Bretting, Peter

From: Bretting, Peter
Sent: Wednesday, June 24, 2015 10:43 AM
To: Emily Marden
Subject: RE: DivSeek SC meeting report, May 28, 2015, Rome

Hi Emily—apologies for the delayed reply. I was out much of last week [redacted].

I'd be happy to help with the governance discussions, if you judge that my participation on the governance committee might be useful.

We missed your expertise and wise counsel during the meeting in Rome.

Many thanks!

Peter

Peter Bretting
USDA/ARS Office of National Programs
Room 4-2212, Mailstop 5139
5601 Sunnyside Avenue
Beltsville, MD 20705-5139
Phone 1.301.504.5541
Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: Emily Marden [redacted]
Sent: Wednesday, June 17, 2015 10:42 PM
To: Susan McCouch
Cc: Andreas Graner (IPK); David Marshall (JHI); Elizabeth Arnaud (Bioversity); Bretting, Peter; Rajeev Varshney (ICRISAT & GCP); Ruaraidh Sackville Hamilton (IRRI); Sarah Ayling (TGAC); Daniele Manzella (ITPGRFA); Peter Wenzl; Ruth Bastow (GPC); Powell, Wayne (CGIAR Consortium)
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Susan,

Thank you for this.

I would like to follow up by inviting Steering Committee members to participate on the special committee addressing governance. Please let me know if you are interested and we can discuss further.

Best regards,

Emily

On 17 June 2015 at 09:57, Susan McCouch <srm4@cornell.edu> wrote:

Dear SC members,

Attached please find a summary report of our SC meeting on May 28, 2015 in Rome prepared jointly by members of the JFU.

Please do not hesitate to contact me if there are changes you feel are necessary to accurately reflect the committee's discussions. I would appreciate receiving any suggested edits as tracked changes in the attached document.

For now, Emily Marden has agreed to convene a special committee to review the governance questions that were raised during our meeting in Rome. Her committee will report back to the SC at our next meeting, tentatively scheduled for November or early December 2015.

Best regards,
Susan

--
Susan McCouch
Professor, Plant Breeding & Genetics
Cornell University
162 Emerson Hall
Ithaca, NY 14853-1901
Phone: +1 607-255-0420
Fax: +1 607-255-6683
Email: srm4@cornell.edu or mccouch@cornell.edu
Alternate Email: [redacted]

Bretting, Peter

From:	[redacted] on behalf of Susan McCouch <srm4@cornell.edu>
Sent:	Wednesday, June 17, 2015 12:57 PM
To:	Andreas Graner (IPK); David Marshall (JHI); Elizabeth Arnaud (Bioversity); Emily Marden (UBC); Bretting, Peter; Rajeev Varshney (ICRISAT & GCP); Ruaraidh Sackville Hamilton (IRRI); Sarah Ayling (TGAC)
Cc:	Daniele Manzella (ITPGRFA); Peter Wenzl; Ruth Bastow (GPC); Powell, Wayne (CGIAR Consortium); Susan McCouch
Subject:	DivSeek SC meeting report, May 28, 2015, Rome
Attachments:	DivSeek_May 28, 2015_SC Meeting Report_150617.docx

Dear SC members,

Attached please find a summary report of our SC meeting on May 28, 2015 in Rome prepared jointly by members of the JFU.

Please do not hesitate to contact me if there are changes you feel are necessary to accurately reflect the committee's discussions. I would appreciate receiving any suggested edits as tracked changes in the attached document.

For now, Emily Marden has agreed to convene a special committee to review the governance questions that were raised during our meeting in Rome. Her committee will report back to the SC at our next meeting, tentatively scheduled for November or early December 2015.

Best regards,
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Phone: +1 607-255-0420
Fax: +1 607-255-6683
Email: srm4@cornell.edu or mccouch@cornell.edu
Alternate Email: [redacted]

DIVSEEK STEERING COMMITTEE

28 May 2015
Rome, Italy

REPORT

I. Background

1. In January 2015, the First DivSeek Partners' Assembly approved the DivSeek Charter and elected Prof. Susan McCouch as Chairperson of the Assembly. Subsequently, the Joint Facilitation Unit circulated a call for candidates to DivSeek's Steering Committee and compiled a roster of candidates. Through electronic voting, Partner organizations selected 8 candidates from the roster. The elected candidates confirmed their willingness to serve in the Steering Committee for staggered terms.

2. The Chairperson of the Assembly, also member of the Steering Committee, called for an in-person, one-day meeting of the Committee. The Secretariat of the International Treaty hosted the meeting, which was held in Rome, Italy, at the Headquarters of FAO, on 28 May 2015. The Secretariat of the International Treaty and the Global Crop Diversity Trust, two of the four member organization of DivSeek's Joint Facilitation Unit, agreed to jointly support the meeting financially.

3. The list of participants in the meeting is in Appendix 1 of this Report. In her capacity of Chairperson of the Assembly, Prof. Susan McCouch chaired the meeting of the Steering Committee.

II. Welcome and approval of the agenda

4. The Chairperson invited Dr. Shakeel Bhatti, Secretary of the Governing Body of the International Treaty, to address the participants at the opening of the meeting. Dr. Bhatti expressed his gratitude to all the members of the Steering Committee for their dedication to the initiative and invited them to consider the hosting of the meeting by the Treaty Secretariat as a tangible sign of the commitment by the Treaty community to continue facilitating DivSeek. Dr. Bhatti affirmed that, as much as plant science was in rapid evolution, so were PGR information systems to keep pace and deliver good services to the multiple communities that were engaged in downstream uses of germplasm. Dr. Bhatti illustrated how the Global Information System of the International Treaty was moving into the implementation phase and appreciated the common line of thinking with DivSeek, in areas such interoperability among information systems, data sets and knowledge networks, adoption of standards and technologies Dr. Bhatti encouraged the Steering Committee to devise a program of work for DivSeek that would integrate into existing international cooperation.

5. The Chairperson made some introductory remarks in order to guide the Steering Committee through the tasks it was expected to accomplish. She invited the Committee, in its deliberations, to consider activities that would generate value for the Partner organizations in the short, medium and long term and assess the capacity and expertise that would be needed to meet these goals. The Chairperson reminded the Committee that although they should be mindful of the 'bigger picture' they would also need to focus their efforts on determining a set of strategic activities to conduct before the second Partner

Assembly of January 2016 based on the available capacity. In the views of the Chairperson, the DivSeek comprised three domains of activities: 1) germplasm characterization using rapidly evolving scientific concepts, tools and information platforms, 2) training and capacity-building efforts, and 3) a public-relations domain that describes DivSeek's value propositions to the multiple relevant constituencies, including in developing countries.

6. Following the above opening remarks, the Committee was invited to consider the agenda of the meeting. It approved the agenda as contained in Appendix 2 of this report.

III. Draft landscaping study

7. The Committee was invited to appraise an initial landscape of projects of relevance for DivSeek that Dr. Bastow, of the Joint Facilitation Unit and the Global Plant Council, had developed. Dr. Bastow described four categories of projects, focused on: 1) software infrastructure, tools and standards; 2) crop databases and portals; 3) crop germplasm-evaluation projects that include data generation; 4) sequencing of reference genomes. Members of the Steering Committee expressed interest in learning of the large number of projects and crops represented by the initial landscape study and discussed the need for a more comprehensive study to ensure representation of less visible projects and to highlight areas where DivSeek might facilitate coordination and help to leverage the sharing of information and expertise among different projects.

8. The Committee recommended expanding the landscape study into a formal publication to serve as a reference document for DivSeek and for science policy makers, as well as to provide a basis for fund-raising for DivSeek. The Committee suggested that a refereed publication could be accompanied by an interactive, on-line information resource to facilitate feedback, updating and data curation by project partners and beneficiaries. In strategic terms, the Committee valued the landscaping study as a tool for future boundary setting, i.e. to determine the characteristics and features of projects associated with DivSeek, and to encourage interactions among projects. The study was also considered instrumental to illustrating value propositions, monitoring and assessing impact of the DivSeek initiative.

9. The Committee invited Mr. Francisco Lopez from the Treaty Secretariat to describe a pilot project financed by the Benefit-Sharing Fund of the International Treaty and coordinated by the Indonesian Agency for Agricultural Research and Development (IAARD) and IRRI – two DivSeek Partner organizations – to introduce the use of permanent unique identifiers (PUIDs) to facilitate tracking and quality control of rice germplasm and associated data. The Committee noted that this project represented an important global initiative that would greatly enhance the ability to link diverse sources and domains of information about genetic resources across projects, databases and communities. The Committee also noted that the project offered a valuable example of developing-country leadership, and of the catalytic role played by the CGIAR gene banks in partnership promotion.

10. Starting with the topic of PUIDs as an "organizing principle" for germplasm-associated data, the Committee continued discussions about related topics such as data quality, data curation, preferential vs. public access to data, and subscription-fee-based models for funding the maintenance of databases, such as the model proposed by a white paper submitted by Syngenta to the attention of DivSeek Partner organizations after the first Assembly and shared with Committee members.

11. The Committee was then briefed by Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, on the outcomes of the Expert Consultation on the Global Information System (GLIS) stipulated by Article 17 of the International Treaty, which had taken place in January back-to-back with the DivSeek Assembly. Mr. Manzella shared with Committee members a paper that outlined a draft vision for the GLIS, accompanied by annotations that will consolidate into a programme of work and a roadmap for implementation within the context of the International Treaty.[1] A web-based GLIS platform

[1] The annotated vision and the terms of reference are available, respectively, in Annexes 3 and 5 of this http://www.planttreaty.org/sites/default/files/COGIS1re.pdf document.

with use-oriented entry points to germplasm-associated information was offered for consideration by the Committee as a possible point of intersection between the work plan of the International Treaty and DivSeek. In considering analogous elements between DivSeek and GLIS, including data standards, interoperability among existing systems, transparency on the rights and obligation of users of germplasm-associated information, communication and collaboration efforts and capacity strengthening, the Committee agreed on the need to avoid overlaps and promote complementarity. The Committee flagged joint advocacy and communication efforts, and training and capacity building as promising areas of activity that could foster an harmonious relationship, while respectfully retaining the individual and distinct identities of the DivSeek initiative and the GLIS of the International Treaty.

12. In considering DivSeek as a bottom-up initiative and GLIS as a State-driven platform stipulated by an international legal instrument, the Committee agreed on the high potential for DivSeek to stimulate experimentation, innovation and variability of approaches to data management as well as to upstream and downstream uses of germplasm and associated information among its Partner institutions. The more formal framework of GLIS was recognized as one of the key players of the DivSeek initiative, and it was noted that there were other experienced players in the field. The Committee was informed that in addition to the 14 members of the GLIS Scientific Advisory Committee appointed by State governments, the Secretary of the International Treaty would appoint 10 further members and that Treaty was open to consider representation from DivSeek-associated scientific and technical experts for these appointments.

13. The Committee agreed to keep the issue of the non-exclusive relationship between DivSeek and GLIS under consideration in the course of development of DivSeek's programme of work.

IV. Potential elements for a DivSeek strategy

14. The Chairperson asked Dr. Wenzl, of the Joint Facilitation Unit and the Global Crop Diversity Trust, to introduce the document he had prepared together with Dr. Bastow. The "straw man" document was intended to initiate discussions on elements for a DivSeek strategy. The list of potential elements was organized according to the four priority areas that the DivSeek community had flagged, namely: community building and networking; research approaches and tools; information management; and rights management. In previous discussions, the Committee had indicated communication and capacity building as additional priority areas, and the document reflected them as well. The full list of potential elements for a DivSeek strategy is in Appendix 3 of this report.

15. The Committee considered the different elements, with particular attention to phenotyping platforms, APIs, data standards, training and capacity building on genotyping techniques. The Committee noted the considerable number of potential strategy elements included in the document, reflecting the broad range of expectations of the Partner organizations and potential research opportunities, and decided to continue assessing the importance and urgency of the different elements in the course of development of current and future DivSeek annual programmes of work. The Committee also agreed to assess the funding required to support such strategies.

16. The Committee highlighted the need to keep momentum within DivSeek and to work towards a series of strategic action points. It also invited the institutions serving the Joint Facilitation Unit to align their goals and motivations with DivSeek's future strategy, while recognizing DivSeek's unique and independent identity.

V. New membership

17. The Chairperson opened the consideration of this agenda item by soliciting the Committee's advice on: a) possible membership by individuals; b) possible membership by projects and consortia; c) a membership campaign to attract developing country qualified institutions; d) the features of the membership application process that the Committee had established, in particular as regards the requirement to indicate the anticipated contribution to DivSeek; e) possible membership by private sector, both at the level of individual companies and at the level of associations (e.g. ISF).

18. Regarding *a)* and *b)*, the Committee agreed to provisionally keep the current membership at the level of organizations/institutions, as this aligned with the current governance settings of the Charter. It considered membership tiers as a possible future solution to reflect different interest groups (e.g. donors, communities of practice, advisors and service providers).

19. Regarding *c)*, the Committee recalled the open and inclusive nature of DivSeek and agreed to encourage membership from developing country stakeholders with an interest in promoting germplasm evaluation and information sharing.

20. Regarding *d)*, the Committee confirmed the validity of requesting standardized information from new members in order to manage membership efficiently and strategically. The Committee decided to amend the request to indicate the anticipated contribution to DivSeek (e.g. projects, activities), if any, of the Partner organizations.

21. Regarding *e)*, the Committee was alerted by the Joint Facilitation Unit to the opportunity to keep an active line of communication with the private sector representatives who were at the first Partner Assembly. The Committee highlighted the potential of private sector engagement for DivSeek funding of future training and capacity building programs, as well as for expanding the range of expertise and knowledge within DivSeek. It also discussed some of the systemic and practical implications of private sector membership, with particular attention to a balanced relationship among different DivSeek constituencies and the need to promote equitable data sharing policies. It also recalled the annotation in the Charter, which referred to observer status for private sector, pending the development of operational guidelines for private sector engagement.

22. The Committee decided to request one of its members, namely Ms. Emily Marden, to convene, under her chairmanship, a governance expert group, in accordance with the Charter's provision to elaborate operational guidelines through expert consultations, in order to:

i) validate the Committee's provisional opinion about membership at the level of organizations/institutions, and/or clarify alternative options and implications;

ii) advise the Committee on possible steps towards private sector membership or other engagement, including an assessment of the implications on the implementation of DivSeek's principles as stated in the Charter.

23. In conjunction with the decision to convene a governance expert group, the Committee was informed about an on-going research project by Arizona State University (ASU) on institutional and organizational factors for enabling data access, exchange and use, which the Global Crop Diversity Trust and the Secretariat of the International Treaty were co-funding. Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, informed the Committee of the preliminary research activities conducted by the ASU research team for the project, and distributed a progress report. The Committee invited Ms. Marden to coordinate with the ASU research team to obtain early access to the results of the study for consideration as part of the work of the governance expert group.

24. The Committee reviewed an application for DivSeek membership made by *Universita' Politecnica delle Marche* in connection to the ERA-CAPS project on the genetic architecture of adaptation outside centers of domestication of *Phaseolus vulgaris* and *Phaseolus coccineus* (BEAN_ADAPT project).[2] In the light of the relevance of project activities and outputs to DivSeek's mission and goals, the Committee favorably appraised the application and instructed the Joint Facilitation Unit to formalize the membership.

[2] ERA-CAPS is a project of the seventh framework program for Coordinating Action in Plant Sciences (www.eracaps.org)

VI. DivSeek's annual program of work

25. Based on the discussions held on the previous agenda items, the Chairperson invited the Committee to consolidate a set of strategic and feasible activities to feed into the first annual Program of Work (PoW) that the Steering Committee, with the support of the Joint Facilitation Unit, would submit to the Assembly for review and approval, and to make additional proposals for medium or longer term activities. The Chairperson also invited the Committee to advise on preparatory work for the development of the PoW.

26. In general terms, the Committee agreed on DivSeek operating at the interfaces among projects through a network approach, to encourage coherent actions across, and add value to otherwise disconnected efforts, in alignment with DivSeek's principles and value propositions. In the views of the Committee, DivSeek had already generated first examples of connectors among projects (i.e. the landscaping study, the ASU governance research project) and was to continue along this path, and add essential components, such as: leveraging new funding opportunities; advocating for minimum standards for genotyping and phenotyping; promoting knowledge exchange and training; managing public relations for the benefit of the community.

27. In order to achieve the above, the Committee believed it essential to further clarify and streamline the nature and strategy of the initiative. In addition, the Committee confirmed the necessity to define requirements for associating projects and/or becoming a Partner organization, and to clearly illustrate the added values and services that DivSeek can offer to existing projects.

28. The Committee discussed a range of potential areas of work and listed the following preparatory activities for the first annual PoW:

a) the continuation and expansion of the landscape study, in an on-line interactive format, for future publication and analysis;

b) the revamping of the DivSeek website to bring it in line with the current status of the initiative;

c) the development of FAQs on practical DivSeek topics, including principles and parameters for DivSeek-associated projects, for the Assembly to review and approve;

d) based on the list of potential elements for a DivSeek strategy, the compilation of a menu of topics for DivSeek knowledge exchange and capacity building workshops, including the identification of possible funding sources (e.g. the Benefit-Sharing Fund of the International Treaty, the COST Action of the European Union, the Bill & Melinda Gates Foundation, for African students in particular);

e) the elaboration of a multi-year vision and strategy for DivSeek, taking into account the list of potential elements for a DivSeek strategy as well as the need to promote developing country membership and private sector participation;

f) the continuation of the ASU governance research project and communication of findings to the governance expert group convened by Ms. Marden.

29. To further develop point *d)* above the Chairperson requested that each Committee member draft a one-page outline for a DivSeek knowledge exchange and capacity building workshop.

30. Based on the above list, the Committee tasked itself with the elaboration of a multi-year vision and strategy for DivSeek and requested the Joint Facilitation Unit to develop a draft of the 2016 PoW for the consideration of the Committee and the Partners' Assembly, to program preparatory activities up to the next Assembly taking into consideration available resources, and to report on achievements made in year 2015.

VII. Operation of the Joint Facilitation Unit

31. The Chairperson invited Mr. Manzella to present the document that described the mandate of the Joint Facilitation Unit, as set forth in the DivSeek Charter, its composition and working modalities, and its activities in year 2015.

32. The Committee welcomed the document as clear and concise. It considered a number of potential issues in relation to the role of the Joint Facilitation Unit within DivSeek, as follows:

i) modalities for expansion or contraction of the Joint Facilitation Unit, e.g. in cases where one organization is inactive or becomes unable to serve, or where a Partner organization expresses interest in joining the Unit;

ii) the roles and responsibilities of individual representatives of the organizations that serve the Unit;

iii) the modalities of representation by the respective organizations within the Unit;

iv) the modalities for decision-making within the Unit;

v) the relationship between the Unit and the other elements of DivSeek's governance structure (i.e. the Assembly and its Chairperson and the Steering Committee) with respect to communication lines and providing guidance and direction.

33. The Committee requested the governance expert group to be convened by Ms. Emily Marden to prepare a document for the consideration of the Committee, based on the provisions of the DivSeek Charter, to explain the governance structure of DivSeek, to describe mechanisms that would allow it to evolve in the future, and to present options for clarifying the above issues.

VIII. Other business

34. In order to review progress on the action points that the Committee selected for the various agenda items and to prepare for the second DivSeek Partners' Assembly, the Chairperson invited the Joint Facilitation Unit to explore possible financial and technical support for another in-person meeting of the Committee, in the last quarter of the year.

35. The Chairperson expressed her intention to approach one of the organizations of the Joint Facilitation Unit to clarify its future engagement in the Unit.

IX. Preparation of the report

36. The Chairperson requested the Joint Facilitation Unit to prepare a concise report of the meeting, to reflect the main thread of the discussions and the consensus of the Committee on individual agenda items.

37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

38. In closing the meeting, the Steering Committee thanked the Joint Facilitation Unit for the excellent support to the meeting, including the preparation of documents, and the Secretariat of the International Treaty for the efficient hosting arrangements and the contributions made in the course of the discussions.

Appendix 1

LIST OF PARTICIPANTS

Members of the Steering Committee

Susan	McCOUCH
Andreas	GRANER
Ruaraidh	SACKVILLE HAMILTON
Elizabeth	ARNAUD
David	MARSHALL
Peter	BRETTING
Sarah	AYLING – *available by audio link*
Rajeev K.	VARSHNEY

Joint Facilitation Unit

Peter	WENZL
Ruth	BASTOW
Daniele	MANZELLA

Secretariat of the International Treaty

Shakeel	BHATTI
Francisco	LOPEZ

Appendix 2

DIVSEEK

FIRST MEETING OF THE STEERING COMMITTEE
28 May 2015

FAO Headquarters, Canada Room (A-357)
Rome, Italy

AGENDA OF THE MEETING

1. Welcome
2. Approval of the agenda
3. Draft landscaping study
4. Potential elements for a DivSeek strategy
5. New membership
6. DivSeek annual Program of Work
7. Operation of the Joint Facilitation Unit
8. Other business
9. Preparation of the report

Appendix 3

Potential elements of a DivSeek strategy

Component	Area
Communication	DivSeek website
Resource mobilization	
Community-building & networking	Landscape of ongoing projects
	Social network analysis of researchers
	Membership campaign
	Engaging with blueprint/pilot projects in specific crops
	Targeting and quantifying impacts
Research approaches & tools	Logistics and sample tracking
	Accession-sampling strategies
	Genotyping & sequencing approaches
	Phenotyping techniques
Information management	Permanent unique identifiers
	Standards for genotyping-by-sequencing data
	Standards for selected types of phenotypic data
	Databases & tools for managing primary data
	Data repositories & tools for sharing data
Rights management	Broadly accepted data-sharing framework
	Framework for engaging the private sector in DivSeek
	Governance framework for crop communities
Capacity strengthening	

Bretting, Peter

From: Bretting, Peter
Sent: Thursday, August 13, 2015 2:21 PM
To: 'Emily Marden'; Phillips, Peter
Subject: RE: DivSeek SC meeting report, May 28, 2015, Rome

Hi Emily and Peter—it's good to discuss DivSeek topics again!

From my perspective, the Steering Committee functioned cordially and productively during the May meeting. But we were unclear about the SC's precise role, the rules of engagement, etc. So some guidance from governance experts like you would be greatly appreciated.

Considering the current membership of the "governance group," are you seeking especially non-North Americans as additional members?

Thanks,

Peter

Peter Bretting
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5601 Sunnyside Avenue
Beltsville, MD 20705-5139
Phone 1.301.504.5541
Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: Emily Marden [redacted]
Sent: Thursday, August 13, 2015 11:31 AM
To: Phillips, Peter
Cc: Bretting, Peter
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Welcome back and great to hear from you!

I have been in and out as well, so no worries.

By way of update, I asked Geertrui Van Overwalle, a Dutch academic who has been involved in these issues and has been following DivSeek to participate on the expert committee - but unfortunately she is too busy and declined. Peter P. - you had mentioned someone retired from Gates - is that still an option? I do know one other person there who I could ask, if we think appropriate. A group of 4 would be ideal. I also reached out to Ruaraidh but he has been away as well.

As I think I wrote earlier in the summer, the most pressing issue for the Steering Committee seems to be its own functionality, in terms of the role overall of the Joint Facilitation Unit and the individual role/expertise of each.

Let us know your initial thoughts on functionality and the other potential party. We can then plan a call for sometime in the early fall when all are available.

Best regards,

Emily

On 13 August 2015 at 08:15, Phillips, Peter <peter.phillips@usask.ca> wrote:

Sorry for the silence– [redacted] and then the attendant backlog sidelined me.

Emily, I am now mostly around and can reengage and see what I might be able to contribute. I have been musing that there may be some lessons we can draw from other like-type exercises that might offer some pathways to resolving some of the outstanding issues.

p.

Peter W.B. Phillips, Ph.D.

Distinguished Professor and Graduate Chair, Johnson-Shoyama Graduate School of Public Policy

University of Saskatchewan

Room 146, 101 Diefenbaker Place

Saskatoon, Canada S7N 5B8

Tel: 306-966-4021

Fax: 306-966-1967

Websites:

JSGS: http://www.schoolofpublicpolicy.sk.ca

Personal: http://peterwbphillips.org

VALGEN: www.Valgen.ca

From: Bretting, Peter [mailto:Peter.Bretting@ARS.USDA.GOV]
Sent: Wednesday, August 12, 2015 11:45 AM
To: Emily Marden
Cc: Phillips, Peter
Subject: RE: DivSeek SC meeting report, May 28, 2015, Rome

You're welcome! During the summer [redacted] and I attend commodity and scientific society meetings, so [redacted]

Thanks,

Peter

Peter Bretting

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Mobile Phone [redacted]

E-mail peter.bretting@ars.usda.gov

Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: Emily Marden [redacted]
Sent: Wednesday, August 12, 2015 1:39 PM
To: Bretting, Peter
Cc: Peter Phillips
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Peter,

Thank you for getting in touch!

We have had a slow start this summer as we all respectively go on vacation. I am hoping to convene a few calls over the course of the fall and will be in touch as soon as possible to check schedules.

I believe Peter Phillips is now back from [redacted] (if so, welcome back) and so we should move forward with our planning discussions.

Best regards,

Emily

On 12 August 2015 at 03:56, Bretting, Peter <Peter.Bretting@ars.usda.gov> wrote:

Hi Emily and Peter—are there any ongoing discussions with the governance aspects of DivSeek? I'll begin a period of travel and [redacted] soon, so wanted to check before going "offline."

Hope that you have enjoyed a pleasant and peaceful summer!

Peter

Peter Bretting

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From: Emily Marden [redacted]
Sent: Wednesday, June 24, 2015 7:22 PM
To: Bretting, Peter; Peter Phillips

Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Peter,

Thank you for your message. I welcome you Input on governance matters and know that it will be very valuable.

I am copying Peter Phillips as he has agreed to take continue taking a role in these efforts as well.

I am currently travelling but we will be in touch in the next week as the expert committee continues to take shape.

Best regards,

Emily

On 24 June 2015 at 07:42, Bretting, Peter <Peter.Bretting@ars.usda.gov> wrote:

Hi Emily—apologies for the delayed reply. I was out much of last week [redacted].

I'd be happy to help with the governance discussions, if you judge that my participation on the governance committee might be useful.

We missed your expertise and wise counsel during the meeting in Rome.

Many thanks!

Peter

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> Attached please find a summary report of our SC meeting on May 28, 2015 in Rome prepared jointly by members of the JFU.
>
> Please do not hesitate to contact me if there are changes you feel are necessary to accurately reflect the committee's discussions. I would appreciate receiving any suggested edits as tracked changes in the attached document.
>
> For now, Emily Marden has agreed to convene a special committee to review the governance questions that were raised during our meeting in Rome. Her committee will report back to the SC at our next meeting, tentatively scheduled for November or early December 2015.
>
> Best regards,
>
> Susan

--

Susan McCouch
Professor, Plant Breeding & Genetics
Cornell University
162 Emerson Hall
Ithaca, NY 14853-1901

Phone: +1 607-255-0420
Fax: +1 607-255-6683
Email: srm4@cornell.edu or mccouch@cornell.edu
Alternate Email: [redacted]

Bretting, Peter

From: Emily Marden [redacted]
Sent: Thursday, August 13, 2015 11:31 AM
To: Phillips, Peter
Cc: Bretting, Peter
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Welcome back and great to hear from you!

I have been in and out as well, so no worries.

By way of update, I asked Geertrui Van Overwalle, a Dutch academic who has been involved in these issues and has been following DivSeek to participate on the expert committee - but unfortunately she is too busy and declined. Peter P. - you had mentioned someone retired from Gates - is that still an option? I do know one other person there who I could ask, if we think appropriate. A group of 4 would be ideal. I also reached out to Ruaraidh but he has been away as well.

As I think I wrote earlier in the summer, the most pressing issue for the Steering Committee seems to be its own functionality, in terms of the role overall of the Joint Facilitation Unit and the individual role/expertise of each.

Let us know your initial thoughts on functionality and the other potential party. We can then plan a call for sometime in the early fall when all are available.

Best regards,

Emily

On 13 August 2015 at 08:15, Phillips, Peter <peter.phillips@usask.ca> wrote:

Sorry for the silence– [redacted] and then the attendant backlog sidelined me.

Emily, I am now mostly around and can reengage and see what I might be able to contribute. I have been musing that there may be some lessons we can draw from other like-type exercises that might offer some pathways to resolving some of the outstanding issues.

p.

Peter W.B. Phillips, Ph.D.

Distinguished Professor and Graduate Chair, Johnson-Shoyama Graduate School of Public Policy

University of Saskatchewan

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Bretting, Peter

From: Emily Marden [redacted]
Sent: Monday, August 17, 2015 3:17 PM
To: Phillips, Peter
Cc: Bretting, Peter
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome
Attachments: DivSeek Expert Governance.docx

Dear Peter and Peter,

Attached is a summary of the issues raised in the Steering Committee meeting for expert consideration.

These fall into disparate "buckets" and so we should think about what to consider first.

I think we should start to tentatively plan for a telephone meeting in mid September and should try to develop some thoughts on, perhaps, the governance issues. We can also have Eric and Selim, who are working on the Arizona State project share some of their research. I think their case studies potentially may provide direction for moving forward.

I will also continue to look for additional input.

Peter (Phillips) - if you have thoughts on the governance issues from other organizations that you have worked it, it would be very helpful. There is a desire on the part of Susan that the JFU not participate in the expert committee; however, I know that some of the JFU members would like to participate.

I look forward to further discussion,

Emily

On 13 August 2015 at 08:30, Emily Marden [redacted] wrote:
Welcome back and great to hear from you!

I have been in and out as well, so no worries.

By way of update, I asked Geertrui Van Overwalle, a Dutch academic who has been involved in these issues and has been following DivSeek to participate on the expert committee - but unfortunately she is too busy and declined. Peter P. - you had mentioned someone retired from Gates - is that still an option? I do know one other person there who I could ask, if we think appropriate. A group of 4 would be ideal. I also reached out to Ruaraidh but he has been away as well.

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Let us know your initial thoughts on functionality and the other potential party. We can then plan a call for sometime in the early fall when all are available.

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USDA

United States Department of Agriculture
Research, Education, and Economics
Agricultural Research Service

DRAFT
March 21, 2016

Subject: Program Direction and Resource Allocation Memorandum for ARS Project No. 8042-22000-278-00D, entitled, "Electron and Confocal Microscopy Applications to Pests and Plant Processes Impacting Agricultural Productivity"

To: Dariusz Swietlik, Director, Northeast Area

Through: Maureen Whalen, Deputy Administrator, Crop Production and Protection

From: Rose Hammond, Acting National Program Leader, Plant Health

The project peer review for National Program 303, Plant Diseases, has been scheduled for September – December 2016 by the ARS Office of Scientific Quality Review. ARS Project No. 8042-22000-278-00D, entitled, "Electron and Confocal Microscopy Applications to Pests and Plant Processes Impacting Agricultural Productivity," in the Soybean Genomics and Improvement Research Unit, Beltsville, Maryland, is due to terminate March 24, 2017, and the replacement project will go through peer review. The Project Plan should focus on the research the team will perform to meet the goals and objectives of the NP 303 Action Plan.

The Project Plan, which is due to the Office of National Programs no later than July 25, 2016, for review and validation, should be written with relevance to the components and problem statements within the NP 303 Action Plan, following the specific guidance given below. Please visit the OSQR Web site (http://www.ars.usda.gov/OSQR) for additional information about the peer review process.

New Project Title: Microscopy Applications for the Identification and Management of Agricultural Pests and Pathogens

Relevance to Action Plan:
Electron and confocal microscopy imaging technologies are used to deepen our understanding of pests and pathogens, particularly how they interact with cells of their hosts. The Electron and Confocal Microscopy Unit (ECMU) is a core facility that provides collaborative assistance to Beltsville Agricultural Research Center scientists and their collaborators who need high resolution imaging to validate their research hypotheses. The facility is equipped with state-of-the-art electron microscopes [transmission (TEM) and scanning (SEM)], a confocal laser scanning microscope (CLSM), a stereo-zoom fluorescence microscope, and digital video microscopy adapted for both digital imaging and movies. Rapid visualization of invasive

pathogens and pests allows researchers to make informed decisions that ultimately may help protect consumers and ensure the quality and safety of agricultural products. Microscopy also supports basic research and allows scientists to gain biological insight useful for designing novel control strategies for pests and pathogens.

The proposed research is relevant to the NP 303 Action Plan, Component 1: Etiology, Identification, Genomics and Systematics; Problem Statement 1: *Diagnostics, Etiology, Genomics and Systematics of Plant Disease and Associated Microbes.*

Objectives of Research:

Objective 1: Develop and apply new techniques and methodologies in microscopy that facilitate the systematic identification and characterization of plant pathogens and pests, alone or with their hosts. [NP303, C1, PS1]

Objective 2: Provide expertise and support ARS collaborative research projects that require quality microscopy imaging. [NP303, C1, PS1]
Expiring project objective: 2)Provide technical support and expertise specific to individual research projects with BARC scientists and their collaborators for achieving previously unobtainable data and improvement of the quality of imaging results.

Commented [SS1]: This is a support function that is not research. Was it an objective in the expiring project? How will this be handled in the project plan?

Source of Funds and Funding Level: $561,814 (NTL) from ARS Project No. 8042-22000-278-00D

National Program Information:
National Program Code: NP 303, Plant Diseases

cc:
D. Rausch, NEA
D. Geiman, NEA
OSQR
J. Stetka, ONP
K. Jenkins, ONP

Summary of Requests to Expert Committee

(arising from May 28, 2015 Steering Committee Meeting)

1. Governance Issues

22. The Committee decided to request one of its members, namely Ms. Emily Marden, to convene, under her chairmanship, a governance expert group, in accordance with the Charter's provision to elaborate operational guidelines through expert consultations, in order to:

i) validate the Committee's provisional opinion about membership at the level of organizations/institutions, and/or clarify alternative options and implications;

ii) advise the Committee on possible steps towards private sector membership or other engagement, including an assessment of the implications on the implementation of DivSeek's principles as stated in the Charter.

23. In conjunction with the decision to convene a governance expert group, the Committee was informed about an on-going research project by Arizona State University (ASU) on institutional and organizational factors for enabling data access, exchange and use, which the Global Crop Diversity Trust and the Secretariat of the International Treaty were co-funding. Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, informed the Committee of the preliminary research activities conducted by the ASU research team for the project, and distributed a progress report. The Committee invited Ms. Marden to coordinate with the ASU research team to obtain early access to the results of the study for consideration as part of the work of the governance expert group.

32. [The Steering Committee] considered a number of potential issues in relation to the role of the Joint Facilitation Unit within DivSeek, as follows:

i) modalities for expansion or contraction of the Joint Facilitation Unit, e.g. in cases where one organization is inactive or becomes unable to serve, or where a Partner organization expresses interest in joining the Unit;

ii) the roles and responsibilities of individual representatives of the organizations that serve the Unit;

iii) the modalities of representation by the respective organizations within the Unit;

iv) the modalities for decision-making within the Unit;

v) the relationship between the Unit and the other elements of DivSeek's governance structure (i.e. the Assembly and its Chairperson and the Steering Committee) with respect to communication lines and providing guidance and direction.

33. The Committee requested the governance expert group to be convened by Ms. Emily Marden to prepare a document for the consideration of the Committee, based on the provisions of the DivSeek Charter, to explain the governance structure of DivSeek, to

describe mechanisms that would allow it to evolve in the future, and to present options for clarifying the above issues[1].

37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

2. Membership Issues

   a. Organizational Level

   18. Regarding a) and b), the Committee agreed to provisionally keep the current membership at the level of organizations/institutions, as this aligned with the current governance settings of the Charter. It considered membership tiers as a possible future solution to reflect different interest groups (e.g. donors, communities of practice, advisors and service providers).

   b. Private Sector

   21. Regarding e), the Committee was alerted by the Joint Facilitation Unit to the opportunity to keep an active line of communication with the private sector representatives who were at the first Partner Assembly. The Committee highlighted the potential of private sector engagement for DivSeek funding of future training and capacity building programs, as well as for expanding the range of expertise and knowledge within DivSeek. It also discussed some of the systemic and practical implications of private sector membership, with particular attention to a balanced relationship among different DivSeek constituencies and the need to promote equitable data sharing policies. It also recalled the annotation in the Charter, which referred to observer status for private sector, pending the development of operational guidelines for private sector engagement.

3. Publication Issue

   37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

---

[1] To potentially include additional issues raised in informal discussions:

- How many individuals/institutions should be represented?
- What are the procedures for accepting a new member or retiring a current member?
- Guiding principles for governance structure of the initiative long term and short term
- Who acts on behalf of who? Do JFU members report to their current organizations? Or to the SC and the PA?
- Should the JFU members have specific domains of authority /expertise and reprting responsibilities to streamline implementation of DivSeek directives?
- Is the current reporting structure [EM comment: not sure what this is?] conducive to long term growth and sustainability of the initiative?
- Currrently budgets managed by individual JFU organizations. Should there be some sort of joint management?

