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Consolidation, Revision and Pilot Application of the Rural Access Index (RAI)

Inception Report

TRL

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Abstract

The Rural Access Index is a key measurement of people's transport accessibility in rural areas that estimates the proportion of the rural population living within 2 km of an all-season road. It is used as the indicator for Sustainable Development Goal 9.1.1, which shows rural accessibility. The RAI has been measured in trials with selected countries in 2006 and 2016, and at present more countries are being assessed by the World Bank in 2018. A number of anomalies were found between the different trials, so it was deemed necessary to better understand the data collection and analysis process for the RAI and to revise the methodology to make it more sustainable, consistent, simple, and operationally relevant. The first phase of this project was carried out in early 2018 and provided a status review, and guidance as to the following phases. This report is based on the recommendations made in that report, and includes the results of further investigations, as well as more detailed approaches, methodologies and a work programme for delivering Task Group 2 of the project.

Key words

Rural, Roads, Access, Index, RAI, Population, all-season, data, SDG

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The team acknowledge the inputs of specialists involved in previous RAI data collection and analysis, specifically Atsushi Iimi, Peter Roberts and Shyam KC.

Acronyms, Units and Currencies

AARS	Asia Association on Remote Sensing
ADB	Asian Development Bank
AfDB	African Development Bank
AfCAP	Africa Community Access Partnership
AICD	Africa Infrastructure Country Diagnostic
AsCAP	Asia Community Access Partnership
BELSPO	Belgian Science Policy Office
CERSGIS	Centre for Remote Sensing and Geographic Information Systems
DESA	Department of Economic and Social Affairs
DFID	Department for International Development
DROMAS	District Road Management System
EG-NQAF	Expert Group – National Quality Assurance Framework
GIS	Geographical Information System
GPS	Global Positioning System
GSURR	Global Practice on Social, Urban and Rural Development and Resilience
HDM-4	Highway Development and Maintenance (management system)
IAEG	Inter-Agency Expert Group
ICT	Information and Communication Technology
IMT	Intermediate Means of Transport
JICA	Japan International Cooperation Agency
LIC	Low Income Country
LSMS	Living Standards Measurement Study
MDB	Multi-lateral Development Banks
MDG	Millennium Development Goals
MODIS	Moderate Resolution Imaging Spectroradiometer
MRH	Ministry of Roads and Highways
NAMA	Nationally Appropriate Mitigation Actions
NARAA	National Appropriate Rural Accessibility Actions
NSO	National Statistics Office
OSM	OpenStreetMap
PIARC	World Road Federation
PMU	Project Management Unit
QA	Quality Assurance
RAI	Rural Access Index
RAWG	Rural Access Working Group (Sum4All)
RCMRD	Regional Centre for Mapping of Resources for Development
ReCAP	Research for Community Access Partnership
RED	Roads Economic Decision (model)
SDG	Sustainable Development Goals
SMEC	Snowy Mountains Engineering Corporation
SuM4All	Sustainable Mobility for All (coordinated by World Bank)
TG 1	Task Group 1
TG 2	Task Group 2
TG 3	Task Group 3
TT	Transforming Transportation
UK	United Kingdom (of Great Britain and Northern Ireland)
UKAid	United Kingdom Aid (Department for International Development, UK)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNRA	Uganda National Roads Authority

$	United States Dollar (US$ 1.00 ≈ provide conversion to local currencies)
km	Kilometre
%	Percentage

Executive summary

The Rural Access Index (RAI) is a key indicator that estimates the proportion of the rural population that has adequate access to the transport system. It is defined as the proportion of the rural population living within 2 km of an all-season road. Two kilometres is considered to represent a 20-25 minute walk (subject to the topography). An all-season road is one that is motorable all year, but may be temporarily unavailable during inclement weather (Roberts et al, 2006). The Index was developed because it was seen as important to poverty reduction strategies, given the recognised links between physical isolation and poverty.

The measurement of the RAI has now been adopted as a Sustainable Development Goal (SDG) indicator. It is an important benchmark for the rural roads sector and has an impact on the work carried out in the sector. The RAI is included as SDG indicator 9.1.1 and is at present a Tier III indicator. The UN Inter Agency Expert Group (IAEG)-SDGs has established a 'tier' system of classifying SDG Indicators. The RAI is currently on the lowest tier, Tier III, alongside other indicators, which do not yet have an established methodology for their measurement. To progress to Tier II, an updated methodology must be finalised, and it must be possible to demonstrate that systems are in place to collect and update RAI data in the future for a significant number of countries. To progress to Tier I, RAI data must be measured regularly for at least 50% of UN countries.

In 2016, a World Bank team, with funding from DFID/ReCAP developed and tested a new methodology to measure the RAI using spatial techniques and innovative technologies. The new methodology was intended to be sustainable, consistent, simple, and operationally relevant (World Bank, 2016). The methodology was tested in eight ReCAP countries in 2016. The results from the eight countries using this new spatial method were inconsistent with the original RAI estimates dating from 2006 (World Bank, 2016).

The overall aim of this project is to develop a harmonised approach to data collection and measurement of the Rural Access Index that is relevant, consistent and sustainable. A principal objective is to facilitate scaling up implementation of the RAI across UN member countries in order to promote the indicator to Tier II and eventually to Tier I. Task Group 1 (TG1) of the project was completed earlier in 2018, and included a comprehensive review of the status of the RAI to date (Vincent, 2018). It included a detailed history of the development of the RAI and gave several references to key documents. The TG1 consultant, Stephen Vincent, has been provided with some time to facilitate the handover and enhance the team's understanding of the project to date.

In Task Group 2 (TG2) the team has started to build on the TG1 report by reviewing previously referenced documents, and exploring many others. They have also managed to interview some of the key RAI authors from 2006 and 2016, which has provided interesting insights into the methodology used. The core approach will be to focus on key aspects of the RAI framework, most notably to develop a simple and cost effective methodology that can be sustainably replicated by all countries in the future. Four countries are to be selected for trials in TG2, and this process of selection has already started. A shortlist of countries is included in the report, based on the agreed methodology presented at the kick-off meeting.

This Inception Report defines how the project will be approached, how the revised methodology will be developed to facilitate promotion of SDG 9.1.1 from Tier III to Tier II and beyond, and how the trials will be carried out using the revised methodology. The initial attempt at promotion to Tier II will be attempted in late 2018, and if this is unsuccessful, a further attempt will be made in April 2019. The project team will support the World Bank in submitting the tier re-classification as much as possible. Other aspects are included in the report, such as securing funds for Task Group 3 (TG3) and developing a plan for moving forward into TG3. The work programme has been revised from the initial bid and any risks and assumptions have been further explored so that they can be mitigated through the project.

1 Background

The Rural Access Index (RAI) is as a key indicator that estimates the proportion of the rural population that has adequate access to the transport system. It is defined as the proportion of the rural population living within 2 km of an all-season road. Two kilometres is considered to represent a 20-25 minute walk (subject to the topography). An all-season road is one that is motorable all year, but may be temporarily unavailable during inclement weather (Roberts et al, 2006). The all-season road definition was used as it is lower (and cheaper) than an all-weather standard road (motorable during inclement weather), making progress towards a higher RAI value more affordable for countries.

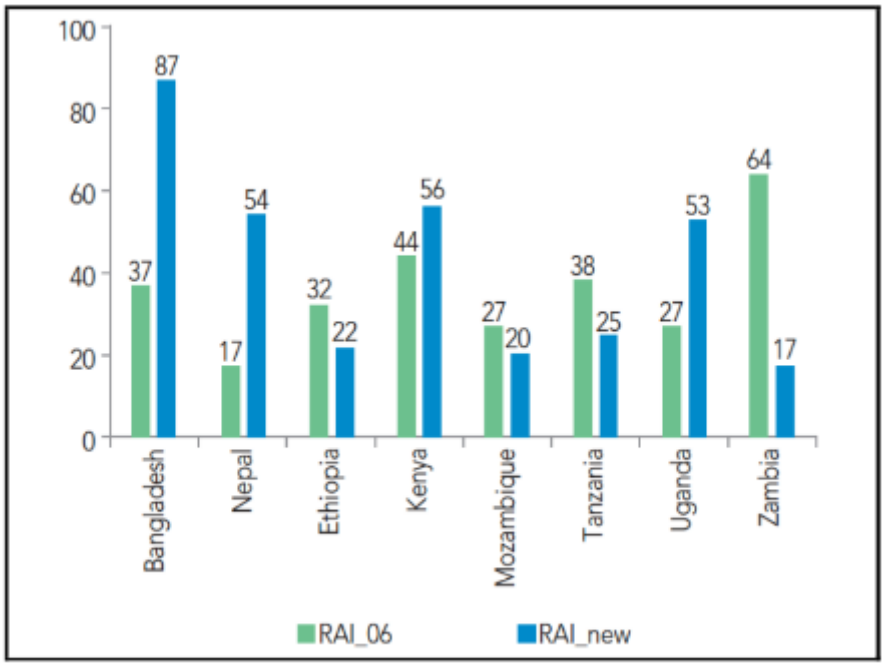
The Index was developed because it was seen as important to poverty reduction strategies, given the recognised links between physical isolation and poverty. It was expected to provide stronger links to the Millennium Development Goals (MDGs) that preceded the Sustainable Development Goals between 2000 and 2015, and reinforce donor assistance to the sustainable development of beneficiary countries.

The measurement of the RAI has now been adopted as a Sustainable Development Goal (SDG) indicator. It is an important benchmark for the rural roads sector and has an impact on the work carried out in the sector. The RAI is included as SDG indicator 9.1.1 and is at present a Tier III indicator. The UN Inter Agency Expert Group (IAEG)-SDGs has established a 'tier' system of classifying SDG Indicators. The RAI is currently on the lowest tier, Tier III, alongside other indicators, which do not yet have an established methodology for their measurement. To progress to Tier II, an updated methodology must be confirmed that can be used consistently, and it must be possible to demonstrate that systems are in place to collect and update RAI data in the future for a significant number of countries. To progress to Tier I, RAI data must be measured regularly for at least 50% of UN countries. It should be noted that the methodology should be flexible enough to allow continual improvement.

In 2016, with funding from DFID through ReCAP, a World Bank team developed and tested a new methodology to measure the RAI using spatial techniques and innovative technologies. For example, high-resolution population distribution data has been developed by the international research community and is available on the WorldPop website at resolutions of 100 x 100 metre grid cells. Digitised mapping is also usually available at roads organisations, with most being managed within a GIS system. The third part of the indicator, road condition (relevant to determine whether a road is all-season or not) is usually available in some form, from relevant roads organisations.

The new methodology was intended to be sustainable, consistent, simple, and operationally relevant (World Bank, 2016). It was considered to be more cost effective and sustainable than the original methods used in 2006, which were largely based on household surveys. In order for countries to keep collecting RAI data it would need the data to be useful for the country so that planners and statisticians would see a value in collecting it on a regular basis.

The methodology was tested in eight ReCAP countries in 2016. The results from the eight countries using this new spatial method were inconsistent with the original RAI estimates dating from 2006 (World Bank, 2016). The graph in Figure 1 shows a comparison between RAI results from 2006 and from 2016 for the ReCAP countries that were selected for the trials. It can be seen that the RAI varied greatly in some countries, for example Bangladesh saw a 50% increase, whilst Zambia experienced a 47% decrease.



Source: World Bank Transport & ICT, 2016

Figure 1: Comparison of RAI results from 2006 and 2016

2 Research objective

The overall aim of this project is to develop a harmonised approach to data collection and measurement of the Rural Access Index that is relevant, consistent and sustainable. Ultimately the project should facilitate scaling up the implementation of the RAI across UN member countries in order to promote the indicator to Tier II and eventually to Tier I in the SDG classification.

Phase TG1 was completed earlier in 2018, and included a comprehensive review of the status of the RAI to date (Vincent, 2018). It included a detailed history of the development of the RAI and gave several references to key documents.

The current phase, TG2, is an opportunity to consolidate existing and proposed approaches to data collection and revise the RAI methodology in collaboration with the World Bank and other stakeholders. A revised methodology should aim to eradicate inconsistencies in data collection, meet international standards and provide a clear framework for data validation. This process is expected to raise the profile of the RAI by putting in place clear data-quality standards and robust analytical methods. This will enhance the RAI's reliability as an indicator (in terms of accuracy and repeatability) and should increase the number of countries using it.

No.	Aims and Objective	Key Tasks	Result and timing
1	Aim: To develop, propose and obtain agreement on a harmonised approach to data collection and measurement of the Rural Access Index that is relevant, consistent and sustainable	Analyse current data, develop draft framework for measurement, gain consensus amongst stakeholders, move forwards	Established measurement framework, agreed at workshop by October 2019
2	Objective: To scale up implementation of the RAI across UN member countries in order to advance the status of SDG Indicator 9.1.1 to Tier II and eventually Tier I in the tier classification of the SDGs.	Check current promotion attempt, if unsuccessful analyse problems, revise framework and base guideline on feedback	Submission to IAEG-SDGs meeting in December, promotion to Tier II by end of TG 2,

This phase will also be used to inform and plan the next phase, TG3. This will be the final phase and is designed to scale up the RAI methodology trials to 30 countries, including all ReCAP countries. A key requirement of TG2 is to secure commitments for funding for national RAI data collection required in TG3. As noted in the Terms of Reference for this assignment, without commitment of financial support to broaden implementation of the RAI, it will not be possible to undertake TG3.

