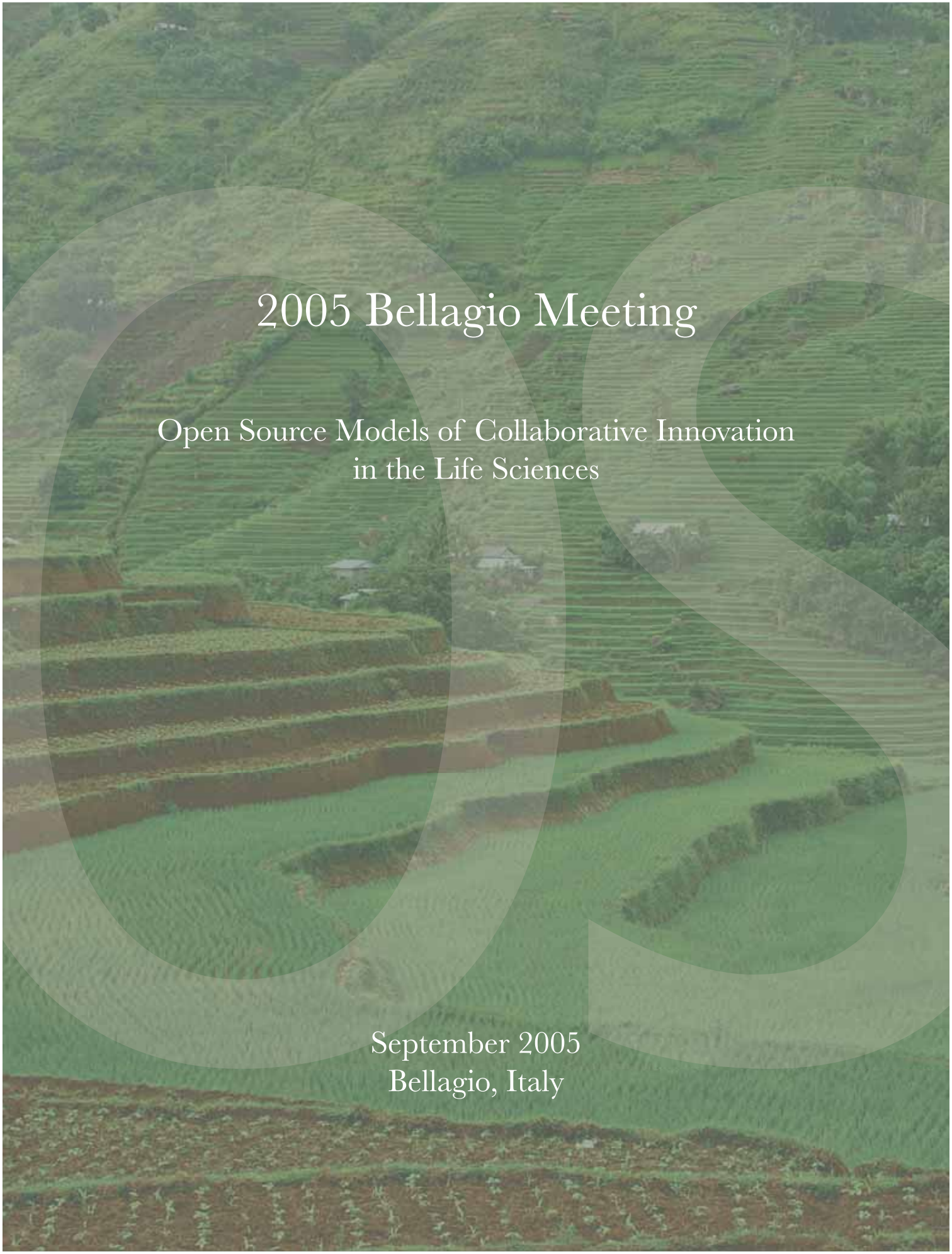

2005 Bellagio Meeting

Open Source Models of Collaborative Innovation in the Life Sciences

September 2005
Bellagio, Italy

The September "2005 Bellagio Meeting on Open Source Models of Collaborative Innovation in the Life Sciences" was organized by The Rockefeller Foundation *(http://www.rockfound.org)* with assistance from Biological Innovation for Open Society *(http:/www.bios.net)* and Meridian Institute *(http://www.merid.org)*.

Copies of this report may be downloaded at *http://www.merid.org/showproject.php?ProjectID=9318.0*.

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INTRODUCTION

"Open source" approaches[1] have been highly successful in creating and disseminating a range of innovative software products worldwide. Linux, the freely available operating system for computers, is estimated to run more computer servers than any other operating system. Many other open source products and initiatives, including the Apache web server, Perl (a computer programming language) and Wikipedia *(http://www.wikipedia.org)*, have been tremendously successful as well. These efforts are the result of thousands of people collaborating across the Internet in a form of production increasingly refer-red to as "distributed peer production" or "distributed innovation."

