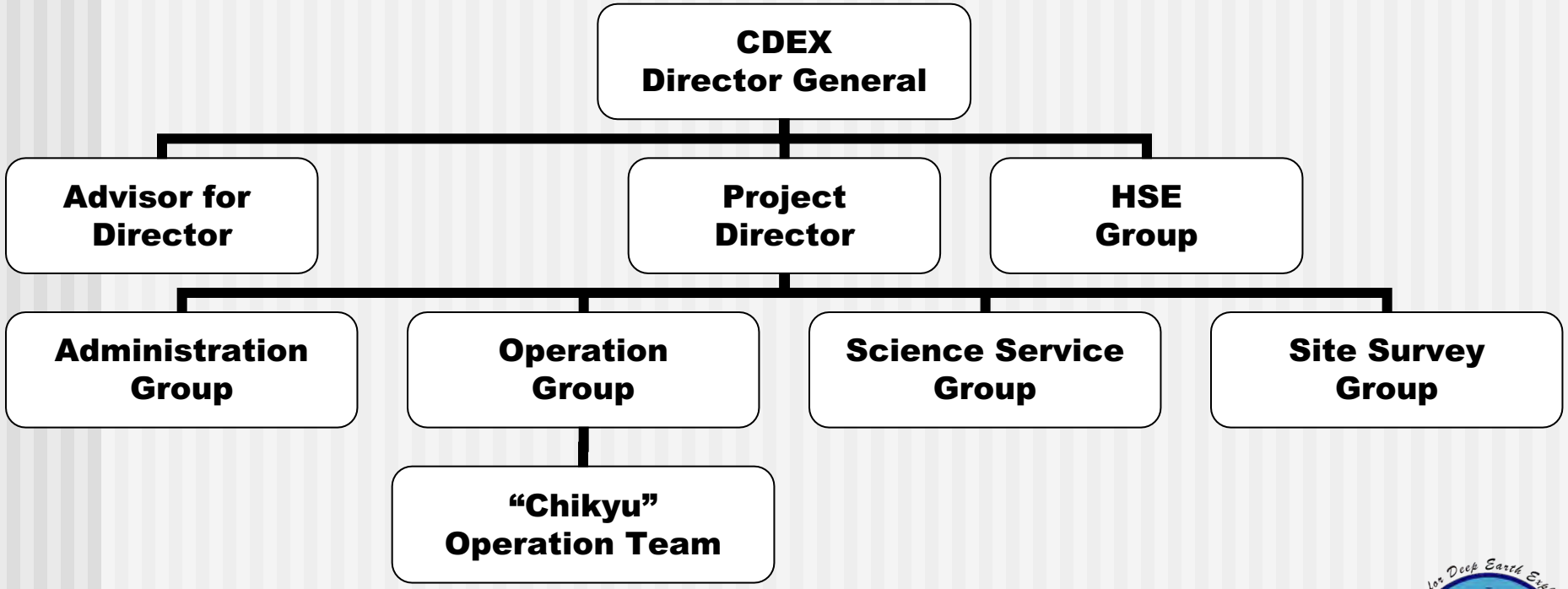
CDEX Policy Statement

Bozeman, MO
19-20 August, 2003

Center for Deep Earth Exploration



HSE & Legal Issues

Health, Safety & Environment Policy

The Center for Deep Earth Exploration (CDEX) is committed to preventing injuries and protecting the environment throughout our operations. It is our aim to comply with and, where practicable, exceed the requirements of applicable HSE legislation, Standards, Guidelines and Codes.

CDEX's management will define and document HSE policies and strategic objectives.
This will be done for:

- Safety and health goals for CDEX and contractor personnel;
- Environmental goals for marine, drilling and science services activities;
- Operating and maintaining Facilities so that the risk to personnel is as low as reasonably practicable;
- Training to meet project, operational and regulatory requirements.

CDEX believes that this can be achieved while meeting its quality objectives and goals.
To do this, we will:

- Provide HSE Leadership & Commitment throughout our operations;
- Seek out and evaluate best practice HSE Planning strategies;
- Develop effective HSE Implementation processes.

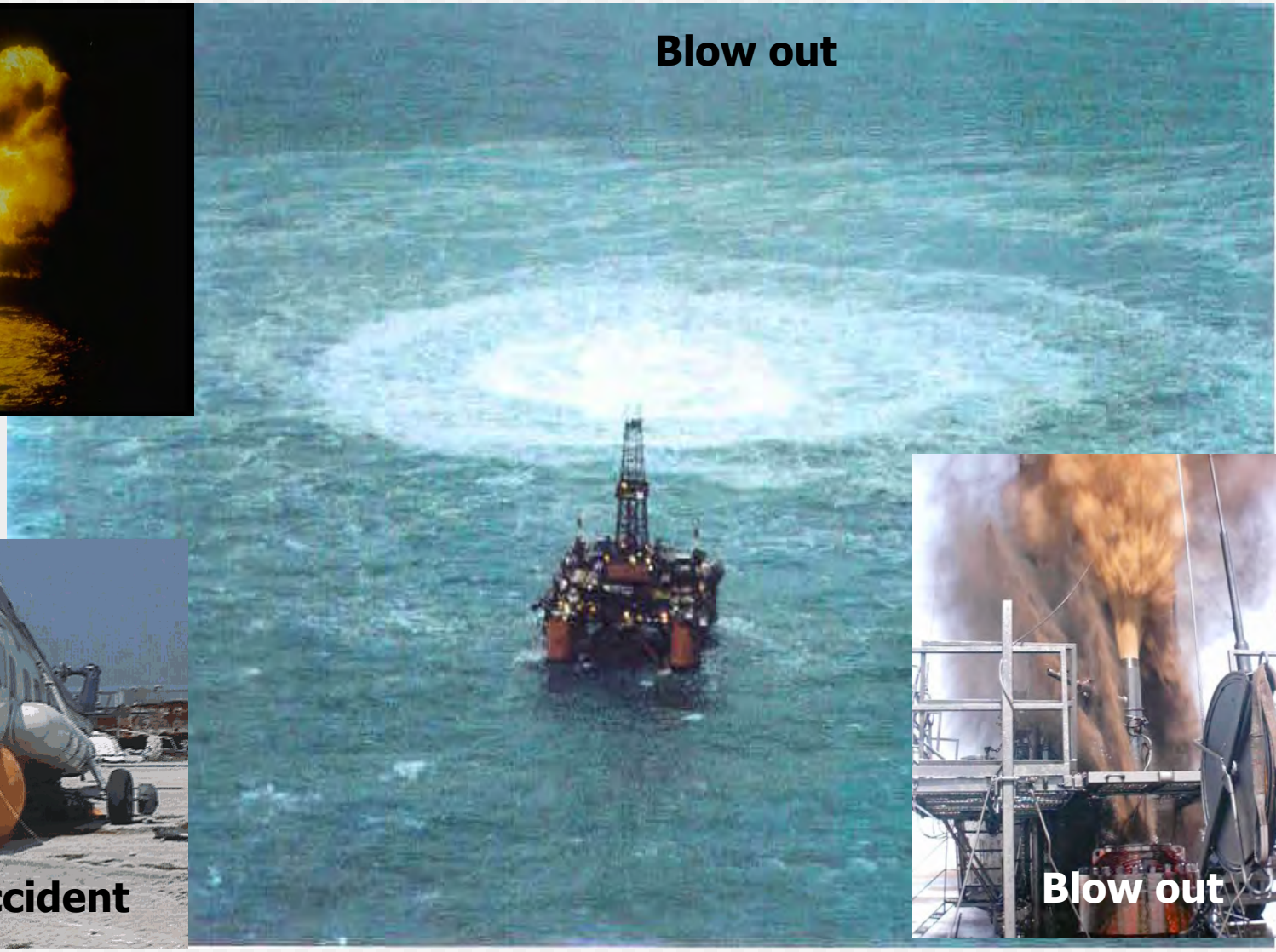
To measure and evaluate our success in achieving these goals, we will:

- Develop comprehensive Auditing and Review systems;
- Set targets that encourage us to continuously measure, evaluate and improve our HSE performance;
- Include HSE performance in performance appraisals;
- Communicate the requirements of this policy throughout all levels of the organization.

It is our commitment to achieve all stated goals and objectives by seeking out, evaluating and, where practicable, implementing best HSE Management practices.

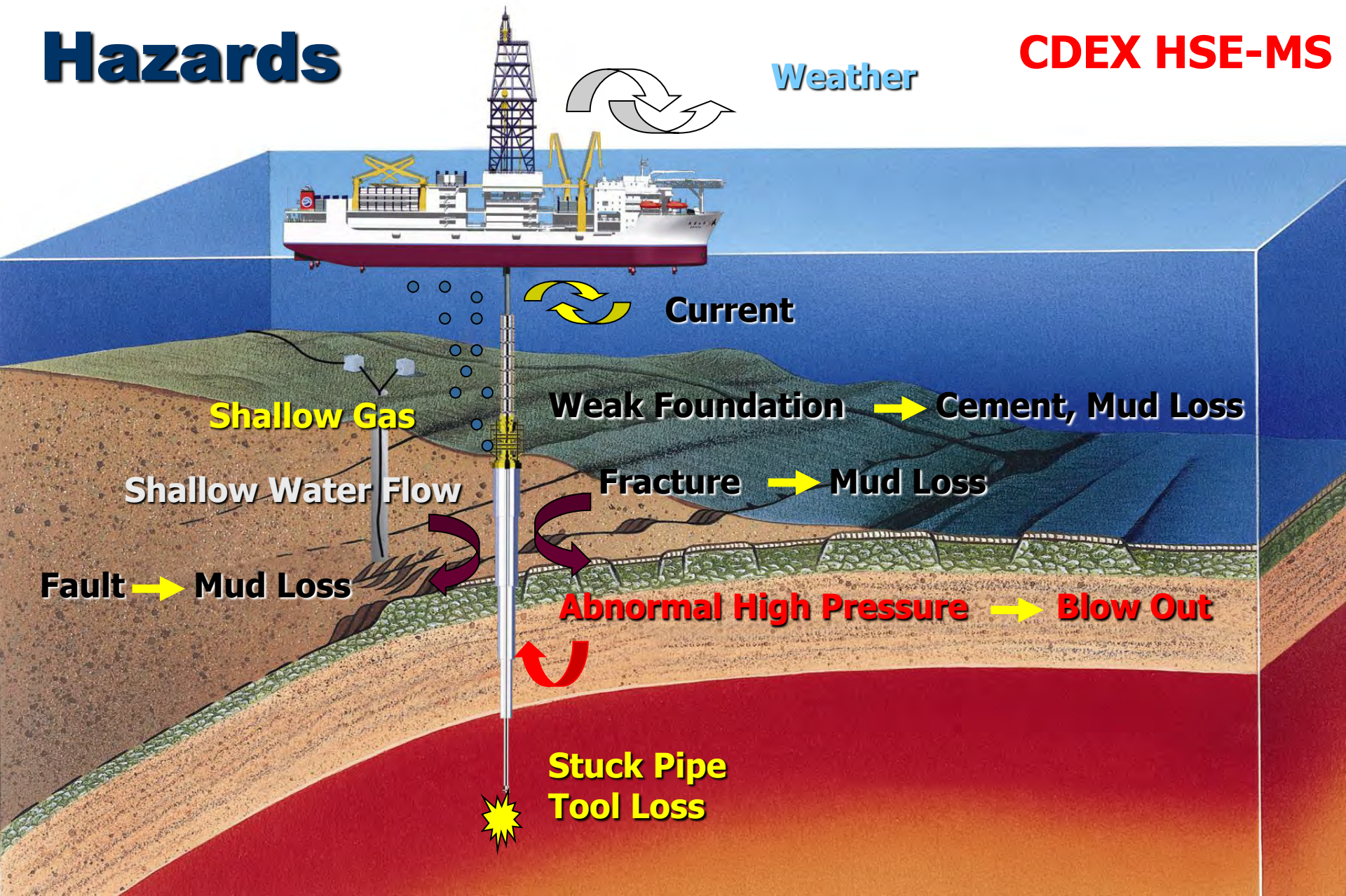
Dr. Asahiko Taira (Director General of Center for Deep Earth Exploration)

Risks



Hazards

CDEX HSE-MS



CDEX HSE Commitments

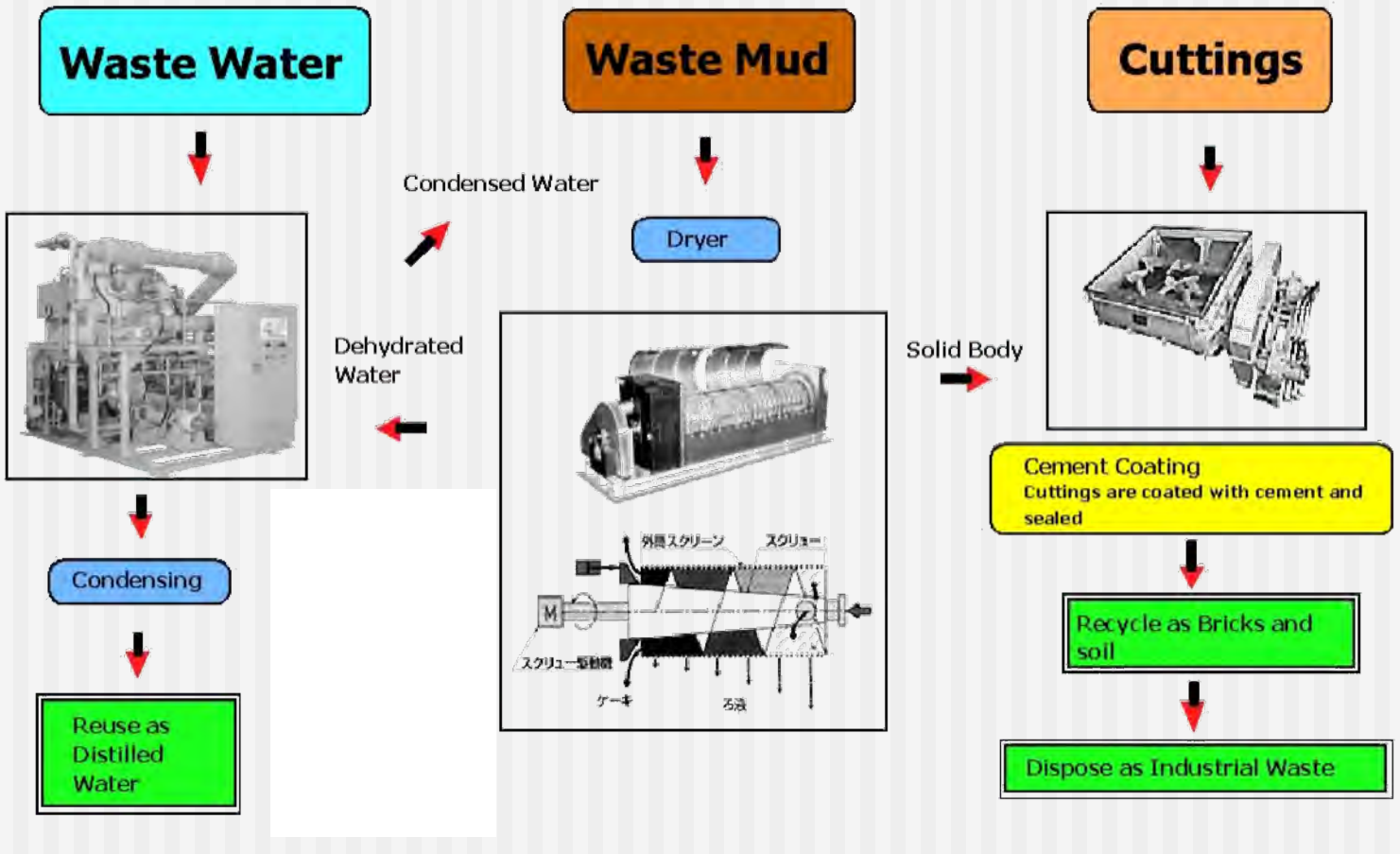
- Build HSE-MS (Management System) to construct HSE strategy
- Carry out Safety Case to meet standards and regulations
- Prepare specific HSE and other mandatory HSE Training program (HUET; Helicopter Underwater Escape Training, Offshore Survival, Fire Prevention, PPE; Personal Protective Equipment)

Environment

- Environment Friendly Operation
  - Minimize Emission
  - Recover “Mud, Cuttings “etc.

