

REPORT OF THE
INTEGRATED OCEAN DRILLING PROGRAM MANAGEMENT
INTERNATIONAL (IODP-MI)
AD HOC COMMITTEE

(Meeting of 29-30 October 2008)

Submitted to the Board of Governors
of the
Integrated Ocean Drilling Program – Management International
by
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On behalf of the ad hoc committee

December 8, 2008

EXECUTIVE SUMMARY

Level funding by the National Science Foundation (NSF) and by the Japanese Ministry of Education, Culture, Sports Science and Technology (MEXT) and extremely high fuel and other prices prohibit the full time operation of the *JOIDES Resolution (JR)* and the *Chikyu*. Present estimates indicate the *JR* will be able to operate a maximum of eight months and the *Chikyu* for six months of a year. Faced with these budget shortfalls the IODP-MI Board of Governors called for an ad hoc committee to make recommendations for solutions to the problem.

An ad hoc committee of academic, industry and government representatives met in Washington D. C. at the end of October 2008 with the mandate to provide recommendations on (1) how scientific ocean drilling can be most efficiently organized and operated given anticipated levels of funding and available infrastructure with emphasis on the period post-2013, and (2) options for developing additional funding for ocean drilling from other government agencies, industry and private sources.

Based on deliberations during a two-day meeting the ad hoc committee stressed the urgency of the funding problem and its threat to the future viability of the IODP. The committee recommends the following:

1. Request from the NSF a total of \$80 million annually to ensure adequate funding for the continuous 12-month operation of the *JR*.

2. Seek other sources of funding, specifically from oil and gas corporations, from other countries and from the philanthropic sector of society. IODP-MI should seek support from six

to ten oil and gas companies for the “Ocean Drilling Consortium” proposal. NSF is urged to expedite the preparation of new Memoranda of Understanding (different from the existing memoranda) with several other countries including China, India, Russia and others to increase funding and further develop the international dimensions of the IODP. IODP-MI is urged to initiate a development program to investigate options for funding from private foundations and individuals.

3. Expand the scope of IODP Marketing and Public Relations.

4. Define the future management structure of IODP-MI in one of two ways:

(a) a strong integration model employing well-defined centralized management, or

(b) a weak integration model involving coordination at the Implementing Organization (IO) level. Each IO would be responsible for the operational as well as the scientific funding of its related drilling platform.

In either case, the authority and accountability of management at all levels must be clearly defined.

5. The proposal handling process for the next phase of scientific ocean drilling needs to be revolutionized. We need more straightforward mechanisms for promoting excellent proposals that incorporate the most important scientific themes, and for rejecting proposals with little chance (scientific or operational) of ever being drilled.

Finally, the ad hoc committee strongly urges the Board of Governors to TAKE ACTION on these recommendations AS SOON AS POSSIBLE.

INTRODUCTION

Limited national budgets and increased operational costs manifested by rising prices for fuel, drilling pipes and other necessary items have resulted in funding for the IODP well below levels needed for the 12-month operation of both the *JOIDES Resolution (JR)* and the *Chikyu*, and have limited the operation of Mission Specific Platforms to every other year at best. Present estimates indicate that in 2010 operation of the *JR* will be limited to eight months or less and the *Chikyu* will be available for no more than six months. CDEX anticipates that the industrial needs for the use of the *Chikyu* within a non-IODP framework will remain high at least for the next few years.

Inadequate funding at these levels will preclude much significant research based on already identified and highly regarded proposals because of the shortage of drilling time. Unavailability of funds to operate these vessels for the scientific community will require the laying up of the vessels for prolonged periods of time or that the vessels be contracted, if possible, to organizations outside the scientific community. In the event that the vessels are laid up, it may be difficult to retain their highly qualified technical crews. Obtaining funds additional to those presently budgeted by the NSF and MEXT is of the highest immediate priority.

The Board of Governors of IODP-MI requested that IODP-MI management create an ad hoc committee to address the funding issue and to recommend ways in which future drilling programs can be operated in the most efficient manner. A sixteen member ad hoc committee of academic, industry and government representatives was identified; fourteen members of this committee met in Washington, D. C. on October 29 and 30, 2008. Representatives of NSF and of the European Consortium for Ocean Research Drilling (ECORD) met with this advisory committee. The membership of the committee is presented as Appendix A.

The committee's mandate was to provide recommendations on: (1) how scientific ocean drilling can be most efficiently organized given anticipated levels of funding and available infrastructure with emphasis on the period post-2013, and (2) options for developing additional funding for ocean drilling from other government agencies, industry and private sources. Concerning additional funding, the IODP-MI Board of Governors also recommended that the "highest priority should be given to drilling partnerships that involve appropriate elements of the international scientific community."

In their invitation to participate on the committee, each of the invitees was asked to respond in writing to the following five questions.

1. IODP involves a number of entities in addition to the funding agencies. These include three implementing organizations, a Science Advisory Structure with a number of panels, a CMO with two offices and several Program Member Offices. In view of the reduction in available funding, is it possible to restructure these entities or to change the way these entities interact with each other in order to increase efficiencies and reduce costs? If so, how?

2. Inviting new drilling proposals is considered essential to maintaining the vitality of IODP. But the reduction in available drilling time results in long delays between the submission of proposals and their implementation. Some very good proposals may never be implemented. How should an optimum balance between inviting new proposals and implementing them in a timely fashion be attained?

3. If full funding is not available from the current funding agencies, should outside funding be sought? The following organizations have been mentioned as additional sources of funding: Industry (energy and pharmaceuticals), other government agencies, countries which are not now full or contributing members of IODP and charitable foundations. How should we go about securing outside funding? What conditions should be attached while securing such funds?

4. Site surveys, longer term studies of samples, and other ancillary activities are not now parts of IODP funding. In the future, should funds for these activities be part of the IODP budget?

5. IODP includes three implementing organizations (USIO, CDEX, and ESO). Should their activities be integrated more than they are now? If so, how?

These questions provided the topics for discussion during the meeting. The written responses to these questions, without attribution, are included as Appendix B.

During the meeting each member of the ad hoc committee participated actively, resulting in a lively discussion of all of the matters included in the foregoing questions. The opening session provided the opportunity for each member to address questions important to his/her position. Professor Pinxian Wang, who was unable to be present, sent a written communication. Subsequent discussion focused primarily on the immediacy of the funding problem and possible solutions. Secondly, but also of importance, the structure of IODP and IODP-MI operations was discussed. As an addition to the agenda, Prof. Joern Thiede shared information on the proposed construction of the research-drilling icebreaker, *AURORA BOREALIS*, a possible future addition to the IODP scientific drilling fleet. The agenda for the meeting is presented as Appendix C.

DISCUSSION

Shortage of funding affects the *Chikyu*, the *JOIDES Resolution* and the operations to be carried out by the Mission Specific Platforms. *Chikyu* is an expensive state of the art drill ship. CDEX believes that the best option for the six month period during which IODP operations are not carried out is to lease the ship to industry. The Mission Specific Platforms are leased for each mission to be carried out and do not involve permanent ownership of any drill ship and therefore do not present a funding challenge when IODP operations are not being carried out. For the remainder of the report we will, therefore, be concerned primarily with utilization of the *JOIDES Resolution*.

To be effective, the *JOIDES Resolution* must operate on a continuous 12-month basis and every effort must be made to obtain the funds needed to secure this time-period. During the past forty years the Deep Sea Drilling Program and its successor programs have been among the, if not THE, most successful international science programs in history. They have served as models of international collaboration as well as models of outstanding earth science. They have provided answers to questions that serve as the basis of man's understanding of the earth and its climate. There are still fundamental scientific questions that must be answered and can be answered only through the capabilities provided by the vessels operated through IODP. Obtaining funds for the continued operation of these drilling vessels is imperative to our ability to continue answering these questions.

The committee is convinced that as the world and its people change, the institutions by which we operate and the manner of operations must change as well. At present, the IODP operates under Memoranda of Understanding (MOU) between the United States and other countries, developed at a different time and under different circumstances. Nevertheless, these MOU's provided sufficient flexibility for the operations of IODP to take place and to maintain the standards of scientific excellence that have been a hallmark of the drilling programs of the past.

The committee urges the Board of Governors to recognize the seriousness of the funding problem and to take immediate action to change the parameters of IODP operations by seeking funding not only from government agencies but also from non-governmental sources, both corporate and philanthropic. The committee urges the Board to recognize the need for the adoption of different, more effective management and scientific strategies. The Board should consider and should take action to implement effective changes as soon as possible. Such changes will not only improve operations but they will send the message that IODP is indeed a forward-looking organization that can serve as a model for international scientific cooperation and collaboration into the future.

The ad hoc committee achieved agreement and strong support for the following recommendations to the Board of Governors. The committee believes adoption of these recommendations will enable IODP to meet the challenges of the present financial situation and provide a strong basis for effective science in the future.

RECOMMENDATIONS

1. Request from the National Science Foundation (NSF) a total of \$80 million annually to ensure adequate funding for the continuous 12-month operation of the *JOIDES Resolution*.

Such funding will eliminate the deficit between the present NSF budget and the

funds necessary for continuous operation of the *JR*. The NSF has recently invested \$130 million to refurbish the *JR* for future operations. A lay up of the *JR* for one-quarter to one-half a year could result in the loss of competent critical crew members, further deterioration of the recently refurbished vessel and an erosion of confidence of scientists in the drilling program. Further, significant and excellent science will not be conducted. Scientists throughout the world have been awaiting the rejuvenation of *JR* operations; further delays will be extremely detrimental to this important international program.

2. Seek other sources of funding, specifically from oil and gas corporations, from other countries and from the philanthropic sector of society.

A. Oil and Gas Corporations: An excellent proposal for joint industry-academia participation has been developed with basic scientific objectives of importance to the oil and gas industry: "Ocean Drilling Consortium: A proposal that focuses on Frontier Exploration". IODP-MI should make a concentrated effort to attract financial support from six to ten corporations for support and participation in this project. The Oil and Gas industry has benefitted from much of the fundamental knowledge developed as a result of past IODP research. This proposal, developed in collaboration with Oil and Gas scientists, focuses on scientific questions of direct importance to the Oil and Gas industry.

B. Other countries: Expanded international membership at some level could be beneficial in ensuring the continued operation of the *JR*. Urge the NSF to expedite its international agreements with such countries as China, India, Russia, Korea, New Zealand and Australia, among others. Revised Memoranda of Understanding should involve mechanisms that provide much greater contributions to the drilling programs than provided at present by the Associate memberships of IODP. An expanded international effort can have far reaching benefits to the program in many ways, scientific and other. With the possible future expansion of the research drilling fleet through the addition of the *AURORA BOREALIS*, the IODP should look even more attractive for future scientific studies. Although the addition of other countries to the IODP family will create added pressure for vessel time, the addition of foreign funds could ensure continuous operations of the *JR*.

C. Philanthropic Sector: IODP has never approached the philanthropic sector (private foundations and individuals) who have a history of supporting science. It is time to start such an effort. A great many philanthropic organizations and individuals have significant interest in the health of the earth. The drilling program in the past has added to our knowledge of the evolution of the earth and its climate. Such knowledge is fundamental to understanding the evolution and the possible future of our environment. There are foundations and individuals who care deeply about the future of our planet and who could be eager to put their wealth to work on ensuring a healthy planet through the scientific research offered by the IODP. The committee urges the Board to direct the president of IODP-MI to initiate a development program to

investigate philanthropy for possible future support of the science dependent on ocean drilling. This may be done by creating a Development Board that in addition to philanthropic giving, should also steward the progress of the ODC proposal and others that may come up.

3. Expand the scope of IODP Marketing and Public Relations.

A widespread knowledge of the importance and of the success of the deep sea drilling program is basic to a favorable view toward funding of the IODP. To date, the program has done a fine job of communicating with the earth science community, but the general public is for the most part unaware of the importance and success of the program. An informed public is important in making wise societal decisions AND in communicating to the congress of the United States the importance of earth science to today's society. A number of Federal agencies are energetically involved in creating "ocean and climate literacy" on the part of the public. A similar effort needs to be made for "Earth Science Literacy," of which the IODP could be a major element. The committee recommends that the present marketing/PR effort of IODP-MI be expanded or at least re-focused to reach a wider public audience. An effective marketing/PR program would serve to support efforts made to implement the recommendations already cited.

