GSMA

2024 Mobile Industry Impact Report: Sustainable Development Goals

Methodology

September 2024

GSMA

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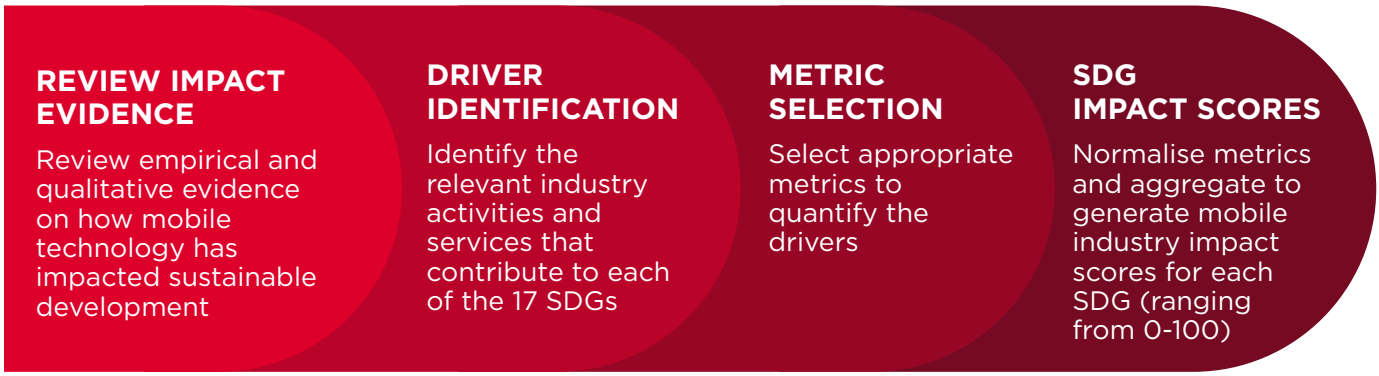
Impact score methodology

This report describes the framework and methodology for assessing the impact of the mobile industry on the UN Sustainable Development Goals (SDGs). For each goal, an 'impact score' is calculated out of 100. A score of zero means the industry is having no impact at all, while a score of 100 means the industry is doing everything possible to contribute to that SDG. The methodology used to construct the impact scores is carried out in four steps. These are discussed in turn.

Figure 1 | Measuring SDG Impact



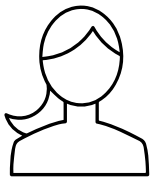
Step 1
Review impact evidence

To measure the mobile industry's impact on the SDGs, it is necessary to identify the mechanisms or 'drivers' through which mobile technology can influence the three dimensions of sustainable development – namely, economic growth, social inclusion and environmental protection.

We therefore draw on the extensive evidence that has already demonstrated the impact that mobile can have on sustainable development across the world. Some of this evidence is summarised below, though it is by no means exhaustive.

Mobile and sustainable development:
What does the evidence show?

Empowering Women



81%

81% of adult women in low- and middle-income countries now own a mobile phone, which can help them feel safer and more connected, and provide access to information, services and life-enhancing opportunities[1].

Poverty and Rural Development

81%

Mobile (and particularly mobile money) can drive reductions in poverty, improve rural livelihoods[2] and help users mitigate the impact of emergencies and external shocks[3].

Economic Growth

5%

The mobile industry contributes $5.2 trillion (5%) to global GDP, driven by direct impacts as well as wider productivity effects in other sectors[4].

Personal Well-being

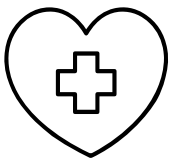
5%

Mobile ownership combined with internet connectivity is associated with an improvement in peoples' lives and well-being[5].

Education

Mobile improves the quality of teaching and learning, and facilitates reading and enhanced literacy[6].

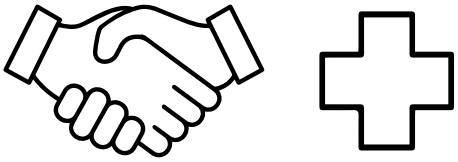
Health



Mobile nutrition and health services improve users' knowledge, behaviours and health outcomes[7].

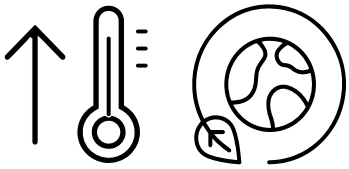
1 See *The Mobile Gender Gap Report* (GSMA, 2023) and *Bridging the gender gap: Mobile access and usage in low- and middle-income countries* (GSMA, 2015)
2 See for example, *The long-run poverty and gender impacts of mobile money* (Suri and Jack, 2016) and *The poverty reduction effects of mobile broadband in Africa: Evidence from Nigeria* (GSMA and World Bank, 2020)
3 See, for example, *Does Mobile Money Affect Saving Behaviour? Evidence from a Developing Country* (Ky et al, 2017) and *Mobile money and risk sharing against village shocks* (Riley, 2018)
4 See *The Mobile Economy 2024*, (GSMA, 2024), and *Mobile technology and economic growth: Lessons to accelerate economic growth and recovery* (GSMA, 2020)
5 See *The Impact of Mobile on People's Happiness and Well-Being* (GSMA and Gallup, 2018) and *Mobile Connectivity in Emerging Economies* (Pew Research Center, 2020)
6 See *The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis* (Sung et al, 2016) and *Reading in the mobile era* (UNESCO, 2014)
7 See *Leveraging mobile phones to attain sustainable development* (Rotondi et al, 2020) and *Creating mobile health solutions for behaviour change* (GSMA, 2018)

Humanitarian Assistance



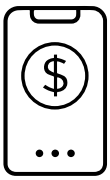
The ability to use mobile phones to communicate and access information, education, financial and health services in emergency situations – as well as facilitate the provision of aid – is now widely recognised as an essential form of humanitarian assistance[8].

Environment and Climate Change



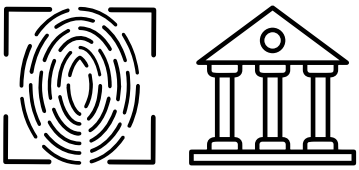
In 2018, the level of avoided emissions enabled by mobile technologies was around 2,135 million tonnes CO_2e. This was 10 times greater than the global carbon footprint of mobile networks themselves[9], [10].

Financial Inclusion



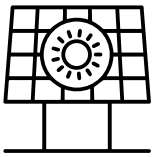
In 2018, the level of avoided emissions enabled by mobile technologies was around 2,135 million tonnes CO_2e. This was 10 times greater than the global carbon footprint of mobile networks themselves[11], [12].

Digital Identity



Operators have enabled accessible and inclusive digital identity by extending birth registration through mobile, partnering with governments on enrolment in national ID programmes and verifying and authenticating identification digitally[13].

Access to Utilities



Mobile technology has unlocked new and innovative models to access energy, particularly pay-as-you-go (PAYG) solar companies, which sold more than 1.5 million units in the last six months of 2023. The PAYG model is being replicated in other sectors such as water, irrigation, clean cooking and sanitation[14].

