



**GLOBAL
PULSE**
ANNUAL REPORT
2015

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FOREWORD



Dr. David Nabarro, Special Adviser to the UN Secretary-General on the 2030 Agenda for Sustainable Development and Climate Change

The year 2015 marked a major shift in the dimensions of international development. In an unprecedented, inclusive and open process, the 193 member states of the United Nations adopted, by consensus, the 2030 Agenda on Sustainable Development. The 17 Sustainable Development Goals (SDGs) contained in the 2030 Agenda constitute a truly transformative plan for people, planet, prosperity, partnership and peace.

The 2030 Agenda is extraordinarily ambitious. The challenges humanity faces in achieving sustainable development demand that all who pursue sustainable development think and work differently. They will need fully to embrace the world-wide explosion in innovation. This will include taking advantage of the data revolution by tapping into new data sources, algorithms, and technologies that can complement current approaches to measurement and analysis, and encourage smarter ways of thinking and working.

In 2009, millions of people suffered because of a global financial crisis: this led their leaders to request that the United

Nations innovate so as to be capable of reacting more quickly and effectively to situations that adversely affect the world's people. The United Nations prioritized the production and use of real-time information so as to be better able to "take the pulse" of communities facing challenges, and engage them in becoming resilient in the face of threats. It was in this context that the Global Pulse initiative was launched. Six years later, Global Pulse is helping the whole of the UN system to play its part in the data revolution, in ways that bring real benefits to vulnerable communities and individuals in difficulty.

Global Pulse is catalysing vital work across and beyond the United Nations system: creating frameworks for the UN to make better use of new data sources, demonstrating how they can be used, and showing that new data sources can better enable the United Nations to deliver its mandate. Over the past six years, Global Pulse has helped UN system entities and other international and regional organizations to support governments, civil society, academic groups and businesses. The initiative has

demonstrated ways in which big data sets can be used to map and curb the advance of hunger and incidence of disease, to inform crisis responses and to act on the impacts of climate change. I am pleased to report that prototype solutions developed and analyzed in recent years have evolved into scaled-up implementation in communities and nations across Africa and Asia. This has enabled policymakers to benefit from the use of big data in ways that improve people's capabilities, productivity and well-being.

The volume and range of digital data sets is increasing exponentially. Through innovations like the Global Pulse, people everywhere are better able to benefit from this abundant and renewable natural resource in ways that contribute to realization of the 2030 Agenda for Sustainable Development. Getting there will require continued willingness to pursue innovations in techniques for data handling and in policies for applying these techniques so as to ensure that this new ability to appreciate what happens in real time is pursued in ways that are both responsible and accountable, and safeguards people's privacy.

The past year has seen a growing number of actors coming together to advance the agenda of the data revolution. They share a common vision—ensuring that all can benefit from the gigabit revolution, closing the digital divide, using innovation to create a fair future for all and leaving no one behind. I would like to see more partners engaged as each holds a different ingredient and all are needed for the vision to be fulfilled.

To conclude: the world's people, civil societies, local governments, businesses, scientists and national leaders are taking bold steps to implement the 2030 Agenda for Sustainable Development. Novel data systems enable them to be ever more ambitious and to work more effectively together. The Global Pulse has helped to remove barriers and enable evolution in an inspiring and transformative way. There is much more still to be done. I commend the work of Global Pulse to you: I hope you share my excitement about its potential.

2015 AT A GLANCE

The Sustainable Development Goals (SDGs) bring a unique opportunity to mainstream understanding and adoption of big data for development. Since its inception in 2009, Global Pulse has been innovating and advocating around opportunities and challenges related to transforming new sources of digital data into better outcomes for vulnerable communities, discovering new approaches, building tools, and working to demonstrate ways to overcome barriers to adoption and scale.

In 2015, Global Pulse continued to increase the scale and pace of its work, as it directed its efforts towards transitioning from case studies and proofs of concept to implementation on the ground. The network of Pulse Labs in UN headquarters (New York), Indonesia and Uganda completed more than 15 joint data innovation projects, and initiated five new projects, all in collaboration with over a dozen UN agencies and development partners. The projects were complemented by a set of 12 big data tools developed together with a wide range of partners and collaborators.

Globally, this year saw an exponential growth in the number of new public, social and private sector actors interested in engaging with the UN to advance a data revolution for sustainable development.

At the regional level, Pulse Labs used locally available sources of big data—including radio content, postal data and crowd-sourced information—to develop projects and prototypes, and continued to act as thought-leaders, knowledge hubs and advocacy platforms. Overall,

the Pulse Labs delivered more than 30 capacity building workshops for UN, government and academic partners. Successes and failures were documented in case studies and tools to help structure continued thinking about data innovation.

At the country level, 2015 was a turning point for public sector adoption in Indonesia. The demand for advanced data analytics, as well as interest in new approaches that complement existing government data with new digital data sources, increased significantly. Pulse Lab Jakarta worked with local and national government partners to demonstrate applications of data analytics not only for measurement of progress, but also for improving decision-making during programme implementation. These efforts should ultimately provide replicable, scalable examples for how countries can ensure that sustainable development is fully data-enabled.

Finally, Pulse Lab Kampala was formally opened at a public event that included demonstrations of data science projects underway at the lab and showcased the

power of public-private partnerships to advance the data revolution in Africa.

“Global Pulse will enable us to harness new data and technologies to better monitor the effects of epidemics, natural disasters and other problems that affect the people of Uganda... The importance of obtaining critical data in making decisions for development cannot be underestimated. With the mobile phone revolution in Uganda, it is now possible to reach people and find out what [Ugandans’] main concerns are. This capacity will be even more enhanced with this initiative which we are launching in Kampala today.”

H.E. Dr Ruhakana Rugunda,
Prime Minister of Uganda

This report summarizes the achievements of Global Pulse in 2015 and provides a glimpse into longer-term prospects and priorities in the field of big data for development and humanitarian action.

From MDGs to SDGs



All 193 Member States of the United Nations made a historic agreement in September 2015 to adopt 17 new goals for a development agenda to succeed the Millennium Development Goals (MDGs). The Sustainable Development Goals represent a leap beyond the MDG framework, as they will be implemented in quite a different world, where constant and unpredictable change has become the norm. Strong and effective institutions must be able to quickly identify emerging risks to development outcomes and adapt their programmes and policies to keep progress on track.

