FINAL TECHNICAL REPORT / RAPPORT TECHNIQUE FINAL

OPEN AND COLLABORATIVE SCIENCE IN DEVELOPMENT NETWORK - FINAL REPORT

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Catalyzing Open and Collaborative Science to Address Development Challenges

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i) Basic Project Information

The Open and Collaborative Science in Development Network (OCSDNet) is an international research network, launched in 2014, to address the fundamental question of whether and how open science has the potential to contribute to the achievement of development goals and opportunities. Facilitated by a coordination team from the University of Toronto and iHub Kenya, the network has been composed of twelve international research teams located throughout Latin America, Africa, the Middle East and Asia from highly diverse disciplinary backgrounds. Over the course of two years, each team explored the challenges and opportunities for an open and collaborative science, and the potential of open science to facilitate fair and sustainable development.

In this final progress report, the coordination team synthesizes insights and lessons learned following an analysis of the 12 sub-projects. Over the course of two years, network members have recognised that an inclusive open science involves a highly dynamic process of negotiating and challenging power relations within highly situated social contexts, and amongst actors and institutions with varying claims for knowledge legitimacy. This questioning of power within OCSDNet's practice and conceptualization of open science has been in contrast to more mainstream discourses, which tend to present Open Science as a neutral set of standards, tools, and workflows to be followed, often with the objective of pursuing utilitarian or market-driven outcomes. In this report, we reflect briefly on some of these insights and shifting discourses and practices of Open Science. The report also includes the more tangible outcomes and outputs of the network. We conclude with key recommendations for those who are interested in working on topics related to Open Science and development as well as suggestions for those facilitating global, heterogenous research groups in a network structure similar to that employed by OCSDNet.

Keywords: Open Science, development, inclusive approaches to knowledge production, inclusive infrastructures, collaboration, co-production, research tools, citizen science

Global Distribution of OCSDNet Projects and Coordination Hubs

Table 1: OCSDNet Project Names & Keywords

The twelve projects to participate in the network are outlined in the table below:[1]

OCSDNet Project Title	Key Words
Practicing Open Science at the 'Grassroots'	
Water Quality and Social Transformation in rural Kyrgyzstan	Kyrgyzstan, rural communities, citizen science, environmental conservation, water quality, participatory action research, open science motivation, teachers and students
Water quality and community development in Lebanon	Citizen science, participatory research, community-based environmental management, water quality, empowering conservation, bottom-up policy making
Community-driven environmental conservation in Costa Rica and Colombia	participatory action research, citizen science, Model Forests, Costa Rica, Colombia, human capabilities, adaptive capacity, sustainable development, biodiversity
Open Science Hardware for Development in Southeast Asia	open science hardware (OSH), transnational networks, little science, citizen science, do it yourself (DIY), Indonesia, Thailand, Nepal, tools, participation, tinkering, Right to Science
Analysing Existing Open Science Projects	
Evaluating Open science e-infrastructure in Brazil	Brazil, virtual herbarium, botany, interdisciplinary collaboration, e-database, open science infrastructure
Negotiating Open Science in Argentina	open science, Argentina, negotiating openness, opening process, boundary objects
Exploring the potential of Open and Collaborative Science through new Tools and Frameworks	
Researcher contracts for Indigenous knowledge in South Africa	South Africa, indigenous knowledge, climate change, intellectual property rights, research contract, decolonising research methodologies, terra nullius
Commercialisation & Open Science in Kenya	Kenya, IP laws, open science, universities, private sector, collaboration, research partnerships, commercialisation
Disaster Management Tools for Small Island States	Disaster recovery plans, Small Island Developing States, Design Science, regional collaboration, knowledge broker artifact
Sustainable development and the potential for OCS in Brazil	Ubatuba, social change, sustainable development, potential of open science, participatory action research, diverse actors
Social problems and the potential of OS in Latin America	Latin America, openness, non-hegemonic countries, social problems, collaborative science, cognitive exploitation
Building Open Science Social Networks in West Africa & Haiti	West Africa, Haiti, open science networks, science shops, open repository, open research, participatory research, cognitive justice

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[1] See individual project pages at www.ocsdnet.org for more information, including specific project outputs.

ii) The Research Problem

Open Science (OS) is an umbrella term that implies a more accessible and transparent approach to knowledge creation, whereby the inputs and outputs of the entire research cycle are shared openly and immediately, not only with the academic community, but with the public and business sectors. This implies that research protocols, emerging findings, data, tools, materials and publications are made openly accessible on the Internet (and/or other platforms) via a diversity of tools and applications (Bartling and Friesike 2014; Friesike et. al. 2015). It is often assumed that OS, if widely adopted, could lead to greater efficiency in research, accelerate discovery and innovation, increase research uptake, and improve accountability to the scientific community as well as to the public (Nosek et al. 2015; Grigorov et al. 2015; Leonelli et al. 2015; McKiernan et al. 2016). The latter is seen as increasingly important given that academic research is often funded by taxpayers and hence the public should have access to knowledge produced by public funding (Larson and Chon 2016).

Across the industrialized world, science ministries are adopting, discussing or refining policy on OS, despite limited empirical evidence of its purported benefits (Whyte & Pryor, 2011; Davies et. al. 2013; Leonelli et. al. 2015; Levin & Leonelli, 2017). For example, the European Commission (EC) has made Open Science one of its top policy priorities, launching initiatives such as the development of a European Open Science Cloud, the creation of the Open Science Policy Platform, the assembly of an expert group in 2016 to inform the implementation of open science policies, as well as the launch of various funding programs by the EC Horizon 2020 program in support of Open Access and Open Science infrastructure development and research.

While OS is thought to lead to social benefits, the eagerness of policy makers to engage with and adopt OS discourse appears to be often driven by a neoliberal economic approach. This discourse contributes to what Slaughter and Rhoades have dubbed "academic capitalism" (2009) - a consumption regime in which knowledge is commodified into products and services with the intention of generating revenue for higher education institutions, private companies and the state. In doing so, knowledge producers tend to lose sight of other equally important functions served by knowledge - such as attending to social challenges or equipping citizens to access fundamental rights.

In the past two decades advocates of 'openness' have opposed the extractive and restrictive positioning of knowledge as a private good (Boyle, 2003; Chan & Costa, 2005; Berg, 2012). Proponents of open access, open educational resources, open data, open government, open source, open hardware and recently open science have emerged in opposition to the enclosure of information, data, publications, software and processes, and advocated instead for their reuse, remix, and redistribution without cost or permission barriers (Evans, 2005). However, more recently, multinational publishers have begun to align themselves with 'open' discourses, by providing fee-based open access publishing services and promising increased author citation and institutional prestige in return (Lawson et. al. 2015, 2016). As a result, a small handful of

multinational publishers continue to dominate the global scholarly publishing market, while increasing barriers for under-resourced Southern research institutions and scholars to make their research 'open.' (Larivière et. al. 2015; Björk 2016, 2017b).

This is a clear reminder that openness is not without risk. Indeed, it is the critical foregrounding of power, inclusivity and collaboration within discussions of knowledge creation and dissemination that have inspired the creation of the Open and Collaborative Science in Development Network (OCSDNet). In the following sections, we discuss how the network, composed of twelve research projects throughout Asia, Latin America, the Caribbean, Africa and MENA regions, has collected empirical evidence around how and whether an open and collaborative approach to creating scientific knowledge could have opportunities for positive development outcomes within a variety of contexts. After two years of research within diverse fields (including botany, climate change, education, law, intellectual property, the maker movement, etc.), research teams have developed clear evidence to demonstrate the importance of engaging critically with the notion of 'knowledge production,' by employing practices of collaboration that are both situated to their respective context and inclusive of a diverse array of actors and epistemologies. As this vision of knowledge creation is quite distinct from more mainstream discourses of open science, we distinguish the work of the network using the term "open and collaborative science" or OCS throughout this report.

iii) Objectives

The overarching goal of OCSDNet was to enable a greater understanding of the impacts of open and collaborative approaches on research and researchers, particularly in science for development in the global South. The network aimed to achieve four specific goals as follows:

Goal 1: Supporting new projects and activities so as to generate evidence on whether, and if so, under what conditions open approaches to science can enable research that contributes to development goals in the global South.