8 See, for example, *Mobile for Humanitarian Innovation, Annual Report* (GSMA, 2021) and *GSMA Humanitarian Connectivity Charter Annual Report* (GSMA, 2017)
9 *The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions* (GSMA, 2019)
10 *The Enablement Effect 2021* (GSMA, 2021)
11 *State of the Industry Report on Mobile Money 2024* (GSMA, 2024)
12 Ibid
13 See, for example, *2018 Mobile Industry Impact Report: Sustainable Development Goals* (GSMA, 2018) and *Digital Identification: A key to inclusive growth* (McKinsey, 2020) as well as several case studies on the GSMA M4D Digital Identity programme website.
14 See, for example, *Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data July-December 2023 (GOGLA, 2024)*

Step 2:
Driver identification

Based on both empirical and qualitative evidence, we identify the drivers through which mobile impacts the SDGs. Figure 2 provides an illustration of three drivers for SDG 1.

Figure 2 | Examples of drivers for SDG 1

Each driver must describe an activity that meets the following criteria:

- Can be performed or supported by the mobile industry
- Contributes to the achievement of the UN SDG, either by:
  - fulfilling a necessary condition to achieve the SDG
  - increasing the speed of achieving the SDG
  - improving the economics of reaching an SDG target.

A full list of drivers for each SDG is provided in the Appendix.

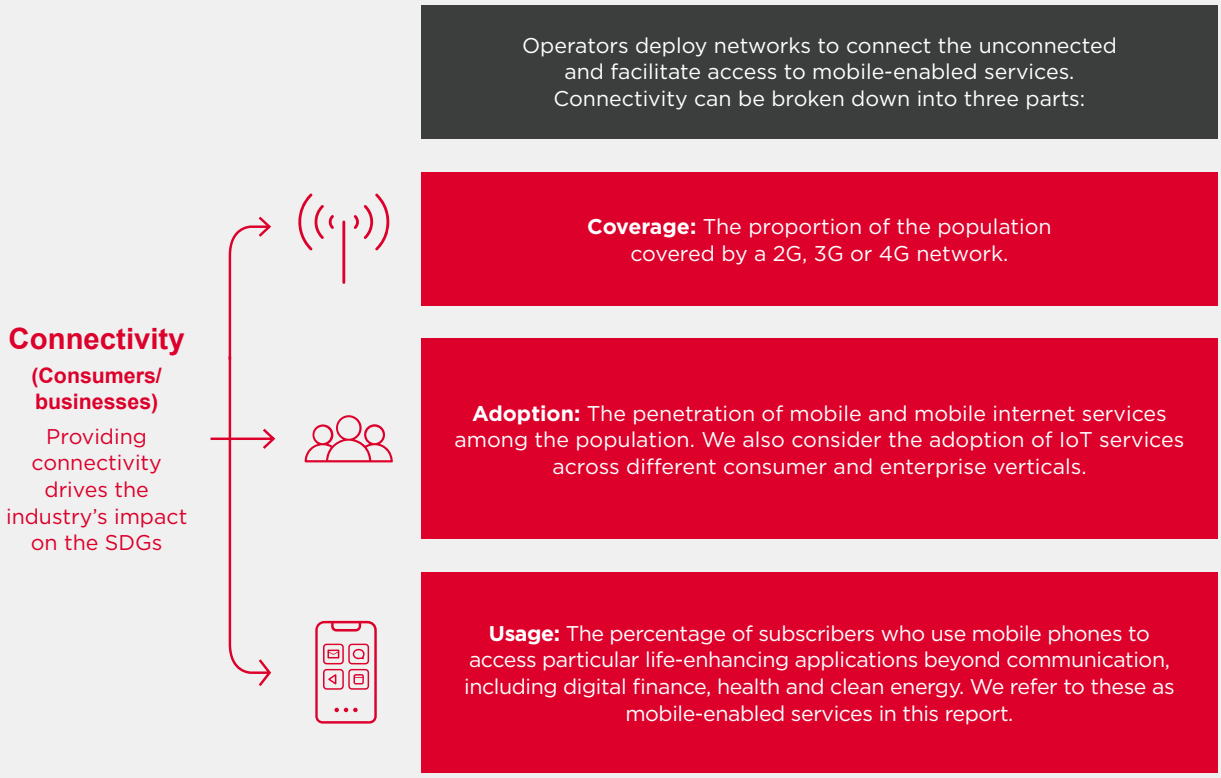
Step 3: Metric selection

We identify appropriate metrics to quantify the drivers and measure the industry's contribution, relative to its theoretical maximum contribution. When selecting metrics, the following criteria must be fulfilled:

- Must be an observable measure that captures how the mobile industry impacts the SDG
- Must be influenced by operators
- Must have a direct link to a driver or be a proxy for driver measurement
- Must be obtainable across relevant geographies (country or region)
- Must be measured on an ongoing basis (to allow for year-on-year comparison)
- Must be available for enough countries so that at least 70% of the global population is covered.

If a driver cannot be measured (for example, if there is insufficient or no data), it is not included in the impact quantification.

Figure 3 | Measuring SDG Impact[15]



15 The GSMA SDG impact framework previously included the Operating Responsibly pillar, which focused on sustainable business practices supporting the mobile industry's contribution to the SDGs. This pillar relied on inputs from the GSMA Sustainability Assessment Framework, which is no longer being updated. Consequently, the Operating Responsibly pillar has been removed from the SDG impact framework and from previous years' SDG impact scores.

To provide a deeper understanding of the mobile industry's ESG performance, the GSMA has launched ESG Metrics for Mobile, a first-of-its-kind mobile sector ESG reporting framework featuring ten industry-specific KPIs. For more information, please see the *ESG Metrics for Mobile White Paper* (GSMA, June 2024)

Figure 4 provides a list of metrics used to measure the industry's contribution.

Figure 4 | Metric list

Metric	Definition	Source
Coverage		
2G coverage	Percentage of the population covered by a 2G network	ITU
3G coverage	Percentage of the population covered by a 3G network	GSMA Intelligence
4G coverage	Percentage of the population covered by a 4G network	
Network performance		
Download speeds	Mean download speeds (Mbps), weighted by 2G/3G/4G split in respective country	Ookla, GSMA Intelligence
Upload speeds	Mean upload speeds (Mbps), weighted by 2G/3G/4G split in respective country	
Latencies	Mean latencies (ms), weighted by 2G/3G/4G split in respective country	
Adoption		
Mobile penetration	Unique subscriber penetration (% of population)	GSMA Intelligence
Mobile penetration (female)	Unique female subscriber penetration (% of female population)	
Mobile penetration (poorest 20%)	Unique subscriber penetration for poorest 20% (% of each country's population in poorest 20%)	Gallup, GSMA Intelligence
Mobile penetration (second-poorest 20%)	Unique subscriber penetration for second 20% (% of each country's population in second-poorest 20%)	
Mobile penetration (rural)	Unique rural subscriber penetration (% of rural population)	GSMA Intelligence
Mobile internet penetration	Unique mobile internet penetration (% of population)	
Mobile internet penetration (female)	Unique female mobile internet penetration (% of female population)	
Mobile internet penetration (poorest 20%)	Unique mobile internet penetration for poorest 20% (% of each country's population in poorest 20%)	Gallup, GSMA Intelligence
Mobile internet penetration (second-poorest 20%)	Unique mobile internet penetration for second 20% (% of each country's population in second-poorest 20%)	
Mobile internet penetration (rural)	Unique rural mobile internet penetration (% of rural population)	GSMA Intelligence
Cellular IoT penetration	Cellular IoT connections (% of total connections)	
Affordability		
Mobile tariff (Entry)	Price of 1GB data (% GDP per capita)	Tarifica
Mobile tariff (Higher)	Price of 5GB data (% GDP per capita)	
Handset price	Price of cheapest internet-enabled device (% GNI per capita)	