4. Additional Issues Raised in Discussion with S. McCouch

Bretting, Peter

From: E. Marden [redacted]
Sent: Friday, October 30, 2015 1:06 PM
To: Bretting, Peter
Cc: Phillips, Peter; Bill Boland; Regiane Garcia
Subject: Re: Governance Subcommittee - Meeting Minutes - Please Review
Attachments: October 28 Governance Meeting Report.docx

Dear all,

Thank you for your time on Wednesday. Please find the Oct 28 meeting minutes attached. Comments welcome.

Best regards,

Emily

On Oct 28, 2015, at 12:07 PM, Bretting, Peter <Peter.Bretting@ARS.USDA.GOV> wrote:

> **Thanks,**
>
> **Peter**
>
> **Peter Bretting**
> **USDA/ARS Office of National Programs**
> **Room 4-2212, Mailstop 5139**
> **5601 Sunnyside Avenue**
> **Beltsville, MD 20705-5139**
> **Phone 1.301.504.5541**
> **Fax 1.301.504.6191**
> **Mobile Phone** [redacted]
> **E-mail peter.bretting@ars.usda.gov**
> **Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301**
>
> **From:** Phillips, Peter [mailto:peter.phillips@usask.ca]
> **Sent:** Wednesday, October 28, 2015 2:55 PM
> **To:** Emily Marden; Bill Boland; Regiane Garcia; Bretting, Peter
> **Subject:** RE: Governance Committee - Updates
>
> It certainly was a lightening rod when we accepted nominees for the advisory council. I had to ask them to withdraw from consideration at the assembly to avoid the awkward and divisive discussion about the role for private firms.

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Teleconference of the Governance Subcommittee,
DivSeek Initiative Steering Committee
28 October 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. **Recap**

E. Marden reviewed the items designated from the 23 September 2015 meeting of the Subcommittee and welcomed the written proposal for DivSeek developed by P. Phillips and B. Boland.

2. **Discussion of Memorandum**

Discussion ensued on the written proposal. The Subcommittee confirmed that there was consensus around implementing an executive function to give DivSeek the operational tools to move forward. This executive function was envisaged as an Executive Director or CEO, guided by an Advisory Board/Steering Committee. It was also envisaged that JFU members and others could be seconded into the executive function on an as-needed basis in order to give DivSeek necessary expertise and flexibility.

The Subcommittee recognized that there are different potential models for implementing an executive function, ranging from creating a new stand-alone organization, to locating the executive function within an existing organization, or to contracting the function out to an existing organization. In addition, there was recognition that any of these structures would require a transitional plan. It was thus agreed that the report developed for the Steering Committee would contain several possible models for an executive function, and that each of these models would include transitional steps to be taken. P. Phillips and B. Boland agreed to flesh out these options.

The Subcommittee also noted that empowerment of an executive to act on behalf of DivSeek would require drafting of concise operational principles that would set clear parameters for actions that could be undertaken with or without additional input from the Advisory Board. P. Phillips noted that he had some governance principles that could be used as a template for such principles and that he would circulate.

3. **Publication**

The Subcommittee next addressed the issue of publication of DivSeek discussions and reports based on the Steering Committee request to elaborate *"a policy on the publication of DivSeek meeting documents and reports."* In discussion, it was noted that a best practice would be to publish documents and reports in streamlined form, without attribution of comments to individuals. It was agreed that such an approach would serve the purpose of transparency and communication while still enabling free and open discussion. E. Marden agreed to write this recommendation up for the Steering Committee meeting

4. **Private Sector**

In recognition of the ongoing importance of engaging with the private sector, E. Marden raised the possibility of meeting with members of the private sector at or before the next

Assembly to gauge the level of interest. This idea was generally accepted by the Steering Committee.

5. **Next Steps**

The Subcommittee agreed to work towards preparing materials for the December 8 SC meeting. Specifically, Bill B. and Peter P. will add detail to their Memorandum, offering options for an executive structure and transition elements. In addition, they will circulate operating principles that could be revised for DivSeek. E. Marden will circulate a proposal for the SC on publication and meeting with the private sector. The Subcommittee aims to circulate materials and to work toward a draft by the third week of November.

Bretting, Peter

From: Bretting, Peter
Sent: Thursday, October 08, 2015 2:29 PM
To: 'E. Marden'; Peter Phillips; Bill Boland; Regiane Garcia
Subject: RE: Governance Committee - Updates

Thanks, Emily. I've inserted some comments in the text below.

Glad that you attended the GB-6 meeting. The reports I've received about GLIS and DivSeek discussions at GB-6 have been disturbing.

Peter

Peter Bretting
USDA/ARS Office of National Programs
Room 4-2212, Mailstop 5139
5601 Sunnyside Avenue
Beltsville, MD 20705-5139
Phone 1.301.504.5541
Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: E. Marden [redacted]
Sent: Thursday, October 08, 2015 1:35 PM
To: Peter Phillips; Bill Boland; Bretting, Peter; Regiane Garcia
Subject: Governance Committee - Updates

Dear all,

Since we spoke I have had a number of conversations bearing on DivSeek governance and I think these are relevant to pass on.

1. I had an off-line conversation with Peter Wenzl (Crop Trust) and Ruth Bastow (Global Plant Council) about DivSeek. I floated the idea of an executive director who has operating capacity, separate from the JFU entities. Both came back separately with extreme enthusiasm. The Trust, in particular, seems to back this idea, as long as the ED is not located at the Treaty. Ruth wondered about setting up a separate legal entity.

2. I also had an offline conversation with Daniele (Treaty). He himself suggested that what was needed was an executive director, or secretariat at an organization that is not one of the current 4. He stated that he thought a separate legal entity would be a bad idea, but that a "secretariat" could be established at some willing organization with current (or other) organization seconded to help with the operations.

I think this is all very good for our proposal. **Agreed, those conversations do seem quite positive. Daniele is a welcome addition to the Treaty Secretariat staff.**

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Bretting, Peter

From: Bretting, Peter
Sent: Sunday, November 01, 2015 1:30 PM
To: 'E. Marden'
Cc: Phillips, Peter; Bill Boland; Regiane Garcia
Subject: RE: Governance Subcommittee - Meeting Minutes - Please Review
Attachments: 2015 October 28 Governance Meeting Report PKB.doc

Hi Emily—thanks for the timely set of meeting notes. I edited them slightly for clarity.

Much appreciated!

Peter

Peter Bretting
USDA/ARS Office of National Programs
Room 4-2212, Mailstop 5139
5601 Sunnyside Avenue
Beltsville, MD 20705-5139
Phone 1.301.504.5541
Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
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It certainly was a lightening rod when we accepted nominees for the advisory council. I had to ask them to withdraw from consideration at the assembly to avoid the awkward and divisive discussion about the role for private firms.

---- Bretting, Peter wrote ----

Hi all—the Beijing Genomics Institute is a DivSeek partner. Wikipediahttps://en.wikipedia.org/wiki/Beijing_Genomics_Institute mentions "The institute has described itself as partly private and partly public, receiving funds both from private investors and the Chinese government." Other research institutes which are DivSeek partners might be similarly described.

Might this be relevant to the discussion of private-sector participation in the DivSeek Initiative?

Peter

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I think this is all very good for our proposal. **Agreed, those conversations do seem quite positive. Daniele is a welcome addition to the Treaty Secretariat staff.**

Peter/Bill – were you going to draft a framework along these lines, with backup examples? If not, I can take a stab at a vision; examples would still be very welcome. However, I would like to start circulating something relatively soon so that we can all comment and then prepare for a larger group.

Of note: I was in Rome for the Treaty Governing Body meeting. The Treaty out of the blue announced that the Global Information System is up and running and IRRI had 'deposited' all of its material in it. After initial surprise, it turns out that IRRI has simply agreed to be a part of the GLIS, but there is no such new entity at the moment. Further, there was a lot of chatter around the edges that this announcement seemed premature as there were still many questions about the terms on which information in the GLIS would be shared. In fact, these issues were widely commented on by contracting parties at the meeting. **Yes, the GLIS is really a "work-in-progress." Describing it as "up and running" was surely inaccurate and premature.**

Also, I had the opportunity to speak informally with a couple legal/policy people from the private sector. They are all quite interested in seeing where DivSeek goes. I floated the idea of having a open 'listening' meeting in January so that we could gauge their perspective and relevant issues. All were quite keen. They also let loose that their main concern would be that information in DivSeek could be subject to the Treaty's SMTA, which to their minds, would be untenable as applied to information. (I tend to agree with this.**As do I). DivSeek is a voluntary association of research institutions, completely independent of the ITPGRFA.**

I am going to send around a Doodle poll for the last two weeks of this month – please let me know if this timeframe does not work for you. **The last two weeks of October are fine for me. Thanks!**

Best regards,

Emily

On Sep 20, 2015, at 12:40 PM, Emily Marden [redacted] wrote:

> Dear all,
>
> Here is a teleconference number we can use for next week's call:
>
> Dial in: [redacted]; Conference Code: [redacted]
>
> This number only works in N. America - so let me know if you are travelling.
>
> I am also attaching the following materials:
>
> 1. Agenda and Draft proposal for Governance (in order to generate discussion)
>
> 2. Summary of Terms of Reference for Governance Committee, arising from DivSeek Steering Committee Meeting
>
> 3. [TBD: background research/proposals on possible governance structures (not attached)]
>
> I am also attaching the following to make sure we all have the relevant documents:

- DivSeek Charter
- DivSeek Draft Document "Operation of the Joint Facilitation Unit"
- Early Draft of Research of Arizona State University

On 11 September 2015 at 16:39, Emily Marden [redacted] wrote:

Dear all,

Let's plan for September 23, at 9 AM PST, 12 EST and 10 AM in Saskatchewan. Susan - you indeed do not need to be on the call, but we are happy to have you if you're available.

Please let me know the best telephone number to reach you at and I will fold people in.

An agenda will be distributed a few days beforehand.

Thank you!

Emily
On Sep 9, 2015, at 9:23 AM, Emily Marden [redacted] wrote:

> Dear all:
>
> I am hoping to have an initial first call with this group (and open to others as I/we try to gather additional expert members) to identify and address the issues raised by the DivSeek Steering Committee.
>
> I will send around an agenda and outline of the issues before the call, as well as some proposals to discuss.
>
> Please let me know if any of the proposed dates work. If not, we will push forward by another week or two.
>
> Best regards,
>
> Emily
>
> You have initiated a poll "DivSeek Governance Committee" at Doodle.
> The link to your poll is:

[redacted]

Share this link with all those who should cast their votes. Do not forget to cast your vote, too.

(If you did not initiate this poll, somebody must accidentally have used your e-mail address; simply ignore this e-mail, please.)

- Your Doodle Team

Doodle AG, Werdstrasse 21, 8021 Zürich

<Whitepaper PGRFA Governance 09012015.pdf><Operation of the Joint Facilitation Unit.pdf><DivSeek+Charter.pdf><DivSeek_Second Progress Report_Final (1).pdf><Governance Committee Meeting Sept 23.docx>

Teleconference of the Governance Subcommittee,
DivSeek Initiative Steering Committee
28 October 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. **Recap**

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2. **Discussion of Memorandum**

Discussion ensued on the written proposal. The Subcommittee confirmed its consensus around implementing an executive function to give DivSeek the operational tools to move forward. This executive function was envisaged as an Executive Director or CEO, guided by an Advisory Board/Steering Committee. It was also envisaged that JFU members and/or others could be seconded into the executive function on an as-needed basis to give DivSeek necessary expertise and flexibility.

The Subcommittee recognized different potential models existed for implementing an executive function, ranging from creating a new stand-alone organization, to locating the executive function within an existing organization, or to contracting the function out to an existing organization. In addition, it recognized that any of these structures would require a transitional plan. It was thus agreed that the report developed for the Steering Committee would contain several potential models for an executive function, with each of these models including transitional steps. P. Phillips and B. Boland agreed to flesh out these options.

The Subcommittee also noted that empowerment of an executive to act on behalf of DivSeek would require drafting concise operational principles that would set clear parameters for actions that could be undertaken with or without additional input from the Steering Committee/Advisory Board. P. Phillips will circulate some governance principles that could be used as a template for this purpose.

3. **Publication**

The Subcommittee next addressed the publication of DivSeek discussions and reports based on the Steering Committee request to elaborate *"a policy on the publication of DivSeek meeting documents and reports."* In discussion, it was noted that a best practice would be to publish reports of key meeting transactions in streamlined form, without attribution of comments to individuals. Such an approach would serve the purpose of transparency and communication while still enabling free and open discussion. E. Marden agreed to draft this recommendation for the Steering Committee meeting

4. **Private Sector**

Recognizing the ongoing importance of engaging the private sector, E. Marden raised the possibility of conferring with members of the private sector at or before the next Partners

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Commented [BP1]: Peter Phillips—could you check this phrasing?

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Assembly to gauge their level of interest. This idea was accepted by the Steering Committee.

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5. **Next Steps**

The Subcommittee agreed to prepare materials for the December 8 SC meeting. Specifically, Bill B. and Peter P. will add detail to their Memorandum, offering options for a DivSeek executive structure and elements for transitioning to that structure. In addition, they will circulate operating principles that could be revised for DivSeek. E. Marden will circulate a proposal for the SC on publication of SC meeting notes and conferring with the private sector. The Subcommittee aims to circulate materials and to work toward a draft by the third week of November.

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Bretting, Peter

From:	Emily Marden [redacted]
Sent:	Sunday, September 20, 2015 3:40 PM
To:	Susan McCouch; Peter Phillips; Bill Boland; Bretting, Peter; Regiane Garcia
Subject:	Re: DivSeek Governance Meeting Sept 23 9 PST/10 CST (SK)/12 EST - dial in information, agenda and background material
Attachments:	Whitepaper PGRFA Governance 09012015.pdf; Operation of the Joint Facilitation Unit.pdf; DivSeek+Charter.pdf; DivSeek_Second Progress Report_Final (1).pdf; Governance Committee Meeting Sept 23.docx

Dear all,

Here is a teleconference number we can use for next week's call:

Dial in: [redacted] Conference Code: [redacted]

This number only works in N. America - so let me know if you are travelling.

I am also attaching the following materials:

1. Agenda and Draft proposal for Governance (in order to generate discussion)

2. Summary of Terms of Reference for Governance Committee, arising from DivSeek Steering Committee Meeting

3. [TBD: background research/proposals on possible governance structures (not attached)]

I am also attaching the following to make sure we all have the relevant documents:

- DivSeek Charter
- DivSeek Draft Document "Operation of the Joint Facilitation Unit"
- Early Draft of Research of Arizona State University

On 11 September 2015 at 16:39, Emily Marden [redacted] wrote:

Dear all,

Let's plan for September 23, at 9 AM PST, 12 EST and 10 AM in Saskatchewan. Susan - you indeed do not need to be on the call, but we are happy to have you if you're available.

Please let me know the best telephone number to reach you at and I will fold people in.

An agenda will be distributed a few days beforehand.

Thank you!

Emily
On Sep 9, 2015, at 9:23 AM, Emily Marden [redacted] wrote:

> Dear all:
>
> I am hoping to have an initial first call with this group (and open to others as I/we try to gather additional expert members) to identify and address the issues raised by the DivSeek Steering Committee.
>
> I will send around an agenda and outline of the issues before the call, as well as some proposals to discuss.
>
> Please let me know if any of the proposed dates work. If not, we will push forward by another week or two.
>
> Best regards,
>
> Emily
>
> You have initiated a poll "DivSeek Governance Committee" at Doodle.
> The link to your poll is:
>
> [redacted]
>
> Share this link with all those who should cast their votes. Do not forget to cast your vote, too.
>
> (If you did not initiate this poll, somebody must accidentally have used your e-mail address; simply ignore this e-mail, please.)
>
> - Your Doodle Team
>
> ---
>
> Doodle AG, Werdstrasse 21, 8021 Zürich

DivSeek
Governance Committee
September 23, 2015

Agenda

1. Introductions

2. Items referred to the Governance Committee
   - *Governance of organization and role of the Joint Facilitation Unit within DivSeek*
   - *A policy on the publication of DivSeek meeting documents and reports on website*
   - *Membership and membership levels*
   - *Private Sector involvement*

3. Materials Provided
   - Summary of Terms of Reference from May 28 Steering Committee Meeting Minutes
   - DivSeek Charter
   - DivSeek Draft Document "Operation of the Joint Facilitation Unit"
   - Early Draft of Research of Arizona State University
   - Proposals for Governance
   - Syngenta Whitepaper (informational only)

4. Focus on Governance of Organization
   - Background

5. Publication Issue
   - Proposal: As a transparent organization, SC meeting minute should be available on website.

6. Membership Issues
   - Confirm one point person per organization
   - Consider different levels of membership
   - Not sure what the issues are here

7. Private Sector
   - Propose a meeting of interested Private Sector parties at next Assembly (January 8, 2016) in San Diego.
   - Table this discussion at present

Draft Proposal for Governance – for discussion only[1]

Points to Consider:
Interests of JFU member organizations
Budget commitments of JFU member organizations
Need for "nimble" operation of DivSeek
Time commitments of interested parties
Long term viability/workability of model
Need for final decisions on multiple issues

AIM: Leverage willing participation of JFU members based on their expertise and contribution of FTE/funding while ensuring that the organization can function in a nimble way. Leverage willing participation of SC members based on expertise and contribution of time. Ensure transparency to decisionmaking. Ensure engagement with community and stability.

Roles

1. **JFU: Management of DivSeek**
    a. **Duties: Contribute FTE expertise in ongoing daily function of DivSeek. Membership contingent upon time and effectiveness in role.**
        i. **Initial members set**
        ii. **Renewable by SC/Chair on an annual basis**
        iii. **Limit to number of terms?**
        iv. **Requirement for minimum FTE/financial contribution?**
            - **Concerns that JFU member can/is not meeting minimum FTE/financial contribution, taken to Chair and SC. In consultation with JFU member will decide if JFU term should be phased out.**
        v. **May step down from JFU with 6 months notice.**
        vi. **Interest in becoming JFU member directed to Chair, considered by SC, upon affirmation by SC, presented to Assembly for majority vote**
            - **Open to private sector?**
            - **Diversity requirement? In terms of type of institution or geographical location or size of institution?**
        vii. **Specific Duties vis a vis Subcommittee (see below) on JFU –**
            - **Interest expressed by JFU member,**
            - **confirmed/altered by SC,**
            - **confirmed by Chair**
        viii. **Each specific Subcommittee must have minimum 1 JFU member and maximum 2 (3?)**
        ix. **JFU member on Subcommittee takes up duties for that subcommittee and is advised by SC members on subcommittee. SC members must approved decisions and actions of JFU member**
        x. **JFU member continues to play a role in home institution, but works with SC subcommittee in assigned role**

[1] Intended to serve as "straw man" for discussion purposes

b. Size: Minimum 3 and maximum 6 members.

c. Potential subcommittee Commitment (from Roles document)
   i. Serving the Steering Committee and the Assembly
      - Documentation
      - Logistics
   ii. Community Building and Networking
      - Landscaping Study
      - ASU Study
      - Publicity?
      - Responses to Inquiry and Updates
   iii. Promotion of Normative Work
      - Based on Priorities set forth by the Steering Committee
   iv. Communication and Representation
      - Website
      - Institutional Websites
      - Communications with Partner organizations
      - Communications with new membership
      - External technical meetings
   v. Resource Mobilization
      - In kind contributions
      - Financial contributions
      - Ad hoc resource management
      - Budgets?
   vi. Engagement with Private Sector

2. Steering Committee: Advisory Board
   a. Duties: Collectively search as advisory board, meeting twice annually to guide Divseek on all areas.
      i. Each individual SC member must also serve on at least one subcommittee, working with JFU member on roles. Subcomittee membership to be identified based on interest and expertise. Each subcommittee must contain at least 2 SC members.
      ii. JFU member will apprise subcommittee of recent activities on a biweekly/monthly basis, as needed.
      iii. JFU will share with subcommittee any materials/decisions/plans generated for the operation of DivSeek, for subcommittee approval. Such distribution and approval may be made electronically.
      iv. Where approval is unanimous, JFU member can then simply inform other DivSeek JFU members of action
      v. Where non-unanimous, or where the subcommittee deems broader review to be necessary because of potential far reaching impacts, materials/decision/plans may be shared with entire SC and/or JFU for review and approval. Monthly phone calls will be scheduled, as necessary, to discuss such issues. Where consensus cannot be reached, the Chair will have final decision making authority as to whether the JFU member can proceed with the materials/decision/plans, as appropriate.

vi. For clarity, any publications made on behalf of Divseek, must be reviewed and approved by the Chair, in addition to being reviewed and approved by subcommittee

3. Assembly: Stakeholders
    a. Duties: Stakeholders in the organization

Whitepaper

Challenges and opportunities in creating consistent governance around plant genetic resources for food and agriculture and related information, knowledge and rights

Background:

- Plant genetic resources (PGR) are a critical "raw material" for plant breeders. It is rather a "green currency" than "green gold" and needs to be utilized to preserve and enhance its value. In addition to the material, the related information, data, and knowledge (incl. genotypic and phenotypical information) are necessary to enable and enhance utilization.
- The access, transfer, and use of PGR and related information are becoming increasingly complex, costly, and uncertain. Some of the existing mechanism are unnecessarily complex and/or do not achieve their expected purpose.[1] Governance structures are either missing or inconsistent. Structures are lacking which create legal certainty and support the sharing of information and knowledge. This situation is de facto creating a chilling factor and encourages avoidance of PGR especially within the private sector.
- Investment into the development of new, improved plant varieties is a costly and lengthy endeavor. Legal certainty and clarity regarding the rights and obligations associated to the used breeding material and information is of fundamental importance.
- Several projects in relation to PGR are currently under development which could either further complicating the current situation for accessing and utilizing PGR or facilitate and promote utilization for the benefit of all. These initiatives include the revision of the ITPGRFA ABS mechanism, the development of the technology and information sharing portal, and DivSeek. Of key importance would be a coordinated governance structure

How bad would look like: Lack of a consistent governance and user rules

- Already today there is legal uncertainty whether information relating to PGR utilized in DivSeek or the information portal enjoy "freedom to use".[2] It is unclear whether the information can be used without prior informed consent of the related countries of origin. Resulting products are potentially encumbered. Lack of legal certainty may have a chilling effect at least on use by the private sector.
- There is lack of rules whether and how PGR related information (incl. sequence information) can be utilized to create IP rights, which could limit the unrestricted use of the information by 3rd parties. The same could occur if information is made publically available. A potential, unknown encumbrance by IP rights (especially patents) could interfere with the commercial use of products and could lead to wasted R&D investments. Lack of legal certainty may have a chilling effect at least on smaller entities with limited capability to investigate freedom-to use by the private sector.

How good would look like: Proper governance to create a mutually supportive open innovation network of material, information, and knowledge

- **Material:** There is an ongoing decision to revise the ABS regime under the treaty and to expand the scope of the MLS to enhance its functionality. One potential solution could include the following elements:

[1] For example, the benefit sharing mechanism under the ITPGGRFA on one hand creates no monetary income fort he benefit sharing fund, on the other hand requires an cumbersome trace & track of materials.

[2] Note: Certain countries extend the ABS related obligation from use of material to use of information (e.g., Andean states)

- The scope of the IT is extended to all publically available PGRFA of all crops incl. commercial varieties publically available in the member states. [3]
- Simplified subscription-fee benefit-sharing mechanism: The IT provides a subscription models under which users pay a certain % (e.g., 0.1%) on their seed sales. Exception could be created for non-profit entities, or breeders working on orphan crops. [4]

- **Information & Knowledge:** Information and knowledge relating to PGRFA should only be freely available to all subscribers. This would create an additional pull-in effect to join the subscription model. Any benefits sharing in relation to the use of information & knowledge is deemed covered by the subscription fee of the user.
  - Incentives for sharing information & knowhow by subscribers could be provided by rebates to the subscription fee if the information is considered of high value. This reduction should be granted upon request by the subscriber and subsequent review by an expert committee.

- **Open Innovation: Shaping a positive "inclusive patent" system under the International Treaty**

Patents are a key incentive for investment into R&D and knowledge sharing, especially in areas which require high investment such as trait development. Especially, genetically modified crops but also other high-performing plant varieties require a substantial investment which could easily be in the $150m range. If the use of material and / or information related to PGRFA excluded the use of patents to protect the resulting products, company or investors would use alternative sources. On the other hand in areas of sequential or combinatorial innovation like breeding patents can also slow down innovation cycle if their exclusivity character is overemphasized and unmitigated.

It is a key challenge within the current revision process of the IT to overcome the current confrontational "Yes/No" debate around patents and to find a solution which creates open innovation and especially enables broad access to breeding material but still preserves the incentives of the patent system. A possible solution for patented technology developed from PGRFA and related information could have the following elements:

- Allow patenting of PRGFA-derived trait innovations (with the exception of patents on specific plant varieties) provided that the resulting patents are accessible through a reciprocity-based clearing house. Such a clearing house has recently been established with in the vegetable industry.
- Use of the patented technology for breeding, research, or for solely humanitarian purpose should be free for all
- Commercial use of the patent technology in developed countries should result in benefit sharing (royalty payments) to the innovator. On request the amount of royalties can be reviewed by an independent expert committee.

[3] Today the IT only covers a limited list of crops in Annex I and does not cover commercial varieties although they are a GR under the CBD.
[4] A more detailed white paper on this subject can be provided.

DS/SC-1/15/4

Operation of the Joint Facilitation Unit (2015)

This document: i) presents the functions of the Joint Facilitation Unit; ii) clarifies the current modalities under which the Joint Facilitation Unit is working; iii) summarizes the activities that the Joint Facilitation Unit is carrying out in year 2015.[1]

1. THE MANDATE OF THE JOINT FACILITATION UNIT

The DivSeek Charter foresees the following responsibilities of the JFU:

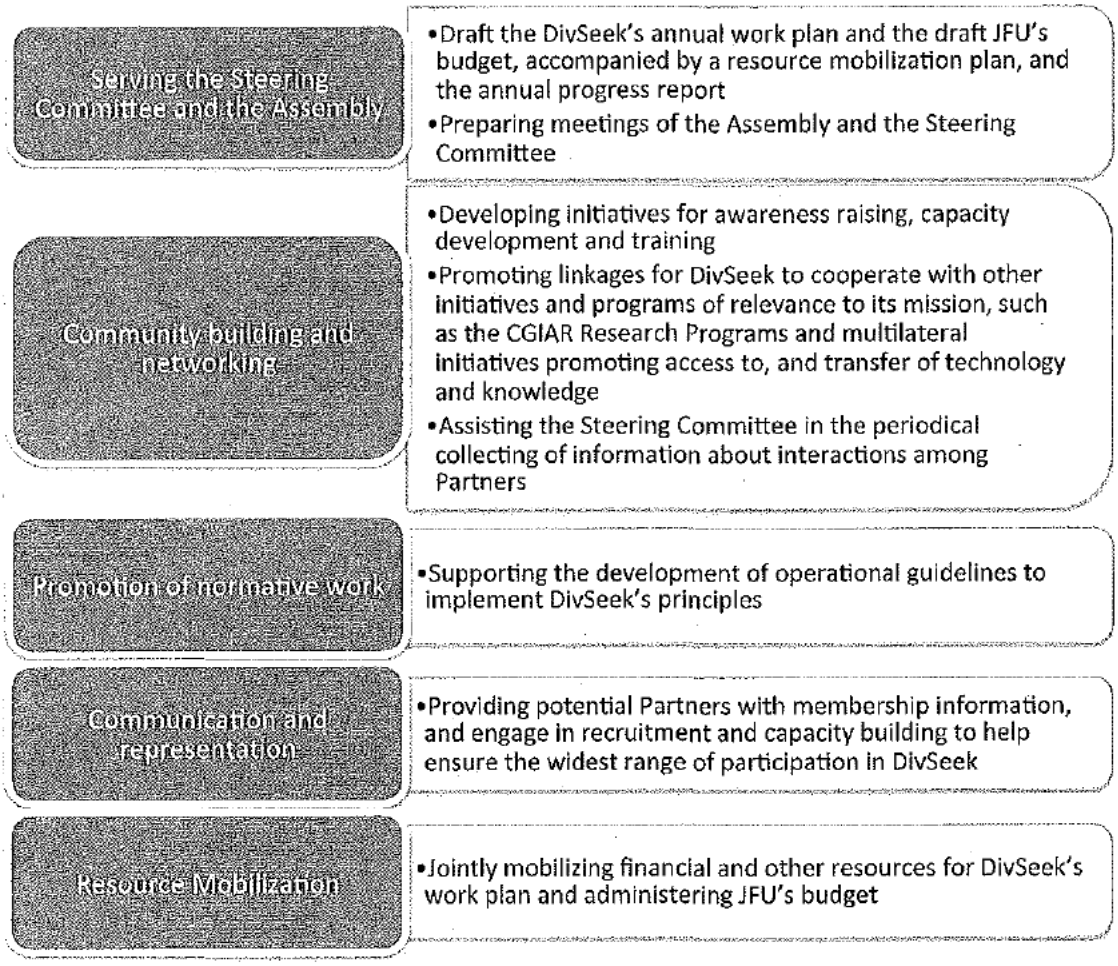
a) Developing the draft DivSeek's annual work plan and the draft JFU's budget, accompanied by a resource mobilization plan, and the annual progress report;
b) Developing initiatives for awareness raising, capacity development and training;
c) Supporting the development of operational guidelines to implement DivSeek's principles;
d) Providing potential Partners with membership information, and engage in recruitment and capacity building to help ensure the widest range of participation in DivSeek;
e) Promoting linkages for DivSeek to cooperate with other initiatives and programs of relevance to its mission, such as the CGIAR Research Programs and multilateral initiatives promoting access to, and transfer of technology and knowledge;
f) Assisting the Steering Committee in the periodical collecting of information about interactions among Partners;
g) Preparing meetings of the Assembly and the Steering Committee; and
h) Jointly mobilizing financial and other resources for DivSeek's work plan and administering JFU's budget.

JFU's responsibilities can be divided in the following five categories:

i) Serving the Steering Committee and the Assembly - paragraphs *a)*[2] *and g)*;
ii) Community building and networking - paragraphs *b), e)* and *f)*;
iii) Promotion of normative work - paragraph *c)*;
iv) Communication and representation – paragraph *d);*
v) Resource mobilization - paragraph *h).*

[1] This document is not intended to establish any principle for the operation of the JFU.
[2] In response to a concern expressed at the first Partners' Assembly, it is important to highlight that the JFU does not approve DivSeek's annual programme of work. It prepares a first draft of the document that is reviewed by the Steering Committee and a second draft incorporating the feedback received. Once endorsed by the Steering Committee, the draft document is presented to the Assembly, which is DivSeek's decision-making body, for review and approval. Once approved by the Assembly, the JFU facilitates the implementation of the annual program of work.

The figure below illustrates the five categories.

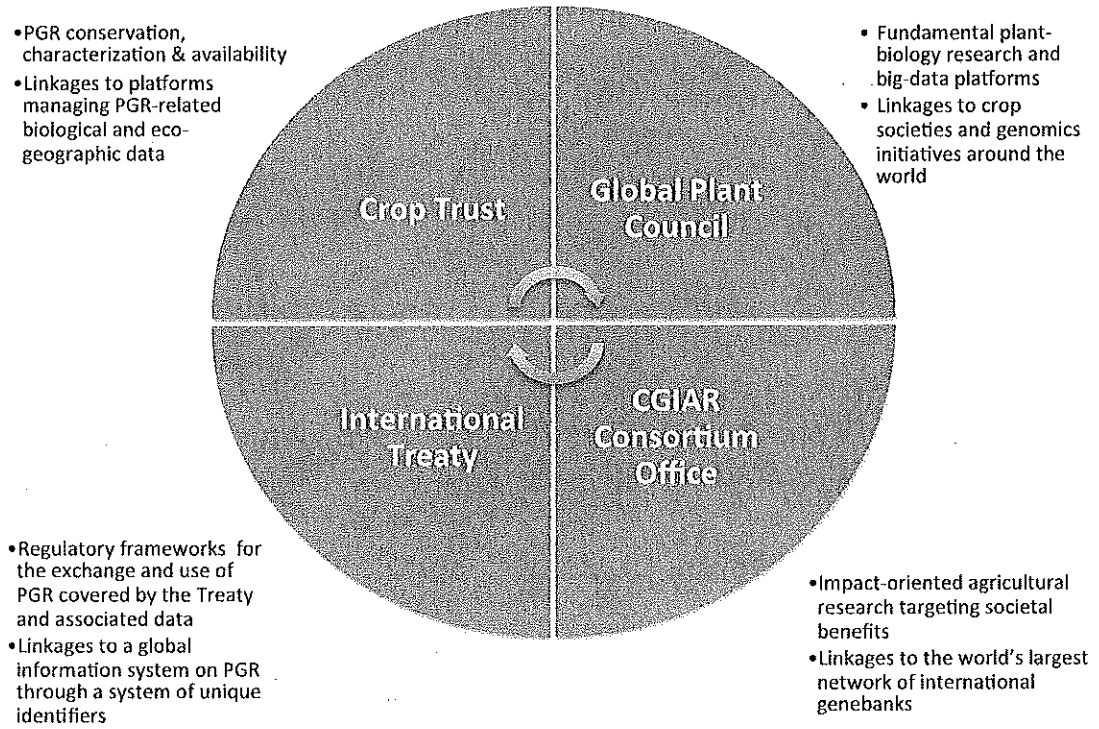


2. THE COMPOSITION AND WORKING MODALITIES OF THE JOINT FACILITATION UNIT

2.1 Composition of the Joint Facilitation Unit

As contained in the Charter, four organizations with global reach and complementary constituencies provide the JFU and contribute one representative each to the JFU. The four organizations are: the Global Crop Diversity Trust (Crop Trust), the Global Plant Council, the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty), and the CGIAR Consortium Office. The four representatives are, respectively: Peter Wenzl, Ruth Bastow, Daniele Manzella and Wayne Powell.

Each of these four organizations contributes a wide range of expertise and technical knowledge to the JFU; some examples are depicted in the diagram below.



The contribution to the JFU by the four organizations is not exhausted by the work of the four representatives. When and as needed and based on available resources, the four representatives mobilize other in-kind contributions by the respective organizations (e.g. on fund raising, communication, logistics of DivSeek's meetings).

2.2 Working modalities

In the implementation of its facilitating activities, the JFU is operating in accordance with the following criteria:

1) Structured cooperation with defined responsibilities for the deliverables;

2) Equality among JFU-participating institutions;

3) Timely alignment of JFU's facilitating activities with instructions received from the Chairperson and the Steering Committee.

The following practical internal arrangements have been made.

- The JFU operates through on-line and physical meetings that are scheduled on an as-needed basis.
- The allocation of work within the JFU is decided collectively, based on relevant expertise and availability of individual representatives.
- Regular reports on progress with individual activities are made at JFU meetings.
- Back-to-office reports on attendance to external meetings (see section 3.4 below) are shared within the JFU and with the Chairperson.
- The four representatives of JFU participating institutions have individual divseek.org email accounts that they use for internal and external communications.

3. THE CURRENT WORK

In the implementation of its functions and based on the working modalities above, the JFU is carrying out the following activities.

3.1 Meetings of Assembly and Steering Committee

The JFU is developing **documentation** for the meetings in consultation with the Chairperson. JFU's individual representatives take the lead on individual documents based on expertise.

The JFU is committed to circulating the meeting agenda and documents in advance of the meetings. It will circulate documentation for the 2016 Assembly thirty days in advance.

The JFU is responsible for the **logistics** of the meetings, with the Crop Trust and the International Treaty taking the lead on administrative tasks, such as travel and lodging, based on the location of the meeting and other practical aspects.

3.2 Community building and networking

Based on feedback received from the DivSeek Partner organizations, community building and networking are likely to be a component of DivSeek's program of work for 2016. To facilitate the development of this component, the JFU:

a) is developing a draft **landscaping study** of existing projects whose scope and objectives are relevant to DivSeek's mission;

b) will deliver a **study** by Arizona State University (ASU) **on institutional and organizational factors** for enabling data access, exchange and use aims for DivSeek, which the International Treaty and the Crop Trust are co-financing.

The studies are expected to generate useful information based on which the Steering Committee may review the draft DivSeek's program of work for 2016 that the JFU will prepare.