4. Clearly define the future management structure of IODP-MI.

In order to enhance the future effectiveness and the efficiency of IODP it is essential that a management model be adopted that is understood by all participants. The committee recommends that two models be considered: (a) a strong integration model employing well-defined centralized management and (a) a weak integration model involving coordination at the Implementing Organization (IO) level. The strong integration model requires adequate funding with management responsible and accountable for the allocation of funds and with the decision-making authority to ensure that integration of drilling and science occurs and that funds are used wisely and as directed.

The coordination model would vest the responsibility for platform funding in the hands of each IO. The central management office would be replaced by a much smaller coordination office, whose location may be rotated rather than fixed. This office would provide the coordination and communication necessary for all of the drilling programs. Fundraising, development, marketing, public relations, etc., would be functions of the Central Management in the first model as discussed above, but would become the responsibility of the IOs in the second model. In either case, the authority and accountability of management at all levels must be clearly defined.

The Board of Governors should work together with funding agencies to define the new management model. It is, of course, recognized that the funding agencies will have a major role in the discussions leading to the management model decision.

5. Scientific direction, proposal selection and proposal management should be revised.

The proposal handling process for the next phase of scientific ocean drilling needs to be revolutionized. We need more straightforward mechanisms for promoting excellent proposals and for rejecting proposals with little chance (scientific or operational) of ever being drilled.

The proposal system should incorporate larger scientific themes effectively. Be they named missions or some other term we need to start using the platforms more as floating experimental beds that sail with missions of exploration, rather than as two-month earmarks for individual one-off scientific ideas. This approach needs to have mechanisms for identification of missions, and adequate support for inclusion of operational imperatives, E/O activities, and funding mechanisms early in the scientific planning process. This will allow us to utilize both the Scientific Advisory Structure (SAS) and the platforms at peak efficiency, providing a broader impact for scientific ocean drilling. (We note that “missions” as defined earlier did not find favor with a segment of the scientific community and therefore the mission concept will have to be carefully redefined in concert with the scientific community)

The above recommendation is made with the understanding that the responsibility for scientific direction will come primarily from the workshop to be organized by the SAS in 2009.

FINAL COMMENTS

The ad hoc committee strongly urges the Board of Governors to TAKE ACTION on these recommendations AS SOON AS POSSIBLE. The funding problem is critical and decisions on the management structure should not be delayed.

The ad hoc committee recognizes that the transition to a new mode of operation will be difficult, but if action is not taken now, in all likelihood IODP will look ahead only to increased challenges. In today’s financial climate a proactive approach is imperative to solving current and future financial and organizational issues. ACT NOW.

APPENDICES

A. Ad hoc committee members.

B. Written responses to questions

C. Meeting agenda of October 29-30, 2008

Appendix A – Committee Members

Ad-hoc Committee Members

John Byrne (Chairman)	Oregon State University
John Ludden	British Geological Survey
Brian Taylor	University of Hawaii
John Orcutt	Scripps Institution of Oceanography
Masaru Kono	Tokyo Institute of Technology
Gabe Filippelli	Indiana University
Bob Gagosian	Consortium for Ocean Leadership
Asahiko Taira	JAMSTEC
Dan Evans	ECORD Science Operator
Carlos Dengo	ExxonMobil
Saad Saleh	Shell Oil
Michael Purdy	Lamont Doherty Earth Observatory
Joern Thiede	Alfred-Wegener Institute
Katrina Edwards	University of Southern California

LIAISONS

Rodey Batiza	National Science Foundation
Catherine Mevel	ECORD

Guests

Manik Talwani	IODP-MI
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Observers

Takao Kato	IODP-MI
Kelly Oskvig	IODP-MI

Appendix B – Questionnaire Responses

1. IODP involves a number of entities in addition to the funding agencies. These include three implementing organizations, a Science Advisory Structure with a number of panels, a CMO with two offices and several Program Member Offices. In view of the reduction in available funding is it possible to restructure these entities or to change the way these entities interact with each other in order to increase efficiencies and reduce costs? If so, how?

The previous ODP program had the benefit of a single ship operation and funding dominated by a single agency NSF but with the addition of funds from international partners with allocation of scientific priorities by the Science Advisory Structure and various planning groups. Under the JOIDES/IODP umbrella this organizational structure has served the Ocean drilling community very well. However, essentially the same structure was implemented for the much more complex IODP which uses two drilling ships with quite different capabilities and Mission Specific Platforms (MSP's). The current funding issues have exposed the fragility and lack of flexibility in the current organizational and management structure.

The IODP is advantaged in that the available drilling platforms (Chikyu, "Resolution" and MSP's) offer a range of drilling capabilities that should allow delivery of the one of the main objectives – an **Integrated** Ocean Drilling Programme. However, the programme has defaulted to a series of "mission specific" drilling programmes (e.g. Chikyu – Japan Trench drilling, Resolution, mainly paleoceanography with some mid ocean ridge drilling and the site specific MSP programme. There has been no apparently no attempt to exploit the synergies offered by the different types of drilling platform. In an ideal world, a scenario would be riserless drilling by Resolution flowed by riser drilling by Chikyu with perhaps MSP drilling in shallow water areas – such a scenario would allow for seamless integration of a variety of scientific objectives and data sets.

Unfortunately, the logistical and planning barriers may perhaps be insurmountable. As Chikyu cannot transit the Panama Canal, any riser drilling outside the Indian and Pacific Oceans carries huge transit time penalties suggesting any riser drilling in the Atlantic must await completion of the drilling programme off Japan (and this is aside from the contracting out by Japan of the

Chikyu as a drillship for industry). In the short to medium term, the programme therefore defaults to the Resolution and MSP's which in combination may offer good possibilities for an integrated drilling programme. However, any possibilities for achieving this are seriously reduced by the reduction in available funding for Resolution and the availability of MSP's perhaps every other year.

In short the programme is facing a major crisis for the first time in its successful history.

What can be done? The three implementing organizations can be treated as sub contractors who deliver the drill ships and the capabilities to drill specific scientific objectives. Program Member offices remain appropriate for obvious national reasons though whether two CMO offices are necessary is questionable.

The core of the problem may lie with the Science Advisory Structure, its planning groups and panels (see Q2) which may not be fit for purpose in ensuring delivery of the scientific objectives of the

programme of this size and complexity. Issues here are the sheer size of the Advisory structure and overly complex processes associated with proposal submission and approval, decision making and planning as well as discipline representation throughout the structure.

If I understand the situation correctly, IODP has to pay for 12 months of rental of the Joides. If it is not used the cost for 4 months is about \$m18. This is about half the total SOC. For 6 months of Chikyuu the total cost is 75m\$. It would seem to me that possible savings from rationalizing the organizations are not large compared with the platform operating costs. A solution has to be found for these major shortfalls.

Organization of IODP: Presently we are facing a maze of offices (some small, some big, according to my impression not always working harmoniously together) in the US, Japan and various places in Europe, and a substantial number of committees, with all kinds of efforts to streamline operations (=make it cheaper, though the amounts to be saved are small as compared to the entire program). IODP is facing a situation which is unacceptable to the scientific community, in particular for many of the young scientists not yet fully established who are expected to invest substantial amounts of their productive research time, with periods of several years then waiting for the actual drilling. CHIKYU and JOIDES RESOLUTION will only be available part time and they are both plagued by a variety of technical problems (I do not know all the details) which are fixed at the expense of the already reduced share of research time (latest example the notice of the postponement of the starting date of JR operations to January 2009 -killing the planned legs in high latitudes of the Southern Hemisphere during the upcoming season). ECORD has not been able to provide the mission specific platforms at regular intervals - because of different reasons, but with similar effect. This is a situation detrimental to a highly qualified, motivated and numerous scientific community which will soon start to fall apart, if the situation is not rectified in the foreseeable future. It is not possible to run a "program" under such circumstances.

What can be done (I will address funding further below)? I think the structure of "offices" has to be streamlined and they have to be brought in to one place (the same for a decade at least) . What about founding a new "International Center of Scientific Ocean Drilling", combining the activities/ services of IODP in Sapporo, Washington DC, IODP-MI, relevant parts of Oceanleadership, EMA, to run the panels, committees, all of the central activities of IODP. It will be difficult to agree on a location; maybe it has to be found through a tendering process.

The operational offices for the ships/platforms (decentralized, but tasked with technical developments), as well as the established core repositories (which could be tasked in addition with outreach activities of various sorts) should remain where they are.

The structure appears top-heavy, largely due to complications of international implementation. A single centralized CMO would be a good start. The original ODP program, with management in Washington DC seems to have worked well, and could again. I worry about thinning out the SAS, however. The participation in the original ODP program was well facilitated by the panel structure. The transition to IODP seems to have become more bureaucratic, and the review process more cumbersome. The advisory structure is not a huge cost relative to the cost of operations, and is the vehicle for input from the community. Losing the community would lose the program. So keep the SAS as broad as reasonably

possible, but cut the bureaucratic burdens on the proponents where possible. An alternate option might be to completely separate the three IODP components, so that the management of each could maintain laser focus on their particular platform. This would be risky. The three different programs would compete for funding. The competition this would create may be helpful, but I suspect that at least one, and perhaps two, of the components would be outcompeted by the third, and would eventually die.

I served on USAC, SSP and was liaison to EPSP when I was on SSP. In general I found the SAS structure to be adequate to assess the science proposed for IODP. After serving on SSP and observing the process used by EPSP, I believe significant sums of money can be saved by EPSP going to an SSP-type assessment of drilling proposals. SSP does not invite the proponents to their meetings. Instead panel members are charged with evaluating the data and reading the submitted proposals. They then make an assessment through a Power Point presentation to the rest of the panel members. They also give a grade to the submitted data as to quality and whether the data submitted justifies the science suggested in the proponent's proposal. The panel then votes on the recommended grades. This method not only makes for an unbiased assessment of the proponents, it also requires all panel members to equally participate in the process. EPSP on the other hand invites the proponents to attend their meetings to make an EPSP-type assessment of their proposal. Often the proponents are simply not qualified to make an EPSP-type presentation. Also, I found that many panel members make absolutely no contribution to the business of the panel. In my view, some panel members literally take advantage of IODP funds to take a vacation with their wives! I suggest that EPSP change the way it does its business by following an SSP model to not only save money by not requiring proponents to attend but also to involve EPSP panel members in their business. The EPSP panel members are supposed to be the experts and not the proponents.

The CMO definitely should be consolidated into a single office. The two-office model is ineffective.

Each PMO needs to remain intact. Those functions are vital.

Note here that I have a considerable amount of experience within the SAS. It is hard to imagine reducing the number of panels without increasing the workload/responsibilities of the remaining panels and/or reducing their effectiveness and oversight. I suppose we could just give up on things like technology development (EDP), or let the IOs decide everything for themselves concerning shipboard measurements and data management (STP). From my perspective, having sailed on Chikyu, some international oversight is required on the part of STP.

Katrina Edwards

It is probably possible to reduce the complexity of the structure, the number of total operating entities within SAS and otherwise within the IODP, thereby increasing efficiency and decreasing costs. However, I think that it would require

a-that the cost-structure of running the SAS and other entities within the IODP in present operation be laid out evaluated completely relative to operational costs within IODP (this being not completely clear to me from the 'how IODP works' sheet). This has perhaps been done and is why it is brought up here, but I point out because it is not intuitive to me that the cost associated with these entities is large

enough relative to the broader financial burdens of the IODP to warrant significant restructuring - or at least, that this is a clear and obvious place one must start.

b - A group (us? a specific task force) to evaluate the specific responsibilities each committee within the SAS is formed, in order to identify the most natural synergies between committees where mergers may be possible. Merging existing groups in some capacity would probably be the most logical way to eliminate redundancies and conflicting recommendations both. For example, based on my limited and incomplete knowledge I've questioned the need for the existence of both the SSP and EPSP, when there are elements that may be more simply dealt with in tandem. But this is difficult to evaluate without complete information about each of the panels, what they are charged with, both now and historically.

Also, although this may be obvious, based on my observation of the SAS panels and their operations, whatever group may be charged with this task, should be one that is politically unrelated to membership within the present SAS if at all possible. It may not be possible, but if a group could be formed that is both knowledgeable yet lacking some gain that could be realized through restructuring, this would probably serve the long term interests of the drilling community best.

Realistically, there are several options for optimization: Simplify governance and science advisory structure to be more fit-for-purpose. Look for opportunities to eliminate redundancies (if they exist), simplify interfaces and hand-offs.