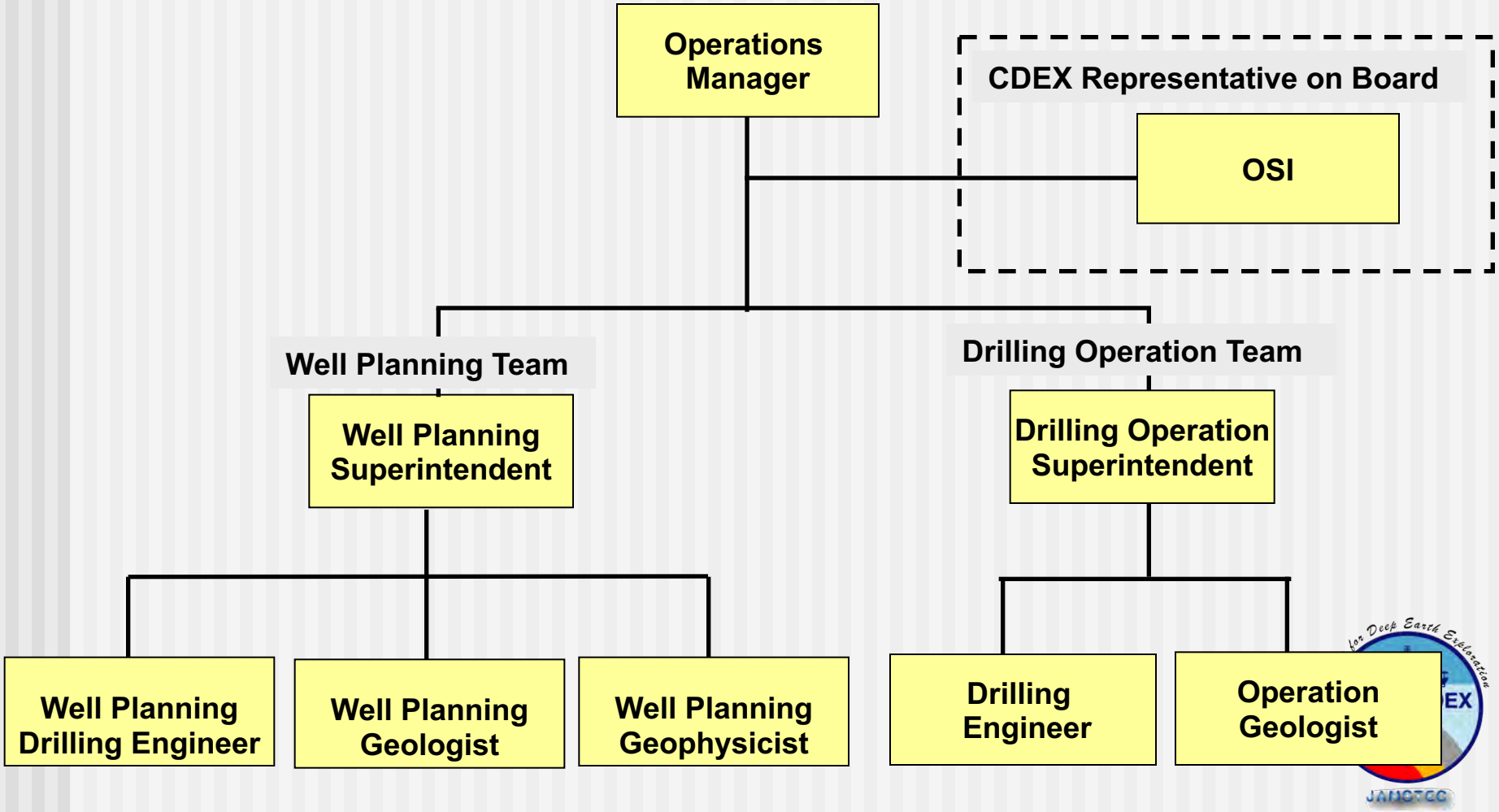
Environment

Mud, Cuttings Disposal System



Platform Operation

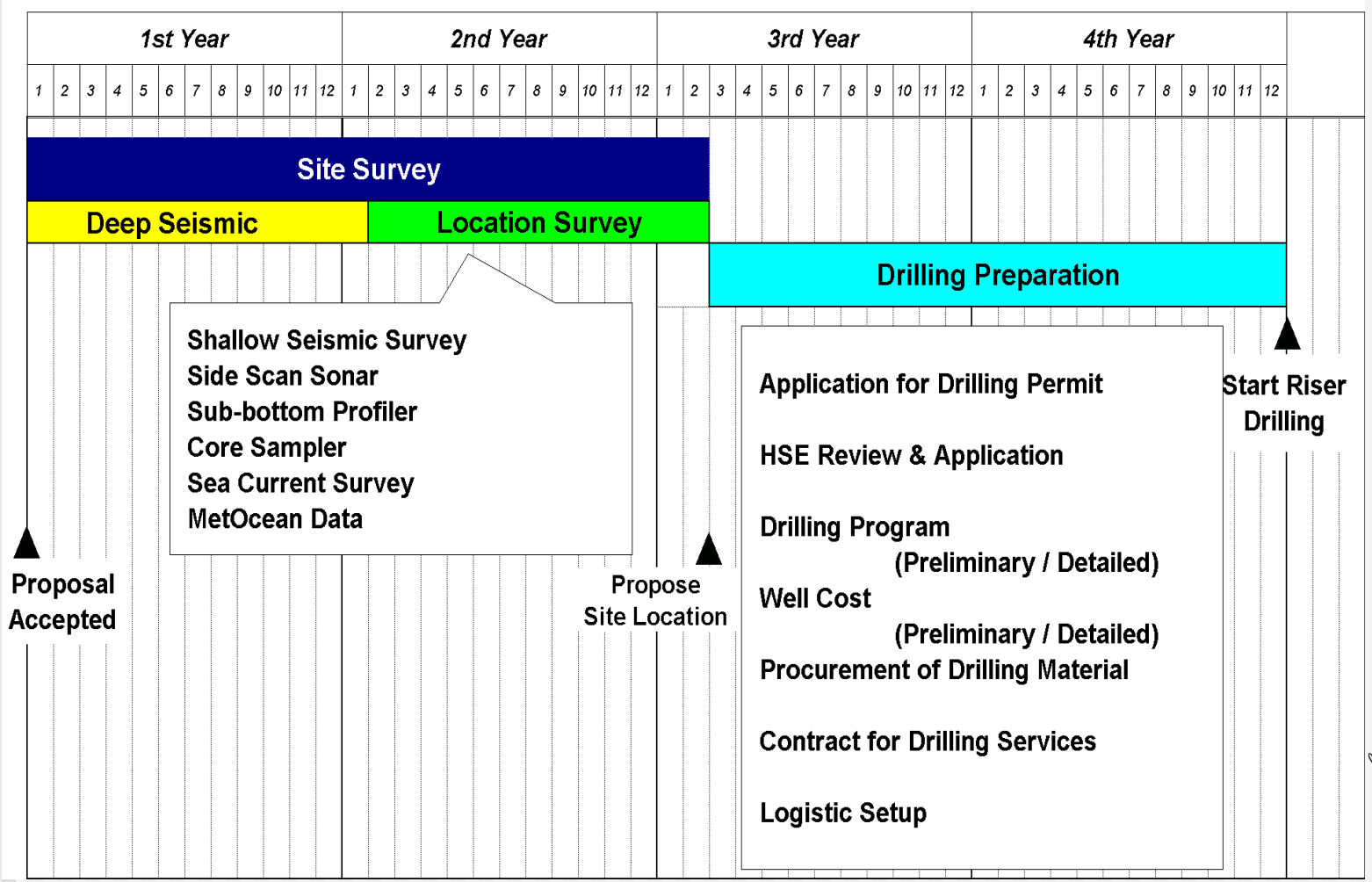
Operation Group



Platform Operation

- Location Survey
  - Hazard Survey: Supervising/Analysis
- Drilling
  - Well Planning, Well Cost Estimate (AFE), Well Reporting, Drilling Operation Supervising, Wellsite Geology, Logging Operation Supervising

Riser Drilling Work Schedule

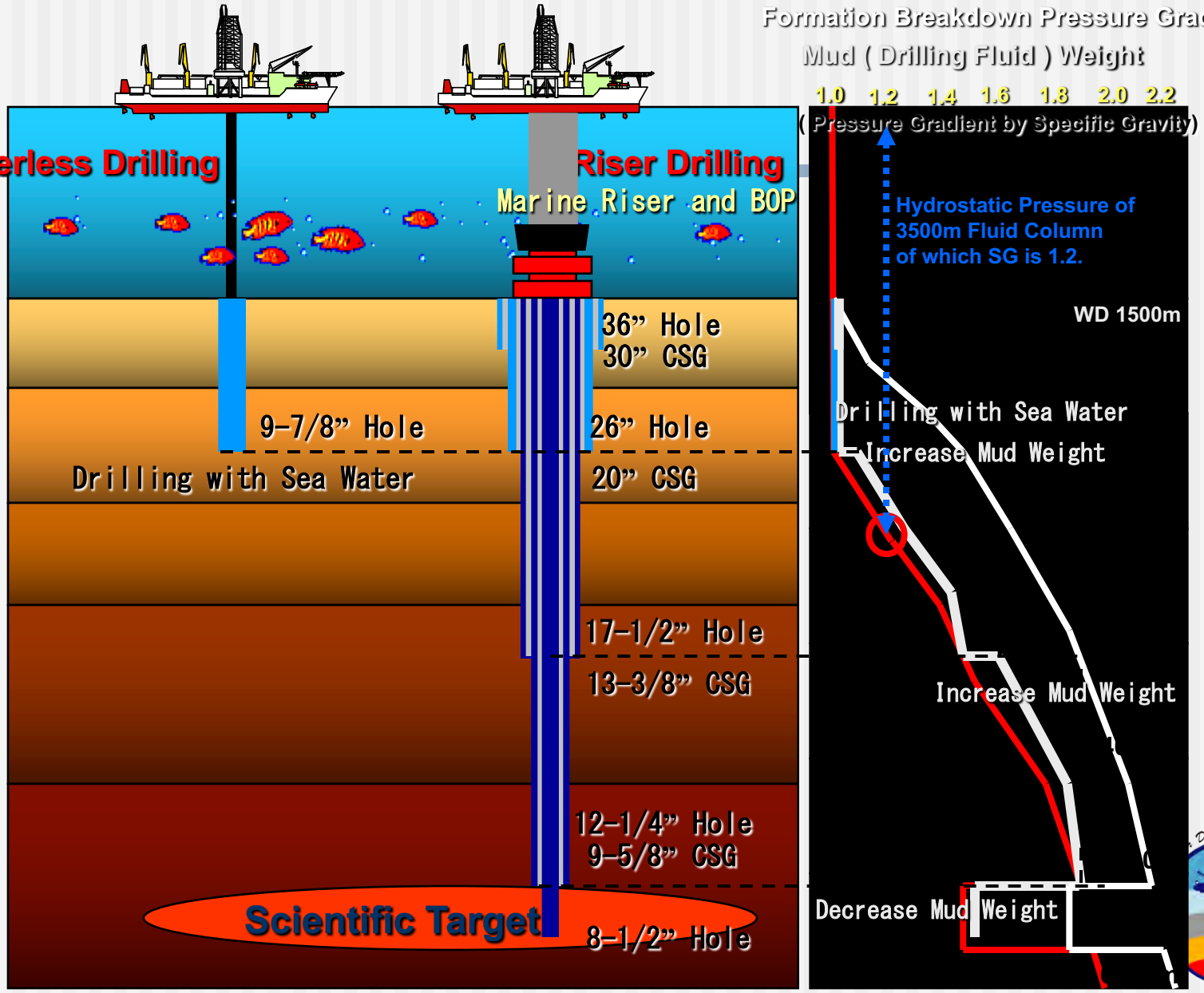


Supply/ Transportation

- Basic Crew Change: 4 weeks on/ 4 weeks off
- Personnel Transportation:
  - by Helicopter （< 600 km）
  - by Crew Boat （> 600 km）
- Drilling Material Transportation:
  - by Supply Vessel

→Shore Base & Heliport are required.

Riser Drilling

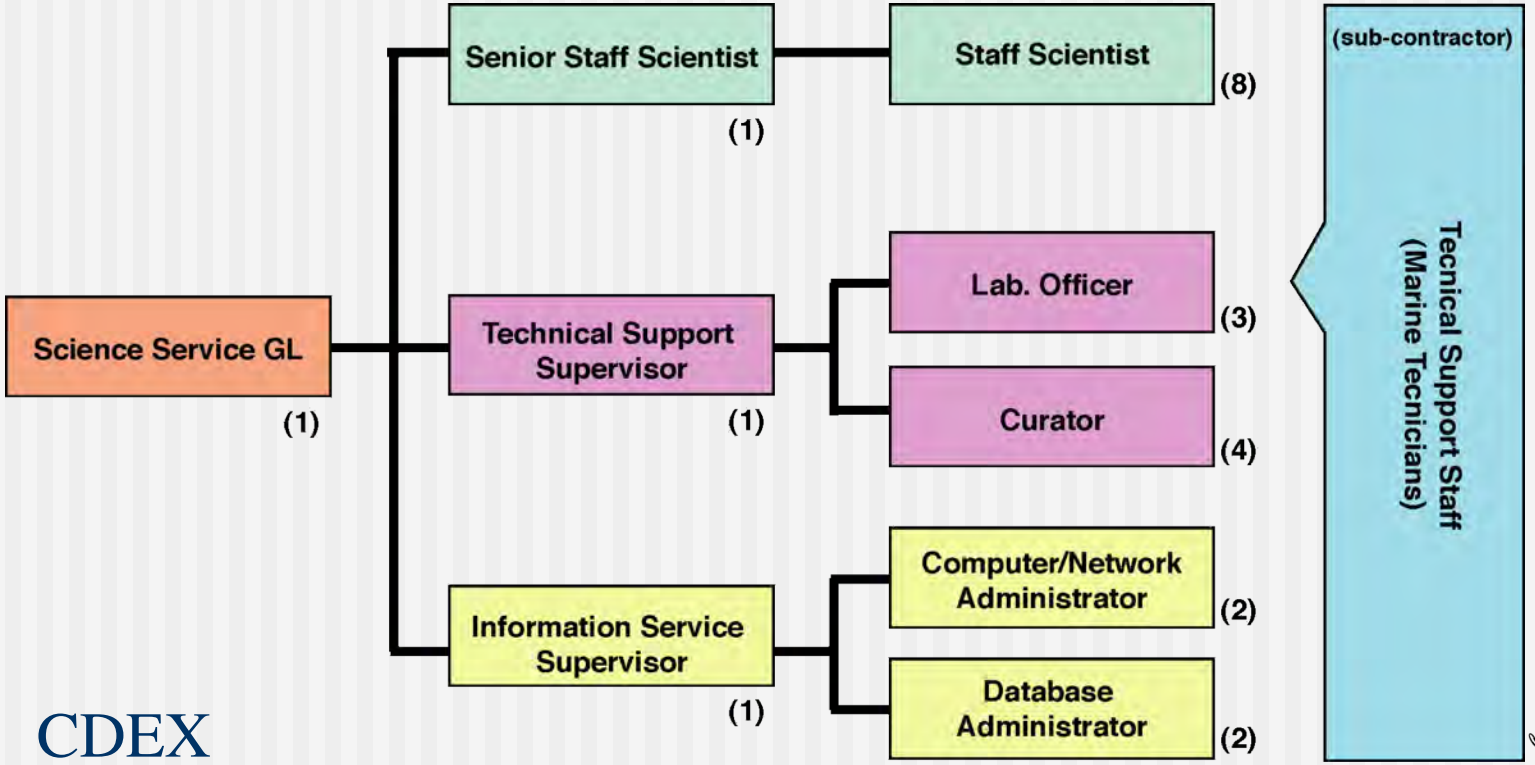


Completion/ Abandonment/ Suspend in Riser Drilling

- For Completion
  - High Pressure X'mas Tree on Wellhead (in High Pressure Well)
  - Low Pressure X'mas Tree on Wellhead (in Low Pressure Well)
- For Abandonment
  - Set Mechanical Bridge Plug + Cement Plug
  - Cut & Remove all Sub-bottom Casing
  - No debris on Seafloor
- For Suspension/ Re-entry
  - Set Mechanical Bridge Plug + Cement Plug
  - Install Corrosion Cap on Wellhead

