



# Utilising mobile big data and AI to benefit society

Insights from the Covid-19 response



## GSMA Intelligence

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with almost 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

For more information, please visit the GSMA corporate website at [www.gsma.com](http://www.gsma.com)

Follow the GSMA on Twitter: [@GSMA](https://twitter.com/GSMA)

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

[www.gsmaintelligence.com](http://www.gsmaintelligence.com)  
[info@gsmaintelligence.com](mailto:info@gsmaintelligence.com)

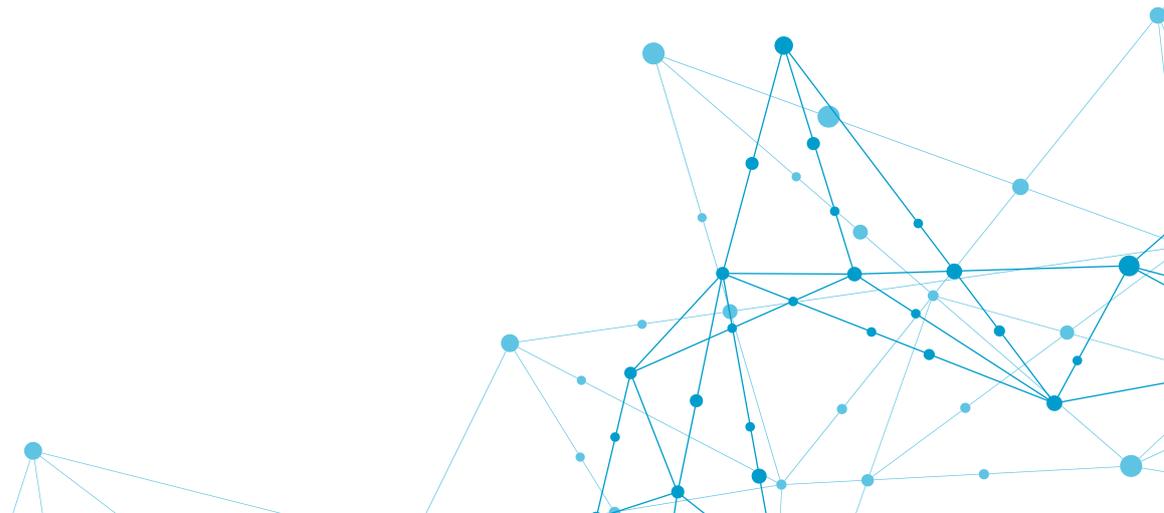


This initiative has been funded by UK aid from the UK government and is supported by the GSMA and its members.

The views expressed do not necessarily reflect the UK government's official policies.

# Contents

<b>Foreword</b>	<b>4</b>
<b>Executive Summary</b>	<b>5</b>
<b>1. The global Covid-19 pandemic</b>	<b>8</b>
1.1 Government response to Covid-19	9
1.2 The role of mobile networks in the Covid-19 response	10
1.3 Using MBD analytics in the Covid-19 response	12
<b>2. GSMA AI4I Covid-19 response: insights and learnings from focus countries</b>	<b>16</b>
2.1 Understanding the AI4I ecosystem in the context of the Covid-19 response	17
2.2 The GSMA AI4I Covid-19 engagement process	19
2.3 Case studies: DRC, Rwanda, Benin and Burkina Faso	21
<b>3. GSMA AI4I Covid-19 response: impact and recommendations</b>	<b>32</b>
3.1 Impact of GSMA AI4I Covid-19 response activities	33
3.2 Best practice recommendations to support 'MBD analytics for good' initiatives	35
<b>4. Opportunity to scale MBD analytics beyond Covid-19</b>	<b>39</b>
<b>5. Conclusion</b>	<b>42</b>
<b>Appendix</b>	<b>44</b>



## Foreword

In 2020, as Covid-19 emerged, institutions and governments started to explore how mobile big data solutions could help track, contain and predict the spread of the virus. Many mobile operators formed partnerships with governments to help manage the crisis, but this was only the beginning. Leveraging those insights would require technical expertise, a deep knowledge of local policy and collaboration between public- and private-sector partners.

The GSMA AI for Impact (AI4I) initiative was well positioned to meet the challenge. AI4I launched in 2017, bringing together a global task force of 21 mobile network operators and an advisory panel of 12 United Nations agencies to raise awareness and develop best practices on the use of aggregated, anonymised mobility data to address global challenges.

The pandemic has been a turning point for mobile big data analytics. A watershed moment in which mobile operators, governments and international agencies have worked together on a remarkable number of projects globally to develop effective response measures. Mobile operators have helped with efforts to better understand and respond to the virus in at least 40 countries. With the support of the UK Foreign, Commonwealth and Development Office, the GSMA received and responded to requests from 14 low- and middle-income countries (LMICs), and developed mobile big data products in the Democratic Republic of Congo, Benin, Rwanda and Burkina Faso. The results achieved in the face of this unprecedented crisis are a testament to the power of public-private collaboration.

The progress made during the pandemic must not be lost. This report brings together key learnings from the wide variety of use cases developed in response to Covid-19. It defines the crucial elements needed for a thriving mobile big data ecosystem, and illustrates how the collaborative partnerships formed to fight the virus have laid the foundations to build that ecosystem. The concrete, practical recommendations contained within this report will be of value to stakeholders seeking to use mobile big data analytics tools and insights to deliver positive social outcomes.

The mobile industry holds tremendous, largely untapped, value for society through its mobile big data analytics expertise — and not only in times of crisis. To unlock this potential and to achieve scale, solutions must be sustainable in the long term. The GSMA encourages stakeholders to ensure that the right environment and conditions exist to realise the potential of AI and mobile big data solutions. As society aims to recover from the economic and social impact of the pandemic, these solutions will be needed more than ever.



**John Giusti**  
Chief Regulatory Officer, GSMA

# Executive Summary

**The Covid-19 pandemic has had a profound impact on the health and livelihoods of much of the global population. As of March 2021, there were nearly 125 million confirmed cases of the virus around the world and over 2.7 million deaths.<sup>1</sup> The global economy has also taken a hit: the economic impact of the pandemic is projected to result in the contraction of overall output by 3.5 per cent in 2020,<sup>2</sup> and could send an additional 130 million people into extreme poverty.<sup>3</sup>**

With social and travel restrictions put in place to curb the spread of the virus, mobile connectivity has emerged as a lifeline, allowing many everyday activities to continue. Mobile networks also generate enormous amounts of data, often referred to as mobile big data (MBD), which can provide unique insights on population mobility patterns and socioeconomic indicators when aggregated, anonymised, analysed and combined with relevant data and information from other sources.

In the context of the Covid-19 response, insights from MBD analytics products and services support evidence-based decision-making by helping governments and other stakeholders to:

- monitor the effectiveness of lockdown enforcements and their impact on infection rates
- understand how the pandemic may spread, given the potential for travellers to take diseases from areas with high infection rates to areas of low incidence
- locate and identify vulnerable population groups that could be adversely impacted by lockdowns and social distancing measures

- optimise the supply of medical facilities and personnel in areas of greatest need
- plan how to safely resume social and economic activities, and optimise the provision of public services amid changes in usage patterns.

Recognising the potential for MBD analytics to support Covid-19 response and recovery measures by governments and other stakeholders, the GSMA AI for Impact (AI4I) initiative facilitated in-country implementations of MBD analytics projects across 14 low- and middle-income countries (LMICs) in Africa and Asia. The AI4I Covid-19 response was delivered over a 10-month period, with funding from the UK Foreign, Commonwealth and Development Office (FCDO). The approach was guided by a six-phase engagement process, designed to facilitate collaboration among local stakeholders and successfully deliver scalable, sustainable and replicable MBD products and services.

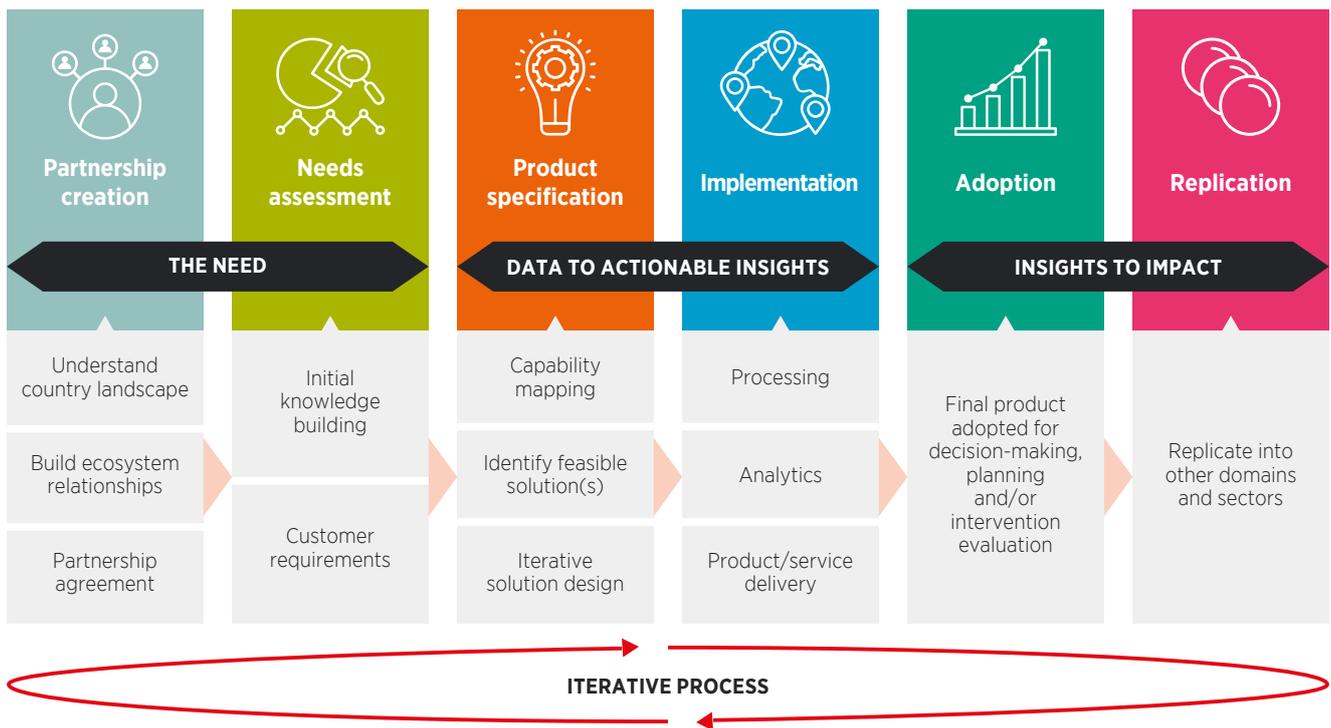
1 [WHO](#)

2 [World Economic Outlook October 2020, IMF](#)

3 ["COVID-19's economic fallout will prolong health crisis, report warns" UNCTAD](#)

Figure i The GSMA AI4I implementation engagement process

Source: GSMA



This report provides an overview of the application of MBD analytics in response to Covid-19 from a global perspective. The GSMA has tracked the implementation of MBD analytics to support the Covid-19 response by mobile operators, most of them members of the AI4I Task Force, in 40 countries around the world. The report also details the key insights and learnings from GSMA in-country activities under the AI4I Covid-19 response initiative in the Democratic Republic of Congo (DRC), Rwanda, Benin and Burkina Faso, and provides a summary of the support provided to stakeholders in 10 other countries. Through these activities, the GSMA has:

- successfully co-created and delivered valuable MBD analytics products and services, including dashboards and reports, to support the Covid-19 response
- increased awareness of the power of MBD analytics among local stakeholders and its potential to help tackle epidemics and other global challenges
- promoted best practice in data privacy and governance to safeguard trust in the handling of mobile customer data and ensure the ethical application of AI-based solutions
- created new local AI4I ecosystems, and expanded existing ones, by providing a platform for dialogue and collaboration between public- and private-sector partners
- enhanced technical skills among local stakeholders, particularly government agencies, by leveraging expertise in building technical skills for MBD

analytics, which was developed through collaboration with the AI4I initiative mobile operator Task Force and Advisory Panel

- disseminated knowledge and lessons learnt from the AI4I Covid-19 response activities to local and global stakeholders to support the efficient deployment of MBD analytics in the future.

The GSMA AI4I Covid-19 response has had a significant early impact across the focus countries in a short time. This includes initiating and building partnerships with multiple stakeholders, delivering valuable products and supporting local skills development. The lessons learnt from this initiative should serve as a foundation to build new MBD analytics products and services for a variety of use cases, beyond the response to Covid-19, and across geographies.

Looking ahead, MBD analytics holds the promise of helping governments around the world to better prepare for future disease outbreaks and tackle various local and global challenges, in line with the UN Sustainable Development Goals (SDGs). When adopted early, MBD analytics products and services can play a key role in helping governments implement response measures more effectively and efficiently. This requires continued collaboration between demand-side agencies – including governments, development agencies and donors – and supply-side partners to leverage the power of MBD analytics to address the challenges faced by societies, economies and the planet.

## The GSMA AI for Impact initiative

In 2017, mobile operators and their partners across geographies came together – through the GSMA – to drive the application of mobile innovations for social good. The resulting GSMA AI4I initiative develops global partnerships to accelerate action on the use of MBD analytics and AI as powerful forces to transform business and society, and achieve impact in alignment with the UN SDGs. The initiative, guided by a task force of 21 mobile operators and an advisory panel of 12 UN agencies and partners, defines the technical, commercial and ecosystem requirements to deliver viable data-driven products and services that adhere to principles of privacy and ethics.

The primary objective of the AI4I initiative is to scale and accelerate the opportunity for MBD analytics to help governments, public agencies and NGOs address a wide range of environmental, social and governance challenges. Through the AI4I Programme, the GSMA shares experiences and promotes best practices among key stakeholders by:

- establishing a common framework (consistent and replicable across geographies, operators and use cases) to accelerate the adoption of MBD solutions and drive progress towards the SDGs while respecting and protecting individuals' privacy
- validating the approach through local initiatives that show how analytics derived from aggregated, anonymised mobile network data can add value for decision-makers
- raising awareness of the range of applications of mobile data analytics and the opportunities for adopting data-driven decision support systems.