We believe that it is essential to re-affirm the strategic objective (mission) of IODP in a way that the entire international community understands and accepts. With additional clarity of mission, there should be insights into the optimal governance structure. In other words, "form follows function"

It seems clear that the number of offices that ODP-MI has should be reduced to one and that it should be in a cheaper location than downtown Washington DC or the centre of Tokyo. The panels of IODP are important but perhaps meet too often (at least for a part time drilling program) and more crucially the number of liaisons attending should be very much reduced. The last meeting I attended had more guests and liaisons than panelists. This seemed like a huge junket to me and a terrific waste of funds.

The answer to this question is inextricably linked to strategies developed to address some of the other questions below. However, the key to program management in difficult fiscal times is efficiency. The need for two CMO offices, one in Washington and one in Japan, is questionable. Chikyu operations are effectively a separate program from JOIDES Resolution (JR) operations and should be treated that way in any post-2013 drilling program (see also response to 5 below). If a top-down policy is determined upon (see response to 2 below) the SAS could be extensively revamped to incorporate Detailed Planning Groups (DPGs). If we focus on JR, there may be a need for only a single IO and a much reduced management structure within IODP-MI and COL (see response to 5 below).

Although I am an advocate for increasing efficiency, I believe that, with one exception, the current structure is already pretty lean, and thus I do not advocate for significant restructuring of the entities noted above.

I believe that the Program Member Offices will need to remain unchanged, given their mandates and roles. I say this as a former Chair of the US Advisory Committee to JOI-USSSP, a position that revealed to me how diverse the operations of the US PMO are and how important it is to have an office advised by the scientific interests of US scientists. I suspect that the same opinion will hold true for ESSAC, J-DESC, and IODP China.

I believe that the SAS structure has proven an effective way to nurture and then evaluate the best science from the community, and has already been reduced somewhat from initial levels. I am not saying that proposal flow (i.e., bringing ideas to implementation) is optimal, and I provide a potential solution to this in answer to the second question below. But considering that this nearly completely volunteer-driven structure still holds up and continues to find its own ways to improve interactions among the various panels, I suggest that it be left alone. I say that as a former member of the SSEP and current member of the SPC, and thus an outsider might have a different perspective!

I also believe that the three IO's have such unique individual responsibilities and facilities that I do not understand how efficiencies of scale can be achieved. But I do not have a deep understanding of their operations, and thus defer to the more informed on this point.

The biggest efficiency of scale issues that I see is having a CMO with two offices. I understand the reason why this structure evolved, but have witnessed some of the problems that ensue. I see absolutely no benefits of this arrangement from a cost, management, or service perspective, and suggest that there be only one CMO.

Review process of proposals takes long time because of many panels for it. The review system may be able to be simplified so as to decide to (or not to) adopt proposals at most in three years.

I believe restructuring should be conducted, and at a low level has already been started with the reduction in the number of members from the US and Japan on the SAS panels. However, I do not see the point of continuing to have both SPC and SASSEC. I would strongly suggest that SASSEC be disbanded.

It is difficult to comment in detail on funding without a full grasp of the budget. The most likely restructuring might involve some merger between CMO and PMO's – ie one/two CMO's with secondments from members, or liaison between CMO and SAS??

I think that in the post 2013 era, the CMO should still pursue a number of integrative activities considered to be "core" activities, but that other activities become more coordinative than integrative. Examples of the latter could be engineering development, some outreach, and reduced M&A. I also would favor simplifying the financial basis of the Program and would have the IOs cover all platform costs, including those presently considered operational SOC. This would mean that CMO would not provide a pass-

through for operational SOC to any of the IOs. I would also change the basis of CMO from a US contract with NSF to either a Cooperative Agreement, or an entirely new entity, not necessarily in the US.

Last year, SASEC established a working group to consider possible scale down of SAS activities (Keir Becker, Chair). The report of this working group indicated that even if some drastic reduction is done, the gain in saving in the IODP budget is small (much of the SAS activities is supported not by IODP funds but by national funds). In view of the crucial importance of the support and enthusiasm of the scientific community which backs up this international program, the working group recommended to SASEC just a minor reduction in the SAS activity. This recommendation was taken up and there have been some reduction in the number of panel members, number of times the panel meets, etc. This approach was also supported by Lead Agencies and ECORD at Beijing SASEC meeting.

I personally think that an in-depth review of this matter should be carried out and a new structure may be defined for the period after renewal (past 2013).

The current structure is cumbersome and could be streamlined, perhaps by reducing the number of panels in the Science Advisory Structure, as well as Program Member Offices.

Almost everything about IODP is complicated, and any restructuring must aim for greater simplicity.

If Japan, US and ECORD are to remain a contributing members to an integrated program post-2013, it is difficult to envisage a situation other than that of having 3 IOs (see also point 5).

The SAS is an area where there could be change, and in relation to the lead committees the term 'advisory' should be adhered to more closely. It is clear that many members of panels or committees do not have a sound understanding of the IODP structure, and this is not a good basis for programmatic decision making. In general, the view of the 'scientific community', and the desire not to upset it, probably hold too much sway in this very expensive program – at a cost that has been calculated (?correctly) at about \$700,000 per sailing scientist, management must have greater control.

SASEC – Is SASEC necessary? One of the justifications for having SASEC has been that there is a need for a body to approve the APP, but this (and other tasks) is also done by SPC, BoG and the LAs, which is more than enough. Much of the other tasks of SASEC could be carried out by SPC and sub-committees e.g. update of the ISP and associated workshop.

SPC – should be at the head of SAS, and probably does not need much change. Its present relationship with OTF, involving 5 empowered members of SPC, has been a good development.

Panels – The panels provide a good system of advice, and have already been reduced in numbers. However, I consider that the EDP could be removed and its work carried out more effectively by an IODP Task Force with targeted membership.

CMO. Unless the concept of integration is to be dropped, in which case a CMO is unnecessary, the role of CMO needs to be strengthened to better manage this expensive program. However, to properly strengthen the CMO requires them, *inter alia*, to have greater overall financial control as they presently only handle SOC funds that represent but a small proportion of the overall budget, and it is difficult to imagine that the funding agencies would cede that control. Ideally, the LAs would hand over the budget and oversee with a lighter touch than at present.

PMOs. The PMO system works pretty well and individual nations need the involvement.

ECORD is willing to continue operating mission specific platforms. If the successor of IODP is a multiplatform programme, we will definitely need the three implementing organizations. I do not see the funding agencies pooling all the funds (SOCs and POCs). It is important for ECORD's visibility to fund its own IO. But it may be necessary to discuss the funding structure (POCs and SOCs)

The Advisory structure has become too complex, with too many panels. The decision making process is so diluted that it may take years before decisions are made and implemented. Simplification of the SAS is absolutely necessary. But the role and efficiency of the BoG and how it interacts with the programme should also be addressed. It seems to me that in the current situation, the IODP-MI members do not feel engaged enough.

To integrate the activities, we need a CMO (central management Office = IODP-MI). One office would be more efficient and would likely save money. But the problem of the CMO is that it manages only a small part of the total budget of the programme and therefore its control on the ship activities is really limited.

The Program Member Offices (I do not like this name) are the contact point between the programme and the scientific community at the national/consortium level. They are therefore absolutely essential. How they are organized should remain the responsibility of the country/consortium.

Yes, IODP-MI could be reconstituted as a more compact organization. However, potential money savings resulting from this will be modest.

The five questions raised by John Byrne and Manik Talwani address some important current IODP issues, but in my opinion, they focus a bit too much on details. These questions could simply be boiled down into a single point: financing IODP. I will therefore comment on how I view the current financial situation and add my perspective on the future.

The current total program cost of IODP is about US \$200M. Of this, \$155 - 165M is allocated for three platform operations (POC): USIO = \$55M, CDEX = \$80 - 90M and ESO = \$20M. More than 70% of the rest is consumed for more or less standing SOC cost (science support staff, publication etc), while IODP-MI handles only a small fraction of the total cost. Although I agree with the current trend of saving more money wherever possible in IODP operations, the issue is how we view the present POC. The present POC levels provide for 7-8 months of *JOIDES Resolution (JR)* operations, 5-6 months of *Chikyu* operations, and one MSP operation per year. The reason why *JR* and *Chikyu* operations are not fully

funded for the full year is not due to funding reductions from the funding agencies, but rather due to the rapid and unexpected rise of drilling operation costs due to increasing oil prices: from \$30 to \$150 per barrel within the last three years. This extraordinary rise in oil prices recently dipped to \$70 per barrel because of the recent global economic crisis. Although it is difficult to foresee whether or not this drop in oil prices can restore the extraordinary rise of drilling operation costs back to where they were 5 years ago, I believe that drilling operation costs will return to a certain lower level which would eventually increase platform operation days. So the current financial reality can be summarized as follows: Since the beginning of IODP, funding levels from the various funding agencies have stayed at the expected level.

Huge increases in drilling operational costs reduced the operational days to 70 to 50%, but future trends may be promising towards an increase.

For the science community, if the present level of operational tempo is maintained, a total of 13 - 14 months of *JR* and *Chikyu* drilling expeditions and one month of MSP are available. The long-term maintenance of the present level of operation days is not an easy task. But if it is succeeded by the effort by I/Os, IODP-MI (e.g. Ocean Drilling Consortium) and funding agencies, I believe this to be the great achievement of IODP: a basic science program that withstands the various financial difficulties imposed by the outside economy.

I understand there has been a build-up of frustration among the science community due to delays in proposal execution and unsatisfactory availability of operation days. Even so, I believe the program still provides great opportunities and the trends may look better in the future due to the reduction of drilling cost. A mind "re-set" of the science community needs to occur: to accept the reality, to share the pain and reschedule the best science to be addressed by the present platform operation. IODP is still strong and many great opportunities lie ahead of us. It is vital that IODP-MI takes leadership in conveying this positive message to the community.

The reduction in available funding for scientific ocean drilling has exposed flaws in the structure of the agreements that are at the core of IODP. If IODP is to be successful in winning renewal beyond 2013 consideration must be given to new structures..

The three implementing organizations (IOs) do not have the funds to provide the roughly 26 operating months per year as originally planned. Before considering a restructuring of the IOs, it is important to look critically at how the platforms are utilized as well as their frequency of use.

The goal of IODP should be to maximize the science (as put forward in the ISP) that is delivered for the funding available. A single integrated international program, managed centrally and driven by a competitive drilling proposal process, is the most effective mechanism by which this can be achieved.

However, the structure of the existing international agreements does not allow the funding available to the program to be distributed in a manner that optimizes the science return. Utilizing the JOIDES

Resolution (JR) for a full twelve months each year makes the most sense in terms of maximizing the science for the dollar. Currently the majority of proposals at the Operations Task Force (OTF) and at the Science Steering and Evaluation Panel (SSEP) require a riserless platform, such as the JR. (It does not make financial sense to use the Chikyu in riserless mode, although it is capable of doing so, given its high operating costs.) In order to operate the JR for a full year, approximately \$5-\$10M additional funding would be necessary. Operating the JR for twelve months not only increases the science return, it increases the opportunities for participation on expeditions by the member countries.

One way to achieve this objective would be to require the nations that contribute platforms to the program to be solely responsible for their operational costs: i.e. the US pays for all the operating costs of the JR, Japan pays all the operating costs of the Chikyu, and Europe pays for all costs associated with operating an MSP. The science operating costs would continue to be co-mingled as has been the long and successful tradition of Ocean Drilling. Currently, funds from US and Europe contribute to the operational costs of Chikyu. If those funds could be freed up within the US and Europe to support 12 months of JR and at least one MSP mission per year then the amount of science delivered by IODP would increase. Given the colossal operational costs associated with Chikyu it seems impractical at this time to ever consider 12 month IODP operation.

This plan would require renegotiation of the agreements between the lead agencies that govern IODP along with refinement of the definitions of Science Operating Costs (SOC) and Platform Operating Costs (POC).

The program needs an effective Central Management office (CMO), one that facilitates the Science Advisory Structure (SAS) and that coordinates with the IOs and the Lead Agencies. However, the current process would be greatly streamlined by allowing the SAS to interact directly with the IOs. Many of the functions of the current CMO, such as oversight of publications, data management, and core curation, could be accomplished by the IOs, where this work is being done, with the coordination of a more efficient CMO. The CMO would be needed to monitor that program policies defined by the SAS were being complied with and that the IOs were cooperating as necessary.

