international
BARCODE
OF LIFE

International Barcode of Life Project

Board of Directors (Executive Committee) Meeting

August 22nd, 2011
via teleconference

INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT
BOARD OF DIRECTORS
EXECUTIVE COMMITTEE MEETING
MONDAY, AUGUST 22, 2011

2:00 PM – 5:00 PM (Eastern Daylight Time)
via teleconference

AGENDA

	Item	*Item Type*	*Lead*	*Time*	*Page*
1	**Notice of meeting**	Information	Secretary	**2:00 pm**	**1**
2	Quorum	Information	Secretary		
3	Chairman and Secretary	Decision	Secretary		
4	Adoption of Agenda	Decision	All		
5	Approval of minutes from last meeting (January 12, 2011)	Decision	All		**2**
6	Matters Arising from minutes of last meeting	Information	Chair		
7	**Action Points from Board of Directors Meeting, April 28, 2011**			**2:15 pm**	
7.1	Genome Canada Interim Review Response		Chair	(30 minutes)	
	- Response letter and documentation to Genome Canada	Information			
	- Acceptance of Genome Canada's No Cost Extension	Information			**9**
	- Negotiation of New Genome Canada Contract	Comment			**11**
	- Data Management, Preservation and Access	Comment			**14**
7.2	Memorandum of Understanding (iBOL Nodes)		Executive Director	(15 minutes)	
	- Approval of Revised MOU	Decision			**17**
	- Follow up plans for individual nodes	Comment			**29**
	- iBOL Canada development plans	Comment			**-**
8	**Governance**			**3:00 pm**	
8.1	Governance and Management Re-organization		Chair	(30 minutes)	
	- iBOL and University of Guelph	Comment			**30**
	- iBOL-CBOL Collaboration	Comment			**32**
	- Operational Organization	Decision			**33**
8.2	Board of Directors and Officers		Chair	(15 minutes)	**34**
	- Board Membership	Comment			
	- Officers	Comment			
8.3	Science Advisory Board (SAB)		Executive Director		**36**
	- Terms of Reference	Decision			
	- Remuneration	Decision			
	- Membership	Decision			**39**
8.4	Technology and Applications Advisory Board (TAAB)		Executive Director		**41**
	- Terms of Reference	Decision			
	- Remuneration	Decision			
	- Membership	Comment			**43**
8.5	Scientific Steering Committee		Executive Director		**44**
	- Terms of Reference	Decision			
8.6	Scientific Steering Committee Executive (SSCE)	Decision	Executive Director		**45**
	- Terms of Reference	Decision			

9	**Operations**			**3:45 pm**	
9.1	Management Plan	Comment	Executive Director	(15 minutes)	**47**
9.2	Enterprise Risk Management	Comment			**49**
9.3	Management Information Systems	Comment			**52**
9.4	Funding of iBOL Operations	Comment			**60**
10	**Scientific Update**			**4:00 pm**	
10.1	Scientific Director's Overview	Information	Scientific Director	(10 minutes)	**61**
10.2	Report of SSCE Chair	Comment		(5 minutes)	**63**
10.3	Annual Highlights Report	Comment	All	(30 minutes)	**-**
10.4	4th International Barcode Conference, Adelaide	Information			**-**
11	**Varia**			**4:45 pm**	
11.1	Dates for Future Meetings	Information	Executive Director		**68**
11.2	Appointment of Interim Vice-Chair				
11.3	In Camera session [Executive & Board members only]				
12	**Adjournment**			**5:00 pm**	

EXECUTIVE COMMITTEE MEETING

INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT

NOTICE OF MEETING

AUGUST 22, 2011

2:00 – 5:00 P.M. (Eastern Daylight Time)
Via teleconference

To: Jesse Ausubel
Christian Burks
Paul Hebert
Karl Tibelius

Guests: Ivar Myklebust
Faustino Siñeriz
Rocky Skeef
Xian-En Zhang

Susanne Fortier – NSERC – ex officio advisor
Mark J. Poznansky – President & CEO - OGI
Peter Freeman – Executive Director
Jean Brunet – Secretary

Please be advised that a meeting of the Executive Committee of the INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT (the "*Corporation*") will be held on August 22, 2011, from 2:00 – 5:00 P.M. (Eastern Daylight Time) via teleconference. The agenda of the meeting is attached hereto. **Board Directors are invited to participate if they wish.**

You will find below the dial-in numbers to reach the conference; please test the numbers in advance to make sure that you connect from your country:

CONFERENCE ID NUMBER: 7466622

TOLL-FREE DIAL-IN NUMBER (NORTH AMERICA): +1 877 343 2259

LOCAL DIAL-IN NUMBER (NORTH AMERICA): +1 416 343 2275

GLOBAL TOLL-FREE DIAL-IN NUMBER: 800-3050-3002
(THIS NUMBER APPLIES TO A LIST OF 21 COUNTRIES, INCLUDING NORWAY – SEE LINK BELOW. THEY USE THEIR NORMAL LONG DISTANCE CODE, FOLLOWED BY THE NUMBER.)

INTERNATIONAL TOLL-FREE DIAL IN NUMBER FOR SOUTH AFRICA: 0800981702. TO USE THE INTERNATIONAL TOLL-FREE NUMBER, SIMPLY DIAL THE NUMBER AS PROVIDED. IF YOU ARE EXPERIENCING DIFFICULTIES, PLEASE CONTACT YOUR LONG DISTANCE CARRIER. SEE LINK BELOW FOR OTHER NUMBERS.

INTERNATIONAL ACCESS

GLOBAL TOLL-FREE: FOR A COMPLETE LIST OF THE 21 PARTICIPATING COUNTRIES

VISIT HTTP://WWW.CONFERENCING.BELL.CA/EN/RESSOURCE_CENTRE

INTERNATIONAL TOLL-FREE: GO TO

HTTP://WWW.SERVICES-BELL.COM/TOLLFREE

FOR THE LIST OF PARTICIPATING COUNTRIES AND THEIR CORRESPONDING DIAL-IN NUMBER

Kindly inform Meg Fritzsche (mfritzsche@ibol.org) if you are unable to attend.

Guelph (Ontario), August 10, 2011.

Jean Brunet, Secretary

MINUTES of the meeting of the Executive Committee of **INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT** (the «*Corporation*») held by teleconference, on January 12, 2011, at 3:00 P.M. - E.S.T.

PRESENT: Jesse Ausubel
Christian Burks
Paul Hebert
Karl Tibelius

GUESTS: Teresa Clarke (OGI)
Kim Corbett (Genome Canada)
Dale Dempsey (Genome Canada)
Kate Swan (Genome Canada)
Peter Freeman
Greg Singer
Jean Brunet

1- NOTICE OF MEETING

2- QUORUM

All members of the Executive Committee being present, having quorum and notice of meeting having been duly sent, the meeting is declared to be regularly constituted.

3- CHAIRMAN AND SECRETARY

Resolution ExC-2011/01/12-1

On motion duly made and seconded, IT IS UNANIMOUSLY RESOLVED:

"That Dr. Burks chair the meeting and that Mr. Brunet act as Secretary of the meeting"

4- APPROVAL OF THE AGENDA

The Secretary presents the agenda of the meeting for approval.

Resolution ExC-2011/01/12-2

On motion duly made and seconded, IT IS UNANIMOUSLY RESOLVED:

"To approve the agenda as presented."

5- INTERIM REVIEW

Dr. Freeman recalls the process of the iBOL Interim Review and presents comments received from various stakeholders, namely OGI and iBOL's Scientific Advisory Board, Technology and Development Advisory Group and Scientific Steering Committee. The new deadline for submission of the Interim Review Report to Genome Canada is February 8, 2011, with inclusion of data until December 31, 2010. Dr. Tibelius strongly recommends that the report address the issues raised by the reviewers and focus primarily on the project's progress against expectations. A face-to-face meeting will be held on March 8, 2011. It is suggested to emphasize in the report the accomplishments of the first 18 months with the presentation of facts and figures, addressing the goals that were established with the funding partners at iBOL's inception.

Dr. Hebert specifies that the deliverables for the first six quarters required by the funding partners will be presented in the Executive summary. Overall targets had been set for five years, and specific targets were established in the Notice of Award, together with conditions for the release of funds.

Executive Committee members provide various comments on the new direction taken in the Interim Review Report following the December 6, 2010 comments from Board members. It is suggested adding more information as to actual achievements up to December 2010, in order to indicate clearly whether the project is achieving its milestones, and also address the governance and management structure of iBOL. The failure to

release data on a weekly basis instead of a quarterly basis must be clearly addressed.

Dr. Burks summarizes the discussion and suggests that the report, both in the Executive Summary and in greater detail in the report, deliver a clear and positive message focused on: (1) iBOL's scientific accomplishments & highlights; (2) accountability & governance process, structure & influence; and (3) iBOL's impact and benefits.

Resolution ExC-2011/01/12-3

On motion duly made and seconded, Dr. Tibelius abstaining, IT IS RESOLVED:

> *"To endorse the progress made to date on the draft Interim Review Report underlining the importance of taking into account the feedback and suggestions received from OGI's pre-review, as well as iBOL Board members, and subject to comments provided by Executive Committee members; and*
>
> *To authorize the submission to OGI and Genome Canada of a final draft of the Interim Review Report reflecting the various inputs received."*

6- IBOL STRATEGIC PLAN AND BUDGET

Dr. Freeman requests guidance from the Executive Committee on iBOL's strategic plan and budget going forward, referring to Sections III and IV of the Interim Review Report, and more specifically to figure 5.1.

iBOL is a mixed model of management of the Nodes, working groups and core facilities. A distinction must be established between governance and management of iBOL(its Board, Advisory Committees and Secretariat) versus administration of its Nodes and working groups and coordination of its core facilities. . It is suggested to develop a structure connecting with actual reporting requirements. Members discuss the National Networks and Network of Networks concepts, and underline the

importance of reaching the goals, not only establishing a structure. It is suggested reworking figure 5.1 in order to present how the various elements of the structure come together to create a cohesive whole that is iBOL.

7- NOMINATION FOR EXECUTIVE SUB-COMMITTEE OF THE SCIENTIFIC STEERING COMMITTEE

The Scientific Steering Committee (the "*SSC*") has requested the appointment of a sub-committee in order for such sub-committee to exercise the mandate of the Scientific Steering Committee between full meetings of the SSC. The mandate of the SSC is to assist and advise the scientific directors on the overall research plans and deliverables of the iBOL project. This mandate includes monitoring of scientific and administrative progress of the project's six Themes and twenty-six working groups. The SSC sub-committee would meet quarterly and shall be comprised of eight members, including the Scientific Director as Chair, the Executive Director as Vice-chair, and six "*Theme leaders*" , each assigned to one of the six Themes of the iBOL project (DNA Barcode Library, Methods, Informatics, Applications, Administration and GE^{3}LS).

Six nominations were received, but no nominations were received for Theme 2 (Methods), as follows:

Theme	Nominee
1.DNA Barcode Library	Pete Hollingsworth
2. Methods	---
3. Informatics	Vincent Robert
4. Applications	Mark Stoeckle
5. Administration	David Schindel Yousef Al-Hafedh
6. GE^{3}LS	David Castle Yousef Al-Hafedh

Dr. Burks suggests developing Terms of Reference for the SSC sub-committee, to be submitted to the Executive Committee or Board of Directors, for approval.

Resolution ExC-2011/01/12-4

On motion duly made and seconded, IT IS UNANIMOUSLY RESOLVED:

> *"To approve the creation of a sub-committee of the Scientific Steering Committee, in order to act between full meetings of the Scientific Steering Committee, subject to the development of Terms of Reference to be submitted to the Executive Committee or Board of Directors of iBOL; and*
>
> *To authorize the Scientific Steering Committee to appoint members to the sub-committee of the Scientific Steering Committee, as it may see fit:*

8- DRAFT MoU DEVELOPMENT

Dr. Freeman presents a draft Memorandum of Understanding ("*MoU*") indicating the main principles and definitions underlying the MoU, together with elements that must be addressed. Executive Committee members provide comments. It is recommended acknowledging the distinct role of CBOL in the MoU, without CBOL being a party to such MoU. A separate agreement should be executed between CBOL and iBOL, specifying the relationship between both organizations.

9- BOARD OF DIRECTORS MEETING DATE AND LOCATION

The Secretary recalls that the next Board meeting will be held on April 28, 2011, in New York. Dr. Ausubel offers his assistance in organizing the meeting.

The CBOL international meeting will be held in Adelaide, Australia, in the week of November 28, and it is suggested that the Fall Board meeting be held in conjunction with such meeting, together with a Scientific Steering Committee of iBOL. It would thus be preferable to hold the SSC meeting at the beginning of the week and the Board meeting at the end, after the iBOL international meeting.

10- VARIA

Directors and Officers Liability Insurance

Dr. Freeman informs the Executive Committee that the Directors and Officers Liability Insurance comes up for renewal.

Resolution ExC-2011/01/12-5

On motion duly made and seconded, IT IS UNANIMOUSLY RESOLVED:

> *"To authorize the renewal of the current Directors and Officers Liability Insurance."*

Other sources of funding

Dr. Hebert questions Dr. Tibelius as to the acceptability to Genome Canada of iBOL securing other sources of funding for the operations and co-funding of iBOL. Dr. Tibelius agrees that Genome Canada considers that other sources of funding are acceptable and welcome. Dr. Burks encourages that added funders be considered and involved in the overall oversight and accountability iBOL.

Interim Review Report process

Dr. Burks wishes to clarify the process for submission of the Interim Review Report. A final draft will be circulated to the Executive Committee members prior to its submission.

Thanks

Dr. Tibelius mentions that Ms. Kim Corbett will be leaving on a one year maternity leave and wishes to thank her for her great support with the iBOL project and helping structure the initial administrative and management side of the project.

11- NEXT MEETINGS

It is suggested to hold the next Executive Committee meeting in the last week of August. Executive Committee members will be polled as to date preference and availability.

12- ADJOURNMENT OF MEETING

Resolution ExC-2011/01/12-6

On motion duly made and seconded, IT IS UNANIMOUSLY RESOLVED:

"*To adjourn the meeting.*"

Christian Burks, Chairman

Jean Brunet, Secretary

RESEARCH PROJECT
AMENDING AGREEMENT #5

THIS AGREEMENT made as of June 28, 2011.

BETWEEN

ONTARIO GENOMICS INSTITUTE
(hereinafter referred to as "OGI")

-and-

THE UNIVERSITY OF GUELPH
(hereinafter referred to as the "Recipient")

WHEREAS OGI and the Recipient entered into an agreement dated January 16th, 2009, for the "Eligible Project" entitled "*International Barcode of Life*" (the "iBOL Agreement");

AND WHEREAS OGI and the Recipient wish to amend the iBOL Agreement;

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. The expiry date is hereby revised to mean December 30th, 2011.

2. In all other respects the iBOL Agreement, the Research Project Amending Agreement #1 – executed June 22nd, 2009, Research Project Amending Agreement #2 – executed January 8th, 2010, Research Project Amending Agreement #3 – executed February 5th, 2010 and Research Project Amending Agreement #3 – executed February 9th, 2011 remains in full force and effect, unamended.

AS AGREED TO BY:

ONTARIO GENOMICS INSTITUTE

Mark Poznansky, PhD, O.Ont, C.M, President and Chief Executive Officer
Ontario Genomics Institute
(I have the authority to bind OGI)

July 7, 2011
Date

THE RECIPIENT

Prof. Rich Moccia Associate Vice-President Research (Research Services)
University of Guelph
(I have the authority to bind the University of Guelph)

June 28, 2011
Date

Dave Reinhart, Director, Research Financial Services
University of Guelph
(I have the authority to bind the University of Guelph)

June 28/11
Date

GenomeCanada

July 18, 2011

Dr. Paul Hebert
Biodiversity Institute of Ontario
University of Guelph
579 Gordon Street
Guelph, ON
N1G 2W1

Dear Dr. Hebert,

Thank you for submitting a response to my letter of May 6th outlining conditions that had to be met by iBOL in the short term. We are pleased that you engaged members of your Board of Directors in responding to the conditions and that Jesse Ausubel, as Acting Chair of the Board, is taking a lead role in working with iBOL to develop a more business-like management structure. I would like to provide you with feedback on the three conditions that you were asked to address in the response submitted:

1. **Management plan**: The plans described to strengthen the management structures and practices, including implementing a risk register and management information systems as well as drafting an annual Highlights Report and revising/establishing MOUs between iBOL and its nodes, are very positive steps. It is noted in your response that you are not yet in a position to respond to the request to clearly define the roles and responsibilities of the senior members of the iBOL team and how they will interact effectively, particularly the Scientific Director and Executive Director. We understand that this will be discussed at the August 22nd Executive Committee meeting and look forward to this discussion as well as receiving further documentation to address the management of the project after the meeting.

2. **Financial plan**: The plans to document international funding sources, update the model for valuation of specimen contributions and broaden effort reporting are acceptable and meet the condition set. It is noted that Appendix 1 indicates that these efforts will be completed by August which aligns well with the idea to hold a meeting between OGI staff, Greg Singer and me within the next month to review the principles of the co-funding valuation model to ensure it meets Genome Canada's needs.

