APPENDIX A

LIST OF OPEN DATA IN DEVELOPING ECONOMIES CASE STUDIES

odimpact.org

Burundi: Open Results and Performance Based Financing — As part of efforts to improve health outcomes and health system functioning, Burundi was one of the first African countries to introduce results based financing (RBF). RBF is an instrument that links development financing with pre-determined results. Payment is made only when the agreed-upon results are shown to have been achieved. OpenRBF — a platform for opening data related to RBF initiatives — was first delivered in Burundi in response to the Burundian Ministry of Health's efforts to improve health care functioning at the national level and strengthen accountability mechanisms. Early returns were positive; OpenRBF engaged in a longer term partnership with the government. OpenRBF was concurrently applied to education programs and to AIDS awareness programs in Burundi.

Cambodia: Opening Development Data — Developed by the East-West Management Institute, and part of the broader Open Development Initiative, Open Development Cambodia (ODC) seeks to improve public awareness and information-sharing around development data. ODC seeks to use data aggregated from a diversity of governmental and nongovernmental sources to provide visualizations, maps, and other data-driven products and tools to inform the public sector, private sector, civil society, data-driven journalists, and the general public as to the workings and impacts of development efforts.

Colombia: Establishing Climate Resilience in Agriculture — In Colombia, as in many other places around the world, the effects of climate are increasingly evident. One sector that has been particularly hard hit is agriculture. Unanticipated weather shifts and extended drought periods have created major challenges for the country's farms, perhaps especially for small, independently owned farms. The Aclímate Colombia project is a cross-sector partnership led by the International Center for Tropical Agriculture (CIAT), a civil society organization, with private-sector industry groups and government actors. The platform (available at aclimatecolombia.org) leverages a diversity of data sources, including many open government datasets, to help farmers understand how to better navigate shifting weather patterns. Although still relatively young, Aclímate Colombia has already had a tangible impact and received widespread recognition. It is a powerful example of how data-sharing across sectors — along with the use of sector-relevant intermediaries — can take high-level data science insights and translate them into concrete, actionable information, in the process helping farmers increase their livelihoods.

Ghana: Empowering Smallholder Farmers — Esoko is a simple but powerful communication tool for businesses, government, NGOs, and others to connect with farmers. Esoko is a for-profit company that maintains close relationships with the public sector. Managed from its main office in the capital city of Accra, Esoko is principally directed at businesses, while individual farmers only constitute its secondary group of interest. Nevertheless, the information that Esoko provides to farmers by repackaging data from different sources (including government and crowdsourced data) and disseminating the information via mobile phones with call-center support in local languages, has the potential to be of benefit to farmers. One of the principal objectives of Esoko has always been to empower smallholder farmers.

India: Open Energy Data — In 2007, The Prayas Energy Group (PEG), an Indian NGO, launched the Electricity Supply Monitoring Initiative (ESMI) to collect real-time power quality information by installing Electricity Supply Monitors (ESM) in various locations in the city of Pune, India. The initiative was part of an ongoing effort by consumer groups and regulators in the Indian state of Maharashtra to monitor power quality after numerous complaints about frequent interruptions and power outages. Having been involved in evidence-based advocacy in the Indian power sector since the early 1990s, Prayas was aware of these issues and created the ESM initiative in line with its "proactive approach to point out gross inefficiencies" and to bring Transparency, Accountability and informed Participation (TAP) to the power sector. The organization has also carried out numerous regulatory and policy interventions covering areas such as capacity addition, capital expenditure in transmission and distribution, and service delivery to unelectrified consumers.

Jamaica: Open Data to Benefit Tourism — Like much of the Caribbean, the Jamaican economy is strongly dependent on the health of its tourism industry. Influenced by the rise of all-inclusive resorts and a general disincentive for tourists to stray far from a few highly trafficked areas, tourists rarely experience much of Jamaica's unique culture, and the economic benefits of tourism are often concentrated in a few areas. To increase tourism (and the spread of its positive impacts), a community mapping project[90] is seeking to combine open government data with crowdsourced mapping data to enable the more participatory development of the tourism sector. Built around open tourism data and the engagement of government agencies, civil society organizations, developers, and an interested group of community mappers, the initiative is providing early insight into how data and collective intelligence can impact an industry that in many ways represents the lifeblood of the country.[91]

Kenya: Improving Voter Turnout with Open Data — Kenya's national Independent Electoral and Boundaries Commission (IEBC) released information about polling center locations on its website in the lead up to Kenya's 2013 general election. The information was difficult to access and reuse, however. Seizing on the gap between opening government data and citizens' actual ability to use that data, two Code 4 Kenya fellows conducted an experiment in unlocking government data to make it useful to the public. The fellows scraped the released IEBC data and built a simple website where it could be more easily accessed. The result was the initial version of GotToVote!, a site that provided citizens with voter registration center information, and also helped them navigate the sometimes complex world of registration procedures. This first version was developed in just 24 hours at zero cost.

Nepal: Open Data to Improve Disaster Relief — In the wake of the devastating earthquake that struck Nepal in 2015, so-called "digital humanitarians" — both local and international volunteers — took it upon themselves to create detailed maps of the most affected areas. One such platform, Quakemap.org, allowed citizens to report needs to organizations providing relief — 434 of 551 actionable reports were acted upon. This response built upon an already robust mapping project in Nepal and is a powerful demonstration of the positive benefits of open data efforts working in collaboration with humanitarian relief efforts at both the local and international level.

Paraguay: Predicting Dengue Outbreaks with Open Data — Since 2009, dengue fever has been endemic in Paraguay. Recognizing the clear problem at hand, and the lack of a strong system for communicating dengue-related dangers to the public, the National Health Surveillance Department of Paraguay opened data related to dengue morbidity. Leveraging this data, researchers created an early warning system that can detect outbreaks of dengue fever a week in advance. The data-driven model can predict dengue outbreaks at the city level in every city in Paraguay. Importantly, the system can be deployed in any region as long as data on morbidity, climate, and water are available.

South Africa: Code for South Africa Cheaper Medicines for Consumers — In 2014, Code for South Africa, a South Africa-based nonprofit organization active in the open data space, took a little known dataset from the national Department of Health website and created the Medicine Price Registry Application (MPRApp), an online tool that allows patients to compare medicine prices. There is evidence that doctors use the information provided by MPRApp to save their patients money, however. MPR currently relies on the time and skills of its developer to be updated regularly. The continued use and impact of MPRApp remains uncertain unless sustainable funding can be secured. With no marketing or promotions to speak of, MPRApp has had an impact on the lives of a few South Africans; with a sustainable model and increased awareness of MPRApp, particularly among trusted intermediaries in the health sector, it can provide many more patients access to cheaper medicines.

Uganda: Opening Health Data to Improve Outcomes — In Uganda, open data initiatives are being used to help improve health outcomes and revolutionize a health care industry marred by staff shortages, lack of resources, and corruption. The Kampala-based organization Cipesa, for example, has collaborated with a local media organization, Numec, to create the iParticipate project, which analyzes and shares open government data with the aim to enable citizen empowerment. Part of this project is to develop and populate data concerning health care services by collating information sent via SMS by journalists, civil society, and the wider public. Similarly, the Women of Uganda Network (WOUGNET), which trains women to use information technology, created an online platform to collect and document information relating to poor health care services. This allowed Wougnet to lobby for the creation of a health clinic in Aloni parish, which is now under construction.

APPENDIX B

INPUT RECEIVED

INTERVIEWEES

Experts and stakeholders interviewed during the development of the 12 Open Data in Developing Economies Case Studies:

Bibhusan Bista, Young Innovations
Nama Raj Budhathoki, Kathmandu Living Labs,
Pranav Budhathoki, Local Interventions Group
Penhleak (Pinkie) Chan, Open Development Cambodia
Dr J. Cunningham, Doctor in the Public and Private Healthcare Sectors, South Africa
Aidan Eyakuze, Twaweza
Adi Eyal, Code for South Africa
Miryam Patricia Guzmán García, Fedearroz
Dr R. Henry, Doctor in the Public Healthcare Sector, South Africa
Elena Ignatova, BlueSquare, Belgium
Priya Jadhav, Assistant Professor, Indian Institute of Technology — Bombay
Daniel Jimenez, International Center for Tropical Agriculture (CIAT)
Vincent Kamenyero, Burundi
Verena Luise Knippel, World Bank
Swheta Kulkarni, Research Associate, Prayas Energy Group
Antoine Legrand, BlueSquare, Belgium
David Lemayian, Code for Africa
Anca Mantioc, The Engine Room
Michelle McLeod, Caribbean Open Institute / University of the West Indies
Maurice McNaughton, Caribbean Open Institute / University of the West Indies
Arnold Minde, Developer of Shule.info
Oscar Montiel, Open Knowledge International
Mulle Musau, Elections Observation Group (ELOG), Kenya
Ravi Kumar Nepal, World Bank, Code for Nepal
Dr. Etienne Nkeshimana, Burundi
Jean Claude Nshimirimana, Open RBF Programs, Ministry of Health, Burundi

