Putting Mobile Phone Data to work for Policy: Theory of Change Narrative

A summary narrative document to support readers of the Theory of Change for the *Putting Mobile Phone Data to work for Policy* programme hosted by the World Bank

Introduction

This document sets out in more detail the Theory of Change described here for the World Bank's programme "Putting Mobile Phone Data to work for Policy" which is housed within the Global Data Facility (GDF), under a Mobile Phone Data (MPD) window. This Theory of Change is a work in progress and currently being consulted on (June 2024).

Background to the programme

Launched in 2023, the programme aims to 'mobilise investments to accelerate local capacity to integrate the responsible use of anonymized, aggregated MPD into National Data systems for real-time statistics and responsive policy solutions'. To read an explanatory powerpoint presentation about the programme, please see here.

Why mobile phone data?

In LMICs with constraints to generating reliable data through traditional methods, and scarcity of data sources, non-traditional data and Big Data such as mobile phone metadata, can be applied and combined with other data, using new methods, to rapidly generate current information. Its strengths include that it has large geographic scale and penetration and high granularity, and that it is automatically generated in near-real time.

What are the barriers to use of mobile phone data?

The programme is being designed, in part, to tackle some of the barriers to adoption of mobile phone data being used as one of the tools that can inform data-driven decision making.

Some of these barriers to use include:
- low awareness and understanding of the potential, and limitations, of the data
- concerns about data protection for privately-held data
- limited experience of establishing public-private data partnerships for accessing privately-held data, and legal and data protection agreements
- cost of establishing data pipelines
- need for engineering expertise to establish reliable privacy protecting data pipelines and software
- scarcity of analytical skills to develop robust methods for different applications
- capacity gaps in LMICs, from technical capabilities to available human resources
- few fully realised and evidenced, replicable data use cases, and limited range of applications to date

- limited experience of integrating non-traditional data products into national data ecosystems to facilitate use and sustainability

The Theory of Change

Background

Purpose

The purpose of the Theory of Change is to:

- Describe the shared vision of the programme
- Identify what needs to happen at country level, identifying key assumptions, and what the GDF-MPD programme needs to do, to support countries
- Provide a communication tool for sharing these ideas with relevant stakeholders for refinement and validation
- To guide monitoring and evaluation (the Theory of Change will be updated ad hoc, based on ongoing learning)

Development process

This Theory of Change was developed with the World Bank project team working on the Global Data Facility Mobile Phone Data window, together with staff from the International Telecommunications Union (ITU) and in consultation with members of the UN Committee of Experts on Big Data and Data for Official Statistics (UN-CEBD), drawing on collective experience in the sector regarding 'what works' to get MPD into use.