3. **Revised agreement with GenBank**: The draft Letter of Cooperation (LOC) submitted for review was shared with members of the Interim Review Committee for feedback. The reviewers commented that the 2011 Letter of Cooperation is more detailed and proposes mechanisms that address some of the concerns raised during Interim Review. It is noted that the 2011 LOC indicates that BOLD will release iBOL data on a quarterly or more frequent basis. The reviewers were asked to comment on whether quarterly release is sufficient given that the approved iBOL Data Release Policy states that phase I data will be released to GenBank weekly. The reviewers agreed that for this type of data, quarterly release represents a reasonable timeframe. Based on this feedback, we would be willing to approve a revised Data Release Policy with this change if agreeable to the iBOL Board of Directors. It may be useful to consider revising the Data Release

Policy in this manner so that there is no confusion by iBOL nodes as to the expectation for data release timelines. Lastly, it was noted that the 2011 LOC does not address the quarterly reporting on progress that is provided from GenBank to iBOL, Genome Canada and OGI. As long as these reports will continue despite not being specifically referenced, the 2011 LOC is approved by Genome Canada.

In addition to the requirement to submit additional documentation to meet the management plan condition, as detailed above, it is expected that the following items will be conditions of the Notice of Award for $2M in new funding from Genome Canada that will be issued once an agreement is in place between Industry Canada and Genome Canada:

1. Oversight
   The project will be subject to direct oversight and monitoring by Genome Canada, the Ontario Genomics Institute (OGI) and other funding partners using mechanisms such as the iBOL Board of Directors.
2. Agreements and Certifications
   The standard agreement and certification requirements will be stated.
3. Budget, Co-funding, and Gantt Chart
   The project will be required to submit a revised budget, including international co-funding that has been pre-approved by Genome Canada, and an updated Gantt chart as well as a Working Group Data Release Targets table.
4. Data Release
   The project's Data Release and Resource Sharing Policy, must remain current with internationally accepted standards for Data Release and Resource Sharing and comply with Genome Canada's guidelines.
5. Open Access
   The project must have a Publication Policy, which includes a commitment to comply with Genome Canada's Policy on Access to Research Publications.
6. Interim Review
   The project must comply with the terms and conditions of an Interim Review to be held in fall 2012.
7. Advisory Committees
   The project must update the Terms of Reference for its Science Advisory Board (SAB) to comply with Genome Canada's Terms of Reference for Science Advisory Boards. In addition, to reflect Genome Canada's increased role in oversight and management of International Consortium Initiatives, the Terms of Reference must state that Genome Canada will be invited to SAB meetings as an observer or ex-officio member of the SAB.

   The project's Technology Development Advisory Group (TDAG) must meet regularly to provide guidance on optimal use of technologies, best practices, review technical progress and address other areas described in the group's Terms of Reference.
8. Ethical, Environmental, Economic, Legal and Social Aspects of Genomics Research (GE^3LS)
   i. The project must execute the inter-institutional agreement for GE^3LS research, and ensure funds have flowed and are being expended.

ii.

9. Acknowledgment of Contributions
   Commitment to acknowledge the contribution of the Government of Canada through Genome Canada and the Ontario Genomics Institute, as well as all other relevant funders.

Please note that each condition has been condensed for brevity; full details of each condition will be provided in the NOA. In addition, other conditions may be added to the NOA, if required.

I would like to take this opportunity to congratulate you and your team on the progress made to date in responding to the feedback provided through the Interim Review process.

Please feel free to contact me if you have any questions.

Kind regards,

KSwan

Kate Swan, M.Sc.
Associate Director, International Genomics Programs

cc: Mark Poznansky, Ontario Genomics Institute
Klaus Fiebig, Ontario Genomics Institute
Teresa Clarke, Ontario Genomics Institute

BOLD/GenBank Letter of Cooperation

General Agreements:
BOLD will broker the submission of barcode sequence data to GenBank on behalf of individual researchers, projects, and consortia.

Submission will include but will not be limited to:

1. Nucleotide sequences
2. Trace files
3. Primers, or probeids for primers
4. Country, and locality data as provided by submitters
5. Specimen voucher annotation as provided by submitters
6. Structured comments for any supported project

Retractions on submitted records should be avoided but are necessary at times. BOLD will only request retraction or redaction when the reasons are valid, rising from technical or data integrity issues.

Common cases include:

1. Unintentional submission of data by submitter
2. Accidental submission resulting from technical error
3. Contaminated sequence data

Depending on the situation, GenBank will:

1. If the sequences have not been made public in GenBank, the retracted records will be deleted and the accessions will be deprecated. BOLD will inform the submitter NOT to cite the accessions in a publication.
2. If the accession have been released to the public in GenBank, the records will be removed from distribution, Entrez indexing and BLAST databases. They will still be retrievable by accession number of gi. These accessions can be restored at a later date.
3. If an iBOL sequence is suppressed and resubmitted as a BOLD submission because it was not intended to be part of iBOL, BOLD will need to modify the sequence id (general tag). GenBank tracks accession/sequence id pairing and cannot upload a sequence with the inconsistent pairing.

BOLD and GenBank will maintain an update channel that allows for the update of records in GenBank when changes have been made on BOLD. GenBank will restrict updates to BOLD submitted records such that changes must be made through BOLD and brokered to GenBank. To support this mechanism the following agreements have been made:

As a key component of a functional update channel, BOLD will expose the current state of relevant fields for all records submitted to GenBank through BOLD and for records public on BOLD through the following live list files:

1. *Taxonomy Live List* – contains the organism name (in compliance with any data release policies from submitters), BIN designation, and data release level (applicable where phased release of data is utilized by a project or consortium)
2. *Sequence Live List* – contains trimmed nucleotide sequences
3. *Metadata Live List* – contains all metadata fields that are submitted to GenBank, including primers, country and locality, collection coordinates, collectors, and name of individual who provided the organism name.
4. *Voucher Live List* – contains all specimen identification fields on BOLD including those that do not have a matching field on GenBank. Consists of museumID, fieldID, collectionCode, and depository/sample source.
5. *Public on BOLD Only Live List* – Provides a list of records that are public on BOLD but lack a GenBank accession. Also provided are the organism names, project managers and their contact information.

Live list files will be updated on a weekly basis with archives maintained at BOLD.

Meetings and Communication:
In order to maintain collaborative development of shared functionality as well as timely resolution of issues, BOLD and GenBank will meet on a regular basis with the goal of monthly teleconferences. Communications regarding data flow that occurs as part of regular operations will be standardized in the following ways:

1. Conformation and response to submission of data from BOLD to GenBank will be provided by GenBank in the form of an email with accessions as well as an accession list deposited in a shared ftp location hosted at GenBank.
2. GenBank will provide Flatfiles via email and ftp once data processing on a submission is complete.
3. Inquiries regarding submitted data will be copied to the data submitter as well as to a standard email contact at BOLD.
4. GenBank will send out inquiries regarding submissions within 4 weeks of submission and allow an additional 4 weeks for response by data submitter at which time BOLD will make a summary decision or annotate the record.

iBOL Specific Agreements:
In support of the iBOL project to generate barcodes for 500K species over 5 years, BOLD and GenBank will establish special pipelines, communication, and reporting procedures to ensure accuracy of released/published data and timely access to data. The iBOL project utilizes a phased data release policy with an initial submission of partial records (Phase 1) performed on a fixed frequency. The release of complete records is triggered by use of data in a manuscript or initiated by data owners (Phase 2).

The following are agreed upon in support of this project:

1. BOLD will perform release of iBOL data on at least a quarterly basis in compliance with the iBOL data release policy. These submissions will have a hold date of 10 days.
2. BOLD will only submit data that has undergone extensive validation and review.
3. BOLD will notify GenBank of change in phase of any iBOL record (Phase 1 to Phase 2 or vice versa) through livelists and bi-weekly reports over email.
4. GenBank will notify BOLD of PubMed entries and publications that utilize iBOL data as an indicator of change in phase of associated records. BOLD will in turn review and modify the state of associated records to Phase 2 where appropriate.
5. BOLD will provide the iBOL user community with the ability to release interim taxonomy prior to publication of data in a manuscript.

The final disposition at GenBank of iBOL partial records without interim taxonomy in the structured comment (Phase 0) is currently unresolved.

DRAFT
AUGUST, 2011

MEMORANDUM OF UNDERSTANDING – iBOL NODES

BETWEEN: **INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT,** corporation having its head office at 150, Metcalfe Street, #2100, Ottawa (Ontario) K2P 1P1

hereinafter called "*iBOL*"

AND: **[NODE OR INTERNATIONAL NAME]**

hereinafter called "♦"

WHEREAS the International Barcode of Life Project (iBOL) Project ("*iBOL*") is a Canadian not-for-profit corporation, having its head office at 150, Metcalfe Street, #2100, Ottawa (Ontario) K2P 1P1;

WHEREAS the purpose of iBOL is to coordinate an international network of scientists and funding agencies focused on (a) sample acquisition and DNA barcoding of eukaryotic species, (b) development of a reference library of barcode sequences, and (c) development of analytical technologies and bioinformatics resources for DNA barcoding;

WHEREAS the Parties signatory to this document is / are co-ordinating <country / region name> involvement in iBOL through the <Node Name>, composed of leading researchers involved in DNA Barcoding and representatives of the key organisations charged with advancing the discovery of organisms in <Country / Region name>; and

WHEREAS the Parties wish to collaborate for the mutual benefit of their programs;

IN WITNESS WHEREOF, THE PARTIES AGREE AS FOLLOWS:

1. SCOPE

This document outlines the intended role of countries and regions participating as "*Nodes*" in the International Barcode of Life Project ("*iBOL*").

2. BACKGROUND

DNA barcoding is a strategy for rapidly and accurately identifying species by sequencing a short region of the same gene and comparing the sequence across a broad reference database of similar sequences, and which database will enable inventorying and assessment of biodiversity for all nations.

3. DEFINITIONS

3.1 iBOL

'*iBOL*' refers to the International Barcode of Life Project and includes its Board of Directors, Advisory Committees, coordinating Secretariat and participating '*Nodes*'.

3.2 iBOL Nodes

iBOL Nodes are networks of leading researchers and key organizations affiliated to iBOL and engaged in DNA barcoding and/or in funding and advancing biodiversity science in a country or region of the world.

3.3 iBOL National Nodes

National Nodes are those whose activities are focused primarily on collection and curation of specimens for DNA barcoding.

3.4 iBOL Regional Nodes

Regional Nodes are those which have the additional capacity to expand partnerships and establish core facilities for DNA barcoding and related research on a regional basis that extends beyond their national boundaries.

3.5 iBOL Central Nodes

Central Nodes are those countries and regions which commit to (a) establish large sequencing facilities that will barcode samples from diverse sources and geographies, and (b) act as leaders in knowledge and technology transfer across (other) Central, Regional and National Nodes.

3.6 iBOL Core Facilities

iBOL Core Facilities are laboratories and technology platforms established by iBOL Regional and Central Nodes to provide the DNA barcoding community with the sequencing, analysis, bio-informatics, bio-repository, training and/or knowledge mobilization resources appropriate to a project of iBOL's scale.

4. UNDERTAKING

The Parties will, subject to future funding commitments and evolving institutional priorities, maintain <<iBOL Node Name>> as a <<Central / Regional / National Node>> within iBOL, follow and benefit from the

"*Participation Guidelines for iBOL Nodes*", as described in Appendix I, and will work through the <<iBOL Node Name>> Steering Committee to participate in its programs, and contribute to its success.

5. REPORTING REQUIREMENTS

The parties will maintain, update, share and report information on the Node's participating groups, projects, resources, activities and funding status, as outlined in the *"Node Profile Template"* in Appendix II hereof, and will report annually on the Node's progress and accomplishments.

6. DATA RELEASE

The parties will share information and support iBOL's Data and Resource Sharing Policies, in accordance with Appendix III hereof.

7. PRESS RELEASE

The Parties will jointly decide whether or not to issue any press releases and other forms of publicity covering this MoU or the activities associated with it, but this provision will not limit public disclosure legally required of any of the Parties individually.

8. EFFECTIVE DATE

This MoU has an Effective Date when all the Parties have executed this agreement.

9. TERM

The term of this MoU shall commence on the Effective Date and shall continue in effect until December 2015.

This MoU will renew automatically unless a notice to the contrary is issued by any party thereof.

Any party to this MoU may terminate the present agreement at any time upon a ninety (90) day prior notice.

10. LIABILITY

This MoU does not create any liability between the parties nor any binding or legal partnership or association and each party remains a legally independent party.

None of the parties shall be liable for any act of the other party, and such latter party shall hold the other party harmless for any claim to such effect.

11. EXECUTION

CONSEQUENTLY THE PARTIES HAVE EXECUTED THE PRESENT MoU ON THE RESPECTIVE DATES MENTIONED BELOW.

INTERNATIONAL BARCODE OF LIFE (iBOL) PROJECT	**[NODE OR INTERNATIONAL NAME]**
Per: _____	Per: _____
Per: _____	Per: _____
Date: _____	Date: _____

Appendix I

Participation Guidelines for iBOL Nodes

Expectations

It is expected that the Participating Groups and organizations in an iBOL Node will collectively:

1. Establish a Steering Committee to guide the strategic development and funding of the Node.
2. Identify a co-ordinating institution and individual(s) to promote, manage and facilitate the Node's contribution to iBOL.
3. Maintain and share information on the Node's participating groups, projects, core facilities, infrastructure and funding status.
4. Contribute to the achievement of iBOL's goals by actively participating in its scientific, project management, communications, public outreach and training activities.

Because the primary activity of iBOL involves the construction of a well-populated reference library of DNA barcode sequences, it is expected that substantial effort will be directed towards this endeavour, with the following targets:

National Nodes: Collect, photograph, curate and database an average of 20K specimens per year.

Regional Nodes: Collect, photograph, curate, sequence and database an average of 40K specimens per year

Central Nodes: Collect, photograph, curate, sequence and database an average of 80K specimens per year, and provide additional sequencing and informatics support to National Nodes.

Benefits

Participants in iBOL Nodes can expect the following benefits:

1. Opportunity to collaborate on a global basis with leading scientists and institutions engaged in the largest biodiversity genomics initiative ever undertaken.
2. Access to iBOL Core Facilities, which will (a) provide training opportunities for researchers interested in gaining direct exposure to analytical approaches and (b) provide sequencing and informatics support to National Node participants, based on mutually agreed specimen and species targets.
3. Representation on iBOL's Scientific Steering Committee, which assists and advises in setting the goals and deliverables of the iBOL Project.
4. Opportunity to contribute to the development of DNA barcoding as a global standard for species identification, and the use of DNA barcode data for the benefit of science and society.
5. Use of iBOL Communications and Outreach resources in knowledge mobilization, capacity building and fund development efforts.

Appendix II

iBOL Node Profile Template

international BARCODE OF LIFE

iBOL Node Profile

COUNTRY

1: CONTACT INFORMATION FOR THE iBOL NODE

iBOL Node Name	*Web Address*	*iBOL Node Status (Central, Regional, National, Other)*

NODE REPRESENTATIVES

NAME	INSTITUTION	E-MAIL
Primary		
Alternate		

2: VISION OF THE iBOL NODE

3: MISSION OF THE iBOL NODE

4: GOALS OF THE iBOL NODE

5: ACTIVITIES REQUIRED FOR THE iBOL NODE TO ACHIEVE ITS GOALS

Theme	*Working Group*	*Node Activities / Priorities*

6: ORGANIZATION OF THE iBOL NODE

Participants and organizations providing resources and direction to the iBOL node.
Roles may include membership of the node steering committee or equivalent.

NAME	INSTITUTION	E-MAIL	EXPERTISE / POSITION

7: FUNDING PLAN FOR THE iBOL NODE

Funding Source	*Receiving Institution / Principal Investigator*	*Purpose*	*TOTAL Funding Amount*	*Timeframe (From – To)*	*Confirmed or anticipated?*

8: CORE FACILITIES PLAN FOR THE iBOL NODE

Institution	*Provide (i) Description of facilities available, and (ii) planned specimen capacity (2010-2015)*				
	Specimen collection	*Sequencing*	*Informatics / Database*	*Curation*	*Other*

9: LIST OF KNOWN BARCODING PROJECTS AND ASSOCIATED RESEARCHERS IN COUNTRY / REGION

No.	Institution / PI	Taxa	Purpose	Funding	Management

Appendix III

iBOL Data and Resource Sharing Policies

(Adopted by resolution of the iBOL Board of Directors, June 25, 2009)

Introduction

The International Barcode of Life Project will assemble a reference library composed of short, standardized gene sequence profiles (DNA barcodes) to enable the molecular identification of known species and facilitate the discovery of new ones. The Ft. Lauderdale Conference[1] on sharing data from large-scale biological research projects defined a community resource project as "a research project specifically devised and implemented to create a set of data, reagents or other material whose primary utility will be as a resource for the broad scientific community." Members of the International Barcode of Life Project (iBOL) are constructing such a community resource and in accordance with the guidelines established at Ft.Lauderdale, iBOL is committed to rapid data release and sharing. This position is typical of most large-scale collaborations in genetics (e.g. the International HapMap Project) and mirrors the data release policies of organizations such as the National Human Genome Research Institute, Genome Canada, the Gordon and Betty Moore Foundation in the USA, and The Wellcome Trust in the UK.