## The AI for Impact initiative is delivering public-private partnerships to sustainably scale mobile big data analytics and AI for a better future



### Global Task Force

21 mobile operators accounting for over 2 billion connections in more than 100 countries



### Advisory Panel

Global thought leaders from UN agencies, international organisations and partners, providing on-the-ground insights and needs



### Think globally

A common framework for international collaboration on technology, policy, ecosystem and business models — driving scale



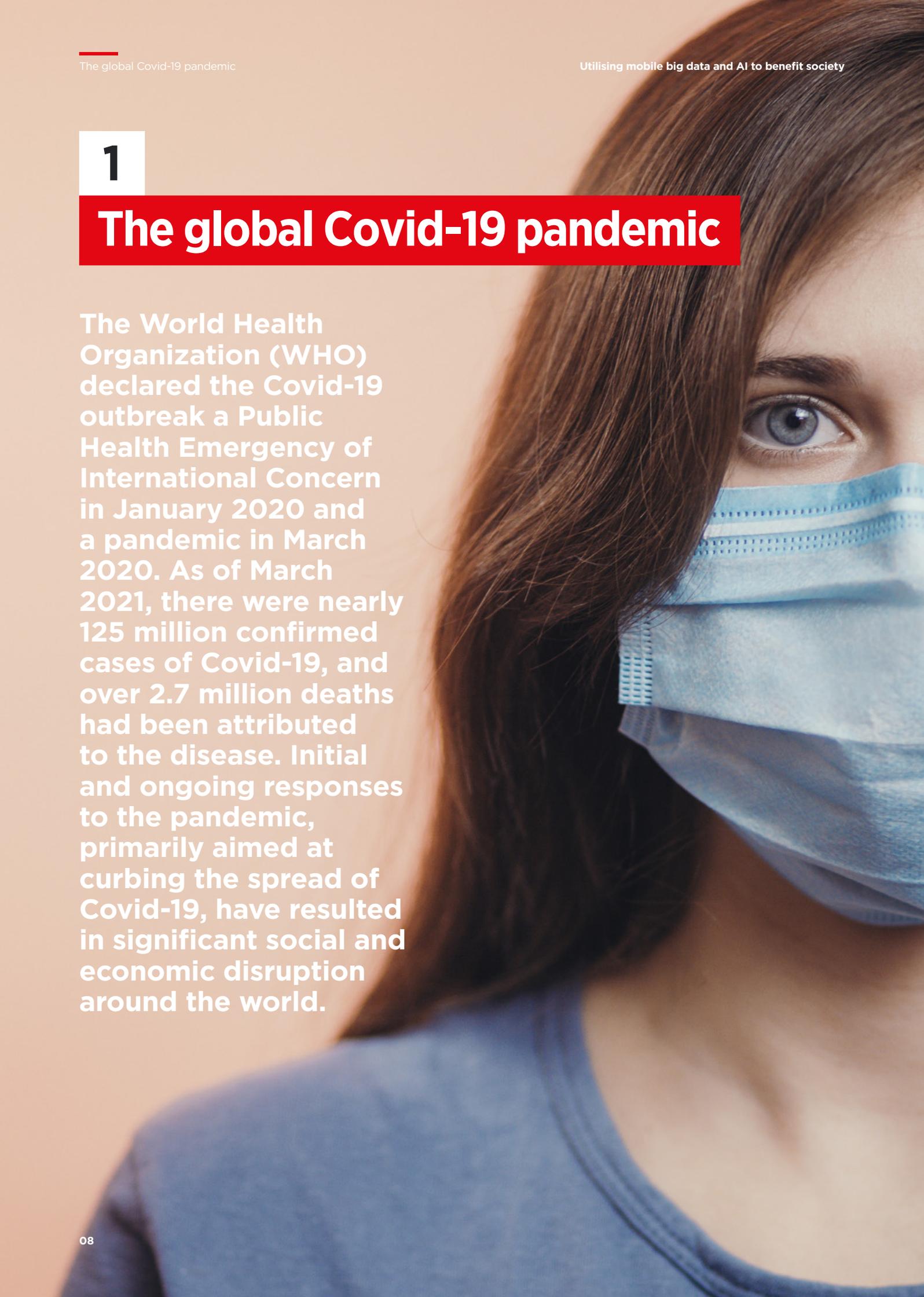
### Act locally

Market-shaping and mobile big data analytics and AI implementations that enable effective decision-making and greater impact

1

# The global Covid-19 pandemic

The World Health Organization (WHO) declared the Covid-19 outbreak a Public Health Emergency of International Concern in January 2020 and a pandemic in March 2020. As of March 2021, there were nearly 125 million confirmed cases of Covid-19, and over 2.7 million deaths had been attributed to the disease. Initial and ongoing responses to the pandemic, primarily aimed at curbing the spread of Covid-19, have resulted in significant social and economic disruption around the world.

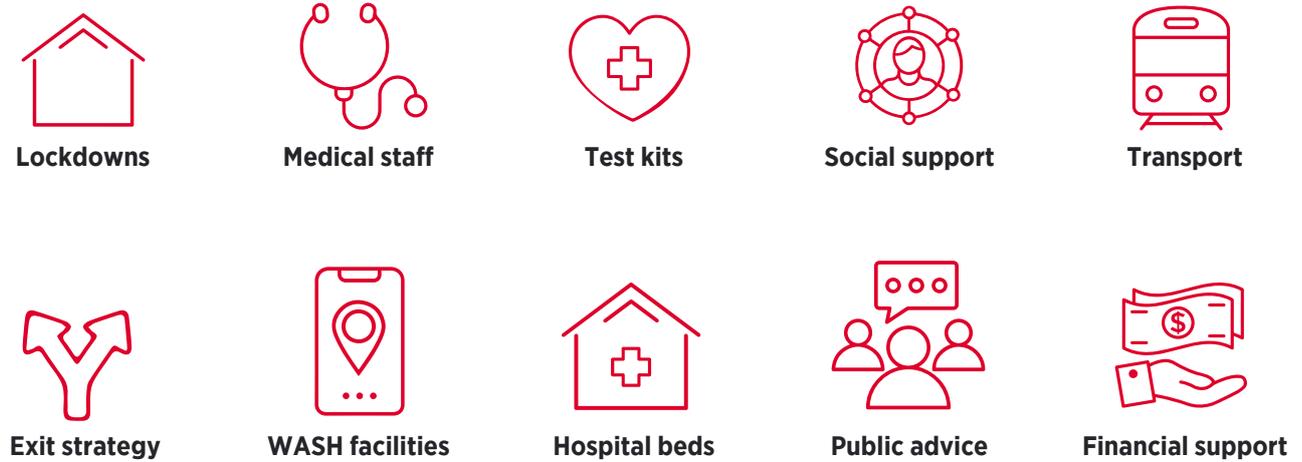


# 1.1 Government response to Covid-19

Governments, alongside development agencies and donors, have been at the forefront of the response to Covid-19. Government measures have been wide ranging, including restrictions on the movement and mixing of the population to suppress transmission of the virus to avoid overwhelming public health systems. There have also been measures to provide economic support for the hardest-hit communities and businesses, and to ensure the adequate supply of equipment and personnel in disease hotspots.

The arrival of vaccines provides hope for a return to some form of normalcy, but it could take a while to realise the impact in both developed and developing regions, given the magnitude of the challenge to produce and distribute vaccine doses, as well as to inoculate people at scale. As such, response measures will remain in place in 2021 and for some time after to prevent new spikes in infection rates and to support vulnerable people. Meanwhile, governments are beginning to take steps to prepare health systems for future disease outbreaks, build new infrastructure to cope with changes in socioeconomic behaviours, and shape a more sustainable and resilient economy.

**Figure 1** Some examples of government response measures to the Covid-19 outbreak



## 1.2 The role of mobile networks in the Covid-19 response

Mobile networks play a crucial role in delivering connectivity around the world. Today, mobile broadband networks cover nearly 95% of the global population and are the only form of connectivity available to many people in LMICs. During the pandemic, mobile networks have become a lifeline, allowing many economic activities to continue and for people to maintain social interactions.

In addition, the everyday use of mobile networks generates enormous amounts data, often referred to as mobile big data (MBD). Through the use of mobile operators' MBD analytics and AI expertise, MBD can be aggregated, anonymised, analysed, combined with data and information from other relevant sources, and packaged into valuable products and services, such as reports and dashboards. These can be powerful support tools for decision-making across a wide range of problems – such as determining how to respond to epidemics and natural disasters, mitigating pollution, planning infrastructure deployment or allocating scarce resources.

In the context of Covid-19, MBD analytics can inform government response measures at various stages of the pandemic. Given the impact of mobility on the spread of human-transmitted infectious viruses, it is essential to have accurate, up-to-date information on aggregated mobility patterns to identify transmission hotspots and understand how quickly the virus is spreading.

In LMICs, lockdowns can further limit economic opportunities for poorer people, potentially leading to an increase in hunger, deprivation and related mortality. In these countries, the Africa Joint Continental Strategy for Covid-19 Outbreak highlights the need to promote evidence-based public health practice for the surveillance, prevention and control of Covid-19. MBD analytics is well suited to provide valuable and trusted insights for the following purposes (see below).



### Tracking population migration

Tracking migrations from one part of the country to another or across borders is important given the likelihood for travellers to take diseases from areas with high infection rates to areas of low incidence. In India, the enforcement of lockdown measures sparked the migration of many workers in the informal sector from urban to rural areas with limited healthcare capacity.<sup>4</sup>



### Locating and identifying vulnerable population groups

This includes daily wage earners and people reliant on the informal sector of the economy, who could be more adversely impacted by lockdowns and social distancing measures.



### Monitoring compliance with lockdown enforcements and their impact on infection rates

A study in the three most affected regions in Italy (Lombardy, Veneto and Emilia-Romagna) found that greater compliance with lockdown measures reduced the daily infection rate.<sup>5</sup>



### Managing scarce resources

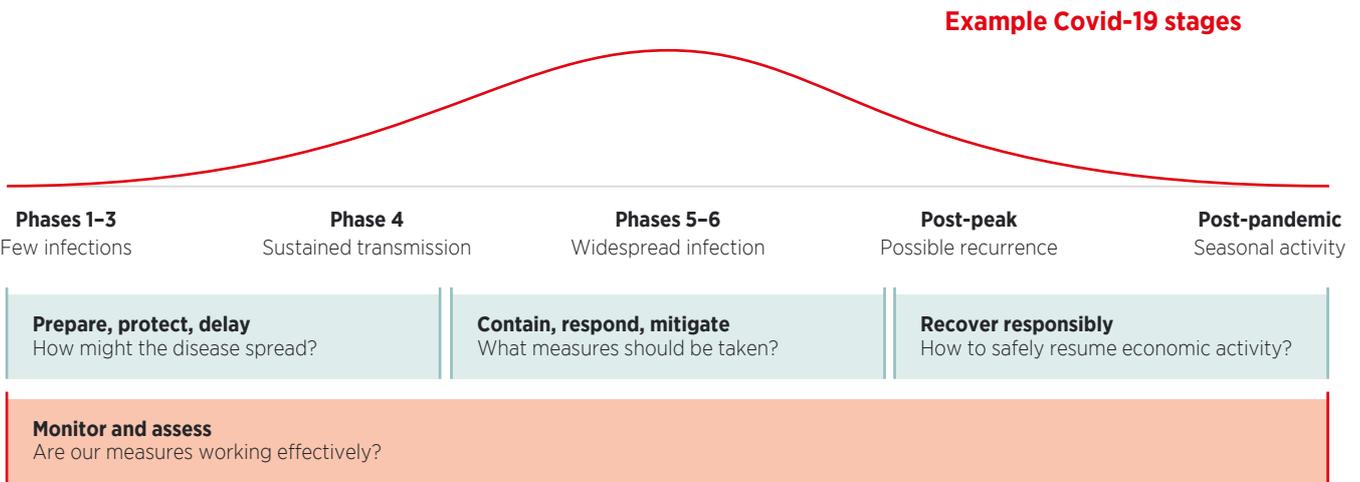
Understanding the dynamic locations and clustering of the population, for example, can help identify gaps in the provision of water, sanitation and hygiene (WASH) facilities and optimise medical supplies and logistics in areas of greatest need.

<sup>4</sup> ["Millions of Indians Are Fleeing Cities, Raising Fears of a Coronavirus 'Land Mine' in Villages". The Wall Street Journal, May 2020](#)

<sup>5</sup> [Lockdown timing and efficacy in controlling Covid-19 using mobile phone tracking, Marco Vinceti, Tommaso Filippini, Kenneth J. Rothman, Fabrizio Ferrari, Alessia Goffi, Giuseppe Maffei, Nicola Orsini, 2020](#)

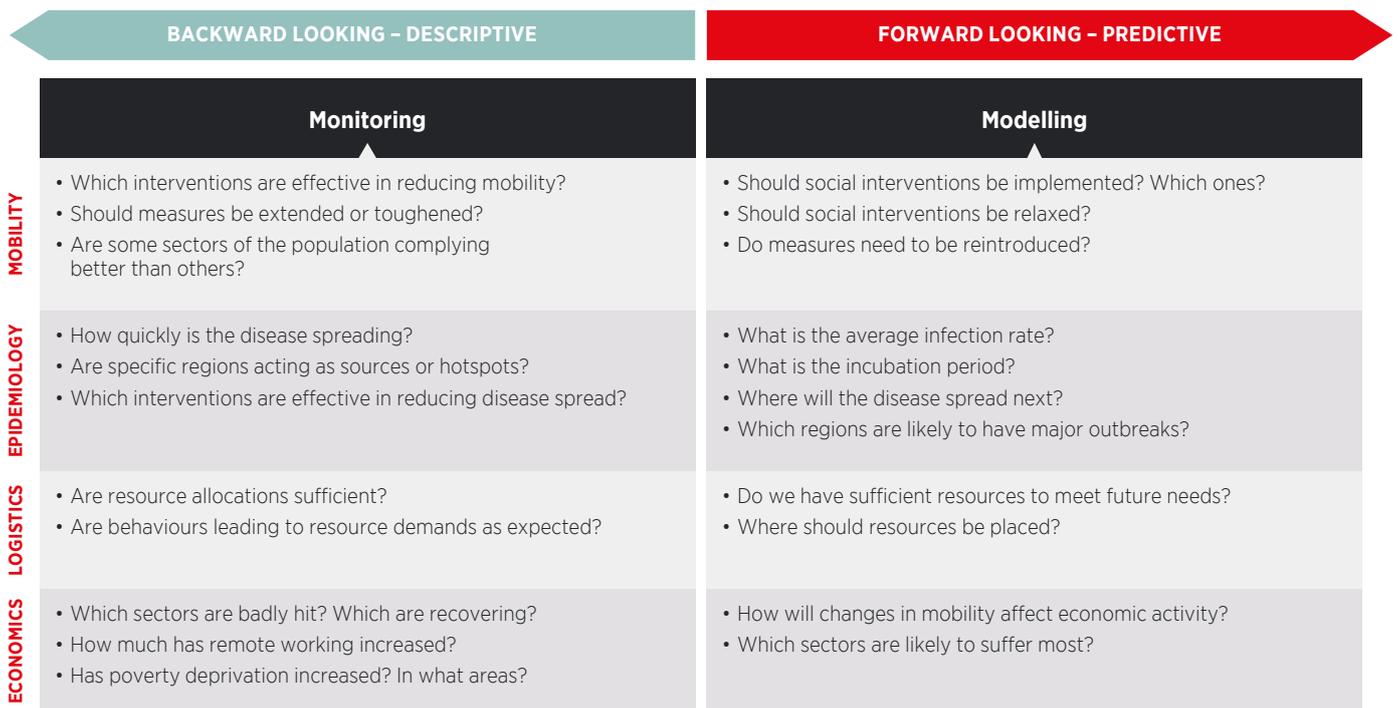
**Figure 2** MBD analytics can support various stages of the Covid-19 response...

