dial Digital Impact Alliance

Leveraging Data for Development to Achieve Your Triple Bottom Line

Mobile Network Operators with advanced data for good capabilities see stronger impact to profits, people and the planet

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dial Digital Impact Alliance

ABOUT DIAL

DIAL aims to realize a more inclusive digital society in emerging markets, in which all women, men and children benefit from life-enhancing, mobile-based digital services. A partnership among USAID, the Bill & Melinda Gates Foundation, the Swedish government, and the United Nations Foundation, DIAL helps accelerate the collective efforts of government, industry and NGOs to realize this vision.

DIAL is staffed by a global team and is guided by a board of leading emerging market entrepreneurs, technologists and development experts. With this leadership, DIAL is uniquely positioned to serve as a neutral broker, bringing together government, industry and other development stakeholders to promote new solutions to old problems. For more information about the Digital Impact Alliance or this paper, please visit our website: www.digitalimpactalliance.org

altai consulting

ABOUT ALTAI CONSULTING

Altai Consulting is a consulting firm that specializes in emerging markets. Its client base includes private companies active in various sectors as well as public institutions, international organizations and charities, including the World Bank, CGAP, GOGLA, the Bill & Melinda Gates Foundation, USAID, DFID, JICA, UNHCR, UNICEF and IOM. Altai has also advised the governments of several developing countries in Africa, the Middle East and Asia in improving the effectiveness of their public policy and service delivery mechanisms.

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Contents

FOREWORD

With more than 5 billion people connected to mobile services in 2017 and projections of reaching 5.9 billion by 2025, or 71 percent of the world's population,[1] the mobile phone sector has become increasingly important in helping achieve the Sustainable Development Goals (SDGs). The SDGs were adopted in 2015 by all 193 countries in the United Nations General Assembly as a way to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. However, the mobile industry is still far from realizing its full impact. Mobile network operators (MNOs) have an opportunity to think above and beyond "business as usual" to achieve the SDGs, not merely due to a moral imperative but because of the "triple bottom line" of people, planet and profits. Achieving the goals will create new revenue streams currently untapped by the industry in the short term, and will create new customers and increase the value of current customers in the long term.

Mobile network operators (MNOs) have an opportunity to think above and beyond "business as usual" to achieve the SDGs, not merely due to a moral imperative but because of the "triple bottom line" of people, planet and profits.

A critical piece of the mobile industry's impact lies in the data it generates, which governments, humanitarian and development organizations, and donors agree is needed to address key humanitarian issues and reach the SDGs by 2030. To fully implement and monitor progress on the SDGs, decision makers need data and statistics that are accurate, relevant, accessible and easy to use. According to the Global Partnership on Sustainable Development Data's State of Development Data Funding and PARIS21's Report on Support to Statistics (PRESS), over the next 15 years $17.4 billion will be required to help developing countries measure and monitor the SDGs. However, only $12.3 billion is committed, underscoring the need for more powerful, targeted data and analysis so that government and donor investment in the SDGs leads to impact.[2]

From the context of this publication, digital data for development (D4D) refers to the use of data generated by mobile, satellite and digital devices to inform and strengthen nonprofit, humanitarian and public-sector decision-making. In a number of instances where this type of data has been available on a timely and secure basis, respecting individuals' privacy and safeguarding personal context, the resulting analyses have proven to contribute to public health, food security, education, economic development and other SDG goals. Data such as people's location and movement patterns, financial and economic activity, identity and demographics, service usage patterns, social graphs, and call patterns can complement, enrich or replace existing data sources used by governments and NGOs. While a number of pilot D4D projects have demonstrated the power of D4D data, very few have resulted in large-scale use of D4D data on an ongoing basis for public service delivery or decision-making.

[1] The Mobile Economy 2018, GSMA.
[2] The State of Development Data Funding (SDDF) 2016 report, Global Partnership for Sustainable Development Data.

This is the second[3] paper in series on data for development produced by the Digital Impact Alliance (DIAL), which works with MNOs and other partners to solve these challenges and unlock mobile data consistently for use in achieving the SDGs and other development priorities. This paper provides new insights on value exchange mechanisms based on primary and secondary research, including in-depth, one-on-one interviews with more than 50 senior executives along the D4D value chain in both developed and emerging markets. Interviewees represented a wide variety of industries and institutions, including NGOs, MNOs, data analytics companies, academia, statistical offices and adtech firms.

The goal of this paper is to help MNOs in low-income economies[4] better understand the value of their data, particularly as it relates to the development sector, by addressing which data is valuable and to whom, what purposes it can be used for, and how it can be made available and at what price. It provides guidance on how MNOs can generate additional value from their data, be it in monetary terms (e.g., new revenue streams) or non-monetary terms (e.g., pricing innovation, improved brand perception, customer retention/churn reduction, government relationships, improved analytics and data-driven business processes). This paper will introduce MNOs to viable, systematic models for delivering insights from mobile data that will lead to improved public service delivery and program decision-making. DIAL and its partners, including the GSMA, will publish additional insights on viable business models and commercial incentives that will help MNOs and other data holders participate meaningfully in the D4D sector.

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[3] The first paper, "Unlocking MNO Data to Enhance Public Services and Humanitarian Efforts," addresses the shared value proposition of data for development among governments, nonprofit organizations and MNOs, and the primary obstacles to reaping the rewards of this promising sector. Subsequent papers will aim to answer specific research questions regarding market models, operational and technical models, and governance models for mobile data from the perspective of different stakeholders, such as governments, NGOs and third-party analytics providers.

[4] Per the World Bank for the current 2018 fiscal year, low-income economies are defined as those with a GNI per capita of $1,005 or less in 2016, calculated using the World Bank Atlas method.

EXECUTIVE SUMMARY

Based on our extensive research and in-depth interviews, we found that MNOs wishing to participate in the data for development space need to reformulate how they should participate, where they should focus their efforts and what kind of benefits they can expect. First, MNOs should recognize that now is an excellent time for them to make their entry into the D4D space or expand their data for development operations. Currently, they hold an advantage because of the type of data they have to offer and their dominance in developing countries. But this advantage may soon be lost, as smartphone penetration increases and data from smartphone apps becomes a more powerful offer. However, the 2030 Agenda deadline is less than 12 years away. If the world is to overcome data gaps and design more impactful and targeted health, education and other social services to achieve the SDGs, the time for MNOs to act is now.[5]

Second, as MNOs devise their D4D strategy, they need to recognize what type of benefits they can expect and which ones they should focus on. Because of the low willingness to pay among governments and NGOs in low-income countries, evolving regulations, and effort required for price discovery, they should expect limited monetary pay-off. Instead, they should look to the extensive non-monetary benefits, such as better corporate strategy development enabled by impact focus, expanded relationships with regulators and government authorities, customer centricity and employee retention, adjacent sector opportunities, increased analytics sophistication, increased pricing sophistication, better brand image, and better internal business processes.

We found that MNOs wishing to play in the data for development space need to reformulate how they should participate, where they should focus their efforts and what kind of benefits they can expect.

Finally, when conceiving their participation in D4D, MNOs should expand their ideas about what they have to offer to governments and NGOs. While raw data has been and will be helpful, issues around regulations and privacy make it challenging to share it with outside parties. A more viable solution is to instead offer productized and packaged insight and analysis, which is much more valuable and avoids many of the regulatory concerns. Producing such insights will require MNOs to bolster their data management and analysis capabilities, but investing in these areas will pay off in the long run, both in terms of involvement in data for development and for the internal benefits of having these capabilities.

[5] We note throughout this paper that MNOs have delivered on a number of impact and humanitarian sector initiatives. Our call is to enable them and D4D sector participants to do so in a cohesive, holistic, structured manner so as to increase impact and ease of cooperation, while offering tangible benefits to all parties.

The following is a brief summary of the key findings of this study, as well as recommendations for MNOs on why and how they should enter and/or increase their commitment to the data for development sector.

From the perspective of MNOs, several critical barriers have prevented scaled use of mobile data:

- MNOs have other priorities and do not recognize the business case for sharing their data with humanitarian and development organizations.
- Many MNOs have limited internal capabilities for data management and analytics, which prevents them from providing their data to governments and NGOs without incurring excessive costs.
- Regulations around data sharing and privacy are unclear, poorly understood and sometimes highly restrictive, leading to uncertainty about the legality and practicalities of sharing data in many of the African, Asian and other developing markets where the need is greatest.
- Communication between MNOs and governments/ NGOs is insufficient for real partnerships to flourish.
- Governments and NGOs often lack the institutional resources and specialized skills to analyze and incorporate the data or insights provided by MNOs into their business processes.