3 Current Status of RAI Measurement

As noted, the RAI status review (TG1) provided a comprehensive review of the RAI work to date, together with relevant references, contacts and suggestions for TG2/TG3 (Vincent, 2018). At the start of TG2, the author of this report briefed the team in person.

Since the start of TG2, the team has managed to source some additional references to add to the status of the RAI. Some key documents are reviewed in Section 5 of this report. The discovery of additional documents and data is expected to continue throughout TG2, so new material will be reviewed in each report as appropriate.

Currently the World Bank is continuing to measure the RAI in 15 additional countries to those measured in 2016 (World Bank, 2018), using the same methodology as was used in 2016, but introducing different spatial technologies where possible. A draft report (not yet available for distribution) has been made available to the team by the World Bank. This summarises progress in those 15 countries (World Bank, 2018). The methodology still uses WorldPop as the main source of population information, while data from roads agencies or public domain data such as that from OpenStreetMap are used to obtain the main road network alignment. In many cases smartphone roughness measurement is mentioned, as well as limited use of open source satellite imagery. These various methods will be reviewed and analysed as part of the TG2 tasks and the measurement approach will be examined to validate the results.

4 Approach and Methodology

In order to achieve a harmonised approach to data collection and measurement of the RAI that is relevant, consistent and sustainable, it will clearly be essential to work as closely as possible with the custodian of the RAI, the World Bank, other agencies such as the ADB, AfDB and IADB, as well as UNEP and UNECE. In addition, the team will need to work with relevant country partners, especially those NSOs and road authorities in ReCAP countries who will be trialling the new methodology. If SDG 9.1.1 can be integrated into the measurement routine for IDA 19 Replenishment and other funding mechanisms, this could facilitate the transition to Tier I.

The team will take an integrated approach to maintain the rural access provision—preservation—use continuum, which is relevant to the RAI. Whilst team members will have individual tasks and responsibilities, they will liaise closely at all stages of the project. This will maximise the skills and experiences on offer and will allow the team to develop any synergies that arise. This integrated approach will be fostered through production of the various reports, the workshop and the scientific paper.

The core approach will be to focus on key aspects of the RAI framework, most notably to develop a simple and cost effective methodology that can be sustainably replicated by all countries in the future. The trial countries should feel ownership of the process to measure the RAI, and should be motivated to collect the data locally. To achieve this requires an approach that encourages the local departments or agencies to collect the data themselves, so far as is possible. In this way it should be possible to identify any issues or weaknesses in the methodology and address them appropriately.

There are many good suggestions in the TG1 report that will be internalised. It is good to have the benefit of working with the TG1 Team Leader to ensure a seamless handover and ensure that the TG1 recommendations are implemented as intended. It is understood that a limited number of days are available for the TG1 Team Leader to work with the team to ensure knowledge transfer between TG1 and TG2, so this time will be used for the benefit of the project. It is expected that the TG1 Team leader will be

able to provide links and introductions to relevant people in the custodian agency and with other stakeholders, which will facilitate the handover process. He will also be able to share and explain the results of TG1 and any documentation referred to in the status report.

The strategy will also be to include local institutes where possible to facilitate the process of data collection, especially National Statistics Offices (NSO) which often have the responsibility for providing data for the SDG Indicators. There are well established remote sensing centres in the regions, for example the Regional Centre for Mapping of Resources for Development (RCMRD) in Nairobi and the Centre for Remote Sensing and Geographic Information Services (CERSGIS) in Ghana, both of whom are very experienced in mapping and data collection through earth observation and more generally remote sensing. In Asia there are many local remote sensing organisations, but the Asian Association on Remote Sensing (AARS) does provide some regional links.

4.1 Task 1: Establish a co-ordinated measurement framework

The first step in the process to establish a measurement framework is to gain access to the previous RAI data and fully understand how it was collected. The three main data sources are consistent: Population, location and road condition, but within these areas, different types of data and different methods of collection have been used. To determine this the team will need to speak to as many stakeholders as possible. Consultations have already taken place with the main custodian of the RAI, principally Atsushi Iimi from the World Bank, who was involved in the 2016 trials and is managing the current trials in 15 additional countries, and Peter Roberts, who managed the original study in 2006. We have also contacted the co-authors, Peter Roberts, Shyam KC and Cordula Rastogi.

It is not clear how much original data, if any, can be obtained from the original 2006 study. The team is following up with leads in the World Bank provided by Peter Roberts, but he is not aware of any data that has survived or its location. The main data analyst of the original report was Shyam KC, who was able to provide more insights into the methodology used for developing the RAI and provided some useful links to the World Bank's Living Standards Measurement Study (LSMS) and other data sources that were used at the time.

As noted in our technical proposal we will test data for accuracy, validity, reliability and consistency, timeliness, relevance and completeness, where it is available. At the end of this task we expect to have a dataset that is as complete as possible, and understand exactly how it was collected and how reliable it is in terms of measuring the RAI. The team will endeavour to complete this task as soon as possible following the inception period, as this data will be the foundation of the research.

The original measure of the RAI is to be retained; this has been agreed previously. This includes the key parameters of 2 km distance and the definition of an all-season road.

4.1.1 Population

WorldPop has been used as a source of population data. It will be necessary to review the use of WorldPop and compare it to previous census-based methods, and to other potential sources of population data. This will allow the team to better understand the use of population data for the RAI. WorldPop is based at Southampton University in UK, so the team will try to arrange a meeting to explore the details of the database and understand exactly how it operates.

4.1.2 Location

All countries have some form of mapping of their road network, which is increasingly being based on a GIS platform. However, the accuracy of these maps can be questionable, usually because the road network expands rapidly and the mapping is not updated regularly. The team will try to obtain information on the quality and coverage of road network mapping to determine the basis upon which the RAI was calculated.

It is noted that the 'new-RAI' approach of the World Bank only considered classified roads. While this may be a pragmatic simplification, this may not be appropriate for a poverty-related development indicator, as rural mobility depends on all-season roads, whether or not they are classified. It is quite possible that some

roads that are not all season accessible maybe classified, and others that are all season accessible maybe unclassified, so there is no uniform way to classify roads between countries.

4.1.3 Condition

The original RAI also includes the definition of an **all-season** road. Whilst there is a definition, the interpretation of an all-season road seems to have been understood differently in some cases. Most road organisations provide road condition on the basis of good, fair and poor. It has been assumed that for paved roads, good and fair condition constitutes an all-season road, whereas for unpaved roads only good represents an all-season road. This notion has been challenged before so it will be necessary to revisit the concept of all-season and ensure that it is consistent, coordinated and repeatable. Also the road condition itself has been measured in different ways. Whilst this is not an issue in itself, it is necessary for the team to understand the different methodologies in order to develop a consistent framework. For example, many of the current trial countries use roughness as a measure of condition, whereas in the past visual surveys or speed would be most common, especially for rural and unpaved roads.

The current World Bank trials have relied heavily on a smartphone app to measure roughness, but the roughness scales differ significantly between countries. Also, smartphone roughness apps have been found to be inconsistent in their outputs (Workman, 2017), especially at slow speeds. Most apps do not collect data below 15 kph, and even using two devices in the same vehicle can give different results. As such smartphone apps are unlikely to be appropriate to determine international standards of roughness for the crucial measurement of all-season passability. One country used an assessment of satellite imagery that was acquired three years previously. All of these condition measurement methodologies can be valid, but the task in this phase is to understand them fully and how they were used, in order to develop a consistent framework.

4.2 Task 2: Explore the feasibility of scaling up the use of spatial data

The ability to scale up the RAI is clearly key to promoting the RAI from Tier III to Tier I. To achieve Tier I status it needs to be used and regularly updated in 50% of UN countries. A number of possibilities for scaling up were explored during the TG1 study (Vincent, 2018), with the most promising being the use of smartphone data to monitor vehicle movements. If a road is being used regularly it is likely to fall into the all-season bracket. If mobile phone tracks can be analysed to show location, speed and distance, then they could in theory be reliably used to monitor the condition of roads. Some initial work has been done in this area using GPS tracking and threshold speed, and was demonstrated at a ReCAP workshop in Mozambique (Geilinger, 2011).

The team will also consult with regional and country remote sensing specialist organisations and individuals to explore any alternative spatial methods that could be used to complement the proposals put forward in the TG1 final report (Vincent, 2018). The TG1 report also explores a number of options for future involvement in the RAI, for example the Sustainable Mobility for All (SuM4All) initiative, HDM-4 and the Roads Economic Decision Model (RED), and other ReCAP projects. The RAI is already an accepted indicator for rural access within SuM4All, and with key team members being part of the working group this provides an excellent opportunity for coordination and cooperation. The potential for using HDM-4 to provide an indication of the extent of rural roads that it could be financially possible to construct and maintain will be explored, as well as the possibility of using RAI data within HDM-4.

The team will initiate this task immediately following the inception period. In fact, three of the team will be arranging a transport services event for all ReCAP countries from 12-14th November, as part of the ReCAP 'IMPARTS' Project (GEN2136A). We will take this opportunity to inform the countries of the RAI project and gauge their interest, as well as exploring what data they may have. This will be a good opportunity to raise awareness of the project and the potential inputs required from each country. The participants will be informed of the RAI project in advance of the workshop, so that they can come prepared.

4.3 Task 3: Agree data standards and quality assurance measures

As with any database, the quality of the outputs will depend on the quality of the inputs. In the case of the RAI estimates, the quality may be related to the reliability of basic data, and also to the assumptions used in any modelling or sampling.

The following factors are key to understanding the methodologies employed and the accuracy of their results:

- Population Data: Most countries conduct nationwide population censuses on a 10-year frequency, with regular (typically every 3 years) Living Standards Measurement Surveys (LSMS) on a sample basis (typically 1 – 1.5%) which are extrapolated nationwide for policy analysis. LSMS surveys often have questions related to accessibility to nearest road, and basic parameters including the surfacing and passability of that road, however each country's questions are likely to be different (countries will typically include these questions in community surveys, not at the level of the household). However, WorldPop data is also now available, and is calculated from a variety of sources including population census data from NSOs but augmented by mobile data, migration data and satellite data in a machine-learning environment, and estimates are published at 100 x 100 metre grid cells. Typically WorldPop data sets are published per country every 5 years. The differences between these data sources can be great, and so can have significant impact on the calculation of the RAI.
- Road Network Data: In most countries there are separate agencies responsible for the different classes or hierarchies of the road network (national, local, cities etc.). The quality and accuracy of road centreline data often varies among these agencies. The traditional focus of many countries has been to establish road management systems and databases on their national networks first, and then focus on local roads. As a result, data for local roads has tended to be much less accurate and less comprehensive than data for trunk roads. Also, in many countries, there is no central agency responsible for consolidating data on rural roads. For example, in the Philippines, each province manages its provincial network. The central Department of Interior and Local Government in the Philippines did not begin to attempt to consolidate data from the 79 provinces under its responsibility until 2015. Nor had it developed a standardised methodology for collection of data on provincial networks. Open Street Map (OSM) or Google Earth road network data also tends to show better coverage in urban areas, while coverage in rural areas tends to be piecemeal. The coverage and quality of these different data sources in any country therefore needs to be understood and recorded as part of the methodology for a data set.
- Rural versus Urban. A striking feature of our review of RAI data and reports to date has been the lack of definition of 'rural'. According to the UN Statistics Division, "the distinction between urban and rural population is not amenable to a single definition applicable to all countries (UN, 2017). For this reason, each country should decide which areas are to be classified as urban and which as rural, in accordance with their own circumstances". However, while some NSOs publish clear definitions of urban/rural in their statistical publications, others do not, and so one of the fundamental parameters of RAI typically goes unrecorded against the data set. It is also noted that there have been attempts to develop global databases of urban areas based on the built environment showing contiguous patches of built-up land greater than 1 km (Schneider, 2009). This uses a definition unrelated to population, but the relevant global data sets do not appear to have been updated since 2001/02. It is noted, however, that WorldPop includes urban change mapping work funded from World Bank and undertaken in collaboration with researchers from the University of Wisconsin and with additional support from Google and BELSPO. Other initiatives in this field have been identified, including the World Bank Global Practice on Social, Urban and Rural Development and Resilience (GSURR) and the UN Department of Economic and Social Affairs (DESA) Population Division, which publishes World Urbanization Prospects and, in 2018, started publishing country data on the urban/rural split. However, the current RAI seems to be based on urban/rural definitions from a University of Columbia study of urban area imagery from 1995. Clearly urban/rural areas will change constantly so will need to be updated on a regular basis. In summary, a clear definition of 'rural' is necessary for the purposes of RAI, and we will look to

consult with stakeholders to ensure that the definition is clear and is recorded as part of any methodology, and that its implications are well understood.

The team will undertake a desk study on the various data collected to date (as outlined in Section 3), to document the methodology in pilot countries through discussion with those responsible for its collection, processing and collation. If possible we will also meet with WorldPop to understand the methodologies, constraints and potential measures of uncertainty in the input data sources to the RAI. We will also look to include sensitivity analysis on the RAI in terms of the impact of those uncertainties.

Given the above fundamental issues, then, it is clear that methodologies need to be agreed and documented; and that data must be quality checked according to clear QA procedures, prior to publication of data sets.