Source: GSMA for the overall figure. Pandemic phases are taken from the WHO's Pandemic Influenza Phases (2009)



**Figure 3** ...by helping governments to answer key questions across a variety of use cases

Source: GSMA



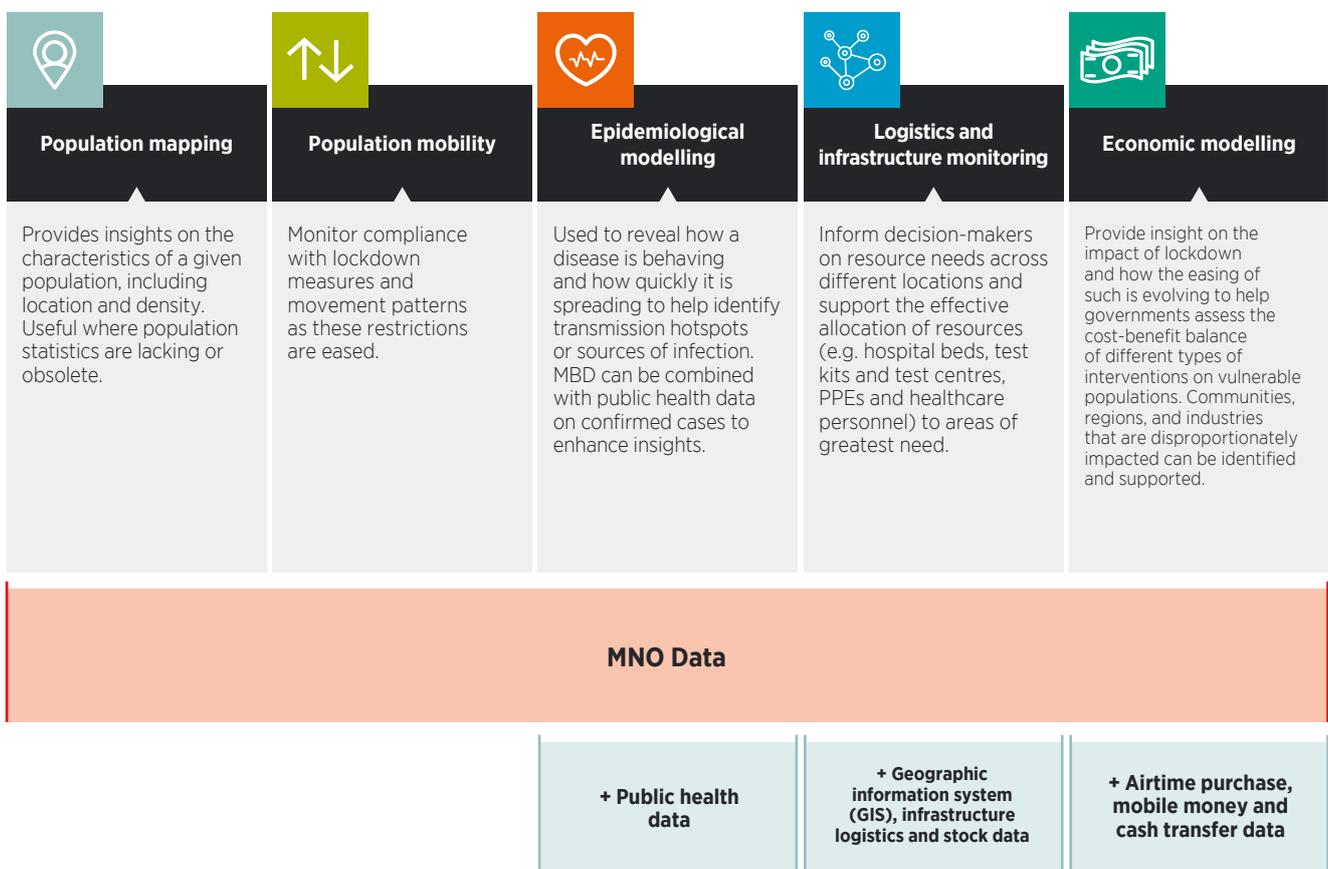
As lockdowns ease and economic activities recover in a post-pandemic scenario, these tools can also evolve to help inform other government decisions: on the safe re-opening of businesses and the wider economy to prevent new spikes in infection rates; the reallocation of public services and logistics resources based on changes in usage patterns due to the pandemic; the targeted deployment of vaccines and other healthcare resources; and the identification of economic and social vulnerabilities within populations.

# 1.3 Using MBD analytics in the Covid-19 response

The GSMA has mapped key MBD analytics use cases to various government Covid-19 response measures. These can also be applied to address other global challenges and use cases.

The relevance of each use case will vary according to the stage of the pandemic outbreak and the unique needs in a given country, as well as the local capacity to develop and utilise MBD products and services.

**Figure 4 MBD analytics use cases for the Covid-19 response** Source: GSMA

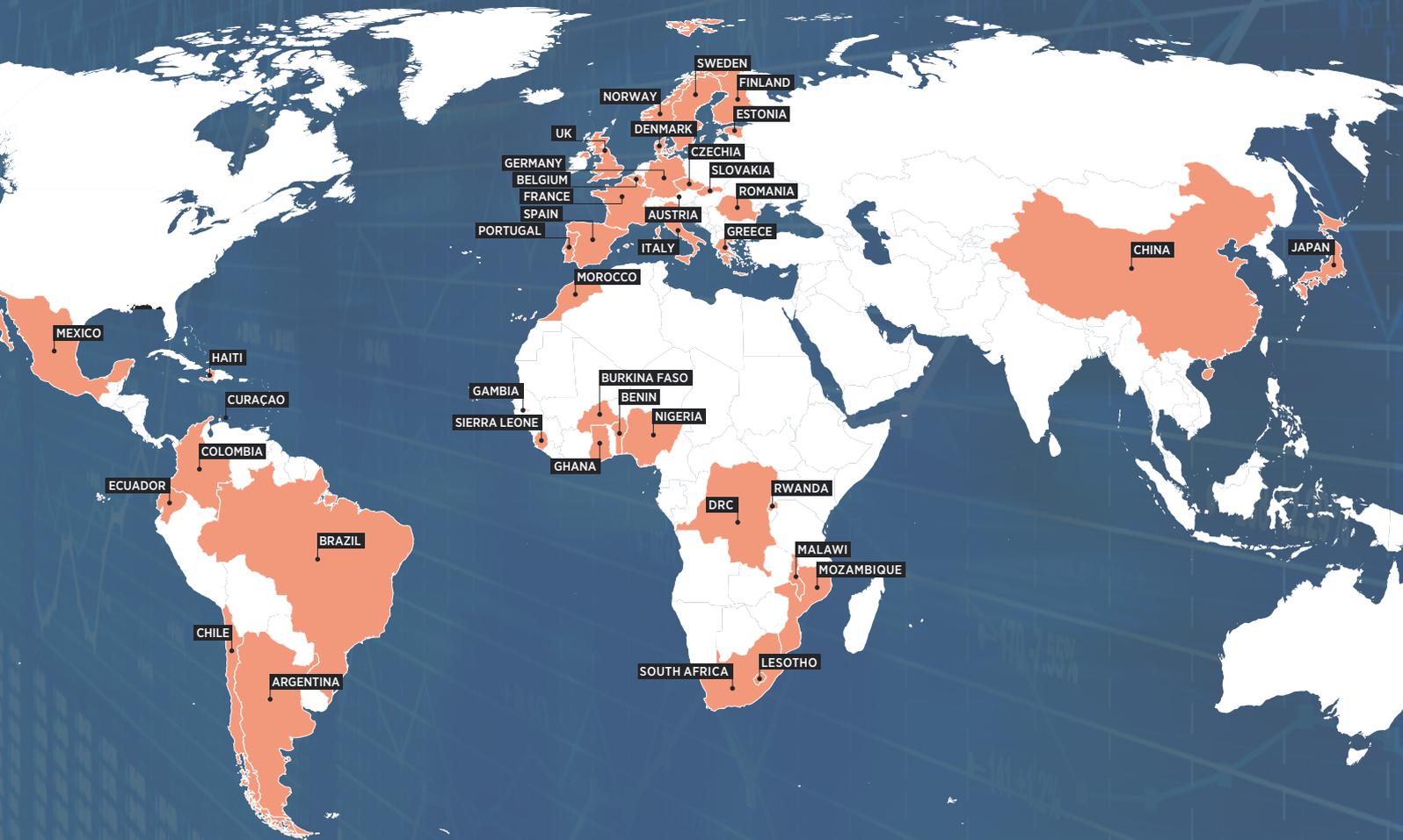


Given the increasing complexity of use cases, and the evolving nature of the pandemic, the majority of applications to date have focused on population mobility and epidemiological modelling. However, as in-country capabilities develop, and with adequate investment planning, more sophisticated applications are being implemented. Meanwhile, the relevance of applications to challenges beyond Covid-19 are beginning to emerge.

Figure 5 provides a snapshot of 41 countries where MBD analytics has been implemented by mobile operators (most of them AI4I Task Force members) since the WHO declared Covid-19 a global pandemic. This includes the GSMA-led initiatives in the DRC, Rwanda, Benin and Burkina Faso (see section 2.3 for detailed insights and learnings).

**Figure 5** Snapshot of countries using MBD analytics applications to support the Covid-19 response

Source: GSMA



## Selected examples of MBD solutions

### Norway

Epidemiological modelling



Since January 2020, Telenor has been providing mobility data on movement between Norway's 356 municipalities to the Norwegian Institute of Public Health's Covid-19 task force. Telenor's mobility data has been utilised to inform modelling of the potential spread of the virus, to develop predicted incidence in each municipality and to simulate the number of hospitalisations, intensive care patients and deaths.

### Sweden

Population mobility



Telia worked with the Public Health Agency of Sweden to understand how groups of people move in society amid the pandemic. The analysis established that even without a formal lockdown instruction from the government, mobility reduced by 20% in March 2020, compared to the first week of the previous month. With weekly statistics published at the national level on the Telia website, and interviews conducted on national news channels, Telia has become a trusted source of information for the general public on people's movements. Telia's insights also revealed a strong increase in people's movements in countries that implemented lockdown versus those that didn't (e.g. other Nordic countries compared to Sweden).

### France

Population mobility



Orange worked with the French National Institute for Health and Medical Research (Inserm) early on, to help prepare and evaluate lockdown measures. The analysis showed a 65% reduction in journeys during lockdown and how this was particularly effective in reducing work and recreational trips. It also revealed unexpected findings. For example, 20% of people appeared to have left Paris before the announcement of lockdown. This illustrated the need for planning of public messaging and the importance of up-to-date information for resource planning.

### Germany

Population mobility



Deutsche Telekom and Telefónica are providing aggregated and anonymised nationwide mobility data that can be broken down to federal states, districts and municipalities to the Robert Koch Institute, the leading authority for public health in Germany. While still protecting individual privacy, the information can be used to help scientists understand mobility and predict the spread of Covid-19 to inform disease prevention strategies. A live mobility monitor allows the public to observe mobility levels relative to the same period from 2019.



## Spotlight

## MTN Nigeria provides insights to support medical preparedness and identify economically vulnerable communities

Nigeria recorded its first Covid-19 case in February 2020. In response to the Covid-19 outbreak, strict measures to contain the spread of the virus were implemented, including a presidential order for lockdown and suspension of interstate travel over an initial two-week period, later extended by another two weeks. This had a significant impact on the economy, particularly the informal sector, which employs around 93% of the workforce.<sup>6</sup> Before the crisis, approximately four in 10 Nigerians were living below the national poverty line, and millions more were living just above the poverty line, making them vulnerable to falling back into poverty when shocks occur.<sup>7</sup>

Against this backdrop, mobile operator MTN collaborated with the Nigeria Governors Forum, a coalition of the 36 state governors, to enable data-driven insights to shape resource planning and response measures. In this context, it is important to note that MTN provided very limited but indicative data to the state governments, to ensure privacy of the customers, which was sufficient to produce the required insights.

In the first phase, the project developed a model to predict the worst-case scenario for infections in each state. This was used to support the health committees with local resource planning decisions. The predictive analysis utilised anonymised and aggregated mobile network data, combined with geospatial reference datasets from open-source public data repositories, and applied to an epidemiological model. MTN presented the national needs analysis and resource requirement dashboard centrally and from there cascaded data to local health authorities.

The second phase focused on understanding where the population at greatest socioeconomic risk from the impact of the disease was clustered geographically. Lockdown measures, which were designed to reduce population movement and interaction to halt transmissions, meant many subsistence/daily paid workers lost their source of income and ability to buy essential food supplies. The MBD solution was able to identify the geographies with the most vulnerable population through the application of anonymised and aggregated mobile money transactions, as a proxy indicator for economic status. This was validated by third-party economic indicators and layered with infrastructure insights from geospatial reference datasets.

This insight went on to form the basis of the geographical targeting for the HelpNow crowdfunding platform, an initiative developed by a coalition of partners, which has been designed to collect and disperse crowd-sourced donations to the most vulnerable in Lagos state. People and families located in the vulnerable areas are encouraged to apply for grants through the HelpNow initiative.