Overview

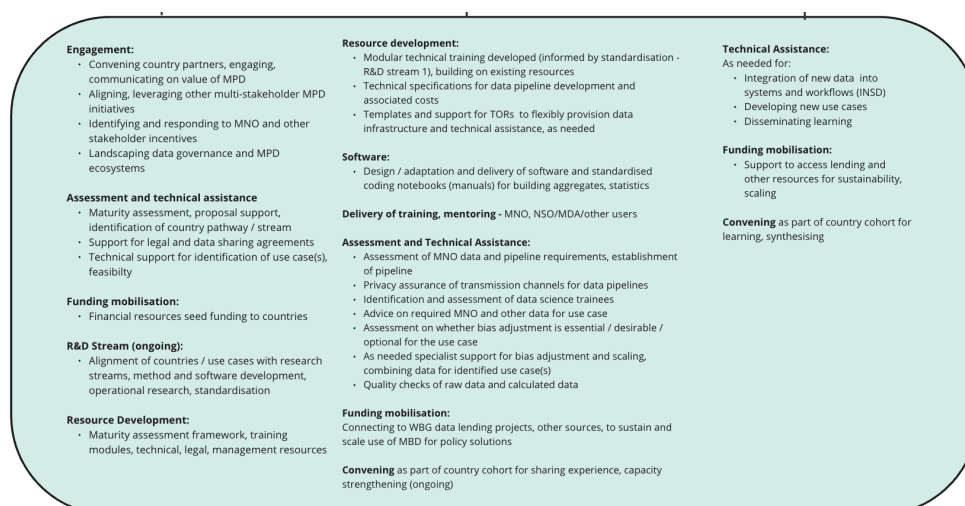The whole TOC diagram looks like this:
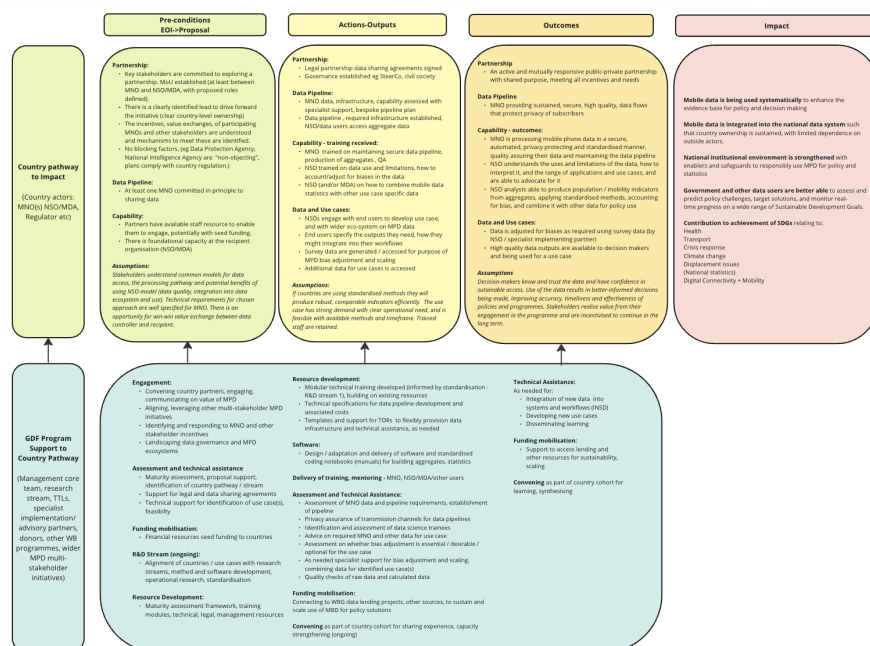
The **top row** of this diagram represents **a country-level pathway to a set of desired outcomes** including:

- A public-private **partnership** between country stakeholders
- Sustained, privacy protecting **provision of mobile phone data (MPD)**
- Stakeholder **capability to process and analyse** the data
- The **data being applied** to a national policy/programme related use case

This is intended to be a generic pathway that would be relevant to any country included in a WB-GDF programme cohort, and it does not presuppose a particular use case. Countries may be starting from different points in the pathway (maturity); stakeholders will vary; the partnership arrangements are likely to be different; and aspects such as how data is accessed, what types of data, who analyses and who uses it will vary across countries. But there are general similarities and some standard components that are required. Part of the purpose of developing and using the ToC as a learning tool throughout the programme is to identify the range of variation and any unanticipated actions, or assumptions (that turn out to be necessary conditions) for outcomes to be achieved.

The bottom row represents how the GDF-MPD program would support the country along the pathway (i.e the <u>inputs</u> that the programme will deliver). This row is separated out from the country-level pathway to give full emphasis to everything that the programme team understands must be in place or be provided in order for a country to move along the country-level pathway.

Engagement:
- Convening country partners, engaging, communicating on value of MPD
- Aligning, leveraging other multi-stakeholder MPD initiatives
- Identifying and responding to MNO and other stakeholder incentives
- Landscaping data governance and MPD ecosystems

Assessment and technical assistance
- Maturity assessment, proposal support, identification of country pathway / stream
- Support for legal and data sharing agreements
- Technical support for identification of use case(s), feasibilty

Funding mobilisation:
- Financial resources seed funding to countries

R&D Stream (ongoing):
- Alignment of countries / use cases with research streams, method and software development, operational research, standardisation

Resource Development:
- Maturity assessment framework, training modules, technical, legal, management resources

Resource development:
- Modular technical training developed (informed by standardisation - R&D stream 1), building on existing resources
- Technical specifications for data pipeline development and associated costs
- Templates and support for TORs to flexibly provision data infrastructure and technical assistance, as needed

Software:
- Design / adaptation and delivery of software and standardised coding notebooks (manuals) for building aggregates, statistics