A number of different methods of collection and quality assurance will be developed. Available methods will be applied to the selected pilot countries, and the results presented to development partners and other stakeholders through various international forums. Based on analysis and feedback, the guidelines and framework under Task 11 and Task 12 of this project will be refined in the final recommendations report.

The UN Expert Group on National Quality Assurance Frameworks (EG-NQAF) is working to update UN NQAF (United Nations, 2012). This update will address implementation issues, among them assuring the quality of SDG indicator data and data from new sources and new data providers. The updated draft Manual on UN NQAF is expected to be available in March 2019. The team will endeavour to discuss with stakeholders to determine if there are lessons that can be applied in terms of the RAI.

The team will also look to consult with IE Connect in Washington, DC. ieConnect is an initiative between World Bank, DFID, and other multilateral development banks (MDB) which aims to transform the way in which transport and ICT projects are designed, implemented and evaluated. It is understood that the IE Connect Team will have insights into new data sources and technologies that could influence the calculation of the RAI going forward.

4.4 Task 4: Develop, assemble and rollout a complete catalogue of all RAI data

The World Bank's Digital Task Force is establishing a website which will allow access to a database containing the RAI index data for a number of different datasets and would be a focus for knowledge exchange about the RAI and SDG 9.1.1. This website would ideally be a one-stop location for all knowledge related to the RAI including responsibilities, contacts, guidelines etc. and is likely to include the following data:

- 2006 RAI: "Original estimates in 2006 based on household surveys and modelling methodologies" (64 countries)
- Official RAI – "relies on data provided by the national road agencies for location and condition information, while leveraging high-resolution population distribution data based on national census results" (8 countries, from 2009 – 2015)
- Open Source RAI: "Official RAI methodology has been complemented through the leveraging of open source road datasets. While this Open Source approach correlates relatively well with some official RAI results, it should be noted that individual country data may be unreliable (approx. 72 countries, in 2018). Official RAI data sets for the 15 countries reported under the World Bank draft report on Measuring Rural Access: Update 2017/18 (World Bank, 2018), once the data has been verified".

It is understood that the Digital Task force database could be integrated with Sum4All systems at some time in the future. Sum4All (Sustainable Mobility for All) is a consortium of over 50 leading organisations and agencies in the transport sector, including DFID, ADB, AfDB, World Bank and ReCAP, which is committed to supporting transport policies and systems to transform mobility on a global scale. The World Bank provides the secretariat and ReCAP co-Chairs the SuM4All Rural Transport Working Group (RAWG) with DFID and has a seat on the Steering Committee. The SuM4All website (www.sum4all.org) contains a portal that displays transport indicators. This project team is planning initial discussions with the World Bank to get

further details on the data that underlies the SuM4All portal, and to understand the intended migration or integration with the SuM4All systems. The Sum4All could also be a potential host for the RAI repository in the long term.

A separate UN SDG Indicators database https://unstats.un.org/sdgs/indicators/database contains the metadata for all SDG indicators that have Tier II or Tier I status (i.e. have been collected to an agreed and approved methodology). The repository does not yet contain data for Indicator 9.1.1. The UN SDG indicators database is part of an online reporting platform for the SDGs. This offers a solution that is country-led, free for any country or organisation to replicate, and is fully customisable. The Office for National Statistics in the United Kingdom further developed the tool and established it as its own national reporting platform for the SDGs (see https://sustainabledevelopment-uk.github.io).

As noted in our proposal, it is believed that an RAI database should have the facility to be more than just a database. It should act as a management system for rural access data that facilitates many of the aspirations for RAI, as set out by Vincent (2018) and the ToR. For example, it could be used as a portal for submitting new data (to the required standards), notification and management of new RAI measurements, and provide up to date information on the number of countries using RAI. An RAI database should also include storage of information regarding the methodology used to calculate RAI for a given country / dataset; data on the base data used to calculate the RAI (including much of the information recorded in the Country Information Sheet (see Section 4.4.1) such as road length, population, key contacts etc.); any quality assurance that has been applied to that dataset; and an assessment of the quality of the data.

There are other factors for consideration too, including potential storage of RAI at a sub-national level, and storage of the constituent data that make up the RAI (population, road centreline etc.); the long-term sustainability, funding and governance for such a database; the mechanisms whereby countries / NSOs can update or publish their data in future; and the future relationship with the UN SDG database once Indicator 9.1.1 achieves Tier II status.

The team will look to investigate these aspects in November and December 2018, in discussion with SuM4All and World Bank, in order to come up with short, medium and long-term plans for establishing a catalogue of RAI data.

4.4.1 Country Information Sheet

The team have devised a County Information Sheet for the purpose of collating or consolidating known information on RAI under this project, and in order to provide an assessment of its quality (see Appendix A). This is designed to capture:

- Published data
- Definitions, methodology and assumptions
- Dates of last and next household surveys
- Dates of last road network centreline survey, and update procedures if any
- QA assessment
- Use of RAI as an indicator in policy documents and programmes
- Key contacts

It is anticipated that all of this information will be captured in an RAI database as described above.

4.5 Task 5: Establish a mechanism for capturing new RAI data

The main aim of this task is to establish a mechanism through which any organisation or project intending to measure new values of RAI will routinely notify the World Bank as the current custodian of SDG 9.1.1, so that this information can be integrated into the World Bank planned schedule of future RAI measurements;

The first step for this task will be to understand how the current 15 trial countries are notifying the World Bank of their data/results. If possible the historical data collection and submission processes will also be investigated. This task will require close coordination and cooperation with the World Bank, as they are custodian and will be directly responsible for receiving the data. In order to make the process for notifying

the custodian of RAI of the intention to collect RAI data as efficient as possible, there should be a programme of awareness raising so that country partners understand the data that is required and how it will be used. Ultimately a web-based process would appear to be feasible but it should be as simple and straightforward as possible.

This task will be linked to the catalogue/database that will be established under Task 4. It will also be dependent on the involvement of local organisations, as will be established under Task 2, such as roads organisations or NSOs. This task will therefore follow on from Tasks 2 to 4.

4.6 Task 6: Investigate the feasibility of using an accuracy range across countries

The Status Review TG1 report suggests determining accuracy ranges across countries and adopting the use of correction factors to address known inaccuracies in datasets. Given the wide range in the way data is collected, especially for road condition, this is a sensible solution to provide some consistency in results. However, the identification of correction factors will be determined by the access that can be provided to past data, as there is unlikely to be sufficient data in the four trial countries to determine common inaccuracies. A statistically-valid sample size will be necessary to work out correction factors, so our statistician will advise in this area.

The TG1 report suggested that NSOs should play a role in determining the accuracy and suitability of road network maps and information. As part of Task 3 the team will be testing the accuracy of the various data sources, including WorldPop and OpenStreetMap. For this some form of 'ground-truthing' could be required in order to provide the baseline against which to compare the data collected using spatial means. This process will be different for each data type, population, location and road condition. There are guidelines for 'ground-truthing' in other ReCAP projects (Workman, 2017) that can be allied, in principle, to this situation, but a country-wide full comparison will not be possible given the available time and resources. 'Ground-truthing' will therefore be restricted to representative samples within a country. For example, OpenStreetMap GIS databases can be compared to established and current road organisation rural mapping that is known to be accurate. In this way it may be possible to apply a correction factor to compensate for missing or inaccurate roads that is statistically appropriate.

Some of the exercises that may be possible, provided the data is available, would be:

- To compare different sources of population data and the rural/urban boundaries that are used, to see the variation and potential effect on the RAI.
- To compare different datasets of GIS road mapping, such as national data, vs OSM, vs GRIP database, etc. to see if there are large discrepancies. It would be assumed that the national road network data is the most accurate as it should have the ownership/classification of the roads.
- To compare the way that the all-season criteria is applied to roads. It would be possible to check existing data by visiting areas within a country and checking against the GIS datasets.

It will also be necessary to liaise with NSOs as much as possible in the four TG2 trial countries to understand the data that is collected and where the inaccuracies may lie. This information will also feed into the feasibility of using accuracy ranges. One example of the inaccuracies that could be experienced is the reporting of a whole village as being in one location, i.e. the centre of the village. The system used in Bangladesh would apply here, where the villages can also be quite large. In such a case if it is a large village, much of the village could be further than 2 km from the road, but would be counted as being within 2 km according to the centre of the village, see Figure 1. This would mean that the system would over-report the RAI.

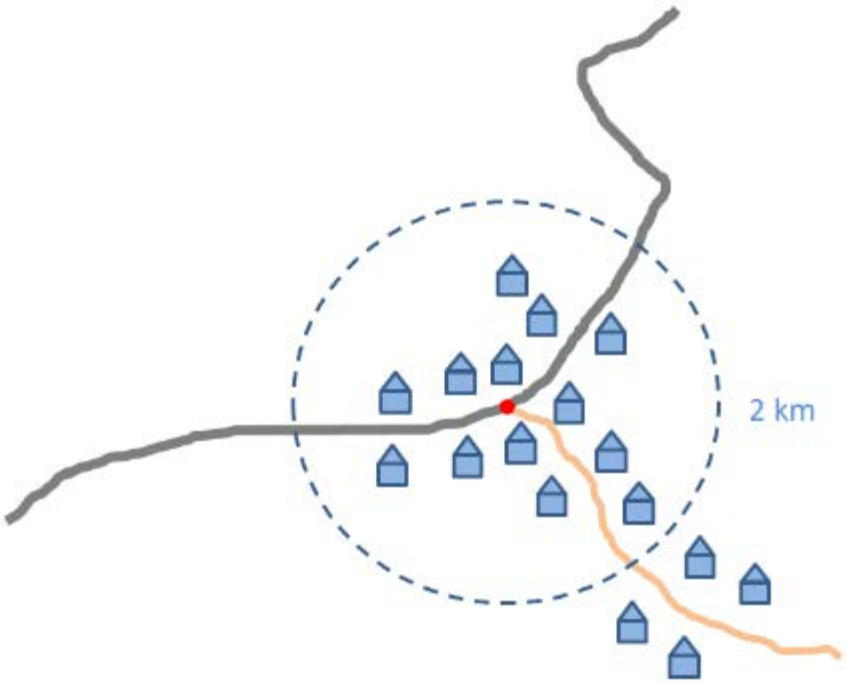


Figure 2: Potential for over-reporting of RAI

Alternatively, if the centre of the village is further than 2 km form the road, there could be some houses that are actually within 2 km, but would not be counted because the village centre is further than2 km from the road, see Figure 2. In this case the system would under-report the RAI. Overall this may not be a significant issue, but issues such as this will be explored and included in the assessment of accuracy and correction factors.

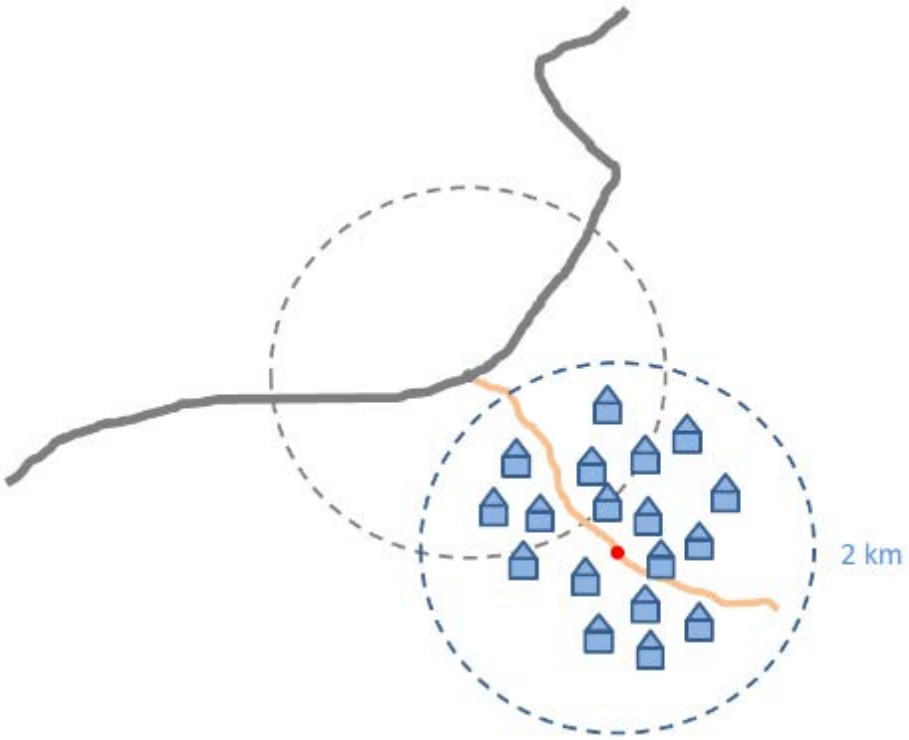


Figure 3: Potential for under-reporting of RAI

It is expected that this task will be started when a reasonable amount of historical data has been collected. At present the testing of existing datasets can be initiated within the next two months.

4.7 Task 7: Explore the viability of implementing a secondary rural access indicator

A number of experts have expressed the opinion that in the long term it would be possible to develop an indicator more appropriate to measuring rural access, for example one that is more useful for country and regional planning and would therefore be more sustainable because the country would have a motivation for collecting the data. It is accepted that a new SDG Indicator could only be introduced in 2025, but the outcomes of TG2 should be able to inform the requirements of this and set its direction, so that it does not become an independent activity working in competition with the RAI.