<sup>6</sup> A Rapid Diagnostics Assessing the Impact of Covid-19 on enterprises and workers in the informal Economy in Nigeria, ILO

<sup>7</sup> World Bank

2

## **GSMA AI4I Covid-19 response: key insights and learnings**

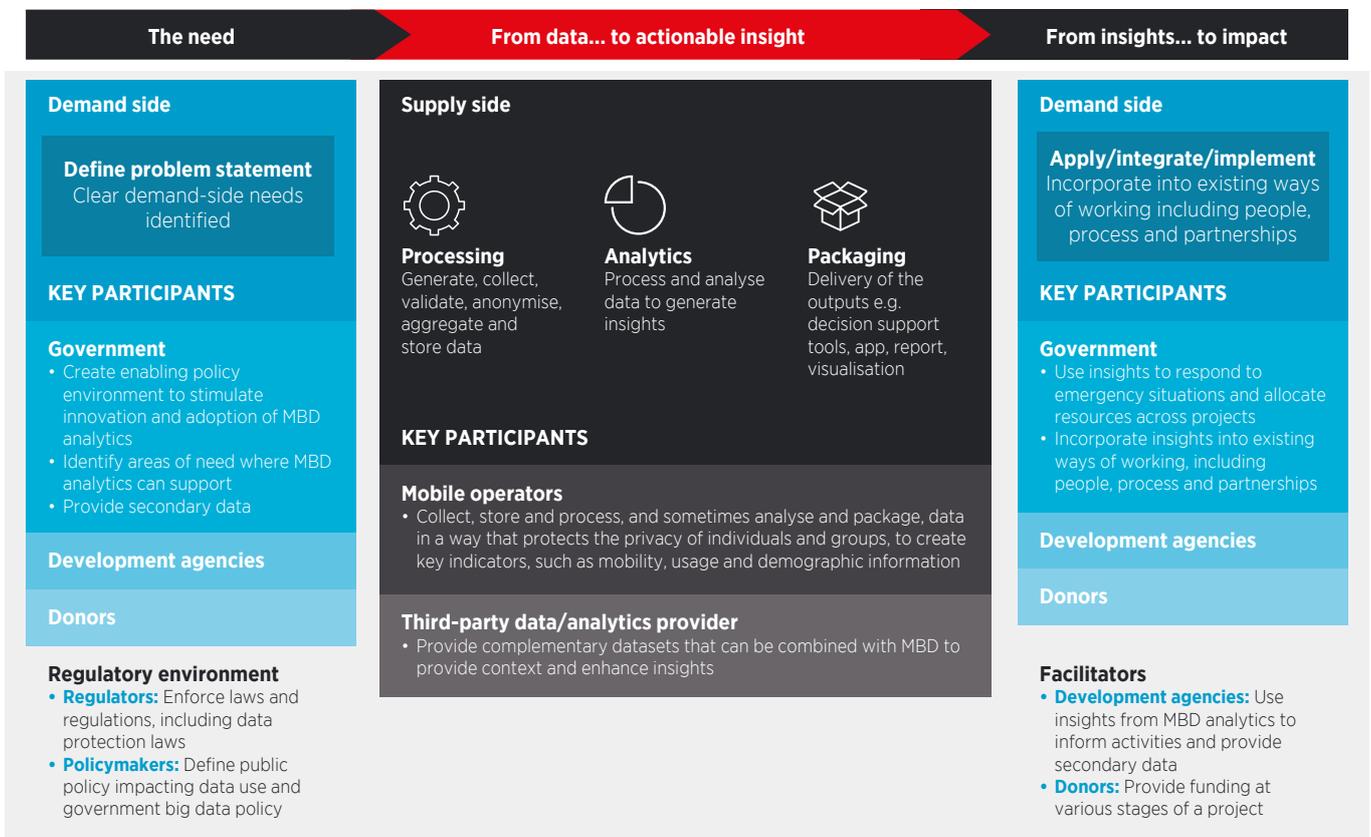
**The GSMA has spearheaded collaborations between mobile operators and governments in LMICs to implement MBD analytics and AI decision-making tools, under the AI4I Covid-19 response initiative. The 10-month project was funded by the UK FCDO to build local capacity, share knowledge and maintain high ethical standards in the use of MBD and AI, to ensure long-term adoption of sustainable, replicable and locally led interventions.**

## 2.1 Understanding the AI4I ecosystem in the context of the Covid-19 response

The AI4I ecosystem comprises many different stakeholders who play a role in converting MBD into actionable insights and valuable products and services (see Figure 6). Identifying needs, defining roles and responsibilities, and engaging the relevant stakeholders in each setting are essential to forging effective partnerships. This is especially true given the interdependence and, in some cases, varying interests between and among stakeholders.

Figure 6 The AI4I ecosystem: stakeholders, roles and responsibilities

Source: GSMA



Governments, development agencies and donors are the primary demand-side agencies. In the context of the Covid-19 response, these stakeholders use insights on mobility patterns from MBD analytics products and services to inform key decisions, response measures and resource planning.

Mobile operators sit at the heart of the supply side of the AI4I ecosystem. The scale and distribution of mobile networks puts operators in a unique position to generate data that can produce insights about the features and movement patterns of any given population. Globally, mobile networks account for 10.2 billion connections (including 5.2 billion unique

subscribers), around 7 million cell towers, and trillions of daily events, including voice calls, browsing activities and app notifications.

Like other big data sources, there are several steps that have to be taken to obtain valuable products and actionable insights from MBD, including combining MBD with datasets from third-party organisations. With a distinct understanding of the characteristics of MBD, operators play an important role in this process, alongside subject matter experts where necessary, to successfully deliver trusted insights and scalable MBD products and services, underpinned by three key considerations (see Figure 7)

**Figure 7** Key considerations underpinning MBD products and services

Source: GSMA



### Technical considerations

In its raw form, MBD does not provide any useful information. Several steps are required to obtain valuable products and actionable insights from MBD: processing (including anonymisation and aggregation); analytics (use of specific techniques, including AI, to analyse MBD and combine with third-party datasets); and packaging (format for final output).



### Privacy and ethics

Data privacy principles are essential to address transparency, accountability, and security in the implementation of MBD analytics in a way that fosters an environment of trust. Additionally, AI ethics principles are key to ensure the responsible and trustworthy use of data in accordance with international human rights conventions, to mitigate societal harm and maximise benefits for society and the global economy.<sup>8</sup>



### Sustainable business models

A sustainable business model, with adequate public sector investment, is crucial to unlock the full potential of MBD analytics and encourage long-term commitment and ongoing innovation. With growing awareness and evidence of the potential of MBD analytics, governments should proactively create budgets to support the sustainable implementation and replication of solutions for other use cases.



See Appendix 3 and the **AI4I Digital Toolkit** for a detailed explanation of each of these steps. [aiforimpacttoolkit.gsma.com](https://aiforimpacttoolkit.gsma.com)

<sup>8</sup> <https://www.gsma.com/publicpolicy/wp-content/uploads/2020/04/The-GSMA-COVID-19-Privacy-Guidelines.pdf> See the Covid-19 privacy guidelines

## 2.2 The GSMA AI4I Covid-19 engagement process

The GSMA has implemented in-country projects, based on government needs (demand side) and mobile operator capabilities (supply side). In the wake of the Covid-19 pandemic, the AI4I Covid-19 response has been built on four key pillars.

Figure 8 The four pillars of the GSMA AI4I Covid-19 response

Source: GSMA



The GSMA approach follows a set of progressively complex use cases, starting from population and mobility insights to advanced analytical tools that leverage epidemiological, logistics, infrastructure and economic vulnerability modelling (see Figure 4). This is guided by a six-phase engagement process, designed to facilitate collaboration among local stakeholders and successfully deliver scalable, sustainable and replicable solutions (see Figure 9). In practice, this is an iterative process with regular feedback loops, used to refine the preceding steps throughout the project lifecycle.

The active participation of mobile operators has been a key success factor of the AI4I Covid-19 response, in contrast to other initiatives where mobile operators are viewed solely as sources of data. Mobile operators' distinct understanding of the indicators extracted from MBD puts them in a unique position to further analyse anonymised data, along with contextual data from relevant sources, such as satellite or drone companies, open data platforms, and public sector agencies, to produce actionable and trusted insights for demand-side agencies.

The GSMA has worked with mobile operators to fully utilise their expertise throughout the engagement process, including problem scoping and product development. Involving the supply-side participants, where possible, in co-creating solutions and product development has resulted in the rapid implementation of pragmatic and robust solutions. At the same time, this has ensured that the highest standards of data privacy were met and that operators' raw data was not shared with third parties.



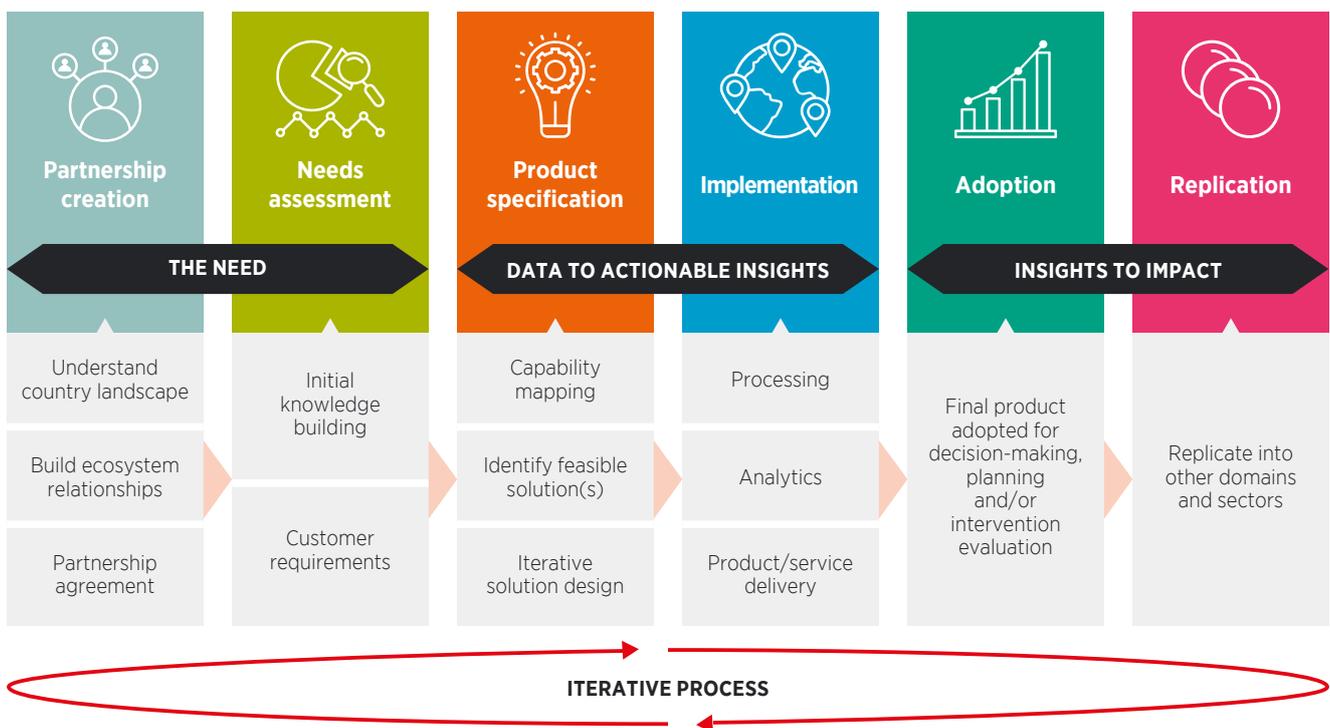
I would say that an ecosystem approach, working together, is the only key solution to have sustainable solutions that are really responding to the challenge that everyone is facing.

Ministry of ICT and Innovation, Rwanda



Figure 9 GSMA AI4I implementation engagement process

Source: GSMA



## 2.3 Case studies: DRC, Rwanda, Benin and Burkina Faso

The GSMA AI4I Covid-19 response programme facilitated in-country collaborations between multiple demand-side and supply-side partners in four primary countries – the DRC, Benin, Burkina Faso and Rwanda. The GSMA’s approach was to co-create solutions, using the AI4I engagement process, to build up a base of local expertise and understanding of the benefit of data-driven tools. In addition, the GSMA has provided support to government agencies and other stakeholders in 10 additional countries: Bangladesh, Gambia, India, Niger, Nigeria, Pakistan, Sierra Leone, South Africa, Sudan and Zimbabwe.

These case studies highlight key insights and learnings from the four primary countries. They also describe the roles of key stakeholders in the AI4I ecosystem and illustrate the value of the AI4I engagement process.



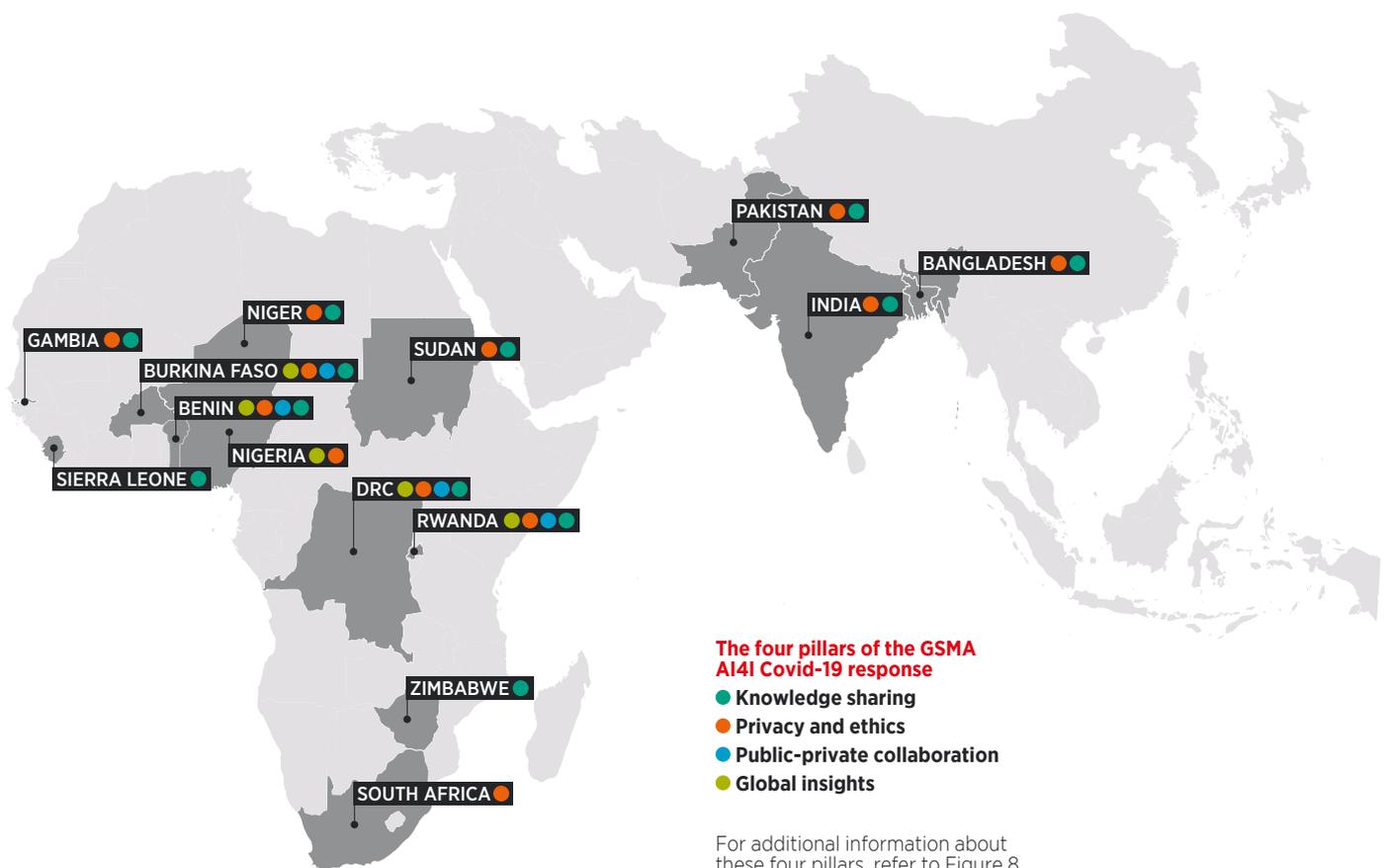
MBD analytics is a tool that can allow us to reach the vision that, as African countries, we have set.