Scientific ocean drilling remains the primary technique for sampling below the ocean that covers 70% of the Earth' surface. It is an essential tool for frontier exploration (e.g., of the sub-seafloor biosphere and hydrosphere), seafloor observation, alternative energy research (gas hydrates and carbon sequestration), and studies of paleoceanography, past climate change and geodynamics (rifting, spreading, subduction, collision, igneous provinces). Successful execution of the remainder of the current program and its renewal in 2013 is therefore critical to the health of multiple interconnected programs in the Geosciences (and Biosciences). Maximizing the use of the publicly financed drilling platforms for science is the common goal of the CMO, IOs and funding agencies. One way that IODP-MI could contribute to that goal is to:

1) Re-size IODP-MI to increase efficiencies and reduce costs

Accepting the *coordination* versus *management* functional reality, the Corporation should down-size so as to better demonstrate its effectiveness in that role prior to renewal. The appointment of a new

President will occasion a modification of the contract with NSF. We should use the opportunity in selecting a new President, and modifying the contract with NSF, to decrease the number of key personnel in the Corporation from four to two (i.e., one President and Vice President). Also, as proposed at the BoG meeting in Beijing last summer, the By-Laws should be modified at the next annual meeting of the members to allow one Corporation office only. And that office under the new President should be moved so as to minimize costs (e.g., by co-locating with a member university or institution).

Confucius said: you can be courteous only after you are well fed. The majority of the international scientific ocean drilling community do not feel “well fed” by the current program. They miss the “good old days” when the JOIDES Resolution was theirs to use twelve months per year, especially so given the greatly expanded budget of the current program and the fact that the majority of proposals and the backlog of prioritized but unscheduled cruises is for that capability, notwithstanding the additional capabilities of the Chikyu and MSP. Therefore, without meaning to be discourteous, many would ask the ODP Council and funding agencies to consider a revised program architecture for renewal such as the following:

2) Renewal program architecture

- MEXT, NSF and ECORD each bring operational platforms to the program at their expense, and financial support for the operation of drilling platforms (POCs) would be the responsibility of the IODP member(s) that make the decision to offer the capability to the program.
 - Only SOC funds are co-mingled
 - The IODP-MI is a coordinating office between a federation of Ocean Drilling IOs and funding agencies, that also oversees the SAS, data/core archiving, communications etc.
 - If part-time operation of the drilling platforms is offered to the program, securing financial support for the remainder of the platforms operation time would be the responsibility of the implementing organizations and/or their respective IODP members(s).
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Leading up to IODP there were 3 major conferences aimed at defining a new drilling programme – scientists were unconstrained about the sort of platform and technology available and so came up with a suite of diverse projects on a wish list involving the JR, the Chiku and MSP's . We are far from reaching what I would consider the minimum requirements of IODP based on the expectations of this list. Much of the drilling completed has been on legs that were proposed before the start of IODP. A considerable focus was placed in the deep-biosphere objectives which, in my mind are unrealised as we have not engaged this community – (in contrast bio has been very influential in developing research in sub-seafloor hydrothermal, carbonate mounds, ecosystems etc...)

We have failed to engage significantly with industry. ECORD has failed to raise extra funds from the EC.

Hopefully the next 4 years will go a long way to achieving some of the key objectives.

There is a view that any programme should focus on having at least one vessel functioning on a year round basis, i.e., 12 months of JR, to be viable – Paleoclimate objectives would dominate such a programme and some would argue that a vessel dedicated to getting the best records of past climate

was enough to justify a scientific drilling programme. These would be integrated with short piston cores, ice cores, lake cores and world climate modelling.

Most/All earth – “process” – integrated projects where gases, fluids, biology, sediments and basement need to be sampled require drilling with riser control.

The community is relatively well divided between these two communities (Climate records and Earth processes) and both could exist and raise funds with limited consideration of the other.

I would suggest, at least in planning the science, two approaches 1) getting the best high resolution climate records possible through a continuously (?) operating JR-type vessel coupled with piston cores etc. and records in the Arctic and close integration with climate modelling initiatives; 2) Earth process projects which would involve industry and could include validation of resources, establishment of off-shore CCS, natural risk observatories etc...

For the Earth Process projects - I would also consider linking any future drilling with ICDP and adopting a model which is comparable to ICDP for project development and funding. That is a co-ordinating structure for the selection of the science and project team approach to individual projects with funding being found for individual projects outside of the programme. One could imagine a number of technologically challenging projects going on at once with funding from science councils, industry and national governments.

The separation of the two science streams does not imply any difference in quality and level of the problem posed. It reflects a reality of IODP that because we currently have access to the JR without a riser that it is used predominantly for sampling mud for climate studies and when used for more technologically challenging science it is either inappropriate or fails. So let's just be realistic and use the JR for what its best at and define a parallel programme to address resources, CCS, and risks

2. Inviting new drilling proposals is considered essential to maintaining the vitality of IODP. But the reduction in available drilling time results in long delays between the submission of proposals and their implementation. Some very good proposals may never be implemented. How should an optimum balance between inviting new proposals and implementing them in timely fashion be attained?

It is probably fair to say that the long delays between proposal submission and drilling existed before the reduction in drilling time which has now made a bad situation even worse.

One has to ask the question why? A widely held opinion by part of the IODP community is that proposals are much less likely to receive support given that the scientific priorities of the SPC reflect the research interests of its members. Whether this is true or not is not clear to me though drilling objectives of recent legs suggests that this may be the case. However, the discipline representation on the SPC is heavily biased towards paleoceanography and secondly to mid ocean ridge geology which does not augur well for objective prioritisation and proposal assessment outside of these research areas. This is a real concern and the composition of the SPC needs urgent review. A more balanced representation should be achieved and perhaps balance could be provided by ex officio external expertise (assessors) drawn from academia and recognised geoscientists from the oil industry.

Quite rightly proposals have been viewed as competitive in terms of quality and scientific priority. But does this process remain optimal in delivering quality science given the reduction in available drilling time? The reduction in drilling time should require that more science is delivered from each leg through choice of multi-disciplinary objectives to test during each leg and at each site: this may entail drilling fewer sites. This does not fit easily with the current process which tends to be focused towards individual research areas such as igneous geology and parts of the stratigraphic record. More integration between the various IODP geoscience communities is therefore necessary to optimize on the available drilling time. **Invitation of ONLY integrated multi objective, multi-theme, proposals (i.e. fewer proposals)** with geographic focus (less transit time penalties) may be the best, and perhaps, the sole way of achieving focus and assuring timely delivery of quality science. Of course this does not fit easily with the tradition of competitive proposal submission by the Ocean drilling community focused on single themes.. A vision would be for interdisciplinary working groups (paleoceanography, passive margins sedimentology etc) to consider the range of thematic problems that can be effectively and efficiently addressed during a single leg or at individual sites. Every effort should be made by these groups to integrate MSP drilling into proposals. Accretionary prism and mid-ocean ridge drilling by their very nature should remain the focus of two additional groups..

The composition of these working groups will need careful consideration to ensure that there is a balance between the different special research interests of the IODP community. Ideally such groups should be composed of representatives drawn from key IODP theme areas, data holders from academia and independent geoscientists drawn from academia and the oil industry(active or ex): in the latter case recognised industry geoscientists can provide regional and problem specific expertise as well as direction to enable data access possibly minimizing the site survey issues discussed below.

We need new proposals to maintain interest in the program and to lend credibility to the renewal proposal. Some mechanism might be sought to fast-track new and exciting proposals ahead of those that are dormant.

The 30-40% of projects that are most poorly ranked should be dropped.

An effort should be made to attract proposals that industry might co-finance. And proposals that can exploit travel time to and from industry-sponsored missions.

New projects should be invited in the virgin waters of the Arctic.

This should generate a lot of public interest and government support.

Extra funding might come the northern countries who are worried about staking their claims to the new shipping lanes and resources.

The process to generate new proposals, to evaluate and to prioritize them has functioned very well in the past, but will stall in the near future if actual drilling cannot be properly planned for. I am myself involved in a workshop (Nov. 2008) to plan site surveys and drilling proposals for the central Arctic and I have only been willing to participate in this venture under the auspices of the ramp-up of the discussions about the AURORA BOREALIS. There will be many young scientists participating in this workshop; it would almost be a betrayal of their efforts if we cannot point to a chance for drilling. There are exciting outcomes of many workshops published in GEOSCIENTIFIC DRILLING or the news bulletins of IODP, they fulfill the scientific frame of the original IODP Science Plan which highlighted important problems and is well focussed. It will not be a problem to maintain the momentum of IODP if drilling is guaranteed.

This is indeed a problem. My experience is that during long delays, the program changes its corporate memory and that mission creep ensues, resulting in proponent frustration. To run their careers, proponents must seek other funded projects, and it is not uncommon for proponents to make other commitments, and thus be not fully engaged in the drilling when it occurs. More good proposals would be submitted if there was support (i.e. funding) along the way that would help projects move toward maturity and drilling in a time-efficient sequence. So, if the program could make commitments to drilling early in the process, and then provide a vehicle for funding the preliminary work (including site survey efforts), then proponents could develop the science and manage their careers while they wait for drilling. This model goes all the way back to DSDP, and the early days of IODP, but the model was dropped as a cost savings. I think this was a mistake. Leaving some of the funding mechanism within the drilling program "umbrella" would guarantee that the community stays with the program -- remove some of the risk and then the proponents will be motivated to propose the very best science. Perhaps there should only be a call for proposals only when it appears there will be time available in the "pipeline". For example, if the schedule is full from 2008-2010, then the next call might request proposals for drilling in 2011, and then if a proposal for 2011 drilling is accepted, funding would automatically become available to bring the proposal rapidly to maturity. This would better link the science between survey and drilling, and provide the appropriate incentives to proponents.

This is a very difficult problem. I believe the community weeds itself out in that long delays make prospective proponents produce a better proposal team and they will submit better proposals. Thus, I suggest nothing be done with respect to uninvited proposals. However, I would propose a limit to the number of resubmissions. Full4 and higher number proposals are ridiculous. If they don't get it right in three tries, drop the proposal.

IODP needs to also invite specific proposals which match closely with the science objectives of IODP. This would encourage competition between various groups to submit proposals and represents a different way to do IODP business. The winning team could go through the same science review as uninvited proposals, but it has to be assumed that the invited proposals would be fast-tracked through the system.

Now is not the time to ask that question, especially after it was announced (again) that a delay will occur in delivery of JR (again). We (the SAS) used to maintain a reasonable balance, but it has been impossible to do so when the platforms are not available. At the SSEP level of the SAS, really good proposals have always moved through the system quickly. People get frustrated because they often submit crappy proposals. I do think it would be better for the SSEP to reject more proposals right away instead of trying to nurture everything up to a high level of quality. Half of the proposals could be eliminated after the first or second submission.

The vitality of the drilling program demands that new excellence is continually drawn on. IODP must campaign and support the highest science overall. The DSDP, ODP, and IODP have supported research that has resulted in some of the most important scientific discoveries in the earth and ocean sciences, and most recently, the life sciences. This is a history of success that we need to do everything possible to insure will continue into the future.

It has been a couple years since I served on the SEEPS panel, but when i did there were long and detailed conversations about how to deal with proposals that were fundamentally flawed. i.e., that the project is flawed - cannot be done, or should not be prioritized within that community. Period. There was will, but lack of means of dealing with inadequate proposals. Often times these proposals ended up filtering through the system, moving up because nobody knew what else to do with them. This was the biggest problem i witnessed. There was a fairly weak and tentative means for "rejection" of problem proposals towards the end of my time in SEEPS. It was cumbersome and I do not think terribly effective, but i do not know what has happened since then.

The number of really exceptional programs that came through was not all that high, and the truly good ones seem to jettison through the system - all things being relative and dealing with the drill ship and scheduling and all.

It seems to me that what needs to happen it that the SEEPS - and all the panels - need to be allowed the use of some teeth in their evaluation. This is difficult to do because of the delicacy of international

programs like this. But it is problem that in particular with the new mode of operations, fundamentally needs solved.

The proposal review and acceptance process needs to be streamlined. Another observation - I have heard from several young scientists that they do not believe they stand a chance to get funded for an IODP drilling proposal because they are competing against an established, entrenched, senior scientist group. I don't have data to back up these comments. But that said, should IODP consider reserving certain portion of their funding for a "young scientist program".