Data has been identified as an enabler of the SDGs, not only to monitor progress, but also to inclusively engage stakeholders at all levels to advance evidence-based policies and programmes that reach the most vulnerable. In particular, the call for a data revolution recognizes that new and innovative tools are necessary to complement traditional policy-making methodologies. The SDGs provide a framework for the work done at Global Pulse, which helps UN partners stay ahead of the curve in a fast-changing world.

“The data revolution is giving the world powerful tools that help usher in a more sustainable future.”

Ban Ki-moon, United Nations Secretary-General

2009-2014: A Short History of Global Pulse

2009

The UN Secretary-General established the Global Impact and Vulnerability Alert System (GIVAS) in response to world leaders' request to track, in real time, the needs of vulnerable populations in the wake of the 2008 global economic crisis. The aim of the initiative was to harness new technology and new sources of real-time data to create a mechanism that would close the gap between the onset of a crisis and the availability of actionable information to protect the vulnerable.

2010

Two "Voices of the Vulnerable" reports were published on the impacts of the global economic crisis, which set the groundwork for identifying innovative approaches to improve early warning and monitoring in the future. Consultations revealed numerous examples from industries that were transforming digital data (from mobile phones to internet search, from social media to transactions) into real-time information streams for decision-making.

The initiative was renamed Global Pulse, a network of innovation labs. These would support the UN system by providing a safe environment for partnering with private sector and academia to (a) gain access to new data sources, and (b) test how to turn them into a resource for measuring human well-being in real time.

2011

Global Pulse published a seminal report, "Big Data for Development: Challenges and Opportunities," to conceptually explain how big data can be applied to take the pulse of vulnerable populations and enable feedback-driven approaches to development programmes. At a briefing of the UN General Assembly, the initiative presented five proof-of-concept projects, developed over the previous 18 months, to demonstrate the relevance of big data for international development.

2012

During the annual summit of the Association of Southeast Asian Nations (ASEAN), the UN Secretary-General and the President of Indonesia pledged their commitment to creating an innovation centre of excellence in the region. The first regional Pulse Lab was launched in the Indonesian capital, Jakarta, to serve as a hub for data innovation, connecting the technology sector, universities and academia with national institutions and UN agencies.

2013

Global Pulse focused its efforts on advocating for data philanthropy and the responsible use of big data for development, resulting in new strategic partnerships for accessing real-time data sources, cutting edge data mining tools and data science expertise. Two key guidebooks on "Big Data for Development" and "Mobile Network Data for Development" were published to drive forward the movement and provide greater understanding of how to leverage big data.

2014

Global Pulse established Pulse Lab Kampala in Uganda to support the United Nations Country Team and expand data science in the Africa region. A new programme of 25 data innovation projects was initiated, and a Data Privacy Advisory Group was convened. Global Pulse provided key input to the Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development and provided secretariat support to the Group.



TRACK 1

INNOVATION DRIVER

Data Innovation Projects and Tools

TRACK 2

ECOSYSTEM CATALYST

Policy, Advocacy and Adoption

A Two-Track Strategy

Global Pulse has three primary objectives:

1. achieve a critical mass of implemented data innovations;
2. lower barriers to adoption and scaling;
3. strengthen the big data innovation ecosystem.

These objectives are achieved through a two-track implementation strategy:

TRACK 1: INNOVATION DRIVER

- Implement data innovation programmes to provide UN and development partners with access to the data, tools and expertise required to discover new uses of big data for development.
- Develop toolkits, applications and platforms to improve data-driven decision-making and support evaluation of promising solutions.

TRACK 2: ECOSYSTEM CATALYST

- Contribute to the development of regulatory frameworks and technical standards to address data sharing and privacy protection challenges.
- Engage key stakeholders on a priority innovation agenda.
- Provide public sector organisations with policy guidance and technical assistance to strengthen their capacity for integrating real-time insights into operations.

Engagement Models

Global Pulse has three modalities for working with the UN, governments and other development partners on big data innovations:

EXECUTOR

Implements data innovation projects, with UN and development partners contributing subject-matter expertise.

FACILITATOR

Provides or brokers data science partnerships with private sector and academia to implement data innovation projects for partners.

TECHNICAL ADVISOR

Provides guidance on policy issues such as data privacy and data access, as well as technical issues such as data science methodologies and innovation practices.

Pulse Labs

Global Pulse brings together governments, UN agencies and partners from academia and the private sector to test, refine and scale methods for using new sources of digital data to support development goals. Pulse Lab New York, established in 2009, serves as the headquarters of Global Pulse and is the thought-leadership and knowledge-sharing hub for the network of Pulse Labs (New York, Kampala and Jakarta).

Big data analysis takes practice and teamwork. The Labs consist of multidisciplinary teams of social scientists, data scientists, engineers and analysts who build bridges with a wide range of partners and collaborators to prototype and implement big data innovation programmes. The Pulse Labs share knowledge from innovation projects by producing case studies and technical papers as well as project briefs.

Partnerships

Partnerships are at the heart of Global Pulse's mission to help build consensus for data innovation to improve development and humanitarian outcomes. Partners collaborate with Global Pulse by:

GRANTING ACCESS TO DATA

Providing access to digital data.

PROVIDING TECHNOLOGY

Sharing tools for data mining and analytics, or computing capabilities.

SHARING EXPERTISE

Making data scientists or other technical staff available to collaborate on projects.

ADVOCACY

Providing funding or co-hosting events and supporting capacity-building efforts.

"The importance of visualization to make sense of large datasets is well-acknowledged in the business sector. Through this new partnership with Global Pulse we are thrilled to put our technology to work as part of the growing 'data for good' movement."