The iBOL data release and resource sharing policy (as outlined below) seeks to accelerate the timely development of products that will benefit humankind by providing rapid access to the primary outputs from iBOL: raw DNA sequences associated with taxonomic assignments. This goal mirrors recommendations for minimum data release associated with large-scale genomics projects (Field *et al.* 2008)[2]. Publication of more detailed sequence annotations and analyses (e.g., involving multiple sequence alignments, with expert species-level identifications attributed to each sequence) remains an equally important vehicle for data release and iBOL members are expected to publish these findings in a timely manner. Participation within iBOL requires commitment and adherence to the following polices and guidelines:

Types of Data Generated by iBOL

iBOL will generate various types of data, some of which will be similar or identical to other genomics or molecular biology projects and some of which will be unique. The primary goal of iBOL is the construction of a DNA barcode reference sequence library representing 500K species derived from 5M specimens. Each sequence entry will relate

[1]The definition of "community resource project" was developed at a meeting held on January 14-15, 2003 in Fort Lauderdale, Florida. The report on the conclusions of the meeting, "Sharing Data from Large-scale Biological Research Projects: A System of Tripartite Responsibility", can be found at http://www.genome.gov/Pages/Research/WellcomeReport0303.pdf

[2]Field D, Garrity G, Gray T, Morrison N, Selengut J, Sterk P, Tatusova T, Thomson N, Allen MJ, Angiuoli SV, Ashburner M, Axelrod N, Baldauf S, Ballard S, Boore J, Cochrane G, Cole J, Dawyndt P, De Vos P, dePamphilis C, Edwards R, Faruque N, Feldman R, Gilbert J, Gilna P, Glöckner FO, Goldstein P, Guralnick R, Haft D, Hancock D, Hermjakob H, Hertz-Fowler C, Hugenholtz P, Joint I, Kagan L, Kane M, Kennedy J, Kowalchuk G, Kottmann R, Kolker E, Kravitz S, Kyrpides N, Leebens-Mack J, Lewis SE, Li K, Lister AL, Lord P, Maltsev N, Markowitz V, Martiny J, Methe B, Mizrachi I, Moxon R, Nelson K, Parkhill J, Proctor L, White O, Sanson S-A, Spiers A, Stevens R, Swift, P, Taylor C, Tateno Y, Tett A, Turner S, Ussery D, Vaughan B, Ward N, Whetzel T, San Gil I, Wilson G, Wipat A. The minimum information about a genome sequence (MIGS) specification. 2008. Nature Biotechnology 26, 541 - 547)

to a documented specimen-collecting event (e.g., date, place, method and agent of specimen collection) that includes a physical voucher specimen held in a reference collection. A voucher specimen, digital image of that specimen and precise geospatial coordinates of the collection locality should accompany each sequence entry except in certain circumstances (e.g., when locality data could compromise the survival of an endangered species). The key annotation element of the barcode library is an authoritative specie level identification for each specimen that has been crosschecked against a list of validated taxonomic names.

It is recognized that such a complete data set requires a concerted and oftentimes-iterative taxonomic identification process. In many cases, this requires multiple expert opinions and involves timelines that extend far beyond those normally considered for genomic data release. To delay data release until such a taxonomic validation is complete will be inconsistent with the iBOL Data Release Policy. To demonstrate project progress and foster collaboration, iBOL members will rapidly release raw sequence data (electropherogram trace files) and provisional (e.g., high level) taxonomic information, as described below. This will facilitate input from the larger research community - recognizing the need for further refinement of taxonomic annotations and ongoing curation of the sequence database after preliminary release. The primary objective of iBOL is to generate a comprehensive DNA Barcode database that is accessible and relevant to the needs of both the public and the research community. For iBOL to succeed, it is critical that every effort is made to complete the taxonomic annotation and validation process to whatever endpoint is possible, and that complete data are released as soon as is feasible. The following is a description of the data types involved and the pipeline for generating said data.

1) **Specimen submission data**

   Once a specimen is collected and submitted for analysis, it will be assigned a unique BOLD Process Identification Number and Sample Identification Number. There will also be biological and geographical data associated with the sample or specimen. The following are the minimum requirements for the initial data release:

   - Country/Ocean where the specimen was collected
   - Date of collection

   Other data may also be submitted with the sample or specimen, but these are not mandatory for the initial data release. They may include:

   - A digital image of the specimen (although this is not mandatory, it is highly recommended that an image be included at some point in the data processing pipeline)
   - GPS coordinates of collection site (although this is not mandatory it is highly recommended[3] that GPS data be included, except under exceptional circumstances)

2) **Taxon Name/Identifier**

   A provisional taxonomic assignment or identification is usually made upon sample submission and is required for early data release. This may be at the family level or may be a descriptive name (e.g., “environmental sample”), and is not intended to be a

[3] http://www.nature.com/nature/journal/v453/n7191/pdf/453002a.pdf

final identification. An accurate identification of genus and species is the goal, but this may not be achieved for some time, and data release must not be dependent on annotation of the sequence with a definitive taxonomic identification.

3) **Genetic Data**
   - Gene region sequenced
   - PCR primer sequence and conditions
   - Electropherogram "trace" files utilized in the:
   - Sequence "contig" assembly (DNA barcode)
   - BOLD Barcode Index Number (BIN)

Quality Control/Quality Assurance of Genetic Data

Data must satisfy rigorous Quality Assessment/Quality Control (QA/QC) processes before release. Preliminary data as described above must pass the following QA/QC criteria:

i) Length of finished sequence must be >75% of BARCODE[4] approved marker length (e.g., 500 bp for COI), with an expectation of 2X coverage

ii) Sequence quality must be reasonable (i.e., <1% ambiguous bases in final trimmed contig assembly, with an expectation of average Phred score > 20)

iii) Sequence must not match common contaminants (e.g., human)

iv) Assessment of high-level taxonomic consistency (i.e., the DNA barcode should cluster with related taxa)

Parts i – iii could be automated processes; part iv is critical and may require human intervention

Barcode of Life Data System (BOLD)

Regardless of whether specimen processing and DNA barcoding is completed at the DNA barcoding facility within the Biodiversity Institute of Ontario, or at DNA sequencing facilities in other iBOL member institutions, the iBOL research community will use BOLD and/or, when established, BOLD International Mirror sites as the primary vehicles for assembling and releasing barcode data.

Timeframe for Data Release to Public Databases (GenBank)

Data submitted to iBOL affiliated projects in BOLD will be transferred to GenBank prior to user initiated publication. Data release will follow a two phase process to be performed on a weekly basis.

Phase I will involve the release of all generated sequence data and high level taxonomic information. This early release is intended to liberate enough information to be useful to other researchers and to monitor progress in the growth of barcode records for each iBOL Working Group. It will be performed automatically and involve data that can be released following computerized quality checks and generation of Barcode Index Numbers (BINs). In detail, the following data will be released in Phase I (within one week of the sequence generation):

- Location information: All available information
- Temporal information: date of sample collection
- Taxonomic information: order-level assignment with BIN

[4]CBOL/INSDC approved BARCODE marker (e.g. 5' COI for animals)

- Sequence information: automatically assembly sequence, trace files, primers used, and the centre that carried out sequencing
- Database identifiers: BOLD process ID and specimen identifiers (voucher number, depository, and collection code)

Phase II will involve the release of additional data elements that require manual curatorial efforts and detailed taxonomic enquiry. Phase II will ordinarily occur when manuscripts are submitted for publication. However, some researchers have indicated their intent to support rapid release of all data elements even if the early versions of the release involve substantial errors in taxonomic assignment. However, these will be corrected through an ongoing update process. The following data will be transferred from BOLD to GenBank before or at the point of manuscript submission or publication:

- Location information: GPS coordinates, elevation/depth, province/state, exact site of collection, and individuals credited for collecting the specimen
- Taxonomic information: species-level assignment (and subspecies, if appropriate) and individual credited for the identification
- Sequence information: manually assembled and curated barcode sequence

Resource Types

Just as there are several types of data generated by the iBOL project, there are several resource types that will be shared publicly by the iBOL team.
These include:

1) **Biomaterials** These could include specimens or tissue samples. Members of the iBOL consortium are committed to the regulatory framework established under the Convention on Biological Diversity. Any transfer of resources between iBOL members will respect all restrictions in relation to biomaterial transfer and is governed by a Materials Transfer Agreement (MTA) or similar agreement which should be signed before transfer takes place. MTAs must include descriptions of terms of access and use by other researchers, storage, and curation. Some countries or institutions may choose to restrict the access and use of their biomaterials, and those terms must be clearly described in the MTA or other such agreements.

2) **The Barcode of Life Data System (BOLD).** DNA barcode records in BOLD are a community resource that will be shared publicly. No charges will be made to users of the publicly available data. The only requirement for using data from BOLD is the need to give proper accreditation to iBOL researchers who generated the data and to BOLD. iBOL strongly encourages use of public data within BOLD for development of applications that will result in technology development, improvements to public health and environmental health monitoring, or any other innovations.

3) Informatics Tools. The informatics tools used in BOLD and other aspects of the iBOL project are considered community resources within iBOL. For example, the Laboratory Information Management system used by the Barcoding facility at the Biodiversity Institute of Ontario is a part of BOLD and can be accessed and shared with all members of iBOL and the greater research community.

Accreditation of Released Data

The members of iBOL recognize that it is very important for all researchers, whether they are academic, government, or industry, graduate students, post-doctoral fellows, or professors, to be acknowledged for the data that has been generated and made available to the wider scientific community. This is important for several reasons, including the fact that publications and citations are globally recognized as performance measures for projects and for researchers. It is also important because researchers or others who wish to make use of those publicly released data benefit from knowing who generated those data, so that they may explore further partnership or collaboration opportunities, or seek further information, or they may have other data that would benefit the original researcher. Thus, it is important that the data that are released as described above, contain information about the submitter, and that the appropriate text are included with those releases to encourage citations and acknowledgments. Users of the data should acknowledge the source.

There are other mechanisms whereby researchers may receive appropriate accreditation for early data release. Two such avenues that are strongly encouraged by iBOL members are: Project Description and Data Release Publications. These serve a multitude of purposes by (a) providing information for accreditation of data submitters, so that those researchers may be cited, (b) provide the iBOL team and the greater research and public community with opportunities to provide input and fresh data that can be used to refine and improve upon preliminary data, and (c) provide opportunities for information exchange that can lead to new partnerships and new funding being leveraged.

Project Description Publications are just that: predictive descriptions of large projects undertaken by teams such as iBOL. They may contain little or no data, or preliminary data, but contain a description of the project, its objectives, the team, methodologies that will be used, timelines and deliverables, and mechanisms and timing of data release. Examples exist for other Community Resource Projects, for example see:

- The International HapMap Project.http://www.hapmap.org/ Nature. 2003 Dec 18; 426(6968):789-96.
- The ENCODE (ENCyclopedia Of DNA Elements) Project. Science. 2004 Oct 22; 306(5696):636-40.

Data Release Publications are peer-reviewed publications that describe preliminary datasets within a project. It is recognized and stated within the publication that these are preliminary data that will be refined and further analyzed at later stages in the project, e.g., Hubert *et al*., 2008[5]. Although the data and taxonomic identifications in that paper are relatively complete; additional validation derived from ongoing research in this group will provide much value to the scientific community and to the public data resource.

[5]Hubert N, Hanner R, Holm E, Mandrak NE, Taylor E, Burridge M, Watkinson D, Dumont P, Curry A, Bentzen P, Zhang J, April J, Bernatchez L. 2008. Identifying Canadian Freshwater Fishes through DNA Barcodes. PLoS One 3(6): e2490

Proprietary Data

iBOL members consider all barcode data within BOLD a community resource to be shared publicly according to the terms and conditions outlined in this policy. There is no Intellectual Property associated with these data.

Privacy/Ethical/Sensitivity Concerns

1) Generally, there are few privacy concerns associated with DNA barcode data. However, some restrictions may apply, for example, in the case of data associated with samples within the Human Pathogen Working Group. Any iBOL researcher who engages in collection of samples from human subjects is expected to comply with national and institutional ethical requirements, and all proper documentation must be submitted before start of specific sub-projects. Consistent with applicable Privacy legislation or other policies, any data associated with such projects must be sufficiently anonymized such that no personal identification can be made.

2) As samples are collected to develop the iBOL DNA Barcode Library, some of these samples will be taken from ecologically fragile and sensitive areas. Some countries may have concerns about releasing information that may publicly identify those ecologically sensitive sites. For example, access to GPS data of orchid species within tropical forests could increase the risk to those species. If such a concern is raised, iBOL researchers will commit to holding such sensitive data confidential, or providing other means of anonymizing the data; GPS data are not mandatory.

3) Several members of the iBOL team are researchers within government departments, and they are mandated to monitor for invasive or harmful species within their country or region. Such departments and organizations have proscribed protocols for public release of information about invasive or otherwise harmful species. There may be concerns that early release of DNA barcode data, as described above, of an invasive species, may contravene government protocols. It is incumbent upon an iBOL researcher, whose first concern is with such protocols, to include an assessment of identification of invasive species in the QA/QC protocol, as described above. If preliminary data identify an invasive or harmful species, then those data must not be released until the restrictions or requirements of the specific government or department are satisfied. The Board of Directors of iBOL will be informed when such situations arise that limit the release of data.

Governance

All members of iBOL will adhere to this Policy. Any requests for extensions of timelines, advice on interpretation, other questions, will be directed to the iBOL Board of Directors.

Follow up actions to coordinate efforts of iBOL Nodes

DRAFT FOR COMMENT

iBOL Node Follow up – GROUP 1 (for Nodes with well-established Steering Committees)

EXAMPLE: Norway (Regional Node)

To: Node Representatives

From: Secretariat

The leadership of the International Barcode of Life project (iBOL) looks forward with enthusiasm to approval of the Memorandum of Understanding that will make NorBOL an iBOL Regional Node. It's not too soon to begin planning the implementation of NorBOL's role in reaching iBOL's global goals. Regional Nodes in iBOL have set goals of adding 40,000 records to the global BARCODE reference records and as NorBOL's representatives, you've done an exemplary job of strategic planning.

Specifically, the Node Profile you submitted earlier this year identified two critical elements: (1) the iBOL Working Groups that align most closely with Norway's priorities, and (2) Norwegian institutions, projects and researchers that can provide voucher specimens for barcoding.

This letter proposes some operational steps that will help NorBOL contribute effectively to the barcode library, and gain the expected benefits from participation in iBOL. iBOL's leadership looks forward to discussing these steps with NorBOL.

1. The Canadian Centre for DNA Barcoding (CCDB), or other iBOL Core Facilities, will provide barcoding services for agreed numbers of voucher specimens received from iBOL nodes. CCDB estimates that it will support the sequencing of approximately 400,000 specimens this coming year. Earlier receipt of samples will reduce delays in the processing of NorBOL's samples and will increase the likelihood that NorBOL will receive the maximum benefit;
2. NorBOL will identify the institutions, projects and researchers that will provide 40,000 voucher specimens during the coming year, and the iBOL Working Groups to which they correspond. The specimens should be accompanied by the data elements required under the BARCODE data standard, and belong to species not yet represented in the Barcode of Life Data Systems (BOLD);
3. CCDB will generate trace files and sequences from the voucher specimens and will test them for reliability, quality, and compliance with the BARCODE data standard;
4. CCDB will provide support with upload of specimen data and sequence assembly. The finished data record will be released to GenBank in compliance with iBOL's data release policy; and
5. NorBOL participants will collaborate with CCDB in the validation of the data records in BOLD, including any re-examination of voucher specimens to confirm taxonomic identifications.

We invite your comments on these operational steps and on establishing a schedule for NorBOL's involvement in iBOL. iBOL will be working with many nodes that require barcoding services. For this reason it is important for NorBOL participants to submit samples early in the year to ensure their processing before CCDB's capacity to support iBOL is expended.

Thank you again for your enthusiastic response to iBOL and for the leadership and vision you've shown.

From: Kevin Hall [mailto: k.hall@exec.uoguelph.ca]
Sent: Monday, August 08, 2011 3:38 PM
To: Mike Emes; Paul Hebert
Cc: Alastair Summerlee; Rich Moccia; John Miles

Subject: Creation of a Management Board for the Biodiversity Institute of Ontario

Dear Mike and Paul

Further to our discussion over the previous few months, I will be forming a management board to oversee the operations and management of the Biodiversity Institute of Ontario (BIO). The management board is currently being populated and I will announce the membership of the board once the full board has been secured. The board will contain representation from the university, federal and provincial governments and industry. Board members will be selected to ensure that the board has the required skills necessary to meet the mandate of the board. At this time, several of th functions of the board are articulated below; however, it is important to recognize that we will allow the inaugural management board will meet to further refine the function of the board.

Management Board proposed terms of reference 1. Purpose 1.1. Management Board provides high level oversight and support for the CEO and Scientific Director of BIO. It will assist with the development of strategy, monitors progress against strategy, and provides assurance to the University of Guelph that BIO is managed properly.

2. Responsibilities

2.1. Management Board is responsible for:

- Assisting with developing BIO strategy, identifying where the organization should be in three to 10 years time and articulating the broad approach needed to reach this position.
- Monitoring progress in implementing strategy, challenging performance and providing leadership where conflicts occur.
- Providing corporate governance and assurance for the BIO.

2.2. As such the Board:

- Reviews and agrees to the BIO corporate and business plans, budgets and significant strategies.
- Approves the annual budget.
- Agrees to expenditure which totals (or is expected to total) $ XXX or above or which is novel or contentious.
- Provides assurance to the University that the BIO is managed properly by inputting into and monitoring the BIO's planning, budgeting and performance processes, corporate governance, audit; and risk management system.
- Has a role in identifying corporate risks.