This goal was achieved through network support of 12 sub-projects. Overall, across the network, we witnessed the initiation, implementation, analysis and reflection of 12 highly unique research projects and activities examining different aspects of open science in development. Our in-person workshops (Nairobi 2014, Singapore 2015, Bangkok 2016, Cyprus 2017) were important to enable network teams to come together and examine shared findings iteratively, despite vastly different contextual circumstances. It also offered the opportunity to think sustainably and strategically about what future iterations of collaboration might look like. While some projects experienced significant difficulties with team and/or institutional dynamics throughout the project lifecycle, these challenges allowed us to reflect on some of the real-world challenges and associated power dynamics of practicing open science in the context of development.
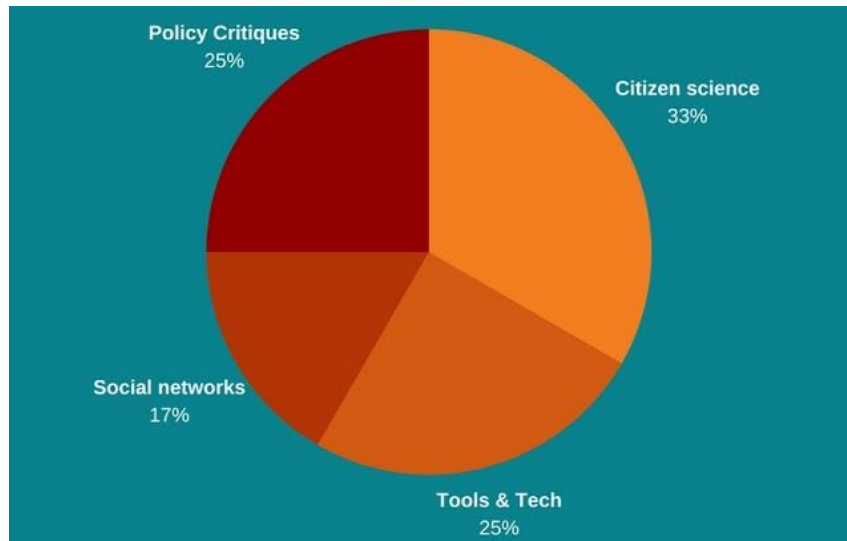
Caption: Broadly defined, OCSDNet projects undertook research to understand Open Science related to issues of policy critiques, citizen science, social networks, and tools and technology.

Goal 2: Build a community of Open Science practitioners and leaders in different contexts, by nurturing an interactive research network.

Many OCSDNet members had never been involved in open science prior to the network's inception. After more than two years of intensive collaboration, an important outcome was the recognition that the 12 network projects, spread across 22 countries, had developed unique ways of collaborating, sharing knowledge, and critically assessing knowledge-creation processes within their own contexts. In particular, network teams largely developed a shared vocabulary for discussing open science and its implications. This can likely be attributed not only to the interactive and collaborative nature of the network over the past two years, but also the explicit <u>one-year process of developing a manifesto</u> together.
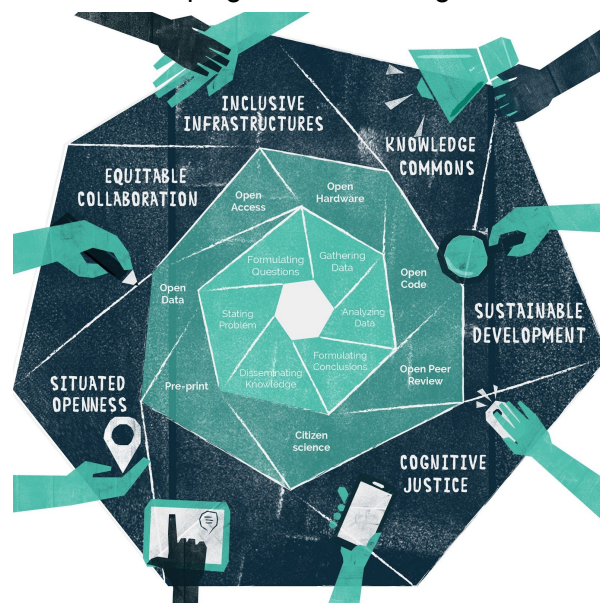
Goal 3: Identify the structural, technical, policy and cultural barriers for individuals and organizations to participate in OCS and determine how these barriers could be addressed.

This goal was achieved through the coordination team's research meta-analysis (see methodology below). Despite the diversity of projects, disciplinary backgrounds and geographic contexts, we found that several shared challenges emerged across projects that demonstrate the barriers for participation in OCS activities. In brief, some of these core challenges included the following:

Strategic use of Science
Our discussion around general observations identified that every project in the network made strategic use of the diverse understandings and modalities of practicing Open Science to meet a series of social, political and economic objectives within their contexts. As an example, we found that several teams leveraged the authority and legitimacy that "science" evokes, in order to get buy-in from stakeholders that otherwise would not engage with civil society groups, such as the team in Kyrgyzstan which received international attention for their inclusive, participatory and critical thinking citizen science curriculum, as well as the team in Costa Rica and Colombia through which local citizens were offered a new, "scientific" vocabulary to describe their livelihood activities, which could attract more attention and legitimacy from government officials and the private sector.

Historical power structures and colonial legacy
Several subprojects found that existing policies and publishing infrastructures, largely put in place during the colonial period, favored closed and hierarchical processes of knowledge production. This made it difficult to practice science in a more open and collaborative manner. For example, one project working in francophone Africa identified that colonial scientific institutions continue to delegitimize local knowledges. Other projects in Kyrgyzstan and the Caribbean found that political leadership and certain political climates of postcolonial institutions were not amenable to more "democratic processes" like OCS.

Need for knowledge translation and mediators
The challenge of translation included both literal translation of complex open science concepts into local languages (e.g. *ciencia abierta* did not adequately convey embedded aspects of the term "Open Science") as well as more broader translations of contexts, types of data formats, and multiplicity of users. In this regard, the importance of working with intermediaries and knowledge brokers through such translation processes was noted.

Difficulties in achieving diverse stakeholder buy-in
Several projects found that there was a lack of legitimacy to the "alternative science" when it was conducted by grassroots groups and that it was difficult for grassroots groups to engage with more established traditional scientific institutions who did not share similar values and

processes. Similarly several teams found it was equally challenging to obtain buy-in and trust from citizen scientists since the science project was not the top priority for citizen volunteers. The subprojects who worked with citizen volunteers found it challenging to keep their participants motivated and involved, although one project saw that as a positive since the voluntary nature ensured that only those who were most motivated continued to participate (and those who were not serious dropped out). One project noted that the output oriented view of Open Science from grassroots groups who wanted results quickly also led to disappointed participants who didn't feel they were getting the outputs from the project back quickly enough. Thus, one project expressed need for the development of governance and management structures that take into account the different cultural expectations and available investments of time and resources by various partners. Such structures could perhaps help ameliorate the differences in work habits, subcultures, and bureaucratic requirements.

Lack of regional and local models / protocols / frameworks / laws that support different forms of openness
Many projects noted a lack of protocols and frameworks to support different forms of openness. For example, one project noted the lack of standardization of data and data protocols (ethical and otherwise). Another lamented the lack of regional models and institutional support to create them.

Existing social networks key to success
Nearly all projects agreed that the strength of their existing social and institutional networks was essential to successfully practicing OS. Navigating the scientific and political spheres successfully required strong relationships and strategic alliances. For example, one of the projects, an academic center housed in the university relied heavily on their connection with the municipal council in order to reach the citizens they hoped to recruit for the project.

Issues of funding sustainability for OCS
Projects noted the intensive nature of running participatory action research and that there was high demand for involvement and time commitment. As such, several agreed that a management or logistics person who was engaging and highly extroverted was crucial as a point person for citizen participants.

Lack of skills / competencies / education of various actors

Projects noted that OS in development appears to be more appealing for early career researchers who have not yet established themselves and who may be inspired by its principles of more egalitarian science. Several projects found the youth to be key advocates for OCS. However, not all stakeholders to OCS can participate equally because there are different commitments, skills, and motivations. For example, many projects noted that non-academic stakeholders lacked the competencies and skills to participate in university led scientific research. Thus, no matter how hard a project aimed to be "citizen-driven," there inevitably was some division of labor since different skills were needed for different stages of the process. Thus, many of the citizen science oriented projects included some sort of training or capacity building process but this also brings about the question of the valuation of different types of expertise and how to acknowledge and prioritize the knowledge that citizens already have that may not be "scientific" per say. How to ensure that flows of knowledge are not just one way?