The appeal of OS is multi-faceted. Many people are attracted to OS for political or philosophical reasons. It provides an alternative approach to innovation processes that are increasingly dominated by powerful multinational companies that use aggressive legal strategies to restrict access to the technologies and knowledge that underlie their products. People are also interested in OS approaches for practical reasons. The notion of distributed peer production enables thousands of individuals with wide array of interests, expertise, capacity and capabilities to collaborate. This approach, which is not usually centrally coordinated or controlled, typically has lower transaction costs when compared to traditional forms of production. OS is also appealing to individuals and institutions, who, in the course of research and development, encounter a "patent thicket" that blocks or slows their access to, for example, key enabling technologies. OS approaches can help people work around these patent thickets in a manner that allows them to innovate, while also preserving the same innovation route for others.

In September 2005, The Rockefeller Foundation convened a meeting at their conference center in Bellagio, Italy, to explore the emergence of "open source models of collaborative innovation" in the life sciences, particularly health and agriculture. While the OS approach has been tremendously successful in the software arena, the Foundation was interested in exploring the feasibility of applying it to challenging health and agricultural problems confronting hundreds of millions of poor people in developing countries. The specific objectives of the meeting included the following:

- Develop a common, working definition of "open source" and other related terms being used to describe collaborative research in the life sciences, in part through a comparison between models developed in the area of software and models emerging in agriculture and health research;
- Briefly review and critique the literature that explains what motivates and organizes collaborative research models and to compare these models to traditional market- and state-driven models of innovation;
- Conduct an in-depth analysis of one or more specific examples of OS models that have been proposed or are being developed in the area of agriculture and health. Explore how economic, social, legal, regulatory and other factors in the agriculture and health sectors affect the potential applicability of OS models of innovation and discuss strategies for overcoming barriers to its introduction; and,
- Map out a strategy for raising awareness of and encouraging the piloting and institutionalization of OS models in sectors and technologies where it is likely to have the most significant impact on human development.

To accomplish these objectives, the meeting was divided into roughly three sections. During the first day of the meeting, participants focused primarily on the first two objectives described above. During the second day, participants focused their discussions on such OS initiatives as BiOS (Biological Innovation for Open Society) and ThinkCycle, as well as on the potential applicability of OS approaches to existing programs and initiatives where they may be most relevant. Day three of the meeting continued on these themes and was spent primarily in deeper

exploration of how the OS approaches could be applied to suitable non-OS initiatives.

Meeting participants had diverse backgrounds, expertise, perspectives and interests. Some were interested in agricultural issues, while others had a background primarily in health. Some had interest and expertise that bridged both health and agriculture. Participants came from both developed and developing countries and had diverse backgrounds, including, but not limited to, science, law and policy. Donors, academics, government, industry and non-governmental organizations were represented. Some participants had a primary interest in solving a particular problem (e.g., developing an AIDS vaccine), while others were primarily interested in broad restructuring of the innovation system.

Individuals participated in their personal capacity, not as formal representatives of their organizations. Participants agreed at the start of the meeting that the discussions would be "off the record" and that the meeting summary would not attribute specific comments to individuals.

NOMENCLATURE AND MODELS

The meeting began with a presentation and discussion about nomenclature and common characteristics of "open source" or "open innovation" initiatives. The presentation is available as Appendix A *(http://www.merid.org/OS/Appendix_A_Open_Innovative_Strategies.pdf)* — Open Innovation Strategies: Basic Definition and Categories. The presentation and discussion highlighted that "open source"[2] is shorthand for two concepts—"distributed innovation" and "open licensing."

Distributed innovation (or peer production) is typically characterized by:

- Participants located in diverse locations (i.e., not within a single firm or institution).
- Participants working in a coordinated and loosely cooperative fashion, but not in a centrally managed or coordinated manner.
- Modularization of work, typically in small units that can be worked on by dispersed and diversely motivated individuals.

Participants in these collaborations have diverse motivations (e.g., monetary, altruistic, peer-learning), different capabilities (e.g., time, expertise) and different interests. They also emerge from different institutional settings (e.g., private v. public sector, for-profit v. non-profit v. independent) with the corresponding incentives and constraints.