In meeting its responsibilities Management Board will approach its work in a way which reflects and champions the BIO's values.

I will try to convene a meeting of the Management Board in September 2011. Please don't hesitate to contact me should you require additional information or clarification of the above. In addition, please feel free to share this information with any project partners of the BIO.

kind regards

Kevin

****

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Tel: 519-824-4120 ext.53081
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Memorandum

From:
Peter Freeman, Executive Director, iBOL
David Schindel, Executive Secretary, CBOL

To:
Jesse Ausubel, Chair, iBOL Board of Directors
Scott Miller, Chair, CBOL Executive Committee

Re: iBOL-CBOL Collaboration

Discussions and collaborative planning between iBOL and CBOL have jumped to a higher energy orbit since completion of the Genome Canada Interim Review of the iBOL Project. We are writing to describe this progress briefly and to propose a next step toward better integration of our operations.

There are several areas of closest collaboration in which we have established what is essentially a joint iBOL/CBOL Secretariat. Some areas focus on iBOL goals such as:

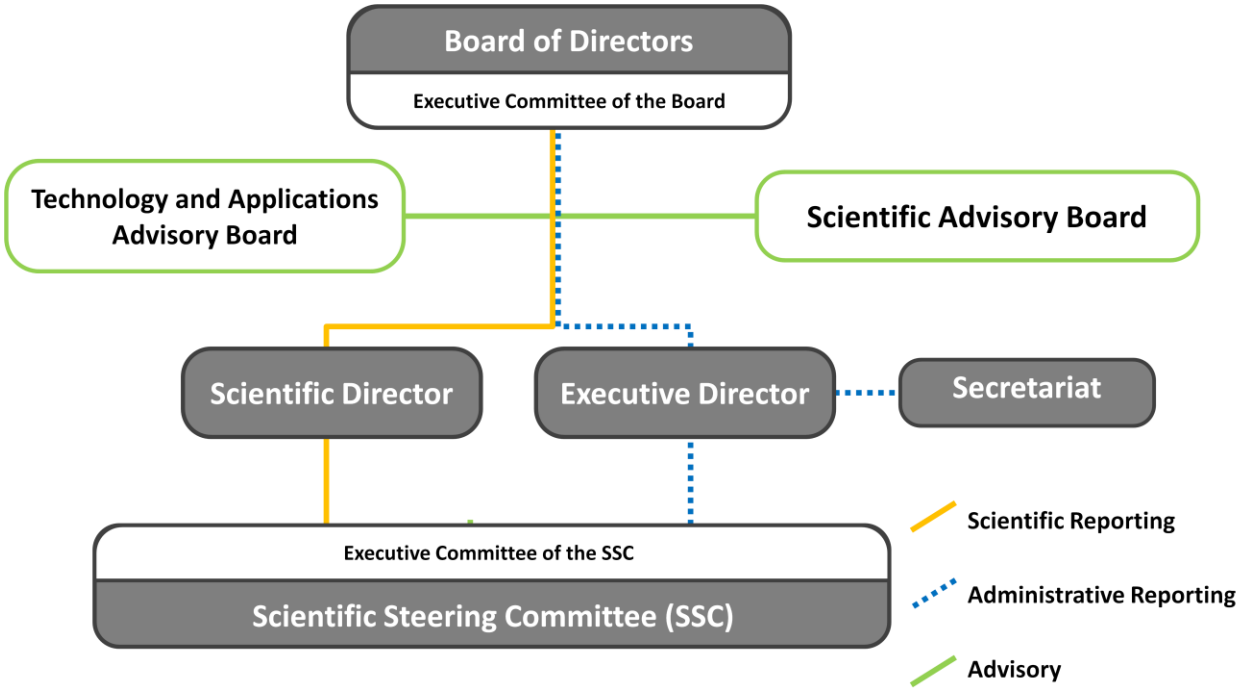
- Increasing participation by iBOL Nodes and facilitating their barcoding operations;
- Accelerating the submission of samples and data to meet Working Group goals, especially the quantitative iBOL targets set for library construction;
- Planning and implementing the most efficient interactions between iBOL Working Groups and Nodes;
- Maximizing the impact of iBOL's SSC by making their meetings more interesting to participants, and by establishing more effective two-way communication; and
- Integrating iBOL participants into CBOL activities such as the Adelaide Conference, Leading Lab training opportunities, and the Connect social network.

Other areas of cooperation have their roots in CBOL's mission, such as:

- Implementing the BARCODE data standard;
- Building data interoperability with other biodiversity informatics initiatives (e.g., GBIF, EOL);
- Raising the visibility and acceptance of barcoding among international organizations (e.g., CBD, CITES), government agencies (e.g., USDA, EPA, FDA) and other potential users;
- Expanding participation through Leading Lab Network training activities; and
- In general, providing a operational test-bed for international collaboration, data sharing, and real-world applications of barcoding.

iBOL and CBOL now hold regular conference calls and net meetings, and David recently spent two days in Guelph following the SSC Executive meeting. We think our communications are open, constant, and of great mutual benefit.

In light of this high level of cooperation at Secretariat level, it may make sense to create reciprocal channels of communication between the leaderships of the two initiatives. Specifically, we suggest that CBOL's Executive Secretary participate in a non-voting *ex officio* capacity in iBOL's Board of Directors meetings, while iBOL'sExecutive Director attends CBOL Executive Committee meetings in a similar capacity.


Board of Directors
Executive Committee of the Board
Technology and Applications Advisory Board
Scientific Advisory Board
Scientific Director
Executive Director
Secretariat
Executive Committee of the SSC
Scientific Steering Committee (SSC)
Scientific Reporting
Administrative Reporting
Advisory

Board of Directors Membership

Name	Institution	Country	Term of appointment expires
Jesse Ausubel (Chair)*	The Rockefeller University	USA	2013
Christian Burks *	Former President and CEO, Ontario Genomics Institute	CANADA	2012
Paul Hebert (Scientific Director)*	Biodiversity Institute of Ontario, University of Guelph	CANADA	2012
Ivar Myklebust	Norwegian Biodiversity Information Centre	NORWAY	2012
Faustino Siñeriz	National Council of Scientific and Technical Research	ARGENTINA	2013
Rocky Skeef	National Research Foundation	SOUTH AFRICA	2012
Karl Tibelius*	Genome Canada	CANADA	2012
Xian-En Zhang	Ministry of Science and Technology	CHINA	2013
Suzanne Fortier *(ex officio)* Advisor to the Board of Directors	Natural Sciences and Engineering Research Council of Canada (NSERC)	CANADA	2012
Jean Brunet *(ex officio)* Legal Counsel and Secretary to the Corporation	Stein Monast LLP	CANADA	N/A

Note: * Board of Directors' Executive Committee Member

Mark Poznansky, PhD

Mark J. Poznansky has been the President and CEO of OGI since 2010.

His role at OGI draws on his substantive experience in the life sciences and in running institutes and businesses, as well as his knowledge of government affairs and business development.

Previously he ran his own consultancy group offering a range of services including program reviews, strategic planning, change management and leadership training to clients in government, hospitals, universities and the private sector. Before that, he was President and Scientific Director of Robarts Research Institute (London, Ontario), where during his tenure, from 1993 to 2007, the institute increased its staff from 100 to over 600, increased its annual research funding from $10 million to over $40 million, and developed a reputation for business development spinning out seven different companies, including Viron Therapeutics, where Dr. Poznansky served as President and CEO. He also served on the Merck USA Scientific Advisory Leadership Team for three years. Prior to that, he was Associate Dean of Medicine for Research at the University of Alberta. He has held faculty positions at University of Western Ontario, University of Alberta and was a lecturer at Harvard University.

Dr. Poznansky has published over 50 research papers. He serves as Chair of Let's Talk Science, until recently served as Chief Science Advisor to the CEO of the Thunder Bay Regional Research Institute and is a board member of the Innovation Institute of Ontario. He was a founding member and past chair of the Council for Health Research in Canada, and also chaired the Scientific Advisory Boards of the Canadian Medical Discoveries Fund and MDS Capital Corp. He has also served as a member of numerous science-related committees including the Science Advisory Committee of the Heart and Stroke Foundation of Canada and the Medical Research Council of Canada Grants panel. Dr. Poznansky was made a member of the Order of Ontario in 2004 and the Order of Canada in 2005.

Earning his bachelor's degree and PhD at McGill University, Dr. Poznansky completed postdoctoral training at Harvard Medical School.

iBOL Science Advisory Board

DRAFT Terms of Reference (August 2011)

Background

The Science Advisory Board (SAB) provides advice and guidance to the Board to help ensure that the Project achieves its stated scientific objectives and milestones.

Composition

1. The membership of the SAB must be independent from the Project team with no real or perceived conflicts. The SAB should include 4-6 members with sufficient expertise to cover the breadth of the research proposed.
2. The first Chair of the SAB should be appointed by the Board of Directors.
3. The SAB membership should be determined through a consultative process involving the SAB Chair designate and the Board of Directors.

Mandate

The mandate of the SAB is to provide advice and guidance to the Board to help ensure that the Project achieves its stated scientific objectives and milestones.

To accomplish its mandate the SAB should:

1. Assess whether iBOL is making significant contributions to basic science
2. Provide strategic advice to the Board on approaches and directions to aid the Project in achieving its long-term scientific objectives. This includes providing advice on major relevant opportunities and trends in science and technology as well as scientific and GE^3LS challenges facing the Project team.
3. Provide advice to the Board on proposed scientific and GE^3LS changes to the Project. The Project team must consult the SAB prior to submitting major changes in the research plan to the Board of Directors.
4. Identify and report to the Board issues of scientific practice, conduct, and responsibility related to communication, data management, and GE^3LS, that arise from the Project, where appropriate.

Administration and Organization

Timing

1. The SAB should meet with the Project team twice a year with at least one of these being a face-to-face meeting. The first face-to-face SAB meeting should be held within six months of project initiation (i.e. February 1, 2010). Efforts should be made to ensure that most SAB members can attend in person. The initial meeting should serve to familiarize the SAB members with the Project's approved goals and milestones.

2. The SAB should meet in person with leaders of the Project team well in advance of any key funding reviews so there is sufficient time for iBOL researchers to implement any recommendations.

Responsibilities of Chair

1. The Chair of the SAB is responsible for:
   a. Working with the Project team to develop an agenda for each SAB meeting;
   b. Chairing the meeting;
   c. Working with other members of the SAB to prepare a brief written report of the meeting, which includes specific recommendations to the Board and action items arising from the meeting;
   d. Reporting to the iBOL Board of Directors.

Documents and Record Keeping

1. The SAB should receive copies of documentation related to the Project including:
   a. 2 weeks prior to the first SAB meeting: the final approved project description and approved budget and milestones; copies of peer-reviews;
   b. 2 weeks prior to each SAB meeting: a scientific report that includes: an account of the progress in achieving the Project's objectives and milestones; a description of major proposed changes to the scientific priorities of the Project;
2. Access to publications arising from the Project;
3. Prior to key funding reviews: the documentation submitted for review;
4. Following key funding reviews: the reviews of the Project from the review committee.

Reports

The written report of each SAB meeting should be sent to the Board within 4 weeks of each meeting. Copies of the report (including the Project team's presentations to the SAB) and the resulting actions taken by the Project team must be provided to the Board of Directors.

Terms of Appointment and Addition of New Members

1. Members of the SAB will be appointed for the term of the Project (January 2010-December 2015).

2. Changes in SAB membership may occur throughout the term of the project. Any changes in the SAB membership must be approved by the Board of Directors.

Remuneration

Members and the Chair receive an honorarium for the work they do on behalf of the SAB. In addition, all reasonable expenses related to their attendance at meetings will be reimbursed.

Science Advisory Board Membership

Name	Institution	Country
Stephen J. O'Brien (Chair)	Director, Laboratory of Genomic Diversity, National Cancer Institute	USA
Gary Borisy	Marine Biological Laboratory	USA
William Gelbart	Harvard University	USA
David Haussler	University of California, Santa Cruz	USA
Paul Thompson	Michigan State University	USA

Proposed Science Advisory Board members – August 22, 2011

Warren E. Johnson

Oliver Ryder

Oliver Ryder, PhD

Oliver A. Ryder, Ph.D., Director of the Genetics Division of the San Diego Zoo Institute for Conservation Research, received a B.A. in biology from U.C. Riverside and his graduate degree from U.C. San Diego. He joined the conservation science research effort at the San Diego Zoo as a Postdoctoral Fellow, advanced, and, in 1986 was named Kleberg Chair. He is also an Adjunct Professor of Biology, in the Department of Evolution, Behavior and Ecology, in the Division of Biology, at the University of California, San Diego. Involved in initiating population management efforts in zoos, he served as Species Coordinator for the Przewalski's horse and on committees involved in establishing guidelines for small population management. He has contributed broadly and substantively to the development of conservation genetics and the application of emerging technologies for characterizing and conserving biodiversity. He leads San Diego Zoo Global's Frozen Zoo® initiative to bank samples for ongoing and future genetic studies in support of world-wide conservation efforts. The collections of the Frozen Zoo® include frozen tissues, DNA extracts, cryobanked gametes and fibroblasts from over 9,000 individuals comprising in excess of 1,000 species of vertebrates. Ryder is one of the organizers of the Genome10K project, an initiative to produce high-quality whole genome sequences from 10,000 species of vertebrates. He has served as President of the American Genetic Association, been named a Fellow of the American Association for the Advancement of Science, and has published more than 280 scientific and popular articles. Current research interests include application of genomics technologies to gain insights into the biology and natural history of threatened and endangered species to assist in population assessments, management and recovery.

Warren E. Johnson, Ph.D.

Warren Johnson earned his Ph.D. in Animal Ecology from Iowa State University in 1992 after receiving an M.S. in Wildlife Ecology from Utah State University in 1984 and a B.A. in Biology from Oberlin College in 1983. He has been with the Laboratory of Genomic Diversity since 1992, first as a visiting scientist from the National Zoological Park, Smithsonian Institution. Warren has traveled extensively around the world studying wildlife species and collecting samples for studies on infectious disease, mammalian evolution, comparative genomics, and genetic mapping in model organisms.

iBOL Technology and Applications Advisory Board
Terms of Reference

Background

The Technology Development Advisory Board (TAAB) provides advice and guidance to the iBOL Board of Directors, setting high aspirations and spurring iBOL to innovations in technology and applications

Composition

1. The membership of the TAAB must be independent from the Project team with no real or perceived conflicts. The TAAB should include 4-6 members with sufficient expertise to cover the breadth of the technologies and applications envisaged in iBOL's work plan.

2. The first Chair of the TAAB should be appointed by the Board of Directors.

3. The TAAB membership should be determined through a consultative process involving the TAAB Chair designate and the Board of Directors

Mandate

1. The mandate of the TAAB is to provide guidance to the iBOL Board of Directors setting high aspirations and spurring iBOL to innovations in technology and applications

2. To accomplish its mandate the TAAB should:

3. Identify existing and emerging technologies that can be used to enable diffusion and use of DNA barcoding for the benefit of science and society

4. Recommend strategies to operationalize applications of DNA barcoding in relevant regulatory and policy environments

5. Identify opportunities to exploit iBOL's scientific achievements through commercial applications

6. Identify issues related to GE3LS*, that arise from the Project, where appropriate

*genomics and its related ethical, economic, environmental, legal and social aspects

Administration and Organization

Timing

The TAAB should meet with the Project team twice a year with at least one of these being a face-to-face meeting.

Efforts should be made to ensure that the majority of the TAAB members can attend in person. The initial meeting will serve to familiarize the TAAB members with ongoing technology and applications development efforts within iBOL.

Responsibilities of the Chair

The Chair of the TAAB is responsible for:

1. Working with the iBOL Secretariat to develop an agenda for each TAAB meeting;
2. Chairing the meeting;
3. Working with the other members of the TAAB to prepare a brief written report arising from meeting, which includes specific recommendations and action items arising from the meeting; and
4. Reporting to the iBOL Board of Directors

Documents and Record Keeping

1. The TAAB should receive copies of documentation related to the Project, including:
    a. 2 weeks prior to each TAAB meeting: a scientific report that includes an account of the progress in achieving the Project's objectives and milestones, and a description of major proposed changes to the scientific priorities of the Project
    b. Prior to key funding reviews; the documentation submitted for review
    c. Following key funding reviews: the reviews of the Project from the review committee
    d. Access to publications arising from the Project

Reports

The written report of each TAAB meeting should be sent to the iBOL Secretariat within 4 weeks of each meeting. Copies of the report will be provided to the iBOL Board of Directors.

Terms of Appointment and Addition of New Members

1. Members of the TAAB will be appointed for the term of the iBOL project.

2. Changes to the TAAB membership may occur throughout the term of the project. Any changes to the TAAB membership must be approved by the iBOL Board of Directors.

Remuneration

Members and Chair receive an honorarium for the work they do on behalf of the TAAB. In addition, all expenses related to their attendance at meetings will be reimbursed.

