



OPEN DATA FOR DEVELOPING ECONOMIES CASE STUDIES
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Open Data to Improve Disaster Relief

By Juliet McMurren, Saroj Bista,
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OPEN DATA FOR DEVELOPING ECONOMIES CASE STUDIES NEPAL

Open Data to Improve Disaster Relief

SUMMARY

After two devastating earthquakes in 2015, Nepal faced a lengthy and costly relief effort and recovery. Nepali open data activists sought ways to crowdsource and deploy open data to identify the most urgent needs of citizens, target relief efforts most effectively, and ensure aid money reached those in need. A number of initiatives created post-quake maps that were used by relief agencies, alerted rescuers to Nepalis in need of urgent assistance, provided opportunities for citizens to share feedback on the recovery with government, and ensured fiscal accountability for aid

money through transparency portals. Data-driven disaster preparedness efforts and the use of local knowledge, expertise and connections greatly enhanced the success of the post-quake open data projects. Natural disasters are human and economic calamities, creating a huge drain on the resources of countries and the international community. The initiatives discussed in this case study show the potential for open data to inform crowdsourced data collection efforts, helping to save lives and make relief efforts more effective.



CONTEXT AND BACKGROUND

PROBLEM FOCUS / COUNTRY CONTEXT

Nepal is a seismically active country: between 1900 and 2011, there were six serious earthquakes, resulting in a total of around 13,500 deaths.¹ In April and May 2015, Nepal was struck by a series of major earthquakes that killed 8,898² people and injured a further 22,300.³ The first earthquake, measuring magnitude 7.8,⁴ struck on April 25, 2015, with an epicenter in Barpak Village, approximately 75 km from the capital, Kathmandu. The weeks

that followed saw over 300 quakes greater than magnitude 4.0, including a second serious earthquake (magnitude 6.3⁵) on May 12, with an epicenter near Mount Everest.⁶

The effect of the earthquakes was devastating. Thirty-one of the country's 75 districts were affected, of which 14 were declared crisis-hit. Almost half a million homes were destroyed,⁷ including entire villages near the epicenter of the

1 Wikipedia, "List of Earthquakes in Nepal," Wikipedia.org, https://en.wikipedia.org/wiki/List_of_earthquakes_in_Nepal.

2 Government of Nepal, *Nepal Earthquake 2015: Sector plans and financial projections*, May 2016, <http://nra.gov.np/uploads/docs/AStGGdnejZ160823113341.pdf>.

3 National Planning Commission of Nepal, *Post Disaster Need Assessment*, Executive Summary, NPC, 2015. v

4 Jessica Robertson and Heidi Koontz, "Magnitude 7.8 Earthquake in Nepal and Aftershocks," U.S.G.S., May 12, 2015, https://www2.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal/; and Government of Nepal, *Nepal Earthquake 2015: Sector plans and financial projections*, May 2016, p. 47, <http://nra.gov.np/uploads/docs/AStGGdnejZ160823113341.pdf>.

5 Jessica Robertson and Heidi Koontz, "Magnitude 7.8 Earthquake in Nepal and Aftershocks," U.S.G.S., May 12, 2015, https://www2.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal/.

6 "Nepal – Earthquake post disaster needs assessment: sector reports (English)," The World Bank, 2015, <http://documents.worldbank.org/curated/en/546211467998818313/Nepal-Earthquake-post-disaster-needs-assessment-sector-reports>.

7 Ibid.

earthquakes,⁸ and a further 250,000 were damaged.⁹ In addition, there was extensive damage to government buildings, schools, hospitals, heritage sites, transport and power infrastructure, and agricultural land. All told, almost 3.5 million people were left homeless by the earthquakes, and 8 million people—almost a third of the country’s population—were affected.¹⁰

The impact of the earthquakes was exacerbated by Nepal’s poverty and low levels of development. Although Nepal has been highly successful in reducing its poverty rate from 64.7 percent in 2006 to 44.2 percent in 2011, it remains one of Asia’s poorest countries, with a GDP per capita of \$2,573 in 2016.¹¹ The United Nations Development Program considers Nepal a low human development country.¹²

On the 2015 Global Open Data Index, Nepal is ranked 61st of 122 countries, with a score of 30 percent open.¹³ The 2015 Open Data Barometer ranked Nepal 68th with a score of 13.09, well below the global average of 32.96. As of January 2017, Nepal has not joined the Open Government Partnership (OGP), though preliminary steps have been taken toward that eventual end.¹⁴ The 2014 creation of OpenGov Hub Kathmandu, a co-working and collaboration space for open data, transparency and accountability, and civic technology organizations and startups, also points to a continued evolution of open data interest and use in the future.¹⁵ However, Nepal’s technical infrastructure and readiness remains limited. According to the ODB, for instance, Nepal has only 15 Internet users per 100 people.¹⁶

8 Sahina Shrestha, “Lang Tang Is Gone,” *Nepali Times*, May 1-7, 2015, <http://nepalitimes.com/article/nation/langtang-destroyed-in-earthquake,2205>.

9 <https://www.worldbank.org/content/dam/Worldbank/document/SAR/nepal/PDNA%20Volume%20A%20Final.pdf>

10 Ibid.

11 International Monetary Fund, “Report for Selected Countries and Subjects,” IMF, October 2015, <http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weorept.aspx?sy=2015&ey=2016&scsm=1&ssd=1&sort=subject&ds=.&br=1&pr1.x=34&pr1.y=16&c=558&s=NGDPD%2CNGDPDPC%2CPPPGDP%2CPPPPC&grp=0&a=>.

12 United Nations Development Program, *Human Development Report 2015*, “Statistical Annex,” UNDP, http://hdr.undp.org/sites/default/files/hdr_2015_statistical_annex.pdf

13 Open Knowledge, “Global Open Data Index: Nepal,” <http://index.okfn.org/place/nepal/>.

14 Narayan Adhikari and Pranav Budhathoki, “The OGP Process in Nepal – On the Path of Our Own Choosing,” Open Government Partnership Blog, December 1, 2016, <http://www.opengovpartnership.org/blog/narayan-adhikari/2016/12/01/ogp-process-nepal-%E2%80%93-path-our-own-choosing>.