Metric	Definition	Source
Usage		
Social media (female/rural)	% of (female/rural) mobile subscribers that have used phone for visiting social networking websites	GSMA Intelligence Consumer Survey
Social media, monthly (female/rural)	Frequency of (female/rural) consumer use of social networks (how many used at least once a month)	
Health (female/rural)	% of (female/rural) mobile subscribers that have used phone to help improve or monitor health	
Health, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile for improving health (how many used at least once a month)	
Information (female/rural)	% of (female/rural) mobile subscribers that have used phone to get information about products and services	
Information, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to get information about products and services (how many used at least once a month)	
News (female/rural)	% of (female/rural) mobile subscribers that have used phone to read news	
News, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to read news (how many used at least once a month)	
Government services (female/rural)	% of (female/rural) mobile subscribers that have used phone to access government services	
Government services, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to access government services (how many used at least once a month)	
Job (female/rural)	% of (female/rural) mobile subscribers that have used phone to look for or apply for a job	
Job, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to look for or apply for a job (how many used at least once a month)	
Purchase (female/rural)	% of (female/rural) mobile subscribers that have used phone to order/ purchase goods online	
Purchase, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to order/purchase goods online (how many used at least once a month)	
Transfer money (female/rural)	% of (female/rural) mobile subscribers that have used phone to transfer money	
Transfer money, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to transfer money (how many used at least once a month)	
Utility bills (female/rural)	% of (female/rural) mobile subscribers that have used phone to pay utility bills	
Utility bills, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to pay utility bills (how many used at least once a month)	
Education (female/rural)	% of (female/rural) mobile subscribers that have used phone to improve education	
Video calling (female, rural)	% of (female/rural) mobile subscribers that have used phone to make video calls	
Video calling, monthly (female, rural)	% of (female/rural) mobile subscribers that have used phone to make video calls (how many have used at least once a month)	
Free video (female, rural)	% of (female/rural) mobile subscribers that have used phone to watch free videos	
Free video, monthly (female, rural)	% of (female/rural) mobile subscribers that have used phone to watch free videos (how many have used at least once a month)	
Agriculture (female/rural)	% of (female/rural) mobile subscribers that have used phone to access information and services that benefit farm or fishery	
Agriculture, monthly (female/rural)	Frequency of (female/rural) consumer use of mobile to access information and services that benefit farm or fishery (how many used at least once a month)	

Metric	Definition	Source
Usage		
Mobile finance (female/rural)	% of (female/rural) mobile subscribers that use mobile financial services (mobile banking and/or mobile money)	World Bank, GSMA, GSMA Intelligence
Mobile finance (poorest 40%)	% of mobile subscribers that use mobile financial services (mobile banking and/or mobile money) within the poorest 40% of each country's population	
IoT connections (per capita/ household/ vehicle)		
Smart vehicles	Connected cars, connected bikes, insurance telematics	GSMA Intelligence
Wearables	Fitness trackers (including personal health trackers), smart watches	
Smart home	Home appliances (fridges, washing machines), home infrastructure (routers), home security (alarms), energy monitoring (thermostats)	
Health	Remote monitoring of medical devices, emergency vehicle infrastructure	
Smart utilities	Energy, water and gas smart metering, smart grid	
Smart retail	PoS, digital signage, vending machines, ATMs	
Smart manufacturing	Inventory tracking, monitoring and diagnostics, warehouse management	
Smart city	Public transport, surveillance, electric vehicle charging, street lighting, parking, waste management	
Smart buildings	Heating and air con, security, lighting, hot desks, office equipment	
Enterprise, others	Fleet management, applications in agriculture, oil, mining, construction	
Industrial	IoT connections across several verticals, including smart cities, smart utilities, smart retail, smart manufacturing and smart buildings	
Fish	IoT connections in the fishing sector (including fish farming, coastal fishing and deep sea fishing)	
Agriculture	IoT connections in the agricultural sector	

Metric	Definition	Source
e-Waste		
e-Waste	Levels of electronic waste produced by small IT and telecoms equipment, including mobile phones (kg/inhabitant)	UN

Figure 4 illustrates how the metrics work for two of the drivers for SDG 1. To measure the industry's impact in the provision of communication services in poor communities, we analyse mobile take-up by the poorest 20% and the second-poorest 20% in each country. These indicators are well suited to measuring the impact of the mobile industry on poverty as we know from existing evidence that higher levels of mobile adoption have reduced poverty across different countries and regions. To maximise its impact on this driver and SDG 1 more generally, the mobile industry needs to provide mobile services to everyone in the two lowest income quintiles.

To measure the impact of the mobile industry in providing access to financial services, we include a metric on the take-up of mobile financial services (mobile banking or mobile money) among the poorest 40% of a country's population.

