Regional Development of the U.S. Integrated Ocean Observing System (IOOS)

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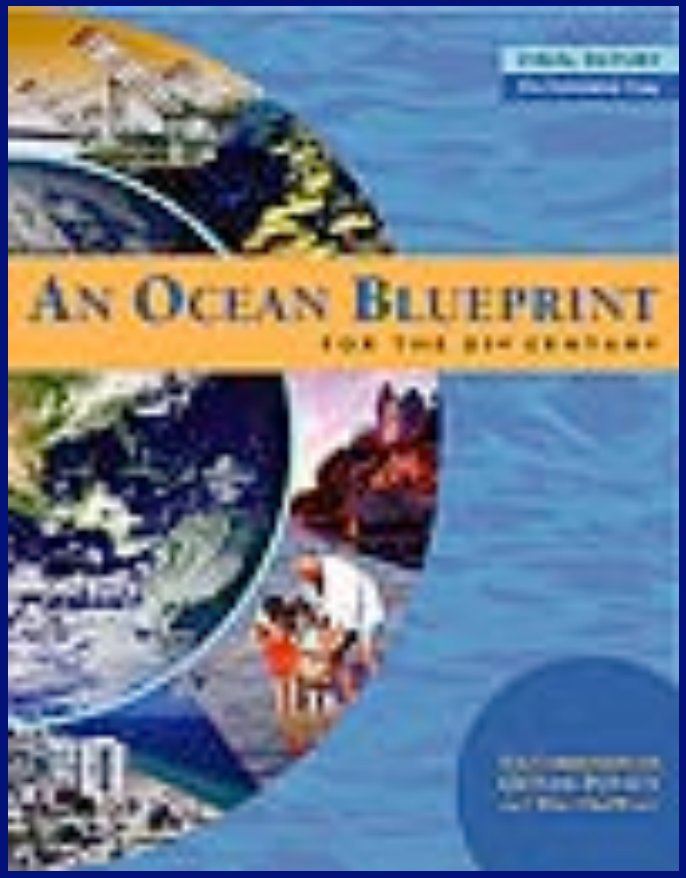
IOOS
U.S. Contribution to the Global Ocean Observing System (GOOS)
& the Oceans & Coasts Component of the
Global Earth Observing System of Systems (GEOSS)