15 “We’ve Opened an OpenGov Hub in Nepal!” OpenGov Hub, May 21, 2014, <http://opengovhub.org/blog/5/2014/weve-opened-an-opengov-hub-in-nepal>.

16 World Wide Web Foundation, “Open Data Barometer, 2015,” http://opendatabarometer.org/data-explorer/?_year=2015&indicator=ODB&lang=en&open=NPL.

KEY DATA PROVIDERS, USERS AND INTERMEDIARIES

Unlike many of the projects included in this series of case studies, where different actors assumed different roles in the open data value chain, the actors involved in this particular initiative combined roles as data collectors, providers, users and intermediaries. The focus on generating crowdsourced data and putting it to use alongside open government data blurred the lines that typically demarcate traditional roles among open data stakeholders.

WITH THAT IN MIND, THE LEAD ACTORS IN THE PROJECTS EXAMINED HERE ARE:

Kathmandu Living Labs¹⁷ (KLL): A non-profit civic technology company working to create high impact technology to transform the ways government works.

Young Innovations Ltd¹⁸: A Kathmandu tech company founded in 2007 specializing in solutions for development, their goal is to establish open data as one of the priorities of the Government of Nepal.

Local Interventions Group¹⁹: Local Interventions Group (LIG) is a non-profit working in the global south to improve governance through data-driven solutions. Founded by participants in a student seminar at the London School of Economics, it has offices in the UK and Nepal. LIG is both data user and provider, having actively sought to expand Nepali open datasets through

crowdsourcing and the conversion of static government data to machine-readable format.²⁰

Open Nepal²¹: a knowledge hub and learning space for Nepali organizations and people who produce, share, and use data for development. The platform is owned by Young Innovations, NGO Federation of Nepal, Freedom Forum, and Development Initiatives, and was intended to bring together journalists, CSOs and those in the tech industry working with open data.²²

Code for Nepal²³: a 501(c)(3) non-profit organization registered in the U.S., dedicated to empowering Nepal through increasing digital literacy and access to open data, building apps to improve lives, service delivery to earthquake survivors and right to information.²⁴ Cofounded by Mia Mitchell and Ravi Kumar Nepal in 2014, Code for Nepal has pursued projects aimed at bridging the digital divide experienced by women, poor people, rural people, and ethnic minorities in Nepal.²⁵

KEY BENEFICIARIES

Most of the open data projects reviewed here were intended to directly benefit the Nepali population affected by the quakes, either through immediate relief work or through a more efficient and effective recovery. This improved efficiency, however, also benefited aid agencies, donors, and government, through better targeting of relief and recovery efforts and funds. Other projects were intended to reach intermediaries such as journalists, so that they could use the data to improve accountability.

17 <http://www.kathmandulivinglabs.org/>

18 <http://younginnovations.com.np/>

19 <http://www.localinterventions.org.uk/>

20 Interview with Pranav Budhathoki, CEO, Local Interventions Group, September 7, 2016.

21 <http://opennepal.net/>

22 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

23 <http://codefornepal.org/en/>

24 See: Code for Nepal, <http://codefornepal.org/en/>.

25 Code for Nepal, "About Us," <http://codefornepal.org/en/about-us/>.

PROJECT DESCRIPTION

The effort to leverage open data in response to the Nepal earthquakes was diverse, and spanned a number of initiatives and organizations – with additional examples not covered in this case study involving the use of corpo-

rate datasets to inform relief efforts.²⁶ This case study focuses on a number of these efforts, addressing each in sequence and then trying to draw some cross-cutting lessons.

The screenshot shows the KLL website navigation bar with links for ABOUT, TEAM, PROJECTS, GET INVOLVED, and CONTACT. On the right, there are links for Blog and Connect, and a search icon. Below the navigation bar, the 'Current Status' section reports that the survey is now complete in all 14 enlisted districts. It provides the following statistics:

Survey Duration	5 months
Total Surveyors Deployed	~2000
Nos. of Districts Surveyed	14
Total Records Collected	824,096
Total Photographs Collected	7,668,807

Below the statistics, it mentions that MyRepublica wrote about it in its cover story and provides a link to read the full article. At the bottom, it states that preparations are now underway to undertake a similar survey in the remaining 17 out of the total 31 earthquake affected districts.

(<http://www.kathmandulivinglabs.org/projects/national-housing-reconstruction-programme>)

KATHMANDU LIVING LABS

Among the most prominent of the projects, Kathmandu Living Labs (KLL), arose out of a collaborative effort in the Fall of 2013. Dr. Nama Raj Budhathoki, now Executive Director of KLL, member of the Humanitarian OpenStreetMap Team (HOT), and local organizer of OpenStreetMap, had recently completed a doctorate in crowdsourcing, open data and social and mobile media at the University of Illinois, Urbana-Champaign in 2010.²⁷ His co-founder, Robert Soden, was working for the World Bank in

Washington D.C., and looking for a Nepali partner for a World Bank Open Data for Resilience Initiative (OpenDRI) project in 2012. Robert and Nama met in Kathmandu in Fall 2012, when Nama took on a leadership role on OpenDRI in Nepal. KLL was formed as a not-for-profit civic technology company in the fall of 2013, as a means of continuing the work after the end of the OpenDRI project.²⁸ This kick-off initiative sought to map all the “educational institutions, health facilities, road networks, tangled mesh of *gallies*, religious sites and other geographic features of Kathmandu Valley.”²⁹

26 Stefaan G. Verhulst, “Corporate Social Responsibility for a Data Age,” *Stanford Social Innovation Review*, February 15, 2017, https://ssir.org/articles/entry/corporate_social_responsibility_for_a_data_age.

27 Saira Asher, “How ‘Crisis Mapping’ Is Helping Relief Efforts in Nepal,” BBC News, May 6, 2015, <http://www.bbc.com/news/world-asia-32603870>.