Muchiri Nyaggah, Local Development Research Institute, Kenya

Juan Pane, National University of Asunción, Paraguay and Latin American Open Data Initiative

Esteban Peláez Gómez, Coordinator of Social Projects, Fundación Corona

Ashok Pendse, Authorised Consumer Representative with the Maharashtra Electricity Regulatory Commission (MERC)

Mor Rubinstein, Open Knowledge International

Priyadarshan Sahasrabuddhe, Vishwadeep Pressparts Pvt. Ltd

Fabrizio Scrollini, DATA Uruguay

Jennifer Shkbaktur, IDC Herzliya

Simone Soeters, Cordaid, The Netherlands

Thy Try, Open Development Cambodia

Daniel Uribe, Fundacion Corona

Samhir Vasdev, ICT Sector Unit, World Bank Group

Adele Waugaman, USAID

Christopher Whyms-Stone, Trench Town Culture Yard

OPEN DATA IN DEVELOPING ECONOMIES ADVISORY COMMITTEE

Izabela Corrêa, Former Coordinator for the Promotion of Ethics, Transparency, and Integrity, Directorate for Corruption Prevention, Brazil

Elena Ignatova, BlueSquare

André Laperrière, Executive Director, Global Open Data Initiative for Agriculture and Nutrition (GODAN)

Maurice McNaughton, Director of the Centre of Excellence for IT Enabled Innovation, Mona School of Business and Management, University of the West Indies, Jamaica

Jean Philbert Nsengimana, Minister of Youth and Information Communication Technology, Rwanda

David Selassie Opoku, Open Data for Development (OD4D) Africa Lead, Open Knowledge International

Fernando Perini, International Development Research Center, Canada

Nii Narku Quaynor, Chairman, Network Computer Systems, Ghana

Nicole Stremlau, Programme in Comparative Media Law and Policy, University of Oxford, UK

RECOGNIZED PEER REVIEWERS OF THE OPEN DATA IN DEVELOPING ECONOMIES CASE STUDIES AND DRAFT PAPER

Patrick Enaholo, Pan-Atlantic University, Nigeria

Sara Fernandes, University of Minho and United Nations University

Claudia Frittelli, Carnegie Corporation

Silvana Fumega, University of Tasmania, Institute for the Study of Social Change

Shurland George, World Wide Web Foundation

Felipe Gonzalez-Zapata, University of Manchester

Julina Hooks, Teachers College Columbia University

Alicia Johnson, San Francisco Emergency Management

Antonio Almansa Morales, Diputación Provincial Málaga (Málaga City County Council)

Freddy Oswaldo, Independent Consultant

Iris Palma, DatosElSalvador

Mohamed Salimi, HCP

Juliana Taylor, Start Smart

Julia Roberto Herrara Toledo, Red Ciudadana

Mariam Rafique Vadria, Delivery Associates

Christopher Wilson, University in Oslo

Ken Zita, Network Dynamics Associates

PARTICIPANTS TO WORKSHOP AT THE INTERNATIONAL OPEN DATA CONFERENCE IN MADRID, SPAIN (WEDNESDAY, OCTOBER 5, 2016) ON "GETTING TO GRIPS WITH THE IMPACT OF OPEN DATA" (THE OPEN DATA IN DEVELOPING ECONOMIES PROJECT)

Facilitator: Stefaan Verhulst, The GovLab

Participants:

Laura Bacon, Omidyar Network
Mark Cardwell, USAID
Patrick Enaholo, Pan-Atlantic University, Nigeria
Adi Eyal, Code for South Africa
Feng Gao, Open Data China
Silvana Fumega, University of Tasmania, Institute for the Study of Social Change
Mohammad Hossein Ichani, Open Data for Iran
Michael Jelenic, World Bank
Michelle McLeod, University of the West Indies
Maurice McNaughton, University of the West Indies
Indanna Minto-Coy, University of the West Indies
Jean Claude Nshimirimana, Ministry of Health, Burundi
David S. Opoku, Africa Lead, Open Data for Development, Open Knowledge International
Juan Pane, National University of Asunción, Paraguay and Latin American Open Data Initiative
Alán Ponce, University of Southampton
Brandon Pustejovsky, USAID
Lorna Seitz, Legis Institute
Tanya Sethi, AidData
Ilham C. Srimarga, University of the Western Cape
Kat Townsend, MCC
Mireille van Eechoud, University of Amsterdam
Roza Vasileva, World Bank
Julian Walcott, University of the West Indies
Natalie Widmann, Max Planck Institute for Intelligent Systems

APPENDIX C

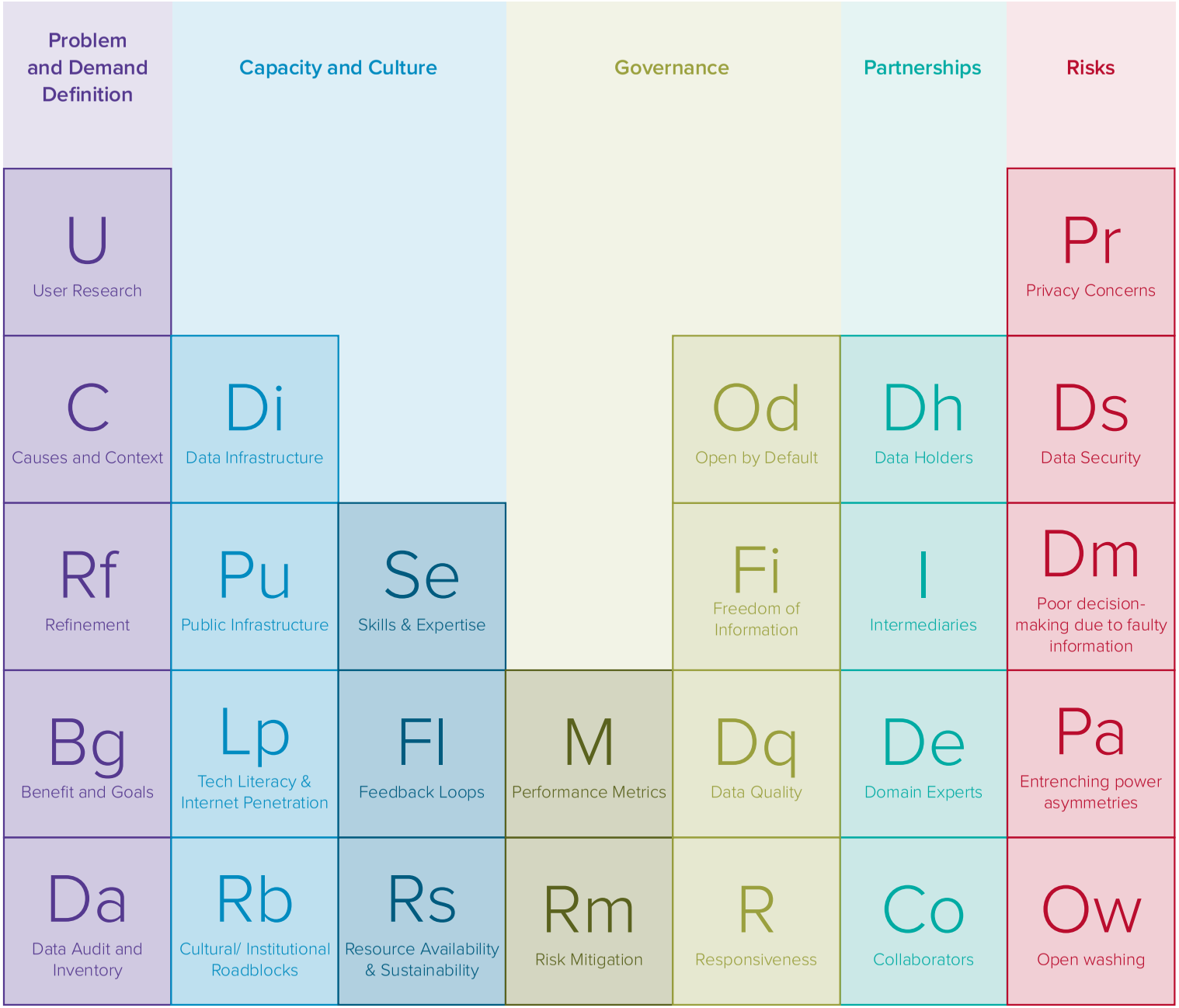
PERIODIC TABLE OF OPEN DATA IMPACT ELEMENTS

What determines the impact of open data? Based upon extensive research we identified 27 factors or elements, along five categories, that are important when developing or reviewing open data initiatives. Taken together they provide a checklist for data providers, data users, donors, and others to consider.