NOAA
Navy
NASA
NSF
USACE

USGS
MMS
EPA
USCG
DOE

2004 U.S. Commission on Ocean Policy

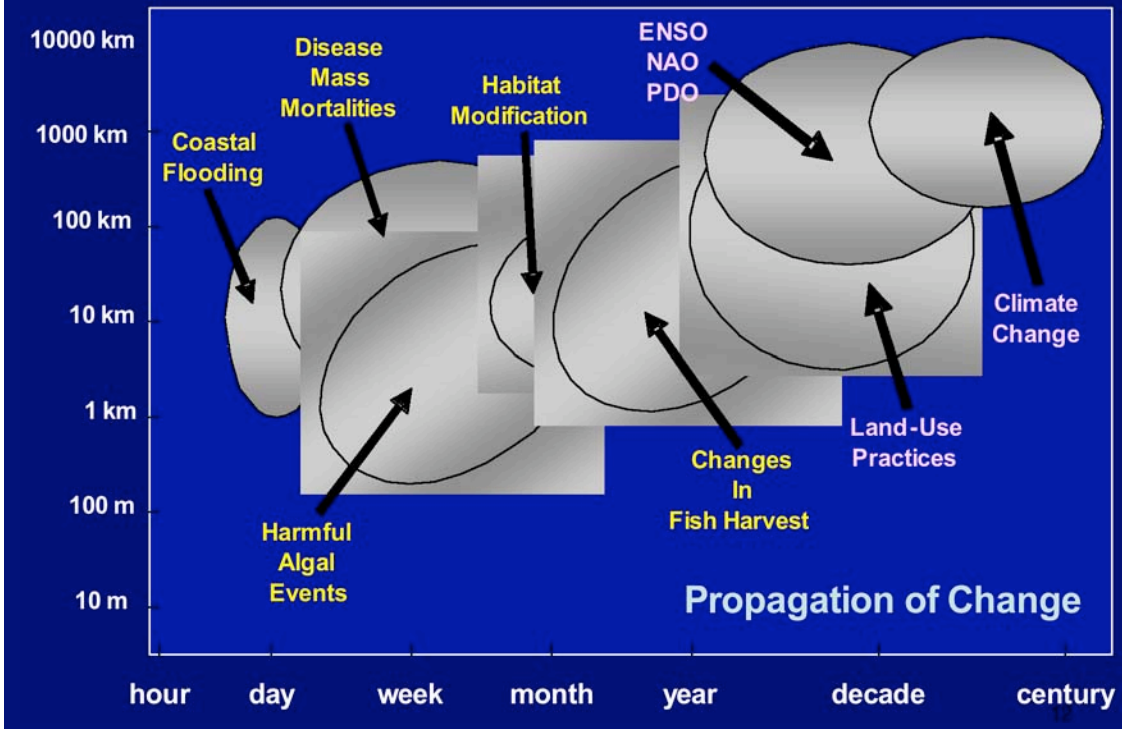


- **Implement an Integrated Ocean Observing System (IOOS)**
  - Make more effective use of existing resources
  - Enhance operational capabilities over time to address 7 societal goals
- **Implement Ecosystem–Based Approaches to**
  - Managing natural resources,
  - Environmental Protection, &
  - Coastal Zone Management
- **Strengthen Regional Approach**
  - As a means of implementing ecosystem–based management

Three Legs of Global Ocean Governance Call for Ecosystem–Based Management

- **1982 UN Convention on the Law of the Sea**
  - Maintain living resources; take into account the interdependence of stocks & species
  - 1992 Conservation & management of straddling & highly migratory fish stocks
- **1992 UN Conference on Environment & Development Program of Action for Sustainable Development (Agenda 21)**
  - "Establish a GOOS that will enable effective management of the marine environment & sustainable utilization of its natural resources"
- **2001 FAO Reykjavik Declaration: Managing fisheries for sustainability must**
  - Contribute to effective conservation of ecosystems & their resources
  - Take into account impacts of fisheries on marine ecosystems & vice versa

Ecosystem-Based, Adaptive Management



- **<u>Rapid & Repeated Detection</u> of changes**
  - ➢ **over a broad spectrum of time-space scales**
- **<u>Timely Predictions of</u> such changes**

Goal: Tune the flow of environmental data & information to the Time scales on which decisions <u>should</u> be made.