28 See: Kathmandu Living Labs, <http://www.kathmandulivinglabs.org/pages>.

29 “Who We Are,” Kathmandu Living Labs, <http://www.kathmandulivinglabs.org/about>.

Immediately after the earthquakes, KLL began to build on its pre-earthquake mapping work. Working from desks in the organization's parking lot—it was unsafe to go back indoors³⁰—KLL members coordinated the work of about 8,000 local and international volunteers who collaborated to build a detailed map of affected areas. Online volunteers around the world used post-quake satellite images to update the team's pre-quake maps, while in Kathmandu, KLL staff scraped images of damage from social media and mapped the damaged city on foot.³¹ The resulting map was then used by search and rescue teams, emergency services, the Nepal Army, and international relief agencies such as the Red Cross³² and UN³³ to plan and mobilize their resources. The volunteer mapping efforts were coordinated using the Humanitarian Open-StreetMap Team (HOT) tasking manager,³⁴ an open source tool that helps to coordinate large-scale mapping efforts by breaking the job into smaller tasks to be assigned to collaborators.³⁵

KLL also used its data to develop QuakeMap.org, a website through which users could report their needs to emergency organizations. With phone networks largely inoperative after the earthquakes, the internet became a life-

line for many. Built on the open source Ushahidi platform that had previously been used after the Haiti and New Zealand earthquakes, QuakeMap.org invited people to contribute information in real time about immediate local needs. Observers could note where people were trapped, identify damage to infrastructure, post information on resources such as emergency shelter, or ask for assistance with necessities such as shelter, food, and water.³⁶ KLL had a small team of volunteers dedicated to validation of reports on QuakeMap.org, via a callback to the poster to verify the facts. The Nepal Army, which took the lead in the relief effort, downloaded reports from QuakeMap.org every two hours, passing on requests for assistance to their relief division. A second level of validation also took place within Army headquarters, where a desk was set up to verify QuakeMap.org reports.³⁷ Once assistance was received, the database was updated to indicate the problem was resolved and to avoid duplication of resources.³⁸ QuakeMap.org also included a page called Who's Doing What Where, to help relief agencies view activity in the field and direct their work more effectively.

30 Shreeya Sinha, "Three Ways Nepalis Are Using Crowdsourcing to Aid in Quake Relief," *New York Times*, May 1, 2015, http://www.nytimes.com/2015/05/02/world/asia/3-ways-nepalis-are-using-crowdsourcing-to-aid-in-quake-relief.html?_r=3.

31 Imogen Wall, "Could Mapping Tech Revolutionize Disaster Response?" *The Guardian*, April 25, 2016, https://www.theguardian.com/global-development-professionals-network/2016/apr/25/could-mapping-tech-revolutionise-disaster-response?CMP=share_btn_tw.

32 Shreeya Sinha, "Three Ways Nepalis Are Using Crowdsourcing to Aid in Quake Relief," *New York Times*, May 1, 2015, http://www.nytimes.com/2015/05/02/world/asia/3-ways-nepalis-are-using-crowdsourcing-to-aid-in-quake-relief.html?_r=3.

33 Imogen Wall, "Could Mapping Tech Revolutionize Disaster Response?" *The Guardian*, April 25, 2016, https://www.theguardian.com/global-development-professionals-network/2016/apr/25/could-mapping-tech-revolutionise-disaster-response?CMP=share_btn_tw.

34 <http://tasks.hotosm.org/>

35 Nirab Pudasaini, "Open Source and Open Data's Role in Nepal Earthquake Relief," *OpenSource.com*, June 8, 2016, <https://opensource.com/life/16/6/open-source-open-data-nepal-earthquake>

36 Saira Asher, "How 'Crisis Mapping' Is Helping Relief Efforts in Nepal," *BBC News*, May 6, 2015, <http://www.bbc.com/news/world-asia-32603870>

37 Interview with Dr Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

38 Siobhan Heanue, "Nepal Earthquake: How open data and social media helped the Nepalese to help themselves," *ABC News*, August 17, 2015, <http://www.abc.net.au/news/2015-08-16/nepal-earthquake-how-open-data-social-media-helped-rebuild/6700410>.

OPEN NEPAL AND YOUNG INNOVATIONS

A second prominent initiative, the Earthquake Response Transparency Portal,³⁹ was launched by Open Nepal and Young Innovations, two organizations involved in technology and development. Soon after the Haiti earthquake in 2010, more than 40 countries ratified the International Aid Transparency Initiative (IATI)⁴⁰ standard for publishing development-related data (including budgets, annual reports, and strategic documents for country plans). In 2012, Young Innovations launched AidStream,⁴¹ a platform to help aid organizations publish data in the IATI format, which uses XML.⁴² Since then, the format has been adopted by more than 470 organizations, including Oxfam, the Red Cross, and the Bill & Melinda Gates Foundation.⁴³

Before the earthquakes, few organizations within Nepal had adopted the standard.⁴⁴ However, within 24 hours of the first earthquake, Open Nepal, an online and offline development data knowledge hub, and Young Innovations had partnered to produce the Earthquake Response Transparency Portal, a portal that tracks national and international donations (both cash and in-kind) to earthquake relief efforts. As Bibhusan Bista, CEO Young Innovations, put it:

Immediately after the earthquake there was a self-ignited, organic movement among youth in different sectors... to provide whatever assistance they could to earthquake victims. On April 26, the day after the earthquake, five or six of my colleagues and I gathered in the carpark at our office, since the ground was still shaking and we couldn't go inside. And we asked ourselves: what can we do? Instead of rushing to the field, where a lot of people are already active, can we do something based on our expertise? So... we said, let's start tracking the resources coming into Nepal.⁴⁵

39 <http://earthquake.opennepal.net/>

40 <http://www.aidtransparency.net/>

41 <http://aidstream.org/>

42 Jennifer Rigby, "A Year After the Devastating Earthquake, Nepals Young Are Rebuilding Their Country," Quartz.com, April 27, 2016, <http://qz.com/670197/a-year-after-the-devastating-earthquake-nepals-young-are-rebuilding-their-country/>