Bob Goodson,
Founder of Quid, an information mapping technology company

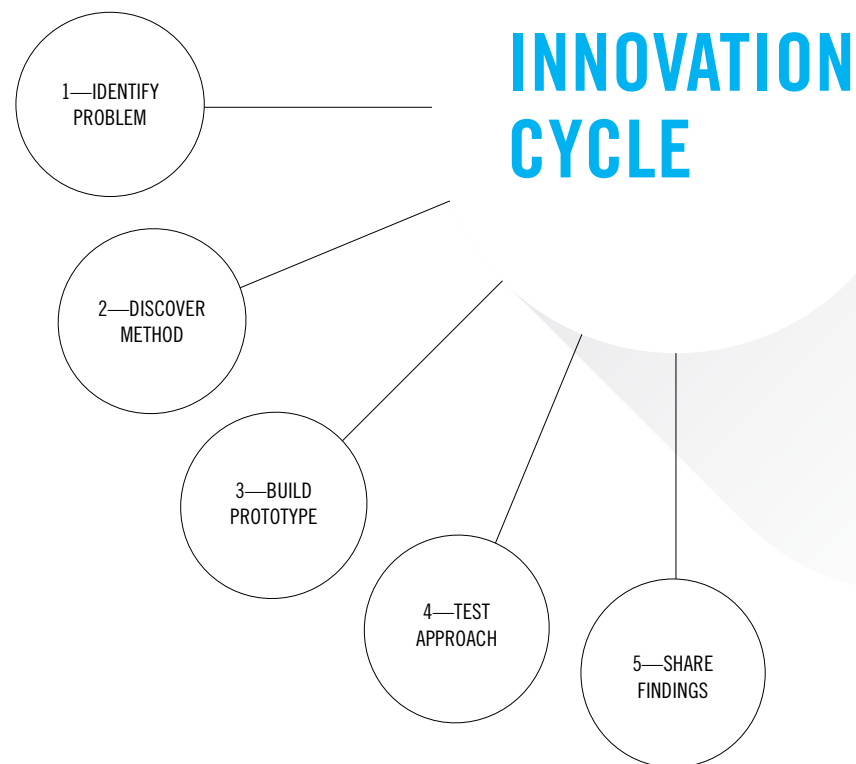


| <i>Related SDG(s)</i> | <i>Project</i> | <i>Partners</i> | <i>Data Type</i> | <i>Country</i> | <i>Lab</i> |
|---|---|--|------------------------------------|------------------------------|------------|
| FOOD AND AGRICULTURE | | | | | |
| 2 | Mobility Profiles for Food Security and Livelihoods | WFP | Mobile | Senegal | Kampala |
| 2 | Crowdsourcing High-Frequency Food Price Data | FAO, WFP | Crowdsourcing | Indonesia | Jakarta |
| ECONOMIC WELL BEING | | | | | |
| 1 8 9 | Estimating Economic Activity from Postal Data | Universal Postal Union (UPU) | Postal | Global | New York |
| 1 | Roof Counting as a Proxy of Poverty Trends | Uganda Bureau of Statistics, UNDP | Satellite imagery | Uganda | Kampala |
| 10 11 16 | Citizen Feedback for Enhanced Local Government Decision-Making | LAPOR! (Office of the President) | Government data collection systems | Indonesia | Jakarta |
| 1 | Using Airtime Purchases to Detect Economic Shocks | | Airtime credit | Uganda | Kampala |
| 9 12 | Analysing Public Perceptions of Fuel Subsidy Reform | Ministry of National Development Planning (Bappenas) | Social media | Indonesia | Jakarta |
| 16 | Improving Knowledge Sharing on Peace and Governance | Government of Ghana, UNDP | Governance and Peace (GaP) poll | Ghana | Kampala |
| 8 | Reflections on Unemployment | UNICEF | Social media | Indonesia | Jakarta |
| 3 9 12 | Understanding Changes in Perceptions on Biofuels | David and Lucile Packard Foundation | Social media | UK, Germany, the Netherlands | New York |
| CLIMATE AND RESILIENCE | | | | | |
| 3 11 13 | Supporting Forest and Peat Fire Management | UNORCID | Social media | Indonesia | Jakarta |
| PUBLIC HEALTH | | | | | |
| 3 16 | Supporting Response to Infectious Disease Outbreaks | Ministry of Health, WHO | HMIS, DHIS2 | Uganda | Kampala |
| 3 | Real-Time Monitoring of HIV Treatment Protocols | Ministry of Health, UNAIDS | Health data | Uganda | Kampala |
| 3 10 | Informing Communication Campaigns Around HIV and Discrimination | Ministry of Health, UNAIDS | Social media | Brazil | New York |
| 3 16 | Understanding Awareness and Sentiment on Immunisation | Bill & Melinda Gates Foundation | Social media, news outlets | Nigeria, Pakistan | New York |
| DATA PRIVACY AND DATA PROTECTION | | | | | |
| 3 9 16 | Mapping the Risk-Utility of Mobile Data for Sustainable Development | Massachusetts Institute of Technology (MIT) | Mobile | Global | New York |
| GENDER | | | | | |
| 5 10 16 | Gaining Insights on Child Marriage from Social Media | David and Lucile Packard Foundation | Web searches, speeches | Global | New York |

DATA INNOVATION PROJECTS AND TOOLS

Joint data innovation projects through the Pulse Labs provide opportunities for the private sector, UN agencies, government institutions and academia to gain hands-on experience working together to learn how to deploy data science and analytics to real-world problems.

This is a summary of data innovation projects carried out in 2015. Several projects matured past the prototype phase and have gone into implementation as pilots or operational solutions carried over into 2016.



INNOVATION CYCLE

Global Pulse works with partners to identify development and humanitarian issues that could be addressed through analysis of new data sources. Projects are designed to discover practical uses of big data to address policy issues and prototype technology tools and solutions.

The framework for joint innovation moves through a cycle of consultations, project design and partnership engagement (to secure data, tools and expertise), followed by a period of investigation and prototyping. Finally, Global Pulse and partners evaluate and share their findings, methodologies, successes and failures both internally and publicly with stakeholders.

Inside LAPOR!, Indonesia's complaints unit
GovInsider, November 2015

The Office of the Presidential Staff is using data from LAPOR! to monitor public services, working with the United Nations' Pulse Lab Jakarta. The lab is analyzing its data with public sentiment on social media to find the strengths and weaknesses of public services.

Data Innovation Projects

In 2015, Global Pulse and its partners completed 17 data innovation projects in support of the Sustainable Development Goals. Five additional projects were initiated and are currently being developed. The summaries below highlight several of these projects.