In the meantime, there is a need to consider alternative measurements to complement the current RAI to address national concerns that it may not truly reflect the situation in the country. The TG1 report (Vincent, 2018), referred to two categories of potential secondary rural access indicator. Firstly, some countries could estimate an *additional* value related to the RAI which takes account of local issues, including the increased use of motorcycles and the use of unclassified infrastructure. These values would be additional to the standard RAI measurements. Such additional indicators would be relevant to particular countries (for example, those with significant numbers of rural motorcycles), and would not be adopted or promoted as standard SDG indicators for widespread (universal) adoption. We will work with partners interested in developing such additional, locally-important indicators, but will concentrate on options for indicators with wider relevance (that may be able to take account of a broad range of local circumstances).

Secondly, Vincent (2018) suggested there was also a need for, and interest in, an additional SDG indicator that takes account of a wider range of rural accessibility issues, such as access to markets, health facilities and schools, and the provision of appropriate and sustainable transport services. Our understanding is that this task relates to the potential development and adoption of an alternative, additional SDG indicator, in line with the SuM4All Global Tracking Framework, that could be universally adopted. This could complement the RAI (provision of roads), by taking account of mobility and/or ability to access markets, health facilities and education. According to Vincent (2018), there is not only interest in this, but also many countries are already collecting potentially relevant data, such as travel time to markets and health facilities. Such data is often used in rural development planning and rural road investments, making this additional indicator highly relevant at national and devolved levels.

One key advantage of such an additional indicator is that it could absorb many of the issues raised by the use (in some countries) of motorcycles and unclassified transport infrastructure, while at the same time being universally acceptable as an additional SDG indicator. The SuM4All Global Tracking Framework uses SDG 9.1.1 (the RAI) as its principal indicator for rural mobility, but also lists 26 potential supporting indicators covering all equitable access, some which have direct relevance in the rural context. In liaison with partners and the RAWG, we will explore potential indicator options and interest in these. While there have been some suggestions of composite indices, covering multiple criteria, we note that the adopted SDG indicators generally appear simple to understand, and this favours specific mobility examples or access criteria.

From the outset, we will consider the potential for the cost-effective acquisition of accurate data sets, and the potential responsibilities for this. The objective will be to develop a consensus among partners and key stakeholders of what could be an acceptable and highly relevant indicator that can be measured with reasonable ease and accuracy. We recognise that the processes of indicator development and acceptance can be complicated and slow, but we will work with SuM4All and the RAWG to explore the potential.

The ReCAP 'IMPARTS' project (GEN2136A), also implemented by TRL, is researching how transport services respond to investments in rural roads, and how such 'responses' can be captured and measured (in terms of improved mobility outcomes for rural people and their goods). As noted in Section 4.2, the IMPARTS inter-regional workshop schedule for November 2018 in Tanzania will provide a valuable opportunity to discuss with ReCAP stakeholders from many countries, both the RAI and interest in additional indicators.

4.8 Task 8: Specify a clear custodian framework for collection of RAI datasets

It is essential to specify a clear custodian framework for collection of RAI datasets, which sets out roles and responsibilities for populating the RAI catalogue. This will need to be implemented both centrally and at country level, as well as for quality assurance purposes;

This task links directly with Tasks 1, 4 and 5. As custodian, the World Bank will need to be closely consulted throughout this task. The framework will also be dependent on the prevailing country partners who will have the responsibility for providing RAI data.

A methodology for populating the catalogue will be identified and agreed. This may vary for different countries depending on the data collection process and the methodology used. The rules for database population will be specified, including who is responsible, how data should be checked and cleaned before it is entered and the process for entering the data, centrally and locally.

It is expected that this task will follow on from Tasks 1, 4 and 5, as shown in the work programme. In this respect it is expected that it will start before the first progress statement is produced.

4.9 Task 9: Trial the proposed measurement framework in at least four countries

The first step in this task is to select appropriate trial countries. A methodology for this was developed and agreed with the PMU, and has since been revised following initial meetings with the World Bank and DFID. This methodology can be seen in Annex 1. The team will identify trial countries as soon as possible in the programme, so that contact can be initiated and trials can be given the maximum time possible. This process will start with the ReCAP workshops in Tanzania in November 2018 and is expected to be concluded by December 2018. A more detailed summary of country selection is shown in Section 8 of this report.

A number of other tasks need to be concluded before the trials can start. For example, a draft measurement framework needs to be agreed and appropriate data standards and quality assurance measures need to be in place. There should also be significant progress made on assessing accuracy ranges and correction factors, although these can be applied after data collection. The team will make initial visits to each country as soon as possible in order to give the data collection process as much chance to succeed as possible.

Initially, appropriate partners will need to be identified and agreed within the selected countries. The country NSO at present has the responsibility to report on SDG indicators, so it may be appropriate for the responsibility for reporting RAI data to rest with them. Rural roads organisations clearly also have a role to play, but there could also be others who will facilitate the process of data collection. The ReCAP coordinator in country would obviously need to be involved, but in terms of data collection in the long term that partner may well be the NSO or another organisation. This is one area that will be explored when liaison with the trial countries begins.

The team will sensitise the trial countries to the data that will need to be collected, and when the framework and necessary data standards and quality controls are in place, the countries will be supported to collect the data. This is expected to start in February or March 2019.

4.10 Identify other funding sources and financial support

Securing funding for TG3 is essential for the continuation of the project. The team will take advice from the custodian and ReCAP as to potential sources of funding, as well as making the other MDBs and Bilateral donors aware of this need with a view to sourcing TG3 funding. They will also seek support from the ReCAP PMU and DFID to reinforce requests for funding when necessary, as the request or support from a programme or donor is likely to carry more weight than from a consultant.

In terms of sustainability we will also explore the possibility of funding from within individual countries. This would be the ideal scenario for the long term, although there are well-documented reasons why this is

unlikely to happen in many cases, the main one being that the RAI in itself is not normally used for national planning purposes.

This task will start early on in the project, and will continue throughout. Whenever the team has a consultation with a key stakeholder or partner they will discuss the possibilities of funding the RAI data collection. The team expects to build good relationships with all stakeholders and use these links to source funding for TG3.

4.11 Draft a framework for scaling up RAI data collection

In TG3 it will be necessary to scale up RAI data collection and measurement beyond ReCAP member countries to provide greater geographical representation. This will include a strategy for promoting SDG Indicator 9.1.1 from Tier III to Tier II, and from Tier II to Tier I in the UN classification;

The process of promoting the SDG 9.1.1 from Tier III to Tier II is already under way, and an attempt for promotion will be made to the IAEG-SDGs in November 2018. If this is unsuccessful a further attempt can be made in the spring of 2019. The World Bank has prepared a document for promotion, based on a recently developed set of guidelines. These guidelines can be used as a basis for a draft framework as they have been developed through IAEG experience of promoting indicators through the Tiers.

To be able to expand the RAI in a meaningful and accurate way to a wider range of countries, the methodology for updating the RAI must remain flexible and countries must be given different options that they can use to suit their particular conditions and situation for collecting RAI data. The team recognise that this is essential and they will use this as a guiding principle in developing a draft framework for scaling up RAI data collection.

In terms of the long term sustainability of the RAI, there is scope to consider the possibility of developing National Appropriate Rural Accessibility Actions (NARAA), as suggested in the TG1 report (Vincent, 2018). There is certainly scope to apply the idea of locally-appropriate RAI methodologies to measure rural access, provided there is an appropriate quality control framework, with agreed correction factors, if required.

This task will clearly be dependent on feedback from the country trials and the draft measurement framework. The draft RAI guidelines will be developed in parallel with this task. These must include the lessons from other tasks, including the trials, and provide an overall strategic approach to measuring the Rural Access Index that is relevant, consistent and sustainable. It will involve a framework and processes for data collection, recording and submission to the IAEG-SDGs.

4.12 Provide detailed recommendations on the way forward in TG3

The outputs of TG2 will frame the way forward into TG3. The goal of expanding the RAI to 30 countries (including all ReCAP countries) will be core to the development of outputs during TG2. The team will utilise their knowledge of the ReCAP countries to find the most appropriate solution for applying the RAI in TG3. The non-ReCAP countries to be included in TG3 could be any UN countries, not just low income countries (LIC), which gives a greater flexibility to test the methodology across the widest possible range of conditions. TG3 of course is dependent on successful funding being found during TG2.

We expect that the approach will again include close liaison with the World Bank as custodian of the RAI, as well as with ReCAP and other stakeholders. It will be important to consult effectively with the appropriate road and/or transport organisation in each country, to ensure that the data being collected is accurate and appropriate, but also to ensure that the methodology is being implemented appropriately. The framework to be developed in TG2 stresses sustainability and cost effectiveness of the methodology, so this will be closely monitored to check that this aim has been achieved.

The final report will provide detailed recommendations for TG3.

5 Comments on key documents

This chapter includes a brief review of some key papers and reports that chronicle the introduction of the RAI in 2005 and its development to the present day.

Some limitations to the opportunities for road investment to promote rural development (Hine, J. 1984)

This is a very early report that considered how agriculture development was affected by roads, in India, Ghana and Kenya. The author noted that the condition of roads had little effect, but bringing roads closer to the farms did, although most farms in Ghana were already close to roads. He stressed that the biggest development came when human porterage was replaced by vehicular transport. The most effective use of funds was to invest in bridges, drainage and remedial work that extend vehicle access to all year round.

The author developed a model to assess the proportion of people who live within 3 km of a road. This was compared to 'ground-truthing', with variable results (the ratio of predicted to observed varied from 1 to 22). One of the conclusions was that most people already lived close to roads, so road building was unlikely to have an effect on agriculture. However, the concept of using proximity to a motorable road as an indicator of development was born.

The 'random-road' methodology discussed in this paper appears to have been the basis for the RAI estimations based on modelling, as tabulated in some early RAI documents, such as Roberts and Shyam (2005) and Roberts, Shyam and Ragstogi (2016).

A guide to living standards measurement study surveys and their data sets (Grosh, M.E., Glewwe, P. 1995)

The LSMS was developed by the World Bank in the 1980's to explore ways of improving the quality of household data collected in LICs. This took several years to develop, but became a standard by which World Bank data was collected, and still is. The LSMS programme has worked with several statistical offices around the world, collecting data, incorporating innovative new technologies into data collection, helping to develop survey methodologies and building capacity. This would have been relevant to the original RAI data collection, but at present it is not clear whether it was used or not.

Improving rural mobility (Starkey, P. Ellis, S. Hine, J. Ternell, A. 2002)

This is another early paper that argues to include tracks and paths, and Intermediate Means of Transport (IMT), as modes of access, promoting the notion of integrated transport planning, roads and transport, including IMTs. It promotes IMTs as a way to circumvent the need to build lots of new roads, which probably wouldn't happen anyway without massive investment. It also promotes tracks and trails, not necessarily full roads, which can take motorcycles and other small IMTs. It notes that rural road construction in itself does not necessarily meet the needs of the poor, and highlights that just having a road does not necessarily guarantee access. This is relevant for the secondary indicator proposed in Task 7.

A new map of global urban extent from MODIS satellite data (Schneider, A. et al, 2009)

Although this reference was found in a 2015 webpage, it refers to a paper published in 2009, which refers to a "new dataset depicting global urban land c. 2001-2002". So although it is quite dated, it does provide some insights into how urban/rural population could be estimated by identifying man-made objects such as roads, buildings, runways, etc. It uses an estimate of whether a pixel is dominated by man-made objects or vegetation. The resolution is quite coarse, as would be expected for 2002, but the principle is interesting. At this stage it is not known whether the methodology was developed, but it is unlikely this method would have been used for the 2006 RAI collection. It is noted, however, that the WorldPop website refers to ongoing research with University of Wisconsin on urban change mapping with funding from World Bank.

Rural Access Index: A Key Development Indicator (Roberts, Shyam; 2005)

This was the paper which introduced the RAI. The MDGs had not specifically identified transport indicators, yet there was a clear linkage between poverty and isolation. The creation of the RAI was an attempt to address this shortfall. It changed what to measure, where to measure, and how to define what was being measured. It focused not simply on the length of network, or the density of network, but the accessibility of the population to that network. It also focused on the household level, rather than the administrative unit

(such as the village or district). Thirdly, it was intended to provide a common international basis for understanding rural access as it pertained to transport. Furthermore, it was intended to help planners to devise policies and projects to meet specific rural access objectives.

The preferred method of collection in 2005 was via household survey. For those countries which already included questions that permitted RAI to be measured, then the cost was deemed to be less than 1 day of experienced statistical input. Where questions had to be developed, there would be a one-off cost to negotiate, design, test and incorporate such a question, incorporating local language and perceptions, of up to 1 week. Where there were no household surveys implemented, then it was anticipated that simplified procedures using simple mapping and GIS software could be applied. This would allow RAI to be estimated based on minimal data availability. It was recommended that RAI be updated every 2-3 years, using better methods as they became available.

The explosion of internet-based mapping, of road networks and population data since 2005, has introduced new opportunities but also new challenges in the collection and reporting of RAI, that this project is intended to review and address.