Science Support

Science Service Group

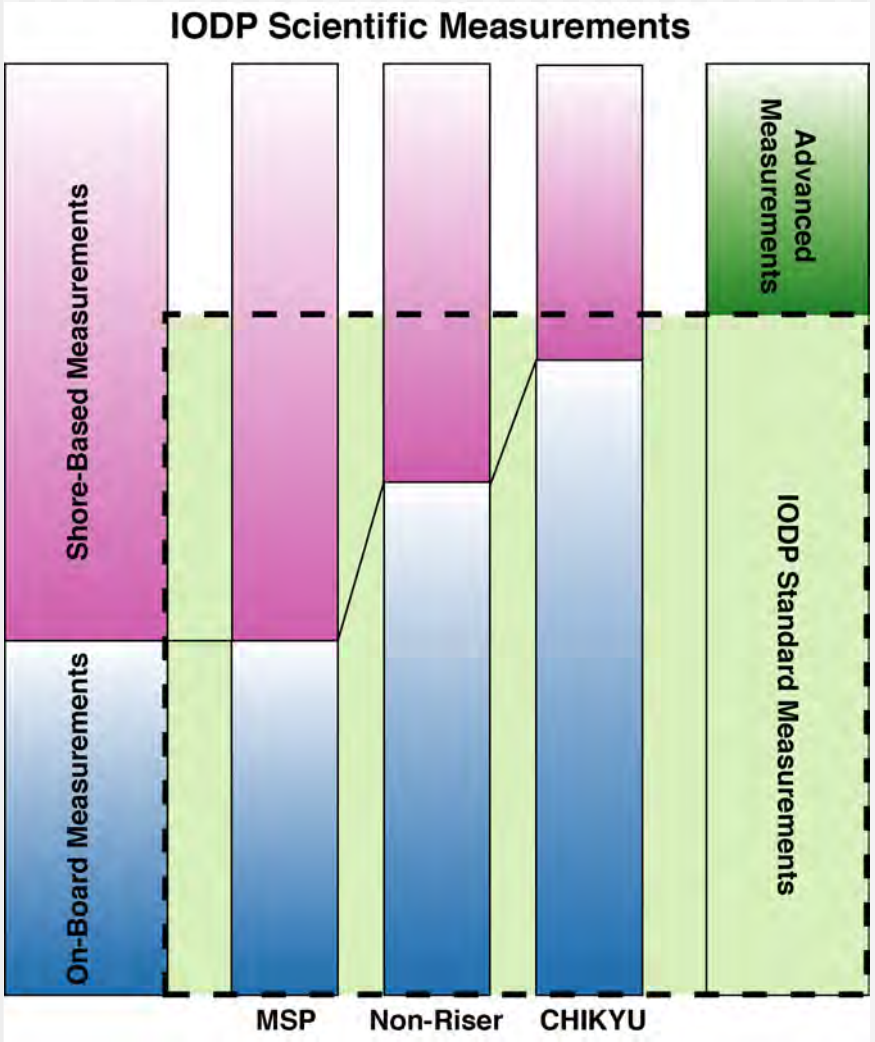


CDEX

Science Service Policy

- Long and continuous science support through staff scientists who will coordinate proponents/group.
- High quality technical support will be served on board through safe and efficient manner.
- Sophisticated information services are provided through state-of-the-art IT technology and supports.
- A shore-based laboratory and sample repository operates for high quality science support.
- Promoting a technological development.
- Borehole measurement services and fundamental borehole monitoring will be supported.

IODP Scientific Measurements



Shore-based Laboratory and Core Sample Repository in Kochi


Center for Advanced Marine Core Research, Kochi Univ.


Core Sample Repository

“Neptune”

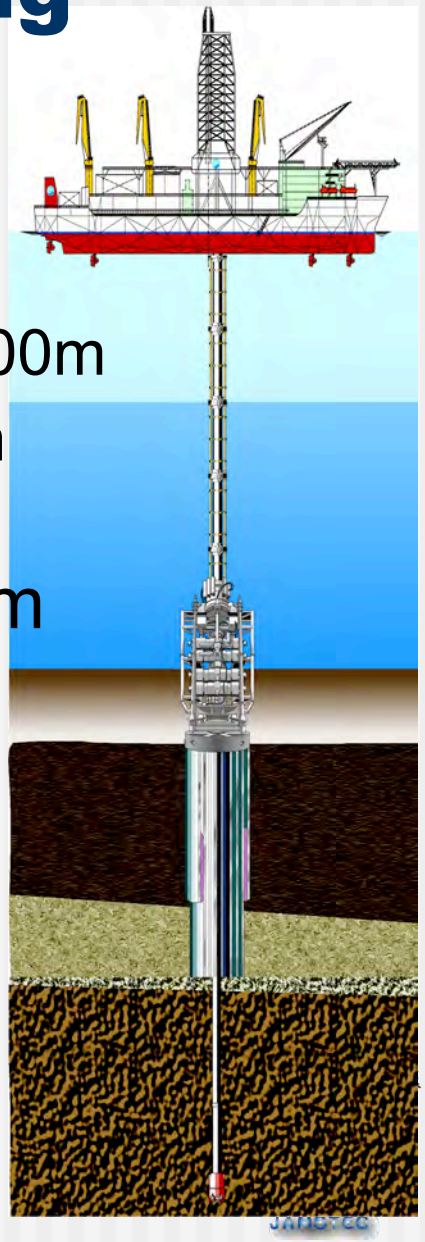
Microbio Repository

Center for Deep Earth Exploration
CDEX
JAMSTEC

Engineering Development

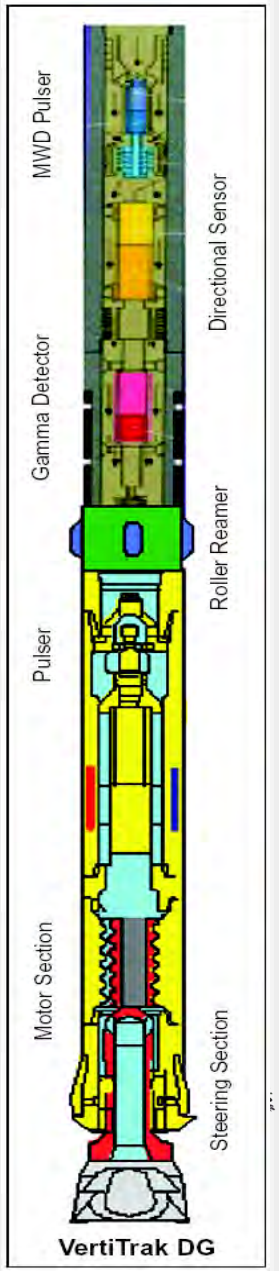
“Chikyu” Development (Long Term)

- Completing “Chikyu” Capabilities
  - Maximum Operating Water depth : 4,000m
  - Maximum Drill String Length : 12,000m
- Develop Sub Sea System for 4,000m
  - Target to operate in 2014
    - Riser tensioner/Vessel
    - Marin Riser
    - BOP
    - Mud circulation system



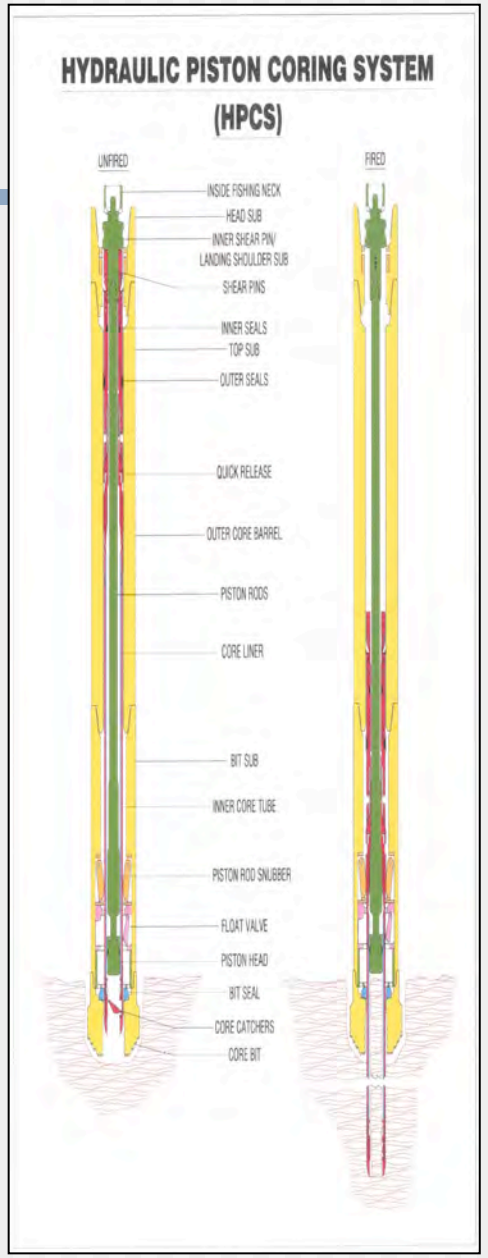
“Chikyu” Development (Long Term) cont.

- Deep well drilling technology
  - 4-1/8”ID Drill Strings (inc. BHA) for 12,000m (completed)
  - Wireline-Coring System
    - Conventional Coring
    - Downhole Motor?
  - Vertical Drilling System
    - Coring Capability/Combinability
  - High Temperature Rated Equipment
  - High Temperature Rated Drilling Fluid
    - Borehole Stability Improvement



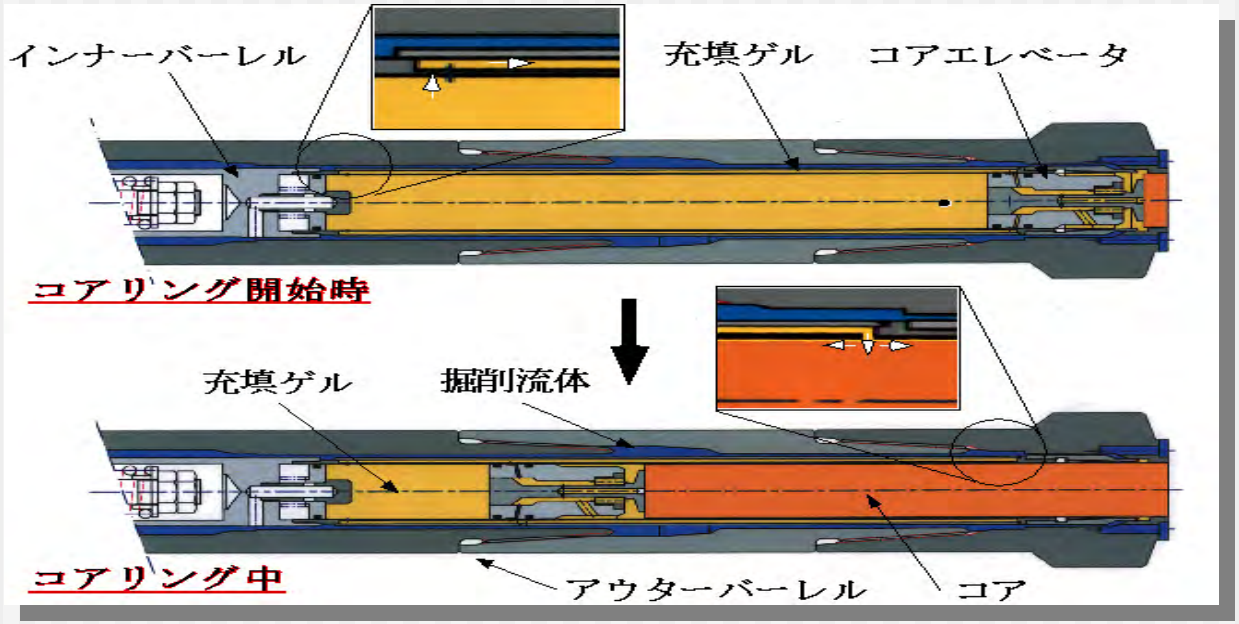
Other Development and New Applications (Short Term)

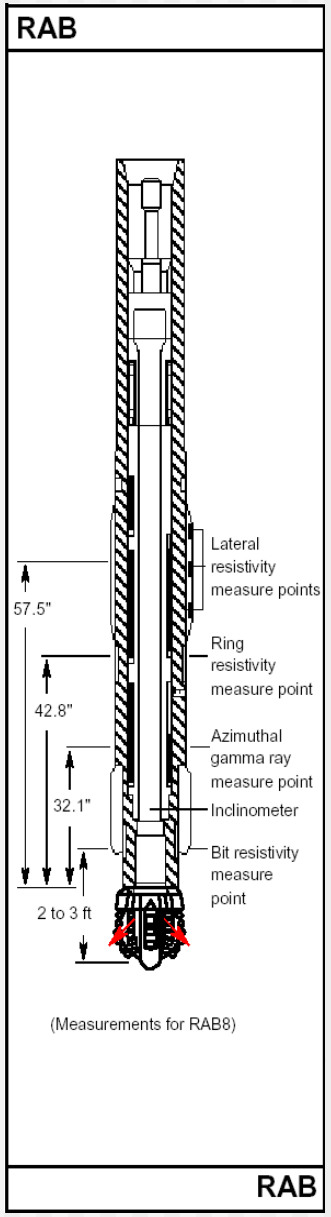
- Improving Core Recovery
  - Core Barrels/Core Bits (completed)
    - HPCS (Hydraulic Piston Coring System)
    - ESCS (Extended Shoe Coring System)
    - RCB (Rotary Core Barrel)
    - SD-RCB (Small Diameter Core Barrel)



Other Development and New Applications (Short Term) cont.

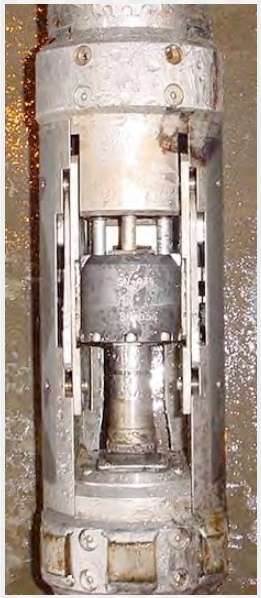
- Improving Core Recovery cont.
  - New Coring System
    - Gel Core System (on Going in JAMSTEC)
    - LWD and Coring Combinability (RAB-C)
    - Downhole Motor Coring

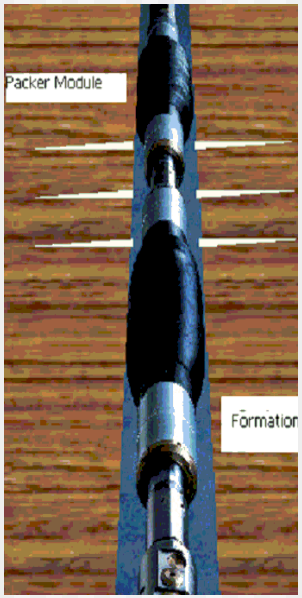


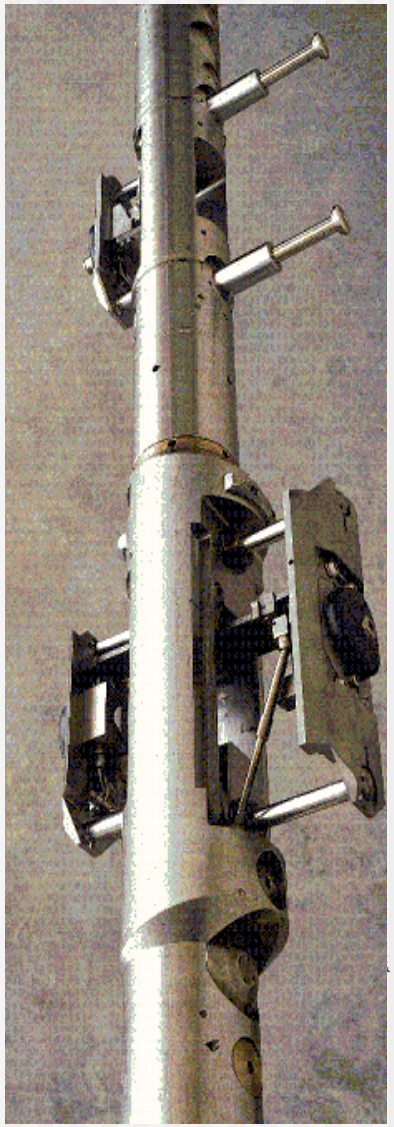


Other Development and New Applications (Short Term) cont.