Open licensing, which often complements peer production, can provide a range of rights and responsibilities to collaborators, as outlined in the chart below. OS approaches have devised licenses that, for example:

- Provide "freedom to operate" (FTO) for an undetermined class of actors, rather than an individual

	Undermined class	FTO innovation	Enablement	FTM&D	Self-binding commons	Moral segmentation
Linux	Y	Y	Y	Y	Y	N
Apache	Y	Y	Y	Y	N	N
Wikipedia	Y	Y	Y	Y	Y	N
HapMap	Y	Y	Y	Y	Y = >N	N
PLoS	Y	Y	Y	Y	N	N
PIPRA	N?	Y	?	N	N	Y
BiOS	N (members)	Y	Y/N?	Y	Y	N
IOWH	N	N/L (licenses)	N/L (licenses)	N	N	Y
Research Reservations	Y/N (universities)	Y	N	N	N/L (but WARF)	Y
Humanitarian Licensing	N	N	N	Y/L	N	Y

licensee, for research and follow-on innovation. ("FTO Innovation" and "Undetermined Class" in chart below.)
- Enable research by requiring that materials and methods be made available to others. ("Enablement" in chart below.)
- Enable unrestricted distributed innovation by permitting participants to freely make, improve and distribute end products. ("FTM&D" in chart below.)
- Require, through "reciprocal sharing" / "commons-binding" / "copyleft" agreements, that innovations must be shared back with those people that contributed to the development of the tools/products/techniques from which the innovation was developed. ("Self-binding Commons" in chart below.)
- Permit the patenting or appropriation of innovations derived from the licensed technology for certain limited uses or markets, through "moral" or "market" segmentation (e.g., commercial / non-commercial; poor/rich; academic/for-profit). ("Moral Segmentation" in chart below.)

In the chart below, various initiatives and strategies are compared to one another using the six attributes described above.[3] The chart—which is meant to be illustrative, not comprehensive5—illustrates a diverse array of licensing strategies among initiatives that range from those that might be characterized as OS or primarily OS to those that share some OS objectives with regard to accessibility but that have few if any OS characteristics. The discussion and chart helped participants understand the complexity and diversity that underlies the broad term "open licensing."

MAKING OS WORK

Following this effort to canvas and categorize existing OS practice, meeting participants discussed the kinds of projects or challenges that are best suited to an OS approach? What are the characteristics of an ideal technology for an OS approach? What kind of people and institutions are likely to participate in OS initiatives? This led to a much deeper exploration of OS initiatives and approaches—their general characteristics; the motivations that drive participants; the constraints they face; and the legal strategies that are used to ensure innovations remain available to other people who agree to the terms of the OS initiative. The discussion about these characteristics was informed by a presentation, "'Open Source' Models of Collaborative Innovation in the Life Sciences," which can be found in Appendix B *(http://www.merid.org/OS/Appendix_B_OS_Models.pdf)*.

Characteristics

Much of the conversation throughout the meeting focused on the characteristics of successful open source initiatives. The characteristics below were distilled from both general discussions about OS approaches as well as specific exploration of existing and emerging initiatives in health and agriculture.

- *Goals and Motivations*

OS initiatives need a simple and compelling goal that is feasible and taps into multiple motivations. These motivations can include the desire to address societal challenges, to overcome systemic constraints, to unseat monopolists or simply to collectively address a common problem faced by participants. Examples mentioned included opportunities to work on "Apollo-like" projects, curiosity about potentially transformational technologies (e.g., Homologous Allelic Replacement Technologies or HARTs), and frustration with dominant, proprietary technologies or patent thickets in software or in life sciences.

- *Seeding Technologies*

OS initiatives need a sufficiently robust platform technology to attract collaborators and to stimulate action (in some cases, a well designed framework is sufficient). Often this is provided by a credible funder or a founder willing to seed the initiative with technology. Linux was launched by the availability, utility and quality of the Linux kernel. In the case of BiOS, the donation of TransBacter and GUSPlus by the initiative's founder served as a "seed." Participants discussed variations of OS business models, especially the significance of funding during the startup, seeding of a project, and reaching the tipping point (see below).

- *Granular and Modular*

OS initiatives need to be sufficiently modular and granular so that tasks can be accomplished in reasonable timeframes and/or addressed by multiple networks of people executing tasks in parallel. This granularity and modularity facilitates parallel execution of tasks and helps enable short production cycles (see below).

- *Short Production Cycles*

The granularity and modularity of the tasks enables networks of collaborators to accomplish improvements in reasonably short timeframes, thereby maintaining momentum and keeping collaborators engaged.

- *Parallel Execution*

Granularity and modularity also enable networks of collaborators to work in parallel on the same or complementary tasks. Relative to linear models of product development, parallel execution speeds the development cycle, which also helps maintain momentum and interest among collaborators.

- *Leaders as Connectors*

While OS projects enable many people with diverse interest, capacity and capabilities to participate, they benefit

from credible leaders who inspire and connect networks of collaborators, thereby leading to the emergence of clusters (for example, see slides in Appendix B illustrating clusters of Linux programmers). It was noted that these leaders are "connectors" rather than people allocating resources.

◗ *Governance*

While OS projects are not centrally managed, controlled or coordinated, successful OS projects typically have some kind of tacit or explicit governance structure that addresses such issues as decision-making, roles and responsibilities and hierarchy. This structure can be clearly articulated in legal or other documents, or can be shaped in a less formal manner by the personality of the leader or the culture of the discipline.