Ministry of ICT and Innovation, Rwanda



**Figure 10** The GSMA AI4I Covid-19 response across 14 countries in Africa and Asia

Source: GSMA



**Quick facts**



**Total Population**

86.8 million (2019 estimate)

**GDP per capita**

\$794 (2019 estimate)

**Informal employment**

89% (2018)

**Total mobile connections**

40 million (2020)



Sources: World Bank, International Labour Organisation, GSMA Intelligence

## Democratic Republic of Congo (DRC): enhancing the government response to Covid-19 through mobility insights

The DRC has a long history of infectious disease outbreaks and endemic malaria, making it particularly vulnerable to persistent public health emergencies. The first case of Covid-19 in the country was reported on 10 March 2020. This led to a first wave of infections, with a second wave following later in the year.

The rapid rate of transmission of the virus meant that the outbreak could have overburdened the country's already stretched healthcare system. Defining the government's initial response and assessing its effectiveness proved challenging due to the lack of population data and lack of previous use of MBD analytics.

The AI4I Covid-19 response in the DRC aimed to help the government understand the country's vulnerability to the pandemic, inform response measures and strengthen the provision of healthcare services.

### Approach

- **Partnership creation** – The GSMA established an ecosystem of diverse partners from the public and private sectors to work together in a virtual “Mobile Big Data Control Room”.
- **Needs assessment** – The GSMA organised educational workshops to strengthen understanding of MBD analytics, identify the insight needs of health authorities, and demonstrate how MBD analytics can support decision-making and intervention evaluation while preserving individuals' privacy.<sup>9</sup>
- **Product specification** – Through a series of co-creation workshops, stakeholders identified indicators to better understand population mobility and evaluate the effectiveness of social distancing measures, discussed a variety of use cases, and explored options of a final product (a dashboard and its features).
- **Implementation** – Upon receipt of MBD insights in its aggregated and anonymised form, stakeholders worked in parallel to deliver three products: a dashboard to provide insights on nationwide



We got Ebola in the Congo... Malaria has been here for decades. MBD can help inform decisions, allocate resources and really help fight this pandemic. Across government bodies, not even [just] the health ecosystem, we can use MBD to make decisions tomorrow. The GSMA helped us to coordinate with mobile operators and they also coordinated the other stakeholders.

Ministry of Health, DRC



population mobility patterns, as well as hospital capacity and hotspots being monitored in Kinshasa; reports on population mobility with preliminary indications on economic pressures created by the crisis; and an epidemiological model based on population mobility and health indicators.

- **Adoption** – Various government agencies have adopted the products and are keen to identify opportunities for enhancement.
- **Replication** – There is potential to apply the capabilities to other disease outbreaks and new use cases across different government departments, subject to sustainable funding.

### Impact and learnings

MBD analytics products have provided health authorities with insights into how movement patterns changed in response to government measures and other factors, such as economic pressures. Specifically, government agencies have utilised these insights for the following actions:

- **Evaluating lockdown compliance** – Kinshasa's Gombe district saw a 70% drop in the total flow of mobile subscribers travelling to the district in the weeks after lockdown was enforced.
- **Highlighting unintended consequences of lockdowns and border closures** – Locations with increases in population mixing and potential future disease hotspots were identified.
- **Assessing risk of viral transmission on resumption of economic activity** – The insights enabled visibility of population movement from Kinshasa's most affected districts to other parts of the city and other provinces in the country as mining activities resumed.



The dashboard shows that the strategic decision to lock down the country and the city of Gombe was an important decision, although one that was made without scientific evidence based on data. The dashboard now gives confidence to the members of the Presidential Task Force to make informed decisions in the future.

Presidential Covid-19 Task Force, DRC



<sup>9</sup> See the Covid-19 privacy guidelines

“

This is an important tool for us and I thank in advance all partners and the donors who will help us to keep improving the dashboard so that we can use it even more now with this second wave.

Secrétariat Technique du Covid-19, DRC

”

Several lessons have been learnt from this initiative. First, it highlighted the importance of tailoring solutions to the level of understanding and experience of local stakeholders. In the DRC, the lack of previous experience and local skillset in the implementation of MBD analytics needed to be addressed early on. However, this helped to demonstrate the value of the GSMA AI4I engagement process in building successful partnerships with the right mixture of local and international expertise.

Second, it showed the need to commit sufficient time and resources to identify key decision-makers, raise awareness of MBD analytics, and build capacity and relevant technical skills among demand-side agencies and other local stakeholders. Finally, it demonstrated the benefit of co-creating solutions with local stakeholders, with the demand-side and supply-side stakeholders working together in an efficient manner.

Looking ahead, there is scope to enhance the functionalities of the dashboard to support day-to-day decision-making. In addition, stakeholders need to ensure a sustainable funding model to support the ongoing use of MBD analytics, agree long-term ownership and facilitate the replication of solutions across use cases.

**Quick facts**



**Total Population**

12.6 million (2019 estimate)

**GDP per capita**

\$820 (2019 estimate)

**Informal employment**

98% (2018)

**Total mobile connections**

9.7 million (2020)



Sources: World Bank, International Labour Organisation, GSMA Intelligence

## Rwanda: assessing the impact of Covid-19 on public transport

Rwanda's public health response to Covid-19 has been robust and rapid. After the first case was discovered on 14 March 2020, the government introduced a number of measures to contain the spread of the disease, including a country-wide lockdown, the prohibition of non-essential business and gatherings, and the suspension of domestic travel between cities and districts.

These response measures have affected public transport usage across Rwanda. The changes in public transport usage, capacity and mobility patterns have led to a potential mismatch in supply and demand. This is having a profound impact on existing services, public transport financing and the government’s ambitious pre-Covid-19 objectives and policymaking on public transport efficiency.

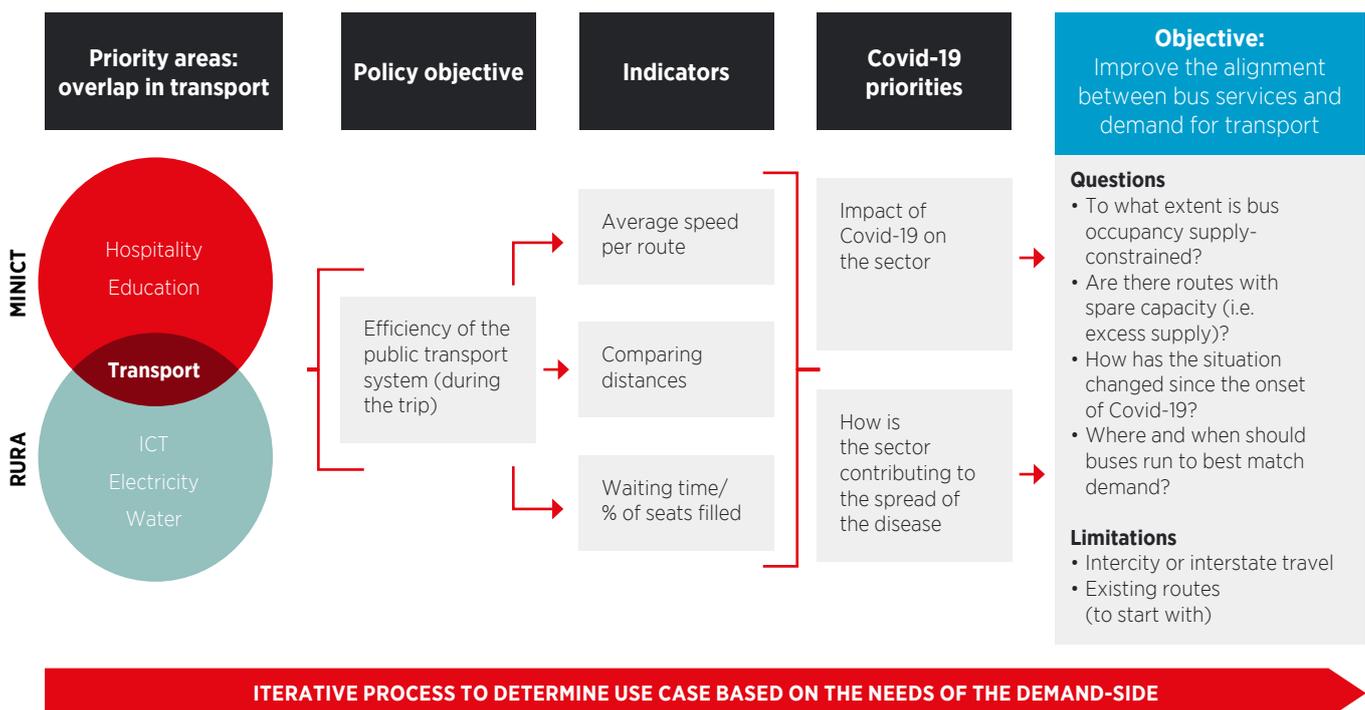
The AI4I Covid-19 response in Rwanda aimed to help make the bus system more efficient in view of the changes in the way that many people use public transport. The solution combined insights from MBD with transport and infrastructure data.

**Approach**

- **Partnership creation** – The GSMA brought together key partners for the project: the Ministry of ICT and Innovation (MINICT), the Rwanda Utilities Regulatory Authority (RURA), the Rwanda Transport Development Agency (RTDA), the University of Tokyo and mobile operator MTN.
- **Needs assessment** – Through a series of meetings and consultations with both MINICT and RURA, the project team determined a priority use case for MBD analytics in response to the Covid-19 pandemic, as shown in Figure 11. The GSMA also ran educational and technical workshops to strengthen understanding of MBD analytics.

- **Product specification** – Given the urgency of the project, the GSMA worked with stakeholders on a weekly basis to build a picture of mobility within Rwanda based on MBD to give a more complete view of transport patterns beyond ticketing data alone.
- **Implementation** – The project will deliver a report that identifies routes that are overused or underused compared to general population movements between cities and districts. It will also recommend ways to improve the bus system and optimise bus route allocations for maximal capacity and operating efficiency, in view of the impact of Covid-19 responses on mobility patterns.
- **Adoption** – The output will enable government agencies to realise new efficiencies in the bus network to enable the existing system to serve current needs, keep costs low, reduce congestion, and support the population to safely return to work and education.
- **Replication** – There is an opportunity to leverage the knowledge gained and models developed from addressing the impact of Covid-19 on public transport to the government’s smart city and smart transport initiatives, which are run by the MINICT, and to complement the RTDA’s work exploring public transport business models. Further opportunities lay in infrastructure development programmes, both in Rwanda and abroad.

**Figure 11 The needs assessment process to determine use case in Rwanda** Source: GSMA



### Impact and learnings

The needs assessment phase was critical to quickly identify priority areas for demand-side agencies, among other competing needs, and pinpoint a key objective and scope to guide the subsequent steps to deliver the project. This resulted in the full engagement of senior staff at demand-side agencies from the outset, aided by a previous experience with data solutions among technical staff at these agencies.

The GSMA helped RURA to assign roles around the typical divisions in the data science pipeline: data engineering, processing and analytics. This helped to establish clarity between the contracted team and other partners and improved the possibility for parallel activities to take place. It also revealed areas where extra support was needed, such as on data engineering and infrastructure, which resulted in the engagement with the University of Tokyo.

The GSMA played a key role in encouraging the project participants to meet international data protection standards. By providing awareness sessions for broader stakeholders, as well as continuous regular support to the core technical team, the GSMA was able to help participants to identify and address any privacy concerns at an early stage. This was further supported by a data protection impact assessment (DPIA), which was carried out in accordance with the GSMA Covid-19 privacy guidelines<sup>10</sup> for stakeholders to understand any privacy risks arising from the project and address them.

Conducting a DPIA is key to ensuring that the primary stakeholder driving the project is aware of the related risks and can take the relevant steps to mitigate those risks. This is essential for maintaining trust in the industry while responding to governments and public health

“

We have to remember that we are dealing with big data and data from different sources. So the background work to structure the data, analyse the data and drive good interventions, it entails a lot. It requires a lot. However, the outcomes again are way more beneficial compared to the investment made.

Ministry of ICT and Innovation, Rwanda

”

agencies that have sought assistance in the response to Covid-19. In the context of Rwanda, the DPIA conducted by RURA increased awareness and improved data protection processes throughout the project lifecycle and within the regulatory body itself. Furthermore, RURA was able to demonstrate an improvement in data-handling processes and procedures with respect to their internal governance mechanisms.

Looking ahead, the learnings from this project can be replicated to other use cases. There is potential to apply a similar approach to a more comprehensive redesign of the public transport system, considering new routes and including intra-city travel. Reports and models can be developed to target and prioritise improvements to transport infrastructure, by identifying sections of unpaved road where upgrades would have the greatest impact based on existing travel patterns. This can accelerate the economic development of rural and peri-urban areas, providing greater returns on infrastructure investments. The same approach is also applicable in many other markets, where public transport infrastructure could be improved to encourage switching from private transport, or where demand for transport outstrips supply and the addition of new capacity needs to be prioritised.

“

This is not only about the end result. It's about the creation of knowledge. Sometimes one of the biggest challenges is having the time to think things through. Any knowledge is a win.

Rwanda Utilities Regulatory Authority

”

<sup>10</sup> See the Covid-19 privacy guidelines

Sources: World Bank, International Labour Organisation, GSMA Intelligence

### Quick facts



#### Total Population

11.8 million (2019 estimate)

#### GDP per capita

\$1,219 (2019 estimate)

#### Informal employment

94.5% (2018)

#### Total mobile connections

10.3 million (2020)



## Benin: using MBD analytics to strengthen government decision-making

The first case of Covid-19 in Benin was reported on 16 March 2020. The government of Benin implemented targeted social and travel restrictions in response; it has also prepared a Covid-19 response plan but lacks reliable timely data upon which to base decisions.

The AI4I Covid-19 response in Benin aimed to help strengthen decision-making in response to the pandemic across government ministries through the adoption of MBD analytics.

### Approach

- **Partnership creation** – The GSMA coordinated conversations between multiple government ministries and agencies, mobile operators, international partners and local technical partners to establish the ecosystem of stakeholders in Benin. This led to a formal collaboration between the GSMA, the Ministry of Communication and Post, the Ministry of Health, and the Francophone Agency for Artificial Intelligence in Africa (AFRIA) and its technical partner, Otris Consulting.
- **Needs assessment** – The GSMA provided educational workshops to stakeholders and facilitated cross-sector discussions on use cases. Local needs and an initial technical specification were defined to meet the challenges resulting from the Covid-19 pandemic in Benin. Based on these discussions, four potential use cases were identified: provide better understanding of the population at risk; anticipate propagation of the virus on a national scale; inform logistical decisions (e.g. vaccination, tests) and hospital capacity; and assess the efficiency of social distancing measures (cordon sanitaire and curfew), especially in transmission hotspots and borders.
- **Product specification and implementation** – The GSMA leveraged AFRIA's contacts with local stakeholders to develop an illustrative dashboard with population mobility and Covid-19 risk modelling, which has been used to demonstrate the potential value of MBD analytics to government agencies and development partners. This has also allowed stakeholders to gain a better understanding of local data privacy requirements.