Recent market dynamics suggest it may be an ideal time for MNOs to increase their involvement in D4D efforts:

- MNOs have new incentives to explore potential new revenue streams as a result of market dynamics, such as slowing subscriber growth, intense competition and shrinking profitability as consumers shift from higher-margin data services.
- Due to their increased use of mobile phones, historically underrepresented and low-income people are generating data that can supplement traditional data collection methods, allowing these communities to be “seen” for the first time.
- In their efforts to achieve the 2030 Agenda, governments, donors and nonprofit service providers are looking to develop data-driven, decision-making processes and systems similar to those that have unlocked value for industry, representing a potentially untapped source of value for MNOs.

KEY FINDINGS AND RECOMMENDATIONS FOR MNOS

Several critical barriers have prevented scaled use of mobile data

It may be an ideal time for MNOs to increase their involvement in D4D efforts

The window of opportunity to implement large-scale D4D initiatives will likely not remain open for much longer

Efforts will be most successful and sustainable if they focus on the long-term benefits of participation

MNOs should focus on providing value-added insights and services rather than raw data and should price based on the value generated for the user

MNOs have an opportunity to align regulations with their impact initiatives

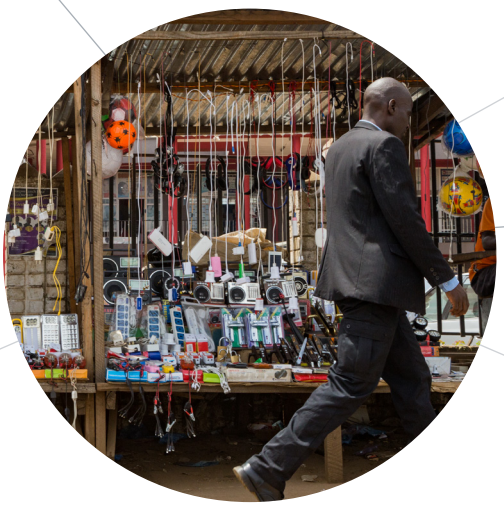
- While social and industry objectives for using D4D are often different, the types of analytics are quite similar. As social impact and commercial data analytics methodologies and tools become more accessible, the costs are falling, making it easier and faster for MNOs to agree to participate in D4D efforts.

The urgency to achieve the SDGs by 2030 offers a new opportunity for MNOs to get involved and reap the benefits. However, the window of opportunity to implement large-scale D4D initiatives will likely not remain open for much longer:

- Interest in and enthusiasm around using data to achieve the SDGs is growing, including among donors, leading to increased opportunities for MNO involvement.
- MNO data is highly sought after and valuable to these projects because of its high degree of representativeness, quasi real-time availability, high frequency and ability to capture location.
- However, the use of alternative sources of data in D4D is gaining traction.
- Increasing smartphone penetration rates in emerging markets are opening the way for holders of app data to also contribute. This includes Facebook, which is providing high-value services such as Disaster Maps.
- Getting to scale is challenging under any circumstances. One need only look at the fate of most of the more than 2 million apps on the app store.[6] Given the value appropriation by first movers and first at-scale platforms, building platforms is inherently difficult and expensive to do.

MNOs' contributions to D4D efforts will be most successful and sustainable if they focus on the long-term benefits of participation:

- Many governments and NGOs believe mobile phone data should be seen as a public good and be made available free of charge. Therefore, operators should expect limited monetary pay-off and should instead focus on non-monetary benefits,[7] as well as impact in the communities served.
- Examples of such non-monetary benefits include access to new data-driven insights that can be used for internal business purposes, customer retention, access to new markets, differentiated product offerings, access to a senior institutional network that includes regulators and government authorities, and improvements to brand image and reputation.



[6] Source: Statista.
[7] Our findings suggest a low willingness to pay applies to any digital service. The commercial sector has realized this and adjusted their business models accordingly. Lower-priced digital services (e.g., newsfeeds, real-time navigation, music) are possible today and getting better primarily because of the availability of more consumer data.

- An especially important non-monetary benefit of meaningful engagement in D4D is increased pricing sophistication and improved customer knowledge. Enhanced customer knowledge allows for smarter product design. Coupling that customer knowledge with pricing innovation for the D4D sector will help MNOs find pockets of high-value, defensible segments that have not emerged before

That said, MNOs seeking to generate revenue from D4D efforts should focus on providing value-added insights and services rather than raw data and should price these products and services based on the value generated for the user:

- MNOs should invest in and expand their internal analytics capabilities, including infrastructure, and data science and analytics teams, in order to go beyond raw data and be able to offer meaningful answers to governments and NGOs.
- Such insights will not only be more valuable to the organizations, they can be used internally for a variety of business purposes, including access to new industries, employee retention, customer stickiness, churn reduction, cross selling and granular analysis of customers.
- When it comes to pricing, cost-based and market-based approaches are poorly adapted to D4D. Therefore, value-based pricing is the best option, but will require significant investment in price discovery and business development. (Note that pricing occurs in the context of selected commercial/ business models that the MNO chooses to deploy, which is covered later in the paper.)

Regulations are continually evolving, but MNOs have an opportunity to align them with impact initiatives:

- While data protection regulations are currently inconsistent across countries, the European Union's more stringent General Data Protection Regulation (GDPR) may become a global standard due to its extra-territorial applicability, from an MNO perspective. However, regulations have been evolving before and without GDPR through initiatives such as the 2014 African Union Convention on Cyber Security and Personal Data Protection.
- MNOs should take an active role in shaping D4D partnerships and helping establish common frameworks for regulations and methodologies that will define how data can and will be shared and used.
- Communicating publicly about their D4D initiatives will allow MNOs to have a stronger degree of control on the messaging and be able to address potential data privacy concerns head on. It goes without saying that MNOs should prioritize protecting privacy and acting as a responsible steward of data in order to earn the trust of individuals and communities.

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KEY RESEARCH QUESTIONS AND METHODOLOGY

This study focuses on shared value creation opportunities (monetary and non-monetary) from a data for development perspective and aims to answer the following key research questions:

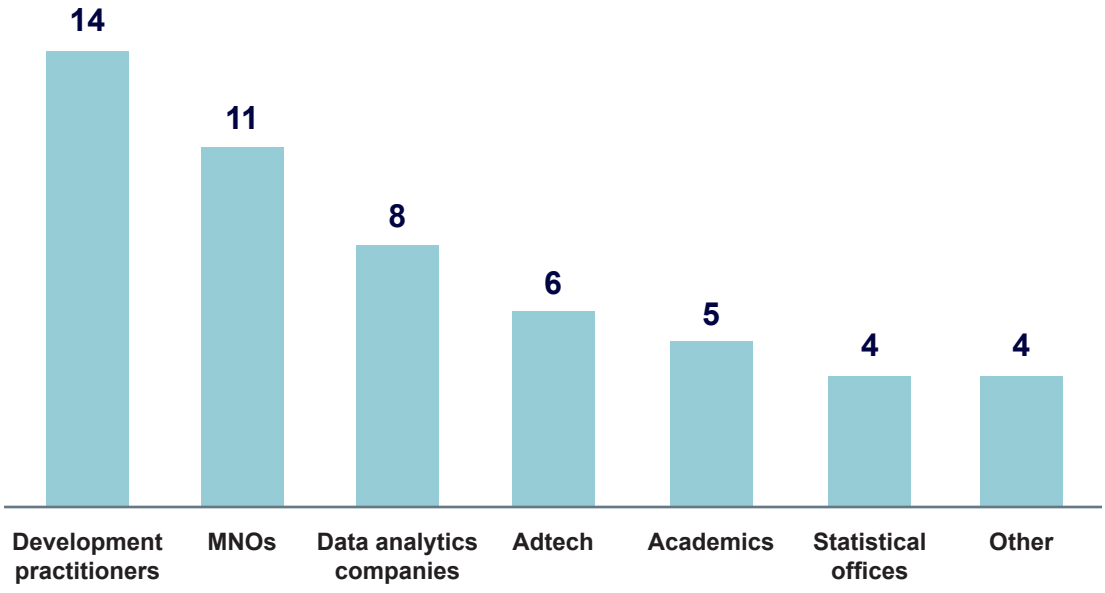
- Which data is valuable: coverage, distribution spend, localized call detail records (CDRs), transactional mobile money data, internet usage data such as URLs accessed, apps used, etc.?
- Who will find this data valuable: NGOs, statistical institutes, academia, corporations, etc.?
- Who is showing an appetite or willingness to purchase this data or the insights derived from it?
- What are the most promising use cases for the data or insights in terms of revenue, profitability and scale
- How can data be made available in a cost-effective, privacy-compliant manner?
- Who are the leading industry players making this data available?
- What are the potential pricing models for this data? What are the costs for MNOs producing this data, including marginal costs linked to data anonymization, encryption and distribution?

