Minutes

Fourth Meeting of the Engineering Development Panel (EDP) of the IODP

January 17 – 19, 2007

New York, New York

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IODP Engineering Development Panel
4th Meeting, 17-19 January 2007
New York City, New York, U.S.A.

ATTENDEES

Engineering Development Panel – EDP Members

Alberty, Mark	USA
Arai, Yusei*	Japan
Flemings, Peter (Chair)	USA
Fukuhara, Masafumi	Japan
Germaine, Jack	USA
Holloway, Leon	USA
Nakata, Haruya	Japan
Person, Roland	ECORD
Schultheiss, Peter	ECORD
Sears, Stephen	USA
Takemura, Mitsugu	Japan
Tezuka, Kazuhiko	Japan
Thorogood, John L.	ECORD
Ussler, Bill	USA
Von Herzen, Richard	USA
Wohlgemuth, Lothar	ECORD
Ye, Ying	China

* Alternate for Suzuki

Guests, Liasons, and Observers

Becker, Keir	SPC
Blum, Peter	USIO
Chen, Liping	USIO
Eguchi, Nobuhisa	IODP-MI
Goldberg, Dave	LDEO
Grigar, Kevin	USIO
Ito, Hisao	CDEX
Kyo, Masanori	CDEX
Lovell, Mike	STP
Meissner, Eric	LDEO
Mrozewski, Stefan	LDEO
Myers, Gregory J.	IODP-MI
Oshima, Toshiyuki	MEXT
Oskvig, Kelly	IODP-MI
Pheasant, Iain	ESO

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EXECUTIVE SUMMARY

Overview

The Engineering Development Panel of the Integrated Ocean Drilling Program convened their 4th Meeting in New York City at BP's offices. Our meeting followed the structure proposed at our 1st EDP Meeting, where we established that the winter meeting would focus on shorter term issues such as: 1. assessing the outcome of previous fiscal year Engineering Development projects**;** 2. learning of the status of current fiscal year issues and projects; and 3. making final comments on the engineering development component of next year's Program Plan.

In addition our meeting focused on two additional issues:

1. The IODP-MI Proposal Process: IODP-MI has made tremendous strides to develop a process that uses EDP's Technology Roadmap (http://www.iodp.org/eng-dev) as a foundation to implement engineering development (see http://www.iodp.org/eng/). EDP reviewed the process proposed, considered how EDP could more effectively contribute to this, and made suggestions for how IODP-MI can more effectively achieve engineering development.
2. EDP Technology Roadmap: EDP reviewed and began to revise the Technology Roadmap. A new version of the road map will be released after the next EDP Meeting.

EDP Recommendations, Consensus Statements and Action Items

The EDP forwards the following recommendations, consensus statements, and action items to the SPC or the IODP-MI as appropriate.

EDP Consensus 0701-01: Proposed New Vice Chairperson of EDP
The EDP nominates Dr. Makoto Miyairi as vice-chairperson of EDP.

EDP Consensus 0701-02: EDP Technology Roadmap
The EDP has made minor revisions in its roadmap. The additions will be edited by the Chair and distributed to panel members prior to EDP Meeting #5. The revised document will not be public. At EDP Meeting #5 we will discuss, modify if necessary, and accept the revised document. EDP will then make the new version of the Roadmap a public document, and use it to establish priorities.

EDP Consensus 0701-03: Approval of EDP Meeting #3 Minutes
The EDP approves the minutes from EDP Meeting #3.

EDP Consensus 0701-04: The Importance of preserving the ability of an ROV Capability on the SODV

1. EDP fully appreciates the constraints and difficulties surrounding the prioritization of options leading to the decision making process for the SODV. However, we strongly feel that one of the most critical engineering developments in the road map which will be crucial to IODP 'transformational science' may have been significantly compromised in the current SODV plans. The presentation from the USIO at the EDP meeting in New York in January 2007 could not definitively conclude that the current SODV Plans could accommodate the deployment of an ROV of the required capabilities. We urgently request that the USIO clarify the capability of an ROV deployment for the 'unstretched' SODV.
2. ROV capability is a critical transformational technology for ocean drilling. ROV applications include, installation and service of subsea science packages (e.g. CORKS), seabed frame installation and use, seabed visualization, facilitating use of large diameter tools, monitoring for environmental impact of flow resulting from the well, safety, improved efficiency of re-entry operations, and seabed surveys. To wellhead work, the ROV is both the opposable thumb and the third eye.
3. The infrastructure for accommodating a full ocean depth ROV should be installed on the SODV now. A clear plan for installation under the new configuration must be developed. Failure to make this provision is an extreme compromise of the technology roadmap that conflicts with feedback from EDP and other committees. Proponents will respond to ROV capability with transformational science proposals but they will not do so until the capability is present or a plan for its deployment is clearly defined.

EDP Consensus 0701-05: Comment on 2008 Eng. Dev. Plan—ESO Down-Pipe Camera

The EDP views visualization as an important tool to deliver the science plan and it is defined in Technology Roadmap 1.0. The EDP did not receive a Concept Proposal and the ESO did not present any results on this project at this EDP meeting. Thus EDP cannot comment on this part of the 2008 Eng. Plan.

EDP Consensus 0701-06: Comment on 2008 Eng. Dev. Plan-USIO Downhole Sensor Sub and Remote Memory Module

EDP supports testing and evaluation of the DSS-RMM tool described as part of the 2008 Engineering Plan. Tests that simulate the field environment in which the tools will be used should be accomplished. Offshore field tests should be accomplished. The results should be documented to ensure that adequate acceptance criteria are satisfied before the tools are deployed in an operational mode.

EDP strongly endorses DSS-type measurements. This project is 7 years old. EDP has concerns whether this specific tool will be successful. EDP recommends that there should be an independent review of the DSS project and the vendor selection to determine if the current delivery path is going to meet IODP needs in an acceptable timeframe.

EDP Consensus 0701-07: USIO Pulsed Telemetry Module

EDP supports the idea that real-time downhole measurements be made and that these measurements be transmitted in real-time to the surface. An approach is to use mud-pulse technology. However, the PTM is linked to the DSS. There currently is no other function for the PTM other than to support the DSS. EDP has recommended an independent review of the DSS (Consensus 0701-06). EDP suggests that PTM should not be progressed ahead of, or in parallel, with the DSS project.

EDP Consensus 0701-08: Comment on 2008 Eng. Dev. Plan-CDEX Monitoring

EDP appreciates the efforts expended in developing the high level design of the LTBMS and the subsequent design review. EDP supports the continued development of this critically important technology. During the next phase of detailed engineering design, EDP recommends specific consideration be given to several important topics. The first topic concerns the operational temperature limits at long timescales. This remains a critical enabling technology barrier to long term deep installations. The 2nd topic should integrate well design details including cement requirements, casing sizes, annulus size constraints, and casing contingencies. There is concern that the actual final casing dimension may not be that originally envisioned due to drilling challenges and that this may compromise the performance of the monitoring plan. Finally, the design should include operational plans for continual monitoring, surveillance, maintenance, and data archival.

EDP Consensus 0701-09: Eng. Dev. Proposal Process
The EDP endorses the Engineering Development Proposal Process developed by IODP-MI as generally in alignment with EDP's proposed project life cycle process. EDP recognizes the efforts of IODP-MI to disseminate information regarding engineering development to the larger community (http://www.iodp.org/eng/). EDP will work with IODP-MI to further strengthen this process.

EDP Consensus 0701-10: Weighted Fluid Operations
The EDP requests that IODP identify those techniques and tools unique to the IODP that will be used in weighted fluid operations and assess the impact and then feedback to the EDP identified developments that need to be added to the Roadmap.

EDP Consensus 0701-11: Operational Review Task Force
EDP recommends that IODP-MI monitor the engineering issues that are identified by the Operational Review Task Group after each expedition in the form of a simplified table that relates directly to the 'engineering road map'. This table will enable past engineering issues to be tracked and should be available at EDP meetings in order that engineering issues and priorities can be reviewed and updated as required.

The EDP endorses the Engineering Development Proposal Process developed by IODP-MI. EDP recommends that if unsolicited proposals (Class A & B) are not forthcoming for high priority engineering developments in the EDP Technology Roadmap, then IODP-MI should seek funds from lead agencies for these developments such that they can develop a request for solicited proposals (Class C) in a timely manner.

Furthermore IODP-MI should seek funds annually from lead agencies for engineering developments (unspecified) so that unsolicited proposals for high ranking developments can be funded rapidly as and when appropriate.

EDP Consensus 0701-12: IODP-MI Proposal Process-Concept Phase Review
EDP desires to see proposals at the end of the concept phase. Work described in the Concept Phase in the Class B and Class C Engineering Development Proposal in the IODP Engineering Development Proposal Process should be complete when the proposal is presented to EDP. The proposal should contain a description of how work in the Design, Fabrication and Implementation phases will be executed.

EDP Consesnsus 0701-13: Prediction and detection of overpressure in drilling operations

The capability of IODP to drill with weighted fluids introduces the probability of conducting ongoing operations in the presence of overpressure. The presence of overpressure introduces a new level of complexity to the operations which requires, for both safety and environmental considerations, techniques to both predict and detect pressure in these drilling environments. Existing IODP pressure detection techniques were designed for use in soft sediments and were not intended for continuous drilling in overpressured environments. Techniques need to be developed or adapted from industry to detect pressure while drilling in weighted fluid drilling environments.

EDP Consensus 0701-14: Thanks to Dr. Peter Schultheiss

The EDP greatly appreciates the dedicated efforts and the effectiveness of outgoing panel member Peter Schultheiss.

EDP Consensus 0701-15: EDP Meeting #5

The EDP recommends holding EDP Meeting #5 in Japan on Monday, July 9, 2007 – Wednesday, July 11, 2007. The location will be decided by our Japanese hosts. Possible location includes Chiba, Tokyo, and Sapporo.

EDP Discussion Item 0701-01: Liaisons to SSEPs, ETF, and STP

The EDP had extensive discussions about the importance of having liaisons to SSEPs, ETF, and STP. There was general support for promoting these interactions.

IODP Engineering Development Panel
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MINUTES

Wednesday, January 17, 2007

In these minutes, the Recommendations, Consensus Statements, and Action Items are not repeated in detail. Please refer to the Executive Summary for the full text of each, as indicated.

1. Welcome, Introductions of Participants (*Appendix 1)* by Flemings

At 0840 Flemings welcomed the panel, guests, and liaisons. Introductions were made by each attendee. Flemings reviewed Robert's Rules of Order and presented the EDP mandate for the benefit of the new panel members and guests. Ussler was given the responsibility of taking meeting notes and preparing the minutes for the first day. Germaine was assigned taking meeting notes and preparing the minutes for the second day. John-Andrew Morrison (BP) conducted a safety briefing.

2. Review of Meeting Agenda (*Appendix 2*) by Flemings

Flemings reviewed the meeting agenda. A motion to approve the agenda was made by Germaine, a second by Sears. Flemings asked for discussion. Germaine asked if this agenda was unchanged from the latest one emailed to all panel members. What was being considered for approval was unchanged.

Von Herzen asked if there is a place in the agenda to discuss heave compensation.

Flemings stated this should be discussed in the drilling/vessel working group for the Technology Roadmap.

Myers noted that the ORTF (operational review task force) replaces REVCOM.

Flemings noted that Jeff Fox was stuck in an ice storm and should arrive on Thursday.

Flemings asked for any objections; hearing no objections, the motion was approved by consensus.

3. Formal Acceptance of 3rd EDP Minutes by Flemings

A motion to discuss the minutes for the 3rd EDP meeting held in Windischeschenbach, Germany was made by Germaine; seconded by Sears. Flemings asked for discussion. No discussion occurred or corrections were made. Hearing no objections, the motion was approved by consensus. The minutes can be found on the IODP website (http://www.iodp.org/edp).

4. SPC Report (*Appendix 3*) by Becker

Becker commented that the role of the EDP in the review of scientific drilling proposals within SAS will occur only at the request of the SPC. The EDP will not be asked to review large numbers of proposals. Nor should the EDP be involved in the day-to-day operational issues associated with drilling legs. This was formerly part of the TEDCOM mandate, and now is the responsibility of the ORTF.

The formal presentation by Becker (Appendix 3) included 5 main topics:

a. an update on the FY07-09 schedule
b. proposals to be ranked at the March 07 SPC meeting
c. a SASEC meeting report
d. an update on mission implementation
e. the SASEC working group formed to evaluate aspects of the SAS-EDP relationship

Becker reviewed 2 consensus items from SPC Consensus 0608-04 and 0608-05 (see Appendix 3).

The situation with the SODV has become more complicated. He reviewed SPC Consensus 0806-03 shifting the operational start date to November 1, 2007. If operations are delayed slightly, then the entire schedule will shift. However, if more substantial delays occur, then the 1st Equatorial Pacific leg will be dropped because coordination with NanTroSEIZE drilling with the Chikyu is critical for the success of that mission. Becker showed 2 summary slides of potential ship schedules for all 3 platforms. The Canterbury basin gas hazard review was positive and the proposed sequence of drilling legs will be maintained.

Von Herzen asked about the color coding of the ship schedule slides.

Becker stated: blue=operational window; green=optimal weather window; tan=transit

Alberty asked if seawater will be used in the riser drilling in FY08 by the Chikyu. Because of the tectonic conditions it is likely the Chikyu will be drilling into holes with high static pressure heads. Alberty hasn't seen any engineering development (ED) proposals for drilling into deep, high pressure zones. This has implications for the coring tools that are intended for logging the riser holes.

Myers noted engineering development (ED) needs should be identified in the EDP Technology Roadmap. The EDP has to anticipate the ED needs associated with riser drilling.

Flemings reiterated Myers comments. It is the job of the EDP to identify ED needs and to get them into the Technology Roadmap.

Becker moved on to discuss the FY09-10 schedule. SPC Consensus 0608-17 proposed a clockwise ship-track model for the SODV through the Pacific, assuming a start at Wilkes Land. This plan is based on the proposals at the OTF, plus those forwarded at the March 07 SPC meeting. The drilling schedule for the Chikyu is less clear (see PowerPoint slide). The MSP schedule will be determined after the March 07 SPC meeting.

Becker presented a slide of the March 2006 proposal rankings, which have been divided into two groups: red=identified for forwarding to the OTF for FY09-10 scheduling; and green=site survey issues need to be resolved before forwarding. He pointed out that 618-Full3 will require a MSP with riser drilling capability. Many of these proposals have ED issues and needs. Casing design for deep drilling is a particular issue that needs to be addressed.

Becker presented a PowerPoint slide with a list of proposals to be ranked at the March 2007 SPC meeting.

Flemings asked Becker if he was concerned that only 5 proposals have been newly forwarded by the SSEPs (522-Full5 has actually been seen by SPC before)

Becker pointed out that the SSEP deactivated a proposal for the first time. The proponents have been asked to submit a new proposal that will be subject to a new set of external reviews. This is the first time any proposal has been 'deactivated'.

Becker moved on to present highlights from the first SASEC meeting. SASEC has formed a working group to assess the SAS structure and this WG will report at the March 07 SASEC meeting. A new ISP is being developed for the 2nd 10-year phase of the IODP, post-2013. There will be a Geologic Hazards workshop scheduled for mid-July 2007.

Becker noted that the 2nd SASEC meeting addressed MI (Mission Implementation, see http://www.iodp.org/missions). SASEC approved the revised LIP workshop agenda. SASEC asked its SAS WG to poll the IODP community about suggestions for how SAS should be structured during Phase II of the IODP. Becker reviewed the PowerPoint slide on the SASEC WG on SAS.

Becker discussed the IODP proposal process (see PowerPoint slide).

Arai asked who or what panel would implement ED for a particular proposal?

Becker answered ED recommendations for ED originate with the EDP and go to the SPC with a request to develop a plan. This plan is submitted to IODP-MI, and RFPs are sent out.

Takemura asked for clarification on how MI proposals would be handled.

Becker answered that the component proposals for a MI are sent to the SSEPs. After review and ranking the SPC approves them for scheduling, which is the same for all other proposals. Mission teams will be given a time-line to develop an integrated proposal.

Von Herzen asked if MI proposals are a top-down type of development.

Becker answered that MIs are intended to be a bottom-up style of proposal development. The call for proposals is the same as for any other proposal.

Von Herzen asked if MIs are being developed to fill-in gaps left by ordinary proposals.

Becker stated, "I'll come back to the MI proposals later." He asked the EDP to respond to the SAS WG questionnaire. The WG thinks the EDP is functioning very well and is a good model for other panels. The STP could benefit from a similar approach.

Becker reviewed the 4 key questions from the SAS WG. He requested a response by 1/31/07.

Flemings asked to what degree is the advice given used by IODP-MI. Question 4 is particularly relevant to these concerns.

Flemings asked Becker to go back to the panel structure slide. He reiterated what Becker said—that the EDP is to help IODP-MI to develop an engineering plan and this can be executed if IODP-MI has a budget. But, how can the needed momentum be created to get the resources needed to achieve ED goals as set forth by the EDP, if a budget does not exist or is inadequate?

Becker stated the EDP should take a longer-term view. IODP-MI can incorporate ED needs into its annual program plan.

Flemings pointed out that at the August 06 SPC meeting, the SPC approved FY08 plans, but didn't discuss the budget needed. The FY08 plans must be prioritized because funds are limited.

Becker noted the more justification for ED that we can provide, the better chance to succeed in getting funds from the lead agencies. For example, at the NSF, Jamie Allan looks for evidence of SAS approval.

Sears noted that in order to come up with a 2-5 year ED plan, we need more detail from the highly-ranked proposals. There are confidentiality issues, but getting sufficient detail is a major consideration. The quality of the EDP's input is dependent on knowing what's in the proposal pipeline.

Becker stated SAS did not ask the EDP for review of proposals at this meeting because in their judgment existing engineering capabilities are deemed adequate. The EDP needs to look at the objectives spelled out in the ISP. The weakest part of the ISP is the aspect of

implementation and this is what will be updated in the Phase II ISP by the SASEC. In order to get a sense of the ED needs, the EDP could read all the abstracts posted on the IODP website (http://www.idop.org/active-proposals).

Schultheiss asked if there was a need to bridge a gap with technologically risky and mature proposals that are perceived not to have a technology problem in order to achieve the drilling objectives. Should the SSEPs say there isn't ED needed?

Becker suggested sending liaisons to the SSEPs.

Evans noted there is some overlap between the STP and EDP—heave compensation, for example, is outside the domain of the STP, but would improve core quality and recovery, so better heave compensation would revolutionize what the STP can do.

Flemings re-emphasized that the EDP can get more pertinent information concerning drilling proposals by reading the abstracts on the IODP-MI website and by sending liaisons to the SSEPs to report back.

Myers stated that at the last SSEPs meeting, an overview of the EDP TR was presented. Word is getting out and a set of potential ED needs has been identified and the panels are becoming aware of them.

End of formal Becker presentation

5. <u>SAS Activity Report</u> (*Appendix 4*) by Eguchi

Eguchi reviewed the IODP proposal flow with a PowerPoint slide similar to that presented by Becker. SSEP Consensus 0611-05 indicated that the SSEPs want to have an EDP liaison. There have been 14 new drilling proposals submitted by the October 2006 deadline—7 in solid earth and 7 in environment sub-themes. There are 121 active proposals in the IODP SAS system. He showed pie-charts of the distribution of the active proposals by IODP members and by ISP themes. A Venn diagram showed very clearly the overlap among the platforms for joint operations in active drilling proposals. He mentioned the relatively new Scientific Drilling journal as a medium for providing program and expedition reports, technical developments, project progress reports, and workshop news.

Flemings noted that the EDP cannot hold its next meeting in May—too early—and June is not a possibility because of large numbers of annual board meetings in Japan. He proposed the first or second week of July as the next time period for the summer EDP meeting.

Eguchi stated having the EDP meeting in July poses no conflict with IODP-MI management.

Coffee break at 1007

Meeting resumed at 1028

6. IODP-MI Overview and Reports (*Appendix 5*) by Myers

Myers outlined the 5 major topics of his series of presentations:

a. Summary of report to the SPC
b. FY07 and FY08 projects
c. Engineering development proposal process
d. Engineering issues from ORTF
e. Third party tool implementation guide

Myers listed two SPC Consensus items—borehole tool for deploying seismometers (SPC Consensus 0608-08) and a downpipe camera included in the FY08 engineering development plan (SPC Consensus 0608-19).

Myers described some 'near-term engineering development foci' he derived from the TR:

a. Sampling, Logging, and Coring sub-theme – improving systems fundamental to IODP
b. Drilling/Vessel sub-theme – understanding factors that control core quantity and quality
c. Borehole Infrastructure – standardizing equipment, where possible, among platforms, observatories, and procedures

These are relatively straightforward tasks.

Current year projects include—the CDEX Long-Term Borehole Monitoring System (LTBMS), the ESO down-pipe camera feasibility study, the USIO LWC core barrels, and the USIO Pulsed Telemetry Module (PTM) feasibility study.

Myers reviewed the status of the CDEX LTBMS. All elements of the feasibility study were completed in FY06 (FY-1). The IODP-MI task force determined the CDEX LTBMS is feasible and that CDEX should do the work.

The ESO down-pipe camera is just a feasibility study, with no hardware acquisition or development. IODP-MI asked that this study occur quickly and wants the result by Q2 FY07. Two challenges identified so far include—cross-platform capability and 10,000 psi design pressure. Currently there is not a high pressure camera system available.

Flemings asked for clarification. In August 2006 at the SPC meeting, a FY08 engineering plan had to be put forth and a budget had to be developed. What is confusing is that Myers is reviewing the status of FY07 projects, but is also waiting for results from FY06 to fund projects for FY07.

Myers stated right now we're dealing with a cascade effect. I am also trying to build a case for FY08 engineering development projects.

Flemings stated the EDP hasn't seen anything formal on the down-pipe camera system. Funding has been set aside outside of the EDP's discussions.

Myers noted the ESO camera feasibility study will be completed by Q2 FY07 so that EDP can see the report by its July 2007 meeting.

Flemings stated we're still trying to sort out the ED project funding cycle. It is not streamlined yet. At the July 2007 EDP meeting we will forward ED ideas/priorities to IODP-MI for the FY+2 engineering plan. The finalized plan will come back to the EDP at its subsequent winter meeting. The EDP cannot change the plan, but comment on how compatible the ED plan is with EDP vision.

Ussler asked Myers if FY09 ED proposals will be presented to the EDP at its July 2007 meeting.

Myers answered yes.

Flemings stated the intended focus of that meeting will be FY+2 ED proposals.

Myers continued with discussion of the PTM. The PTM builds on the DSS and RMM and produces an integrated system to move data collected at the bit to the rig floor. There are a number of project challenges (summarized in *Appendix 5*). The primary problem is that the DSS and RMM have not acquired primary data from the intended environment of operation. Proposed scope of work extends to FY2010.

Based on the present status of the DSS-RMM, IODP-MI has recommended to the USIO to complete the FY07 feasibility study by Q2, successfully demonstrate operation of the DSS-RMM system at a test facility by end of Q2 FY07, and if successful, the USIO should generate a FY08 funding request for comprehensive testing, etc (see *Appendix 5*).

Nakata asked about the status of the EDP WG report on the PTM compiled by Sears. What was done with the report?

Myers answered the EDP has not made a strong recommendation of what to do. However, the reports provided sufficient information/justification to move forward with the PTM, but not to build right away. The DSS-RMM technologies are not yet proven or ready.

Flemings reiterated what happened during the 2nd EDP in Japan. The PTM proposal went out for electronic review by the EDP. Comments were compiled and presented by Flemings to the SPC. There was tepid support from the EDP. This led IODP-MI to step back and to work on the basic problems with the DSS-RMM.

Blum stated there is no chance that the USIO can generate a proposal for the PTM by the April 15th ED proposal deadline (see http://www.iodp.org/eng-dev). If everything falls into place with the testing of the DSS, we may be able to claim the DSS works and we potentially could forward a proposal. This still may not put aside EDP concerns.

Myers noted it is good to know where the USIO stands on the PTM. This indicates that the PTM will become a FY10, not a FY09 ED project.

Germaine stated it is not the EDP's responsibility to review the ED proposal, but the EDP should provide some criteria that should be met by that proposal.

Sears agreed with the tepid endorsement EDP gave for the PTM. The EDP should see the Q2 FY07 DSS test results at the July 2007 meeting, and then provide a recommendation as to proceed or not.

Alberty asked if the FY+2 requirement was perhaps too stringent for the PTM project.

Arai asked if the PTM was similar technology to that provided by Schlumberger?

Myers answered the integrated PTM-DSS-RMM is essentially a MWC system with a mud pulse to the surface. Industry does not have this type of device. The uniqueness is coring while making the measurements. The EDP has weighed in, and IODP-MI feels that the EDP does not need to see the PTM proposal again, unless there is a change in scope.

Alberty stated "No, that is not what the EDP is saying". There is a timing issue. The EDP does want to see the PTM proposal again.

Flemings stated when 3 out of 3 ED proposals (CDEX LTBMS; USIO LWC core barrels; and USIO PTM) are out of sync with the FY+2 planning/budget cycle, we need to think about how to address getting these 3 proposals on track better. Part of the job of the EDP is to weigh into the engineering development plan that goes to the SPC. The EDP needs to be a participant in those decisions and say something about the ED plan that is FY+2; it cannot step away from that responsibility. The IOs may be criticized by the EDP, but they need to make the case for projects and their timing. However, if IODP-MI makes decisions in the absence of EDP comment, then this is not a very functional system.

Von Herzen stated part of the reason for the tepid response is the lack of full participation of EDP members in the email review. These discussions and decisions should be made during a panel meeting, not by email. This does not guarantee a consensus.

Becker noted the EDP did not have a quorum of respondents to the 2 proposals, so the EDP recommendation may be invalid.

Sears stated it wasn't clear that the PTM should go forward. So, the EDP should comment again at its July 2007 meeting when more data is available. This will work for a FY09 ED proposal, but what should be done for FY08?

Myers stated it sounds like the USIO cannot provide a FY08 proposal in time.

Flemings commented that the EDP needs to view this as a process issue, not as a single proposal issue.

Blum stated the USIO can provide a proposal by April 15th, but it cannot meet successful completion of testing of the DSS by that time. The USIO can provide something in parallel, and move forward if Q2 testing is successful.

Flemings stated the USIO should look at FY09 to develop the technical foundation of the PTM. If IODP-MI receives negative comments from the EDP, then FY08 money should not be spent on the PTM. A deliverable from this 4th EDP meeting is comments on the current FY08 spending plan.

Myers pointed out that IODP-MI does not have FY08 money in hand for projects, the FY08 plan is still in the form of a request. IODP-MI will not get hard numbers until June or July 2007.

Becker noted that lead agencies have usually provided budget guidance to IODP-MI by late January of each year.

Oshima stated for NSF, early February is when the total budget is established.

Becker stated the final FY08 program plan is approved by SASEC during its summer (late June) meeting. Then the lead agencies approve the final program plan at the end of summer (~August).

Sears commented that he sees the disconnect in fiscal year funding. The EDP is commenting at this meeting on FY+2 ED projects. It doesn't make sense to shut down a project, but it's not obvious what to do with multiyear projects at this stage.

Myers commented multiyear projects are funded in annual blocks. However, projects need to be kept running smoothly, and it is unclear how to do this right now.

Blum commented from an USIO perspective, the long-term planning cycle is useful, but the shorter, finalizing cycle is more difficult to work with. The EDP should be involved in the process, but it is not clear how to make decisions. If only the FY+2 cycle is being considered, then the EDP is out of the loop; the FY+1 cycle may need to be included too.

Flemings noted that the EDP does not want to get involved in year-to-year monitoring of each ED project. The EDP does want to weigh-in at the feasibility stage, and separate on-going projects from new ED initiatives.

Myers went on to discuss the Engineering Task Force (ETF) model established by IODP-MI. The ETF will take advice from SAS and EDP. It is a small group of engineers who meet biannually and focuses on engineering project implementation. The first OTF had a number of observatory people, but the membership will rotate depending on the engineering needs. The ETF take the TR and put it into action. Becker was present at the first OTF meeting.

Flemings asked what is the difference between the OTF and the EDP?

Myers answered the EDP interprets the ISP and puts together a TR. Project proposals come in that address the ED needs of the TR; the EDP reviews these proposals and makes recommendations concerning implementation. The ETF imposes project controls on those proposals that are funded and functions as a project management group.

Flemings noted that with the CDEX LTBMS project, it ought to be reviewed by a qualified group. Is the ETF that group?

Tezuka stated the ETF addresses specific projects and membership changes according to the projects.

Von Herzen asked if the ETF will be making a yes/no decision.

Myers answered the ETF takes advice from the EDP, so the ETF is after a positive decision to support the ED effort.

Tezuka asked if the ETF is on a volunteer basis.

Myers answered primarily volunteers, but one person on the first ETF was paid to insure sufficient expertise was obtained. The ETF had to be put together quickly. Payment for services will not be a rule.

Schultheiss noted the ETF is a very important part of the ED process and has nicely separated boundaries with the EDP. EDP performs the review, and the ETF assists IODP-MI with the project management.

Myers commented that the ETF looks on a day-to-day time-scale, whereas the EDP looks at the big picture.

Thorogood asked if the composition of the ETF is based on the skills required by the projects.

Myers answered the ETF membership changes as projects come through, but it is not tailored to individual projects.

Goldberg noted that one issue that came up during an IO meeting was conflict of interest (COI).

Myers stated on the ETF, COI is dealt with by asking members to sign a non-disclosure agreement, but each member must make disclosure of their COI and excuse themselves from participation.

Myers continued his presentation by reviewing the IODP Engineering Webpage (http://www.iodp.org/eng-dev). This went on-line about 2 months ago, and he solicited comments on:

a. IODP-MI engineering vision
b. Engineering development proponents guides
c. Proposal solicitations/Electronic submission
d. Links to existing IODP technologies
e. IODP technology roadmap
f. Third Party tool page
g. Monthly highlighted engineering developments

IODP-MI wants to stimulate unsolicited ED proposals. Myers reviewed individual webpages from the eng-dev site.

Flemings asked for comments on the engineering development website. It is clear that EDP members have had a significant impact already; it has established a foundation for IODP-MI to do its job; it is exciting to see this much attention placed on engineering; the next step is to go from vision to funding/implementation.

Thorogood commented that he has explored the website and found that the link to the Technology Roadmap was buried. He suggested moving it up front to the beginning of the eng-dev webpage.

Myers asked for feedback on how to repackage the TR. He plans to include a weblink to the minutes for EDP #3. He wants the EDP to come to a consensus as to the top 30 ED challenges. The TR is a long document that is difficult to navigate, and a condensed version would aid in communicating ED needs to the community.

Myers distributed copies of the Engineering Development brochure to members of the EDP. This was first circulated at Fall AGU in San Francisco.

End of formal presentation

7. Discussion of Technology Roadmap (*Appendix 1*) by Flemings

Flemings briefly reviewed the EDP #3 consensus items. He summarized the email proposal review of the PTM and CDEX LTBMS proposals. The EDP supported the concepts in both proposals, but the EDP had no proper basis to make any comments.

The first draft of the TR, now published on the IODP website is a work in progress. One challenge before us is identifying the common engineering challenges among the drilling platforms. The method that has been used to identify the ED challenges has been a 'kitchen sink' approach—any entries are welcome and it is not our intention to exclude anything. However, there are no funding criteria at this point, which will force prioritization of ED needs.

Flemings reviewed EDP Consensus 0606-07, which lists the top 10 unranked ED needs in each of the 3 sub-groups of the TR. IODP-MI has taken these ED needs as being 'important' and would like to receive proposals on these topics. The goal is to develop a portfolio of ED projects that span a range of cost and intensity.

Flemings asked the EDP to re-consider the TR. Are there major entries that need to be re-written? Are there new entries? Should anything be deleted or consolidated? Is there anything that has such a high priority that it needs to be elevated into the top 10 now?

End of formal presentation

Von Herzen noted that there is an equal number of ED challenges in each of the 3 sub-groups of the TR. Is this required? Could there be more than 10 in one sub-group, and less than 10 in another?

Flemings commented that an equal number of high priority items in each category is not required.

Germaine reminded the panel that we had made a conscious effort not to cross-evaluate each of the sub-groups.

Holloway commented that some projects are dependent on other projects and that we need to identify the dependency. We need to develop linkages and parallelism. Inter-dependency does not come out in the way the table is not structured.

Ended morning session at 1205.

Lunch.

Resumed meeting at 1305.

8. <u>Engineering Development Process Implementation</u> (*Appendix 5*) by Myers

Myers reviewed the draft form of the Engineering Development Process posted on the IODP website (www.iodp.org/eng-dev). Version 2 has been distributed to the EDP members. Myers reviewed the definition of Class A, B, and C projects.

Holloway asked if there was an inconsistency with regard to science support projects versus engineering development projects in the definition of the Class A, B, and C

projects. (editor's note: in version 2, Class A projects are titled 'Unsolicited Engineering Science Support Projects' and Class B projects are titled 'Unsolicited Engineering Development Projects').

Myers noted the distinction among the 3 classes is based only on total costs, not the focus of the projects. He noted that the 'science' terminology that Holloway commented about is a relict of past documentation. 'Science' should be removed from the project description.

Myers noted that Class C projects have not been discussed in SAS so far. The plan is that Class C proposals would be solicited by IODP-MI following consideration by SAS. A multi-page proposal will be required. All Class C proposals will be forwarded to EDP for review and advice. Class C proposals are the only proposals solicited by IODP-MI; Class A and B are un-solicited proposals.

Holloway asked if IODP-MI is going to initiate the call for Class C proposals.

Myers answered IODP-MI will lead the RFP writing process, but would also run the RFP through the EDP first. Is this desired by the EDP?

Myers reviewed his colorful flow diagrams (see *Appendix 5*) illustrating the flow and decision points in the flow of a proposal through the IODP structure.

Schultheiss asked if pre-proposals will be requested.

Myers noted that if a proposal is not aligned with the TR, it will not fly.

Sears asked if it is the intent for projects to be on hold until FY+2. That appears to be the consequence of the proposal flow and decision point timing.

Myers answered yes, a project has to wait until FY+2 funding and an engineering plan is formulated.

Alberty asked, for example, if Class A proposals are coming along that fill ED gaps in the TR, then how are these proposals worked into our TR? Myers comments that if a proposal is not aligned with the TR, it won't fly, but if there is an inadvertent gap in ED need not identified by the TR, then shouldn't the proposal be considered?

Myers commented that the current thinking is that ED proposals coming through would fit with the TR. Every project that comes through should map to the TR.

Thorogood commented that if a new idea comes in, then it redefines the TR.

Myers responded by saying the IODP-MI is trying to create a structure for accommodating ED proposals, but is not trying to inhibit creativity.

Flemings commented that Alberty's suggestion is that the EDP should see the suite (all) of proposals that come in by the April 15th deadline. Then the EDP can update the TR at its summer meeting.

Alberty noted that all the proposals should be available to the EDP. As IODP-MI processes the Class A proposals (these are not ordinarily seen by the EDP), how these match with the TR is of interest to the EDP, especially what doesn't map to the TR. When IODP-MI moves forward with Class A proposals, it is important that the EDP gets this information and compares it with the TR and makes updates as appropriate.

Holloway asked if the proponents will be asked to structure projects on a multi-year basis, or will they hedge? (Editor's note: the implication of Holloway's 'hedge' comment is that proponents may submit a 1 year proposal that does not cover the full development plan or costs, and try to extend the project year-by-year).

Myers commented that the IODP-MI program plan is always decided on a year-to-year basis. But, in reality, funds do get carried forward. IODP-MI will ask that a multi-year project be structured appropriately from the beginning. The ETF will be asked to review progress of projects. Watchdogs will be assigned to each project. It is not clear how multi-year projects will be sheparded through the proposal process. EDP can also assign a watchdog to each proposal that comes through the sorting process outlined in the flow diagrams.

Holloway asked when the second year comes up, who's contractually bound to shut down a project that is floundering. How is the contractor going to be compensated?

Myers responded that the details of contracts will have to be worked out.

Fukuhara asked if there is any requirement for the EDP to put thresholds or conditions on its recommendations at its summer meeting before a proposal is considered by the IODP-MI. If this is a large project, can key items be identified or flagged?

Myers responded by saying it's up to the EDP as to how to handle a proposal.

Schultheiss expressed concern about the inevitable delay unsolicited proposals will have with the proposed FY+2 timing. An ED need may be too important to wait until un-solicited proposals show up, and instead solicitation may be required for some important topics.

Myers agreed with Schultheiss' comments. There are ED needs identified in the TR that will not get proposals right away. This is why the Class C proposal category was developed.

Tezuka commented on an apparent inconsistency. The dollar-amount criteria appear to be based on an annual budget, but for multi-year projects, the total amount is important for making the Class distinction.

Myers noted the classification is based on the total amount of a multi-year project. However, when putting together the annual program plan, the cost for a particular budget-year is what is included and discussed.

Goldberg noted that the documentation says annual.

Myers acknowledged that this may be an error that will be corrected.

Von Herzen commented that it isn't clear how a feasibility study would be classified and would fit into the engineering development proposal structure.

Myers stated IODP-MI would ask for a separate proposal, just for a feasibility study.

Alberty commented that there are two paths for Class A proposals—seen by EDP, or not.

Myers responded by saying the path for Class A proposals depends on the degree of comfort IODP-MI has with making a decision without EDP input. If EDP advice is needed, then it will be requested. The intent is to make EDP aware of all ED proposals. For those that bypass EDP review, IODP-MI will inform EDP.

Sears asked that if a feasibility study is needed, that the EDP should not see it. IODP-MI should make the decision to fund a feasibility study independently. The EDP should see the results of the feasibility study.

Myers noted that the EDP could request a feasibility study at any time.

Sears noted that FY+2 funding recommendations will be made by the EDP at its summer meeting. But, is there some possibility of off-line, discretionary funding?

Myers stated SOC funding is a potential source, but this needs the blessing of the SAS.