3.3 Promotion of normative work

The Charter foresees multiple normative documents for DivSeek, namely: a) representational guidelines for the Steering Committee; b) rules of procedures for meetings of the Assembly and the Steering Committee, c) operational guidelines that specify the principles of DivSeek, including for private sector engagement.

Representational guidelines for the Steering Committee were flagged as priority by experts who served in an advisory capacity before the first Assembly, and by the Chairperson. Based on **priorities** that the Steering Committee may set forth, the JFU will facilitate the development of normative documents, for the Steering Committee to review and the Assembly to approve.

3.4 Communication and representation

The JFU manages the content on DivSeek's **website** (www.divseek.org) and the Crop Trust administers it. The JFU will abide by any rule that the Assembly and the Steering Committee may establish regarding publication of documents for, and reports of the meetings.

The institutional websites of the JFU participating organizations (e.g. www.croptrust.org and www.planttreaty.org) also host information on DivSeek, derived from DivSeek's documents, to highlight programmatic and operational synergies with the mandates and activities of the organizations. This is without prejudice to the recognition of DivSeek as a community-driven initiative.

The JFU is responsible for **communications with Partner organizations**. The JFU maintains an updates list of Partner organizations, which is attached to the Charter.

The JFU handles requests for information through the website. The divseek.org email accounts of the JFU individual representatives are linked to the info@divseek.org address that is on-line.

The JFU is responsible for communicating with **new organizations** interested in joining the initiative. The Steering Committee has endorsed a procedure for interested organizations to become DivSeek Partners. The procedure consists of: a) an expression of interest in writing, based on a standard form available on-line; b) a review of the expression of interest by the Steering Committee, and; c) upon endorsement by the Steering Committee, acceptance of the Charter in writing.

DivSeek is an open and inclusive initiative and via its **membership** aims to reflect a wide range of relevant stakeholders. The JFU is raising awareness of the DivSeek initiative through the communication channels of the respective institutions of affiliation.

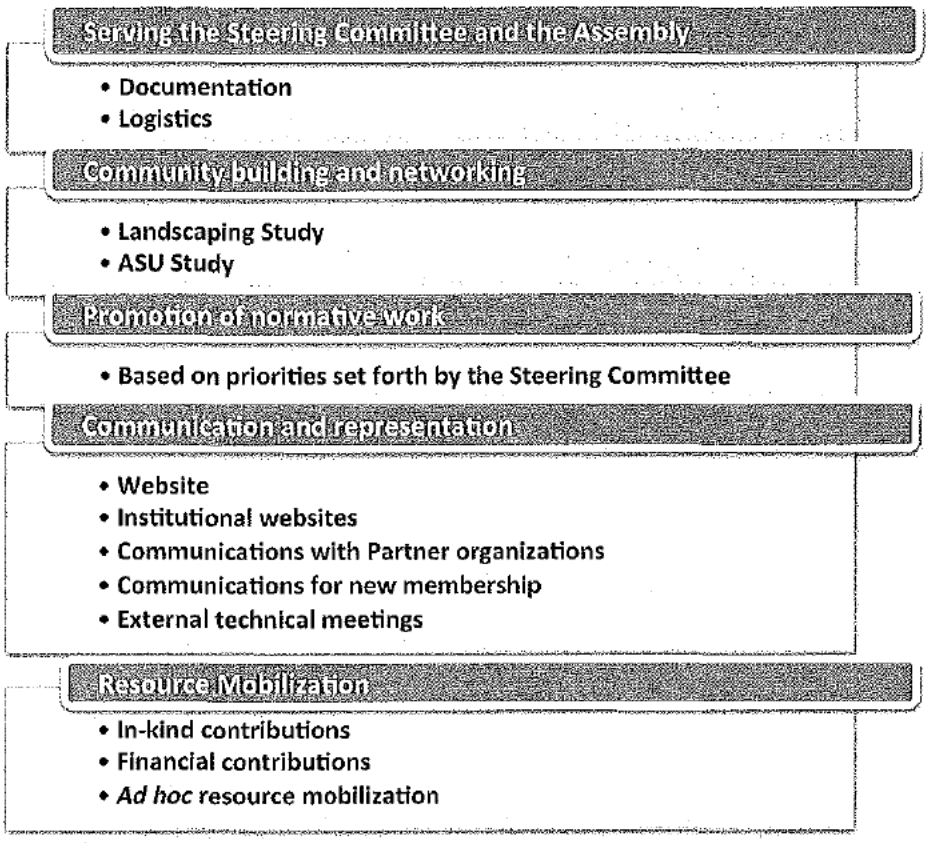
The individual representatives of JFU participating organizations coordinate with the Chairperson regarding attendance and representation at **external technical meetings** of relevance to DivSeek's activities.

3.5 Resource mobilization

At present, the JFU operates through **in-kind contributions** of the four participating organizations, including staff time of the four representatives, and **financial contributions** by the International Treaty and the Crop Trust, for meetings of the Assembly and the Steering Committee. JFU's budget depends on the allocations made from individual budgets of these organizations.

The International Treaty and the Crop Trust are undertaking ***ad hoc* resource mobilization** to sustain DivSeek. Once a resource mobilization plan is in place, as foreseen in the Charter, the JFU will jointly implement it.

The figure below illustrates the current facilitation work of the JFU.



DIVSEEK Charter

This Charter defines the general conditions for the operation of DIVSEEK and sets forth the governance structure for voluntary cooperation by Partners. This Charter does not create any legally binding obligation between or among Partners.

The DIVSEEK First Assembly approved this Charter on 9 January 2015 in San Diego (USA). The list of organizations represented at the Assembly is in the Annex.

Background

Meeting the food needs of a growing human population in an era characterized by climate change and increased competition for land and water is a key global challenge. Crop production must rise, and crops must become more resilient to an increasingly unstable climate to produce sufficient nutritious food and other agricultural products in a sustainable manner. Natural variation from genetic resources is the raw material for crop improvement, and thus must be a critical component of any comprehensive strategy to address food security and the sustainability of agricultural production.

Game-changing technologies and advanced data processing and analysis capabilities now enable a more comprehensive approach to genetic resources, using existing but dispersed capacities of genebanks, breeders, researchers, farmers and other stakeholders, to respond to global research priorities. In recent years a number of crop-specific projects have been initiated in this new sphere. In an attempt to link these efforts DivSeek was initiated, as a voluntary association of like-minded partners harnessing genetic resources for food security to create synergies that would benefit most stakeholders and hence accelerate the unlocking of the value of genetic resources for the benefit of sustainable intensification and climate proofing of global agriculture.

Mission

The mission of DIVSEEK is to cross-link, support and add value to individual activities that **harness the power of crop diversity** for food and nutritional security and societal and economic benefits, by enabling breeders and researchers to mobilize genetic variation in order to **accelerate crop improvement**.

Principles

DIVSEEK aims to bring together a broad array of voluntary partners to **facilitate networking** among otherwise disconnected efforts to harness genetic resources for crop improvement and to ensure the continuous relevance of their outputs for the targeted beneficiaries. DIVSEEK is a **community-driven** and **inclusive** initiative open to all institutions from all relevant sectors, including public, private, academic, civil society and intergovernmental organizations. Any organization can become a Partner by accepting this Charter in writing.[1]

DIVSEEK advocates the application of state-of-the-art genomic, phenotyping and bioinformatics technologies to enhance the quality, efficiency, and cost-effectiveness of germplasm conservation, provision and utilization for breeding, to **deepen our understanding of crop diversity** and to stimulate public interest in the role of genetic diversity for crop improvement.

DIVSEEK facilitates the **linking of germplasm with passport, characterization and evaluation data** through formulating and advocating common data and informatics standards and best practices designed to enable interoperability among information systems, to broaden the usability of data and germplasm, and to support open access to germplasm-associated data. DIVSEEK advocates and promotes the widespread adoption of terms and guidelines for access and use of data and knowledge about plant genetic resources.

DIVSEEK follows a **modular approach** to information management which aims to define and maintain a set of core standards for data exchange to enable data integration and interoperability among continuously evolving and potentially diverse platforms and data domains. This approach reduces transaction costs, allows for effective 'rights management' at a level of discretion determined by individual stakeholders, and allows stakeholders to absorb and adapt to new requirements and rapidly changing technologies.

DIVSEEK contributes to on-going international cooperation for the developing and strengthening of a **global information system**, to facilitate the exchange of information on scientific, technical and environmental matters related to plant genetic resources for food and agriculture.

DIVSEEK recognizes the importance of **understanding the needs and capacities** of stakeholders such as genebanks, breeders, researchers and farmers to define priority areas for germplasm characterization and evaluation, and data access. DIVSEEK identifies and communicates critical needs and facilitating cross-crop learning and capacity development and training to access and apply cutting-edge tools for the analysis and knowledge transfer from genotypic and phenotypic data on plant genetic resources, for impact-oriented and discovery-driven research.

To implement the actions and principles set forth in this Charter, DIVSEEK may elaborate operational guidelines, including through **expert consultations**.

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[1] At the first DivSeek Assembly, private sector organizations have acted as observers, pending the definition of operational guidelines for their engagement.

Membership

Partners are organizations that support DIVSEEK's mission by voluntarily associating specific activities with DIVSEEK and by providing advice and support. Partners individually determine the nature and extent of their participation in DIVSEEK.

New organizations that wish to join as Partner may submit a letter of interest to the Joint Facilitation Unit and, upon invitation by the Steering Committee, be asked to approve this Charter in writing.

Governance

All Partners are invited to nominate one representative and one alternate to participate in the annual DIVSEEK **Assembly**. The Assembly meets at least once a year. The functions of the Assembly are to:

a) Consider and approve DIVSEEK's annual work plan and the budget of the Joint Facilitation Unit, accompanied by a resource mobilization plan, and the annual progress report, submitted by the Steering Committee;
b) Recommend the strategic direction of activities and projects associated with DIVSEEK;
c) Elect the Steering Committee members from among Partners, for a term of two years, renewable for one term[2]; and
d) Elect a Chairperson of the Assembly, for a term of two years, renewable for one term.

The **Steering Committee** consists of the Chairperson of the Assembly and eight Partner representatives, preferably from different regions, types of organizations and categories of expertise. The Steering Committee convenes at least twice a year. Representational guidelines for the Steering Committee may be defined by the Assembly. The functions of the Steering Committee are to:

a) Prepare the agenda for the Assembly;
b) Provide inputs and eventually endorse the draft DIVSEEK's annual work plan and the draft budget of the Joint Facilitation Unit, accompanied by a resource mobilization plan, and the annual progress report;
c) Periodically collect information about interactions among Partners and convey such information to the Assembly;
d) Advise the Assembly on the strategic direction of activities and projects associated with DIVSEEK; and
e) Work with the Joint Facilitation Unit to prepare and present information and updates on DIVSEEK for the constituencies and governing bodies of the institutions providing the Joint Facilitation Unit.[3]

The Assembly and the Steering Committee shall make every effort to adopt their decisions by consensus, that is, the absence of a formal objection by any of the Partners present at the

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[2] The first Steering Committee will have staggered appointments; half of the members will be appointed for one year, half for two years; all will be eligible for a second term of two years.

[3] The Global Crop Diversity Trust, the CGIAR Consortium Office, the Global Plant Council and the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture provide the Joint Facilitation Unit. Voluntary cooperation on DIVSEEK does not necessarily entail any obligation in relation to the International Treaty on Plant Genetic Resources for Food and Agriculture.

meeting. A valid quorum for meetings of the Assembly is the presence of the majority of the Partners. Changes to this Charter shall only be possible with the consensus of the Assembly, with at least three quarters of the Partners present.

The Assembly and the Steering Committee may establish rules of procedure for their meetings. Such rules of procedures may provide for matters such as: a) notice and record of meetings; b) decision making (e.g., where consensus cannot be reached) and recording of dissent; c) electronic tools and procedures for decision making; d) conflict of interest; e) replacement of Steering Committee members.

The functions of the **Joint Facilitation Unit** are to:

a) Develop the draft DIVSEEK's annual work plan and the draft budget of the Joint Facilitation Unit, accompanied by a resource mobilization plan, and the annual progress report;
b) Develop initiatives for awareness raising, capacity development and training;
c) Support the development of operational guidelines to implement DIVSEEK's principles;
d) Provide potential Partners with membership information, and engage in recruitment and capacity building to help ensure the widest range of participation in DIVSEEK;
e) Promote linkages for DIVSEEK to cooperate with other initiatives and programs of relevance to its mission, such as the CGIAR Research Programs and multilateral initiatives promoting access to, and transfer of technology and knowledge;
f) Assist the Steering Committee in the periodical collecting of information about interactions among Partners;
g) Prepare meetings of the Assembly and the Steering Committee; and
h) Jointly mobilize financial and other resources for DIVSEEK's work plan and administer the budget of the Joint Facilitation Unit.

Use of logos and names

Partners may, on a good-faith basis, use DIVSEEK's logo and name for DIVSEEK's activities. Partners understand that, subject to their agreement, their names and logos may be displayed on DIVSEEK's web site and documentation.

Withdrawal

Partners wishing to withdraw from DIVSEEK should provide written notice to the Joint Facilitation Unit, preferably two months in advance. Upon withdrawal, the Partner is to cease associating any of its projects and partnerships being executed as a result of participation in DIVSEEK with DIVSEEK's initiative and logo.

Annex to the Charter

List of DivSeek Partners

AAFC	Agriculture and Agri-Food Canada	Canada
ACPFG	Australian Centre for Plant Functional Genomics	Australia
ANU	Australian National University	Australia
APPF	Australian Plant Phenomics Facility	Australia
AVRDC	The World Vegetable Center	Taiwan Province of China
BBSRC	Biotechnology and Biological Sciences Research Council	UK
BECA	Biosciences Eastern and Central Africa	Kenya
BGI	Beijing Genomics Institute	China
Bioversity	Bioversity International	Italy
BLE	Federal Office for Agriculture and Food	Germany
CATIE	Center for Tropical Agriculture Research and Education	Costa Rica
CFF	Crops for the Future	Malaysia
CGIAR CO	CGIAR Consortium Office	France
CIMMYT	International Maize and Wheat Improvement Center	Mexico
CIP	International Potato Center	Peru
CIRAD	Agricultural Research Centre for International Development	France
Clemson Univ.	Clemson University	USA
Cornell Univ.	Cornell University	USA
CRA	Agricultural Research Council	Italy
cROP	Common Reference Ontologies for Plant Biology	USA
Dalhousie Univ.	Dalhousie University	Canada
EBI	European Bioinformatics Institute	UK
EMBRAPA	Brazilian Corporation of Agricultural Research	Brazil
ETH Zurich	ETH Zurich World Food System Center	Switzerland
FZJ	Research Centre Jülich	Germany
GCDT	Global Crop Diversity Trust	Germany
Genome BC	Genome British Colombia	Canada
Genome Canada	Genome Canada	Canada
Genome Prairie	Genome Prairie	Canada
GPC	Global Plant Council	UK
IBBR-CNR	Institute of Biosciences and Bioresources, National Research Council	Italy
ICARDA	International Center for Agricultural Research in the Dry Areas	Syria
ICBA	International Center for Biosaline Agriculture	UAE
ICRAF	World Agroforestry Centre	Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid	India

	Tropics	
IITA	International Institute of Tropical Agriculture	Nigeria
INRA	National Institute for Agricultural Research	France
IPK	Leibniz Institute of Plant Genetics and Crop Plant Research	Germany
iPlant	iPlant	USA
IRRI	International Rice Research Institute	Philippines
ISU	Iowa State University	USA
ITPGRFA	Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture	
JHI	James Hutton Institute	UK
NIAS	National Institute of Agrobiological Sciences	Japan
NIG	National Institute of Genetics	Japan
NordGen	Nordic Genetic Resource Center	Sweden
QAAFI	Queensland Alliance for Agriculture and Food Innovation	Australia
TGAC	The Genome Analysis Centre	UK
UBC	University of British Columbia	Canada
UC Davis	University of California, Davis	USA
UGA	University of Georgia	USA
UMN	University of Minnesota	USA
UM	University of Missouri	USA
USASK	University of Saskatchewan	Canada
USDA-ARS	United States Department of Agriculture - Agricultural Research Service	USA
VicDEPI	Victorian Department of Environment and Primary Industries	Australia
Wageningen UR	Wageningen University and Research Centre	The Netherlands

DivSeek governance research project

Second progress report

Preliminary case study descriptions

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FINAL DRAFT

August, 25th 2015

DISCLAIMER

Research methodology and limitations

The scope of this report is to briefly present some findings and insights from initial interviews from a number of case studies. As we are only partway through the study, this work should be considered preliminary. Future interviews and data should clarify gaps and reduce inaccuracies.

Following the review of literature (see the first progress report submitted to the DivSeek steering committee in May), the research team selected case studies according to the metrics illustrated in the document "Institutional and Organizational Factors for Enabling Data Access, Exchange and Use Aims for DivSeek" presented to the Joint Facilitation Unit and the DivSeek Chairperson. We provide a brief description of the metrics in the Appendix.

Data for these preliminary results were collected by interviewing one member for each case study – usually the project manager – and by analyzing project websites and documents available online. In some cases, we received additional documents from interviewees.

Although there are certainly limitations to presenting findings with limited data collection, we also believe that discussing preliminary thoughts on the first round of case studies with the members of the DivSeek governance group will be helpful for better defining our research trajectory, in line with the needs of the initiative.

Executive summary

Introduction & metrics

Our study aims at providing research-based suggestions for the governance of the DivSeek initiative. For each case, we oriented our interviews towards understanding: (1) the project scope and general characteristics; (2) the stakeholder configuration and the involvement of the private sector; (3) data and material sharing policies; (4) governance mechanisms.

In general, we observe tensions and trade-offs among project scope, stakeholder configuration, and data and material sharing policies. For instance, in some cases, open data policies have prevented the participation of certain actors, especially those from the private sector, or have undermined the scope of the project by resulting in poor quality datasets (see case study #5 and #4). In other cases, the general characteristics of the project, such as an open and participatory approach, have paradoxically limited the range of actors who might be interested in participating (see case study #2).

Since data-intensive genetics research is a relatively young field, finding the best institutional arrangement to balance competing interests and objectives is an ongoing process that takes place in the course of the implementation. Sometimes, initiatives experiment with different policy or management options. This is the case of the Generation Challenge Program which shifted from a research-oriented model to a service-provider model (now embodied as the Integrated Breeding Platform). As such, it has evolved from enforced data sharing to optional data sharing. The GCP team hopes that allowing researchers to decide whether and with whom they share data will increase the quality of data released (see case study #5).

In the following sections we briefly describe early thoughts and interpretations about each of the four selected dimensions.

1. *Scope of the project and general characteristics*

We identified four main goals that large-scale genomics projects may pursue. A project may focus on a single goal or may combine two or more goals.

Research: projects can support the production of new knowledge in the agriculture genomics field. Those projects have funding to support their own research agendas and/or provide funding to support existing research initiatives.

Service provision: projects can focus on developing and providing cyberinfrastructures to enable data-intensive genetics research. Those projects usually offer flexible online or offline platforms for data management and data storage, analysis tools and software, along with capacity building workshops to enhance platform use.

Coordination: projects can foster coordination among actors in the field, in order to prevent duplication of initiatives, activate economies of scale and promote synergies among relevant actors.

Community building / Cooperation: project can create and manage relationships and collaboration activities among a wide community of actors in an effort to promote the development of shared practices and common knowledge.

2. *Stakeholder configuration & private sector involvement*

For each case, we examined the type of stakeholders involved, distinguishing private, public or non-profit sector. In most of the cases, the members of an initiative belong to the same group of either public and non-profit actors, or private actors. Public-private partnerships are often sought or anticipated but rarely realized.

We notice that many projects, especially when they are led by public or non-profit institutions, involve less stakeholders than initially expected. For instance, many projects that claim to be open to all or aim at involving a large number of actors (i.e. to create shared datasets) fail to involve the private sector. Often this is because the data and material sharing policies provide firms no incentive to participate. Similarly, members from developing countries are often excluded or their involvement requires extensive and time-consuming negotiation processes (see case study #6). Actors with similar capacities and interests are more likely to collaborate.

Finally, private sector involvement depends on rules and access to decision making. Private actors are often reluctant to share their data for the fear of losing their competitive advantage. Thus, they rarely participate in initiatives that require them to share their own data. However, under certain conditions, they may agree to share outcomes of common research projects (see case studies #3 and #4). Also, private actors are willing to participate only if they have a strong role in decision-making processes. Private sectors have a preference for initiatives with well-defined and narrow goals (see cases #3 and #4). Significantly, we have not found any case where private organizations join established and structured initiatives.

3. *Data and material sharing policies*

Data and material sharing policies have a strong influence on project configuration. First, it should be noticed that organizations are more willing to share their data within circumscribed groups of actors, compared to large audiences. Second, two approaches emerged concerning data sharing. Some projects have developed a clear data sharing policy that obliges members to share their data with external or internal actors. Other projects allow actors to decide with whom and to what extent they share data, i.e. data sharing is a voluntary. Combining these two dimensions offers four different data sharing configurations:

Internal sharing / Enforcement: the project requires data and material sharing only among the members of the project (i.e. a research group, members of a consortium…);

Internal sharing / Voluntary: the project allows actors to choose with whom they want to share their data and according to which rules. The project indirectly encourages data and material sharing at the individual level (dyadic relationships), providing information about other members' activities and promoting trust among the members of the network.

External sharing / Enforcement: the project requires members to make data and information freely available to the public. Several variants to this model include: restrictions on the use of data; sharing only partial information and sharing only outcomes from the project's activities.

External sharing / Voluntary: the project allows actors to choose if they want to release their data to the public.

While some projects are trying to enforce external data sharing to create common datasets, other projects have chosen a voluntary model, hoping that providing user-friendly tools for data sharing will progressively push researchers towards that direction. Private actors are more willing to join projects where external sharing is optional and data sharing is enforced only internally and only with regards of the project data.

4. Governance

As previously discussed, many projects constantly revise governance models, thus altering rules and relationships among different actors. As a result, the issue of governance still requires further investigation.

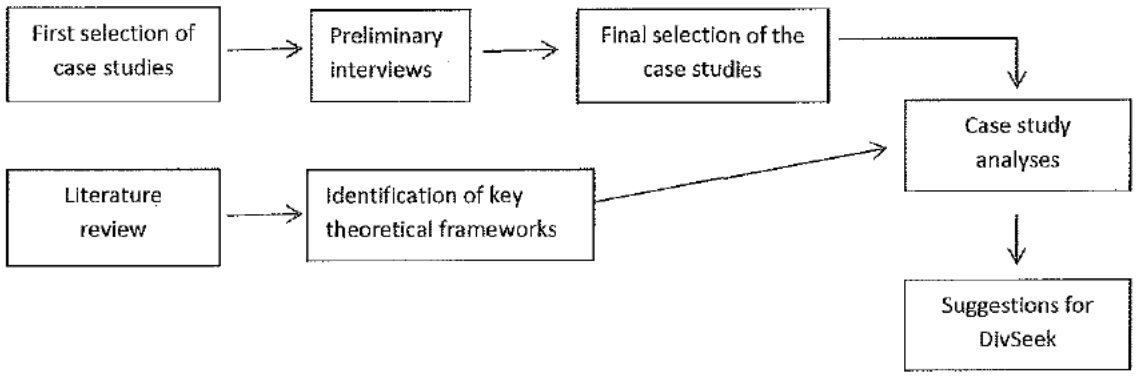
Next steps

The next stage of the research will further investigate 3 to 4 case studies in order to expand our knowledge on governance mechanisms, data and material sharing among involved actors, role and needs of the private sector, and actual outcomes of the projects.

In-depth case studies will be chosen from the current selection of cases, and from a second round of preliminary interviews with other project managers, in the agriculture and health genomics sectors.

The initial analysis of case studies that is presented in this report has also led the research team to refine the case study selection metrics, as illustrated in the Appendix.

Figure 1. Research process



Case studies

Case study 1

Seeds of Discovery

Scope of the project: service-provider. The project aims at creating a public accessible dataset for genetic data on wheat and maize.

Stakeholder configuration: public and non-profit actors

Private sector involvement: none

Data and material sharing: data is produced by the project and is made freely available to the public.

Website: www.seedsofdiscovery.org

Brief description

Seeds of Discovery (SeeD) is a CIMMYT-based project which aims at supporting and promoting genetic research activities on maize and wheat. According to the project vision, genetic research should be beneficial to the whole supply chain and, for that reason, SeeD is dedicated to connect scientists, breeders and genebanks to advance scientific research.

Indeed, the project's main activity is the production of genetic data and information, through the characterization and documentation of third-party germplasm collections. All data produced by SeeD is collected in a comprehensive dataset that facilitates the access, for scientists and breeders, to the germplasm information contained in genebanks collections.

SeeD is funded by the Mexico's Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food in the framework of a national program that supports the sustainable modernization of Mexican traditional agriculture.

A large-scale project requires strategic choices

SeeD team decided on purpose to focus on wheat and maize. The main aim of the project was to have a large impact in the agriculture genetics research field, connecting researchers, breeders and genebanks. Therefore, they decide to focus on just two crops, maize and wheat, given their high importance in food policies (maize and wheat represent 40% of world's food) and their high commercial value. In this way, they hoped to support research activities that would have translated into an economic return for breeders and farmers, at the same time attracting more investments and more interested partners, in both private and public sector.

SeeD was also very attentive in defining its main activity. The initiative was designed in response to scientists' need for data to advance genetic research. In the word of the SeeD team, too "many genebanks resemble libraries that lack sufficiently informative catalogs". Thus, accessing and using genebank collections is often difficult for scientists, with the consequence that most of genebank

resources are underused. The SeeD team decided to address this problem by taking advantage of newly developed technologies that allow to digitally characterize plant genes, and thus map entire genebank collections, facilitating access to them.

A unique dataset

The uniqueness of Seeds of Discovery is the dataset of wheat and maize germplasm information that the project is creating, thanks to its data production activities. Unlike other projects, SeeD does not carry research activities on its own, nor does it collect data from already existing datasets: its main activity includes the characterization and documentation of third-party germplasm collections. In this way, SeeD is creating a dataset that contains unique information for genetic research. For instance, SeeD is the first organization to sequence the whole CIMMYT germplasm collection, which include 175,000 varieties of wheat and maize.

Data production is at the heart of the SeeD project, which is receiving increasing attention from external partners as its dataset keeps growing. SeeD dataset provides access to all data produced by the characterization of CIMMYT and other genebank collections, as well as tools for the analysis, visualization and manage of genetic information. The offer of complementary services for data management and analysis is fundamental to create datasets that truly support scientists' work.

Complex legal requirements discourage private companies

Seeds of Discovery is entirely financed by the Mexico's government and CIMMYT. Additional partners include public and non-profit research centers. The private sector is not involved in the project. To participate, private companies should be willing to provide access to their germplasm collections, and according to our interviewee, there are two main reasons companies are worried about that. First, they are worried about sharing material – or any type of data – because they might lose a source of competitive advantage, providing to external actors their resources. Second, they perceive the Standard Material Transfer Agreement (SMTA) under which germplasm is exchanged as too complex and/or risky.

Case study 2

iPlant

Scope of the project: service-provider. The project offers a freely available platform for the management and analysis of genetic data.

Stakeholder configuration: public and non-profit actors

Private sector involvement: none

Data and material sharing: none; actors are free to decide how and to what extent they share data with internal and external actors

Website: www.iPlantcollaborative.org

Brief description

iPlant is a downloadable, open source data management platform which provides biology scientists with informatics tools for the management, analysis, sharing, visualization and cloud storage of large amount of genetic data. The main goal of iPlant is to support data-intensive life science research, developing, along with scientists, a highly flexible platform and a user-friendly interface for data management.

Indeed, iPlant does not provide users with any access to shared databases, nor does it pursue a research agenda of its own. The team and the community working on iPlant are focused on the development of bioinformatics tools, and how they can optimize collaboration among scientists. Its vision states: "Fundamentally, iPlant is a project that creates cyberinfrastructure and collaborates with its user community to enable science. iPlant does not set, nor pursue, its own scientific agenda, but rather builds an infrastructure that allows community members to pursue their own ends, in collaboration with the project and, more importantly, with each other".

Connecting scientists and bioinformatics

iPlant was established in 2008 based on funding from an NSF program seeking projects able to (1) facilitate access to advanced IT tools for biology scientists and (2) enhance collaboration among scientists on data-intensive research projects.

Yet at the beginning, iPlant faced the challenge of convincing scientists of the value of the platform. There were two main issues. First, biology was less data-intensive than it is now, and few scientists were looking for data management tools. Second, providing a good platform for those few scientists was difficult because technical constraints prevented the development of a user-friendly, intuitive platform. To solve this latter issue, starting in the second year, the iPlant team organized a series of workshops and conferences to gather experts and scientists together, and involve them in the design of the platform. In this way, while biology was becoming increasingly data-driven, the iPlant team was able to collect feedback and ideas, and translate scientists' needs into user-friendly IT tools.

The organization of participative designed workshops and conferences has been fundamental for the success of the initiative. The events enabled experts and scientists to get to know each other and build an active community around the iPlant platform. The community is nowadays a combination of both physical and virtual interactions, which provide the iPlant team with feedback and suggestions on the platform functionalities. The involvement of the community contributes to the value of the project, because it allows iPlant team to meet scientists' expectations and needs. Indeed, the iPlant team is engaged in community building activities by organizing workshops for the users of the platform, promoting training sessions for research centers with lower research capacity and partnering with external organizations for grant applications. However, the extent to which those interactions are frequent and continue beyond the scope of the project, or the effective role of the iPlant team as broker of those interactions, are still unclear from our first interview.

Data sharing: a conflictual goal?

iPlant is focused on three main goals: (1) providing scientists with an adequate cyberinfrastructure for data-intensive biology research; (2) supporting collaboration among scientists; and (3) encouraging data sharing. However, despite the willingness of the team to integrate all three goals, there are trade-offs that need to be taken into consideration.

At the current stage, the iPlant platform allows scientists to upload their data, analyze and visualize them, and store them in a cloud-based system. The platform is highly flexible and all codes are available under an Open Source license. Thus, scientists can leverage the iPlant cyberinfrastructure to develop customized data management platforms. Platform functionalities allow scientists to share their data with collaborators or larger groups. The easiness of sharing data is indeed supposed to promote data openness.

However, iPlant does not promote data sharing by asking scientists to share their data nor does it impose data sharing policies. As iPlant aims at providing to as many scientists as possible with an adequate IT infrastructure for managing data, the team has decided not to have a data sharing policy. Each user of the platform is free to upload his or her own data and to decide with whom and to what extent to share it. Users may decide to keep data private; share it with few research partners; or make it freely available to everyone, among other options. It is unclear from interviews whether or not iPlant affected collaboration propensity among scientists.

Structure and actors involved: a public-driven initiative

iPlant is an NSF-funded not-for-profit research initiative with primary partners at the University of Arizona, Texas Advanced Computing Center, Cold Spring Harbor Laboratory and University of North Carolina at Wilmington.

Users of the iPlant platform and members of its community include mainly public or non-profit research organizations. A few private sector members are less willing to participate to initiatives oriented towards data sharing, and they generally prefer platforms developed in-house or by larger IT companies. The specific characteristics of iPlant – open source and collaborative – are perceived by iPlant interviewee to discourage participation of private actors.

Funding: a long term issue

iPlant is currently facing funding issues. Developing and maintaining a cyberinfrastructure is expensive and iPlant is managed by a large team. Until now, the initiative has been supported by 10 years of NSF funding. By the time funding runs out in three year, iPlaint must figure out how it will ensure financial sustainability. It is considering several market-based options including developing a fee-based system for the use of the platform, selling consulting activities and partnering with other organizations to obtain further grant funding.

Case study 3

Structural Genomics Consortium

Scope of the project: research; coordination. The project aims at coordinating pre-competitive research among a selected number of private organizations.

Stakeholder configuration: private actors, and few public actors whose role was unclear in our interview.

Private sector involvement: the project is industry-driven

Data and material sharing: data sharing rules concern only data produced as outcomes of the consortium research activities. All such data are freely available to the public.

Website: www.thesgc.org

Brief description

The Structural Genomic Consortium (SGC) is a non-profit organization, funded and managed by private companies, which aims at facilitating joint research activities on a pre-competitive basis. Indeed, the consortium is committed in undertaking research activities on topics identified as relevant by the members of the consortium, with the support of a large network of partner research organizations. The network provides access to the material, informational and human resources necessary for SGC research.

Despite its private orientation, the SGC is based on Open Access principles such that all products and knowledge from its funded research are released into the public domain, without use restrictions. Indeed, while SGC research outputs may be used to feed internal innovation processes of its members, none of the companies involved in the SGC is allowed to directly patent the outputs of any SGC research project.

An industry-driven initiative

The SGC was established at the initiative of ten private companies which agreed to work together to identify and fund shared fundamental research needs as a mean of reducing costs of their R&D activities. Previously, member companies were investing in similar R&D projects that resulted in little or no commercial return. The decision to collaborate on pre-competitive R&D has allowed companies to share costs, activate economies of scale and avoid the duplication of investments.

Participation in the consortium is based on a membership fee-system, through which the SGC finance its research activities. Membership gives the right to a company representative to seat at the Board of Directors, but it also implies that the company has to accept SGC pre-competitive agreement and sign a SGC data sharing policy (see data sharing session). The pre-competitive agreement, which prohibit patenting on any research results, regard both member companies and scientists working within SGC associated labs. This latter rule applies to the whole network of 300 scientific labs that are partners of the consortium. As SGC is just a coordination entity, research

activities are generally developed with the support of established laboratories, such as those at the University of Toronto and at the University of Oxford, where most of activities take place. Scientists working for the SGC within those centers are funded by the consortium, but it is unclear from our interview the extent to which partners organization receive or do not receive funding for their collaboration.

Goal setting is critical for collaboration

Private actors are more willing to engage in collaborative projects if they are able to influence the goal setting process. Indeed, the goal setting process is critical within the SGC and it is the responsibility of the Board of Directors, where companies' representatives gather together. Each representative has the right to propose research goals and all goals should be approved by the unanimity of the board in order to be inserted into SGC research agenda. In general, consensus is easier if companies avoid competitive concerns, focusing on non-commercially valuable research topics (i.e. research niches) or on topics that are outside companies' business areas (i.e. chemistry). In addition, goals must be clear and measurable in order to keep the consortium management team accountable to companies. The Chief Executive, who is also appointed by the board, is responsible for reaching the goals and report directly to the Board of Directors.

Data sharing: competition and open science

Industries within the consortium are not required to exchange on internal R&D activities nor do they need to share results of internal projects, data, information or material. All agreements undertaken as members of the consortium regard exclusively outputs of SGC research activities. In this way, companies are willing to collaborate since they are not required to share any information that may erode their competitive advantage. However, it is unclear from our preliminary interview if this separation is actually clearly defined in everyday interactions among companies or if continuous interactions among them have ended up in some level of information and data sharing, beyond SGC formal rules.

In addition, since SGC research projects have no-direct commercial value, members of the consortium have agreed to publicly and freely publish SCG research results. At this moment, all data produced by SCG as result of its research activities is free and public on their website. SGC estimates that in the last year (2014), around 4,000 persons have used (or at least downloaded) SGC data. The SGC data sharing policy prevents users from developing any IP right on the data downloaded but it may be used for further research or innovation. SCG does not require acknowledging the source of data and does not require users to contribute back with data.

Case study 4

Cacao Genome Database

Scope of the project: research. The project was a time-bound collaboration for sequencing the cacao gene.

Stakeholder configuration: public and private actors

Private sector involvement: some private organizations have agreed to be involved in the project; their participation has influenced the project policies.

Data and material sharing: data produced as result of common research activities is made freely available to the public. However, private actors have limited the data available and enforce limitations on data use.

Website: www.cacaogenomedb.org

Brief description

The Cacao Genome Database (CGD) was established in 2008 as a research project aimed at sequencing the cacao genome. The initiative was funded by Mars, IBM, and the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS), and partnered with other research institutions, including among others Washington State University, Clemson University Genomics Institute and Indiana University Center for Genomics and Bioinformatics. The project has successfully mapped the cacao gene sequence, which is now publicly available, even if some restrictions on its use remain.

The public-private collaboration that support the Cacao Genome Database has been made possible thanks to the convergence between private and public interests. Private actors were interested in sequencing the cacao genome in order to increase their economic returns; public actors were pursuing public research goals relevant to food and developing countries support policies. However, tensions between private and public actors emerged in some phases of the project, such as data sharing.