- New Measurement and Sampling
  - Wireline/LWD Logging Tools
    - Wireline Logging : Sampling Tools
  - Long Term Monitoring System
    - Observatory Measurement







Cross IOs-IMI Issues

Cross IOs-IMI Issues

- Personnel Exchange Program
  - Staff Scientists
  - Engineers of Technological Development
  - Technical Support Staffs
- Information Services
  - IO's Database
  - Software Development
- Engineering Developments
  - LWD and LWC
- Safety Training
  - For Scientists

CDEX's Data Set

- Site Survey
  - Seismic Profiles (Deep & Shallow High res.), Side Scan Sonar Image, Subbottom Profiler, Core Sample, Sea Current Data, MetOcean Data
- Chikyu (+Shore-Based Lab.)
  - Mud Logging (Temp., Depth, Gas Con. etc.)
  - Scientific Measurement (Documents, CT Image, XRF Scan, Phys. Prop., Geochem. Microbio., Logging, etc.)
  - Navigation & Operation

ちきゅう　DRILL FLOOR 搭載

09:00～PM 2nd Aug 2003

DRILL FLOOR 搭載

写真左　総組場の DF Block 吊上げ　09:52 2nd Aug

写真下　600Tx2 基 Crane（Driver 2 名）を使って本船

Dock まで移動

ちきゅう　DRILL FLOOR 搭載

09:00～PM 2nd Aug 2003

DF Block 重量は約１０００T　　本船搭載（調整中）　11:28 2nd Aug

（やぐらはこれよりもやや重い）　10:45 2nd Aug

Aft Dock の本船　11:34 2nd Aug　　本船やぐらが組まれる予定の Fwd Dock

この日はこの状態で午後 Drill Floor 溶接　　（補強中）　11th Aug からデリック一体組

開始

Figure 10. Contracting Relationships

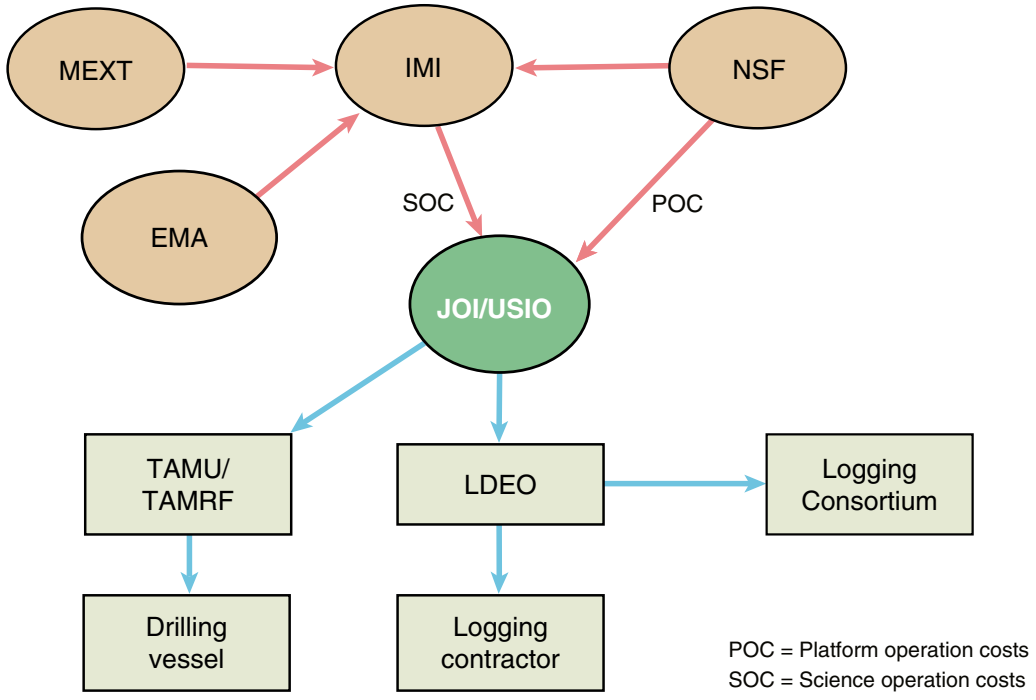
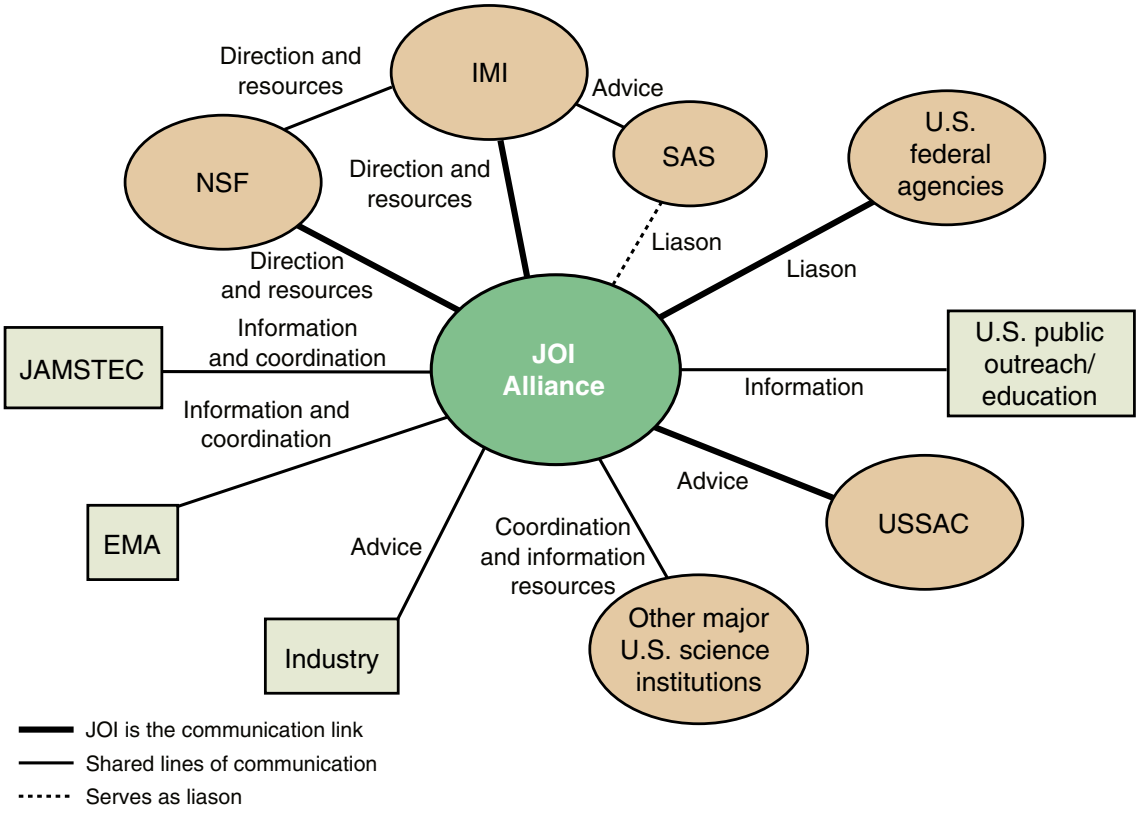


Figure 11. Stakeholder Relationships



British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

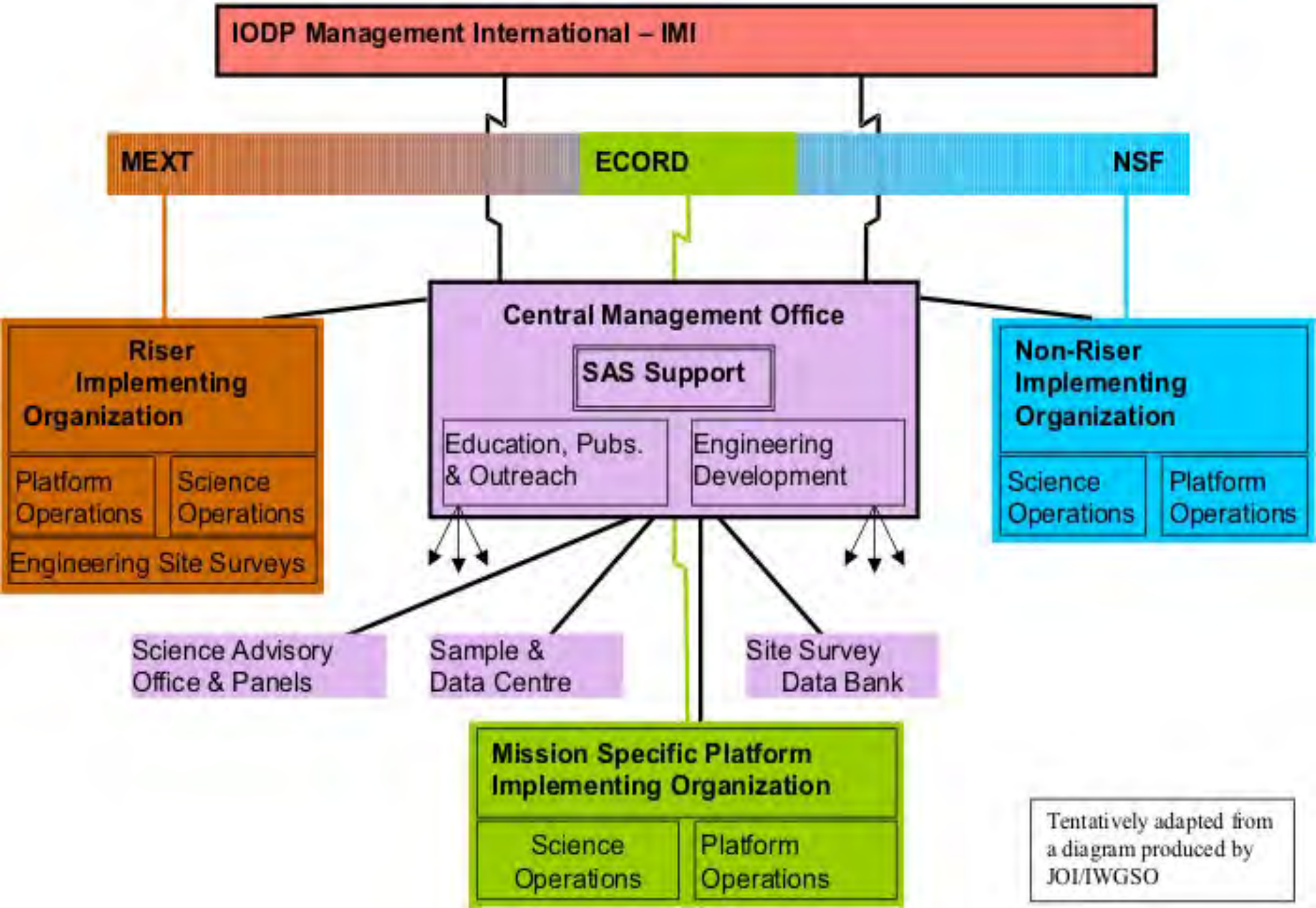
Operations Address:
Marine Operations and Engineering
2A Nivensknowe Road
Loanhead
Midlothian EH20 9AU
Scotland, UK

Background Information

European Consortium for Ocean Research Drilling (ECORD)

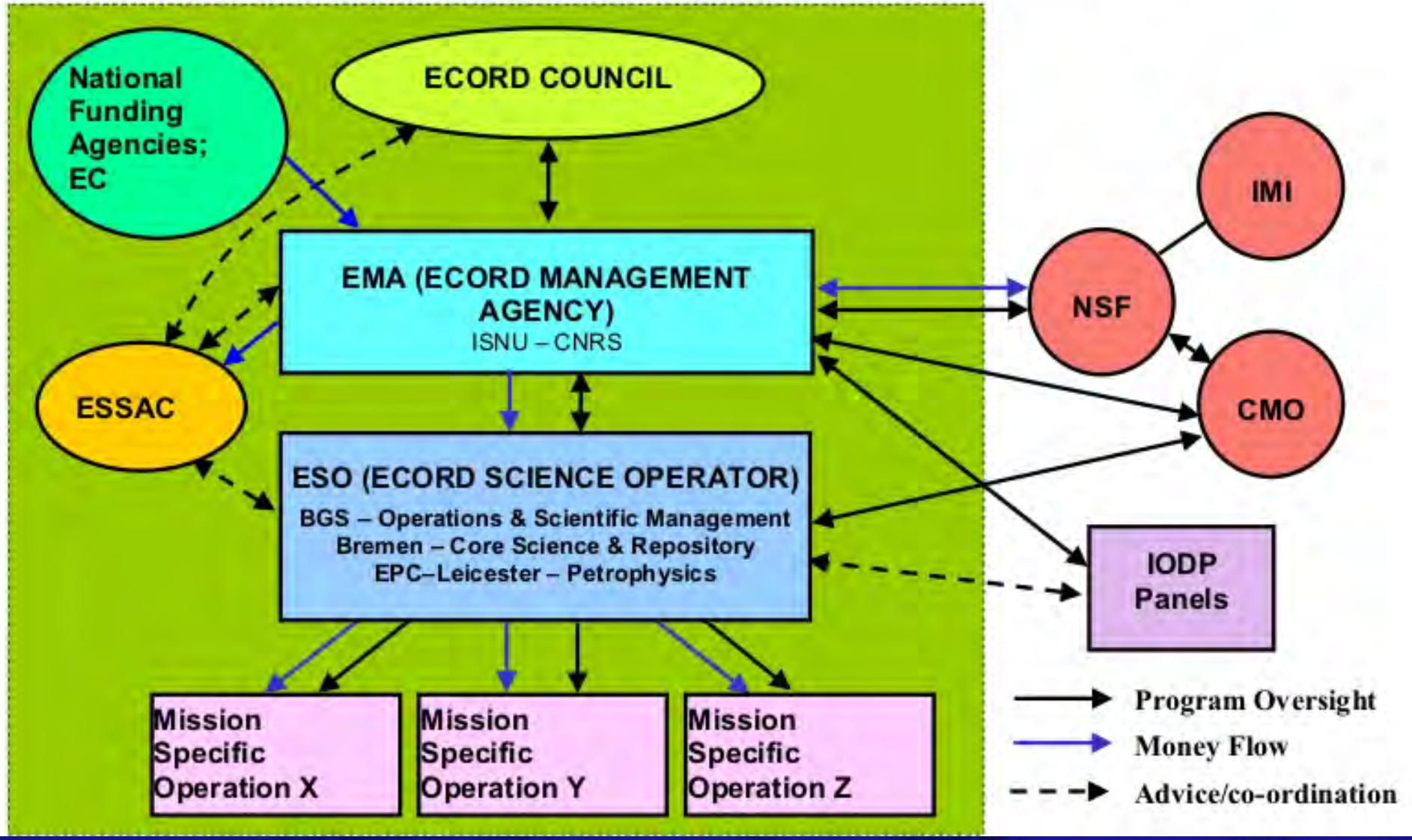
- ECORD aims to include all European ODP-members
- Structures (all now created):
  - European Management Agency CNRS-INSU
    - *Internal banker, contractor of ESO*
  - ECORD Council comprising national Funding Agencies with Chair & 2 vice-Chairs
  - ESSAC : Coordination of science advice for Europe in IODP, staffing & panel members
  - European Science Operator for IODP MSPs

IODP Management Structure

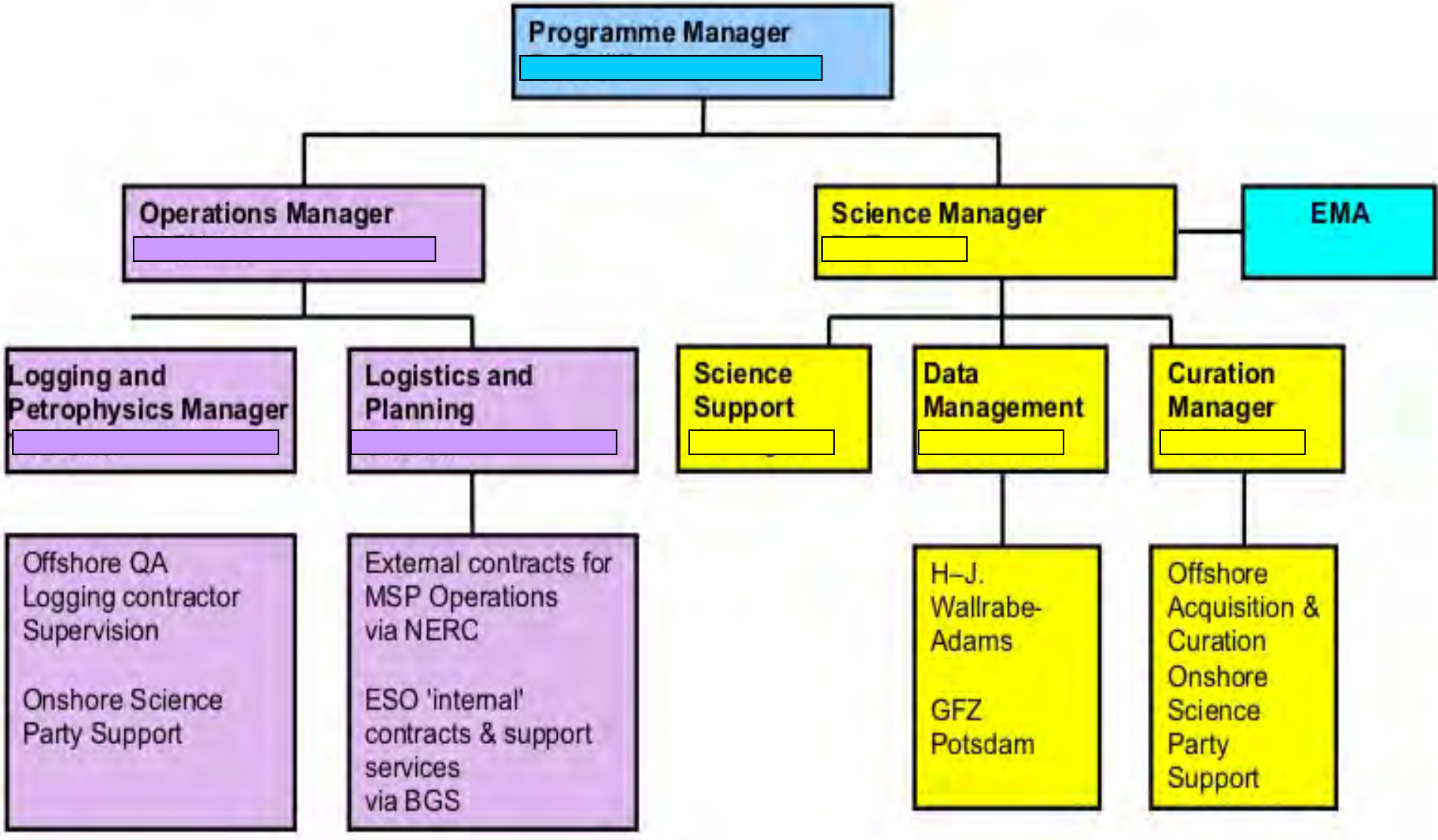


Tentatively adapted from a diagram produced by JOI/IWGSO

Structure of ECORD (European Consortium for Ocean Research Drilling)