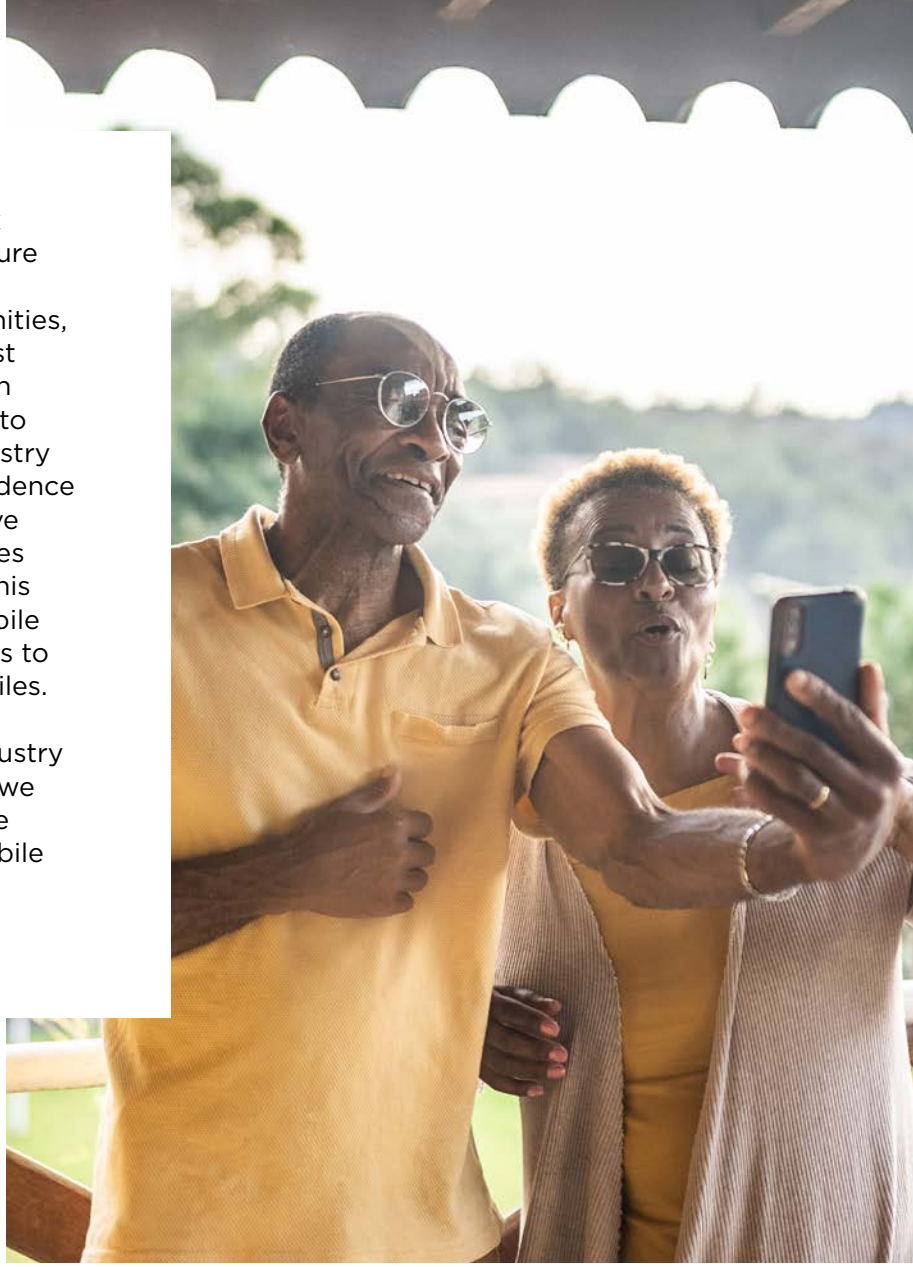


Figure 5 | SDG 1 drivers and metrics

Drivers	Metrics
Provide communications services to stimulate local business and economic growth in poor communities	Mobile penetration (poorest 20%)
	Mobile penetration (second-poorest 20%)
Support access to financial services	Take-up of mobile financial services among the poorest 40%

The metrics referenced in Figure 5 are by no means exhaustive. A full list of metrics for SDG 1 is provided in Figure 6.

The mapping of all metrics to the 17 SDGs can be seen in Figure 6.

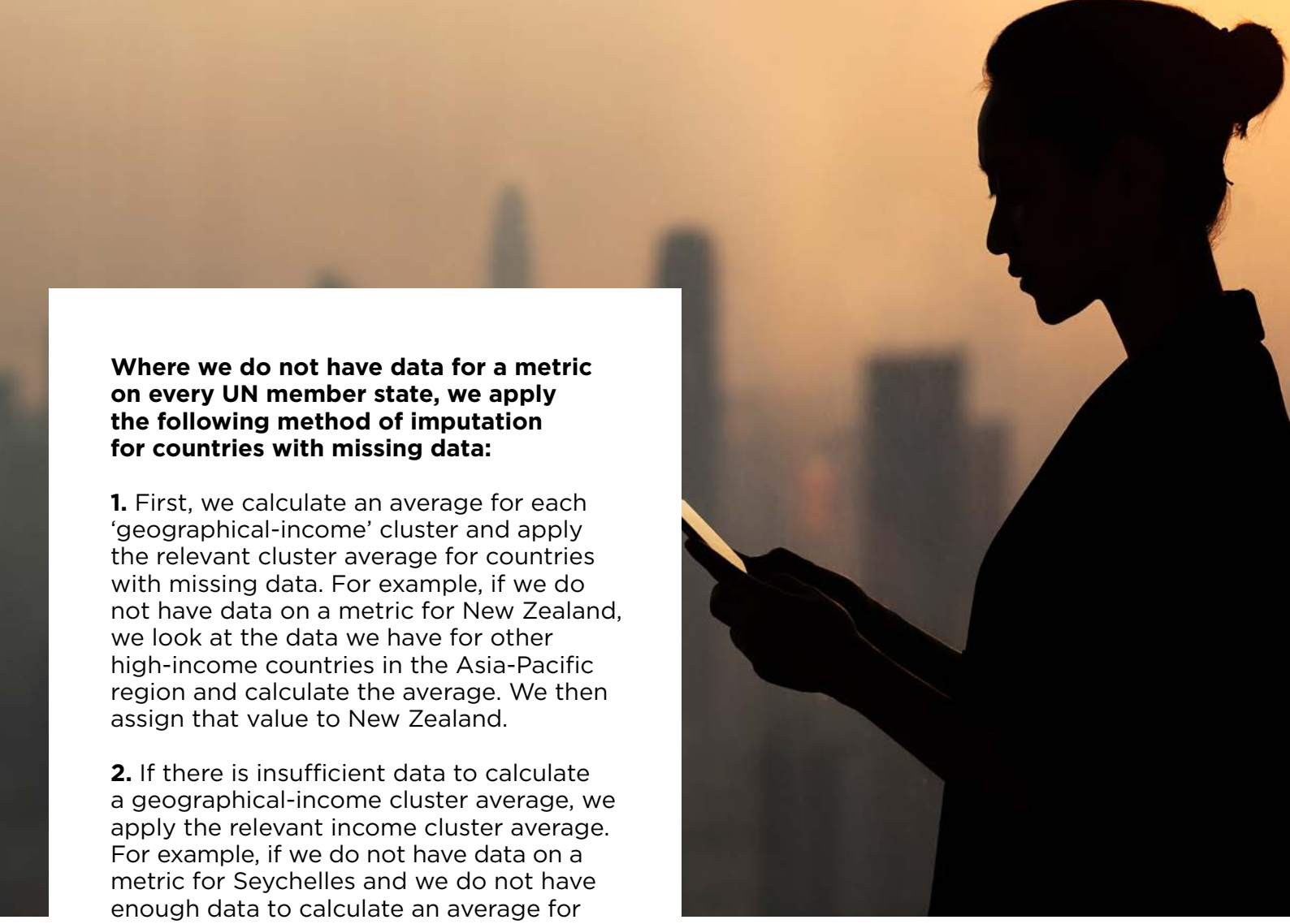
Figure 6 | SDG 1 drivers and metrics

Indicators	SDG 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Coverage																	
2G coverage									✓								
3G coverage									✓								
4G coverage									✓								
Network performance																	
Download			✓						✓		✓		✓				
Upload			✓						✓		✓		✓				
Latency			✓						✓		✓		✓				
Adoption																	
Mobile penetration			✓	✓		✓	✓	✓	✓		✓		✓		✓	✓	✓
Mobile penetration (female)					✓					✓							
Mobile penetration (poorest 20%)	✓									✓							
Mobile penetration (second-poorest 20%)	✓									✓							
Mobile penetration (rural)		✓								✓				✓	✓		
Mobile internet penetration			✓	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
Mobile internet penetration (female)					✓					✓							
Mobile internet penetration (poorest 20%)	✓									✓							
Mobile internet penetration (second-poorest 20%)	✓									✓							
Mobile internet penetration (rural)		✓								✓				✓	✓		
Cellular IoT penetration	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓		✓
Affordability																	
Cost of 100MB data (% of monthly GDP per capita)									✓								
Cost of 500MB data (% of monthly GDP per capita)									✓								