Africa Infrastructure Country Diagnostic. Improving Connectivity: Investing in Transport Infrastructure in Sub-Saharan Africa. (R Carruthers, RR Krishnamani, S Murray; 2008).

The Africa Infrastructure Country Diagnostic (AICD) included an update of RAI data for 24 countries in Africa, and some findings from analysis of this data were published in 2008. However, because this RAI data was generated using GIS-based methods it was not regarded by AICD analysts as suitable for direct comparison with the 2006 RAI data.

The AICD RAI data was used to consider the rural road infrastructure investment needed to achieve different levels of RAI. The length of all-season road infrastructure that would need to be constructed indicates the infrastructure investment required. An important conclusion was that, pragmatically, it might not be financially possible to achieve an RAI of over 50% in some African countries. It also concluded that short-term improvements in the RAI would not be sustainable unless appropriate action was taken to ensure that improved roads would be maintained.

Mobilising the household data required to progress toward the SDGs (Alkire, S. & Samman, E. 2014)

This document considered how frequent data collection for poverty related indicators could be advanced. It examined household surveys, administrative data and Big Data options. As well as quality of data, the study looked at how data could be collected sustainably and highlights examples of best practice. All of the data collection methodologies are potentially relevant to the RAI and the lessons learned are that traditional surveys, accompanied by interim surveys that use technological developments, have the greatest potential for monitoring core indicators of human poverty. Big Data had potential but at that time still had multiple challenges that needed to be overcome. The report was submitted to the IEAG-SDGs.

RAI Activities in AfDB Countries (African Development Bank, 2018)

This presentation by the African Development Bank in 2018 highlights the calculation and use of RAI in 10 African countries, from 2010 through to 2017.

It is noted that none of the data from these countries listed in the presentation appears on the World Bank Digital Task Force website. This is an issue that has been highlighted in other reports, and will be addressed under Task 5 of the current project, to ensure that World Bank as custodian of RAI 9.1.1 is informed of publication of data so that it can be included with other country data as part of the SDG data set.

Rural Access Index (RAI) - The Case of Timor-Leste (International Labour Organization, 2017)

This paper explains the applications of the RAI as a tool for policy makers, government agencies and practitioners working in the roads sector, for formulating road policies and strategies, in guiding and managing investments, and in monitoring the effectiveness of investments.

It highlights that the earlier method used by the World Bank (2006) relied to a large extent on data from household surveys that are available in countries to estimate the RAI. These data sets differ from country to country and do not provide adequate and equal spatial representativeness – within and between countries.

Furthermore, the original method used available data at country level about the road network and its condition – and these data are very often incomplete. This, in combination with the high costs of conducting household surveys, significantly reduces the usefulness and sustainability of the RAI.

It also make the point that national or sub-national validation/calibration of the model is important, and that reporting of RAI in the past without verification / calibration has probably resulted in significant under- or over-estimation of the RAI, reducing its usefulness as a policy instrument or monitoring tool.

Using Timor-Leste as a case study, it proposed a new definition to include road condition and travel time using the most commonly available method of transport, but emphasising the importance of calibration to local conditions.

Measuring Rural Access: Using New Technologies (World Bank Transport & ITC, 2016)

This report included a new method for calculating RAI, based on spatial (GIS) analysis of population, road network and road condition from official government sources, without counting households on the ground. This new method was expected to be more sustainable and consistent than the previous method. However, it also introduced road condition into the calculation, which was an acknowledged challenge since data at the road segment level is often fragmented, is not always geo-referenced, and can be costly to maintain.

This report applied the new method to 8 pilot countries which had previously collected and published RAI data in 2006 based on the Roberts (2005) methodology. Comparison of the 2016 with the 2006 results indicated that while 4 countries had apparently improved their RAI during that time, 4 countries had reduced their RAI, some significantly. These differences were almost entirely attributed to the new methodology.

However, these inconsistencies raised concerns on both the old and new data, and highlighted the limited involvement of pilot countries in the measurement process. The introduction of a new road condition indicator also appeared problematic in terms of availability, comparability and cost.

Status Review of the Updated Rural Access Index (RAI) (Vincent, 2018)

This 2018 report for ReCAP was the precursor to the current project. It contained a comprehensive literature review, including review of the aforementioned reports. It also raised concerns that that few countries had collected or published RAI data during the intervening years from 2005 to 2018, and highlighted that even where RAI had been calculated, datasets had not been made available to World Bank, as custodian of the indicator, for publication.

Consultations were held with key stakeholders including ReCAP, World Bank, African Development Bank, Asian Development Bank, and some National Statistics Office (NSOs), to review the status of the RAI and to recommend ways of raising the status of the RAI.

The 2018 report recommended that the original definition of RAI should be retained, but that new methodologies should be prepared, using alternative methods where necessary. Involvement and approval of NSOs was also seen as key, to ensure buy-in and sustainability. Extension of RAI indicators to take into account use of vehicles other than 4-wheel vehicles, and accessibility to health centres, schools and markets, was also recommended.

Measuring Rural Access: Update (draft) (World Bank; 2018)

The draft 2018 World Bank report applies the 2016 method to a further 15 countries (in addition to the 8 countries covered in 2016). Comparison with the 2006 data shows similar issues to those raised in 2016 - half of the countries show a significant decrease in RAI, and the involvement of the NSOs and/or the roads agencies in the collection and processing of data is not clear.

We also note that the 'official' 2016 data for those 15 countries are often significantly different from information collected using 'open source' data calculated separately and published on the World Bank's Digital Task Force website in 2018; although such comparison is not addressed in this report (see Table 1).

Table 1: Comparison of RAI current results vs open source

No.		Official	Open Source (all 2018)
1	Armenia	66.0% (2018)	17.7%
2	Burundi	24.9% (2016)	65.0%
3	Iraq	63.4%	40.8%
4	Jordan	71.4%	47.1%
5	Lebanon	92.6%	78.1%
6	Lesotho	18% (2016)	20.2%
7	Liberia	41.9% (2016)	39.2%
8	Madagascar	11.4% (2017)	7.8%
9	Malawi	23.1% (2016)	36.5%
10	Mali	22.3% (2017)	27.2%
11	Nigeria	25.5% (2014)	51.9%
12	Peru	37.2% (2016)	28.0%
13	Rwanda	55.3% (2016)	44.2%
	Saint Lucia	56.7% (2017)	- incomplete -
14	Sierra Leone	31.5% (2017)	27.6%
15	Somalia	31.2% (2016)	38.2%

The 2016 and 2018 World Bank reports include notes for each country that document the methodology used. These reports will be starting points for further investigation and analysis under this study, to understand how the methodologies are producing such different results.

6 Inception Phase

The activities carried out during the inception phase are summarised here:

- Kick-off meeting
- Skype meeting with Atsushi Iimi
- DFID meeting
- Meeting with Peter Roberts
- Preparations for SDG promotion to Tier II
- Review countries for inclusion in trials.

6.1 Kick-off Meeting

The Kick-off meeting was held on 28th September 2018 at TRL's office with Annabel Bradbury from the ReCAP PMU and the Team Leader from TG1, Stephen Vincent. The meeting set out the outputs and outcomes of the Status Review carried out by Stephen Vincent in TG1, and ensured that the team understood fully the main purpose of the project. Stephen gave a very comprehensive overview of TG1 and his report. In this meeting the main stakeholders were discussed in terms of their hierarchy and involvement in the RAI, and some clarifications were made concerning the Terms of Reference. The minutes of this meeting are provided in Annex 2.

6.2 Meeting with World Bank

A Skype meeting was held between the team and Atsushi Iimi on 11th October 2018. Atsushi is a Senior Economist for the Transport Global Practice within the World Bank and specialises in development economics in Africa. He has responsibility for the RAI initiative. This was a good meeting to introduce the team and explore the role of the World Bank and the work they are undertaking on the RAI. Atsushi also allowed the team to see an advance copy of the status report on the current RAI assessment being carried

out in 15 new countries. This report details the data that is collected, how it is collected and the revised RAI value. The team will comment on the report in detail when it has been officially released, but it was a very useful insight into the current methodology being used by the World Bank. This methodology is essentially the same as that used for the 2016 trials.

6.3 Meeting with DFID

DFID requested to meet the RAI team on 17th October 2018, to emphasise the importance of the RAI to DFID and to ensure that all relevant stakeholders are consulted going forward. DFID stressed that the RAI should remain simple and easily understood by non-transport specialists. A number of issues were discussed, including which countries should be used for trials, key stakeholders and how they should be involved, and promotion of RAI from Tier III to Tier II. The meeting was very useful for the team to understand the wider background and the direction expected for the project. The minutes of this meeting can be seen in Annex 3.

6.4 Meeting with Peter Roberts

The team also met Peter Roberts, who was the Lead Specialist for Infrastructure Services in the Central Transport Unit in the World Bank. He also headed the Transport Results Initiative and the thematic group for Transport and Social Responsibility, and oversaw the original RAI data collection in 2006. Peter confirmed that he had no detailed knowledge of the data, this was collected by World Bank members in each country from either the roads organisations or statistical offices. He had a team who collated and processed the data, including Shyam KC and Cordula Rastogi. The current project team have been able to contact Shyam KC, who is still with the World Bank. Peter does not know if the data is available and has recommended that Shyam KC would know better the detailed methodology used to collect it.

6.5 Meeting with Shyam KC

The team had a Skype meeting with Shyam KC at World Bank. He provided some interesting insights into the methodology used for the RAI in 2005/2006. The main method was household surveys, using LSMS data where possible. There were not specific questions in the surveys, but the RAI team had tried to use other questions that were relevant in order to interpret an approximate RAI. A more detailed study was made for Nepal, due to data availability, and Shyam also offered to provide links to his thesis, which was based on the RAI and may provide more detailed insights into the data collection methods. Some modelling was also used, based on revised models that John Hine had developed on a random roads approach.

6.6 Preparations for SDG promotion to Tier II

It has been learned from Umar Serrajudin, of the World Bank, that an attempt to promote the RAI from Tier III to Tier II will be made on 13th December 2018 by WebEx. The team commented on the draft Tier III work plan and tier reclassification summary, submitted to the IAEG-SDGs by Umar, which will form that promotion attempt. The next steps will be determined following the success or failure of this attempt for promotion.

6.7 Review countries for inclusion in trials

The team has started to review all ReCAP countries for potential inclusion in the TG2 trials. A detailed report of this is included in Section 8 of this report.

7 Revised Work Plan

The work plan has been revised to show a more detailed and focused programme, following feedback from various meetings and consultations during the inception period. The main changes are in Tasks 1 to 4, 6 and 7 which have been brought forward to try and allow the trials to start in the four selected countries. Some

tasks also now show a second and third bar which indicates potential revisions that may be necessary, following the trials and feedback from the countries and stakeholders. This revised programme can be found in Annex 4.

An additional table has been added to show the number and timing of trips to visit the stakeholders and trial countries. At present this is the best estimate, but will clearly depend on progress of the project and availability of stakeholders, trial country representatives, etc. This will remain flexible and subject to change throughout the project. This table can also be seen in Annex 4.

7.1 Deliverables

The scheduled deliverables for TG2 are shown below, and are in line with the Terms of Reference. Wherever possible deliverables will be submitted early, in order to facilitate the early start of trials in the four countries.

7.1.1 Inception Report

This report was submitted on 8th November 2018 and will be finalised in December 2018.

7.1.2 Progress Statement 1

This is the second deliverable and will include the progress made in establishing a coordinated measurement framework for the RAI and the final selection for the four trial countries. As mentioned earlier we will aim to also significantly progress additional tasks such as the framework/methodology and standards/quality assurance of data by this time, in order to facilitate the country trials to start as soon as possible.

7.1.3 Progress statement 2

This is the third deliverable and will include preliminary results from the trialling of the measurement framework, with initial key recommendations for working towards TG3, including progress on the funding sourcing and potential partners.

7.1.4 Draft Guidelines

The fourth deliverable will be draft guidelines on the overall strategic approach to measuring the RAI. This will comprise a framework and process for data collection, recording and submission to the IAEG-SDGs and for presentation at the stakeholder workshop. The draft Guidelines will clarify which alternative methods are acceptable, for example GIS spatial methods, household surveys, spreadsheet methods (such as that used in Bangladesh), open source data (as trialled by the World Bank), and others. This draft will also clarify who is responsible for doing what, when there are alternative measurements and which is regarded as the official RAI measurement for SDG Indicator 9.1.1. under certain circumstances.

7.1.5 Stakeholder workshop

This inter-regional stakeholder workshop will be planned to launch the draft guidelines for measuring the RAI. The workshop will also review the outcomes of TG2 and look forward to TG3. The workshop will be held towards the end of the phase, when the framework has been finalised and tested in four countries. There is no indication in the ToR as to the proposed number or nature of participants at the stakeholder workshop. Given the funding level allowed in the provisional sum we would expect the four trial countries to be represented, as well as ReCAP, key members of the project team and other stakeholders such as the World Bank. If the workshop can be piggy-backed onto an existing conference, this would be beneficial to all; at present the timing would coincide with the PIARC World Roads Congress in October 2019.

7.1.6 TG2 report

This report will describe the outputs and outcomes of TG2 and will include a detailed work plan for TG3, which will be reviewed by key stakeholders.