Openness must be flexible and contextualized

Finally, several projects noted that not all data and knowledge can be open and that sometimes "open knowledge" could in fact be a gateway to exploitation and co-option by private sector actors. Contentious political contexts can inhibit openness and at times activists and others needed to protect themselves and their information rather than making it all open. Similarly, sensitive data could often not be made entirely open. The project recommended for flexibility in openness in designing data policy (rather than a blanket approach that all data must be made open for example). As several projects noted, sometimes, the best thing for the community was for data to be withheld or closed.

Goal 4: Contribute to the building of a new and vibrant area of study (Open and Collaborative Science in Development), producing knowledge to inform policy and practice, and a community of researchers who identify themselves as working on OCS.

The OCS Manifesto was a key contributor to our field-and-community building efforts. The Manifesto launch in Cyprus during the ElPub meeting in June 2017 generated attention and

reactions globally and was shared by actors from Latin America, Africa, the Middle East, Asia, Europe and North America. As of January 28, 2018, the Manifesto video had 776 views and 47 shares. The geographic distribution of these views show a concentration in Latin America, North America and Europe (Argentina (22%), United States (11%), Canada (7.7%), Brazil (5.2%), Mexico (4%) being the top 5 countries). The Manifesto captured the attention of at least 7 global research and development networks and has been cited and circulated in conference presentations by others working in Open Science. The document sparked reactions from a diverse set of actors, including actors who have been critiqued by OCSDNet in the past for supporting a technocentric approach to Open Science (e.g. OpenCon and FOSTER).

As of the final writing of this report, we were informed that the principles were included in this policy brief on Citizen Science and Open Science prepared by the The European Citizen Science Association (ECSA). The policy brief[2] is intended to provide guidance to the EU on how best to support citizenship science activities. The authors thanked us for permission to include reference to our principles and said it made the discussions while writing the brief much more cognizant of issues of diversity and inclusion. This shows that OCSDNet is a visible player in the community and is playing a role in shaping the debate around how Open Science should be defined, particularly in regards to development. The comments around the Manifesto demonstrated: 1) an overall appreciation about the participatory and diverse nature of our consultation process; 2) alignment with the critical vision for Open Science that the Manifesto puts forth; 3) the inclusive lens of the principles as a unique contribution to the field.

iv) Methodology

At project inception, we decided to adapt the Institutional Analysis and Development (IAD) framework as the primary scaffolding tool for the design and analysis of the proposed research network. The IAD framework, originally conceived by Elinor Ostrom (1990), was developed to study shared resources ('the commons') and their governance by communities without state intervention. The framework has been continually refined by Ostrom and other scholars over the past three decades (Ostrom 1985 and the details of the framework here). Ostrom's framework enabled us to leverage the concept of a 'knowledge commons' which asks how individuals and communities can have autonomous access to mechanisms that enable them to decide how their collective knowledge will be used, shared, governed and managed (Hess & Ostrom, 2005; Bollier & Helfrich, 2014; Frischmann et. al. 2014). With the notion of the commons as a starting point, we found that OCS can offer potential opportunities for increasing diverse forms of participation in the circulation and construction of scientific knowledge which have traditionally excluded actors from outside powerful and wealthy research institutions. The diversity of participation and the integration of community actors allows for scientific research that lends itself more easily towards addressing local, context-specific development issues. It is this potential to form collaborative connections across traditional and institutional boundaries, we

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[2] Available here:
https://ecsa.citizen-science.net/blog/citizen-science-open-science-policy-brief-out

argue, that is the key feature and attraction of OCS, particularly for those who have been historically excluded.

Given that the research team was also the one coordinating the network, the meta-level synthesis of the 12 sub-project was action research oriented. That is to say, we developed our understandings of the situated nature of openness through our own regular interactions and exchanges with the various subproject teams. In addition to our own observations, we also enriched our understanding of the challenges and new potentials that the project were encountering through monthly brief project updates which we received through a google form that was sent out monthly by our team. Finally, in order to develop our meta-synthesis of the subprojects, the coordination team conducted two rounds of coding and analysis. The first round entailed the coding of project specific documents (proposals, chapters, final reports, interviews) and analysis of the various documents under five main themes of our coding structure. Each member of the four-person analysis team assessed three of the sub-projects. The projects were assessed first on an individual basis then comparatively across the three projects being analyzed. Finally, common themes that emerged across the three projects being analyzed by the individual researcher were also noted.

In the second round, which took place during our final meeting on January 6th, 2018 in Toronto, the five-person analysis team plus the PI came together physically and discussed each of the five categorical sections systematically one at a time. Each person first presented their insights for the category for 5 minutes each, one at a time. Then, a group discussion followed about insights gained across the projects and comparing findings from all projects. The goal was to find common trends across all the projects for the various themes.

v) Project Activities
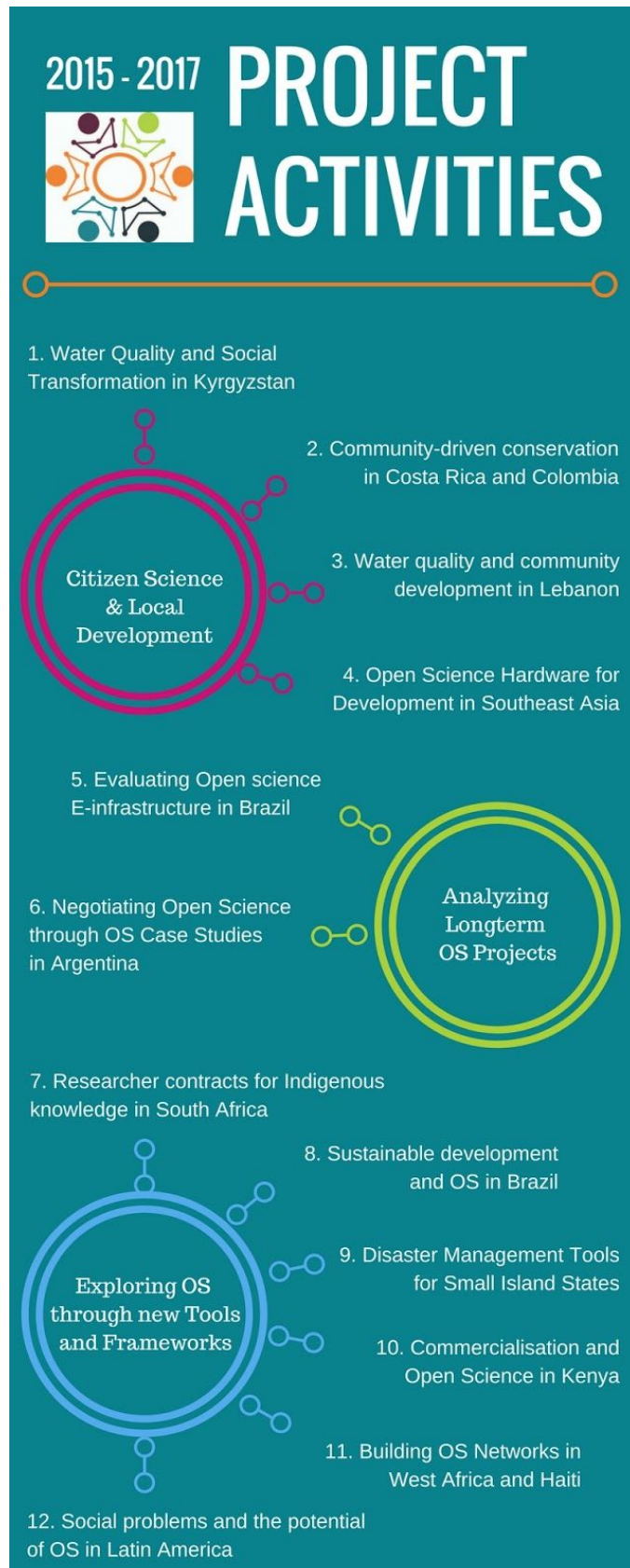
Selection of Sub-Projects

A robust process was conducted to identify and select the sub-projects for the Network. A call for concept papers was run in September 2014 and widely distributed through our various networks and social media channels. We received 91 submissions from across the global South across different domains. 15 project proposals were selected to a proposal development workshop in Nairobi but 1 from the Caribbean had to drop out. 11 countries, with 3 projects from Sub-Saharan Africa, 1 from the Middle East, 1 from the Caribbean, 5 from Latin America, and 4 from South, East and Central Asia attended the proposal workshop. The participants represented a mix of young scholars and well-established researchers.