This study builds off two research modules:

- **Comprehensive secondary research** using existing documentation on data for development and data monetization, including the most recently published GSMA report, *Mobile Data for Social Good* (June 2017), and *Data as a Force for Good* (March 2017), a white paper from LUCA, Telefónica's data unit. (See the full bibliography at the end of this report.)
- **In-depth, one-on-one interviews** with more than 50 senior executives along the data for development value chain in both developed and emerging markets. The charts below illustrate the number of executives interviewed from each sector and where interviewees are located. Quotes from these interviews are included here in order to provide real-world examples of the concepts being discussed.

This study focuses on external data monetization opportunities from a data for development perspective and aims to answer key research questions.

Figure 1: Distribution of Interviews Conducted by Altai Consulting and DIAL by Type of Interviewee



The main limitation of the methodology is linked to the reluctance of many stakeholders to disclose data they collect or have access to, how they use it in concrete terms, and when this data is subject to a transaction and the terms of these transactions, which are kept confidential. This reluctance can partly be explained by the lack of a clear legal framework, as well as the hesitation of some stakeholders that they could be called out for leveraging the data available to them. Similarly, the literature available on data for development and data monetization remains very high level with few details and is based on a limited variety of examples.

Figure 2: Map of Altai and DIAL Interviews

THE CURRENT LANDSCAPE OF MNO DATA FOR DEVELOPMENT

MNO Data Has Been Deployed Successfully in Several Fields

Most data for development use cases have been proof of concept and research studies, with MNOs being involved on a pro-bono basis. They are concentrated in several key fields, but there are still plenty of new areas to uncover. The following is a brief overview of where mobile data, particularly location data generated by mobile phones, is currently most relevant for the data for development space. For a deeper look into the applicability of MNO data-driven insights across a range of development topics, please refer to DIAL's February 2018 Report *Unlocking MNO Data to Enhance Public Services and Humanitarian Efforts*.

Type of Use	Data	User	Example
Health	Location data taken from mobile phones can be used to trace human mobility, and thus can play a significant role in epidemics.	Governments and NGOs can use this data to better allocate resources in prevention and response to these health crises.	MTC mobile data analytics were used in Namibia for malaria planning and elimination.
Infrastructure and Transport	Location data can illustrate how people move through a city or a country by depicting the usage of highways, commuter routes, etc.	Governments, NGOs and public transport companies can use this data to assess infrastructure needs and optimize road networks and public transport routes.	In the Philippines, MNO data from Orange has been used to understand traffic congestion.
Crisis Response	Usage data can help identify deviations from normal call patterns; location data from mobile phones can be used to track movements in affected areas; and SMS can be used to send information to affected users.	Governments, humanitarians and emergency response teams can use SMS and location data to send alerts and information to people in affected areas. Patterns from CDR analyses can be used to identify the affected areas and monitor recovery. And location data can be used to identify short-term migrations and allocate resources to those who are displaced.	After the earthquake in Haiti, Digicel and Flowminder used mobile data analytics to map population movement and track the cholera outbreak.
Air Quality	Emissions data can identify areas of increased pollution.	Governments and international institutions can use this data to predict precise pollution level mapping.	Telefónica Brazil analyzed air quality in São Paulo and Madrid using open data from weather stations, air quality sensors and traffic sensors.
Statistics, Measurement and Evaluation	Location data can be used to check the accuracy of and update census counts and track population movements, while usage and spend data can be used to assess people's income levels.	Governments and official statistics can use location data to monitor the evolution of the population and study tourism patterns. Combining location data with usage and spend data can be used as a tool to map poverty. All D4D actors can use mobile data to monitor their impact on target populations through levers such as income evolution and population movements.	WorldPop/Flowminder measured the distribution of poverty across Bangladesh by combining anonymized mobile phone data and satellite imagery data to create high resolution, dynamic maps of poverty indicators.

Barriers to Large-Scale Use of D4D to Achieve SDGs

Mobile data has proven valuable for development needs over and over again, but it remains in the experimental stage for a variety of reasons. Most use cases have been limited to ex-post analyses, but the real value of mobile data lies in quasi real-time availability. Projects using mobile data were mostly ad-hoc research projects rather than integrated into current development efforts. None of the major use cases have been brought to scale, despite numerous proofs of concept. The partnerships that enabled these use cases relied on pro-bono participation of MNOs and donor financing. And there is still no demonstrable return on investment and no market matching mechanism for mobile data supply and demand.

As one interviewee observed, “The optimism [around D4D] has tripped up over the practicalities of accessing it and handling it.” Therefore, sustainable partnerships will require rethinking the terms of collaboration.

The research and interviews confirmed the existence of four primary barriers to reaching scale, both from the supply side (MNOs) and the demand side (governments/NGOs).

The Market Opportunity for MNOs Is Unclear

MNOs in the emerging world have continually stepped up to participate in data for development initiatives. However, full participation has been hampered by the fact that MNOs are already dealing with many issues related to their core business. As we learned from our interviews with MNO executives, they are concerned about their business being negatively impacted by allocating scarce resources to projects that have no tangible impact on their top line or bottom line.

Mobile data has proven valuable for development needs over and over again, but it remains in the experimental stage for a variety of reasons.

In the vast majority of pilot D4D projects, data was shared freely by the MNO because it was considered a service to the public good. Additionally, MNOs understand that being good corporate citizens also improves their brand and image. However, several MNOs said that the public relations impact of this type of data sharing has been limited, and when it comes to monetary compensation, the amount of revenue gained is too small to make a difference.

Some MNOs see a financial risk in sharing data because it could be leaked to competitors or other third parties and expose information about the MNO’s operations. As one interviewee explained, “Any type of info we release is feared to be highly comparable and can be used by competitors, especially for anything related to customer demographics, location. This came out when discussing traffic data. Even anonymized, it shows where our customers are and where they go.”

MNOs, Government Ministries and NGOs Need to Build Collaborative Capacity

Apart from a few large MNOs, which have robust data management teams, many smaller MNOs in low-income markets do not have data managers with the skills and competence required to participate in data for development projects. Oftentimes, only one person is serving as gatekeeper to the data and responsible for computing KPIs for management, maintaining the data pipeline for reporting purposes, and meeting business units' data analysis needs.[8] Furthermore, this person has a list of business-critical questions to answer before being able to address a D4D request. Anonymization and aggregation, which must be done in a robust way to protect customers' privacy and allow for good analytics, add additional complexity. Because most MNOs don't have the human resources and equipment to dedicate to non-core and less profitable activities, they need help to facilitate D4D projects.

NGOs also lack consistent data engineering and data science teams to undertake complex big data assignments in a secure, privacy-compliant environment. While MNOs can often produce basic aggregates, KPIs, analytics such as mobility maps or even raw data, there is no capacity to digest this in an effective way on the demand side. There is a missing link, in terms of "baseline analytics sophistication," to bridge the gap between what MNOs can produce and what governments/NGOs need to operate effectively.

Regulation and Privacy Concerns Persist

Issues around data privacy are coming to the fore across the world, leading to fear and confusion about using D4D among MNOs, government ministries and NGOs. There are many questions that have no clear answers, such as what data can be shared and how, to whom does it belong, and to what extent the use of data for public good falls under the remit of privacy laws. In the absence of a transparent framework, MNOs are opting to stay away from any project involving sharing data with third parties.

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As one interviewee explained, MNOs in Europe have the resources to hire a lawyer to help them understand the laws surrounding the use of data and privacy issues, and they can help prepare for potential litigation. But for MNOs in the developing world, "a lot of the legal frameworks are unspecified, so it becomes arbitrary … If the regulator decides we don't like what you are doing … then you need to shut it down."

On one hand, these operators feel pressure to share their data for the public good, particularly during crises such as the Ebola outbreak. On the other hand, they need to adhere to nebulous local regulations regarding privacy. This confusion largely explains why researchers failed to access CDR data to track details about the Ebola epidemic in West Africa two years ago.[9]

Lack of Connections Between MNOs, Government Ministries and NGOs

There are practically no established forums or communication channels between MNOs and governments/NGOs. Most data for development initiatives happen because of pre-existing personal relationships between an MNO executive and someone working with a government ministry or NGO. This lack of integrative collaboration mechanisms is reinforced by unfamiliarity

[8] Source: Altai Consulting, which has worked on extracting MNO data in Mali, Chad, DRC, Uganda, Tanzania, Madagascar, Iraq and Afghanistan.
[9] "Waiting on Hold," (The Economist, 2016), https://www.economist.com/news/science-and-technology/21627557-mobile-phone-records-would-help-combat-ebola-epidemic-getting-look.

among governments and NGOs of what MNO data is and what it can do. While this unfamiliarity is fading, for many, D4D initiatives remain highly theoretical, or even fantastical.

Interviewees confirm this lack of connectedness and awareness. One MNO executive explained that NGOs never bother to reach out to MNOs for even the most basic questions, and most have no idea what MNO data could be used for. Another interviewee from the development side agreed that most NGOs are only beginning to build data use cultures and analytics sophistication.