No single element can guarantee success but having several in place across the five categories, and working together, increases the likelihood of impact. Similarly, it is unlikely that a single open data project will include every single component described here — these elements can be combined (i.e., bonded) in a way that creates a favorable impact.

Clint Adair - Unsplash

ELEMENTS WORK TOGETHER



PROBLEM AND DEMAND DEFINITION

Particularly in developing economies, where resources to put toward data release or data use can be in short supply, a clear, detailed understanding of the problem to be addressed by open data can help to ensure that efforts are targeted and optimized. Some of the most effective open data projects examined here are laser-focused on a specific user group (e.g., smallholder farmers in Colombia or Ghana), or identified gap (e.g., the lack of power quality in the Indian energy sector). Clearly defining the problem can also aid in the development of metrics of success and a strategy for monitoring progress against a well-defined baseline. Many of the initiatives studied as part of this project lacked such a monitoring strategy, making assessments of impact, evidence-driven iteration, and the demonstration of return on investment more challenging.

U
User Research

Open data initiatives tend to be more successful and avoid the notion of, "if you build it, will they come," when they are clearly optimized for an intended audience or user base from the start. The upfront identification, mapping and understanding of relevant constituencies, and a similar examination of their needs can enable more targeted open data-driven interventions.

C
Causes and Context

In many open data initiatives, and in governance innovation efforts more generally, practitioners can find themselves addressing symptoms rather than the root causes of problems. Open data projects, such as the effort to predict dengue outbreaks in Paraguay, tend to be more successful when they seek to address underlying problems (mosquito breeding and transmission) rather than the symptoms of those problems (high levels of dengue fever).

Rf
Refinement

To move from a well-understood problem area, to a granular, actionable, and quantifiable path forward, successful practitioners often look to refine their understanding of the problem to be addressed by seeking to understand, for instance, *why* the problem exists in its current form, what contributing factors could be at play, what potential knock-on effects of addressing the problem might be, and why the problem has not yet been solved by some other interested party.

Bg
Benefit and Goals

Open data projects often fail to build an audience or continue to evolve and expand successfully over time if they do not successfully define the intended benefits of the open data use and set clear target goals. These deficiencies often can create difficulty in the development of metrics and indicators — important drivers of iteration and impact.

Many of the projects studied, including notably Kenya's GotToVote! project did not have a clear baseline against which to measure the success of the project. Without an understanding of the current baseline, measuring progress toward identified goals and demonstrating whether and how open data efforts actually benefited the public remains a challenge.

Da
Data Audit and Inventory

Once the problem and value proposition are in place, practitioners are able to explore the availability of datasets**,** both in the form of open government data, and from other potentially useful and relevant data sources, like NGOs, the private sector, or crowdsourcing efforts. A clear problem definition can help to uncover which data sources could add value and inform strategies for collecting or accessing that data. Colombia's Aclímate Colombia, for instance, identified the types of data it needed for its agriculture algorithms and engaged the semi-public industry groups that had it. The Prayas Energy Group in India, on the other hand, found that no one collected or stored the type of energy usage information it needed for its power quality monitoring efforts, so it launched its own (open) data collection effort across 18 Indian states.

PARTNERSHIPS

In many high-impact open data projects, partnerships within and especially across sectors play a key role in enabling success. Whether creating touchpoints with citizens through partnerships with civil society, informing the public through media partnerships, or filling important data gaps through partnerships with private sector entities, open data suppliers and users often improve outcomes through collaboration.

Dh
Data Holders

Although open data is meant to provide value to data users without any direct engagement with data holders necessary, partnering with entities on the supply side (including government) can help to fill data gaps and enable higher impact data use.

Aclímate Colombia is a strong example of the potential of such partnerships. The initiative, aimed at providing farmers with a better ability to plant crops in a way that is resilient to changes in climate, would not be possible without collaboration between the driver of the initiative (a civil society organization), key data holders (government ministries and agencies), and a second group of key data holders (private and semi-private crop growers' associations). GotToVote! in Kenya, on the other hand, did not establish such cross-sector partnerships, and its long-term sustainability is now in question.

I
Intermediaries

In many developing economies, as mentioned above, Internet penetration and, especially, data literacy are low among the citizenry. The presence of intermediaries — including journalists and others with relevant skills — can help to determine whether or not the available open data-driven outputs reach a community of users, and the intended impact is achieved.[49] The continued advancement of open data intermediaries can be seen as a key area of capacity building in developing economies.

To encourage the use of Code for South Africa's MPRApp, doctors and pharmacists played an important intermediation role with citizens. These trusted advisors — with nothing to gain from helping patients spend less money on their prescriptions — helped to alert citizens to the database and the potential for identifying much cheaper generic drugs to treat their ailments.

In addition, the open data-driven offerings of Open Development Cambodia are often presented on the initiative's website in a comprehensible manner (similar to data-driven Wikipedia articles on topics of public concern, like forest cover or development aid spending), but reach a much wider audience when taken up by journalists in the country and abroad in reporting on conditions in the country.

Both of Tanzania's open education dashboards, on the other hand, failed to attract a regular user base, likely as a result of a failure to engage consistently with intermediaries that could make the sites' offerings useful to an intended audience with low digital literacy and access.

De
Domain Experts

In many cases, demand-side open data actors' expertise lies in technology or data science rather than the problem areas they seek to address through the use of open data. Tapping into the knowledge of stakeholders with relevant sector-specific expertise can improve efforts to optimize and target open data efforts based on a true understanding of needs, opportunities, and barriers. Nepali NGOs and businesses using open government data and crowdsourced data during the response to a major earthquake in the country, for instance, engaged with on-the-ground experts in crisis response who came to Nepal from around the world to help target its offerings.

Co
Collaborators

Open data practitioners can extend their capacity by collaborating with like-minded organizations, institutions, or individuals, including foreign actors. Ghana's Esoko agricultural information service, for example, is part of the Global Open Data for Agriculture and Nutrition (GODAN) network, enabling the company to tap into the knowledge of similar organizations from around the world seeking to leverage open agriculture data for business development and/or public benefit.

RISKS

The release and use of open data in developing economies are not without risks. An upfront mapping and consideration of risks associated with intended uses of open data can allow practitioners to design programs from the outset in a way that is well-positioned to overcome or mitigate those risks. The risks listed here, however, should not be considered arguments against using open data in development. Rather, they are reasons for taking a more fine-grained approach that pays close attention to the empirical evidence, sifting out what works and what does not, and identifying conditions for scaling and replication.

Pr
Privacy Concerns

Privacy concerns probably rank among the most commonly cited worries over opening up data. Especially in conflict-stricken regions, individuals' anonymity can be of life-or-death importance. Potential privacy harms can arise even from the release of ostensibly anonymized personally identifiable information (PII).[50] Although the vast majority of open data efforts seek to anonymize or otherwise limit the release of PII, it is important to recognize that a lack of sophistication in anonymization or aggregation efforts can result in the inadvertent release of sensitive information.[51] In addition, in some instances information that itself poses no privacy concerns can be combined with other openly available datasets; the aggregated and linked information can lead to unexpected disclosure of personal data, such as bringing together open data on political activities with separately accessible information on a person's location or place of work, for example.[52]

Ds
Data Security

Because much government data contains sensitive information regarding individuals, industries, and national security, opening that data often leads to quite reasonable questions about data security. Cybersecurity remains a challenge across the world, and perhaps especially so in developing countries, which may lack the technical expertise to adequately protect information from sophisticated hackers and other intrusions.[53] At the same time, though security concerns are very real and important, they must be balanced against the opportunity cost or risk of not sharing data; often, government decision makers can lean on tenuous security concerns to justify keeping data closed and restricting access, potentially limiting the solution space.

Dm
Poor decision-making due to faulty information

Whether related to humanitarian efforts, crisis relief, or the livelihoods of vulnerable populations, data-driven efforts in developing economies can be literally life-or-death affairs. Given the many challenges and obstacles involved in open data projects, it is important to recognize the risks inherent in basing such life-and-death decisions on information that could be incomplete, out-of-date or otherwise faulty. The broader point is this: insights generated from data are only as good — and their impacts only as positive — as the quality of the underlying data.[54]

Pa
Entrenching power asymmetries

Although data can be empowering, it can also consolidate or reinforce existing privileges and authority inherent in societies. This problem is closely linked (though not restricted) to digital divide challenges; when only the elite of a society have access to data and/or data science capabilities, releasing data is likely to disproportionally benefit that elite.[55] We found numerous examples,[56] and they are important reminders that open data projects need to work hard to ensure that their social and economic benefits are widely, and evenly, distributed.