ROOF COUNTING AS A PROXY INDICATOR OF POVERTY TRENDS

<http://unglobalpulse.org/projects/measuring-poverty-machine-roof-counting>

1 Pulse Lab Kampala is exploring the use of satellite imagery to track poverty trends. In Northern Uganda, where poverty levels are high and the majority of the population lives in rural areas, roofing material can be a proxy indicator for poverty. As the household economy improves, families often upgrade their dwelling by changing from traditional grass thatch to iron sheets. Pulse Lab Kampala has developed an image processing software that uses satellite imagery to count roofs and identify the type of material they are constructed from. The tool and methodology complement existing statistical tools that use surveys and primary data collection to assess poverty levels. The project is being carried out in collaboration with the Uganda Bureau of Statistics, UNDP, and the University of Edinburgh.

the potential of data analytics to inform local government decision-making. The project used data from a combination of existing complaint systems and passive citizen feedback from social media. The results demonstrate the potential utility of (a) near real-time information on public policy issues and their corresponding locations within defined constituencies, (b) enhanced data analysis for prioritisation and rapid response and (c) insights on different aspects of citizen feedback. The publication of citizen feedback on public-facing dashboards can enhance transparency and help constituents understand how their feedback is processed.

CITIZEN FEEDBACK FOR ENHANCED LOCAL GOVERNMENT DECISION-MAKING

<http://unglobalpulse.org/projects/citizen-feedback-data-local-government-decision-making>

10 11 16 Pulse Lab Jakarta worked with the provincial government of Nusa Tenggara Barat (NTB) and the Office of the President (LAPOR!) to explore

ESTIMATING ECONOMIC ACTIVITY FROM POSTAL DATA

<http://unglobalpulse.org/projects/estimating-national-wellbeing-with-postal-data>

1 8 9 This project examined the value of postal data as a proxy for economic activity. Post offices around the world share a common protocol that is regulated by the Universal Postal Union (UPU). This enables more than a billion letters and parcels to be moved around the world each day. More than 100 billion records are available in the form of Electronic Data Interchange (EDI) messages in UPU's postal technology network. Add to that EDI messages from partners like airlines, customs and distributors, and the big data potential is massive.

Pulse Lab New York worked with UPU to demonstrate the potential of this data to produce proxy indicators for countries' socioeconomic profiles, by analyzing 14 million records of dispatches sent between 187 countries over a four-year period, from 2010 to 2014. The project showed that economic indicators such as GDP per capita and the Human Development Index closely correlate with indicators derived from the postal network. In addition, the postal data was combined with data from other global networks—trade, migration, international flights, Internet protocol (IP addresses) and digital communications—to produce novel multidimensional connectivity indicators.

REAL-TIME MONITORING OF HIV TREATMENT PROTOCOLS

3

Under the leadership of the Ministry of Health and UNAIDS, Pulse Lab Kampala designed an application to monitor, in real time, the implementation of Option B+ in Uganda. The Option B+ programme aims to prevent expectant mothers living with HIV from passing on the virus to their unborn children. The application tracks service delivery and the performance of health centres involved in the implementation of Option B+. In a second phase of the project, correlations between treatment drop-out rates, and different social factors, such as dealing with the stigma of having HIV, distance of travel to the health centres or medication stock outs, will be explored. The purpose of the application is to enable the flow of timely information to address bottlenecks in the rollout of Option B+ in the districts.

CROWDSOURCING FOOD PRICES IN RURAL INDONESIA

2

This project used citizen reporters to crowd-source commodity prices in near real-time in areas where the availability of other data sources was limited. The project recruited a network of 200 dependable citizen reporters who used a mobile app to report the prices of staples in Nusa Tenggara Barat, one

of Indonesia's poorest provinces. Food shopping in the area is almost exclusively done at informal cash-only markets and stalls. Supplies are inconsistent, which makes the region vulnerable to price volatility. Moreover, the remoteness of the area makes it difficult and expensive to monitor the volatility using traditional methods, which usually involve sending researchers to the area. Over a period of six weeks, the citizen reporters provided more than 65,000 data points that referenced more than 2,650 unique trade outlets across the province, covering approximately 20,000 square kilometers. The data collected exceeded the minimum required to accurately capture price trends, proving the usefulness of the crowdsourcing method in gathering information needed to design programmes that end hunger. This project builds on two others: nowcasting of food prices from Twitter (already completed) and nowcasting from Google searches (under development). Pulse Lab Jakarta is collaborating with the World Food Programme (WFP) and the Food and Agriculture Organization (FAO) in an expanded second phase of the project.

"The unparalleled reach of the global postal network's unique data footprint in the e-commerce era paves one way in which UPU member countries can make a critical contribution to helping the world achieve the SDGs."

Bishar A. Hussein,
Director-General, UPU

DATA ANALYSIS AND VISUALIZATION TO SUPPORT RESPONSE TO DISEASE OUTBREAKS

3

In coordination with the World Health Organization (WHO), and in collaboration with the Ministry of Health, Pulse Lab Kampala produced a series of data visualisations to support the early response to a typhoid outbreak that occurred in early 2015. The project used data analytics to correct for data missing in the Ministry's Health Management Information System (HMIS) and the District Health Information System (DHIS2), and established relationships between health data and risk factors, such as rain patterns and human mobility. The visualisations allowed decisionmaking for the allocation of medicine, medical personnel and health centres. The Lab aims to develop an application that will be incorporated into the HMIS system, and which could be scaled up and used in other countries.

"The visualisations produced by Pulse Lab Kampala have been tremendously helpful to the Ministry of Health. The field teams have used the visualisations to identify the hotspots of the typhoid outbreak by district, sub-county and even health centre. This has enabled the Ministry to prioritise which areas of the country, and which health centres, to allocate resources to—including medicine, medical personnel and training."

Dr. Monica Musenero Masanza,
Assistant Commissioner, Epidemiology and Surveillance, Ministry of Health, Uganda

<http://unglobalpulse.org/projects/mapping-infectious-diseases>

SUPPORTING RESPONSE TO FOREST AND PEAT FIRE MANAGEMENT USING SOCIAL MEDIA

3 11 13

In response to one of the worst outbreaks of forest fires and haze in Indonesia in recent years, Pulse Lab Jakarta investigated the mobility and health impacts of haze events on affected populations, as articulated in social media. A collaboration between Pulse Lab Jakarta and the UN Office for REDD+ Coordination in Indonesia (UNORCID), the project explored the use of real-time information during forest and peat fire haze events to support emergency response management. The study explored early signals from Twitter relating to major forest fires or haze events with a view to understanding the relationship between communications trends and on-the-ground events. The results demonstrated that Indonesians tweet significantly more about haze during and immediately after major fire events. For example, during the February to March 2014 haze crisis in Riau, people tweeted mostly about the status of fires and support they were receiving from the government. In 2016, the Lab intends to find additional ways to extract useful information from social media and combine the signals with other sources of digital data for real-time insights on disaster impact and human well-being. It will also integrate social media data with operational information used during disaster response to support more timely and effective emergency response and recovery efforts.