Technology and Applications Advisory Board Membership

Name	Institution	Country
John McPherson (Chair)	Ontario Institute for Cancer Research	Canada
Matthew Bainbridge	Baylor College of Medicine, Texas	USA
Jay Shendure	University of Washington	USA
Barton Slatko	New England Biolabs	USA
Baoli Zhu	Chinese Academy of Sciences	China

Note: All TAAB members are appointed for the life of the Project

Scientific Steering Committee
Terms of Reference
(DRAFT, August 2011)

Composition

The Scientific Steering Committee (SSC) will include approximately 50 individuals, who will represent two constituencies: each iBOL Node (nation) will have a representative on the SSC and so too will each of iBOL Working Group. The Lead of each Working Group will be a member of the SSC with the Co-Lead serving as a designate. The Chair of the GE3LS committee will also be a member of the SSC.

Mandate

The mandate of the SSC is to assist and advise the Scientific Director on the overall research plans and deliverables of the iBOL Project. This is the principal mechanism for making critical decisions about the research direction and practical management of the iBOL project.

Administration and Organization

Timing

The SSC will meet once each year, with supplemental meetings arranged at the call of the Scientific Director.

Responsibilities of the Chair

The Chair of the SSC Executive will be elected by its members. His/her responsibilities will be to:

1. Chair the annual meeting;
2. Determine the need for supplemental meetings and call for their arrangement; and
3. Prepare an agenda for each meeting

Documents and Record Keeping

Prior to each SSC meeting, the Chair will provide a scientific report that includes an account of the progress in achieving the objectives and milestones of the project.

Following each SSC meeting, the Chair will make a report to the iBOL Board of Directors.

Remuneration

No remuneration is provided to members of the SSC.

iBOL SSC Executive

Terms of Reference

(DRAFT, August 2011)

Composition

The Scientific Steering Committee Executive (SSCE) shall be comprised of up to 10 (10) SSC members, and shall include six (6) "Theme Leaders" each assigned to one of the six themes of the iBOL Project (DNA Barcode Library, Methods, Informatics, Applications, Administration and GE^{3}LS). Members shall serve on the SSC Executive for a one year term, renewable at the next SSC meeting following their appointment.

Mandate

The objective of the SSC Executive shall be to exercise the mandate of the Scientific Steering Committee (SSC) between full meetings of the SSC. The mandate of the SSC (and therefore of the SSC Executive) is to assist and advise the Scientific Director on the overall research plans and deliverables of the iBOL Project. This is the principal mechanism for making critical decisions about the research direction and practical management of the iBOL project.

To accomplish its mandate the SSC Executive should:

- Be pro-active and vigorous in its decisions and recommendations in the overall interests of the project and the achievement of its goals.
- Reflect in its decisions and recommendations the input of the SAB and TAAB.
- Seek to reach its decisions and recommendations by consensus. If consensus cannot be reached, the decision shall be made by majority vote, at the discretion of the Chair.

Administration and Organization

Timing

The SSC Executive will meet at least quarterly, with supplemental meetings arranged at the call of the Chair. At least two meetings should be face-to-face meetings involving the SAB and/or the TAAB

Quorum

Quorum, in person or otherwise, is reached with an overall representation of 50% of the SSC Executive members.

Responsibilities of the Chair

The Chair of the SSC Executive will be elected by its members. His/her responsibilities will be to:

1. Chair meetings of the SSC Executive;
2. Determine the need for supplemental meetings and call for their arrangement;
3. Work with the Executive Director to develop agendas for the meetings;
4. Work with the Executive Director and other members of the SSC Executive to prepare written reports arising from the meetings

Documents and Record Keeping

Following each of its meetings the SSC Executive will communicate its decisions and recommendations to the Scientific Director

The SSC Executive Chair will submit reports twice yearly to the Board of Directors and annually to the Scientific Steering Committee.

Remuneration

No remuneration is provided to members of the SSC Executive. However, all expenses related to their attendance at meetings will be covered.

AGENDA 9.1

MANAGEMENT PLAN 2011-12

Background

Vision

DNA barcoding, the use of sequence diversity in standardized gene regions to identify species, is revolutionizing biodiversity science by shifting key practices, especially those linked to species identification and species discovery. It exerts this impact by ensuring the retention of voucher specimens so that taxonomic assignments can be validated, by adding geospatial information, and by preserving the trace files that underpin each sequence record. DNA barcoding is also gaining application in fields ranging from environmental monitoring to marketplace surveillance and forensics. The full realization of DNA barcoding's impacts and its extension into more domains of science and society is the grand challenge of the International Barcode of Life Project, captured in its vision of **Managing Biodiversity for the Benefit of Society**

Strategic Plan 2010 - 2015

The International Consortium Initiative (ICI) proposal submitted to Genome Canada in 2008 provided an overall five-year strategic plan (2010–2015). The core target of that plan, to build a reliable, accessible library of 5 million barcode sequences from 500,000 taxonomically diverse and high-priority species by December 2015, has become even more compelling during the past three years, as concerns about loss of biodiversity and other global changes have grown and the tools of genomics have strengthened. To meet the 2015 goals, iBOL now has begun to develop and implement more detailed *Annual Management Plans*, which respond to feedback from participants and funders, address new challenges and opportunities, and adjust resource allocations and activities accordingly.

Management Plan 2011-12

The draft management plan for 2011-12 is outlined below. This draft will be revised and finalized with further input from the Scientific Steering Committee Executive (SSCE), the Board and its advisory committees. Priorities identified in the ongoing enterprise risk management program (risk register) will be incorporated in the plan. Following prioritization, responsibilities, resources and timelines will be established for each set of actions.

9.1 Management Plan

VISION	**Managing Biodiversity for the Benefit of Society**		
MISSION	**To develop a rigorous DNA-based identification system for all eukaryotes, and to apply this new tool to better manage, discover and protect global biodiversity**		
GOALS	**A. ENGAGE & COORDINATE PARTICIPATING PARTNERS**	**B. BUILD A GLOBAL, ACCESSIBLE LIBRARY OF DNA BARCODES FOR EUKARYOTIC SPECIES**	**C. PROMOTE APPLICATIONS OF DNA BARCODE DATA FOR SCIENCE AND SOCIETY**
PRINCIPLES	Create awareness of the iBOL Project among the scientific community in general and taxonomists in particular	Harness the expertise and collections (e.g., of participating taxonomic institutions) to make a major contribution towards the sample supply chain for iBOL.	Make data publicly available
	Establish and manage a global network of specialists engaged in barcoding	Provide access to core facilities and technology platforms (i.e. rapid identification and discovery tools)	Insist on timely integration and release of barcode and taxonomic data
	Act as an information / education & training conduit to maximise the benefits of iBOL participation for these researchers, and in turn maximise their contributions towards the iBOL project.	Assure quality control standards of barcode data (best practice)	Infuse data & science into decision making processes
	Demonstrate exemplary ways and strategies for countries to make a major contribution to iBOL and the construction of global DNA Barcode libraries.	Provide leadership on standard-setting /adoption re. data acquisition/release	Promote equitable access to benefits of barcoding (incl. training aspects)
	Fund-raising: Assist in "selling in" applications for DNA barcoding programmes and projects, lobbying and informing decision-makers in funding agencies and ministries.		Educate the public and more professionals in modern techniques of biodiversity science.

	Strategies identified	Action Plans to Execute Strategies	Impact on Goals	Feasibility	Owner
1	**Getting Organized**				
1.1	**Operationalize the 'triangle' of Nodes, WGs and Barcoding facilities**	Identify 'who's who' in 3 constituencies			
		Establish clear roles/responsibilities/ reciprocal expectations for each constituency			
		Determine capacity/cost models for barcoding facilities			
		Do a triage of Nodes and WGs. Replace weak performers and folk who resigned. Set the leads some targets to flush out the weak links.			
		Use connect.barcodeof life to support WG involvement			
1.2	**Capture synergies between iBOL and CBOL**	Develop joint plans for stakeholder engagement (esp. nodes ,WGs)			
		Merge WGs 5.1 and 5.2 into 'Globally-distributed Secretariat"			
2	**Optimizing Supply Chain (Theme 1)**				
2.1	**Establish iBOL-directed supply chain with focus on major institutional collections**	Formalisation of the collections strategy.			
		» Produce a short document outlining the scope and practice			
		Shift from opportunistic to targeted model of specimen supply			
		» Use limited time offers, bids for available barcoding capacity, clear requirement for associated images/vouchers etc; people should work hard to get their samples into the pipeline.			
		» Competitive, cost effective			
		Direct approaches to institutions holding collections			
		» Note that deals with a small number of big players can make all the difference. Need to undertake careful scoping study to design the implementation of this.			
		» Draw up target list – institutions and contacts			
		» "scope" the project before launching			
		» Harness new funds, beyond current capacity of nodes			
		» Keep nodes 'in the loop' , but not 'calling the shots'			
		» Send in expert teams (this is another 'capacity' that needs to be identified and managed)			
2.2	**Move from 'non-barcode compliant' to 'barcode compliant' records**	Trace archives			
		Talk to main players – central node facilities EU, Canada, US, China			
		Data Release Policy: 'automatic data release' clause			
		Use Adelaide as big opportunity to push this issue			
		» Reminder			
		» Opening Plenary			
		» Data standard paper			
		» Clear rationale			
		» BIN Paper			
3	**Streamlining R&D (Themes 2,3,4,6)**				
3.1	**Rationalize R&D Themes 2 and 4**	Coalesce Theme 2 (WG 2.2 ,2.3, 2.4) and WG 4.1			
		» Adopt Leading Labs focus for coalesced theme			
		» Share information on CFI application (Canada)			
		» Ensure that Connect Information Resource and CCDB protocols pages are fully integrated. CBOL can help resource communication of protocols.			
3.2	**Optimize Theme 3 Informatics**	Examine possibilities of integrating Theme 3 WGs with DAWG and DbWG as international coalition			
4	**Engaging a Broader Community**				
4.1	Ask, and answer, the "why barcode" questions/ challenges at multiple audience and 'domain' levels. Provoke interest, enthusiasm, funding.....	Need to get high profile science building on DNA barcodes out into public domain. Don't just wait for post-hoc parasitism. Banbury useful for general comments, but there was a lack of follow through. Consider (a) invite key speaker to Adelaide to inspire (e.g. hanski), (b) SSC to brainstorm on questions, (c) nature paper to explore potential value of massive scale horizontal genomics, (d) follow up with workshop to build on foundation in a targeted fashion to drive forward a few key ideas. SECONDLY: Implement a large scale distributed experiment with the aim of (a) harnessing a broad community, (b) implementing a standardised sample strategy to produce a massive dataset to describe biodiversity. This could involve 50 malaise traps for one week around the globe. Consider urban versus rural paired comparison. Need to minimise local factors, but aim to include additional macro-scale covariates. Cities versus national parks pairs, standardising what city is, what national park is. Consult with spatial ecologist/macro ecologist. Obtain information on global biodiversity and also issues like turnover.			

Risk / Opportunity	Risk Category	iBOL Element	Risk	Likelihood	Consequence	Risk rating	Control measures	Notes
Risk	Core Capabilities	Governance	Management structure unable to keep pace with project growth	High	High	9	Institute Risk Register & improve MIS; carry out Enterprise Risk Management exercise; change roles and responsibilities of Board members and senior managers	All actions initiated
Risk	Financial	CCDB	Reduction in GC funding will curtail barcoding activity in Guelph	High	High	9	Move sequencing to other core facilities; raise additional funds for CCDB operations; raise funds to support iBOL Secretariat; distribute Secretariat activites	
Risk	Financial	Governance	Reduction in GC funding will undermine international project coordination capability.	High	High	9	Fundraising plan; negotiate with GC to separate iBOL's governance budget from U of Guelph's core facility budget.	
Risk	Compliance	Theme 5	iBOL's contributors (i.e., submitters to CCDB) don't realize the importance of their part of the Project and its timely delivery; Node and WG Leaders unaware of contributors and therefore not leveraging their efforts	High	High	9	Map contributors to nodes and WGs; Provide dashboards to track Node & WG efforts; use Adelaide meeting as deadline; spread narrative understanding of what is required for success by end of 2015	
Risk	Compliance	Theme 5	Many nodes exist "on paper" only, and are not responsive to/engaged in iBOL	High	High	9	Redesign MOU; set up regular conference calls & other mechanisms to build identiy & enthusiasm;	
Risk	Reputation & Image	Theme 5	Inability to respond to enquiries, and accept legal risks of public statements (e.g., re. food substitution or other commercially sensitive topics) limits the impact of iBOL in demonstrating uses/applications of barcoding	High	Medium	6	Establish Communications/response plan within bounds of legal risk (a matter for iBOL or its participating institutions?); do a practice exercise; develop tracks or alternatives for "risky" barcoding projects	
Risk	Delivery	Theme1	WG1.8 (Marine biosurveillance) behind schedule	High	Medium	6	Map contributors to nodes and WGs; Set Milestones; use Sept 2011 Aberdeen World Conference on Marine Biodiversity to convene, motivate contributors;	
Risk	Delivery	Theme 6	Delay in contract negotiation (Genome Canada / OGI / University of Guelph) delaying start of GE3LS effort	High	Medium	6	Frequent Reminders & follow up; adjust GE3LS program / timelines; spur additional GE3LS-like elements of iBOL	
Risk	Reputation & Image	Themes 1, 6	Lack of micro attribution of sample donors and provenance data providers in GenBank records undermines contributors' ability to report their iBOL effort to their funders. This may limit their incentive to contribute.	High	Medium	6	Initiate dialogue with sample providers and outline their attribution requirements; use existing biodiversity information portals as a model; adjust BOLD and GB microattribution accordingly	
Risk	Delivery	Theme 1	Vertebrate campaign (WG1.1) not getting enough traction due to lack of active involvement from curators of large genetic resources collections.	High	Medium	6	Develop strategies for stimulating contributions from large tissue repositories; extend outreach to smaller and more recent collections, particularly those in biodiversity rich nations	
Risk	Delivery	CCDB	Sourcing materials for the barcode reference library may become the bottleneck in the analytical chain due to lack of dedicated resources. Most funds for Theme 1 are diverted towards building analytical capacity while collection processing gets only leftovers.	High	Medium	6	Acknowledge the importance of front-end processing as a key element of specimen sourcing; allocate dedicated iBOL funding towards front-end processing.	
Risk	Delivery	CCDB	Campaign managers and front-end staff at core facilities will become 'overstretched' having to micromanage a growing number of projects that receive insufficient external attention.	High	Medium	6	Encourage decentralization of specimen sourcing and empower nodal leading labs to perform more managerial functions.	
Risk	Delivery	Theme 5	iBOL nodes and leading labs may fail to meet their iBOL commitments in specimen/data quality and volume due to insufficient staff training and suboptimal supply chain workflows.	High	Medium	6	Revise existing training programs (geared more towards workshops and training visits of national representatives to core facilities); invest more into site visits of core staff to help set up workflows and to provide site-specific training.	
Risk	Delivery	Theme 1	ABS policies of contributing countries may hinder access to specimens (e.g., Peru, Argentina, India)	Medium	Medium	4	Work even more closely with CBOL to gain access to existing collections and to build local capacity	
Risk	Reputation & Image	Theme 5	Lack of Partnership plan with other international biodiversity initiatives (GBIF, EOL, CBOL, CBD…) multiplies work for iBOL itself & requires iBOL to do tasks for which it is not well-suited, and makes iBOL unpopular	Medium	Medium	4	Conference calls / brainstorm to develop shared plans with partner organizations; give advance notice to key partners of important news or events; share credit and recognition; filter new research results yet more carefully for newsworthy results	MOU signed with GBIF in early 2011
Risk	Core capabilities	Theme 5	Some iBOL contributors may be reluctant to work under their node's governance model imposed above due to conflict between the goals of node administrations and the researchers doing the ground work (e.g., competition for funding).	Medium	Medium	4	Evaluate iBOL nodes for the probability of such conflicts. Develop nation-specific solutions to remedy the situation.	
Risk	Delivery	Theme 5	iBOL nodes and leading labs may fail to meet their iBOL commitments in specimen/data quality and volume due to insufficient resources.	Medium	Medium	4		
Risk	Reputation & Image	Theme 5	identity of iBOL is weak because project not acknowledged in most iBOL-related publications	High	Low	3	Frequent Reminders & follow up to authors of barcoding papers to mention papers are "contributions to the International Barcode of Life project"; re-analyze motives for shared branding & redesign outreach	
Risk	Core Capabilities	Governance	Lack of funding to bring entire SSC together annually	High	Low	3	1. Only bring Chairs, not co-Chairs; 2. Limit meeting to Nodes that are truly engaged and delivering; 3. Set reimbursement caps; 4. Use piggy-back strategy on other biodiversity mtgs	Caps already implemented in Sept 2010 - $1500 per participant