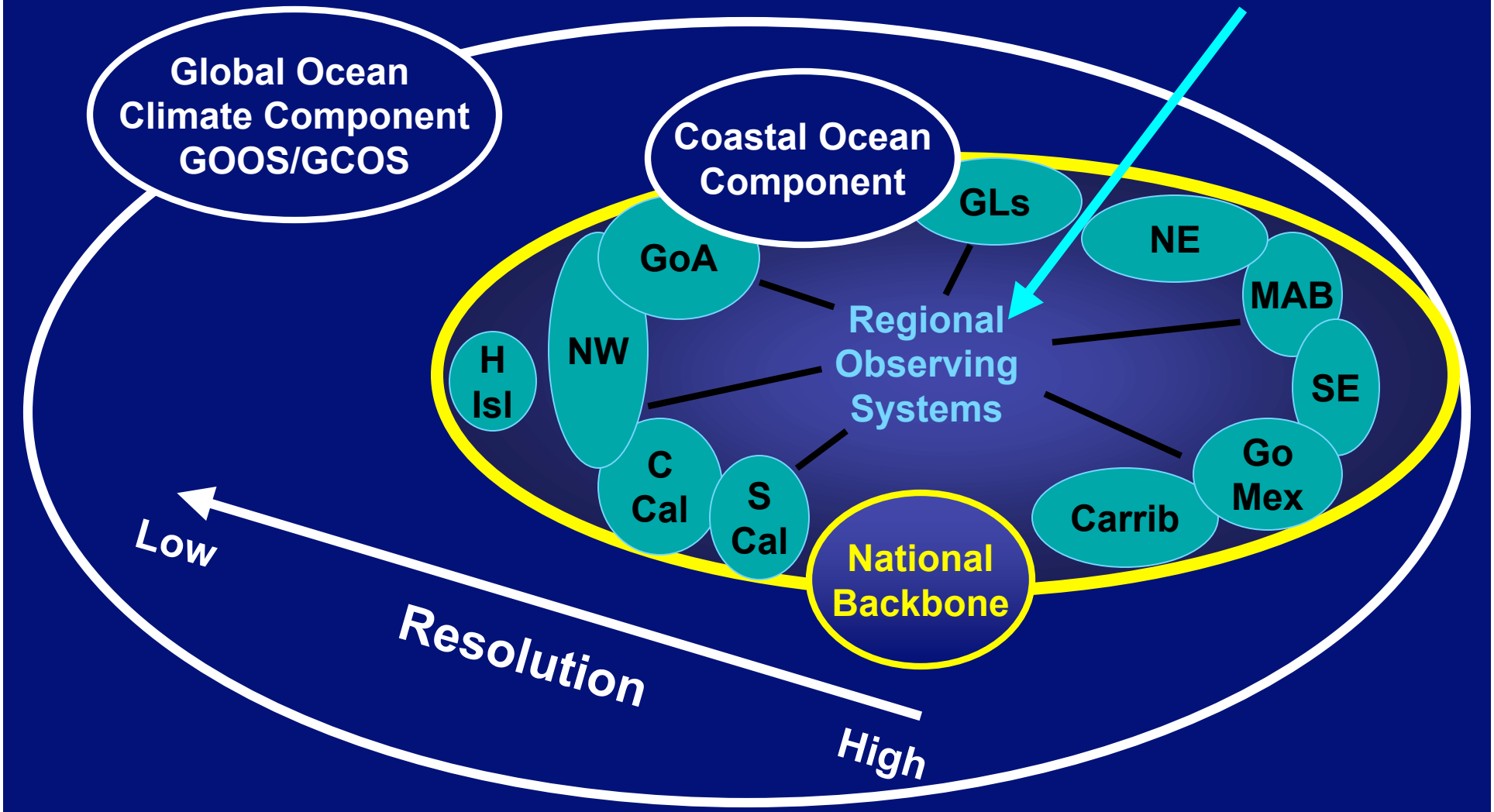
WE DO NOT HAVE THIS CAPABILITY TODAY

WHY?

- **Inefficient, ineffective data management**
  - Data lost or not accessible
  - Time required to acquire, process & analyze data of known quality
- **Under sampling in time, space & ecological complexity**
  - Inputs to coastal ecosystems poorly quantified
  - Lack of long term, high resolution time series
  - Lack of synoptic measurements of physical, chemical & biological properties & processes
  - Currently a major limitation to the development of models for ecosystem–based management
- **Lack of capacity for rapid data acquisition & analysis**
  - Remote & Autonomous *in situ* sensing & real time telemetry of geological, biological & chemical properties
  - Operational models for assimilating & analyzing data with speed & skill

The IOOS is being designed & implemented to address these challenges

U.S. IOOS
Multi–Scale System



Regional Associations (RAs) Responsible for Organizing Regional Coastal Ocean Observing Systems (RCOOSs)

- **Establish goals & priorities based on data requirements of users, e.g.,**
  - **State & Federal Agencies**
  - **Private Sectors, NGOs & Tribes, Academia….**
- **Engage Regional Federal Bodies & State Agencies responsible for**
  - **Public Health & Environmental Protection**
  - **Resource & Coastal zone management**
- **Inform Federal Agencies of user needs for data & information**
- **Enhance the backbone based on user needs**
- **Build on existing assets**

Coastal Phenomena of Interest

Relevant to Ecosystem–Based Management

Globally ubiquitous, Local Expressions of Large Scale Changes

Climate, Marine Ops, Natural Hazards

- Surface currents, waves
- Sea level, Temperature, Salinity
- Coastal flooding & erosion