7.1.7 Scientific paper

The final deliverable is to draft at least one scientific paper/presentation for acceptance at an international conference. An abstract has already been submitted for the PIARC World Road Congress in October 2019, and it is anticipated that an interim paper can be presented at the T2 conference in Mozambique in July 2019, as this will be a relevant audience of rural road practitioners. Alternatively, there could be value in arranging a workshop at the T2 conference (to be held in Maputo, Mozambique, in July 2019) in order to get feedback on the relevance of the RAI framework to date.

8 Country Selection

A methodology for country selection of four ReCAP countries to take part in the initial trials was discussed at the kick-off meeting and was subsequently submitted to the ReCAP PMU on 28th October 2018. This methodology can be seen in Annex 1. The issue was also discussed at the meeting with DFID on 17th October 2018, for which the minutes are included in Annex 3.

In line with the methodology, a spreadsheet has been produced showing all ReCAP countries, with the key data areas that will be required and the country's history of involvement in the RAI. This can be seen in Annex 5. The team has started to consider countries for inclusion in RAI trials, using the spreadsheet of country data to assist this judgement on an objective basis. However, the final decision is likely to be largely subjective because it was agreed that a range of data should be trialled in order to test the framework in as many scenarios as possible. In the interests of completing the programme on time some countries with good mapping and easily accessible data should also be included.

The countries initially shortlisted from the spreadsheet are:

Africa:

- Ghana
- Malawi
- Mozambique
- South Sudan
- Sierra Leone
- Tanzania
- Uganda
- Ethiopia

Asia:

- Bangladesh
- Myanmar
- Nepal

The rationale for each is summarised briefly in Section 8.1:

8.1 African shortlisted countries:

- **Ghana:** GIS Mapping in Ghana was carried out in 2008 with assistance from DFID. It has been in the process of being updated for some time, but the status at present is not known. Road condition data has been collected again from 2017, after a hiatus of some years. Staff across the country were put through an intensive training programme in order to ensure that road condition data was collected uniformly in all districts. A local version of the RAI that was based on 2 km distance to an 'access' road was undertaken in 2017, but there are no details of the methodology used, although the map references data collected by CSIR using WorldPop data (Head et al, 2018 [in draft]). This seems to be the only data collected since the original RAI in 2006. Generally, data should be relatively easy to collect in Ghana, if it is available, and the Ministry of Roads and Highways (MRH) are generally cooperative with ReCAP.

- **Malawi:** Malawi has up to date and accurate GIS mapping, with potential for good data collection. Team members also have experience there and would be able to facilitate data collection. Malawi is currently being assessed for RAI as one of the 15 countries under the current World Bank RAI project. While recent work has been done, it would give an opportunity to trial different methods and perform sensitivity analysis on the results of those methods. It is also understood that the 2018 National Census is nearing completion, and so good up-to-date population data should be available soon. Malawi is also undergoing rapid urban change, as highlighted in the Malawi Urbanization Review (GSURR, 2016), and it would be interesting to look at the impact on RAI.
- **Mozambique:** Mozambique is a large country with many poorly connected areas, partly due to the extended conflict. Mapping is thought to be relatively good. A version of the RAI has been carried out recently, but was based on a 5 km distance, not a 2 km distance (Head et al, 2018 [in draft]). It was also one of the countries updated under the new methodology in 2016, but no data is available for Mozambique from the original 2006 study. The team have discovered that a spoft drinks company have been using GPS devices in all of their trucks to demonstrate the spread of their project, so it is possible that this could be an alternative source of information.
- **Sierra Leone:** Sierra Leone woud be an example of a country where there may be more difficulties in data collection. However, it is part of the current 15 country assessment being carried out by the World Bank, so there may not be so much value in repeating that work unless there are particular issues that should be challenged.
- **South Sudan:** South Sudan was suggested as a potential trial country in the meeting with DFID, because the small road network would in theory not take too long to update. However, civil war will make data collection difficult and the local roads organisation are unlikely to have up to date road conditions or GIS road mapping. The difficulty in getting data and determining what the data means through ground truthing would most likely exclude South Sudan as a potential trial country. Conflict countries generally have un-typical accessibility for set periopods of time, and measuring the RAI in this situation would not necessarily be a good example for other countries or even countries in conflict.
- **Tanzania:** Tanzania has a well-established database (DROMAS 2) that has been in operation for some time and is available online: http://dromas.tarura.go.tz/dromas_map. The rural roads agency TARURA is in the process of updating roads and their classifications; a study was carried out in 2008 which identified all district roads and classified approximately half of them, but it is recognised that the classification needs to be updated (SMEC, 2005). Recent road condition data should therefore be available for the majority of the network. GIS mapping is reasonable, and in the process of being updated. Tanzania was also assessed for RAI in 2016.
- **Uganda:** Uganda has a relatively good GIS maps for main roads, but the GIS mapping for smaller roads is less comprehensive. UNRA is generally cooperative and it is likely that data will be relatively easy to obtain. Stephen Vincent visited Uganda during TG1 and found that RAI was not considered, apart from during project appraisal. There is a possibility that UNRA is going to change its status in the near future, so this could cause some temporary issues with data collection and may mitigate against Uganda as a trial country. Uganda was assessed for RAI in 2016. JICA undertook a project in Uganda to map district and urban roads. A number of districts were completed and a report was produced in 2015 (JICA, 2015).
- **Ethiopia:** Ethiopia has previous experience with RAI and uses it to some extent (Vincent, 2018), with the Ethiopian Roads Authority using household surveys in a similar methodology to the RAI. Likely to be good data available to test the framework. RAI measurements have been made using GIS methods as part of the impact monitoring of a six-year rural access programme and extensive GIS mapping is available. Ethiopia was included in the RAI trials in 2016, and has recently become a member of the IAEG-SDGs.

8.2 Asian shortlisted countries:

- **Bangladesh:** Bangladesh has used RAI in the past using a spreadsheet method, as presented at the IRIM in Uganda in 2017, although at present they have moved to an indicator system that concentrates more on access to public services, rather than roads. RAI is however used to support the prioritisation of road improvement projects (Vincent, 2018). There is an extensive rural road database and GIS mapping is good for all roads, indicating that data should be relatively easy to obtain, although Bangladesh is quite unique because of the flooding that happens every year, where potentially good all-season roads are unusable because they are under water. Bangladesh was also assessed for RAI in 2016.
- **Myanmar.** Myanmar has never been assessed for RAI under the current methodology, and in that context may be an interesting example because there are no comparisons to be made, although an ADB project did attempt to measure RAI in 2014 ……. The availability and quality of data that could be collected is unknown, although there is potential for cooperation with World Bank, ADB and KfW in country. The team will attempt to gather more information before considering Myanmar as a potential trial country. Myanmar would be a challenging country to collect data for several reasons, including language, government bureaucracy and the localised conflicts around the borders.
- **Nepal:** The extent of the Nepal rural road network is well established, and GIS mapping includes all district roads, but not rural access roads (Vincent, 2018). It is not clear whether these rural access roads would classify under RAI definitions as classified roads. The UN carried out an extensive mapping project for many levels of indicator for the whole country in the late 1990's, but it is understood that this has not been updated. Road condition on rural roads is unlikely to be collected on a regular basis. Nepal is also quite a unique environment because of the mountainous environment. Nepal was also assessed for RAI in 2016.

9 Project Management

Following the kick-off meeting and other initial meetings with World Bank, DFID etc. the team now have a better understanding of the requirements for the project and the project management approach is described here.

It has become clear that all relevant stakeholders need to be consulted going forwards. In order to drive the process positively and make sure that all relevant parties are motivated to move the process forwards and are working as a team internationally, the project team will make early visits and try to gain a common understanding on the way forwards. This will include agreeing where the main responsibilities lie for taking the RAI forwards. Input from bodies such as the RAI Working Group will be vital to the process, because this group includes representatives from many of the key stakeholders, as well as experienced practitioners.

Because of the importance of this subject to the rural roads sector and because of the large number of stakeholders involved, it is essential that none are left behind as the project progresses. There are built in progress statements that will be published on the ReCAP website, but the team intend to actively inform all stakeholders with regular updates and links to publications.

In order to have a focus for this initial mobilisation, the team intend to produce a draft framework document for the Measurement Methodology Guidelines as soon as possible, and use this to get all relevant parties on board. This document could then be used at the centre of reaching agreement between World Bank, ReCAP, other MDBs, UN agencies and others on how the RAI/SDG Indicator 9.1.1 should be measured.

As custodian of the RAI the World Bank is a key stakeholder. However, the team cannot focus solely on the World Bank as there are many other development banks, donor partners and organisations that have a stake in the success of the RAI. If all of the interested parties are pulling together in the same direction, the project will have a much higher chance of success.

The TRL team are as shown in Table 2:

Table 2: TRL team

Designation	Name	Abbreviation	Days input
Team Leader	Robin Workman	RW	150
Senior Researcher	Paul Starkey	PS	90
Database Specialist (Data Specialist 1)	Kevin McPherson	KM	60
Data Analyst (Data Specialist 2)	James Zihni	JZ	40
HDM-4 Specialist	Greg Morosiuk	GM	10
Rural Transport / RAI Expert	John Hine	JH	10
Statistician	Sritika Chowdhury	SC	25
Geospatial / GIS Specialist	Justin Saunders	JS	20

As noted in the proposal, the time inputs of the team will remain flexible, and will depend on the countries selected for the trials and the nature of the framework and data collection requirements. If one particular team member has experience in a country and has good contacts there, it is more sensible for them to facilitate data collection than someone who has limited or no knowledge. So our time planning will develop to meet the needs of the project in the most efficient way.

The specific tasks for TG2 have been addressed in Section 4. The experts with prime responsibility for each task will be as shown in Table 3: A tick ✓ has been shown against the person who has the prime responsibility for managing that task, and a star ✶ has been shown against other team members who will support the person with prime responsibility.

As noted in the technical proposal, TRL has extensive backstopping facilities, so these will be utilised where necessary to supplement the expertise of the main team. This will be managed within the existing Terms of Reference, but if additional input is required and specifically requested by ReCAP, then a charge will be levied for that additional input.

Table 3: Task responsibilities

Tasks	RW	PS	KM	JZ	GM	JH	SC	JS
1 Establish framework for data collection	✓	✶	✶		✶	✶		
2 Consult with countries to use spatial data	✶	✓	✶		✶			
3 Agree data standards and QA measures for data	✶	✶	✓	✶	✶		✶	✶
4 Develop catalogue for all RAI data	✶		✓	✶			✶	✶
5 Establish mechanism for notification of new data	✓		✶	✶				
6 Investigate feasibility of using correction factors	✓	✶	✶			✶	✶	✶
7 Explore using a secondary rural access indicator	✶	✓	✶			✶	✶	✶

8 Specify framework to collect data and populate catalogue	⅄	⅄	✓	⅄				
9 Trial measurement frame-work in 4 ReCAP countries.	✓	⅄	⅄	⅄		⅄	⅄	⅄
10 Identify funding sources for Phase 3	⅄	✓	⅄			⅄		
11 Framework for scaling up RAI, strategy Tier promotion	⅄	✓	⅄			⅄		
12 Recommendations for way forward in TG3	✓	⅄	⅄		⅄	⅄		

10 Risks, Assumptions and Mitigations

Our approach to risk management includes the identification, evaluation, costing and prioritisation of risks, starting right from the bid stage of any project and following through the course of implementation. A risk log is established that is managed by the TRL internal project manager, where risks are highlighted and dealt with as soon as they become evident. This is followed up by coordinated and economical application of resources to minimise, monitor and control the impact of predicted and unforeseeable events, and indeed to maximise the realisation of opportunities that could arise from such events. The objective of risk management is to ensure that uncertainty does not deflect the project from its course and to minimise the necessity of additional funding necessary to mitigate risks.

Given the work and investigations carried out so far in the inception period, the risks and assumptions from the technical proposal have been revised below, and summarised in Table 4:

10.1 Risks and Mitigations:

1. If the RAI is promoted from Tier III to Tier II under the existing methodology, it is not clear to what extent this would commit the custodian to continue with the same methodology. Given that this project is designed to revise the methodology, this could be seen as a significant risk. Attempts will be made to clarify this with the IAEG as soon as possible.
2. World Bank is the custodian of the RAI, so it is essential that they are committed to the project and the outputs, such as the framework, methodology, guideline etc. There is a slight risk that the World Bank or other stakeholders will not be fully committed to the revised method. To mitigate this risk the team will liaise closely with all stakeholders for a sustainable outcome.
3. A solution is not found to reliably assess RAI. Given the importance of the RAI and the work that has already gone into developing it, the possibility of not finding a solution seems slim. However, if this does become a possibility it will be raised early on in the project and ReCAP will be consulted on the way forward.
4. Details of the methods used to collect road condition data, and/or the criteria used to assign condition categories, is not available. Interactions so far have not uncovered any detailed evidence of the methods used. However, the team will continue to establish contact with previous research teams and, where possible, the NSOs in relevant countries, to ensure that all possible avenues to determine the methods have been explored.
5. Previous RAI data is not available for the catalogue, or is no longer available in a readable format. This is still a possibility for the older data from 2006. The main author of the 2006 report, Peter Roberts, is not aware of any data repository, but other team members from that time are actively being sought. Otherwise the comments from the technical proposal are valid.