Risk	Compliance	CCDB	Project depends on voluntary actions by collaborators	0	Lack "sticks", therefore require more "carrots"; offer good collaborators access to limited capacity	
Risk	Reputation & Image	Theme 5	Matching barcoding capacity to specimen supply: High volume workflows require high volume collaborators, but we have mostly low-volume collaborators; But small collaborators are the future; can't shut them off. They are also often TAXONOMISTS, providing low-volume but HIGH QUALITY data	0	Recruit high volume collaborators (e.g. institutional collections); "aggregate" low volume colaborators via node and WG organization. Recruit more taxonomists. Intensify sharing of experiences to increase productivity of both high and low volume efforts.	
Risk	Delivery	CCDB	As barcoding gains usage in gov't and industry, accuracy gets more important	0	Respond to pressure for high accuracy, perform analyses that indicate importance of various sources of error	
Risk	Reputation & Image	CCDB	Assignment of specimens to WGs is confusing to collaborators (Are they biologically meaningful?). Some specimens fit more than one WG;	0	Revise 'a priori' specimen assignments to reflect biological meaning and allow multiple WG designations; report to collaborators accordingly; separately report to Genome Canada as required for accountancy purposes.	
Risk	Reputation & Image	CCDB	Failure to meet targets for each WG	0	Joint prioritization and allocation (to core facilities) by nodes and WGs;leverage of capacity and cost models of	
Risk	Delivery	Governance	Failure to achieve early release of large numbers of sequences (eg. 90K sequences since start of project have not/cannot be released); low yield of generated sequences reaching GenBank; create approach that is burdensome to GenBank so that GenBank chooses to collaborate little or even not at all.	0	Distinguish technical issues from compliance and communication issues and address separately; understand the workflow at GenBank and how iBOL can minimize burden on GenBank;	
Risk	Data	Governance	Collaborators are confused about data release process - distinction between 'Phase 1' and 'Phase 2' ; unaware about how & when data are released	0	Clarify and communicate data release policy and process (for both collaborators and core facilities with which they interact)	
Risk	Data	Governance	Many collaborators have not read/signed the MTA; Existence of data that weren't legally obtained (ABS issues)	0	Clarify and communicate compliance requirements as part of node/WG -mediated coordination of supply chain	
Risk	Compliance	CCDB	Confusion around governance and status of different U of G entities and projects - BIO, CCDB, CBG, iBOL, iBOL-Canada, BOLD...; note that Rest of world sees Canada as single unit	0	Clarify relationships and roles; in particular disambiguate CCDB, iBOL and iBOL Canada missions and ensure their effective comunication (via websites, print materals etc.)	Actions initiated (Jesse with Uof G leadership); CCDB andiBOL website redesign; development of "iBOL-Canada" Central Node
Risk	Reputation & Image	CCDB	Lack of resources for communication and outreach efforts - we are communicating a balance of science and business to a large and diverse community; Ideally, need different forms of communication for different audiences	0	Work even more closely with CBOL to combine and align communications and outreach resources	
Risk	Reputation & Image	Theme 5	Failure to adhere to barcode standards (scientists and others around the world devalue the currency of barcoding by using the term to refer to procedures we do not respect as barcoding	0	Communicate / educate collaborators (e.g., in Annual Report), and enforce standard at least in major publications such as PLoS	
Risk	Compliance	Governance	Poor data quality: Campaign mgrs lack expertise/resources to validate everything	0	Segregate BOLD into validated/non-validated sections?	
Risk	Delivery	CCDB	Inadequate access to specimens; over-reliance on CCDB; need more primary collection ; institutional collections not exploited (curators can be overly-protective of their collections / not used to working at our scale / cultural barriers (e.g., dislike of molecular work); financial constraints	0	Engage iBOL node/WG structure as designed (focus on primary collection?); introduce strategic focus on institutional collections (and address challenges)	
Risk	Core Capabilities	Governance	Alienation of taxonomic community because iBOL is perceived as inventing low-grade taxonomy, e.g., adding lots of names to the literature; Lack of access to taxonomic expertise (not a priority of funders?)	0	Integrate with Global Names Architecture and other accepted taxonomic intiatives and proceed as much as possible in accord with their accepted strategies; develop strategies to celebrate contributions of taxonomists to iBOL	
Risk	Core Capabilities	CCDB	Vital connection between high-speed barcoding and low-speed collections is unappreciated. Requires highly skilled, highly trained people at the interface between collections and the core facility; internally, staff turnover is a problem; externally, training is the problem.	0	Skills audit, followed by training/retraining; HR processes to enhance key staff retention; Focused workshops for (external) training? Should include the people actually doing the work, not just Pis	
Risk	Core Capabilities	CCDB	Shift to Collection-based (vs Project-based) barcoding requires distinct skill sets. Most training has been project-based and therefore inadequate.	0	CBOL willing to fund training for collection-based barcoding	
Risk	Core Capabilities	CCDB	Campaigns: too much responsibility carried by too few people; Relationships with collaborators aren't easily passed on; Overworked; easy to "drop balls"; Lack of resources to hire more people	0	identify deputy campaign managers? Move more responsibility out to nodes/WGs; Improve managment information systems;	

Risk	Core Capabilities	CCDB	Barcoding seen as boring and already old-fashioned - failure to engage broader scientific community	0	work with SAB and SSC to encourage frequent exciting publications and new proposals to research funding agencies on important scientific questions
Risk	Reputation & Image	Theme 5	Limited capacity of CCDB facility - cannot met iBOL targets alone.	0	iBOL must use CCDB effectively to meet targets (Node/WG prioritization); develop new core facility capacity; focus on species rather than specimens
Risk	Core Capabilities	CCDB	Sequencing: Museum specimens may be good sources of species, but very expensive to barcode (3X more expensive than fresh)	0	Panel discussion in Adelaide?
Risk	Delivery	CCDB	Sequencing: high thruput requires constant, well-forecast, well managed flow of specimens for optimal performance; highly dependent on informatics support; Lack of detailed cost estimates; Dependent on consistent products from suppliers	0	Joint prioritization and allocation (to core facilities) by nodes and WGs;leverage of capacity and cost models of core facilities; leverage core facility 'buying power' to ensure consistency of supplies/reagents
Risk	Delivery	CCDB	Sequencing: Laboratory staff turnover is problematic	0	Started hiring more senior techs that are more likely to stay longer
Risk	Core Capabilities	CCDB	Need for more standardization of protocols & QA/QC among core facilities	0	iBOL/CBOL introduce annual testing (eg QA/QC contests) at global level to show consistency of results; Trace files allow data to be analyzed retrospectively
Risk	Core Capabilities	Theme 2	Informatics: risk of hardware failure; down time (risk of being down for 1-2 days); server environment (inadequate space; overheating; floods)	0	Offsite backups; mirror sites; better server environment in new CBG building;
Risk	Delivery	CCDB	Informatics: human factor risks (hacking; Former employees retain access to projects; Staff turnover	0	Succession planning; review data security; disaster recovery plan.
Risk	Delivery	CCDB	Informatics: Scaleability (User base of BOLD is becoming more diverse/complex; BOLD becoming more complex)	0	
Risk	Delivery	CCDB	Free rider problem - want benefits of iBOL/barcoding without accepting responsibilities	0	courteously inform "free riders" of obligations (re metadata, public release, etc.) and give low priority to those who do not meet high standards
Opportunity	Delivery	Theme 5	Significant funds (public and corporate) are being injected into ecological surveys. Taxonomic identifications are key to accurate data but biological specimens are rarely collected. DNA barcoding can boost the taxonomic accuracy of these survey results.	0	Make or extend contact with conservation foundations and exploration companies and promote DNA-based identification
Risk	Reputation & Image	CCDB	Timely processing of tissue plates. Lab queue often a long wait and when priority plates come in (ie ANIC) older plates get bumped. Protocol should be set to ensure oldest samples are processed first.	0	Complete oldest samples first
Risk	Reputation & Image	CCDB	Lab is under pressure to produce quantity and this causes sequences of low quality or plates with a low quantity of sequences to be delayed in editing and upload. These are often rare and valuable sequences (ie marine)	0	Complete oldest samples first
Risk	Delivery	CCDB	Failure tracking several months behind. Very difficult to assess replication without full results. Also very difficult for collaborators to move to "Phase II" without all results	0	Improve workflow
Risk	Core Capabilities	CCDB	Staffing: continuity- need senior staff to maintain workflows; redundancy - needs backups for everyone; G license should be required for collections; need for longer term contracts	0	better screening/training, longer term contracts
Risk	Delivery	CCDB	Loss of specimens or tissue plates	0	Centralize workflow
Risk	Core Capabilities	CCDB	Storage - specimen collection as well as DNA archive - not enough room	0	??
Risk	Core Capabilities	CCDB	Collections Database - currently only one staff member to maintain and modify - no backup individual	0	need BIO IT support
Risk	Core Capabilities	CCDB	Image backups - currently stored on few hard drives - location??	0	integration w EOL and other archives of images

9.3 Management Information Systems

In its April 28th meeting, the iBOL Board of Directors charged the Secretariat with the task of developing Management Information Systems (MIS) so that project leaders and stakeholders could better assess how the project was doing. This ties in closely with other action items related to financial reporting: specifically, to better document international sources of funding and to provide better accounting of international effort.

The attached MIS figures are an initial attempt at providing Project-level statistics to iBOL's decision-makers and stakeholders. In addition to high-level "how things are going" statistics, we show the ability to dive deeper into which Nodes and researchers are contributing to which Working Groups, and whether or not this fits with the planned activities of the Nodes and Working Groups. All data are derived from the Canadian Centre for DNA Barcoding, iBOL's largest core facility. While the CCDB can provide excellent statistics that cover most of iBOL's DNA barcode library-building activities, it alone cannot accurately capture all international effort. For example, some Nodes use alternative core facilities (e.g., China), while other Nodes have significant efforts that fall outside of Theme 1 are not captured at all using CCDB's DNA barcoding statistics.

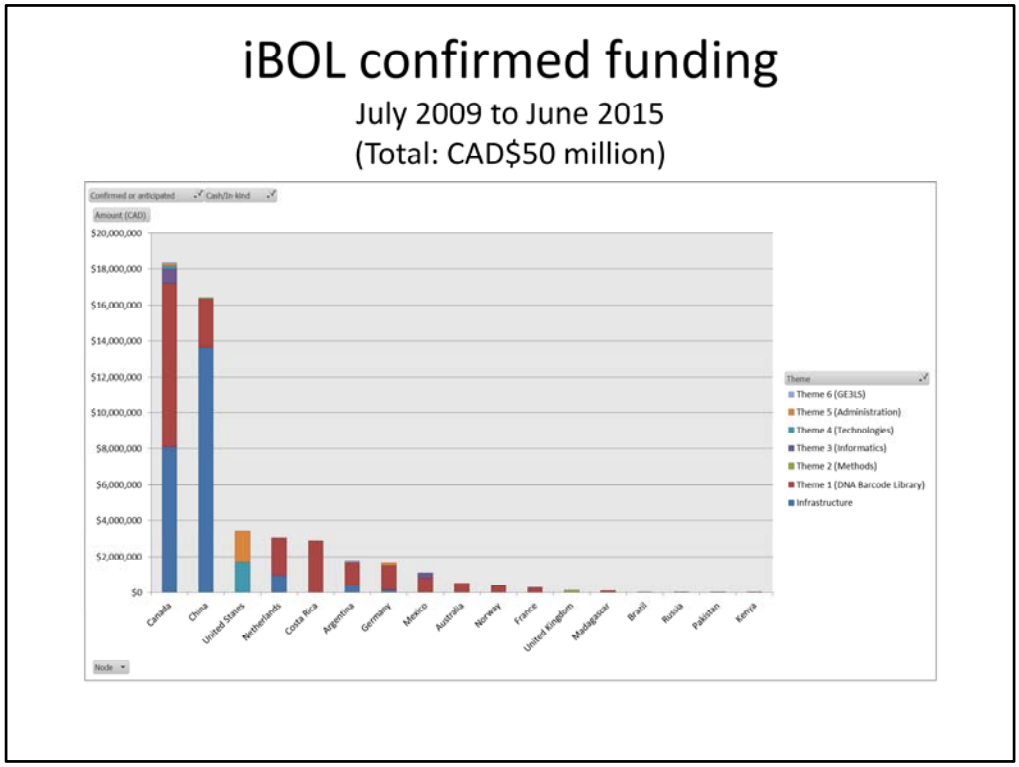
To more accurately capture the effort and scientific product generated by iBOL, the following scheme is proposed:

- New grant applications, as well as Notice of Awards from either the funding agency or the researcher should be collected from iBOL's Nodes by the iBOL Secretariat. This will ensure accuracy in Node-level funding amounts within each iBOL Theme.
- Annually, each Node should be responsible for reporting the following:
    - Scientific achievements, including a list of published papers, meetings held, invited presentations, status of major barcoding efforts, etc.
    - A high-level financial report, to show categorized expenses in each of iBOL's six Themes (see Table 1)

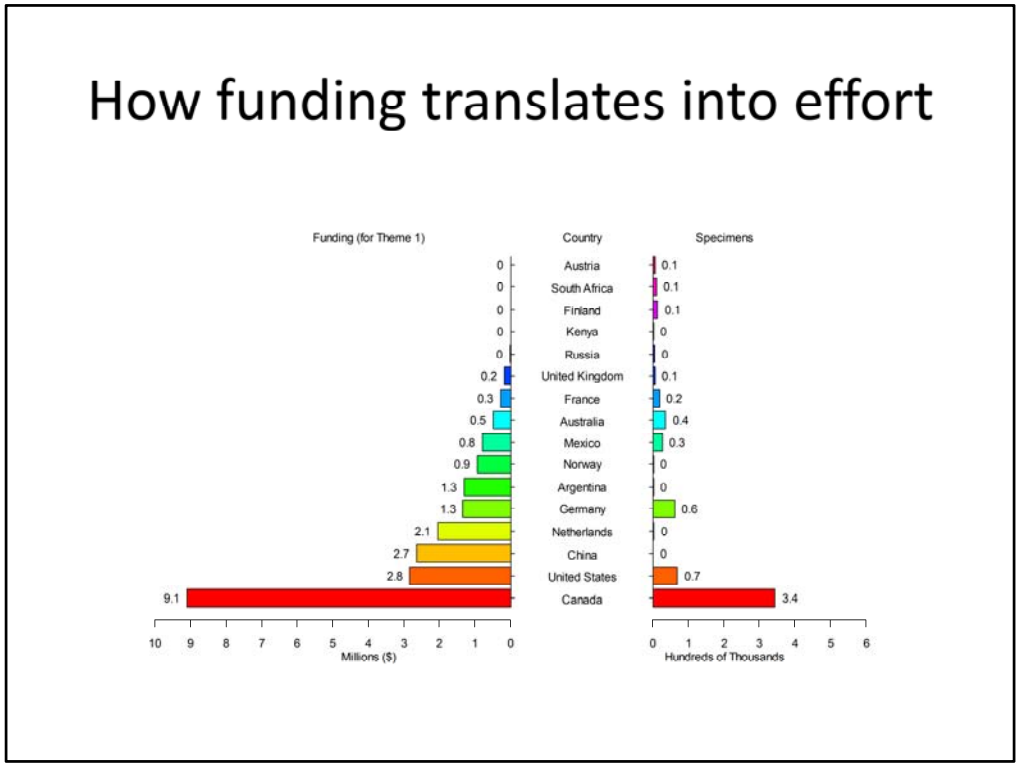
These reports would then allow iBOL Management to see not only what funds were raised for iBOL activities, but how those funds were used to produce scientific products. These reports could then be validated against reporting from iBOL's core facilities.