OCSDNet website

The OCSDNet network website was used for dissemination of content from subgrantee projects. The site includes a blog as well as providing space for interested parties to (1) share and access resources, (2) stay informed about the network activities. We also build forums where participants could engage in discussions about issues related to openness and development, but did not find high usage since most participants were more comfortable on email. Thus we decided to switch to a Google group (email listserv) which gets more usage. This was an important lesson in meeting the end-user on a technology platform where they are already most comfortable and not building additional technological layers that may not in fact be helpful/used.

Newsletters

We developed and disseminated regular internal newsletters, which helped to disseminate blog posts, important opportunities, resources and key activities between projects. We also released external newsletters (sent to approximately 230 subscribers in the wider OCS in D community). These interactions have been very important for "field building" for open science and development, as well as developing a sense of collaboration and openness within the network.

Advisory Team

The coordination team identified and secured the support of four advisors: Apiwat Ratanawaraha, Cameron Neylon, Hebe Vessuri, and Matthew Todd. We signed an MoU with each advisor, something which was done based upon lessons learned from other networks. The advisors regularly reached out to their assigned sub-grantees and were expected to chat with them at least once every 3 months. Midway through the project, Matthew Todd had to step down due to personal commitments and we were able to bring on Halla Thorsteinsdottir to fill his role as advisor.

Management of Sub-projects

On the whole, the management of the sub-projects was largely quite smooth once the project subgrant agreements had been signed. Some items of note: while the Coordination Team had originally approved 13 projects for funding, in May 2015 we had to make a difficult decision to let one of the projects go, before any funding had been delivered. In this case, the project lead failed to produce a satisfactorily comprehensive proposal despite generous deadlines and many hours of support from the coordination team and network advisors. We also did not to release a final tranche of funding for one of the subprojects who did not submit a final report or final financial statement in spite of multiple emails of inquiry.

In-Person Workshops and Meetings

Over the course of the project's three years, we ran several in-person network events which enabled all of the projects to further develop their relationships and areas of shared interests through formal and informal networking and activities. More details on these events can be found in the linked reports.

● *Proposal Development Workshop (October 2014) - Nairobi, Kenya*

● *ICTD 2015 Network Workshop (June 2015) - Singapore, Singapore*

- *Network Meeting (February 2016) - Bangkok, Thailand*

- *Network Meeting (June 2017) - Limassol, Cyprus*

In addition to the Network-wide meetings, we also had an annual coordinator's strategy meeting in person in order to regroup, extract lessons from the previous year and plan for the next year. These meetings were held in Toronto in August 2015, September 2016, and January 2018. These meetings were not in the original budget, but after the first year of running the network, we realized the significant limitations of online discussions for strategic planning purposes and the need for face-to-face time to flesh out future activities and reflect on what has been accomplished to date.

Caption: As part of our coordinator meeting in Toronto (August 2015) we also had our first face-to-face meeting with DECI-2 members (Ricardo and Dal - online).

Conference and Events

In addition to our own in-person meetings, our coordination team also regularly attended external conference speaking and workshop events. For more details, see the following sections.

Caption: Members of the network significantly contributed to the field of open science through a large number of public speaking events.

vi) Project Outputs

In the original project proposal, six core outputs were planned as part of key network activities. After three years of project activity and data analysis, we are pleased that we have been able to deliver all six intended outputs, although some have emerged in different ways to what was originally conceived, as explained below:

> *1.   An active network of southern researchers, supported by a virtual platform designed for the project, engaged in research and interactive learning;*

1. Twelve projects were selected, established and supported over the course of more than two years.
2. The OCSDNet [website](#) was designed to showcase project activities and outputs. Currently, all projects have their own page on the website including an overview of the project, all associated blogs, and additional content that has emerged from their research. See for example the [Natural Justice project page.](#)
3. The OCSDNet social media platforms gained traction over the three year period with over 1,000 followers on Twitter and 904 Likes on Facebook. Tweeting and blogging was often done in English, Spanish and French, expanding our reach beyond only Anglophone countries.
4. Although the website originally had a "forum" feature to allow for project-to-project communication, this feature was transferred to a Google Group format, for increased accessibility and usability. We found that this was a useful tool for sharing resources, opportunities, successes, as well as asking cross-project questions. In addition, a regular internal newsletter was created for collating and disseminating interesting news, blogs and discussions.
5. The term "southern researchers" became quite controversial and conflicting over the course of the network's duration, as we recognised that many of the teams were headed by 'Northern' researchers working in 'Southern' institutions. This, of course, created some tension in the strict dichotomy of global North and South, while also raising the question of how we might extend a call for proposals that reaches the institutions and individuals with capacities and worldviews that may be different to the normative english-speaking 'northern' perspectives.

> 2. An integrated framework for OCS4D will be a key output of the project, as it may have general analytical and explanatory utility that are relevant to cognate programs or fields.

The original proposal suggested that a framework for open science in development would be developed from the Institutional Analysis and Development (IAD) Framework, which was developed by Elinor Ostrom for the purposes of assessing how localised contexts (communities or institutions) influence the motivations, rules and incentives associated with non-state

governance of common resources. For the case of OCSDNet, our initial belief was that "knowledge" should be understood as a common resource to which everyone should have access to, as well as be involved in its creation, maintenance and dissemination. With this idea as a starting point, the majority of our monitoring, evaluation and network-level data collection revolved around understanding the specific challenges, opportunities and other factors that influence the collaborative design, production, creation and dissemination of knowledge - or in other words, what we understand as open science.

What we have come to learn is that open science in development requires a highly *situated* lens with which to understand knowledge production in the local context. This means that within a given culture, institution, community, language group, etc. - one's understanding and practice of open science will differ, based on the tangible and tacit information and support that does or does not support a culture of 'openness.' For instance, in Argentina, open science has become a very popular topic and practice amongst researchers, and is indeed already supported at the national level through the creation of open research repositories and emerging national-level policies. In contrast, the idea of 'openness' is very foreign in Post-Soviet contexts such as Kyrgyzstan, where a history of an authoritarian state has generated a culture of fear and suspicion around non-state-led science and collaboration. On the other hand, the context of 'open science' amongst Indigenous communities in South Africa challenges the idea that "openness is always good," given the historical root of knowledge exploitation and unequal power relations between researchers and Indigenous 'informants.'

Despite the situatedness of open science, in terms of its potential to be understood as a useful practice for achieving sustainable development, the network was able to overcome this dilemma through the co-creation of an OCS Manifesto, which encapsulates a set of seven principles that we have come to understand as a framework of 'good practices,' for imagining and practicing science that is fair and inclusive to diverse groups. These principles are listed below.

We propose that Open and Collaborative Science:

1. Enable a knowledge commons	2. Recognize cognitive justice	3. Practice situated openness
4. Advocate for every individual's right to research	5. Foster equitable collaboration between scientists and social actors and cultivate co-creation	
6. Incentivize inclusive infrastructure	7. Use knowledge as a path to sustainable development	*See: ocsdnet.org/ manifesto/open-science-manifesto for more information.*

Principle 1: Enables a **knowledge commons** where every individual has the means to decide how their knowledge is governed and managed to address their needs

Principle 2: It recognizes **cognitive justice**, the need for diverse understandings of knowledge making to co-exist in scientific production

Principle 3: It practices **situated openness** by addressing the ways in which context, power and inequality condition scientific research

Principle 4: It advocates for every individual's **right to research** and enables different forms of participation at all stages of the research process.