43 "Who's Using It?" AidStream, <https://aidstream.org/who-is-using>

44 Amrit Sharma, "Where Is All the Aid Money for Nepal Going? Open data could help lift the veil," Takepart.com, August 6, 2015, <http://www.takepart.com/article/2015/08/06/open-nepal-earthquake-aid-money>

45 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

The group began with United Nations Office for the Coordination of Humanitarian Affairs (OCHA) Financial Tracking Service (FTS) data, but then began scraping, cleaning and standardizing data as it was reported in the national and international media, as well as from government and non-government sources, to create a centralized portal. As Bista said: “There were a lot of questions being asked: do we have enough resources? Are those resources being used appropriately? We needed a common, accessible repository to track those data.”⁴⁶

The portal’s intent was “to support the accountable and effective use of funds that are available for relief and reconstruction activities.” To achieve this goal, it sought to 1) establish the traceability of funds from donors to intermediaries to implementing organizations; 2) enable inquiries about results of specific relief efforts and projects; and 3) provide a country-wide view of relief efforts to avoid duplication. Attempting to provide a holistic view of relief efforts and their finances, the portal shows both data from primary and secondary sources on funds given and received by all national and international entities, as well as how funds were used by these organizations.⁴⁷ Data used to build the portal is available for download in.csv format.

The data used for the Earthquake Response Transparency Portal had to be scraped, cleaned and standardized before it could be used. Much of the data came from press releases issued by donors and was in unstructured text format, which had either to be manually entered or scraped using purpose-built tools. Data from the

UN was machine-readable, but not fully open. Double counting was common in the days after the earthquake, with numbers reported from donors and implementing agencies working on the same project being added together.⁴⁸

Bista observes that the portal was intended to reduce friction and overcome some of the delays inherent in IATI reporting. In addition, the portal was also designed to address irregularities that often plague the aid and donor ecosystem. Bista notes that irregularities are apparent just by looking at the data at the macro level. For example, he said that despite a promised \$4.4 billion in aid, the data only accounted for some \$3.85 billion.⁴⁹ The Earthquake Response Transparency Portal sought to address such shortcomings by tracking pledge money as it passed from the donors through intermediaries, and by independently verifying aid money’s use for intended projects in an open manner. In the process, Young Innovations hopes to improve accountability by uncovering instances of corruption or inefficiencies leading to money failing to reach its intended beneficiaries. “Independently verifying that the pledged money was delivered to the intended project is the biggest challenge for transparency and accountability today,” he says. “We want to prevent the Haiti mistakes and serve as a model for how technology can help facilitate transparency and accountability.”⁵⁰

The main users of the Earthquake Response Transparency Portal were data-using intermediaries such as journalists. After the post-disaster needs assessment and the donors’ confer-

46 Ibid.

47 Young Innovations, “Earthquake Response Transparency Portal,” <http://earthquake.opennepal.net/about>.

48 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

49 Amrit Sharma, “Where Is All the Aid Money for Nepal Going? Open data could help lift the veil,” Takepart.com, August 6, 2015, <http://www.takepart.com/article/2015/08/06/open-nepal-earthquake-aid-money>.

50 Ibid.

ence, as donor pledges began to flow in, media reporting often failed to make a distinction between pledges, commitments and actual disbursement. As Bista put it: “There were reports in the media saying, this is the amount that has been given by India, or the UN. We wanted to educate intermediaries that we have actually not received that money. The pledge has to be converted to commitment, the commitment then has to be converted to disbursement, the disbursement then has to be converted to expenditure on an actual project.”⁵¹

In addition to data intermediaries, Bista identifies three other potential target audiences: the donors themselves, to hold them accountable for gaps between pledges and actual disbursement; CSOs and NGOs, who could use the portal both to investigate donor resources and areas of interest for potential rebuilding projects, and to “follow the money” to ensure projects were carried out; and government policymakers, to enable planning of government contributions to the rebuilding.⁵²

CODE FOR NEPAL

A third series of projects were launched by Code for Nepal, a Nepal-based nonprofit that seeks to leverage innovation, data and training efforts to improve public life. Soon after the first earthquake, Code for Nepal was looking for ways to provide a humanitarian response in badly affected regions outside Kathmandu. To do this, the team used a low-tech form of

crowdsourcing, hoping to encourage the widest possible participation.⁵³ Within 36 hours of the earthquake, Code for Nepal developed an open Google document to enlist information about relief agencies, volunteers and victims.⁵⁴

Additionally, Code for Nepal carried out two surveys of earthquake survivors to seek feedback on the kind of aid they had received. *Rahat Payo*⁵⁵ (a Nepali term meaning “did you get relief?”) and the *Kobo Toolbox*⁵⁶ surveys were carried out in two phases. The first phase surveyed 776 affected Nepalis in 40 locations across five districts in August 2015. A second phase, conducted in December 2015, focused solely on residents of the village of Barpark, the epicenter of the first major earthquake. The preliminary findings were published on the Code for Nepal website and the data shared in an open format.⁵⁷ The results of the surveys were published in the media, and were shared with non-profits working in the field, providing a granular, on-the-ground perspective of the effectiveness and reach of aid distribution. Ravi Kumar reports that more surveys are planned, probably in online format.⁵⁸

LOCAL INTERVENTIONS GROUP

Local Interventions Group, a governance-focused non-profit with offices in Nepal, also used open data to address the post-earthquake situation. This work was built on the foundations and experience of earlier projects in the areas of open governance, crowdsourcing, and

51 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

52 Ibid.

53 Femke Mulder, et al., “Questioning Big Data: Crowdsourcing crisis data towards and inclusive humanitarian response,” *Big Data and Society*, August 1, 2016, <http://bds.sagepub.com/content/3/2/2053951716662054>.