This is hard. At the moment I would not write a new proposal and I would discourage new scientists from wasting their time with this too. I wrote my first proposal 11 years ago and still have no prospect of being drilled in the near future. A new assistant professor can't afford to spend time like that. The system will self regulate a little as until the fate of IODP is clearer and more positive very few people will want to put much effort into this. A common consensus is that IODP is doomed and unlikely to be renewed so who would want to write a proposal that will never be drilled? Clearly the only thing that would really improve this is more drilling time. This either means more money, fewer ships or at least less time spent by the Chikyu drilling the Nankai trough since this is effectively drilling time that does nothing to address the back log of undrilled proposals. Moreover, it leaves large pieces of the ODP community like paleoceanography feeling very left out and even less inclined to support renewal. Several member countries, including my own have only tiny communities involved with the seismogenesis issue. ODP's great value was that even if a few legs were not your topic you could bet there would be one in year or two that would appeal. Under IODP this has stopped and it is killing the community of activists. Myself included.

This is a difficult balancing act. To maintain a bottom-up policy, the program must be open to all proposals. The bottom-up approach has worked well historically, but in a period of tight funding will indeed tend to lead to submission of excellent proposals that may never be drilled. To limit the associated waste of effort by proponents, the SSEPs could be directed to reject a greater percentage of pre-proposals. This has been tried, but could be reiterated. Pre-proposals might even be reduced in size to planning letters. Clear communication with proponents at every stage is essential. Management at all levels must be responsive to the constituency.

The only alternative to the bottom-up strategy seems to be a top-down system of some kind with solicitation of specific proposals, perhaps through DPGs established for that purpose. Such a top-down policy might benefit from a revamped Science Plan taking the new approach into account. This plan could come out of INVEST activity, but the top-down versus bottom-up debate would have to occur first. In fact, directing the SSEPs to reject more pre-proposals amounts to a default top-down policy, especially if it is implemented more effectively. This is because the SSEPs would have to be given criteria for such rejection that are related to some overarching plan.

The real solution to this problem, however, is to increase program funding (see response to 3 below). Any transition to a top-down policy could even be viewed as temporary, pending improvement in the funding climate.

The delay of the conversion of the Joides Resolution is most responsible for the piling up of good but not drilled proposals at SPC. Present situation discourages inviting new drill proposals, which depresses ocean drilling sciences: a negative feedback. I would like to ask the implementing organizations to make every effort to get budget to operate drilling ships longer for science.

I fear that this is the greatest scientific risk to the program at this point. Based on interactions that I have with the community, there is a high level of frustration with the sluggish system. That frustration was perhaps kept at bay somewhat with earlier promises of full year operations of the Chikyu and the SODV, but now has arisen in a different tone. No longer do I hear "I don't know why I submit proposals and revisions anymore, because there is such a lag between proposal submission and expedition implementation. Now I hear "I am not submitting proposals or revisions anymore, because I doubt that our proposal will ever get drilled." A very dangerous shift in tone in advance of the renewal process, which I feel we have to be very aggressive at countering, not with words, but with action.

To this end, I introduced to the Science Planning Committee at their last meeting in Sapporo a new concept for operations in the short term, and a proposal to continue in this mode in the long term. This process involves being more operationally realistic and more proactive in ensuring that the best parts of the best proposals get drilled in a timely manner. The details are in the SPC consensus statement below, which was widely supported by the SPC as well as individuals in the IO's and funding agencies with whom I spoke informally afterwards. We will begin acting on this consensus statement in the manner laid out below, and I feel that this approach can successfully address the concerns presented in this question.

SPC Motion 0808-25: The SPC supports pursuing a more flexible approach to expedition design. The combination of environmental windows, restricted scheduling, and urgency in moving forward rapidly with science after a hiatus and in advance of renewal, provides an incentive to implement expeditions in a different way than the standard expedition model. Further, more flexible implementation may provide better opportunities to achieve top science objectives while operating under operational realities for the remainder of this program and for renewal.

The SPC members on the Operations Task Force (OTF) will initiate the flexibility model by reviewing northern Pacific proposals currently residing with the OTF and under consideration for possible scheduling in FY2010. This review will begin immediately, and will focus on balancing the highest possible scientific outcomes with operational efficiency.

The SPC constitutes a subcommittee (Filippelli, Ohkouchi, Peterson) to explore how to develop a flexibility scheme at the proposal level that ensures maximum science and maximum implementation

flexibility. This subcommittee will report on these efforts at the March 2009 SPC meeting. The subcommittee will pursue a number of lines of inquiry, potentially including:

1. Request that the Implementing Organizations (IOs) provide guidance about expedition flexibility, including ramifications of combining expedition objectives and/or staffing and crew rotation to implement various length expeditions and/or combined science parties and/or short-term port calls for crew and scientist rotation.
2. Request that the funding agencies and Program Member Offices (PMOs) provide information about what financial impact the above flexibility options might have.
3. Request that the Science Steering and Evaluation Panel (SSEP) considers how proposals might include additional information about objectives achieved with respect to the overall proposal objectives with streamlined drilling plans.

Re-reviewing of re-ranking for adopted proposals should be done as soon as possible taking consideration of balance between cost of adopted proposals and available budget and drilling time.

There should be clear guidelines on how proposals be handled. At the moment, there is a clear indication that there is not a level playing field. My experience is as follows. The

Ontong Java Plateau proposal, for which I am lead proponent, is on its fifth revision and is awaiting more site survey data. It has not gone out for external review, whereas other proposals with less site survey data have gone out for review and have even gone on to SPC for ranking. This has to change. I would suggest that there be a category of proposals that are awaiting site survey data (which do not go forward to SPC but should go out for external review). These should be given, for example, 2-3 years to obtain the required data before being deactivated. The same rules should apply to ALL proposals. This would give the SSEP opportunities to remove proposals from the queue.

Two major deterrents for would-be proponents are the huge amount of time and effort required with low chance of success, and the very long lead-time before potential project realization. Possible solutions include: (a) reducing the number of both preliminary and full proposals that can be submitted in any one year; (b) making the preliminary proposal requirements still less arduous and 'rejecting' more of these at this stage; (c) further encouraging multi-partner proposals so that more scientists and teams are involved in any one proposal; (d) consider a factor that considers the length of time 'good' proposals have been in the system in their ultimate ranking and scheduling.

I think that it is essential that the community have the option of submitting new proposals. Proponents know they take their chances, but preventing submission runs the risk that the community will lose interest in drilling science.

SPC decided to take back the proposals residing in OTF at regular intervals and reevaluate them in parallel with the evaluation of the newer proposals. SASEC endorsed this decision, and hopes that SPC and OTF would work together to implement the most scientifically interesting (exciting) expeditions regardless of their residence time in SAS. SASEC is strongly against the option to reduce the acceptance of new proposals.

My personal opinion is that much of the unsatisfied feeling in the community is the result of the long delay in renovation process of JOIDES resolution. Except this unlucky factor, there seems no need to change the basic treatment of the proposals.

New proposals addressing vital topics that have evolved since IODP began are desirable. The program certainly needs to be refreshed periodically. However further delaying approved proposals that were submitted at the beginning of IODP will detract from new proposal submission because of fairness. It is unfair to sideline proposals that have been actively updated and kept alive by proponents and evaluation committees for many years. In some cases the delay is a significant period of peak professional lifetimes. Keeping a large international group of proponents as in CDPS interested is difficult if there is little prospect of drilling. Mature scientists that contribute wisdom to the program are lost. The proposals in OTF should be given priority and those submitted long ago and have hibernated should be reevaluated considering the current state of the science and finances. Don't keep a proponent group hanging, let them know the earliest time their project can be drilled. Let them respond with minimal programs.

(a) A more rigorous science and priority evaluation needs to be made when reviewing proposals. In other words, a more thorough assessment of the scientific objectives, their risks and the data upon which they are based ought to be made. For example, IODP Expeditions 304 and 305 failed to meet their objectives of mantle drilling. This was a result of poor interpretation of the data upon which the fundamental assumptions underpinning the drilling was based. A more critical assessment of the data and the risks should have been made.

(b) Another option is to reduce the ambition of the drilling objectives. Too often drilling expeditions are planned that are designed to accommodate the drilling capability rather than request the minimum number of holes to test the hypotheses. There are many examples where fewer holes are actually required than requested. The law of diminishing returns applies if 90% of objectives can be met within a month of drilling, should we devote a further 50% of resources obtaining the remaining 10% of results?

If a more minimalist approach was adopted, then shorter legs could be scheduled, accommodating more legs and thus reducing the lag between proposals and operations.

The encouragement of new proposals, or at least pre-proposals, needs to be maintained to ensure the vitality of the program, but the number of proposals in the system must be reduced as it is inefficient both for the proponent to waste their time on proposals that are unlikely to be scheduled and for the SSEP to continually review them. This means that a significant number of proposals need to be weeded out of the present numbers, and that less-promising new proposals should be routinely rejected at the earliest stage. Nurturing should be confined to the most scientifically promising and logistically realistic proposals.

It is indeed important to have new drilling proposals to keep the programme alive. But the nurturing process of the proposals has reached a level where it paralyzes the whole system. Proposals are never rejected and pile up at all levels in the SAS. This is really discouraging for the proponents. It is important that the SAS becomes more selective and make difficult decisions at an early stage. Asking for addenda make the PI feel that the programme is interested, and then they do not understand why in the end their project is not implemented. It would be more efficient and more satisfactory to the proponents to be more selective at the start and then make all effort to implement the projects as soon as possible.

Given the increasing cost of operations, it is likely that ship time will not increase in the future (I hope I am wrong)... Moreover, some programmes are becoming more complex and require several expeditions to achieve their goals. The mission approach seems to me a good way to go. Whether missions should originate in individual proposals or should be defined by the community through workshops need to be discussed.

The mission approach was rejected by the current panels. This shows how difficult it is to ask an existing structure to evolve.

At the INVEST meeting, re-consideration of ISP with the level of present platform opportunity has to take place.

New drilling proposals will always be essential to the vitality and viability of IODP. This is especially true as we look towards renewal. Every scientist who submits a proposal, in whatever context, believes that it is worth funding and recognizes the long odds against it. Some very good proposals will inevitably prove difficult to implement for one reason or another, and some good proponents will never see the shortcomings of their own proposal. After many years of continuous optimization, the IODP proposal

and scheduling process may work about as well as it can, given the current realities of what constitutes a proposal and an expedition. There is probably little to gain by trying to optimize the process further without radically redefining the nature of proposals and many aspects of expedition implementation.

3. If full funding is not available from the current funding agencies, should outside funding be sought? The following organizations have been mentioned as additional sources of funding: Industry (energy and pharmaceuticals), other government agencies, countries which are not now full or contributing members of IODP and charitable foundations. How should we go about securing outside funding? What conditions should be attached while securing such funds?

Given the importance of the programme to geoscience, I am in no doubt that external support is essential to ensure the continuation, indeed survival, of the programme. One should not discount support for drilling for clathrates from governments but this will not be long term. While other countries that are not part of the IODP community may provide some support, it may well not bridge the funding gap.

The most likely support at the appropriate level is the oil industry. Key issues are the level and duration of financial support from industry. Alignment between the objectives of individual companies will be a key factor arguably needing facilitation. In addition, the capabilities (drilling depth) of the Resolution may not fit with industry objectives which may impact on the duration of industry support. I would like to observe that comments made by academia at workshops hosted by Manik Talwani reveal some large gaps in problem analysis and hypothesis testing.

However every effort should be made to achieve alignment with industry. I suspect the best topics to work are stratigraphic tests (including source beds) in various ocean basins and tectonic problems that can be tested on starved passive margins: reservoir prediction in turbidite systems is likely to be another major area of interest.

Industry is the major potential source. Some input might be found from metals exploration companies who are starting to become interested in off-shore resources. The option of simply renting out the drillships should be avoided if possible. The negotiations underway to develop joint projects in which the scientific goals are shared by industry and academic scientists should be pursued. Pressure might be put on petroleum companies who may be interested in improving their public image by financing pure research aimed at solving socially relevant problems.

Additional funding: I have not much in terms original thoughts to add. Concerted efforts should be directed towards industry (10 companies have expressed an interest to participate in the upcoming Arctic workshop), but we also have to involve them very early in the game; they will not buy in if we come with ready/ finalized projects to them for funding. Can we design joint programs to establish fundamental geotechnical properties of the seafloor? Engage them in studies of the geological framework of new large hydrocarbon provinces (?Arctic), or gas hydrate studies? Can the large international petroleum companies be invited to become real members of IODP (maybe as a consortium of industrial partners)?