The Evolution of D4D Offers New Opportunities

Thus far, most data for development projects have been one-off, proof-of-concept projects initiated by the private sector in partnership with academics and primarily funded by foundations, donors and development banks. However, a number of factors are changing and evolving, leading to increased opportunities and resources for D4D projects taken to scale.

Growing Donor and Government Interest in D4D Is Mobilizing Resources

Donors and country governments, as part of their commitment to helping achieve the SDGs by 2030, are demonstrating an increased appetite for funding the design and use of digital development solutions to deliver and monitor progress of SDG-related programs. This creates a growing opportunity for data analytics organizations and mobile network operators. This interest is emerging in the form of new investments in organizations and tools to enable governments, NGOs and others to participate.[10] For example, donors have helped launch a variety of initiatives, such as the Global Partnership for Sustainable Development Data (GPSDD), Data2x, and Pathways for Prosperity Commission on Technology and Inclusive Development.

D4D has gained traction at major industry events and in the media with the support of multilateral institutions. The UN Global Pulse plays an important role in publicizing the potential role of big data in development. At the industry level, the GSMA promotes the use of mobile operators' big data capabilities to address humanitarian crises, including epidemics and natural disasters, through its Big Data for Social Good initiative, which was launched in February 2017 and is backed by 20 MNOs. The United Nations Foundation is also a major supporting partner, providing coordination and integration within this ecosystem, including DIAL, Data2x and GPSDD.

D4D has gained traction at major industry events and in the media with the support of multilateral institutions.

This enthusiasm around D4D and the promotion of flagship use cases that demonstrate how MNO data can be used to support social and humanitarian projects should encourage the emergence of new partnerships between MNOs, governments, NGOs and research institutes.

MNO Data Is Still Uniquely Relevant for D4D

Thanks to high mobile phone penetration in low-income countries, MNO data offers a high degree of representativeness and quasi-real-time localized information at a high frequency. According to one interviewee, MNOs' quantitative data includes CDRs, network events and URLs, while

[10] The Digital Impact Alliance (DIAL) is one example.
[11] This quote is from a player in a developed country with >100 percent coverage. This would not be applicable in emerging markets.

their qualitative information includes IMSI (SIM), IMEI (phone), MSISDN (phone number) and geo localization (cell ID). "With a market share above 15 percent,[11] this data is considered to provide a good level of representativeness of the market."

Depending on their in-house capabilities in terms of data management, MNOs can access this data without significant marginal costs. That said, for some MNOs the cost of gathering, cleaning and transforming data can present a challenge and make them reluctant to participate in D4D projects.

Smartphone Penetration Will Change the Dynamic

MNOs' comparative advantage has eroded as smartphone penetration has grown, particularly in low-income countries. It is expected to grow globally from 57 percent in 2017 to 77 percent in 2025, and in sub-Saharan Africa, from 34 percent in 2017 to 68 percent in 2025.[12] With smartphone growth, the penetration of mobile first platform services and apps is increasing fast. For example, since June 2014 more than 100 million people in Africa connected on Facebook every month, and 80 percent of those connections were established via mobile phones.[13]

These types of actors usually have access to a wealth of data that is more precise and representative than that of MNOs. In the case of location data, many apps track user location precisely with GPS, regardless of whether users are using the app. And while the CDRs used by MNOs usually have a number of data points per day in the two-digit figures and offer limited granularity, the number of data points offered by app data is often greater than 100 per day, and they provide precise locations. Unfortunately, this type of data usage is not always done in a privacy protective manner. Even in cases where such data is helping to deliver life-enhancing or lifesaving services, it is critical that entities that are gathering and using this data do so in compliance with established regulations and ensuring that all data is properly anonymized to protect people's privacy.

Tech giants such as Facebook and Google are de-facto monetizing user data via advertising, but many other mid-sized and small firms are using location-based data derived from app usage as a source of revenue.

Many of the use cases that have relied on anonymized location data provided by CDRs will eventually rely on data provided by apps. This is the direction the industry has been taking in developed markets, where the usefulness of CDRs has declined over time. Digital and mobile first platforms are also more advanced in terms of their technical and marketing approaches, as their business model often integrates these types of revenue streams from the beginning. Tech giants such as Facebook and Google are de-facto monetizing user data via advertising, but many other mid-sized and small firms are using location-based data derived from app usage as a source of revenue, as seen in the proliferation of location intelligence services.

The time for MNOs to act is now, not merely due to a moral imperative but because of the "triple bottom line" of people, planet and profits. With the 2030 Agenda deadline less than 12 years away, MNOs can contribute significantly to achieving and impacting the SDGs. More broadly, MNOs can benefit greatly from learning how to capitalize on their data by improving internal data-driven decision-making, deriving business value from their customer's data or generating lasting impact in the communities in which they operate through sharing insights with public service delivery organizations.

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[12] The Mobile Economy 2018 (GSMA).
[13] *L'Afrique, Futur Paradis du "Big Data" pour Facebook?* Jeune Afrique, September 9, 2014.

LESSONS FROM THE ADVERTISING TECHNOLOGY (ADTECH) INDUSTRY

The adtech industry is one example where the sellers of data set clear policies as to what and how they share their data, and clear value is demonstrated to the buyers. It is important to note that there is a big difference between the surveillance marketing done by some adtech players and the way MNOs use data to offer improved products and services at reduced costs. However, this industry can offer some lessons to the growing data for development space.

Applications are the primary source of data, not CDRs. This data is used for advertising—to target the right people with the right ad. Most often, customers agree to share data with a third-party application in order to use that app, particularly if the app is free. App publishers resell data in a privacy compliant manner to adtech firms through various models, such as a flat fee to get a software development kit (SDK) installed, revenue sharing on ads displayed and pricing based on volumes of data points requested through APIs.

Location data is most valuable and is never sold as a stand-alone piece, but is instead used to enhance marketing products. Typically, this can be real-time location data used to add value to the advertisement by pushing to the right clients. This is in part due to drive-to-store initiatives that require real-time location data. But more fundamentally, it's due to the fact that location data allows for sophisticated segmentation of the population, because where someone goes can tell a lot about who they are.

Enhancement and integration of location data with orthogonal datasets, including transaction, traffic, weather, retail, content usage, etc., is the real value driver. According to one interviewee: "If I see you every day from 9:00 am to 5:00 pm, I know where you work. And with usage in the night, I know where you live, and what is the price of your home by buying real estate data." As a result of data integration, the number of data points has exploded, providing near real-time information about people. This has given digital businesses a powerful model for understanding their customers and a major competitive advantage.

Even at an aggregated and anonymized level, this data is quite useful, as it allows for the examination of patterns of groups of people. The impact of this knowledge is illustrated in Data2x's project, *Analyzing Economic Activity With Credit Card and Cell Phone Information*, wherein credit card records and call detail records from one Latin American city were used to describe economic lifestyles—patterns of behavior that illustrate the needs and priorities of individuals. Through this work, they were able to glean insights into how women's economic lifestyle clusters differed in important ways from men's.[14,15]

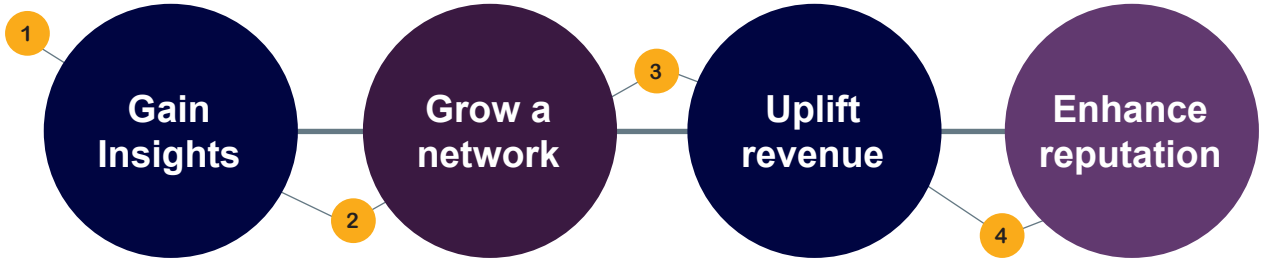
It will be important to keep in mind that due to some players inappropriately using customer data without their knowledge and without adhering to privacy policies, the data for development sector will have to deal with the fallout of those instances and the negative publicity surrounding them. Therefore, actors within the data for development sector will need to be even more upfront and proactive about responsible use of data and the protection of people's privacy.

[14] http://www.data2x.org/wp-content/uploads/2017/03/Big-Data-and-the-Well-Being-of-Women-and-Girls.pdf
[15] For additional examples please refer to Figure 9 on Unlocking MNO Data to Enhance Public Services and Humanitarian Efforts.

HOW MNOS CAN LEVERAGE D4D OPPORTUNITIES

Define the Right Business Objective

Participation in the data for development space offers several value-added opportunities for MNOs, not least of which is the chance to help achieve the SDGs and sign on to the triple bottom line of people, planet and profits.