Indicators	SDG 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Affordability																	
Cost of cheapest internet-enabled device (% of GDP per capita)									✓								
Usage																	
Social media				✓						✓						✓	
Social media, monthly				✓						✓						✓	
Health		✓	✓														
Health, monthly		✓	✓														
Information	✓							✓		✓							
Information, monthly	✓							✓		✓							
News				✓						✓						✓	
News, monthly				✓						✓						✓	
Government services	✓	✓	✓	✓						✓						✓	
Government services, monthly	✓	✓	✓	✓						✓						✓	
Job	✓							✓		✓							
Job, monthly	✓							✓		✓							
Purchase	✓							✓		✓							
Purchase, monthly	✓							✓		✓							
Transfer	✓							✓		✓							
Transfer, monthly	✓							✓		✓							
Utility bill						✓	✓										
Utility bill, monthly						✓	✓										
Education				✓													
Education, monthly				✓													
Video calling				✓	✓				✓		✓						
Video calling, monthly				✓	✓				✓		✓						
Free video					✓												
Free video, monthly					✓												
Social (female)					✓					✓							
Health (female)					✓												
News (female)					✓					✓							
Government services (female)					✓					✓							

Indicators	SDG 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Usage																	
Purchase (female)					✓					✓							
Education (female)					✓												
Video calling (female)					✓												
Video calling, monthly (female)					✓												
Free video (female)					✓												
Free video, monthly (female)					✓												
Information (rural)	✓														✓	✓	
Job (rural)	✓														✓	✓	
Purchase (rural)	✓														✓	✓	
Transfer (rural)	✓														✓	✓	
Video calling (rural)	✓																
Video calling, monthly (rural)	✓																
Free video (rural)	✓																
Free video, monthly (rural)	✓																
Agri (rural)	✓														✓	✓	
Agri, monthly (rural)	✓																
Mobile finance			✓	✓		✓	✓	✓	✓								✓
Mobile finance (female)					✓					✓							
Mobile finance (rural)		✓								✓					✓	✓	
Mobile finance (poorest 40%)	✓									✓							
IoT connections																	
Smart vehicles			✓								✓						
Wearables			✓														
Smart home												✓					
Health			✓														
Smart utilities						✓	✓					✓					
Smart retail								✓									
Smart manufacturing								✓				✓					
Smart city			✓								✓		✓				
Smart buildings											✓	✓					
Enterprise, others								✓				✓					

Indicators	SDG																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
IoT connections																	
Industrial									✓								
Agriculture		✓															
Fish														✓			
e-Waste																	
E-waste											✓	✓	✓		✓		



Where we do not have data for a metric on every UN member state, we apply the following method of imputation for countries with missing data:

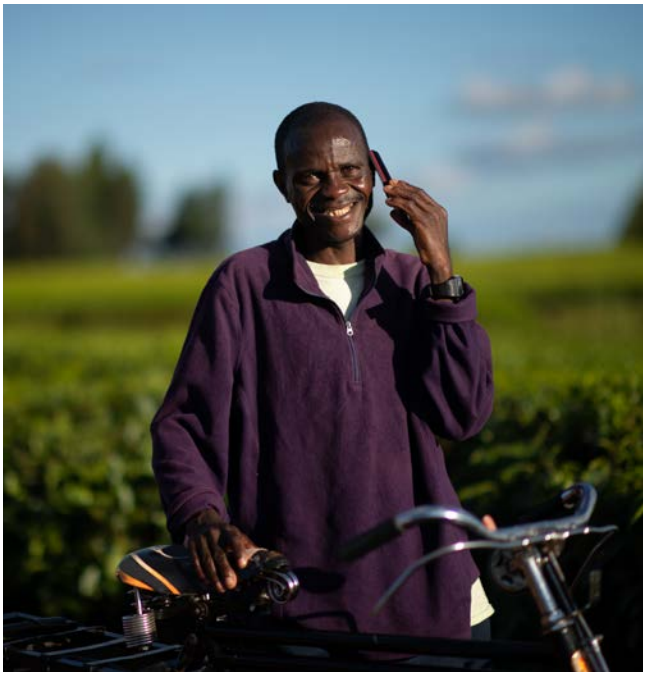
1. First, we calculate an average for each 'geographical-income' cluster and apply the relevant cluster average for countries with missing data. For example, if we do not have data on a metric for New Zealand, we look at the data we have for other high-income countries in the Asia-Pacific region and calculate the average. We then assign that value to New Zealand.

2. If there is insufficient data to calculate a geographical-income cluster average, we apply the relevant income cluster average. For example, if we do not have data on a metric for Seychelles and we do not have enough data to calculate an average for high-income Sub-Saharan Africa countries, then we apply the average for all high-income countries. While it is possible to employ more sophisticated methods of data imputation, the results of the Mobile Industry Impact Report are ultimately reported at a global and regional level. Given that for each metric we have data that captures at least 75% of the global population, we believe that the approach provides an accurate assessment of the mobile industry's impact on the SDGs at this level and is therefore proportionate. Nonetheless, there remain a number of areas where better data is needed. The following still require suitable metrics:

- the use of mobile to verify individuals' identity
- the use of mobile internet in schools and public education
- the use of mobile and mobile-internet services by businesses (by size and type).

As part of the GSMA's reporting framework, we will continue to collect better data on these and other areas going forward to provide a robust analysis of the industry's impact on the SDGs.

Step 4:
Impact score calculations



The next step is to calculate industry impact scores for each SDG. This is done using a bottom-up approach described below, using all available data for the 193 countries that have adopted the SDGs.

- **A: Standardisation of metrics.** Metrics that have been identified based on the drivers are standardised on a zero to 100 scale to ensure comparability. This is based on a Theoretical Maximum and Minimum value, where 100 represents the best performance. In some cases, metric values are bounded (e.g. between zero and 100% for 2G, 3G and 4G coverage), in which case there is an obvious maximum and minimum to use. Where this does not apply, we use the actual maximum and minimum values. For example, in the case of download speeds, if the highest speed was 40 Mbps and the lowest was 10 Mbps, the country with the highest speed would receive a score of 100 (effectively representing the benchmark against which other countries are compared) and the country with the lowest speed would receive a score of zero. Other countries would be scored based on where they lie within the 10-40 range (e.g. a country with download speeds of 25 Mbps would receive a score of 50). The formulae used to standardise the indicators are as follows, depending on whether increases in the unstandardised indicator are positive.