Principle 5: It fosters **equitable collaboration** between scientists and social actors and cultivates co-creation and social innovation in society
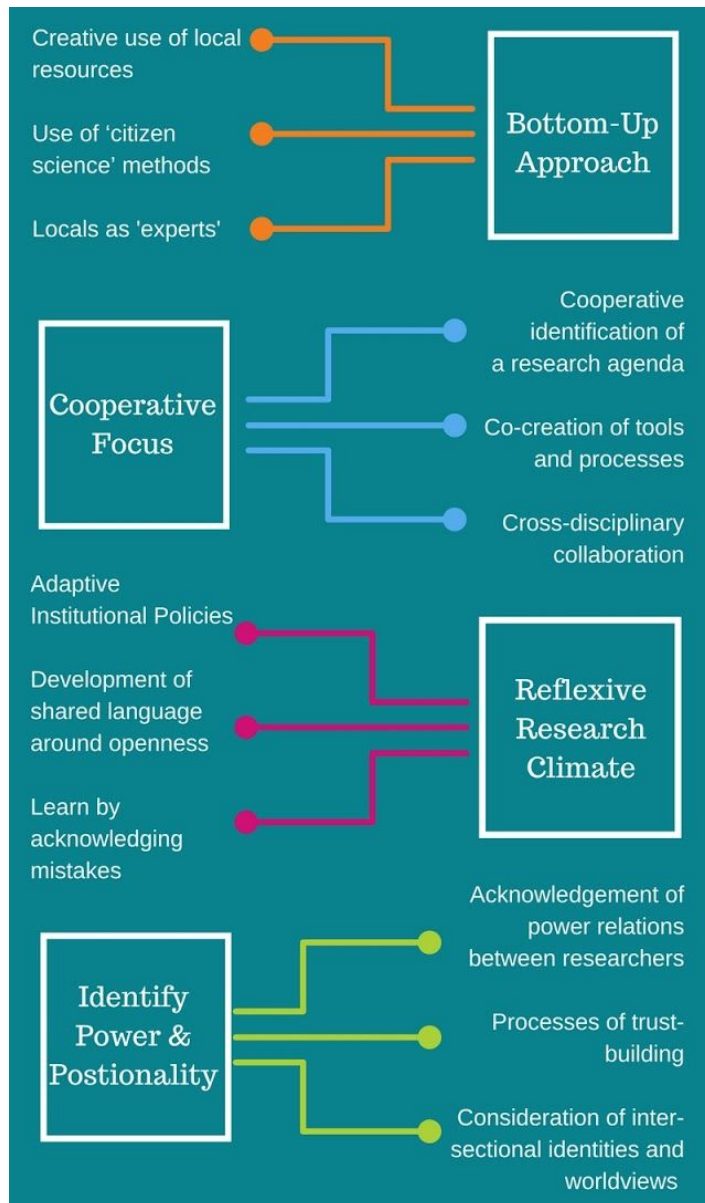
Principle 6: It incentivizes **inclusive infrastructures** that empower people of all abilities to make, and use accessible open-source technologies.

Principle 7: strives to use **knowledge as a pathway to sustainable development**, equipping every individual to improve the well-being of our society and planet

After completion of the research and analysis, we have recognised that we did not spend adequate time and attention towards foregrounding a gender analysis component into the initial stages of the network. As a result, despite some interesting observations around the participation of women (including a majority of sub-projects headed by women PI's, as well as a high number of women participants as "citizen scientist" volunteers), it is difficult for us to make any claims around whether or not open science offers the potential to minimize traditional barriers in science, to increase the participation of women and other underrepresented groups in processes of knowledge production.

Ideally, this will be an important next step for a follow-up iteration of the network and a proposal is being submitted to IDRC in this regard.

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3. Research supported by the network leads to context-specific understanding of how and in what conditions more open and collaborative approaches to science contribute to effective application of research to achieving development goals;

Out of the twelve sub-projects supported throughout the duration of OCSDNet, most have delivered solid findings, case studies and conclusions around the conditions and obstacles under which OCS can be effectively used to achieve development goals. Thus, evidence from the network suggests that the following factors have the potential to support a strong environment for OCS:

- Cooperative identification of a research problem / plan
- Acknowledgement of power relations and roles amongst / between researchers
- Consideration of intersectional identities and worldviews
- Institutional flexibility, adaptiveness and support
- Shared language / vocabulary around openness
- Establishment of trust
- Research reflexivity
- Cross-disciplinary collaboration
- Co-creation of tools and processes with critical consideration of who is doing the design, who has access, etc.
- Creative use of locally available resources
- Use of 'citizen science' approach, including robust training of citizen scientists

Creative use of local resources
Use of 'citizen science' methods
Locals as 'experts'
Bottom-Up Approach

Cooperative identification of a research agenda
Co-creation of tools and processes
Cross-disciplinary collaboration
Cooperative Focus

Adaptive Institutional Policies
Development of shared language around openness
Learn by acknowledging mistakes
Reflexive Research Climate

Identify Power & Postionality
Acknowledgement of power relations between researchers
Processes of trust-building
Consideration of inter-sectional identities and worldviews

4. Research carried out by network researchers based on the conceptual framework leads to new methodologies, models, tools, and metrics for studying open and collaborative science for development in the Global South;

One of the unique aspects of the network is the diverse array of research methods and disciplinary perspectives used to assess open science in the context of development. To that end, OCSDNet researchers examined OCS through the perspective of *law* by creating a research contract to protect the knowledge rights of indigenous communities around climate change in South Africa; from the perspective of environmental and chemistry sciences in Kyrgyzstan and Lebanon by engaging and training local people as 'citizen scientists' in water-quality testing experiments; from the perspective of botany and ICT systems in Brazil by assessing the usage of an open, online virtual herbarium; from a participatory action research and 'citizen science' perspective in Costa Rica/Colombia and South-East Asia by directly engaging local people in identifying and co-creating solutions to local challenges, as well as a host of others. This diversity of perspectives has given us a robust set of experiences from which to assess how open science is practiced and understood in diverse contexts, and to draw similarities and differences between them.

As a result of these many perspectives, an array of tools have been generated that will continue to have relevance to ongoing practical development and research work. These include:

1. The creation of a research contract for Indigenous communities in South Africa
2. The creation of a 'climate knowledge broker' in the Caribbean, which streamlines diverse terminologies amongst SIDS, for more effective and efficient disaster management and planning.
3. The co-creation of a participatory, open science curriculum in Kyrgyzstan, developed in collaboration with rural teachers and school children
4. The creation of an extensive network of French-speaking university students across West Africa and Haiti, to educate and advocate for open science and open access within institutions across the region
5. The creation of water-quality testing kits, manuals and accessible equipment for citizen scientists in Lebanon;
6. The establishment of 'extra-institutional' public forums in Ubatuba, Brazil to discuss local challenges and opportunities to collaborate across diverse publics

5. Research supported by the network generates a variety of outputs, from more traditional peer-reviewed articles in OA journals, to other forms of scholarly artifacts, narratives and stories told through social media and multimedia representations. This is in keeping with one of the key components of OCS, which calls for development of alternative metric and evaluation tools, with new forms of embedded value that are in line with addressing development challenges, often in the local context;
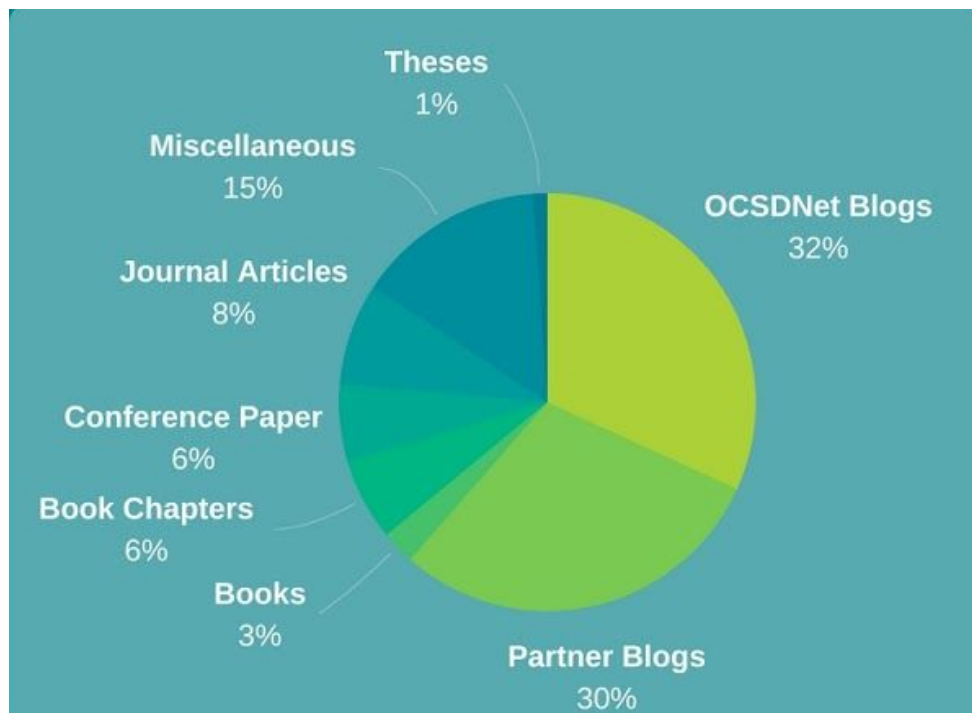
Caption: Over the course of three years, OCSDNet projects and coordinators have been responsible for a significant number of publications. These include more than ~270 publicly available research ouputs.