I think we should lean heavily on the established funding sources to raise their contributions (maybe this entire effort has to be brought up to another level = science ministries), to achieve continuous use of the available drilling platforms. Scientific Ocean Drilling is after all the most successful research program to establish fundamental properties of Planet Earth and most of the excitement is still in the unknowns: Quest for the Moho, the Deep Biosphere, geodynamics of plate tectonics, paleoenvironmental variability, etc....But can we offer drilling programs for the definition of the EEZs (covering at the same time also some of our own scientific interests) and thereby become more relevant?

I am not familiar with large foundations (such as the Melinda and Bill Gates Foundation and the like) or superrich people. Many of them fund medical research which by nature of the subject is aiming at the individuals of mankind and their well being - with approx. 80 million additional humans entering the world every year this may well be. Also we are dealing with the properties and health of one patient, namely the entire Planet Earth, home to more than 6 billion people. If we are neglecting to collect the necessary knowledge on the basic properties of it or if its resources we may endanger the future of all of mankind - to say we are dealing with the more important "patient" (somebody better qualified than I has to sit down and phrase this in a way that it sounds convincing). Also here a concerted effort is urgently needed.

Nice thought, but sadly, most of these other funding mechanisms are inherently unstable, and unlikely to sustain the program over the long haul. If we go this route, a lot of energy will be wasted in chasing small pots of transient money. What the program needs is long-term commitments for continuity. If industry can live with that, fine. But usually such things are the role of governments.

Coming from industry I think there is potential to get more financial support on top of their current participation as panel members. However, IODP absolutely must speed up the proposal to drilling time if industry participates as they usually have a specific interest that is much more time sensitive than IODP's current long time between proposal submission and actual drilling. Perhaps timing should be related to funding percentage. One hundred percent funding might mean a proposal is drilled in that year for example.

Yes, in theory. But, it's not as if these options have not been pursued already. Do you mean above-and-beyond something like the ODC, which will probably never materialize in spite of several high-profile meetings and workshops? This type of thing cannot be an arranged marriage. If the energy companies don't want to join, they won't. If they can find better platforms than Chikyu or JR, they will. Getting other countries to join is not realistic.

a- Funding of IODP by current participating member and present cost structure. It will be quite challenging to make recommendations about future financial models without considering present and past models more comprehensively than is provided in the short description we were provided with (i have no other experience with IODP funding or operation costs - only what comes in this sheet), and understanding fully what has changed that has resulted in the problems and operational changes in recent years.

b- I think quite a bit could be done to fund raise in new and creative ways with charitable foundations and with industry. I do not share one commonly held view, that we do or should have short-terms monetary goals as the model for these efforts. i.e., that prospecting for oil or pharmaceuticals is likely to offer the type of short or long-term financial support required to make significant difference to the solvency of IODP. I may be quite wrong minded about this and look forward to discussions that may change my views. However, I do think there are significant opportunities that have not been taken advantage of in the drilling for science community. First off, we don't do a very effective - or perhaps broad-based is more accurate - job at promoting our science and taking credit for the really amazing work that has been done historically via ocean drilling. As stated above, ocean drilling has been used to resolve some of the most important problems facing science over the past 40 years. And it has historically been used for community-based science, rather than for the benefit of individual giants in scientific research. We all know about Einstein and the theory of special relativity - that link is firmly grounded in science and the public at large. How many people would link the proof of plate tectonics with ocean drilling? Or appreciate the fact that a large fraction of the data used to understand climate change is generated by drilling for science? I've started to ask when I give more public lectures and nobody does, apparently. Our obscurity hasn't really helped us so well in making our cases for national funding perhaps, but I think could be turned on its head for fund raising in the private and industrial settings:

i) Private: foundations love to take credit for finding diamonds in the rough, polishing them up, and showing how great they shine when given proper attention and put in the right light. i really think that is exactly where we are at with ocean drilling. In terms of fundamental ground-breaking discoveries, two fields appear to me to be ripe for promotion - solid earth dynamics and the deep biosphere/subseafloor ocean. I think the latter is starting to demonstrate this capacity and there is much more to come. I think that the solid earth dynamic area holds similar potential, but has been bogged down by a few highly specialized objectives and proponents, and if you sit back and take a look at what has been revealed in the past decade, there is a forest there that has been missed for the trees.

I am not sure how this could be done within the IODP that would be satisfactory to all parties. i think i would need to hear more about what the practical limitations and options may be to make specific recommendations.

ii) Industry: it is I am sure apparent to all that climate change has finally caught the public eye. We should use this fact, and the consequence of this fact that is becoming increasingly apparent: that people want to do something about it, and that included blaming the greatest offenders and heralding those who attempt more green efforts in their operations. There are many industries that

may like nothing more than a practical means of improving ones image, if for the public eye alone. Why not take that and offer industrial sponsorship of scientific projects focused on earth's history?

Again, that practicalities and particulars of implementation not clear to me, but it seems a quite possible fruitful avenue to pursue.

We see that there is a conflict arising in terms of escalating costs, pressure on government. funding, and an expanding set of government funded drilling platforms - JOIDES Resolution, Chikyu, and potentially the arctic capable Aurora Borealis (in design/funding stage by Europe). Therefore, it is highly unlikely that there will be enough support for all three drilling platforms for a sustainable program in the traditional sense.

Permit more pooling of resources so that it is managed as one program from a stewardship and operational basis. This might be difficult to accomplish given country-specific requirements. But whatever platform makes the most sense on a cost/operability basis should be used instead of managing this as three parallel operational/funding programs. Make the drilling platforms leasable to private companies on a transparent contracting basis, including in the costs the need to provide some modest measure of IODP infrastructure support. However, there should be no strings attached with regards to disposition of the information. While this might be viewed as not helping the overall science, we think it will be required to just keep the program going.

The chance of getting companies to buy into funding a consortium (current "ODC" effort) that will ultimately release all of the data would be difficult. As a subset, permit hybrid programs (mixed public and proprietary legs) which are virtually impossible with current rules.

One option to consider as a vehicle to secure funding is for IODP to create a Development Board, who's purpose is to have an integrated global approach for funding. This Board could have voluntary members from IODP, governments, industry (energy, mining, etc) and academia. Some thought would have to be given to the needs of the different funding sources (per comment above)

Of course it would be nice to have outside funding and if we can get it that would be good. I would say that provided any commercial moratorium (say 2-3 yrs) is not too long then it would fine. IODP does not seem to have the right contacts for this because we are too academic in our mind set. It might be a good idea to ask the advice of our more applied colleagues at institutes that do not participate much in IODP who they deal with. I am thinking of Oklahoma or UT in USA and perhaps Aberdeen, Oslo and Delft in Europe.

Absolutely. I've no idea how to go about this, but I'm sure that there are people who do know. Find them and put them to work, taking care to avoid placing administrative barriers in their paths. Though a worthy aim, I doubt that adding member countries will help much – the amounts involved are too small. The major effort must be placed elsewhere.

New agencies, commercial or private support is vital, even if it means changing the scientific focus of the program post-2013. Better some drilling science than none at all. We should certainly try to ensure that expeditions are for purely scientific purposes, carry full science parties and that all results are publishable in the open literature, as has been the case historically. However, compromise may be necessary in the case of industry support and we should not balk at that if the life of the program is at stake. Nevertheless, to encourage industry to be altruistic, we could present IODP as a vital part of training the new personnel that they increasingly need. This involves training in site survey skills in addition to those involved in core analysis.

Yes, I believe that external funding would allow these scientific platforms to operate as they were intended, and that the highest promise is related to energy and pharmaceutical industries. We realize the reality that limited resources mean limited on-contract operations, and that off-contract exploration work is probably pretty easy to obtain. But I believe that the community, and likely the national bodies that paid for these platforms, would prefer that they be used in scientific mode. One way to accomplish this is through the consortium approach vehicle already pursued by Manik Talwani. One way to approach this is to target individual scientific aims that are of interest to other entities. One example is hydrate drilling, which has a number of interested parties (e.g., USGS, DOE, international interests). Another is to engage other communities like the microbiological/pharmaceutical/genetics interests, from whom Katrina Edwards has already received some external funding from the Moore Foundation. I think that this kind of partnership could be leveraged even more effectively, by considering some focused discussions with pharmaceutical companies aimed at understanding more fully how the microbiological material collected from scientific ocean drilling intersects with drug discovery targets (i.e., antimicrobials, anti-cancer biochemicals, etc.). This latter piece is one that has not been adequately pursued, as the scientific benefits of microbio/pharm expeditions plus the royalty potential for co-discoveries seems a nice fit for the program.

Conditions attached? This is a difficult question, as some scientists would prefer to have any additional operations and funds be tied to the same review process as normal scientific proposals. But I think the reality is that the operations for the various platforms will always be dominated by the normal, process, and any additional operations that we achieve by additional external funding should be influenced strongly by the interests of the external funders. These may range from keeping some data proprietary for certain lengths of time to having some restrictions on publication timing.

If possible, outside funding should be sought. Other government agencies and countries are preferred.

If full funding is not available from the current funding agencies, should outside funding be sought? This is a difficult question to answer. Overall, the answer is “yes” because I think we all want to see the platforms being used 12 months per year. I think that ALL avenues for outside funding should be explored as no one avenue will be sufficient given the shortfall. You may also want to consider contracting the ships/MSP with entities such as the Discovery Channel, National Geographic, etc., for certain projects.

How should we go about securing outside funding? Marketing the platforms and projects to the various entities listed above will be critical. Part of this marketing is to look at the highly ranked proposals to see how/if they would have any applicability in the energy/commercial sector. I think it is important to keep the science as the top priority.

YES certainly we should be actively pursuing alternative funding streams – and all those mentioned should be considered. We suggest there are multiple and flexible schemes for participation by other bodies in further funding and that we should not seek to be too prescriptive in the first instance. Different models will suit different funding bodies. We are uncertain about the current activities in progress in this area by IODP – but two important elements are: (a) a major drive and dedicated persons/team to pursue alternatives; and (b) maintain as high a PR profile as possible, further demonstrating the uniqueness, challenge, potential and opportunities of IODP drilling. Again a dedicated group is required for the latter.

An additional approach is for individual proposals to seek specific additional funding. In our case, for example, we already have the support of oil companies and we could speak with them further about some extra-funding, as they do have some direct economic interests in the area of our proposal. Important here is that the proposal concerned (e.g. in this case GUCADRILL) and the sponsoring companies receive some direct benefit from coming on board – we suggest an early route to drilling.

I think that all potential sources of funds should be actively pursued. Foundations are probably best approached by individual or groups of proponents, or IOs. The IOs might consider hiring a marketing specialist, or else outsourcing to a commercial marketer.

This problem was not fully discussed at SASEC, so what follows is based on my personal thinking. I would prefer that IODP part and industry-related part should better be clearly divided. This is the approach taken for Chikyu. To try to include scientific element in the industry-related voyages would be not only complicated with different attitudes of industry and academic sectors, but also invite some breaching in the community efforts. We need united efforts at this time to plan for a good Phase II program past 2013.

Tie outside funding to specific proposals that are of interest to industry supporters and non-scientific agencies that will contribute to a specific theme

Yes. A mixture of industrial and national capability support should be sought. This could be used in conjunction with 2 (a) above i.e. where additional holes might provide the additional 10% of results, these would be dependent on additional, external support.

IODP should seek funds from a variety of sources. It is difficult to set rules for hypothetical situations that could have any number of variables, so any offer needs to be treated individually but equitably. It also needs to be borne in mind that an absence of hydrocarbon industry funding can be advantageous when getting permits to drill in environmentally sensitive regions.

The forty-year ocean drilling has been so successful, that its basic operational concept has never changed significantly even with the introduction of multi-platform system in 2003. Meanwhile, the new factors appearing in the past and forthcoming years call for further changes:

The oil price rises much faster than the priority of scientific ocean drilling in the fund competition, resulting in financial difficulties for the coming years if not decade.

With the newly developed technology, many of the scientific goals of the IODP can be better addressed by a combination of ocean drilling with other deep-sea facilities and continental activities.

Industrial interest in deep-sea drilling has risen up tremendously in the recent years and become unprecedentedly close to the scientific ocean drilling program.

The rapid economic growth in a number of developing countries has significantly raised up their interest in deep-sea drilling and, hence, opened up new additional resources for the IODP and its successor.

