation
  - Inconsistent regulations hinder acceptance
  - Tourism boards & economic development organizations – Right messaging is key to success.

- Key Takeaways
  - Education and outreach for control methodologies are needed to change perception
  - Disconnect between drivers for control and the push for implementation
  - Permitting is a large obstacle for commercialization
  - The insurance industry has not kept pace with the introduction of control methods
  - Working with economic development agencies, tourism boards and other such associations can influence the acceptance of control methods
- Potential Pathways Forward
  - Develop greater public awareness and understanding of control technologies
  - Commission Cost-Benefit studies of control compared to response
  - Discussions with the Insurance Sector
  - Work with permitters to understand and in the future streamline regulations
  - Develop decision trees on when and how to employ HAB controls

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Cross-cutting themes

- Resources are limited - Integration & leveraging, Partnerships/shared resources, Market research to focus on needs and scale observations appropriately
- Measuring "everything everywhere all the time" makes observing/monitoring cost-prohibitive (and not necessary) - "Mainstream" HABs into broader environmental monitoring, where appropriate
- Use incubators/accelerators, flexible startups, new business/licensing models, grant funding combined with "blended" finance approaches to sustain services & products
- Communicate the impact of not sustaining observing & EWS efforts – food safety & security – use extreme events to focus regional preparedness
- Education of public (& aquaculture insurers) on control options and cost/benefit – work through economic development agencies and tourism boards to gain acceptance and facilitate permitting
- **MTS will present results at the Ocean Business meeting April 8-10, 2025 in Southampton, UK**
- **Final report in development**

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