◗ *Tipping Point*

OS projects benefit from a strategy that includes reaching a "tipping point" at which the project has attained a critical mass and becomes self-sustaining without a continued and significant push from the individuals and institutions that started the project.

◗ *Simple, Pervasive Communications Technology*

Collaborators need simple and pervasive communication technologies to facilitate interactions (e.g., email, web, and other collaborative tools, both synchronous and asynchronous). These technologies must enable easy communication among participants associated with different organizational models (i.e., academic institutions, companies, government) and diverse individual capacity and capabilities.

◗ *Legal Strategies for a "Protected Commons"*

OS projects require legal strategies that ensure that innovations remain available to people for further innovation and, as appropriate, production of end products. Typically, this is accomplished through licensing agreements that create a "protected commons" (see "self-binding commons" above). These licensing agreements enable further innovation and help establish productive norms of behavior among collaborators. Common examples of such licenses for OS software products include the General Public Licenses like GPL and LGPL, Academic Free Licenses like BSD, MIT and Apache, as well as licenses based on the Creative Commons[5] for open content, scientific and artistic works.

Participants noted that OS projects may need to be prepared to enforce license agreements against defectors or competitors with rival technologies in order to ensure the integrity of the protected commons. Liability issues, especially for regulated products (e.g., agricultural biotechnology products, vaccines, etc.) are an important consideration when determining the optimal legal strategy for a particular project. Several participants emphasized that legal strategies and liability issues associated with the release of biological material developed through OS research and development initiatives deserve careful consideration.

A focused discussion about many of the issues described above followed a presentation that can be found in Appendix C *(http://www.merid.org/OS/Appendix_C_OS_Software.pdf)*. The presentation focused specifically on the following issues:

- Infrastructure for sharing IP, with a distinction made for various forms of IP including: patented IP; patentable IP; public domain; copyrighted work, and data/databases;
- Contribution-related and ownership-related issues associated with patented IP;
- Contribution-related and ownership-related issues associated with patentable IP;
- IP sharing, including intended use, potential unintended use, dual use, and by whom (i.e., are the users and contributors the same); and
- Legal strategies associated with enabling and application technologies and the difficulty of drawing the line between them.

In-depth information about the licensing and legal strategies used by BiOS was presented and discussed at the meeting and can be found in Appendix D *(http://www.merid.org/OS/Appendix_D_BiOs_Presentation.pdf)*. The presentation focused on frequently asked questions including the following:

- Does the license cover only plant molecular enabling technologies;
- Does the license cover only patented technologies;
- Under what circumstances can licensees patent improvements;
- To what entities is a BiOS license available;
- Is there a humanitarian use exemption; and
- Will the BiOS license encourage investment?

Incentives and Constraints

In addition to the characteristics above, participants discussed the incentives and constraints faced by OS collaborators and potential collaborators at both an individual and institutional level. It was noted that individuals often face a number of constraints, which often vary depending on their institutional affiliation. University policies that discourage making innovations freely available are a specific institutional constraint that promotes proprietary and exclusive licensing of academic research in many US universities. There was some discussion and debate among participants about the significance of organizational issues (described above in the "Characteristics" section) versus incentives and constraints. Some participants suggested that organizational issues were more significant than incentives structures and strategies for overcoming constraints; other participants disagreed.

With regard to individual incentives, one participant suggested that accreditation systems, which rank individuals within a network based on specific criteria, can be important incentives for participation and quality assurance. The participant cited, as a specific example, the Omidyar Network, which has an accreditation system that helps users in the network understand the significance of comments from specific individuals. The Omidyar accreditation system is unique in that a consequence exists for voting or expressing an opinion. This helps avoid a system in which an individual or group of individuals can bias the network by flooding it with votes. Some participants noted that many OS initiatives have successfully emerged despite any formal accreditation systems, relying instead on informal attribution of credit to worthy contributions and contributors over time.

OS Approaches Accommodate…

OS approaches are typically structured in a manner that accommodates a wide array of capabilities, capacity and interest. For example, well structured OS initiatives allow some people to contribute a lot, while others contribute only a little. Well structured initiatives would also allow someone with a specific interest to focus on that specific issue. This characteristic of OS projects, as noted below, contributes to lower transaction costs, another attribute of many OS projects.

Results

The presentations and discussions led the group to highlight some of the more significant results of well structured and functioning OS initiatives. These include, but are not limited to the following:

- Reduced transaction costs;
- High trust among collaborators;
- Shared semantics among collaborators;
- Self-organizing teams of collaborators; and
- Dense and clustered networks of collaborators who are similarly qualified and motivated and who are linked through leaders (see above).

Well developed OS initiatives (i.e., those with the characteristics described above) can result in rapid and repeated incremental improvements, leading to the achievement of the defined goal.