Ow
Open washing

The term *"open washing"* has taken hold in practitioner circles over recent years describing the risk that governments may seek to leverage the enthusiasm for open data to avoid more difficult and potentially transformative openness and transparency efforts.[57] The Extractives Industries Transparency Initiative, for instance, is a laudable effort to push for more energy-related openness around the world, which has had demonstrable impacts on accountability. There is a growing belief, however, that a subset of still largely closed governments is joining the initiative only "in order to increase their international reputation and bolster their access to foreign aid."[58]

CAPACITY AND CULTURE

The lack of available resources, insufficient human capital and immature technological capabilities can create major challenges to achieving meaningful impact with open data projects. These challenges can exist both within a country's open data ecosystem — that is, the capacity of government, civil society, tech community, and the general public — as well as within the actors on the demand side using open data toward certain objectives and the donor organizations funding them.

OPEN DATA ECOSYSTEM ELEMENTS

Di
Data Infrastructure

On the supply side of open data the lack of a strong data infrastructure — that is, hardware and software platforms to make data consistently accessible and machine-readable in a timely manner — often creates major challenges to positive impact.

Burundi's OpenRBF platform is an example of working around issues related to data infrastructure. Burundi provided access to data on its results-based financing efforts around healthcare through the OpenRBF platform, a digital infrastructure for collecting and publishing such data. The existence of an "out-of-the-box" tool for making results-based funding (RBF) data public in reusable formats catalyzed the widespread opening of RBF data across many developing countries in Africa.

Pu
Public Infrastructure

Similar to the ICT4D environment, much of the literature and practice[48] of open data in developing economies points to the importance of a strong public infrastructure — human capital (including data science and statistical knowledge), public services (including education and libraries), and civil society — to ensure that data is collected, cleaned, and released in a usable manner and that updates and feedback are seamlessly incorporated into open datasets. Supply side efforts to leverage these public infrastructures can increase the demand for open data and establish touchpoints with users.

An active ecosystem of data users and international open mapping platforms and individuals helped to ensure that Nepal's open data-driven crisis response efforts could be quickly developed and put into practice. The challenges experienced by Ghana's Esoko platform as a result of unreliable electricity access in the country, on the other hand, shows the many ways that public infrastructure can affect the success of open data projects.

Lp
Tech Literacy & Internet Penetration

Even as access to the Internet continues to expand across the developing world, especially through smartphones and other portable devices, many open data projects are being launched into communities that suffer from low Internet penetration and a persistent digital divide. Several of the initiatives studied struggled to achieve their transformative potential, particularly when practitioners failed to engage intermediaries or civil society groups capable of reaching unconnected audiences.

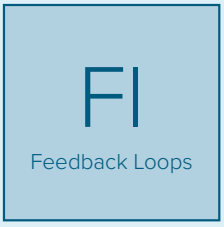
Stakeholders involved in South Africa's Medicine Price Registry Application (MPRApp) and Tanzania's open education dashboards pointed to low Internet penetration rates, and the related challenge of low tech literacy, as major barriers they confronted to achieving greater positive impacts.

As is often the case in developed countries, too, cultural and institutional roadblocks can limit the impact of open data. These roadblocks can manifest in the form of an institutional culture that remains skeptical of openness, or the absence of well-trained individuals and professionals capable of recognizing and acting on the potential of open data (readiness) — beyond the prevalence of engaging volunteers in the development of open data initiatives. In all cases, a more concerted culture- and capacity-building effort is often necessary to create an impact.

In Burundi, for instance, efforts to create transparency and accountability around its results-based financing efforts were slowed and complicated by a lack of readiness for technology-enabled openness within key institutions. Jamaica's open data tourism efforts relied on the readiness of outside volunteers to supplement open data through crowdsourcing — with the impact of the project dependent on their capacity to collect data and information in a strategic, usable manner.

OPEN DATA USER/DONOR ELEMENTS

Especially for more technical uses of open data — such as sophisticated data analytics — actors on the demand side of open data need to possess certain skills and expertise. Employees at CIAT, the organization behind Aclímate Colombia, for instance, possess high-level data science capabilities that enabled them to leverage open data to create sophisticated algorithmic tools to inform agricultural decision making. Other projects, like crowdsourcing efforts from Jamaica and Nepal, relied on the skills of a few important institutional actors on the demand side and the less-technical efforts of volunteer data collectors.



Open data initiatives tend to be less successful when they do not create mechanisms for users and beneficiaries to provide input to demand-side practitioners. Tanzania's open education dashboards are a notable example. The platforms were launched into an environment with low Internet penetration and digital literacy, with seemingly little opportunity for the intended users and beneficiaries of the tools, like parents or education advocates, to suggest ways to make the platforms more usable (and useful) for the community.

The availability of funding and resources are a key variable of success on both the supply and demand sides of open data. Focusing on the demand side, although many open data projects can be stood up quickly on a tight budget (such as Kenya's GotToVote! an initial prototype of which was created for only $500), sometimes with a very small team (Paraguay's dengue prediction efforts were championed by researcher Juan Pane and a small team under his direction), establishing sustainability and scaling use often requires more sustained funding and/or well-defined business models. This was the dynamic at work for example in South Africa, where the MPRApp relied almost entirely on the time and effort of a single person. Likewise, in Uganda, CIPESA, the developers of the iParticipate open health data and citizen engagement effort, struggled to proactively elevate health service delivery concerns to relevant government officials because of funding issues affecting both data collection and outreach efforts.

The agriculture information tool Esoko, on the other hand, has managed to take hold in Ghana in large part due to its for-profit, largely business to business (B2B) model, as well as significant investments from foundations and international organizations.

GOVERNANCE

A diversity of governing decisions affect the use and impact of open data efforts. Issues of governance exist at both the ecosystem level — especially related to standards and policies of data release — and on the demand side, with questions of risk mitigation and impact assessment leading the way.

OPEN DATA ECOSYSTEM ELEMENTS

Od
Open by Default

Given the level of government resource allocation and time investment required to implement strong open data initiatives, high-level political buy-in and codified open data policies (reflecting the International Open Data Charter principles)[59] are needed to provide the incentives and flexibility to government officials to meaningfully advance open data goals.

The ESMI effort in India, for example, is an industry- and NGO-driven effort to create and open useful data on power quality in the country. This effort, which has had relatively little discernible impact to date, is only necessary because of the lack of energy data being opened by government — an issue that could be resolved with a commitment to openness by default and other internationally accepted principles.

Fi
Freedom of Information

Clear policies pushing forward access to information and data can act as important drivers for open data initiatives. Without explicit policy backing, the sustainability of open data efforts can be called into question, and access to necessary data can dry up at any time. The existence of Freedom of Information policies can also provide means for accessing relevant information, though often at a much slower pace than open data.

A key enabler for the MPRApp open data initiative, for example, was South Africa's legislative framework that promotes and enacts transparency in medicine pricing. Such a framework compels the Department of Health to collect and publish data on medicine prices in South Africa, ensuring that the supply side of the MPRApp will continue to be made accessible, allowing Code for South Africa to focus on improving the tool and getting it into the hands of its intended users.

Dq
Data Quality

A widely prevalent challenge to positive impact arises from poor data quality. Data quality is an issue in developed countries, but often presents even greater barriers to success in developing countries. Quality issues can manifest in a number of ways, like inaccurate information, a lack of completeness in official datasets, out-of-date data, or otherwise corrupted datasets.

Aclímate Colombia, for example, experienced challenges gaining access to the most complete and up-to-date information sets for its agriculture tools, slowing their development. Open Development Cambodia's efforts are consistently challenged by not only strong restrictions in terms redistribution, reproduction, and reuse on some datasets, but also by the inconsistency and unpredictability of when updates to important official datasets occur.

In South Africa, the MPRApp was hurt by a lack of interoperability; that is, open data was not made available in standards that allowed for aggregation and manipulation. Likewise, Kenya's GotToVote! experienced major challenges when one of its central data sources crashed unexpectedly, rendering the platform temporarily unusable.

R
Responsiveness

Just as open data is unlikely to create a major impact without demand-side actors to act upon released data, a lack of responsiveness, often characterized by a lack of commitment to take up data-driven insights within governing institutions, can limit the impact of open data. Often, governments succumb to the temptation to open wash data, nominally opening it up but failing to create feedback loops to ensure that users are actually using the data or that data is being released to meet a genuine demand.

In Jamaica, for example, an interactive community mapping project is supplementing open datasets with a crowdsourced effort to improve tourism in the country; the project's clear potential has not yielded major impacts yet in part because tourism authorities have not yet acted on the generated insights. The researchers who used open data to predict dengue fever transmission in Paraguay also experienced ongoing challenges wresting the most useful data for their algorithms from government data holders; there has been little indication that their insights will be meaningfully taken up by institutional authorities.

OPEN DATA USER/DONOR AGENCY ELEMENTS

M
Performance Metrics

Open data projects are better positioned for success when practitioners develop and monitor metrics of impact to inform management and iteration.

The vast majority of the open data initiatives studied in this series lacked clearly defined performance metrics. Not only does this create major challenges for iterating upon early efforts, it calls the sustainability of these interventions into question, with a demonstration of success and impact a likely requirement for continued funding and investment.