The last point is of significance because this new resource will be at a different level than that in the 1990s which had symbolic rather than financial importance. These new players in deep-sea studies are in a position to provide serious contributions in particular after 2013. However, some of the existing IODP rules are not favorable for their sustainable participation. Unlike in developed countries, the marine, in particular deep-sea community in these countries is new and mostly engaged in regional or local projects. If the membership offers them opportunities to participate in remote cruises and in various panels only, their membership can hardly last for many years, as their founding agency cannot see much benefit from such activities. This has already happened in the past years.

The best way to involve new countries into IODP is to demonstrate what kind of benefit the membership can bring to them, and the most efficient benefit is to drill in the waters of their interest. A drilling leg in the nearby water will help to build up a deep-sea scientific community in that country. Since the IODP vessels have some spare months for drilling, why not to slightly change the rule, and to open a new door for new members to increase their contribution. This new step will result in far-reaching consequences, especially beyond 2013.

My suggestions are:

To set up a new category of drilling legs with joint support of IODP and other organizations, including its members. Such legs are still in the framework of IODP and subject to regulations of IODP (such as the data sharing and core reposition) and scientific evaluation by the IODP panels, but are arranged outside the long queue of waiting list. Those are still IODP legs and provide world-wide scientific interest and hence fundamentally differ from the commercial use of IODP ships.

To establish (or promote) a new international structure to coordinate the scientific endeavor of IODP with other deep-sea programs such as IMAGES, InterRidge, InterMARGIN and the appearing international organization of sea-floor observation. Nowadays there are not many scientific questions which can be solved by drilling alone, and financial problems are common to almost all the above mentioned programs. It will strengthen their position by their unification even at a loose level. Thus, IMAGES can partly function as site survey for IODP, InterRidge and InterMARGIN are originally tied to IODP, and sea-floor observation is one of the IODP priority ("Sub-Floor Ocean"). If IODP takes the initiative, this will efficiently ease the potential new members to join.

To include the task of reorganization beyond 2013 in the agenda of INVEST"-like meetings. Probably the new phase should not simply inherit the approved drilling proposals of IODP but has to reshuffle the cards, the same applies to its structure. The new system should be able to accommodate more members and to broaden its resource backgrounds.

To organize a workshop of representatives from the new and potential members of IODP to listen to their opinions and to solicit a way to enhance the benefit of participating in IODP. One of the main targets is to find appropriate ways to nurture deep-sea scientific community in those countries. This purpose cannot be reached simply by sending lecturers to them or invite

individual scientists to IODP meetings or cruises. Rather, we need efficient approaches to influence the community in those countries.

Looking for additional funds to sustain the program is of course desirable. All opportunities should be considered. What remains essential is the property of the data which should remain with the programme.

Up to now, the drilling programme has been conducting basic research, and has not worried about societal relevance, even if some projects did address issues important for the society. To look for other funding sources, this problem need to be addressed in the future. This should be an important topic for the upcoming “big conference” in Bremen next year.

I/Os with help of IODP-MI should seriously pursue outside funds, preferably in long-term contracts. These operations supported by outside funds however, should be considered as non-IODP.

Ongoing efforts have already highlighted some of the difficulties involved in seeking and securing additional sources of funding outside the current MOUs. Nonetheless, continued efforts to explore all conceivable avenues should be encouraged. This would include IODP-MI, the IOs, and individual proponents.

I fully support attaining external funding to keep the program going. Inviting more countries to participate and become full members would also be beneficial. Obviously there is not enough money to run 3 different drilling operations. It is unfortunate, but what are the options for separating the JR, Chikyu and MSP? MSP could become a separate drilling operation, like ANDRILL. Would we have enough money to run just the JR?

FUNDING SHORTFALL

IODP was conceived with the premise that JR would conduct drilling during the entire year. However, it appears now that from FY2010 on, funding for expeditions would be available for no more than six months every year. IODP tasks involve ship based and shore based infrastructure including the technical staff. These tasks are simply not scalable down from twelve months to six months. Furthermore, for the ship to be sitting at the dock for six months every year after an expenditure of more than \$115 million

dollars for a refit is simply unpalatable at a number of levels. For the ship to be leased out to do non scientific tasks helps financially. It does not help in maintaining the infrastructure, nor does it advance scientific investigations in any way.

Can entities such as charitable foundations, other government agencies step in to fill the gap and support IODP expeditions? In theory, yes; in practice, no, at least not in the immediate future. So what do we do to make scientific use of the ship beyond the funded six months, to justify NSF's investment, but without further expenditure of NSF funds ? I am not aware of any coherent plans by either NSF or USIO.

The answer may lie in dealing with countries such as China, India, and Korea, and with industry. But it requires thinking outside the box, that is, outside the IODP box.

I recently had discussions with Professor Pinxian Wang in Shanghai and Dr Shailesh Nayak in New Delhi. Professor Wang is the head of the IODP office in China and Dr Nayak is the Secretary, Ministry of Earth Sciences, Government of India and will be the signatory on the IODP MOU for India. China is, and India is soon to be an Associate member of IODP. Each country will contribute one million dollars annually to IODP. These contributions are obviously tiny compared to the total annual IODP budget of more than \$250 million and, commensurately, the benefits to China and India are also very small. Both Professor Wang and Dr Nayak had nearly identical suggestions on how their respective contributions to drilling programs could be substantially increased. Each of them could lease the drill ship for two to four months and pay the entire fare. The expedition objectives would be scientific, proposed primarily by China (or India), but in conjunction with internationally based scientists. In other words, it would be a shared program but funded entirely by China (or India). It would not be an IODP program; it would be an entirely new program, sharing some of the attributes of IODP and would obviously require new MOUs. Examples of expeditions are "South China Sea" funded by China and a "Gas hydrate program" funded by India. Parting words both from Wang and Nayak were "Money is no problem"

Basic to such an agreement would be the premise that the non IODP six month use of JR would not only involve the IO. It would be a joint NSF/IO endeavor in dealing with the other countries.

Obviously similar agreements could be negotiated with industry.

(It should also be mentioned that Korea has already been negotiating a use of the JR with USIO)

USE OF THE DAY RATE

When asked what is the shortfall in JR's funding, the answer is not a simple one. In fact there are two answers. If the funding is for IODP programs, the answer for a typical expedition is \$3.4 million per month. If the funding is external for non IODP programs, (e.g. industry), the answer is typically \$5.9 million per month. Why the difference?

If the additional funding is for IODP programs, from say a massive addition of funding from NSF, from another government agency, or a charitable foundation, the “day rate” of about \$2.5 million per month is already paid for. If, on the other hand, the funding is for a non IODP program, NSF will not contribute the “day rate”, which is strictly for IODP expeditions, and hence the larger cost.

We note that the “day rate” for the entire year is already paid for. Instead of requiring that it may only be used for IODP expeditions, it could be used as a “cost share”, for other science programs, such as with China, India, Korea, or industry as outlined above. Note also that this would not incur any additional costs, but would make the non IODP use of the JR very attractive.

The above will, of course, require that the “day rate” for the idle six months is taken out of IODP, but used for the kind of programs mentioned above. This will ensure the continuity of infrastructure and the conduct of science during those six months. It also requires that the use of the six months is to be negotiated not just by the IO, but jointly by the IO and NSF. Most importantly, though indirectly, it will help maintain the viability of IODP.

Seek commercial funding opportunities - not related to science but in line as much as possible with the scientific program. These could be site surveys, environmental hazards and shallow target drilling for exploration - accessible by member companies. One could think of that a supporting company could claim the drill ships for a limited time. Any supporting company must subscribe to the scientific part as well through a contribution either by data sharing (i.e. in kind) or financially by co-funding a proposal (incl operational costs). The latter of course could be an industry led science proposal of course.

4. Site surveys, longer term studies of samples, and other ancillary activities are not now parts of IODP funding. In the future, should funds for these activities be part of the IODP budget?

The absence of funds for these activities is very detrimental to the future of IODP. While longer term studies of samples can be, and are funded by national agencies such as NERC, the absence of funds within the IODP budget is a serious issue for other less fortunate scientists. These funds should remain part of IODP with the proviso that applications for long term studies are subject to some kind of peer review.

The absence of funds to support "site surveys" is equally serious if not more so. The term site survey is often abused in the IODP community and there are two types of "site survey". The first is the type of seismic survey which requires a number of regional liens that collectively provide the regional structural and structural context for problem definition. These types of survey are costly (will require MCS ships) and normally require a separate funding proposal to NSF or another partner IODP agency. I do not envisage that IODP funds should support this kind of data acquisition. However specific site surveys to define individual drill sites and are typically acquires for safety purposes. For paleoceanographic sites two single channel cross lines often suffice but even these come at a cost unless sourced from legacy seismic data. More specific MCS seismic surveys also come at a cost and would be appropriate for funding by IODP if the overall proposal has the support of the Science Advisory Structure. The problem is much more difficult for the US than for partner members who may have separate funds for such surveys..In the 70's France and the UK worked together to provide the regional surveys and the specific site surveys.

The site survey funding issue is the tip of a very large iceberg. It may impede the progress of a proposal through to drilling resulting in delays or it may prevent drilling high priority sites. Note that relatively minor costs, and ease of delivery, of paleoceanographic site surveys will facilitate drilling of these sites.

In short IODP should be able to provide funding for the purposes noted in the question

In an ideal world, maybe; but in times of tight IODP budgets these cannot be funded

Site surveys as part of the IODP structure? I do not think so. There are not many qualified institutions which are able to provide proper site surveys, and it should be up to the proponents to establish the necessary liaisons. However, no funding can be secured if there is no prospect of the actual drilling in the foreseeable future.

YES! As in item 2 above, this would help to keep the community committed to the program. At present, there is little career advantage to associating with IODP. So it is little surprise that the community of

survivors is shifting their efforts into other activities. Young scientists, especially, will look for programs in which they can grow their careers. IODP now looks too risky for young scientists.

I believe eliminating these funds would be a mistake. A criticism of IODP is that poor data are often used in a proposal to justify the science in the drilling proposal. If anything, IODP should use the post-pre proposals to develop a data acquisition plan which is funded by IODP. (The data acquisition plan must also be approved by SSP and EPSP.) This would occur once the SSEP's agree the proposal has enough merit to warrant drilling. Alternatively, the data acquisition plan might be developed in the same manner but funded by the countries whose members submitted the proposal.

Another criticism of IODP is that there is not enough post-cruise funding to fully explore the drilling results. I would not cut funds in this area but actually encourage proposals for further research using the drilling results.

They should be, of course, but it's never going to happen. The resources do not exist.

No. The biggest weakness of the IODP is its inability to pay for the actual science associated with any drilling leg. However, what I have witnessed is that leveraging off of IODP for site-survey work in different countries (US and Germany) can be quite effective, and this allows for the science as well. For whatever reason, it seems leveraging just science funding off of drilling by comparison to something more comprehensive like site survey work, is more difficult to secure.

Ideally yes but practically no. Drilling must come first. If we had ONE 12 month operating boat then it might be a good idea, but in the present state it should be a matter for individual member countries.

Ideally, yes. It can be difficult to justify site surveys independently based on stand-alone scientific goals. Additional science support would also be wonderful – it's inadequate at present. However, having said that, we must also be careful not to load drilling budgets at this stage with additional, potentially expensive, activities.

It will be very nice if IODP can fund site surveys. However, the present budgetary conditions will not allow it; priority should be given to longer duration of yearly operation of drill ships for scientific drilling.

The only way to develop a truly integrated program that brings excellent science from idea to implementation is to engage “implementers,” in the broadest sense of the word, into the process earlier. One of the highlights of the Mission proposal was an earlier integration of operations and fiscal reality into the proposal process. The Mission concept never got off the ground, largely, I feel, because it was an idea that was introduced before its time, during a period of great promise for full year multiple platform operations. The new reality has revealed to the community that resources are limited, and we no longer have the luxury of planning the program solely around individual 2-month scientific proposals that do not even come to terms with cost until they have been through the entire SAS review process. In fact, we at OTF are looking at one riser program that would require about three years of operations at one site, and one non-riser program planned primarily as an observatory expedition but without funding for any of the observatory components. Many scientists that I speak to now tell me that they would be happy to re-introduce aspects of the Mission concept into planning for the renewal.

I suggest that we re-explore how we might be able to help scientists achieve the greatest scientific by being more integrated in our approach of expedition planning. Whether we revisit “missions” or simply develop a new system, it is clear to me at least that budget tightening combined with the higher inherent costs of observatories and riser drilling (with at least some 3-D seismics to support operational and scientific objectives) may by default result in a program dominated by cheap and easy drilling. As a paleoceanographer, I would not be too upset by that outcome for my field, but the great discoveries achieved by ocean drilling science over the past decades come from all three components of the ISP.