Gain Insights

While many MNOs in emerging markets are still building in-house capabilities to manage and analyze their data, this should not preclude them from participating in the D4D space. Collaborating with partners can give them access to experts in the field, who can provide insights, analysis and guidance on how network data can be used for external purposes. This is already a rather common practice between MNOs and their partners. Even operators that do have in-house capabilities can benefit from such expertise, as partners such as technology implementers, donors, national statistics institutes (NSIs) and research institutions can provide analyses combining MNO data with data the company would not usually be able to access. Participating in the data sharing space can also enhance the internal technical capacities of an MNO.

Grow an Institutional Network and Enhance Reputation

Data for development projects conducted with major government ministries and NGOs can help MNOs build a more senior network in countries where their presence is not as strong by gaining visibility with senior government officials and large local companies.

MNOs will also benefit from reputational gains for their corporate social responsibility, including increased goodwill, positive public image and visibility. This is especially true for MNOs with in-house data science teams, which can bring insights and skills to local governments or NGOs and have a higher added value.

Operators with in-house data analytics capacities can use D4D projects as a way to showcase their expertise and skills, often through publications and the media. D4D can also be a source of credibility for MNOs playing in the big data space, as data analysts from MNOs work hand in hand with actors such as NSIs and academia.

Uplift Revenue

Based on the research, MNOs have little to no intention of generating revenue by sharing raw, anonymized data. The best an operator could plan for is some type of cost recovery to cover extraction, anonymization, cleaning, etc. However, the picture changes dramatically as operators (or third-party analytics intermediaries) convert that data into higher-order insights. Therefore, while increased revenue is not expected to be significant for basic data insights, there can be significant value derived from creating and publishing analytical products based on aggregate customer characteristics. Our recommendations for practitioners and MNOs have been about first collaborating on risk mitigation and cost avoidance and then turning their focus on revenue generation.

Enhance Reputation

When social impact initiatives are central to business strategy, the payoff is visible in key indicators such as LTV (long-term customer value), customer churn reduction, and stronger relationships across the customer journey (awareness to use). Especially in prepaid markets with significant revenue at risk due to pricing battles, MNOs should see D4D sector participation as a key enabler of long-term customer management with emerging customer segments.

Decide How Far Downstream to Go

A major question for MNOs seeking to provide data for development purposes is how far downstream they should go. Should they provide raw data, basic indicators, sophisticated analytics or full-fledge consulting services based on data?

Raw data is the easiest to extract but is also the most sensitive data from commercial, privacy and national security perspectives. Growing regulatory and citizen concerns, and new regulations such as GDPR, make sharing raw data increasingly unlikely. Sharing raw data is also the lowest position in terms of added value from the MNO.

Leaders like Orange and Telefónica already offer **basic insights and indicators** in select market environments. Additional MNOs have begun to get more involved through GSMA's BD4SG (Big Data for Social Good) program. MNOs that develop data management and analytics capacity for internal use (e.g., churn management and customer relations management) can provide insights for D4D without incurring significant additional costs. Examples include origin/destination matrices, density maps and hourly call analyses.

Sophisticated analytics use mobile data with other data sources to provide richer insights. This is the case in research and pilots in epidemiology, which often combine mobile data with information from the Ministry of Health.

Providing **consulting services** would mean shifting towards a different business model. In addition to producing insights, the MNO would also help implement the changes necessary to leverage them.

In deciding the level of participation they want to take on, MNOs need to take into account several internal and external factors. To define their strategies, operators should start by answering the key questions outlined in Figure 4 (on page 20).

One interviewee recommended that MNOs that don't have in-house capabilities to implement their project should get external support via commercial or open source products. However, if there are no existing products for a use case that the MNO wants to try out, they should develop them in house.

Figure 3: Range of Data Types MNOs Could Share

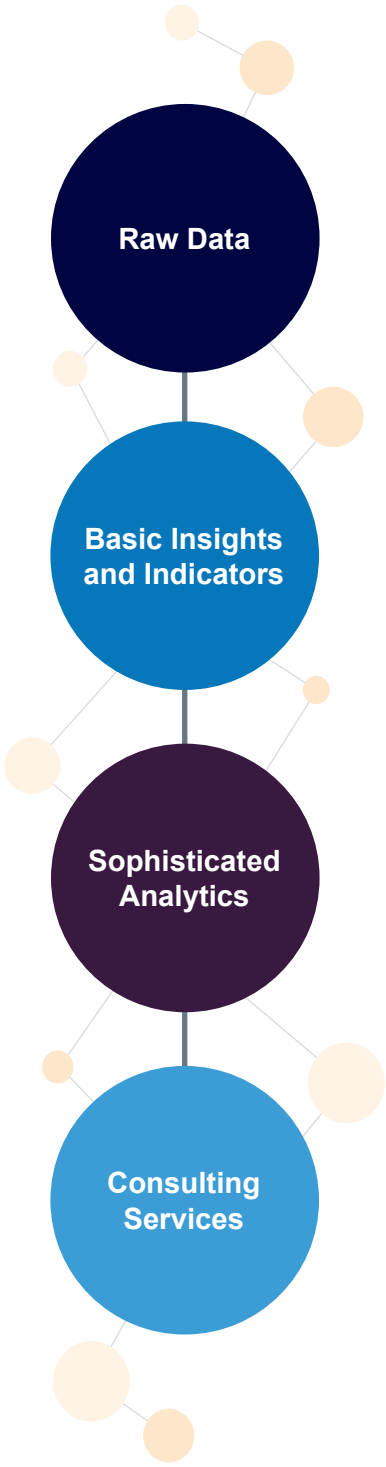


Figure 4: High-Level Questions for MNOs to Consider in Deciding a D4D Participation Approach

Regulatory environment	• What do the laws, regulations and company policies for this market allow? • What are the risk-reward trade-offs and incentives as embedded in the regulatory framework?
Demand	• Who are the potential D4D partners in their market? • Do they have internal data analytics capacities? • Are they able and willing to pay for data?
Capabilities	• What are the MNO's internal capabilities in terms of data management and analytics? • Do they want to invest in developing them? • Can they find the necessary resources in their market? • Are there third parties with strong data analytics capabilities in their market?

Choose a Method of Distribution

MNOs have utilized different data sharing practices, and some have combined different approaches.

Bilateral and Multilateral Agreements

To date, data held by private companies has been largely accessed and analyzed through one-off ad hoc agreements rather than through an open, structured market mechanism. These agreements often involve several parties, including the data provider (e.g., MNO), the end user of the data (e.g., NGO, government ministry) and possibly a third party bringing the analytical skills (e.g., data analytics firm, research institute).

Partnerships With Third-Party Analytics Providers

A number of third-party data-as-a-service providers are creating early but vibrant market mechanisms that make big data indicators on populations available. These indicators have traditionally sprung from datasets such as demographic, economic and earth sciences information. However, they are increasingly integrating new indicators driven by unstructured datasets, such as behavioral, social media, retail consumption, travel patterns, social network analysis and energy use. Interviews indicated that a number of MNOs in low-income markets are experimenting with new business models (e.g., revenue share) with such service providers, although it's still in the early stages. Examples of micro-segmented population data being combined with offline data such as footfalls or retail purchases is not new in developed markets.[16] Going forward, this model could be a viable intermediary channel for accessing market intelligence.

METHODS OF DISTRIBUTION

- **Bilateral and Multilateral Agreements**
- **Partnerships With Third-Party Analytics Providers**
- **Vertical Integration of Core Analytics Practice**
- **API Platforms**
- **Crowdsourcing Innovation**

[16] Examples include geo-location intelligence platforms used by the adtech sector.

Vertical Integration of Core Analytics Practice

Some MNOs have developed their own analytics capabilities internally through vertical integration of the data science practice. Telefónica's data unit LUCA[17] has engaged with the social impact sector in a number of initiatives. Other MNOs are taking various paths toward building analytics sophistication or developing TDaaS (Telecommunications Data as a Service) offerings. Singtel launched Dataspark, a mobility analytics company with a footprint of more than 600 million customers in 22 countries. Verizon integrated Precision Market Insights, its location intelligence platform, into its acquisition of AOL's ad targeting, optimization and measurement system in 2016. Given the lower maturity of low-income market MNOs in this space, there is a shared value creation opportunity to work with the right donor or implementing partner in country on building subscriber intelligence capabilities together that would be beneficial to the impact sector.[18]

API Platforms

Other actors have made their data available more widely using application programming interfaces (APIs) that allow developers and others to access data for testing, product development and data analytics. By signing a terms of service agreement, companies give access to streams of its data in order to build applications.[19]

The Open Algorithms (OPAL) initiative offers an alternative way to scale up the use of private-sector data for public good in a privacy-conscientious, socially and economically sustainable manner. OPAL is structured around bringing the code to the data—through open algorithms as well as safe and fair technological and governance systems—for better decisions in support of the sustainable development goals.

