Report on London Workshop
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1. Background:

Against a background of growing advocacy and funder support for open approaches to the conduct and dissemination of scientific research, this project aims to contribute to a greater understanding of how openness could impact research and researchers in developing countries, particularly in science for development. Open approaches can include increased sharing of research data, participatory citizen-crafted science and innovative models for global scientific collaborations, enabled by digital technologies such as the web.

Open science has the potential to increase research efficiency, maximise the visibility and impacts of all forms of research outputs and enable greater engagement with the public, all of which are valuable in the context of scientific research to meet both local and international development goals. By bringing together a diverse group of stakeholders, we will explore how open science norms and practices might be further established in developing countries via a community-driven approach and begin to build a research community around these themes.

We convened a group of researchers in London to contribute to a conceptual framework for open science for development. This work was designed to lay the foundations for and inform a larger workshop in Cape Town convened with the OpenUCT initiative during which research agenda setting discussions will take place and a new network for open science for development will begin to take shape.

2. Organisational considerations:

The attendee list and workshop agenda was curated to maximise representation from fields that were identified as crucial to the open science for development discourse, while recognising both that we have not yet established the scope of the field and that the open science community in the global south is nascent. The latter statement is especially true as we suspect that many people are using open approaches in their work but would not self-identify as having being an “open scientist” or aligned with the open science movement.

The attendees (see Appendix 1) represented the following areas:

- Citizen Science
- Hacking and making community
- Development Studies
- Open Access Publishing
- Open data
• Scientific research
• Methodological design

In terms of research approaches, representation from anthropology, development studies, life and physical sciences, management studies, sociology, experimental and theoretical sciences and policy backgrounds led to a wide range of views and fruitful input of expertise.

To guide this selected cohort in thinking through the high level questions we wish this project to address, a collaborative approach was taken to agenda design, making use of previous experience within the group in running workshops with related aims, albeit in different communities.

3. Flow of Workshop:

The first day of activity was built around defining the scope of open science for development and articulating the aspirations we have for open science — what do we expect open science approaches to deliver in terms of development impact? What challenges are there to achieving these aspirations? The second day led on to a discussion of knowledge gaps — what do we need to know about these challenges and opportunities to respectively overcome and facilitate them? This allowed us to formulate a problem statement and begin to identify more specific projects and key players.

This process can be broadly summarised as the following steps:

i. Articulate aspiration and possibilities;
ii. Establish where we want to be in terms of open science approaches being used in science for development;
iii. Use this vision to identify barriers to its realisation;
iv. Consider regional differences requiring understanding e.g cultures of cooperation, funding and reward mechanisms, intellectual property landscape;
v. Prioritise knowledge gaps to address;
vi. Consider all of the factors above, becoming more specific in a series of steps;
vii. Articulate what solutions to these problems and questions might look like.

The narrative arc was designed to initially enable unconstrained consideration of the concepts which are key to the project but then allow a narrowing of the parameters for consideration, which was the key objective of holding a smaller workshop in advance of the main agenda setting workshop. This approach enabled us to identify challenges and points of contention as well as a clearer focus for future discussions.
4. Definitions and Concepts:

One of the most challenging aspects of the workshop was addressing and forming a consensus on definitions of “open”, “science” and “development”, which are evidently central to building a conceptual framework of open science for development.

“Open”

Discussion focused around attributes of open science, the most common concept applied was reusability, although inclusion and openness to participation also featured heavily in discussions of citizen science in particular. The question of what makes open 'open' was not resolved and there was no wish to limit the aspects of open approaches which would be classed as valid subjects of study. Indeed, as a completely open approach to all aspects of research is rare if not impossible to achieve, the majority of research questions are expected to examine only elements of open practise.

Michael Nielsen's informal definition,
included in the original project proposal, still offers a useful and succinct summary: 
"Open science is the idea that scientific knowledge of all kinds should be openly shared as early as is practical in the discovery process."

However, this does not encompass some of the aspects of inclusivity, co-creation and wider collaboration which came out in our exploration of attributes of open science and opportunities for its impact on development. It may be necessary to formulate a necessarily non-comprehensive list of these attributes during the formulation of our conceptual framework and work will continue at the next workshop.