<http://unglobalpulse.org/projects/forest-and-peat-fire-management-social-media>

<http://unglobalpulse.org/blog/tracking-hidden-impact-indonesia's-forest-and-peatland-fires>

Pulse Lab Jakarta deployed an ethnographer to capture the human stories behind the trends and anomalies captured by the big data analysis on forest and peatland fires. Besides finding a palpable sense of frustration among haze-affected communities, as well as knock-on effects on commodity prices, food supply and water supply, the research outputs also highlighted the complexity of haze impacts and the need for multi-agency action in both prevention and response mechanisms. Anecdotal evidence of adverse policy outcomes was also evident. For example, some schools canceled their classes and closed down in an attempt to protect children from the haze, which resulted in greater exposure to smoke, as most children remained outdoors.



Tools and Technologies

Global Pulse develops tools that can be adapted by partners to suit different contexts at local, national and regional levels. These toolkits include guidance for collecting, storing, anonymising, combining, analysing, visualising and collaborating around big data. Toolkits and capabilities that have been developed with and for partners include:

SOCIAL MEDIA DATA

Sex-disaggregation

Using public information from Twitter profiles, in particular the name and profile picture, to infer the sex of users.

Reverse geocoding

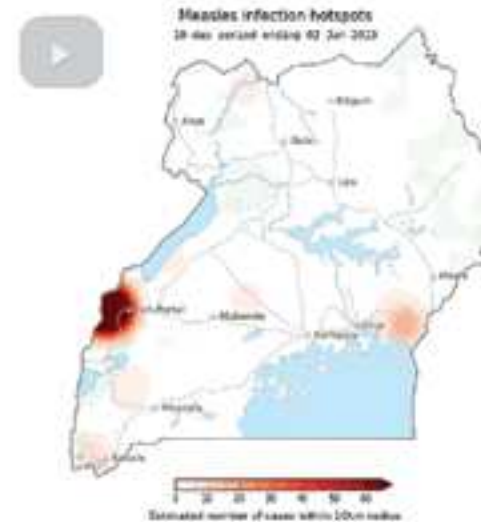
Captures location-based information and attaches references to enable in-depth analysis.

Pre-processing social media data

Automatically cleans data by removing irrelevant information and normalizes text (i.e., corrects non-standard spelling, abbreviations or phonetic substitutions).

Real-time monitoring dashboards

Displaying relevant content from social media streams as they are posted in response to unfolding events.



MOBILE PHONE DATA

Mapping

Analyses population movement trends derived from mobile phone network data to support disease modelling or develop early warning applications for disaster outbreaks.

Content categorization

Automatically categorizes citizen reports received through mobile applications like UNICEF's U-Report into thematic groups based on keywords.

RADIO CONTENT

Speech-to-text analysis

Automatically detects and categorizes keywords from public radio content to help identify issues of concern to citizens.

GEOSPATIAL DATA

Biodiversity monitoring tool

Enables layering and analysis of a variety of different types of spatial data relevant to biodiversity metrics.

Sweden Supports Groundbreaking Big Data Initiative

Sweden Abroad, February 2015

Progress has been fast in recent years and now the next groundbreaking step is taken with the launch of Pulse Lab Kampala which will collect and compile information from radio broadcasts from different parts of Uganda during 2015. The technology is brand new and has never been used before.

Bringing the Personal Internet of Things to the Poor

The New York Times, May 2015

For example, the UN Global Pulse unit, set up in 2009, monitors social network messages from Twitter and elsewhere for early-warning signals—"digital smoke signals," it says—of a disease outbreak, crop failure or economic turmoil in a region of a developing country.



<http://unglobalpulse.org/projects/UNFPA-social-data> Pulse Lab Kampala and UNFPA explored the use of social media to understand the debate among Ugandans on contraception and teenage pregnancy, and to analyse perceptions towards different types of contraception. They developed a real-time interactive tool that analyses public Facebook posts for keywords related to contraception and teenage pregnancy. The tool can be used to track emerging and trending topics and perceptions related to family planning.

| Objectives | Strategies | Example Activities |
|--|--|---|
| <p>A Lowering barriers to scaling</p> | <p>Advocating for the value of partnerships and policy action to advance the development of data access modalities</p> <p>Raising awareness of big data privacy issues and responsible data frameworks</p> | <p>Member of The Broadband Commission for Digital Development and The Global Working Group on Big Data for Official Statistics</p> <p>Hosting annual <i>Data Playground</i> event to feature successful public-private partnerships to advance a data revolution for SDGs</p> <p>Held annual meeting of the UN Global Pulse Data Privacy Advisory Group in The Hague</p> <p>Webinar on the data privacy landscape in Africa with expert presentations on data privacy and data protection in the region</p> |
| <p>B Strengthening the innovation ecosystem</p> | <p>Connecting communities of practice across disciplines</p> <p>Open innovation campaigns, challenges and competitions</p> | <p>Co-hosting annual Data Science in Africa conference & workshop</p> <p>Implementing and facilitating collaborative projects on gender data in partnership with the Data2X initiative</p> <p>Hosted <i>HackGov: Empowering Indonesia Hackathon</i> and <i>Big Ideas Competition for Asia: Urban Issues Using Data Innovation</i></p> <p>Launched <i>Data for Climate Action</i> campaign</p> |
| <p>C Supporting institutional adoption</p> | <p>Knowledge products and transfer</p> <p>Technical assistance and capacity building</p> | <p>Facilitated big data for development learning event and design workshop for the Hewlett Foundation</p> <p>Published data asset mapping facilitation tools to help structure thinking about data projects by Pulse Lab Jakarta</p> <p>Delivered trainings on big data analytics for development and humanitarian action to Government of Indonesia partners</p> <p>Provided technical advice to UN Women and UNFPA innovation workshops, and mentorship support to UNDP Country Offices conducting data innovation pilot projects</p> |

POLICY, ADVOCACY AND ADOPTION

Global Pulse’s policy and advocacy activities aim to foster an enabling environment for the adoption of big data in development practice. This involves **A** supporting the development of frameworks and standards to address data access and privacy challenges, **B** strengthening the innovation ecosystem, by connecting communities of practice across disciplines and geographies, and **C** enabling institutional adoption, by providing public sector organizations with policy guidance and technical assistance in building big data innovation capacity.