Other organizations include the nonprofit Flowminder Foundation, which has developed a suite of tools for mobile data analytics that make it easier for MNOs and implementers to run turnkey analyses. Other toolkits include Bandicoot, an open-source Python toolbox to analyze mobile phone metadata.

The GSMA, with its BD4SG (Big Data for Social Good) program, is working closely with leading operators to develop a set of mobile data indicators.[20] A number of UN agencies, including UNICEF Innovation Labs, have built out tooling environments to work with mobile data, along with routine data that MNOs can effectively leverage.[21]

[17] https://www.luca-d3.com/index.html
[18] This is covered in the first paper in this series, "Unlocking MNO Data to Enhance Public Services and Humanitarian Efforts."
[19] https://www.gsma.com/betterfuture/bd4sg.
[20] For example, Near is an international company that makes data from MNO apps available through API to help companies understand market behavior and other business trends.
[21] DIAL is taking a role in supporting a number of D4D sector efforts and in providing the enabling environment for the ecosystem to be effective and collaborative. While it is not the purpose if this paper to provide a landscape analysis of all the open platforms that exist, we want to highlight some notable efforts and the major gaps.

Crowdsourcing Innovation

Some MNOs have used contests or challenges to incentivize a wide range of civil hackers, pro-bono data scientists and other expert users to find innovative solutions with available data. They do this by making data available to qualified applicants, who compete to develop new apps or discover innovative uses for the data.

In general, while firms have found this to be an effective model to source innovation from outside, there have been more successes in other sectors, such as enterprise software, where solutions have been effectively incubated and taken to scale in a profitable manner. The institutional, investment and market structures that can take these "academic" papers to tangible products, supported by production capital and with the robustness and sophistication of a live platform, have been lacking.

The institutional, investment and market structures that can take these "academic" papers to tangible products … have been lacking.

An example of this type of crowdsourcing was done in Ivory Coast and Senegal by Orange Telecom, which hosted a global challenge that allowed researchers to use anonymized, aggregated data to help solve various development problems related to things such as transportation, health, economic development and agriculture.

Figure 5: The Pros and Cons of Distribution Models Used by MNOs

	Pros	Cons
Bilateral and multilateral agreements	• MNO can decide what level of investment it wishes to make; analysis can be done internally or externally via a service provider • Full control over the use of the data through an MoU	• Coming to an agreement with the partners involved can be a lengthy process • Data might need to leave the country to be analyzed • The scalability of this method is limited
Partnerships with third-party analytics providers	• Access to external capacities • Opportunity to use different data resources • Enables future sales growth	• Need for technical and legal protections
Vertical integration of core analytics practice	• Data does not leave the company • Builds internal capacity	• Large investment in terms of time and money to build or purchase capacities, infrastructure, etc.
API platforms	• Data does not leave the company • Multiple sources of data used • Scalable	• No control over the use of the data
Crowdsourcing Innovation	• Limited investment needed from the MNO, leverages external capacities • New use cases are developed for free • Identifies promising solutions the MNO can invest in	• Good for POCs, but less relevant for long-term initiatives

Considerations When Setting a Price

Governments and NGOs Are Reluctant to Pay

So far, most D4D initiatives have not involved monetary transactions between the user of data-driven insights (such as an implementer) and the MNO. When MNOs were compensated, it was usually only for the costs associated with extracting, cleaning, anonymizing and aggregating data, not for the data itself. There are some exceptions to this, but our study found that they are rare and display a large variance in terms of price per record, making them inappropriate as a benchmarking guide.

Interviews with government ministries and NGOs illustrate their belief that data should be provided free of charge when used for the public good. According to one interviewee, “The very idea that a company might try to monetize on public good goes against everything we work for.” Another explained, “Data monetization is just kind of antithetical to what we are trying to do in terms of having to pay for this kind of information.” Overall, the consensus was that data for development should be free, otherwise, governments and NGOs would not be in a position to use it.

In addition, pressure is mounting for MNOs to make their data freely accessible to local statistical offices, upon request. In the short and medium term, there is a real possibility that MNOs will not only be unable to monetize some of the insights developed from their data stores (e.g., density maps), but they will have to cover the costs of making it accessible for free to government ministries and statistical offices. At best, MNOs may be able to charge for cost recovery. One interviewee noted that a government could simply pass a law that requires MNOs to share their anonymized data for free.[22]

Offering Insights and Analysis Instead of Raw Data

While it may be difficult to get NGOs or government ministries to pay for anonymized data or aggregated indicators from data, MNOs should investigate alternative business models and commercial structures. For example, providing insights and analytical work rather than basic aggregates and access to raw data offers a way out. Raw data is not particularly useful, while most of the work that goes into making data valuable is the cleaning, packaging and analyzing of it. Moreover, in many jurisdictions, using MNO systems data for any other purpose other than internal business processes is prohibited by regulation.

One interviewee noted how big data is being monetized in the area of censuses, with Spain purchasing data from MNOs for the next census, something that could become a standard practice. “The data being made available is not raw data but insights on socio-economic status, mobility, etc.”

[22] Similar ideas were also voiced by interviewees about providers of capital in low-income markets (e.g., World Bank, IFC) making developing covenants around sharing of data in their loan agreements.

There is also an opportunity for data for development to complement and possibly replace some of the measurement and evaluation (M&E) efforts of NGOs and government actors. As one interviewee noted, "One of the biggest impacts of this work is that MNOs already have data available that can measure elements of what evaluation, measurement, M&E dollars are already being invested in. So this type of work can minimize expensive M&E surveys and leverage existing data instead."

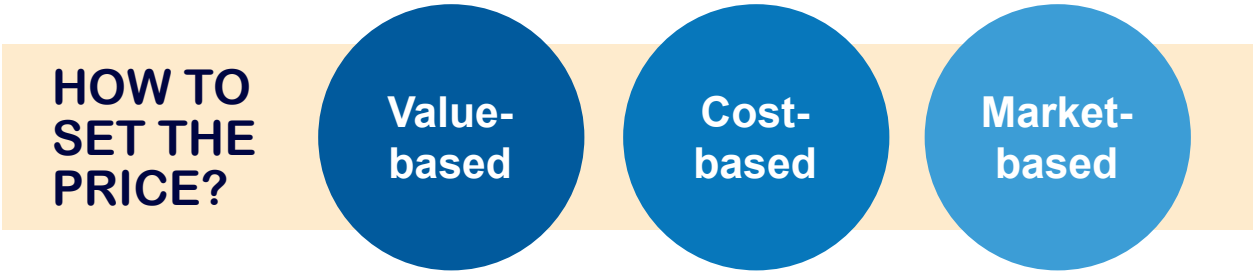
However, MNOs need to consider who actually owns the data. If the customer is considered the owner, then they will be the one with the authority to decide if, how and with whom it is shared. A scheme in which customers proactively share their data and have absolute control over it is becoming likely, especially in light of the European Union's General Data Protection Regulation (GDPR), which is discussed below.

How to Price Data

In the event that MNOs want to monetize their anonymized data in a D4D context, and they are able to overcome the overall ambiguity of willingness to pay, setting a price is complex, and several factors need to be taken into account. As one interviewee noted, "How to price is the most difficult part of my job. How important is this info? How else can I get this info? What is the competition?" Another interviewee suggested that this data might one day become like a publicly owned utility, which would transform the situation dramatically.

The difficulties of determining a price for data and insights is a challenging endeavor even in mature markets and commercial use cases. There is no real MNO data marketplace to refer to, as there is in the adtech sector, and pricing as well as revenue sharing agreements are most often confidential. It is unlikely that the parties involved will agree to make the commercial terms of their transaction public, meaning that price discovery lessons reached in one country may not help an MNO in another country or within the same country.

MNOs have three approaches to consider as they set prices for data and analyses: value-based, cost-based and market-based.



- **Value-based:** Value-based pricing is the most promising option for data monetization but requires significant effort in terms of price discovery to identify what the value is for the customer. For commercial data-monetization use cases, this is usually addressed via some sort of revenue sharing agreement, and the research found that many of the commercial data-monetization projects are priced with a revenue sharing model. But in the context of D4D projects, revenue sharing is not an option. As such, MNOs will have to have strong business development managers to handle this price discovery, the difficulty of which will be compounded by the fact that in D4D, each project will likely require a lot of customization, making it tough to come up with clear price benchmarks.[23]

[23] Based on some anecdotal evidence and DIAL's work with Delta Partners, we found that the price per engagement of CDR data can range between $25K USD and $300K USD for one operator, depending on the time period, number of subscribers and level of effort required from the MNO, with 12 months of data coming in between $50K USD and $170K USD and the high end being for 20 million subscribers.