54 Interview with Ravi Kumar Nepal, September 9, 2016.

55 <http://codefornepal.s3.amazonaws.com/rahatpayo/index.html>

56 <https://1s3ej.enketo.kobotoolbox.org/webform>

57 Interview with Ravi Kumar Nepal, September 9, 2016.

58 Ibid.

smarter city solutions. In particular, the organization had built projects to help Kathmandu citizens report complaints concerning local police; crowdsourced grievances with government in two remote regions of Nepal; and worked with Google to create GIS maps of human trafficking hotspots and routes.

Within 24 hours of the earthquake, Local Interventions Group began partnering with the Nepali Home Ministry to digitize information collected by its post-earthquake emergency telephone hotline. It partnered with Accountability Lab, an incubator aimed at “strengthening systems of accountability,”⁵⁹ to send out Mobile Citizen Help Desks into affected areas, identify local needs and link affected communities to resources. Over subsequent weeks and months, as the recovery progressed, this work developed into #quakeHELPDESK, a four-part earthquake response strategy that not only allowed users to track aid data use, but also provided “a platform for affected communities, emergency responders, and volunteers to report gaps at the last mile.”⁶⁰

The other components of the project included citizen perception surveys conducted for the UNOCHA InterAgency Common Feedback Project⁶¹ (an open data platform designed to improve the responsiveness of the relief and recovery effort); the Open Mic Project,⁶² a partnership with Internews which sought to track and counter earthquake rumors and misinfor-

mation; and Follow the Money, an aid tracking and accountability program.⁶³ All these projects helped the Local Interventions Group close the feedback loop through a communications campaign with the UN, in which town hall meetings with local political representatives to discuss grievances raised through the #quakeHELPDESK were broadcast on local FM radio.⁶⁴

WHO’S DOING WHAT WHERE

In addition to these projects, various other organizations also sought to use data to introduce new efficiencies and greater transparency into relief efforts. One notable example arose from the Humanitarian Data Exchange (HDX),⁶⁵ an open platform managed by the UN OCHA for sharing humanitarian data to drive analysis. The HDX team set up Nepal—Who’s Doing What Where (Housing Recovery and Reconstruction) (HRRP 4W). This tool inventories relief housing efforts in the 14 districts most severely affected by the earthquakes according to what, where, when, and by whom projects are being planned and carried out. Data is supplied every two weeks through self-reporting after training by over 350 partner organizations working in housing recovery and reconstruction. The data are then compiled and cleaned at a national level, and used to develop reports.⁶⁶ The current database shows data from January 1, 2016 to the present, and reports continue to be filed as of late August 2016.

59 <http://www.accountabilitylab.org/>

60 “Our Mission,” #quakeHELPDESK, <http://www.quakehelpdesk.org/what.php>

61 <http://cfp.org.np/>

62 <http://www.quakehelpdesk.org/openmic.php>

63 Local Interventions Group, “Interagency Common Feedback Project: Nepal earthquake 2015,” <http://www.localinterventions.org.uk/programmes.php?post=32>.

64 Interview with Pranav Budhathoki, CEO, Local Interventions Group, September 7, 2016.

65 <https://data.humdata.org/>

66 Humanitarian Data Exchange, “Nepal—Who’s Doing What Where,” <https://data.humdata.org/dataset/160625-hrrp-4w-national>.

FUNDING

The projects had varied sources (and amounts) of funding. The Earthquake Response Transparency Portal was funded entirely by Young Innovations from the proceeds of its more commercial activities.⁶⁷ Most of the projects, however, were heavily dependent on grants from aid agencies such as the United Nations.

IMPACT

Indicators of success and impact can be divided into two broad categories: metrics and stories of use, and changes to organizational, political and social culture or behavior.

Given that the projects in Nepal emerged from a crisis, efforts to track site metrics or analyze use or traffic were seldom made at the time, although some of those interviewed said that they intended to do so in the future. As a result, it is necessary to rely on more qualitative accounts to gauge the use made of these various projects. It is important to keep in mind that even such accounts are incomplete and conjectural, however, since we can only speculate on how the relief effort would have been different if, for example, KLL's OSM project had never taken place. Nonetheless, the below attempts to assess some illustrative examples of impact across the different initiatives.

Quake Map and the perceptions surveys that formed part of #quakeHELPDESK were both UN funded, for example.⁶⁸ The work of Code for Nepal was funded largely through donations, although the second Rahat Payo survey was supported by George Mason University and Tufts University.⁶⁹

METRICS AND STORIES OF USE

Before the earthquake, Dr. Budhathoki and a dozen student interns collectively mapped every educational institution, health facility, road network, and religious site of the Kathmandu Valley, adding these and other important geographic features to OpenStreetMap. The team also gave mapping workshops to university students, government officials, the tech community, NGOs, and youth groups, recruiting volunteers to join their mapping efforts.⁷⁰ Through their pre-earthquake efforts, they had collectively created the most detailed map of the Kathmandu Valley available in the country.⁷¹

After the earthquake, Dr. Budhathoki went from managing a small team of between seven and 100 local volunteers to coordinating the efforts of 9,000 remote volunteers from a situation room. A week after the first earthquake, the team had been able to map 70 to 80 percent of the earthquake-affected areas.⁷² Internation-

67 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

68 Interview with Pranav Budhathoki, CEO, Local Interventions Group, September 7, 2016.

69 Interview with Ravi Kumar Nepal, September 9, 2016.

70 See: Kathmandu Living Labs, <http://www.kathmandulivinglabs.org/pages>.

71 Shreeya Sinha, "Three Ways Nepalis Are Using Crowdsourcing to Aid in Quake Relief," *New York Times*, May 1, 2015, http://www.nytimes.com/2015/05/02/world/asia/3-ways-nepalis-are-using-crowdsourcing-to-aid-in-quake-relief.html?_r=3.