Delivery of training, mentoring - MNO, NSO/MDA/other users

Assessment and Technical Assistance:
- Assessment of MNO data and pipeline requirements, establishment of pipeline
- Privacy assurance of transmission channels for data pipelines
- Identification and assessment of data science trainees
- Advice on required MNO and other data for use case
- Assessment on whether bias adjustment is essential / desirable / optional for the use case
- As needed specialist support for bias adjustment and scaling, combining data for identified use case(s)
- Quality checks of raw data and calculated data

Funding mobilisation:
Connecting to WBG data lending projects, other sources, to sustain and scale use of MBD for policy solutions

Convening as part of country cohort for sharing experience, capacity strengthening (ongoing)

Technical Assistance:
As needed for:
- Integration of new data into systems and workflows (INSD)
- Developing new use cases
- Disseminating learning

Funding mobilisation:
- Support to access lending and other resources for sustainability, scaling

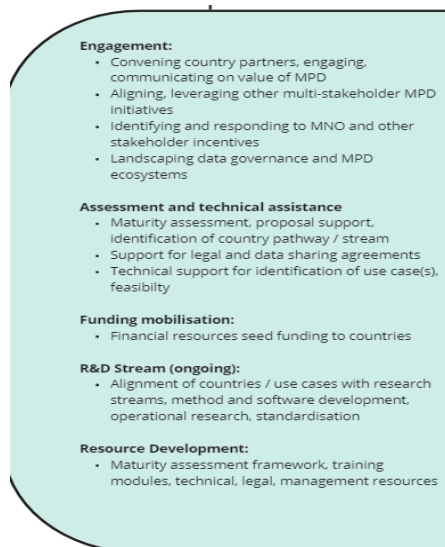**Convening** as part of country cohort for learning, synthesising

This 'support pathway' is not specific about who would provide each of the types of support needed. For this programme, the key support and programme management stakeholders include: (a) GDF-MPD programme management core team and R&D stream leads, (b) WB Task Team Leads (TTLs), and (c) other suppliers, such as Technical Service Providers. There is likely to be variation in particular in how the specialist technical support is provided.

The support needs will probably also vary by country according to, for example, the stage of maturity (where they are starting from with partnerships and capabilities), and what kind and complexity of data analysis and use they want to deliver.
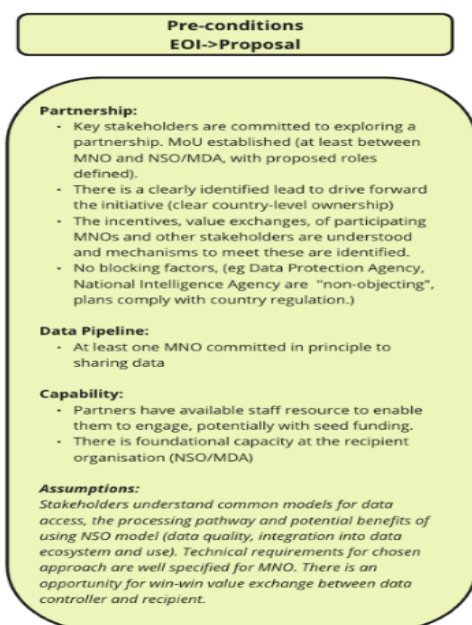
At the Pre-conditions stage

The support from the programme at Pre-Condition stage...

Engagement:
- Convening country partners, engaging, communicating on value of MPD
- Aligning, leveraging other multi-stakeholder MPD initiatives
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The 'support pathway' starts from the 'pre-conditions' stage in recognition that countries may need support to get key elements in place that would allow them to proceed.

This activity supports country leads and stakeholders to engage with each other, to draw up initial partnership and legal agreements and to scope their plans sufficiently to produce first an expression of interest and then a proposal. The GDF-MPD's Maturity Assessment tool has been developed to help to identify each country's specific support needs going forward.

...is designed to enable/facilitate the following Pre-Conditions to be achieved in-country

Pre-conditions
EOI->Proposal

Partnership:
- Key stakeholders are committed to exploring a partnership. MoU established (at least between MNO and NSO/MDA, with proposed roles defined).
- There is a clearly identified lead to drive forward the initiative (clear country-level ownership)
- The incentives, value exchanges, of participating MNOs and other stakeholders are understood and mechanisms to meet these are identified.
- No blocking factors, (eg Data Protection Agency, National Intelligence Agency are "non-objecting", plans comply with country regulation.)