Table 1: Example financial report

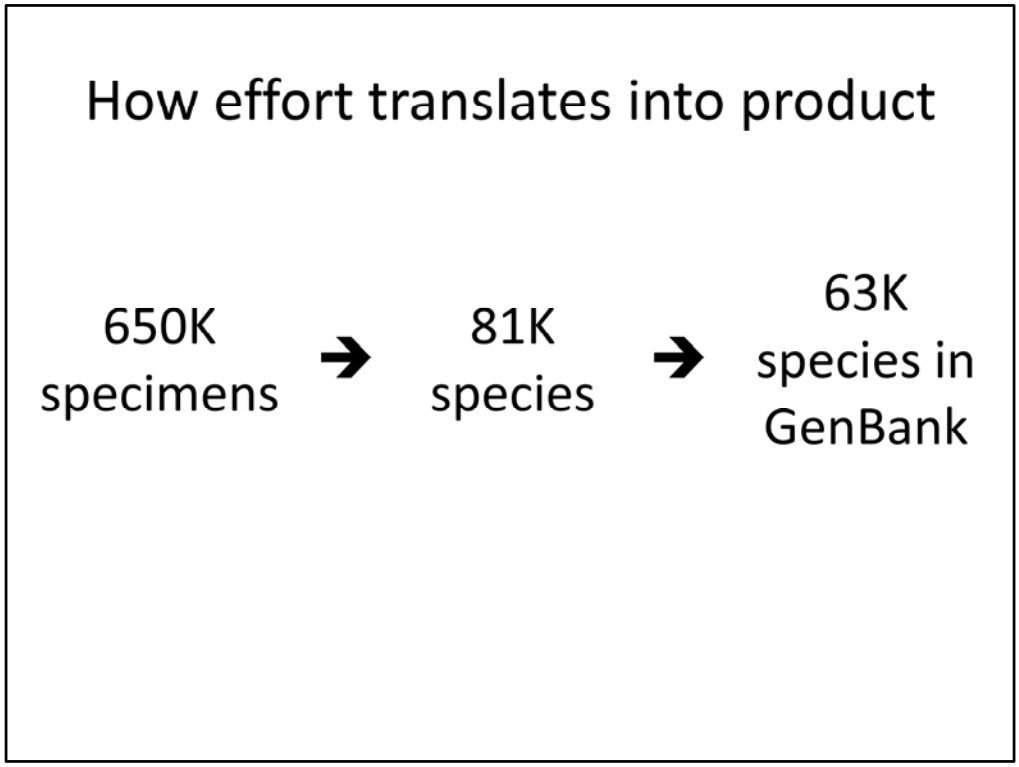
	Year	
	2010	**2011**
Theme 1: DNA Barcode Library	**$65,000**	**$71,500**
Salaries	$10,000	$12,000
Consumables	$50,000	$55,000
Services from Others		
General & administrative	$5,000	$3,500
Equipment		$1,000
Theme 2: Methods	**$0**	**$0**
Salaries		
Consumables		
Services from Others		
General & administrative		
Equipment		
Theme 3: Informatics	**$31,000**	**$45,000**
Salaries	$30,000	$35,000
Consumables		
Services from Others		
General & administrative	$1,000	$2,000
Equipment		$8,000
Theme 4: Technologies	**$0**	**$0**
Salaries		
Consumables		
Services from Others		
General & administrative		
Equipment		
Theme 5: Administration	**$10,000**	**$27,000**
Salaries		$12,000
Consumables		
Services from Others		
General & administrative	$10,000	$15,000
Equipment		
Theme 6: Ethical, Economic, Environmental, and Legal research	**$10,000**	**$27,000**
Salaries		$12,000
Consumables		
Services from Others		
General & administrative	$10,000	$15,000
Equipment		
Total	**$116,000**	**$170,500**



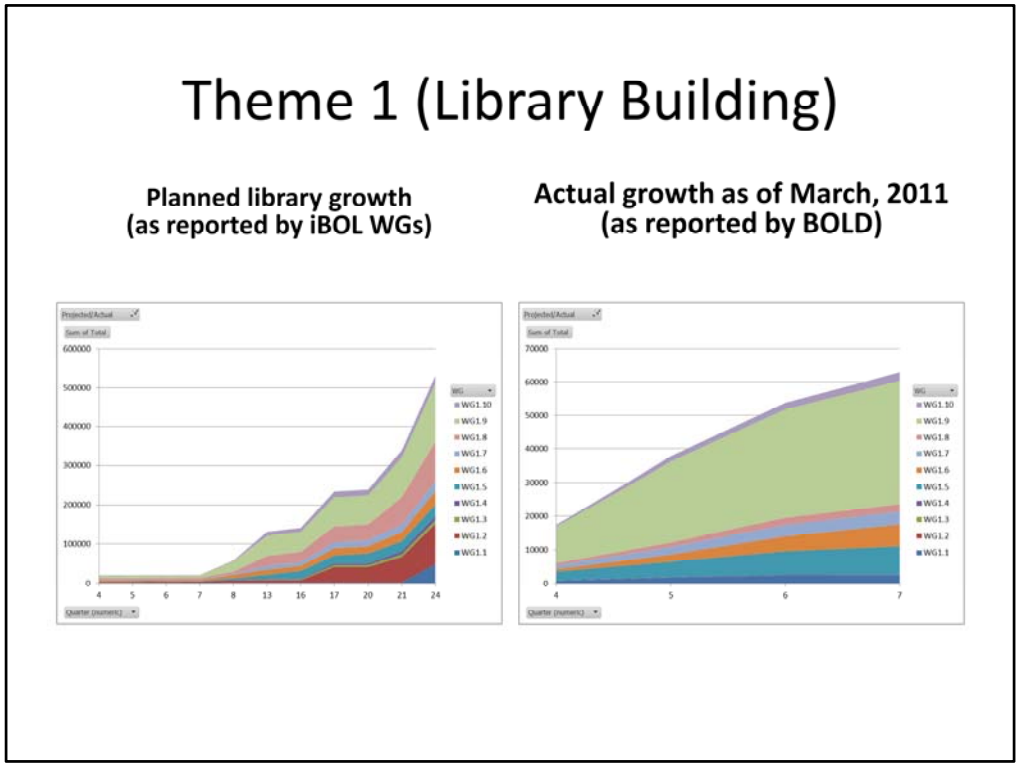
17 countries reported some level of confirmed funding between 2009 and 2015, totaling $50 million. China and Canada are clear outliers, although the majority of China's funding has been infrastructure-related.



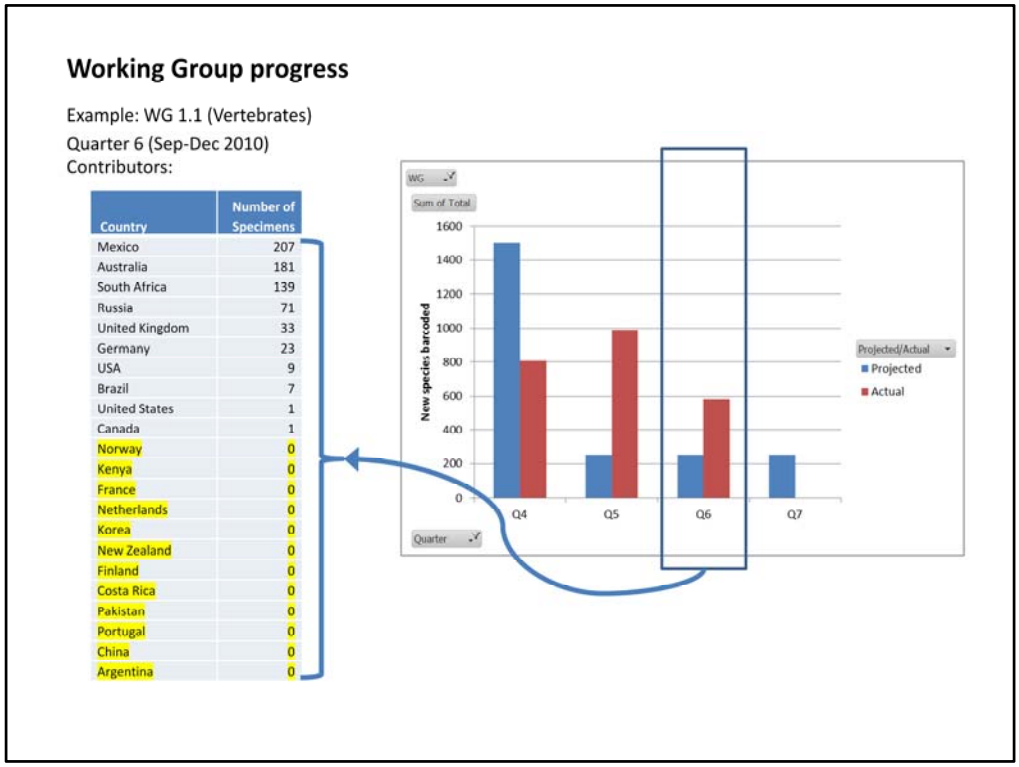
Here we show confirmed funding for Theme 1 activities for the first two years of the Project compared to the number of specimens submitted for DNA barcoding during that same period. Note that these data come from the Canadian Centre for DNA Barcoding (CCDB), so the effort of Nodes utilizing their own core facilities (e.g., China) will be under-reported. Effort in other Themes cannot be captured as easily.



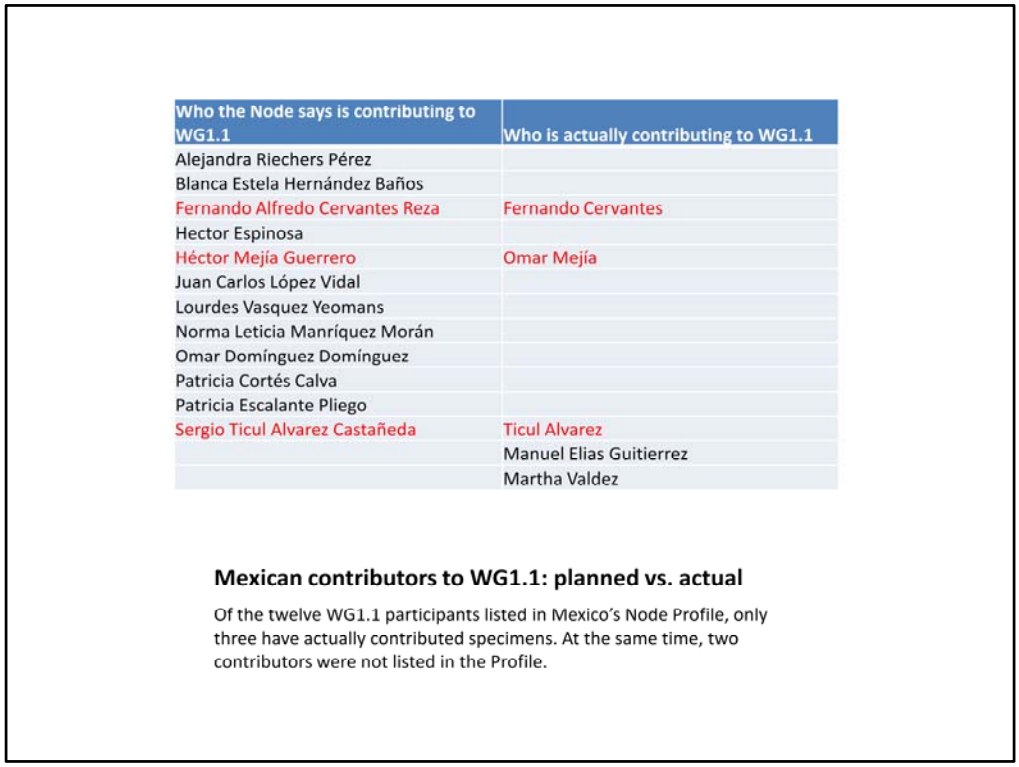
Here we show how the number of specimens submitted to the Canadian Centre for DNA Barcoding translates into species barcoded, and how this further translates into finished barcodes that can be uploaded to GenBank. Note that plant barcodes cannot yet be submitted to GenBank, which alone accounts for approximately 9K species. In addition, submissions to GenBank that were not brokered by BOLD are not captured here (e.g., the Moorea project).



These figures are meant to give a very high-level view of the library-building aspect of the Project. On the left are the aggregated projections from the ten Working Groups (as reported in the Interim Review), while the figure on the right shows actual growth across working groups.



Following from the previous figure, we now focus on WG1.1 (Vertebrates) and compare projected versus actual barcode production per quarter. This information can be linked to the Nodes, to see which are the most active in a particular WG in a particular quarter, and which Nodes have indicated an interest in a WG but have not contributed. Note again that these numbers are reported by the Canadian Centre for DNA Barcoding, so Nodes utilizing alternative core facilities will have under-reported effort levels.



Who the Node says is contributing to WG1.1	Who is actually contributing to WG1.1
Alejandra Riechers Pérez	
Blanca Estela Hernández Baños	
Fernando Alfredo Cervantes Reza	Fernando Cervantes
Hector Espinosa	
Héctor Mejía Guerrero	Omar Mejía
Juan Carlos López Vidal	
Lourdes Vasquez Yeomans	
Norma Leticia Manríquez Morán	
Omar Domínguez Domínguez	
Patricia Cortés Calva	
Patricia Escalante Pliego	
Sergio Ticul Alvarez Castañeda	Ticul Alvarez
	Manuel Elias Guitierrez
	Martha Valdez

Diving deeper, we can see what researchers have been indicated by the Node (Mexico) as being active in a particular Working Group, and compare this to those researchers that have actually contributed specimens. Here is an interesting example where a large number of researchers have been indicated as WG1.1 participants, but only three from the list have actually contributed specimens. Meanwhile, two individuals *not* listed by the Node have contributed specimens to this WG.

9.4 Funding of iBOL Operations

Category	Estimate	Notes	Current Funding Sources		
			Node	Institution	Source
Salaries	**$ 325,500**	Executive Director [GC] Director, Media & Comm [GC] Administrator [CBOL] In-kind finance/admin/comms support from BIO[GC / IDRC]	Canada / US	University of Guelph / Smithsonian Institute	Genome Canada / CBOL / IDRC
Travel	**$ 220,200**				
Scientific Steering Committee	$ 80,000	32 people, reimbursed at max. $2.5K each for annual meeting	Canada	University of Guelph	Genome Canada / IDRC
SSC - Executive	$ 21,200	2 meetings: 8 people, $1K meeting expenses + $1K airfare and $200	Canada	University of Guelph	Genome Canada
SD, ED, Secretariat, PIs	$ 65,000	SD 30K; ED 20K; Secretariat 15K	Canada	University of Guelph	Genome Canada
Board of Directors	$ 30,000	BoD: 2 meetings x 10 people x ($1K airfare + $200 hotel) Exec: 2 meetings x 5 people x ($500 airfare + $100 hotel)	Canada	University of Guelph	Genome Canada
Advisory Committees (SAB, TAAB)	$ 24,000	SAB, TAAB (2 meetings of each) x 5 people x ($1K airfare + $200 hotel)	Canada	University of Guelph	Genome Canada
G&A	**$ 113,000**				
Public Communication & Outreach	$ 60,000	SSC Meeting (excl. travel); events, sponsorships, promotions, posters, brochures, reports, newsletters, website	Canada	University of Guelph	Genome Canada
Honoraria - SAB and TDAG	$ 45,000	10 peoplex 2 meetings ea.; $1.5K for each member + $1.5K for each meeting attendance	Canada	University of Guelph	Genome Canada
Office expenses	$ 8,000	Computers, telephone, office supplies	Canada	University of Guelph	Genome Canada
Fees/Consultancy/Services	**$ 49,500**				
Audit expenses	$ 1,500	Corporate account annual audit	Canada	University of Guelph	Genome Canada
Strategic Planning	$ 20,000	(e.g. workshop w/ facilitator)	Canada	University of Guelph	Genome Canada
Legal expenses	$ 25,000	Corporate Secretary	Canada	University of Guelph	Genome Canada
Insurance	$ 3,000	Directors and Officers liability insurance	Canada	University of Guelph	Genome Canada
Total	**$ 708,200**				

Scientific Progress

Accelerating the Assembly of Barcode Libraries

Issue: Need to make good use of museum collections to build library with species-level taxonomy

Natural history museums hold billions of identified specimens, but the complexities introduced by DNA degradation has meant that many older specimens have been excluded from analysis.The Australian National Insect Collection (ANIC) is serving as a test bed for the efficacy of DNA barcode efforts which comprehensively examine all species in a collection. Five staff from BIO travelled to ANIC in both October 2010 and April 2011 to test the speed with which specimens could be processed. More than 28,000 specimens representing more than 9000 species were databased, photographed and tissue sampled during these visits. Subsequent sequencing work on these specimens (which averaged 30 years in age) at the core faculty in Guelph revealed that recovery of full-length amplicons decreased rapidly with specimen age. Trials with various primer sets have established several important facts. Firstly, despite the great age range of specimens in single plates, contamination events were not hugely disruptive to workflows. Secondly, with substantial effort, it was possible to recover a DNA barcode record from almost every specimen. This work has established an important precedent; it is possible to generate a comprehensive barcode library for a continental fauna in a relatively short period through work on museum collections. The success of the work at ANIC has stimulated a similar program of analysis on four insect orders (Coleoptera, Diptera, Hemiptera, Hymenoptera) in the Canadian National Collection.

Accelerating Species Descriptions

Issue: Need for more rapid protocols for species description

Millions of eukaryote species await description, but the cost of describing all animal species using traditional approaches has been estimated at $250 billion. This fact makes clear that new approaches are needed to accelerate and simplify species description. A project is underway to address this need by employing DNA barcodes as both a tool for the validation of described species and for the clarification of synonomies. A pilot study is examining the family Xyloryctidae which includes 272 recognized Australian species, the last described in 1964.

More than 3000 Australian specimens of Xyloryctidae have been barcoded providing the basic framework for a DNA-based assessment of species diversity. This work has revealed the likely presence of more than 200 undescribed species. Work is now focused on the assembly of a barcode sequence from type specimens of all 272 described species before the end of 2011. The biggest hurdle to initiation of this work has been overcome. The three museums holding most of this type material (ANIC, South Australian Museum, The Natural History Museum) have agreed to provide a leg from the specimens in their collections. Analysis of the first specimen was successful, generating a full-length barcode from a 60 year-old specimen using a short amplicon strategy.

Aside from building a barcode library for type specimens, work is underway to clarify generic boundaries by examining phylogenetic relations of all known and presumptive species of Xyloryctidae by analyzing a small number of additional gene loci. Once generic boundaries are decided and species units are delineated, a publication will summarize this information. A second publication will use these results as a basis for an expedited species description protocol with the goal of describing at least 100 new species of Australian Xyloryctidae before September 2012. To place this effort in context, this total will exceed the number of species of Lepidoptera described from Australia over the past 20 years.

Analyzing Massive Collections with Sanger-based DNA Barcoding

Issue: Need for more less expensive analytical protocols

Current sampling methods are able to assemble specimens at a pace that far outstrips taxonomic capacity. For example, the Swedish Malaise trap program gathered more than 40 million specimens over a two-year period, but only half of these samples have been identified to a family level six years after the collections were made.

Conventional DNA barcoding protocols which employ bi-directional Sanger sequencing and protocols designed to produce high quality DNA extracts cost about $10 per specimen and are too expensive to use with mass collections. Research staff at the CCDB has focused effort on the development of protocols to reduce this cost to less than $1 a specimen. Progress has been excellent and the first Malaise trap samples have been processed. Cost efficiencies have been made by coupling a low-cost DNA extraction protocol with a move to 384 well plates for all steps following DNA extraction and a shift to unidirectional sequencing. This analytical approach has the potential to allow a single technician to analyze more than 100K specimens per year.