When public and private actors work together

The Cacao Genome Database is mostly funded by Mars and USDA-ARS. While USDA-ARS has a public interest in supporting cacao research because of its value for developing countries breeders, Mars has agreed to be involved in and to finance the project because of its economic interest in mapping the cacao genome. Genome sequencing is a source of competitive advantage for food companies, since it allows them to select the best markers (those that belong to more productive, healthier and stronger plants) and to reduce breeding costs. Thus, a research initiative such as the Cacao Genome has a strategic value for Mars. Moreover, a large scale collaboration with other research institutions provides access to a larger knowledge base and resources to better and faster mapping genome sequences. Finally, large scale genome projects are also an opportunity for

companies to show their engagement in public issues (in this case, improving cacao breeders work) or their capacity. For instance, in the case of IBM, the CGD was an occasion to show its IT capacity on future potential clients.

Data sharing and strategic value

While the strategic value of the initiative has attracted Mars' funding, it has also led to tensions between private and public actors, for instance in the design of data sharing and open access policies. To protect company's interests and for the fear of losing its competitive advantage, Mars has initially opposed data openness. At the beginning of the project, only general information about CGD main activities was accessible to the public. Data and information sharing happened "behind the scenes" among the partners involved in the research.

Only four years after, in 2012, when the cacao gene was almost entirely sequenced, Mars agreed to publicly release the sequence, which is now fully accessible online. According to the interviewee, competition against another research group for USDA-ARS funding is one of the main reason why Mars has allowed sequence sharing. Other reasons include increasing the project visibility for the benefit of the company's public image and the design of a specific data use agreement that protect Mars' economic interests. Indeed, the use of data from the CGD is regulated by an agreement that preclude any third party from deriving commercial benefits from it. The agreement has been designed by PIPRA (Public Intellectual Resource for Agriculture), a non-profit organization that "provides intellectual property rights and commercialization strategy services to increase the impact of innovation" (www.pipra.org). The agreement is nevertheless important because by addressing Mars concerns on the commercial use of the data, it at least allows the Cacao Genome Database to release data at an earlier stage of the research. Finally, it has to be noticed that only the gene sequence has been made publicly accessible. Additional phenotypic information to identify the region of the gene and its traits are not provided. The lack of this data makes more difficult the full use of the gene sequence by external actors.

What for developing countries

Many food genetic projects are sensitive for developing countries. Cacao, for instance, has an important economic value for small farmers in Africa and South America. Mars argues that improving cacao breeding through genetic research is beneficial to the whole cacao supply chain. Higher productivity and better cacao beans translate to higher profits that are shared among all actors of the chain. Whether it happens, it is unclear from our interviews. However, the Cacao Genome team has highlighted that breeding programs in developing countries are actually included into the project. Breeders are important because they provide material and phenotyping information. Although they have access to the data produced by project, they are very often not able to take advantage of it and they rely on scientists to translate scientific knowledge into practical information. Indeed, the project organizes yearly meetings among breeders and scientists in order to enhance connections among them. Whether those meetings enhance capacity building of local breeders and scientists is unclear from our interview.

Case study 5

Generation Challenge Program & Integrated Breeding Platform

Scope of the project: research; service provider; coordination; capacity building. The scope of GCP is supporting research projects in the genetic agriculture field; the scope of IBP is providing researchers with the infrastructure they need for data-intensive genetic research.

Stakeholder configuration: public and non-profit actors

Private sector involvement: none, although the IBP is trying to expand its target market to private organizations.

Data and material sharing: data sharing policies have changed from GCP to IBP. In the Generation Challenge Program, participants were required to publicly share their data. This system, however, created several issues of data quality. So, IBP now leaves researchers free to decide with whom and to what extent share their data. The project hopes to incentivize data sharing by providing user-friendly tools.

Website: www.generationcp.org & www.integratedbreeding.net

Brief description

The Generation Challenge Program (GCP) was an umbrella initiative that coordinated and supported a number of worldwide-selected agriculture research programs aimed at improving crops breeding in marginal environments. With a financial turnover of approximately USD 15 million per year, the GCP counted around 20 members and over 200 partners, including national and regional research programs from both developed and developing countries, and universities.

Alongside its research agenda, the GCP funded the Integrated Breeding Platform (IBP), a data management platform which allows scientists to manage, analyze, share, visualize and store large amount of genetics data. IBP has been launched by the GCP in response to the increasing need of scientists for bioinformatics tools, and to further support GCP efforts to promote open access to scientific data. The IBP is a fundamental "service component" of the GCP. It is "conceived as a vehicle for dissemination of knowledge and technology, enabling access to and proactive distribution of crop genetic stocks and breeding material [...] and capacity building programs" (wwww.generationcp.org/about-us/who-we-are).

The challenge of supporting scientific research

The Generation Challenge Program (GCP) was a ten-year research-driven initiative. It has been launched in 2003, with the aim to aggregate different public and non-profit organizations working in the agriculture field and to coordinating their efforts towards common research goals. The GCP activities were set every five years in a research agenda that was financially supported by a network of non-profit organizations and governmental bodies.

Both the agenda setting and selection process for assigning funding were important activities of GCP. In the first stage, the GCP agenda was focused on many different research goals, spanning over several crops. The funding was assigned through competitive calls, which were evaluated by an internal committee. This internal evaluation caused some conflicts among members for the distribution of funding and to solve them, the GCP changed its structure in 2007, nominating a board of external experts for the evaluation of the projects. The board would have also been responsible for the setting of the GCP research agenda, in collaboration with a consortium committee, composed by a representative of each member. The consortium committee was mostly a legal requirement: as the GCP is not a legal entity, members were required to approve and sign every internal decision.

Under the guidance of the new board and committee, the GCP entered in its second phase. In order to orient funding towards more relevant research goals, the committee re-defined GCP mission, narrowing the scope of the research agenda (for instance focusing GCP goals on a lower number of crops). Moreover, the grant calls system was progressively substituted by commissioned research projects in order to better align funded research projects with GCP goals.

Following scientists' needs: from research to data management

The development of the Integrated Breeding Platform has been driven by the increasing number of data-intensive research projects among GCP partners. As scientists were encountering difficulties in managing and sharing their data, the GCP decided to invest in the development of a customizable data management platform. IBP offers scientists a set of data management tools (ontologies, statistical analysis, visualization tools, storage facilities) that are needed for breeding and pre-breeding activities and research. Moreover the platform offers researchers several facilities, among which: a network of reliable breeding service providers, a resource library, training material, peer communities and technical assistance. These latter services are especially addressed to research organizations with lower research capacity since IBP, in line with GCP mission, aims at supporting capacity building in the agriculture research field.

Access to the platform is free (or almost free) and is open to every actor in the field, not just to GCP members or partners. IBP, however, is planning to implement a fee-system to make the project, which is currently funded by a 6 million grant, financially independent. Fees will be calculated according to the status and the financial availability of each organization demanding access to the platform.

Following scientists' needs (2): freedom to share

One of the goals of the GCP was the establishment of a central repository of data that would have included both public datasets and data released from projects financed through the GCP. In order to achieve this goal, the GCP established that projects would have received the last 20% of their grant only after the public release of data resulting from the funded research. The scope of this rule was to encourage and establish the practice to share data among scientists. Nevertheless, scientists' involved were much less willing to invest their time in data sharing practices than expected by the GCP team. Most of the data released under this system was of very poor quality. In order to quickly accomplish the task, scientists often shared incomplete gene sequences and low quality data with no

additional information. Moreover, each project shared its data according to different ontology and format making it difficult for other scientists to download and properly use the information.

Learning from this experience, the IBP team designed a different strategy to progressively induced scientists to share their data. According to the IBP team the first step is to encourage scientists to use the platform, letting them free to independently decide whether share their data and with whom. As in iPlant, scientists can keep their data private, share it with research partners, or with a larger audience. In this way, IBP hopes to increasingly standardize data format and ontologies. Second, the IBP team is working to improve the platform by designing functionalities that allow scientists to smoothly share their data. The ease of use is supposed to encourage scientists to share their data. Moreover, as data is already in a proper format, this system avoids the quality issues faced by the GCP.

Case study 6

NextGen Cassava and Cassavabase

Scope of the project: research-oriented; coordination; capacity building. The project aims at coordinating and supporting research activities on cassava. Capacity building workshops are offered to developing countries research.

Stakeholder configuration: public and non-profit actors

Private sector involvement: none, as cassava has a very low commercial value

Data and material sharing: data sharing among internal actors of the projects and data sharing with external actors.

Website: www.nextgecassava.org & www.cassavabase.org

Brief description

NextGen Cassava is a research program exclusively focused on cassava genetic selection. The initiative is led by Cornell University and it is funded by the Melinda and Bill Gates Foundation. Other participants include research centers in the U.S. and African countries. Given its strong specialization, the initiative attracts just a small number of scientists around the world.

Cassavabase is the specialized database that collects all data that are produced by NextGen Cassava research activities and partner projects. The database is freely accessible to anyone, after the acceptance of the Toronto Agreement for data use. Along with a library of genetics data, Cassavabase offers analysis, visualization and social networking tools.

A very simple structure

Since the project has a narrow research goal, key players and research agenda goals have been easily defined since the beginning. The initial selection of partners has been done by Cornell University, as project leader, and the Gates Foundation, as main financial partner. The Gates Foundation was already active in the cassava field and was able to suggest potential partners for the project.

The structure of the program is very simple and can be described as a hub-and-spoke model. The hub is represented by the research and management team at the Cornell University, which coordinates and supervises most of the research activities, and is in charge of the maintenance of the Cassavabase platform. Although they may be in contact among them and meet yearly, partners – the spokes - report to the central hub.

A case of enforced data sharing

The Cassavabase platform was developed because data sharing was one of the conditions of the grant. The Gates Foundation requires Cornell University to collect all data coming from funded

research projects into a publicly accessible repository. While no specific conditions about data release were set by the Foundation, the NextGen Cassava team chose to make data freely available immediately after their production, in order to allow early use from other scientists. At the same time, to protect data producers, data use has been regulated by the Toronto Agreement which states the obligation for users to contact the project managers and ask about forthcoming publications before publishing any research from the dataset.

Researchers do not well-accept the lack of control over further use of the data. In some cases, scientists fear about who will be using their data and how data will be used outside the project partners. For that reason, they are reticent to join the NextGen Cassava project. As observed by one of our interviewees, public data sharing is not just about trusting partners in the project, but trusting the whole system.

Trust-building is fundamental for sharing

The lack of trust not only impacts on data sharing. Material sharing is even more complicated, since material is affected by more legal restrictions than data, especially when it comes from native or protected environments. NextGen Cassava is actively engaging with developing countries' research institutions to facilitate material exchange. Their involvement is fundamental for cassava research, since most of phenotyping activities can be done only *in situ*. Our interviewees highlighted the importance of realistic and honest conversations with possible partners to progressively build trustful relationships (one of them noticed that conversations may last even two-three years). Indeed, as relationships are traditionally power-unbalanced, developing countries are afraid of outcomes distribution when working with developed countries' institutions. NextGen Cassava is trying to directly address this concern by supporting developing countries' scientists through workshops and capacity building programs.

Innovation may increase participation and research outcomes

One of the main problems faced by NextGen Cassava was the collection of phenotyping information from breeders. At first, they adopted a barcode system where breeders had to scan a specific barcode to identify each plant they had to insert in the database, and then another one to identify the plant disease, and so on for any relevant characteristic. Although the system was helpful for the scientists, it was far too complicated for breeders. So, NextGen Cassava decided to apply a new tablet-based technology, which allows breeders to easily insert all information required from scientists, simply touching corresponding images on the screen. The new system not only has provided scientists with all the information they need, but it has facilitated the involvement of breeders in scientific research projects.

No commercial value, no private sector

Private sector is not currently involved in the project. NextGen Casssava is open to collaboration with the private sector but this latter has shown very little interest given the low commercial value of cassava. However, it is unknown if any actor from the private sector is using the Cassavabase platform, since the management team has no information about data users.

Appendix. Case studies selection metrics

Name	Description
Project name	Name of the project
Flows	
Data	Does the project provide access to data?
Material	Does the project provide access to material?
Typology	
Database	The project offers access to data and material produced by members, other institutions or uploaded by external contributors. The project does not have any research goal on its own.
Research project	The project aims at pursuing its own research agenda and/or supporting existing research initiatives.
Platform	The project provides an open platform for the collection, management, analysis and sharing of data and material.
Partners	
Public	Public institutions are part of the project
Private	Private institutions are part of the project
Non profit	Non-profit institutions are part of the project
Research institutions	Universities and research centres are part of the project
Main partners	Who are the main partners? I.e. founders, main funding institutions...
Geographical characteristics	
Focus of the project	Geographic area to which the project aims at providing benefits
Stakeholders nationality	Main stakeholders nationality
Data production	
Internal	Data are produced by the partners / members of the projects
External contribution	Data can be uploaded by anyone who respects the contribution policy
Aggregator of public data	Data are collected through publicly available datasets
Data access	
Open	The access is open and free, even if users may be required to register or agree with the use/contribution policy
Specified access	Access is reserved to specific groups (i.e. members)
Data policies	
Users	Rules that regulate the use of data and material
Contributors	Rules that regulate users' contribution
IT characteristics	
Access to germplasm data	The platform provides access to public datasets
Tools for data management	The platform provides tools to manage data

Web based / downloadable	The platform is available only online / The platfrom may be downloaded
upload or no of own data	Users can upload and manage their own data
private / public options	Users are allowed to choose with whom and to what extent share their data
storage facilities	The platform provides storage facilities for users
Visualization tools	The platform provides visualisation tools
Open source code	The code of the platform is open source

Bretting, Peter

From: Susan McCouch <srm4@cornell.edu>
Sent: Tuesday, March 10, 2015 10:37 AM
To: Bretting, Peter
Cc: Susan McCouch; Peter Wenzl; Ruth Bastow; Peter Phillips; Daniele Manzella
Subject: FW: DivSeek Steering Committee

Dear Peter,

Congratulations! I am pleased to let you know that you have been elected to the first Steering Committee of DivSeek. We look forward to your participation. Your appointment will be for a term of 1 year, and we are planning our first meetings now.

Please go to the Doodle Polls below to help finalize the dates for a virtual meeting in April and an in-person meeting in late May.

April Virtual Meeting
[redacted]

May in Person meeting - Rome (or Bonn)
[redacted]

Please note, for the April meeting it is going to be very difficult to find a time that works for everyone as we have members in Vancouver all the way to the Philipines. Thus, we are suggesting times whereby Emily would have to be up early i.e. 6am or 7am in Vancouver, and Ruraidh would need to stay up late 9pm or 10pm in the Philippines.

To complete this process, please send me back a quick mail to confirm your willingness to serve on the Steering Committee. Thank you for your participation in DivSeek and I look forward to working with you.

Best regards,
Susan

Bretting, Peter

From: [redacted] on behalf of Susan McCouch <srm4@cornell.edu>
Sent: Tuesday, March 10, 2015 12:40 PM
To: Susan McCouch
Cc: Ruth Bastow; Peter Wenzl; Peter Phillips; Daniele Manzella
Subject: Announcing election results for DivSeek Steering Committee members

Dear Partner Organizations,

With this message, I would like to share with you the results of the Steering Committee elections.

We received a total of 19 (nineteen) candidates for the Steering Committee, 48 (forty-eight) organizations voted, and the Joint Facilitation Unit counted the votes after the deadline of 6 March.

I am pleased to announce the following results:

1. Andreas Graner - Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) - 2 years

2. Ruaraidh Sackville-Hamilton - International Rice Research Institute (IRRI), Philippines - 2 years

3. Elizabeth Arnaud - Bioversity International, France - 2 years

4. David Marshall - James Hutton Institute, UK - 2 years

5. Emily Marden - University of British Columbia, Canada - 1 year

6. Peter Bretting - US Department of Agriculture–Agricultural Research Service (USDA–ARS), USA - 1 year

7. Sarah Ayling - The Genome Analysis Centre (TGAC), UK - 1 year

8. Rajeev Varshney – International Crop Research Institute for Semi Arid Topics (ICRISAT), India - 1 year.

Please join me in congratulating our new Steering Committee Members, and in thanking them for their commitment to contribute to the DivSeek initiative. I am confident that the DivSeek community will greatly benefit from the expertise of this Steering Committee, and we look forward to working closely with them.

Work is already underway, and we are planning two meetings of the Committee in order to develop the first programme of work and to implement other actions requested by the Assembly. I will continue to communicate with you on a regular basis on the progress being made in advance of the next Partners' Assembly, and am looking forward to the exciting developments ahead.

With kind regards,

Susan McCouch
Chairperson of the Assembly

--

Susan McCouch
Professor, Plant Breeding & Genetics
Cornell University
162 Emerson Hall
Ithaca, NY 14853-1901
Phone: +1 607-255-0420
Fax: +1 607-255-6683
Email: srm4@cornell.edu or mccouch@cornell.edu
Alternate Email: [redacted]

Bretting, Peter

From:	[redacted] on behalf of Susan McCouch <srm4@cornell.edu>
Sent:	Monday, March 23, 2015 7:21 PM
To:	Andreas Graner (IPK); David Marshall; Elizabeth Arnaud (Bioversity); Emily Marden (UBC); Bretting, Peter; Rajeev Varshney (ICRISAT & GCP); Ruaraidh Sackville Hamilton (IRRI); Sarah Ayling (TGAC)
Cc:	Susan McCouch; Peter Wenzl; Ruth Bastow; Daniele Manzella; Wayne Powell (CGIAR CO)
Subject:	DivSeek Steering Committee Meeting: May 28th in Rome

Dear DivSeek SC members,

Based on the results of the Doodle Poll, I am writing to let you know that the **first DivSeek SC meeting** has been scheduled for **May 28th in Rome**. Please put it on your calendars and hold the date.

For detailed logistics regarding the meeting venue, please refer questions to Peter Wenzl, Daniele Manzella, and Ruth Bastow, who are cc'd on this msg.

We ask that you make plans to **travel to Rome on May 27.** We will organize a dinner ahead of the full day meeting on May 28th.

I believe everyone except Emily indicated that this date was workable, so we hope to see you all there. We will organize a teleconference so that Emily can join us remotely.

I want to personally welcome all of you to the Steering Committee and thank you for your willingness to dedicate your valuable time to helping us outline and prioritize the activities and directions of the DivSeek initiative.

I look forward to seeing you in Rome.

Best,
Susan

--
Susan McCouch
Professor, Plant Breeding & Genetics
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162 Emerson Hall
Ithaca, NY 14853-1901
Phone: +1 607-255-0420
Fax: +1 607-255-6683
Email: srm4@cornell.edu or mccouch@cornell.edu
Alternate Email: [redacted]

Bretting, Peter

From: E. Marden [redacted]
Sent: Thursday, November 26, 2015 4:12 PM
To: Bill Boland; Phillips, Peter; Regiane; Bretting, Peter
Subject: Fwd: DRAFT Expert Group Report
Attachments: Governance of DivSeek Nov 22.doc; DivSeek Expert Governance (3).docx; Public-Private-Producer Partnerships (P4s) in Canada Final Report.pdf

Dear all

I am sending this around again. In need a draft that can be shared with the Steering Committee by the end of the weekend. I will go through this again to continue refining. However, I do request your input. Peter P. and Bill - in particular - please make sure you agree that I have characterized your research findings accurately.

Best regards (and happy thanksgiving!)

Emily

Begin forwarded message:

From: "E. Marden" [redacted]
Subject: DRAFT Expert Group Report
Date: November 22, 2015 at 10:54:44 AM PST
To: Bill Boland [redacted], "Phillips, Peter" <peter.phillips@usask.ca>, Peter Bretting <Peter.Bretting@ARS.USDA.GOV>, Regiane [redacted]

Dear all,

Please find the appendix documents attached.

I am also sending a word version of the draft report I just sent - if needed.

Thank again!

Emily

Summary of Requests to Expert Committee

(arising from May 28, 2015 Steering Committee Meeting)

1. Governance Issues

22. The Committee decided to request one of its members, namely Ms. Emily Marden, to convene, under her chairmanship, a governance expert group, in accordance with the Charter's provision to elaborate operational guidelines through expert consultations, in order to:

i) validate the Committee's provisional opinion about membership at the level of organizations/institutions, and/or clarify alternative options and implications;

ii) advise the Committee on possible steps towards private sector membership or other engagement, including an assessment of the implications on the implementation of DivSeek's principles as stated in the Charter.

23. In conjunction with the decision to convene a governance expert group, the Committee was informed about an on-going research project by Arizona State University (ASU) on institutional and organizational factors for enabling data access, exchange and use, which the Global Crop Diversity Trust and the Secretariat of the International Treaty were co-funding. Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, informed the Committee of the preliminary research activities conducted by the ASU research team for the project, and distributed a progress report. The Committee invited Ms. Marden to coordinate with the ASU research team to obtain early access to the results of the study for consideration as part of the work of the governance expert group.

32. [The Steering Committee] considered a number of potential issues in relation to the role of the Joint Facilitation Unit within DivSeek, as follows:

i) modalities for expansion or contraction of the Joint Facilitation Unit, e.g. in cases where one organization is inactive or becomes unable to serve, or where a Partner organization expresses interest in joining the Unit;

ii) the roles and responsibilities of individual representatives of the organizations that serve the Unit;

iii) the modalities of representation by the respective organizations within the Unit;

iv) the modalities for decision-making within the Unit;

v) the relationship between the Unit and the other elements of DivSeek's governance structure (i.e. the Assembly and its Chairperson and the Steering Committee) with respect to communication lines and providing guidance and direction.

33. The Committee requested the governance expert group to be convened by Ms. Emily Marden to prepare a document for the consideration of the Committee, based on the provisions of the DivSeek Charter, to explain the governance structure of DivSeek, to

describe mechanisms that would allow it to evolve in the future, and to present options for clarifying the above issues[1].

37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

2. Membership Issues

   a. Organizational Level

   18. Regarding a) and b), the Committee agreed to provisionally keep the current membership at the level of organizations/institutions, as this aligned with the current governance settings of the Charter. It considered membership tiers as a possible future solution to reflect different interest groups (e.g. donors, communities of practice, advisors and service providers).

   b. Private Sector

   21. Regarding e), the Committee was alerted by the Joint Facilitation Unit to the opportunity to keep an active line of communication with the private sector representatives who were at the first Partner Assembly. The Committee highlighted the potential of private sector engagement for DivSeek funding of future training and capacity building programs, as well as for expanding the range of expertise and knowledge within DivSeek. It also discussed some of the systemic and practical implications of private sector membership, with particular attention to a balanced relationship among different DivSeek constituencies and the need to promote equitable data sharing policies. It also recalled the annotation in the Charter, which referred to observer status for private sector, pending the development of operational guidelines for private sector engagement.

3. Publication Issue

   37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

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[1] To potentially include additional issues raised in informal discussions:

- How many individuals/institutions should be represented?
- What are the procedures for accepting a new member or retiring a current member?
- Guiding principles for governance structure of the initiative long term and short term
- Who acts on behalf of who? Do JFU members report to their current organizations? Or to the SC and the PA?
- Should the JFU members have specific domains of authority /expertise and reprting responsibilities to streamline implementation of DivSeek directives?
- Is the current reporting structure [EM comment: not sure what this is?] conducive to long term growth and sustainability of the initiative?
- Currrently budgets managed by individual JFU organizations. Should there be some sort of joint management?

4. Additional Issues Raised in Discussion with S. McCouch

To: DivSeek Steering Committee

From: DivSeek Expert Governance Committee

Re: Report of Governance Expert Group

Date: December 8, 2015

EXECUTIVE SUMMARY

DivSeek is strongly advised to:

1. Modify the current organizational structure to include an Executive Director with executive/operational function. In this revised model, the JFU members would become advisory, or could be seconded for specific functions under the direction of the Executive Director. The Steering Committee would maintain the same role and be importing in setting the ground rules and objectives. The Asseembly's role would continue unchanged.

2. Develop (a) a five-year strategic plan that sets out operational policies to define the range of projects and partnerships to pursue and the key goals and objectives, and (b) an annual workplan to realize the goals of DivSeek.

3. Empower the Executive Director to operationalize the workplan and five year strategic plan.

If this recommendation is accepted, there are three options for implementation:

1. The Steering Committee appoints an Executive Director and designates the executive function (i.e. administrative capacity) at one of the current JFU partner organizations;

2. The Steering Committee appoints an Executive Director and designates the executive function to be located within an existing organization that is engaged in similar ventures as DivSeek to deliver the programming (e.g. CIAT); or

3. At the direction of the Steering Committee, contract with a third party organization with recognized executive and management capacity that can deliver the programming under contract (e.g. CABI).

DISCUSSION

1. Background

At the first meeting of the DivSeek Steering Committee in May, 2015, certain issues were referred for further consideration to a "governance expert group" to be convened by Steering Committee member, Emily Marden. The list of issues identified by the Steering Committee for the governance expert group were identified in the Report of the Steering Committee Meeting; the relevant excerpts from the Report are included in Appendix 1 to this document.

Pursuant to this request, Emily Marden convened an expert group consisting of (in addition to herself): Bill Boland (U. Saskatchewan), Peter Bretting (USDA), Regiane Garcia (U. British Columbia), and Peter Phillips (U. Saskatchewan). Collectively, the group has extensive experience with public and private agriculture governance issues, including experience with organizations around the world. The expert group held meetings by teleconference in September and October, as well as discussions via email.

In addition to bringing their relevant expertise to bear on the questions presented, the expert group considered the following DivSeek documents: (1) the May, 2015 Steering Committee report; (2) the DivSeek Charter, adopted in January, 2015; and (3) the Operation of the Joint Facilitation Unit (2015) DS/SC---1/15/4 document.

The expert group deemed the governance questions to have priority and so focused mainly on these. Recommendations on publication and the private sector were also considered and are summarized at the end of this report.

2. Governance Issues

DivSeek was formed at the first Assembly of the Partners in January 2015 in San Diego. As a part of that formation, a Charter was approved. The DivSeek Charter identified roles for a Joint Facilitation Unit (JFU), a Steering Committee (SC) and the Assembly of Partner Organizations (Assembly). The DivSeek JFU currently consists of a single representative from each of: the Secretariat of the International Treaty (Treaty), the Global Crop Diversity Trust (GCDT), the Consortium Office of CGIAR, and the Global Plant Council (GPC).

As is often the case in the first year of a new organization, governance challenges have arisen. To some extent, DivSeek was conceived with both too much and too little governance: that is, DivSeek has a JFU, SC and Assembly, but lacks both clear operational leadership and a team to deliver the work of the organization.

a. Importance of Operational Leadership and Function

The JFU developed an Operational Document (DS/SC-1/15/4)(OD) to help guide DivSeek and to clarify roles. However, while this OD lays out what could be an appropriately

aggressive initial mandate and set of activities, it does not provide for an operational structure to advance the work.

The OD suggests that all activities of DivSeek are decided, supported and implemented collectively (§2.2). At the same time, the JFU members ultimately answer to their organizations rather than DivSeek. Such an approach is certainly appropriate for the development and founding of an organization. However, this structure is problematic for operation, especially for an organization such as DivSeek that aims to engage flexibly with a variety of actors, including international organizations, NGOs, universities, NARS, farmer organizations, producer organizations and the private sector. Consensus at the operational level while representing individual organizations is not feasible particularly in the face of pressures to be adaptive and responsive.

The attempt to embrace consensus even while representing divergent views is a common problem within agricultural research partnerships. In general, key contributing organizations want to position their own personnel within the decision-making process to observe developments and to protect their investment and interests. Moreover, agricultural research partnerships can be difficult to organize efficiently as they often consist of a variety of dissimilar organizations with different values and organizational objectives. Extensive research on agricultural-related partnerships by Phillips, Boland and Ryan (2013) (attached at Appendix 2) suggests that outside of funding issues, a lack of feasible operational principles is the greatest threat to the survival of these partnerships. We mention a few cases from this research below to demonstrate the significant impact of operational principles on outcomes:

- Vineland Research and Innovation Center: One model of success is the Vineland Research and Innovation Center in Ontario, Canada. This is a large and complex partnership that evolved from a former public research institute into a partnership that consists of over 30 upstream and downstream organizations. Vineland is governed by a board of 12 directors, and one CEO, who has full control of operations and finance. The office of the CEO retains operational control and streamlines decision making into a single authoritative system. The Board approves annual work plans and all key operational policies. The Board's input is relied on as important – given that members are experts drawn from many of Vineland's partners. As such, while the CEO maintains operational authority, the Board provides input and review, and critically, links together a large number of diverse organizations into network and sets the tone for shared interests and investments.

- Molecular Plant Breeding Cooperative Research Centre (MPBCRC): In contrast, the MPBCRC in Australia failed despite having a sound business plan and being well-financed. At one time it was one of the largest agribiotechnology ventures in the Southern Hemisphere. MPBCRC used a distributed model of governance and lacked a central decision making capabilities, relying instead on consensus based decision making. MPBCRC is no longer operational. MPBCRC suffered from a lack of a clear board vision (they agreed on the general direction but could not distill it to

instructions to their operational team) and ineffective leadership. This was compounded by conflicts emanating from the different sectors, as public and private employees use different values that were operationally incompatible, providing grounds for conflict. Failure could not be attributed to their output: the ROI was 300% on technology investments and 700% on educational outreach. The business fundamentals were sound, but the governance structure was not capable of sustaining the partnership.

An array of other examples along the spectrum of success to failure is included in the attached report.

b. Elements of Successful Ag Organizations

The Phillips, Boland and Ryan (2013) study identifies a set of considerations necessary to a demand-driven research partnership capable of operational success. These are worth considering *in toto* as DivSeek moves forward. We acknowledge that some of the issues below have already been addressed by DivSeek.

The factors are:

1. Initial Identification of the Common Interest Driving the Organization

   - Formation of a Committee to oversee the planning of the partnership;
   - Mapping the research network, identifying and convening potential partners and key actors in the research network;
   - Determining the common interest shared by the potential partners.
   - Developing a clear and concise strategic vision to guide the participants and to empower an operational mandate; and
   - Defining loyalty to the partnership so that the results and operations of the partnership do not elicit conflict with the individual partners.

2. Core Elements:

   - Organization: includes a description of the roles and responsibilities of each partner organization, the governing body the board (Steering Committee) and the executive (Executive Director);
   - Activities: includes a description of each partner's activities and responsibilities as well as the mechanisms of interaction among partners;
   - Budget: includes the total cost of partnership, joint financing requirements, and the specification of each partner's contributions—in cash and in-kind—or at least principles and practices that will enable future contributions; and

- Monitoring and evaluation mechanisms: include an examination not only of the results of the partnership, but also of the collaboration itself, including an analysis of the partners' commitments and the overall synergistic effects.

3. Common Clauses in a Organization Formation Agreement

- Identification of the partners
- Subject of the contract: the partnership
- Objectives of the partnership
- Organizational design
- Duration and termination
- Obligations and commitments of the partners
- Means of contributing resources (financial and in kind)
- Dates of payment
- Types of activities
- Evaluation and monitoring mechanisms
- Mechanisms for conflict resolution

c. Recommendations for DivSeek

Further defining the operating principles is a necessary next step. Specifically, there is a need to define both: (1) the existence of and parameters for executive action and (2) the nature of partnerships to be encouraged through DivSeek.

i. Establish Operational Leadership

Based on the Phillips, Boland and Ryan study, it is clear that a empowered executive is necessary to allow DivSeek to engage and leverage opportunities.

There are two possible paths, any of which could be implemented via one of the three specific approaches discussed below:

- "Top Down": An executive could be established and given a set of guiding principles that set the outer bounds of the allowable partnerships and activities; or
- "Bottom Up": An executive could be established and given the authority to engage with any and all current and future partners on projects to advance

their DivSeek related activities, thereby building through custom and precedent the range and scope of allowable partnerships.

Neither is unambiguously preferred: top down definition in absence of any practical examples can be slow and/or self-limiting while the bottom-up approach is highly enabling but can lead to an excessive diffusion of models and simply put the onus on the putative partners to define their principles. Over time, each model is likely to converge on a common set of principles.

Depending on the institutional approach chosen, an effective administration is needed to implement the strategies and plans. This would necessarily include development of a budget for the executive function and recruitment of necessary staff either by temporary/permanent staffing and/or secondments is necessary.

ii. Further Define Operating Principles

In either case, an empowered executive needs clear parameters for operating (i.e. what can be done by the executive, and where must additional consultation with the Steering Committee take place?). There are models for such principles that can be provided; these could be reviewed and modified by the Steering Committee to delegate appropriate amounts of authority. In this context, the Steering Committee will need to decide what types of actions the executive is authorized to take without SC review, and which activities require notification to the SC, or authorization by the SC.

An executive for a multi-faceted organization such as DivSeek will also need to have the ability to draw upon and engage experts in relevant fields. Such expertise can be gained by seconding members of the JFU or other partner organizations, as appropriate.

Importantly, the move to adopt an executive function requires only moderate revision of the Charter. It can be revised to incorporate an executive function to undertake the operations of DivSeek. The JFU can remain in an advisory capacity. The SC and Assembly remain largely unchanged.

From a governance perspective, DivSeek currently lacks clear workable operating principles. The OD §3.5 addresses management of the Steering Committee and Assembly. However, while these work items are necessary, they are not sufficient to ensure that DivSeek itself operates. There is a need to provide a sharper focus on piloting or advancing the practical data sharing platforms envisaged in DivSeek.

Given the many distinct stakeholders and broad goals of DivSeek, it is not reasonable to expect the organization itself to have immediate or near-term access to adequate internal resources to deliver the new platforms by its own initiative. Instead, DivSeek will need to draw on experts and to work cohesively and effectively with other organizations. In this context, it is worth noting that all of the early priority opportunities discussed at the past meetings are in areas where there are established actors, a few investments and some action consistent with DivSeek. For this reason, it will be necessary to develop an

operational model that works with rather than competes with these other actors and ventures.

iii. Medium Term Plan

While there is pressure for immediate action, it would be wise to sketch out a 5 year plan (say in 1-3 pages) that lays out medium term expectations and goals. Most of the projects are unlikely to fit in one-year increments, so having a longer term vision and set of goals would help to guide the development and implementation of those projects.

iv. Annual Work Plan

An annual workplan with priorities for the next calendar year needs to be developed for immediate action. At present, DivSeek is long on principles and short on actionable activities. The workplan should identify a range of specific activities that assign responsibility and motivate action.

3. Specific Options for Establishing an Executive Function

Option 1: Build an executive function at one of the existing JFU partners

- **Synopsis**: The JFU could be restructured into an operating unit rather than a secretariat. This would require the core partners to the JFU to decide on how they will transfer control of their staff and assets to one entity and then step back. This could be done quickly and cleanly if there is agreement.

- **Transition considerations**: Establishing an executive function within one of the existing JFU organizations would be the simplest to effect if the four JFU founding members support this approach. The advantage is that all four partners to the JFU have been involved from the start and have a good sense of the opportunities and implications. However, this approach may not be a simple matter to effectuate.

Option 2: Partner with another existing organization that is engaged in similar ventures as DivSeek to deliver the programming

- **Synopsis**: A number of organizations around the world are engaged directly in activities consistent with DivSeek. It could be possible, given the right circumstances, to negotiate a partnership whereby the responsibility for advancing DivSeek is transferred to a third party. This could involve full devolution of the venture or the transfer of the venture as a new 'business-line' for the organization. One option floated as a for-instance was CIAT, which has recently received new funding for a DivSeek-like venture. Combining resources could motivate the DivSeek venture and accelerate new projects. Depending on the terms of the transfer, there would be different impacts on the JFU, the founding partners and the Steering Committee. The main challenge of this option is that any organization taking

this on would likely want to ensure the venture adds value to their mission—if their mission changes, it could pull DivSeek in directions other than intended by the Charter.

- **Transition considerations**:
    - This option would likely require (a) the partners to the JFU to agree to transfer authority and likely some funding/staff to support such a venture, (b) the destination organization accommodating the goals of DivSeek and making room for the general assembly (and possibly even the Steering Committee).
    - If this option is considered, the Steering Committee could either issue a call for expressions of interest, proactivity identify and approach obvious partners to explore this option or do both.

Option 3: Contracting with a third party organization with recognized executive and management capacity that can deliver the programming under contract

- **Synopsis**: One strategy would be to essentially contract out the management function, either to an international or not-for-profit organization (or even to a for-profit management firm). This would create the cleanest break between the executive function and board oversight, as the relationship would be moderated by a contract, which would help to focus the efforts of the charter signatories and the other partners to identifying strategic direction. Sometimes the intervention of an arms-length disinterested manager can help the partners and projects be developed efficiently and effectively.
- Transition considerations:
    - This option would require the partners to the JFU to transfer funding to support such a venture.
    - This option would allow the Partners' Assembly (and possibly even the Steering Committee) to continue to function as envisaged in the Charter.
    - If this option is considered, the Steering Committee would need to issue a call for expressions of interest. There may be a few obvious partners to proactively approach and invite to bid on the contact but it would be ill advised to sole-source this contract.