### Impact and learnings

A key lesson from this project is the importance of working with a local partner (AFRIA in this instance), which has resulted in accelerated progress. AFRIA has been instrumental for navigating the complexities and has brought additional local stakeholders into the ecosystem. Another important lesson is the need to initiate discussions on sustainability of the collaboration from the outset. The GSMA and AFRIA spent considerable time and effort to gauge the needs and interest of different ministries and other local and international organisations to ensure an alignment of priorities and longevity of the project. AFRIA's commitment to expand the local ecosystem, post GSMA engagement, will be crucial for the continued development of MBD use cases and solutions in Benin.

In terms of future outlook, the Ministry of Health and locally based development institutions aim to prioritise projects with tailored solutions that match Benin's long-term development objectives, beyond responding to short-term pressures from Covid-19. This provides an excellent foundation for replicating the approach to other use cases. Additionally, there is scope for more government agencies (including the Ministry of Communication and Post and Ministry of ICT, which has already expressed interest) to participate in the ecosystem and support the development of new use cases, given the greater awareness and understanding of the potential of MBD analytics products and services to strengthen decision-making.

**Quick facts**



**Total Population**

20.3 million (2019 estimate)

**GDP per capita**

\$787 (2019 estimate)

**Informal employment**

94.6% (2018)

**Total mobile connections**

9.9 million (2020)



Sources: World Bank, International Labour Organisation, GSMA Intelligence

## Burkina Faso: improving the Covid-19 response and preparation for other disease outbreaks

Burkina Faso was already dealing with a complex humanitarian and security crisis, a weak health system and poor availability of data for decision-making when Covid-19 arrived in the country. The first confirmed case of the pandemic was recorded on 9 March 2020.

The AI4I Covid-19 response in Burkina Faso aimed to establish collaboration between the public and private sectors and development partners, to utilise MBD analytics to improve the response to Covid-19 and other endemic diseases.

### Approach

- **Partnership creation** – The GSMA brought together key partners for the project, namely the Ministry of Health (MoH), Orange Burkina Faso and Orange Business Services, Cooper/Smith, the World Bank, the Ministry of ICT and the Regulatory Authority for Electronic Communications and Posts (ARCEP). Additionally, the Data Protection National Agency (CIL) has been engaged to ensure necessary approvals for the use of MBD.
- **Needs assessment** – Three use cases were defined: provide better understanding of population mobility and evaluate the impact of the government's Covid-19 response measures; build an epidemiological model to improve understanding of how epidemics spread in order to provide the required medical support in specific areas of the country; and optimise and inform infrastructure placement, specifically health facilities.
- **Product specification and implementation** – Orange Business Services created a dynamic dashboard for the MoH's Centre of Health Emergency Response Operations (CORUS) to provide insights on population mobility patterns for decision-making and continued conversations on how to include additional use cases.

### Impact and learnings

The project highlights the importance of clearly defining and understanding the priorities and objectives of demand-side agencies, in this case the Ministry of Health, as well as the other key stakeholders involved with the project (e.g. technical experts and data providers). This is essential to get the buy-in of all stakeholders and speed up progress to more advanced stages of the project, especially under fast-changing conditions and tight timelines. It also highlights the need to consider the potential impact of political events, such as the November 2020 national elections in Burkina Faso, on the timely delivery of a project.

Looking ahead, a dashboard will be used to demonstrate the insights that can be created from MBD analytics and to determine which are the most relevant and actionable. This will help to refine the product specifications required to meet the challenge of Covid-19 and other disease outbreaks, and to deliver valuable MBD products and services to the government, using anonymised and aggregated data from Orange.



**3****GSMA AI4I Covid-19 response:  
impact and recommendations**

**The GSMA AI4I Covid-19 response has had a significant impact across the focus countries, through extensive engagement with public- and private-sector partners, donors and development partners. Much was achieved in a short period (under 10 months) and many learnings were gained that will serve as a foundation and guidelines for current and future implementations of MBD analytics across use cases and geographies.**

## 3.1 Impact of GSMA AI4I Covid-19 response activities

**The AI4I Covid-19 response in the 14 focus markets have contributed to the following achievements.**



### **Successfully deliver MBD analytics products and services**

The GSMA collaborated with local and international partners, spanning the demand and supply sides of the AI4I ecosystem, to co-create and successfully deliver valuable MBD analytics products and services, including dashboards, reports and predictive models, to support the Covid-19 response. These have been designed and implemented based on a careful assessment of local needs and priorities to address the challenges identified by government agencies and other demand-side partners. In addition, the application of the AI4I engagement process throughout the product delivery process has laid the foundation for future efforts to replicate MBD analytics across a wider range of use cases.



### **Increase awareness of the power of MBD analytics among local stakeholders**

Educational workshops have increased awareness and understanding of the potential of MBD analytics products among government agencies and local partners, and its ability to support government responses for various epidemics and health emergencies. In several of the primary and secondary countries, the GSMA initiative was their first experience of MBD analytics and its potential to aid decision-making among government officials. In the DRC, for example, the Ministry of Health sees the partnership with the GSMA and mobile operators as an opportunity to support the mandate of the recently established national digital health agency (ANiCiS), in order to apply the power of digital solutions to respond to the unique health challenges the country faces.

**Promote best practice in data privacy and governance**

The GSMA has promoted accountability in the use of data in line with best practice and the highest standards in data privacy and governance, in order to identify and mitigate risks associated with handling customer data. This has been particularly significant given the urgency of the Covid-19 response and the lack of existing legal and regulatory frameworks in many LMICs. As a result, relevant government agencies and policymakers in several countries have now initiated conversations on how to improve data governance. In the DRC, ANICiiS is currently drafting a data privacy charter that future technical partners will have to abide by to maintain privacy controls. ANICiiS is also initiating a dialogue with national legal bodies to create a legal framework and national laws to protect data privacy and trust in the future.

**Establish and grow the local AI4I ecosystem**

The partnerships developed through the GSMA's in-country activities have helped lay the foundation for an MBD analytics ecosystem and created a platform for dialogue and collaboration between the public and private sectors, and their local and international partners. There is now scope to expand these newly formed local ecosystems by bringing in new partners, such as other government agencies, third-party data providers and development agencies, to develop new MBD use cases. In Rwanda, the National Institute of Statistics of Rwanda (NISR) has expressed interest to better understand the MBD solution and to work more closely with data scientists at RURA. This could broaden the AI4I ecosystem in Rwanda, develop local talents and facilitate the exploration of new use cases.

**Enhance technical skills of local stakeholders**

The GSMA has worked closely with local stakeholders, government officials, mobile operators and local technical consultants to build the right technical knowledge and skills required for each phase of the AI4I engagement process. Leveraging extensive experience and expertise from the collaboration with the AI4I mobile operator Task Force and Advisory Panel, the GSMA has delivered educational workshops and co-created MBD analytics products and services with local stakeholders to develop relevant technical skills and knowledge. Enhancing the technical skills of local stakeholders will be crucial to the future design, implementation and adoption of MBD products and services across various use cases, in line with local data privacy requirements.

**Increase knowledge sharing**

The GSMA has actively disseminated learnings from the AI4I Covid-19 response activities to local and global AI4I ecosystem players and other stakeholders. This has been achieved through global insights reports, a series of webinars, international conferences and blogs hosted by the GSMA and delivered with the help of the many experts and partners brought together over the duration of the project.

## **3.2 Best practice recommendations to support ‘MBD analytics for good’ initiatives**

**MBD analytics has contributed to Covid-19 response measures around the world and will continue to aid efforts to manage future disease outbreaks and support economic recovery plans. Specific use cases and partners may vary from country to country, but the broad principles that underpin the successful and sustainable implementation of MBD solutions are largely the same. Below are best-practice principles relating to the six phases of the AI4I engagement process, based on learnings from the in-country activities. These principles have been applied to the Covid-19 response, but are equally relevant for a wide range of scenarios.**

## Partnership Creation



### Understand and adapt to the local context –

While it is important to ensure global replicability, the successful implementation of a social-good project largely depends on relevance to the local environment. As a first step, supply-side ecosystem players, facilitators and donors should make a careful assessment of the needs and concerns of local demand-side stakeholders in order to achieve expected outcomes. The actions and decisions of these key partners throughout the project must reflect the local context and complement, rather than duplicate, existing efforts.

### Build collaboration within the ecosystem –

Success can be achieved when public- and private-sector partners work together on collaborative MBD products and services. Stakeholders on any given project should create processes that connect the demand and supply sides, such as constant communication and responsiveness (understanding the concerns, priorities, needs and expertise of every stakeholder). This should be initiated at the start of the project and maintained throughout the project lifecycle to ensure collaboration.

### Clearly define roles and responsibilities –

Ecosystem players bring various qualities to a project. In many cases, the contributions of the partners on a project are complementary; in others, they may be similar for some stakeholders. In any case, there is a need to identify who is driving the project and stakeholders should agree the role and responsibility of each partner from the outset to set the right expectations. Closely related to this is the need to formalise partnerships through contractual arrangements and MoUs to ensure alignment and ownership of key elements of the project by the respective partners.

## Needs Assessment



### Understand the policy landscape to avoid future bottlenecks –

The activities of mobile operators in any given jurisdiction and the handling of customer data (storage, processing etc.) are governed by specific policies and laws. These may include laws that are not obviously about data, including constitutional and human rights laws. Where data laws are not yet in place, public- and private-sector partners should ensure that they adhere to the highest standards of privacy, in lieu of a data protection legal framework. All participants must comply with existing local law and international standards, where relevant.

### Establish a clear and practical data governance framework –

Given the sensitivities around MBD, stakeholders should define the following clearly from the start of the project: what the purpose of the project is; how transparency will be provided to end users whose data will be processed; how data will be prevented from being re-identified; how data will be handled securely; who will conduct a data-privacy impact assessment; who may access data and in what form; what measures are in place to avoid discrimination and respect human rights; and how long data will be retained. Relevant regulatory agencies (e.g. the ICT regulator, the local data protection agency) should also be informed of the project and data-sharing agreements. Stakeholders should obtain the necessary approvals from relevant legal entities early in the project, set up a clear mechanism to manage data within stipulated privacy guidelines and best practices throughout the project lifecycle, and evaluate products and partnerships from an ethical perspective.

### Upskill demand-side workforce –

The concept of MBD analytics is new to many governments and demand-side agencies. Encouragingly, awareness of the potential of MBD analytics is rising rapidly. However, demand-side agencies should now make a conscious effort to enhance the technical skills of their workforce to better understand the possibilities and limitations of MBD analytics, and apply insights to decision-making processes.

## Product Specification



### **Ensure that output is relevant and actionable –**

A key factor to realising impact is to make the output demand-driven, relevant and actionable. Supply-side partners must focus on the relevance of the final output for decision-making and value generation. This will secure the buy-in and adoption of MBD analytics products and services by demand-side partners, and incentivise donors and other facilitators that have an interest in the potential impact of the solution.

### **Articulate a clear incentive for supply-side partners –**

Processing, validating and analysing anonymised and aggregated data for social-impact initiatives requires a considerable amount of resources and investment (time, technical skills, facilities etc.) from mobile operators and should be subject to fair remuneration. In designing a project, stakeholders should identify and spell out appropriate incentives, such as a sustainable business model, to encourage greater engagement and long-term participation. Pro bono activities can only be temporary and exceptional.

### **Build confidence and trust in the output –**

To safeguard trust in the mobile industry and its handling of customer data, stakeholders should place privacy and ethics at the core of

considerations for any given project. As such, they should handle customer data responsibly and only share and analyse this data in a privacy-preserving manner while adhering to ethical guidelines. This explains why mobile operators, which are subject to strict privacy regulation and requirements, are best placed to process MBD and transfer raw datasets to third parties.

### **Empower key users and co-create locally –**

In scenarios where the MBD analytics project is led or facilitated by foreign partners, they should plan and implement mechanisms to progressively empower local partners. Co-creation of MBD analytics products and services with local stakeholders, alongside knowledge sharing, will ensure continuity beyond the participation of foreign partners and enhance the potential for replication in other use cases.

## Implementation



### Leverage existing resources –

Developing technical solutions (e.g. back-end algorithm, front-end visualisation) from scratch can be time consuming and resource intensive. As such, stakeholders should consider utilising existing assets to accelerate the implementation process. This can be achieved in the following ways: using available open-source code instead of rewriting from scratch; working closely with operators to understand existing capabilities and systems; prioritising technical partners with a known track record or existing working relationship; working with local partners to quickly address technical issues; and seeking existing projects that use relevant third-party datasets and have the requisite infrastructure in place.

### Adapt to fast-moving scenarios –

In urgent and fast-changing situations, such as during natural disasters and epidemics, stakeholders should be prepared to move with speed and agility in designing, implementing and adopting MBD analytics products and services. The Covid-19 pandemic is a case in point: the rapid spread of the virus and the impact of lockdowns on social and economic activities necessitated quick changes in government priorities and response measures. Being able to adapt quickly to a new situation/demand is critical in an emergency response context, given the potential for demand-side decisions and/or external events to shift the initial focus of the project. As such, stakeholders should agree mechanisms for adaption and agility early in the project to ensure flexibility and quick responses when the situation calls for it.

## Adoption



### Communicate the impact of the solution –

Demand- and supply-side partners should communicate the benefits and impact of a solution to all stakeholders in order to demonstrate value and, by extension, sustain momentum towards more widespread adoption of MBD analytics. A regular feedback loop between demand-side partners, as primary users of MBD analytics products and services, and supply-side partners, as data and technical solutions providers, helps enhance improvements and support efforts to expand the scope and extend the usefulness of a solution.

## Replication

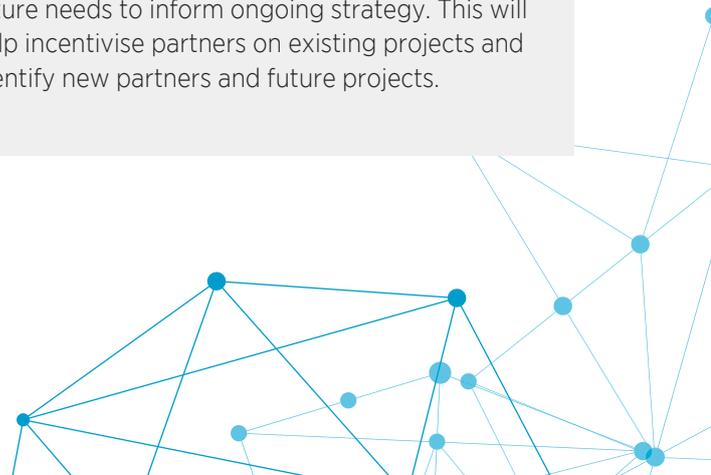


### Review previous projects –

As local AI4I ecosystems build a track record for delivering MBD analytics products and services, stakeholders should assess, and draw learnings from, previous projects as part of replication for other use cases. This will facilitate the design of new projects to realise efficiency and scale. Stakeholders should also assess learnings from the implementation of similar projects in other markets.