6. The data for the trial measurement framework is not available in the countries selected for the trial. Generally the trial countries will be selected based on the likelihood of data availability, but at least one country will be included that has likely poor data, so that all scenarios can be tested.
7. Funding for TG3 is not available. Funding options for TG3 will be explored early on in the project and given a high priority and the team will liaise closely with the ReCAP PMU to approach potential donors. However, if funding still proves difficult to secure, the team will liaise with the PMU to find a way forwards.
8. The consultant is specifically requested to attend overseas meetings or make overseas trips outside the remit of the ToR and the technical bid. Although this is unlikely, PMU will be consulted if the situation arises, as additional costs would be incurred.
9. The provisional sum for the inter-regional stakeholder workshop could be inadequate, depending on who is expected to attend. As the potential participants of the inter-regional stakeholder workshop are not defined it was not possible at bid stage to comment on the adequacy of the provisional sum. It is unlikely that this sum was designed to cover a participant from all ReCAP countries as it would not be sufficient, so it is assumed that the trial countries and a selected number of stakeholders would be invited. If ReCAP has a different perception of the workshop requirements, this will need to be discussed. The workshop timing is likely to coincide with the PIARC World Road Congress in October 2019. In recent discussions with the PIARC Secretary General it was confirmed that there may be scope to organise the workshop at the WRC. The team will follow this up in the near future.
10. Health and safety risks with working in LICs. TRL has a rigorous risk assessment system for overseas work, and this will be followed for all country visits. TRL uses International SOS to inform and advise on all security measures in countries where we work, so the team are confident that the TRL procedures are sufficient to ensure safety in-country.

Table 4: Table of risks and mitigations for TG2

	Indicator	Level of Risk		
No.	Risk	Likelihood	Impact	Mitigation
1	Committed to current methodology if promoted	L	H	Make stakeholders aware, not expected to be an issue
2	Key stakeholders not fully committed	M/L	M/H	Raise awareness, motivate stakeholders
3	A solution is not found to reliably assess RAI	M/L	M/H	Explore all avenues for spatial information
4	Methods used to collect RAI are not available in detail	M	M/L	Investigate with previous practitioners,
5	Previous RAI data is not available for the catalogue	H	L	Unlikely to be available, but less important
6	Data for trial measurement framework not available	L	M	Investigate likelihood of data before country selection
7	Funding for TG3 is not available in TG2	H	M/H	Be aware of funding needs throughout TG2 and motivate
8	Team required to travel outside of ToRs	M	L	Revise contract accordingly to include additional travel
9	Workshop provisional sum is inadequate	H	L	Link to other international events, such as WRC

10	Health and safety risks in trial countries	M	L	Take usual precautionary measures

10.2 Assumptions:

1. The provisional sum for arranging and conducting the stakeholder workshop does not include any allowance for administration. In this case if an agent/administrator is needed to arrange flights, etc. then we will apply for this to be paid for under the provisional sum. Costs will be minimised where possible by coordinating the workshop with the PIARC WRC event.
2. There is always a slight risk that participants of the inter-regional workshop will be refused visas or will be unable to travel. It is assumed that such issues will not impact on the workshop and that if flights are left unused due to such issues the costs will still be reimbursable, provided that the organisers had made all reasonable efforts to facilitate the visas/flights in good time.

11 Next Steps

The next steps for this research over the coming months up to the first Interim Progress Statement at the end of February 2019 are shown as follows.

11.1 Present overview of RAI at ReCAP event

The IMPARTS and First Mile ReCAP Transport Services event will be held in Arusha, Tanzania from 12th to 14th November 2018, inclusive. All ReCAP countries are invited, so this will be an ideal opportunity to liaise with the country representatives and sensitise them to the RAI project. The team Leader will make a presentation on RAI during the event and the team will attempt to gather as much information as possible, as well as gauging interest to be involved. Participants will be asked to prepare beforehand, so that they are able to provide relevant information.

11.2 Select trial countries

A shortlist of countries is shown in this report. Following feedback from the ReCAP Transport Services event a final list will be proposed, and agreed with ReCAP PMU. This is expected to be proposed by the end of November 2018.

11.3 Draft framework

It is essential that work starts on the draft framework as soon as possible, in order to facilitate the start of the trials. This has therefore been given an early start in the revised work programme. Following approval of the Inception Report, work will start on this task.

11.4 SDG promotion

The SDG 9.1.1 indicator is being put forward for promotion from Tier III to Tier II following the IAEG-SDGs meeting in November 2018. Depending on the outcome of this effort to promote the indicator, next steps will be proposed to either make a second attempt in the spring (if promotion is unsuccessful), or to plan for promotion to Tier I if it succeeds.

11.5 Consolidate historical data

Investigations have already started on identifying historical RAI data. Once sources have been confirmed the team will arrange for data collection. In some cases this will be possible remotely, but in others it may be necessary to visit the source directly, in order to establish the methodologies used to collect the data, as well as the data itself. Collection will hopefully start in December 2018.

11.6 Report on progress at the RAI Working Group meeting

The project will report on progress at the RAI working group meeting in January 2019. This can be done remotely, but there is a possibility that one or two of the team will be in Washington at the same time, so a presentation in person would be arranged in this circumstance.

11.7 Attend Transforming Transportation conference

The team are committed to attending the Transforming Transportation conference in Washington in January 2019 and presenting the project at a parallel session on Rural Access and Technology, Impact Evaluations and Indicators, being arranged by the PMU and DFID.

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Annex 1 Methodology for Country Selection

Proposed Approach to Country Selection in TG2

R Workman

27th September 2018

In response to the clarification requested in the Award Letter for GEN2033D, dated 12th September 2018, we provide the following clarification:

Introduction

As stated in our Technical Bid under 1.2 'Comments on ToR', we will look for ReCAP countries where data is most likely to be readily available in an appropriate format. To do this we will consult with ReCAP management, consultants, researchers and projects, those who were involved in previous RAI studies and existing contacts that TRL has in the 17 ReCAP countries. We will also enquire with ReCAP coordinators in the countries themselves, following introductions by ReCAP. It will not be possible to physically visit all potential countries during the selection process, but when they countries have been selected an initial visit will be undertaken as soon as possible to identify and collect data.

Methodology

It is assumed that a spread across ReCAP countries is required, so possibly two from Africa and two from Asia, or three from Africa and one from Asia. It is also assumed that at least one or two countries should be from the RAI revision in 2016, so that results can be directly compared.

Our methodology will be to develop criteria by which the potential ReCAP countries can be assessed, in order to make an objective selection. These criteria will be visited during the inception period, and finalised soon thereafter. The criteria are likely to include the following:

To initially develop a shortlist of countries;

- Data coverage: Countries that have data which is likely to provide as much coverage as possible for the whole country. As noted in the Status Review report for TG 1 very few countries have data that is county-wide, most available data is project specific.
- Data management: Countries that have established and functioning databases of relevant data, which could be road data, transport related data and socio-economic data. For rural roads the focus will be on road condition that can indicate whether a road is motorable or not, within the context of the RAI. The use of Intermediate Means of Transport could also have a bearing on the 2 km accessibility, so this will need to be considered during the country selection phase.
- Current GIS mapping: Countries that have comprehensive and up to date GIS based mapping of rural road networks will be given priority. Spatial data is important when considering the new RAI methodology and if a country has an established mapping system this will facilitate the data collection.
- As mentioned in the Status Review report, most countries collect similar data, but for different purposes. If there are countries where relevant RAI data is collected and is useful for the country themselves, and therefore has a higher chance of being sustainable, this would be an advantage for data collection in TG 2.
- Varied environments: Between the four countries a varied environment would be useful to test the methodology in different circumstances. For example, topography has a bearing on the measurement of RAI, because 2 km on flat terrain can be quite different to 2 km in mountainous terrain, which affects the accessibility.
- Varied issues: A range of rural access issues would also be desirable, such as varied modes of transport and use of non-classified roads.

- Alternative values: The scoping study report proposed the possibility of using correction factors, and calculating alternative values of RAI to reflect changes in modes of rural access. These possibilities will be explored during the inception period and provision will be made to include these factors in the initial data collection in four countries, if appropriate.
- Consideration will be given to selecting one or two countries that are likely to have limited data or data issues, in order to collect enough information to develop methodologies across a range of different scenarios.

To reduce the shortlist to four countries:

- As mentioned in the Status Review report for TG 1, it would be beneficial to involve the National Statistical Offices, who have the potential to provide relevant data for the RAI. We will attempt to contact these institutions for the shortlist of potential countries to see which have the most potential for providing relevant data.
- The use of mobile phone information is also a potential source of RAI data. It is assumed that countries on the shortlist will have well developed mobile networks, so the availability of mobile phone datasets and how they can be used could be another criteria for involvement. This will of course be subject to data confidentiality regulations.
- A judgement will be made on the likelihood of acquiring reliable and quality data to suit the RAI methodology, following the agreement of data standards and quality assurance measures.
- The final country selection will be made based on the above parameters, and in consultation with ReCAP and other stakeholders.

These criteria may be adjusted following the inception phase, and final criteria will be presented and countries selected following the establishment of the framework/methodology for RAI and the agreement of data standards and quality assurance.

Annex 2 Minutes of Kick-off Meeting

RAI kick-off meeting

28/9/2018

TRL

9.30am to 12.30pm

Present:

Annabel Bradbury (AB)
Stephen Vincent (SV)
Martin Greene (MG)
Greg Morosiuk (GM)
Ola Famuyiwa (OF)
Paul Starkey (PS)
John Hine (JH)
Kevin McPherson (via dial-in) (KM)
Robin Workman (RW)

1. Introductions

2. Stephen Vincent presentation

SV presented the scoping study for Phase 1. SV noted that P Roberts defined RAI in 2005, and he stressed that the RAI is not dependent on the method used to measure it, the method just determines the accuracy. HH surveys were used in 2006, amongst other methods, but WB later derided this method as inaccurate. An easy way to sustain the RAI would have been to include an additional question in all country level HH surveys, but this was never achieved.

SDG 9.1.1 is a simple statement of RAI. Now as SDG 9.1.1, other agencies are also associated with RAI, i.e. regional development banks, UN agencies, etc. Also UN Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs), and possibly country NSOs, who could be key to implementing the RAI. Lobbying is necessary to move up from Tier III to Tier II and beyond. Meeting minutes are posted on the IAEG-SDGs web page (link from ReCAP RAI page).

World Bank are key as the main custodian. Atsushi Iimi, economist with WB, is an important player. Umar Serajuddin is also very helpful as the WB interface between WB and UN-SDG processes. SV held meetings with WB and will pass on contacts and details of meetings, all of which is available in the TG1 final report. He stressed the importance of engaging with stakeholders, in person where possible. AfDB have used RAI as project level indicator, but data is only project specific. Overall, countries don't use RAI for their own planning purposes.

SV noted that there is anticipated to be a limit to the RAI that can economically be achieved in any country, as highlighted in the AICD paper by Carruthers et al (2008) summarising results from AICD study of 24 countries in Africa. so it is important that the team make sure that the RAI is understood as an indicator, not as a target. i.e. Myanmar, this would be worth commenting on. This is not always fully understood (talking about 5km RAI as a more realistic target). Scoping study proposed an additional RAI as a secondary indicator for alternative vehicle access. Correction factors could be applied if data is known to be unreliable. No new indicators until 2020, and realistically until 2025.

SDG indicator 9.1.1 is now the focus. For promotion to Tier II it is necessary to have an established and accepted Methodology, which should be simple, robust, etc. and evidence of plans to extend repeatable measurements to a much larger number of countries. Need to expand to more countries for promotion.

The boundary between urban and rural is important, and is constantly changing. WB use GRUMP database to define rural/urban boundary, but this is out of date/not well maintained (needs investigation).

PS asked whether there would be any conflict of interest in using SV as the project progresses. This was thought not to be a problem. SV has about 10 days available under the current agreement for handover.

3. Annabel comments

RAI Working Group (by teleconference) – Annabel will introduce the team, key are WB (S Ellis), ReCAP, AfDB, ADB, IsDB. Last meeting was held yesterday. Next meeting is in Washington in January, to coincide with the Transforming Transportation conference. Workplan is on website. How to gain momentum? As there are so many SDG indicators, 9.1.1 only gets 3 slides in the SDG indicator meeting! AB will send minutes of the working group meeting on 27th September 2018. The project team will be part of the working group for the duration of the project.

The November meeting in Stockholm will be an IAEG-SDGs meeting where the RAI working group's work plan will be presented. WB are including 14 more countries, but with same methodology. Some data is sensitive.

Can build on website, SuM4All, etc. Umar is a good contact. AB to send link to new WB data repository website.

SV suggested using this scientific base as a negotiating tool, help Atsushi and get him on board. No incentive for roads authorities to collect RAI data, but NSOs have the responsibility to provide data for SDG indicators, so better to focus on them. Find out how they are measuring now, suggest easy way for them to collect what they need. A HH survey question would need to be tailored for each country.

Liz Jones wants to meet the team on 16/17th October in DFID.

4. RW presentation

RW went through the team and tasks, highlighting issues from the proposal.

Inception period will include a detailed programme, work plan and travel plans. Present programme was discussed. A revised approach will be proposed, stakeholders will be contacted and the trial countries will be selected during this time.

RW also proposed the country selection process. SV suggested selecting a range of countries, including countries with known issues of data coverage or quality so that the methodology can be tested and applied to all scenarios. Needs repeatability.