Data Pipeline:
- At least one MNO committed in principle to sharing data

Capability:
- Partners have available staff resource to enable them to engage, potentially with seed funding.
- There is foundational capacity at the recipient organisation (NSO/MDA)

Assumptions:
Stakeholders understand common models for data access, the processing pathway and potential benefits of using NSO model (data quality, integration into data ecosystem and use). Technical requirements for chosen approach are well specified for MNO. There is an opportunity for win-win value exchange between data controller and recipient.

The 'country pathway' starts with achieving a set of 'pre-conditions' that, based on experience to date, need to be in place for a MPD project to be feasible, particularly within the programme timeframe.

Although stakeholders may vary, the ToC does identify key country stakeholders that have to be in partnership - the mobile network operator(s) (MNOs), national statistical offices (NSOs) and/or other ministries/agencies, and regulatory authorities which would include bodies such as the Telecoms Regulator, the Data Protection Authority, etc. These parties need to have at least a Memorandum of Understanding (MoU) and agreement in principle to data sharing and to their intended roles.

One **assumption** (condition) that need to be met for pre-conditions to be achieved includes that the stakeholders recognise an opportunity for a win-win value exchange between data controller and recipient (e.g. value is exchanged in the form of, say, technical capacity strengthening, or fulfilling corporate social responsibility goals, or achieving impactful data use).

At the 'Outputs' stage

The support from the programme at Outputs stage…

Resource development:
- Modular technical training developed (informed by standardisation - R&D stream 1), building on existing resources
- Technical specifications for data pipeline development and associated costs
- Templates and support for TORs to flexibly provision data infrastructure and technical assistance, as needed

Software:
- Design / adaptation and delivery of software and standardised coding notebooks (manuals) for building aggregates, statistics

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Assessment and Technical Assistance:
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- As needed specialist support for bias adjustment and scaling, combining data for identified use case(s)
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Funding mobilisation:
Connecting to WBG data lending projects, other sources, to sustain and scale use of MBD for policy solutions

Convening as part of country cohort for sharing experience, capacity strengthening (ongoing)

This is a key stage of the pathway with a lot of in-country activity and support needs.

Based on a more in-depth assessment of technical and capability needs, the programme provides modular training for the different stakeholders including MNOs, data users and decision-makers, and data scientists. Countries may contract the services of technical service providers to help establish data pipelines, and advise on data needs, or to carry out analysis and quality assurance. Where possible standardised coding notebooks and software can be provided but there may also be a need for expertise to adapt or design new methods and systems, in coordination with the programme R&D workstream.

…is designed to enable/facilitate the following Outputs to be achieved in-country

Actions-Outputs

Partnership:
- Legal partnership data sharing agreements signed
- Governance established eg SteerCo, civil society

Data Pipeline:
- MNO data, infrastructure, capability assessed with specialist support, bespoke pipeline plan
- Data pipeline , required infrastructure established, NSO/data users access aggregate data

Capability - training received:
- MNO trained on maintaining secure data pipeline, production of aggregates , QA
- NSO trained on data use and limitations, how to account/adjust for biases in the data
- NSO (and/or MDA) on how to combine mobile data statistics with other use case specific data

Data and Use cases:
- NSOs engage with end users to develop use case, and with wider eco-system on MPD data
- End users specify the outputs they need, how they might integrate into their workflows
- Survey data are generated / accessed for purpose of MPD bias adjustment and scaling
- Additional data for use cases is accessed

Assumptions:
If countries are using standardised methods they will produce robust, comparable indicators efficiently. The use case has strong demand with clear operational need, and is feasible with available methods and timeframe. Trained staff are retained.
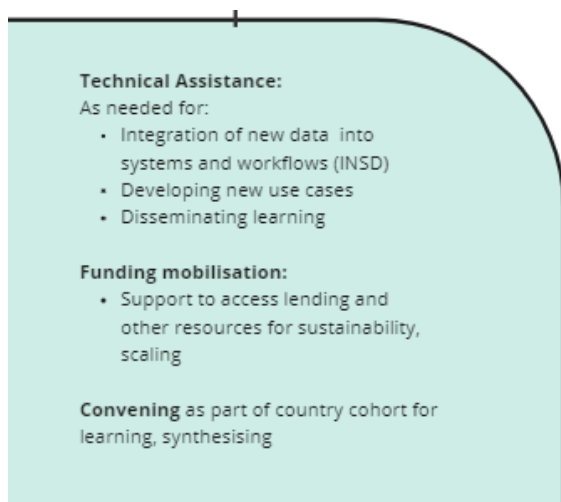
These are the first significant results in the country pathway. The partnerships are formalised and governance established. A data pipeline is established with required infrastructure and software, and with MNO staff trained to manage it. NSOs and/or MDA staff have been trained on the specifics of mobile phone data. Engagement is taking place with end users to develop intended applications of the data, specifying what data outputs will be needed. And with specialist support there is consideration of additional data that may be needed to adjust for MPD biases.