Flemings commented, building on the comments of Von Herzen and Sears, there is a danger in migrating away from multi-year projects that can flow forward. It is not possible to predict, but it is conceivable that some multi-year proposals will continue to receive their funding year after year. There is a concern that the proposal flowpath will get locked into the year-by-year budget structure, and multi-year projects will be difficult to foster and allocate/commit future funds.

Thorogood commented that looking at the proposed ED proposal process from an industrial point-of-view, risk reduction is not part of the strategy. The US government funds risk reduction strategies, why shouldn't the IODP do the same? There ought to be a risk reduction phase in a project, otherwise high risk projects will not be proposed and the IODP will only get relatively low risk projects in their portfolio. The proposed proposal process doesn't fit well with my experience in industry. If the IODP is trying to be on the leading edge, then it needs to define mechanisms to make this work.

Sears agreed with Thorogood's comments. The EDP only meets twice a year, thus IODP-MI would have to decide where to put feasibility funding and studies.

Thorogood noted that a project life-cycle is what is important, not the EDP meeting/review cycle.

Alberty commented that the EDP could call for a feasibility study, and the product of the feasibility study is to come up with a proposal.

Myers stated IODP-MI does not have discretionary funds that could support this approach.

Thorogood responded by saying that the proponents would then have to partially fund the feasibility phase of a proposal/project.

Goldberg asked to return to an earlier point of discussion. Myers is trying to avoid the funding issue for good reason. What is more important is to get EDP feedback and update the TR. There could be other sources of funding, such as 'gap projects', and that there seems to be a 'leaky' valve with regard to POC monies. We need to know what the IOs and 3rd parties are doing.

Blum stated his support for IODP-MI to accommodate feasibility studies that take an initial idea and assess it. Then better planning can be made and the idea executed through the proposed proposal process. In many cases, a lot of planning does need to be done 'under the radar', thus it is important to recognize that proponents need funding to develop feasibility studies and proposal development. Background research is essential for developing a sound development plan.

Schultheiss commented that the IODP might benefit from the oil and gas industry experience in many ways. The EDP could encourage joint ventures. When thinking about attracting interest, cost and the time-line are important, but also the likelihood of funding. Is there any way to set aside engineering funds, such as SOCs?

Flemings answered "In answer to your question, it's never going to happen. The only way to get engineering investment is to defend it in the context of the scientific drilling goals."

Becker commented that he cannot speak for IODP-MI directly, because the SPC doesn't control SOC funds. However, it would be a good idea to have a pot of money for engineering development. But, the reality is that the IODP is struggling to meet the basic costs of the program.

Myers responded by saying a pot of funds would be useful. But, without a recommendation from the EDP, IODP-MI cannot go to the lead agencies and request such an accommodation. Support from the SAS is also needed, but fundamentally agree

with the need for creating a source of discretionary funds to support engineering developments.

Thorogood asked if the EDP shouldn't be making this suggestion.

Flemings responded by saying the EDP has to emphasize what ED is important. A portfolio of proposals creates the funding pressure.

Thorogood noted that the TR is the connectivity between the science plan and engineering requirements. If the IODP is looking at high-risk drilling projects, then the EDP needs to endorse support for risk reduction by front-end loading projects with ED support. From an industrial project management point-of-view, this front-end loading and risk mitigation is critical for the success of high-risk ventures.

Holloway asked how the IODP-MI would handle competing proposals.

Myers responded by saying that this was a good question. The ETF would be asked to assist with evaluating competing proposals, but if there is a COI, then that member would be excused. The IODP-MI would use the ETF to implement the proposal, provided the concept was endorsed by the EDP.

Goldberg asked for clarification of the competing proposal discussion. Could both proposals be presented to the SPC, and then on to the ETF?

Myers responded by saying that the IODP-MI plan is for procuring technology, but not from a particular vendor. If the proposals go before the SPC, IODP-MI could act on recommendations from the SPC.

Myers continued with his PowerPoint presentation. He identified 2 Class A projects currently scheduled for FY08 funding—the PTM and the down-pipe camera; Class B includes the LTBMS. There is no intent to solicit any Class C proposals at this time.

Von Herzen asked if all feasibility studies will be one year in duration?

Myers responded that most likely they would be 1 year, or possibly less (e.g., 6 months) because IODP-MI would want feedback fast, and would need to involve the EDP.

Flemings asked how the 3 Classes of proposals can be reconciled with the EDP ED vision. In reality, the two existing Class A projects are feasibility projects, and they may come back as Class A, or multi-year projects. This is an important issue. The intent at this point is for the EDP to review Class B proposals by the EDP only once.

Myers continued his presentation by discussing funding issues and scheduling. He showed a project management timeline (GAANT chart in *Appendix 5*). The black bars are a program plan cycle (1 year duration). Red diamonds are the EDP meetings; colored

bars are projects presently underway or planned. Grey diamonds are proposal submission deadlines (April 15th every year). Myers reviewed the active projects.

Myers noted that IODP-MI has already received 1 proposal for the April 15, 2007 ED proposal deadline (for FY+2 funding).

Ussler asked if salary was a possible line-item in a budget for Class A proposals. It was not explicitly listed on the cover sheet.

Myers responded by saying salary can be included in any proposal by any group of proponents, including the IOs. We want to have an even playing field. There is no restriction on salary and benefits.

Holloway asked if this policy puts industry at a disadvantage regarding salary.

Myers continued by saying the IODP-MI is casting a limited net right now for soliciting ED proposals—no newspaper or magazine ads, yet. The EDP could help spread the word that ED proposals are desired by IODP-MI.

Holloway asked about who will write an RFP for a Class C solicitation.

Myers replied that funding will come from IODP-MI to Myers to write the RFP solicitations. We may need the ETF to help fill-in with their expertise.

Pheasant questioned if IODP-MI does the technical solicitation, how is it linked back to the drilling platform.

Myers replied, for example, are you asking if a platform needs a heave compensator and the IOs aren't involved, how do you get buy-in? This depends on the nature of the technology. My job is to interface with the IOs and get buy-in early. The proponents will be kept in the loop and the IODP-MI will give the proponents feedback.

Holloway asked if there is a mechanism to spread funding across the 3 platforms.

Myers responded that it doesn't matter if an ED project is a single- or multi-platform development.

Flemings noted that the EDP is trying to highlight the important ED needs. There is only a certain amount of money available.

Holloway expressed concern that this may lead to selecting numerous smaller projects, and bias against large ones.

Sears made a few comments regarding Class B projects. If the EDP sees a project, then we have to assume that the concept stage has already been completed. The proposal the EDP sees needs to describe how the future work will be done. Right now it's not clear

how the EDP will be able to decide what's been completed and what is being proposed to be done once funding is in place.

Flemings recommended that Sears' comment be discussed in the breakout sessions.

End of formal presentation.

Flemings outlined five issues for the WGs to address during this meeting:

a. IODP-MI proposal process—reconcile this with the EDP TR (Thorogood)
b. Proposal evaluation process (Alberty)
c. Drilling/Vessel TR sub-group (Takemura/Sears)
d. Sampling/Coring/Logging TR sub-group (Fukukhara/Germaine)
e. Borehole Infrastructure TR sub-group (Ussler/Person)

Flemings also asked the EDP to consider the questions regarding the SAS structure outlined by Becker.

Break at 1430

Resumed meeting at 1445, assembled working groups and met until 1730

Meeting was adjourned at 1730

Thursday, January 18, 2007

The meeting was called to order by Flemings at 8:36

10. <u>CDEX Overview of FY 06 Activities</u> *(Appendix 6)*

The Long Term Borehole Monitoring System overview was presented in considerable detail. The history of the design and review process was reviewed. Conceptual design is basically complete and the schedule is worked out to have the system ready for NanTroSieze installation as per the drilling schedule. Design requirements are basically driven by NanTroSieze scientific requirements for sensors and borehole depth. The design has been completed to the stage of a high level conceptual design for all components up to the interface to the sensors. The system essentially consists of a seafloor unit containing telemetry, communications, power, and storage which interfaces to borehole modules installed at preset elevations to interface to sensors. The modules contain data acquisition and communications necessary to operate the sensors. The panel was reminded that the sensors per se are the responsibility of the scientists and considered a third party component. Important considerations still remain involving the power supply, communications and power to the land based cable network, temperature range tolerance for borehole modules, installation configuration and deployment.

Questions: considerable discussion followed. The schedule was discussed to review the various phases. Availability of funds: The basic system is considered a SOC cost while the sensors will require scientist generated funding. Concerns were expressed relative to the temperature requirements for both the modules and the sensors. A/D conversion seems to be a major obstacle. Field systems are currently operating at about 70 °C but this is a long way from the 125 °C (at 3,500m) and 170 °C (at 6000m). This is especially disconcerting given the fact that life expectancy is log-log linear on a time-temperature plot. Fault tolerance did not appear to be covered in the conceptual design and should be covered in the engineering design phase; ground fault detection being one example. Battery life is an essential part of the system. Questions were discussed concerning the necessary maintenance and replacement cycle, and how this would be affected given the option of having a land based power source. Clearly many of these details will not become final until the communication and sensor configuration is resolved. One of the major design constraints for the downhole cable system comes from the limited penetrations through the Christmas tree. The current design is to make use of one cable for both power and communication and not to use fiber optics. Fiber optics were considered to be too unstable for this environment. Expected operation life is between 5 and 10 years for the system. This is should be a long enough time to be useful to the science goals even in the absence of a major earthquake. Since there are no electrical components to date that can survive under the expected temperatures the current plan is to phase these in as available. There is still opportunity for installations in lower temperature environments. At present the 100 °C, 1-year barrier has not been broken. The Japanese have experience with 80 degrees and 5 years. Was consideration ever given to using an analog based system? This was considered but the digital was chosen due to the high frequency requirements of the seismic requirements. It was pointed out that the

design should include a service plan. Some discussion on the various components ensued. A/D conversion is a critical temperature sensitive component and sits in the gray zone between a "sensor" component and a "module" component. This really needs clarification especially given the fact that the sensor side is the scientist's responsibility. There was concern over what devices would be included in the term telemetry. It seems to cover anything in the communication system between the modules and the seafloor unit. This is generally the case. Relative to this the telemetry system is considered to be a SOC cost and this is the case for all systems, not just this project. Packers, on the other hand, are part of the installation and considered a POC. The single coaxial cable will be encased in tubing for installation. The plan is definitely to have the system prototyped at a land site.

11. <u>DSS and RMM System</u> (*Appendix 7)* by Grigar

Kevin provided an overview of this year's activity along with the background of the tool's historical development. The following provides a summary of the ensuing discussion. The present plans are in place to test the system at the Schlumberger facility. This can provide up to 10,000 psi conditions, but can not simulate the cold temperatures. Other types of stress testing should be considered including shock testing (Lamont will soon have a facility) and drilling simulation (Terratec has a facility). These are especially important because the tools must withstand both the impact and vibration. It is hard to predict failure under these conditions and we want to avoid down time during a leg. Relative to the failures that have occurred in the past there was discussion as to the causes. Two of the causes were associated with design errors relative to o-ring seals. O-ring seals were identified as a perpetual problem for tools. The reason for the cracks in the induction housing has yet to be determined and is under investigation. This led to questions relative to the design process and checking requirements. The process of design needs to have a process in place whereby formal and routine checking is performed at various stages of the design process. It appears that this is not yet in place.

<u>Pulse Telemetry Module</u> *(Appendix 8)* by Grigar

Kevin presented background on the PTM. This system integrates with the DSS/RMM technology and the goal is to get this moving forward but things are interlocked with problems with the DSS/RMM. The following summarizes the discussion.

The schedule was reviewed in light of the optimistic expectations concerning the next stage of DSS/RMM testing. Basically these tools must work in order to justify the PTM development. Concerns were expressed that there is no contingency plan and more importantly no consideration of expanding the usefulness of the PTM by linking it to other tools. The situation is basically the same as one year ago. Consideration should be given to link the PTM to CDEX operations or the next MSP as a possible test bed. Finally, it was pointed out that the plan presented and request for funding are not compatible. The next reasonable test is to establish proof that the DSS/RMM system is operable and decouple this from the PTM.

Coffee break.

<u>Logging While Coring</u> (*Appendix 8)* by Grigar

Kevin returned to present the status and history of the LWC subsystem. The following paragraph summarizes the discussion.

The system configuration was chosen because it was a reasonable modification for Schlumberger existing technology. This largely constrained both the ID and OD of the tool. There was the possibility to make this modification and be compatible with the RCB system. The motivation was clearly to test the concept to see if it created a new science opportunity. In the future, this system could be used with other coring systems or redesigned to meet other size constraints. One of the driving factors is the battery pack. This system is different from other logging operations because it uses a different BHA and spaceouts. The tool has memory and is not used with any telemetry. This means the data are only available after tripping the drill string. What is the vision for such a tool? It is considered a special device and with current design will never become routine. A major change in the drilling industry would be required to make such a measurement routine, not because of tool cost but for data interpretation and technical support. Currently, further development of this tool is on hold and no funds are being requested for FY07.

<u>CDEX-07 Borehole monitoring system</u> (*Appendix 10*) by Kyo

A bit more of the background was covered along with a schematic of the system highlighting the major components and expected source of funding for each. The power needs were discussed for the two major scenarios; the system being connected to the land based network (expected to be on line in 2010) and completely autonomous. Both designs will require battery power but capacity is still unclear. Final system demand is still not fixed (design goals have been set) and land capacity is not yet specified. In any case, sufficient capacity will be needed for backup storage. If the system is land linked the current hope is to make use of the power and two way communication and eliminate the need for routine service visits. Obviously, there will be a need for some servicing over the design life (~ 10 years). The question of long term operation was discussed. Consideration must be given to the cost of daily monitoring if the system is land linked. Will this be JAMSTEC's responsibility? If the system is not linked who will be responsible for collecting the data? This has historically been the scientist's responsibility to secure funds for ROV deployment and service the subsea systems and has been a successful strategy. A related question is ownership of the data. This issue will soon be addressed by SPC. Details of deployment still seem vague. The subsea system will have about a 2400 m depth capacity. Deployment sequencing details have not yet been worked out and these must be integrated into the engineering design. It was widely recognized that this is essential to the design and some of these details may require more specific knowledge of the sensors. Relative to system cost, there seems to be some vagueness relative to responsibility for the telemetry system, the recording system and the batteries. It is not very clear where the boundaries exist between each.

How much redundancy is built into the subsea package? There is battery backup and parallel data storage, not clear about fault detection. Acoustic transmission is being considered and would provide opportunity for status reporting. The design schedule is compatible with the Chikyu schedule. On a side note, EDP is encouraged to comment and provide advice on all topics involving IODP but will only have definite impact on issues related to SOC funding.

Considering the range of pipe diameters available (9.5 to 7.5 inches) for the installation of the monitoring system, there will not be much flexibility in the installation plan. This will place more pressure on pre installation information gathering and interpretation. Given only two reduction steps in pipe diameter, CEDEX is investigating the possibility of using expandable pipe. The maximum distance between sensor modules is 2000m. The land test is planned to take place in an 800 m hole. Future design detailing is required for cement property specifications but this must be matched to rock properties as well as sensor and installation requirements. Parameters of concern are the stiffness, density, viscosity and setup time. Details also need to be worked out for sensor installation in a mudded hole and then cementing in place.

Third Party Tools (*Appendix 9)* by Grigar

Kevin reported that we currently have two third party tools: the APCT-3 which is the instrumented head for the APC and the new Cork Design for Juan de Fuca. It is clear that the APCT-3 has been a very positive experience and steps are in place to integrate the capability more fully into the system. This will require stocking of replacement parts, routine calibrations, and upgrades to the software. It was noted that this is the third generation of an effort initiated by Dick Von Herzen.

12. FY08 Technology Development Funding Plan (*Appendix 5)* by Myers

Greg presented one slide showing IODP-MI's perspective on FY08 funding for EDP feedback.

Discussion relative to the LTBMS encouraged moving forward with the engineering design. The panel appreciated the fact that IODP-MI followed suggestions to obtain a review of the high level design and that this review was positive. During the next phase of design, more consideration should be given to the linkage between shallow and deep water technology, especially related to implementation of drilling, casing and cementing. Temperature tolerance still remains an enabling obstacle. Finally, the next level of design should address long-term operation, maintenance, capture and storage of data.

There was discussion relative to the Down Pipe Camera system. EDP has not seen a proposal for this, but it is a Class A (<100K) project and we are only being asked for feedback. The proposal will only address the camera; the deployment system is not being considered. This item is in our road map, but is not part of the priority list. On the other hand, the camera is a high impact operational technology. It has proven value in the past, in particular relative to the MSP operation. Acoustic camera technology is not being

considered; the temperature range is being investigated. The system will operate through the pipe and must have clear water conditions.

Discussion relative to PTM (or rather DSS/RMM)

The DSS/RMM technology is being separated from the PTM development. IODP-MI is proposing to fund at a Class A project level the continued development of the DSS/RMM through further testing. General discussion was in favor of this option. Relative to the PTM, consideration should be given to a more extensive feasibility study including a more "systems wide" application of the PTM. This could provide useful technology for other tools and provide reasons to develop the technology decoupled from the success of the DSS/RMM. In addition, consideration should be given to the temperature range of the technology. Concern was expressed relative to dividing a "B" level project into several level "C" projects. This is not the intent of the system.

Lunch Break

Group Picture

13. Operations Review Task Force Report *(Appendix 5)* by Myers

Greg gave a summary of the ORTF report findings relative to issues of interest to EDP. Peter provided a short instruction to the panel to focus on possible gaps in the TR. It was noted that this report is biased toward the problems and does not provide the positive feedback that would be used to take items off of our ED needs list. This should be addressed in future reports. It was noted in particular that the active heave compensation worked well with CORK installations. No sea state details were provided. It was also noted that the report did not identify the rumored coring problems that were experienced on the Arctic Expedition. Greg's report is attached to the minutes as *Appendix 5* and will be reviewed in detail when considering modification to the TR. The items in this report should be summarized in a table and linked to specific road map items. The importance of closing the loop with the advisory panel on road map items was again emphasized. This is true of the successes as well as the problems.

14. SPC Request to Provide Feedback

Bill presented the SPC Consensus 0608-08 that requested the EDP to evaluate a SSEP Recommendation (0605-04) for encouraging immediate development of a borehole tool to deploy seismometers as part of a dedicated subseafloor observatory. In general, the development of downhole deployment and servicing tools has already been identified as a specific goal in the draft IODP Technology Roadmap (C-24: Borehole re-entry and servicing systems). This request from the SPC sparked a long discussion, part of which focused on understanding the request. One perspective was that the request was specifically for development of downhole seismic sensor deployment technology while others felt it was a more general request concerning serviceability of all types of technology used in long term monitoring systems. Relative to serviceability, sentiment

was strong that long-term monitoring systems are expensive investments and should be designed as complete systems from the outset with a clear ability to service the downhole instrumentation and to have a surveillance and repair plan in place when appropriate for the specific experiment. To accomplish such a goal would be a major effort and should be considered a Class C Development Proposal undertaking.

Discussion continued and Germaine motioned to add a new road map item on seismic sensor deployment technology. Motion was seconded by Sears. Discussion followed with arguments both for and against. Clearly we have other specific items in the draft technology roadmap, but we do not want to arbitrarily react to external forces by writing specific development efforts into the technology roadmap. The role of the EDP is to identify long-term technology development needs; it is the responsibility of IODP-MI to use the technology roadmap for guidance in responding to specific needs and requests, and to enable the development of technology in concert with the scientific drilling program. At present the EDP has no knowledge of any drilling proposal, either approved or in review that would utilize the deployment technology identified in the SSEP Recommendation. The EDP was informed that an Ancillary Proposal Letter (APL), that may have utilized borehole seismic sensor deployment technology, had been recently withdrawn by the lead proponent from the proposal pool under consideration by the SSEPs. Discussion continued and Alberty called the question. Motion was defeated 6-8-2. Ussler volunteered to prepare a draft modification to C-24 that broadened and clarified the importance of having deployment and servicing systems developed for borehole observatories.

15. <u>USIO SODV Update</u> (*Appendix 11)* by Goldberg

The following summarizes the main points of discussion. Peter reviewed a memo that he prepared in early December (*Appendix 14*) with feedback from several EDP members. It is clear external forces have had a severe negative impact on the new vessel design. Given the financial situation, tradeoffs clearly were required. The situation presented to the panel was that two designs are in contention: one for a stretched vessel and one for a repackaged vessel. The stretched design is clearly preferable but may be too expensive. At this point in time, the latter option is more likely. The cost of time is a major driver and the decision to move forward cannot be delayed. Considerable concern was expressed by the panel over the fact that the repackaged option will not provide reasonable space for an ROV. This was a clear preference of the panel which had been expressed in previous meetings, yet was not implemented. Use of two detached van bays will not provide adequate space. The alternative option, which was to modify the ship later, is not considered viable. This will be extremely expensive and there does not appear to be much hope of getting such funding. The possibility of making a more minor modification in the lower deck area was a potential solution but would have to be done in connection with a specific drilling leg.

Discussion then turned to the topic of heave compensation. It has been clear all along that quality heave compensation is a critical technology concern. The current plan for only passive compensation is not ideal. There is an internal group looking at options

(apparently including downhole frames) but again time and cost are key drivers of the process and it is highly unlikely that any other solution will be implemented. That being the case, questions were raised concerning the robustness of the decision making process. It was reiterated that the change in the costs associated with external factors has forced changes and severely constrained the options.

Peter reviewed his 12/1/06 memo focusing on the request to re-evaluate priorities with respect to the repackaged vessel option. It was again pointed out that setting aside space for the ROV would require giving up too much. It was not a routine leg technology and there remains a future option if science has the requirement. It would still require raising a significant amount of money. Reduction or elimination of other items was discussed but the panel was reminded that the NSF proposal required that we keep what we have and add more to the technology. That is a major consideration and requires a broader view of the ship technology. For example, reducing costs in the analytical labs would be preferred as this could be added later. However, if this is done there are many who would argue that there has been no improvement in the ship's technology. Therefore, a balanced approach is necessary.

Regrading the ROV, there was more discussion on the decision making process related to information gathering. The question was asked whether there were any serious discussions with ROV operators so that the design team really understood what would be required for shipboard operation? The panel was assured that there were several face-to-face meetings on the topic. When pressed for details for an implementation plan to upgrade in the future, it was made clear that time simply does not permit this level of detailing. Several members were not pleased with the plan especially given the fact that ROV's have been used to 2,000 m in the past and now this is not a viable option. The question was whether there was any consideration given to an AUV. There was apparently no consideration given to this item. Flemings and Alberty formulated a consensus item (0701-04) on this issue.

Regrading the upgrade to the passive heave compensation, the panel asked what is being done to fine tune the system. The upgrade will include such things as replacement of worn parts, improving air flow during the stroke, re-plating some components to reduce friction. These incremental improvements will improve the system but it is not clear how well it will function in the end. Concern was expressed that a systematic study had not been conducted to provide technical information for decision making. There appears to be many opinions but no real factual data on system capabilities.

The VIT is being modified to upgrade the winch but not provide pan and tilt capability. This might be done at a later date.

Relative to having a future seafloor frame capability, it was stated that this will not be in the current upgrade but it is believed that a frame can be stored on the modified vessel if necessary.

COFFEE BREAK

16. <u>Surveillance and Reliability</u> (*Appendix 13)* by Sears

Following Steve's presentations there were several follow-up questions. The system as presented was very large, comprehensive and of obvious benefit. Is it possible to start out small and ramp up the effort? It is essential to focus on individual components rather than the entire system. That lends itself to implementing the technology one component at a time. To function effectively for a small scale limited budget operation, it is essential to have the plan in place and then implement on a project by project basis. It needs to be planned carefully so the investment is protected as the system grows. In the system Steve presented, the technology identified several systematic problems which were improved over time. These included design details of control pods, metal brittleness problems due to the cold temperature, and O-ring seal failures. The current system is more of a data base for decision making which is done by people. As the technology improves, it is anticipated that much of this decision making will be done automatically. Implementation is definitely possible within IODP. The first step is to design the measures that will be used to assess functionality of each component in the system. This would focus on engineering rather than science. One attractive feature of such a system is that it could also be used in conjunction with safety concerns.

Separate in two working groups

a) Peter and John headed a group to work on the proposal process.
b) Mark and Bill headed a group to work on a process to use in ranking technology development items in the road map.

EDP thanked Mark and BP for the wonderful meeting accommodations. Peter announced that tomorrow's session will be closed session

Meeting adjourned at 1700

Friday, January 19, 2007

The meeting was called to order by Flemings at 0843

Flemings proposed the following modifications to the meeting agenda:

a. Alberty algorithm – a possible approach to ranking ED needs
b. Meeting location in Japan
c. Closed session- review status of the TR and this meeting's consensus items
d. Open session
e. Adjourn

Alberty presented the 'Alberty algorithm' which is a weighted ranking scheme that takes into account the priority of an ED need and the expertise of the individual. The test case for this algorithm will be selection of the next meeting location in Japan. There are 3 possible locations.

The algorithm includes: 1. The priority (P), ranked 1 (low), 2, or 3 (high); 2. The expertise (E), ranked (initially assigned 0 (no competency), 1, or 2 (highly competent). The total score is computed from the sum of the product of P and E, divided by the sum of the E. This weighting allows different ED needs to be compared on an expertise-normalized basis.

A discussion ensued concerning whether the expertise scale should be 0, 1, and 2, or 1, 2, and 3. Peter reminded everyone that this is only one of the many possibilities and he encouraged everyone to propose alternatives. At present, the proposal is to apply the ranking separately in each of the three categories. It adds even more complication if we try to rank across categories, especially when one considers the level of personal expertise. There was also concern about assigning a 0 to low expertise. Other options are definitely possible but this is a personal selection and there is no requirement to ever assign a zero. Another possibility is to use a 3, 2, 1 system. For now we will proceed with the 2, 1, 0 expertise ranking system and test how well it works.

Alberty commented that it really doesn't matter mathematically, the results should be the same.

21. <u>Select Next Meeting Location</u>

Peter introduced the next topic and proposed that we use our new ranking system to provide feedback on the three potential meeting locations. Tezuka-san presented the three options Makuhari (JAPEX research center), Tokyo (JAPEX head office) and Sapporo (IODP-MI office). He provided an overview of the pros and cons. Items of discussion included, transportation, lodging, meeting facilities, dining. It was also agreed that the ultimate decision rests with the host and that we are simply providing some preferences at this point.

The Alberty Algorithm was used to rank the three possible meeting locations. The ranking was conducted by having each person write on a piece of paper their expertise and ranking for each of the three sites. Peter collected the slips of paper and Bill and Jack input the data into Excel to do the calculation. This process took about 20 minutes. So one important outcome of the exercise is that we need to find a more efficient way to do the ranking.

The results Makuhari (2.29), Sapporo (2.06) and Tokyo (1.95) Our host will use this information as one of many factors that lead to a final location decision.

Peter thanked everyone for all the hard work and announced that he would like to move to closed session and we would not be conducting any more open business at this meeting. Jack motioned for closed session, Leon seconded, approved by consensus. The EDP went into closed session at 0942

The EDP came out of closed session at 1245.

Motion to adjourn meeting was approved by consensus at 1250.

Appendices Listing

Appendix 1: Flemings – General; Agendum Item 1

Appendix 2: Fourth EDP Meeting Agenda; Agendum Item 2

Appendix 3: Becker – SCP Report; Agendum Item 4

Appendix 4: Eguchi – Updates from IODP-MI; Agendum Item 5

Appendix 5: Myers – Status of Engineering Developments; Agendum Item 13

Appendix 6: Ito – LTBMS FY06 Update; Agendum Item 10

Appendix 7: Grigar – DSS/PTM Update; Agendum Item 11a

Appendix 8: Grigar – LWC Update; Agendum Item 11

Appendix 9: Grigar – Third Party Tools; Agendum Item 11d

Appendix 10: Kyo – LTBMS FY07 Update; Agendum Item 11

Appendix 11: Goldberg – USIO/SODV Update; Agendum Item 15

Appendix 12: Pheasant – ESO Downhole Camera; Agendum Item 11c

Appendix 13: Sears – Reliability Engineering; Agendum Item 16

Appendix 14: Flemings – Memo from EDP SODV Committee; Agendum Item 15b

Appendices Listing

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Appendix 11: Goldberg – USIO/SODV Update; Agendum Item 15

Appendix 12: Pheasant – ESO Downhole Camera; Agendum Item 11c

Appendix 13: Sears – Reliability Engineering; Agendum Item 16

Appendix 14: Flemings – Memo from EDP SODV Committee; Agendum Item 15b

APPENDIX 1

EDP Meeting #4--NYC

1. Robert's Rules

2. EDP Mandate—How EDP Works

1.4.3. Robert’s Rules of Order

- Some basic principles and procedures apply to all decision making processes; these principles and procedures are referred to formally as 'parliamentary procedure'. Parliamentary procedures are the rules that help us maintain order and fairness in all decision-making processes. Robert's Rules of Order is one man's presentation and discussion of parliamentary procedure that has become the leading authority in most organizations today. The basic principles behind Robert's Rules of Order are:

1.4.3. Robert's Rules of Order

- someone has to facilitate and direct the discussion and keep order.
- all members of the group have the right to bring up ideas, discuss them, and come to a conclusion.
- members should come to an agreement about what to do.
- members should understand that the majority rules, but the rights of the minority are always protected by assuring those members the right to speak and vote.

1.4.3. Robert's Rules of Order

- Take up business one item at a time.
- Doing so maintains order, expedites business, and accomplishes the purpose of the organization.

1.4.3. Robert's Rules of Order

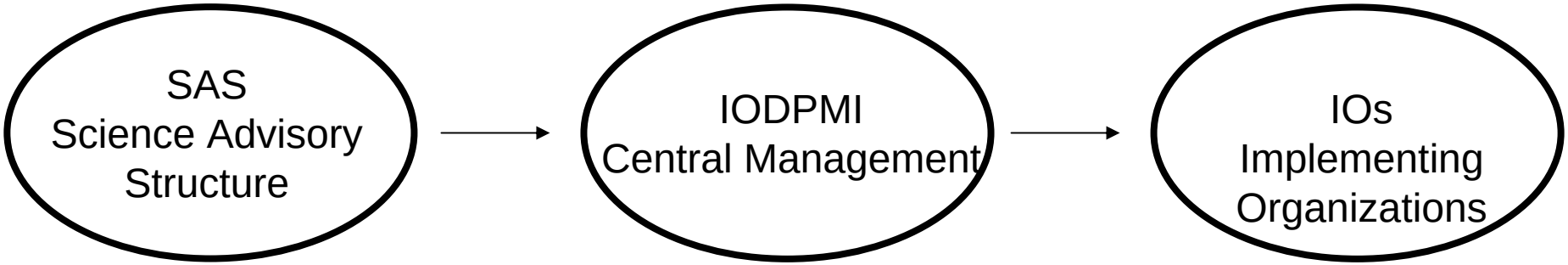
- Each meeting follows an order of business (agenda)
- Only one main motion can be pending at a time
- Only one member can be assigned the floor at a time
- Members take turns speaking
- No member speaks twice about a motion until all members have had the opportunity to speak

1.4.3. Robert's Rules of Order

- Promote courtesy, justice, impartiality, and equality.
- This ensures that everyone is heard, that members treat each other with courtesy, that everyone has the same rights, and that no individual or special group is singled out for special favors.

1.4.3. Robert's Rules of Order

- Members take their seats promptly when the chair calls the meeting to order, and conversation stops
- Members raise their hands to be recognized by the chair and don't speak out of turn
- In debate, members do not 'cross talk', or talk directly to each other, when another member is speaking
- Members keep their discussion to the issues, not to personalities or other members' motives
- Members speak clearly and loudly so all can hear
- Members listen when others are speaking



Scientific Advice &
Prioritization
(8 panels & committees)

Annual Program Plan

Drill Wells

EDP Mandate

1) Identify 2-5 year technological needs
   A) Assess off-the-shelf technology vs. R&D to achieve
   B) Determine appropriate modes to achieve engineering development
   C) Establish procedures to evaluate program contracts in support of technical design and innovation (are we obtaining high priority things we want)
2) Evaluate proposals to assess IODP technical readiness and recommend technological approaches and necessary engineering developments

1) Evaluate science proposals. Evaluate technical readiness, recommend approaches and necessary engineering development Evaluate E.D. proposals (e.g. FY ‘07 Proposals)

2) Advise Outside Projects (Ex. S.O.D.V.)

3) Develop 2-5 year vision for E.D.

   A) Absorb: I.O. priorities, science proposals, science mandate.

   B) Output: Prioritized vision (drive proposal process)

   C) Evaluate large E.D. proposals

4) Process Recommendations – How do we improve the process of E.D. to get better E.D. (Ex. Develop proposal process, develop testing process)

EDP Report:
Wed. Jan. 16, 2007

1. Brief Review
2. The Technology Roadmap

3rd EDP Meeting
June 27 - 29, 2006
Windischeschenbach, Germany

EDP Consensus 06-06-1: Approval of EDP Meeting #2 Minutes

EDP Consensus 06-06-2: Approval of EDP Meeting #3 Agenda

EDP Consensus 06-06-3: Proposal Review

EDP Consensus 06-06-4: EDP Technology Roadmap

EDP Consensus 06-06-5: EDP Meeting #4 –New York, Jan 17-19

EDP Consensus 06-06-6: EDP Meeting #4 Agenda

EDP Consensus 06-06-7: High Priority Eng. Developments

Proposal Review

- **EDP Consensus 06-06-3: IO Proposals**
- IODP-MI has asked EDP for comment on two proposals:
- USIO Engineering Proposal FY 08 Pulse Telemetry System Acquisition and Implementation
- CDEX Engineering Development Proposal Program Plan for US Fiscal Year 2007
- EDP supports the concepts presented as being aligned with the Initial Science Plan. However, the feasibility studies that preceded each of these proposals have not been completed. Thus, EDP does not have a proper basis to make further comment.

EDP Consensus 06-06-4: EDP Technology Roadmap

- A draft of the EDP Technology Roadmap will be recorded as an appendix to the EDP Meeting Minutes. This document is hereby released as a public document (Appendix 17). It is a first draft and it is a work in progress. EDP will continue to refine the EDP Technology Roadmap at future EDP meetings.

EDP Technology Roadmap

1.0 Executive Summary

2.0 Introduction and EDP Roles and Responsibilities

3.0 The Technology Roadmap

3.1 Technology Challenges Facing the IODP

3.2 Pathways to Engineering Development Solutions

Engineering Developments: Sampling, Logging, and Coring

Engineering Developments: Drilling/Vessel Infrastructure
Engineering Developments: Borehole Infrastructure

3.3 Process of Engineering Development

3.0 The Technology Roadmap

- A long term vision (> 2 years) of priorities in engineering development that are vital to achieve the science goals of the IODP.
  - Evolving document will undergo major review at EDP's June meeting.
  - Founded on scientific goals of the IODP as enunciated in the Initial Science Plan and active IODP Proposals.
  - Assess the ED needs for achieving these initiatives and provide a very rough estimate of timelines and likely costs, and provide some sort of prioritized long-term sequence for such developments. It will tie these priorities to the needs for achieving the science plan.

Roadmap Purpose

- Motivate engineering development (SAS, IODP-MI, IO's, Funding Orgs, etc)
- Induce proposals for engineering development
- Identify common engineering challenges between platforms
- Strengthen process of engineering development
- Focus thinking to determine what is important

3.1 Technology Challenges

Table 1: The ISP

1	**The Deep Biosphere and the Subseafloor Ocean**
1a	Initiative: The Deep Biosphere
1b	Initiative: Gas Hydrates
2	**Environmental Change, Processes and Effects**
2a	Internal Forcing of Environmental Change
2b	Initiative: Extreme Climates
2c	External Forcing of Environmental Change
2d	Environmental Change Induced by Internal and External Processes
2e	Initiative: Rapid Climate Change
3	**Solid Earth Cycles and Geodynamics**
3a	Formation of Rifted Continental Margins, Oceanic LIPs and Oceanic Lithosphere
3b	Initiative: Continental Breakup and Sedimentary Basin Formation
3c	Initiative: Large Igneous Provinces
3d	Initiative: 21st Century Mohole
3e	Recycling of Oceanic Lithosphere Into the Deeper Mantle and Formation of Continental Crust
3f	Initiative: Seismogenic Zone

3.1 Technology Challenges

Table 2: Technology Challenges for the IODP

(To achieve the scientific goals of ISP, there are a range of technology challenges that require engineering development.)

1. Expand temperature tolerance
2. Drill/Instrument unstable lithologies and geo-pressures
3. Improve core recovery and quality
4. Improve depth control and cross-instrument depth correlations
5. Develop long-term borehole monitoring systems and perform in situ experiments
6. Improve well directional control
7. Make measurements under in-situ conditions
8. Sample and analyze under in situ conditions
9. Improve hard-rock drilling capabilities
10. Improve remote and post-deployment capabilities
11. Improve reliability
12. Extend depth capabilities
13. Improve operability under strong current, severe sea state

3.1 Technology Challenges

Table 2: Item 3: Improve core recovery and quality

At least 4 settings where core recovery has been a significant problem in DSDP/ODP/IODP history.

- **Drill fault zones (ISP Science Theme 3 and the Seismogenic Zone Initiative).**
- **Young lava flows**
- **Shallow poorly indurated regimes (e.g. unconsolidated sands and/or layered hard soft lithologies)**
- **Initiation of coring (on bare and sloping seafloors)**
- **Geotechnical cores (deformed by APC)**

3.1 Technology Challenges
Table 2: Item 9

9. Improve hard-rock drilling capabilities

Challenges in drilling hard rock include: 1) borehole initiation on sloping sea floors or in terrains with little or no sediment cover 2), advancing the drill bit through unstable formations, and 3) development of technologies that allow more rapid rate of penetration in homogeneous lithologies (i.e., even in the event of reduced recovery such as in sheeted dike sequences) is required for total crust penetration.

3.1 Technology Challenges
Table 2: Item 11: Improve reliability

- Institute reliability program for both drilling and borehole monitoring operations. This program would be focused across all activities in a given type of operation, rather than attempting to increase reliability on a single project basis. Tasks would include maintaining data bases on operating parameters and failure modes, root cause failure analysis on breakdowns, quality control and assurance on system components, and recommendations on operating procedures and limits. Most large offshore installations in the petroleum industry employ surveillance and reliability engineers as a dedicated job role.