4. Publication of DivSeek Meeting Documents

For an organization that places a priority on transparency, the common practice is to document meetings by reporting topics discussed, but omitting identification of individual

positions or disagreements. Thus, a meeting report can identify the agenda, including issues discussed, and report tht discussion ensued. Where necessary different perspectives can be reported with the ultimate decision reached.

This kind of approach serves the purpose of transparency and communication while still ensuring space for free and open discussion.

5. Engagement with the Private Sector

The expert group feels strongly that open discussion with the private sector is important as a first step to guage the degree to which the private sector is interested in participating in Divseek, and the terms they seek. The expert group received one unsolicited statement from Syngenta expressing interest and desired terms. However, the group also awaits the read out of the ASU study which looked specifically at the terms and successes of private sector engagement in a number of analogous organizations.

Bretting, Peter

From: E. Marden [redacted]
Sent: Tuesday, November 03, 2015 2:06 PM
To: Bretting, Peter
Cc: Phillips, Peter; Bill Boland; Regiane Garcia
Subject: Re: Governance Subcommittee - Meeting Minutes - Please Review
Attachments: 2015 October 28 Governance Meeting Final Report.doc

Thanks for the helpful clarifications!

I have revised the document. Peter P- note there is a question for you embedded in here. Also, this is a nudge to Peter P. and Bill - if you have an outline to circulate this week, please do so, to help us move toward drafting a report for next month.

Best regards,

Emily

On Nov 1, 2015, at 10:29 AM, Bretting, Peter <Peter.Bretting@ARS.USDA.GOV> wrote:

> <2015 October 28 Governance Meeting Report PKB.doc>

Teleconference of the Governance Subcommittee,
DivSeek Initiative Steering Committee
28 October 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. **Recap**

E. Marden reviewed the items designated from the 23 September 2015 meeting of the Subcommittee and welcomed the written proposal for DivSeek developed by P. Phillips and B. Boland.

2. **Discussion of Memorandum**

Discussion ensued on the written proposal. The Subcommittee confirmed its consensus around implementing an executive function to give DivSeek the operational tools to move forward. This executive function was envisaged as an Executive Director or CEO, guided by an Advisory Board/Steering Committee. It was also envisaged that JFU members and/or others could be seconded into the executive function on an as-needed basis to give DivSeek necessary expertise and flexibility.

The Subcommittee recognized different potential models existed for implementing an executive function, ranging from creating a new stand-alone organization, to locating the executive function within an existing organization, or to contracting the function out to an existing organization. In addition, it recognized that any of these structures would require a transitional plan. It was thus agreed that the report developed for the Steering Committee would contain several potential models for an executive function, with each of these models including transitional steps. P. Phillips and B. Boland agreed to flesh out these options.

The Subcommittee also noted that empowerment of an executive to act on behalf of DivSeek would require drafting concise operational principles that would set clear parameters for actions that could be undertaken with or without additional input from the Steering Committee/Advisory Board. P. Phillips will circulate some governance principles that could be used as a template for this purpose.

3. **Publication**

The Subcommittee next addressed the publication of DivSeek discussions and reports based on the Steering Committee request to elaborate *"a policy on the publication of DivSeek meeting documents and reports."* In discussion, it was noted that a best practice would be to publish reports of key meeting transactions in streamlined form, without attribution of comments to individuals. Such an approach would serve the purpose of transparency and communication while still enabling free and open discussion. E. Marden agreed to draft this recommendation for the Steering Committee meeting

Commented [BP1]: Peter Phillips—could you check this phrasing?

4. **Private Sector**

Recognizing the ongoing importance of engaging the private sector, E. Marden raised the possibility of conferring with members of the private sector at or before the next Partners

Assembly to gauge their level of interest. This idea was accepted by the Steering Committee.

5. **Next Steps**

The Subcommittee agreed to prepare materials for the December 8 SC meeting. Specifically, Bill B. and Peter P. will add detail to their Memorandum, offering options for a DivSeek executive structure and elements for transitioning to that structure. In addition, they will circulate operating principles that could be revised for DivSeek. E. Marden will circulate a proposal for the SC on publication of SC meeting notes and conferring with the private sector. The Subcommittee aims to circulate materials and to work toward a draft by the third week of November.

Bretting, Peter

From:	E. Marden [redacted]
Sent:	Monday, October 26, 2015 11:56 PM
To:	Phillips, Peter; Bretting, Peter; Bill Boland; Regiane
Cc:	Daniele Manzella (ITPGRFA)
Subject:	Re: Governance Subcommittee - Wed October 28 - 10 Pacific/11 Saskatoon/1 PM Eastern
Attachments:	Phillips and Boland on Governance of DivSeek.doc; Public-Private-Producer Partnerships (P4s) in Canada Final Report.pdf; Agenda October 28.docx

Dear all,

This is a reminder of our call this Wednesday at 10 AM Pacific/1 PM Eastern. Dial in information is below.

I am attaching a brief agenda, as well the promised memo from Peter Phillips and Bill Boland. The PDF is a background document referenced in that document.

I am copying Daniele on this email as well, as we hope that he can join the call and share feedback on the attached.

Best regards,

Emily

> I have picked "Wednesday, October 28, 2015 10:00 AM (Time zone: Pacific Time)" as final option(s) for the Doodle poll "Governance Subcommittee."
>
> Follow this link to open the poll:
> [redacted]
>
> Here is a teleconference number we can use for next week's call:
>
> Dial in: [redacted]; Conference Code: [redacted]
>
> Emily

Teleconference of the Governance Subcommittee,
DivSeek Initiative Steering Committee
28 October 2015

Agenda

1. Recap and update

2. Presentation of Memorandum on DivSeek Governance (P. Phillips and B. Boland)

3. Discussion of Governance Options that Could Be Presented to Steering Committee

4. Additional Issues for Consideration by Steering Committee
    a. Implications for Charter
    b. Implementation and Need for Transitional Structure
    c. Potential for a Permanent Host
    d. Roles for current JFU

5. Other Issues
    a. Publication of DivSeek meeting documents and reports
    b. Engaging with the private Sector

6. Elements of a Report to the Steering Committee

7. Another other business

JOHNSON SHOYAMA GRADUATE SCHOOL OF PUBLIC POLICY

University of Saskatchewan campus
101 Diefenbaker Place, Saskatoon, Canada S7N 5B8
tel: (306) 966-4021 fax: (306) 966-1967
email: peter.phillips@usask.ca
Websites: VALGEN.CA and peterwbphillips.org

Memorandum:

Date: December 30, 2015
From: Peter W.B. Phillips and Bill Boland, University of Saskatchewan
To: DivSeek Governance Committee

Re: **DivSeek Governance**

This is a brief strategy note produced for the use of the DivSeek Governance Committee as it considers further structure to advance the implementation of the DivSeek vision and mandate.

Issues:

DivSeek was ratified in January 2015. In the first year, governance challenges have arisen. In some ways, there is both too little and too much governance: DivSeek has an Assembly, Steering Committee and Joint Facilitation Unit, comprising members from the ITPGRFA/FAO, GCDT, GPC and the CGIAR Consortium Office, but lacks any clear operational leadership or team to deliver the work of the institution. We address two pressing issues relate to this below:

1. **Leadership and management:** The JFU developed an Operational Document (DS/SC-1/15/4) to guide directions. In May, it became clear that the guidance was inadequate. While the OD lays out what could be an appropriately aggressive initial mandate and set of activities, it fails to provide an operational structure that can advance the work. The impression left in the OD is that all decisions are decided, supported and implemented collectively (ss. 2.2.2), while at the same time the JFU members are seconded from and ultimately answer to their organizations rather than DivSeek. While this principle was appropriate for the development and founding of the overall organization, this is problematic for operation, especially when DivSeek will need to find flexible ways to work with a variety of actors, including international organizations, NGOs, universities, NARS, farmer organizations, producer organizations and the private sector. Consensus at the operational level is infeasible in the face of pressures to be adaptive and responsive. Other strategies are needed to advance action.

While there has been some discussion about developing more of an executive operations center—which would have control over operations and logically would be centered on one individual as leader and final decision-maker, albeit ultimately responsible to the General Assembly—this option has not been fully explored.

This is a common problem within agricultural research partnerships, as all key contributing organizations want their own people within the decision making process to observe and protect their investment and interests. Agricultural research partnerships are difficult to organize efficiently as they consist of dissimilar organizations with different values and organizational objectives. Our research and database of ag-related partnerships (Phillips, Boland and Ryan 2013) suggests that outside of funding, this is the greatest threat to the survival of these partnerships. A number of the cases showed the range of options:

- One model of success is the Vineland Research and Innovation Center in Ontario, Canada. This is a large and complex partnership as it evolved from a former public research institute into a partnership that consists of both upstream and downstream organizations, over 30 in total. Vineland is governed by a board of 12 directors, and one CEO, who has full control of operations and finance. The Board does not decide individual projects but approves annual work plans and all key operational policies. The board is important to the operations and not simply a rubber stamp; given the members are experts drawn from many of Vineland's partners, it links together a large number of diverse organizations into network and sets the tone for shared interests and investments. The office of the CEO retains operational control and streamlines decision making into a single authoritative system, which is then accountable through the relationship between the CEO and board.
- In contrast to the above, The Molecular Plant Breeding Cooperative Research Centre (MPBCRC), in Australia, failed despite having a sound business plan and being well-financed. At one time it was one of the largest agribiotechnology Southern Hemisphere. MPBCRC is no longer operational. A number of reasons standout. MPBCRC suffered from a lack of a clear board vision (they agreed on the general direction but could not distill it to instructions to their operational team) and ineffective leadership. This was compounded by conflicts emanating from the different sectors, as public and private employees use different values that were operationally incompatible, providing grounds for conflict. MPBCRC used a distributed model of governance and lacked a central decision making capabilities, resorting to consensus based decision making. Failure could not be attributed to their output: the ROI was 300% on technology investments and 700% on educational outreach. The business fundamentals were sound, but the governance structure was not capable of sustaining partnership.

We **recommend** the JFU and its founding organizations develop a plan to search, select and appoint a CEO with executive function and that the founding organizations become advisory not directing. In a strict sense, the Board would not engage in evaluation of the emerging projects or partnerships, but would set the ground rules and evaluate performance. Nevertheless, it would be wise to keep the board members individually and collectively informed and to solicit their advice on potential opportunities sand threats to the emerging partnerships. See below for advice on the scale and scope of the partnerships.

2. **JFU current facilitation workplan:** Most of the work listed in ss. 3.5 of the OD relates to managing the Steering Committee and Assembly; while all of these work items are necessary, they are not sufficient. There is a need to advance the workplan to provide a sharper focus on piloting or advancing the practical data sharing platforms envisaged in DivSeek.

Given the nature of DivSeek and the goals it aspires to, it is impractical to expect the organization to have immediate or near-term access to adequate internal resources to deliver the new platforms by its own initiative. Moreover, all of the early priority opportunities discussed at the past meetings are in areas where there are established actors, a few investments and some action consistent with DivSeek—it will be necessary to develop an operational model that works with rather than competes with these other actors and ventures.

We **recommend** a first action of the CEO and executive team would be to submit operational policies that lay out the range of projects and partnerships they would pursue, a five year business plan and an annual workplan to realize the goals of DivSeek.

Bretting, Peter

From:	E. Marden [redacted]
Sent:	Monday, October 19, 2015 12:48 PM
To:	Phillips, Peter; Bretting, Peter; Bill Boland; Regiane
Subject:	Governance Subcommittee - Wed October 28
Attachments:	2015 Final Notes-Meeting-Sep23 .docx

I have picked "Wednesday, October 28, 2015 10:00 AM (Time zone: Pacific Time)" as final option(s) for the Doodle poll "Governance Subcommittee."

Follow this link to open the poll:
[redacted]

Here is a teleconference number we can use for next week's call:

Dial in [redacted] Conference Code: [redacted]

I am attaching the minutes from last week's call and will follow up with further information when available.

Emily

Teleconference of the Governance Subcommittee,
DivSeek Initiative Steering Committee
23 Sept 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. **Introductions and Overview of Agenda**

E. Marden introduced the goals of the subcommittee, the Terms of Reference, and the Agenda. It was noted that governance was a priority issue for the DivSeek Initiative in order for it to develop and grow over the long-term. Other issues were noted, including membership, publication of meeting minutes for the DivSeek Steering Committee (SC), and how/when to invite the private sector to participate in the DivSeek Initiative.

2. **Governance the is the Priority Issue for the SC**

It was noted that, despite the Charter, there are no formal operating rules for DivSeek and that sometimes it is difficult for the DivSeek Joint Facilitation Unit (JFU) members to reach consensus and move forward. The subcommittee discussed the evolution of the membership of the JFU; the need for a mechanism for adding or subtracting members from the JFU was noted, as well as the in kind nature of budgeting and the need for additioanl support. The subcommittee reflected that the documents contain many principles and goals but no operating framework.

3. **Possible Paths Forward**

Having recognized the current need for clear operating principles for DivSeek, conversation turned to the potential paths forward. There was general consensus that a permanent JFU consisting of the four current partners was probably not ideal, in part because other organizations are interested in becoming members of the JFU, and because some current members may want to phase out or diminish JFU participation at certain times. Involving more organizations in the JFU could increase the level of engagement of the community. The pros and cons of appointing an executive operations person (e.g. executive director) were discussed. The subcommittee also discussed integrating the staff from the JFU members and/or others into formal secondment roles, full or part time, working on specific DivSeek issues. There was discussion of governance models from agriculture and agricultural research in other parts of the world across the spectrum. Bill Boland offered to examine his accumulated research for examples that show the strengths and weaknesses of various models. Ultimately, however, there was agreement that DivSeek needs an operations center of some kind to develop and grow further.

4. **Importance of DivSeek Initiative**

The importance of DivSeek and its continuing operations was emphasized. The subcommittee noted that DivSeek has already achieved a significant measure of success in focusing an array of diverse organizations on a common and important goal. The potential for advancing the goal of sharing genomics data was illustrated by the agreement around DOIs as a permanent identification descriptor that grew out of the pre-Divseek COGIS meeting in January 2015; this important step was initiated by the Treaty Secretariat. Once the discussed turned to technical aspects, a technical group was able to agree on a

meaningful standard. This example shows the desire for shared standards that enable ongoing research and innovation, principles that underlie DivSeek.

5. **Next Steps**

The subcommittee agreed to work towards submitting some proposals for the December 8 SC meeting. Specifically, Bill B. and Peter P. will review examples from other organizations and present some models as well as the outlines of a proposal. R. Garcia will consider whether there are any Brazilian or other S. American examples. We will examine this material and start to draft a proposal for the SC. The subcommittees will aim to reconvene by teleconference in 3 or 4 weeks (mid October).

Bretting, Peter

From: E. Marden [redacted]
Sent: Thursday, October 08, 2015 1:35 PM
To: Peter Phillips; Bill Boland; Bretting, Peter; Regiane Garcia
Subject: Governance Committee - Updates

Dear all,

Since we spoke I have had a number of conversations bearing on DivSeek governance and I think these are relevant to pass on.

1. I had an off-line conversation with Peter Wenzl (Crop Trust) and Ruth Bastow (Global Plant Council) about DivSeek. I floated the idea of an executive director who has operating capacity, separate from the JFU entities. Both came back separately with extreme enthusiasm. The Trust, in particular, seems to back this idea, as long as the ED is not located at the Treaty. Ruth wondered about setting up a separate legal entity.

2. I also had an offline conversation with Daniele (Treaty). He himself suggested that what was needed was an executive director, or secretariat at an organization that is not one of the current 4. He stated that he thought a separate legal entity would be a bad idea, but that a "secretariat" could be established at some willing organization with current (or other) organization seconded to help with the operations.

I think this is all very good for our proposal.

Peter/Bill – were you going to draft a framework along these lines, with backup examples? If not, I can take a stab at a vision; examples would still be very welcome. However, I would like to start circulating something relatively soon so that we can all comment and then prepare for a larger group.

Of note: I was in Rome for the Treaty Governing Body meeting. The Treaty out of the blue announced that the Global Information System is up and running and IRRI had 'deposited' all of its material in it. After initial surprise, it turns out that IRRI has simply agreed to be a part of the GLIS, but there is no such new entity at the moment. Further, there was a lot of chatter around the edges that this announcement seemed premature as there were still many questions about the terms on which information in the GLIS would be shared. In fact, these issues were widely commented on by contracting parties at the meeting.

Also, I had the opportunity to speak informally with a couple legal/policy people from the private sector. They are all quite interested in seeing where DivSeek goes. I floated the idea of having a open 'listening' meeting in January so that we could gauge their perspective and relevant issues. All were quite keen. They also let loose that their main concern would be that information in DivSeek could be subject to the Treaty's SMTA, which to their minds, would be untenable as applied to information. (I tend to agree with this).

I am going to send around a Doodle poll for the last two weeks of this month – please let me know if this timeframe does not work for you.

Best regards,

Emily

On Sep 20, 2015, at 12:40 PM, Emily Marden [redacted] wrote:

Duplicate email trail removed

Bretting, Peter

From: E. Marden [redacted]
Sent: Friday, September 25, 2015 1:02 PM
To: Peter Phillips; Bretting, Peter; Bill Boland; Regiane
Subject: DivSeek Governance Committee - Sept 23 Meeting Minutes
Attachments: Notes-Meeting-Sep23.docx

Dear all,

I think we had a very productive meeting on Wednesday. Please see the attached minutes and let me know if you have any comments or changes.

Best regards,

Emily

On Sep 23, 2015, at 9:18 AM, E. Marden [redacted] wrote:

> <DivSeek Expert Governance (3).docx>

Meeting of DivSeek Governance Committee
23 Sept 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. **Introductions and Overview of Agenda**

E. Marden introduced the goals of the Committee, the Terms of Reference, and the Agenda. It was noted that governance was a priority issue for the organization in order for it to become a long-term organization and to receive funding. Other issues were noted, including membership, publication of meeting minutes, and how/when to invite the private sector to participate in DivSeek.

2. **Issue of Governance is Priority**

It was noted that, despite the Charter, there are no formal operating rules and that sometimes it is difficult for the JFU parties to reach consensus and move forward. The group discussed the evolution of the membership of the JFU; the issue of adding or subtracting membership in the JFU was noted, as well as the in kind, and as needed, nature of budgeting. The group reflected that the documents contain many principles and goals but no operating framework.

3. **Possible Paths Forward**

Having recognized the issues at present in terms of the need for clear operating principles, conversation turned to the potential paths forward. There was general consensus that a permanent JFU consisting of the four current partners was imperfect, in part because other organizations are interested, and because organizations may want to phase out or diminish participation at certain times. It was also noted that involving more organizations could increase the level of engagement of the community. The pros and cons of having an executive operations person (e.g. executive director) was discussed. The Committee also discussed integrating the JFU members and/or others into secondment roles, full or part time, working on specific DivSeek issues. There was discussion of models from agriculture in other parts of the world across the spectrum. Bill Boland offered to examine his accumulated research for examples that show the strengths and weaknesses of various models. Ultimately, however, there was agreement that DivSeek needs an operations center of some kind to become a lasting organization.

4. **Importance of the Undertaking**

The importance of DivSeek and its continuing operations was emphasized. The group noted that the DivSeek has already achieved a significant measure of success in bringing together an array of organizations toward a common and important goal. The potential for advancing sharing of genomics data was illustrated by the agreement around DOIs that grew out of the pre-Divseek COGIS meeting in January 2015; this important step was initiated by the Treaty and once the opening was given to technical discussion, a group was able to develop a meaningful standard. This example shows the desire for shared standards that enable ongoing research and innovation, principles that underlie DivSeek.

5. **Next Steps**

The group agreed to work towards putting forward some proposals for the December 8 Steering Committee meeting. Specifically, Bill B. and Peter P. will go through examples of other entities and present some models as well as the outlines of a proposal. R. Garcia will consider whether there are any Brazilian or other S. American examples. We will examine this material and start to put in proposal form for the Divseek Steering Committee. The group will aim to reconvene in 3 or 4 weeks (mid October).

Bretting, Peter

From: E. Marden [redacted]
Sent: Wednesday, September 23, 2015 12:18 PM
To: Peter Phillips; Bretting, Peter; Bill Boland; Regiane
Subject: Terms of reference
Attachments: DivSeek Expert Governance (3).docx

Summary of Requests to Expert Committee

(arising from May 28, 2015 Steering Committee Meeting)

1. Governance Issues

22. The Committee decided to request one of its members, namely Ms. Emily Marden, to convene, under her chairmanship, a governance expert group, in accordance with the Charter's provision to elaborate operational guidelines through expert consultations, in order to:

i) validate the Committee's provisional opinion about membership at the level of organizations/institutions, and/or clarify alternative options and implications;

ii) advise the Committee on possible steps towards private sector membership or other engagement, including an assessment of the implications on the implementation of DivSeek's principles as stated in the Charter.

23. In conjunction with the decision to convene a governance expert group, the Committee was informed about an on-going research project by Arizona State University (ASU) on institutional and organizational factors for enabling data access, exchange and use, which the Global Crop Diversity Trust and the Secretariat of the International Treaty were co-funding. Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, informed the Committee of the preliminary research activities conducted by the ASU research team for the project, and distributed a progress report. The Committee invited Ms. Marden to coordinate with the ASU research team to obtain early access to the results of the study for consideration as part of the work of the governance expert group.

32. [The Steering Committee] considered a number of potential issues in relation to the role of the Joint Facilitation Unit within DivSeek, as follows:

i) modalities for expansion or contraction of the Joint Facilitation Unit, e.g. in cases where one organization is inactive or becomes unable to serve, or where a Partner organization expresses interest in joining the Unit;

ii) the roles and responsibilities of individual representatives of the organizations that serve the Unit;

iii) the modalities of representation by the respective organizations within the Unit;

iv) the modalities for decision-making within the Unit;

v) the relationship between the Unit and the other elements of DivSeek's governance structure (i.e. the Assembly and its Chairperson and the Steering Committee) with respect to communication lines and providing guidance and direction.

33. The Committee requested the governance expert group to be convened by Ms. Emily Marden to prepare a document for the consideration of the Committee, based on the provisions of the DivSeek Charter, to explain the governance structure of DivSeek, to

describe mechanisms that would allow it to evolve in the future, and to present options for clarifying the above issues[1].

37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

2. Membership Issues

   a. Organizational Level

   18. Regarding a) and b), the Committee agreed to provisionally keep the current membership at the level of organizations/institutions, as this aligned with the current governance settings of the Charter. It considered membership tiers as a possible future solution to reflect different interest groups (e.g. donors, communities of practice, advisors and service providers).

   b. Private Sector

   21. Regarding e), the Committee was alerted by the Joint Facilitation Unit to the opportunity to keep an active line of communication with the private sector representatives who were at the first Partner Assembly. The Committee highlighted the potential of private sector engagement for DivSeek funding of future training and capacity building programs, as well as for expanding the range of expertise and knowledge within DivSeek. It also discussed some of the systemic and practical implications of private sector membership, with particular attention to a balanced relationship among different DivSeek constituencies and the need to promote equitable data sharing policies. It also recalled the annotation in the Charter, which referred to observer status for private sector, pending the development of operational guidelines for private sector engagement.

3. Publication Issue

   37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

---

[1] To potentially include additional issues raised in informal discussions:

- How many individuals/institutions should be represented?
- What are the procedures for accepting a new member or retiring a current member?
- Guiding principles for governance structure of the initiative long term and short term
- Who acts on behalf of who? Do JFU members report to their current organizations? Or to the SC and the PA?
- Should the JFU members have specific domains of authority /expertise and reprting responsibilities to streamline implementation of DivSeek directives?
- Is the current reporting structure [EM comment: not sure what this is?] conducive to long term growth and sustainability of the initiative?
- Currrently budgets managed by individual JFU organizations. Should there be some sort of joint management?

4. Additional Issues Raised in Discussion with S. McCouch

Bretting, Peter

From: Emily Marden [redacted]
Sent: Friday, September 11, 2015 7:40 PM
To: Susan McCouch; Peter Phillips; Bill Boland; Bretting, Peter
Subject: DivSeek Governance Meeting Sept 23 9/10/12 AM

Dear all,

Let's plan for September 23, at 9 AM PST, 12 EST and 10 AM in Saskatchewan. Susan - you indeed do not need to be on the call, but we are happy to have you if you're available.

Please let me know the best telephone number to reach you at and I will fold people in.

An agenda will be distributed a few days beforehand.

Thank you!

Emily
On Sep 9, 2015, at 9:23 AM, Emily Marden [redacted] wrote:

> Dear all:
>
> I am hoping to have an initial first call with this group (and open to others as I/we try to gather additional expert members) to identify and address the issues raised by the DivSeek Steering Committee.
>
> I will send around an agenda and outline of the issues before the call, as well as some proposals to discuss.
>
> Please let me know if any of the proposed dates work. If not, we will push forward by another week or two.
>
> Best regards,
>
> Emily
>
> You have initiated a poll "DivSeek Governance Committee" at Doodle.
> The link to your poll is:
>
> [redacted]
>
> Share this link with all those who should cast their votes. Do not forget to cast your vote, too.
>
> (If you did not initiate this poll, somebody must accidentally have used your e-mail address; simply ignore this e-mail, please.)

- Your Doodle Team

Doodle AG, Werdstrasse 21, 8021 Zürich

Bretting, Peter

From: Emily Marden [redacted]
Sent: Wednesday, September 09, 2015 12:23 PM
To: Susan McCouch; Peter Phillips; Bill Boland; Bretting, Peter
Subject: Fwd: Doodle: Link for poll "DivSeek Governance Committee"

Dear all:

I am hoping to have an initial first call with this group (and open to others as I/we try to gather additional expert members) to identify and address the issues raised by the DivSeek Steering Committee.

I will send around an agenda and outline of the issues before the call, as well as some proposals to discuss.

Please let me know if any of the proposed dates work. If not, we will push forward by another week or two.

Best regards,

Emily

You have initiated a poll "DivSeek Governance Committee" at Doodle.
The link to your poll is:

[redacted]

Share this link with all those who should cast their votes. Do not forget to cast your vote, too.

(If you did not initiate this poll, somebody must accidentally have used your e-mail address; simply ignore this e-mail, please.)

- Your Doodle Team

Doodle AG, Werdstrasse 21, 8021 Zürich

Summary of Requests to Expert Committee

(arising from May 28, 2015 Steering Committee Meeting)

1. Governance Issues

22. The Committee decided to request one of its members, namely Ms. Emily Marden, to convene, under her chairmanship, a governance expert group, in accordance with the Charter's provision to elaborate operational guidelines through expert consultations, in order to:

i) validate the Committee's provisional opinion about membership at the level of organizations/institutions, and/or clarify alternative options and implications;

ii) advise the Committee on possible steps towards private sector membership or other engagement, including an assessment of the implications on the implementation of DivSeek's principles as stated in the Charter.

23. In conjunction with the decision to convene a governance expert group, the Committee was informed about an on-going research project by Arizona State University (ASU) on institutional and organizational factors for enabling data access, exchange and use, which the Global Crop Diversity Trust and the Secretariat of the International Treaty were co-funding. Mr. Manzella, of the Joint Facilitation Unit and the International Treaty, informed the Committee of the preliminary research activities conducted by the ASU research team for the project, and distributed a progress report. The Committee invited Ms. Marden to coordinate with the ASU research team to obtain early access to the results of the study for consideration as part of the work of the governance expert group.

32. [The Steering Committee] considered a number of potential issues in relation to the role of the Joint Facilitation Unit within DivSeek, as follows:

i) modalities for expansion or contraction of the Joint Facilitation Unit, e.g. in cases where one organization is inactive or becomes unable to serve, or where a Partner organization expresses interest in joining the Unit;

ii) the roles and responsibilities of individual representatives of the organizations that serve the Unit;

iii) the modalities of representation by the respective organizations within the Unit;

iv) the modalities for decision-making within the Unit;

v) the relationship between the Unit and the other elements of DivSeek's governance structure (i.e. the Assembly and its Chairperson and the Steering Committee) with respect to communication lines and providing guidance and direction.

33. The Committee requested the governance expert group to be convened by Ms. Emily Marden to prepare a document for the consideration of the Committee, based on the provisions of the DivSeek Charter, to explain the governance structure of DivSeek, to

describe mechanisms that would allow it to evolve in the future, and to present options for clarifying the above issues[1].

37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

2. Membership Issues

   a. Organizational Level

   18. Regarding a) and b), the Committee agreed to provisionally keep the current membership at the level of organizations/institutions, as this aligned with the current governance settings of the Charter. It considered membership tiers as a possible future solution to reflect different interest groups (e.g. donors, communities of practice, advisors and service providers).

   b. Private Sector

   21. Regarding e), the Committee was alerted by the Joint Facilitation Unit to the opportunity to keep an active line of communication with the private sector representatives who were at the first Partner Assembly. The Committee highlighted the potential of private sector engagement for DivSeek funding of future training and capacity building programs, as well as for expanding the range of expertise and knowledge within DivSeek. It also discussed some of the systemic and practical implications of private sector membership, with particular attention to a balanced relationship among different DivSeek constituencies and the need to promote equitable data sharing policies. It also recalled the annotation in the Charter, which referred to observer status for private sector, pending the development of operational guidelines for private sector engagement.

3. Publication Issue

   37. The Committee requested the governance expert group to be convened by Ms. Emily Marden to elaborate a policy on the publication of DivSeek meeting documents and reports, for the consideration of the Committee. Pending the development of such a policy, the Committee decided not to publish this report online.

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[1] To potentially include additional issues raised in informal discussions:

- How many individuals/institutions should be represented?
- What are the procedures for accepting a new member or retiring a current member?
- Guiding principles for governance structure of the initiative long term and short term
- Who acts on behalf of who? Do JFU members report to their current organizations? Or to the SC and the PA?
- Should the JFU members have specific domains of authority /expertise and reprting responsibilities to streamline implementation of DivSeek directives?
- Is the current reporting structure [EM comment: not sure what this is?] conducive to long term growth and sustainability of the initiative?
- Currrently budgets managed by individual JFU organizations. Should there be some sort of joint management?

4. Additional Issues Raised in Discussion with S. McCouch

Bretting, Peter

From: Bretting, Peter
Sent: Wednesday, December 09, 2015 12:27 PM
To: Emily Marden
Subject: Re: Notes from Dec 8

Thanks,

Peter

Peter Bretting
National Program Leader
USDA/ARS Office of National Programs
George Washington Carver Center
4-2212, Mailstop 5139
Beltsville, MD 20705-5139
301-504-5541
Cell [redacted]
peter.bretting@ars.usda.gov

On Dec 9, 2015, at 7:23 AM, Emily Marden [redacted] wrote:

> Hi Peter
>
> Thanks for your note. I completely agree with your positions as did the others. I am forwarding the notes that Peter P and I took from the first part of the meeting. The governance discussion went well. More on that in notes to come.
>
> Best
>
> Emily
>
> ---------- Forwarded message ----------
> From: **Emily Marden** [redacted]
> Date: Wednesday, December 9, 2015
> Subject: Notes from Dec 8
> To: Susan McCouch <srm4@cornell.edu>, Susan McCouch <[redacted]
> Cc: Peter Phillips <peter.phillips@usask.ca>
>
> Hi Susan,
>
> Please see attached notes from yesterday morning's meeting. Peter and I have amalgamated our notes into this document.
>
> Best,
>
> Emily

<Divseek Dec 8 Meeting Notes pp (1).docx>

Bretting, Peter

From: Emily Marden [redacted]
Sent: Wednesday, December 09, 2015 8:23 AM
To: Bretting, Peter
Subject: Fwd: Notes from Dec 8
Attachments: Divseek Dec 8 Meeting Notes pp (1).docx

Hi Peter

Thanks for your note. I completely agree with your positions as did the others. I am forwarding the notes that Peter P and I took from the first part of the meeting. The governance discussion went well. More on that in notes to come.

Best

Emily

---------- Forwarded message ----------
From: **Emily Marden** [redacted]
Date: Wednesday, December 9, 2015
Subject: Notes from Dec 8
To: Susan McCouch <srm4@cornell.edu>, Susan McCouch [redacted]
Cc: Peter Phillips <peter.phillips@usask.ca>

Hi Susan,

Please see attached notes from yesterday morning's meeting. Peter and I have amalgamated our notes into this document.

Best,

Emily

Updates since Last Meeting

GPC:

Landscape projects identified. Of relevance to DS.

- Many projects have some DS elements but not exclusively DS; determination of what is DS component will evolve; SC asked for insights
- Projects being mapped geographically; these are self-identified and identified by Ruth, but there are many more. Could populate more.
- Can add questions and sorting mechanisms that could be used to identify and characterize projects.
- Other relational mapping possible (Phillips will investigate).
- Lacking developing world projects. Are they missed? Do they exist? Susan noted projects in India, for example, but may not want to be included on the list. Can we acknowledge them without causing difficulties? Do we create dialog with China or India in terms of internal projects being shared.

TREATY:

GB recognized DS. Have program of work for GLIS, as documented.

Bit of hard talking, but outcome extremely positive and enabling.

ASU study discussed and preliminary finding presented. Mostly unanalyzed case study descriptions at this point. SC will need a draft report with summary conclusions before it can consider how to use. After further discussions (later in the meeting), it was agreed by SC that while the report is needed, it would be premature to plan to use it as a discussion item at the January workshop. The SC awaits the draft final report, as planned, at the end of January.

GCDT

Have recognized concerns about what DS is going to do. Trust concerned about where heading. Currently DS is being pulled into policy domain, particularly at the Treaty's request. The Trust instead hopes DS can become a science platform, at the intersection of a triangle of genebanks, breeding programs, and the genomics/big data community to make accessions more useful. The Trust's core interest is in the genebank space. The Trust remains committed DS and is happy both to host and continue Peter's time for now.

CGIAR Consortium

Genetic resources are at the core of new CG portfolio for 2017. The question is how does DS connect into new portfolio? Portfolio will be focused on food systems and sustainability. Two platforms are proposed – genebanks and genetic gain. Need for connectivity on platforms is important. This could be an important role for DS.

Securing funding for genebanks going forward in current climate is important. All must do more with less. US$90 million secured for genebanks; this is less than optimal, requiring clear performance indicators and management. Genetic gain platform will use high throughput genomics and related genome knowledge to increase impact in farmers' fields,

DivSeek could be a potential umbrella organization. DS must balance the perspective of supply driven with demand driven needs. We know that sequencing and resequencing is happening but not clear how that will shape food systems.

Within the CG Consortium, major changes are underway.

Treaty

Indicated clearly the Treaty does not want to assume lead/executive role. Rather prefers to contribute to enabling policy and governance, complemented with training and capacity development. Also exploring sequencing services by connecting partners--especially in countries where genomics sequencing is not available.

Happy to have lead/executive role at Trust or outsourced with third party (as with GLIS). This would require consultation at JFU and transition planning. The Trust and Treaty have not discussed how to take the Director model forward. Whatever chosen, with consultation, we can move to the new model.

Further Discussion:

- GPC agreed DS needs single person as point. Only way to make progress. Would still be involved. We would not be host but happy to continue doing certain activities (e.g. landscaping).

- Trust agreed an executive and operational team is a good way to work. This could advance drafting business plan to seek funding. From a trust perspective a key concern is identifying and assembling the skills needed at genebanks – there is a need for managers/capacity building and marrying fields of germplasm and genomics. This might involve stitching genebanks together in various arrangements.

- Consortium noted the need for transparency. As a final observation, the Consortium noted that big data is not getting sufficient importance—DS could help address that.

The SC went into Camera at this point of the agenda.

SC discussion about the Goal of DivSeek:

Susan: Are we an organization that brings people together or does DS actually want to accomplish something with the data (integration or dissemination). Could be both? Initially, DS was coordination. Since then, many people think it can be and should be more.

Sara: Asked how do we measure impact and demonstrate what we are doing. In this one year, what can we show? How have we and are we are going to be adding value. Measuring coordination is hard.

Dave Marshall: Suggested DS should undertake work with exemplar projects to illustrate options and strategies. Exemplars can cover the range of diversity of crops, resources and technical challenges. Yet another rice project is not sufficient. Apart from exemplar projects, DS could also be

- a technical advice/best practice broker.
- provide information hosting. Many crops struggle with this. Much of the hosting is organization based rather than crop based; this leads to a multiplicity of platforms, such as for wheat. Finding a framework to pool info is challenging; a major need
- offer advice on governance and legal framework
- to some extent it could be a funding broker.

All: While there might be an apparent tension with Treaty, in reality the Treaty focuses on the conceptual issue whereas DC focuses on the genetic issue. The Treaty is building links to other systems.

Ruaraidh: GLIS offers an good information platform, but more as an index than an information system. A key aspect of any information system is the unique identifiers. The PUIDs (DOIs) are linked to specific packets of seeds originating in the genebanks, which then links to all passport data. While used extensively for outgoing materials, the PUIDs are expensive to assign (est. $1000/accession) and are not used as widely as desirable (e.g. not by those working with other materials and often not for derived varieties.