### Focus on sustainability and replicability –

The case for MBD analytics is enhanced by its potential to support solutions for multiple use cases and help address many pressing global challenges. To realise this potential, stakeholders should design projects with sustainability and replicability in mind from the outset. This requires ongoing investment from all parties in technical expertise, public investment in AI and big data solutions, and an assessment of current and future needs to inform ongoing strategy. This will help incentivise partners on existing projects and identify new partners and future projects.



## 4

## Opportunity to scale MBD analytics beyond Covid-19

**The GSMA AI4I Covid-19 response has demonstrated how MBD analytics can be used to generate trusted insights to inform effective response measures in emergency situations. The urgency of the need, combined with the global nature of the pandemic, has raised the profile of MBD analytics and its contribution to the Covid-19 response. On this basis, the GSMA designed an engagement process that focused on proactive and collaborative activities to achieve actionable outcomes for each market.**

Looking ahead, MBD analytics holds the promise of helping governments around the world to better prepare for future disease outbreaks and tackle various local and global challenges, in line with the UN SDGs. In many LMICs, it could also provide the foundation for successfully implementing a national AI strategy.

In another publication,<sup>11</sup> the GSMA describes how MBD analytics can make a difference to society, based on five priority themes: cities, infrastructure and economic growth; climate change and environment; managing disasters; health and education; and citizen inclusion. The use cases and approach identified for the Covid-19 response (see section 1.3) can be replicated for many other priorities (see Figure 12).

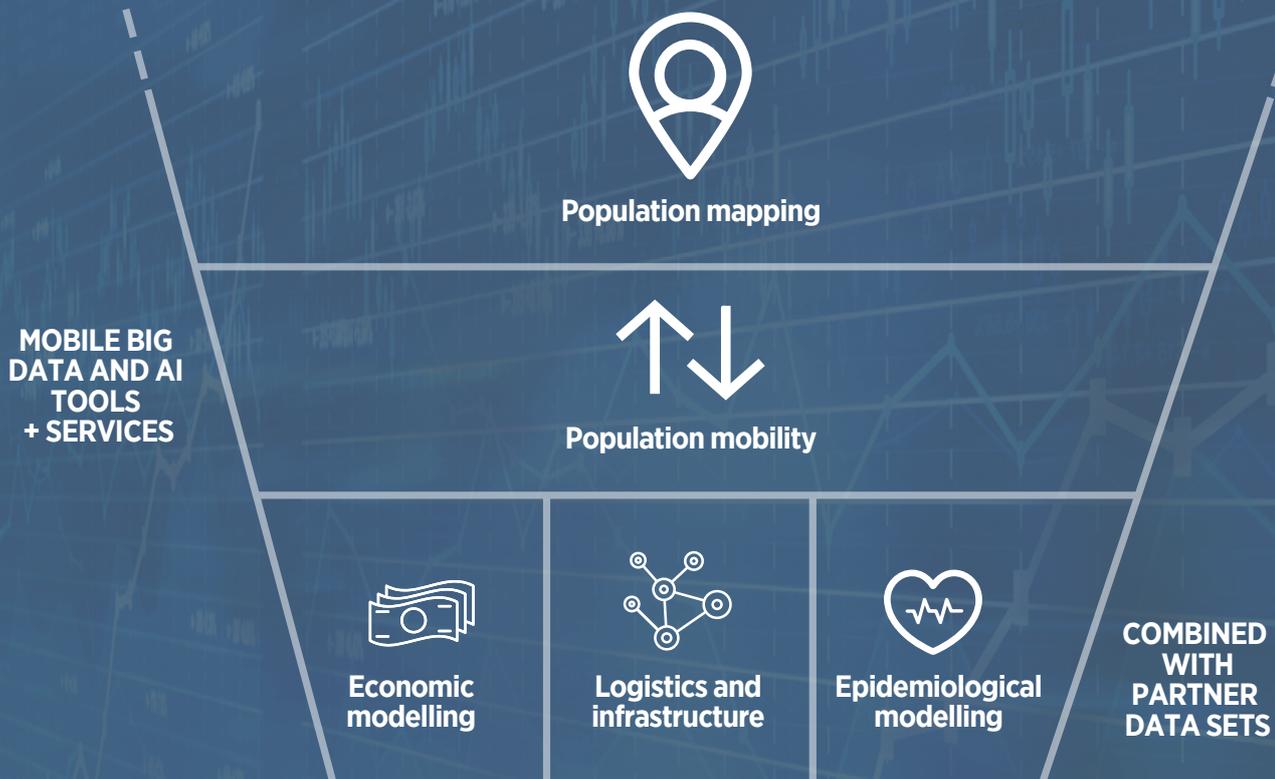
11 Mobile Big Data For a Better Future. GSMA, 2019



Figure 12 Mapping Covid-19 response applications to the 'MBD analytics for good' framework

Source: GSMA

## The mobile big data analytics framework opens up a world of opportunity



To deliver local solutions to global challenges



United Nations Sustainable Development Goals



## Spotlight

## The MBD analytics opportunity to tackle infectious diseases

With less than 10 years remaining to meet the SDGs, large gaps still persist in the detection and treatment of infectious and endemic diseases. For example, the current pace of progress is not fast enough to meet the SDG target of ending the tuberculosis (TB) epidemic by 2030, and after many years of impressive reductions in the global burden of malaria, progress has stalled.<sup>12</sup> The latest figures from the WHO show the following:

- Globally, the cumulative reduction of TB incidence was 9% between 2015 and 2019, less than half way to the WHO's End TB Strategy milestone of 20% reduction in the same time period.
- In 2019, there were an estimated 229 million cases of malaria worldwide, resulting in around 409,000 deaths.
- Each year there are 1.3 million to 4 million cases of cholera, and 21,000 to 143,000 deaths worldwide due to the disease.

MBD analytics can be applied to endemic diseases where population movement can be a factor in the spread of infections. In Mozambique, Vodafone has partnered with the Clinton Health Access Initiative and WorldPop, with the support of the Bill & Melinda Gates Foundation, to support the government in efforts to tackle malaria by using MBD analytics.<sup>13</sup> In Bangladesh,

Telenor's local operation, Grameenphone, combines epidemiological data, travel surveys, parasite genetic data and anonymised MBD to measure the geographic spread of different types of malaria parasites.<sup>14</sup>

In most cases, the Covid-19 pandemic has slowed or interrupted activities aimed at tackling these and other infectious diseases, potentially exacerbating the current situation. This calls for a redoubling of efforts by stakeholders, supported by enabling technologies such as MBD analytics, to bring cost-effective and impactful solutions to vulnerable communities.



We have some other diseases like malaria where mosquitos are the carrier but humans are also the vector ... and if you have an overview of where individuals generally move ... you may be able to predict disease outbreaks before they even start happening.

Rwanda Utilities Regulatory Authority (RURA), Rwanda



<sup>12</sup> The Sustainable Development Goals Report, United Nations, 2020

<sup>13</sup> "World Malaria Day 2020: Vodafone coronavirus mapping", Vodafone, April 2020

<sup>14</sup> "New weapon against drug resistant malaria: Big Data, says Telenor Research", Telenor, April 2019

## 5

## Conclusion

**The GSMA AI4I Covid-19 response occurred under extraordinary conditions. The rapid spread of the pandemic resulted in far-reaching health and economic impacts for communities around the world. Meanwhile, restrictions on travel and physical gatherings presented a unique set of challenges in the engagement process.**

The successful implementation of the projects conducted, with the support of the UK FCDO, validates the GSMA's established approach towards the delivery of MBD and AI4I initiatives; it also provides important learnings for stakeholders in responding to similarly urgent situations. Importantly, it highlights that turning ad hoc collaboration into more permanent partnerships can help prepare for and prevent future crises. Initiatives during the Covid-19 pandemic have mostly been reactive, resulting in the loss of valuable time at project inception.

Through sustainable public-private partnerships, MBD and AI expertise can support the response to future health emergencies, natural disasters and other unforeseen socioeconomic crises. This requires the public sector to take full advantage of the opportunity by developing a data and digital transformation culture in public bodies, by allocating public investment to big data and AI solutions and engaging the mobile industry as a partner to co-develop these solutions. Unlocking the opportunity of MBD can support more efficient, evidence-based decision-making, leading to positive impacts on societies and economies.

# Appendix

## A1 References and further reading

[World Bank Group COVID-19 Crisis Response Approach Paper](#)

**World Bank**

[Policy Responses to Covid-19](#)

**International Monetary Fund**

[How is WHO Responding to Covid-19?](#)

**World Health Organization**

[COVID-19: Perspectives on the global response to the 2019 novel coronavirus](#)

**Bill & Melinda Gates Foundation**

[Africa Joint Continental Strategy for Covid-19 Outbreak](#)

**Africa Union**

[Should Low-Income Countries Impose the Same Social Distancing Guidelines as Europe and North America to Halt the Spread of COVID-19?](#)

**Yale**

[Mobile Privacy and Big Data Analytics: Big Data for Social Good Considerations](#)

**GSMA**

[Mobile Big Data Analytics and AI for a Better Future](#)

**GSMA**

[Scaling Big Data for Social Good: The need for sustainable business models](#)

**GSMA**

[Monitoring human mobility during the COVID-19 lockdown in Ghana using mobile phone data from Vodafone](#)

**Migration Data Portal**

## A2 Key partners in the AI4I ecosystem in the DRC, Rwanda, Benin and Burkina Faso

### DRC

<b>Demand side</b>	<b>Presidential Covid-19 Task Force</b> <ul style="list-style-type: none"> <li>Use mobile insights to respond to Covid-19 or other pandemics</li> </ul>
	<b>Secrétariat Technique du Covid-19</b> <ul style="list-style-type: none"> <li>Consult and decide on key health measures and resource allocations</li> <li>Use mobile insights to respond to Covid-19 or other pandemics</li> </ul>
	<b>ANICiS and the Ministry of Health (MoH)</b> <ul style="list-style-type: none"> <li>Coordinate all e-health projects in DRC</li> <li>Collect MBD needs from the MoH's agencies and strengthen understanding of MBD solutions within government</li> </ul>
<b>Supply side</b>	<b>Orange DRC</b> <ul style="list-style-type: none"> <li>Provide mobile customer data to FluxVision</li> <li>Respond to technical questions and update data</li> </ul>
	<b>Vodacom DRC</b> <ul style="list-style-type: none"> <li>Provide CDR data to Flowminder</li> </ul>
	<b>Africell DRC</b> <ul style="list-style-type: none"> <li>Share processes with Flowminder to analyse data</li> </ul>
	<b>FluxVision</b> <ul style="list-style-type: none"> <li>Process and analyse Orange data and produce report output</li> </ul>
	<b>Kinshasa Digital</b> <ul style="list-style-type: none"> <li>Interface with health authorities and ANICiS</li> <li>Create a dashboard to be used by government agencies and adapt tools to users' requests</li> </ul>
	<b>Flowminder</b> <ul style="list-style-type: none"> <li>Analyse CDR data from Vodacom and Africell and produce report output</li> </ul>
	<b>World Bank HQ (DIME unit), Texaf Digital Campus and Columbia University</b> <ul style="list-style-type: none"> <li>Provide technical expertise on epidemiological modelling</li> </ul>
<b>Facilitators</b>	<b>GSMA</b> <ul style="list-style-type: none"> <li>Lead engagement with various partners and coordinate overall project</li> <li>Recruit local data scientist</li> <li>Provide technical support</li> <li>Build and share knowledge</li> </ul>
	<b>PATH</b> <ul style="list-style-type: none"> <li>Advise ANICiS and the MoH</li> <li>Recruit a local project coordinator</li> </ul>
	<b>DIAL</b> <ul style="list-style-type: none"> <li>Support ANICiS by financing a local project coordinator via PATH</li> </ul>
<b>Donors</b>	<b>FCDO</b> <ul style="list-style-type: none"> <li>Funding for GSMA AI4I</li> </ul>
	<b>GIZ, Fondation Roi Baudouin and Internews</b> <ul style="list-style-type: none"> <li>Funding for Kinshasa Digital</li> </ul>
	<b>Swiss Confederation and IOM</b> <ul style="list-style-type: none"> <li>Funding for Flowminder</li> </ul>
<b>Regulator</b>	<b>ARTPC</b> <ul style="list-style-type: none"> <li>Endorse the use of mobile operator data for MBD solutions</li> </ul>

## Rwanda

<b>Demand side</b>	<b>Rwanda Utilities Regulatory Authority (RURA)</b> <ul style="list-style-type: none"> <li>• Articulate demand-side specification</li> <li>• Provide compute facilities and infrastructure</li> </ul>
	<b>Ministry of ICT</b> <ul style="list-style-type: none"> <li>• Demand specification, policy validation, project oversight</li> </ul>
	<b>Rwanda Transport Development Agency (RTDA)</b> <ul style="list-style-type: none"> <li>• Provide context on the current and planned transport situation in Rwanda</li> </ul>
	<b>The Centre for the Fourth Industrial Revolution (C4IR)</b> <ul style="list-style-type: none"> <li>• Engaged through the early discussions with Ministry of ICT</li> </ul>
<b>Supply side</b>	<b>MTN Rwanda</b> <ul style="list-style-type: none"> <li>• Provide CDR data to RURA</li> </ul>
	<b>Public transport operators</b> <ul style="list-style-type: none"> <li>• Provide ticket sales data to RURA</li> </ul>
	<b>RURA</b> <ul style="list-style-type: none"> <li>• Data processing, data aggregation and implementation</li> <li>• Host public CDR and ticket sales data</li> <li>• Provide support with data packaging</li> </ul>
	<b>RTDA</b> <ul style="list-style-type: none"> <li>• Provide road network and bus route data</li> </ul>
<b>Facilitators</b>	<b>GSMA</b> <ul style="list-style-type: none"> <li>• Lead engagement with various partners and coordinate overall project</li> <li>• Recruit local data scientist</li> <li>• Analytics specification</li> <li>• Provide technical support</li> <li>• Build and share knowledge</li> </ul>
	<b>Positium</b> <ul style="list-style-type: none"> <li>• Provide workshop on the use of mobile data in the transport sector, specifically on Positium's experience of redesigning the Estonia bus system</li> </ul>
	<b>University of Tokyo</b> <ul style="list-style-type: none"> <li>• Provide expertise on software developed by the University of Tokyo and used by RURA for mobility analysis</li> <li>• Support with computing infrastructure at RURA</li> </ul>
<b>Donors</b>	<b>FCDO</b> <ul style="list-style-type: none"> <li>• Funding for GSMA AI4I</li> </ul>
<b>Regulator</b>	<b>RURA</b> <ul style="list-style-type: none"> <li>• Endorse the use of mobile operator data for MBD solutions</li> </ul>