- This is a different engineering discipline than project engineering, which has a different focus based on cost, schedule, and functionality, with reliability as one of many other priorities.

3.2 Engineering Development Solutions

Sampling, Logging, and Coring (27)
Drilling/Vessel Infrastructure (31)
Borehole Infrastructure (24)

Kitchen Sink Approach: All entries are welcomed…through prioritization, the important items are highlighted.

Did not discriminate SOC/POC etc.

Range from Existing Technology (i.e. buy off shelf) (E), Modification (M), Innovation (I)

Range from cheap to really expensive

ED B-10 Real time drilling parameter acquisition while coring

Transmit from down-hole sensor sub (DSS) in real time the drilling dynamics data to the surface like weight on bit, torque on bit, annular pressure and temperature. Most probable technique will be mud-pulsed telemetry to the surface. A subset of the same data acquired by the logging-while-coring system can be continuously transmitted to the rig floor. The real-time knowledge of weight on bit, and torque on bit can be used to modify drilling procedures to further optimize coring conditions.

ED Cat	ED #	Engineering Development	Requirements	Science Goal	ISP Technology Challenges	Availability
		Description of Development	What needs to be accomplished?	How does it fit with ISP? Refer to Table 1	Refer to Table 2	Existing Technology (i.e. buy off shelf) (E), Modification (M), Innovation (I)
A	1	Thin-walled, geotechnical core sampler	Acquire minimally disturbed geotechnical cores	all	3,5,7,8,11	I E

ED Cat	ED #	Engineering Development	Requirements	Science Goal	ISP Technology Challenges	Availability
		Description of Development	What needs to be accomplished?	How does it fit with ISP? Refer to Table 1	Refer to Table 2	Existing Technology (i.e. buy off shelf) (E), Modification (M), Innovation (I)
B	10	Real Time Drilling Paramater Acquisition while coring	pressure, weight on bit	all	2, 3, 4, 7, 8, 9, 10, 11	M

3.3 Process of Engineering Development

1. How: Concept, Design, Fabrication, Implementation

2. Who: Opportunity for all institutions to meet engineering development needs. Emphasis on using proven technology where available

3. Review: Develop step-wise procedure for engineering development and review

High Priority Items

- **EDP Consensus 06-06-7:**

- EDP, in closed session, discussed and debated the merits of each of the Engineering Development items in the Roadmap. The EDP has formulated a list of about 10 unranked items in each of the three sub-groups ((1) Sampling, Logging, Coring; 2) Drilling, Vessel Infrastructure, 3) Borehole Infrastructure) that are of high priority (Table 1.0, below). ***No effort*** has been made to establish relative priorities between sub-groups. EDP will continue to discuss the relative merit of every item in the Roadmap and it is expected that priorities will evolve over time.

Unranked – Higher Priority Engineering Developments

Sampling, Logging, Coring;	Drilling/Vessel Infrastructure	Borehole Infrastructure
A-1. Thin-walled short-stroke Geotechnical Sampler	B-1. Large Diameter Pipe	C-1. High temperature electronics and sensors
A-2. Cone Pen. /Remote Vane	B-2. ROV Guided Logging Tools	C-2. Temperature tolerant drilling muds/drilling bits
A-4. Hard rock re-entry syst.	B-3 Heave Compensation	C-5. Packer-like tech dev
A-5. Coring guidelines, operations manuals	B-5. Seabed Frame	C-7. Reliable wellhead seals and hanger seals
A-13a. Core orientation on standard coring tools-APC	B-6. Pressure Compensated Bumper sub	C-8. Electric, optical fiber and fluid feedthroughs
A-13b. core orientation on standard coring tools-rock	B-7. Rig Instrumentation System	C-13. Microbiology sampling techniques
A-17. Pressure coring systems	B-10. Real time drilling data acquisition while coring.	C-14. Development of low power sensors
A-18. Pressurized Sample Transfer 4. (autoclave)	B-11. Formation logging while coring	C-16. Systems reliability for LTMS
A-22. Upgrade to XCB system	B-25 Improve expandable casing system	C-17. ROV-serviceable wellheads/submarine cable connects.
A-23. Anti-contamination system (gel core barrel)		C-19. Design standards for electrical, communications,

Messages:

1. Drill String Stabilization important (5/9 of Drilling/Vessel Group)

2. Better Coring Tools (8/10 sample, log core)

3. Temperature & Reliability for long term monitoring (4/10)

A portfolio of projects*

What is to be done?

1. Review Technology Roadmap

2. Are there major entries that need to be re-written?

3. Are there new entries

4. Should anything be deleted?

5. Is there anything so high priority it needs to be elevated now?

APPENDIX 2

IODP Engineering Development Panel
4th Meeting, 17-19 January 2007
New York City, New York, U.S.A.

AGENDA

MEETING DATES & TIMES:
17 January (Wednesday) – 19 January (Friday) 2007 08:30 – 17:00 (will end at noon on Friday)
MEETING LOCATION:
BP Building, 34th Floor
535 Madison Avenue, New York, NY 10022
Phone +1 (212) 421 5010
http://maps.yahoo.com/maps_result?addr=535+madison+avenue&csz=10022&country=us&new=1&name=&qty

Wednesday, Jan 18
8:00 AM—Meet & Greet and Continental Breakfast
8:30 AM—Start Meeting

1. Welcome, meeting logistics, safety, introduction, Robert's Rules
2. Approval of meeting agenda
3. Approve Minutes from EDP Meeting #3
4. SPC Report (Becker/Flemings/Myers)
5. SAS Activity Report (Eguchi)

10:00-10:15 AM Break

6. Status of FY08 Engineering Development Plan (IODP-MI)
7. Review of Technology Roadmap as of August 2006 (Flemings)

12:00-1:00 Lunch

8. Engineering Development Process Implementation (Myers)
    a. Web site
    b. Proposal Process
    c. Future Steps

3:00-3:15 Break

9. 3:00-5:00 RoadMap Session 1

5:00 End of Day

6:00-7:30 Reception (hors d'oeuvres (spouses/guests invited))

Thursday, Jan 18
8:00 AM—Meet & Greet and Continental Breakfast
8:30 AM—Start Meeting

10. Review of FY 06 activities (FY-1)
    a. CDEX—Long Term Borehole Monitoring Feasibility Study
11. Status of FY07 activities (FY)
    a. USIO—Pulsed Telemetry Module & Logging While Coring
    b. CDEX—Long Term Borehole Monitoring

c. ESO—Down Pipe Camera System
d. Externally funded projects that IO's are monitoring (related to 3rd Party tools)

10:00-10:15 AM Break

12. Final EDP comments on FY 08 Eng. Plan (FY+1) (EDP-led)
13. REVCOM issues related to Engineering development (IODP-MI)
14. SSEPS Recommendation on Borehole Seismometers

12:00-1:00 Lunch

15. SODV Update
    a. USIO Report
    b. Review of EDP Comments on SODV (Flemings)
16. Surveillance and Reliability Discussion (Sears)

3:00-3:15 Break

17. RoadMap Session 2

5:00 Break

Friday, Jan. 18

8:00 AM—Meet & Greet and Continental Breakfast
8:30 AM—Start Meeting

18. 3rd Party Tools Review (Myers)
19. Finalize and Review Roadmap Additions
20. **10:00-10:15 AM Break**
21. Select Meeting Location
22. Finalize Consensus Items and Recommendations

12:00 Formal Meeting Ends
12:00-1:00 Lunch (all depart BP building by 1:30 pm)

APPENDIX 3

SPC/SASEC Report to EDP
New York, Jan 2007, K. Becker

1. Update on FY07-09 schedule development
2. Proposals to be ranked at March 2007 SPC
3. Report from first two SAS Executive Committee (SASEC) meetings
4. Update on mission implementation
5. SASEC WG on SAS - EDP aspects

FY07/08/09 Schedule Development - Chikyu and MSP

SPC Consensus 0608-04: The SPC approves the science plan and operations schedule of the Chikyu for NanTroSEIZE non-riser and riser operations (Proposals 603A-Full2, 603B-Full2, 603C-Full) in FY2008 and early FY2009 as recommended by the NanTroSEIZE Project Management Team in July 2006 and the Operations Task Force (OTF) in August 2006.

SPC Consensus0608-5: The SPC approves the mission-specific platform operations for the Great Barrier Reef component of Proposal 519-Full2 South Pacific Sea Level in FY2008-09, provided that (a) the proponents complete the proposed site surveys and submit the site-survey data in a timely and satisfactory manner and that (b) a successful EPSP review is completed in a timely manner as defined by the Operations Task Force (OTF).

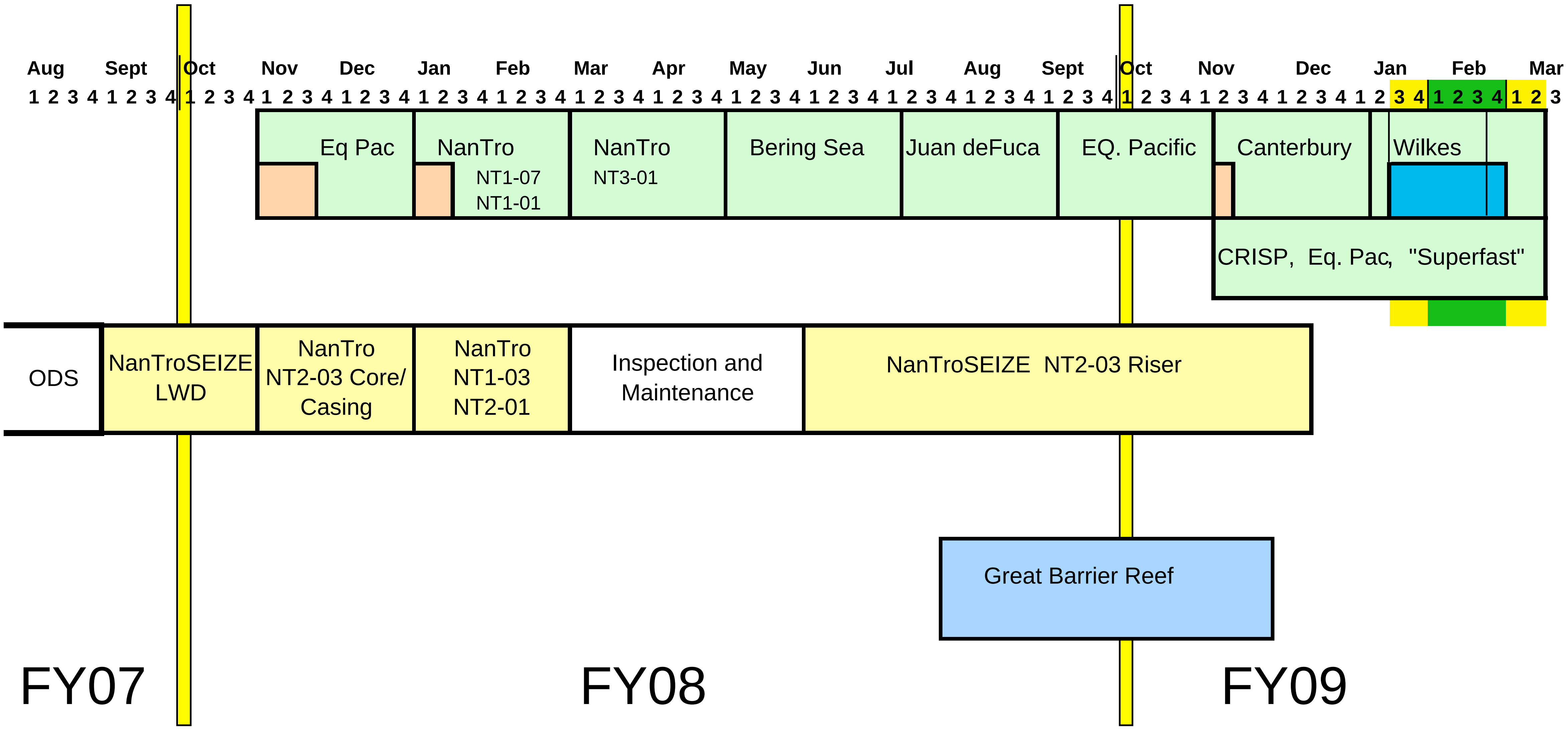
FY07/08/09 Schedule Development - SODV (start date delayed to Nov 1 2007)

SPC Consensus 0608-03: The SPC approves the science plan and operations schedule of the U.S. scientific ocean drilling vessel (SODV) as recommended by the Operations Task Force for FY2008 and earliest FY2009, as well as the readjustments required in the event of a delay in the starting date for SODV operations. The recommended expeditions will begin in November 2007 and proceed as follows:

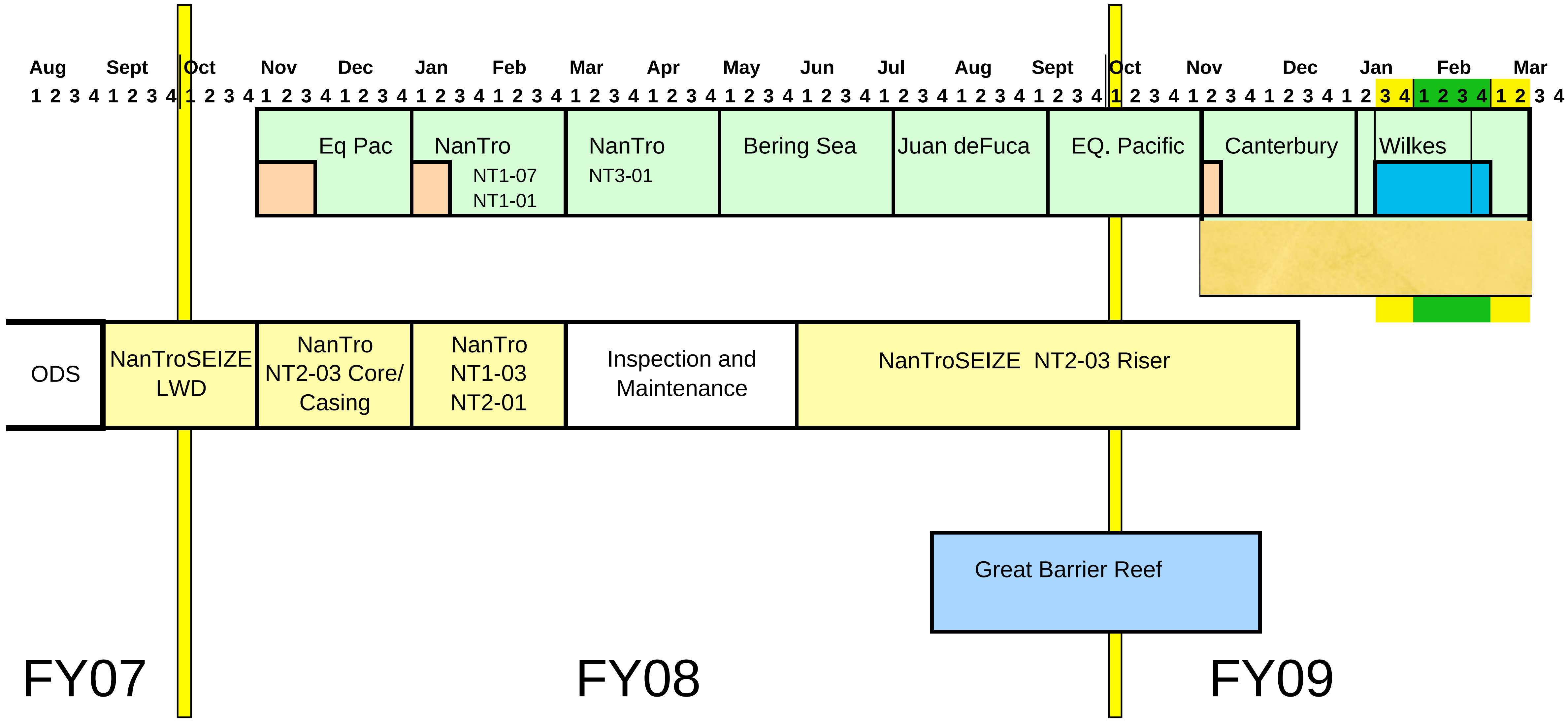
- Equatorial Pacific Paleogene Transect I (626-Full2)
- NanTroSEIZE Stage I (603A-Full2, 603B-Full2, 603C-Full)
- NanTroSEIZE Stage I continued
- Bering Sea Plio-Pleistocene Paleoceanography (477-Full4)
- Juan de Fuca Flank Hydrogeology II (545-Full3)
- Equatorial Pacific Paleogene Transect II (626-Full2)

In the event of a slight delay in the start of SODV operations, the entire schedule should simply shift later, as long as good weather windows remain open for the Bering Sea and Juan de Fuca expeditions. In the event of a longer SODV delay that would preclude such a simple shift, the first Equatorial Pacific expedition would be deferred until later and the schedule would begin with NanTroSEIZE Stage I operations.

Summary FY07-09 Schedule as of August SPC



Summary FY07-09 Schedule as of Jan 2007



Successful Canterbury Basin gas hazard review at January 2007 EPSP

FY09/10 Schedule Development

Projected SODV Operations

OTF presented trade-offs for several ship-track models based on existing pool of approved proposals. One model was a clear favorite, based on the critical mass of highly-rated proposals and the imperative to maximize IODP science.

SPC Consensus 0608-17: The SPC approves a ship-track model for SODV operations in FY2009-10 that would proceed clockwise through the Pacific Ocean, assuming a start at Wilkes Land.

FY09/10 SODV schedule to be developed from pool of proposals remaining at OTF plus those ranked and forwarded at the March 2007 SPC meeting.

Projected Chikyu and MSP Operations

Chikyu: Some combination of further NanTroSEIZE work and riserless operations in Indian and W. Pacific Oceans, to be developed by OTF.
MSP - to be determined after March 2007 rankings.

Results of March 2006 Rankings

	Proposal #	Short Title	Mean	Stdv
1	677-Full	Mid-Atlantic Ridge Microbiology	2.4	2.06
2	603D-Full2	NanTroSEIZE Observatories	2.9	1.85
3	637-Full2	New England Shelf Hydrogeology	3.9	3.57
4	605-Full2	Asian Monsoon	5.9	3.57
5	549-Full6	Northern Arabian Sea Monsoon	6.0	3.22
6	537A-Full5	Costa Rica Seismogenesis Project Phase A	6.6	3.50
7	537B-Full4	Costa Rica Seismogenesis Project Phase B	8.6	3.37
8	552-Full3	Bengal Fan	9.7	3.89
9	505-Full5	Mariana Convergent Margin	10.5	3.61
10	659-Full	Newfoundland Rifted Margin	10.6	3.08
11	654-Full2	Shatsky Rise Origin	11.1	3.40
12	555-Full3	Cretan Margin	11.5	4.69
13	667-Full	NW Australian Shelf Eustasy	11.8	3.99
14	535-Full5	Atlantis Bank Deep	12.2	3.54
15	584-Full2	TAG II Hydrothermal	12.5	4.24
16	618-Full3	East Asia Margin	13.0	3.39
17	547-Full4	Oceanic Subsurface Biosphere (OSB)	13.8	2.91

Red = identified for forwarding to OTF for FY08/09/10 schedule development

Green shading = site survey issues to be resolved before forwarding

Forwarded to OTF for FY08/09/10

		Proposal #	Short Title	Mean	Stdv
Group 1	1	677-Full	Mid-Atlantic Ridge Microbiology	2.4	2.06
	2	603D-Full2	NanTroSEIZE Observatories	2.9	1.85
	3	637-Full2	New England Shelf Hydrogeology	3.9	3.57
	4	605-Full2	Asian Monsoon	5.9	3.57
	5	549-Full6	Northern Arabian Sea Monsoon	6.0	3.22
	6	537A-Full5	Costa Rica Seismogenesis Project Phase A	6.6	3.50
Group 2	7	537B-Full4	Costa Rica Seismogenesis Project Phase B	8.6	3.37
	8	552-Full3	Bengal Fan	9.7	3.89
	9	505-Full5	Mariana Convergent Margin	10.5	3.61
	10	659-Full	Newfoundland Rifted Margin	10.6	3.08
	11	654-Full2	Shatsky Rise Origin	11.1	3.40
	12	555-Full3	Cretan Margin	11.5	4.69
	13	667-Full	NW Australian Shelf Eustasy	11.8	3.99
	14	535-Full5	Atlantis Bank Deep	12.2	3.54
	15	584-Full2	TAG II Hydrothermal	12.5	4.24
	16	618-Full3	East Asia Margin	13.0	3.39
	17	547-Full4	Oceanic Subsurface Biosphere (OSB)	13.8	2.91

Group 1 proposals remain at OTF until scheduled.
Group 2 proposals re-ranked at March 2007 SPC if not scheduled.
Green-shaded proposals await resolution of site survey issues.

Proposals to be ranked, March 2007 SPC

Deep biosphere and subseafloor ocean

505-Full5 Mariana convergent margin
547-Full4 Oceanic subsurface biosphere
555-Full3 Cretan margin
584-Full2 TAG II hydrothermal
633-Full2 Costa Rica mud mounds * newly forwarded from SSEP

Environmental Change, Processes, and Effects

548-Full2 Chixculub K-T impact crater
552-Full3 Bengal Fan
581-Full2 Late Pleistocene coralgal banks
618-Full3 East Asia margin
644-Full2 Mediterranean outflow * newly forwarded from SSEP
661-Full2 Newfoundland sediment drifts * newly forwarded from SSEP
667-Full NW Australian shelf eustasy

8.3. Solid Earth Cycles and Geodynamics

522-Full5 Superfast Spreading Crust * newly forwarded from SSEP
535-Full5 Atlantis Bank
537B-Full3 Costa Rica seismogenesis phase B
612-Full3 Geodynamo * newly forwarded from SSEP
654-Full2 Shatsky Rise origin
659-Full Newfoundland rifted margin

Highlights of First SASEC Mtg (July 2006)

- SASEC formally approved FY07 program plan (MSP: New Jersey Sea Level, Chikyu: initial NanTroSEIZE LWD operations)
- SASEC formed a WG to reevaluate SAS structure, to report at March 2007 SASEC meeting
- SASEC decided to update Initial Science Plan by 2008, building on IODP workshops in 2006/2007 (This is a separate activity from process that will start in a few years to write a new science plan for the second 10 years of IODP.)
- For IODP-MI sponsored workshops in 2007, SASEC recommended proposed geological hazards workshop, and asked for a revised proposal for LIPs workshop
- SASEC asked SPC to continue with expedition science assessments and approved a process for long-term IODP evaluation via thematic review committee(s)

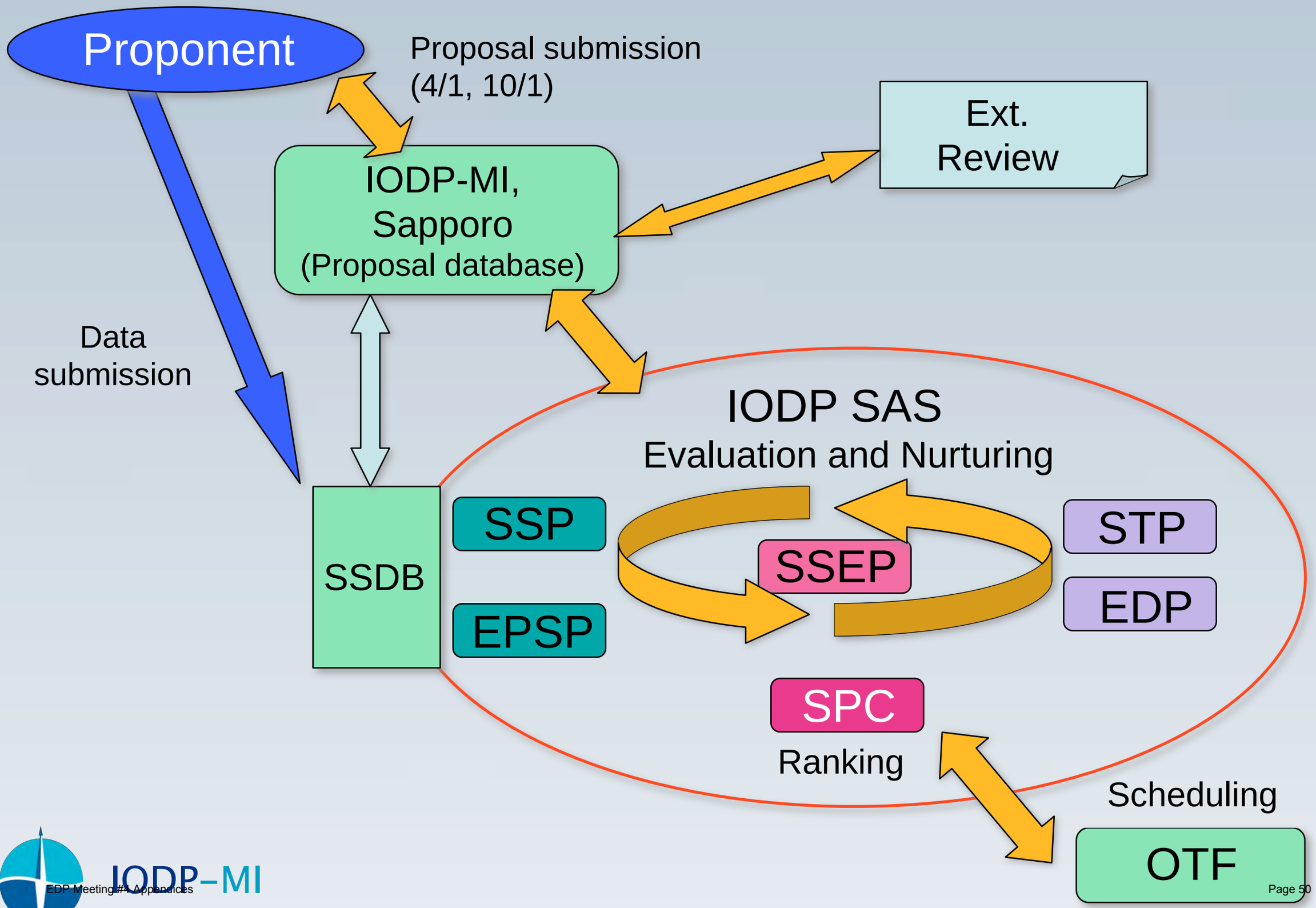
Highlights of Second SASEC Mtg (Nov 2006)

- Mission Implementation: SASEC modified slightly and then approved the draft implementation plan produced by the mission implementation WG. Lead agencies asked for two wording changes, and final plan posted at www.iodp.org
  - Call for mission proposals (and normal proposals) to be issued over winter with April 1 deadline.
  - SSEP will review these proposals at May 2007 meeting.
  - An external review panel appointed by SASEC will independently review the mission proposals.
  - SPC will review mission proposals at August 2007 meeting, rank them if necessary, and may designate initial mission(s).
  - IODP-MI would then form missions teams to write component proposals; these might need EDP participation.
- SASEC asked its SAS WG to poll the IODP community in considering how SAS should be best structured for Phase II.

SASEC Working Group on SAS

- SASEC Consensus 0706-07: SASEC appoints a subcommittee consisting of Yoshi Kawamura (non-voting), Mike Bickle, Keir Becker, Jim Mori, David Divins (non-voting), and Hans Christian Larsen (non-voting) to review the Science Advisory Structure and recommend any changes to optimally configure its activities as IODP enters Phase II. The subcommittee should also recommend any changes in structure necessary to integrate missions into the IODP proposal review process. The subcommittee should submit its recommendation to SASEC at its spring 2007 meeting. The committee should select a chair at or before its first meeting.
- KB elected chair; first meeting Oct 31 before Nov 1-2 SASEC.
- Mission implementation working group did not recommend any signficant changes to SAS for implementing missions.
- IODP-MI BoG formed committee to review IODP-MI (chaired by past SPC chair Mike Coffin), and that mandate includes reviewing "efficiency" of SAS and SAS/IODP-MI relations.

IODP Proposal Process



SASEC WG on SAS - EDP Aspects

- EDP invited to respond to SAS WG questionnaire during January timeframe. (4 questions on next 2 slides)
- Initial WG thoughts are that EDP is functioning very well, and that the EDP - ED Task Force approach to prioritization and then implementation is a good model
- In fact, STP could benefit from an approach similar to that adopted for EDP, with a long-term technology roadmap and a regular cycle to the two annual meetings, one focusing on shorter term actions, the other emphasizing the long-term view.
- Is the EDP membership adequate/sufficient/too large?
- Should EDP membership terms be longer?
- How should EDP provide input to mission teams as needed?

SASEC Working Group on SAS - Questionnaire

Looking forward to SAS performance as IODP enters Phase II with full multi-platform operations:

(1) Describe up to three issues you (might) have with SAS in terms of its quality and efficiency in (a) reviewing IODP proposals and/or (b) delivering advice to IODP-MI and the IODP Implementing Organizations.

(2) Describe up to three ways in which you think the performance and efficiency of SAS evaluation of IODP drilling proposals might be improved.

SASEC Working Group on SAS - Questionnaire

(3) Are there aspects of the SAS advisory activities for which (a) more resources are needed for more effective performance or (b) less resources could produce satisfactory (or even better) performance. (In this question, SAS "resources" could encompass panels per se, panel meeting schedules, levels and terms of panel membership, or new concepts you might suggest.)

(4) Are there ways to improve the effectiveness of SAS interactions and communications with any elements of the IODP community (IODP agencies, IODP-MI, IO's, PMO's, proponents, expedition participants)?

Please respond directly to the chair of the working group, kbecker@rsmas.miami.edu by 31 January 2007.

SASEC Update of Initial Science Plan

- SASEC Consensus 0706-11: SASEC, as the executive authority of SAS, plans to update the Initial Science Plan by the end of 2008. Workshops and symposia to be held in 2006 and 2007 will provide input to this process, and community input will be solicited through the national committees, an article in the Scientific Drilling journal, an EOS advertisement, and at the AGU Town Meetings. A subcommittee of editors will be appointed by SASEC at their spring 2007 meeting and will be expected to deliver a final manuscript by summer 2008. SASEC will evaluate the final draft at its summer 2008 meeting. Evaluation may consist solely of SASEC review or may require external evaluation by summer 2008.

- This is a separate activity from the process that will start in a few years to write a new science plan for the second 10 years of IODP. That new plan will be needed ~1-2 years in advance of renewal in 2013.

Mission Implementation WG Report

- Mission Implementation WG members: S. Humphris and Y. Tatsumi for SASEC, K. Becker for SPC, M. Underwood for SSEP, and M. Talwani for IODP-MI.
- Mission Implementation WG met mid-August, came to agreement on several important aspects, and on August 25 released draft report for SPC review.
- WG agreed not to proceed with "fast-track" special process in first year to designate 1-2 initial missions.
- At August SPC meeting, several critical comments received and working group revised plan accordingly.
- Revised Mission Implementation Plan posted on IODP-MI site in September, approved by SASEC Nov 1-2.
- Two wording changes requested by Lead Agencies as of Dec 5; revised plan posted at www.iodp.org/missions.

Structure of Mission WG Report

- Introductory Statement
- Goals of Missions
- Mission Definition - from Nov 2005 SSEP
- Overarching Principles of Mission Designation + Implementation
- Call for Mission Proposals - annual, first call for April 1 2007
- Content and Structure for Mission Proposals
- Review of Mission Proposals and Mission Designation
- Mission Implementation - three stages + support levels
  - Stage 1 Mission Scoping
  - Stage 2 Mission Implementation (i.e., actual execution)
  - Stage 3 Phasedown
- Mission Evaluation Process within SAS (after initial designation)
- Critical Needs for Successful Implementation of Mission

APPENDIX 4

#4 Engineering Development Panel Meeting

New York City, NY
U.S.A.
17 - 19 January 2007

Nobu Eguchi
IODP-MI Science Coordinator

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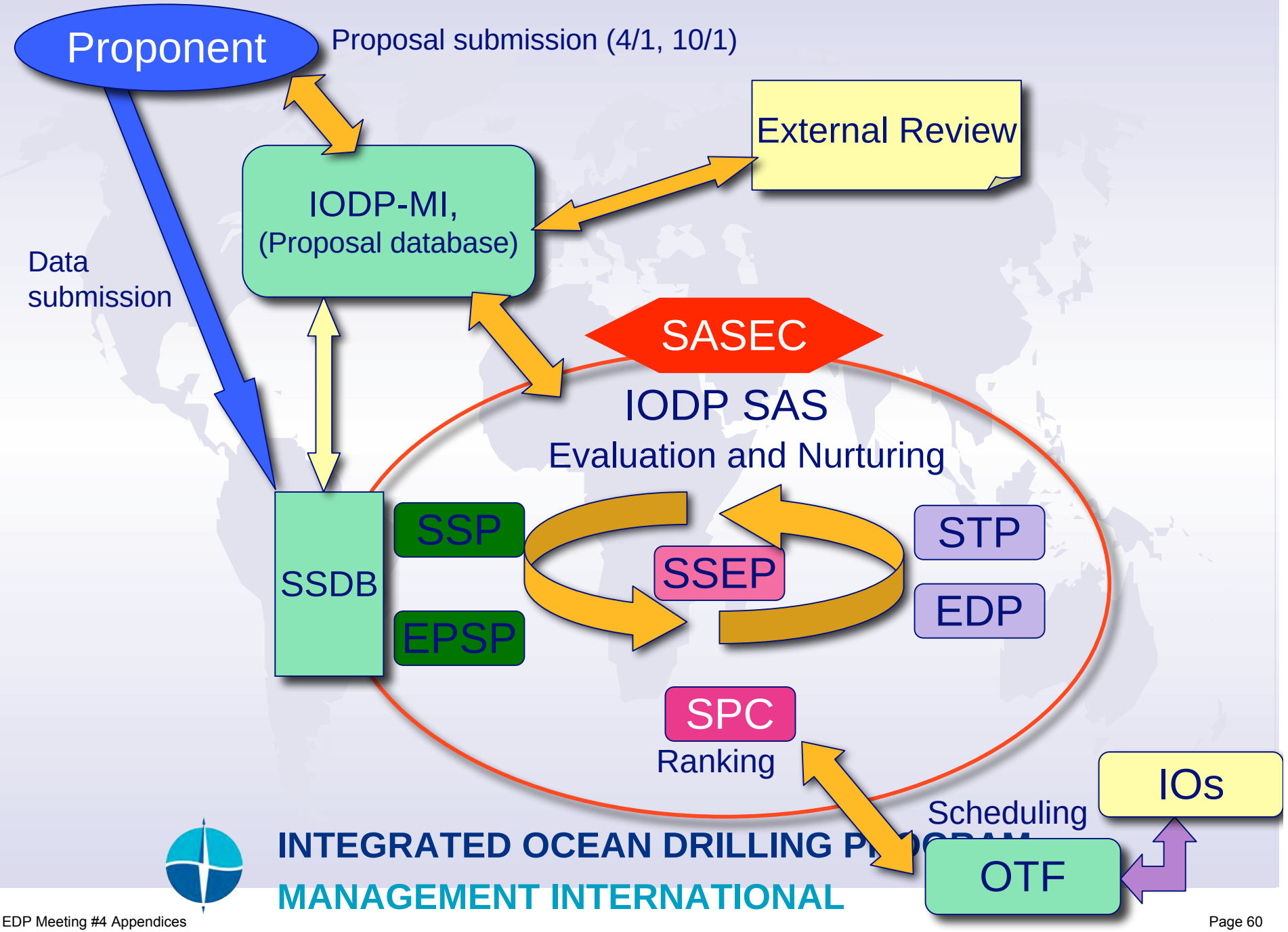
SAS Activities Outline

- Review of IODP proposal flow
- SAS meeting schedule
- Proposal statistics: recent submissions & active proposals
- Miscellaneous items


Proponent
Proposal submission (4/1, 10/1)
External Review
IODP-MI,
(Proposal database)
Data
submission
SASEC
IODP SAS
Evaluation and Nurturing
SSDB
SSP
EPSP
SSEP
STP
EDP
SPC
Ranking
Scheduling
IOs
OTF

IODP SAS Meeting Schedule

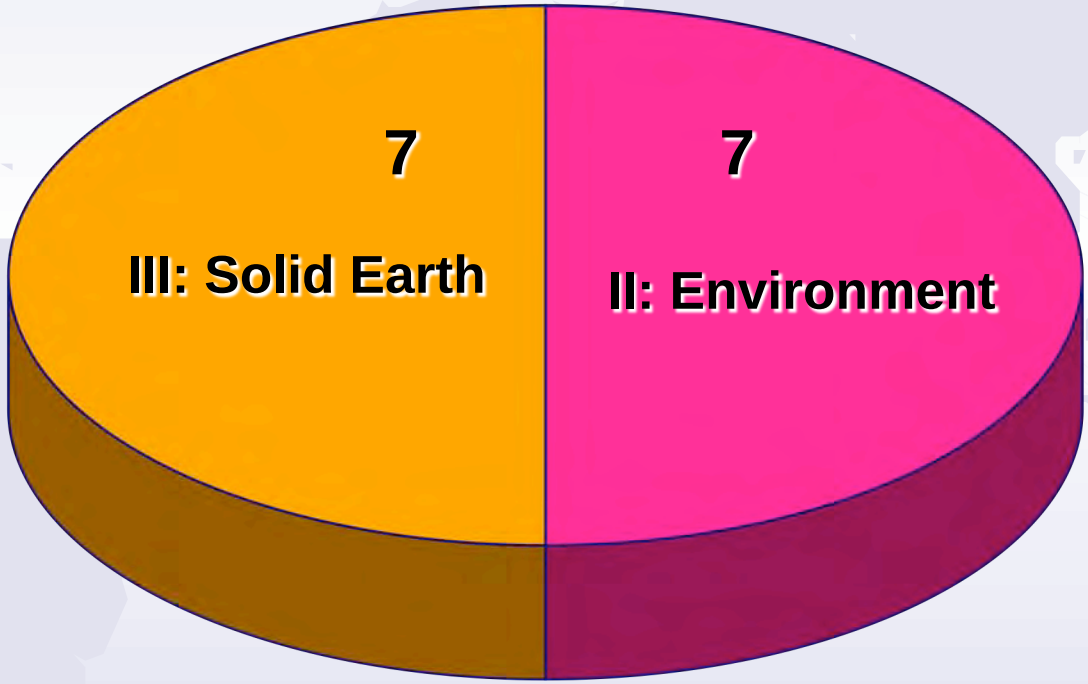
IIS PPG	7-8 Jul 2006	Den Haag, the Netherlands
SASEC	11-12 Jul 2006	Washington, DC, USA
SSP	24-26 Jul 2006	Sapporo, Japan
SPC	28-31 Aug 2006	Bergen, Norway
SASEC	1-2 Nov 2006	Odawara, Japan
SSEP	13-16 Nov 2006	Sapporo, Japan
STP	7-9 Dec 2006	San Francisco, USA
EPSP	09-10 Jan 2007	Yokohama, Japan
HG DPG	12-13 Jan 2007	Honolulu, USA
EDP	17-19 Jan 2007	New York, USA
IIS PPG	19-20 Jan 2007	Houston, USA
SSP	20-22 Feb 2007	La Jolla, USA
SPC	4-7 Mar 2007	Osaka, Japan
SASEC	*22-23 Mar 2007*	*Videoconference*
SSEP	*29 May-1 Jun 07*	*Houston, USA*
STP	*4-6 Jun 2007*	*Beijing, China*
EPSP	*11-12 Jun 2007*	*La Jolla, USA*
SASEC	*25-26 Jun 2007*	*Bremerhaven, Germany*

SSEP Recommendation

SSEP Consensus 0611-5:
The SSEP approved to include discussion on technologies for difficult drilling and request a liaison from the Engineering Developing Panel to participate in the next SSEP meeting.