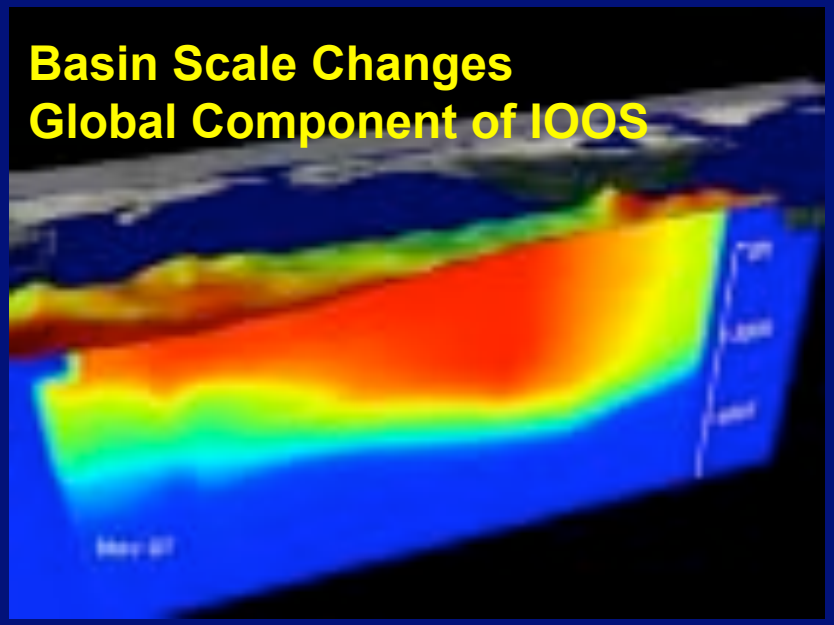
Public Health Risks

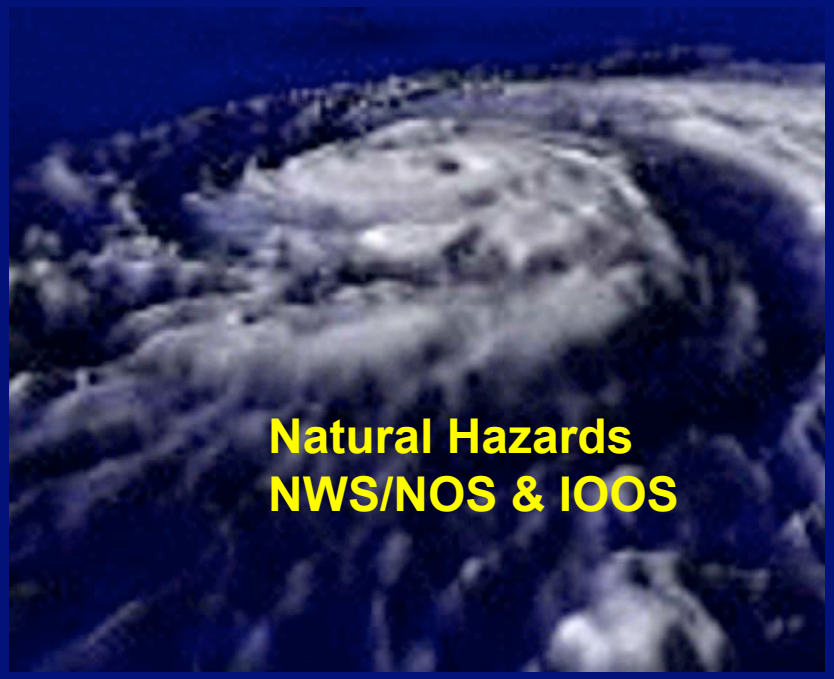
- Seafood contamination
- Direct exposure to pathogens & toxins

Ecosystem Health & LMRs

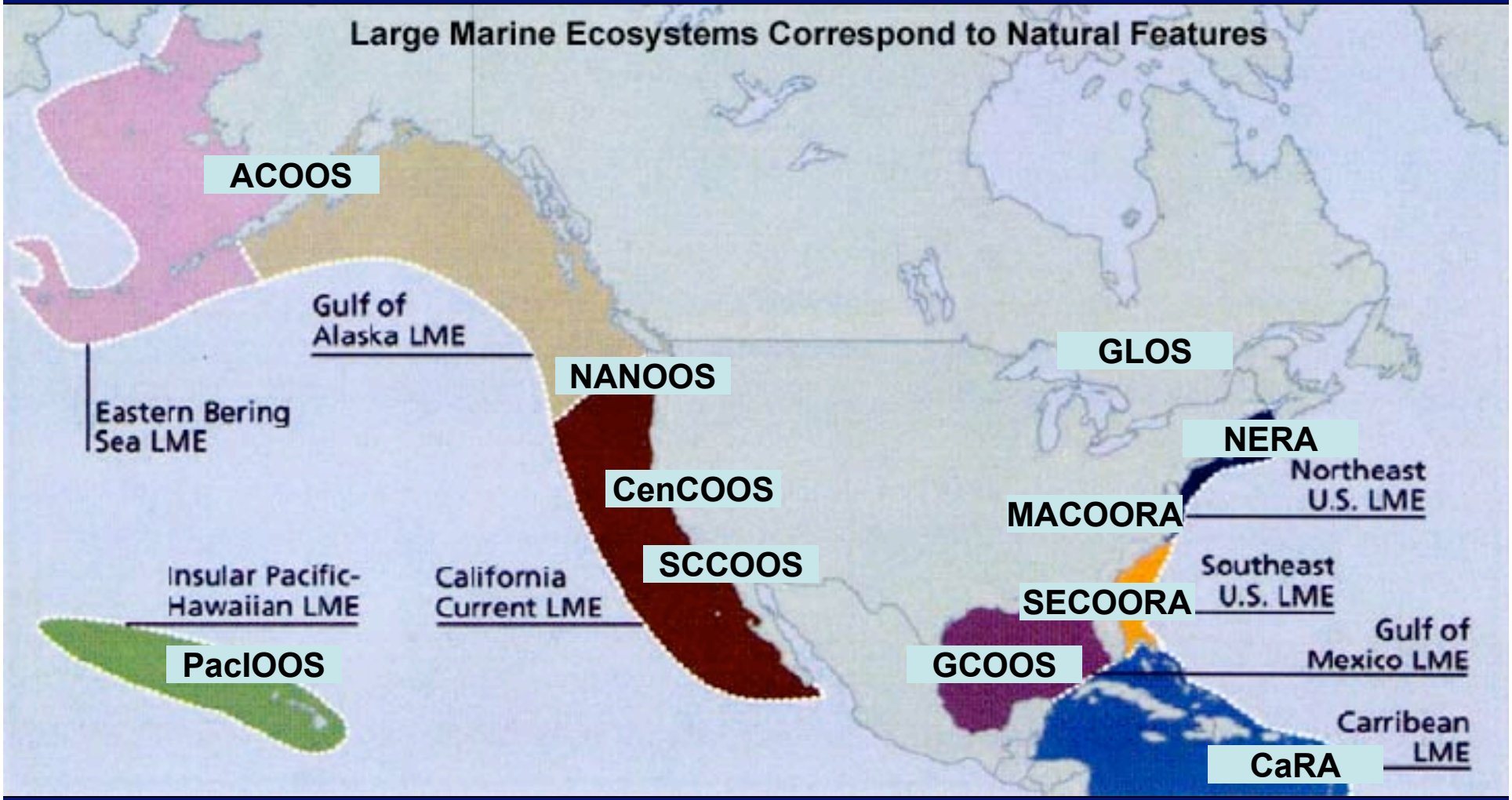
- Loss of habitat, Biodiversity
- Nutrient pollution, Anoxia
- HABs, Invasive species
- Mass mortalities
- Chemical contamination
- Declines in living resources
- Aquaculture production