Where the industry's impact increases as the value of the metric increases:

$$Metric\_Norm_i = \frac{Metric_{i,\,Dimensioned} - Metric_{Theoretical\ Min}}{Metric_{Theoretical\ Max} - Metric_{Theoretical\ Min}}$$

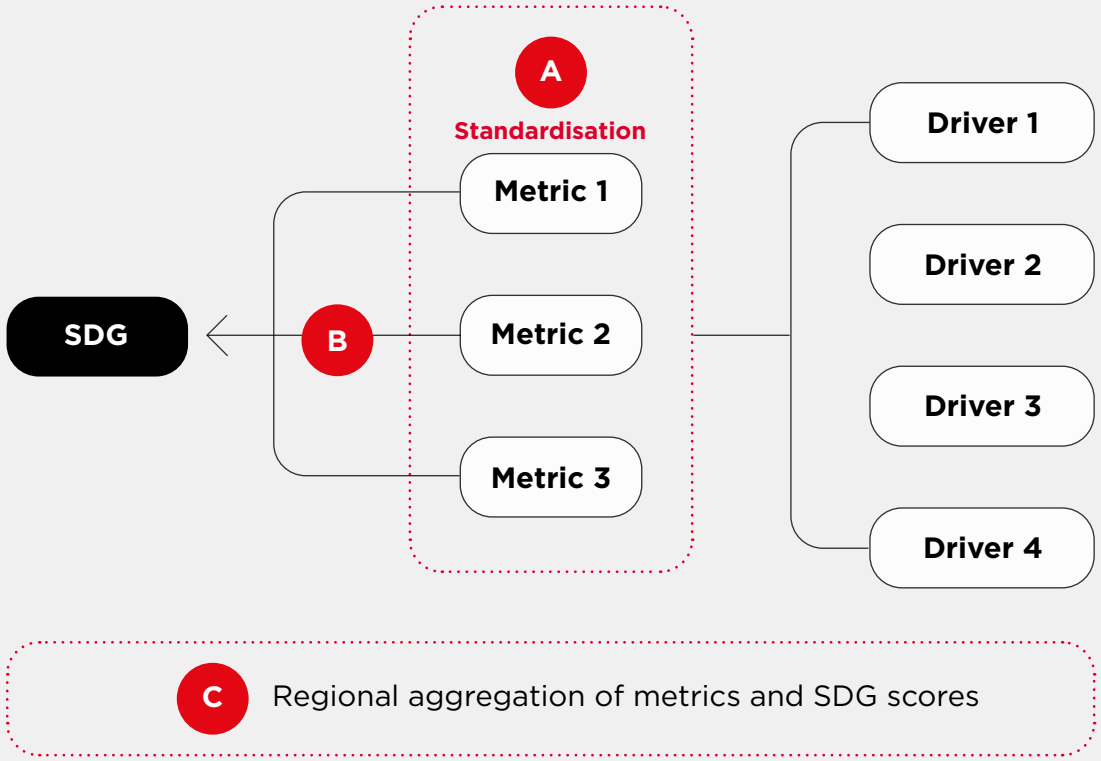
Where the industry's impact decreases as the value of the metric decreases:

$$Metric\_Norm_i = \frac{Metric_{Theoretical\ Max} - Metric_{i,\,Dimensioned}}{Metric_{Theoretical\ Max} - Metric_{Theoretical\ Min}}$$

- $Metric\_Norm_i =$ represents the normalised (zero – 100) value of a metric/sub-metric in country i
- $Metric_{i,\,Dimensioned}$ represents the normalised (zero – 100) value of a metric/sub-metric in country i
- $Metric_{Theoretical\ Max}$ represents the theoretical maximum value of metric/sub-metric – this does not vary by country
- $Metric_{Theoretical\ Min}$ represents the theoretical minimum value of metric/sub-metric – this does not vary by country
- **B: Derivation of SDG impact score.** The SDG impact score is obtained by averaging the underlying metric scores. This reflects the current performance of the mobile industry with respect to its theoretical maximum.
- **C: Regional aggregation.** Regional scores for metrics and SDGs are calculated as a population weighted average of the country-level scores.

A high-level overview of this calculation framework is provided in Figure 7.

Figure 7 | Impact score calculation



The SDG impact score represents the mobile industry's contribution to the SDG relative to its theoretical maximum. It is calculated by taking the average of the underlying metric scores. A score of 100 means that the mobile industry has achieved everything possible to contribute to that goal. Metric and SDG scores are aggregated globally and by region and development status. These are calculated by weighting the country scores by population in each region and development group.

02

Appendix: SDG drivers

SDG 1

No poverty

Drivers

- Generate employment opportunities across the value chain for people living in extreme poverty (<$1.25 per day)
- Provide a platform for people in poverty to find employment
- Provide communications services to stimulate local business (and economy) growth in poor communities
- Use mobile to address asymmetry of information for people living in poor and remote communities
- Enable social enterprise in small and remote communities by providing the ability to sell in non-local markets via mobile services
- Support access to financial services
- Support low-cost, accessible remittance services in developing areas
- Provide affordable mobile services to poor communities to enable access to basic communication
- Provide location data
- Provide access for the poor to basic services through mobile-enabled service platforms such as health and mobile money
- Facilitate access to utility services for all, using channels such as mobile money and/or IoT
- Increase competitiveness of local businesses by improving their productivity through access to mobile services
- Provide digital identity services to enable the delivery of social services and safety nets, improve access to financial services, improve the protection of legal rights (including access to ownership of land) and protection against exploitation
- Increase exposure and support adoption of appropriate new technology through access to the internet
- Provide mobile services to support emergency calls for help
- Develop resilient infrastructure to support emergency broadcast systems