Key Findings from the “Big Data and the 2030 Agenda for Sustainable Development: Achieving the Development Goals in the Asia and the Pacific Region” conference:

1. Big data is a value addition, not a replacement for official statistics.
2. Big data is one part of a complex ‘data ecosystem,’ alongside traditional sources of information.
3. The volume, variety and velocity of big data offers an opportunity to assess information holistically, across the three dimensions of sustainable development and the 17 Sustainable Development Goals of the 2030 Agenda.
4. Institutional frameworks that protect and support the diversity of big data actors are needed to enable the effective functioning of the data ecosystem.
5. Strong interlinkages and partnerships between big data stakeholders are essential for the development and scaling up of the big data ecosystem, and need to be systematically nurtured.
6. Challenges need to be acknowledged and incorporated into big data strategies and programmes.

Raising Awareness to Drive Policy Action

A One objective of Global Pulse’s work is to contribute to lowering barriers to big data access. As these topics are still emergent, Global Pulse continues to work to broaden awareness of the opportunity of big data for the public good, identify risks and benefits, and stimulate a dialogue to accelerate the development of shared value models whereby the private sector can play its part in channeling big data for social impact. Key activities included high-visibility big data awareness campaigns and contributions to international working groups to advance development of frameworks for public-private sector data sharing, coupled with privacy risk management practices and policies.



BIG DATA FOR SUSTAINABLE DEVELOPMENT
The data revolution was in focus both globally and regionally throughout 2015. Global Pulse drew particular attention to big data and the role of accelerating private-sector data partnerships during high profile events including the public opening of Pulse Lab Kampala, which was presided over by the Prime Minister of Uganda, and at the *Data Revolution in Africa* high-level conference held in Ethiopia by the UN Economic Commission for Africa (UNECA). In Asia, the topic was explored in depth during a two-day meeting on *Big Data and the 2030 Agenda for Sustainable Development: Achieving the Development Goals in the Asia and the Pacific Region* organised by the UN Economic and Social Commission for Asia and the Pacific (ESCAP) and with support from Pulse Lab Jakarta.

A BIG DATA REVOLUTION FOR HUMANITARIAN RESPONSE

Global Pulse was involved in policy dialogues focused on the nexus of big data and humanitarian action throughout the year. These included co-convening a *Responsible Data for Humanitarian Response* conference that focused on addressing the real-time data deficit in humanitarian response and issues around data privacy frameworks, held in The Hague, Netherlands. These efforts culminated with a high-level side event held during the UN General Assembly in September on *A Big Data Revolution for Humanitarian Response*, which brought together representatives from the private sector, UN humanitarian leaders and governments to discuss solutions to the lack of policy frameworks for big data privacy, access and governance in order to address the needs of the humanitarian community.

UN DATA INNOVATION LABS AND WORKSHOPS

In 2015, the United Nations' Chief Executives Board for Coordination—which brings together the executive heads of 30 organisations of the UN system—approved a data revolution roadmap. The proposal included the creation of Data Innovation Labs to support the exploration of new data sources for programme planning and achievement of the SDGs. Under the joint leadership of UNICEF and WFP, Global Pulse serves as the technical advisor on a series of workshops, designed to build inter-agency capacities for designing big data strategies and projects.

GLOBAL WORKING GROUP ON BIG DATA FOR OFFICIAL STATISTICS

Global Pulse is a member of four task teams of the UN Statistical Commission's Global Working Group on Big Data for Official Statistics. The Group provides a forum to address issues pertaining to big data methodology, technology, privacy, access and finance in order for big data to be used effectively in monitoring and reporting on the SDGs. In 2015, Global Pulse provided substantive input to the development of best practices for data

partnerships, a template for terms and conditions of data sharing partnerships, and a draft set of principles for access to big data sources.

**Community Insights On Principle 8:
Address Privacy and Security**
Principles for Digital Development, June 2015

UN Global Pulse hosted the eighth Principles for Digital Development event on "Address Privacy and Security" on May 8, 2015 at the United Nations Secretariat Building in New York. The interactive session included panel discussions on the topics of Privacy and Security, followed by a small group discussions around barriers to effective implementation and strategies to overcome them.



Policy Publications

Throughout 2015, Global Pulse supported or contributed to a number of policy publications related to data innovation and the importance of the responsible use of big data for development.



Human Development Report 2015
Work for Human Development (UNDP)

Global Sustainable Development Report
(UN DESA)

Measuring the Information Society Report 2015
(ITU)

The Data Revolution
Finding the Missing Millions (Overseas Development Institute)

Big Data and the 2030 Agenda for Sustainable Development
Stocktaking Report (UN ESCAP)

Innovation Spaces
Transforming Humanitarian Practice in the UN (University of Oxford)

How to Unlock the Value of Data-driven Innovation and New Evidence in Policy-making
(Knowledge Sector Initiative)

UN Global Pulse Data Privacy Principles

The principles acknowledge standards set out in the UN Guidelines for the Regulation of Computerized Personal Data Files adopted by General Assembly resolution 45/95. They are not based on any specific national or regional laws, but draw inspiration from a number of global instruments concerning privacy and data protection.

Purpose of use

We access, analyse or otherwise use data for the purposes consistent with the United Nations mandate and in furtherance of the Sustainable Development Goals.

Right to use

We access, analyse or otherwise use data that has been obtained by lawful and fair means, including, where appropriate, with the knowledge or consent of the individual whose data is used.

Purpose compatibility

We ensure to the extent possible, that all of the data we use for project purposes is adequate, relevant, and not excessive in relation to the legitimate and fair purposes for which the data was obtained.

Individual privacy

We do not access, analyse or otherwise use the content of private communications without the knowledge or proper consent of the individual.