The **assumptions** (condition) for outputs to be achieved include: that standardised methods will result in robust data being produced in an efficient manner, and that feasible use case(s) with strong demand can be identified.
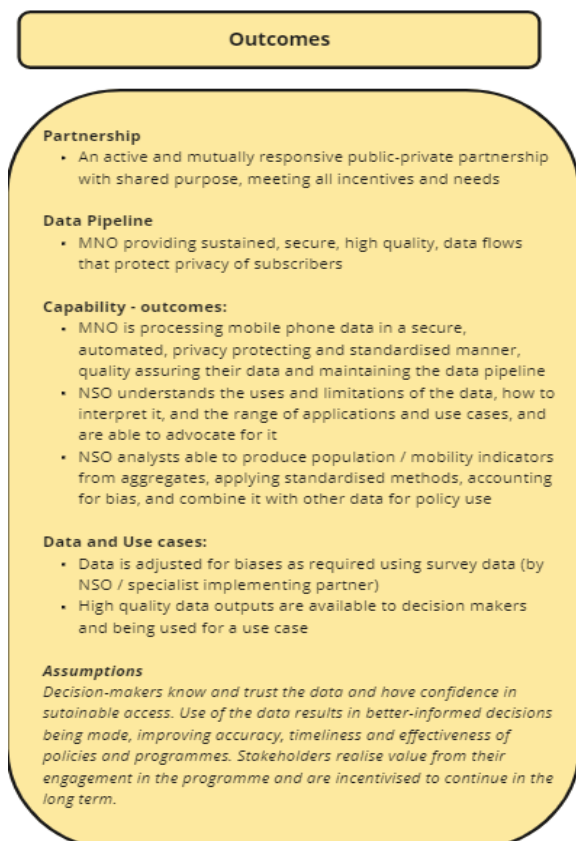
At the 'Outcome' stage

The support from the programme at Outcome stage...

Technical Assistance:
As needed for:
- Integration of new data into systems and workflows (INSD)
- Developing new use cases
- Disseminating learning

Funding mobilisation:
- Support to access lending and other resources for sustainability, scaling

Convening as part of country cohort for learning, synthesising

By this stage support needs may be reducing in intensity, but the programme is still supporting as needed the integration of new MPD derived data and products into systems and workflows and developing further use cases. Together with supporting countries to access lending and other resources, these are critical steps in sustaining and developing their MPD work.

...is designed to enable/facilitate the following Outcomes to be achieved in-country

Outcomes

Partnership
- An active and mutually responsive public-private partnership with shared purpose, meeting all incentives and needs

Data Pipeline
- MNO providing sustained, secure, high quality, data flows that protect privacy of subscribers

Capability - outcomes:
- MNO is processing mobile phone data in a secure, automated, privacy protecting and standardised manner, quality assuring their data and maintaining the data pipeline
- NSO understands the uses and limitations of the data, how to interpret it, and the range of applications and use cases, and are able to advocate for it
- NSO analysts able to produce population / mobility indicators from aggregates, applying standardised methods, accounting for bias, and combine it with other data for policy use

Data and Use cases:
- Data is adjusted for biases as required using survey data (by NSO / specialist implementing partner)
- High quality data outputs are available to decision makers and being used for a use case

Assumptions
Decision-makers know and trust the data and have confidence in sutoinable access. Use of the data results in better-informed decisions being made, improving accuracy, timeliness and effectiveness of policies and programmes. Stakeholders realise value from their engagement in the programme and are incentivised to continue in the long term.

These are the intended results of the programme in each country by the end of the period.

The public-private partnership has matured into an active, responsive relationship with a shared purpose, that is meeting partners' needs, thereby increasing the likelihood of impact and sustainability. The MNO is maintaining a secure data pipeline and data flow with quality assured data. NSO analysts understand the data and are able to advocate for it to users, and to produce population and/or mobility indicators, and combine these with other data for policy use. These data outputs are available to decision-makers and are in use for at least one policy or programme 'use case'.