While some convergence is happening, in many species there are multiple annotation systems. It is healthy in a community to have multiple sequences – it is not terrible; it is the progression at the moment.

What is in GLIS? Anything to do with plant genomic resources for food and agriculture. Farm trials. Key elements are: when send material with SMTA, must make non confidential data available, and this will be included. Second, on the side of the recipient, they have an obligation to send back the results of their non confidential studies. Key is to provide the mechanism that allows them to report.

Susan: The GLIS concept is consistent with DivSeek. There is NO issue with this concept.

Andreas: WRT the mission of DivSeek and the relationship with the Treaty, he noticed resolution 3/2015. He strongly recommends the SC NOT accept the invitation. His view is DS does not have jurisdiction to opine. We should be enabling synergies as in the first bullet.

Question raised: How does the private sector fit into all of this; sorting this out and engaging would really distinguish DS from the Treaty.

We are not defined by the Treaty but are harmonious with it. We need to be inclusive of ALL relevant communities and not exclude anyone, whether private sector or non-members of the Treaty. Three groups currently have gaps: ventures that are funded; the non treaty members; private sector. Working with them would make DS very different.

DivSeek should work on structuring info that relates to genetic entities, rather than GLIS, which is pointers to information. One possibility is DS creates repository where people can put data. But, the challenge of developing long term infrastructure is that it would then need long-term institutional support. Reality is that it is easy to get money to set things up but to keep them going over the long term, hard to do.

Could DivSeek just brand/quality assure the product/system, with participants largely going their own ways but staying consistent in their coding and disclosure.

Elizabeth: Could DivSeek be an information platform to bring people together to find solutions. Looking at Ruth's list, putting all projects together, do they need a place to put data or do they need to find other data or ways to use data?. So perhaps for all those projects we can find a way for them all to collaborate by providing technical solutions and best practices.

Solving problems can be an intractable role to take. But looking at the landscape list, we can see many in the same field (e.g. maize), likely many also trying to solve similar problems. Multiple project may have a common challenge; bringing them together could help solve the isolation now plaguing projects. IN this context, could DivSeek be the matchmaker; either we take the initiative, looking down the list and getting groups together; or, someone looking help (e.g. bioinformatics expert) could trigger a matching process. One useful goal would be to encourage collaboration; people often have money but no practical expertise. Mission: "Bring people together"?

PUID is initially just for use with Treaty material but eventually it could (should?) be used for everything. * This could be part of the workplan. One goal could be to assign every program a PUID. Challenges/options include:

- costs to get PUID. We have to have a way to support an expense or to lower the cost of getting a PUID

- Encouraging granting agencies and journals to require PUIDs as norm for publishing/granting.
- Do we need a database to track everything once it is out?
- Could get involved in finding and giving out number.

Susan: Information is not currently hosted and combined in a meaningful way. Not integrated. Could use GOBI to integrate. But there are huge challenges for data integration. Right now data is diversifying faster than it is coming together. Right now projects just as often regenerate data rather than access and share existing data. Even more important for phenotyping, as regenerating phenotype results is usually not possible. But putting phenotypic data into a repository is more complex; people want both digested/summarized results and the statistics indicating probabilities.

Data handling data storage.

Andreas: How can we valorize the data? We could start to interact with people in terms of use cases. Have workshop to think about how to use all the data, i.e. the exemplary projects.

- How can we help genebank collections: management tools to become more efficient? Making collection more efficient by removing duplicates. Addressing collection management issues.
- Pre breeding; how do you move stuff from collections to purified lines and into use in breeding systems? Many mobilization issues. This tailors into breeding.

Rauri: Suggests efficiency from removing duplications not likely all that significant; fewer duplicates than thought; and cost of removing may be greater than maintenance costs for many species

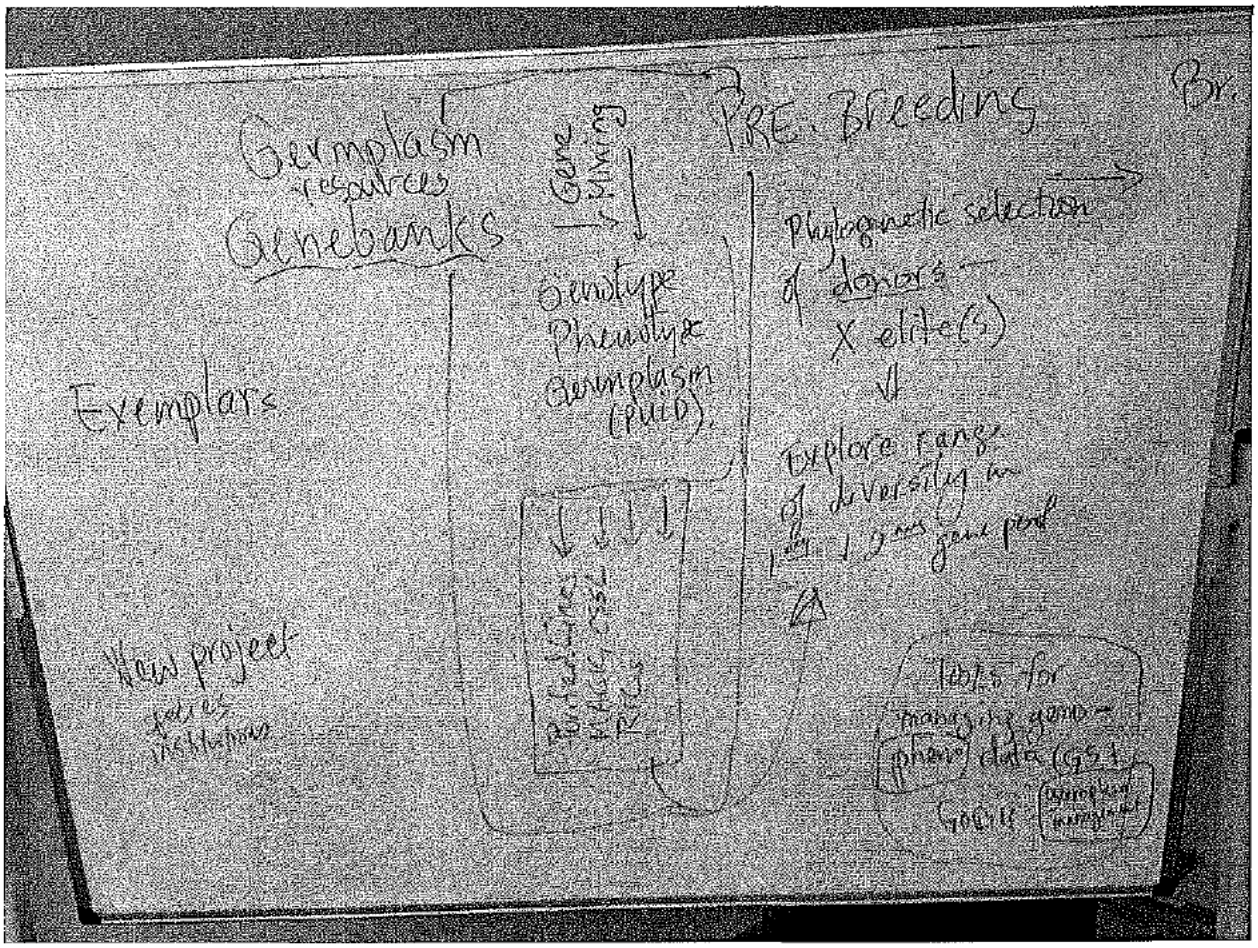
From this discussion the idea of a matrix, moving things from pre breeding to elite was discussed and mapped. Then an info management matrix cuts across the prebreeding space.

Right now a huge need to encourage pre breeding domain vis a vis genebanks. Getting things out of genebanks through prebreedings.

Big Idea: Do flagship project building on GOBI project.

Peter P: What would Canada want: explore wheat, pulse, other Canadian crops. Barley oats etc. Canada is doing a CFREF project linking genotype, phenotype and imaging through bioinformatics.

Crop wild relatives discussed. Could be fundable. Not much done by anybody. Breeders interested. Could relate well to sustainability/ climate change as well as food security platforms and priorities.



Notes/options related to Susan's visual

1. germplasm characterization and management:. Can affect genebank management [germplasm management, after further discussion, decision that this is not probably a primary goal at this point. It will be a byproduct of other things, not the primary objective]

2. allele mining across a range of crop wild relatives, purified lines, magic CSSLs and RILS.

3. prebreeding design: Phylogenetic selection of donors x elites to explore range of diversity in primary and secondary gene pools

Potential summary of where we are:

There are array of options for a work plan:

Goals: support the development of biodiversity informatics to help genebank management, informed access, valorization

Activities: identify relevant players [we have project inventory and landscape} networking, interaction with funders and decision makers

1. Pulling together people to create and advance norms of good germplasm management to advance breeding

- ** integration of PUIDs is a core mission. Communicating with authors, publishers, also the GPC. [norms building]

- Promoting norms through workshops etc

	Norm	Limits	Action
Genetic materials in genebanks	PUIDs linked to seed packets and passport info	Only outgoing Treaty material now	Work to lower cost and get embedded in standards for journals and grants
Phenomics	Ontologies; some disclosure but limited repositories	Various ontologies that don't converge	Work to encourage more concordances among ontologies and repositories
Genomics	Multiple sequences, not all on common methods; mostly public repositories	Religious wars about which sequence system to use	Promote more common sequencing and disclosure of sequence model
Imaging	DOIs emerging as code;	few images in repositories; few digitized for further access	Set norms and promote
Publications	DOIs for journals but not for all pubs	Not universally used in follow-on publication	Promote as norm/standard for publication in this area
Algorithms	No standards for disclosure or sharing	No practice	Create pooling among public sector teams
Best practices	No standards for documenting or exchanging	No practice	Create model for codifying and sharing among public sector teams.

2. Capacity building: workshops on common issues; bring together projects by species or trait or technology to identify gaps and new options; knowledge transfer

- Deliverable: white papers recommendation, workshops,

3. Projects – anything from building, funding, managing, doing. We could initiate OR other could initiate and we could assist. There is a large menu. .

- **Needs to go with a glamourous project. Say $10 million for GOBII for genebanks. Good project, but would take a significant funder. Does the gene mining and helps you manage genotype, phenotype and germplasm. Would allow you to take allele mining and trace through a breeding pedigree and see where it had ever been deployed. Allow you to find markers that are specific. Could make people choose partner to train teams.

Impacts on Governance

Agreed JFU needs an executive lead

Whether DS remains with Trust of moves on to partner with another entity will be determined by the workplan. If a move is appropriate in response to the workplan, LOIs should be solicited for 3-5 leadership.

DS JFU needs to find a way to move from the consensus model to allow partners to take lead on areas of greatest interest/capacity and to not be beholden for activities not within their mandate but appropriate for DS.

Bretting, Peter

From: Bretting, Peter
Sent: Thursday, October 08, 2015 2:01 PM
To: 'E. Marden'; Peter Phillips; Bill Boland; Regiane Garcia
Subject: RE: Governance Committee - Updates
Attachments: 2015 Notes-Meeting-Sep23 PKB 8 Oct.docx

Thanks, Emily. Attached are some suggested edits to the nice meeting summary you drafted. Sorry for being so tardy addressing it.

Peter

Peter Bretting
USDA/ARS Office of National Programs
Room 4-2212, Mailstop 5139
5601 Sunnyside Avenue
Beltsville, MD 20705-5139
Phone 1.301.504.5541
Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: E. Marden [redacted]
Sent: Thursday, October 08, 2015 1:35 PM
To: Peter Phillips; Bill Boland; Bretting, Peter; Regiane Garcia
Subject: Governance Committee - Updates

Dear all,

Since we spoke I have had a number of conversations bearing on DivSeek governance and I think these are relevant to pass on.

1. I had an off-line conversation with Peter Wenzl (Crop Trust) and Ruth Bastow (Global Plant Council) about DivSeek. I floated the idea of an executive director who has operating capacity, separate from the JFU entities. Both came back separately with extreme enthusiasm. The Trust, in particular, seems to back this idea, as long as the ED is not located at the Treaty. Ruth wondered about setting up a separate legal entity.

2. I also had an offline conversation with Daniele (Treaty). He himself suggested that what was needed was an executive director, or secretariat at an organization that is not one of the current 4. He stated that he thought a separate legal entity would be a bad idea, but that a "secretariat" could be established at some willing organization with current (or other) organization seconded to help with the operations.

I think this is all very good for our proposal.

Peter/Bill – were you going to draft a framework along these lines, with backup examples? If not, I can take a stab at a vision; examples would still be very welcome. However, I would like to start circulating something relatively soon so that we can all comment and then prepare for a larger group.

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Teleconference of the Governance Subcommittee
DivSeek Initiative Steering Committee
23 Sept 2015

In Attendance: Bill Boland (U Saskatchewan), Peter Bretting (USDA), Regiane Garcia (UBC), Emily Marden (UBC), Peter Phillips (U Saskatchewan)

1. Introductions and Overview of Agenda

E. Marden introduced the goals of the subcommittee, the Terms of Reference, and the Agenda. It was noted that governance was a priority issue for the DivSeek Initiative in order for it to develop and grow over the long-term. Other issues were noted, including membership, publication of meeting minutes for the DivSeek Steering Committee (SC), and how/when to invite the private sector to participate in the DivSeek Initiative.

2. Governance the is the Priority Issue for the SC

It was noted that, despite the Charter, there are no formal operating rules for DivSeek and that sometimes it is difficult for the DivSeek Joint Facilitation Unit (JFU) members to reach consensus and move forward. The subcommittee discussed the evolution of the membership of the JFU; the need for a mechanism for adding or subtracting members from the JFU was noted, as well as the in kind nature of budgeting and the need for additioanl support. The subcommittee reflected that the documents contain many principles and goals but no operating framework.

3. Possible Paths Forward

Having recognized the current need for clear operating principles for DivSeek, conversation turned to the potential paths forward. There was general consensus that a permanent JFU consisting of the four current partners was probably not ideal, in part because other organizations are interested in becoming members of the JFU, and because some current members may want to phase out or diminish JFU participation at certain times. Involving more organizations in the JFU could increase the level of engagement of the community. The pros and cons of appointing an executive operations person (e.g. executive director) were discussed. The subcommittee also discussed integrating the staff from the JFU members and/or others into formal secondment roles, full or part time, working on specific DivSeek issues. There was discussion of governance models from agriculture and agricultural research in other parts of the world across the spectrum. Bill Boland offered to examine his accumulated research for examples that show the strengths and weaknesses of various models. Ultimately, however, there was agreement that DivSeek needs an operations center of some kind to develop and grow further.

4. Importance of DivSeek Initiative

The importance of DivSeek and its continuing operations was emphasized. The subcommittee noted that DivSeek has already achieved a significant measure of success in focusing an array of diverse organizations on a common and important goal. The potential for advancing the goal of sharing genomics data was illustrated by the agreement around DOIs as a permanent identification descriptor that grew out of the pre-Divseek COGIS meeting in January 2015; this important step was initiated by the Treaty Secretariat. Once the discussed turned to technical aspects, a technical group was able to agree on a

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meaningful standard. This example shows the desire for shared standards that enable ongoing research and innovation, principles that underlie DivSeek.

5. **Next Steps**

The subcommittee agreed to work towards submitting some proposals for the December 8 SC meeting. Specifically, Bill B. and Peter P. will review examples from other organizations and present some models as well as the outlines of a proposal. R. Garcia will consider whether there are any Brazilian or other S. American examples. We will examine this material and start to draft a proposal for the SC. The subcommittees will aim to reconvene by teleconference in 3 or 4 weeks (mid October).

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Bretting, Peter

From: Emily Marden [redacted]
Sent: Wednesday, June 17, 2015 10:42 PM
To: Susan McCouch
Cc: Andreas Graner (IPK); David Marshall (JHI); Elizabeth Arnaud (Bioversity); Bretting, Peter; Rajeev Varshney (ICRISAT & GCP); Ruaraidh Sackville Hamilton (IRRI); Sarah Ayling (TGAC); Daniele Manzella (ITPGRFA); Peter Wenzl; Ruth Bastow (GPC); Powell, Wayne (CGIAR Consortium)
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Susan,

Thank you for this.

I would like to follow up by inviting Steering Committee members to participate on the special committee addressing governance. Please let me know if you are interested and we can discuss further.

Best regards,

Emily

On 17 June 2015 at 09:57, Susan McCouch <srm4@cornell.edu> wrote:

> Dear SC members,
>
> Attached please find a summary report of our SC meeting on May 28, 2015 in Rome prepared jointly by members of the JFU.
>
> Please do not hesitate to contact me if there are changes you feel are necessary to accurately reflect the committee's discussions. I would appreciate receiving any suggested edits as tracked changes in the attached document.
>
> For now, Emily Marden has agreed to convene a special committee to review the governance questions that were raised during our meeting in Rome. Her committee will report back to the SC at our next meeting, tentatively scheduled for November or early December 2015.
>
> Best regards,
> Susan
>
> --
> Susan McCouch
> Professor, Plant Breeding & Genetics
> Cornell University
> 162 Emerson Hall
> Ithaca, NY 14853-1901
> Phone: +1 607-255-0420
> Fax: +1 607-255-6683
> Email: srm4@cornell.edu or mccouch@cornell.edu
> Alternate Email: [redacted]

Bretting, Peter

From: Emily Marden [redacted]
Sent: Wednesday, June 24, 2015 7:22 PM
To: Bretting, Peter; Peter Phillips
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Peter,

Thank you for your message. I welcome you Input on governance matters and know that it will be very valuable.

I am copying Peter Phillips as he has agreed to take continue taking a role in these efforts as well.

I am currently travelling but we will be in touch in the next week as the expert committee continues to take shape.

Best regards,

Emily

On 24 June 2015 at 07:42, Bretting, Peter <Peter.Bretting@ars.usda.gov> wrote:

Hi Emily—apologies for the delayed reply. I was out much of last week [redacted]

I'd be happy to help with the governance discussions, if you judge that my participation on the governance committee might be useful.

We missed your expertise and wise counsel during the meeting in Rome.

Many thanks!

Peter

Peter Bretting

USDA/ARS Office of National Programs

Room 4-2212, Mailstop 5139

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Bretting, Peter

From: Emily Marden [redacted]
Sent: Wednesday, August 12, 2015 1:39 PM
To: Bretting, Peter
Cc: Peter Phillips
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Dear Peter,

Thank you for getting in touch!

We have had a slow start this summer as we all respectively go on vacation. I am hoping to convene a few calls over the course of the fall and will be in touch as soon as possible to check schedules.

I believe Peter Phillips is now back from [redacted] (if so, welcome back) and so we should move forward with our planning discussions.

Best regards,

Emily

On 12 August 2015 at 03:56, Bretting, Peter <Peter.Bretting@ars.usda.gov> wrote:

Hi Emily and Peter—are there any ongoing discussions with the governance aspects of DivSeek? I'll begin a period of travel and [redacted] soon, so wanted to check before going "offline."

Hope that you have enjoyed a pleasant and peaceful summer!

Peter

Peter Bretting

USDA/ARS Office of National Programs

Room 4-2212, Mailstop 5139

5601 Sunnyside Avenue

Beltsville, MD 20705-5139

Phone 1.301.504.5541

duplicate email trail removed

Bretting, Peter

From: Emily Marden [redacted]
Sent: Thursday, August 13, 2015 2:27 PM
To: Bretting, Peter
Cc: Phillips, Peter
Subject: Re: DivSeek SC meeting report, May 28, 2015, Rome

Hi Peter,

Yes - I had been trying to get non North-American members with little success thus far. I neglected to mention that I also asked Peter Drahos, but no response thus far. Suggestions welcome!

Emily

On 13 August 2015 at 11:21, Bretting, Peter <Peter.Bretting@ars.usda.gov> wrote:

Hi Emily and Peter—it's good to discuss DivSeek topics again!

From my perspective, the Steering Committee functioned cordially and productively during the May meeting. But we were unclear about the SC's precise role, the rules of engagement, etc. So some guidance from governance experts like you would be greatly appreciated.

Considering the current membership of the "governance group," are you seeking especially non-North Americans as additional members?

Thanks,

Peter

Peter Bretting

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Beltsville, MD 20705-5139

duplicate email trail removed

Bretting, Peter

From: Susan McCouch <srm4@cornell.edu>
Sent: Tuesday, May 26, 2015 8:52 AM
To: Bretting, Peter; Elizabeth Aranud; Sarah Ayling; Andreas Graner (IPK); Emily Marden; David Marshall; Ruaraidh Sackville Hamilton (IRRI); R.K.Varshney@CGIAR.ORG
Cc: Peter Wenzl; Daniele Manzella; Wayne (CGIAR Consortium) Powell; Ruth Bastow; Susan McCouch; Ruth Bastow
Subject: Re: DivSeek_Membership Application
Attachments: UNIVPM_RPAPA_Request+to+join-signed.pdf; BEAN_ADAPT_ERA-CAPS_originalproposal.pdf; CV_RobertoPapa_2015.rtf

Dear Peter and other SC members,

Thank you very much for your comments regarding the proposed membership policy for DivSeek (pasted below). We plan to review and formally accept or amend the proposed policy during our upcoming meeting in Rome. As always, your comments are welcome.

We will also have an opportunity to discuss a pending application for membership that we received recently. This application from Prof. Roberto Papa (see attached documents) serves as a useful "case in point" for evaluating the necessity of requiring a "review" prior to acceptance of an application for membership.

Thanks and look forward to seeing you soon,
Susan

From: <Bretting>, Peter <Peter.Bretting@ARS.USDA.GOV>
Date: Friday 22 May 2015 22:39
To: Ruth Bastow <ruth.bastow@divseek.org>, "S. McCouch" <srm4@cornell.edu>, Elizabeth Aranud <e.arnaud@cgiar.org>, Sarah Ayling <Sarah.Ayling@tgac.ac.uk>, "Andreas Graner (IPK)" <graner@ipk-gatersleben.de>, Emily Marden [redacted] David Marshall <David.Marshall@hutton.ac.uk>, "Ruaraidh Sackville Hamilton (IRRI)" <r.hamilton@irri.org>, "R.K.Varshney@CGIAR.ORG" <R.K.Varshney@cgiar.org>
Cc: Peter Wenzl <peter.wenzl@divseek.org>, Daniele Manzella <daniele.manzella@divseek.org>, "Powell, Wayne (CGIAR Consortium)" <w.powell@cgiar.org>, Ruth Bastow <ruth@globalplantcouncil.org>
Subject: RE: DivSeek Steering Committee Meeting Monday 27 April

I missed the 27 April teleconference so also missed the discussion of the form letter of intent" which was circulated prior to the teleconference. Page 7 of the teleconference minutes includes a request for comments—which follow--from the Steering Committee about the letter of intent.

The current partners in the DivSeek Initiative became such by first signing by a non-binding expression of interest, working collectively to draft a Charter, and then formally accepting the DivSeek Charter. Now that DivSeek has a Charter, is the step of submitting a letter of interest, to be assessed by the Steering Committee, actually required? Could organizations who didn't attend the Jan. 2015 meeting in San Diego—where the charter was accepted by attendees via acclamation—simply sign a letter stating that they too accepted the Charter?

Or is an initial step of screening an expression of intent deemed necessary to avoid what might be considered "frivolous" participation/membership in the Initiative? If so, wouldn't that be a complicated task at present, because DivSeek hasn't yet delimited the scope of its potential activities and approaches?

Considering the above, I cannot provide any substantive comments or guidance now, other than suggesting that perhaps the need for and/or content of the form letter of intent be reconsidered after the scope and nature of the DivSeek activities and approaches are further developed and refined.

Again, I missed the 27 April teleconference so apologies for perhaps misunderstanding this issue.

Thanks,

Peter

Peter Bretting
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Fax 1.301.504.6191
Mobile Phone [redacted]
E-mail peter.bretting@ars.usda.gov
Web site: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=301

From: Ruth Bastow [mailto:ruth.bastow@divseek.org]
Sent: Friday, April 24, 2015 10:10 AM
To: Susan McCouch; Elizabeth Aranud; Sarah Ayling; Bretting, Peter; Andreas Graner (IPK); Emily Marden; David Marshall; Ruaraidh Sackville Hamilton (IRRI); R.K.Varshney@CGIAR.ORG
Cc: Peter Wenzl; Daniele Manzella; Wayne (CGIAR Consortium) Powell; Ruth Bastow
Subject: DivSeek Steering Committee Meeting Monday 27 April
Importance: High

Dear DivSeek Steering Committee Members,

Please find attached an agenda and associated documents for our 'virtual' meeting on Monday 27th April.

The meeting will take place at 3pm British Summer Time (BST), which is GMT+1.

The call will be held using the GoToMeeting platform.

To join the call you just need to paste this link into your web browser [redacted]

For a number of countries it is also possible to call in please see the end of this email for further details.

If you have not used GoToMeeting before please make sure that you

1. Download the GoToMeeting Software using the link below

http://support.citrixonline.com/en_US/Meeting/help_files/G2M010002?Title=Download+GoToMeeting

2. Watch the video on how to join a session

http://support.citrixonline.com/en_US/Meeting/help_files/G2M030001?Title=Join+a+Session

If you have any further questions regarding the meeting on Monday please don't hesitate to contact me.

Regards

Ruth

DivSeek Steering Committee Virtual Meeting

Mon, Apr 27, 2015 3:00 PM - 4:30 PM BST

• Please join my meeting from your computer, tablet or smartphone.
[redacted]

• You can also dial in using your phone.
United Kingdom [redacted]
Access Code: [redacted]

More phone numbers

United States (Long distance): [redacted]

Canada (Long distance): [redacted]

France (Long distance): [redacted]

Germany (Long distance): [redacted]

LETTER OF EXPRESSION OF INTEREST

To: the Joint Facilitation Unit of DivSeek

Purpose of this letter

This letter is to express interest in joining DivSeek as a Partner organization.

DivSeek is a community-driven initiative that aims to cross-link, support and add value to individual projects that deepen our understanding of crop diversity and stimulate efforts to mobilize natural genetic variation to accelerate crop improvement and enhance food and nutritional security.

The completed form (provided below) will be forwarded to the Steering Committee of DivSeek, who will review the request to join DivSeek with respect to the relevance of the organization to the mission and principles of DivSeek, as expressed in the DivSeek Charter. The DivSeek Charter is available at: http://www.divseek.org/documents

Upon review of the information provided in the completed form, the Steering Committee may request more information.

The Steering Committee of DivSeek meets twice per calendar year and will review expressions of interest during those meetings. The decision of the Steering Committee will be communicated to the requesting organization by email.

If the Steering Committee confirms acceptance of the request to join, the requesting organization will formally be invited to join DivSeek via acceptance of the DivSeek Charter in writing by a representative of the requesting organization.

The DivSeek Charter defines the general conditions for the operation of DivSeek and sets forth the governance structure for voluntary cooperation by Partner organizations. The Charter does not create any legally binding obligation between or among Partner organizations.

Partner organizations support DivSeek by voluntarily associating specific activities with DivSeek and by providing advice and support. Partner organizations individually determine the nature and extent of their participation in DivSeek.

Please fill the sections below with information on your organization and return an electronic copy of this letter, and attachments thereto, to: **membership@divseek.org**

Contact details

Name of the organization:

Università Politecnica delle Marche (UNiVPM)

Institutional website:

www.univpm.it

Country:

Italy

Address:

Via Brecce Bianche 60131, Ancona, Italy

Name and contact details of the person filling this letter on behalf of the organization:

Roberto Papa, Department of Agricultural, Food and Environmental Sciences (D3A), Università Politecnica delle Marche, Tel: +39-071-2204984; Mobile [redacted] email: r.papa@univpm.it

Mission and activities

Please describe the mission and activities of the organization, as they relate to the mission and principles of DivSeek. Please include links to information available on the web and, if necessary, attach files.

The mission of the Polytechnic University of Marche (UNIVPM) in the field of agriculture includes teaching, research and dissemination activities on the conservation of plant genetic resources and the development of strategies and knowledge to facilitate the use of PGR in plant breeding. These activities are mostly covered by the Department of Agricultural, Food and Environmental Sciences (D3A). We have several courses at all levels (Bachelors, Masters and PhDs), including plant breeding, biodiversity, and conservation and use of genetic resources. We have also carried out several projects on conservation, evaluation and exploitation of PGR at local, national and international levels. These projects were carried out on herbaceous crops (Phaseolus spp, Zea mays, Hordeum vulgare, and tomato), as well as on

Anticipated contributions

Please describe the specific activities and/or projects that the organization would like to associate with DivSeek.

The project that we would like to associate to DivSeek is Bean_Adapt (see attachment) and future projects that are under preparation

Other information

Please insert any other information to support your expression of interest.

See Bean_Adapt project and Roberto Papa CV, as attached file

Date

25/05/2015

Signature

1. Project title

Evolution in a changing environment: the genetic architecture of adaptation outside centers of domestication of *Phaseolus vulgaris* and *P. coccineus*.

2. Project Acronym

BEAN_ADAPT

3. Composition of the consortium

Please insert full name, affiliation, and gender of the Collaborative Research Project partners (Project Leader = applicant 1; PI for each project partner = applicants 2, 3, etc). Full contact details of the PL and each PI should be entered into the fact sheet of the ELAN electronic submission system.

CRP Partner	Last, First Name	Affiliation (Organisation, City – Country)	M/F
1	Papa, Roberto	Università Politecnica delle Marche (UNIVPM)	M
2	Jackson, Scott A.	University of Georgia (UGA)	M
3	Gepts, Paul	University of California (UC Davis)	M
4	Fernie, Alisdair R.	Max-Planck-Institute of Molecular Plant Physiology (MPI-MP)	M
5	Graner, Andreas	Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)	M

4. Themes

Indicate if you address one of the thematic areas mentioned in the Call Notice in your proposal. You can select up to three areas, indicate your main area with No. 1.

[X]	Food security	[ ]	Non-food crops	[1]	Adaptation to a changing climate
[ ]	Biotic/abiotic stress	[ ]	Others (not listed in the Call Notice):		

5. Keywords

- *genetic resources*
- *genomics*
- *metabolomics*
- *crop evolution*
- *population genetics*

6. Composition of the research partner teams

Give the names and titles of the project team-members for each CRP partner. The number of persons mentioned here should be limited to those scientists actually needed for performing the project tasks. Describe the particular expertise of the team member against the tasks to be performed by each project partner.

Please use consecutive numbering (1-1, 1-2, 1-3; 2-1, 2-2, ...), where the first figure refers to the project partner (use the applicant numbers, set in section 3), and the second figure represents the number of the team member.)

CRP Partner	Organisation	Name of team member: Last, First Name, Title	Expertise / Specialisation
1-1	Università Politecnica delle Marche (UNIVPM)	Papa Roberto, Professor	Genomics, population genetics, signature of selection, evolution and adaptation
1-2	Università Politecnica delle Marche (UNIVPM)	Nanni Laura, Researcher	Genetics, population genetics, Plant breeding
1-3	Università Politecnica delle Marche (UNIVPM)	Bitocchi Elena, Researcher	Genetics, evolution, signature of selection
1-4	Università Politecnica delle Marche (UNIVPM)	Bellucci Elisa, Postdoc	Population genetics, biodiversity conservation
2-1	University of Georgia (UGA)	Jackson Scott, Professor	Genetics, genomics, bioinformatics, wild germplasm
2-2	University of Georgia (UGA)	Abernathy Brian, Computational Specialist	Computation biology, databases, data analysis and sharing
2-3	University of Georgia (UGA)	El Baidouri Moaine, PhD	Sequence data analysis, signatures of selection, evolution
3-1	University of California (UC Davis)	Gepts Paul, Professor	Plant genetics, genomics, and breeding, crop evolution and domestication, genetic conservation
3-2	University of California (UC Davis)	Andrea Ariani, Postdoc	Population and landscape genomics
3-3	University of California (UC Davis)	Palkovic Antonia, Assistant Specialist	Agronomist, field and greenhouse experimentation
4-1	Max-Planck-Intitute of Molecular Plant Physiology (MPI-MP)	Fernie Alisdair PhD	Metabolomics, primary metabolism
4-2	Max-Planck-Intitute of Molecular Plant Physiology (MPI-MP)	Tohge Takayuki, PhD	Metabolomics, secondary metabolism
5-1	Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)	Graner Andreas, Professor	Plant genetics, genome analysis, plant genetic resources conservation management
5-2	Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)	Scholz Uwe, PhD	Bioinformatics
5-3	Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)	Himmelbach Axel, PhD	Molecular biology, DNA sequencing

7. Project summary

In English, max. 3000 characters.

This project seeks to understand the genetic architecture of adaptation of the common bean (*Phaseolus vulgaris*; *Pv*) and its cross-compatible sister species, the runner bean (*Phaseolus coccineus*; *Pc*), in their centers of origin in the Americas and following their dispersal to Europe, as a model for future major environmental and socio-economic changes, such as increases in temperature, variability in rainfall, and new consumer preferences. We will identify the genetic basis and phenotypic consequences of adaptation to new environments through the study of their introduction and expansion in Europe, as a historically well-defined event of recent and rapid adaptation. We will use a multidisciplinary approach (genomics, population/ quantitative genetics, biochemistry, plant physiology) on a nested set of samples. A large collection (21,500 accessions, *Pv*_ALL and *Pc*_ALL) from three major genebanks, will be characterised by genotyping-by-sequencing (GBS), to define the population structure and to obtain subsets of genotypes for phenotyping (field and growth chamber) and deeper genomic–transcriptomic–metabolomic characterisation. In a subset of 500 geo-referenced lines of *Pv* (*Pv*_core1), we will obtain ~4× whole genome sequencing (WGS), which will be used for population genomics by comparing subpopulations from the two continents (defined geographically and genetically). This will identify the effect of selection for adaptation to European environments and for genome-wide association studies (GWAS), which will be based on field trials in four contrasting environments, to focus on phenological adaptation. Both species (*Pv*_core2, *Pc*_core1) will also be studied under controlled conditions for plant responses (growth, phenology, transcriptomics, metabolomics) to contrasting conditions of photoperiod and temperature. Differential expression analysis, analysis of the co-expression patterns, and GWAS will be used to identify genes and metabolites putatively associated with adaptation, while genotypic information obtained from RNA-seq data will be used, with GBS and WGS data, to test for signatures of selection. We will compare the results between the allogamous *Pc* and the two gene pools of autogamous *Pv*, where shared signatures between species and gene pools (neutrality tests, expression analysis) will provide a powerful cross-validation tool. The integrated datasets will be used to provide candidate genes to be validated using bulk segregant analysis (BSA). Among the main outcomes of BEAN_ADAPT are the development in *Pv* of haplotypes of all 20,000 accessions (HapBean), along with associated information and seed stocks, which will represent a unique tool for plant scientists. For *Pc*, we will also have a well-defined set of information that will constitute the foundation for the development and application of its genomic resources.

8. Project description

Maximum twelve A4 pages for project description (= sections 8.1 – 8.11 in total) for a CRP of 3 partners. For each additional partner that joins the consortium an extra page will be allowed for description of the research plan (section 8.5).

Formatting: margins of 2.5 cm, font size of Times New Roman 11 point, with a line spacing of 15pt, spacing after paragraph 2pt.

8.1 Project Duration (months):

36 months

8.2 Intended starting date:

April 2015

8.3 Objectives of the project (max. 1 A4 page)

Describe as precisely as possible the scientific objectives of the project. Whenever possible, quantify the objectives in terms of measurable outcomes. Explain the novel character of the research proposed in view of the ambition of the second ERA-CAPS call.