72 Ibid.

al media reported that the OSM map was being used by relief agencies such as the Red Cross. According to Adele Waugaman, a former fellow at the Harvard Humanitarian Initiative, KLL's efforts to map all the health facilities in Kathmandu Valley before the earthquake would "undoubtedly help the relief workers' ability to deliver supplies and help save lives."⁷³

QuakeMap.org received 2,035 reports, of which 978 were verified by volunteers and 551 required action.⁷⁴ Calculating the true value of the portal is more complicated, however, than looking at the metrics. As Dr. Budhathoki put it: "How many lives were saved by it? How much human suffering was relieved by the use of QuakeMap data? I don't know. I can't give any quantified data about that."⁷⁵

CHANGING CULTURE AND BEHAVIOR

Although the Earthquake Response Transparency Portal had no use case before its launch, Bista's hunch that the target market would be the media proved correct. Within Nepal, the portal has been used by national journalists to provide evidence for their write-ups. Bista reports that international media such as the BBC have also used the portal to track governmental use of funds.

Young Innovations also found an audience among journalists. It found itself being asked to provide training in data journalism to members of the media wanting to know how they

could make better use of the platform. In addition, some surprising uses also emerged. For instance, the Nepalese diaspora in the US, which was actively generating and gathering funds and resources for the relief effort, used the portal to screen NGOs to decide where to contribute. There were also requests for increased granularity of data by district, by users who were interested in tracking geographic distribution of aid, although the nature of the data reporting made this difficult to supply.⁷⁶

IMPROVING IATI

The experience of the Earthquake Response Transparency Portal has also illuminated some of the limitations of IATI reporting in emergencies, and in the process perhaps contributed to future improvements in the system. The portal met a clear need by several audiences for immediate, centralized reporting of structured and standardized data during a crisis and its aftermath; these were benefits existing IATI reporting mechanisms could not provide. Bista has been able to feed this experience back into the IATI ecosystem through participation in international conferences on humanitarian data, such as the World Humanitarian Summit in Istanbul in May 2016. "Through this, we are also contributing to the discussion on how data on global humanitarian aid should be standardized," he said. IATI now has a team working on data standardization, including representatives from Young Innovations.⁷⁷

⁷³ Ibid.

⁷⁴ Nirab Pudasaini, "Open Source and Open Data's Role in Nepal Earthquake Relief," OpenSource.com, June 8, 2016, <https://opensource.com/life/16/6/open-source-open-data-nepal-earthquake>.

⁷⁵ Interview with Dr. Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

⁷⁶ Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016..

⁷⁷ Ibid.

RISKS

The proliferation of open data projects in the chaotic environment after a natural disaster presents opportunities to help, but also introduces the possibility of greater confusion and chaos. Untrained volunteers keen to help may swamp relief agencies and hamper their efforts; even where their help is welcome, as with KLL's QuakeMap work, managing volunteers requires the commitment of staff time. Unconscious duplication of effort may also occur:

several perception surveys of earthquake survivors were carried out by those organizations interviewed, for example, with surveyors sometimes unaware of one another's work. Finally, crowdsourced emergency information platforms can add to confusion among survivors and waste time among rescuers if information is not carefully verified. Platforms such as Open Mic, which counter rumor among survivors, provide a tool to combat misinformation.

LESSONS LEARNED

Several important lessons with wider applicability emerge from this particular case study. These can broadly be categorized by consid-

ering the key enablers of the project, as well as the most important barriers or challenges to its success.

ENABLERS

LEARNING FROM HAITI

Several of the projects were very consciously built on the experience of Haiti's devastating earthquake of January 2010. Those involved were well aware of the pitfalls of poor preparedness and a lack of transparency for a poor, earthquake-prone country, and sought to find ways to improve the outcome for Nepal, either before the earthquake or immediately after it.⁷⁸ This awareness of previous efforts, and willingness to build on lessons learned, was one of

the key enablers that contributed to the impact and success of Nepali efforts.

The experience of Haiti motivated Dr. Nama Budhathoki to return to Nepal to begin mapping the country. During his studies, he had observed how open mapping was used to aid relief efforts during the Haiti earthquake. Aware that a serious earthquake would one day hit Nepal,⁷⁹ and conscious of the poor quality of Nepal's existing official maps,⁸⁰ some of which had not been updated for between 10 and 25 years,⁸¹ he

78 Amrit Sharma, "Where Is All the Aid Money for Nepal Going? Open data could help lift the veil," Takepart.com, August 6, 2015, <http://www.takepart.com/article/2015/08/06/open-nepal-earthquake-aid-money>.

79 Shreeya Sinha, "Three Ways Nepalis Are Using Crowdsourcing to Aid in Quake Relief," *New York Times*, May 1, 2015, http://www.nytimes.com/2015/05/02/world/asia/3-ways-nepalis-are-using-crowdsourcing-to-aid-in-quake-relief.html?_r=3.

80 Saira Asher, "How 'Crisis Mapping' Is Helping Relief Efforts in Nepal," BBC News, May 6, 2015, <http://www.bbc.com/news/world-asia-32603870>.

81 Interview with Dr. Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

had returned to Kathmandu after graduating to begin building an open mapping community in Nepal. “Nepal sits in one of the most risky zones for earthquakes and other disasters. In Haiti they made [the map] after—I wanted to make the map before the earthquake.”⁸²

The creators of the Earthquake Response Transparency Portal were also acutely aware of the problematic history of the Haiti earthquake appeal. Nepalis had been concerned about reports of discrepancies in the reporting policies of international aid organizations, particularly after it was revealed that \$500 million was missing from Red Cross funds earmarked for Haiti’s earthquake recovery. According to Bibhusan Bista, CEO of Young Innovations, “[The portal] empowers people with a snapshot of how money is flowing into Nepal’s rebuilding and reconstruction projects and promotes transparency at a time of great need.... We don’t want to repeat the mistakes of Haiti.”⁸³ He continues:

*After Haiti, there were a lot of concerns about the relief and rehabilitation funds being misused and misallocated. To avoid that, it is critical to first see who is giving what money to whom. To us, that was an interesting case to be made, that openness could avoid the mistakes that were made in Haiti. That was, for us, the internal incentive to go on with the project.*⁸⁴

PERMISSION TO INNOVATE

The government also played a central role in the success of these various Nepali open data projects. Immediately after the earthquake, Bis-

ta says that crucial government actors including the National Planning Commission and the then Prime Minister of Nepal embraced the importance of transparency and accountability. Crucially, they supported such efforts not merely within the government, but also through independent, non-state initiatives like the Earthquake Response Transparency Portal.⁸⁵ This type of high-level buy-in can play a key role in pushing forward innovation and experimentation with open data.