OCSDNet research teams, as well as the coordination team have created a high number of research outputs that document the learning from their research while contributing to the expansion of the field of OCS. These 'publications,' have been written/created in a variety of forms, including:

Type of Publication	Number Written/Created
OCSDNet Blogs	85
Partner blogs	79
Books	7
Individual chapters	17
Conference Papers	16
Journal Articles	21
Miscellaneous	24
Newspaper articles	5
Radio Presentation	2
Reports	3
Theses	3

Websites	5
TOTAL	**267**

All of these outputs (and their associated links, if available) are viewable in spreadsheet format, here. A few notable publications (or pending publications) are listed below.

1. **'Contextualizing and Situating Openness in Science'** *(pending publication)*
   A network publication (book) composed of chapters from each of the twelve sub-projects, detailing the context-specific circumstances that make 'open science,' as a practice and philosophy, amenable to their respective local contexts, based on their research experience. The book is to be published by the University of Ottawa Press under it's new Open Access series.

2. **'Towards an Inclusive Open and Collaborative Science: Lessons from OCSDNet'** *(pending publication)*
   A book chapter submitted to IDRC for inclusion in a volume looking critically looking at openness, from the perspective of inclusivity.

3. **OCSDNet Blog** - A significant compilation of original material from OCSDnet project teams, the coordination team and guest writers, all of which have been shared on social media, oftentimes with significant response from others working in the field of open science and/or development.

4. **Project SOHA Blog:** A significant collection of original blogs written by early-career researchers across French-speaking West Africa and Haiti, about their experiences and discourses around open science and cognitive justice.

5. **The Ubatuba Brazil Open Science Blog & Platform** - A collection of original blog posts, videos, social media links and Wiki page by the OCSDNet project in Ubatuba, Brazil http://cienciaaberta.ubatuba.cc/blog

6. **Open Science, Open Issues** - A book by Sarita Abigali (OCSDnet, Ubatuba, BRazil) with chapter contributions from several other network members

7. **"Seeds for the future in the mountains of Kyrgyzstan: Young citizen scientists investigate and take action for their local water resources"** (*Pending Publication*) A chapter by Aline Rosset, OCSDnet team in Kyrzystan

8. **Ebook: Expanding Perspectives on Open Science: Communities, Cultures and Diversity in Concepts and Practices** - Conference proceedings from Elpub 2017 in Cyprus, with contributions from several OCSDNet Members

9. [**Stratégies de valorisation des savoirs locaux africains : questions et enjeux liés à l'usage du numérique au Cameroun**](#) Journal article by Thomas Hervé Mboa Nkoudou, PhD Researcher in Project SOHA

10. [**Towards Open Science in Argentina: From Experiences to Public Policies:**](#) Journal article by Valeria Arza and Mariano Fressoli, OCSDnet Argentina

> 6. New and sustaining South-South and North-South research partnerships emerge as a result of activities supported by the network.

All OCSDnet projects noted that the 'creation of new partnerships' had been an important outcome of their respective projects. While some of these partnerships may have been 'temporary,' over the course of the project's duration, it is likely that many of these partnerships will have important, longer-term uses and benefits to multiple parties. In various capacities, OCSDnet researchers noted that they engaged with youth and local communities (including school children and teachers in Kyrgyzstan), government institutions (including policy makers, in some instances), the general public (by way of radio announcements, social media, etc.), research and scientific communities, civil society groups (such as activist networks in Argentina), and NGO's.

Caption: Using a variety of research methods and communication channels, we have engaged with a wide range of stakeholders around the globe.

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vii) Project Outcomes

From the original outputs stated above, the following **outcomes** were expected:

> As a result of this network, researchers in the Global South develop research capacities including new methodologies and analytical skills;

Capacity development for "researchers in the global South," as well as the capacity of the coordination team was one of the most significant outcomes of OCSDNet. In particular, OCSDnet engaged with a significant number of "early-career researchers," many of whom had leading roles within their respective projects. While some of these researchers were part of OCSDnet from the onset, others became active in the network through processes of project activities and networking in various forums. Indeed, OCSDNet provided important opportunities for early-career researchers in leading capacities from Argentina (Hugo), Costa Rica (Josique), Thailand (Hermes), Kyrgyzstan (Aikenna & Aliya), Cameroon (Thomas) and Brazil (Felipe); while others were involved in subsidiary activities - including contributions towards field building through the writing of open science blogs via the OCSDNet website. Several of these individuals have expressed their immense appreciation for being a part of the network, and have noted the importance of lessons learnt for future work and research.

In addition, many of the OCSDNet projects were geared towards the 'training,' of different groups to perform different types of tasks. These included:

- Technical lab training for women "citizen scientists," to identify, monitor and test water quality in village wells throughout rural Lebanon;

- The capacity development of teachers throughout Kyrgyzstan to teach 'open science,' to school children through creative, low-cost and hands-on activities that seek to address local development issues (such as water quality in rural areas); as well as the attitude change of both teachers and children in terms of who can or should *be a scientist / create knowledge.*

- Technological skills development for French-speaking West African and Haitian university students through various workshops aimed towards teaching "open" research skills - such as using Zotero to share resources, making use of open access research journals, contributing towards open repositories, as well as contributing towards under-represented African knowledge through editing/updating Wikipedia pages.

Apart from these 'harder' technical skills listed above, it is likely that many groups also contributed towards the development of 'softer' skills, including increased political empowerment and personal agency. This is notable in the case of South Africa, whereby

OCSDNet researchers engaged directly with Indigenous communities, to help them understand how law and legality are important tools for protecting long-held community knowledge; as well as in Brazil, Costa Rica and Colombia, whereby OCSDnet research teams provided physical forums for diverse community actors to engage on local issues, form new partnerships, and recommend new solutions.

The OCSDNet Coordination team has also observed an important (albeit sometimes subtle) change in the mindsets of several PI's, in terms of their attitudes towards collaboration and cross-disciplinary learning. For instance, the PI's from the Virtual Herbarium project in Brazil as well as from the citizen science & water quality project in Lebanon were both aligned with positivist epistemologies and a highly technical-science background. However, through engagement with network activities (including prompts from monthly reporting questions, in-person meetings and online discussions), both teams admitted that the social elements of their respective projects are what make 'open science' interesting, important but also difficult. For instance, in the case of the Brazilian Virtual Herbarium, the team noted that it was the engagement between botanists and digital technicians that was most challenging, in terms of creating an open, sustainable and effective platform for hosting data on Brazilian plant species. In the case of Lebanon, the team did not anticipate the difficulty of translating complex scientific concepts and technical lab training for non-scientific community members; and had to reassess what their project would understand as "high-quality data," in terms of what they were trying to achieve. Hence, through involvement with OCSDNet, several researchers were able to go far beyond their traditional disciplinary boundaries, with the result that they were able to deliver far more nuanced, effective and sustainable outcomes in their respective contexts.