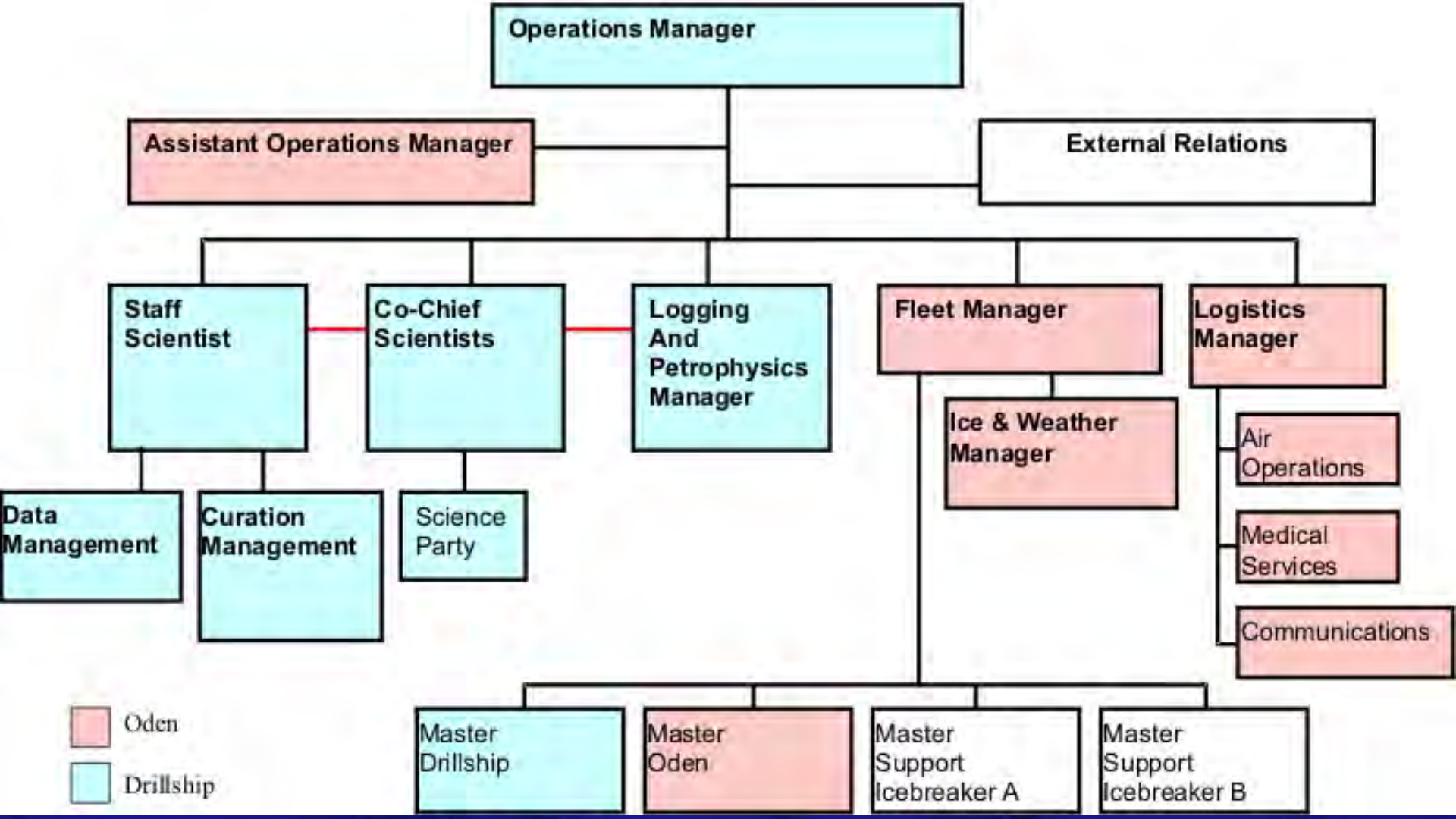


ESO Management Structure



Specific Operations will harness all of the above with contractors selected by competitive tender

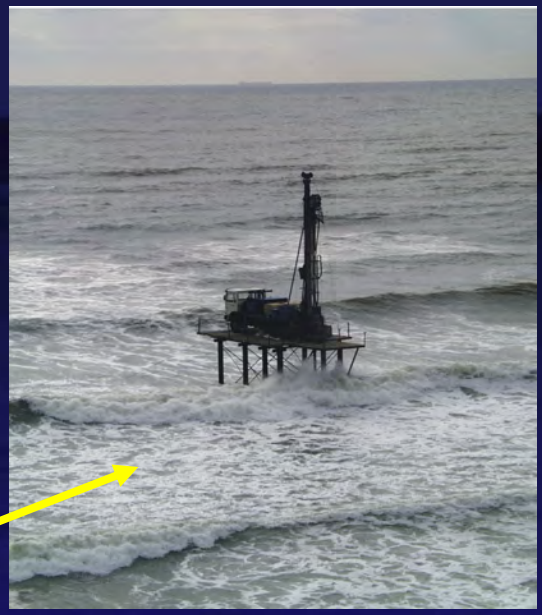
Arctic Drilling Management Structure

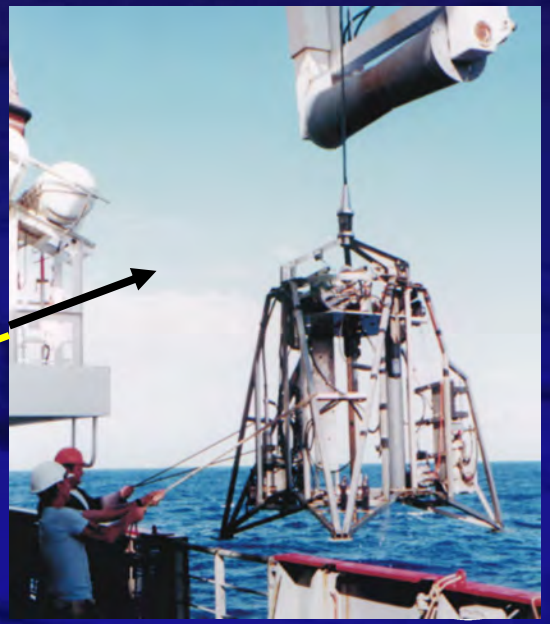


Mission Specific Platforms

For all those other places ...

- **Low cost coring,**
- **Very shallow water drilling,**
- **Continental shelf & margin drilling,**
- **Oriented core sampling,**
- ***Arctic drilling***





British Geological Survey

BGS began ocean drilling in 1968. It has continuously developed technology over 35 years. Capabilities further enhanced for IODP

Coral Reef and Shallow Water Drilling

US Coring at Eniwetak

- Drillship fitted out on site
- 400m of Coral reef to basalt basement
- Water depths: less than 50m

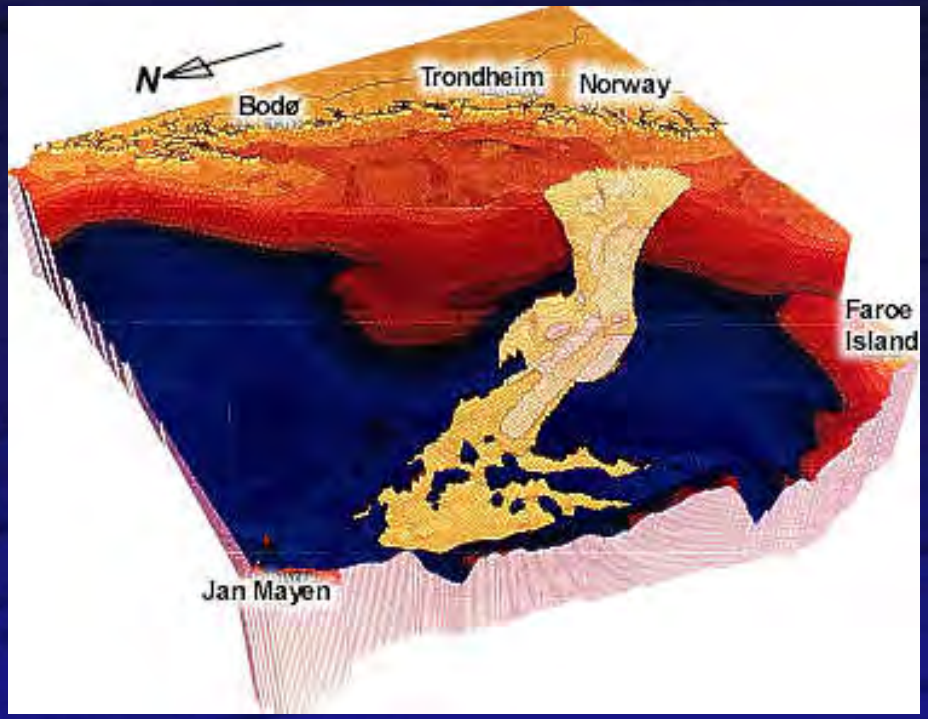
Great Barrier Reef

- Jack-up fitted on site with land rig
- two entire reef sections cored under strict environmental conditions

Ocean Margins & Coastal Seas

- 1st use of Geotechnical Drillships for Scientific & Oil Company Coring
- Equipment developed for multi-platform stratigraphic coring operations
- Dynamically-Positioned platforms used for deeper water / bad weather areas
- Expanding capability of coring into deep sections in deep water
- Penetration to 300m below seabed
- Water depth: 15 - 1700m

Solving industry geotechnical & stratigraphic problems



Storegga Slide

Aluminium Drillstring used at:

- Voring Plateau Norway
- Rockall UK and Ireland
- Ormen Lange, Storegga
- Where

BGS Marine core barrel fitted with specially designed internal BOP and a single roller cone bit :

- drilled through glacial boulders before
- coring relevant sections below

- Penetration: 540m below seabed
- Water depth: 1000m

BGS Antarctic Drilling Operations

- BGS already successfully drilled in ice – covered regions
- BGS Rock Drills used to drill near Larsen B ice shelf, near Antarctic Peninsula in late 2002

Other Special Purpose Drilling

In October, 2002, BGS drilled an active hydrothermal vent in the Manus Basin, PNG, recovering mineralised core comparable to onshore ore bodies

European Petrophysical Consortium

- **Leicester:** 16 years experience in ODP
  - Logging Staff Scientists 22 times
  - 32 scientists have sailed on 30 ODP legs
  - Excellent facilities for all petrophysical data
  - CALLISTO: a unique log-calibration facility
- **Aachen:** 10 years experience in ODP
  - Logging Staff Scientists 8 times
  - State of the art equipment, software and facilities
- **Montpellier:** 13 years experience
  - State of the art software & equipment
  - Unique 2 borehole test facility

University of Bremen

- Only non-USA ODP Core Repository
- Open since 1994 and holds:
  - 68 km of cores from 24 ODP legs including:
  - All ODP Southern Ocean cores (> 60°S)
  - All post –1994 ODP cores from Atlantic Ocean, Mediterranean & Caribbean
  - Up to another 14 km of ODP core to be added in 2003.
- Taken 300,000 samples for 1400 visitors
- New building in 2004 will increase space and improve facilities

Summary: What are the Differences?

	Riser	Non-Riser	Mission-Specific
Water Depth	200 to 3000 m	200 to 8000 m	0 to 3000 m
Drilling Depth	Up to 10 km	Up to 2 km	Up to 500 m
Drilling Conditions	Worldwide, except ice *(but very expensive!)*	Worldwide, except ice & petroleum provinces	Arctic; shallow shelf; continental slope;coral reef

Swedish Polar Research Secretariat

- SPRS promotes polar research by planning and conducting scientific expeditions to Antarctica and the Arctic.
- SPRS has two research stations in Antarctica. In an agreement with the Swedish Maritime Administration the Secretariat has access to and utilizes the icebreaker Oden for research operation in the Arctic.

- Contracted SPRS to develop an operations, science support, logistics, & implementation plan for a scientific ocean drilling expedition to the Arctic's Lomonosov Ridge (JOIDES proposal 533)

- BGS and SPRS are making an operations plan for the Lomonosov ridge

Report of the iSciMP Database Working Group

Boulder, Colorado
2-3 June 2003

iSciMP Recommendations to iPC

Recommendation 02-02-1*:* iSciMP recommends that there be a *database operator* who shall function as the distribution and collection point (**clearinghouse**) for all data collected as part of IODP. The database operator will **coordinate** and facilitate efforts with the science operators of the riser drilling program, the non-riser program, and the mission specific platforms to establish the common database and user interface and for the uploading of all IODP data. iSciMP encourages this database operator to build on the efforts of the previous drilling program and to seriously consider efforts currently underway in support of IODP.

Database Working Group Attendees

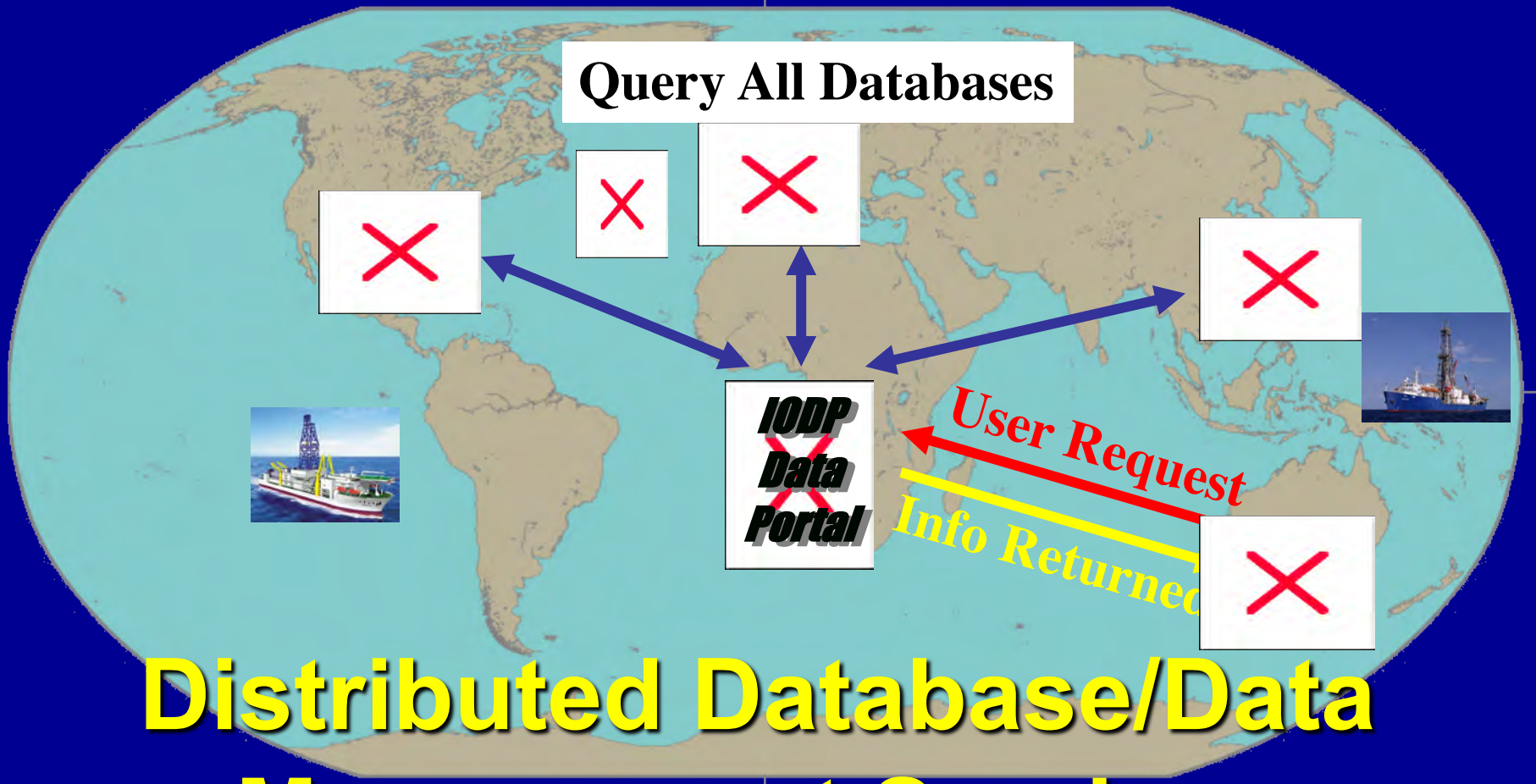
Members:

David Becker - ODP/TAMU
Michael Diepenbroek - Univ. of Bremen
David Divins - NOAA/NGDC
Colin Graham - British Geological Survey
Shin'ichi Kuramoto - CDEX
Kate Moran - URI
Saneatsu Saito - JAMSTEC
Kyoma Takahashi - Central Computer Services Co., Ltd.