- **Cost-based:** When MNOs sell raw data or basic aggregates, the costs incurred to extract and distribute will likely involve dedicated work and time on the part of a data warehouse manager and a few days of work by an account management executive handling the relationship with the government ministry or NGO. Using a cost-based approach might be useful in the event of a cost-recovery transaction, where the MNO does not have the intention to make a profit off the transaction itself, but would be a poor guide to pricing the data itself. We note that when historical data is needed, these efforts become quite complex and cost intensive. In our own projects at DIAL with MNO partners, we have found that it has taken the MNO anywhere from three to 10 weeks to extract one to two years of historical data for a subscriber base of about 5 million.
- **Market-based:** Using a market-based approach is very useful for data products that have comparable competing products, which is not often the case. For instance, various[24] papers highlight the fact that using mobile data can be faster and cheaper than using traditional surveys for census or poverty measurement, but cost comparisons often do not compare apples to apples, since traditional surveys capture much more information than location or MNO spend data. From that perspective, the cost of existing alternatives can provide some guidance, but cannot be a precise source of price setting.

Even though value-based is the most promising, several interviewees referred to the difficulties of this type of pricing. According to one: "In the end, I would want to price it based on the value for my customer. The same data won't have the same commercial value for a bank than it would for a school, for instance. It's very hard to price. There would have to be different prices for different clients. Since we are here to contribute to social good, I believe we could provide data freely for development agencies." Another interviewee highlighted that no standard pricing could ever be set: "[It is] …always a customized transaction, even if there is a standard price list. At the end of the day, those prices do not mean anything, it's a one-on-one discussion, typical B2B, many different deals."

"In the end, I would want to price it based on the value for my customer. The same data won't have the same commercial value for a bank than it would for a school, for instance. It's very hard to price. There would have to be different prices for different clients. Since we are here to contribute to social good, I believe we could provide data freely for development agencies."

Another challenge of value-based pricing is that the value of the same set of data will vary significantly depending on the context, the end user and its potential applications. As one interviewee pointed out: "A geolocation of one person, on a given day, is worthless ..." but geolocation over time and, therefore, the behavioural patterns that emerge can be very valuable. "It is impossible to decorrelate pricing from the use case."

We have discussed earlier in this paper aspects of non-monetary payoffs for MNOs. We want to highlight the accumulated benefit of pricing sophistication. We found that meaningful engagement in D4D leads to better customer knowledge. Enhanced customer knowledge allows for smarter product design. Coupling that customer knowledge with pricing innovation for the D4D sector, will help MNOs find pockets of high-value, defensible segments that have not emerged before in analyzing willingness to pay.

[24] These may include tower-level indicators, population cohort-level signals such as journey maps, origin-destination matrices, etc.

Figure 6: Selective Price Points

Flat fee to have SDK capturing location data (among other things) embarked on one of the most popular French App (10m + users): **1.5m Euros (<15 cents/user)**

SMS with geoloc' targeting (Western Europe): 2.5 Euros

API Call to **access 10,000 ID locations (single)** would cost between 0.3 and 1$

Catchment area / Customer Profile for 500 stores of an international fast-food chain will be between 30k and 200k/month (i.e. **60$ to 400$ per store per month**)

The above argument is a key takeaway, given the pricing sophistication we are seeing in the commercial sector:[25]

- *How you charge* is becoming more important than *how much you charge*.
- Consider segmenting customers by willingness to pay and not demographics. Within the non-profit sector, there is significant heterogeneity and high-value micro-segments, that can provide capital coverage till the time a more sustainable market clearing mechanism emerges.

Learn from cutting edge pricing strategies being deployed by pricing leaders such as Uber, LinkedIn, etc., and innovate around pricing as much as the product. Develop pricing rigor around the emerging pricing approaches such as subscription pricing, dynamic pricing, pay-as-you-go, freemium and auction-based. And draw parallels from other sectors, such as Advanced Market Commitments in pharmaceuticals, that have seen great success as applied to low-income markets.

Focusing on Non-Monetary Benefits

Given all of the difficulties and risks associated with monetizing customer data in a development context, as well as the fact that revenue earned will likely be marginal given the reluctance to pay among most governments and NGOs, MNOs should pursue different avenues to achieve benefits and compensation from data for development. MNOs should focus on the pay-off they can expect in terms of:

- Improved brand image domestically and abroad
- Better relations with regulators and government authorities
- Greater customer centricity
- Access to new industries
- Employee retention
- Customer stickiness
- Churn reduction
- Cross selling
- Increased pricing sophistication and innovation
- Granular understanding of customers so that customized experiences can be created on the network

MNOs should pursue different avenues to achieve benefits and compensation from data for development.

Additionally, removing the money variable from the equation removes the challenges of price discovery, billing complexity, risk of customer backlash, and some of the legal risks attached to reselling customer data.

[25] Ramanujam, Madhavan, and Georg Tacke. *Monetizing Innovation How Smart Companies Design the Product Around the Price.* Wiley, 2016.

MNOs willing to engage in data for development projects should take a much more active role. Rather than simply providing the data and standing back, they could take more responsibility to control the quality, use and dissemination of the output, and then make the most of it from a customer relationship management perspective.

One interviewee described how being involved with D4D solutions helps MNOs "move up the hierarchy" when talking to clients. Rather than having junior account managers at an MNO talking to junior-level officers to sell a few hundred subscriptions, D4D projects allow access to officials at the highest levels of government. The interviewee noted an experience with the Ministry of Health in a Western African country, where they met with a cabinet-level official to discuss a particular solution and ended up being asked to provide a quote for an even larger "connected hospitals" project. "So the D4D topic clearly opens doors, all the way to the top, which can greatly serve us."

One interviewee described how being involved with D4D solutions helps MNOs "move up the hierarchy" when talking to clients.

Navigating the Regulatory Environment

Today, each country has its own data protection regulations with varying levels of stringency, and sometimes no regulations at all. Typically, MNO data used externally needs to be fully anonymized, wherein the identity of the customer is not apparent and cannot be decrypted, reversed or aggregated to different levels, such as for a given area, population or duration. A minimum number of data points are required to be able to use the data as defined by the data provider and the regulator.

Regulations in the European Union

The EU has one of the most advanced regulatory environments to protect users' privacy. It recently approved a new General Data Protection Regulation (GDPR) to be enforced in May 2018 that was "designed to harmonise data privacy laws across Europe, to protect and empower all EU citizens' data privacy and to reshape the way organisations across the region approach data privacy."[26]

One of the changes introduced by the GDPR is that the conditions of users' consent have been strengthened. Now they must be given in an intelligible and easily accessible form, and the purpose of the data processing must be attached to that consent. GDPR also introduces the concept of data portability, which is the right for users to receive personal data concerning them as well as the right to transmit that data to another controller. As a result of these changes, affected MNOs may only be allowed to make data accessible for those users who have given consent. This may enable more systematic use of MNO data for external purposes, including for social good.

According to one interviewee: "The introduction of new rules for data sharing will create additional constraints during transition periods to adapt to the new regulatory environment, but over the long

[26] https://www.eugdpr.org/key-changes.html.

run, they might generate more interest from users, enticing them to share their data while taking more control over the use of their data requiring feedback on value generated."

Another interviewee pointed out that MNOs are in a better position in this new regulatory environment: "Regulations are more and more stringent, but MNOs have a unique advantage, as the data they collect is necessary for the network to function, which is not the case for data collected by apps. Therefore, MNOs may have more wiggle-room."

Regulations in African Nations

For most countries in Africa, data privacy laws are emerging and are at different levels of maturity. While some countries still do not have specific laws on data protection, we are seeing rapid and notable progress by regulators and increasingly sophisticated customer protections. In 2014, the African Union adopted the "Convention on Cyber Security and Personal Data Protection" to strengthen laws around data protection.[27] As of July 2017, 12 sub-Saharan African countries had enacted data protection and privacy laws (Angola, Benin, Burkina Faso, Mali, Gabon, Ghana, Côte d'Ivoire, Lesotho, Madagascar, Senegal, South Africa and Zimbabwe). Others, including Kenya, Niger, Nigeria, Tanzania and Uganda, have bills that had not yet been passed into law. While progress in the past three to five years has been impressive, some of the proposed and existing national laws fall short of comprehensively protecting data and privacy. (See Figure 6 on page 26 for a map depicting which African nations have data privacy and protection laws and which do not.)

For example, Uganda's Data Protection Bill (2015) and Ghana's Data Protection Act (2012) lack succinct clauses on key issues, such as notification of breach and data portability, and also have limitations on the right to access, among others.[28] In countries where the regulatory framework is not developed, there is some reluctance to use data for external purposes and send it abroad for analysis, fearing possible legal consequences. As one interviewee observed: "The lack of policies and absence of general framework on how data can be made available is one of the main barriers faced by the private sector, notably MNOs, as possible consequences of sharing this data are unclear."

Laws, regulations and guidelines are likely to be influenced by the EU's GDPR, given its extra-territorial applicability, strong protections and rising public concern about data use.