SDG 2

Zero hunger

Drivers

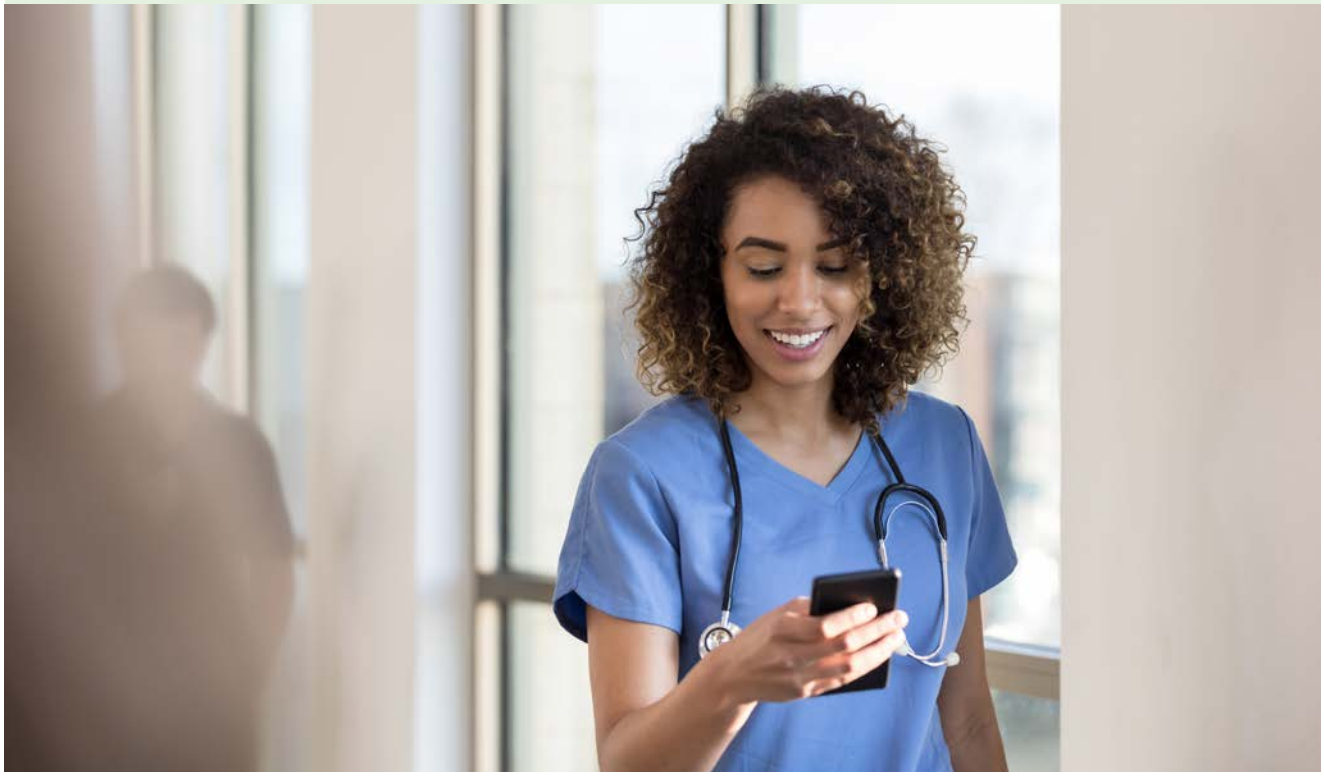
- Increase productivity of agribusinesses through access to mobile-enabled service platforms (e.g. mobile money) and facilitate access to financial services for smallholder farmers
- Provide digital identity services to enable access to affordable internet, health services, energy, food and clean water and to enable the protection of legal rights (including access to ownership of land) and protection against exploitation
- Enable access to nutritional information and monitoring through m-health programmes and applications
- Connect communities to agri-education through mobile to communicate effective agricultural practices
- Provide access to micro-finance to encourage more productive use of land and agricultural resources
- Connect remote communities to digital agricultural marketplaces to increase price transparency, reduce price volatility of food commodity markets, improve price outcomes and increase the income of farmers
- Provide emergency broadcast systems to enable effective risk mitigation of environmental threats to agriculture
- Establish the technical architecture where data acquired by crop and weather sensors is shared in a harmonised way with applications that can increase harvest productivity and adapt to climate change
- Develop IoT (LPWA) infrastructure to enable crop and weather condition sensor monitoring that increases harvest productivity and adaptation to climate change

SDG 3

Good health wellbeing

Drivers

- Enable communication with qualified medical practitioners through voice/ SMS services
- Provide access to health programmes through mobile to monitor well-being
- Provide access to health programmes through mobile to educate local communities
- Provide access to mobile money services to reduce the cost barrier to receiving care
- Provide digital identity services to enable access to affordable internet, health services, energy, food and clean water
- Establish the technical architecture where data acquired by smart vehicles and related IoT traffic sensors is shared in a harmonised way with applications that can improve road safety
- Support the development of M2M technology to enable 'smart' vehicles
- Provide a channel through which organisations can educate local communities on sexual and reproductive health-related issues
- Provide emergency broadcast systems to enable effective management of contamination incidents and health epidemics
- Use IoT technology to improve water quality, monitoring of toilets and analysis of faecal matter
- Big data for epidemics
- Apply best-practice risk management of hazardous chemicals in company operations and supply chains



SDG 4

Quality education

Drivers

- Provide affordable access to basic voice/data services to enable access to primary and secondary e-learning and to facilitate equitable online learning opportunities (e.g. massive open online courses) for men and women
- Contribute digital literacy content to primary and secondary education providers to improve relevance of traditional primary and secondary education
- Enable access to online teaching networks via mobile internet, allowing teachers to exchange information and access professional support to improve teaching outcomes
- Provide digital identity services to enable access to inclusive and equitable education and decent livelihoods
- Facilitate school fees payments through mobile money
- Provide a channel through which organisations can educate local communities on sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
- Establish vocational ICT training placements and fund scholarships for higher education/vocational training programmes in ICT for least-developed countries to increase capacity building and quality education opportunities in developing countries

SDG 5

Gender equality

Drivers

- Connect women to sharing economy infrastructure through mobile internet that enables trading or monetisation of traditionally unpaid care and domestic work
- Implement leadership equality programmes to increase the number of female CEOs and senior managers, and promote equal leadership opportunity throughout the supply chain and across other industries
- Enable access to female-specific e-health services to support access to sexual and reproductive health services for women
- Provide an affordable mobile service entry point to women in all areas
- Implement mobile awareness/digital literacy programmes for women through low- and middle-income targeted initiatives
- Enable access to mobile financial services to promote financial inclusion
- Provide digital identity services to enable gender equality
- Increase the likelihood of female mobile take-up by creating offerings that are more accessible to women, given that literacy rates are often lower and digital literacy/confidence is lower

SDG 6

Clean water and sanitation

Drivers

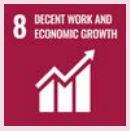
- Enable the development of new water models relying on mobile technologies for payment collection, remote monitoring, improved planning and customer relationships
- Enable the development of new sanitation models relying on mobile technologies for payment collection, remote monitoring, improved planning and customer relationships
- Provide digital identity services to enable access to affordable internet, health services, energy, food and clean water
- Facilitate access to water and sanitation through mobile money (e.g. pay-as-you-go)
- Apply best-practice environmental impact management in company operations and supply chain
- Improve water quality through IoT technology
- Increase water efficiency by reducing water leakage
- Develop IoT infrastructure for water efficiency monitoring to increase water use efficiency across all sectors and improve consumption behaviours
- Develop IoT infrastructure for sanitation solutions
- Establish the technical architecture where data acquired by volumetric and water quality sensors is shared in a harmonised way with applications that can improve efficiency
- Enable access to water, sanitation and management programmes to educate local communities
- Enable communities to report back on water quality and sanitation issues through voice and SMS to identify and rectify issues effectively

SDG 7

Affordable and clean energy

Drivers

- Enable access to clean energy solutions through mobile-enabled energy models using mobile payments and IoT
- Provide digital identity services to enable access to affordable internet, health services, energy, food and clean water
- Facilitate access to affordable and clean energy through mobile money (e.g. pay-as-you-go)
- Increase the proportion of renewable energy used to operate infrastructure such as base stations and data centres
- Develop IoT infrastructure for energy efficiency to enable energy monitoring and improve energy consumption behaviour
- Increase energy efficiency of operating infrastructure such as base stations and data centres
- Attract more investments to the clean energy sector based on the use of mobile channels and enable donors/investors to assess their impact through data collection
- Establish the technical architecture where data acquired by energy management sensors is shared in a harmonised way with applications that can increase energy sustainability



SDG 8

Decent work and economic growth

Drivers

- Provide consumer connectivity to increase the size of the addressable market in each country through online channels
- Provide business communications infrastructure to stimulate and support local economy growth
- Support the development of infrastructure for IoT solutions to increase the productivity of businesses
- Increase productivity of businesses through access to mobile services and mobile-enabled service platforms (e.g. mobile money)
- Increase productivity of agribusinesses through access to mobile-enabled service platforms (e.g.mobile money) and facilitate access to financial services for smallholder farmers
- Support access to mobile financial services to enable formalisation of micro, small and medium-sized enterprises
- Support the development of infrastructure for IoT solutions to improve consumption
- Provide digital identity services to enable financial inclusion and economic empowerment, inclusive and equitable education, decent livelihoods, the protection of legal rights (including access to ownership of land) and protection against exploitation
- Enforce strict labour policies across supply and distribution chain to prevent use of forced labour or child labour
- Provide access to mobile money, micro-finance and financial services products through mobile
- Create new job opportunities in the ecosystem (e.g. mobile money agents)
- Create mobile solutions for identity management (e.g. to simplify government targeting of specific population segments)