Ecosystem–Based Management Especially Important in the CZ





Regional Associations
11 Groups Funded to Meet Requirements for Certification



IOOS Regional Associations (RAs) Establish a Governance Mechanism

- **Build RCOOSs by**
  - Incorporating, enhancing & supplementing existing OS infrastructure in each region
- **Engage all stakeholders**
  - Ensure the involvement of data providers & users in the design, operation & improvement of the RCOOS
  - Data providers & users (stakeholders)
    - Private sectors: Industry, NGOs, Academia, Research Institutions
    - Public sectors: Federal & State Agencies, Academia
- **Create a Legal Structure that serves as its own fiscal agent to**
  - Receive & dispense funds
  - Engage in enforceable contracts
  - Obtain liability insurance

IOOS Regional Associations (RAs) Business Plan

- **Goals & Objectives Must**
  - Relate to one or more of the 7 societal goals.
  - Conform to IOOS Design Principles.
- **Financial**
  - Plan for obtaining, increasing, sustaining, & diversifying revenue streams for system design, implementation, operation, & improvement.
- **Needs, Benefits, Product Development & Marketing**
  - Describe what sectors of society will benefit and how.
  - Link objectives to benefits and product development.
- **Linking Observations to Models & Products**
  - Describe the observing, data management, & modeling subsystems & how they will be efficiently linked & developed to achieve objectives.
- **Education & Training**
  - Establish a mechanism for engaging the education community in design of the IOOS & use of IOOS data for Earth science education.
  - Describe plans for growing the workforce of trained system operators & how the user community will be trained to access & use data & information.

Regional Ocean Councils (ROCs)

- **Functions**
  - develop regional goals, priorities & mechanisms for responding to each issue;
  - communicate regional needs at the national level & better address issues of national importance in the regions;
  - address a wide range of issues, interactions among activities, & influences from upstream to far offshore;
  - help build public awareness about ocean and coastal issues
- **Characteristics**
  - Council membership should be representative of every level of decision making in the region, drawing on the knowledge of all stakeholders;
  - The specific structure and functions of a regional ocean council should be determined by participants in the region;
  - Boundaries of regional ocean councils should encompass large areas with similar ecosystem features.
    - e.g., LMEs except Pacific coast & Great Lakes
- **Formation**
  - efforts to establish ROCs should be supported immediately in areas where regional approach is already strong.

1998 Congress Called for Integrated Ocean Observing System (IOOS)

Provide Data/Info Required for More Rapid Detection & Timely Prediction of State Changes

- **Improve the safety & efficiency of marine operations**
- **Improve homeland security**
- **Improve forecasts of natural hazards and mitigate their effects more effectively**
- **Improve predictions of climate change & their effects**
- **Minimize public health risks**
- **Protect & restore healthy coastal marine ecosystems more effectively**
- **Sustain living marine resources**

1 System, 7 Goals

IOOS is Designed to be an Integrated System

Rapid Access to Diverse Data from Many Sources