## Benin

<b>Demand side</b>	<b>Ministry of Communication and Post, Ministry of ICT, Ministry of Health</b>
<b>Supply side</b>	<b>MTN, MooV, Societe Beninoise d'Infrastructures Numeriques (SBIN)</b>
<b>Technical partners</b>	<b>AFRIA, Otris Consulting</b>
<b>Donors and facilitators</b>	<b>UNICEF, UNFPA, WB, Enabel, Seme City, IRD, FCDO, Bluesquare, OpenSI, Global Partnerships</b>
<b>Regulator</b>	<b>The Regulatory Authority for Electronic Communications and Post Office (ARCEP)</b>

**Burkina Faso**

<b>Demand side</b>	Ministry of Health
<b>Supply side</b>	Orange Business Services, Orange Burkina Faso
<b>Technical partners</b>	Cooper/Smith, World Bank
<b>Donors and facilitators</b>	FCDO
<b>Regulator</b>	Commission de l'Informatique et des Libertés (CIL)

# A3 The AI4I ecosystem – key considerations for stakeholders

## Technical considerations

In its raw form, MBD does not provide any useful information. It is also sensitive from a privacy perspective and its use is governed by data protection laws. Like other big data sources, several steps have to be taken to obtain valuable products and actionable insights from MBD. In many cases, this involves combining MBD with datasets from third-party organisations such as satellite or drone companies, open data platforms, and public sector agencies, to provide context and enhance insights. It also involves presenting the insights in a way that meets the needs of demand-side partners and can be acted upon by them. This process is summarised into three main steps:

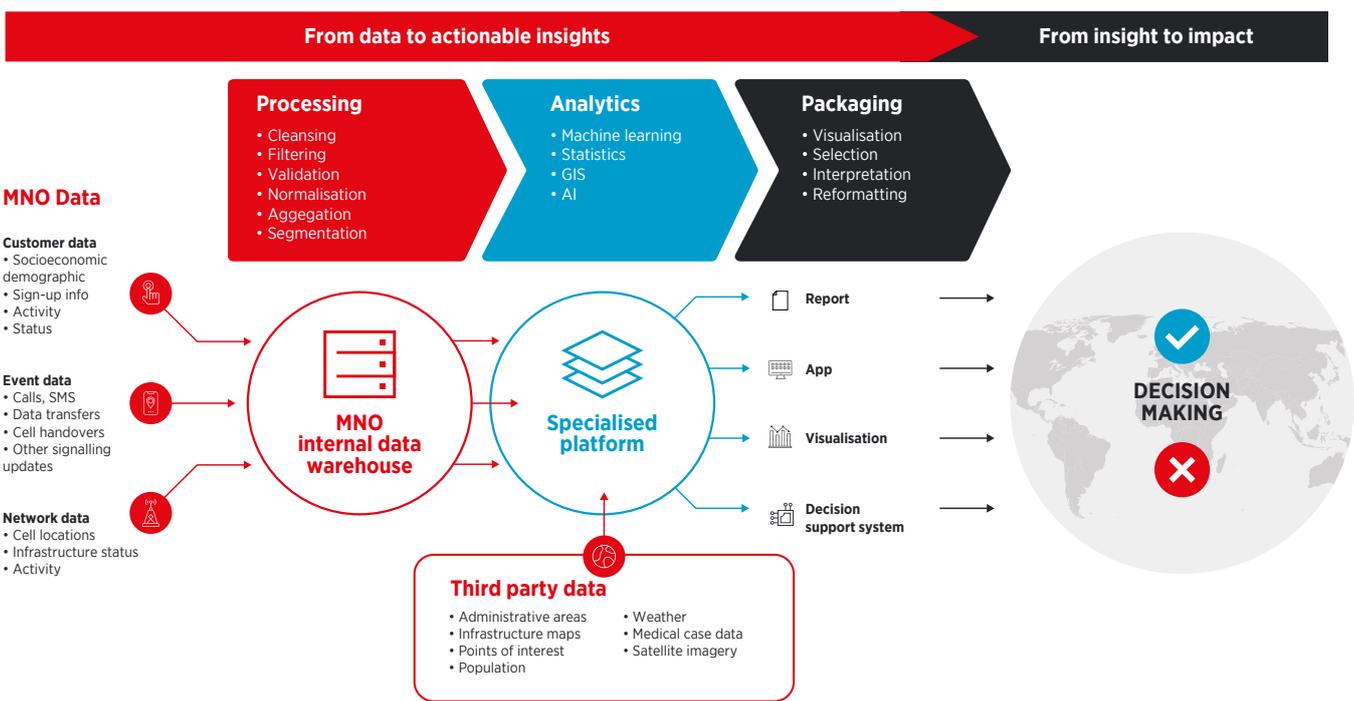
- Processing** – This involves several steps, starting with anonymisation (i.e. irreversibly masking the identifying numbers of the caller and receiver by replacing them with a unique identifier) and aggregation to protect user privacy.

- Analytics** – This involves the use of specific techniques and components to analyse MBD and third-party datasets to produce the desired outcome. For example, in epidemiological applications the locations of medical cases can be used to map the spread of specific diseases or disease strains. When combined with mobility data, this allows the prediction of future outbreaks.
- Packaging** – This describes what the product should look like, how it should be presented, whether and how often it should be updated, what additional data it should incorporate, and what functionality it should offer. This is often determined by the end user and intended application of the solution. It is important for all partners to work together to establish the requirements and ensure that the product will support the intended use.



**See the AI4I Digital Toolkit for a detailed explanation of each of these steps.**  
[aiforimpacttoolkit.gsma.com](http://aiforimpacttoolkit.gsma.com)

**Figure 13** Key steps for converting MBD into actionable insights Source: GSMA



**Privacy and ethical considerations**

The use of mobile data by governments or other demand-side agencies raises privacy concerns for users of mobile services. As such, establishing key data privacy principles that address subjects such as transparency, accountability and security is vital to implementing MBD solutions in a way that respects the privacy of the individual and fosters an environment of trust. Additionally, AI ethics principles are key to ensure the responsible and trustworthy use of data in accordance with international human rights conventions, to mitigate societal harm and maximise benefits for society and the global economy. Specific issues arise when developing business-to-government (B2G) solutions – for example, ensuring that data insights will not be used for use cases other than what has been specifically agreed upon.

Globally, more than 120 countries have adopted legal and regulatory data protection frameworks. In these countries, the use of mobile operator data for MBD analytics should comply with existing privacy laws and regulations. It is, however, important to note that mobile and fixed operators are also subject to additional obligations related to the processing of telecommunications data. For countries where there is



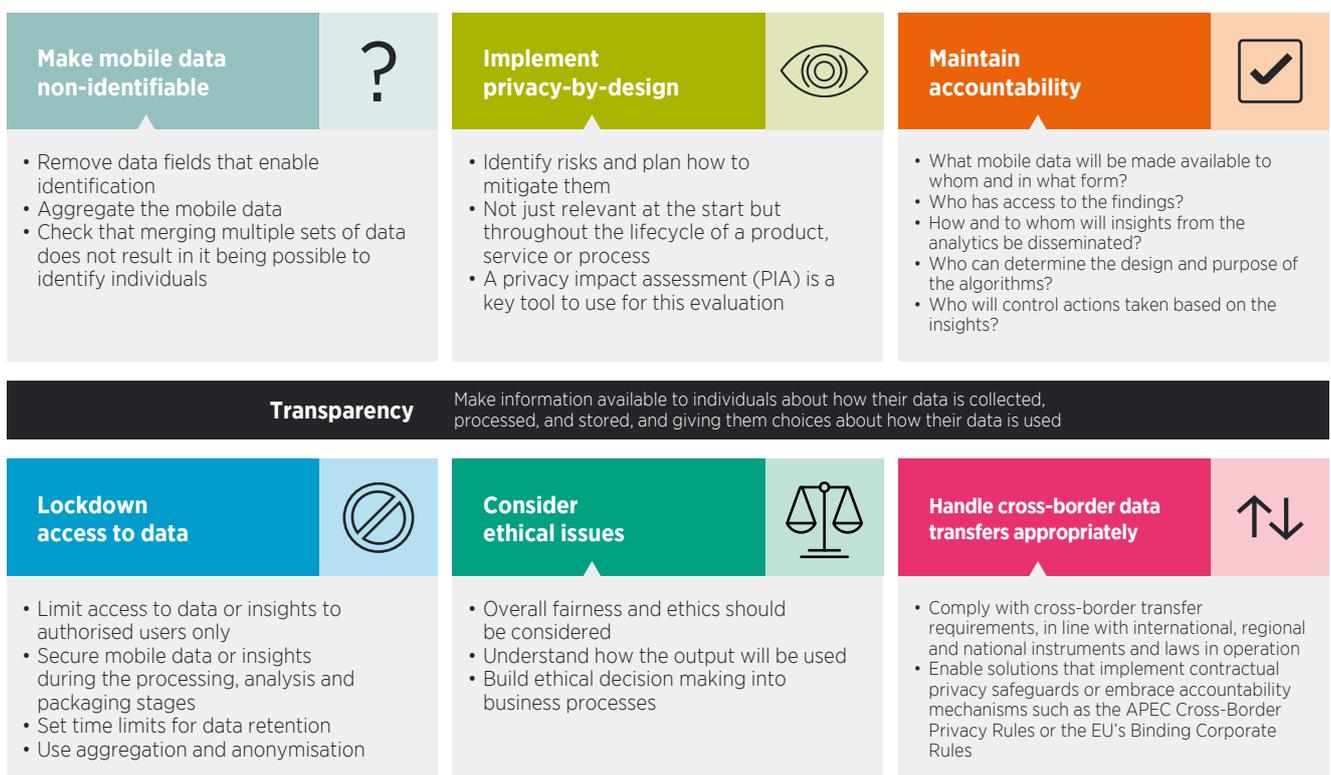
In countries where there are no data protection laws, the GSMA supports the development of such laws at a national level. The GSMA considers it essential that data protection laws are well drafted to address privacy concerns in these markets. The GSMA has published the Covid-19 privacy guidelines to support mobile operators and other stakeholders in the use of mobile operator data in the Covid-19 response, based on international standards and best practice.



no comprehensive legal and regulatory data protection framework yet, the GSMA encourages stakeholders in a given project to adhere to the highest international standards of data protection.

**Figure 14** Key data privacy considerations in the implementation of MBD solutions

Source: GSMA



In addition to general data protection and privacy laws, mobile operators are also subject to strict additional obligations related to the processing of data in certain jurisdictions. These may include the following: licence conditions; multimedia/communications laws; e-privacy laws; interception and disclosure laws (for law enforcement purposes); data retention laws; electronic transactions laws; and statutory codes of conduct or guidelines.

When developing MBD and AI solutions, mobile operators, governments and other participants should consider whether the use of mobile data complies with requirements stipulated in these laws, regulations and licence conditions. Figure 14 summarises the key privacy considerations in line with recognised data privacy principles.



Applying privacy-by-design and ethics-by-design to MBD projects can further mitigate these risks by building in privacy and ethical considerations at all stages of the project lifecycle. The GSMA has published several resources to help AI4I ecosystem players address privacy and ethics risks associated with AI. These include *Mobile Privacy and Big Data Analytics* and *AI Ethics Principles*.

AI is an important tool for analysing huge volumes of data to learn patterns, detect similarities and anomalies, and identify the most meaningful signals. It presents ground-breaking opportunities for AI4I ecosystem players to extract certain insights that would not be possible otherwise and analyse patterns that could lead to social benefits when applied. However, the application of AI comes with its own challenges, from questions about responsible and trustworthy use of data to broader societal concerns around ethics and trust.

These concerns and challenges can be mitigated through the application of existing principles, laws and regulations that protect individuals and address risks. 'Trustworthy AI' that is grounded in the right

frameworks and principles, designed and deployed in a manner that is consistent with international human rights conventions, and supported through research, training and education can lead to exponential benefits for society and the global economy.

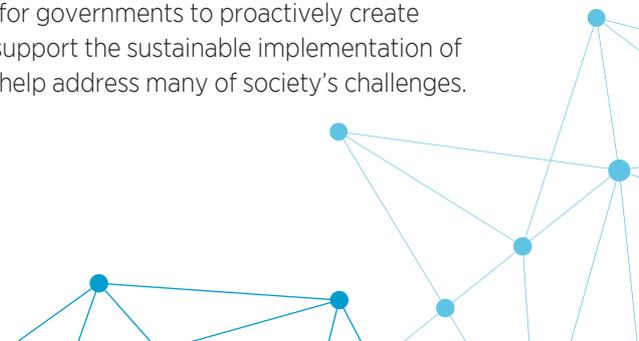
### Sustainable business models

In recent years the mobile industry has developed MBD analytics products and services for the public and private sectors. In many cases, these products and services have been implemented on a commercial basis, thereby delivering scale through the continuous, consistent and predictable use of MBD, and maximising social and economic value for beneficiaries and other stakeholders.

The process of converting MBD into actionable insights requires investment in the right equipment and software, technical skills and expertise, and a process that guarantees the availability of robust data to deliver valuable products and services. For example, the creation of a MBD dashboard product would only deliver its full value when updated regularly. Consequently, stakeholders need to agree a sustainable funding structure throughout the project lifecycle, based on a shared economic value.

As primary users and beneficiaries of insights from MBD analytics, demand-side stakeholders derive the most economic value from MBD analytics and therefore have a major interest in the sustainability and, ultimately, replicability of MBD solutions. Collaboration between stakeholders is essential to establish common goals and determine the economic value of the contribution of the MBD products and services and related insights to addressing a given problem.

Sustainability is crucial to unlock the full potential of MBD analytics and encourage long-term commitment and ongoing innovation in the AI4I ecosystem. While donors and development agencies have on many occasions funded pilots and activities in the early stages of a project, the availability of ongoing public funding at more advanced stages remains a challenge. Experience has shown that pro bono solutions cannot be sustainable in the longer term. Governments have a vital role to play here, notably in the crucial stages of implementation and replication for other use cases. With growing awareness and evidence of the potential of MBD analytics, there is a strong case for governments to proactively create budgets to support the sustainable implementation of solutions to help address many of society's challenges.



**For more information, please go to:**

**GSMA AI for Impact website**

[gsma.com/betterfuture/aiforimpact](https://gsma.com/betterfuture/aiforimpact)

**AI for Impact digital toolkit**

[aiforimpacttoolkit.gsma.com](https://aiforimpacttoolkit.gsma.com)

**@gsma #AI4I #BetterFuture**



---

This initiative has been funded by UK aid from the UK government and is supported by the GSMA and its members.

The views expressed do not necessarily reflect the UK government's official policies





**GSMA Head Office**

Floor 2  
The Walbrook Building  
25 Walbrook  
London EC4N 8AF  
United Kingdom

**Tel: +44 (0)20 7356 0600**

**Fax: +44 (0)20 7356 0601**

Copyright © 2021 GSM Association