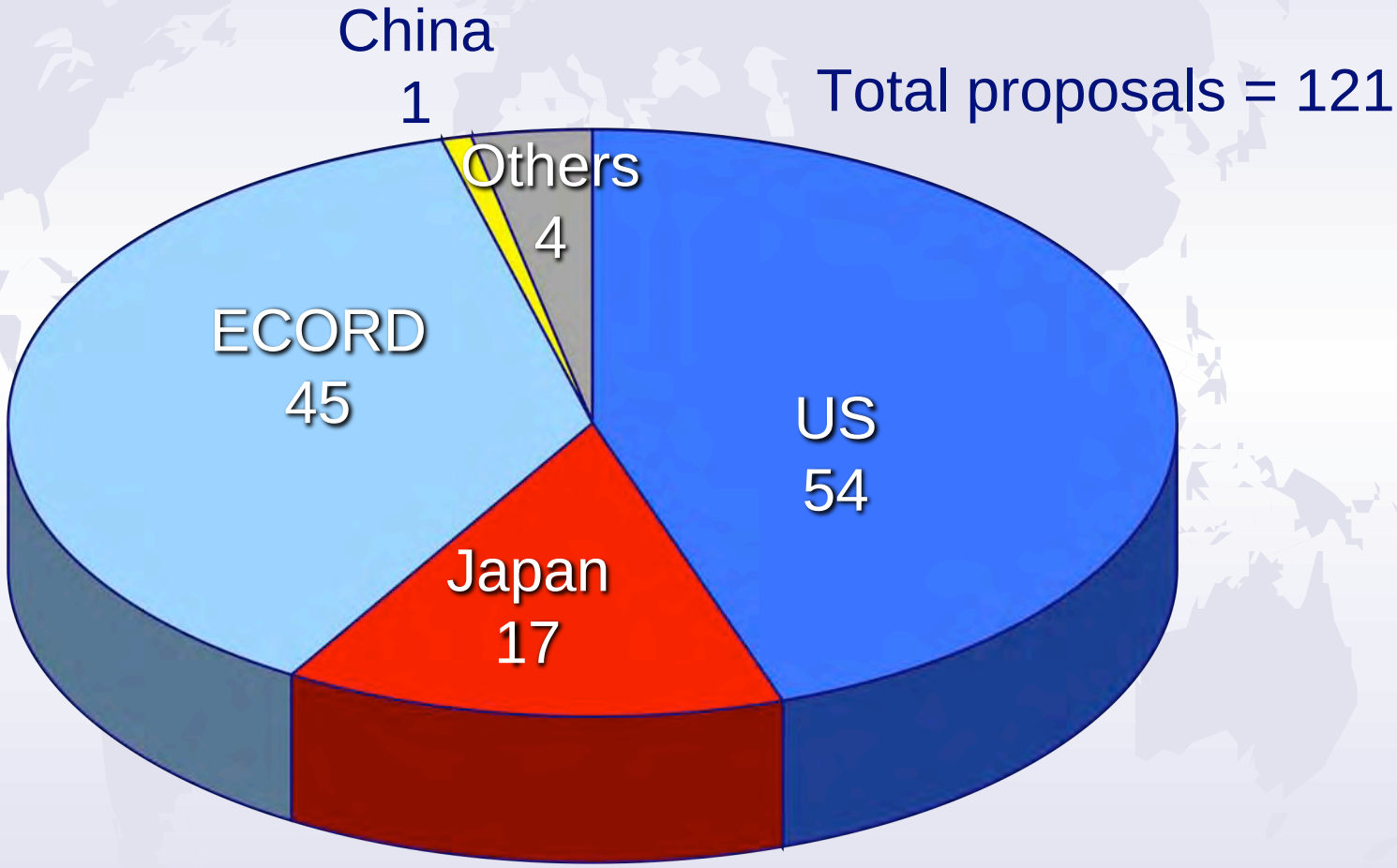
Submissions for October 2006 deadline: 14

By ISP Themes



Proposal distribution by IODP Members

(by lead proponent)



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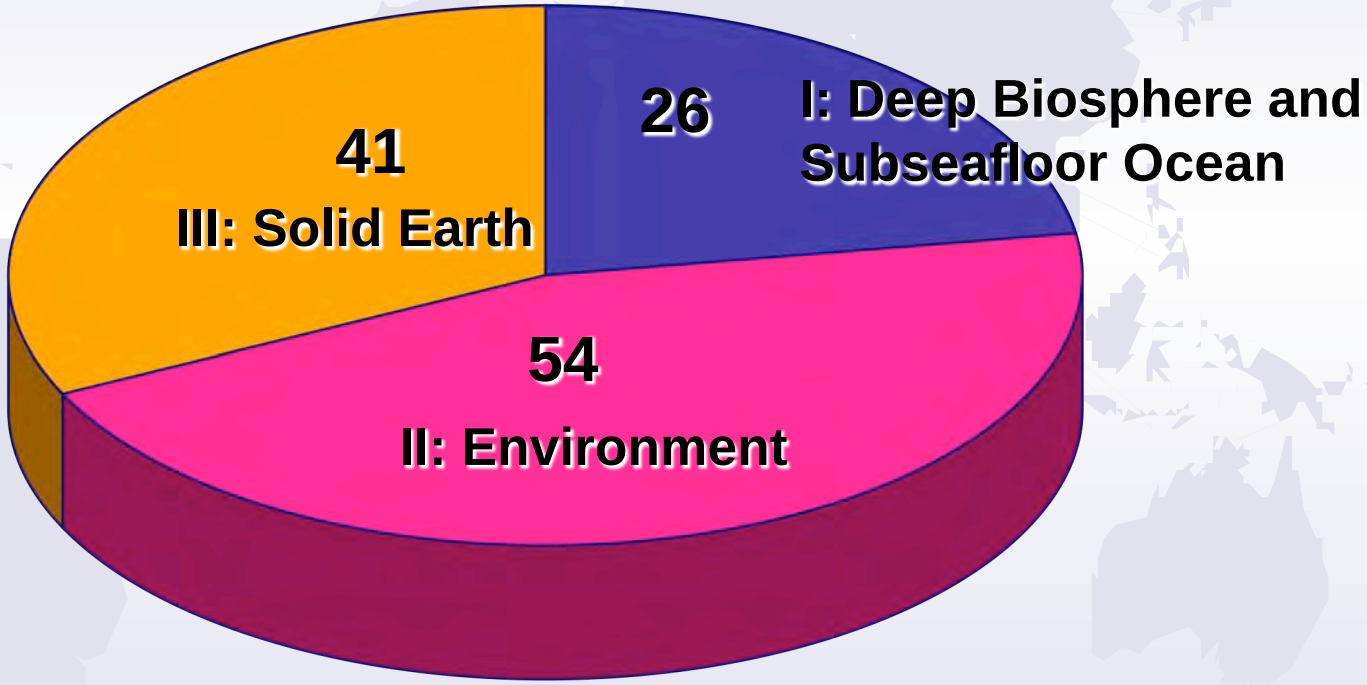
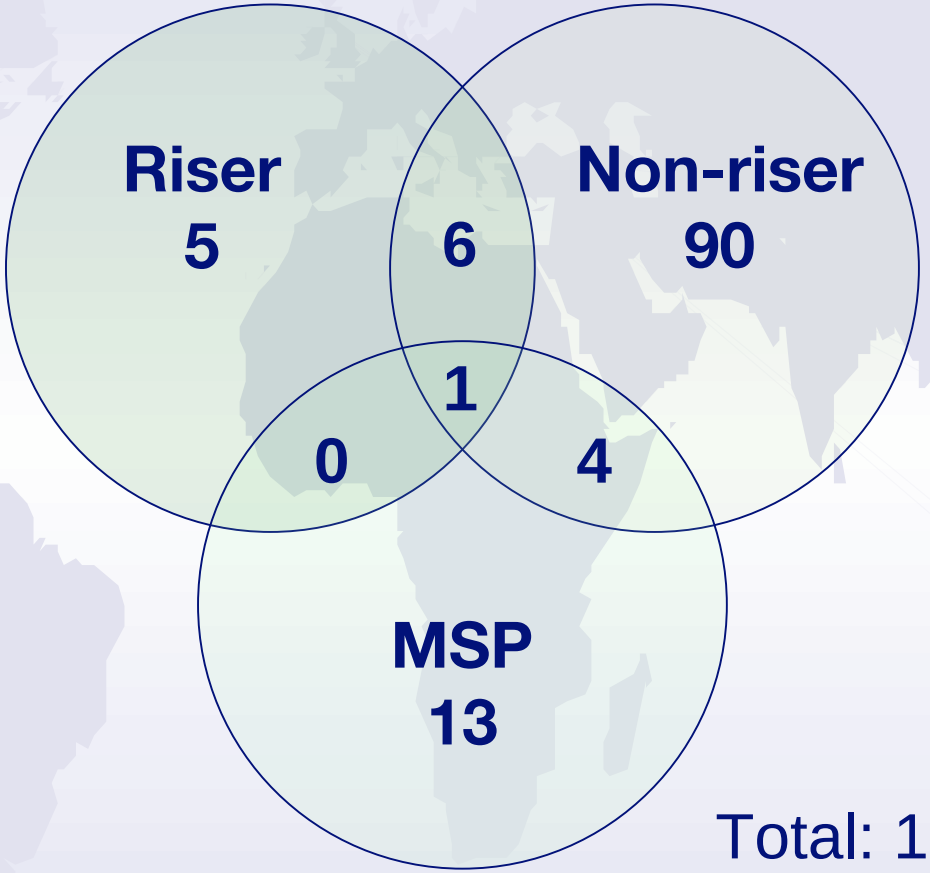
Active Proposals: 121 (as of Jan. 2007)

By ISP Themes



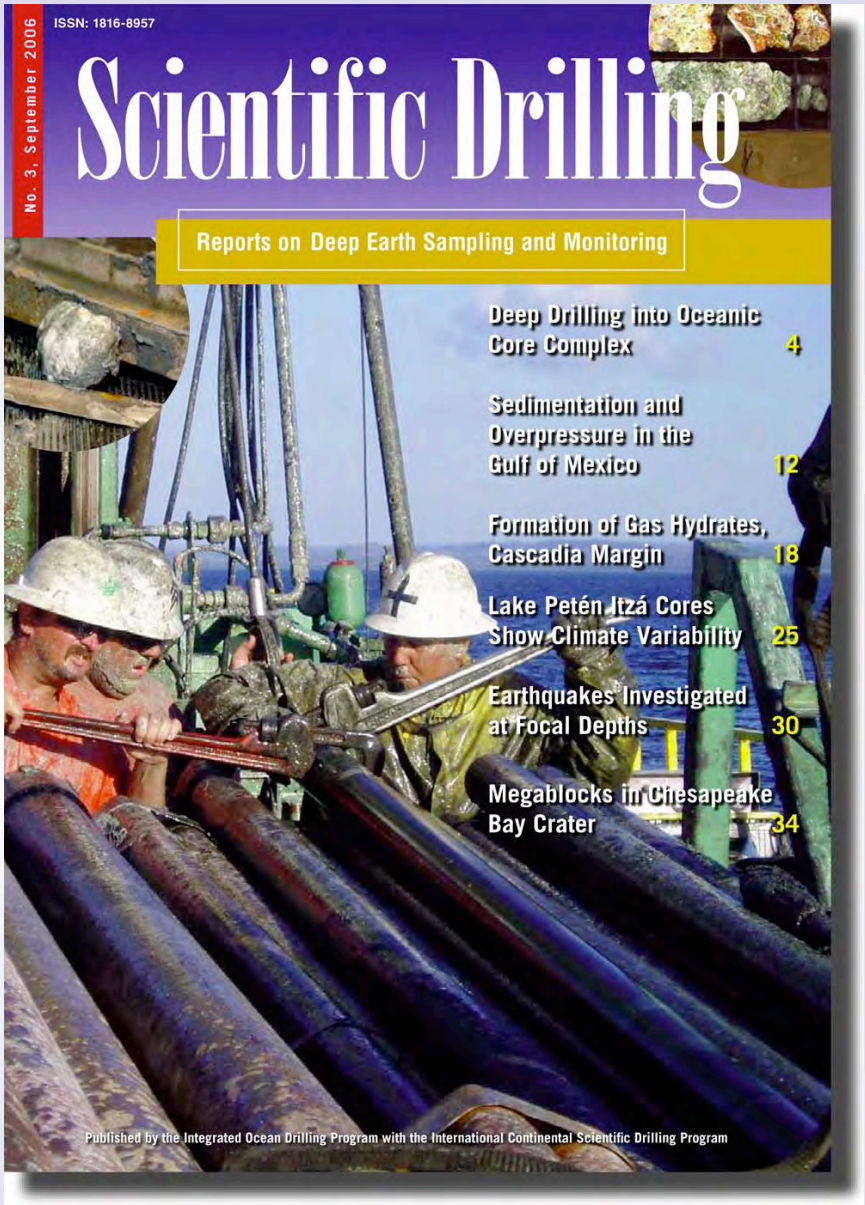
Drilling platforms for active proposals



Total: 119 proposals
(121 - 2 CDPs)

Proposals (most likely) be ranked @ March SPC

505-Full5	Mariana Convergent Margin
522-Full5	Superfast Spreading Crust
535-Full5	Atlantis Bank
537B-Full3	Costa Rica Seismogenesis Phase B
547-Full4	Oceanic Subsurface Biosphere
548-Full2	Chixculub K-T impact Crater
552-Full3	Bengal Fan
555-Full3	Cretan Margin
581-Full2	Late Pleistocene Coralgal Banks
584-Full2	TAG II Hydrothermal
612-Full3	Geodynamo
618-Full3	East Asia Margin
633-Full2	Costa Rica Mud Mounds
644-Full2	Mediterranean Outflow
654-Full2	Shatsky Rise Origin
659-Full	Newfoundland Rifted Margin
661-Full2	Newfoundland Sediment Drifts
667-Full	NW Australian Shelf Esustasy



IODP Program Journal *Scientific Drilling* **Reports on Deep Earth Sampling and Monitoring**

- IODP program journal
- co-published with ICDP
- 2 issues / year, ~50-60 pages / issue
- 3rd issue in September 2006
- Target audience is the broader Earth science community
- Content:
  - program and expedition reports
  - technical developments
  - project progress reports
  - workshop reports & news items
- 3 IODP editors, 1 ICDP editor
- DOI referenced; internally reviewed
- Distributed free of charge

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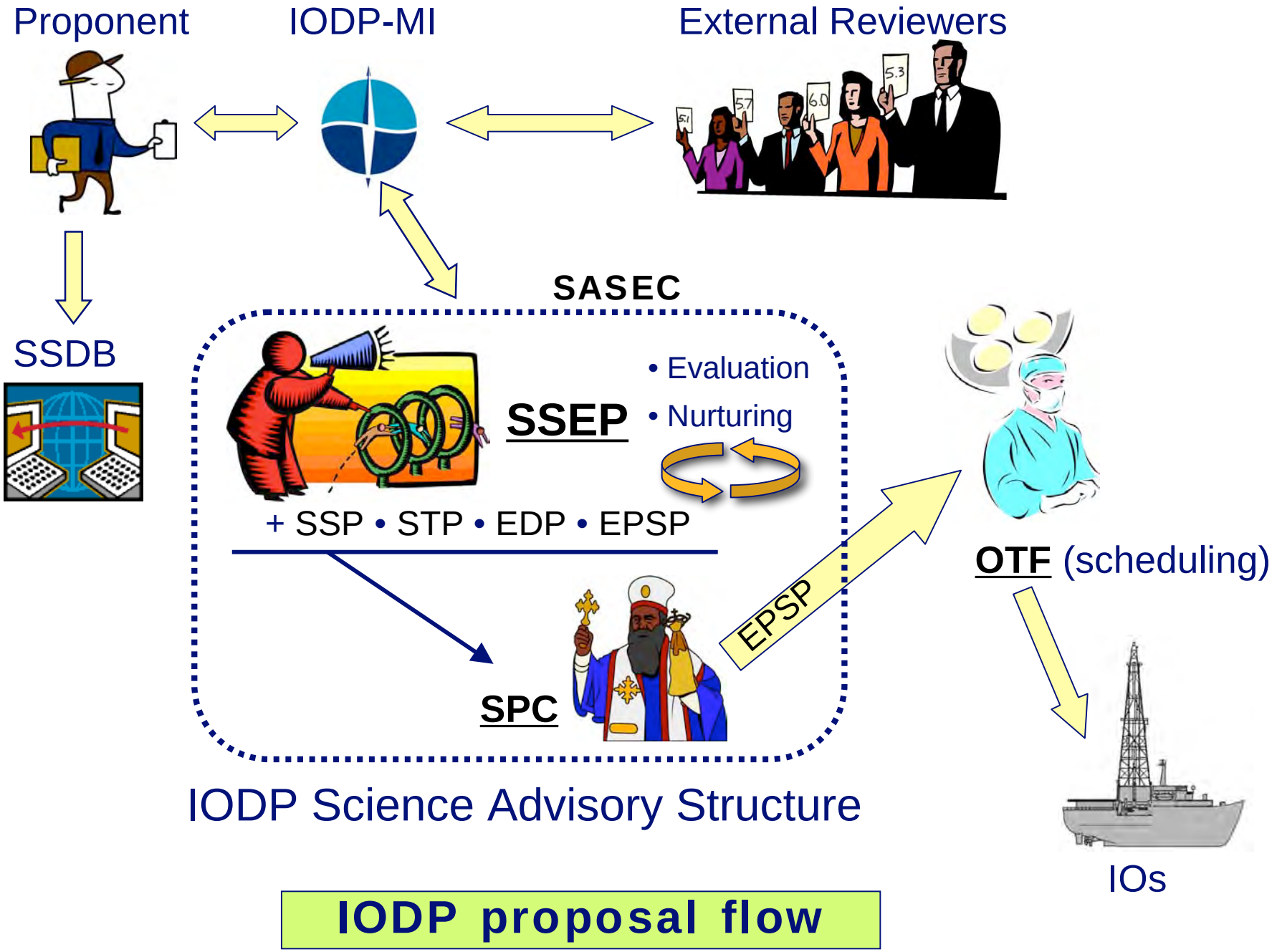
The End


Proponent
IODP-MI
External Reviewers
SSDB
SASEC
SSEP
• Evaluation
• Nurturing
+ SSP • STP • EDP • EPSP
SPC
EPSP
OTF (scheduling)
IOs
IODP Science Advisory Structure
IODP proposal flow

APPENDIX 5

Engineering Development Panel Meeting

New York, New York

January, 2007

Greg Myers
IODP-MI

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Outline

1. Summary of Report to Science Planning Committee
2. FY2007 and FY2008 projects
3. Engineering Development Proposal Process
4. Engineering Issues from Operations Review Task Force
5. Third Party Tool Implementation Guide

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Science Planning Committee

Joint presentation with EDP Chair

- Provided IODP Technology Roadmap overview
- Summarized engineering proposal process
- Presented current and future engineering projects
- Provided status of engineering web page
- SPC consensus items

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SPC Recommendations from August 2006 Meeting

SPC Consensus 0608-08:

The SPC receives SSEP Recommendation 0605-04 on developing a borehole tool that would deploy seismometers as part of a dedicated subseafloor observatory (e.g. SeisCORK) and forwards it to the Engineering Development Panel (EDP) for evaluation. The EDP should report on this issue at the March 2007 SPC meeting.

SPC Consensus 0608-19: FY2008-09 engineering development II – SPC prioritizations:

The SPC recommends including the down-pipe camera development project in the FY2008 program plan, together with the two previously considered engineering projects for a pulse telemetry module and long-term monitoring system (see SPC Consensus 0505-01 and Consensus 0603-25).

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Outline

1. Summary of Report to Science Planning Committee
2. FY2007 and FY2008 projects
3. Engineering Development Proposal Process
4. Engineering Issues from Operations Review Task Force
5. Third Party Tool Implementation Guide

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“Near-Term Engineering Development Focus”

Sampling, Logging and Coring

- Improving systems fundamental to IODP (refinements to core barrels, logging tools, etc.)

Drilling/Vessel Infrastructure

- Understanding the factors that control core quantity and quality (rig instrumentation, heave comp, drilling dynamics, etc.)

Borehole Infrastructure

- Standardizing equipment where possible, between platforms, observatories and procedures.

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Current Engineering Development Projects

- CDEX - Long Term Borehole Monitoring System
- ESO - Down-Pipe Camera
- USIO - Logging While Coring Core Barrels
- USIO - Pulse Telemetry Module

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Long Term Monitoring System - CDEX

Project in progress (prioritization based on SPC Consensus 0505-1)

- Overview
  - Borehole infrastructure to acquire long term pressure, distributed temperature, seismic, fluid sampling data, initially in select NanTroSEIZE boreholes
- Status
  - All elements of Feasibility study were completed in FY 2006 (FY -1)
  - CDEX has recently completed the revised proposal for FY2007 (current fiscal year)

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Long Term Monitoring System - CDEX

- IODP-MI engineering task force (ETF) reviewed feasibility study in October 2006 and has determined that the design, construction and deployment is feasible.
  - The ETF agreed that CDEX should perform the begin the detailed design work in FY2007

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Down-pipe Camera System - ESO

1. Downhole visualization technology is needed by IODP
   - Has operational and science benefits
2. All platforms may benefit
   - Discussion of design has been occurring between IO's
3. Project challenges
   - Feasibility began in FY2007. Results requested by end of Q2 FY2007
   - Cross platform operability
   - Downhole capabilities (pressure up to 10K psi)

Down-pipe Camera System - ESO

Based on the successful completion of work in 2007 (current fiscal year), IODP-MI recommended the following:

- Evaluate feasibility study results and generate FY2008 (FY +1) scope of work and budget
  - FY2008 scope of work may necessitate EDP review if scope changes significantly

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Pulse Telemetry Module - USIO

1. Near bit drilling dynamics data acquisition technology is needed for IODP
   - Directly applies to EDP technology roadmap (developments B3,B5,B6,B7 and B10)
   - Unique because it provides real-time data WHILE CORING
2. Project Challenges
   - Drilling sensor sub (DSS) and Retrievable Memory Module (RMM) have not acquired primary data from intended environment
   - Memory version of DSS must be proven
   - Proposed scope of work extends to FY2010
   - Sea test in 2008
   - EDP recommendation does not provide advice for immediate course of action

Pulse Telemetry Module - USIO

Based on known challenges, IODP-MI recommends the USIO:

- Complete the FY2007 feasibility study by Q2 and evaluate results
- Successfully demonstrate the DSS-RMM system at a test facility by the end of Q2 FY2007
- With successful completion of above items, the USIO should generate a FY2008 funding request for comprehensive testing, quantitative data analysis, documentation and foundational system improvements
- Update will be provided at June EDP meeting

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FY2008 Engineering Development Summary

- **CDEX - Long Term Borehole Monitoring System**
  - **FY2008 = second year of detail design**
- **ESO - Down-Pipe Camera**
  - **Based on current year feasibility study results, construction may begin in FY2008**
- **USIO - Pulse Telemetry Module**
  - **Based on current year feasibility study results, comprehensive testing recommended for FY2008**

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EDP final consideration of FY2008 plan needed

Possible points to consider:

- Do these projects align with IODP technology roadmap or previous SPC recommendation?
- Does the plan help to achieve the goals of the Initial Science Plan?
- Are there any recommendations for these developments?

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FY2008 Budget

- Budget at this point is still a “request” to lead agencies.
- Firm numbers for the individual projects are not yet available.
- IODP-MI is requesting funds to implement the FY2008 projects its request to lead agencies.
- We will likely know funding status by late spring 2007

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Engineering Task Force

- An IODP-MI led team
- Charged with taking SAS advice, most commonly from EDP and implementing engineering initiatives.
- Consists of small group of engineers and designers from U.S., Europe and Japan.
- Meets biannually
- Focuses on engineering project implementation

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Engineering Web Page

First version of the IODP-MI engineering web page is online at: www.iodp.org/eng

Site contents include:

- IODP-MI engineering vision
- Engineering development proponents guides
- Proposal solicitations / Electronic Submission
- Links to existing IODP technologies
- IODP technology road map
- Third Party Tool page
- Monthly highlighted engineering developments

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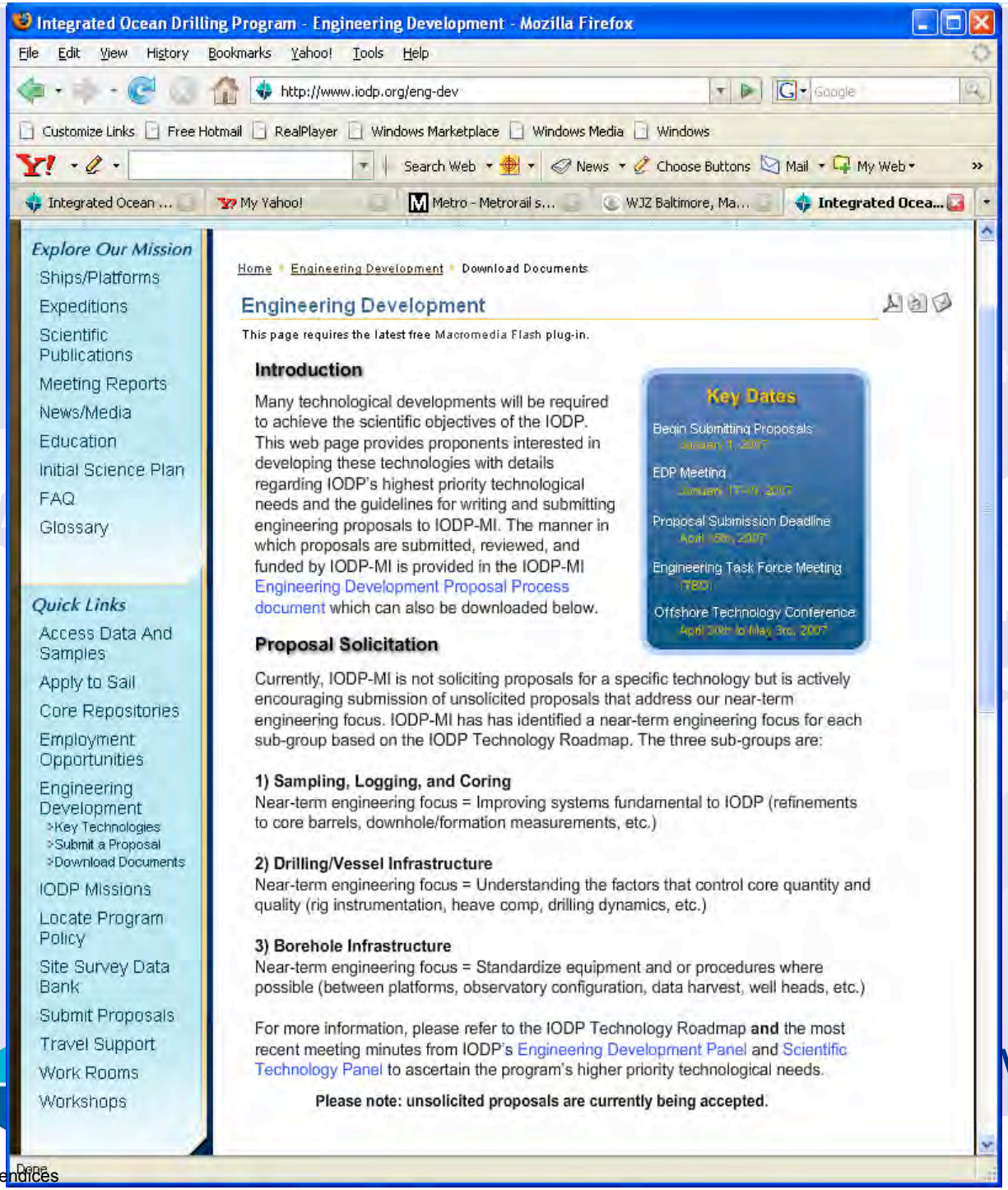
Integrated Ocean Drilling Program - Engineering Development - Mozilla Firefox
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Integrated Ocean ... My Yahoo! Metro - Metrorail s... WJZ Baltimore, Ma... Integrated Ocea...
Explore Our Mission
Ships/Platforms
Expeditions
Scientific Publications
Meeting Reports
News/Media
Education
Initial Science Plan
FAQ
Glossary
Quick Links
Access Data And Samples
Apply to Sail
Core Repositories
Employment Opportunities
Engineering Development
>Key Technologies
>Submit a Proposal
>Download Documents
IODP Missions
Locate Program Policy
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Submit Proposals
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Engineering Development
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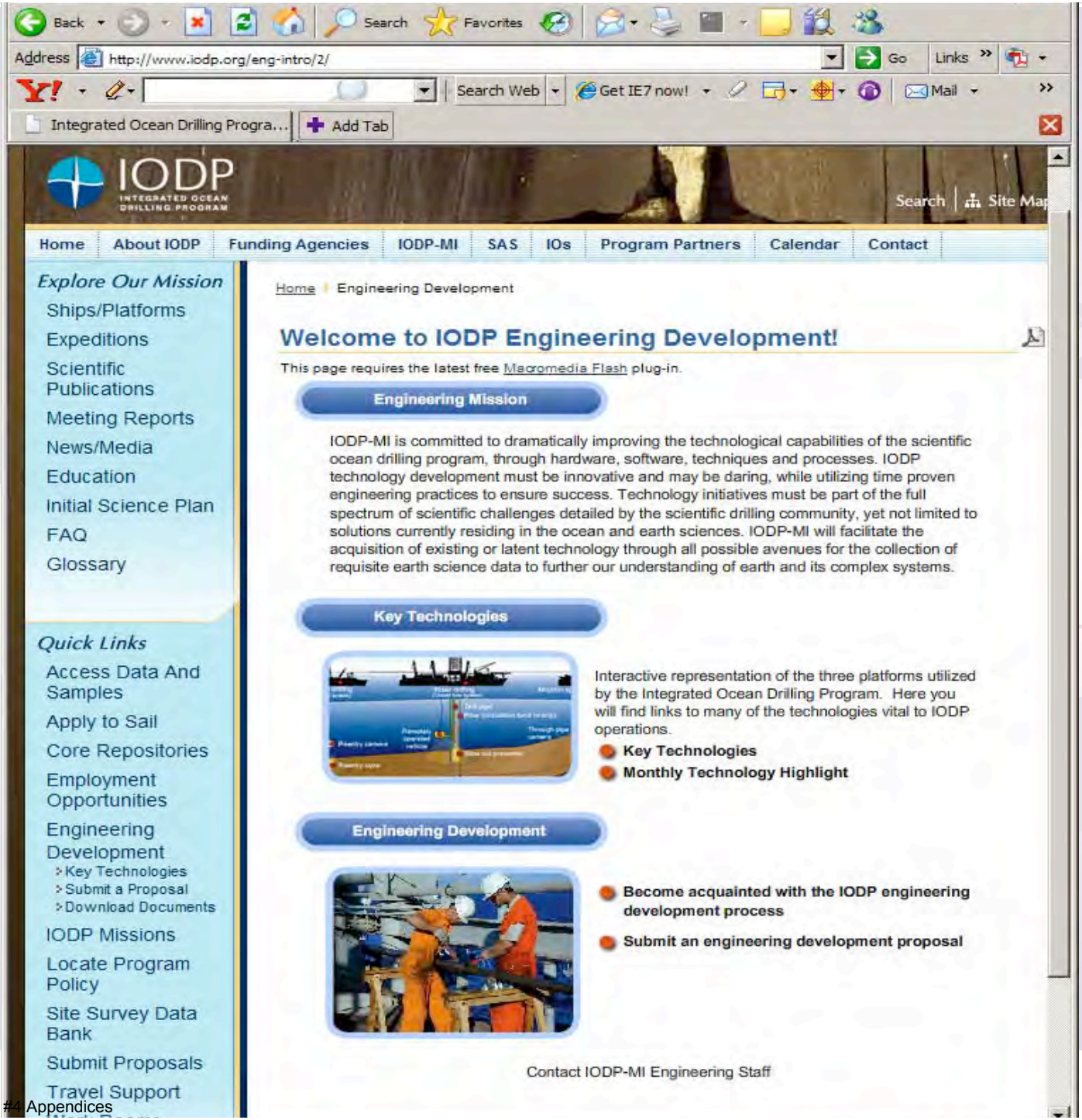
Introduction
Many technological developments will be required to achieve the scientific objectives of the IODP. This web page provides proponents interested in developing these technologies with details regarding IODP's highest priority technological needs and the guidelines for writing and submitting engineering proposals to IODP-MI. The manner in which proposals are submitted, reviewed, and funded by IODP-MI is provided in the IODP-MI Engineering Development Proposal Process document which can also be downloaded below.
Key Dates
Begin Submitting Proposals
EDP Meeting
Proposal Submission Deadline
Engineering Task Force Meeting
(TBD)
Offshore Technology Conference
Proposal Solicitation
Currently, IODP-MI is not soliciting proposals for a specific technology but is actively encouraging submission of unsolicited proposals that address our near-term engineering focus. IODP-MI has has identified a near-term engineering focus for each sub-group based on the IODP Technology Roadmap. The three sub-groups are:
1) Sampling, Logging, and Coring
Near-term engineering focus = Improving systems fundamental to IODP (refinements to core barrels, downhole/formation measurements, etc.)
2) Drilling/Vessel Infrastructure
Near-term engineering focus = Understanding the factors that control core quantity and quality (rig instrumentation, heave comp, drilling dynamics, etc.)
3) Borehole Infrastructure
Near-term engineering focus = Standardize equipment and or procedures where possible (between platforms, observatory configuration, data harvest, well heads, etc.)
For more information, please refer to the IODP Technology Roadmap and the most recent meeting minutes from IODP's Engineering Development Panel and Scientific Technology Panel to ascertain the program's higher priority technological needs.
Please note: unsolicited proposals are currently being accepted.
Done


Back
Search
Favorites
Address
http://www.iodp.org/eng-intro/2/
Go
Links
Search Web
Get IE7 now!
Mail
Integrated Ocean Drilling Progra...
Add Tab
IODP
INTEGRATED OCEAN DRILLING PROGRAM
Search
Site Map
Home
About IODP
Funding Agencies
IODP-MI
SAS
IOs
Program Partners
Calendar
Contact
Explore Our Mission
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Engineering Development
Welcome to IODP Engineering Development!
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Engineering Mission
IODP-MI is committed to dramatically improving the technological capabilities of the scientific ocean drilling program, through hardware, software, techniques and processes. IODP technology development must be innovative and may be daring, while utilizing time proven engineering practices to ensure success. Technology initiatives must be part of the full spectrum of scientific challenges detailed by the scientific drilling community, yet not limited to solutions currently residing in the ocean and earth sciences. IODP-MI will facilitate the acquisition of existing or latent technology through all possible avenues for the collection of requisite earth science data to further our understanding of earth and its complex systems.
Key Technologies
Interactive representation of the three platforms utilized by the Integrated Ocean Drilling Program. Here you will find links to many of the technologies vital to IODP operations.
Key Technologies
Monthly Technology Highlight
Engineering Development
Become acquainted with the IODP engineering development process
Submit an engineering development proposal
Contact IODP-MI Engineering Staff

Address http://www.iodp.org/key-technologies

Integrated Ocean Drilling Progra... | Add Tab

Sunday, November 12, 2006

IODP INTEGRATED OCEAN DRILLING PROGRAM

Search | Site Map | Login

Explore Our Mission

- Ships/Platforms
- Expeditions
- Scientific Publications
- Meeting Reports
- News/Media
- Education
- Initial Science Plan
- FAQ
- Glossary

Quick Links

- Access Data And Samples
- Apply to Sail
- Core Repositories
- Employment Opportunities
- Engineering Development
- IODP Missions
- Locate Program Policy
- Site Survey Data

Home ▸ Welcome to IODP Engineering Development! ▸ Engineering Development ▸ Key Technologies

Key Technologies

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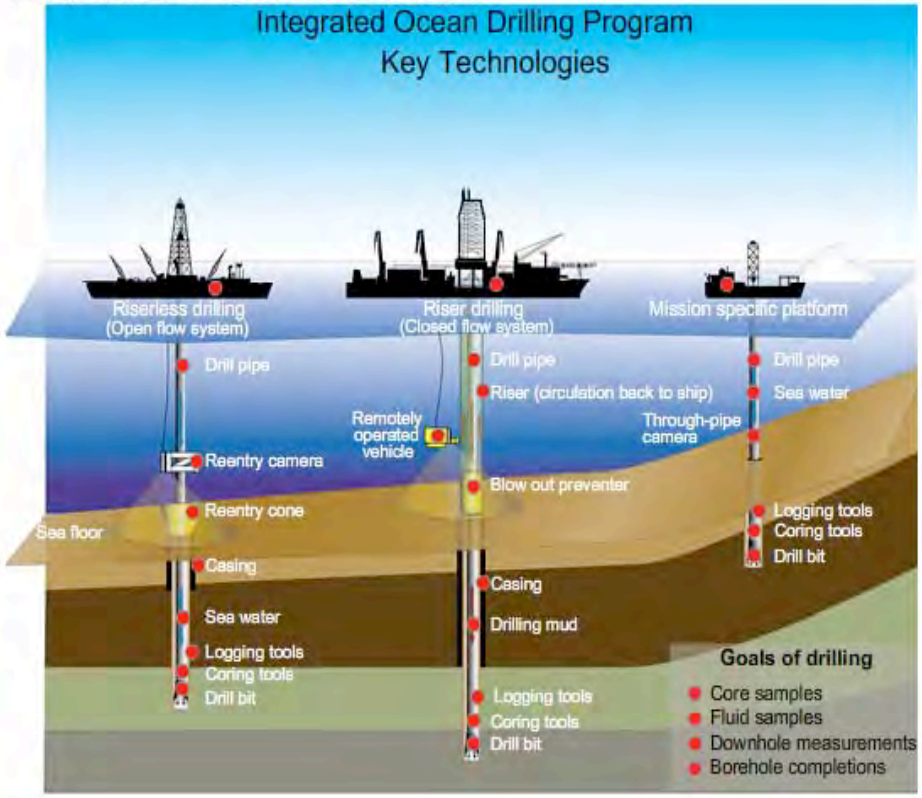

[Back]

GRAM

Recent IODP-MI Engineering and Technology Activities

- Create centralized hub to facilitate IODP engineering development
  - Create IODP-MI vision for engineering
  - Create an engineering development web page
  - Receive advice from SAS
  - Create an engineering task force for implementing SAS advice
  - Put IODP Technology Roadmap into action
  - Create and administrate processes for handling engineering proposals
  - Implement the IODP third party tool policy
  - Work with IO's and third parties on consistent plan for engineering development
  - Develop funding models for engineering
  - Review current projects and proposals
  - Develop IODP Annual Program Plan engineering section

INTEGRATED OCEAN DRILLING PROGRAM

MANAGEMENT INTERNATIONAL

Outline

1. Summary of Report to Science Planning Committee
2. FY2007 and FY2008 projects
3. Engineering Development Proposal Process
4. Engineering Issues from Operations Review Task Force
5. Third Party Tool Implementation Guide

INTEGRATED OCEAN DRILLING PROGRAM

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Engineering Development Proposal Process

- Draft process has been created and circulated for review
- It is available on the web at: www.iodp.org/eng
- Premise of proposal process is:
  - Create sustainable, systematic process for engineering development proposals
  - Utilize existing process documents where possible
  - Preserve existing definitions and refine where needed

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Engineering Development Proposal Process

Goal – to provide a systematic method for collecting and handling engineering development proposals to be considered for inclusion into the annual program plan in a timely and consistent manner

INTEGRATED OCEAN DRILLING PROGRAM

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Engineering Development Definitions

Class A Development

- Dollar amounts less than $100,000 annually
- Minimal proposal documentation required
  - These proposals will be further sorted by IODP-MI and “may” be forwarded to EDP for further review and advice.