So, my response to the question is yes, funds for these activities should be part of the IODP budget, so long as they support scientists in achieving their best science and operators in achieving the most timely and cost-effective operations possible.

Yes. Site-surveys and long term monitoring in oceanic regions cost a lot of money. In addition, it is also important not to suggest excess site surveys (e.g., 3-D seismic survey) in review of proposals. I hope IODP supports site surveys suggested by review panel at least.

Finding money to obtain site survey data is probably the major reason why there are so many proposals in the pipeline to be drilled. It would be great to have site surveys as part of IODP funding, but IODP does not have site survey vessels available. These are all part of the national entities, so contracting

these vessels would be an IODP-MI responsibility. I would suggest that site surveys be part of future IODP funding, but with the current budget situation, is this realistic? Longer-term study of samples and data should not be part of the IODP budget – funds can be obtained from national funding agencies.

We are uncertain whether IODP funding here implies national research council budgets put aside for IODP work, or purely international central funding? With limited funding for the latter, it is clearly necessary to prioritize (eg items in point 3 above). Essential site surveys should be supported by central IODP funding where possible, whereas specific projects relating to one or several legs should remain the responsibility of national budgets. There are good arguments, however, for generic multi-leg or ocean-wide scientific projects of fundamental scientific interest having access to central funds.

Good question. I think so, but a lot depends on what the post-2013 Program Principles end up being and how "contributions" from the Lead Agencies and Members are defined and normalized.

The requirement of 3D site surveys for riser platform is a very heavy burden to proposers. In the next phase of IODP, these surveys should be included in the program itself. In the present phase, perhaps it is difficult to modify the program in this direction, because of the heavy deficit in the budget. For non-riser proposals, the demand of site survey does not pose such a heavy burden. So, the present system for that part appears to be OK.

This could be detrimental because of the current scientific evaluation panel structure. The multidisciplinary and multi-national mix results in low scores for some of the most innovative non-conventional proposals because the majority of the panel is unable to understand the science outside of textbooks and does not have the historical background through reading the non-specialist scientific literature. NSF and other national panels are more likely to correctly evaluate the potential of scientific breakthroughs.

Yes, but within a limited budget. At the least, funds for pilot studies should be provided to enable critical results to be delivered. One model to consider is that all IODP proposals are submitted through the relevant national offices, and only after they have secured post operational funding from the national funding agencies. This is the case for UK ship time. A request for ship time can only be considered once the science has been peer reviewed and post cruise funding is promised. The advantages of this approach is (a) there would be fewer but better proposals submitted to IODP, (b) there would be a

greater sense of community ownership of the science since it would already have won funding under the normal open competition environment that is applied to any other national capability funding.

Studies beyond the moratorium period are probably best left to individual action.

For most proposals, the present system, whereby proponents are responsible for obtaining finance and organizing their own site surveys, is best albeit often difficult for the proponents and in some cases not producing optimum results. The sequence of events is also important: OTF, on behalf of IODP, do not normally accept ranked proposals for scheduling until a site survey has been approved by SSP, and it would be unreasonable for IODP to take on the costs associated with preparing proposals before they are with OTF.

The big exception to this process is riser proposals such as NanTroSEIZE and CRISP where drilling cannot be carried out without the acquisition of very expensive 3D data which would normally be beyond the means of national cruise funding. Unless a source of site survey funding is found for such proposals, then riser drilling is not possible, and there is a real need for a riser program beyond NanTroSEIZE.

This is not realistic. The only problem to address as a programme is the funding of 3D seismics for riser drilling.

This is the area where the science community should work hard to secure outside science funds. It is very difficult to include these activities within IODP funding.

The idea of including site surveys and other ancillary activities under one large IODP umbrella sounds attractive in theory, but beyond any practical and bureaucratic concerns, not to mention unforeseen consequences, such a goal seems sharply at odds with the funding difficulties alluded to in Questions 1 and 3.

5. IODP includes three implementing organizations (USIO, CDEX, and ESO). Should their activities be integrated more than they are now? If so, how?

I am doubtful that much if anything will be gained by a forced integration of these organizations. They deal with separate drilling entities with quite different capabilities with commonality mainly in areas such as shipboard lab facilities, logging etc. They are also national organizations with, I believe their own funding.

From my limited experience the answer is obviously yes. At the Beijing meeting I was intrigued to see how the representatives of the three organizations interacted. USIO seemed to call the shots; they consulted with CDEX to try to get their agreement; ESO seemed to have little input and the Australians tried their best to get a word in edgeways.

In an ideal world, the budgets would be combined. There does not seem to be enough funds and/or valid scientific projects to pay for 12 months of operation of the Chikyu. If the Chikyu could be rented out for riser drilling for say 8 months a year instead of 6, the two months extra rental would cover the deficit in Joides operations. Such an arrangement is obviously not acceptable to all concerned, but some attempt should be made to rationalize the operation of the two main ships.

I think the principles of sharing the expenses of building and running the actual platforms have to be reviewed very carefully. The burden for the providing countries may be unfairly heavy. I have not enough insight to have a proper opinion.

Separation of the implementing organizations to be specific to the platforms they address, as per current custom, is OK. I can, however, see benefit in streamlining and centralizing management at the highest level to make sure the program is seamlessly integrated between its components.

Initially I thought this wouldn't work, but I think it actually works well. Each one manages a specific aspect of drilling and they're the experts in their respective type of drilling. I wouldn't change anything.

They should be, but it's never going to happen. The "I" in IODP stands for "Independent". As soon as we push CDEX and MEXT into a corner, they will pull out and run Chikyu by themselves. We've come close to that "nuclear option" already. In reality, the SAS has almost no control over how Chikyu will be

deployed. It's a utopian fantasy to think that Japan will ever put the interests of the international science community above their own national interests.

For me, being outside of the IODP, this is impossible to evaluate without more information than the paragraph included in the description provided. I look forward to learning more.

Yes but I am not sure how, or even that it would make much difference. The IOs just run the ships right? So probably having one IO for each platform is a good idea for making sure that it works well. This must generate a competitive spirit. I am not sure it would save much money by integrating them. I assume they all talk to each other anyway. It would be good if they could share personnel, like technicians however, especially if the ships are not working all the time.

While funds remain so limited, I suggest focusing on keeping the JR operational, ideally for 12 months per year, and reducing the emphasis on MSPs. This would involve diverting some or all of the ESO science contribution to the JR. CDEX is committed to Chikyu and I understand that they have not been contributing to science costs associated with the JR. We should maintain scientific cooperation with CDEX: US scientists should still sail on Chikyu and Japanese scientists on JR. However, we might as well recognize that, financially, Chikyu operations effectively constitute a separate program.

Some form of centralized management of even a JR-centered program is important. However, it is not clear that both COL and IODP-MI (at least in its present form) are required. Too much money is being spent on management and not enough on operations and science support.

As with the issue in question 1, it seems that their operations, funding, and mandates are so unique one from the other that integration would be challenging, but I defer to folks with more expertise on this issue. Seems that there are POC-based issues that make restructuring difficult.

No – in order to maintain the buy-in of the major partners, some sort of national identity has to be maintained. IODP-MI is the coordinating agency of these national entities, along with the SAS. It is the

SAS that facilitates communication between the different partners, along with PMO meetings and IO interactions. I do not see how better integration would be possible.

This raises the issue of the role of IODP-MI in the next stage of IODP. Are two offices really necessary? Does having an office in Sapporo really warrant that expense? Does the IODP-MI office really need to be in Washington DC? If it remains, can it be more active in lobbying for IODP in Congress? How would moving the office to a less expensive location impact the program?

If we have learned anything from the first phases of IODP it is that none of the IOs has sufficient funds for additional integration. If anything, we must move in the direction of less integration and more coordination.

I don't have clear idea about this question. Perhaps, the renewal time will provide a good opportunity to reconsider this important point. In that case, an outside review (by people who have expertise and experience in running similar international programs) should be carried out to look at the current situation as well as the possibility of new approach.

Integrated! Certainly but they should remain independent

The 3 IOs have to some extent evolved separately to meet the needs of their national funding agencies, but at the same time a significant degree of integration exists:

- Adherence to IODP procedures and policies
- Central data portal for data enquiries making their disparate systems transparent to the user
- Fully integrated core-management systems
- All SOCs contracted from IODP-MI
- Some staff exchange has taken place
- IOs interaction, eg EPC has close relationship with Lamont
- Integrated publications; all CDEX and ESO publication is carried out by USIO
- While each IO has its own outreach needs, there is also an integrated international approach

While some of these activities could be strengthened, significantly greater integration is unlikely unless the CMO is given greater powers through monetary control. The level of integration should certainly not be decreased (as would happen if there were no CMO), but while some incremental increase in integration on several established fronts is desirable, wholesale changes are unlikely to be productive.

There is some level of integration between the three IOs. Of course, there is still space for improvement. However, in the current situation, the IOs report to their funding agency for a large part of their of their activities. Moreover, there are cultural differences in the way things are run that will be difficult to overcome.

Yes, there are several areas where I/Os can share and collaborate on tasks. The cost savings, however, would be small.

The implementing organizations have achieved a fair amount of success so far in integrating many activities, particularly in data management, publications, education, and communications. Further progress in these areas can probably be made by continuing to facilitate interaction through joint task forces and working groups. The IOs have achieved only limited, ad hoc success in integrating personnel and training, and this will likely not improve significantly because of the inherent differences among the governing rules and procedures of the various organizations.

Appendix C – Agenda

Ad Hoc Review Committee Agenda

October 29 – 30, 2008

Location: IODP-MI Washington, DC office
815 Connecticut Ave. NW, Suite 210

Meeting Chair: John Byrne, john.byrne@oregonstate.edu

Onsite Contact: Therese Lowe, tlowe@iodp.org 202-465-7503
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Overview: The agenda will be divided into two parts. The first would be for the 29th morning which would be a get acquainted session. 29th afternoon and all day 30th would be devoted to discussions by the entire committee of the responses to each question by turn and arriving at a consensus response. Reporters will be appointed to put together a consensus response to each question. The reporters will, after the meeting, submit a report addressing each question. These reports will then be combined into a preliminary report.

Wednesday, October 29, 2008

8:30 – 9:00	Continental Breakfast	
9:00 – 9:05	Introductions	all
9:05 – 9:10	Logistics	Talwani
9:10 – 9:20	Ad-Hoc committee mandate	Talwani
9:20 – 10:30	Introductory statements: Each person in each group will give a 6 minute talk from their personal perspective and the perspective of that group with regard to restructuring the framework.	
	Group 1 - Implementing Organizations	Evans, Gagosian, Taira
	Group 2 - European perspective	Ludden, Thiede, Mevel
	Group 3 - Science Advisory structure	Taylor, Kono, Fillipelli, Edwards
10:30 – 10:45	Coffee Break	
10:45 – 12:00	Introductory statements (continued)	
	Group 4 Funding Agencies	Batiza, Hori, Mevel
	Group 5 Industry	Dengo, Saleh, Orcutt
	Group 6 Inviting other countries	Purdy, Batiza, Hori, Mevel
12:00 – 1:00	Lunch Break	

1:00 - 1:10	Introduction of Group discussions of Responses to Questionnaire	Byrne
	<p>Consider each of the questionnaire questions in turn, spend about ~1.5 hours discussing responses to that question (by the entire committee), come up with consensus steps on how to deal with that question. A reporter will be appointed, who will, soon after the meeting, come up with a draft that would be representative of the consensus. This draft will be circulated to all the members of the committee.</p> <p>Ultimately the drafts, after the comments and the suggestions have been factored in, will lead to the provisional report.</p>	
1:10 – 3:00	Restructuring to increase efficiencies and reduce costs	All
3:00 – 3:15	Coffee Break	
3:15 – 5:00	Inviting new proposals	All
5:00	Adjourn	
6:30	Reception at Cosmos Club	

Thursday, October 30, 2008

8:30 – 9:00	Continental Breakfast	
9:00 – 10:30	Outside Funding	All
10:30 – 10:45	Coffee Break	
10:45 – 12:00	Ancillary activities	All
12:00 – 1:00	Lunch Break	
1:00 – 2:00	Integration of IO activities	All
2:00 – 4:00	General Discussion and Action items	Led by Byrne
4:00	Adjourn	