Guests:

Jennifer Anziano - JOI
Hisao Ito - iPC

THE Challenge for IODP is Integration



Distributed Database/Data Management Services

IODP Information Services Center Mandate

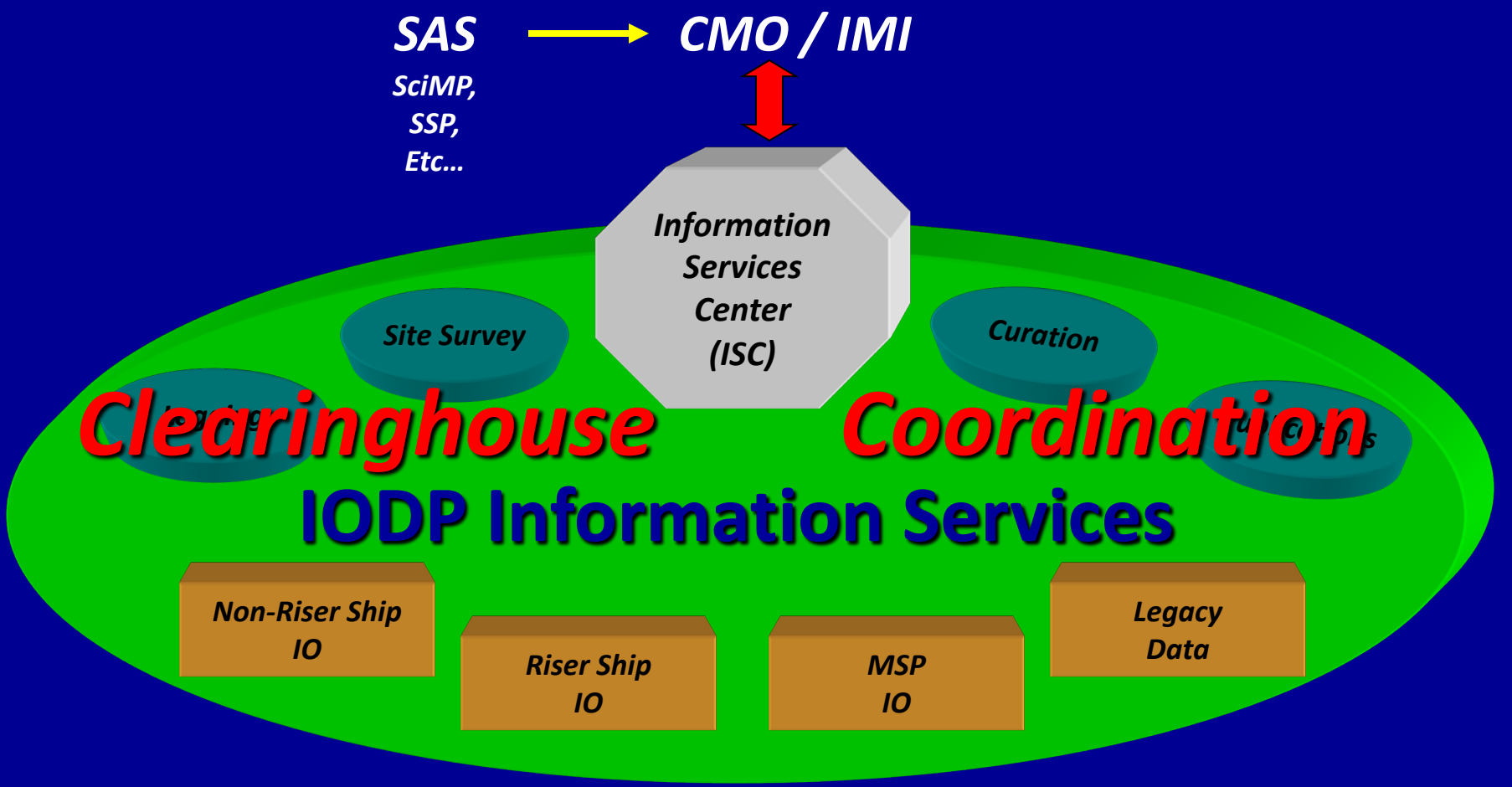
The IODP Information Services Center provides for the ready access of all IODP data to IODP researchers, the international science community, industry, educators, media, and the public in a timely manner. This is achieved through the coordinated actions of the Center and of IODP Implementing Organizations that implement common program policies, standards, and effective mechanisms for the collection and availability of IODP data.

Structure of IODP Information Services

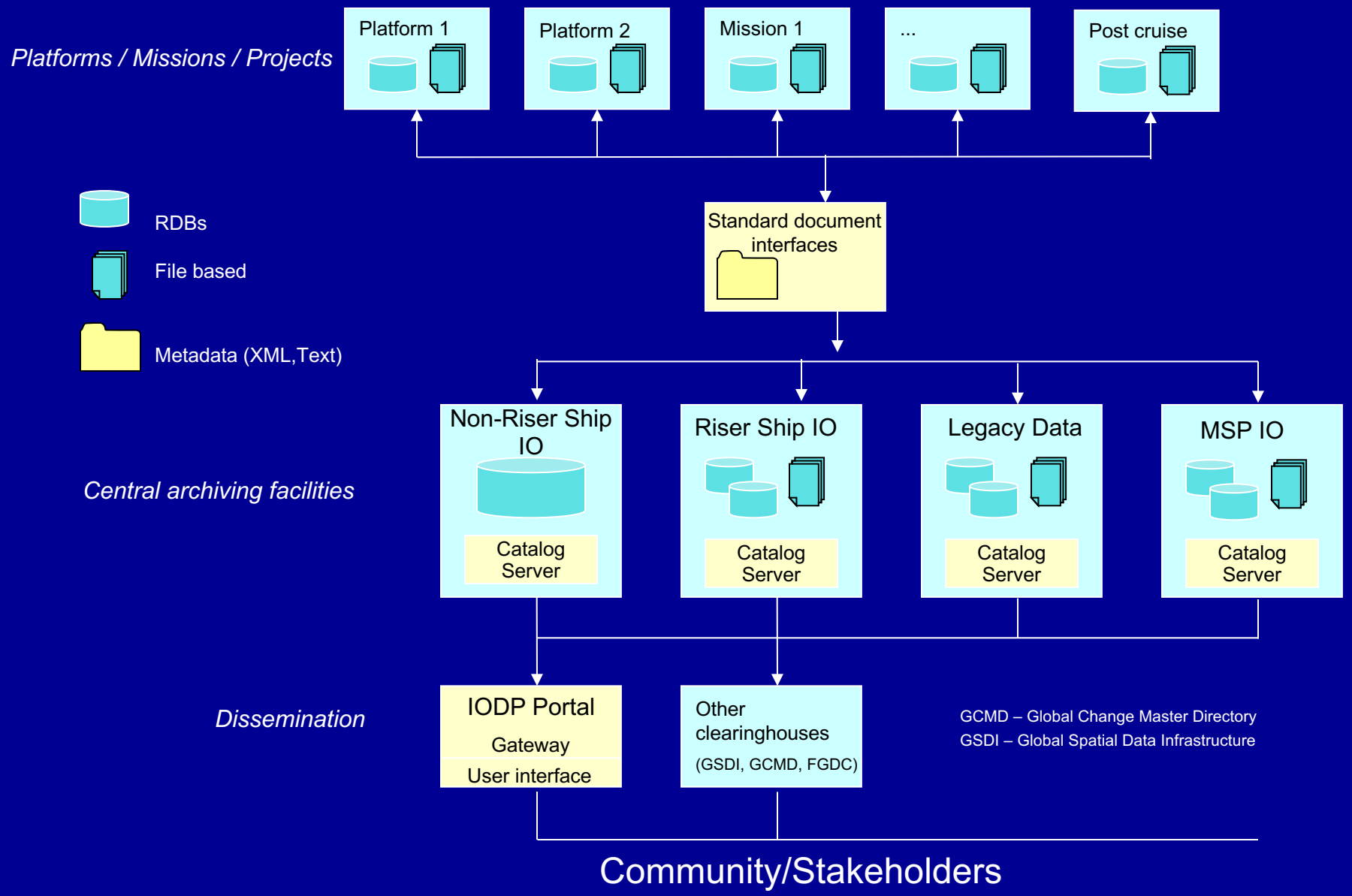
IODP Information Services functions as a distributed networked system and its Center (ISC) includes:

- a ***clearinghouse group*** comprised of management, technical staff, communications staff and network and computer infrastructure to provide access to the program-wide information; and
- a ***coordination function*** with:
  (a) information services staff from each of the IOs;
  (b) site survey data bank services staff; and
  (c) scientific drilling legacy data staff.
  (d) others ….

Structure of the IODP Information Services



IODP - Technical Setup & Data Flow



IODP Information Services Center Responsibilities

- provide access to all IODP data (e.g. shipboard and shore-based)

- develop & maintain:
  - the central program web-based portal to stakeholders (scientists, educators, industry, policy-makers, public). Note: this portal should be dynamic & open to other international information systems & communities (e.g. physical oceanography)
  - portal user interfaces that are scalable for different stakeholders

- following SAS advice, adopt & maintain standards to:
  - *capture, storage, and distribution of data and metadata on each platform and shore-based data. Required developments and implementations should be largely based on ISO, OGC, W3C standards and recommendations (for more information see http://www.fgdc.gov/standards/related_activities.html)*
  - *foster publication of data within IODP information services, e.g., using Digital Object Identifiers (DOI, http://www.doi.org)*

IODP Information Services Center Responsibilities

- perform regular evaluations of the performance of the clearinghouse and the IOs in the delivery of IODP information services
- oversee the long-term archiving of IODP legacy data (e.g, in partnership with recognized data centers)
- maintain and provide access to the program's publications database and integrate IODP information/data with IODP publications (e.g. using DOIs)
- provide access to IODP curatorial information

IODP Information Services Center Responsibilities

- coordinate the development of data capture interfaces for specific platforms on an as-needed basis
- coordinate communications among platform operator's IT/IS managers to share new ideas, resolve problems, and to adopt new information technologies.
- maintain links with other data groups (e.g. WDC, NGDC, ICDP, DEOS) and disseminate relevant information among IOs

IODP Information Services Standard Practice

- The ISC should be regularly evaluated following IODP project management standards to ensure that it meets the data and information needs of the IODP stakeholders as defined by the SAS
- An annual review of the ISC by external IT/IS experts to ensure that IODP is utilizing the best technology possible (e.g. in terms of cost, applicability, or efficiency)
- IOs should ensure that the standard (as defined by SAS) shipboard IODP data are captured electronically by the end of the moratorium period for each project
- IOs will work together with the ISC Clearinghouse to provide consistent data collected on all platforms with particular attention given to common units, calibration information, and standardization of measurements (e. g. depth, age models, etc.)
- IOs are responsible for performing quality control and consistency checks on all data and metadata generated on their platform for each project
- The ISC will provide feedback to the IOs on the quality and consistency of the metadata supplied

IODP Information Services Standards

- Based on advice from the SAS, the ISC will adopt data standards for IODP consistent with international and emerging standards (e.g. ISO, FGDC)

- IOs provide the ISC Clearinghouse with access to IODP data using consistent, standard metadata catalogues (e.g. in XML following adopted IODP standards)

IODP Information Services Definition of Information

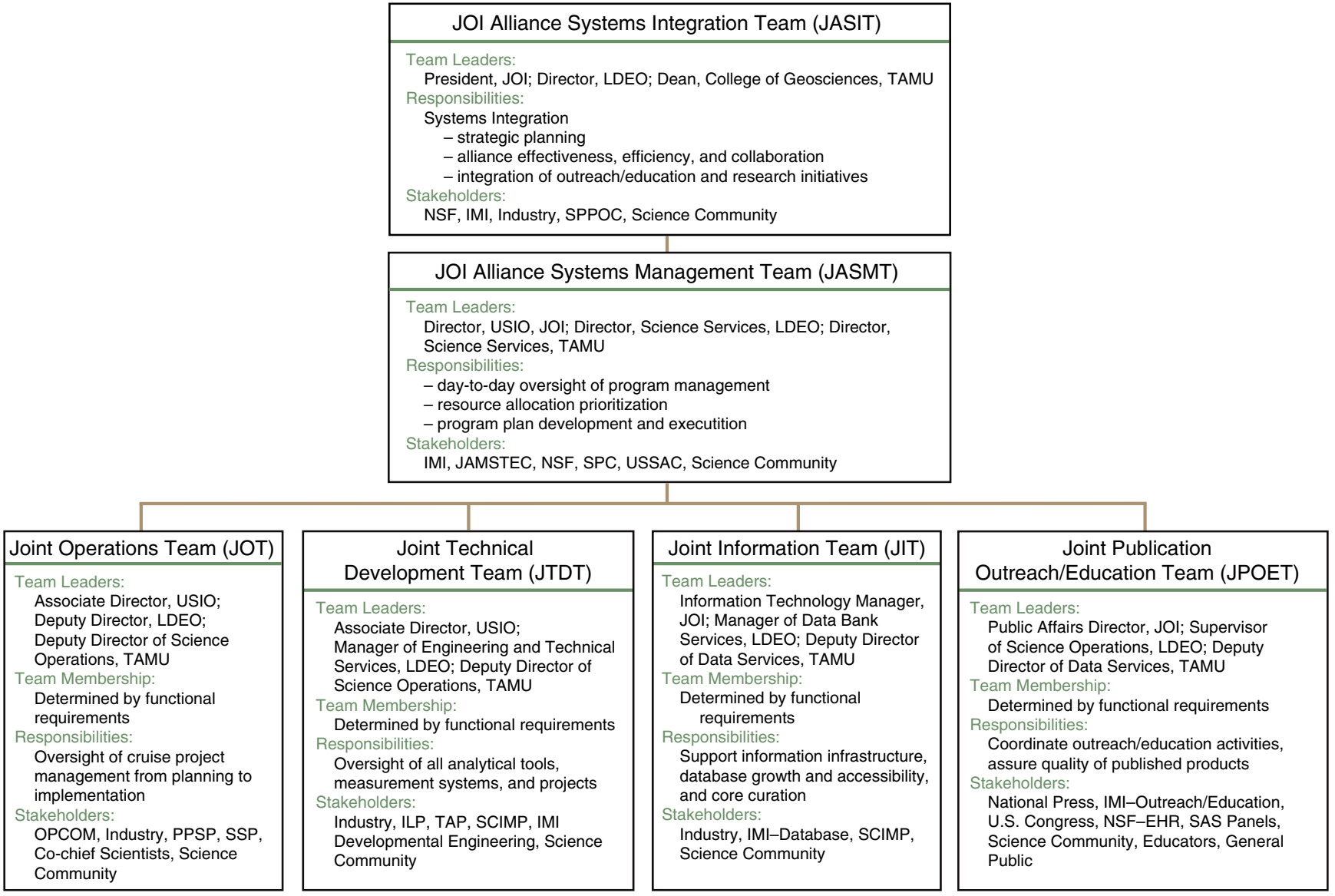
Information includes, but is not limited to:

- Shipboard and shore-based collected data (ODP Janus data and microbiology, drilling parameters, downhole measurements, site-specific survey, paleontology, visual core description, XRF, CT data)
- Citations that include IODP information
- Curation information
- Observatory data links
- Ship schedules
- Applications
- Project description information
- Policies
- Publications…..