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Engineering Development Definitions

Class B Development

- Dollar amounts greater than $100,000 annually
- More substantial proposal required
- All Class B proposals will be forwarded to EDP for review and advice

INTEGRATED OCEAN DRILLING PROGRAM

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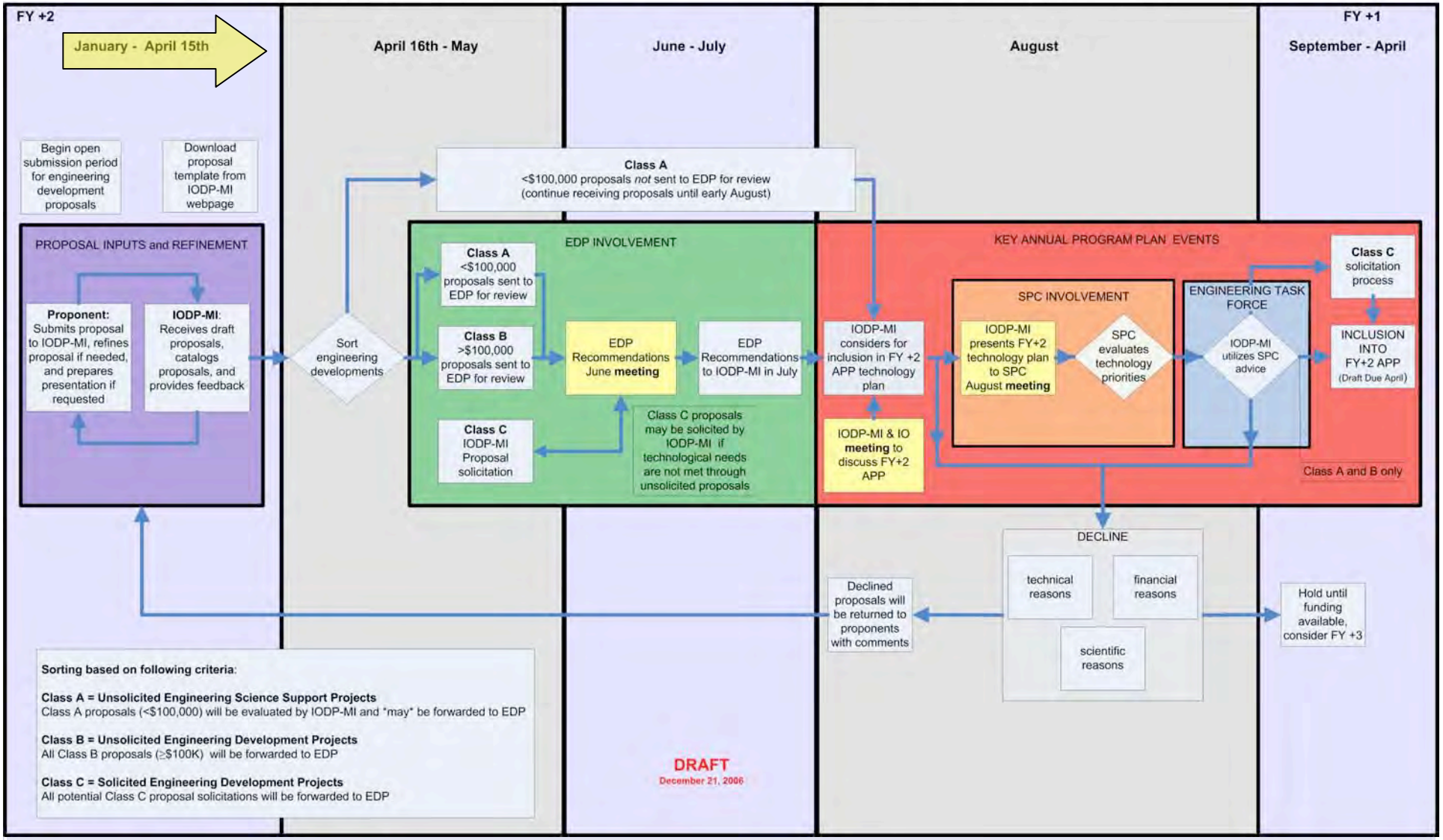
Engineering Development Definitions

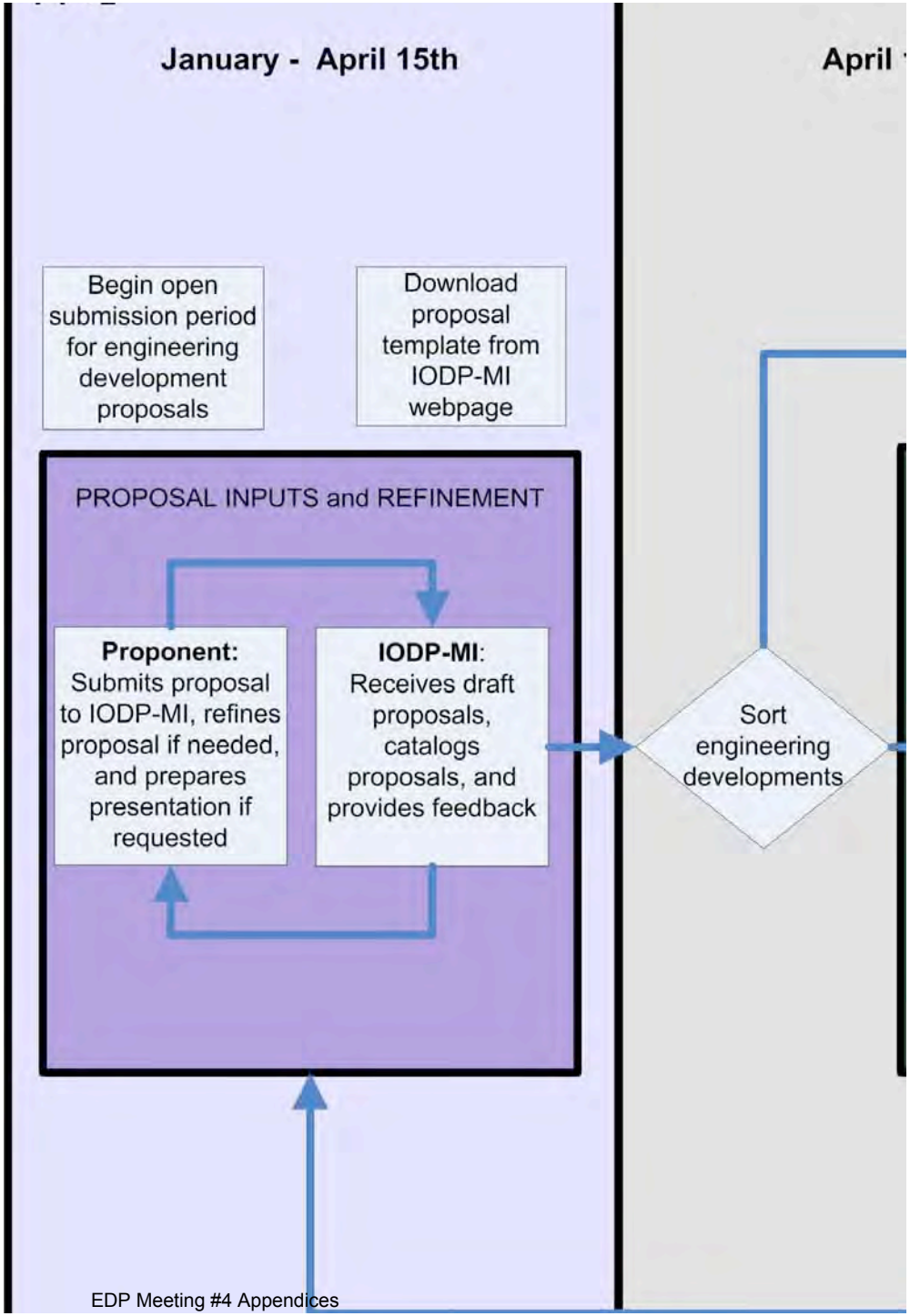
Class C Development

- Proposals are solicited by IODP-MI following SAS consideration
- Multi-page proposal required
- All Class C proposals will be forwarded to EDP for review and advice

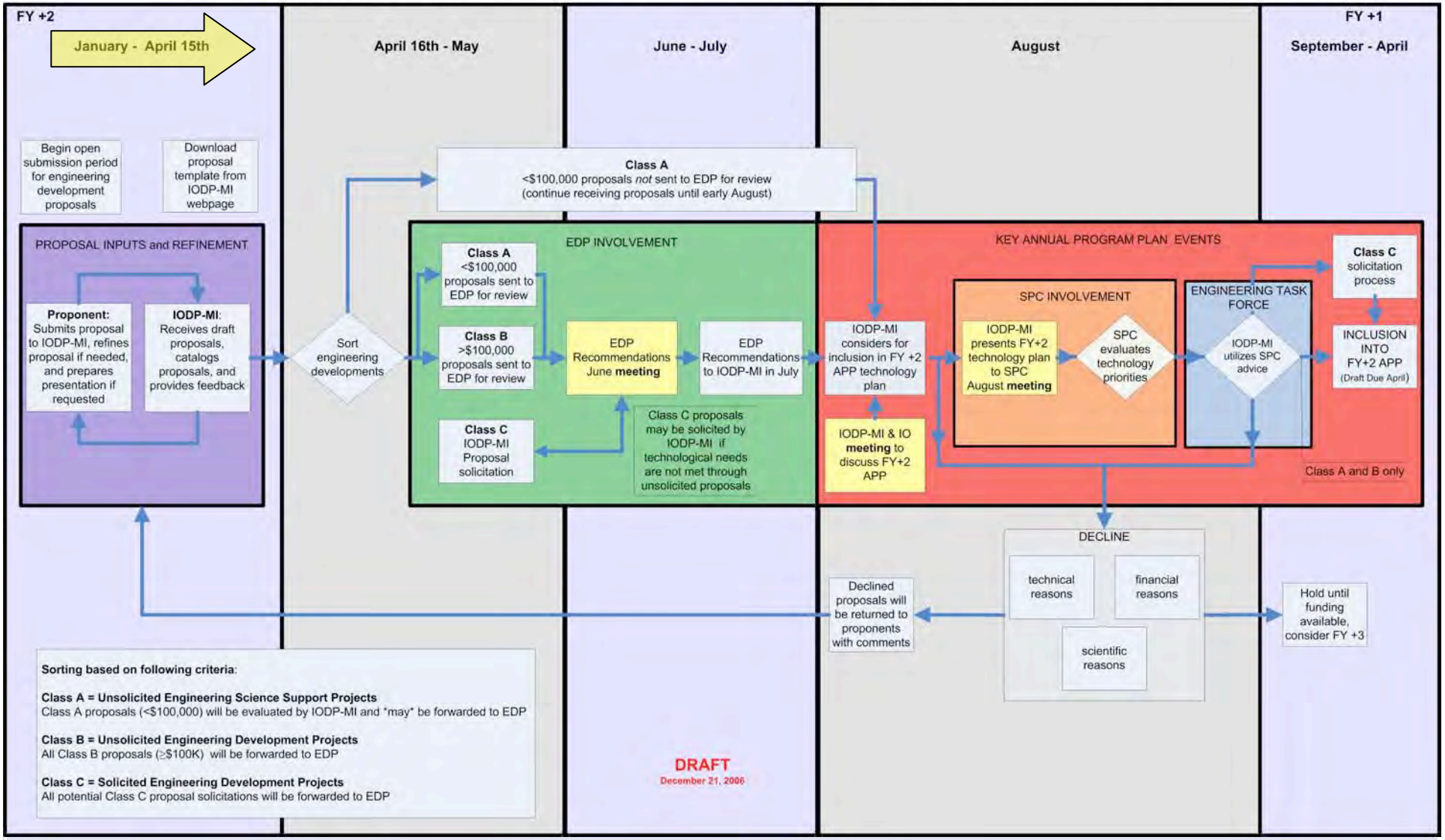
INTEGRATED OCEAN DRILLING PROGRAM
MANAGEMENT INTERNATIONAL

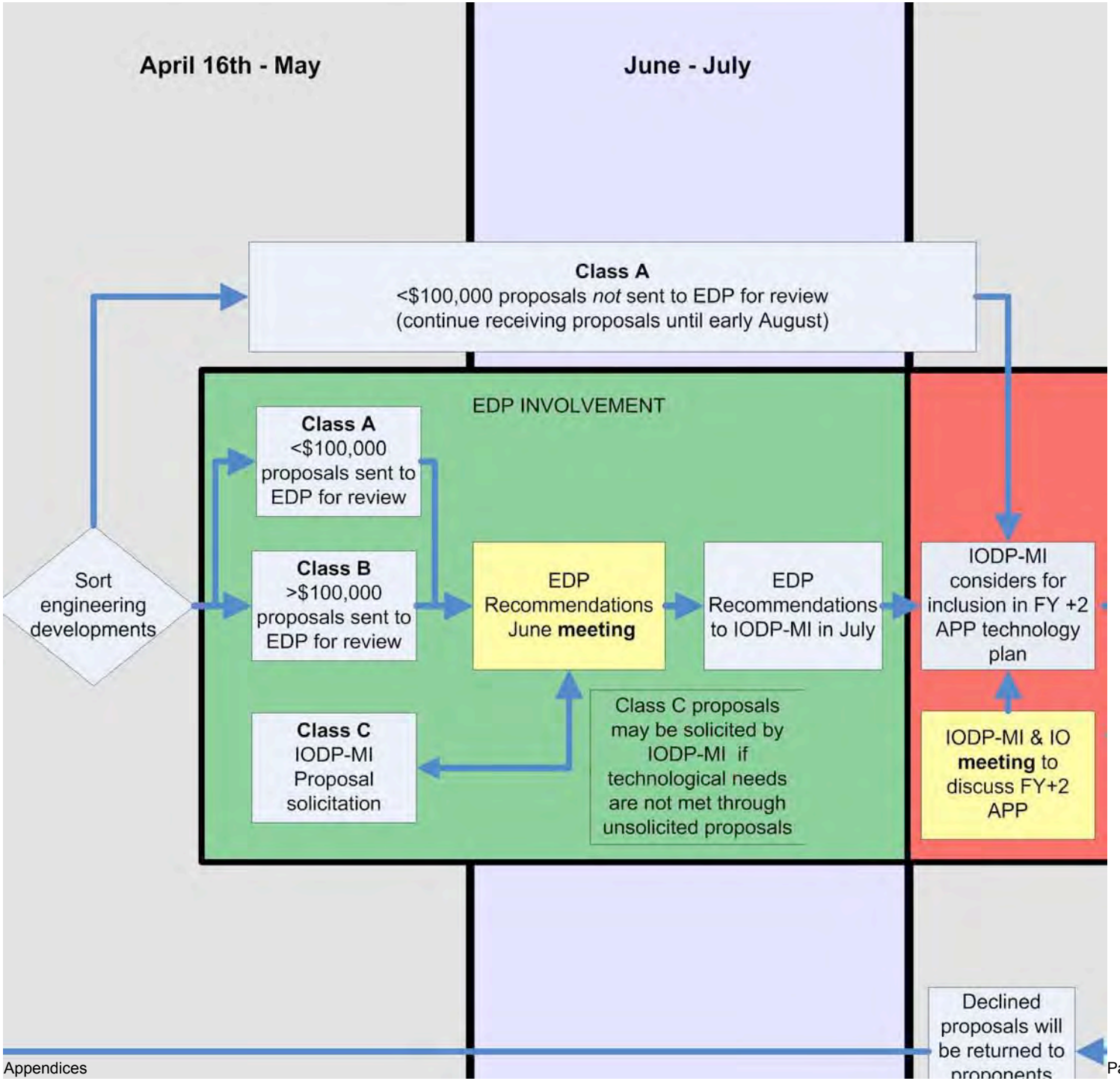
ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN



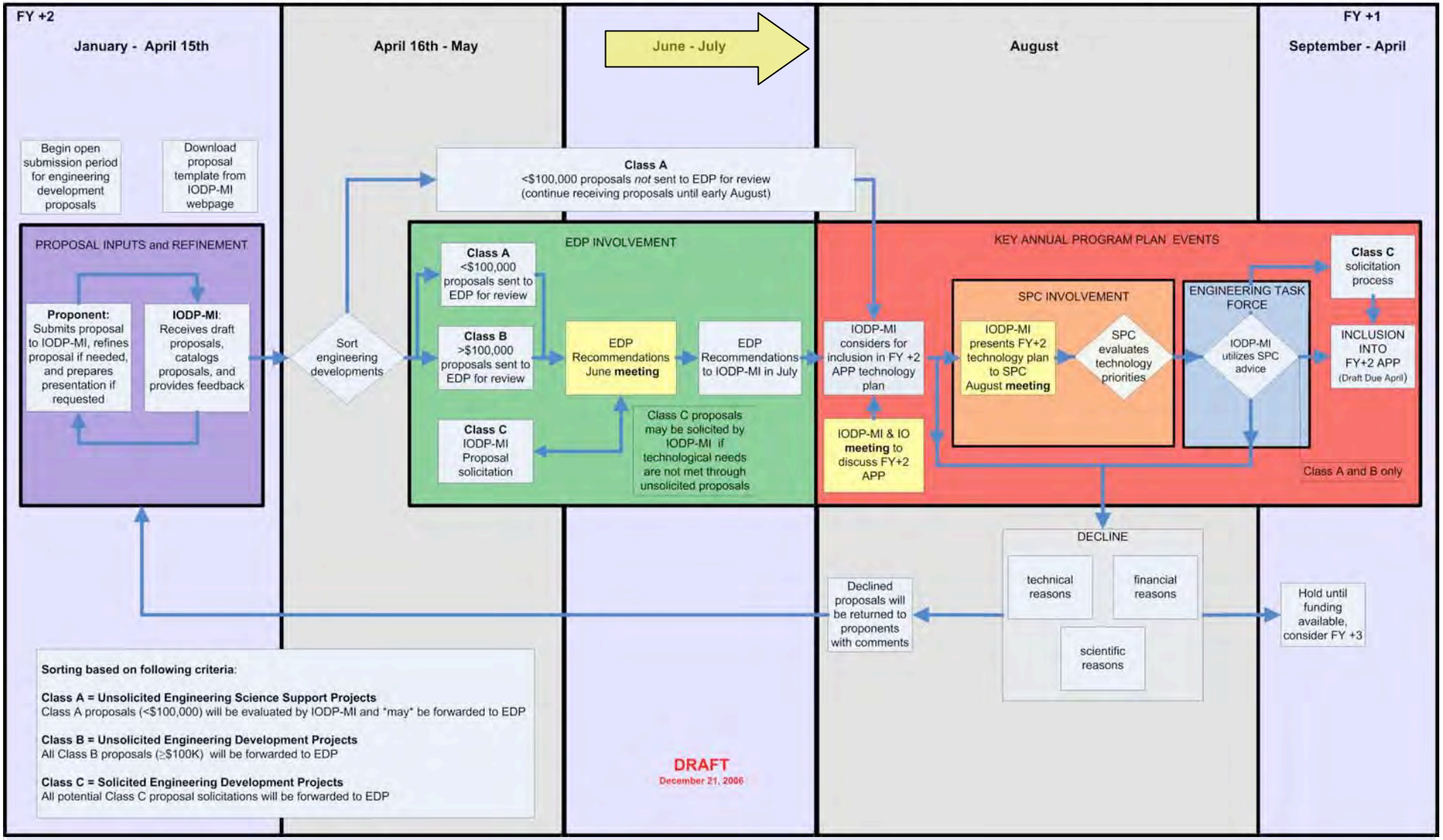

January - April 15th
April
Begin open submission period for engineering development proposals
Download proposal template from IODP-MI webpage
PROPOSAL INPUTS and REFINEMENT
Proponent: Submits proposal to IODP-MI, refines proposal if needed, and prepares presentation if requested
IODP-MI: Receives draft proposals, catalogs proposals, and provides feedback
Sort engineering developments

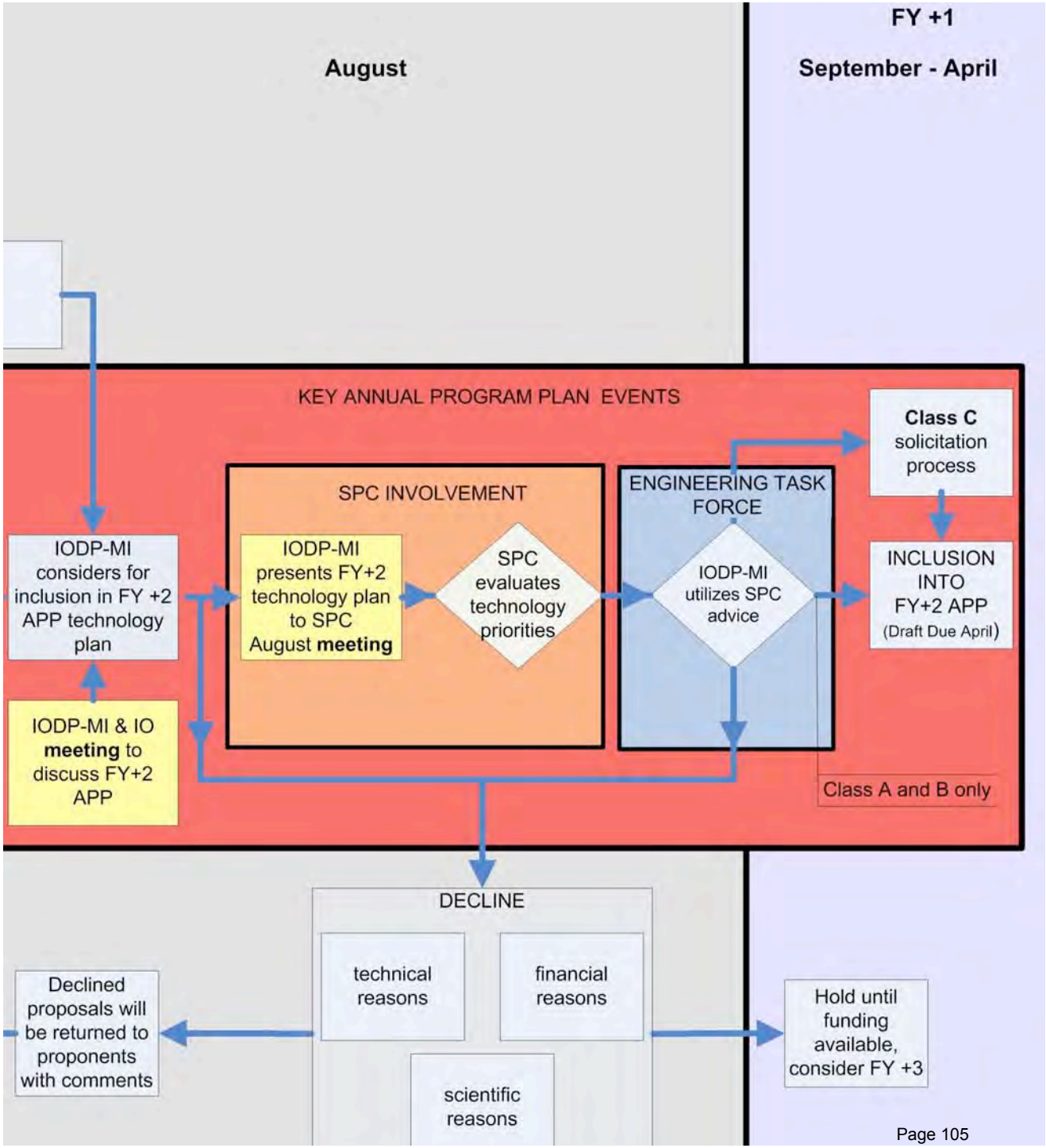
ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN




April 16th - May
June - July
Class A
<$100,000 proposals *not* sent to EDP for review
(continue receiving proposals until early August)
EDP INVOLVEMENT
Class A
<$100,000 proposals sent to EDP for review
Class B
>$100,000 proposals sent to EDP for review
Class C
IODP-MI Proposal solicitation
Sort engineering developments
EDP Recommendations June **meeting**
EDP Recommendations to IODP-MI in July
Class C proposals may be solicited by IODP-MI if technological needs are not met through unsolicited proposals
IODP-MI considers for inclusion in FY +2 APP technology plan
IODP-MI & IO **meeting** to discuss FY+2 APP
Declined proposals will be returned to

ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN




August
FY +1
September - April
KEY ANNUAL PROGRAM PLAN EVENTS
IODP-MI considers for inclusion in FY +2 APP technology plan
IODP-MI & IO meeting to discuss FY+2 APP
SPC INVOLVEMENT
IODP-MI presents FY+2 technology plan to SPC August meeting
SPC evaluates technology priorities
ENGINEERING TASK FORCE
IODP-MI utilizes SPC advice
Class C solicitation process
INCLUSION INTO FY+2 APP (Draft Due April)
Class A and B only
DECLINE
technical reasons
financial reasons
scientific reasons
Declined proposals will be returned to proponents with comments
Hold until funding available, consider FY +3

FY2008 Engineering Development Overview - in context of Categories

Class A Projects

- Pulse Telemetry Module
- Down-Pipe Camera

Class B Projects

- Long Term Borehole Monitoring System

INTEGRATED OCEAN DRILLING PROGRAM

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Funding Issues and Scheduling

INTEGRATED OCEAN DRILLING PROGRAM

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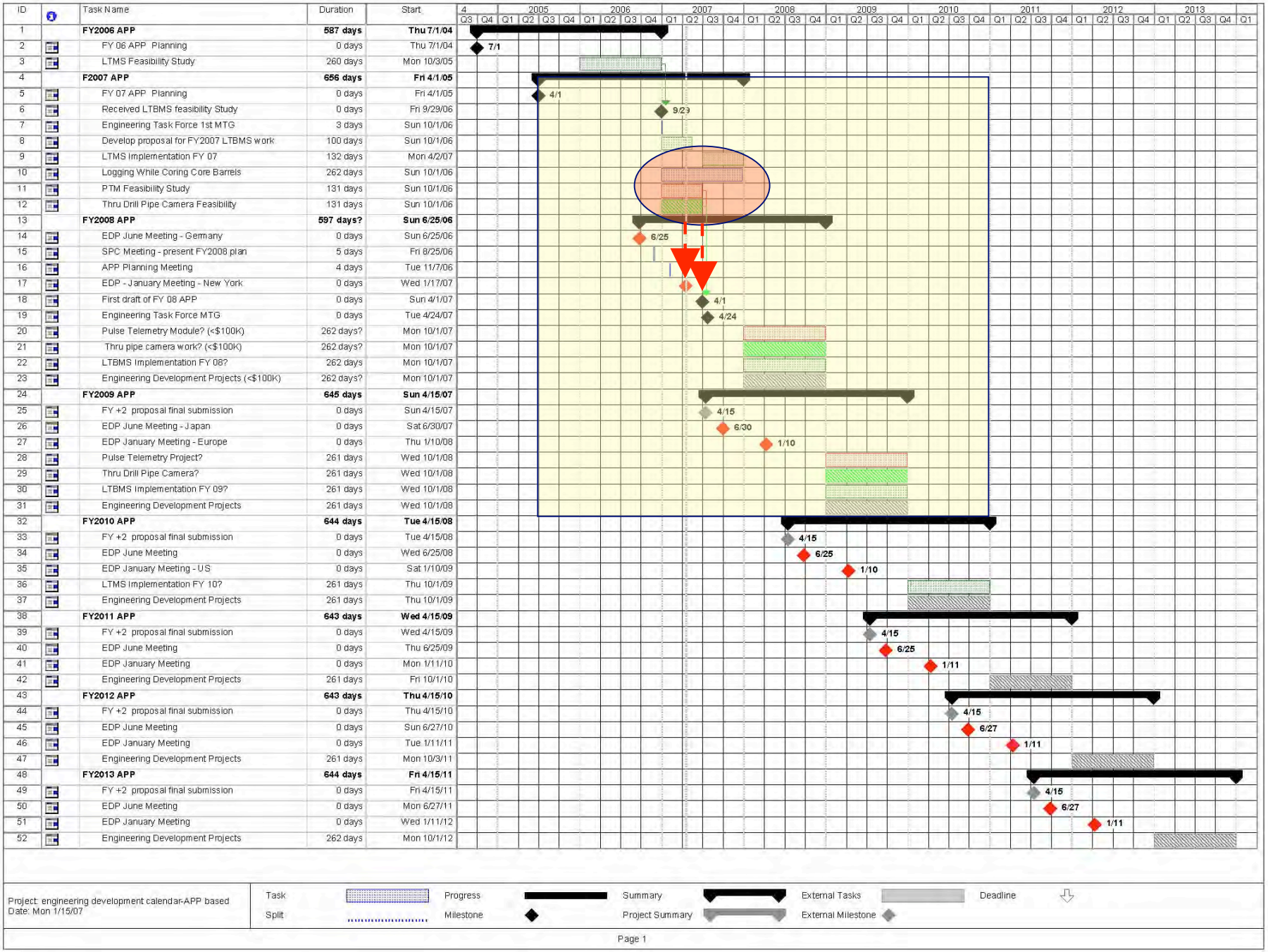
ID
Task Name
Duration
Start
2005
2006
2007
2008
2009
2010
2011
2012
2013
1 FY2006 APP 587 days Thu 7/1/04
2 FY 06 APP Planning 0 days Thu 7/1/04
3 LTMS Feasibility Study 260 days Mon 10/3/05
4 F2007 APP 656 days Fri 4/1/05
5 FY 07 APP Planning 0 days Fri 4/1/05
6 Received LTBMS feasibility Study 0 days Fri 9/29/06
7 Engineering Task Force 1st MTG 3 days Sun 10/1/06
8 Develop proposal for FY2007 LTBMS work 100 days Sun 10/1/06
9 LTMS Implementation FY 07 132 days Mon 4/2/07
10 Logging While Coring Core Barrels 262 days Sun 10/1/06
11 PTM Feasibility Study 131 days Sun 10/1/06
12 Thru Drill Pipe Camera Feasibility 131 days Sun 10/1/06
13 FY2008 APP 597 days? Sun 6/25/06
14 EDP June Meeting - Germany 0 days Sun 6/25/06
15 SPC Meeting - present FY2008 plan 5 days Fri 8/25/06
16 APP Planning Meeting 4 days Tue 11/7/06
17 EDP - January Meeting - New York 0 days Wed 1/17/07
18 First draft of FY 08 APP 0 days Sun 4/1/07
19 Engineering Task Force MTG 0 days Tue 4/24/07
20 Pulse Telemetry Module? (<$100K) 262 days? Mon 10/1/07
21 Thru pipe camera work? (<$100K) 262 days? Mon 10/1/07
22 LTBMS Implementation FY 08? 262 days Mon 10/1/07
23 Engineering Development Projects (<$100K) 262 days? Mon 10/1/07
24 FY2009 APP 645 days Sun 4/15/07
25 FY +2 proposal final submission 0 days Sun 4/15/07
26 EDP June Meeting - Japan 0 days Sat 6/30/07
27 EDP January Meeting - Europe 0 days Thu 1/10/08
28 Pulse Telemetry Project? 261 days Wed 10/1/08
29 Thru Drill Pipe Camera? 261 days Wed 10/1/08
30 LTBMS Implementation FY 09? 261 days Wed 10/1/08
31 Engineering Development Projects 261 days Wed 10/1/08
32 FY2010 APP 644 days Tue 4/15/08
33 FY +2 proposal final submission 0 days Tue 4/15/08
34 EDP June Meeting 0 days Wed 6/25/08
35 EDP January Meeting - US 0 days Sat 1/10/09
36 LTMS Implementation FY 10? 261 days Thu 10/1/09
37 Engineering Development Projects 261 days Thu 10/1/09
38 FY2011 APP 643 days Wed 4/15/09
39 FY +2 proposal final submission 0 days Wed 4/15/09
40 EDP June Meeting 0 days Thu 6/25/09
41 EDP January Meeting 0 days Mon 1/11/10
42 Engineering Development Projects 261 days Fri 10/1/10
43 FY2012 APP 643 days Thu 4/15/10
44 FY +2 proposal final submission 0 days Thu 4/15/10
45 EDP June Meeting 0 days Sun 6/27/10
46 EDP January Meeting 0 days Tue 1/11/11
47 Engineering Development Projects 261 days Mon 10/3/11
48 FY2013 APP 644 days Fri 4/15/11
49 FY +2 proposal final submission 0 days Fri 4/15/11
50 EDP June Meeting 0 days Mon 6/27/11
51 EDP January Meeting 0 days Wed 1/11/12
52 Engineering Development Projects 262 days Mon 10/1/12
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6/27
1/11
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6/27
1/11
Project: engineering development calendar-APP based
Date: Mon 1/15/07
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Page 1

What's next

- Need EDP comments/ recommendations/ endorsements of engineering development proposal process plan
- Begin receiving proposals for FY2009 funding consideration. Due date is April 15th.
  - We've already received one….

INTEGRATED OCEAN DRILLING PROGRAM
MANAGEMENT INTERNATIONAL

Outline

1. Summary of Report to Science Planning Committee
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INTEGRATED OCEAN DRILLING PROGRAM

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Operations Review Task Force

- Convenes in Washington D.C. several months after expedition
- Reviews successes and failures experienced on each expedition
- Task force produces report following meeting

INTEGRATED OCEAN DRILLING PROGRAM
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ORTF Engineering Issues

Expedition 301 – Juan de Fuca

- Design Standardization
  - IODP-MI to work with other science organizations, funding agencies and IOs through workshops, detailed planning groups, and task forces to (1) encourage the standardization/modular design of CORK systems and (2) ensure legacy/design documents are available for publicly funded development.
- Operational Issues
  - To improve ability to achieve critical objectives and investigate operational problems:
    1) USIO to improve Rig Instrumentation System sensor reliability and data access
    2) USIO to investigate lease/purchase of through-the-pipe TV camera system
    3) USIO to consider replacement of current subsea camera and image capture system

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ORTF, continued

Expedition 302 – Arctic Coring

- Drilling and Coring Information
  - The MSP Operator needs to improve Offshore Database cross-platform functionality to supply basic drilling and coring information (e.g., depth, core, section, etc) and output of standard core logging equipment (e.g., multisensor track) to the science party. The MSP Operator should utilize knowledgeable members of scientific community to test functionality of these systems.

ORTF, continued

Expedition 303/306/307 – N. Atlantic Climate I & II, Porcupine Basin Carb Mnds

- **Non-magnetic Core Barrels:**
  - IODP-MI to consult with EDP about the potential for re-engineering non-magnetic core barrels (to decrease cost and improve strength) so IODP can use them widely in future operations.
- **Liner Collapse**:
  - The USIO is encouraged to work with Transocean/ODL Core Technician to examine APC coring tools, equipment, and statistics (sea state, lithology, water depth, etc.) associated with operations resulting in shattered liners and work toward a better understanding of the root causes of liner collapse. The development of database containing the statistics of this study is highly recommended.