Review of the Barcode Data Standard at the 1 million count

Issue: Need to re-examine barcode standard with a view towards lowering analytical costs

To ensure the production of very high quality data, the DNA barcode standard calls for the retention of trace files and bidirectional reads. There are certainly times when bidirectional reads play an important role in the enhancement of sequence quality, such as cases where sequence quality is low for one portion of the read (as is often the case in specimens with co-amplication of a pseudogene). However, there are other cases where the second read is only confirmatory. The many records with bidirectional reads provide an opportunity to test the circumstances under which a unidirectional read will provide high fidelity sequence data. Analysis of these data shows that PHRED scores reliably indicate the cases where a bidirectional read will enhance sequence quality and those for which a unidirectional read will suffice. This analysis has established that a sequence record based on an unidirectional read with a PHRED score in excess of 40 gains no benefit from bidirectional analysis. It also supports the conclusion that bi-directionality is not an effective measure of quality. Incorporation of PHRED scores into the barcode standard will allow at least a 20% reduction in sequencing effort and will reduce the number of sequence records that meet the barcode standard but that are actually low quality.

Meeting Analytical Targets from October 1, 2010 - September 30, 2011

Issue: Barcode production must increase by 200K records per year to reach the 2015 target

The iBOL project has set the goal of assembling 5M barcode barcode records by December 2015. In order to achieve this target, barcode production must steadily rise over the interval with production targets set at 400K for the interval October 2011- September 30, 2011 (and subsequently rising to 600K, 800K, 1000K and 1200K). Since the Guelph core facility lacks the funding required to carry out all of these analyses, plans have called for load sharing amongst the central and regional nodes. However, analytical capacity in other nations has been slow to develop so most sequence analysis is still being conducted at Guelph. Based on current production levels, the 400K target for the current year should be achieved (330K records were added by August 10, 2011). However, the 600K target for next year is unlikely to be met unless sequence production by other facilities increases in a substantial way. There is certainly also a need to gain a more detailed understanding of the number of barcode sequences that have not been submitted to either GenBank or BOLD, but instead reside on personal computers. This issue will be discussed in Adelaide with a view towards identifying sites with major ‘holdbacks’.

SSCE Committee Report - Pete Hollingsworth

The SSCE met on 19th July 2011. The main aim was to evaluate the big challenges and opportunities in harnessing the efforts of the global community to meet the iBOL goals. The rationale was to focus on a small number of important issues, from which targeted actions could be identified that would lead to clear returns. The meeting summary is appended below. The next stage is prioritisation of actions and the development of a clear implementation plan.

Key issues arising from the meeting were the need for:

Effective organisation of the distributed effort of iBOL
The iBOL project has many constituencies and many committees. There is a risk of 'free-spinning-cogs', in which priorities and actions of one group, fail to influence another. A very clear statement and vision of the roles and relationships of this distributed team is required to minimise this risk.

Industrial-scale sample provision to match industrial-scale sequencing efforts
Industrial-scale processing of DNA barcode sequences is underway at Guelph, and some initial large scale tissue mining initiatives have been undertaken. Attention needs to be given to further securing the sample supply chain, by identifying key sources of large numbers of well-identified samples that are amenable for sequencing and are linked to existing digitisation programmes. An example of this, would be to explore brokering dealings with major taxonomic/collections institutes, in order to barcode major swathes of their contemporary research collections.

Making every barcode count
DNA barcoding is a major international endeavour, but much work on DNA barcoding only loosely conforms to the standards established by the iBOL and CBOL initiatives. One risk is that many/most non-Guelph generated DNA barcodes fail to meet barcode standards. We urgently need to drive home the importance of standardisation, data quality and data release in the broader international community.

Moving beyond identification: addressing scientific questions with DNA barcode data
A densely populated reference database from a standardised set of gene regions forms a resource for studies of molecular evolution, ecological interactions and dynamics, understanding the distribution of inter- and intra-specific biodiversity, understanding the nature of species differences in relation to organismal attributes and their environmental/historical context, and also potentially providing insights into the speciation process itself. A critical step for iBOL is to take a strategic approach to tackling big questions with barcode data, with the aim of (a) undertaking excellent science, (b) generating good PR for barcoding, (c) engaging a broader set of scientists / enthusing existing scientists so that the barcode library itself gets built faster and more efficiently.

Without intervention, DNA barcode data will be used in hypothesis-testing science either via individual project design (e.g. ecological forensic studies on food webs) or post-hoc data mining. The science will progress in these areas, driven by usual market forces, but the benefits to iBOL will be limited, and particularly for data mining, many of the beneficiaries will be outside the iBOL project. The greatest returns to the iBOL project will come from early identification of questions, modifications to sampling strategies to get relevant data, and rapid analysis and publication by members of the iBOL team. One proactive strategy is to design large scale distributed experiments, in which we engage the broader iBOL community in sampling/generating barcode data, with the carrot of collectively tackling a pre-specified big scientific question (and hence them being part of a high impact publication). This serves to shift the big-question-science from *post-hoc* data mining by the few, to include *a priori* experimental design and the engagement of a distributed team contributing to the question explicitly from the outset. This should also serve to engage some researchers/funders, who would not become involved in barcoding from the perspective of species identifications alone.

The SSCE has outlined some initial project ideas in this area, and will work these up further. Key next steps are discussions with the Scientific Advisory Board in September, and a major focus of the Adelaide meeting is to prioritise actions to maximise the broader scientific impact of DNA barcode data.

Summary of the SSCE Meeting (19th July 2011; Guelph).

Present: David Castle, Peter Freeman, Meg Fritzsche, Paul Hebert, Pete Hollingsworth (chair), Natalia Ivanova, David Schindel, Mark Stoeckle.
Apologies: Vincent Robert.

1) Organisational issues

Challenge 1: Operationalize the 'triangle' of Nodes, WGs and Barcoding facilities
There is considerable uncertainty in the broader iBOL community as to how the international network of researchers should function and interact in order to meet iBOL goals. This stems from confusion as to the roles and relationships of nodes, working groups and the major sequencing factories. The SSCE agreed the following:

Working groups:
- set global priorities, and strive to ensure that big projects (campaigns) within their working groups are ultimately realised
- identify the major limiting factors in the supply chain, and liaise with nodes and sequencing factories to overcome them
- work with the SSCE and sequencing factories to identify major providers of samples who can source large numbers of high-quality samples
- advise sequencing factories as to which projects are likely to have low likelihood of success and hence avoid resource wastage
- liaise with sequencing factories on protocol development, informatics requirements and most effective use of existing resources (e.g. checklists) for a given taxonomic group
- form a steering group, enabling input into strategy development from the key players

Nodes:
- work to implement international priorities with WGs, but also build on local national strengths, and identify national priorities
- lobby national/regional funders and major institutions to support DNA barcoding
- obtain funds to build national barcoding capacity
- provide effective communication and a national support network for the local barcoding community

Core Facilities:
- undertake the bulk of DNA sequencing for iBOL, and establish robust protocols and informatics resources
- respond to priorities of working groups when processing samples
- make clear statement of sample processing capacity, expected processing times, which samples will be treated as priorities, and what the expectations are for sample/data quality and data release

Immediate actions:
- Communicate clear roles/responsibilities/ reciprocal expectations for each constituency via clearly defined terms of reference
- Determine capacity/cost models for barcoding facilities and communicate sequencing availability and sample requirements to WGs and Nodes
- Identify the key researchers and contacts in the three constituencies
- Undertake a triage of Node and WG leads. Replace weak performers and individuals who have resigned. Continue to monitor activity of Nodes and WGs
- Communicate to WG leads that they are expected to use the Adelaide meeting effectively. Work with them to establish a clear plan of action for this meeting; CBOL will provide some funds to support working groups to meet.
- Use 'Connect' to strengthen WG identity and involvement
- Strengthen node representation on SSCE by adding 1-2 strongly performing node-representatives to access their ideas on how to 'build nodes'
- Aim to get greater engagement from SSC in science. This will involve collaboration across working groups for assessing large-scale questions. Use the SSC meeting in Adelaide as a trigger/focal point for this.

2) Optimizing the supply chain

Challenge 2: Establish iBOL-directed supply chain with focus on major institutional collections
The iBOL project goals will not be met if Guelph remains the only functioning sequencing factory. The current projection is that Guelph will produce sequences from 3 million specimens by 2015. Urgent attention needs giving to where the remaining sequences will come from. In addition, the returns from 'ad hoc' serendipitous sampling is asymptoting. A critical limiting factor for the iBOL project will soon become the supply of large volumes of well identified high-quality material, with associated collateral data and vouchers.

Immediate actions:

- Maintain close monitoring of global barcoding sequencing capacity, and provide protocol support for enhancing the efficiency of the wider community to generate sequence data (e.g. efficient sharing of the expertise of the 'CBOL leading labs' group and the BIO team)
- Ensure that the material sequenced at sequencing factories is the 'right material' making best use of existing sequencing capacity.
    - Engage WGs to source and prioritise materials for sequencing.
    - SSCE to develop plan for finding a small number of major collections who can provide large numbers of well identified high-quality samples, amenable to sequencing, that are linked into existing digitisation programmes, and are complementary to the existing sample sets.
    - Secure additional funds for tissue mining projects (some funding from CBOL ($10K) is available to start this process)
- Engage with WGs and Nodes to secure future supplies of fresh materials. "Cut-off" sequencing to 'good customers' once their samples are well represented in the database
- Induce a perception shift from 'free sequencing is available at Guelph' to 'there is a time-limited opportunity to obtain barcode sequences, if high quality samples with associated images/vouchers are provided within an agreed timeframe'. This is to trigger a sense of urgency in the broader community to work hard to get samples into the core facility pipeline.

Challenge 3: Move from 'non-barcode compliant to 'barcode compliant records
Many sequences produced in the name of barcoding projects do not meet barcoding standards, either due to low quality sequences, lack of associated meta-data, or sequences of non-standard loci. There is a risk that much international effort and money in barcoding will be wasted in producing sequences that do not contribute towards producing high quality DNA barcodes.

Immediate actions:

- Maintain dialogue with major INSD to support maintenance of trace archives
- Revisit data standards for DNA barcode loci to ensure that the targets in these documents are realistic and achievable in practice. Ensure rapid communication of any revisions.
- Increase dialogue with all core facilities to maximise adherence to agreed data standards
- Use the Adelaide conference as a major publicity drive to push the point about what barcoding is, and what it isn't.
    - Talk in the opening plenary session on the importance of standardisation of loci, data quality, and data release.
    - Explore name/shame or (probably better) name/fame options for highlighting talks/abstracts at the meeting and how they contribute towards iBOL goals
- Consider publication of paper reiterating the goals of DNA barcoding, and explicitly discuss why local barcodes for individual genera or data without vouchers etc, is missing the point.
- Encourage rapid publication of the Barcode Identification Numbers (BIN) paper to communicate the rationale underlying iBOLs' data-release policy

3) Management of iBOLs Research and Development Themes (2,3,4,6)

Challenge 4a: iBOLs methodological research and development themes need to function as effective working groups

The working groups of Theme 2 (Methodologies) and Theme 4 (Technologies) have a diffuse remit, and limited operational function. Furthermore the Genome Canada Interim Review recommended termination of WG 4.2 (Mobile Barcoding).

Immediate Actions:

- WG 2.1 (Barcoding Biotas) contributes to the barcode library and should be managed as part of Theme 1.
- WGs 2.2 (Museum Life), 2.3 (Methodological Innovation) and 2.4 (Paleobarcoding) all involve methodological development to obtain barcodes from non-standard material. They are closely related to WG 4.1 (Environmental Barcoding). These should be managed together a single fused Working Group to create critical mass, and a meaningful functional unit.
- The relationship between CBOLs Leading Labs group and this new working group should be assessed to identify potential synergies (they have considerable overlap in remit).
    - Ensure that Connect Information Resource and CCDB protocols pages are fully integrated. CBOL will help resource communication of protocols.

Challenge 4b: iBOLs informatics research and development themes need to function as effective working groups

There are many 'core functionality' questions/challenges, but WG3.1 (Core Functionality) is not active in an international sense as a working group. The primary international activity is in relation to WG3.2 (Mirrors). The obvious complementarities to iBOLs informatics working groups are CBOL's Database Working Group (DBWG) and Data Analysis Working Group (DAWG).

A secondary issue is whether/how to establish tightly curated local databases containing a subset of samples from the global database, that are suitable as reference libraries for regulatory / commercial (or similar) use.

Immediate Actions:

- Explore harmonising activities of CBOLs DAWG and DBWG with WG3.1 to turn WG3.1 into an international working group.
- Define what the broader iBOL project wants in terms of core functionality (vs what BOLD and other platforms might be developing and offering)
- Assess models for establishing segregated databases for private users / government agencies and develop a position statement on access conditions for these databases.

Challenge 5: Initiate the GE3LS programme

There was a delayed start to GE3LS Program due to absence of funds. Funding has now been released with an expected start date of September 2011. Reduced funding allocation will require the work plan to be revisited, but the current expectation is that this will affect the depth to which issues are assessed, rather than deletion of major milestone.

Immediate Actions:

- Aim to fully integrate the GE3LS program with the international barcoding community at the Adelaide barcoding conference.

4) Broadening the use of DNA barcoding data to tackle scientific questions beyond identification

Challenge 6: Identification of the areas of science that will be transformed by the production of a massive DNA barcode library
The production of a densely populated database on a standardised set of loci offers potential for tackling major scientific questions in the fields of molecular evolution, ecological interactions and dynamics, understanding the distribution of inter- and intra-specific biodiversity and its drivers, and understanding the nature of species differences in different groups in relation to organismal attributes and their environmental and historical context. In practise, these questions can be addressed in three main ways. (1) Individual project design (e.g. project scale ecological forensics such as food webs); (2) post-hoc data mining (individual researchers mining barcode databases to tackle biodiversity/molecular evolution questions); (3) large-scale distributed experiments, undertaken by the iBOL community. Attention needs giving to raising awareness of what questions need what type of data, to ensure that DNA barcode sample strategies maximise reusability of data. High profile returns directly to the iBOL project will be achievable from point (3) above. The design of flagship hypothesis testing projects drawing on the iBOL network would be an effective way to ensure iBOL gets maximum returns from its data and would also serve to engage the broader barcoding community.

Immediate Actions:

- Make tackling major scientific questions a major of the Adelaide meeting
    - Invite high profile speaker to inspire audience as to the opportunities for additional uses of DNA barcode data (beyond identification)
    - Making tackling big-science questions a major focus of the SSC meeting
- Prepare high-profile strategy/opinion publication on the science questions that can be addressed using massive scale horizontal genomics
- Follow the above with a small workshop to develop iBOLs strategy in this field
- Scope the feasibility of implementing a large scale distributed barcoding project with the aim of (a) harnessing and engaging a broad community, (b) implementing a standardised sample strategy to produce a massive dataset to evaluate macroscale biodiversity patterns and their environmental/historical correlates.

5) Adelaide barcode conference

Challenge 7: Ensure that the Adelaide barcode conference serves as an inspiration for conference attendees to maximise their engagement with the iBOL project, and use the meeting to refine the function and composition of the SSC.

The preceding text has many actions relevant to Adelaide. They are summarised below:

- Ensure WG leads have clear plan of action for their groups to function as WGs at Adelaide.
- Use Adelaide as recruiting ground to engage dynamic researchers to replace less active members of the SSC.
- Bring together newly consolidated Theme 3 team and also Theme 2+4 WGs in Adelaide in collaboration with CBOL partner groups to get these WGs up and running
- Use the conference to reiterate the importance of standardisation, data quality and data release for DNA barcoding
- Aim to fully integrate the GE3LS program with the international barcoding community at the conference.
- Make tackling major scientific questions a major focus of the Adelaide meeting and also the associated SSC meeting

The outline agenda for the SSC meeting at Adelaide is:
1) Business meeting of SSC, administration, review of committee function
2) Working group leads report on progress
3) Exemplar Node leads to give presentations on ‘how they made it work’
4) Major focus of meeting on science: How do we maximise the scientific impact of the iBOL project? What questions, what data are needed to deliver them, and how are we going to get it?

Agenda 11.1 Dates for future iBOL Meetings

	Committee	2010- 11	2011 - 12
Q1	SSC Executive (teleconference)	-	Tuesday January 10 (tbc)
Q1	Board of Directors – EC (teleconference)	Wednesday January 12	Tuesday February 21 (tbc)
Q2	SSC Executive	Wednesday March 09 (Toronto)	Tuesday March 20 (tbc)
Q2	Scientific Advisory Board	-	tbc
Q2	Technology Development Advisory Group	-	tbc
Q2	Board of Directors	Thursday April 28 (New York City)	Tuesday April 24 (New York City)
Q3	SSC Executive (teleconference)	Tuesday July 19 (Guelph)	Tuesday July 17 (tbc)
Q3	Board of Directors – EC (teleconference)	Monday August 22	Tuesday August 21 (tbc)
Q4	SSC Executive	Friday September 16 (Washington)	Friday September 14 (tbc)
Q4	Scientific Advisory Board	Friday September 16 (Washington)	Friday September 14 (tbc)
Q4	Technology Development Advisory Group	tbc	tbc
Q4	Scientific Steering Committee	Tuesday November 29 (Adelaide)	November (tbc) (Europe?)
	Board of Directors	Sunday December 04 (Adelaide)	November (tbc) (Europe?)