The main aim of this project is to dissect out the genetic basis and phenotypic consequences of the adaptation to new environments of the common bean and its sister species, the runner bean, through the study of their introduction, from their respective centers of domestication in the Americas, and expansion through Europe, as a recent and historically well-defined event of rapid adaptation. Discovering genes and genetic mechanisms that contribute to phenotypic adaptation associated with environmental conditions and their mapping along the reference genome will provide a useful genetic tool for geneticists and breeders for the constitution of novel varieties. This is a crucial aspect towards future major environmental and socio-economic changes, such as increases in temperature, differences in rainfall, and new consumer preferences. These outcomes will also be a step towards complete identification of all the functional elements encoded in the plant genome, which is one of the major scientific targets of plant research. To reach this goal, the proposal plans to apply the most recent '-omics' technologies using a multidisciplinary approach (genomics, population/ quantitative genetics, biochemistry, plant physiology) to highlight the complex relationship between the genotypic and phenotypic diversity in plant populations. Our project is aimed at developing an integrated approach to the efficient exploitation of plant genetic resources (PGRs) preserved *ex situ* in gene banks to maximise their use for plant genetics and plant breeding. This is fundamental if we consider that agriculture has to massively evolve in the near future, due to several factors, including: a significant increase in the world population and the ensuing need for food security; production of high-quality food for human health; need to adapt crops to marked variations in climate; and protection and improvement of the environment. The specific aims of this proposal include:

1) Comparative analysis of the genetic diversity and population structure between the American and European germplasm of *P. vulgaris* (*Pv*) and *P. coccineus* (*Pc*), using genomics, molecular phenotyping (transcriptomics, metabolomics) and field trials at multiple locations. Population genetics approaches will be used to understand in detail the effects of environmental change on the level and structure of genetic diversity of these two species, also in terms of their different mating systems;

2) Identification of genes/ QTLs that control important agronomic and adaptive traits, particularly phenology. This will be done by using genetic and phenotypic data from geo-referenced landraces from different agro-ecosystems from the Americas and Europe for population genomics approaches (i.e., signature of selection mapping, admixture mapping, environmental correlation analysis) and genome-wide association mapping (GWAS). Putative genes of interest will also be identified by comparing different pooled samples of *P. vulgaris* and the two different species, using whole genome sequencing (WGS); validation will be performed using bulk segregant analysis (BSA).

3) Develop a unified information system that will integrate the large amount of data generated by BEAN_ADAPT, which will also facilitate data sharing, both within the project and externally, by linking up the data to the European Search Catalogue of Plant Genetic Resources (EURISCO).

4) Promote the efficient use of *Phaseolus* PGRs by the development of an integrated information system that will be linked with Genebanks management and enhanced by the development and characterisation of 20,000 *Pv* purified lines.

5) Dissemination of the results to scientists, gene bank curators, and breeders. We will report our data and outcomes to the scientific community and to the public through publications in open-access peer-reviewed journals, organisation of project meetings, farmer meetings, and international conferences, and create a database with links to the existing *PhaseolusGenes* database.

8.4 Background (max. 2 A4 pages)

Give the scientific basis for your CRP and describe the present state-of-the-art concerning the specific research topics of your project. Identify important gaps to be filled in the current knowledge. Describe how the proposed project is embedded within the research currently existing in the consortium laboratories.

Phaseolus spp., and in particular the common bean, *Phaseolus vulgaris* L. (2n=2x=22; *Pv*), represent the most important grain legume for direct human consumption worldwide. They are a crucial source of protein for poor farmers in Latin America and east Africa. Moreover, there is increased interest in grain legumes as alternative sources of food protein over animal products, and for their health benefits related to regular consumption. In Europe, *Pv* is the main crop for plant protein for food. In 2012, the European Union imported 501,058 t of the common bean. *Pv* is an economically important crop in the USA, where 1.7 million acres of dry beans were planted in 2012, with a farm-gate value of $1.4 billion. Along with other legumes, *Phaseolus* spp. have important roles in sustainable farming systems, because of their association with bacteria that 'fix' atmospheric nitrogen, thereby enriching the soil. *Pv* (the common bean) and *Pc* (the runner bean) are closely related and cross-compatible species with contrasting breeding systems (autogamous vs allogamous, respectively) and differential adaptation (mesic vs cool, humid, respectively). Independent domestications of *Pv* in the Andes and Mesoamerica originated from two highly differentiated wild gene pools. Both domesticated pools were introduced into Europe after the travels of Columbus, and were then rapidly disseminated to many different European areas characterised by varied environmental conditions (e.g., photoperiod) and agronomic practices. The level of diversity found in Europe for domesticated *Pv*, as determined using molecular markers, is comparable to that observed in the Americas, but without any detectable genetic bottleneck effect [1,2]. Moreover, in Europe, hybridisation and introgression occurred between the Andean and Mesoamerican gene pools, which led to hybridity of 40% of European landraces [1,2]; this indicates that Europe can be considered a secondary centre of diversity [1,3]. This high level of hybridisation is not as expected for an autogamous species such as Pv, and was not observed in Asia, Africa, or Brazil [e.g., 4]. It is most likely the result of selection for adaptation to new environmental conditions, which exploited hybridisation and recombination between the two different gene pools to develop novel genotypic combinations compared to those of their centers of origin [1]. In the allogamous *Pc*, which was domesticated in Mesoamerica, a moderate bottleneck is associated with sharp genetic differentiation between Europe and Mesoamerica accessions [5,6]. Moreover, an adaptive population differentiation in phenology across a latitudinal gradient is also observed in Europe [6], lending strength to the hypothesis that adaptive selection led to the diversification of the runner bean in Europe. Thus, the parallel introduction of *Pc* and the two gene pools of *Pv* into Europe provides an excellent model to study the process of adaptation of crop plants to new environment(s) that represent a broad range of climatic conditions. This includes the possibility of comparing the genetic architecture of adaptation of two closely related species with a contrasting breeding system.

Different approaches can be used to study adaptation: quantitative trait loci (QTL) using linkage or association mapping (i.e., genome-wide association studies; GWAS). Both approaches are based on phenotypic characterisation of adaptive traits that need to be defined *a priori*. Alternative methods rely on the detection of patterns of polymorphisms that depart from neutral expectation, as evidence of the effects of selection at a target locus [see as review, 7] or trait [QST; 8]. These population genomics methods do not require any phenotypic characterization, and can be useful to validate the roles of previously identified genes with putative adaptive values, and to identify genes or genomic regions involved in genetic control of important adaptive pathways for which the phenotypic consequence

may remain unknown. These approaches, which were often originally developed in human genetics, have been successfully applied in several plant species, including in *Pv* [9,10], using a wide range of statistical methods [see as review, 11]. One interesting method that has not yet been applied in plant research is the admixture mapping method [see as review, 12], which requires well-defined parental and admixed populations. This approach might be particularly powerful in *Pv*, with its well-defined gene pools in the Americas and Europe [see as review, 13].

Using next generation sequencing (NGS), it is possible to compare individuals from many populations and across wide geographic ranges on a whole-genome scale [14], with new opportunities for identification of genes underlying local adaptation. This data can also be used for genome-wide scans for signatures of selection at very high resolution, as done for *Arabidopsis thaliana* [15,16] and crop species such as wheat, barley and bean [10,17,18]. -Omics technologies will allow us to investigate adaptation-related changes in transcriptomes and metabolomes (molecular phenotyping); expression networks can be explored to assess the genome-scale impact of new selective constraints [e.g., 10, 19-20]. Moreover, loci (or molecular and conventional phenotypes) involved in local adaptation can be identified by unusual correlations between allele frequencies and ecological variables (that will be treated as target phenotypes in GWAS), provided that differences in sample size and the neutral correlation of allele frequencies across populations due to shared history and gene flow are taken into account [21-22]. Recent studies in dairy cattle [23] and durum wheat [24] have clearly shown that combining evidence from signature of selection analyses with association mapping based on the same markers increases the power to detect genomic regions that influence complex traits, strongly reducing the number of false-positive signals.

Thus, the integration of different gene-mapping approaches represents a unique opportunity that has not yet been well explored, to determine the genetic basis of adaptation to environmental change. The rationale of the present project is to integrate existing activities in the PI's laboratory of -omics technology GWAS, multiple methods of signatures of selection analyses (including admixture mapping methods), differential expression analysis, correlation of allele frequencies and molecular phenotypes with geographical variables to identify loci and key traits involved in the adaptation to a new environment, and comparing populations from the centres of origin with those derived by the introduction in Europe of two closely related species. GWAS and selection scans depend on linkage disequilibrium (LD) between phenotypic causative and linked molecular variants. Indeed, in both GWAS and population genomics, the higher the LD, the lower the resolution for detecting the genome location of the causative molecular variant. Here, we will exploit the unique evolutionary history of domesticated *Phaseolus* spp., which provides the possibility to compare two closely related domesticated species with different mating systems and LD patterns, in addition to two gene pools of the same species (*Pv*).

8.5 Research plan (max. 5 A4 pages) TOTAL max 7 pages in our case

Give an overall description and the general approach and methodology chosen to achieve the objectives. Describe fully the molecular approaches used in the research project. Highlight the particular advantages and limitations of the methodology chosen; quantify the expected project result(s). Break down the research programme into individual tasks (if appropriate by means of milestones & deliverables) attributed to the different partners in the consortium, showing the interrelation between the tasks. Explain why there is synergy between different tasks of the project and how this is going to be exploited.

For each additional partner (above the minimal required three partners) that joins the consortium an extra page will be allowed to describe the research plan.

WP1 Germplasm sampling & characterization-Leader P5, PIs involved:1,2,3,5 *Start date* Apr15

Objectives 1) Assembly of a *Phaseolus* germplasm and generation of single-seed-derived DNA stock set comprising 20,000 *Pv* (*Pv*_ALL) and 1,500 *Pc* (*Pc*_ALL). For *Pv*, also the generation of single plant progenies. **2)** Assembly of a core collection and seed increase of 500 *Pv* accessions, *Pv*_core1, included in *Pv*_ALL, that will be used for both sequencing (WGS) and multi-site field trials (common garden experiments). **3)** Definition of two samples, *Pv*_core2 (200 accessions) and *Pc*_core1 (60 accessions), for phenotyping (RNA-seq, metabolomics, growth chamber). **4)** GBS characterisation of *Pv*_ALL and *Pc*_ALL samples. **5)** Well-characterised core collections (*Pv*_core1, *Pv*_core2, *Pc*_core1) for other WPs and reference information for 'molecular accession passports' for the management of *ex-situ* collections. **6)** Development of a data warehouse to integrate the sequence data with existing databases for plant genetic resources.

Approach Based on genetic, phenotypic and passport data, we will assemble five customised collections of *Phaseolus* germplasm, *Pv*/*Pc*_ALL, *Pv*/*Pc*_core1 and *Pv*_core2. *Pv*/*Pc*_ALL will be subjected to GBS. Seeds of the two core collections will be multiplied and distributed for multilocation field experiments. WP1 will supply seeds of *Pv*_core1 to WP2 for WGS analysis, and seeds of *Pv*_core2 and *Pc*_core1 to WP3 for phenotyping. GBS data will be sent to WP4 to call and curate the single nucleotide polymorphism (SNP) data (Task4.1). GBS data analysis performed by WP1 will be used in WP4 for data integration and storage (Task4.4).

Task 1.1 Germplasm assembly-Leader: P3 (Apr15- May15)

Methods Accessions will be identified and passport data retrieved from the major collections, the German federal *ex-situ* Gene Bank (IPK, Gatersleben, Germany: http://www.ipk-gatersleben.de/gbisipk-gaterslebendegbis-i/), the Western Regional Plant Introduction Station (WRPIS, Pullman, WA, USA: http://www.ars-grin.gov/npgs/acc/acc_queries.html), and the Genetic Resources Unit of the Centro Internacional de Agricultura Tropical (CIAT, Cali, Colombia: http://isa.ciat.cgiar.org/urg/bsearchparam2.do). **Outcomes** 21,500 accessions of *Pv* and *Pc* that represent (i) a spatio-temporal cross-section of the phenotypic and geographic diversity, as mostly landraces, with a small sample of cultivars, and (ii) the distribution range of the two crop species in the Americas and Europe.

Task 1.2 DNA extraction and seed increase-Leader: P5 (Jun15-Nov15)

Methods Single seeds of *Pv*_ALL and *Pc*_ALL will be used by partners 3 and 5 for DNA extraction and GBS. For the *Pv*_ALL, we will obtain single-seed-derived progeny to develop a seed repository based on pure lines, to avoid problems arising from heterogeneous landraces. **Outcomes** A DNA repository of *Pv*_ALL and *Pc*_ALL to be used for GBS analysis along with a seed repository for *Pv*_ALL accessions (each represented by the descent from a single seed) (Jun15-Nov15).

Task 1.3 GBS-Leader: P5 (Jul15-Dec15)

Methods We will use GBS as a universal approach for detailed genotyping of *Pv*/*Pc*_ALL (21,500 accessions). This will offer a link with the sequence data (WGS and RNA-seq) for haplotype reconstruction for the whole *Pv*_ALL. To achieve the lowest cost, we will perform GBS analysis either in-house at IPK and/or the University of Georgia using established protocols [e.g. 25], or subcontract library construction and sequence analysis to an established service provider. SNP calling and annotation will be performed in Task4.1. The SNP dataset will be used to perform population structure analysis. **Outcomes** A comprehensive collection of about 10,000-20,000 SNPs for each accession, anchored to the *Pv* reference sequence [26]. Diversity and population structure description of *Pv*_ALL and *Pc*_ALL.

Task 1.4 Data integration and core sets definition-Leader: P5 (Dec15-Mar16)(Nov16-Feb17)

Methods Three core sets will be defined: *Pv*_core1, of 500 accessions for Tasks2.1 and 3.3, which will comprise a subset defined before this project based on data available from P1 (*Pv*_core2) following and comparing established approaches to combine phenotypic, geographic, passport and genotypic data [27,28]. *Pv*_core2 and *Pc*_core1 for Tasks2.2, 3.1 and 3.2 have been defined by P1 [see 13]. All data will be transferred into a data warehouse for data storage, exchange, visualisation and basic analysis tools. For each accession of *Pv*_core1 based on purified lines from Task1.2, a further seed increase will yield at least 400 seeds per accession, sufficient for multi-site field trials (Task3.3); this second seed increase will be carried out by each of the four locations (Nov16-Feb17).

Outcomes *Pv*_core1 (500 *Pv* genotypes) to be used in common garden experiment and for WGS. A data warehouse that allows systematic access, retrieval and contextualisation of the sequence information will be generated. Seed stocks of *Pv*_core1.

Task 1.5 Distribution-Leader: P5 (Apr15-May15; Apr16-Jul16)

Methods Two periods are planned for seed distribution: 1) Seeds of *Pv*_core2 and *Pc*_core1 are already available from P1 and will be sent to P4 at the beginning of the project, for Tasks3.1 and 3.2. *Pv*_core2 accessions will be included in the *Pv*_core1 set, thus along with an additional 300 *Pv* accessions selected at the end of Task1.4, they will be available for Task1.2 for seed increase, to obtain enough seeds for field experiments (Task3.3). *Pv*_core1 seeds will be available for Task2.1 for WGS. Several months are planned for materials distribution, to take into account necessary bureaucratic procedures (e.g., national import permits, mail/customs procedures). **Outcomes** Timely seed distribution for the various experiments.

Deliverables **D1.1** Core collection comprising 500 SSD-derived lines (*Pv*_core1). **D1.2** DNA resource of 21,500 *Pv* and *Pc* accessions. **D1.3** Dataset of annotated SNPs for genetic analyses. **D1.4** Data warehouse linking genomic data from this project with additional PGR-related information.

WP2 Genomics-Leader: P2, PIs involved:1,2 *Start date* Aug15

Objectives **1)** In-depth genotyping of 500 core *Pv* accessions (*Pv*_core1) using WGS. **2)** RNA sequencing of 200 *Pv* (*Pv*_core2) and 60 *Pc* (*Pc*_core1). **3)** BSA-seq validation of gene-phenotype correlations in segregating populations. **4)** Validation of expression differences between accessions and populations on a gene-by-gene basis using standard quantitative RT-PCR.

Approach Standard sequencing approaches for Illumina-based sequencing of genomes for genotyping and transcriptomes for assembly, transcript counting, and analysis of alternative splicing. WP2 will receive seeds of *Pv*_core1 from WP1, for DNA extraction and WGS, while RNA will be supplied by WP3. WP5 will supply the list of candidate genes to be validated. All data produced by WP2 will be sent to WP4 for bioinformatics analysis and storage.

Tasks 2.1 Whole genome sequencing/ genotyping-Leader: P2 (Aug16-Nov16)

Methods DNA extraction from young leaves will be carried out for *Pv*_core1 accessions. Sequencing of each line to ~4× sequence coverage by Illumina sequencing using 2× 125 bp paired ends with 300-500 bp inserts ~2.1 Gpb sequence/accession. Accessions will be indexed so that individual haplotypes can be computed and to control for potential admixture that can confound analysis. Samples will be indexed with up to 24 accessions per Illumina HiSeq channel. **Outcomes** Approximately 2.1 Gbp of sequence data will be generated for each accession. Since *Pv* is an inbreeding species, lower levels of sequence coverage can be used, as heterozygotes are infrequent.

Tasks 2.2 Transcriptome sampling by RNA-seq-Leader: P2 (Aug15-Nov15)

Methods Transcriptomes of 260 *Pv* and *Pc* accessions will be collected from plants grown under contrasting light and temperature regimes (WP3). For RNA (and metabolites), we will use 780 samples from 260 accessions with 2 treatments including incomplete replication of each accession (on

average, 1.5) to estimate the variance components. This is based on the comparison of populations from America and Europe consisting of 10-15 individual accessions, thus for each population we will have 20 to 30 samples. Each sample will yield >10 Million (M) reads, for a total of nearly 15 M reads per treatment, per accession. RNA will be extracted from young leaves from plants grown in growth chambers (Task3.1), in parallel with metabolites analysis (Task3.2), using standard Illumina protocols and libraries for RNA sequencing. Additional RNA-seq will be conducted for validation. As there is not yet a reference genome for *Pc*, a reference transcriptome assembly will be made to map RNA-seq reads by deep sequencing of RNA from a few genotypes using several tissues (minimum: young/ old leaves, roots, flowers, seeds). Illumina MiSeq will be used with overlapping 2× 300-bp reads, to generate a high quality transcriptome assembly. **Outcomes** Nearly 10 M reads per sample (30 M per treatment per accession) will be used to identify genes that are up/down-regulated, as compared to the contrasting treatment. Reference transcriptome of *Pc*.

Task 2.3 Validation of predicted gene-phenotype correlations-Leader: P2 (Oct17-Jan18)

Methods BSA sequencing will be used to validate candidate genes in populations segregating for targeted traits. We will use available phenotyped populations and sets of individuals (from 10 to 20) with similar phenotypes that will be pooled for sequencing, to find regions of the genome homozygous for alleles from one parent, thereby validating the gene-phenotype predictions. This approach is being taken to keep costs down (pooling of accessions), and to provide a level of validation of predictions. Individual or sets of genes with predicted differences in transcript abundance will be validated using quantitative RT-PCR. *Pv*_core2 will include the parental lines of segregating populations, thus we will have all of the data for these (GBS, WGS, transcriptomic, metabolomics, other phenotypic data), to ensure polymorphism for candidate loci in available segregating populations. **Outcomes** The output will be a set of validated candidate loci for their phenotypic effects.

Deliverables **D2.1** Nearly 1.3 Terabases of sequence data for the 500 re-sequenced accessions. **D2.2** 780 RNA-seq raw data. **D2.3** Re-sequencing data from pooled genotypes. **D2.4** List of validated candidate loci for phenotypic effects.

WP3 Phenomics-Leader: P4, PIs involved:1,3,4,5 *Start date* Jun15

Objectives **1)** Obtain phenotypic data under contrasting conditions in field (*Pv*_core1) and growth chamber (*Pv*-core2, *Pc*-core1). **2)** Obtain samples for RNA-seq from the growth chamber trial. **3)** Score metabolic traits in *Pv* and *Pc* from the growth chamber trial.

Approach We will document a range of traits in a growth chamber trial for both *Pv* and *Pc* for conventional and molecular phenotyping, using metabolomics and transcriptomics. Phenotyping data will also be obtained from field trials. WP3 will receive seeds of *Pv*_core2 and *Pc*_core1 from WP1. RNA extracted in Task3.2 will be sent to WP2 for raw data analysis; all phenotypic data (including metabolomics, transcriptomics) will be sent to WP4.

Task 3.1 Growth chamber trial-Leader: P4 (Jun15-Sep15)

Methods We will grow 200 *Pv*_core2 and 60 *Pc*_core1 accessions in growth chambers under carefully controlled compromise growth conditions (P4), with two contrasting conditions of light and temperature, to simulate a tropical short-day *vs* a temperate long-day environment. We will grow 1,560 plants resulting from 2 treatments × 3 replicates × 260 accessions. Several morphological and phenological traits will be scored (e.g., days to flower and maturity, growth habit, seed weight). **Outcomes** Phenotypic evaluation of American and European landraces under two contrasting environments, to simulate differences in the growth conditions (light, temperature) between centres of domestications and Europe. Data collected will contribute to the project database, to be compared with other phenotypic and genotypic information generated by the project.

Task 3.2 Metabolomics-Leader: P4 (Jul15-Dec15)

Methods To standardise metabolomic and transcriptomic analysis and logistics of handling relatively unstable metabolite extracts, we will sample the leaves at the third leaf stage, from Task3.1. Samples, snap-frozen, homogenised and lyophilised, will then be aliquoted for both RNA-seq (Task2.2) and primary and secondary metabolite analyses. Our preliminary analysis suggests that we will determine about 140 known and 60 unknown metabolites in *Pv*._**Outcomes** Data obtained from these analyses will be used to study metabolite expression and co-expression under different growing conditions, to identify their relevancy towards genetic diversity for adaptation to different environments.

Task 3.3 Common garden (field trials)-Leader: P3 (Apr17-Jul17)

Methods The *Pv*_core1 of 500 lines will be grown in replicated field trials in four locations: Italy, Germany, California, Colombia. These represent very different environments, characterised by two diversified Mediterranean, one continental, and one tropical climate. We will use a randomised complete block design with four replicates using nearest-neighbour analysis following Dixon [29] and Richter and Kroschewski [30]. Traits will be focused on, but not limited to, plant phenology. Traits include, according to successive growth stages [31]: number of days to emergence, 3rd trifoliolate, flowering, pod fill, and maturity and growth habit according to the CIAT classification: I to IV (V if any) [32]. In addition, we will take into account such observations as germination and early growth vigor, and flower and seed colour (or colour pattern), using digital photography and image processing. **Outcome** Dataset with phenological and other agronomic trait data for 500 *Pv*-core1 accessions.

Deliverables **D3.1** Validated phenotypic dataset for growth chamber phenotyping. **D3.2** Validated phenotypic dataset from field trials. **D3.3** Samples for RNA extraction. **D3.4** Validated dataset for primary and secondary metabolites.

WP 4 Bioinformatics, data storage & sharing-Leader: P2, PIs involved:1,2,3,5 *Start date* Oct15

Objectives **1)** SNPs dataset from analysis of raw GBS data of *Pv*_ALL and *Pc*_ALL. **2)** Identification of genes up/down-regulated to light/ temperature treatments, transcript variants, and alternative splicing. **3)** WGS data analysis to provide baseline information on variants and computation of haplotypes for *Pv*_core1. **4)** Project (imputation) of haplotypes of *Pv*_ALL through WGS and GBS data. **5)** Data integration and sharing: ensure access to raw and processed data, integrate and migrate data to public repositories.

Approach The data will be integrated in a unified information system that will facilitate its use, with comparisons of these data and legacy data from gene banks. This WP will take care of the processing, organisation, integration and storage of data produced by WP1, 2 and 3 for data analysis (WP5) and to promote data sharing and dissemination (WP7).

Task 4.1 Bioinformatics GBS-Leader: P5 (Oct15-Jan16)

Methods Raw GBS data of 21,500 accessions of *Pv* and *Pc* will be analysed through bioinformatics tools to map the reads on the reference genome, and to call and impute variants. The SNP dataset will be put into the project database, which can be interrogated or downloaded by project participants (e.g. WP1). **Outcomes** A repository of genotypes that can be used to understand the genetic architecture of the various collections and to identify a set of core genotypes. From a public perspective, this will be immediately useful for genebank curators to rationalise collections and identify duplicate accessions.

Task 4.2 Bioinformatics RNA-seq-Leader: P2 (Dec15-Mar16; mar17-may17)

Methods RNA-seq data will be processed using Illumina protocols, and then be placed into the project database. Reads will be assembled and transcripts counted using CuffLinks and Top-Hat to the reference *Pv* genome [26]. Raw data, assembly and frequency counts will be available via the project database. After publication, or according to project guidelines, the data will be curated in a public

repository, such as NCBI. **Outcomes** FPKM values will be calculated for each gene for each genotype, and pooled genotypes and transcript variants, e.g., splice variants, will be called across genotypes and gene pools. Contrasts will be among pools of genotypes, in addition to species and gene pools, based on geographical origin and population structure, as found with GBS and WGS, as well as between genotypes. We will identify genes involved in response to contrasting light and temperature growth conditions. Confirmation of candidate genes will be carried out using standard quantitative RT-PCR approaches (Task2.2).

Task 4.3 Bioinformatics WGS-Leader: P2 (Dec16-Apr17)

Methods Processed and cleaned sequence data will be used with standard computational tools to call variants, including SNPs, indels, CNV, and when possible with small mate pairs, structural variations. Multiple approaches will be used to call variants and to assess false positives/ negatives, including small-scale wet-lab validation of variants of interest and/or to determine frequencies of false positives/ negatives. All called variants will be placed in a project database for analysis and in public databases per project guidelines. In addition, raw data will be curated. We do not expect any major problems, and as we have done this previously for *Phaseolus* [26]. These data will be used to compute haplotypes (gametic phases) of SNPs for each accession that will then be used to impute and for haplotype prediction, insofar as possible, from the GBS data from the entire collection. A catalogue of indels and small-scale rearrangements will be generated to understand the types of variations and their correspondence with measured traits. We will identify potential admixture that might have occurred during seed propagation at the plant collection centers. **Outcomes** Mapped data, called variants including SNPs and structural variants, and computed haplotypes for the project PIs. Available data for WP5.

Task 4.4 Bioinformatics data integration and sharing-Leader: P2 (Apr16-Jan18)

Methods We have storage capacity to actively maintain sequence data for at least a 12-month period. However, all sequence data and metadata will be placed in public repositories for long-term maintenance, using an established sequence pipeline that uses SRA-XML formatted short-read data deposits with NCBI Short Read Archive (SRA), and associated metadata deposits with Gene Expression Omnibus (GEO). Our aim is to accelerate access to and use of the data by the entire scientific community. Accordingly, the data release policy is based on the principles of rapid data release to the scientific community (Fort Lauderdale agreement on Sharing Data from Large-Scale Biological Research Projects (http://www.genome.gov/27528022). The short-read data and metadata produced will be deposited in public databases (GenBank SRA/GEO) without use restriction after a period of 12 months, for data analysis and quality control. No material transfer agreement will be necessary for access to any materials produced by the project. Data will be shared with appropriate genome databases (e.g., phytozome.org for the common bean). Other, non-sequence-based metadata, from transcriptome/ methylome, will be made available via public databases such as the Gene Expression Omnibus (GEO) [ncbi.nlm.nih.gov]. Data will be integrated using genebank collection accession numbers as identifiers for DNA and RNA sequences as well as metabolite and phenotypic data. As some of the data will be from populations or derivatives of an original accession, accession numbers will be developed (similar to publication DOIs) to track data to accessions and derivatives. Thus, using a unique identifier, the data for an accession can be retrieved. Integration of genotypic and phenotypic data will be done as needed by the PIs; however, the database will facilitate extraction of relevant data (genotypes, expression data, haplotypes, metabolite profiles, phenotypes). Currently, genebanks do not support the selection of accessions on data other than passport or legacy data. We will contextualise the datasets accumulated in this project with related information from public repositories, for facilitated and educated use of *Phaseolus* biodiversity. Both classical concepts based

on relational databases [33-35] and NoSQL solutions, such as key-value databases [36], will be evaluated during the data accumulation phase. We will put special emphasis on integrating the data warehouse with the IPK Genebank Information System, to provide direct links to passport and legacy data. Handling large amounts of genotypic data will require implementation of a strategy to efficiently store genotype matrices for interactive access and visualisation of analysis results. To this end, we will explore non-relational database architectures and data compression methods based on the Burrows-Wheeler transformation [37] as a backbone for our database. A graphical web-interface will be developed to serve as the front-end of the data warehouse, and we will regularly interact with the nascent DivSeek initiative (http://www.planttreaty.org/content/information-about-divseek-initiative) to use and or complement international activities for the use of DNA sequencing to explore genbank collections. **Outcomes** Curation of data for project PIs, and migration to public repositories for long-term curation and access. Creation and development of the database of the project.

Deliverables **D4.1** A curated set of high confidence SNPs. **D4.2** Map and expression profiling for RNA-seq data and preliminary alternative transcripts analysis. **D4.3** Computed haplotypes and genetic variants from 500 *Pv*_core1 accessions, and use of these to project haplotypes within the *PV*_ALL collection. **D4.4** Project database with raw data, the called genetic variants, the computed/ imputed haplotypes, RPKMs for RNA-seq, the called splice variants, and all the different findings obtained during the realisation of the project.

WP5 Data analyses-Leader: P1, PIs involved: ALL *Start date* Jan16

Objectives 1) Molecular and functional characterisation of the diversity of domesticated *Pv* and *Pc*, and its association to environmental changes. 2) Identification of loci and key phenotypes putatively under selection. 3) Integration and validation of the main results. 4) Development of a large set of accessions based on pure lines (*Pv*) with genomic and phenotypic information.

Approach: We will use a multidisciplinary (population genetics, quantitative genetics, genomics, biochemistry, plant physiology) approach to identify: associations between molecular variants and phenotypic or environmental variables, loci and phenotypic traits putatively under selection, and changes in phenotypic expression profiles to identify their molecular basis. Three nested sets of data will be obtained from WP2 and integrated: A (GBS on *Pv*_ALL and *Pc*_ALL), B (WGS and phenotypic characterisation of *Pv*_core1), and C (exome diversity and phenotypes, molecular and conventional, on *Pv*_core2 and *Pc*_core1 grown under contrasting conditions in terms of photoperiod and temperature), with the possibility of *Pv* vs *Pc* comparisons. Moreover, dataset integration will provide the possibility to use the information in datasets B and C to assess diversity of set A, inferring its haplotype structure on the basis of GBS data. WP5 will receive all the data for analysis from WP4; WP5 will supply a list of candidate genes to WP2 for validation.

Task 5.1 Population genomics (diversity analysis and selection)-Leader: P1 (Jan16-Sep17)

Methods We will use genomic data (GBS, WGS, RNA-seq) and quantitative traits from both molecular (transcriptomics, metabolomics) and conventional (e.g., phenology) phenotyping to detect the signature of selection. The PIs have already used several statistical tools in recent studies that will cover the objectives of this proposal [e.g. 10]. *Genomic data*: We will detect occurrence of outliers for divergence, diversity and linkage disequilibrium estimators. Coalescence simulation will be used to determine the neutral expectation, as shown in a recent study involving three PIs of this proposal [10]., For the first time in plants, we will also exploit admixture mapping methods [12], to detect the signature of selection. American-Andean and -Mesoamerican populations will be used as parental populations, while European-Andean and -Mesoamerican will be used as admixed populations [2]. Over the entire genome and for small genomic windows, extreme (high or low) levels of local ancestry

will indicate putative selection effects. *Phenotypic data*: The phenotypic information will be used to compute the Q_{ST} (the analogue of F_{ST} for quantitative traits) and compare it with neutral expectation obtained from DNA diversity, according to the approach proposed by Whitlock and Guillaume [8]. Thus, we will be able to identify phenotypic traits, including molecular phenotypes, as transcripts and metabolites, showing the effects of selection. **Outcomes** Deep genomic characterisation of the diversity of large collections of the two species under investigation. List of loci and traits showing the signature of selection for adaptation.

Task 5.2 Expression analysis and population genomics-Leader: P4 (Apr16-Apr17)

Methods Data from the expression analyses will be analysed on the basis of gene ontology (GO) and of homology to genes from other plant species, using MapMan and GO terms for individual genes, and also by looking at co-expression of genes with those of known functions, using tools available in the PlaNet database [38]. Most of the analyses will follow Bellucci et al. [10], with two improvements: a) the number of genotypes studied will be far greater; and b) comparison of metabolomics and transcriptomics will be used as a means of improving metabolism-associated gene annotation, as described by P4 for *Arabidopsis* [39]. Attempts will be made to match allele-specific expression obtained from RNA sequencing with metabolite contents, and detailed integration analyses will be carried out, which are capable of fusing the data emanating from transcriptomics, metabolomics, and phenotyping studies. **Outcomes** Expression and co-expression analysis and a list of differentially expressed genes and metabolites.

Task 5.3 Environmental correlation analysis and GWAS-Leader: P3 (Jan16-Apr16; Jul17-Oct17)

Methods We will use phenotypic data from the field (Task3.3) and growth chamber (Task3.1) trials with GBS (Task1.3), WGS (Task2.1), and RNA-seq (Task2.2) genotypic data. The analysis of population and family structure will be first obtained along with the pattern of LD decay, to define the most appropriate approach. Kwak and Gepts [40] showed the presence of both population and family structure along with a slow decay of LD in domesticated *Pv* samples. Thus, GWAS is expected to be feasible for *Pv*, and we will be considered in the analysis, following the procedures described by Laidò et al. [24]. Association of environmental variables with allelic frequencies will be tested using several methods (e.g., SAM [41], BayENV2 [42]). **Outcomes** Identification of marker trait associations for phenology under contrasting growing conditions and association with molecular variant and environmental variable.

Task 5.4 Validation, comparison and integration-Leader: P3 (Oct16-Jan18)

Methods Our proposal relies on the integration of different types of techniques and approaches, and on the combination all of the novel tools of genomics, along with molecular (e.g., metabolomics, transcriptomics) and standard (e.g., field trials) phenotyping. This Task will start when most of the data from the GBS, WGS, RNA-seq and metabolomics are available, and we will compare and combine the population genomics and phenomics (classical phenotyping, gene expression, metabolomics) analyses. The Task will finish at the end of the project, when all of the data also from the field trials and validation tasks will be analysed and integrated. **Outcomes** Validation and integration of data and analyses from the genomics and phenomics approaches used will allow identification of valuable traits related to adaptation to new environments, and will identify molecular loci showing strong evidence to be involved in the genetic control of relevant adaptive traits providing innovative tools to exploit genetic diversity for breeding.

Deliverables **D5.1** List of genes and phenotypes showing signature of selection. **D5.2** List of loci significantly associated with traits and environmental variables. **D5.3** Improved expression associated genome annotation. **D5.4** List of strong candidates for validation. **D5.5** List of validated candidates.

WP 6 Coordination and management-WP leader: P1 and **WP 7 Dissemination-WP leader: P3 (PIs involved: ALL):** To avoid duplication, these WPs are well described in the specific points 8.10 and 8.7 of the present proposal, respectively.

8.6 Complementarity of the teams and transnational added value (max. 1 A4 page)

Describe clearly the contribution of each partner to your project. It is expected that unless the academic or industrial involvement is at the level of sub-contracting for specific tasks, public laboratory or industrial companies will be true research partners in the consortia and will contribute significantly to the development of the research programme. Reviewers will be asked to comment and rate the value added by the involvement of all partners in order to assist the assessment of these projects.

Demonstrate how the project will increase synergy between teams around Europe (and beyond, if applicable) and enhance quality and competitiveness of molecular plant research over and above other currently funded research.

One of the major scientific endeavours of our time is to achieve deep understanding of essential biological processes. In particular, plant geneticists and breeders need to identify all functional elements encoded in the plant genome. This can be done only with integration of different types of expertise, by combining all of the novel tools of genomics along with molecular (e.g., metabolomics, transcriptomics) and standard (e.g., field trial) phenotyping. Our proposal represents a step towards this ambitious goal. The proposal involves five research groups from three countries, with expertise in different fields of plant science: i) the Jackson Lab has broad expertise in genomics and bioinformatics, and recently released the reference genome sequence of *P. vulgaris*, combined with bioinformatics tools and computational and storage resources; ii) the Gepts Lab is focused on defining the evolutionary processes that have shaped evolution of crop plants under cultivation, and in particular of *Phaseolus* beans. Gepts also has strong expertise in plant breeding, he currently leads the UC Davis bean-breeding programme, and he is curator of the PhaseolusGenes database; iii) the Fernie Lab has in-depth expertise in metabolomics, guaranteeing innovative support to the project through integration of genomics with new molecular phenotyping technologies; iv) the IPK genebank directed by Graner is the largest *Phaseolus* collection in Europe, and its genetic characterisation will be a fundamental tool for breeders and plant scientists; finally, v) the Papa Lab will contribute with their expertise in applied population genomics, to analyse the large amounts of data that will be obtained. All of the PIs and labs have established bilateral and multilateral collaborations that have produced shared publications. The project will have a relevant impact in promoting synergy between the PIs, due to the complementary skills, and it will also have a relevant impact in promoting collaborations and integration among other research groups, and especially genebanks, because of the research output that will enhance the efficient use of PGR.

8.7 Plan for use and dissemination of knowledge (max. 0.5 A4 page)

Describe how the consortium will deal with the dissemination, publication, and, protection of results generated in the project. Applicants are strongly recommended to read and use the 'IPR Conditions' (Annex II to the Call Notice) which have been established by the ERA-CAPS Working Group on intellectual property rights.