Rm
Risk Mitigation

In some cases, open data projects can be advanced despite some level of risk. In such cases, practitioners must ensure that projects that deal in information that is potentially personally identifiable (including anonymized data) have outlined and implemented a clear, upfront strategy for addressing risks created by open data use.

Many of the projects studied in this series dealt in potentially sensitive information—e.g., health, energy consumption, political, and education data. Although each project took steps to ensure that no personally identifiable information was released to the public, all would benefit from a clearly defined—and, preferably, openly available—risk mitigation strategy to ensure that no harms inadvertently fall on data subjects.

APPENDIX D

SELECTED READINGS ON OPEN DATA IN DEVELOPING ECONOMIES

OPEN DATA AND OPEN GOVERNMENT FOR DEVELOPMENT

Benjamin, Solomon, R. Bhuvaneswari, P. Rajan and Manjunatha, "Bhoomi: 'E-governance,' or, an anti-politics machine necessary to globalize Bangalore?" CASUM-m Working Paper, January 2007, http://bit.ly/2aD3vZe**.**

- This paper explores the digitization of land titles and their effect on governance in Bangalore. The paper takes a critical view of digitization and transparency efforts, particularly as best practices that should be replicated in many contexts.
- The authors point to the potential of centralized open data and land records databases as a means for further entrenching existing power structures. They found that the digitization of land records in Bangalore "led to increased corruption, much more bribes and substantially increased time taken for land transactions," as well allowing "very large players in the land markets to capture vast quantities of land when Bangalore experiences a boom in the land market."
- They argue for the need "to replace politically neutered concepts like 'transparency', 'efficiency', 'governance', and 'best practice' [with] conceptually more rigorous terms that reflect the uneven terrain of power and control that governance embodies."

McGee, Rosie and Duncan Edwards, "Introduction: Opening Governance — Change, Continuity and Conceptual Ambiguity," IDS Bulletin, January 24, 2016. http://bit.ly/2aJn1pq**.**

This introduction to a special issue of the *IDS Bulletin* frames the research and practice of leveraging opening governance as part of a development agenda.

The piece primarily focuses on a number of "critical debates" that "have begun to lay bare how imprecise and overblown the expectations are in the transparency, accountability and openness 'buzzfield', and the problems this poses."

A key finding on opening governance's uptake and impact in the development space relates to political buy-in:

"Political will is generally a necessary but insufficient condition for governance processes and relationships to become more open, and is certainly a necessary but insufficient condition for tech-based approaches to open them up. In short, where there is a will, tech-for-T&A may be able to provide a way; where there isn't a will, it won't."

OPEN DATA AND DATA 4 DEVELOPMENT

3rd International Open Data Conference (IODC), "Enabling the Data Revolution: An international open data roadmap," Conference Report, 2015, http://bit.ly/2asb2ei.

This report, prepared by Open Data for Development, summarizes the proceedings of the third IODC in Ottawa, ON. It sets out an action plan for "harnessing open data for sustainable development," with the following five priorities:

1. Deliver shared principles for open data
2. Develop and adopt good practices and open standards for data publication
3. Build capacity to produce and use open data effectively
4. Strengthen open data innovation networks
5. Adopt common measurement and evaluation tools

The report draws on 70 impact accounts to present cross-sector evidence of "the promise and reality of open data," and emphasizes the utility of open data in monitoring development goals, and the importance of "joined-up open data infrastructures," ensuring wide accessibility, and grounding measurement in a clear understanding of citizen need, in order to realize the greatest benefits from open data.

Finally, the report sets out a draft International Open Data Charter and Action Plan for International Collaboration.

Hilbert, Martin, "Big Data for Development: A review of promises and challenges," Development Policy Review, December 13, 2015, http://bit.ly/2aoPtxL**.**

This article presents a conceptual framework based on the analysis of 180 articles on the opportunities and threats of big data for international development.

Open data, Hilbert argues, can be an incentive for those outside of government to leverage big data analytics: "If data from the public sector were to be openly available, around a quarter of existing data resources could be liberated for Big Data Analytics."

Hilbert explores the misalignment between "the level of economic well-being and perceived transparency of a country" and the existence of an overarching open data policy. He points to low-income countries that are active in the open data effort, like Kenya, Russia and Brazil, in comparison to "other countries with traditionally high perceived transparency," which are less active in releasing data, like Chile, Belgium and Sweden.

International Development Research Centre, World Wide Web Foundation, and Berkman Center at Harvard University, "Fostering a Critical Development Perspective on Open Government Data," Workshop Report, 2012, http://bit.ly/2aJpyQq**.**

This paper considers the need for a critical perspective on whether the expectations raised by open data programs worldwide — as "a suitable remedy for challenges of good governance, economic growth, social inclusion, innovation, and participation" — have been met, and if so, under what circumstances.

Given the lack of empirical evidence underlying the implementation of open data initiatives to guide practice and policy formulation, particularly in developing economies, the paper discusses the implementation of a policy-oriented research agenda to ensure open data initiatives in the Global South "challenge democratic deficits, create economic value and foster inclusion."

The report considers theories of the relationship between open data and impact, and the mediating factors affecting whether that impact is achieved. It takes a broad view of impact, including both demand- and supply-side economic impacts, social and environmental impact, and political impact.

Open Data for Development, "Open Data for Development: Building an inclusive data revolution," Annual Report, 2015, http://bit.ly/2aGbkz5**.**

This report — the inaugural annual report for the Open Data for Development program — gives an overview of outcomes from the program for each of OD4D's five program objectives:

1. Setting a global open data for sustainable development agenda;
2. Supporting governments in their open data initiatives;
3. Scaling data solutions for sustainable development;
4. Monitoring the availability, use and impact of open data around the world; and
5. Building the institutional capacity and long-term sustainability of the Open Data for Development network.

The report identifies four barriers to impact in developing countries: the lack of capacity and leadership; the lack of evidence of what works; the lack of coordination between actors; and the lack of quality data.

Stuart, Elizabeth, Emma Samman, William Avis and Tom Berliner, "The Data Revolution: Finding the missing millions," Open Data Institute Research Report, April 2015, http://bit.ly/2acnZtE**.**

This report examines the challenge of implementing successful development initiatives when many citizens are not known to their governments as they do not exist in official databases.

The authors argue that "good quality, relevant, accessible and timely data will allow willing governments to extend services into communities which until now have been blank spaces in planning processes, and to implement policies more efficiently."

In addition to improvements to national statistical offices, the authors argue that "making better use of the data we already have" by increasing openness to certain datasets held by governments and international organizations could help to improve the situation.

They examine a number of open data efforts in developing countries, including Kenya and Mexico.

Finally, they argue that "the data revolution could play a role in changing the power dynamic between citizens, governments and the private sector, building on open data and freedom of information movements around the world. It has the potential to enable people to produce, access and understand information about their lives and to use this information to make changes."

United Nations Independent Expert Advisory Group on a Data Revolution for Sustainable Development, "A World That Counts, Mobilizing the Data Revolution," 2014, http://bit.ly/2am5K28**.**

This report focuses on the potential benefits and risks data holds for sustainable development. Included in this is a strategic framework for using and managing data for humanitarian purposes. It describes a need for a multinational consensus to be developed to ensure data is shared effectively and efficiently.

It suggests that "people who are counted" — i.e., those who are included in data collection processes — have better development outcomes and a better chance for humanitarian response in emergency or conflict situations.

In particular, "better and more open data" is described as having the potential to "save money and create economic, social and environmental value" toward sustainable development ends.

The World Bank, Digital Dividends: World Development Report 2016, http://bit.ly/2aG9Kx5**.**

This report examines "digital dividends" or the development benefits of using digital technologies in the space.

The authors argue that: "To get the most out of the digital revolution, countries also need to work on the 'analog complements' — by strengthening regulations that ensure competition among businesses, by adapting workers' skills to the demands of the new economy, and by ensuring that institutions are accountable."

The "data revolution," which includes both big data and open data is listed as one of four "digital enablers."

Open data's impacts are explored across a number of cases and developing countries and regions, including: Nepal, Mexico, Southern Africa, Kenya, Moldova, and the Philippines.

Despite a number of success stories, the authors argue that: "sustained, impactful, scaled-up examples of big and open data in the developing world are still relatively rare," and, in particular, "Open data has far to go." They point to the high correlation between readiness, implementation and impact of open data to GDP per capita as evidence of the room for improvement.

OPEN DATA AND OPEN DEVELOPMENT

Reilly, Katherine and Juan P. Alperin, "Intermediation in Open Development: A knowledge stewardship approach," Global Media Journal (Canadian Edition), 2016, http://bit.ly/2atWyI8**.**

This paper examines the intermediaries that "have emerged to facilitate open data and related knowledge production activities in development processes."