Ideal Staffing
For new, independent ISC

Staff	Management	Director: 1
		Exec. Dir.: 1
		Manager (admin): 1
	System development	
	Specification of web portal site	System manager: 1
	Definition of metadata	GIS Expert: 1
		Science Staff (Paleontology): 1
		Science Staff: 1
	Development of web portal site	Web Designer: 1
		System Engineer: 1
		Programmer (Web): 1
		Programmer (Java): 1
	Database construction	Database Administrator: 1
	Network management	Network Engineer: 1
	Legacy Data Conversion	Database Administrator: 1
		Programmer: 1
	Customer Support	Support manager: 1
		staff: 1
		17 (not including Curation, Outreach etc.)

Figure 2. Integrated Alliance Management Teams: Optimization of Service Deliverables



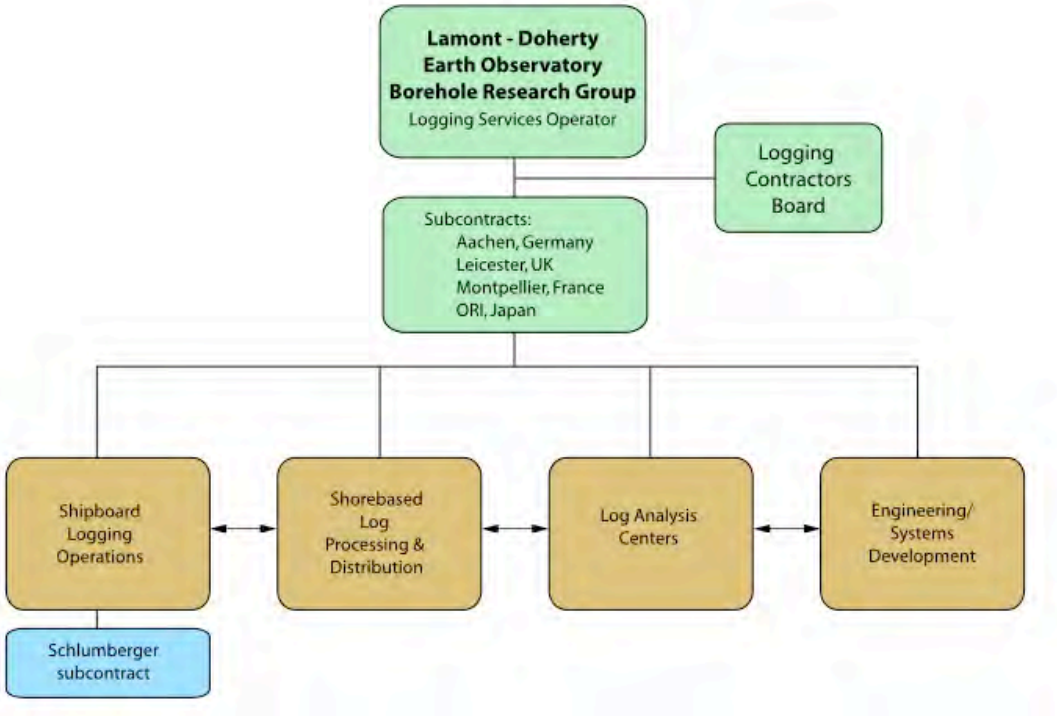
Logging Consortium

- Lamont-Doherty Earth Observatory, Palisades, NY USA
- University of Aachen, Aachen, Germany
- University of Leicester, Leicester, UK
- University of Montpellier, Montpellier, France
- Ocean Research Institute, Tokyo, Japan

Logging Consortium - pooled resources

- staffing pool with more than 167 years experience within ODP
- participation in more than 56 DSDP and ODP cruises
- log interpretation expertise/hardware at 5 international locations

Logging Consortium



Logging consortium - successes

- mutually agreed ‘Principles Document’, responsibility and flexibility
- lead institution for contractual agreements
- MOU’s based on cooperation and shared financial, technological & intellectual resources (staffing)
- board membership, bi-annual meetings

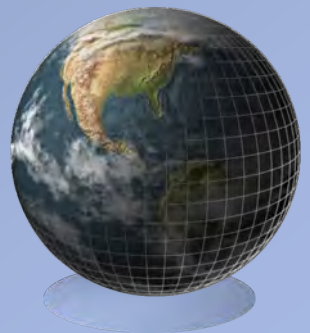
Institutional cooperation - future success

- Commitment (shared staffing, equipment, data access, etc, etc).
- Cross-training of technical personnel
- Contracts & “fast-track” administration

Resolutions

- Additional (regular) meetings of IOs with the CMO (outside the framework of scheduled SAS meetings, but with a small number of invited liaisons from SAS, as appropriate) are important to long-term planning and integration within IODP.

- A number of action items *(next slide)* must be addressed by the IOs, with the CMO, within ~6 months, but with exact timelines to be determined *(next slide)*.



Action Items

1. Develop a program-wide HSE (Health, Safety and Environment) policy which emphasizes a high standard, but also maintains flexibility in response to site-specific demands, and match that policy with a HS and Training framework for technical personnel across platforms.
   - timeline: 6 months (prior to next IO meeting)
   - IO representatives: Kawamura (coordinator), Skinner, Baldauf
2. Implement sharing and exchange of technical staff among platforms, tied to annual program planning.
   - timeline: 6 months (prior to next IO meeting)
   - IO representatives: Davies (coordinator), Kuroki, Evans

Action Items (cont.)

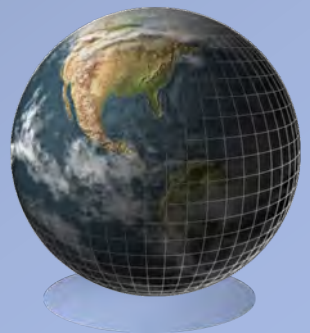
3. Agree upon, then implement, a program-wide sample curation and management policy, in two phases: a) for IODP cores to be collected beginning in FY'04, and b) for older (DSDP, ODP) cores, should the decision be made to move them. Before implementation, SAS should be consulted for advice and input about both phases.

- timeline, phase a: 6 months (prior to next IO meeting)
- timeline, phase b: 6 months (strategy)
- IO representatives: Firth (coordinator), Kuramoto, Rohl

Action Items (cont.)

4. Develop a "minimum acceptable" set of "IODP" data to be derived from all platforms (in consultation with the SAS), so as to distinguish it from proponent-driven data production, analysis and interpretation (some of which may be derived directly from "IODP" data).

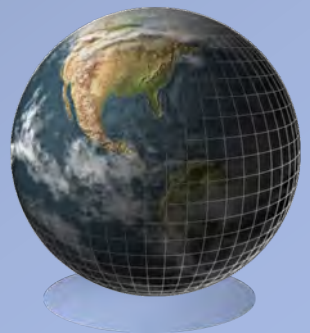
- timeline: 6 months (in collaboration with SciMP)
- IO representatives: Evans (coordinator), Kuramoto, Rack



Action Items (cont.)

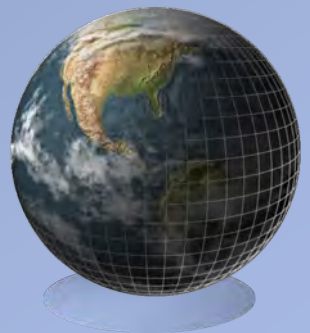
5. Collectively, educate our "customer base", the international scientific community submitting proposals to IODP, about the need to commit to long-range (multi-year) expedition planning. Re-emphasize (to SAS, the Lead Agencies,…) that a successful IODP will require such a commitment, constrained by annual (budget-based) program planning.

- timeline: immediately
- IO representatives: Suzuki (coordinator), Kingdon, Baldauf
- in collaboration with interim and permanent CMO



Next meeting of the IOs

- Late February, 2004 (approximate)
- ESO to host
- Edinburgh, Scotland



A Workshop on Linkages Between the Ocean Observatories Initiative and the Integrated Ocean Drilling Program

University of Washington, Seattle WA
17-18 July 2003

Sponsorship: USSSP, NEPTUNE

Co-conveners:

A. T. Fisher
University of California, Santa Cruz

K. M. Brown
Scripps Institution of Oceanography

Workshop Coordinator:

L. Bertoldi
University of Washington

Primary Workshop Goals…

- Articulate and codify common goals of the IODP and OOI, in preparation for a community-wide OOI meeting (ORION) planned for January 2004;
- Identify experiments and technologies necessary to achieve critical, common objectives (support both programs, assist PIs in writing competitive proposals);
- Establish dialog between scientists, technologists, and educators interested in one or both programs; and
- Encourage involvement by people who have not previously participated in planning or scientific activities for the IODP or OOI

Workshop Participation and Structure

- Workshop supported by JOI/USSSP (U.S. ODP) and NEPTUNE
- Workshop attended by 75 persons from 5 countries
- Attendees included diverse mixture of expertise and experience with DSDP/ODP/IODP and the OOI; senior and junior scientists; engineers, educators and administrators (e.g., four NSF program managers; JOI staff, etc.)
- Workshop did not include scientific presentations or discussion of individual proposals for research - the focus was on interactions between the IODP and the OOI
- Introductory presentations brought all participants up to speed on recent developments; smaller ("breakout") sessions focused on four main themes and four main areas of technical development, plus education and outreach; discussion in small groups and whole group

Workshop Agenda

Day 1, morning	*Day 1, afternoon*
<u>Introductory presentations:</u> • Meeting goals and schedule • Overview of IODP planning and status • Overview of OOI planning and status • Opportunities in education and outreach	<u>Thematic discussions/presentations:</u> • Seismology and deep earth evolution • Lithospheric dynamics, geodetics, and heat transport • Margin stability, sediment transport, and hydrates • Geochemistry and Microbiology • Education and outreach (*embedded*)
Day 2, morning	***Day 2, afternoon***
<u>Technical discussions/presentations:</u> • Pre/post survey, emplacement • Sensors • Data storage and transmission • Sampling and incubation • Education and outreach (*embedded*)	• Technical presentations/discussion • Presentation/discussion of recommendations • Planning for workshop report and writing

Charge to Thematic Working Groups at IODP-OOI Workshop

- Summarize *critical scientific goals* for observatories and ocean drilling from existing planning documents, introduce new goals based on discussion;
- Identify surveys, experiments, measurements, and sampling needed to achieve these goals;
- As time allows, begin to assess technical needs.
- Above all: emphasize *aspects of the above that comprise linkages between the IODP and the OOI.*
- Education and Outreach experts move in and out of *Thematic Working Groups*, meet separately as needed to craft their chapter for the workshop report.

Charge to Technical Working Groups at IODP-OOI Workshop

- Summarize *critical technical needs* from existing planning documents, introduce new needs based on discussion;
- Describe (a) available, (b) developmental, and (c) currently-unavailable technology that will be required;
- For developmental and currently-unavailable technology, (b) and (c) above, suggest mechanisms for making progress, programmatic (organizational) needs.
- Above all: emphasize *aspects of the above that comprise linkages between the IODP and OOI*.
- Education and Outreach included in consideration of technical needs - E&O will be essential, from the start, to assure long-term support for these programs.

Post-workshop plan

- Brown and Fisher will combine text, figures, etc. into a single document, edit for continuity and completeness, distribute to group leaders for comment. [*September 2003*]
- Second draft will be distributed to entire workshop group for comments. [*October 2003*]
- Third draft will be posted for community comments. [*November 2003*]
- Final draft will be distributed in time to be presented (or otherwise carried forward) at ORION meeting, posted on web for general distribution. [*January 2004*]

Status of Ocean Observatories Initiative (OOI)

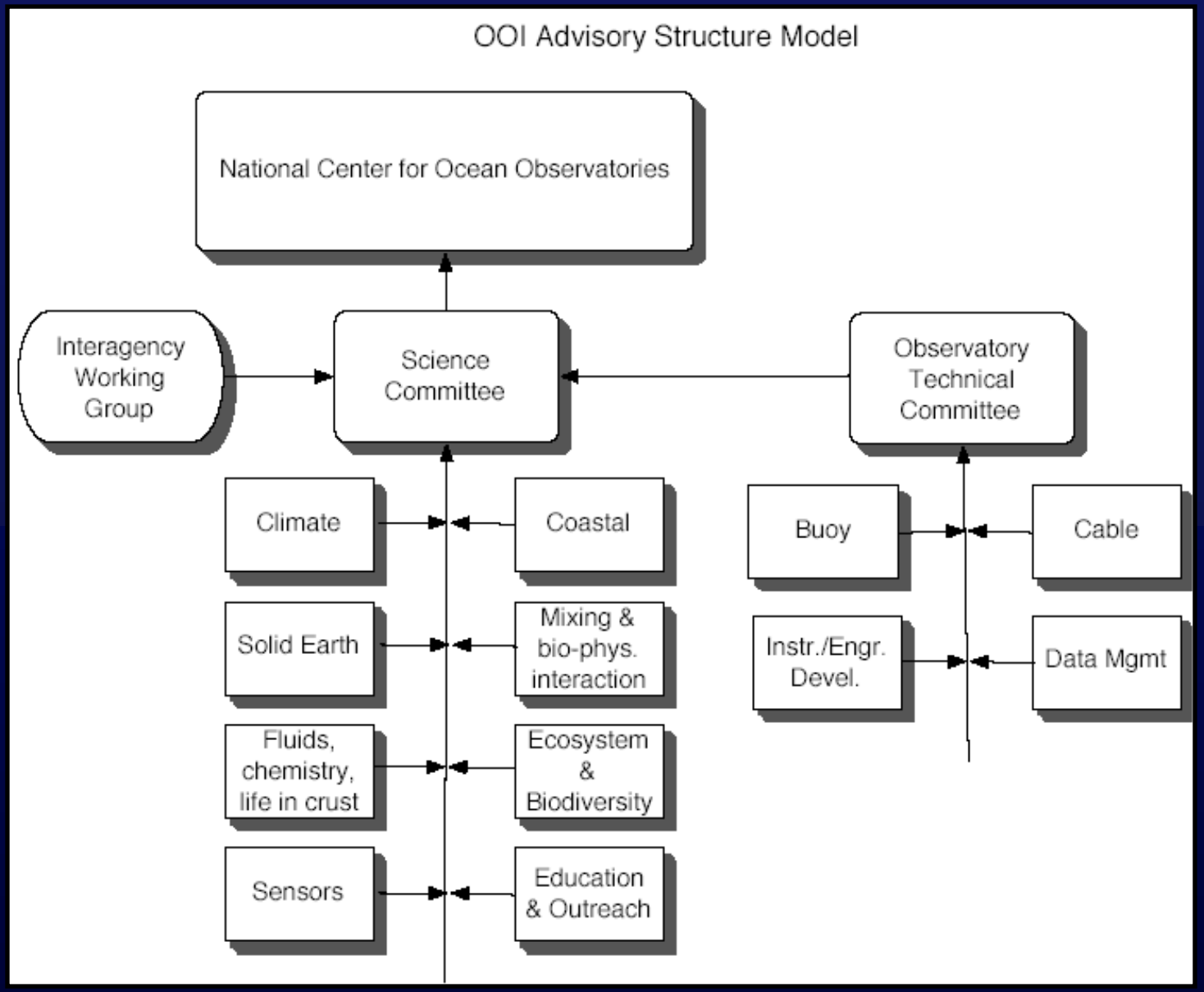
- *a proposed five-year, capital acquisition project developed by the Ocean Sciences Division (OCE) of the National Science Foundation (NSF).*

- *will provide the initial basic infrastructure needed to implement an integrated system of ocean observatories that addresses the ocean science research community's growing need for sustained time-series measurements.*