Sustainability

As noted above, participants discussed the significance of funding during the startup and seeding phases of a project and in the period preceding the attainment of a tipping point. Participants explored, but not in great depth, various business models that would financially support OS initiatives. Several participants suggested that philanthropic organizations and governments would be the likely supporters of OS projects that are primarily focused on knowledge and products that address challenging agricultural and health problems in developing countries. Beyond the tipping point, participants explored whether projects would be truly self-sustaining or would require on-going investments by donors to support the project's infrastructure. One participant noted that the types of OS projects under discussion at the meeting are producing public goods and that the development of public goods has historically been supported by government and philanthropic organizations. It was noted, however, that many successful OS initiatives have been supported by private sectors firms, which contribute personnel and resources to relatively mature initiatives in order to better leverage them for their own interests. As emerging OS life sciences initiatives mature, companies (e.g., agricultural and pharmaceutical) may become more engaged as they see opportunities to use the knowledge and tools generated through OS initiatives.

PERSPECTIVES — "PROBLEM-SOLVERS" AND "REFORMERS"

As the meeting progressed, it became clear that participants were coming at the issues and discussions from very different perspectives. Some participants were looking at the issues primarily from a problem-solving perspective. They were responsible for solving a specific problem, and they wanted to understand the potential applicability of an OS approach. Other participants were primarily interested in thinking about how OS approaches could reform innovation processes.

Some participants were primarily interested in improved models of production (e.g., distributed peer production) for producing tools and information that might help poor people in developing countries address challenging health and agricultural problems. Others were primarily interested in ensuring access to science, knowledge and technology that could benefit developing countries.

Some participants were focused on enabling or platform technologies, while others were focused on downstream or end products. Many participants, of course, have interests that span many or all of these perspectives. Such diverse perspectives led to a rich, robust discussion. Participants acknowledged, however, that the diverse interests required them to think strategically about how these perspectives could fit together and complement one another.

BROADENING THE ADOPTION OF OS APPROACHES

During the meeting, participants spent time learning about and discussing various initiatives, ranging from those that have been built on the principles of collaborative innovation (e.g., BiOS, ThinkCycle) to those that have a public goods orientation, but are not OS in their design (e.g., HarvestPlus, International AIDS Vaccine Initiative).

The non-OS projects, such as HarvestPlus, provided participants with an opportunity to explore how OS principles and approaches might be used to enhance existing projects and initiatives. This was particularly useful in that it allowed participants to discuss how OS approaches could be integrated into initiatives with existing normative behaviors among collaborators and legal strategies for consolidating and protecting intellectual property. Both IAVI and HarvestPlus were of interest to many participants as examples of public-private partnerships (PPPs), which are proliferating as a model for addressing humanitarian issues.

In the section below, a brief description is provided about the four initiatives discussed at the meeting–BiOS, ThinkCycle, IAVI, and HarvestPlus (these descriptions are taken from the initiative or project website). Accompanying these descriptions is a selection of issues that were discussed in the context of a specific initiative. Additional information about ThinkCycle, which was presented at the meeting, can be found in Appendix E.

BiOS – Biological Innovation for Open Society

Participants were provided with an extensive overview of all dimensions of BiOS, including the: Patent Lens, BioForge, and BiOS license.

BiOS

http://www.bios.net

Type: OS Project

The BiOS Initiative is fundamentally an effort to develop new innovation systems for market failures and for neglected priorities.

BiOS holds to a '3-D' philosophy espoused by its founding institute, CAMBIA.

Democratize, Decentralize and Diversify. These basic tenets of social, economic, and environmental responsibility can equally be applied to the harnessing of science and human creativity for improving the quality of life, and for promoting sound business and prosperous communities.

Design, Develop, Disseminate. Grand philosophical ambitions must be grounded with practical tools for achieving the goals in meaningful timeframe. The communications and information technology revolutions afford a unique ability to harvest and share information, knowledge and wisdom within and between communities that have been marginalized or inadequately served.

In so doing, we greatly multiply the potential for public good. However, to do so requires paradigmatic shifts in the culture of innovation, law, capital, intellectual property and indeed of business.

Hence BIOS and the BioForge.

The BIOS initiative will foster democratic innovation in the application of biological technologies, through the merging of:

- intellectual property informatics and analysis,
- innovation system structural reform, and
- cooperative open access technology development activities.

ThinkCycle

http://www.thinkcycle.org/

Type: OS Elements

ThinkCycle is an academic, non-profit initiative engaged in supporting distributed collaboration towards design challenges among underserved communities and the environment. ThinkCycle seeks to create a culture of open-source design innovation, with ongoing collaboration among individuals, communities and organizations around the world. How does one apply an Open Source approach to Hardware Products and Engineering Design? How can a global community of distributed domain experts and stakeholders collaborate towards evolving solutions to critical problem domains?

That is the driving motivation behind the ThinkCycle Initiative.