In particular, they study the concept of "knowledge stewardship," which "demands careful consideration of how — through what arrangements — open resources can best be provided, and how best to maximize the quality, sustainability, buy-in, and uptake of those resources."

The authors describe five models of open data intermediation:

- Decentralized
- Arterial
- Ecosystem
- Bridging
- Communities of practice

Reilly, Katherine and Rob McMahon, "Quality of Openness: Evaluating the contributions of IDRC's Information and Networks Program to open development," International Development Research Centre, January 2015, http://bit.ly/2aD6hoU.

This report describes the outcomes of IDRC's Information and Networks (I&N) program, focusing, in particular, on those related to "quality of openness" of initiatives as well as their outcomes.

The research program explores "mechanisms that link open initiatives to human activities in ways that generate social innovations of significance to development. These include push factors such as data holders' understanding of data usage, the preparedness or acceptance of user communities, institutional policies, and wider policies and regulations; as well as pull factors including the awareness, capacity and attitude of users. In other words, openly networked social processes rely on not just quality openness, but also on supportive environments that link open resources and the people who might leverage them to create improvements, whether in governance, education or knowledge production."

Smith, M. and L. Elder, "Open ICT Ecosystems Transforming the Developing World," Information Technologies and International Development, 2010, http://bit.ly/2auoqsW**.**

The paper examines the hypothesis that "open social arrangements, enabled by ICTs, can help to catalyze the development impacts of ICTs. In other words, open ICT ecosystems provide the space for the amplification and transformation of social activities that can be powerful drivers of development."

Although the focus is placed on a number of ICT interventions — with open data only directly referenced as it relates to the science community — the lessons learned and overarching framework are applicable to the open data for development space.

The authors argue for a new research focus on "the new social activities enabled by different configurations of ICT ecosystems and their connections with particular social outcomes." They point in particular to "modules of social practices that can be applied to solve similar problems across different development domains," including "massive participation, collaborative production of content, collaborative innovation, collective information validation, new 'open' organizational models, and standards and knowledge transfer."

Smith, Matthew and Katherine M. A. Reilly, eds., Open Development: Networked innovations in international development, MIT Press, 2013, http://bit.ly/2atX2hu**.**

This edited volume considers the implications of the emergence of open networked models predicated on digital network technologies for development. In their introduction, the editors emphasize that openness is a means to support development, not an end, which is layered upon existing technological and social structures. Though openness is often disruptive, it depends upon some measure of closedness and structure to function effectively.

Subsequent, separately authored chapters provide case studies of open development drawn from health, biotechnology, and education, and explore some of the political and structural barriers faced by open models.

van den Broek, Tijs, Marijn Rijken and Sander van Oort, "Towards Open Development Data: A review of open development data from a NGO perspective," 2012, http://bit.ly/2ap5E8a**.**

In this paper, the authors seek to answer the question: "What is the status, potential and required next steps of open development data from the perspective of the NGOs?"

They argue that "the take-up of open development data by NGOs has shown limited progress in the last few years," and offer "several steps to be taken before implementation" to increase the effectiveness of open data's use by NGOs to improve development efforts:

- Develop a vision on open development and open data.
- Develop a clear business case.
- Research the benefits and risks of open development data and raise organizational and political awareness and support.
- Develop an appealing business model for data intermediaries and end-users.
- Balance data quality and timeliness.
- Dealing with the data obesity.
- Enrich quantitative data to overcome a quantitative bias.
- Monitor implementation and share best practices.

OPEN DATA AND DEVELOPMENT GOALS

Berdou, Evangelia, "Mediating Voices and Communicating Realities: Using information crowdsourcing tools, open data initiatives and digital media to support and protect the vulnerable and marginalised," Institute of Development Studies, 2011, http://bit.ly/2aqbycg**.**

This report examines how "open source information crowdsourcing platforms like Ushahidi, and open mapping and data initiatives like OpenStreetMap, are enabling citizens in developing countries to generate and disseminate information critical for their lives and livelihoods."

The authors focus in particular on:

- "the role of the open source social entrepreneur as a new development actor
- the complexity of the architectures of participation supported by these platforms and the need to consider them in relation to the decision-making processes that they aim to support and the roles in which they cast citizens
- the possibilities for cross-fertilisation of ideas and the development of new practices between development practitioners and technology actors committed to working with communities to improve lives and livelihoods."

While the use of ICTs and open data pose numerous potential benefits for supporting and protecting the vulnerable and marginalized, the authors call for greater attention to:

- challenges emerging from efforts to sustain participation and govern the new information commons in under-resourced and politically contested spaces
- complications and risks emerging from the desire to share information freely in such contexts
- gaps between information provision, transparency and accountability, and the slow materialization of projects' wider social benefits

Canares, Michael and Satyarupa Shekhar, "Open Data and Sub-national Governments: Lessons from developing countries," 2015, http://bit.ly/2au2gu2**.**

This synthesis paper seeks to gain a greater understanding of open data's effects on local contexts — "where data is collected and stored, where there is strong feasibility that data will be published, and where data can generate the most use and impact" — through the examination of nine papers developed as part of the Open Data in Developing Countries research project.

The authors point to three central findings:

- "There is substantial effort on the part of sub-national governments to proactively disclose data, however, the design delimits citizen participation, and eventually, use."
- Context demands different roles for intermediaries and different types of initiatives to create an enabling environment for open data."
- "Data quality will remain a critical challenge for sub-national governments in developing countries and it will temper potential impact that open data will be able to generate."

Davies, Tim, "Open Data in Developing Countries — Emerging Insights from Phase I," ODDC, 2014, http://bit.ly/2aX55UW**.**

This report synthesizes findings from the Exploring the Emerging Impacts of Open Data in Developing Countries (ODDC) research network and its study of open data initiatives in 13 countries.

Davies provides 15 initial insights across the supply, mediation, and use of open data, including:

- Open data initiatives can create new spaces for civil society to pursue government accountability and effectiveness;
- Intermediaries are vital to both the supply and the use of open data; and
- Digital divides create data divides in both the supply and use of data.

Davies, Tim and Duncan Edwards, "Emerging Implications of Open and Linked Data for Knowledge Sharing Development," IDS Bulletin, 2012, http://bit.ly/2aLKFyI**.**

This article explores "issues that development sector knowledge intermediaries may need to engage with to ensure the socio-technical innovations of open and linked data work in the interests of greater diversity and better development practice."

The authors explore a number of case studies where open and linked data was used in a development context, including:

- Open research: IDS and R4D meta-data
- Open aid: International Aid Transparency Initiative
- Open linked statistics: Young Lives

Based on lessons learned from these cases, the authors argue that "openness must serve the interests of marginalized and poor people. This is pertinent at three levels:

- Practices in the publication and communication of data
- Capacities for, and approaches to, the use of data
- Development and emergent structuring of open data ecosystems

Montano, Elise and Diogo Silva, "Exploring the Emerging Impacts of Open Data in Developing Countries (ODDC): ODDC1 follow-up outcome evaluation report," ODDC, 2016, http://bit.ly/2au65z7**.**

This report summarizes the findings of a two and a half year research-driven project sponsored by the World Wide Web Foundation to explore how open data improves governance in developing countries, and build capacity in these countries to engage with open data. The research was conducted through 17 subgrants to partners from 12 countries.

Upon evaluation in 2014, partners reported increased capacity and expertise in dealing with open data; empowerment in influencing local and regional open data trends, particularly among CSOs; and increased understanding of open data among policy makers with whom the partners were in contact.

Davies, Tim, Fernando Perini, and Jose Alonso, "Researching the Emerging Impacts of Open Data," ODDC, 2013, http://bit.ly/2aqb6uP**.**

This research report offers a conceptual framework for open data, with a particular focus on open data in developing countries.

The conceptual framework comprises three central elements:

- Open Data
- About government
- About companies and markets
- About citizens
- Domains of governance
- Political domains
- Economic domains
- Social domains
- Emerging Outcomes
- Transparency and accountability
- Innovation and economic growth
- Inclusion and empowerment

The authors describe three central theories of change related to open data's impacts:

- Open data will bring about greater transparency in government, which in turn brings about greater accountability of key actors to make decisions and apply rules in the public interest;
- Open data will enable non-state innovators to improve public services or build innovative products and services with social and economic value; open data will shift certain decision making from the state into the market, making it more efficient;
- Open data will remove power imbalances that resulted from asymmetric information, and will bring new stakeholders into policy debates, giving marginalized groups a greater say in the creation and application of rules and policy.

Open Data in Europe and Central Asia, "The Role of Open Data for Sustainable Development: A brief from Eastern Europe and Central Asia," 2016, http://bit.ly/2tiTgli

This report was produced by ODECA in partnership with the United Nations Development Programme and the Open Data for Development Network to assess the use and impact of open data in the Eastern European and Central Asia (EECA) region in the context of the SDGs.