INTERNATIONAL ORGANIZATIONS AND TAPPING INTO EXISTING ECOSYSTEMS

Many of the projects discussed in this case also relied on data and infrastructure provided by international organizations like UN OCHA. This case demonstrates the importance of such organizations in enabling open data efforts in developing countries through access to tools and funding, and in helping to fill gaps in national government databases by opening relevant datasets in their possession.

Pranav Budhathoki also points to an existing ecosystem of data users as a potent enabler in gaining the necessary traction to get results from the data they collected and opened. Because of their funding connections within the UN, they were connected to an international open data system that responded quickly and enthusiastically to their bulletins.⁸⁶ Activating this global, distributed network of problem-solvers brought to bear a diversity of skill and experience that would otherwise have remained untapped.

82 Saira Asher, “How ‘Crisis Mapping’ Is Helping Relief Efforts in Nepal,” BBC News, May 6, 2015, <http://www.bbc.com/news/world-asia-32603870>.

83 Amrit Sharma, “Where Is All the Aid Money for Nepal Going? Open data could help lift the veil,” Takepart.com, August 6, 2015, <http://www.takepart.com/article/2015/08/06/open-nepal-earthquake-aid-money>.

84 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

85 Ibid.

86 Interview with Pranav Budhathoki, CEO, Local Interventions Group, September 7, 2016.

RELATIONSHIPS, TRUST, AND ACCESS

Several interviewees commented that Nepal is a highly hierarchical society in which relationships, and the nature of those relationships, strongly condition access to people and institutions. Making effective use of data may involve creating relationships with key actors before a disaster strikes, when, as Dr. Budhathoki notes, government agencies and relief organizations may have no time or inclination to meet open data groups, no matter the potential value of their data. Demonstrated expertise, and a product in hand, are also helpful in putting to rest doubts. Dr. Budhathoki found his past career in government mapping, his expertise with OSM, his publications, and his qualifications helped overcome institutional suspicion and mistrust of crowdsourced data, while the map data OSM had already generated in Nepal allowed him to demonstrate its value and robustness.⁸⁷

Pranav Budhathoki, CEO of Local Innovations Group, noted that the organization made a point of hiring the most senior journalist they could find as district coordinators for #quakeHELP-DESK, since these people would already have unfettered access to government agencies and established relationships with decisionmakers. Social connections with legislators were even more helpful. “That’s the sort of access we needed to ensure the information we produced got the audience that so many other agencies were struggling to get.”⁸⁸ At the same time, Budhathoki cautions that depending too much on personal connections—and perhaps becoming too cozy with those in power—can hamper the ability to effect real change on the ground.⁸⁹

VOLUNTEERS: BOTH BARRIER AND ENABLER

Several of the interviewees spoke of the benefits of working with local volunteers. Once trained, a team of committed volunteers can take possible projects beyond the means of a relatively poor country, as Nepal’s OSM community has shown. For crisis mapping, local volunteers bring a depth of detailed knowledge that remote contributors, however experienced or careful, cannot.⁹⁰

At the same time, training volunteers represents a significant and uncertain investment. There is no guarantee that, once trained, volunteers will continue to participate, as life circumstances change and interest wanes. Sometimes the supply can be overwhelming, as Dr. Budhathoki describes in the aftermath of the earthquakes, when he found himself managing thousands of remote crismappers. “There was chaos on the ground, but the chaos was also there in the online community,” he says. “How do we effectively coordinate and channel that desire to help Nepal?”⁹¹

Nonetheless, Dr. Budhathoki believes that Nepal was better positioned to harness the potential of mapping than previous countries in crisis because of the existence of a robust and skilled group on the ground, who were able to direct, coordinate and guide international volunteers, and ensure that efforts went where they were most needed. “Without that local knowledge—the in-country capacity—[remote mapping] doesn’t take us too far.”⁹²

87 Ibid.

88 Interview with Pranav Budhathoki, CEO, Local Interventions Group, September 7, 2016.

89 Ibid.

90 Interview with Dr Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

91 Ibid.

92 Ibid.

BARRIERS

CONNECTIVITY AND TECH LITERACY

As with many case studies in this series, a lack of technical capacity and readiness was one of the most commonly cited barriers to success. Many of the intended beneficiaries and users of these portals lacked even a simple Internet connection. Adele Waugaman, a former fellow at the Harvard Humanitarian Initiative, notes that a tool's capacity to function offline can make the difference in determining its usefulness in hot zones during a crisis.⁹³ One doctor interviewed by the *New York Times* working in Gorkha District said he would have used the work by Code for Nepal and Kathmandu Living Labs if he had Internet connectivity. For those like him without a reliable connection, use may be impossible, or limited to screenshots of maps for later use offline.⁹⁴ The production of the maps also relies on a viable Internet connection, since even pencil and paper maps must be uploaded to OSM at some point.⁹⁵

Those with an internet connection must also be comfortable using technology. Dr. Budhathoki observed a certain discomfort with the technical aspects of mapping among potential volunteers.⁹⁶ As Code for Nepal has noted, there is a clear digital divide in Nepal that negatively affects the capacity of women, poor people, rural people, and Nepal's ethnic minorities to partake in the benefits of the Internet.⁹⁷

DATA CREATION VS. DATA USE

Dr. Budhathoki observes that one of the barriers confronted was a preoccupation with simply creating data rather than with ensuring that data is actually useful or used. "We need to emphasize the use of the data from day one," he says. "It's very important not just to create the data, to make maps, but to ensure that the data is being used by relief organizations. ... Creation is the easy part. The harder part is to talk to the relief organizations and ensure they use the maps."⁹⁸