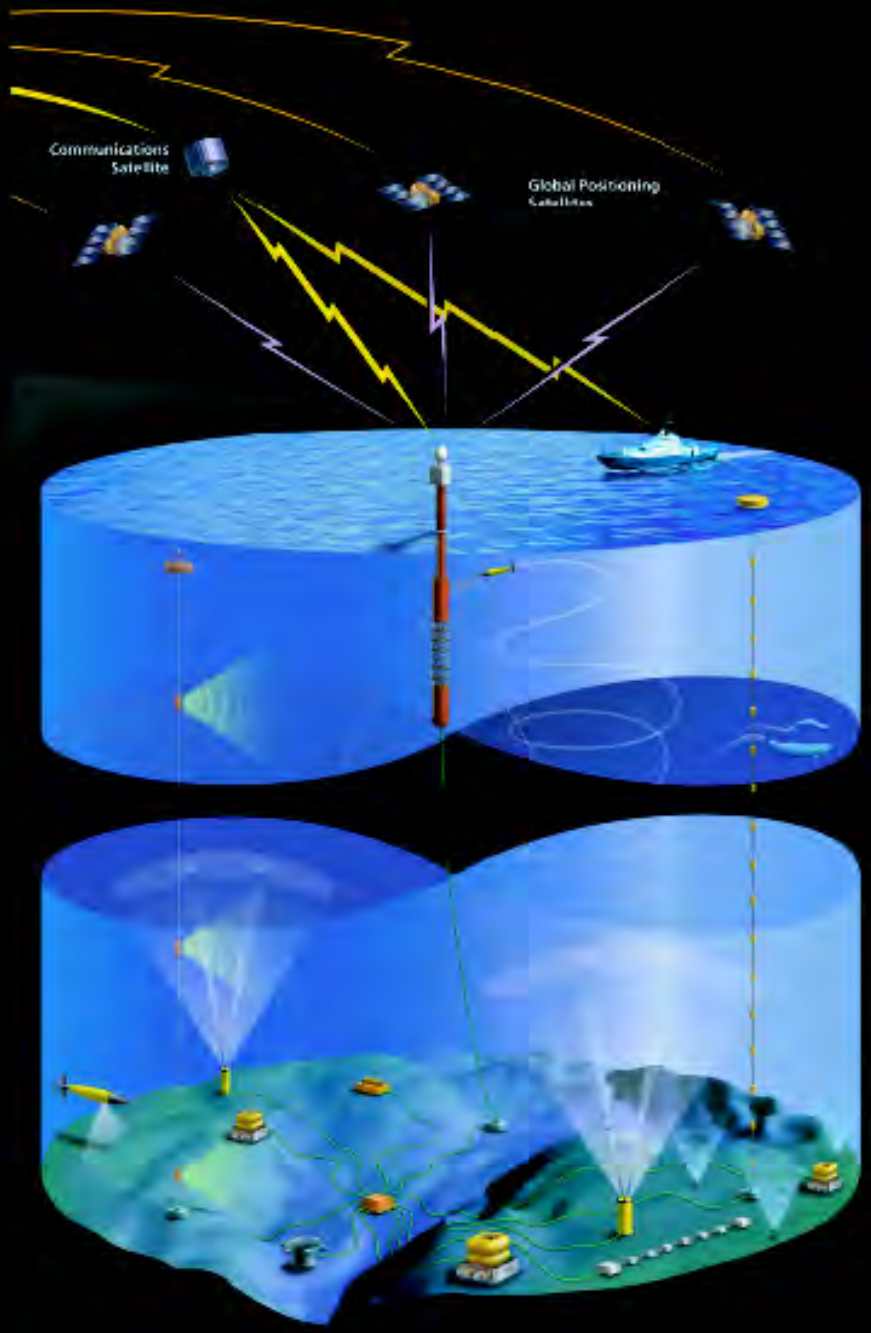
- *contains three primary elements that will expand the capability to observe the oceans both spatially and temporally:*
  1) a tectonic plate-scale cabled observatory that spans several geological and oceanographic features,
  2) relocatable deep-sea observatories based around moorings, and
  3) an expanded network of coastal observatories using both fiber optic cables and moorings

OOI Will Provide the Infrastructure for ORION (Ocean Research Interactive Observatory Networks)

OOI/ORION Advisory Structure



Dynamics of Earth and Ocean Systems (DEOS)
International Science Planning Workshop on



ORION

Ocean Research Interactive Observatory Networks

4-8 January 2004

Location
San Juan, Puerto Rico

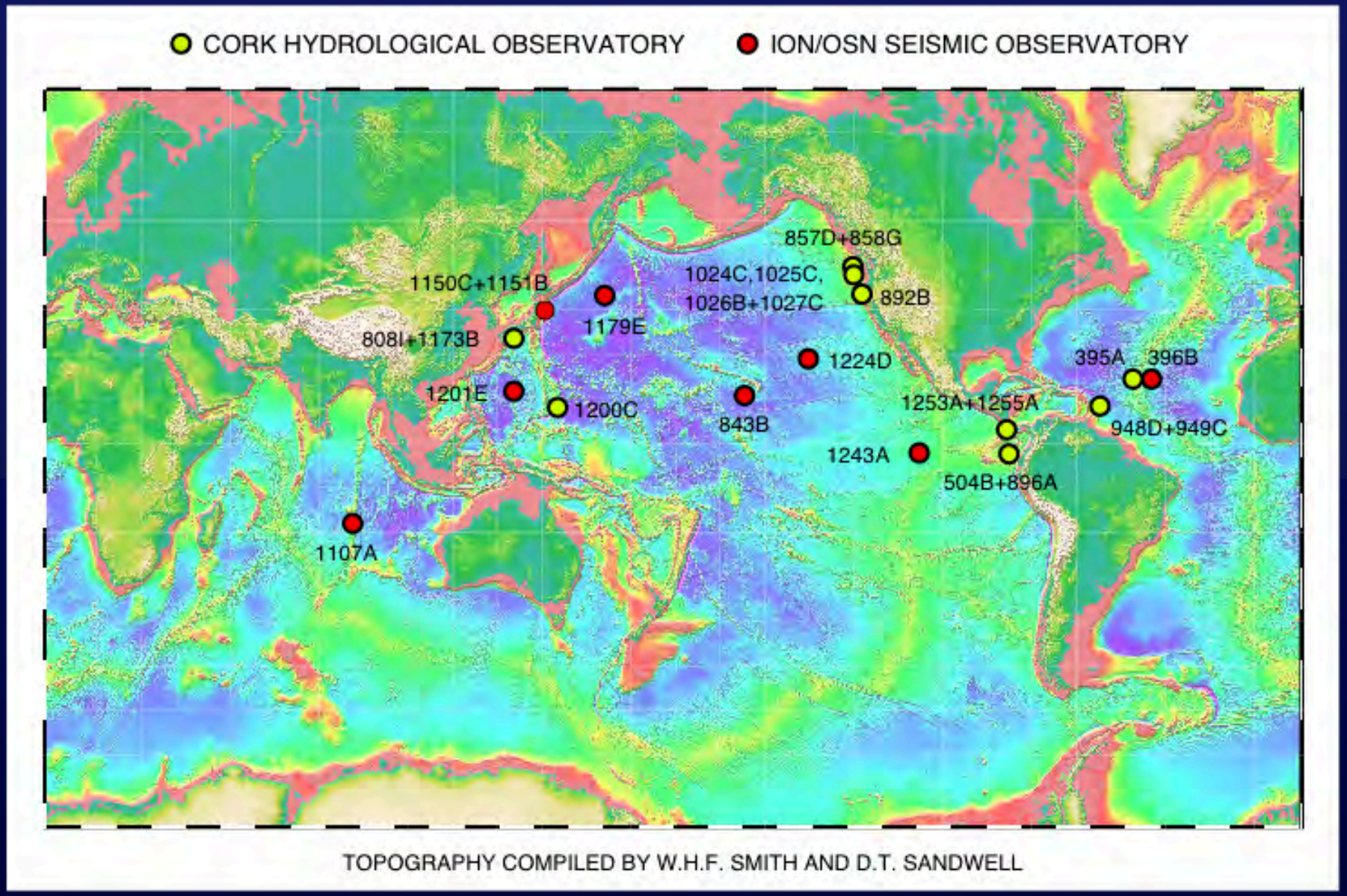
Sponsors
National Science Foundation, USA
Natural Science and Engineering Research Council, Canada

Observatory Science is an Essential Part of Scientific Ocean Drilling

- Last LRP for ODP (1996-2003): Initiative on "In-Situ Monitoring of Geological Processes"
- ISP for IODP (2003-2013):

"Post-drilling observations and experiments in boreholes, pioneered by ODP, will grow in importance in IODP. Sustained time-series recordings by instruments sealed within boreholes will be required to investigate active processes such as pore-water flow, thermal and chemical advection and crustal deformation. Boreholes will also be used for perturbation experiments to investigate in situ physical properties of sediments and/or crust, and their associated microbial communities. A global network of geophysical observatories for imaging Earth's deep interior is also planned."

ODP Borehole Observatories (CORK and ION)



Organization of the ISP for IODP:

**** = direct mention of observatories***

SCIENCE PLAN

* The Deep Biosphere and the Subseafloor Ocean
  Environmental Change, Processes and Effects *(also applies)*
* Solid Earth Cycles and Geodynamics

IMPLEMENTATION PLAN

* Principles of Implementation
* Implementation Plans for Initiatives
* Infrastructure
* Innovations and Technology Development
  Funding

* APPENDIX 2: IODP Implementation Plans (for initiatives)

IODP Principles of Implementation

- **Coordinated use of multiple platforms within a single program**
- **Engineering development and use of special measurement and sampling tools**
- **New logging program**
- **Coordination with observatory sciences**
- **Establishing a site survey program**
- **Cooperation with other initiatives [including ION/DEOS/OOI/ORION] and industry**

IODP and OOI: common characteristics

- "Large," complex, global programs with sophisticated infrastructure;
- Require a mixture of top-down planning and bottom-up proposals, ability to commit to long-term goals and remain flexible to short-term opportunities;
- Each will have a unified science advisory structure to plan use of three principal assets;
- Process - oriented (rather than product [historical record] - oriented);
- Long-standing scientific goals drive technical development, likely to be considerable technical benefit;
- "Exploratory" programs in the best sense, results of experiments will require revision to introductory textbooks, be published in top-tier journals, excite the public

IODP-OOI Workshop Preliminary Recommendations:

Recommendation #1: Take advantage of common opportunities between the IODP and the OOI

Recommendation #2: Internationalize the OOI/ORION

Recommendation #3: Develop fully-integrated education and outreach programs

Recommendation #4: Coordinate access to boreholes and other facilities

Recommendation 5: Recognize and plan for asset (platform, survey) needs

IODP-OOI Workshop Preliminary Recommendations:

Recommendation 6: Accelerate development of essential sensors, samplers, and related technology

Recommendation 7: Continue development of improved drilling, casing, and completion technologies

Recommendation 8: Reconsider the nature of "event response"

Recommendation 9: Integrate use of models, site surveys, and subseafloor observatories to develop and test hypotheses

Recommendation 10: Support training of a new generation of scientists, engineers, and educators

Recommendation 11: Don't be afraid to think big, or to make incremental progress.

IODP - OOI Issues

Implementation of IODP observatory science requires submission of IODP proposals subject to normal review, possibly coordinated with submission of third-party instrumentation proposals to national funding agencies

Special-purpose borehole observatories (e.g., biosphere, hydrates, seismogenic zone) remain to be developed

ISP emphasizes borehole observatories; full integration within seafloor observatory network(s) needed

IODP plan includes limited program funding for observatories

IODP is an international program; OOI is a national initiative: how to integrate programmatically and internationally?

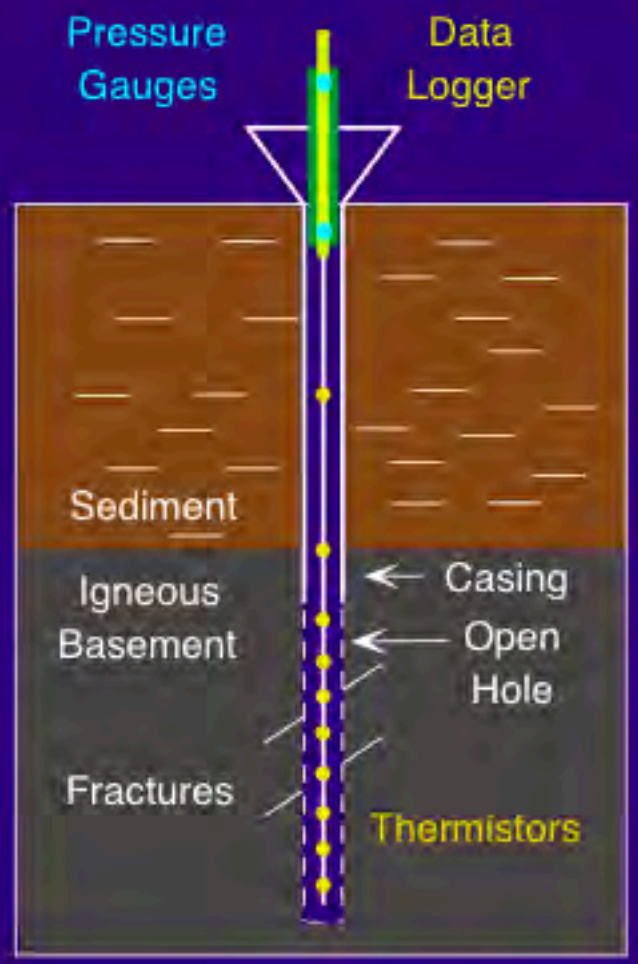
What are Appropriate Models for Funding and Implementing IODP Observatories? - ODP Precedents for Observatory Support

- Program paid for and provided "seafloor/subseafloor infrastructure" and associated engineering
- Third-party scientists funded by national ODP agencies provided scientific instrumentation installed in infrastructure
- National agencies also covered costs of submersible revisits - costs on order of $M's over life of ODP

Should a similar model be used in IODP or should the program take on more costs and responsibilities?

CORK as example of ODP-scientist partnership

- also applies to seismic installations, ACORK, CORKII



CORK = Circulation Obviation Retrofit Kit

Motivation: Seal reentry holes to prevent hydrologic "contamination" and allow reestablishment of in-situ conditions, with:

- Long-term monitoring of T/P for:
  - Background in-situ values
  - Hydrologic transients
    - Subsurface tidal loading effects
    - Tectonic transients
- Sampling of formation fluids
- Hydrologic testing of formation

14 original CORKs deployed in 1991-2001 in sedimented young oceanic crust (shown) and subduction settings.

6 multi-zone newer models (ACORK, CORK-II, wireline CORK) deployed in 2001-2002.

Figure 8. The JOI Alliance: System Integration Contractor

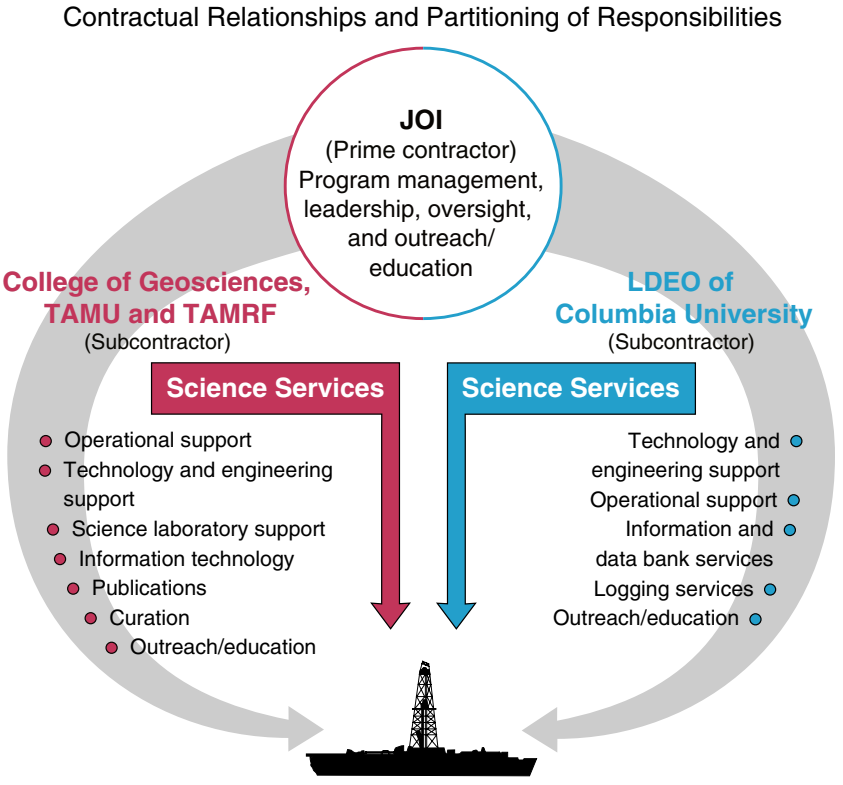


Figure 9. The JOI Alliance: Enhanced Service Delivery through Integration