Focusing their study in particular on Albania, Georgia and Moldova, the authors provide four central recommendations to increase open data's impact on development across the region:

- "Open data initiatives need to combine institutional and civil society development.
- Governments need to actively engage civil society actors when developing open data initiatives, creating higher awareness of open data, and using available capacity and synergies between sectors.
- Open data publication should be incorporated as a part of general civil service reforms, involving data literacy and increased awareness within the public sector.
- International organizations should provide vital support for open data within the EECA region, including necessary expertise in the field."

The World Bank, "Open Data for Sustainable Development," Policy Note, August 2015, http://bit.ly/2aGjaJ4**.**

This report from the World Bank seeks to describe open data's potential for achieving the Sustainable Development Goals, and makes a number of recommendations toward that end.

The authors describe four key benefits of open data use for developing countries:

- Foster economic growth and job creation
- Improve efficiency, effectiveness, and coverage of public services
- Increase transparency, accountability, and citizen participation
- Facilitate better information sharing within government
- The paper concludes with a number of recommendations for improving open data programs, including:
- Support open data use through legal and licensing frameworks.
- Make data available for free online.
- Publish data inventories for the government's data resources.
- Create feedback channels to government from current and potential data users.
- Prioritize the datasets that users want.

Smith, Fiona, William Gerry and Emma Truswell, "Supporting Sustainable Development with Open Data," Open Data Institute, 2015, http://bit.ly/2aJwxsF**.**

This report describes the potential benefits, challenges and next steps for leveraging open data to advance the Sustainable Development Goals.

The authors argue that the greatest potential impacts of open data on development are:

- More effectively target aid money and improve development programs
- Track development progress and prevent corruption
- Contribute to innovation, job creation and economic growth.

They note, however, that many challenges to such impacts exist, including:

- A weak enabling environment for open data publishing
- Poor data quality
- A mismatch between the demand for open data and the supply of appropriate datasets
- A "digital divide" between rich and poor, affecting both the supply and use of data
- A general lack of quantifiable data and metrics.

The report articulates a number of ways that "governments, donors and (international) NGOs — with the support of researchers, civil society and industry — can apply open data to help make the SDGs a reality:

- Reach global consensus around principles and standards, namely being "open by default," using the Open Government Partnership's Open Data Working Group as a global forum for discussion.
- Embed open data into funding agreements, ensuring that relevant, high-quality data is collected to report against the SDGs. Funders should mandate that data relating to performance of services, and data produced as a result of funded activity, be released as open data.
- Build a global partnership for sustainable open data, so that groups across the public and private sectors can work together to build sustainable supply and demand for data in the developing world."

OPEN DATA AND DEVELOPING COUNTRIES (NATIONAL CASE STUDIES)

Beghin, Nathalie and Carmela Zigoni, "Measuring Open Data's Impact on Brazilian National and Sub-National Budget Transparency Websites and Its Impacts on People's Rights," 2014, http://bit.ly/2au3LaQ**.**

This report examines the impact of a Brazilian law requiring government entities to "provide real-time information on their budgets and spending through electronic means." The authors explore "whether the national and state capitals are in fact using principles and practices of open data in their disclosures, and has evaluated the emerging impacts of open budget data disclosed through the national transparency portal."

The report leveraged a "quantitative survey of budget and financial disclosures, and qualitative research with key stakeholders" to explore the "role of technical platforms and intermediaries in supporting the use of budget data by groups working in pursuit of social change and human rights."

The survey found that:

- The information provided is complete.
- In general, the data are not *primary.*
- Most governments do not provide *timely* information.
- *Access* to information is not ensured to all individuals.
- Advances were observed in terms of the availability of *machine-processable data.*
- Access is free, *without discriminating* users.
- The minority presents data in non-proprietary format.
- It is not known whether the data are under *license.*

Boyera, S. and C. Iglesias, "Open Data in Developing Countries: State of the art," Partnership for Open Data, 2014, http://bit.ly/2acBMR7**.**

This report provides a summary of the state-of-the-art study developed by SBC4D for the Partnership for Open Data (POD).

A series of interviews and responses to an online questionnaire yielded a number of findings, including:

- "The number of actors interested in Open Data in Developing Countries is growing quickly. The study has identified 160+ organizations. It is important to note that a majority of them are just engaging in the domain and have little past experience. Most of these actors are focused on OD as an objective not a tool or means to increase impact or outcome.
- Local actors are strong advocates of public data release. Lots of them are also promoting the re-use of existing data (through e.g. the organization of training, hackathons and alike). However, the study has not identified many actors practically using OD in their work or engaged in releasing their own data.
- Traditional development sectors (health, education, agriculture, energy, transport) are not yet the target of many initiatives, and are clearly underdeveloped in terms of use-cases.
- There is very little connection between horizontal (e.g. national OD initiatives) and vertical (sector-specific initiatives on e.g. extractive industry, or disaster management) activities."

Canares, M.P., J. de Guia, M. Narca and J. Arawiran, "Opening the Gates: Will open data initiatives make local governments in the Philippines more transparent?" Open LGU Research Project, 2014, http://bit.ly/2au3Ond**.**

This paper seeks to determine the impacts of the Department of Interior and Local Government of the Philippines' Full Disclosure Policy, affecting financial and procurement data, on both data providers and data users.

The paper uncovered two key findings:

- "On the supply side, incentivising openness is a critical aspect in ensuring that local governments have the interest to disclose financial data. While at this stage, local governments are still on compliance behaviour, it encourages the once reluctant LGUs to disclose financial information in the use of public funds, especially when technology and institutional arrangements are in place. However, LGUs do not make an effort to inform the public that information is available online and has not made data accessible in such a way that it can allow the public to perform computations and analysis. Currently, no data standards have been made yet by the Philippine national government in terms of format and level of detail."

- "On the demand side, there is limited awareness on the part of the public, and more particularly the intermediaries (e.g. business groups, civil society organizations, research institutions), on the availability of data, and thus, its limited use. As most of these data are financial in nature, it requires a certain degree of competence and expertise so that they will be able to make use of the data in demanding from government better services and accountability."
- The authors argue that "openness is not just about governments putting meaningful government data out into the public domain, but also about making the public meaningfully engage with governments through the use of open government data." In order to do that, policies should "require observance of open government data standards and a capacity building process of ensuring that the public, to whom the data is intended, are aware and able to use the data in ensuring more transparent and accountable governance."

Canares, M., M. Narca and D. Marcial, "Enhancing Citizen Engagement Through Open Government Data," ODDC, 2015, http://bit.ly/2aJMhfS**.**

This research paper seeks to gain a greater understanding of how civil society organizations can increase or initiate their use of open data. The study is based on research conducted in two provinces in the Philippines where civil society organizations in Negros Oriental province were trained, and in the Bohol province were mentored on accessing and using open data.

The authors seek to answer three central research questions:

- What do CSOs know about open government data? What do they know about government data that their local governments are publishing in the web?
- What do CSOs have in terms of skills that would enable them to engage meaningfully with open government data?
- How best can capacity building be delivered to civil society organizations to ensure that they learn to access and use open government data to improve governance?
- They provide a number of key lessons, including:
- Baseline conditions should inform capacity building approach.
- Data use is dependent on data supply.
- Open data requires accessible and stable internet connection.
- Open data skills are important but insufficient.
- Outcomes, and not just outputs, prove capacity improvements.

Chiliswa, Zacharia, "Open Government Data for Effective Public Participation: Findings of a case study research investigating the Kenya's open data initiative in urban slums and rural settlements," ODDC, April 2014, http://bit.ly/2au8E4s**.**

This research report is the product of a study of two urban slums and a rural settlement in Nairobi, Mobasa and Isiolo County, respectively, aimed at gaining a better understanding of the awareness and use of Kenya's open data.

The study had four organizing objectives:

- "Investigate the impact of the Kenyan Government's open data initiative and to see whether, and if so how, it is assisting marginalized communities and groups in accessing key social services and information such as health and education;
- Understand the way people use the information provided by the Open Data Initiative;
- Identify people's trust in the information and how it can assist their day-to-day lives;
- Examine ways in which the public wish for the open data initiative to improve, particularly in relation to governance and service delivery."

The study uncovered four central findings about Kenya's open data initiative:

- "There is a mismatch between the data citizens want to have and the data the Kenya portal and other intermediaries have provided.
- Most people go to local information intermediaries instead of going directly to the government data portals and that there are few connections between these intermediaries and the wider open data sources.
- Currently the rural communities are much less likely to seek out government information.
- The kinds of data needed to support service delivery in Kenya may be different from those needed in other places in the world."

Chattapadhyay, Sumandro, "Opening Government Data through Mediation: Exploring the roles, practices and strategies of data intermediary organisations in India," ODDC, 2014, http://bit.ly/2au3F37**.**

This report seeks to gain a greater understanding of the current practice following the Government of India's 2012 National Data Sharing and Accessibility Policy.