Finally, it is also important to note that the capacity development of the OCSDNet coordination team was also a key outcome of the project. Indeed, aside from Leslie Chan (as the PI), the four other team members were early-career professionals who were offered a unique opportunity to be involved with the coordination and leadership of a highly diverse international research network. Through our team's partnership with the DECI team, Becky received ongoing mentorship on Utilisation Focused Evaluation (UFE) and research communication, which was invaluable for assisting us in strategically keeping track of incoming data, as well as

asking the "right questions" in regards to what is useful and feasible. Denisse and Alejandro also benefited from this partnership, as they had leading roles in designing participatory activities for the final network meeting in Cyprus (which was attended by Julius and Ricardo from DECI), while all four benefited from opportunities to contribute towards the creation of valuable development research, as well as the softer skills needed to facilitate conversation amongst diverse individuals via an online platform. Importantly, Denisse undertook the initiative of leading the development and design of the Open Science manifesto, while Angela spearheaded the supervision of the program budget and oversaw communication between the University of Toronto and iHub to ensure maximum program efficiency. The core team also gained from interactions with the subproject teams - for example, Angela eventually went back to school to pursue a PhD in Anthropology with a focus on Science and Technology Studies (STS) and now draws heavily on the foundational scholarly work laid down by Leslie Chan, Hebe Vessuri, Pablo Kreimer, and others in the network to whom she was exposed to through the network.

Thus, the development of both 'hard' and 'soft' skills for researchers and participants in both the global South and North were key outcomes from network activities. Indeed, the consistent engagement with early-career researchers was particularly important for the dynamic of the network, since the younger generation tends to be more comfortable communicating in dynamic, online environments.

> Emergence of common design principles underlying robust, sustainable and equitable OCS initiatives;

As mentioned above, the OCS Manifesto is a key network output that outlines the common principles shared by members of OCSDNet, and which was created as a way of aligning our vocabulary and ideals in striving towards a fair, sustainable and inclusive science. At present, the manifesto is available online in Spanish, French, Afrikaans and English. As part of the dissemination process, a video was created, as well as an infographic.

> The highest outcome could be that context-specific evidence based on the research supported by the network influences policy regimes. However, 3 years is too short a duration to achieve this, but the OCS4D concept will have started taking root in research organizations across the Global South.

OCSDNet was launched at the time when the Canadian Tri-Agency just announced their harmonized open access policy, for which Leslie served as a consultant. The Tri-Agency policy followed the IDRC policy on open access which was rolled out a year earlier. At the same time, the government of Canada was showing strong commitment to open science, both in regard to open access and open data. However, the implications of these policies for research and innovation in developing countries were not well understood; nor were the requirements for

supporting researchers by granting agencies. These were two key areas of a panel on The Role of Open Science in Innovation and Development hosted by OCSDNet at the 7th Annual Canadian Science Policy Conference in 2015. The panel was moderated by Naser Faruqui, Director of Technology and Innovation, IDRC; and the panelists included Leslie Chan and Florence Piron from Project SOHA. Suzanne Kettley, Executive Director, Canadian Science Publishing was also on the panel. At the meeting, policy makers and scientists not familiar with the contexts and challenges faced by researchers from the global South were exposed to these issues and gain a better appreciation of the need to tailor policies according to local contexts.

After the meeting, Leslie was contacted by IDRC to assist them with evaluating their open data draft policy. Two of the OCSDNet projects - The Brazil Virtual Herbarium and the project Empowering Indigenous Peoples and Knowledge Systems Related to Climate Change and Intellectual Property Rights - were selected to participate as case studies to test the proposed open data management and sharing plans. The results of the case studies would serve to refine guidelines for the implementation of development research funders' open research data policies. The original proposal and all the case studies were subsequently published.[3] The pilot study came to the important conclusion that it is probably premature for funding agencies such as IDRC to mandate open data policy, given the diversity of project goals, ethical and privacy concerns, and the very different technical capacity of the grant recipients. Equally important is that the granting agency itself lacks the technical capacity and human resources to support grantees with data management, storage and sharing. There are also myriads of legal, privacy, and intellectual property issues that differ across contexts, further complicating data sharing. Cameron Neylon (an OCSDNet External Advisor), also observed that: "The concept of data is part of a western scientific discourse which may be both incompatible with other cultures, particularly indigenous knowledge systems." He concluded that development research "is a site that surfaces issues in policy design and implementation deserving of more consideration across the research enterprise" (Neylon, 2017).

The work produced by the sub-grantees during their time at OCSDNet was also instrumental for these groups' capacity to influence local and national policy regimes. For example, one of the Argentinian teams used its resources to develop models to measure degrees of openness, and to map out and connect local citizen initiatives across the country, both of which caught the attention of local policymakers and the Ministry of Science and Technology in Argentina. Currently, the lead researchers of this project are advising the design of the National Open Science policy. The case studies produced by the Kenyan team, which analyzed the commercial tensions between open access, intellectual property, and public-private partnership policies, have also caught the attention of national policymakers in the Ministry of Education, Science and Technology as well as the National Research Fund. This project's outputs and researchers will be informing the drafting of national guidelines for enhancing collaborative and demand led research management. Another team working on participatory action research and citizen science through Model Forests is influencing policy regimes at the community level. The

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[3] See https://riojournal.com/browse_user_collection_documents?collection_id=18 for the case studies.

team is currently in the first stages of designing a strategy to integrate OCS in the curriculum structure of a Colombian university.

As noted earlier, the infancy of OCS4D would likely mean that there will be **unanticipated outcomes**. However, making sense of these outcomes with the evolving conceptual framework, and identifying common design principles of robust, inclusive and sustainable open initiatives through comparative analysis will be a key outcome.

One of the 'unanticipated outcomes' of OCSDNet is the emerging evidence to suggest that over the course of the past three years, network communications in varying forums (social media, conferences, workshops, etc.) have begun to contribute towards **building "open and collaborative science" as an important, emerging field** that brings a more critical and nuanced perspective towards open science, in contrast to the general optimism of 'openwashing' as a branding or profit strategy that has been co-opted by powerful actors (such as large publishing companies). Through this work, we have particularly sought to bring an informed Southern perspective towards open science. Two examples of OCS 'field building' are outlined below.
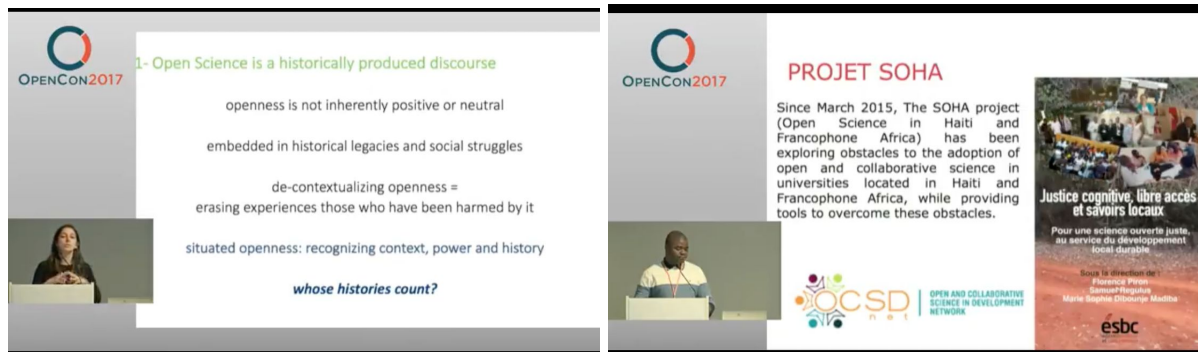
OpenCon 2016, 2017 & 2018

To provide evidence of this claim, in 2015 a contingent of highly motivated early-career researchers from OCSDNet applied to OpenCon from various countries throughout the Global South. Despite excellent applications, all were rejected due to the high costs associated with travelling to Europe for the event. As a result, the vast majority of conference participants attending OpenCon 2015 were from Euro-North American countries. As OpenCon supposedly encourages and promotes 'diversity' and 'cross-disciplinary learning' between young and active leaders, we viewed this rejection of Southern candidates as quite discriminatory, resulting in a context where only a limited ('northern') perspective of openness is explored. Consequently, we emailed OpenCon organisers to highlight this issue.

In 2016, two representatives from the network (Denisse and Thomas) were able to attend OpenCon 2016, and the organisers stressed that they had put careful attention towards funding travel for Southern participants. In addition, the 2016 discussions were much more critical of power dimensions in knowledge-production processes (and the North-South divide); which was very promising for a wider and more inclusive understanding of Open Science in the mainstream scientific community. The change in rhetoric and the turn to a critical take in OpenCon has become more pronounced and we attribute these changes, in part, to the lobbying done by OCSDNet since 2015.