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ORTF, continued

Expedition 304/305 – Ocean Core Complex

- Heave Compensation
  - The USIO and IODP-MI to review the continued support of active heave compensation as part of the SODV planning process.

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ORTF, continued

Expedition 308 – GOM Hydrogeology

- **DVTPP Problems**
  - IODP-MI request the IODP Scientific Technology Panel (STP) to examine methodologies to model the DVTPP data in order to effectively use the tool in the future.
  - The USIO was to conduct a study to examine the scale of problem associated with leaks in the DVTPP and report the results to the EDP for recommendations on how to proceed.
  - The IODP-MI investigate (1) concepts to effectively decouple the drillstring from the DVTPP and T2P, and (2) the refurbishing of the existing CDS (Colleted Delivery System) as possibilities toward making the CDS more efficient.
- Geotech Coring Tools
  - IODP-MI to provide USIO with details regarding geotechnical coring tools that do not require modification for deployment from the SODV.
- Drilling Mud
  - The USIO build on the experiences of Expedition 308 and actively explore future applications of drilling muds and polymers in riserless operations.
  - The USIO to generate and archive a written report describing the Expedition 308 mud deployment program. The report should include operating protocols/guidelines, contingencies, changes to protocols (if any), and suggested future changes.

ORTF, continued

Expedition 308 – GOM Hydrogeology

- SODV
  - The USIO to investigate shore-based and shipboard pressure and temperature calibration facility/procedures as part of the SODV process.
  - On the SODV, the USIO should provide a Rig Instrumentation System (with accurate depth/time base), associated database(s), and appropriate infrastructure to distribute the data to the scientific party on a timely basis.

INTEGRATED OCEAN DRILLING PROGRAM

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ORTF, continued

Expedition 309/312 – Superfast Spreading Rate Crust

- **Magnetic Overprinting**:
  - EDP to investigate the cause(s) of magnetic overprinting of cores and prioritize options to reduce the effect of overprinting.
  - This was mentioned at June 06 Meeting, but not discussed.
- **VSP Gun**
  - IODP-MI work with the Science Advisory Structure to develop a short report that identifies a suite of VSP gun configurations that may be required in future IODP operations and the specific scientific and technical justification for these configurations. IODP-MI will provide this report to the USIO after input from the STP and SSP.
- **Drilling Mud**
  - The IOs should build on the experiences of Phase 1 expeditions and actively explore future applications of drilling muds for riserless hole cleaning and stabilization.

INTEGRATED OCEAN DRILLING PROGRAM

MANAGEMENT INTERNATIONAL

ORTF, continued

Expedition 310 – Tahiti Sea Level

- **Core Liners**:
  - Frequent problems occurred with the plastic core liners due to the coral formations; the liners kept getting crushed or torn and contributed to early bit blocking. The last 10 sites used traditional stainless steel or chromed steel split liner inserts which increased core recovery and rates of penetration. ORTF viewed this as a "lessons learned" for future coral/reef drilling operations.
- **Coring Diameters**:
  - Core size/diameter was an important issue in tendering for an MSP operation. ORTF recommends the IODP-MI work with the SAS (particularly STP and **EDP**), the IOs, and the associated IODP core repositories to develop a report detailing the drilling/coring, core processing, and core archival issues and ramifications associated with core diameters significantly outside the IODP norm so that reliable cost benefit analyses can be made if a tendering decision requires a decision on core diameter outside the norm.
- **Underwater Camera**:
  - The camera was used to ensure that the landing area was free from living coral heads and to monitor drilling sites on completion of the borehole – to take photographs to show the effects of the coring in the immediate vicinity of the boreholes. For these purposes the camera worked well, but the camera had limitations; it was not possible to get information regarding the exact topography of the seafloor and exact formation of the fossil reef features that an ROV could have imaged.

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APPENDIX 6

Long Term Borehole Monitoring System
Review of FY06 Activities

Prepared for

Engineering Development Panel Meeting
January 17-19, 2006 New York

CENTER FOR DEEP EARTH EXPLORATION
Japan Agency for Marine-Earth Science and Tecnology
3173-25 Showa-machi, Kanazawa-ku, Yokohama Kanagawa 236-0001 Japan
http://www.jamstec.go.jp/chikyu/

FY06 Long Term Borehole Monitoring FS

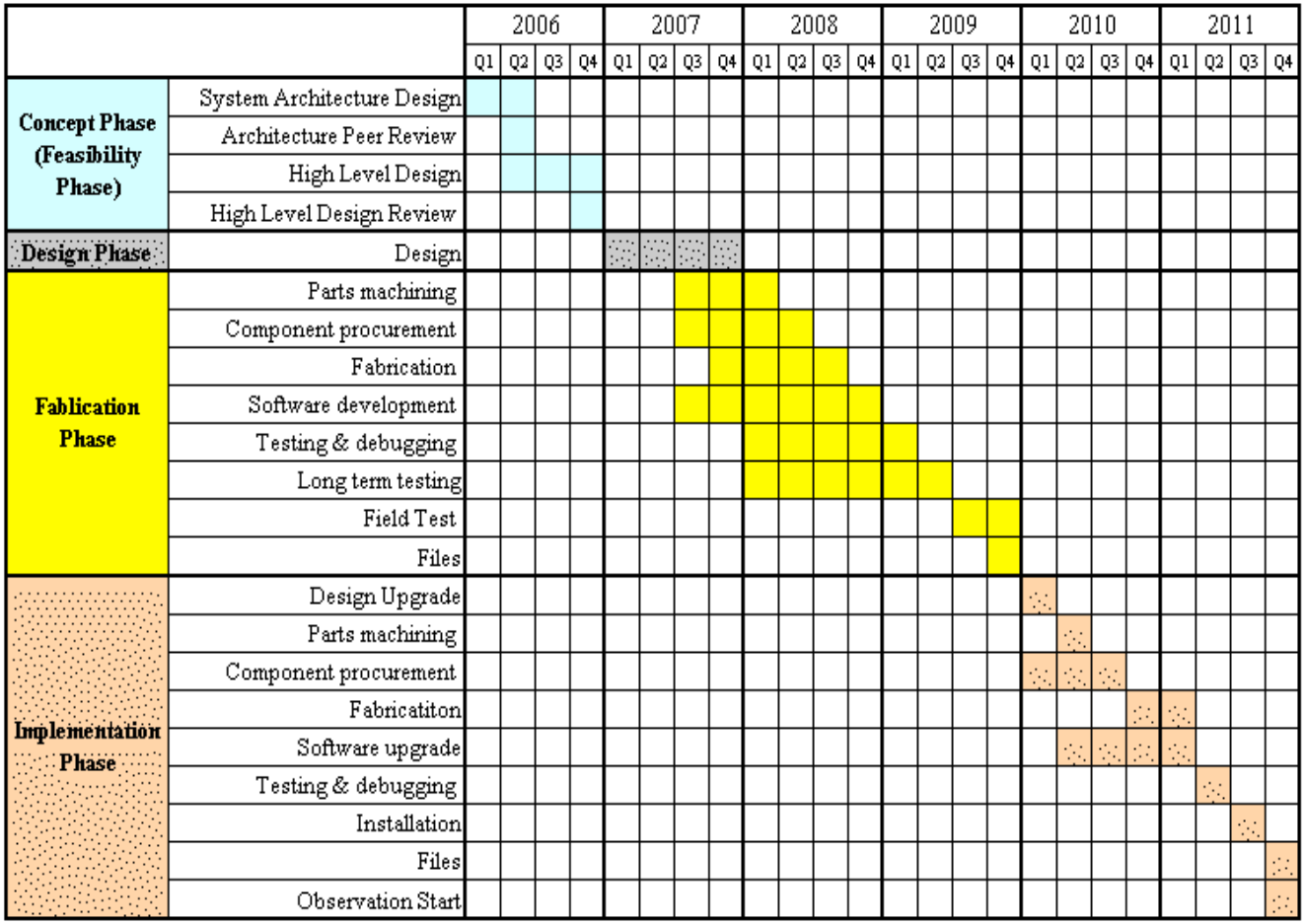
- June 14, 06 System Architecture Design Document
  CDEX to IODP-MI
- July 20, 06 Comments from external reviewers
- Sep. 06 CDEX reply to the peer reviews
- Sep. 30, 06 High Level Design Document CDEX to IODP-MI
- Oct.2-3, 06 Engineering Task Force at Washington DC
- Oct. 11, 06 CDEX High Level Design Document Review
  IODP-MI to CDEX
- Oct. 13, 06 High Level Design Document Final version
  submitted bound version to IODP-MI

  1. System Architecture Design Document
  2. System Architecture Design Document peer review (by IODP-MI)
  3. Reply to the Responses from reviewers
  4. High Level Design Document (dated September 30, 2006)
  5. CDEX High Level Design Document Review (by IODP-MI)
  6. High Level Design Document (dated October 13, 2006): it include CDEX's response to CDEX High Level Design Document Review

- Nov. 9, 06 FY2006 completion letter from IODP-MI

LTBMS Development Phase

1. Concept Phase The question of whether the concept is viable is addressed through identification of needs, review of existing systems, research, laboratory experiments, mock-ups and computer simulation, before the costly steps of detailed design and system architecture are undertaken.
2. Design Phase Determine if the project is technically and economically viable. The purpose of the Feasibility Phase is to progress the overall design, system architecture, testing and business plans to a stage that there is little uncertainty over the project's likely success or failure.
3. Fabrication Phase The objective of development phase is to complete detailed design, construct and test the final product and verify the business assumptions from the feasibility closure. This phase involves Beta testing for software projects and qualification of hardware, including field test of the engineering prototype.
4. Implementation Phase Implementation of Long-Term Borehole Monitoring System in IODP boreholes, and start observation.


2006
2007
2008
2009
2010
2011
Q1 Q2 Q3 Q4
Concept Phase (Feasibility Phase)
System Architecture Design
Architecture Peer Review
High Level Design
High Level Design Review
Design Phase
Design
Fablication Phase
Parts machining
Component procurement
Fabrication
Software development
Testing & debugging
Long term testing
Field Test
Files
Implementation Phase
Design Upgrade
Parts machining
Component procurement
Fabricatiton
Software upgrade
Testing & debugging
Installation
Files
Observation Start

Long Term Borehole Monitoring System

- It is based on an review of scientific requirements.

- In addition to the diversity of the scientific field, observatory at the ultra-deep borehole by riser-drillingthe current systems.

- This proposal targets observatory at ultra-deep boreholes (3.5 km and 6 km) including seismicity, tilting, strain, pressure, temperature monitoring and fluid sampling at several different levels in the boreholes to reveal the nature of seimogenic zone and its vicinities. Similar observatory science is proposed in the Costa Rica Seismogenesis Project (CRISP), too.

- Our goal is to develop a standard/new monitoring system that will/can be used in deep and/or shallow boreholes drilled by IODP. We emphasis our development targets not only NanTroSEIZE and seismogenesis related studies. However, we need a concrete target to be installed for the development of the system, and we believe that once the system has established, it can be applied to other fields with proper tuning/modification.

System Architecture Design Document

☆Fundamental Requirements

Scientific Requirements

Seismic observation, Geodetic observation,Temperature monitoring

Pressure monitoring, Electromagnetic observations

Fluid and microorganism sampling requirements

Technical requirements

☆Basic concept and system components

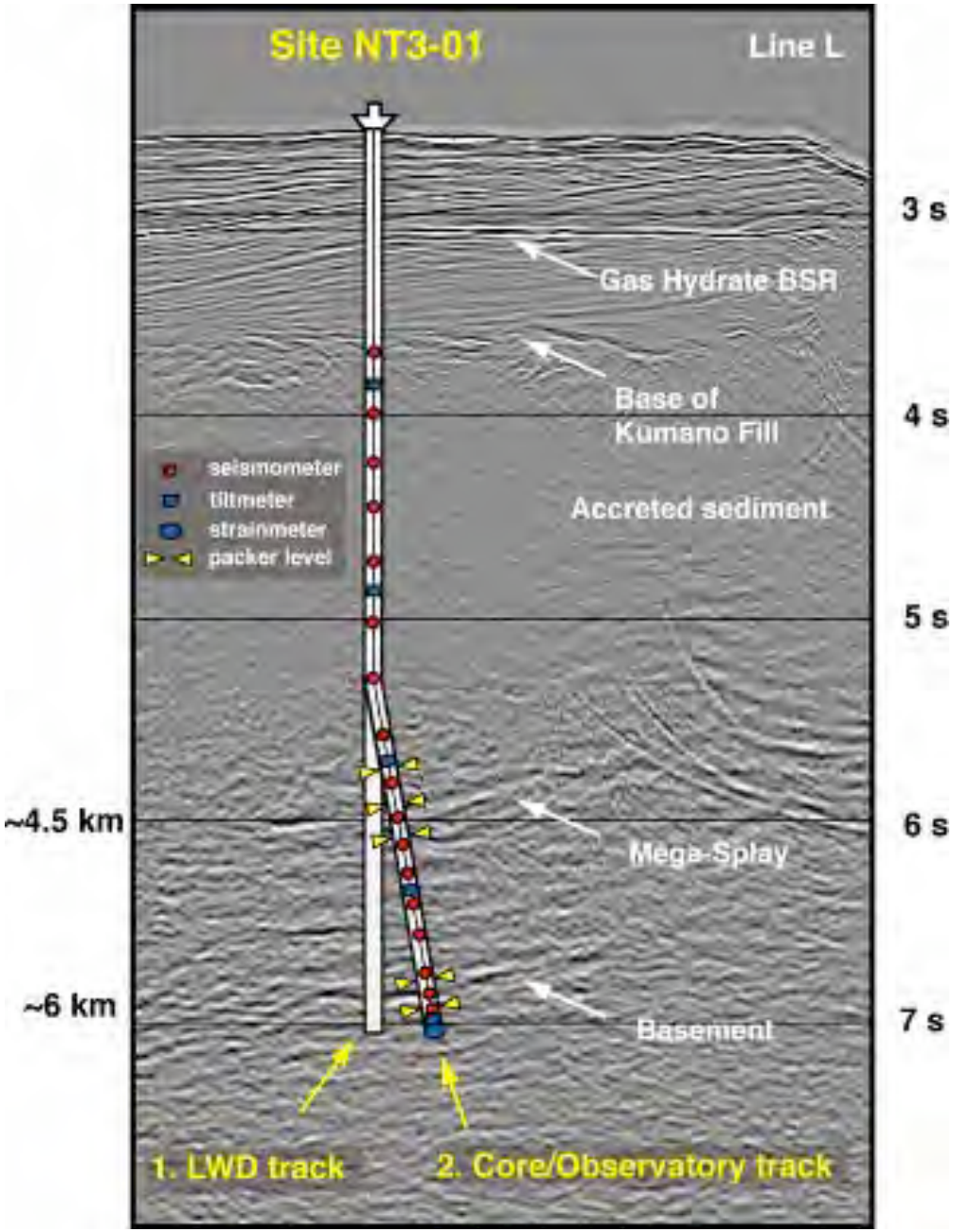
Description of system components

TelemetrySensor and downhole modules, Seabed moduleRecording unit, Power unit, Communication interface, Two-way control of the system, Timing accuracy, Data management.

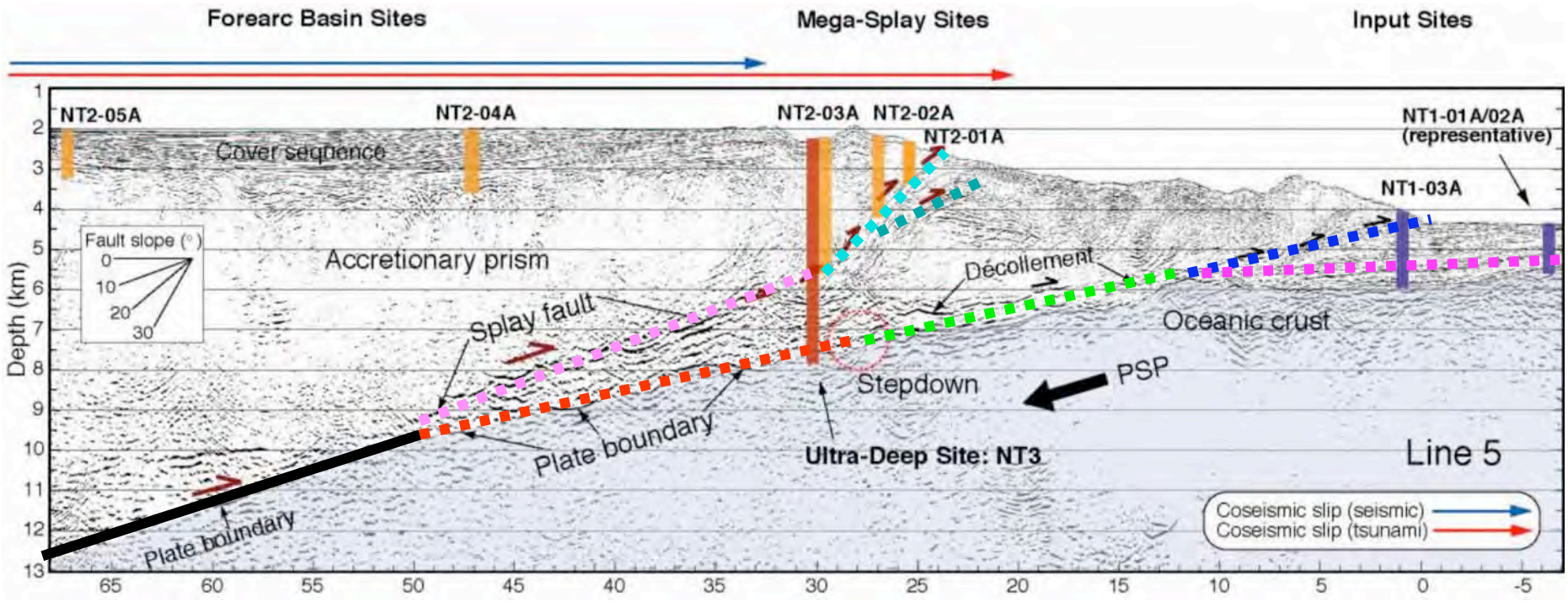
Conceptual prototype

Scientific needs

NanTroSEIZE



Kinematic fault behavior through monitoring



Which part of the fault is slipping?

Summary of desired specifications of sensors

(Shinohara et al., (2003) except for osmo sampling)

- **Seismicity**
  - Noise floor:10−7 m/s2 at 10 Hz
  - Maximum acceleration: 100 g
  - Frequency band: From 0.5−1000 Hz

  Strain and Tilt

  Sensitivity: ~10−12 for volumetric strain is best sensitivity , ~1 nrad for tilt

  Size: 3″ in diameter and 120 cm in length.

  Function: Leveling mechanism

  Sampling: 1 sec

  Temperature

  Precision: 1 mK (relative), 100 mK (detection of pore fluid flow). 1 K (absolute)
  Sampling: About 1 minute

  Pressure

  Sensitivity: ~104 Pa (1 day, 1/2 day), and detectable 10 Pa (100 sec) Absolute accuracy: 1 MPa Sampling: About 1 minute

- **Electromagnetic observations**
  - Sensitivity: 0.01 mV (for electric field) 0.001 nT (for magnetic field) Sampling: About 1 minute

  Osmo sampling

  Osmo samplers built for a 13 month deployments displacing about 16 mL/h.

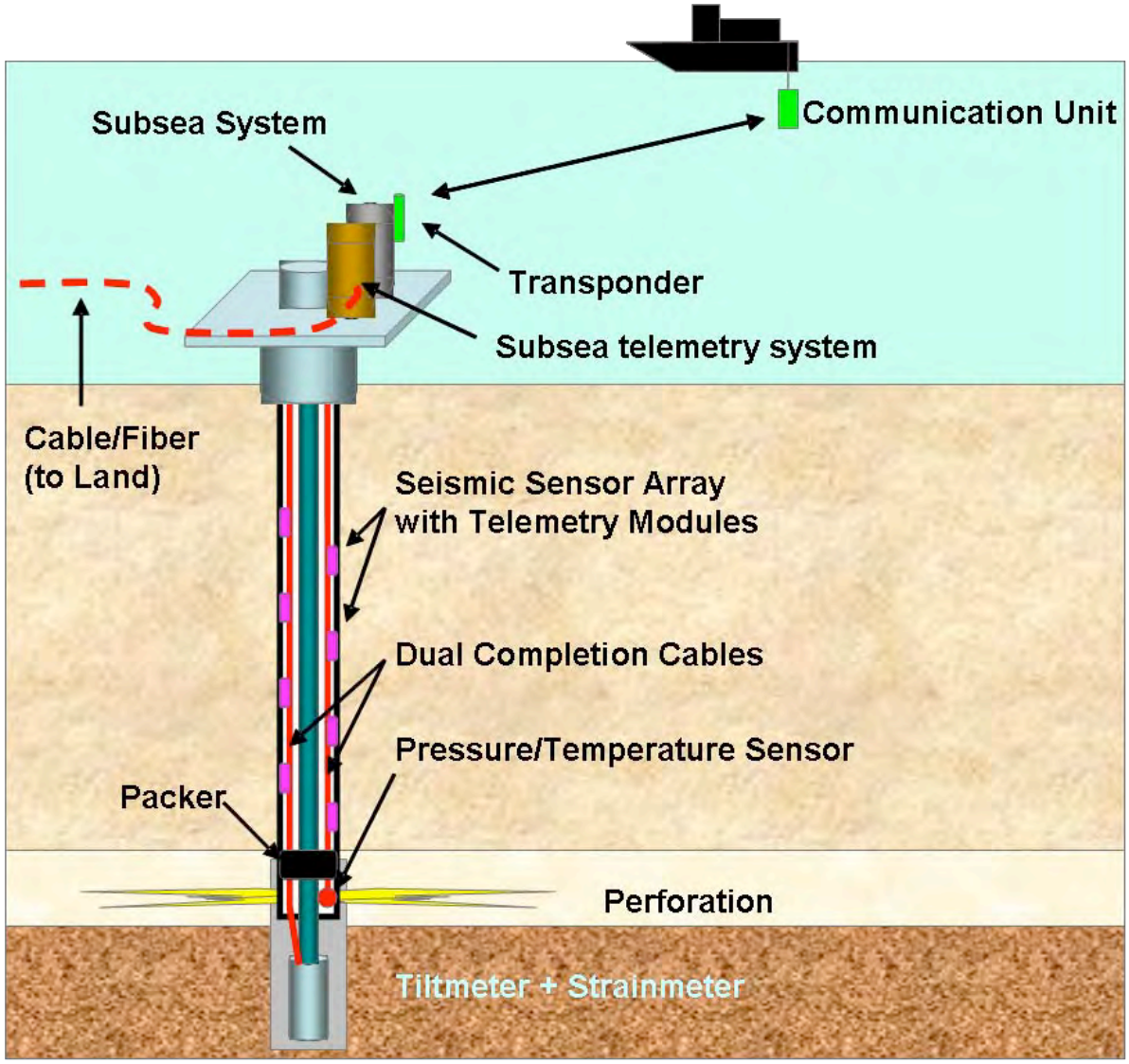


Figure 7: Schematic drawing of the system including subsea and downhole modules.

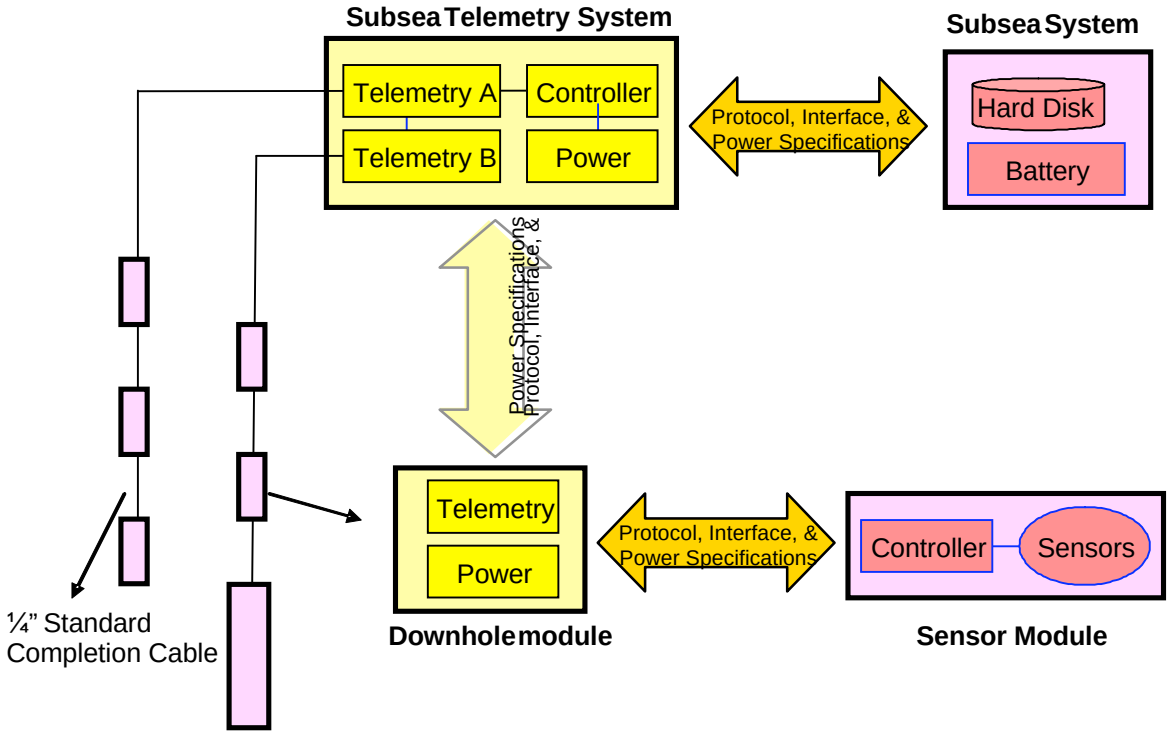


Figure 6: Basic concept of system design.

High Level Design Document

- More detailed technical specifications was be provided.
- Replied peer reviews for SA.

Major subjects are as follows:

1.System topology Fault-redundant and low power telemetry topology

2. Specifications of telemetry

Data rate, frequency allocation, synchronization, frame design, error rate....etc.

3. Power consumption estimation and power supply Power consumption of sensors and cable. Battery specification assuming one year-long observation.

4. Sensor interface Design interface assuming possible sensors connected to the system.

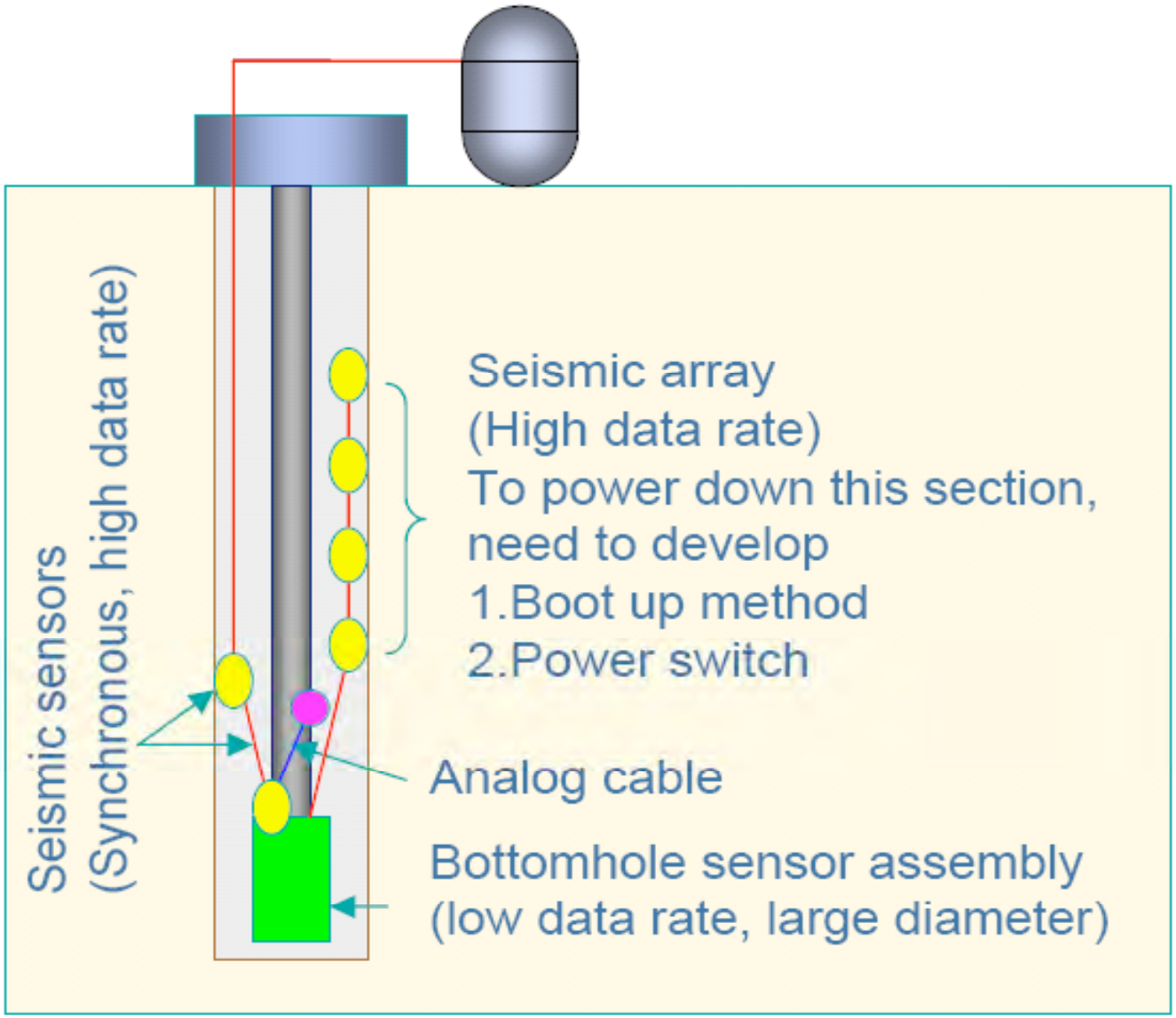
5. Data storage specification Design of subsea recorder unit as well as interface specification to ROV, transponder, and subsea cable. ・

6. Deployment and maintenance operatability Operationally feasible mechanical and physical design.

1. System Topology *Summary*

Although the present Long Term Borehole Monitoring System is based mainly on the proposal for NanTroSEIZE, the system should be applied to another (potential) proposals with platforms other than "CHIKYU" or encourage the scientists to propose new ideas using this challenging Long Term Borehole Monitoring System.

In this Section, we discussed the flexibility of the system in terms of topography of sensors at several depth level and several types of the sensors in the boreholes.


Seismic sensors
(Synchronous, high data rate)
Seismic array
(High data rate)
To power down this section,
need to develop
1.Boot up method
2.Power switch
Analog cable
Bottomhole sensor assembly
(low data rate, large diameter)

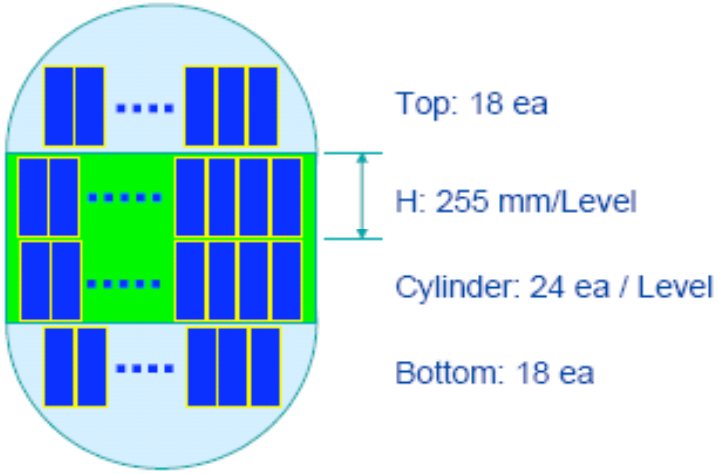
2. Power *Summary*

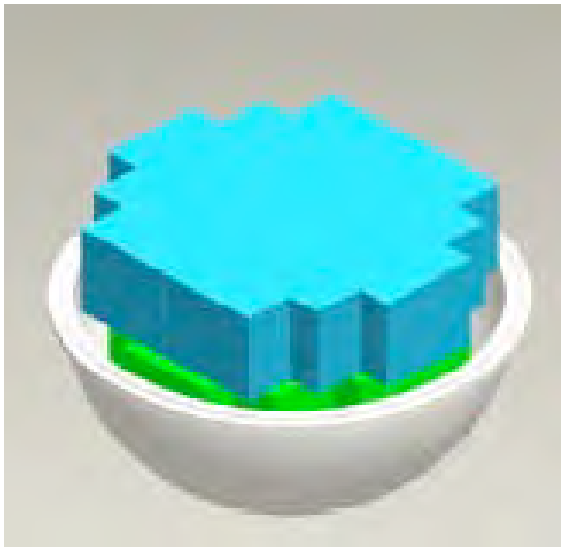
 # Low power consumption and power delivery to dowhhole modules and sensors are the most important part.
 # Estimated power consumption of the sensors and made battery estimates, and power delivery method.

 # We tentatively assumed that power consumption per level must be at 2W, based on CDEX's mock-up test conducted as a part of CDEX's own feasibility study.

 # Designed the battery system necessary for operating the LTBMS, and confirmed that the battery package size is feasible.

 # Power delivery methods, and compared two methods: (1) constant voltage and (2) constant current.

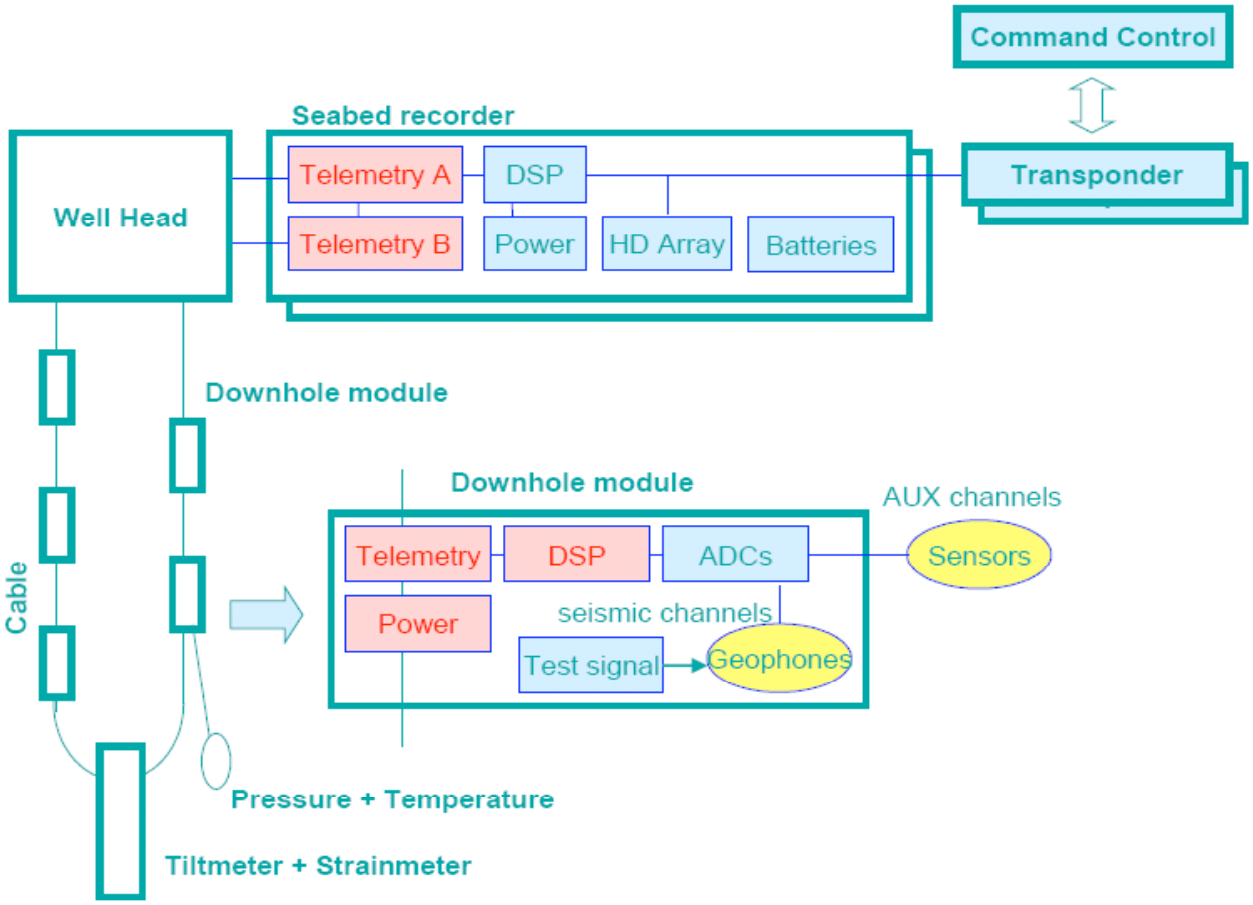

Top: 18 ea
H: 255 mm/Level
Cylinder: 24 ea / Level
Bottom: 18 ea



3. Telemetry *Summary*

 # Telemetry issues are discussed using a hypothetical set of sensors including an array of 8 seismic sensors, pressure and temperature sensors, one tiltmeter, and one strainmeter.

 # Discussed telemetry redundancy, and propose details of telemetry (frequency allocation, frame design, auxiliary data transfer, data format. We emphasize the time accuracy and propose synchronization method.