The **assumptions** (conditions) for outcomes to be achieved include: that decision-makers understand and trust the data, and that they are motivated to use the data for better-informed decision-making. ***Note***: It is really important to recognise this assumption early in the design of an MPD initiative. The assumption needs to hold try for the outcome to be achieved, but should be addressed early in the design of an initiative, i.e. spend time identifying use cases in demand.

Other programme-level information

In addition to the above-described step-by-step analysis of how change happens in a Mobile Phone Data initiative; and how the GDF-MPD programme can enable/facilitate that change to happen, it is worth considering the following overarching assumptions being made in this Theory of Change, and describing the 'Enablers of Change' that have been identified as part of the Theory of Change process. This section describes these in more detail:

Underlying assumptions

The ToC is built from some fundamental underlying assumptions, which do not appear explicitly in the ToC, as follows:

- MPD is a data source for population mobility insights that can address critical development challenges, that has potential to fill data gaps, increase accuracy, coverage and inclusion, with potential for greater effectiveness and in some use cases reduce the need for costly surveys,
- Given the specialised nature of the data processing and analysis, and the innovative nature of the partnerships needed, countries need access to a range of specialist technical assistance, funding, training, resources etc, in order to reach the desired outcomes.
- Establishing a public-private partnership between the mobile network operator (MNO), and governmental stakeholders (e.g. the national statistical office (NSO) and or other ministries, departments and agencies, will facilitate the CDR-derived data to be integrated sustainability in the national data ecosystem.
- Standardising methods and outputs, and where possible employing previously developed code and/or software, will reduce time and resource in generating data products and facilitate consistency, comparability and broader adoption of MPD in production of statistics.
- The desired end-goal is one in which a sustainable flow of data is being achieved, not just a one-off data 'dump' or series of such dumps, but rather one in which data is regularly and reliably provided by an MNO, at whatever spatial and temporal resolution is agreed between partners, on an ongoing basis.
- It is important to link a Mobile Phone Data initiative to a sustainable source of funding to achieve ongoing data flow and data use; such as government funding, WB lending programmes, etc.

Enablers

Learning from experience to date has also identified a number of likely enablers, some of which will be familiar from other change programmes, most of which are implicit in the ToC but are worth highlighting:

- Creating and sustaining Institutional buy-in is greatly facilitated by having senior leadership, even an individual initially, who is sufficiently engaged to drive commitment
- Early outputs, and particularly data being produced that meets a need early on, is key to maintaining momentum and strengthening stakeholder engagement
- Use cases have been most successful when they are clearly demand-driven, with identified end-users who want and need the data for specific purposes
- Public-private data partnerships are relatively novel and formalising them requires some specialist support, as well as in-house (or contracted) legal resources. This stage can slow down or stall progress, unless stakeholders are prepared for it, willing to put in the time, and able to access support
- The specialist nature of data processing and analytics for MPD requires availability of experienced technical advisers and trainers. Those in-country stakeholders who are intended to be processing and analysing the data in the future need to have a high level of foundational expertise before training.
- Mobile network operators vary considerably in their experience of managing and analysing MPD internally and in their attitudes to external data sharing. Data partnerships are still a rarity, meaning that MNOs need to be open to and agile enough for this kind of innovation. It is important to have open conversations about value exchange (what each party would value from the partnership) to develop successful sustainable partnerships.
- Each mobile network operator's system is different, with varying degrees of capacity and interest in processing CDR data for business or onward sharing purposes; and with differing 'tech stacks'. Time needs to be invested to understand how the needs of the data user/processor can be met whilst also meeting the needs/incentive requirements of the MNO.

Invitation to collaborate

The Theory of Change described above is a work-in-progress and a live document that will be updated throughout the life of the programme.

Colleagues are invited to submit their comments/feedback on the Theory of Change. Comments are invited on any/all of the following:
1. Does the content make sense? If you are new to MPD initiatives, does the flow help you to understand what is required? If you have experience in MPD initiatives, does the description of how change occurs ring true for you?
2. What is missing from the overall Theory of Change described above? Are there any fundamental additions you would like to see included in either the country-level pathway or the support programme of the GDF-MPD programme?

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