We do not knowingly or purposefully access, analyse, or otherwise use personal data, which was shared by an individual with a reasonable expectation of privacy without the knowledge or consent of the individual.

We do not attempt to knowingly and purposefully re-identify de-identified data, and we make all reasonable efforts to prevent any unlawful and unjustified re-identification.

Data security

We ensure reasonable and appropriate technical and organisational safeguards are in place to prevent unauthorised disclosure or breach of data.

Risk and harm assessment and risk mitigation

We perform a risk assessment and implement appropriate mitigation processes before any new or substantially changed project is undertaken.

We take into consideration the impact that data use can have not only on individuals but also on groups of individuals.

We ensure that the risks and harms are not excessive in relation to the positive impact of the project.

Data sensitivity

We employ stricter standards of care while conducting research among vulnerable populations and persons at risk, children and young people, and any other sensitive data.

Data minimisation

We ensure the data use is limited to the minimum necessary.

Data retention

We ensure that the data used for a project is being stored only for the necessary duration and that any retention of it is justified.

Data quality and accountability

We design, carry out, report and document our activities with adequate accuracy and openness.

Our collaborators

We require that our collaborators are acting in compliance with relevant law, data privacy and data protection standards and the United Nations' global mandate.

<http://unglobalpulse.org/privacy-and-data-protection-principles>

Data Privacy and Data Protection

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Legitimate and growing concerns about data privacy, and evolving regulatory frameworks about data usage, add complexity to the incentives for and logistics of gaining access to private sector big data. In 2015, Global Pulse continued to actively participate in shaping the international discourse on data privacy, data access and the value of data science for development and humanitarian action at key conferences throughout the year.

As part of its advocacy and policy work, Global Pulse established a Privacy Advisory Group (PAG), which brings together data protection regulators, and experts from the public and private sectors, civil society and academia. The Group has served as a platform for improving Global Pulse

privacy practices, guidelines and tools as well as building capacity and trust within the privacy and data analytics ecosystem. In 2015, the PAG held its annual meeting in the Netherlands along the sidelines of the international Conference of Data Protection and Privacy Commissioners.

To respond to the risk management needs of the big data community, Global Pulse developed a Big Data Impact Assessment Tool. The tool helps users consider both the risks and benefits of undertaking a data innovation project, in order to ensure it is ethically justified and protects privacy. It was tested in the Pulse Labs on a number of projects using radio, mobile and social media data.





WFP And UN Global Pulse Show How Big Data Can Save Lives And Fight Hunger
WFP Newsroom, April 2015

*The United Nations World Food Programme (WFP) and Global Pulse—an innovation initiative of the UN Secretary-General—have teamed up to deliver powerful insights into how data from mobile phone usage could support networks in fighting hunger and boosting humanitarian response efforts...
“This is a new frontier for humanitarian assistance,” says Arif Husain, WFP Chief Economist. “As agencies begin adopting these new techniques, information collection will become cheaper and faster, making relief programmes much more responsive to the needs of hungry poor worldwide.”*

A Growing Community of Practice

B The Global Pulse network of partners and collaborators includes governments, UN agencies, industry leaders, universities, research institutes and networks of researchers and innovators who are ready to bring their skills and expertise to advance the use of data science across global and humanitarian fields.

Deepening relationships with regional universities and academic communities, Pulse Lab Kampala partnered with Makerere University to launch the first edition of Data Science in Africa, a bi-annual training and learning conference. Pulse Lab Jakarta formalized its collaboration with the University of Gadjah Mada, to conduct research with the Faculty of Computer Science addressing health and economic issues. Global Pulse is also working with researchers from the Massachusetts Institute of Technology, Leiden University, UN Volunteers and others on a series of projects testing the feasibility of using big data sources to fill gender data gaps as part of the Data2X initiative on gender data.

The number of UN agencies and offices engaging with Global Pulse continues to grow, as interest in and awareness of big data builds. Key partners in direct implementation of data innovation projects with Global Pulse in 2015 included FAO, UNAIDS, UNDP, UNICEF, UNORCID, UPU, WFP and WHO. Joint programmes of work are under development with UN Women and UNHCR at headquarters level.

In 2015, Global Pulse deepened institutional engagement within the UN system through membership in task forces, advisory groups and networks—including the UN Innovation Network and the UN Development Group’s

Data and Transparency Task Team—as a means to bring big data policies and strategies to scale across the organization.

Finally, a Global Partnership for Sustainable Development Data was launched in September 2015, uniting more than 70 governments, civil society groups, companies, international organisations and expert networks. Global Pulse is a founding member of this multi-stakeholder partnership, which aims to connect key communities to advance a data revolution for the Sustainable Development Goals.

UN Kosovo Team
Implementation of #BigData pilot in #Kosovo starts now #Inno4Dev @OpenDataKosovo thanx 2 @UNGlobalPulse & UNDCO

UNDP Innovation
We are tacking stock & planning #bigdata projects for 2016 w. @UNGlobalPulse . Thx to @Denmark_UN for the support.

"Orange is looking forward to participating in the Data For Climate Action Challenge, a unique opportunity to make the most of digital technology to accelerate progress for all. We will gladly contribute by sharing some aggregated data coming out of our local mobile networks in France and Senegal and offer our expertise in managing data based innovation challenges for the greatest support to development and climate issues."

Stéphane Richard,
CEO, Orange

The Science and Ethics of Data for Good's New Frontier

The MasterCard Center, June 2015

[...] Now, as part of its Data for Climate Action Challenge, UN Global Pulse is calling on private companies in the finance, energy and communications sectors to donate anonymized, aggregated data sets that can be used for analysis in projects that seek to understand how people are adapting to climate change. By combining data from different sectors and geographies, it is possible to gain a better understanding of how people see risk and evaluate economic opportunities, which, in turn, can aid in developing better-targeted solutions for local contexts in the face of climate change.