Command Control
Seabed recorder
Well Head
Telemetry A
DSP
Transponder
Telemetry B
Power
HD Array
Batteries
Downhole module
Downhole module
AUX channels
Telemetry
DSP
ADCs
Sensors
Cable
Power
seismic channels
Test signal
Geophones
Pressure + Temperature
Tiltmeter + Strainmeter

4. Mass Data Storage *Summary*

 # we designed the mass data storage system. We estimated data amount based on the assumption that all the data are stored in seafloor recording system for one year.
 # Then we designed hard disk power management. We estimated that we need 40 ~ 80 20 GBytes hard disks, and we design the power management for these large numbers of hard disks. We estimated power consumption of a 20 GByte hard disk as a function of RAM .

5. Interfaces *Summary*

 # Designed
(1) Interfaces from the subsea recorder to (i) submarine cable, (ii) transponders and (iii) remotely operated vehicles (ROV) to set-up acquisition parameters, to test/calibrate systems and to harvest data, and
(2) Sensor interfaces.

 # Our goal is to provide an initial outline of the interfaces required and how they can be implemented, while using the telemetry system for both communication and power delivery.
 # Our main requirements are to avoid degrading telemetry system performance and to meet the demands of scientific measurements, high reliability and long mean-time before failure (MTBF), low power consumption and backup solutions in case of failure.

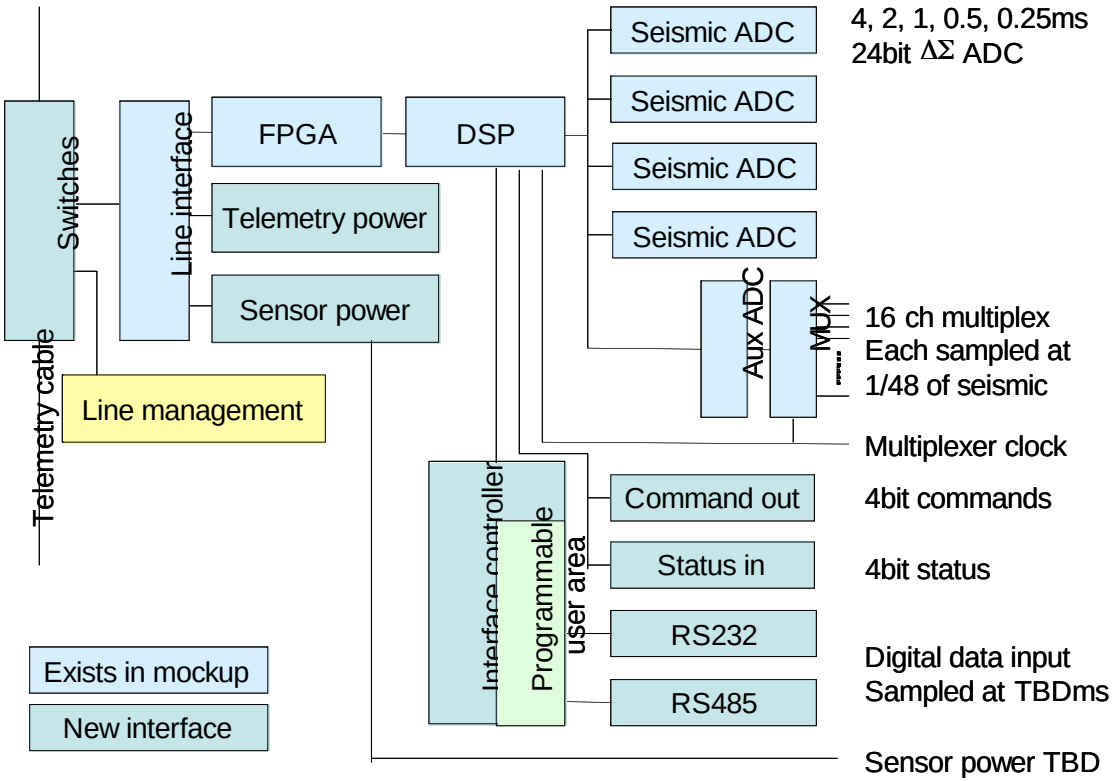
5. Interfaces *Summary (2)*

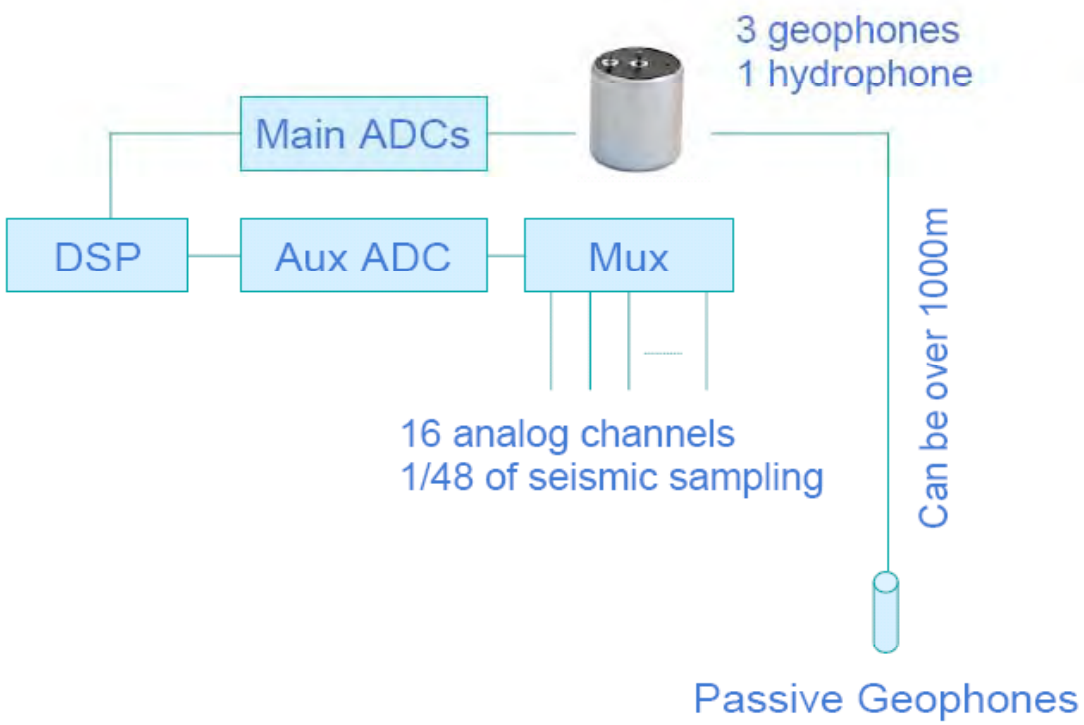
 # For sensor interface, the interface from the downhole sensors and sensor control from the downhole module.

 # Studied sensors (strainmeter, tiltmeter, seismometer, pressure and temperature sensors as examples.

 # Signals from sensors differ from sensor to sensor, for example analog voltage output, frequency, and we also need sensor control, for example seismometer control and valve control fro some type of strainmeter.

 # We also discussed the importance of timing accuracy of the whole system.


Seismic ADC
4, 2, 1, 0.5, 0.25ms
24bit ΔΣ ADC
Seismic ADC
Seismic ADC
Seismic ADC
FPGA
DSP
Switches
Line interface
Telemetry power
Sensor power
Aux ADC
MUX
16 ch multiplex
Each sampled at
1/48 of seismic
Telemetry cable
Line management
Multiplexer clock
Interface controller
Programmable
user area
Command out
4bit commands
Status in
4bit status
RS232
Digital data input
Sampled at TBDms
RS485
Exists in mockup
New interface
Sensor power TBD


3 geophones
1 hydrophone
Main ADCs
DSP
Aux ADC
Mux
16 analog channels
1/48 of seismic sampling
Can be over 1000m
Passive Geophones

6. Deployment and Maintenance Operations

We discussed downhole module architecture, and designed detailed downhole module architecture and System reliability.

7. Development Process

Review of Recent Technologies and Risks The Long Term Borehole Monitoring System consists of

(1) Strainmeter at the bottom
(2) Packer
(3) Downhole module/sensor (pressure housing)
(4) Clamping and coupling mechanism
(5) Cable head
(6) Cable
(7) Downhole electronics
(8) Seabed recorder/ controller

APPENDIX 7

DSS/PTM Update

IODP-USIO Report

EDP Meeting

New York, 17-19 January 2007

Drilling Sensor Sub (DSS) Pulse Telemetry Module (PTM)

- Description-DSS
  - An instrumented drill collar sub which is installed just above the outer core barrel (~40 ft behind the bit).
  - Records WOB, TOB, Annulus pressure and annulus temperature at one second intervals.
  - Additional measurements can be added.
  - Data set not available until the DSS is recovered.
- Description-RMM
  - Instrumented core barrel that receives limited information from the DSS during coring operations.
  - Collects data on WOB, TOB, Annulus pressure and temperature.
  - Recovered after each coring run and data is downloaded.

DSS/RMM Development

- 2001
  - APS Contracted to build drill collar capable of acquiring drilling dynamics data.
- 2003
  - First DSS tool successfully pressure and temperature tested in laboratory.
  - March-April—Deployed on ODP Leg 208 (Seal Failure).
  - DSS repaired and APS Technologies contracted to build a second collar with inductive coupling and support electronics.
  - LDEO partnered with TAMU by modifying an existing downhole tool to create the RMM.
  - July-August—DSS-2 Deployed twice on ODP Leg 210.
    - First deployment was without the RMM.
    - Second deployment included a test with the RMM. RMM failed to collect data from DSS due to a power interrupt incurred on landing in the BHA.
    - DSS WOB/TOB sensors failed on first deployment.
  - DSS-1 was converted to include an inductive coupling system.
- 2005
  - DSS and RMM tested at Schlumberger Test Facility.
  - Data was successfully transferred between the DSS and RMM.
  - Recovered data showed full scale readings on both WOB and TOB during the run.
- 2006
  - Tools sent to APS for analysis and repair and recalibration.
  - November—One DSS tool returned to TAMU.
  - Bench testing gave good readings on both WOB and TOB.

DSS/RMM

- Next Step
  - 19 January—Second tool and memory boards to be returned to TAMU for bench testing.
  - 31 March—land testing of both DSS collars scheduled at Schlumberger. Schlumberger will advise IODP if any earlier dates open.
    - Acceptance of both DSS collars from APS conditional on test results.
  - Q3 FY07—Test both DSS collars with the RMM tool.
  - If tests prove to be acceptable, DSS is accepted and ready for deployment on IODP Expedition.

Pulse Telemetry Module

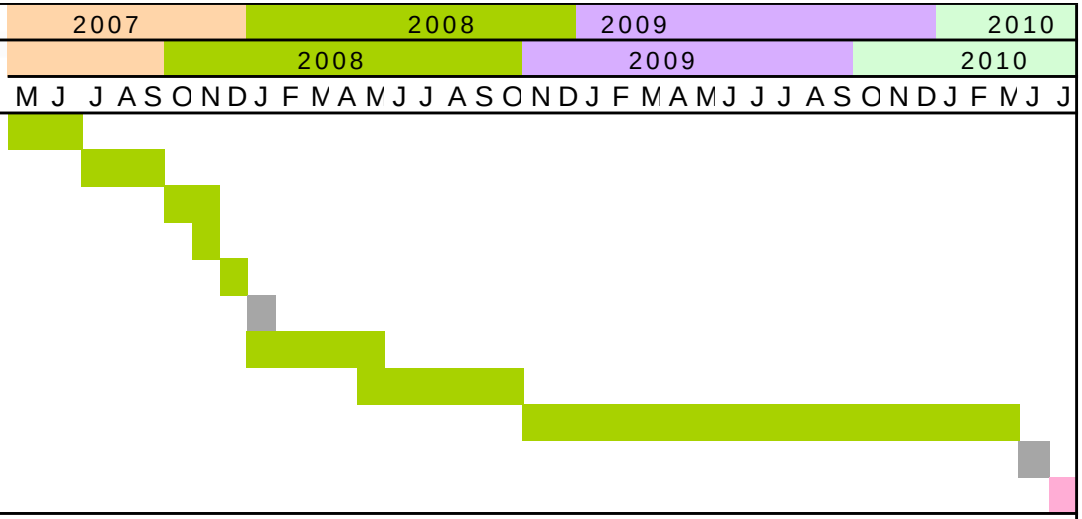
- PTM Feasibility Study Timeline
  - RFP completed and five companies are being contacted to determine their interest in the Feasibility Study.
  - Companies to reply by 15 January to indicate interest.
  - Feasibility study completion date scheduled for 1 March, 2007. Study to include the following deliverables:
    - Written assessment of available off–the-shelf pulser technology.
    - An estimate of engineering and development time and costs to modify off-the-shelf technology.
    - An estimate of circulating fluid flow rates.
    - An estimate of pulse telemetry rates depths from 5,000 to 30,000 feet.

PTM

- Results to date
  - One company has responded positively at this time.
  - One company responded negatively.
  - Three companies have not responded.
- Next Step
  - Issue Request for Quotation to each company interested in performing feasibility study to be completed by March 2007.

Project Timeline

Task	Time
EDP review of feasibility study	2 m
Detailed design	3 m
Prepare SOW/RFQ for manufacture	2 m
Circulate RFQ to manufacturers	1 m
Evaluate responses to RFQ	1 m
Award contract	<1 m
Build	5 m
Rebuild RMM	4 m
Testing and documentation	18 m
Acceptance	1 m
Implementation	<1 m



PTM module development

Task
Milestone
Completion

CY=calendar year
FY=fiscal year

APPENDIX 8

Logging While Coring

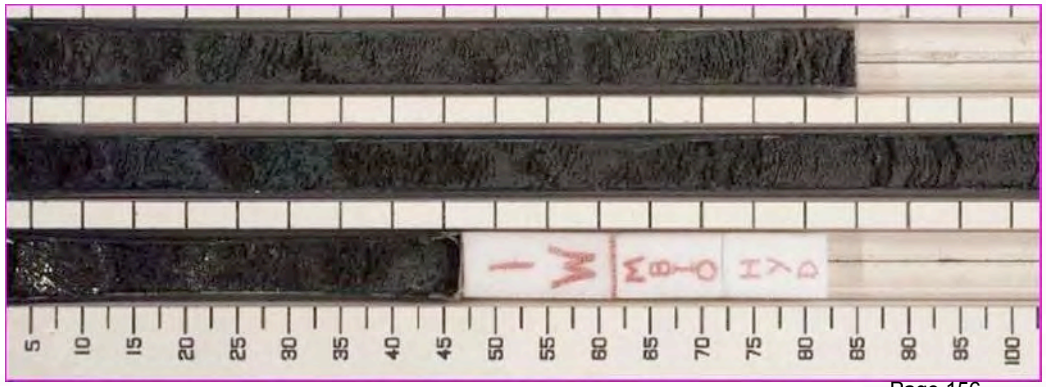
IODP-USIO Report

EDP Meeting

New York, 17-19 January 2007

Logging While Coring (LWC)

- Description
  - LWC system consists of a Schlumberger Resistivity At-the-Bit (RAB) tool with modified battery pack to accept a core barrel through the ID.
  - Uses MDCB (Motor Driven Core Barrel) inner barrels with an RCB Bit.
  - LWC provides resistivity images and gamma ray logs while the hole is being cored.



LWC History

- 2002
  - Schlumberger modified battery pack of the RAB tool to accept IODP MDCB core barrel.
  - Core barrel and BHA design tested at Schlumberger Test Facility, Sugar Land, TX (Genesis Rig).
  - Tool deployed on ODP Leg 204 with good core recovery and high quality logs.
- 2003
  - Core barrels shortened to accept 15’ core instead of 30’ core.
  - Fit test with all components.
  - LWC deployed on ODP Leg 209.
  - Very poor core recovery in much harder material than encountered on Leg 204.
- 2007
  - Re-design of core barrels/catcher/bit in process by LDEO.

APPENDIX 9

Third Party Tools Update

IODP-USIO Report

EDP Meeting

New York, 17-19 January 2007

APCT-3

- 2004
  - Tool developed in joint effort between Andy Fisher and IODP.
    - IODP developed mechanical pieces to design.
    - Fisher contracted Anteras to develop Electronics.
- 2005
  - Tool deployed for sea trials on IODP Expedition 311.
    - Temperature measurements looked very good compared to standard APCT measurements.
    - Crew liked new software interface but suggested a few changes.
- 2007
  - Tools calibrated at SCRIPS in San Diego-Aug. 2007.
    - Calibration attended by Dean Ferrell for IODP.
- Q2 FY 2007
  - Four Tools to be transferred to TAMU for evaluation and testing prior to deployment on future Expeditions.

Juan de Fuca II CORK Design

- 2006
  - CORK Design for Juan de Fuca II Expedition has been contracted to Tom Pettigrew by Andy Fisher.
  - Development has been monitored by IDOP is going very well. Developments include:
    - Testing of expandable packer system.
    - Design of free flow CORK head.
- 2007
  - Design review scheduled for mid February 2007.

APPENDIX 10

Long Term Borehole Monitoring System
07 Proposal

CDEX, JAMSTEC

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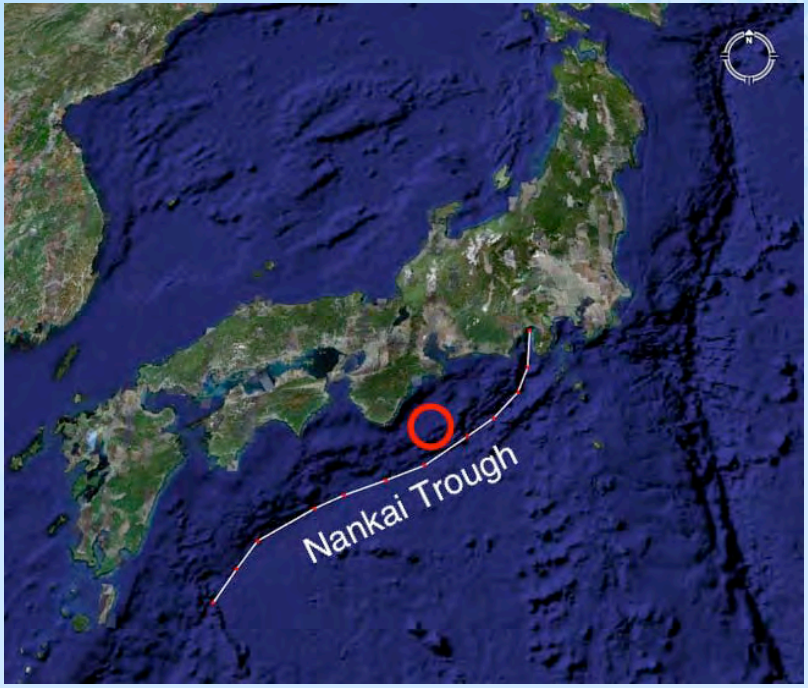
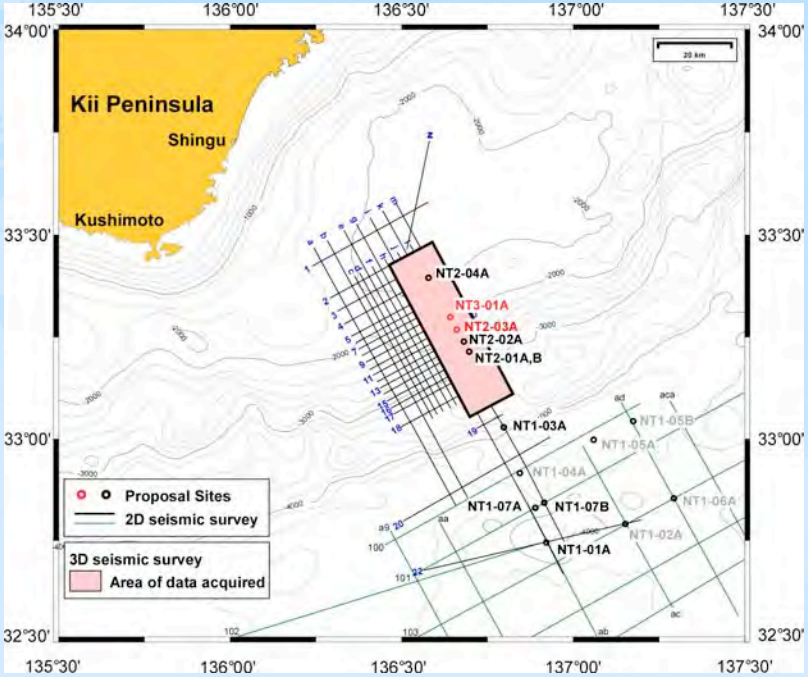
NanTroSEIZE

IODP scientific drilling proposal 603 (NanTroSEIZE)





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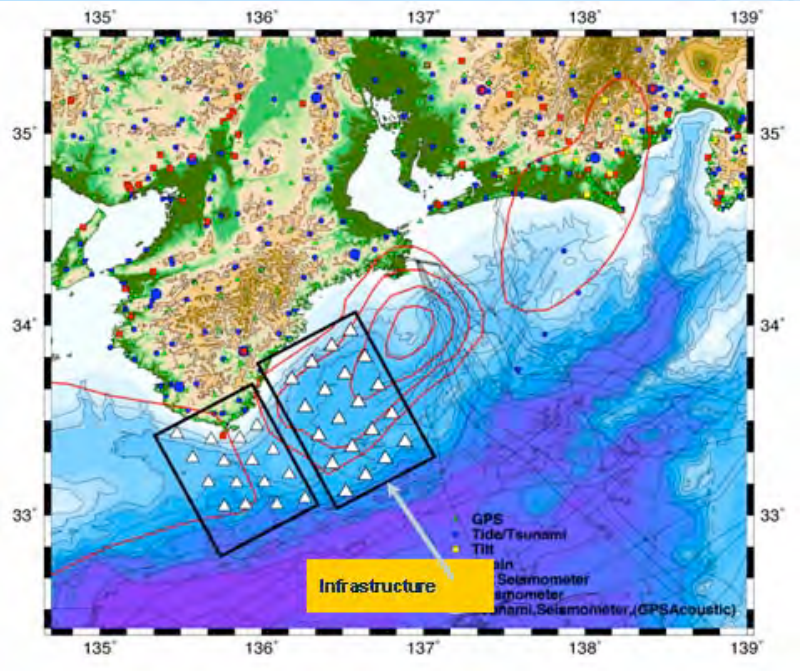
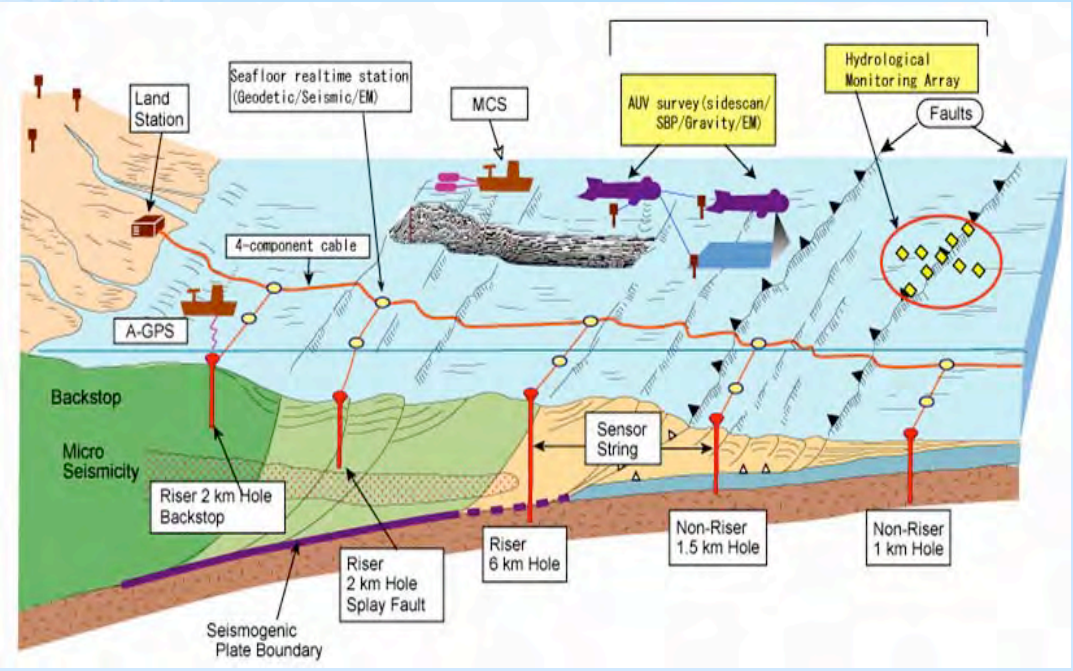
Seafloor Cable Network Monitoring System

- Twenty stations
- Seismic, Tsunami
- Development schedule: 2006 - 2009





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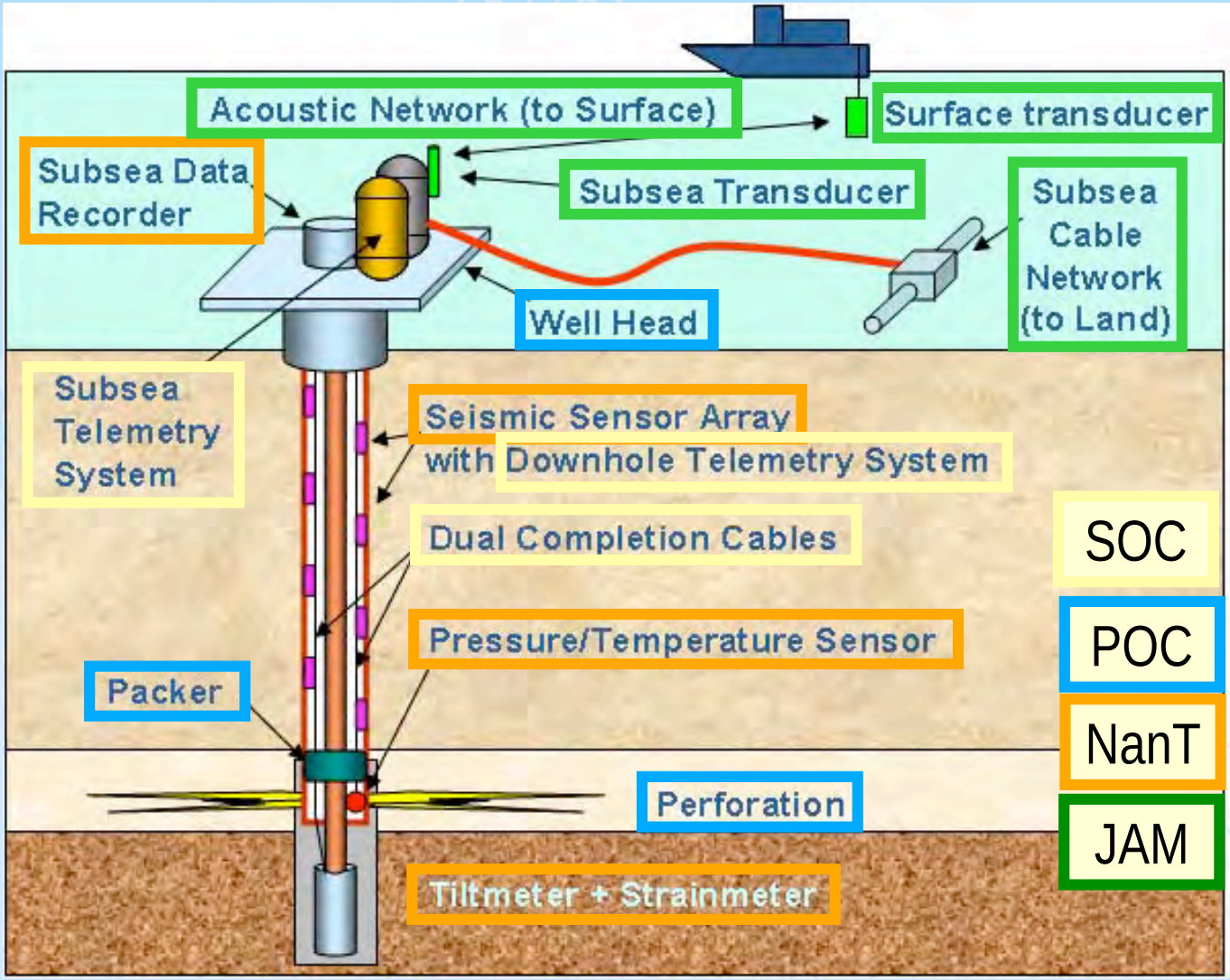
LTBMS Conceptual Image



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NanTroSEIZE *"CHIKYU"* Operation Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2006	Shake Down		Maintainance			Shake Down	Maintainance	SIT			ODS	
2007	ODS								IODP NanTroSEIZE (Stage 1)			
2008	IODP NanTroSEIZE (Stage 1)		Maintainance			IODP NanTroSEIZE (Stage 2)@NT2-03						
2009	Western Pacific / Indiana Ocean									IODP NanTroSEIZE (Stage 3)		
2010	IODP NanTroSEIZE (Stage 3)						Maintainance		IODP NanTroSEIZE (Stage 3)			
2011	IODP NanTroSEIZE (Stage 3)		Maintainance		IODP NanTroSEIZE (Stage 4) @NT2-03 LTBMS Installation							

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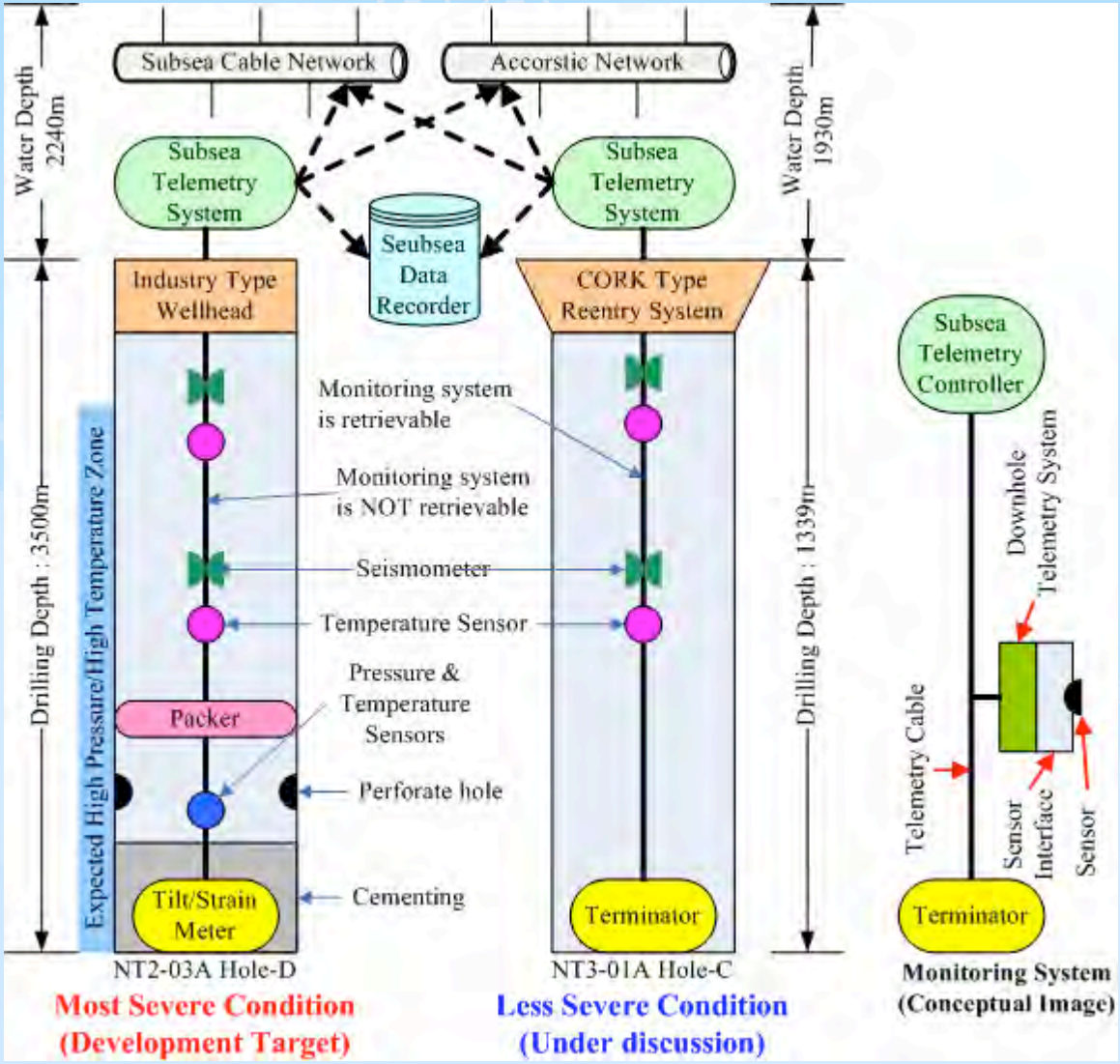
NanTroSEIZE LTBMS Configurations with Conditions



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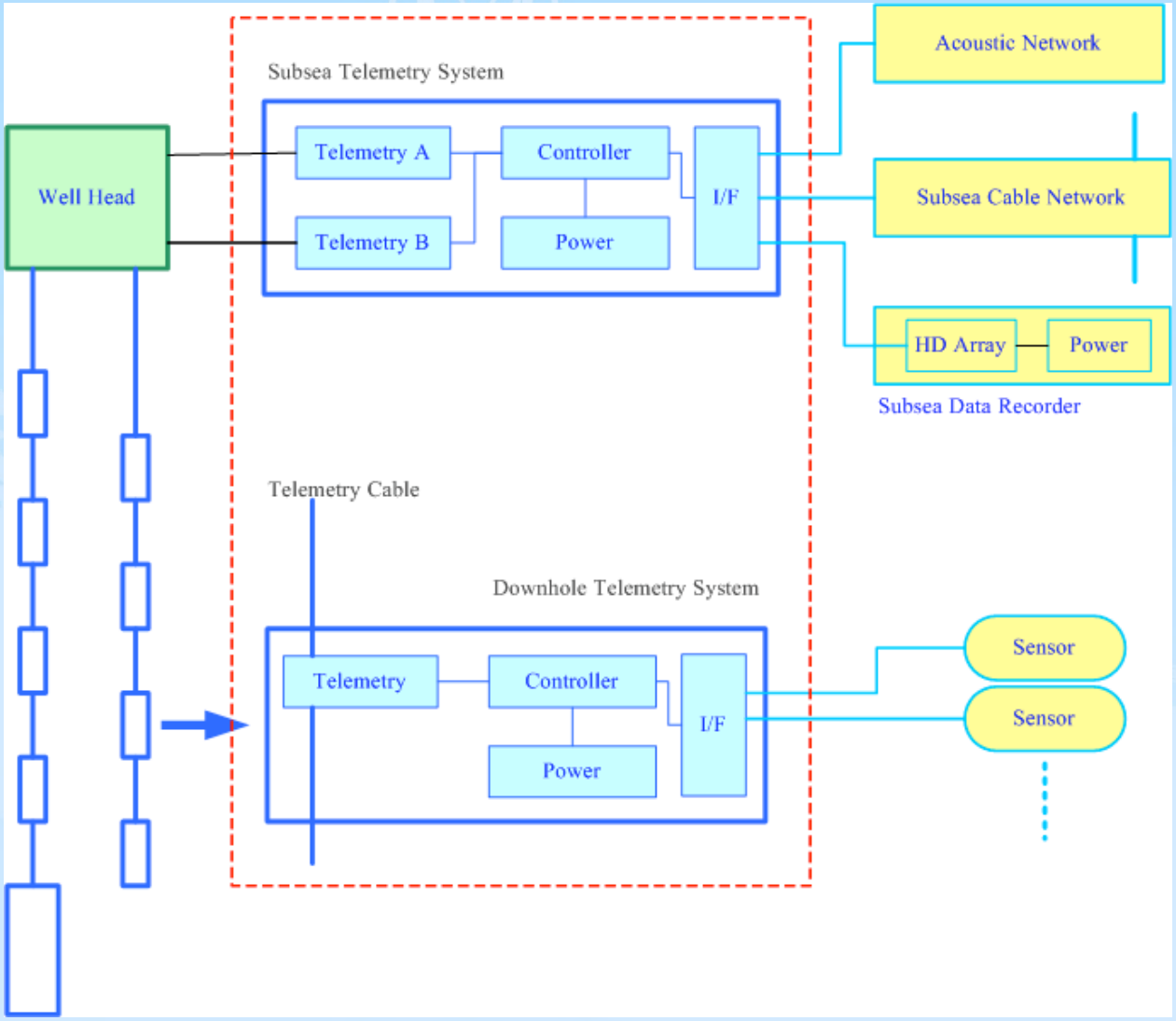
Schematic Diagram of Telemetry System



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Functional Targets of LTBMS

Category	Item	Functional Targets
Subsea Data Recorder	Power consumption	<5W
	Hard disk	Array of 20 GByte HD (1200 GByte for NanTroSEIZE Phase II), Disk mirroring
	SRAM data buffer	10 Mbytes
	Bit error rate	10 e^{-9}
Downhole Telemetry System	Operating temperature	125°C for 5 years
	Power consumption	<2W for each down hole telemetry system
Subsea Telemetry System	Synchronization Accuracy	<10 μs
	Number of addresses	128
	Up link data rates	From 256 kbps to 2.048 Mbps
	Cable distance	Maximum 2,000 m
	Power consumption	<5W
Sensor I/F & Data Acquisition	Analog inputs (High sampling rate)	4 seismic channels
	AUX channels	15 channels
	External status inputs	About 6 status bits
	Seismic sampling rate	0.25, 0.5, 1.0, 2.0, 4.0ms
	AUX sampling rate	1/48 of seismic sampling rate
	Dynamic range	24 bit Delta-Sigma >120dB