Cattapadhyay examines the open government data practices of "various (non-governmental) 'data intermediary organisations' on the one hand, and implementation challenges faced by managers of the Open Government Data Platform of India on the other."

The report's objectives are:

- To undertake a provisional mapping of government data related activities across different sectors to understand the nature of the "open data community" in India
- To enrich government data/information policy discussion in India by gathering evidence and experience of (nongovernmental) data intermediaries regarding their actual practices of accessing and sharing government data, and their utilization of the provisions of NDSAP and RTI act
- To critically reflect on the nature of open data practices in India

Lwanga-Ntale, Charles, Beatrice Mugambe, Bernard Sabiti and Peace Nganwa, "Understanding How Open Data Could Impact Resource Allocation for Poverty Eradication in Kenya and Uganda," ODDC, 2014, http://bit.ly/2aHqYKi**.**

This paper examines case studies from Uganda and Kenya to explore an open data movement seeking to address "age-old" issues including "transparency, accountability, equity, and the relevance, effectiveness and efficiency of governance."

The authors focus both on the role "emerging open data processes in the two countries may be playing in promoting citizen/public engagement and the allocation of resources," and the "possible negative impacts that may emerge due to the 'digital divide' between those who have access to data (and technology) and those who do not.

They offer a number of recommendations to the government of Uganda and Kenya that could be more broadly applicable, including:

- Promote sector and cross sector specific initiatives that enable collaboration and transparency through different e-transformation strategies across government sectors and agencies.
- Develop and champion the capacity to drive transformation across government and to advance skills in its institutions and civil service.

SAPKOTA, KRISHNA, "EXPLORING THE EMERGING IMPACTS OF OPEN AID DATA AND BUDGET DATA IN NEPAL," FREEDOM FORUM, AUGUST 2014, HTTP://BIT.LY/2AP0Z5G**.**

This research report seeks to answer five key questions regarding the opening of aid and budget data in Nepal:

- What is the context for open aid and budget data in Nepal?
- What sorts of budget and aid information is being made available in Nepal?
- What is the governance of open aid and budget data in Nepal?
- How are relevant stakeholders making use of open aid and budget data in Nepal?
- What are the emerging impacts of open aid and budget data in Nepal?

The study uncovered a number of findings, including

"Information and data can play an important role in addressing key social issues, and that whilst some aid and budget data is increasingly available, including in open data formats, there is not yet a sustainable supply of open data direct from official sources that meet the needs of the different stakeholders we consulted."

"Expectations amongst government, civil society, media and private sector actors that open data could be a useful resource in improving governance, and we found some evidence of media making use of data to drive stories more when they had the right skills, incentives and support."

"The context of Nepal also highlights that a more critical perspective may be needed on the introduction of open data, understanding the specific opportunities and challenges for open data supply and use in a country that is currently undergoing a period of constitutional development, institution building and deepening democracy."

SRIVASTAVA, NIDHI, VEENA AGARWAL, ANMOL SONI, SOUVIK BHATTACHARJYA, BIBHU P. NAYAK, HARSHA MEENAWAT AND TARUN GOPALAKRISHNAN, "OPEN GOVERNMENT DATA FOR REGULATION OF ENERGY RESOURCES IN INDIA,"ODDC, 2014, HTTP://BIT.LY/2AU9OXF**.**

This research paper examines "the availability, accessibility and use of open data in the extractive energy industries sector in India."

The authors describe a number of challenges being faced by:

Data suppliers and intermediaries:

- Lack of clarity on mandate
- Agency specific issues
- Resource challenges
- Privacy issues of commercial data and contractual constraints
- Formats for data collection
- Challenges in providing timely data
- Recovery of costs and pricing of data
- Data users
- Data available but inaccessible
- Data accessible but not usable
- Timeliness of data

They make a number of recommendations for addressing these challenges focusing on:

- Policy measures
- Improving data quality
- Improving effectiveness of data portal

VAN SCHALKWYK, FRANÇOIS, MICHAEL CAÑARES, SUMANDRO CHATTAPADHYAY AND ALEXANDER ANDRASON "OPEN DATA INTERMEDIARIES IN DEVELOPING COUNTRIES," ODDC, 2015, HTTP://BIT.LY/2AJZTWI**.**

This paper seeks to provide "a more socially nuanced approach to open data intermediaries," moving beyond the traditional approach wherein data intermediaries are "presented as single and simple linkages between open data supply and use."

The study's analysis draws on cases from the Emerging Impacts of Open Data in Developing Countries (ODDC) project.

The authors provide a working definition of open data intermediaries: An open data intermediary is an agent:

- positioned at some point in a data supply chain that incorporates an open dataset
- positioned between two agents in the supply chain
- facilitates the use of open data that may otherwise not have been the case

One of the study's key findings is that, "Intermediation does not only consist of a single agent facilitating the flow of data in an open data supply chain; multiple intermediaries may operate in an open data supply chain, and the presence of multiple intermediaries may increase the probability of use (and impact) because no single intermediary is likely to possess all the types of capital required to unlock the full value of the transaction between the provider and the user in each of the fields in play."

VAN SCHALKWYK, FRANÇOIS, MICHELLE WILLMERS AND TOBIAS SCHONWETTER, "EMBEDDING OPEN DATA PRACTICE," ODDC, 2015, HTTP://BIT.LY/2AHT5XU**.**

This research paper was developed as part of the ODDC Phase 2 project and seeks to address the "insufficient attention paid to the institutional dynamics within governments and how these may be impeding open data practice."

The study focuses in particular on open data initiatives in South Africa and Kenya, leveraging a conceptual framework to allow for meaningful comparison between the two countries.

Focusing on South Africa and Kenya, as well as Africa as a whole, the authors seek to address four central research questions:

- Is open data practice being embedded in African governments?
- What are the possible indicators of open data practice being embedded?
- What do the indicators reveal about resistance to or compliance with pressures to adopt open data practice?

What are different effects of multiple institutional domains that may be at play in gov-

ernment as an organization?

VAN SCHALKWYK, FRANCOIS, MICHELLE WILLMERS, AND LAURA CZERNIEWICZ, "CASE STUDY: OPEN DATA IN THE GOVERNANCE OF SOUTH AFRICAN HIGHER EDUCATION," ODDC, 2014, HTTP://BIT.LY/2AMGIFB**.**

This research report uses the South African Centre for Higher Education Transformation (CHET) open data platform as a case study to examine "the supply of and demand for open data as well as the roles of intermediaries in the South African higher education governance ecosystem."

The report's findings include:

- "There are concerns at both government and university levels about how data will be used and (mis)interpreted, and this may constrain future data supply. Education both at the level of supply (DHET) and at the level of use by the media in particular on how to improve the interpretability of data could go some way in countering current levels of mistrust. Similar initiatives may be necessary to address uneven levels of data use and trust apparent across university executives and councils."
- "Open data intermediaries increase the accessibility and utility of data. While there is a rich publicly-funded dataset on South African higher education, the data remains largely inaccessible and unusable to universities and researchers in higher education studies. Despite these constraints, the findings show that intermediaries in the ecosystem are playing a valuable role in making the data both available and useable."
- "Open data intermediaries provide both supply-side as well as demand-side value. CHET's work on higher education performance indicators was intended not only to contribute to government's steering mechanisms, but also to contribute to the governance capacity of South African universities. The findings support the use of CHET's open data to build capacity within universities. Further research is required to confirm the use of CHET data in state-steering of the South African higher education system, although there is some evidence of CHET's data being referenced in national policy documents."

VERHULST, STEFAAN AND ANDREW YOUNG, "OPEN DATA IMPACT: WHEN DEMAND AND SUPPLY MEET," THE GOVLAB, 2016, HTTP://BIT.LY/1LHKQPO**.**

This report provides a taxonomy of the impacts open data is having on a number of countries around the world, comprising:

- Improving Government
- Empowering Citizens
- Creating Opportunity
- Solving Public Problems

The authors describe four key enabling conditions for creating impactful open data initiatives:

- Partnerships
- Public Infrastructure
- Policies and Performance Metrics
- Problem Definition

The report is based on 19 case studies on open data initiatives, including many from developing economies, such as:

- Mexico's Mejora Tu Escuela
- Open Education Information in Tanzania
- Kenya's Open Duka
- Indonesia's Kawal Pemilu
- Battling Ebola in Sierra Leone

ADDITIONAL RESOURCE

WORLD BANK READINESS ASSESSMENT TOOL

To aid in the assessment "of the readiness of a government or individual agency to evaluate, design and implement an Open Data initiative," the World Bank's Open Government Data Working Group developed an openly accessible Open Data Readiness Assessment (ODRA) tool.

Assessment reports have been published for:

- Ulynaovksk, Russian Federation
- Antigua and Barbuda
- Peru
- Mexico
- Dominican Republic
- Burkina Faso
- Kazakhstan
- Uganda
- Tajikistan
- Sierra Leone
- Serbia
- Kyrgyzstan