“Science”

Discussion focused around the parameters of what we consider science to be in the context of this project — what type of research is included and excluded?

There was general consensus that the term should be applied in the sense of the German Wissenschaft and encompass the social sciences as well as the physical, life and medical sciences. The use of “open research” as a better term was discussed as was the differentiation between research and scholarship, it was decided that the latter term had connotations of education which other networks are addressing.

Broadening science to research would also include the humanities. This was considered and initially rejected as being too wide a categorisation, there was a general feeling that some constraint was needed to ensure that resulting projects were thematic. It was pointed out that the digital humanities and e-research more widely can have significant utility in enabling open science, even if we exclude them as “open science”. Therefore, the decision was taken to retain the terminology of “science” to mean the natural and social sciences as listed above, but allow projects beyond this scope to be valid for consideration on their own merits if it was felt they addressed an interesting question and demonstrated a clear link to development impacts.

Having identified the difficulties of clearly delineating what research activity counts as science, we will explicitly articulate that challenge in the main workshop in Cape Town and leave the concept open to discussion and interpretation. It is recognised, however, that for the purposes of grant applications and eligibility in the final research network, a more explicit definition may be required.
“Development”

The definition of development is a problem which several disciplines have grappled with and not one which we could solve, but it was useful to explore what we might describe as impacting development and development goals. Discussion of the various models of development led to the conclusion that a focus on economic models was insufficient and given the importance of transparency, citizen involvement and co-creation in some aspects of open science, a definition that arose from a small group presentation on research problems was the idea that development can be described as “the process of creating agency and opportunity”.

In addition, it was felt that development goals as defined by the Millennium Development Goals could offer useful guidance on the areas of research that could be described as impacting development. This would not be exhaustive but serve as a framework for ensuring the development driven aspect of the research agenda and also build on the previous work of those who came to a consensus on these goals, thus avoiding inefficient use of time making decisions on concepts which have already been brought to some form of consensus.

While our definitions remained broad, the above discussions were useful to ensure everyone engaged with the three potentially loaded concepts and as previously mentioned, enabled us to better articulate the challenges of trying to define them.

5. Outcomes of information gathering exercise:
Our first challenge was to share information and thoughts on the challenges and opportunities for open science as well as related work, activities and resources. Participants were invited to record ideas on post it notes which we were free to arrange within patterns and themes (see Appendix 2 for raw output). These individually and collaboratively crafted manifestations eventually emerged as a matrix of categories into which challenges, opportunities and resources (including existing projects and relevant organisations) could be allocated.

An additional dimension was added to draw out regional differences and commonalities between and among Asia, Africa and Latin America/Caribbean countries, a component which will be examined in far greater detail at the main workshop with further regional representatives.

**Opportunities**

The opportunities identified in applying open science approaches (full list in Appendix 2) fell broadly into the following categories:

- Innovation, entrepreneurship and SMEs e.g. biotech innovation, greater access to research data.
- Involvement of citizens in the design and implementation of research, particularly where that relates to aspects of their environment, health and livelihoods.
- Increasing connectivity and e-science infrastructure.
- Building communities and increasing collaboration on different scales.
- Increased inclusivity of involvement research activities and access to outputs.
- Lower cost solutions to research infrastructure and protocols through shared solutions and open licensing.

While mindful of the fact that our list would be biased by virtue of the participants, this reflects the type of opportunities identified in previous work around open approaches to science (as described in the project proposal document). There is currently little evidence that open science will lead to these outcomes, which is something the research agenda we construct should attempt to address.
Challenges

The challenges which emerged from the workshop (full list in Appendix 2) were a combination of technical, social, political and economic barriers to open science achieving the perceived potential and opportunities identified above. Of note were:

- Connectivity issues as open research often relies heavily on online work and collaboration.
- Lack of funding and researcher time, either generally or due to the particular requirements and demands of open science projects.
- Tension in IP regimes and innovation, the conflict of “open” and the desire to commercialise and patent research.
- Need to engage and get buy-in from wide range of stakeholders and funders including institutions and governments.
- Lack of role models and existing communities of practise.
- Lack of incentives to undertake open research.