In 2017, Denisse and Thomas once again participated in OpenCon, this time as panelists of the Diversity, Equity and Inclusion panel. Denisse presented an overview of the findings gathered by OCSDNet, stressing the need for a situated understanding of openness in Open Science

initiatives. Thomas presented an overview of the work done by the OCSDNet sub-grantee Project SOHA, stressing how open movements can contribute to neo-colonialism of knowledge and information. Both presentations were very well received by the audience and speakers received positive feedback for their contributions. As a result, and due to their affiliation to OCSDNet, both Denisse and Thomas were invited to be members of the Organizing Committee for OpenCon 2018, and asked to inform the programming with OCSDNet findings.

Caption: Denisse and Thomas presenting during OpenCon 2017

Electronic Publishing conference (ELPub) 2017 and 2018)

Along with OCSDNet contributions at OpenCon in 2016 and 2017, another significant area of field building has been through network involvement in ElPub during 2017 and planning for 2018. Leslie Chan has been involved with ElPub for many years, and in 2017 was the 'Research Chair' for the program. As a result of this position, we were able to bring many OCSDNet project teams together for the annual Elpub conference in Cyprus, where they presented critical and contextual open science research to publishers and affiliated researchers. At this same event, we also launched the OCS Manifesto, which was attended by approximately sixty people.

In June 2018, Leslie will be the Program Chair for the upcoming ElPub conference, to be held in Toronto. Given his position in planning the agenda and narrative for this event, we have ensured that a critical focus on processes of knowledge creation and dissemination will be central to the discussions. At the event, we also plan to have a funders roundtable and invite representatives from various funding agencies, both private and public, to discuss why and how they are supporting open science initiatives across various contexts.

Both the OpenCon and ElPub examples highlight two forums that were previously used to discuss 'openness' through a relatively non-critical lens, and were open to only a very privileged (and mostly Northern) set of participants. However, through OCSDNet involvement in both forums, the discussion was opened to an array of Southern actors, and discussions centred around many of the systemic challenges and power dimensions of 'openness,' rather than solely on the costs and tools for making openness possible.

viii) Overall Assessment and Recommendations (for IDRC)

- **Network structure:**
  - The network structure was widely agreed to be beneficial by subprojects as it enabled peer-to-peer sharing of lessons and mentoring. Several participants commented that the network enabled them to be more exposed to relevant activities going on in other parts of the globe. Nonetheless, it was hard to have substantive engagement across the projects given that none of them were explicitly collaborative across projects and also their geographic distance. We only met in person once a year and that time always felt somewhat insufficient. Future ideas were for more regional networks that would allow for more frequent meetings and greater shared contexts. For example, the Latin American scholars were very interested in developing a Latin American regional network.
  - If IDRC decides to continue the network approach, we believe that further facilitating intra-network information sharing would be very valuable. For example, the hosting of a conference at IDRC headquarters that brought together leadership and possibly a selection of sub-projects from the various IDRC-supported "Open" networks could facilitate very fruitful dialogue and cross-disciplinary learnings.

- **Advice for new Program Proposals:**
  - Upon initially submitting the proposal to IDRC, the coordination team had not fully considered the cost nor time implications of undertaking research evaluation and communication to the extent necessary to run a complex global research network. Advice from IDRC at this early stage would have ensured suitable skills capacity on the team, as well as funding for more extensive use of M&E tools and research communication. (for example - consideration of translation costs, hiring of graphic designers, etc.)
  - Similarly, going forward, IDRC should seek to ensure that new programs are prepared to integrate a 'gender lens' within their research from an early stage, and mentorship should be provided for the best way to do this.

- **Mentorship with DECI-2**
  - Several OCSDNet coordination team members benefited from the partnership and mentorship with DECI-2, in terms of expanding skill sets in Utilisation Focused Evaluation and research communication. However, similar to the points above, it would have been ideal if this partnership had commenced at the proposal stage, since it became somewhat awkward to work with DECI, given that we had already established our own M&E methodologies prior to this arrangement.

- **Language Support**

- One of the core challenges within our network was the lack of a coordination team member with fluency in French. This was problematic since one OCSDNet program was primarily French-speaking, which made discussions difficult to moderate, particularly when the team encountered serious interpersonal working challenges between the two PI's. In future, it would be ideal if IDRC could make funds available for conflict resolution or mediation, in instances where the coordination team does not have the language capacity to deal with arising sub-project disputes.

- **IDRC-INASSA Split of Funding**
  - One of the main administrative challenges within OCSDNet was the financial split between IDRC and INASSA-funded sub-projects. It became very complicated dealing with both accounts, particularly since the types of activities permitted were different, depending on the geographical location. Both funders also seemed to require different types of reporting, which was not well articulated at the inception of the program. As a result, a considerable sum of money in the U of T account remained unused becasue the allocation rules were so complicated. This has resulted in lost productively and lost opportunties as additona work could have been carried out with the remaining fund. In future, it would be ideal to have all reporting requirements and financial-admin boundaries to be explained from project inception, to ensure that program administrators do not waste unnecessary time and energy navigating these complications.

- **IDRC support for Open Science related initiatives going forward**
  - One of key observations of the project is that the practices and understanding of open science is highly localized depending on the context. As such, a one-size-fits-all approach to policy planning and development would be ineffective and even counter-productive. The open data pilot funded by IDRC also confirmed this. Yet it is disappointing to see that the same old approach to exporting Northern based policy to the South is still common, as can be seen in this recent South Africa - EU workshop on Open Science (Nov. 30-Dec. 1 2017). As a result, the African Open Science Platform that is under development rather resembles a clone from other EU projects in terms of technical standards and policy framework, particularly with regard to open data. This kind of policy transfer is contrary to the current call for evidence based policy making. This is an area perhaps IDRC could exert some influence by calling for more local studies of supporting evidence for open science practices that could inform policy making. This is instead of letting imported policy drive evidence making.

  - Contribution to the book edited by Matthew Smith and Ruhiya Seward was a really valuable exercise as we were given the opportunity to interact with other "open" initiatives supported by IDRC, as well as the opportunity to interact with

researchers and practitioners engaging in theoretical conceptions of open development. But our interactions was largely limited to those with the editors, and not the authors after the one face to face meeting. Given the lengthiness of the book production process, perhaps IDRC could explore other forms of "publication" and dissemination practices that are made possible by the many platforms that are currently available, including pre-print server with added services such as peer reviewing, data linking and visualization tools to enhance research communications between research teams, and more importantly to the broader audience.

○ Following the above, it is perhaps important for IDRC to reconsider the need to invest in infrastructure in support of research communications and disseminations. Given our findings for the need to develop infrastructure that are not simply based on "standards" from the global North, IDRC could support research and development efforts that would allow global South researchers to engage in open research and dissemination. IDRC was the first funding agency in Canada to have an open access policy, and the first to set up a repository to house its research output over a decade ago. But the development of the infrastructure for research communication has stagnated, and so there is a disconnect between what the IDRC support in terms of open access and open science and its ability to support its grantees in providing access to their outputs. The result is that grantees often have to depend on third party providers. To be sure, this is a problem that is now common to the various funders and research producing institutions. The result is that traditionally powerful commercial publishers are not only monopolizing on the content provision of journals, but they are also busy acquiring the essential infrastructure needed for "open" science. It is important for IDRC to work with other public funders to invest in infrastructure that could be controlled and governed by the development and research communities. Without control over the infrastructure, openness would be in name only, as the process will be dictated by the infrastructure providers.

○ It is a common rhetoric that open science is more "efficient" and therefore more "speedy" in terms of finding solutions to research problems. But our finding of open practices, observation of the dynamics of network members, and the importance place on knowledge co-production, suggest that these processes are time demanding. That instead of a one-time engagement or the development of a one-off tool, relationship building that is necessarily for trusted co-production of knowledge requires building trust, and trust building takes time. In such cases, the common project timeline of two to three years is insufficient for such relationship building for truly open and collaborative science to take place. Future funding support for open and collaborative science initiatives should take this into consideration.

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