Approach

At the heart of the community is an evolving database of reasonably well-posed problems and ongoing design solutions contributed by universities, non-governmental organizations (NGOs), companies and the general public. The system is primarily aimed at, but in no way limited to, using the design and engineering skills of the students and researchers in universities worldwide. One scenario is for professors to assign challenges to their students, assist them in working collaboratively with communities and organizations in developing countries while encouraging peer review from domain experts of evolving design solutions archived on ThinkCycle. Motivated teams of students may also work on critical design challenges as independent study projects with their departments. The objective is to document all evolving design solutions, rationale, processes, peer reviews and contributions within a searchable and cross-referenced system. Distributed and shared intellectual property issues are approached by maintaining all contributions for individual projects on the system available publicly or for limited private access. Publicly accessible content is available under a creative commons attribution noncommercial license, while participants can choose to license privately maintained content in any manner they prefer.

- Patent Lens helps people assess the patent landscape in the life sciences.
- BioForge provides platforms for cooperative invention, improvement and delivery of biological technologies within a dynamic internet-mediated commons.
- BiOS's license stipulates that "improvements are shared, and that licensees cannot appropriate the fundamental 'kernel' of the technology and improvements exclusively for themselves. Licensees may obtain access to improvements and other information, such as regulatory and biosafety data, shared by other licensees in a 'protected commons.' To maintain legal access to the technology, licensees must agree not to prevent other licensees from using the technology in the development of different products."

The presentation and ensuing discussion provided participants with a solid understanding of a well-developed and, in comparison to other initiatives, mature OS initiative focused on the life sciences. From this basis, participants were better positioned and able to explore the appropriateness of applying OS approaches to other initiatives which are not, or only marginally, built around OS principles.

ThinkCycle – Open Collaborative Design for Sustainable Product Innovations

The presentation and discussion about ThinkCycle focused on several specific projects (there are hundreds of design projects on ThinkCycle), including a cholera treatment device (see Appendix E for more details about ThinkCycle, including the approach use for developing this specific device). The presentation and discussion also focused on a typology of intellectual property rights patterns that emerged from a small sample of ThinkCycle projects.

ThinkCycle presented a useful example of an online initiative that was heavily oriented towards distributed peer production but more open-ended in terms of the legal strategies that networks of collaborators used for the intellectual property that was developed through their collaborations. The strategies ranged from networks of

collaborators who made their innovations available without any constraints to collaborators who chose to patent their technology. In between these extremes, many teams used various strategies, many of which had the characteristics of open licensing strategies described above.

IAVI – International AIDS Vaccine Initiative

The presentation and discussion about IAVI provided meeting participants with an opportunity to think strategically about if and how OS approaches could be integrated into an existing non-OS initiative. Discussion focused on how both the distributed peer production and open licensing dimensions of open source might enhance this existing initiative. In particular, discussion focused on how distributed peer production approaches might facilitate the upstream research being conducted by IAVI partners (IAVI is working along the full continuum from upstream research to product development and distribution). Participants also explored whether open source licensing approaches could be used successfully by initiatives that will likely require substantial private sector involvement during the product development stage (which is anticipated by IAVI). Participants had divergent views about this particular issue. Examining IAVI was also useful because it is similar to many public-private partnerships (PPPs) that have emerged to address humanitarian challenges in developing countries. Thus, insights about how OS might or might not work within the IAVI context may be useful in thinking about applying OS approaches to other similarly structured PPPs.

The discussions about IAVI highlighted several issues. Participants noted that there is a common misperception that PPPs are OS initiatives. In fact, very few PPPs are OS by design. Participants realized, through an exploration of IAVI, the difficulty, but by no means impossibility, of introducing OS approaches into a well established project that has pre-existing governance structures, legal agreements, normative behaviors and standard work practices. Introducing OS into these environments needs to be done strategically, at the most receptive and promising points in

IAVI

http://www.iavi.org/
Type: Non-OS

IAVI is a global not-for-profit organization working to speed the search for a vaccine to prevent HIV infection and AIDS. Founded in 1996 and operational in 23 countries, IAVI and its network of partners research and develop vaccine candidates. IAVI also advocates for a vaccine to be a global priority and works to assure that a future vaccine will be accessible to all who need it.

Research and development

IAVI's scientific program researches and develops vaccine candidates by directing and financing partnerships with more than 30 private companies and academic and government agencies worldwide. IAVI manages a portfolio of R&D projects, prioritizing vaccine concepts and candidates given the latest science. In financial terms, IAVI operates the second largest AIDS vaccine research and development program. To date, IAVI has invested more than US$100 million in vaccine R&D.

Partnering with developing countries

IAVI works with scientists in Africa and Asia to study how a vaccine can be effective in populations where most new HIV infections are occurring, and where different subtypes of the virus are circulating. IAVI is also studying how a vaccine can be designed so that it is inexpensive to manufacture and easy to administer.