Risks were also outlined and will be discussed in more detail during the inception period. Risks included:

- Lack of involvement by WB as prime custodian
- Details of data collection methods not available
- Previous RAI data not available
- ReCAP fatigue, no direct benefits: trial countries do not provide data, or is not available
- Funding for TG3 not secured
- Additional country visits required
- Provisional Sum could be exceeded for stakeholder workshop, details of stakeholder workshop are not yet clear.

5. Discussions

SV suggestions: NSOs should be considered and included, use AfDB data to calibrate country-wide, consider what other types of access are being measured, i.e. health centres, schools, etc. It is important to consider whether 9.1.1 should just be a single national figure, or whether regional values are also needed, and how this could be funded.

SV suggested that it is good to visit stakeholders in person, much easier to build trust and gain information.

KM will provide WB contact for mobile phone data.

Funding – RW questioned where funding would come from, as WB expect DFID to fund? Possibly private enterprise, Google etc. To be explored.

Programme was discussed, milestones were slightly changed so RW agreed to write to Edson to confirm the agreement so that it can be included in the contract.

- Milestone Progress #1 moved from month 4 (end of Jan 2019) to month 5 (end of Feb 2019)
- Milestone Progress #2 moved from month 8 (end of May 2019) to month 9 (end of Jun 2019)

SV was not aware of where the original RAI data is, or whether it is consolidated. Some AICD data is available on AfDB website, but this needs more investigation. Sensitivity analysis may be useful on data. SV also suggested putting together a "management spreadsheet" of all UN countries, identifying which are ReCAP (AfCAP / AsCAP), identifying which have upcoming HH surveys, whether they have collected RAI in the past, indicating data coverage, data quality etc. to help identify a plan / strategy for data collection.

SV stressed again the importance of an internationally agreed RAI Methodology document.

Regional web-page exists for RAI. Needs to be updated.

Annex 3 Minutes of Meeting with DFID

RAI (Rural Access Index) Task Group 2 meeting with DFID

17/10/2018

DFID Offices, Whitehall, London

10:00 a.m. to 11.30 a.m.

Present:

DFID	**TRL Team**
Elizabeth Jones (EJ)	Robin Workman (RW)
Colin Gourley (CG)	Kevin McPherson (KM)
	Pete Langdale (PL)
	Paul Starkey (PS) (independent consultant)
ReCAP	**RAI Task Group 1 Consultant**
Annabel Bradbury (AB)	Steven Vincent (SV)
Jasper Cook (JC)	
Dave Runganaikaloo (DR)	

Introductions and Background

1. EJ started by saying that DFID does not typically request meetings with project teams, but this meeting was held to emphasise the importance of the RAI to DFID, and to ensure that relevant stakeholders are consulted going forward. Also, that the RAI remains simple, and easily understood by non-transport specialists.
2. AB presented brief background to Task Group 1 work on the RAI, which set the scene for this current Task Group 2 work.

Presentation by TRL

3. KM explained that the project is in Inception Phase, Inception Report to be submitted by mid-November 2018.
4. A kick-off meeting was held in TRL offices in Crowthorne on 28th September, with ReCAP and the TG 1 consultant, which went through main project handover material, aims and objectives of the project, current status of the indicator, and identification of major stakeholders.
5. A telecon was held with Atsushi Iimi (World Bank) (AI) on 11th October to discuss the aims and objectives of the project. AI provided useful information on the status of the indicator, including a draft World Bank report "Measuring Rural Access: Update 17/18" discussing the RAI indicator in 15 countries (additional to the 8 countries covered in a 2016 report). The 17/18 report is still confidential, awaiting authorisation from individual countries prior to publication.
6. The importance of a long-term home for RAI database was emphasised. The WB are considering approaching SUM4All in this regard.
7. KM presented slides from the kick-off meeting, which outlined the tasks and work programme, during which there was discussion on the following key points:
    i. Country selection criteria for trialling. Criteria are still being developed, but will be ReCAP countries (possibly 2 African, 2 Asian) with interest to participate, with historical RAI data for comparison, a range of environments (mountainous, flat), range of perceived data types, and range of utilisation within the country, including good relationships with NSOs.
    ii. Country trials. Trials are currently programmed from April through to August 2019 (Ref. notes 10 and 11 below). DFID suggested bringing forward some trials to earlier in the programme if possible.
    iii. Stakeholders. DFID emphasized that ADB and AfDB were as important to the sustainability of the RAI as WB, and it is imperative that they are on board. ADB in particular is investing heavily transport at present. UNECA and UNESCAP are also important stakeholders that will need to be consulted / involved.

iv. Transforming Transportation. DFID advised that the project should aim to present at Transforming Transportation in Washington DC in January 2019. [Action: AB / EJ to discuss with World Bank to get RAI on the TT19 agenda, possibly as part of a wider rural access side event].
v. Other Conferences. DFID advised looking for opportunities to present at PIARC in Abu Dhabi (October 2019). AB has already submitted an abstract for PIARC, before TRL were contracted.
vi. IDA indicator status. DFID advised that if the RAI can get approval to be adopted as an IDA indicator, then it requires the development agencies / national agencies to come up with plans and funding for regular measurement.
vii. Databases. KM indicated that World Bank Digital Data Task force has a database for RAI 9.1.1 already established. AI has confirmed that are plans to expand it, and link it to UN database of SDGs. Further investigation needed to determine if it can be used on this project, and if possible expanded to include information on methodology, QA assessment, base data etc. Long-term sustainability of the RAI database is key, the ownership and responsibilities for update must be clear, and agreed with all relevant stakeholders. WB continues to add to the RAI database on an ad hoc basis as opportunities present themselves.
viii. IE Connect. DFID identified IE Connect (Impact Evaluation Connect) as another group that should be consulted who may have inputs to the development and sustainability of the RAI and its data. IE Connect is an initiative with DFID, World Bank and other MDBs. There may also be an opportunity for inclusion of a rural access / development indicator into IE Connect work and would be good for the team to meet them in Washington during any forthcoming visit. [Action: EJ to provide contact details].

8. SV noted that he had received an email from AB, with document apparently from Umar Serajuddin (World Bank) (US), containing requirements to move from Tier 3 to Tier 2 and Tier 1 status. [Note: US sent copies of submission for Tier 2 Reclassification of RAI indicator and Metadata on October 18th; AB reviewed and commented with regards to road condition as part of the indicator; US agreed those and indicated that the revised document would be submitted to IAEG-SDGs].
9. SV also indicated that although there is an annual meeting of the IAEG-SDGs to review indicators and agree on their status, there may also be a pathway for interim approvals. US informed AB that SDG 9.1.1 will now be presented to the IAEG-SDGs via Webex rather than at the November 2018 meeting. US will seek support from AB, Adam Diehl and Atsushi Iimi when SDG 9.1.1 is to be presented.
10. CG asked whether any countries had been tentatively identified for inclusion in trials. RW responded that one of the team, Justin Saunders, had recently worked for World Bank in Malawi on GIS mapping, and was confident that good mapping and spatial data would be available and easily accessible. Other potential countries for good data were Uganda and Ghana. CG noted that Ethiopia has already been collecting and using RAI data for some time, so this would also be a good trial country. SV confirmed he had visited Ethiopia as part of the scoping study.
11. South Sudan could be a good country where there is a small road network and RAI should be relatively easy to determine. Would allow the team to show progress quite quickly, if necessary.
12. The importance of a long-term home for RAI database was emphasised. The WB are considering approaching SuM4All in this regard. JC noted that there is an increasing interest in developing an additional rural mobility index within SuM4All and that cooperation with RAI is essential.
13. It was agreed that there is no room for slippage in the programme, and that it is important to determine and to meet key dates at which decisions need to be made for ratification and wider acceptance of the RAI.

Others

14. Need to get ADB and AfDB on board as partner agencies for SDG 9.1.1 (recognising that UNEP and UNECE still have a role as current partner agencies). Jamie Leather at ADB is supportive, and AfDB are new members of the ReCAP Executive Committee, so may also be co-operative. While the World Bank is the custodian agency, SDG 9.1.1 could become an indicator as part of IDA19 and the wider results frameworks of ADB and AfDB etc.
15. There is a new head of World Bank DEC. Jose Luis is retiring, to be handed over to Guangzhe Chen. Apparently well thought of in his previous position as Senior Director in water global practice.
16. Jean Francois Marteau is the recent replacement for Simon Ellis.

Summary of Actions

- AB / EJ to discuss with World Bank to get a RAI presentation on the agenda at Transforming Transportation in Washington DC, January 2019.
- EJ to provide contact details for IE Connect.

Annex 4 Work Programme and Country Visits

ACTIVITY and MILESTONE SCHEDULE

TITLE: Consolidation, revision and pilot application of the Rural Access Index (RAI)

No.	Month No.	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22
	Year	2018			2019												2020						
	TG1 (complete)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
	TG2																						
0	Inception phase activities																						
1	Establish Framework / methodology and revise																						
2	Consult countries and select																						
3	Agree standards and QA measures and revise																						
4	Liaise with donors for catalogue of existing data																						
5	Establish mechanism to inform WB of data																						
6	Investigate feasibility of accuracy range / correctior																						
7	Explore viability of secondary RAI / calc. values																						
8	Specify custodian framework for RAI																						
9	Trial proposed framework in 4 ReCAP countries																						
10	Identify funding sources for TG3																						
11	Draft framework for scaling up RAI																						
12	Recommnedations for TG3, applied in 30 countries																						
	Milestone Deliverables																						
1	*Inception Report*																						
2	*Progress Statement 1*																						
3	*Progress Statement 2*																						
4	*Draft RAI Guideline*																						
5	*Stakeholder Workshop & report*																						
6	*TG2 Report*																						
7	*Scientific Paper/Presentation*																						
	BREAK																						
	TG3 (to be decided on completion of TG2)																						
1	Liaise with ReCAP ctrys. for RAI data collection																						
2	Continue to get finaincial support for RAI																						
3	Implement uptake/embedment in 17 ReCAP countr																						
4	Support uptake/emnbedment in 30 countries overa																						
	Milestone Deliverables																						
1	*Progress Statement 3*																						
2	*Draft Final Report*																						
3	*Final Report*																						
4	*Scientific Paper*																						

KEY

Example Main tasks — Activity full — Invoice Milestone due

Example Milestones — Activity revision — Intermittent input

Potential visits in TG2

			Month No.	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22
	Destination		Year	2018			2019												2020						
			Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
	TG2	**No.**																							
	Washington	6				✓	✓						✓												
	AsDB Manila	3			✓			✓																	
	AfDB Abidjan	2						✓																	
	Other stakeholders	2				✓																			
	Country 1	3						✓				✓													
	Country 2	3						✓				✓													
	Country 3	3							✓				✓												
	Country 4	3							✓				✓												
	Conferences/workshops						✓						✓			✓									
	Total	**25**																							

Note: *Some trips will involve more than one team member, conference attendance will be arranged separately, as stated in ToR*

Annex 5 Country spreadsheets

Africa country spreadsheet

Data	DRC	Ethiopia	Ghana	Kenya	Liberia	Malawi	Mozambique	Sierra Leone	South Sudan	Tanzania	Uganda	Zambia
RAI 2006	✓	✓	✓	✓		✓		✓		✓	✓	✓
RAI 2016		✓		✓			✓			✓	✓	✓
RAI 2018					✓	✓		✓				
ReCAP coord. Agency	MITP	ERA	MRH	KeRRA	MPW	MRA	ANE	SLRA	MRB	TARURA	UNRA	RDA
Contact person	Billy Tshibambe	Alemayehu Endale	Patrick	Stephen Kogi	Suiwomo Harris	Francis Dimu	Luis Fernandes	Tamba Amara	Jeremiah Turic	Vistor Seff	Mark Rubarenzya	Dickson Ndhlovu
Likely Data Quality	F/P	G	G	G/F	F/P	G	G/F	F/P	P	G/F	G/F	F
Population Data Availability												
- National Census												
- Household Surveys												
- WorldPop												
Road Data Availability G/F/P												
- National	F	G	G	F	P	G	G	P	P	G	G	F
- Local												
GIS mapping (date)												
- National			2008			2016				2017		
- Local										2017		
- Length of rural network												
Likely data quality G/F/P												
- National Roads												
- Local Roads												
Mobile phone data Y/N												
Interested to cooperate? Y/N												

Key: G = Good, F = Fair, P = Poor

Asia country spreadsheet

Data	Afghanistan	Bangladesh	Myanmar	Nepal	Pakistan
RAI 2006		✓		✓	✓
RAI 2016		✓		✓	
RAI 2018					
ReCAP coord. Agency	MRRD	LGED	DRRD	DoLI	NTRC
Contact person	Baryalai Helali	Monzur Sadeque	Nandar Kyaw	Jeewan Guragain	Yousaf Zia
Likely Data Quality	F/P	G	F	G/F	G/F
Population Data Availability					
- National Census					
- Household Surveys					
- WorldPop					
Road Data Availability G/F/P					
- National	P	G	P	F	F
- Local					
GIS mapping (date)					
- National					
- Local					
- Length of rural network					
Likely data quality G/F/P					
- National Roads					
- Local Roads					
Mobile phone data Y/N					
Interested to cooperate? Y/N					

Key: G = Good, F = Fair, P = Poor