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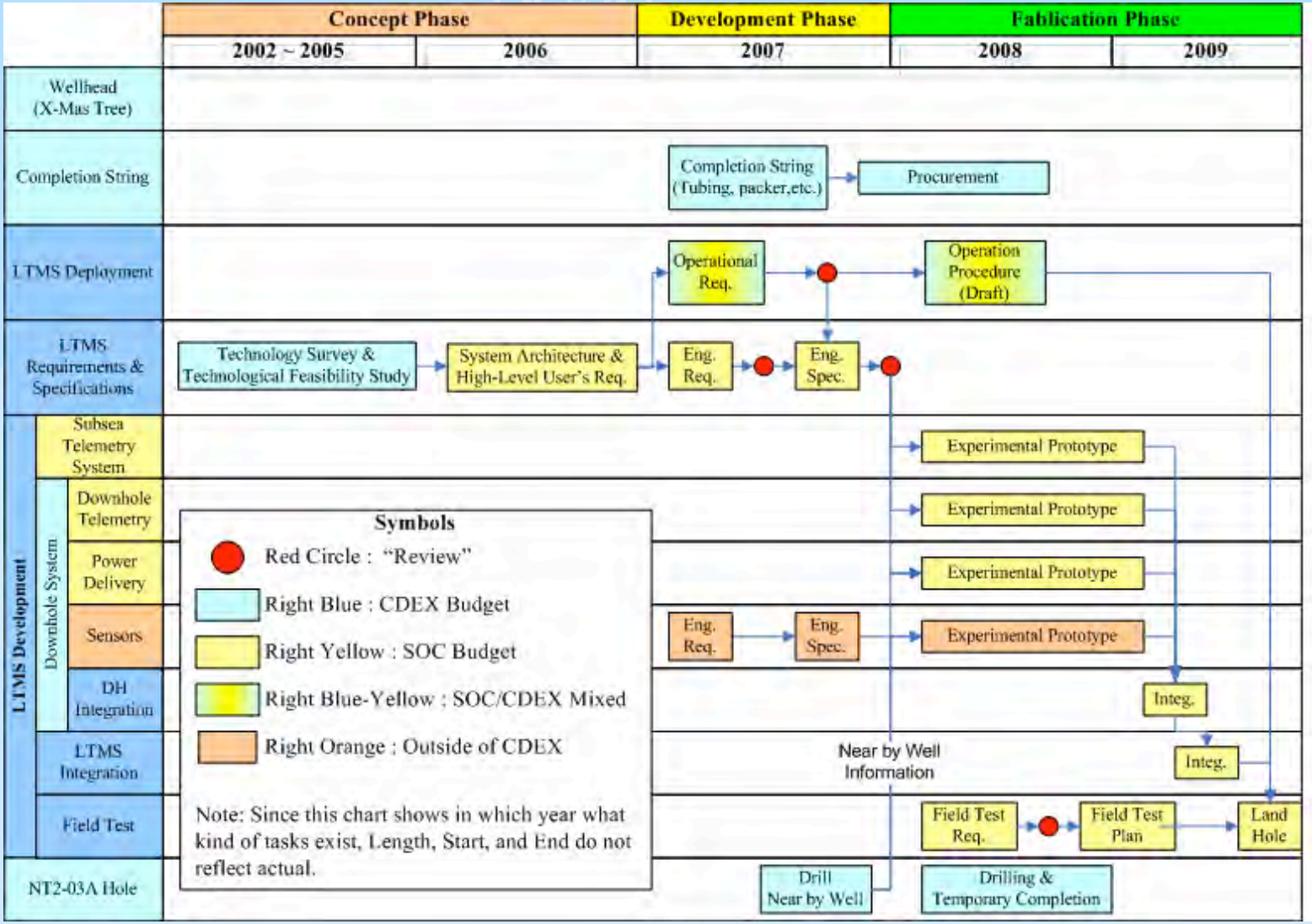
Development Process and Plan (1/2)



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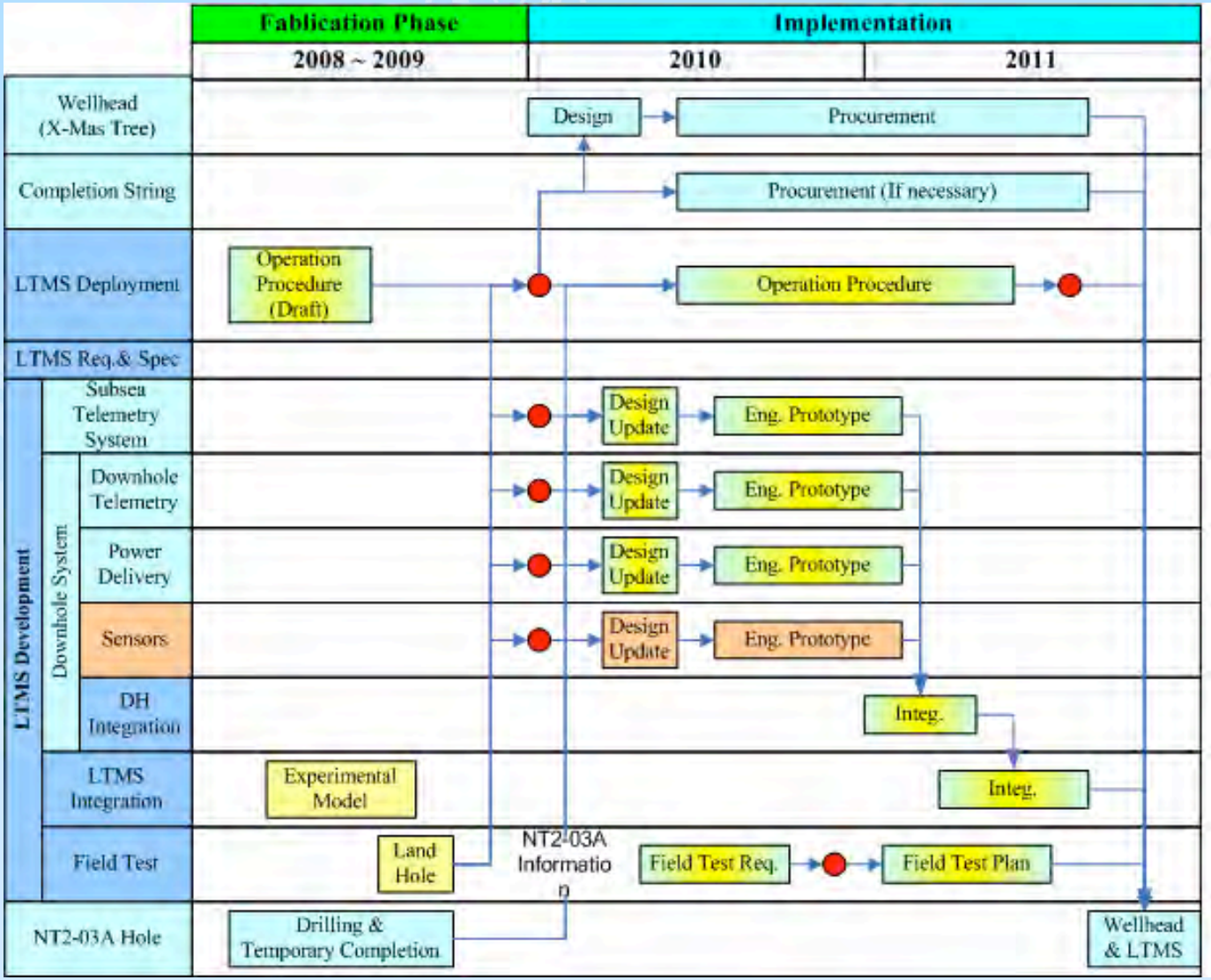
Development Process and Plan (2/2)



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Scope of Work

- Define Engineering (Technological) Requirements
- Define Operational Requirements (Partially with SOC funds)
- Specify Engineering Specifications
- Design and build EXP (Experimental Prototype)
  - a. Perform detailed engineering design (circuit level); Electrical, Mechanical, and software/firmware
  - b. Develop required element technologies, electrical, mechanical, and software/firmware portions
  - c. Select and qualify electrical components
  - d. Specify and implement interfaces;
    - Between the subsea telemetry system and the seafloor network and acoustic network
    - Between the subsea telemetry system and the subsea recording system
    - Between the downhole telemetry system and sensors
  - e. Specify the integration of Assemblies Assemble parts and test it (unit, integration, and field tests)
  - f. Assemble parts and test it (unit, integration, and field tests)
- Define Field Test Requirements
- Specify the integration and prepare Field Test Plans
- Integration of EXP
- Field Test in the Land Hole

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07 Plan

- Engineering Requirements Review: April 2007

Review objective is to check correctness of translations from “user” terms to “engineering” terms. These translations should be agreed by representatives of users and engineering team.

- Quick review of operational requirements: July-August 2007

Review objective is to check specific conditions of IODP completion compare to general completion used in the oil industry, such as completion string and deployment to clarify constraint in mechanical design.

- Engineering Specifications Review: August-September 2007

Review objective is to validate the existing uncertainties to be solved are properly identified.

- Updated Project Plan Review: September 2007

Review objective is to verify the plan is reasonable, doable, and agreeable.

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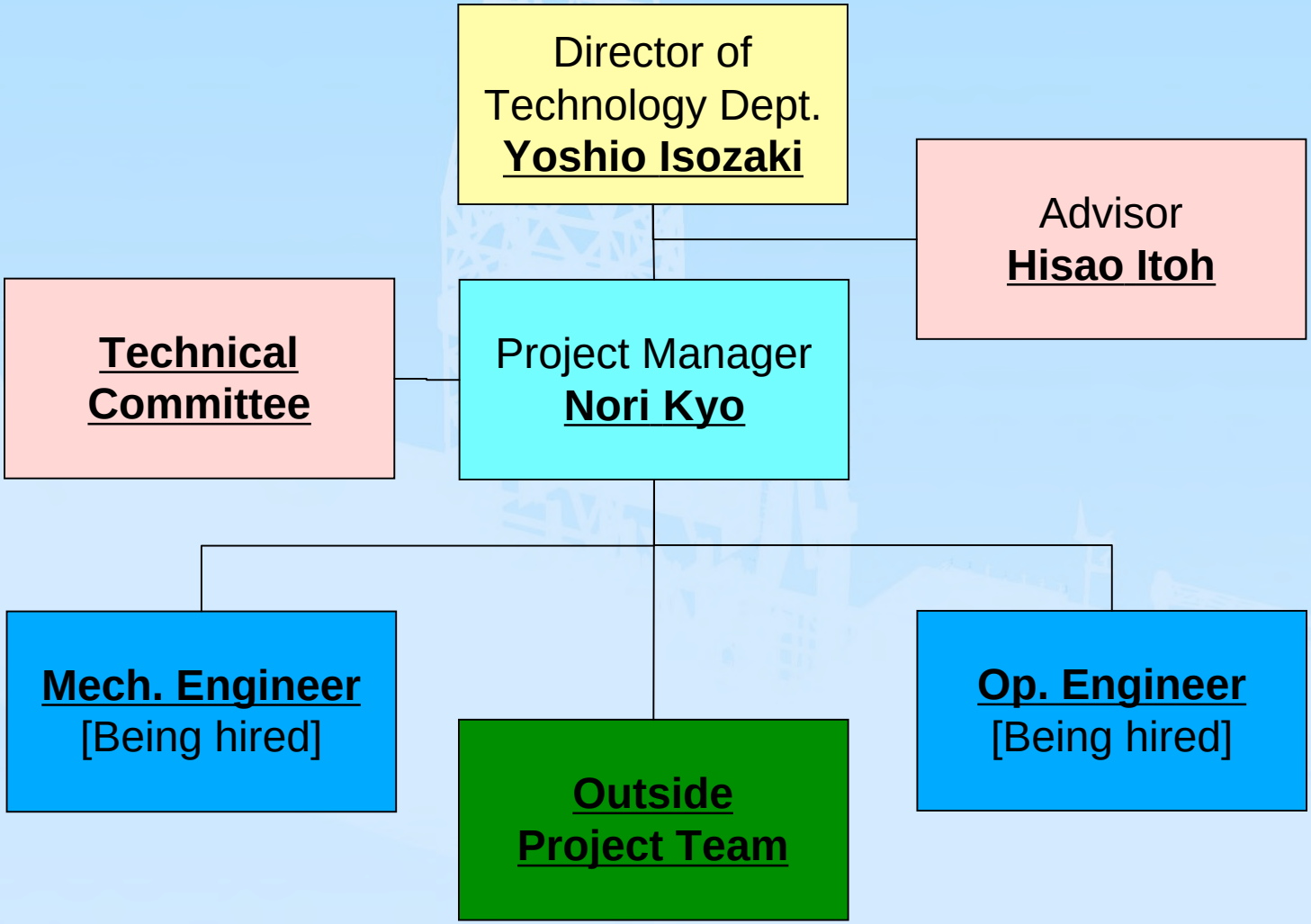
Project Team



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Risk Matrix

Rank	Risk Description	Probability	$-Value	Curren Exposur	Mitigation Plan
1	Temperature estimation	5	3	15 e	
2	Requirements change	3	3	9	
3	External dependency 1: Sensor	5	1	5	
4	External dependency 2: Observation strategy including user requirement	3	1	3	
5	External dependency 3: Operation/Installation	1	1	1	
6	Sub-Contractor management	1	1	1	
7	Budget Control	1	1	1	
8	Contract timing	1	1	1	

CENTER FOR DEEP EARTH EXPLORATION
Japan Agency for Marine-Earth Science and Technology
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APPENDIX 11

USIO

United States Implementing Organization (USIO) Report to EDP

- USIO personnel changes
- SODV status
- FY08 – FY09 schedule
- Pending issues

USIO Personnel Changes

USIO

- Sean Higgins, IODP Associate Director at JOI
- Peter Blum, TAMU Manager of Tools and Analytical Services
- Bill Wasson, TAMRF Executive Administrator
- Rick McPherson, SODV Project Manager
- Eric Meissner, LDEO Manager of Engineering and Technical Services

USIO

SODV Highlights

- $115M, 3-yr MREFC targeted for autumn 2007
- Ship “stretch” proposed to increase science capability and space w/significant science instrumentation
- Significant price increase in petroleum sector due to market forces
- Options being explored include refit within the existing hull
- Any refit includes:
  - Life extension / equipment refurbishment
  - Increased accommodations w/ improved habitability
  - New/increased science capability
  - Maintenance of schedule

USIO

SODV Highlights

- Budget is fixed at $115M
- Continuing resolution in place through mid.-Feb?
- Alternate engineering design underway
  - Reviewed by PAC, STP, EDP, SODV design teams, USIO
  - Design freeze in place
- Shipyard negotiations to commence in late January/ February
- Vessel in Singapore with significant life extension and upgrades in progress

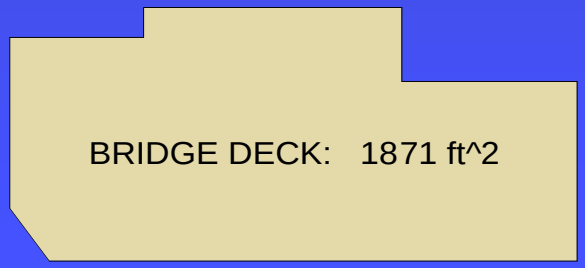

JOIDES Resolution
MONROVIA

SODV Alternate Design Concept

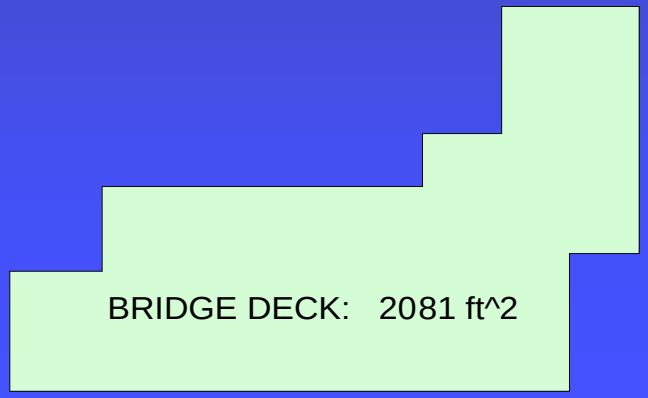
USIO

- Builds on previous version (time/cost effectiveness)
- Integrated laboratory – accommodation structure
- Additional berths (min. 128)
- New science laboratory (increased sq. ft.)
- Bridge level raised and integrated with DP
- New decks in hold for recreation/storage/offices
- Permanent Schlumberger rig up
- 5000 psi mud pumps
- Enhanced passive heave compensation
- New HVAC
- New large diameter pipe for logging tools
- New galley positioned above the water line

Bridge

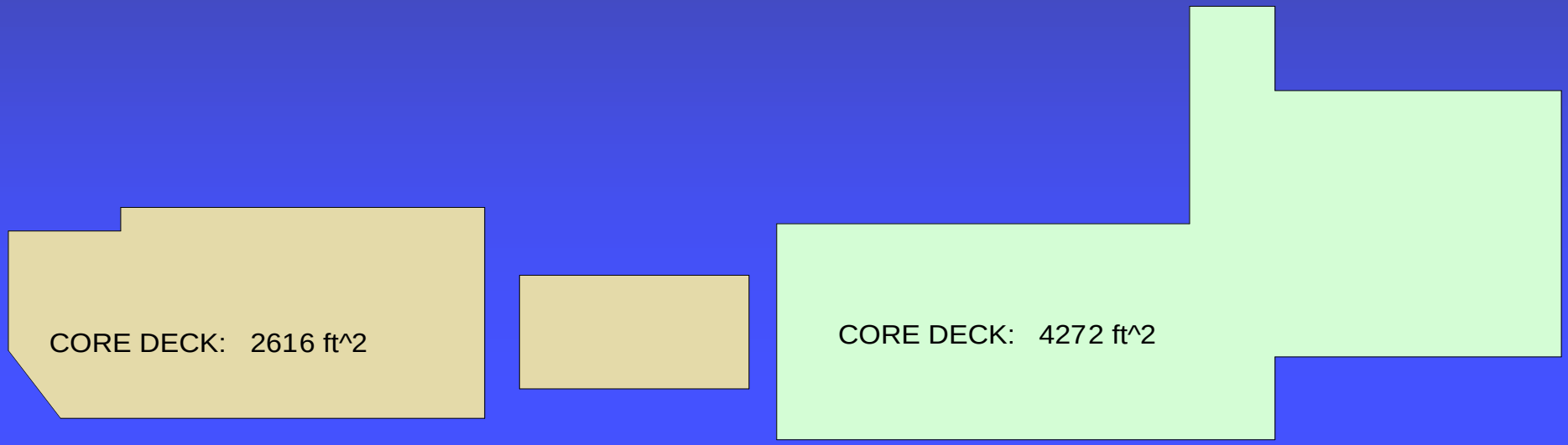


- Downhole Lab
- Conference Rm
- Thin Section
- Logging Office
- Hard Rock Café



- Trans Ocean Office
- Operations Office
- Science Office
- Technical Office
- Mechanicals
- Hazardous Storage
- Planning Room

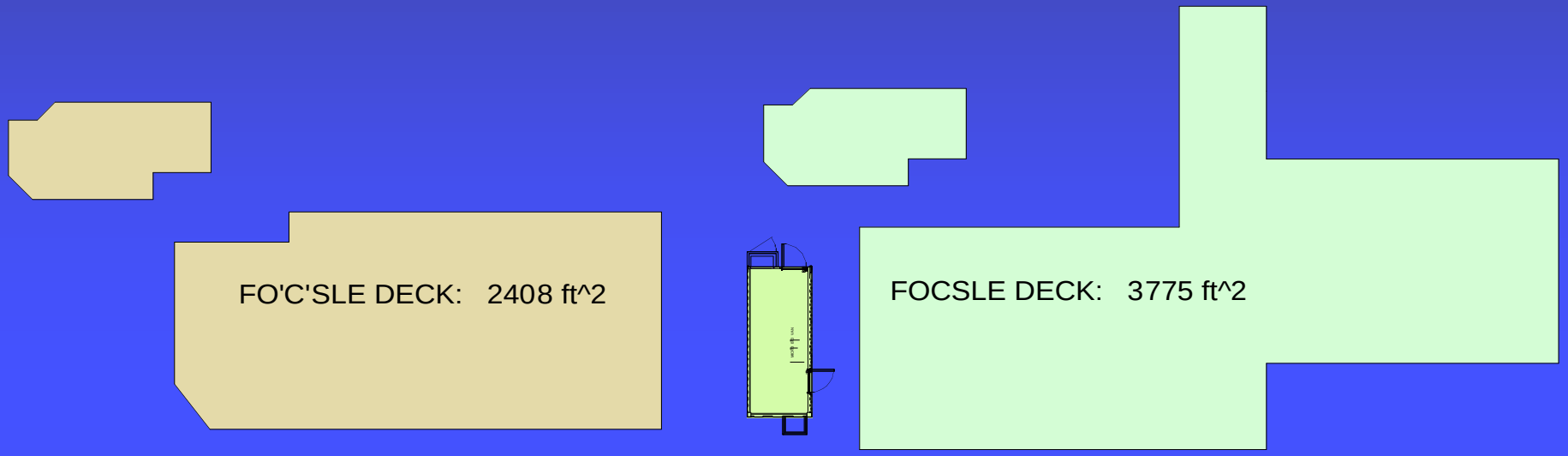
Core



- Core Lab
- Core Receiving
- Trans Ocean Office
- Operations Office
- Science Office
- Technical Office

- Downhole Lab
- Core Receiving
- Core Lab
- Logging Office
- Telemetry Lab
- ET Shop
- Paleo Prep - Microscope

Fo’c’sle

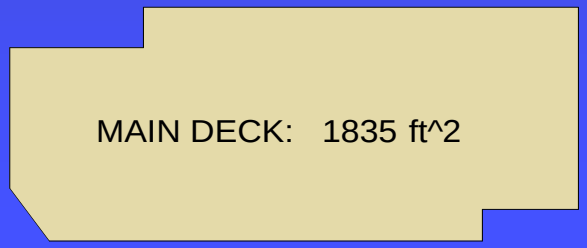


- Underway Lab
- Microbiology Lab
- Chemistry Lab
- Paleontology Lab
- Sample Prep. Lab

- Underway Lab
- Microbiology Lab
- Chemistry Lab
- Thin Section Lab
- X-Ray Lab
- Microbiology Van

- Conference Rm
- Publication Office
- Curator’s Office
- Sample Prep Lab
- Imaging Office

Main

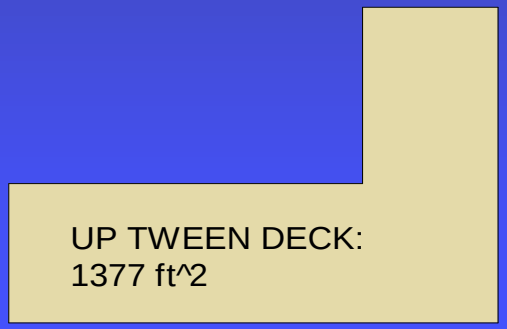


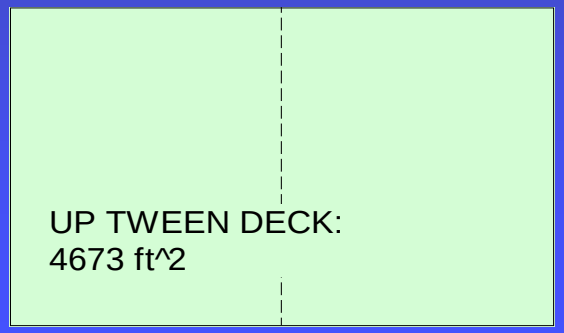
- Movie Room
- Data Center
- IT Office
- User Room
- Publican Office
- Curation Office

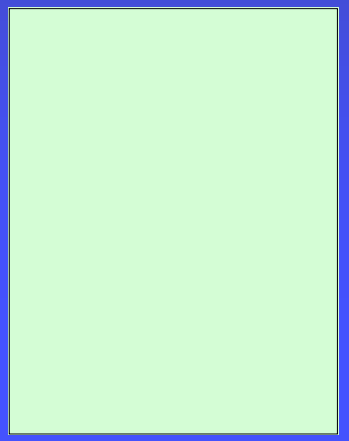
- Laundry
- Change Room
- Mechanical

- Galley & Mess
- Laundry
- Change Room
- Food Storage

Upper Tween & Tween

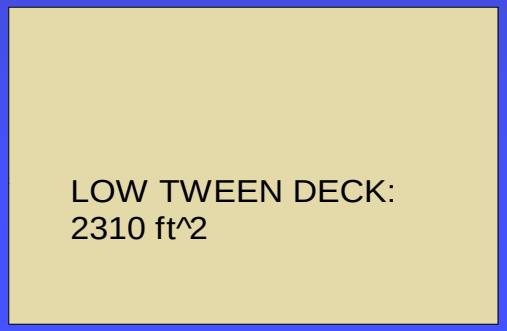




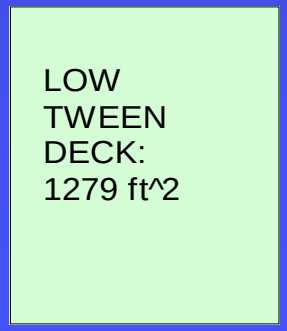


- Imaging Lab
- Mechanical
- ET Shop
- Science Storage
- Science Storage
- Logistics Shop
- Staging Area
- Science Pallet Storage
- Gas Bottles
- Gym
- Movie Room
- Lounge

Lower Tween



- Core Storage
- Science Storage
- Gym
- Hazardous Storage



- IT Office
- Data Center
- User Room / Study
- Developer’s Office

Hold

HOLD DECK: 2310 ft^2

- Core Storage
- Science Storage
- Logistics Shop

HOLD DECK: 2560 ft^2

- Core Storage
- Mechanical

27% Overall Increase

34% Increase: Laboratory, Office and Conf. Space

Deck	JR	SODV	% Change
Bridge	1,871	2,081	11%
Core	2,616	4,272	63%
Fo'c'sle	2,408	3,775	57%
Main	1,835	0	-100%
Upper Tween	1,377	4,673	239%
Lower Tween	2,310	1,279	-45%
Hold	2,310	2,560	11%
Totals	**14,727** sq ft	**18,640** sq ft	**27%**

SODV Alternate Design Concept

USIO

- New science instrumentation
  - Minimum and standard measurements
  - Multiple tracks
  - Improved data acquisition
  - Improved data quality
- Improved coreflow
- Laboratory Information Management System
- IT infrastructure
- New sampling software
- Improved people flow

USIO

Status of Projects/Enhancements Close to EDP

- Large Diameter Drill Pipe
  - 4000 ft ready to be ordered following shipyard contract
- Rig Instrumentation System
  - ODL to purchase new system
- Visualization System
  - Present plan to use existing refurbished system; on a post shipyard completion list for further enhancement
- ROV
  - No SODV funding allocated; capability to add in future an option
- Weight Bearing Umbilical
- Heave Compensation
  - AHC off ship; passive to be enhanced

Heave Compensation Strategy

USIO

- Identify attributes of current passive system configuration
- Establish internal team
  - Complete system review, continue discussions with industry, recommend potential enhancements
- Enhance passive system to maximize efficiency
- Complete real time assessment of passive system to determine if science deliverables can be met
- AHC system reserved to provide an option to return system to vessel at a later date

USIO

SODV Schedule

2 Jan 07	Design freeze
15 Jan	Commercial discussion
15 Feb	Shipyard contract in place
July	Targeted drydock
15 Oct	Vessel commissioning
15 Nov	Commence operations

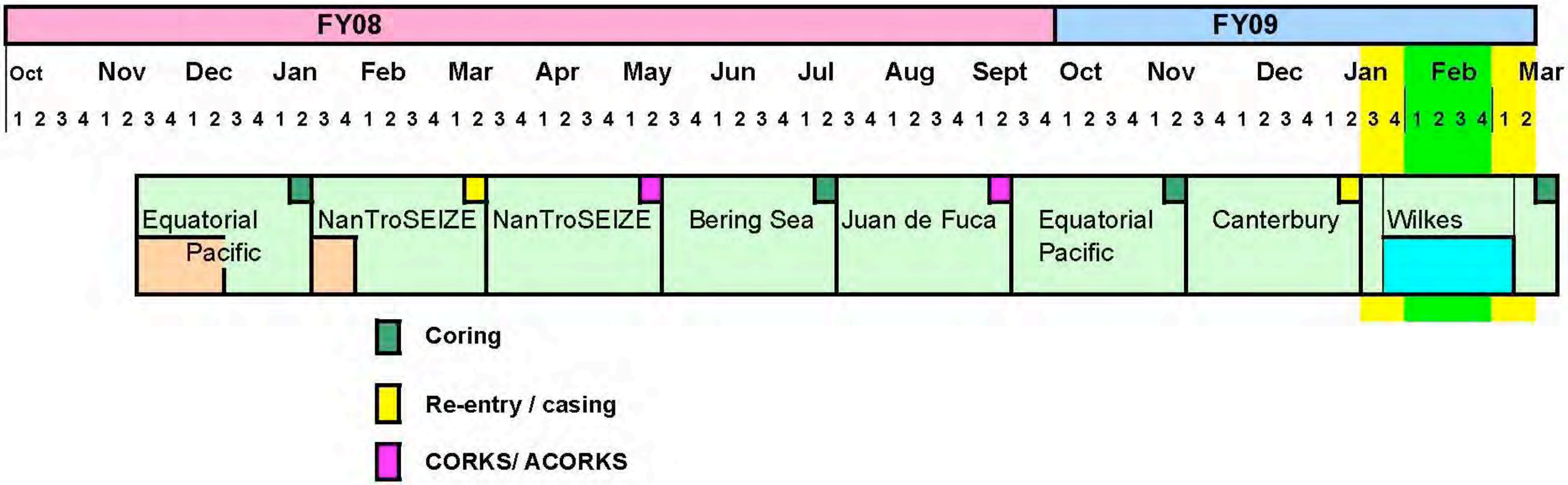
USIO

Schedule Adjustments

Vessel availability

- **Targeting 15 November 2007**
  - **Will be adjusted in February (contract award)**
  - **Will be tuned in July (mid shipyard work)**

- **First expedition will commence from Singapore**


FY08
FY09
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Equatorial Pacific
NanTroSEIZE
NanTroSEIZE
Bering Sea
Juan de Fuca
Equatorial Pacific
Canterbury
Wilkes
Coring
Re-entry / casing
CORKS/ ACORKS

FY08 Schedule Issues

USIO

- **Vessel delivery date**
  - **Pre-operations evaluation requirement tbd**
  - **Limited flexibility to further adjust schedule forced by the "best fit" for Wilkes land**
    - **Significant delays will require postponing Expedition 1 until later in the operational schedule**
      - **Adjustment to schedule/sequence**
      - **Could require short "filler"**
- **FY08 budget has not been finalized**
- **Scheduling of Canterbury and then Wilkes will follow early in FY08**


The Exploration of Earth's Deep Time Continues...

APPENDIX 12

IODP
INTEGRATED OCEAN DRILLING PROGRAM

EDP

17 January 2007, New York

Subsea Down-pipe Camera System Feasibility Study Update

By Michael Wilson & Iain Pheasant

ECORD European Consortium for Ocean Research Drilling

ECORD Science Operator

Universität Bremen

marum

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

The Proposal

- **To further develop the existing camera:**
  - **Enabling better assessment of the seabed environment:**
    - **Aided in the determination of seabed slope and slope stability**
    - **Help gather information on seabed morphology and Habitat**
  - **To better assist the drill operator with:**
    - **landing the drill and re-entry template (DART)**
    - **re-entering the DART or borehole**
    - **Inspecting the drill string or Bit for damage/blockages**

Current System

Topside Control Unit

Umbilical Cable Reel

Subsea Camera Unit

Proposed Specification

- **Maximum diameter** **98 mm**
  - **Work with down to 4 inch barrels**
- **Maximum Length** **2000mm**
- **Safe operation depth** **6000 metres**
- **Colour Camera with**
  - **Standard – High TV resolution (45-480 TV lines PAL/NTSC)**
  - **Low Light capability**
- **Pan and Tilt**
- **Built in Lighting**

Optional Specification

If possible these items could be including

- **Zoom and Focus lens**
- **Directional sensor**
- **Image Scaling**

Communications

- **A standard video signal through a copper conductor is limited to approximately 500 metres, thus a new transmission method is required.**
- **Fibre optic**
  - **Small form Multiplexers already commercially available**
  - **Sends raw video Signal (no loss of image quality)**
  - **Would require single mode fibre optic cable.**
- **Digital Transmission (possible use with current logging cables)**
  - **Convert Video Signal and digitally stream**
  - **Possible use of Broadband technology (DSL, ADSL)**
  - **Cable length may limit Transmission speeds/bandwidth thus effecting image quality**

Development Paths

- There are several development paths available
  - Design from scratch
  - Buy in currently available system and modify
  - Collaboration with external university and/or company
  - Commission external company to develop

Current Market

- Although there are borehole camera systems on the market, No one has yet developed a 6000 metre system with Pan and Tilt (P&T).

- Current Manufactures
  - Hytec produce a 2000m rated P&T unit
  - iPEK produce a 500m rated Zoom P&T unit

Conclusion

- At this early stage in the feasibility study it is hard to give a true estimation of the budget. Other than this should fall into a class A proposal.

- Reasons being there is No definitive specification
  - Camera / Optical
  - Communication

APPENDIX 13

RELIABILITY ENGINEERING, SURVEILLANCE AND MAINTENANCE MANAGEMENT

- FOCUSED ON COMMON SYSTEMS, NOT PROJECTS
- DEDICATED STAFF
  - TRAINING, BUDGET, GOALS
- SURVEILLANCE PLAN
  - DATA REQUIREMENTS, COSTS, TIMING
- RECORD KEEPING – SAP?
- SPECIALTY ENGINEERING
  - VIBRATION ANALYSIS, CORROSION, ELECTRICAL
- SPARING PHILOSOPHY AND PLAN
- INTERVENTION PLAN AND RESOURCES
- QA/QC AND ROOT CAUSE FAILURE ANALYSIS
- SYSTEMATIC INCORPORATION OF LEARNINGS

EXAMPLES – SHELL SUBSEA SURVEILLANCE

- SUBSEA PRODUCTION ESTABLISHED IN 1994
- EARLY SYSTEMS – TAHOE, POPEYE, MENSA
  SERIOUS SHORTCOMINGS
- ESTABLISHED DEDICATED SUBSEA SURVEILLANCE TEAM
- EXAMPLE RELEVANT TO CORKS, SUBSEA MONITORING

Memo:

To: Jack Baldauf
From: Engineering Development Panel SODV Subcommittee
Re: Transformational Science Needs: Comments on revised "non-stretch" SODV plans
Cc: P. Delaney, J. Morris
Date: 12/1/006

SUMMARY: On 11/21/06, the USIO asked EDP to provide feedback by 12/1/06 regarding the revised "non-stretch" SODV plans. An EDP SODV Subcommittee composed of B. Ussler, S. Sears, P. Schultheiss, L. Holloway, R. Von Herzen and P. Flemings responded. Our comments parallel comments given to P. Delaney on 2/12/06. We emphasize steps necessary to achieve transformational science on the SODV.

To achieve transformational science without lengthening the ship demands a more rigorous prioritization of space on the new vessel. EDP recommends that all scientific tasks be evaluated as to the necessity of performing these tasks on board during the cruise, versus deferring them until they can be performed on land, or transmitting data to a larger party in a remote location. If sufficient space can be obtained to achieve critical transformational components (e.g. an ROV) by reducing onboard personnel and/or analytical equipment, this should be pursued.

1) ***The capability of deploying a Remote Operating Vehicle (ROV) is critical to transformational science***
Current SODV Plans have no footprint for an ROV and therefore deployment of an ROV will not be a routine capability.

ROV capability is a critical transformational technology for ocean drilling. The infrastructure for accommodating a full ocean depth ROV must be installed on the SODV now. To not have this is an extreme compromise that conflicts with feedback from EDP and others. ROV applications include, and are not limited to, subsea science packages (e.g. CORKS), seabed frame installation and use, seabed visualization, facilitating use of large diameter tools, monitoring shallow water or gas flow, safety, improved efficiency of re-entry operations, and seabed surveys. There are already an extraordinary number of CORK proposals in the system. We will install observatories that do more science and are cheaper with an ROV. Finally, proponents will respond to ROV capability with transformational science proposals but they will not do so until the capability is present. It may be necessary to reduce onboard personnel and/or analytical equipment dedicated to activities that can also be done on land in order to make the space for an ROV.

2) Larger Diameter Drill Pipe:
SODV plans include 4,000 meters of wide diameter pipe; with 1,000 meters in rotation, this will allow 3,000 meter depth capability.
EDP supports this because it will allow deployment of wide diameter logging tools and consequently achieve transformative science. One member of the EDP SODV Subcom. felt active heave compensation may be more critical than wide diameter pipe.

3)Heave Compensation:
The SODV plan is to mothball the active heave and retro-fit and tune the passive heave. Diamond Offshore suggests a tuned passive heave will be much more capable than the current passive heave and that this may meet operational requirements. A team will be put together to monitor and measure passive heave performance.

EDP repeats its earlier recommendation that Drill String Stabilization be given the HIGHEST POSSIBLE PRIORITY for SODV. We endorse the stepwise approach plan and we emphasize the need for an integrated planning and development approach. An integrated system that is capable of achieving the scientific demands of the IODP may include active and passive heave, a bumper sub, a sea bed frame, as well as a high quality rig and drill string instrumentation system. One member of the EDP SODV Subcommittee suggest that an active heave system will be critical and that perhaps this effort should start now.

4) VIT:
The visualization system will be retro-fitted.

EDP has previously commented that from the perspective of delivering science, the current VIT system is acceptable. EDP also suggested that considerably time could be saved with a more rapid winch system.

5) Live Weight Bearing Umbilical
Current SODV plans suggest that there will be a live weight-bearing umbilical available for downhole tool usage.

EDP strongly supports that a high-speed conductor cable should be readily available (with little loss of drilling time).

6) Seabed Frame

EDP strongly recommends that the SODV should be capable of handling a seabed frame. Specifically, the ship should be designed so that there is capability to easily put on board a leased or purchased seabed frame. There is concern that proposed changes in the moon pool will impact this capability.

7) Rig Instrumentation System (RIS)

Current SODV plans include an upgrade of the RIS.
EDP views the RIS as an integral component implementing successful drill string compensation. It is essential for effective drilling operations and in many situations a key component for achieving scientific objectives by providing drilling operations measurements. We support upgrading the system, including variable sampling rates, the ability to add new sensors, easy access for integration with scientific measurements by the scientific party, etc. We recommend the SODV explore Sperry Sun's products as they are the world leader in this capability.

APPENDIX 14