Advocacy and education

IAVI's advocacy program promotes awareness among political and scientific leaders, community groups and others worldwide about the urgent need for a vaccine. In partnership with other organizations, IAVI advocates for public policies to help accelerate vaccine research and development, as well as to speed the approval, manufacture and use of a future vaccine.

the innovation chain. In the case of IAVI, OS approaches might, for example, be best introduced into some of the consortiums working on basic research or enabling technologies.

HarvestPlus Challenge Program

The HarvestPlus Challenge Program is a large scale, multi-year, well-funded, public goods project that spans both agriculture and health. The project, which is focused on developing staple food crops that are rich in micronutrients through a process known as biofortification, is expected to generate significant intellectual property throughout the project lifecycle. Participants discussed both the potential applicability of OS open licensing approaches and the use of distributed peer production of goods to the HarvestPlus Challenge Program.

Discussions among participants about HarvestPlus focused first on understanding the Program, its current status, future direction, key players and major milestones. Then, discussion focused extensively on the strategies that could be used to introduce an OS approach into the Program, which includes generating the interest and buy-in of key players in the Program, including the donors, staff, collaborators and constituents. The discussion about Harvest Plus, a public sector initiative, also showed that IP issues are both a for-profit and non-profit / public sector issue. Public sector initiatives are increasingly being faced with challenging strategic choices about managing their IP, given their public goods focus. Participants suggested that the OS approach be introduced more broadly to HarvestPlus partners and that more careful consideration be given to if and how OS approaches could be used to enhance this already well established program.

HarvestPlust Challenge Program

http://www.harvestplus.org
Type: Non-OS

Harvest Plus seeks to reduce the effects of micronutrient malnutrition by harnessing the power of plant breeding to develop staple food crops that are rich in micronutrients, a process called Biofortification. This will be accomplished by a global alliance of research institutions and implementing agencies in developed and developing countries, coordinated by the International Center for Tropical Agriculture (CIAT) and the International Food Policy Research Institute (IFPRI).

HarvestPlus was implemented on a full-time basis in January 2004. HarvestPlus is one of the CGIAR's Global Challenge Programs. Initially, six crops and three nutrients are targeted.

HarvestPlus' mission is to reduce the effects of micronutrient malnutrition on poor populations in developing countries, and improve food security, production and quality of life by providing biofortified staple crops as a low cost, sustainable option. This strategy seeks to take advantage of the consistent daily consumption of large amounts of staple food crops by families in poor countries. To achieve this mission, initial research objectives for this project include:

- Selecting and breeding nutritionally improved varieties of six major staple food crops with superior agronomic properties that will make them attractive to farmers to grow;
- Demonstrating the nutritional effects of biofortification;
- Developing efficient, accelerated mechanisms for testing materials on farms, including areas that are among the most nutritionally disadvantaged, to identify varieties with superior agronomic, socioeconomic, and farmer-acceptable traits;
- Promoting the adoption and dissemination of these varieties in selected countries in Africa, Asia, and Latin America; and,
- Measuring the impacts of these nutritionally improved varieties in community-based studies where these varieties have been adopted.

NEXT STEPS

Many of the participants left the meeting inspired by the concept of OS, either as a general tool for IP management, or by its specific application through the models presented at the meeting, such as BiOS. An initial mapping of the kind of incentives that might draw collaborators to participate in OS initiatives began to take shape. Some examples of the incentives are:

- Public/public interest funders: investors in public goods, such as foundations and governments, interested in ensuring the wide accessibility of the platform technologies generated by their investments;
- Publicly funded research institutes: generators of key platform technologies, including international agricultural research centers, public universities and product development PPPs, interested in creating common platforms for public-private research collaborations with low transaction costs;
- New entrant competitors: companies and developing countries that might otherwise be excluded by patent thickets;
- Individual collaborators: publicly interested researchers across sectors in search of Freedom to Operate and personally or professionally interested in collaborative research; and
- Visionaries: those that recognize the inequity and dysfunctional nature of many aspects of prevailing systems of IP management who are seeking new business models that promote transformational change.

Participants also recognized that OS may require a reimagining of prevailing cultural norms and business models and requires careful thought. Potential collaborators may need to consider specific issues in this regard, including:

- A reassessment of existing in-licensing and out-licensing strategies, including the potential need for investment in new modalities for collaboration, such as web platforms;
- The need to nest OS within a larger IP Management strategy, including humanitarian/equitable access strategies, that ensure affordable access to the end products of collaboration; and,
- The challenge of reeducating policy makers among key public and private sector skeptics and competitors that may have vested interests in maintaining existing business models.