Note: A separate detailed Data Management Plan should be submitted along with this Grant Application. For guidelines to establish such a document applicants are referred to 'ERA-CAPS Data Sharing Policy'(Annex III to the Call Notice). The Data Management Plan should be a separate document, and will not count towards the maximum page length of the application form.

Start date or starting event: October 2015

Approach: In line with the ERA-CAPs "IPR Conditions" document, and given the strongly integrated nature of this project, we expect most results to be co-owned by its five partners. If the project is approved, we will enter into a written joint ownership agreement that will spell out the specific terms of the joint ownership, dissemination procedures and review, and commercialisation. As public institutions receiving government funds, we will focus on public availability and distribution of the data and information developed in this project. Results published in (preferably open access) scientific journals or articles will be made available to the public at large. We have identified several constituencies/ stakeholders/ target groups. These include 1) scientists in general, including scientists involved in plant genetic conservation and breeding; 2) the bean research community around the world; 3) scientists involved in genomics and bioinformatics; 4) farmers growing beans; and 5) high school students. Activities will be targeted to each of these groups. Prior notices of dissemination will given to all of the partners involved, and will be subject to mutual agreement, as spelled out in the joint ownership agreement.

Activities: **1)** Develop a project web site with information on the Bean_Adapt project, links to participating groups and gene banks, *Phaseolus* databases, updates on research progress, and new datasets as they become available; **2)** Presentations (oral, poster) at scientific meetings of the bean community, including the Bean Improvement Cooperative biennial meetings, the Euphytica (European plant breeding organisation), and contribution of short, two-page reports to yearly reports (e.g., BIC Annual Report); **3)** Participation via oral presentations or posters in international genomics meetings, like Plant and Animal Genome (yearly, January), the International Conference on Legume Genetics and Genomics (biennially; expected in 2016 and 2018); **4)** Participation in farmers meetings, such as the California Dry Bean Advisory Board meetings and field days (attended by farmers and seed suppliers) and yearly reports – in lay terms – on the activities and goals of BEAN_ADAPT; **5)** Development of posters and activities in collaboration with local science promotion organisations, e.g., Explorit in Davis, CA (http://www.explorit.org/); **6)** Open access publications in international, high-level, peer-reviewed journals; **7)** Engage the information offices at our respective institutions to produce joint news items or video clips and photos for the general press.

All dissemination will recognize the ERA-CAPS programme and the funding organisations, verbally and/or using the respective logos.

8.8 Coordination with outside groups (max. 0.5 A4 page)

If the proposed activity is part of a different national or international collaborative project, grouping or network, describe the relationship between the existing activity and this proposal, and how the components will be coordinated if appropriate. If there is national or international activity in the area of the proposed project which the consortia is not directly engaging with, please describe with justification whether and how efforts will be made to integrate with this activity.

Projects (acronym, dates)	Connections with BEAN_ADAPT (to →; ← from)	Involved partners and countries
International projects and initiatives		
Kirkhouse Trust (UK): ABC (African Bean Consortium), 9/1/2012-8/31/2015	**To:** *PhaseolusGenes* database: markers **From:** Additional SNP markers	Ethiopia, Kenya, Rwanda, Tanzania, Uganda; USA
DivSeek	**To:** Analysis tools for assessing diversity **From:** Genotype data from collections.	S.A. Jackson is part of DivSeek. Involves all CGIAR centers and most plant collections
European projects and initiatives		
German-Israeli project	**To:** expertise in large scale metabolic profiling in crops	A.R. Fernie
European Cooperative Programme for Plant Genetic Resources (ECPGR): Grain Legumes Working Group	**To:** genomic information on ex situ germplasm **From:** Additional phenotypic information on EU accessions; access to EURISCO for integration of information.	A. Graner, Kert Klejer (Head ExCo ECPGR), M. Ambrose (Head Legumes Working Group)
National projects and initiatives		
USDA NIFA AFRI: Wild bean GBS, 09/01/2013-08/31/2016	**To:** GBS data on wild *Phaseolus vulgaris*; association between molecular diversity and GIS climatic data **From:** GBS, WGS, and expression data on domesticated *P. vulgaris*	Gene banks: CIAT, USDA
California Dry Bean Advisory Board,04/01/2014-03/31/2015	**To:** Field and greenhouse facilities **From:** Additional SNP markers	California bean farmers
California Crop Improvement Association, 07/01/2014-06/30/2015	**To:** Field facilities	California bean farmers
USDA NIFA BeanCAP, USA, 09/1/2009-08/31/2014	**To:** *PhaseolusGenes:* QTLs From: Additional SNP, indel markers **From:** diversity data to breeders and for association mapping.	S.A. Jackson and P.Gepts are co-PIs
NextBEAN, Italy, 14/03/2014-13/03/2017	**To:** *PhaseolusGenes* database: markers/QTLs **From:** comparison of results	R. Papa is involved.

8.9 Economic, societal and/or environmental relevance (if appropriate) (max. 0.5 A4 page)

Explain the relevance and timeliness of the research programme proposed, in terms of economic, societal and environmental impact. If appropriate, describe why the biological questions your proposal tries to answer are of relevance to the development of a strong and competitive bio-economy.

Common bean (and other *Phaseolus* spp) is a key crop for plant protein production, and this project will provide very useful contributions to further legume research and production. Considering the importance of protecting the environment, promoting the increase of systems involving legumes represents cheaper and more sustainable alternatives to conventional practices, due to the symbiotic capture of atmospheric N_2, thus reducing the use of industrially produced nitrogen. Our project is particular relevant towards the future challenge of plant breeding: to obtain new varieties to contribute

to food security in a world in demographic expansion and in a context of climate change. We will identify genes/ QTLs for important agronomic traits, which are crucial for breeding, and a subset of these genes will be validated by genotyping and phenotyping of segregating population.

8.10 Project management and reporting (max. 1.5 A4 page)

Describe how the overall coordination, monitoring and control of the project will be implemented. If possible, provide a project organisation chart. If appropriate, set up a detailed diagram giving the time schedule of the tasks and mark their interrelations; add milestones where important goals will be reached and/or decisions on further approaches will have to be taken; indicate a critical path marking those events which directly influence the overall time schedule in case of delays. Explain how information flow and communication will be enhanced within the project (e.g. collaboration and task meetings, exchange of scientists). Risk management: Indicate where there are risks of not achieving the objectives and fall-back positions, if applicable.Note that a Consortium Agreement should be signed among the partners of a research consortium prior to the start of the project. This Agreement should include a reporting scheme. A template for the Consortium Agreement will be available at http://www.eracaps.org/joint-calls/era-caps-calls.

Project monitoring: The overall coordination of the project will be the responsibility of UNIVPM, and the project coordinator will supervise the work-plan to ensure that it is being carried out as planned, with the support of the WP Leaders. The project management will be operative by implementing the most appropriate tools that will guarantee a fluent exchange of information and an efficient and transparent decision-making process. Moreover, efficient project reporting will be guaranteed by continuous progress monitoring and follow-up of all project items, especially milestones and deliverables (see the project organisation chart1 and 2).

Establishment and management of the project:

Collaborative Workspace: A private project management collaborative workspace, the "Project Website" (with access via username and password only), will be established for the project. A shared group calendar will be used to schedule meetings and deadlines.

Organisation of the kick-off and the project meetings A kick-off meeting will be organised at UNIVPM: a training workshop for all PIs in the use of the collaborative workspace, and discussion of the implementation plan of the project for the first year. The project meetings (PMs) will be held once a year to monitor the progress of work and to take strategic decisions, and for the continuous updating of the project plan. Preferably, the PMs will take place during International Conferences (i.e., PAG) where all of the participants will be present. Web project meetings (@) are planned periodically. The Coordinator will draft the minutes for every meeting, and will be responsible for gathering the necessary information to produce the periodic reports and for sending them to all of the partners. An External Advisory Board (EAB), chaired by the coordinator, will provide the Consortium with strategic feedback regarding the project progress, and contribute to the maintaining of the scientific and technological excellence of the project. The board will be composed of three international leaders who are recognised for their expertise in a field of importance to BEAN_ADAPT. The EAB will meet once every 1.5 years (or more if necessary). Prior the beginning of its activity, each EAB member will enter into a non-disclosure agreement. The list of EAB members can be enlarged throughout the project life. The following experts have agreed in principle to become members of the EAB:

1) **Kirstin E. Bett** - Associate Professor - College of Agriculture and Bioresources- University of Saskatchewan, Canada - k.bett@usask.ca; **2) Valerie Geffroy** - French National Institute for Agricultural Research, INRA, France - valerie.geffroy@u-psud.fr; **3) Massimo Delledonne** - Full Professor, Department of Biotechnology, University of Verona, Italy - massimo.delledonne@univr.it

Risk management: The approaches outlined in the project will be revisited carefully before starting and during the activities, to ensure the most cost, time and information efficient approaches. The PIs have already established long-term collaborations on legumes research and strong networks between the laboratories, including the possibility of training and exchanges of the personnel involved. This will help to solve any difficulties that arise during the implementation of the project.

Risks for field trials: All locations foreseen for the project have been known by the PIs for several years, so any technical or environmental risks can be considered beforchand as much as possible.

Time schedule

MONTHS	1 Apr-15	2 May-15	3 Jun-15	4 Jul-15	5 Aug-15	6 Sep-15	7 Oct-15	8 Nov-15	9 Dec-15	10 Jan-16	11 Feb-16	12 Mar-16	13 apr-16	14 May-16	15 Jun-16	16 Jul-16	17 Aug-16	18 Sep-16	19 Oct-16	20 nov-16	21 Dec-16	22 Jan-17	23 feb-17	24 mar-17	25 apr-17	26 May-17	27 Jun-17	28 Jul-17	29 Aug-17	30 Sep-17	31 Oct-17	32 nov-17	33 Dec-17	34 Jan-18	35 feb-18	36 mar-18
Task 1.1																																			
Task 1.2																																			
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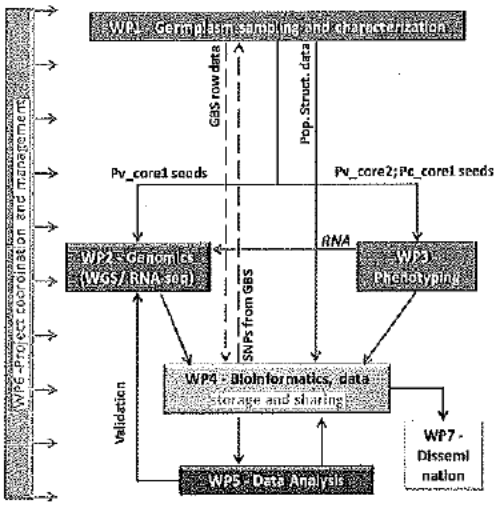
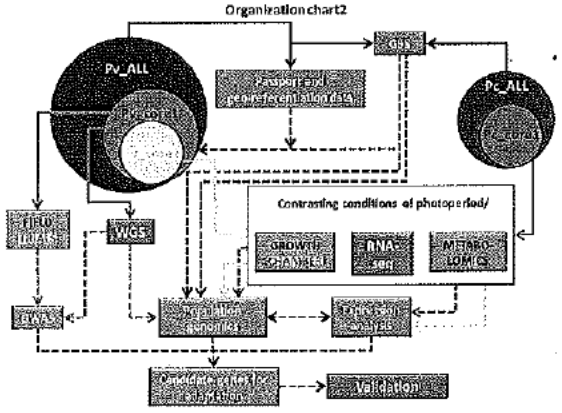
WP6	KM			®					PM							®					PM							®					PM		
WP7																																			

Organization chart1



Milestones	Milestones description	Expected date (months)	Means of verification
M1.1	Definition of Pv_ALL and Pc_ALL and validation of Pv_core2 and Pc_core1	2	List of accessions
M1.2	Seed and DNA distribution of Pv_core2 and Pc_core1	8	Seeds and DNA stocks ready for distribution to depending tasks
M1.3	DNA extraction of Pv_ALL and Pc_ALL	9	DNA stocks ready for distribution to depending tasks
M1.4	Production and analysis of GBS data and definition of Pv_core1	12	GBS data stored in the project database, list of accessions
M1.5	Seed production from Pv_ALL and seed distribution of Pv_core1 seeds completed	16	Seeds stocks ready for conservation and/or analyses
M1.6	DNA extraction of Pv_core1 for WGS	17	Pv_core1 DNA stock ready for WGS
M2.1	Completion of WGS data	20	WGS data stored in the project database
M2.2	Production of RNA-seq data	8	RNA-seq data stored in the project database
M2.3	QTA for validation	34	List of validated candidate loci for phenotypic effect
M3.1	Completion of growth chamber phenotyping and data set validation (including metabolomics and transcriptomics)	6	Morphological and phenological data stored in the project database
M3.2	RNA and Metabolites extraction for Pv_core2 and Pc_core 1	9	Validated data set for metabolites stored in the project database
M3.3	Completion of field trial phenotyping	28	Phenological and agronomic data stored in the project database
M4.1	Definition of SNP data set from GBS	10	SNP data set stored in the project database
M4.2	Definition of RNA-seq data set	26	Validated RNA-seq data sets
M4.3	Definition of WGS data set (SNPs and haplotypes)	25	Mapped data, variants and haplotypes for WP5
M4.4	Implementation and completion of project database	34	Project database available for all PIs
M5.1	Definition of loci and traits under selection	30	List of loci and traits
M5.2	Identification of loci associated to environmental data	25	List of differentially expressed genes and metabolites
M5.3	Identification of marker-trait associations	31	Marker-traits associations
M5.4	List of cross validated loci of interest	34	Cross validation of results
M5.5	Validation of loci of interest	34	List of loci with multiple evidence of selection
M6.1	Implementation of a private project management collaborative workspace	1	Collaborative workspace available
M6.2	Kick-off meeting completed	1	Minutes
M6.3	Periodic meetings completed	36	Minutes
M7.1	Public release of the BEAN_ADAPT web site	6	Web site
M7.2	Information from partners to build the dissemination plan	5	Elaboration of a report
M7.3	Participation at scientific meeting, International conferences, farmer meetings	12-24-36	Open access publications in International, high-level peer-reviewed journal, Technical report, papers, posters

Organization chart2



8.11 Legal requirements

Is the proposed research in compliance with the different national legislation and have the required permits for experimental work, such as GMO trials, been obtained?

☐ Yes **X** No (if "no" explain the current status)

The proposed project does not plan to use GMO materials, thus the experimental work described above does not require national permits. This counts for all the countries involved in the project.

8.12 References (max. 2 A4 pages)

List of publications to which references are made in the project description.

1. Angioi SA et al. **(2010)** Beans in Europe: origin and structure of the European landraces of *Phaseolus vulgaris* L. Theor Appl Genet 121:829-843
2. Gioia T et al. **(2013)** Evidence for introduction bottleneck and extensive inter-gene pool (Mesoamerica x Andes) hybridization in the European common bean (*Phaseolus vulgaris* L.) germplasm. PLoS ONE 8:e75974
3. Santalla M et al. **(2002)** Allozyme evidence supporting southwestern Europe as a secondary center of genetic diversity for the common bean. Theor Appl Genet 104:934-944
4. Burle M et al. **(2010)** Microsatellite diversity and genetic structure among common bean (*Phaseolus vulgaris* L.) landraces in Brazil, a secondary center of diversity. Theor Appl Genet 121:801-813
5. Spataro G et al. **(2011)** Genetic diversity and structure of a worldwide collection of *Phaseolus coccineus* L. Theor Appl Genet 122:1281-1291
6. Rodriguez M et al. **(2013)** European *Phaseolus coccineus* L. landraces: population structure and adaptation, as revealed by cpSSRs and phenotypic analyses. PLOS ONE 8:e57337
7. Storz JF **(2005)** Using genome scans of DNA polymorphism to infer adaptive population divergence. Mol Ecol 14:671-688
8. Whitlock MC and Guillaume F **(2009)** Testing for spatially divergent selection: comparing QST to FST. Genetics183:1055-1063
9. Papa et al. **(2007)** Tagging the signatures of domestication in common bean (*Phaseolus vulgaris*) by means of pooled DNA samples. Ann Bot 100:1039-1051
10. Bellucci E et al. **(2014)** Decreased nucleotide and expression diversity and modified coexpression patterns characterize domestication in the common bean. Plant Cell, DOI 10.1105/tpc.114.124040
11. Hoenlohe PA et al. **(2010)** Using population genomics to detect selection in natural populations: key concepts and methodological considerations. Int JPlant Sci 171:1059
12. Seldin MF et al. **(2011)** New approaches to disease mapping in admixed populations. Nat Rev Genet 12:523-528
13. Bellucci E et al. **(2014)** Genomics of origin, domestication and evolution of *Phaseolus vulgaris*. In: R Tuberosa, A Graner, E Frison (eds), Genomics of Plant Genetic Resources. Springer Netherlands, pp. 483-507. ISBN: 978-94-007-7571-8 (Print) 978-94-007-7572-5 (Online)
14. Nordborg M et al. **(2005)** The pattern of polymorphism in *Arabidopsis thaliana*. PLoS Biol 3:e196
15. Cao J et al. **(2011)** Whole-genome sequencing of multiple *Arabidopsis thaliana* populations. Nat Genet 43:956-963
16. Horton MW et al. **(2012)**. Genome-wide patterns of genetic variation in worldwide *Arabidopsis thaliana* accessions from the RegMap panel. Nat Genet **44**:212-216
17. Peleg Z et al. **(2011)** Genetic analysis of wheat domestication and evolution under domestication. J Exp Bot 62:5051-5061
18. Russell J et al. **(2011)** Analysis of> 1000 single nucleotide polymorphisms in geographically matched samples of landrace and wild barley indicates secondary contact and chromosome-level differences in diversity around domestication genes. New Phytol 191:564-578
19. Rapp RA et al. **(2010)** Gene expression in developing fibres of Upland cotton (*Gossypium hirsutum* L.) was massively altered by domestication. BMC Biol 8:139

20. Swanson-Wagner R et al. **(2012)** Reshaping of the maize transcriptome by domestication. Proc Natl Acad Sci USA 109:11878–11883

21. Mullen LM and Hoekstra HE **(2008)** Natural selection along an environmental gradient: a classic cline in mouse pigmentation. Evolution 62:1555–1570

22. Coop G et al. **(2010)** Using environmental correlations to identify loci underlying local adaptation. Genetics 185:1411-1423

23. Schwarzenbacher H et al. **(2012)** Combining evidence of selection with association analysis increases power to detect regions influencing complex traits in dairy cattle. BMC Genomics 13:48

24. Laidò G et al. **(2014)** Linkage disequilibrium and genome-wide association mapping in tetraploid wheat (*Triticum turgidum* L.). PLoS ONE 9:e95211

25. Mascher M et al. **(2013)** Application of genotyping-by-sequencing on semiconductor sequencing platforms: a comparison of genetic and reference-based marker ordering in barley. PLoS ONE 8:e76925

26. Schmutz J et al. **(2014)** A reference genome for common bean and genome-wide analysis of dual domestications. Nature Genet, 46:707-713

27. Upadhyaya HD et al. **(2008)** Genetic structure, diversity, and allelic richness in composite collection and reference set in chickpea (*Cicer arietinum* L.). BMC Plant Biol 8:106

28. De Beukelaer H et al. **(2012)** Core Hunter II: fast core subset selection based on multiple genetic diversity measures using Mixed Replica search. BMC Bioinformatics 13:312

29. Dixon PM **(2012)** Nearest-neighbor methods. Encyclopedia of environmetrics. Iowa State University, Ames, IA

30. Richter C, Kroschewski B **(2012)** Geostatistical models in agricultural field experiments: investigations based on uniformity trials. Agron J 104:91-105

31. Gepts P **(1987)** Characterizing plant phenology. In: Wisiol K, Hesketh J (eds) Plant growth modeling for resource management. CRC Press, Boca Raton, FL, pp 3-24

32. Singh SP **(1982)** A key for identification of different growth habits of *Phaseolus vulgaris* L. Annu Rep Bean Improv Coop 25:92-95.

33. Rios D et al. **(2010)** A database and API for variation, dense genotyping and resequencing data. BMC Bioinformatics 11:238

34. Paila U et al. **(2013)** GEMINI: integrative exploration of genetic variation and genome annotations. PLoS Comput Biol 9: e1003153.

35. Nettling M et al. **(2014)** DRUMS: Disk Repository with Update Management and Select option for high throughput sequencing data. BMC Bioinformatics 15: 38.

36. Lange M et al. **(2010)** The LAILAPS search engine: a feature model for relevance ranking in life science databases. J Integr Bioinform 7:110

37. Durbin R **(2014)** Efficient haplotype matching and storage using the Positional Burrows-Wheeler Transform (PBWT). Bioinformatics 30:1266-72

38. Mutwil M et al. **(2011)** PlaNet: combined sequence and expression comparisons across plant networks derived from seven species. Plant Cell 23: 895-910

39. Tohge T, Fernie AR **(2010)** Combining genetic diversity, informatics and metabolomics to facilitate annotation of plant gene function. Nat Protoc 5:1210-27

40. Kwak M, Gepts P **(2009)** Structure of genetic diversity in the two major gene pools of common bean (*Phaseolus vulgaris* L., Fabaceae). Theor Appl Genet 118:979-992

Curriculum vitae

PERSONAL INFORMATION

Family name, First name: **PAPA, Roberto**
Researcher unique identifier(s): [redacted]
Date of birth: [redacted]
URL for web site: http://publicationslist.org/r.papa

CURRENT POSITIONS

2002 - Associate Professor in Plant Genetics at D3A, Università Politecnica delle Marche, Italy
2014 - Guest Scientist at the Forschungszentrum Jülich, Germany

EDUCATION

1989 Degree in Agricultural Sciences (BS and MS), University of Perugia, Italy
1993 Ph.D. in Plant Breeding and Plant Genetics, Università degli Studi di Sassari, Italy

RESEARCH TRAINING and FELLOWSHIPS

1991 Research training 'Salt stress in barley', Centre for Arid Zone-University College of North Wales, Bangor, UK.
1991 Research training 'Abiotic stress in barley', Cereal Programme, ICARDA, Aleppo, Syria
1993 - 1994 Research Fellowship Grant 'Genetics of the resistance mechanisms to biotic and abiotic stress', Università Politecnica delle Marche, Ancona, Italy
1996 - 1997 Visiting Scientist at the Department of Agronomy and Range Science, University of California Davis: 'Diversity in *Phaseolus* spp. and *Vigna* spp. and gene flow between wild and domesticated forms'.

PREVIOUS POSITIONS

2010 - 2014 Director, Cereal Research Centre-Agricultural Research Council (CRA-CER), Foggia, Italy.
1997 - 2002 Researcher at the D3A, Università Politecnica delle Marche, Italy.

AWARDS

2001 Awarded "Research Fellow of University of Ancona", academic year 2000-2001 Università Politecnica delle Marche, Italy.

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

1998 - 2014 Supervisor of 14 graduate students, 10 PhD students, and 11 Postdocs Faculty of Agriculture, Università Politecnica delle Marche, Ancona, Italy.
2003 - 2005 Supervisor of a Visiting Scientist funded by the Organisation for Economic Co-operation and Development and the European Science Foundation.
2003 - 2005 Supervisor of 3 Visiting Students on Programmes Leonardo and Archimede, and the IPGRI Award at the Faculty of Agriculture, Università Politecnica delle Marche, Italy.

TEACHING ACTIVITIES

1998 - 2010 Teaching position for Bachelors, Masters and PhD courses - 'Plant genetics', 'Plant Biotechnology and Biodiversity' and "Advanced Plant Breeding" Courses, Università Politecnica delle Marche, Ancona, Italy.
2014 - Teaching position for Bachelors, Masters and PhD courses - 'Plant genetics', 'Conservation genetics' and "Quantitative and Population Genetics" Courses, Università Politecnica delle Marche, Ancona, Italy

ORGANISATION OF SCIENTIFIC MEETINGS and COURSES

2013 Organising Committee - SIGA Annual Meeting, Foggia, Italy.
2006-2005 Scientific Committee of two SIGA Annual Meetings (Riva del Garda and Ischia).
2006 - 2013 Organiser and Scientific Coordinator of 3 national Courses (SIGA topics: "Bioinformatics" and "Plant Breeding", and 1 CRA-CER Course on "Plant Breeding").
2012 Organiser and Scientific Coordinator of the International COST/CRA Course on "Metabolomics and Plant Breeding" Foggia, Italy.
2013 Organising Committee of the International Symposium on Genetics and Breeding of Durum Wheat, May 27-30, 2013 in Rome, Italy.
2014 - Scientific Committee, EUCARPIA International Symposium on Protein Crops Pontevedra, Spain, May 2015.

SCIENTIFIC MEETINGS COMUNICATIONS

2003 - 2014 International Invited Oral Presentation: 20 at International Congresses
2003 - 2014 Others: more than 15 Invited Oral Presentations (e.g. seminars)
2006 - 2014 9 National Invited Oral Presentations

INSTITUTIONAL RESPONSIBILITIES

2005 - 2007 Member of Directory Board, Italian Society of Agricultural Genetics (SIGA)

2007 - 2010 Member of the 'Agricultural Science' PhD School Committee, Università Politecnica delle Marche, Ancona, Italy, and Member of the 'Vegetable Production and Environment' PhD Course.

2003 - 2007 Member of PhD Evaluation Committees in several Italian Universities: Bologna, Perugia, Napoli, Torino, and others.

2007 – 2010 Coordinator of the Department Section "Agronomy and Plant Genetics"

2010 – 2014 Member of the CRA national committee for the evaluation of researchers visiting Fellowship research activities.

COMMISSIONS OF TRUST

2002 - Scientific Reviewer for more than 20 International peer-reviewed Journals, including Nature and PNAS.

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

Since 1998 Member of SIGA (Italian Society for Agricultural Genetics), SIBE (Italian Society for Evolutionary Biology), ESEB (European Society for Evolutionary Biology), GSA (Genetics Society of America), EUCARPIA (European Association for Research on Plant Breeding), American Society of Plant Biologist, EPSO (European Plant Science Organisation).

PREVIOUS RESEARCH GRANTS

1998 - 1999 Principal Investigator (Project Partner) – Italian National MURST Project N. 9811044470_004 - Geographical distribution and genetic structure of landrace populations in the monti Sibillini region.

1999 - 2000 Principal Investigator (Project Partner) – Italian National MURST Project N. 9907384522_003 (21.175€) - *Hordeum vulgare* L. landraces *in situ* conservation in the Mediterranean region.

2000 - 2001 Principal Investigator (Project Partner) – Italian National MURST Project N.MM11041447_005 (22.724€) – The *in situ* conservation of landraces.

2003 - 2005 Principal Investigator (Project Partner) – Italian National MIUR Project N.2002075423_002 - Beans in Europe: development of molecular markers linked to domestication traits for the analysis of population structure and genetic diversity of European germplasm of common bean.

2004 - 2007 Principal Investigator (Project Partner) – SIGMEA Project N.SSPE-CT-2004-501986 - Sustainable introduction of GMO's into European Agriculture, Strengthening the foundation of ERA, VI Framework Programme.

2005 - 2007 Project Leader - CARIVERONA Foundation Project - *Zea mays*: GMO and local varieties.

2005 - 2007 Project Leader (Coordinator) – Italian National MIUR Project N.2005071310 - Genetic structure and linkage disequilibrium in domesticated and wild *Phaseolus vulgaris* L.

2010 - 2012 Project leader (Coordinator) - Italian National MIUR Project N.20083PFSXA_001 - *Phaseolus vulgaris* adaptation during domestication and introduction into Europe.

2012 - Principal Investigator (Project Partner), leader PONa3_00053 Project PlASS - Platform for Agrofood Science and Safety.

1999 - 2009 Project Leader (Coordinator) for a total of six research projects founded by the Marche region, Italy - topics: Germplasm collections; Biodiversity evaluation, utilisation and conservation.

1999 - 2014 Project Leader (Coordinator) for a total of 12 Research Projects founded by the Università Politecnica delle Marche, Ancona, Italy - topics: Genetic diversity and domestication.

2015 – 2017 Project Leader (Coordinator)

MAJOR COLLABORATIONS

Paul Gepts (USA)	*Phaseolus* diversity and breeding
Scott Jackson (USA)	Genomics and evolution
Jens Stougard (Denmark)	Gene expression
Giorgio Bertorelle (Italy)	Population genetics and evolution
Massimo DelleDonne (Italy)	Next-generation sequencing and transcriptomics
Zoran Nikoloski (Germany)	Mathematical modeling and statistics
Andreas Graner (Germany)	Biodiversity and breeding
Alisdair Fernie (Germany)	Metabolomics
Ulrich Schurr (Germany)	Plant Science and Phenomics

Ten-year track record

Top 10 publications in the past 10 years as senior author (out of 57 publications – since 2004):

1. Bellucci E., Bitocchi E., Ferrarini A., Benazzo A., Biagetti E., Klie S., Minio A., Rau D., Rodriguez M., Panziera A., Venturini L., Attene G., Albertini E., Jackson S.A., Nanni L., Fernie A.R., Nikoloski Z., Bertorelle G., Delledonne M. & **Papa R. (2014)** Decreased nucleotide and expression diversity and modified co-expression pattern characterize domestication in the common bean. **The Plant Cell**, tpc-114.
   1 citation
2. Bitocchi E., Bellucci E., Giardini A., Rau D., Rodriguez M., Biagetti E., Santilocchi R., Spagnoletti Zeuli P., Gioia T., Logozzo G., Attene G., Nanni L. & **Papa R. (2013)** Molecular analysis of the parallel domestication of the common bean (*Phaseolus vulgaris*) in Mesoamerica and the Andes. **New Phytologist** *197: 300-313.*
   7 citations
3. Bitocchi E., Nanni L., Bellucci E., Rossi M., Giardini A., Spagnoletti Zeuli P., Logozzo G., Stougaard J., Mcclean P., Attene G. & **Papa R. (2012)** Mesoamerican origin of the common bean (*Phaseolus vulgaris* L.) is revealed by sequence data. **Proceedings of the National Academy of Science USA** *109: E788-E796.*
   22 citations
4. Nanni L., Bitocchi E., Bellucci E., Rossi M., Rau D., Attene G., Gepts P. & **Papa R. (2011)** Nucleotide diversity of a genomic sequence similar to SHATTERPROOF (PvSHP1) in domesticated and wild common bean (*Phaseolus vulgaris*) L. **Theoretical and Applied Genetics**, 123(8): 1341-1357.
   8 citations
5. Tanto Hadado T., Rau D., Bitocchi E. & **Papa R. (2010)** Adaptation and diversity along an altitudinal gradient in Ethiopian barley (*Hordeum vulgare* L.) landraces revealed by molecular analysis. **BMC Plant Biology**, 10: 121
   10 citations
6. Angioi, S., Rau D., Attene G., Nanni L., Bellucci E, Logozzo G., Negri V., Spagnoletti Zeuli P., & **R Papa** (2010) Beans in Europe: Origin and Structure of the European Landraces of Phaseolus vulgaris L. **Theoretical and Applied Genetics** 121(5): 829-843
   14 citations
7. Rossi M., Bitocchi E., Bellucci E., Nanni L., Rau D., Attene G. & **Papa R. (2009)** Linkage Disequilibrium and population structure in wild and domesticated populations of *Phaseolus vulgaris* L. **Evolutionary Applications**, 2: 504-522.
   21 citations
8. Bitocchi E., Nanni L., Rossi M., Rau D., Bellucci E., Giardini A., Buonamici A., Vendramin G.G. & **Papa R. (2009)** Introgression from modern hybrid varieties into landrace populations of maize (*Zea mays* ssp. *mays*) in Central Italy. **Molecular Ecology**, 18: 603-621.
   21 citations
9. **Papa R.**, Bellucci E., Rossi M., Leonardi S., Rau D., Gepts P., Nanni L., Attene G. **(2007)** Tagging the signature of domestication in common bean (*Phaseolus vulgaris*) by means of pooled DNA samples. **Annals of Botany**, 100(5): 1039-1051. Domestication Special Issue.
   26 citations
10. Rau D., Attene G., Brown A.H.D., Nanni L., Maier F.J., Balmas V., Saba E., Schäfer W. & **Papa R. (2007)** Phylogeny and evolution of mating-type genes from *Pyrenophora teres*, the causal agent of barley 'net blotch' disease. **Current Genetics**, 51(6): 377-392.
    22 citations

Invited presentation:

2014 October 28th 2014 Séminaire scientifique « Histoires de plantes cultivées: domestication, adaptation, diversité ». On: *Population genomics of domestication in Phaseolus vulgaris Agropolis International* – Montpellier

International CROP.SENSe.net Symposium 29/09-1/10 "*The consequence of domestication*" University of Bonn, Germany

EFP Workshop Sep 24-27 University of Copenhagen, 'Phenomics and molecular phenotyping to study crop domestication' Denmark

3rd International Plant Phenotyping Symposium, Chennai, India; '*Phenomics and molecular phenotyping to study crop domestication*'

Nutrition and Agriculture Genomics Congress, 7-8 April 2014, London (UK) on "The

Consequence of Crop Domestication"

2013 EU Parliament Audit on "*Biodiversity and Sustainable Agriculture*"
EPPN, Plant Phenotyping Workshop, Porto Heli, Greece; '*Morpho-physiological evaluation of tetraploid wheats under different nitrogen levels*'
Italian Society for Evolutionary Biology (SIBE) Annual Congress, Trento Italy on "*The consequences of domestication*"
Plant Genomic Conference, London, UK; '*RNAseq approach to tag the signatures of domestication in common bean*'
International Symposium on Genetics and Breeding of Durum Wheat, on "*Metabolite Profiling of Tetraploid Wheat Domestication*", May 27-30, 2013, Rome, Italy.
International COST/CRA Course on "Metabolomics and Plant Breeding" *Metabolomics and Plant Breeding,* 15-19 April, 2013, Foggia, Italy.

2015, 2013, 2010 and 2007
Plant and Animal Genome Conferences PAG XV, XVIII and XXI, XXIII, San Diego, USA; "The consequences of domestication", '*Tagging the Signatures of Domestication in Common Bean (Phaseolus vulgaris L.)*', '*Following the signature of selection in the parallel independent domestication events of Phaseolus vulgaris in the Andes and in Mesoamerica*', '*Tagging the signature of domestication in the common bean using RNAseq genotyping*' and '*Evolutionary metabolomics of durum wheat domestication*'.

2012 Workshop on International Durum Collaboration Workshop, Adelaide, Australia; '*Major issues and problems associated with durum quality*'.
Phaseomics 2012, The Genome, Mexico '*The effect domestication on the structure of the genetic diversity of Phaseolus vulgaris* L.'

2011 15th International EUCARPIA-EWAC Conference, Serbia; '*Linkage disequilibrium and population structure in tetraploid wheat*'.
EuroCereal 2011, UK; '*Metabolic profiling in durum wheat: Potential applications*'.

2008 ICLGG IV International Conference on Legume Genomics and Genetics, Mexico; '*Genetic diversity, population structure and linkage disequilibrium in Phaseolus vulgaris L.*'

2007 Phaseomics V, Italy '*Origin and domestication of the common bean*'.

2006 7th European Nitrogen Fixation Conference, Denmark; '*Domestication of Common Beans*'.

2006 OECD Sponsored Workshop 'Domestication, super-domestication and gigantism: Human manipulation of plant genomes for increasing yield', Tsukuba, Japan; '*Tagging the signatures of domestication in common bean (Phaseolus vulgaris L.)*'.

Research expedition:

Germoplasm collections and other expeditions in Argentina, Ethiopia, Mexico and Italy

Membership of international boards:

Editorial Board:

2010 - Associate Editor for BMC Genetics.
2010 - 2012 Australasian Plant Pathology (Springer).
2014 - PlosONE.

Scientific Advisory Board:

2006 - 2007 Scientific Board - SIGA Annual Meetings (Riva del Garda and Ischia), Italy.
2006 - 2014 Scientific Committee of two SIGA Courses (topics: Bioinformatics and Plant Breeding), Monsampolo del Tronto, Italy and two CRA-CER Courses (topic: Metabolomics and Plant Breeding), Foggia, Italy.

Grant review panels:

2015 Member of Evaluation Panel, Chall. 5, Agence Nationale de la Recherche, France
2011 - 2013 Member of Evaluation Panel ERC Advanced Grants, LS8.
2008 - 2015 Member of Evaluation Panel FIRB, PRIN and SIR Projects of Italian Ministry of University (MIUR).
2008 - 2010 Member of Italian-German Evaluation Committee for research projects, 'Program Vigoni'.
2008 Member of Evaluation Panel for Ministry of Research and Innovation, Toronto (CA), ORF-RE programme research projects.
2012 - 2014 Member of Evaluation Panel Agropolis Fondation Call for Proposals Open Science.