One interviewee described the results of new regulations in Nigeria on their business: "Regulation on privacy just became a lot more stringent last year with a direct impact on our VAS revenue, which fell by 65 percent, as we are no longer allowed to use our data to help push third-party content or third-party ads. The new regulation means MNO data cannot be used at an individual level and needs to be aggregated. This regulation was introduced when banks tried to buy ARPU and roaming data from us to identify high-income customers."

The development of a clear set of rules on data privacy in Africa can encourage or limit future data sharing. Laws, regulations and guidelines are likely to be influenced by the EU's GDPR, given its extra-territorial applicability, strong protections and rising public concern about data use. GDPR applies to all companies processing the personal data of subjects residing in the EU, regardless of the company's location, meaning the regulation will apply to any company that offers goods or services to, or monitors the behaviour of, EU data subjects.[29] Therefore, the EU's GDPR may become the standard in terms of privacy regulation by default. As one interviewee noted, "As long as data from EU citizens is involved, it will have implications across Africa."

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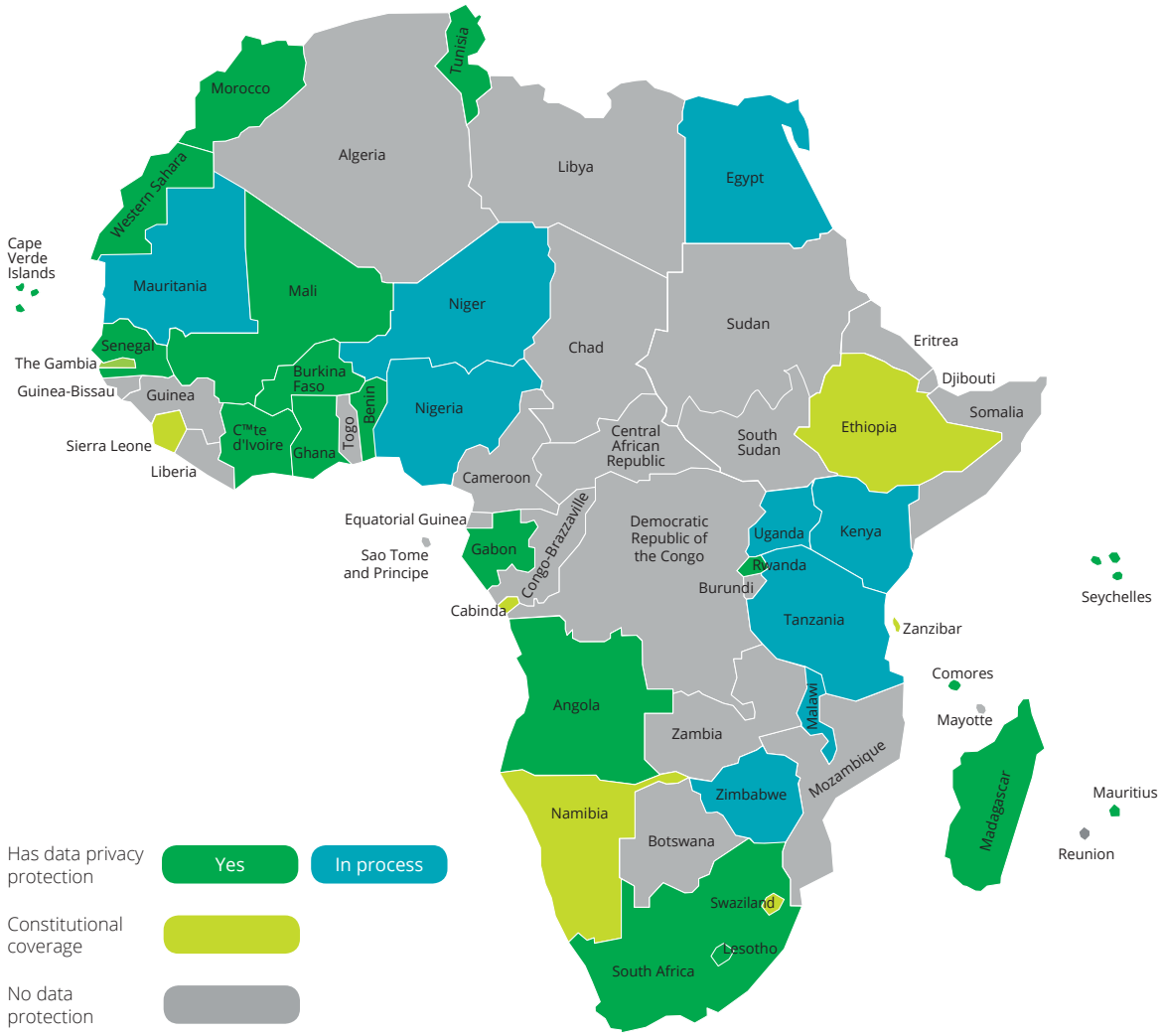
[27] https://au.int/en/treaties/african-union-convention-cyber-security-and-personal-data-protection
[28] "What African Countries Can Learn From European Privacy Law and Policies," CIPESA – Promoting Effective and Inclusive ICT Policy in Africa, (2017).
[29] https://www.eugdpr.org/gdpr-faqs.html.

Figure 7: Africa Personal Data Protection Regulatory Landscape



Source: "Privacy Is Paramount: Personal Data Protection in Africa" (Deloitte, 2017)

DATA PROTECTION RULES – The Exception of National Statistics Institutes (NSI)

The case of national statistics institutes stands out as a regulatory exception. These institutions can collect and use non-anonymized individual-level data without requesting consent. Only their publications need to respect anonymization and aggregation. To do so, they must prove that the data is secure and that it's only used for official statistics purposes. However, there is a lack of clarity regarding access to privately held data such as MNO data. In the context of the GDPR, MNOs are likely to consider sharing their data with national statistics institutions too risky. European statistics institutions are taking different approaches. Countries that had access to individual level data like the Netherlands want continued access, while Eurostat is focusing on developing methodologies to extract the data relevant to their work without access to individual data.

CONCLUSION

Based on our extensive research and interviews with key stakeholders, we recommend MNOs interested in expanding their presence in the D4D space to consider the following:

1. Seize the window of opportunity to implement large-scale D4D initiatives now, as it will likely not remain open for much longer.
2. Define clear business objectives in line with the benefits you can expect and your own capabilities.
3. Focus on the provision of insights rather than raw data and price it based on the value generated for users: develop the product architecture from the price and not the other way round.
4. Take an active role in shaping D4D partnerships and helping establish common frameworks for regulations and methodologies that will define how data can and will be shared and used.

MNOS SHOULD CONSIDER THE FOLLOWING

- **Seize the window of opportunity**
- **Define clear business objectives**
- **Focus on the provision of insights**
- **Take an active role in shaping D4D partnerships**

DEFINITION OF KEY TERMS

Anonymized CDR: Call detail record (CDR) with personal information, such as mobile number and subscriber information, de-identified.

Base Transceiver Station (BTS): The antenna and radio equipment needed to provide mobile service in an area.

Call Detail Record (CDR): Record of a voice call or an SMS generated by an MNO that includes the mobile number of both the person making the call and receiving the call, as well as the date, time, call duration, and low resolution location information (nearest cell tower).

Data for Development (D4D): The use of data generated by mobile, satellite and digital devices that has the potential to inform and greatly improve nonprofit, humanitarian and public-sector decision-making. Must be available on a timely basis and analyzed in a manner that protects end user rights.

Data monetization: Process of converting data (raw or aggregate) into something useful and valuable either for internal or external benefits:

- Internal data monetization focuses on using information to enhance customer experience, drive cross-selling, reduce churn, boost revenue, reduce costs, etc.
- External data monetization aims to generate new revenue streams from the sale of data to an external entity.
- This study focused exclusively on external data monetization opportunities from a D4D perspective.

Mobile Network Operator (MNO): A company that has a government-issued license to provide telecommunications services through mobile devices.

MNO Data: Data collected by MNOs during normal business operations. The data that may be of value in the D4D context includes:

- **Coverage data:** Latitude/longitude of BTS; coverage (2G vs 3G vs 4G), signal strength
- **Customer information:** Customer ID, bank details (for postpaid), plan details, socio-demographic data, billing/home address
- **Usage information:** CDRs (voice/SMS/data), VAS-related data, ARPU, mobile internet data (URLs, time spent, downloads, content type, etc.), refill patterns, etc.
- **Device information:** Brand, model, series, technology used, content, applications, device history
- **Transactional mobile money data:** P2P transfers, cash in/out, salary payments, G2P, merchant payments, etc.

Over the top (OTT): In broadcasting, OTT content refers to delivery of audio, video and other media over the internet without the involvement of a multiple-system operator in the control or distribution of the content. The internet provider may be aware of the contents of the internet protocol packets but is not responsible for, nor able to control, the viewing abilities, copyrights and/or other redistribution of the content.

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