ENDNOTES

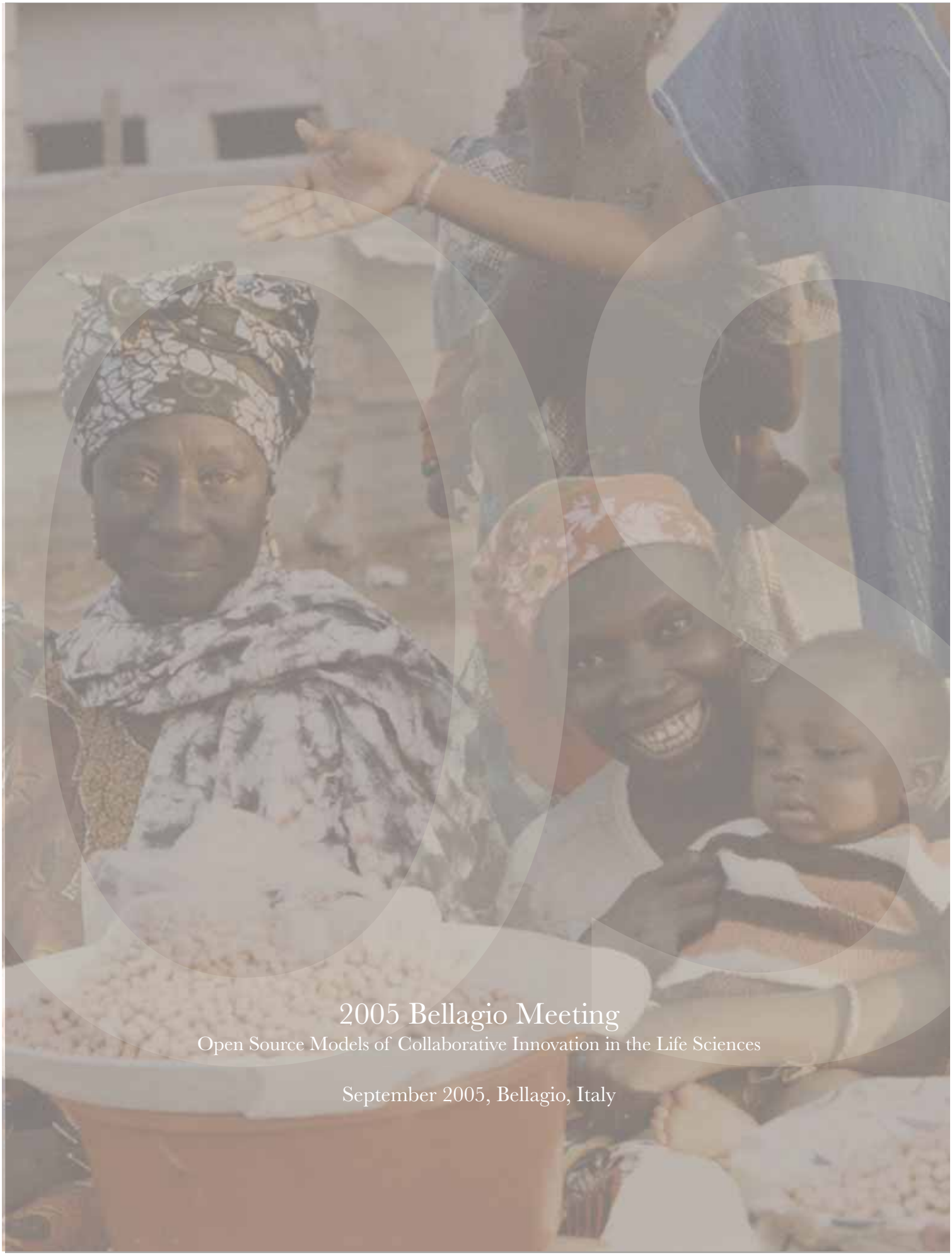
1 The phrase "OS approaches" is used in this document as shorthand to describe models of innovation that are characterized by distributed peer production and license conditions / legal strategies that are designed to ensure that a platform or enabling technology, and any improvements made to that technology, remain freely available for other people to use, disseminate and improve.

2 A participant noted that the term "open source" is potentially problematic for commercial interests that have built their business models around proprietary tools and techniques. The participant suggested that the terms "open innovation", "distributed innovation" or "peer production" may be less problematic.

3 HapMap is an international collaborative process is to develop a haplotype map of the human genome *(http:/www.hapmap.org/index.html)*; PLos is the Public Library of Science *(http://www.plos.org)*; PIPRA is the Public Intellectual Property Resource for Agriculture *(http://www.pipra.org)*; BiOS is Biological Innovation for Open Society *(http://www.bios.net)*; IOWH is the Institute for One World Health *(http:/www.oneworldhealth.org)*.

4 The chart includes a subset of the initiatives discussed during the meeting. It also includes some initiatives, such as IOWH, that were not discussed during the meeting (or discussed only minimally).

5 *http://www.creativecommons.org*



2005 Bellagio Meeting

Open Source Models of Collaborative Innovation in the Life Sciences

September 2005, Bellagio, Italy