While some work went into identifying region specific challenges and commonalities, we did not explore this area in great depth and expect to spend more time in the main workshop digging down into whether these challenges are global or exacerbated by particular regional situations.

Synthesis

In dividing the challenges and opportunities Cameron constructed the following framework:

<table>
<thead>
<tr>
<th>Regions</th>
<th>Projects</th>
<th>Evidence</th>
<th>Products</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>Crowd-driven</td>
<td>Capture</td>
<td>Data</td>
<td>Institutions</td>
</tr>
<tr>
<td>Asia</td>
<td>Data-driven</td>
<td>Synthesis</td>
<td>Educational Resources</td>
<td>Community</td>
</tr>
<tr>
<td>South America</td>
<td>Professional</td>
<td>Advocacy</td>
<td>Technology</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>Europe/North America</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This provides us with a backbone on which to collect further information allowing the mapping of the open science for development space and will be used to inform the questions we ask participants in the main workshop as well as being a foundation for a more formalised conceptual framework and situational analysis.
One area that came out strongly was the role of different actors in enabling research but also in translating that research to policy making, which was seen as vital for impacting development. Hence the need for advocacy as a thus far unconsidered component of the bridge between research and policy was raised.
5. Workshop Outcome — Problem statement:

The construction of the broad problem which we felt a research agenda could address involved a construction of research problems by three separate groups which were then synthesised to generate the question:

**Under what conditions can open science contribute to development goals?**

It was decided that implementation of research into this problem could be best undertaken by gathering existing evidence and data from projects already underway and also undertaking new action research, which led to deeper discussion of methodological approaches.

In order to explore this problem in greater detail we experimented with reformulating the question and assumptions, asking are current approaches to development are limited by their closed nature?

The result of this section of discussion with input from previous sessions was the formulation of the following problem statement:

*Development can be described as the process of creating agency and opportunity. We believe that development can be supported by research, specifically research in the physical, natural, medical, and human sciences. We believe that the effective application of scientific research to development has been limited by a lack of access to the outputs, infrastructures and tools of research, and a lack of opportunity for participation and engagement with the conduct of research. Specific geographies, environments, cultures, and contexts offer greater opportunities for enhancing the application of research to development.*

To address this we ask:

*Under what conditions can more open approaches, including access to outputs, wider participation in framing research questions, sharing of technologies and processes, and more collaborative and inclusive approaches to the conduct of research, contribute to the effective application of research to achieving the development goals of individuals, institutions, nations, regions, and the global community.*

To answer this question, we propose to:

*Seek and gather evidence on where such open approaches to research have contributed to the success of development goals and to stimulate new projects and activities that apply*
open approaches with the specific aim of investigating where and how these approaches enable the research to contribute more effectively to the realization of development goals.

6. Conclusions:

Community

A key aim of the workshop was to begin to form a community for open science for development and this was reflected in the connections that were forged between participants and the suggestions for further contacts from their networks.

We established a discussion group online and will be using this to continue conversations between now and the main workshop and more so following that event to enable both participants and the wider network that we identify to keep in contact.

Moving Forward

All of the activity over the workshop informed the planning of the next stage of the project, a larger workshop in Cape Town to open up the conversation and articulate a research agenda to inform the network which IDRC will launch in this space.

The main points to take forward to the main workshop are:

- We can build on the problem statement we have formulated without needing to begin the conversation again, although we should be open to changes.
- Definitional concepts are challenging and this should be explicitly articulated to avoid circular conversations and enable us to move on to more productive discussions.
- There is scope for further analysis of how the challenges and opportunities identified are relevant to particular regions.
- Methodologies for implementation of research in this area may later provide a sticking point, particularly for meta-level analysis, therefore we should engage methodological expertise to assist in guiding discussions.
- There are still tensions relating to the design of the research network and how it will be organised, as well as the granting mechanism and type of projects which will be funded e.g. observation of open science or practise of open science. This is parallel to the scoping project but we should maintain a clear dialogue with IDRC as
progress is made to ensure that we are best able to inform the relevant aspects of planning with which this project is concerned.
Appendix 1:

List of Attendees

Leslie Chan, University of Toronto
Ross Mounce, Open Knowledge Foundation
Jenny Molloy, Open Knowledge Foundation
Cameron Neylon, PLOS
Michelle Willmers, Open UCT
Lila Rao-Graham, University of the West Indies
Sten Ludvigsen, University of Oslo
Alexandre Hannud Abdo, University of Sao Paolo
Ellie Osir, IDRC
Laurent Elder, IDRC
Appendix 2

Opportunities

- Reproducible protocols
- Local OER as a by-product of research
- Local design guides for open research projects
- Creating new ‘metrics’ for understanding influence and impact
- New communities of practise
- Local open science communities and groups
- Strong imperative in African institutions for international collaboration
- Connecting open research with the cognitive justice movement
- Sharing experiences with funding for open projects
- Funding for lay staff
- Improved internet accessibility to all
- Protocols that balance participation and quality
- Equipment and tools
- Pooling expertise to attract funding i.e. some funding agencies specifically want collaborative groups
- Berlin Declaration signatory momentum
- Support publishing of data
- Clouds for citizen science projects
- Creating an inclusive network of researchers
- Support open hardware/ DIY lab infrastructure
- Low cost customisable lab equipment (and decentralised distribution)
- Open Access funder mandates
- Open innovation and pre-competitive industry funding e.g. open source drug discovery
- Harnessing collective intelligence to solve traditional problems
- OECD 2004 Agreement on Open Access and social benefit from investment in research
- Generating appropriate evidence to support policy development
- Foster collaboration
- Promote inclusion
- Solutions to development challenges
- Rise of Africa-wide computation and e-infrastructure networks
- Open licensing of biotechnology e.g. GM Crops, Biobricks, synthetic biology
- Innovative use of knowledge by SMEs e.g. organic agricultural products, indigenous crops
- Inclusiveness
- All together now! Reinforcement through coherence, shared worldviews and ethos among diverse trends and practices

**Challenges**

- Traditional norms/sclerotic institutions
- Regulations and privacy
- Time - open research could take more time e.g. curating datasets, online communication
• First movers/proof of concept that open science can be better science lacking in some areas
• Lack of role models/champions
• "Professional" science
• Prestige (local and global)
• Providing the right incentives for (potential) participants
• Nature of research outputs
• Incentives and rewards
• Capacity
• Building pool of developer expertise
• Getting buy-in from decision makers
• Tension in IP and innovation regimes
• Lack of awareness and misconceptions
• How to get government agencies to understand data sharing
• Sharing versus privacy
• Tech transfer offices and right to commercialise research conflicting with 'open'
• Getting beyond 'potential'
• Training
• Capacity building and funding
• Language (English)
• Identifying the knowledge domain to support
• Access/connectivity divide
• e-readiness of institutions and organisations
• Research community divisions
• Cross-cultural participation
• Internet access
• Stakeholder support
• Time for scientific peer reviewed papers
• Protocols - level of detail
Resources/Tools/Organisations

- Facebook
- Brazilian Open Science Group (cienciaaberta.net)
- Scholarly Communication in Africa Programme
- Ongoing mapping of Brazilian Open Science
- openscidev.org
- Wikimedia
- Academia.edu
- Github
- Bioline International - OA for developing countries
- Publishers
- African Copyright and Access to Knowledge Project
- Collaboration for Research and Development (cordnetwork.org)
- 2012 Caribbean Open Data Conference
- Caribbean Open Institute Research Project (IDRC)
• Hackerspaces/DIY Bio Labs
• Centro de Referencia am Informacao Ambiental (CRIA) www.cria.org.br
• Open Hardware Accelerants and Start Up Infrastructure
• Faculty of Medicine, University of Oslo
• Open Data in Developing Countries Project (ODDC - IDRC)
• Hackteria.org and open biology network
• Open Access in Latin America (founded by SPARC)
• “Open Science for Development” Mendeley group