Innovation Challenges, Campaigns and Competitions

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United Nations
UN

From 200+ proposals, @UNGlobalPulse announces 10 winners of Asia Urban #BigIdeas Competition bit.ly/1Mc9ONZ

dial DIAL
DIAL Community

DIAL hats off to @UNGlobalPulse for leading the charge on use of #bigdata for #dataforclimate #EarthToParis #COP21

DATA FOR CLIMATE ACTION

The *Data for Climate Action* campaign was launched in 2015 to highlight the importance of leveraging big data to identify new approaches to climate mitigation and adaptation. It culminated in an event during the UN conference on climate change (COP21) with several private sector data philanthropy announcements, and the support and participation of the UN Secretary-General's Climate Advisor, the White House Climate Advisor and the Director-General of Mexico's National Institute of Ecology. The next phase of *Data for Climate Action* will be initiated in 2016 as an open innovation competition for data scientists and researchers around the world.

BIG IDEAS COMPETITION 2015: ASIA URBAN ISSUES USING DATA INNOVATION

Together with the Korean Ministry of Science, ICT and Future Planning, Pulse Lab Jakarta hosted an open innovation challenge, inviting students from across Asia to submit proposals for how data innovation can be leveraged to tackle urban issues such as social protection and welfare, transportation and the environment. The objective of the challenge was to spur inspiration and facilitate connections between communities of young data and technology innovators and policymakers in the region.

DATA INNOVATION FOR BETTER SERVICE DELIVERY

Pulse Lab Jakarta and UNDP organized a data innovation competition focused on frontline public service delivery, protecting the poor and vulnerable and the implementation of the village law in Indonesia. The competition sought to encourage actual experimentation through the use of new tools and approaches. Four winners from a field of 56 entrants received grants to create prototypes of their ideas. Pulse Lab Jakarta worked with the winners to pilot their ideas, resulting in prototypes of: (a) a citizen-centred socio-spatial database on the vulnerability of the urban poor; (b) a simple phone-based system that cuts down malaria patient reporting time by up to 19 days; (c) a tool that provides farmers with accurate spatial data on crops using unmanned aerial vehicles (UAVs) mounted with infrared cameras; and (d) a tool to monitor risk of water-borne disease using Open Street Map and social media conversations on floods. All these initiatives have the potential to empower communities and frontline service workers to make informed policy decisions.



Accelerating Public Sector Adoption

C Global Pulse continued its work to accelerate institutional adoption, engaging with UN agencies, government offices, foundations, and policy bodies to provide technical guidance on big data.

January - March

- Presentation on the opportunities of big data derived from mobile phones at the *High-Level Conference on the Data Revolution in Africa*, hosted by the UN Economic Commission for Africa (UNECA) in Addis Ababa, Ethiopia.
- Technical advice for UNFPA's *Big Data Bootcamp* held in Spain to explore the implications and practical applications of big data for development, human rights and global health.

April - June

- Co-organized the first workshop on Data Science in Africa, which gathered more than fifty students over a three-day summer school on data science followed by a two-day seminar on how data science can be applied to advance sustainable development.
- Supported panel sessions on the topic of data innovation at a UN Development Group (UNDG) retreat and a leadership seminar.
- Delivered a big data for development learning event and design workshop with the Hewlett Foundation, and participated in *Data on Purpose* conference at Stanford University.

July - September

- Supported a workshop on big data for UNFPA Eastern Europe and Central Asia.
- Delivered tutorials on the basics of data science and big data, and how to design a data innovation project, for six UNDP country teams.
- Workshop on how mobile phone data can be used as a proxy indicator for poverty, organized by Pulse Lab Kampala, for government, UN agencies, academia and civil society.

October - December

- Co-hosted an international expert meeting on *Big Data for Development and Humanitarian Action: Towards Responsible Governance* held in The Hague, Netherlands.
- Pulse Lab Jakarta and the Indonesian Ministry of National Planning and Development hosted a seminar and innovation challenge under the theme *#HackGov: Empowering Indonesia*.
- Pulse Lab Jakarta hosted a training for the Indonesian Ministry of National Development Planning on big data analytics for development and humanitarian action.

<http://unglobalpulse.org/resource-library>



PARTNERS AND COLLABORATORS

Strategic partners and collaborators are key to creating the enabling environment needed for the success of “Big Data for Development” research and advocacy. Global Pulse works with a broad network of partners and collaborators on data innovation projects and tools to support sustainable development and humanitarian action. Collaborators range from government ministries, universities, and think tanks to small start-up businesses, large data companies, and grassroots expert networks from all around the world.

PRIVATE SECTOR COMPANIES AND NETWORKS

Amazon Web Services, Crimson Hexagon, DataSift, Mediatrac, Microsoft, Orange, Planet Labs, Real Impact Analytics, Quid, Schneider Electric, SAP, ThinVoid, Telenor, Tridaya Nusantara International, XL Axiata, Knowledge Sector Initiative (KSI), Vihara Innovation Network, Mobile Monday (MoMo) community and the World Economic Forum.

ACADEMIC INSTITUTIONS

Makerere University, New York University's GovLab and Polytechnic School of Engineering, The University of Cambridge, University of Gadjah Mada, the University of Manchester, University of Leiden, University of Edinburgh, Université Catholique de Louvain, Universidad Politecnica Madrid and Stellenbosch University.

GOVERNMENTS AND INTERNATIONAL ORGANIZATIONS

Government of Ghana, Government of the Republic of Korea, Government of Zimbabwe, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the National Biodiversity Strategies and Action Plans (NBSAP) Forum and the World Bank.



UN INNOVATION PARTNERS

Global Pulse supports UN agencies, funds and programmes in harnessing big data and real-time analytics as a resource for achieving the sustainable development goals.

Food and Agriculture Organization of the United Nations (FAO), International Labour Organization (ILO), the Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF), United Nations Development Operations Coordination Office (UNDOCO), United Nations Development Programme (UNDP), United Nations High Commissioner for Refugees (UNHCR), UN Millennium Campaign, United Nations Population Fund (UNFPA), the Universal Postal Union, United Nations Office For REDD+ Coordination In Indonesia (ORCID), United Nations World Food Programme (WFP), UN Women and the World Health Organization (WHO).

DONORS

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GLOBAL PULSE

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Skoll Global Threats Fund
William and Flora Hewlett Foundation
United Nations Foundation

PULSE LAB JAKARTA

Government of Australia
Government of Indonesia
Government of the Republic of Korea
The UNDP Innovation Facility

PULSE LAB KAMPALA

Government of Uganda
Embassy of Sweden
The Royal Danish Embassy in Uganda
United Nations Development Operations Coordination Office (UNDOCO)



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