SDG 9

Industry, innovation and infrastructure

Drivers

- Develop reliable mobile communications infrastructure to provide affordable access to voice services and basic data services
- Support the development of infrastructure supporting IoT solutions to drive sustainability of manufacturing and industrial processes
- Increase inclusiveness of industrialisation by connecting rural/remote communities to employment opportunities
- Support the emergence of new industries (e.g. solar pay-as-you-go)
- Build agent networks as financial touch points for customers
- Enable access to mobile money (micro-finance/insurance) for small-scale industrial enterprises
- Upgrade mobile infrastructure to improve sustainability and energy efficiency, maximising use of clean energy
- Enable the deployment of new mobile towers, based on the community power concept, where mini grid providers generate electricity for towers and the community
- Provide digital identity services to enable access to affordable internet, health services, energy, food and clean water
- Support the development of infrastructure for IoT solutions to drive technological upgrade across sectors
- Build and upgrade infrastructure in developing countries, especially network infrastructure to provide enhanced communication and bandwidth
- Provide affordable access to mobile voice services in least-developed countries

SDG 10

Reduced inequalities

Drivers

- Enable access to information/social networks through mobile to promote social and political inclusion
- Enable access to marketplaces through mobile to increase economic inclusion irrespective of discriminatory factors
- Provide affordable access to basic data services in least-developed countries to remove financial barriers to online content and hence reduce barriers to social, economic and political inclusion
- Enable access for all to mobile money microfinance/insurance to promote economic inclusion
- Enable access to connectivity and mobile money services for refugees and migrants
- Provide digital identity services to enable financial inclusion and economic empowerment, and to enable good governance and political inclusion
- Enable access to financial services
- Introduce or expand remittance services through mobile money to increase ease of remittances and reduce cost

SDG 11

Sustainable cities and communities

Drivers

- Provide digital identity services to enable the protection of legal rights (including access to ownership of land) and protection against exploitation
- Improve monitoring of air quality and waste using IoT solutions, particularly in densely populated cities
- Provide IoT technology to produce data that can be used to inform planning decisions on municipal and waste management
- Establish the technical architecture where data acquired by air quality/ waste management sensors is shared in a harmonised way with applications that can improve the environment for citizens
- Provide emergency broadcast systems in partnership with government agencies to enable effective disaster warning
- Enable emergency calling during disaster periods to reduce potential deaths and enable citizens to be located, marked as safe or sent relief as required
- Improving efficiency of transportation through IoT technology – strengthen building standards for infrastructure to increase network resilience
- Increase energy efficiency of operating infrastructure to reduce energy usage and greenhouse gas emissions
- Increase the proportion of renewable energy used in the value chain
- Implement best-practice e-waste management to reduce e-waste generated

SDG 12

Responsible consumption and production

Drivers

- Increase energy efficiency of operating infrastructure to reduce energy usage
- Increase the proportion of clean energy used in the value chain
- Implement best-practice waste management to reduce waste generated
- Integrate sustainability information into core reporting
- Provide access to information to communities through mobile to improve their awareness of sustainable development practices
- Support the development of the infrastructure supporting IoT solutions to increase the ability to monitor energy consumption/ production, therefore improving sustainable behaviours (business and individual)

SDG 13

Climate action

Drivers

- Increase energy efficiency of operating infrastructure to reduce energy usage and greenhouse gas emissions
- Increase the proportion of renewable energy used in the value chain
- Implement best-practice e-waste management to reduce the amount of e-waste generated
- Provide emergency broadcast systems in partnership with government agencies to enable effective disaster warning
- Establish resilient network infrastructure to ensure network functionality during and after disaster events
- Provide information to enable effective risk mitigation of environmental threats to agriculture
- Establish the technical architecture where data acquired for climate change monitoring sensors is shared in a harmonised way with application that can improve awareness of climate change and a change in the behaviours of businesses and individuals
- Develop IoT solutions for effective climate change monitoring and mitigation

SDG 14

Life below water

Drivers

- Develop IoT solutions (including LPWA) and infrastructure to support monitoring and management of coastal marine ecosystems (including fisheries)
- Provide digital identity services to enable access to inclusive and equitable education and decent livelihoods and to enable good governance and political inclusion
- Wirelessly connect artisanal fishing communities to critical information with a short lifespan but high value (e.g. weather, market prices, etc.)
- Establish the technical architecture where data acquired regarding marine biota, pollution etc can be shared in a harmonised way with applications that can improve the sustainability of the marine environment
- Provide information including sustainable best practices and guidelines on regulations to ensure ecosystem sustainability and compliance with local fishing laws

SDG 15

Life on land

Drivers

- Provide enabling technologies (including IoT) to support forest monitoring, monitor mountain ecosystems and support natural habitat and endangered species monitoring
- Effectively dispose of operational waste to reduce negative externalities and therefore improve biodiversity
- Implement best-practice e-waste management to reduce the amount of e-waste generated
- Provide digital identity services to enable access to inclusive and equitable education and decent livelihoods
- Establish the technical architecture where data acquired for the monitoring of life on land is shared in a harmonised way with applications that can improve the effectiveness of monitoring and interventions
- Provide connectivity to platforms that enhance stakeholder engagement in preventing poaching and trafficking
- Provide connectivity and information to enhance stakeholder engagement on sustainable best practices and guidelines on regulations to ensure ecosystem sustainability

SDG 16

Peace, justice and strong institutions

Drivers

- Provide mobile technology for use by police to prevent violence and related deaths
- Provide digital identity services to enable the protection of legal rights (including access to ownership of land), protection against exploitation, good governance, political inclusion and identity management
- Adhere to strict data privacy and security policies that align to national and international law
- Implement effective procurement policies to ensure suppliers/vendors adhere to rule of law
- Implement ethical practices against corruption and bribery within own operations and supply chain
- Support the fundamental freedoms of expression, thought, belief and opinion through equitable access to the internet
- Ensure children's safety both online and offline
- Help prevent activation of stolen devices and black market/crime
- Support national security authorities to combat terrorism and crime

SDG 17

Partnerships for the goals

Drivers

- Provide mobile money services as a channel for capital flows for tax and other forms of revenue collection
- Build environmentally sustainable infrastructure and enable technology solutions that promote environmental sustainability
- Share mobile technology IP to build capacity in least-developed countries by inputting into the UN Intellectual Property Bank
- Expand local communications operations in developing countries to accelerate capacity building
- Partner with governments and institutions to harness the data revolution for sustainable development
- Actively seek engagement with public and private organisations to promote sustainability
- Provide digital identity services to enable good governance and political inclusion
- Provide accurate and timely disaggregated data to governments and institutions for effective decision-making

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