INSTITUTIONAL CULTURE

Institutional culture—in government, in civil society, among the public—always plays a key role in determining whether open data projects are successful or not. Bista reports that his organization would like to increase the granularity of its data to show giving at different levels. For instance, he says it would be helpful to show how money is apportioned to secondary donors who subsequently disburse it to others. However, this kind of granularity is not supported by current reporting practices or by an institutional culture, both of which have yet to embrace openness and transparency. "The organizations are not responsive," he said. "They feel their obligation is to their donors and to the government authorities and what they demand, instead of feeling that they need to release data for public consumption. That lack of

93 GovLab interview with Adele Waugaman, September 16, 2016.

94 Shreeya Sinha, "Three Ways Nepalis Are Using Crowdsourcing to Aid in Quake Relief," *New York Times*, May 1, 2015, http://www.nytimes.com/2015/05/02/world/asia/3-ways-nepalis-are-using-crowdsourcing-to-aid-in-quake-relief.html?_r=3.

95 Interview with Dr Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

96 Ibid.

97 Interview with Ravi Kumar Nepal, September 9, 2016.

98 Ibid.

accountability and transparency, to me, is the biggest challenge—and it's not just people in Nepal, it's international organizations."⁹⁹

Ravi Kumar agrees that institutional and political culture is a major brake on the impact of open data in Nepal:

When there's a lack of capable, responsive in-

*stitutions on the ground, there's only so much you can do to leverage open data, civic tech, or ICT4D. Nepal hasn't had local elections in more than a decade. There's no local capacity—or if there is local capacity, they were not ready to be responsive, equitable and fair. Even though we have the results, we can't get a response to these things.*¹⁰⁰

LOOKING FORWARD

CURRENT STATUS

Most of the projects were short- or medium-term, and were not intended to persist beyond the relief or recovery phases. The relief projects, such as QuakeMap and Code for Nepal's Google Doc, have largely been shut down. QuakeMap.org is no longer actively soliciting new reports as of July 13, 2015, although new reports could still be filed and would be followed up. Dr Budhathoki reports, however, that the site is being held in readiness in case it is needed for future emergencies.¹⁰¹

Those projects tracking the experiences of survivors through the recovery period are still ongoing, although surveys occur less frequently. Interviewees from LIG and Code for Nepal hope to continue their respective surveys into a third phase if funding permits.

As of September 2016, the Earthquake Response Transparency Portal continues to be active. "The rebuilding and reconstruction will go on for the next five years," says Bista. He adds: "After the early, chaotic relief and rescue phase, we are moving towards a tangible reconstruction effort and structured rebuilding of schools and health centers. If we can structure the data and get it into the portal, 'follow the money' activities become much easier. As we see it, this is where the real value of the portal [lies], and centralized open data on fiscal flows for rebuilding and reconstruction becomes even more crucial."¹⁰²

99 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

100 Interview with Ravi Kumar Nepal, September 9, 2016.

101 Interview with Dr Nama Raj Budhathoki, Executive Director, Kathmandu Living Labs, September 10, 2016.

102 Interview with Bibhusan Bista, CEO, Young Innovations, September 12, 2016.

SUSTAINABILITY

The projects surveyed are, with few exceptions, supported by commercial ventures or aid funding and carried out by teams of paid staff, sometimes with volunteer help. Furthermore, Nepal’s recovery and reconstruction is the nation’s highest priority, so demand for projects to facilitate the process continues to be high. Bista emphasizes the sustainability of his project will depend on maintaining both supply and

demand sides—the openness of the data from the government side, and the community of users—but the project’s funding has been provided by Young Innovation’s commercial projects, whose profits are reinvested to support its civic tech activities. Bista hopes, however, that it will be possible to sync the portal with other projects on evidence for development, and in the process diversify its funding sources.¹⁰³

REPLICABILITY

Many of the projects use platforms or models that have been successfully deployed after disasters in the past, and clearly could be again. For example, OSM HOT and Ushahidi-based crowdsourcing platforms were both used successfully after the Haiti and Christchurch earthquake, and are now an established part of the humanitarian open data toolbox.

Bista feels that the experience of the Earthquake Response Transparency Portal would be highly replicable in other places. “We would need to do a little work to create an open source model, because the software we’ve created is not quite ready to just take and use elsewhere,” he says. “But the concept itself is highly replicable.” Bista says Young Innovations are currently in discussion with the UN OCHA FTS about the possibility of incorporating some

components of the portal’s software into FTS. “[R]eplication could involve not just using the software as a whole, but the standards and the concepts that we have could be brought in to make another system that’s working elsewhere even better,” he says.¹⁰⁴

Surveys of the kinds carried out by LIG and Code for Nepal could also be successfully deployed in other locations to oversee the responsiveness and accountability of the recovery process. Their efficacy would be greater, however, if agencies conducting such surveys carried out environmental scans to ensure they were not duplicating one another’s work. Currently, there is no equivalent of Ushahidi’s crowdsourcing platform for humanitarian surveys. The emergence or creation of a dominant technology might help reduce such duplication.

¹⁰³Ibid.

¹⁰⁴Ibid.



CONCLUSION

The response of Nepal and the international community to the earthquakes of 2015 was greatly enhanced by the efforts of its open data community. In some cases, their activities provided vital information that would otherwise have been unavailable to rescuers, as with KLL's OSM work. In other cases (Quake-Map.org and Code for Nepal's Google doc) the work they did offered a lifeline to survivors, who could use the new platforms to reach out for assistance.

All this work continues to be significant through the recovery phase, as organizations like LIG, Young Innovations, and Code for Nepal seek

to ensure that survivors' voices are heard, that their needs are met, and that donor money is received and responsibly spent. Despite the important role such institutions played in enabling the projects discussed in this case study, interviewees often spoke with frustration about the challenges a lack of responsiveness from international organizations and national government could introduce into open data efforts. These experiences make clear that although open data can have major impacts in crisis relief efforts, open data proponents must continue to advocate for open governance to obtain the full benefit of humanitarian open data.