Terms of Reference
Data Systems Consultant
for an
Information Architecture Assessment and Metadata Development in Anguilla

Unit: Global Practice for Urban, Disaster Risk Management, Resilience & Land (GPURL)
Location: Position will be based in Anguilla
Contract: Short-Term Consultant
Dates: July 15, 2020 – June 30, 2021
Days: 60 days, 8 hrs. days

Background:
Caribbean countries are exposed to high levels of risk from meteorological hazards, which have significant negative impacts on their economic and fiscal stability. These natural hazards are exacerbated by the adverse impacts of climate change - intensifying hazard patterns and increasing stress on water availability, coastal investments, and livelihoods. The high costs of recovery and reconstruction have resulted in increased debt, unsustainable budgetary deficits, and unreliable funding streams for many countries in the Caribbean. Absence of macroeconomic stability makes it harder for Caribbean countries to implement poverty reduction policies.

Anguilla is a micro-state, one of the five United Kingdom (UK) Overseas Territories in the Caribbean. Lying at the northern end of the eastern Caribbean island chain, it covers 90 square kilometers. Anguilla has a GDP of US$ 323.81 million (2018) and an estimated population of approximately 15,397 (2018). While tourism and construction are the main economic drivers and employment suppliers in Anguilla, the economy is fueled by luxury tourism, offshore banking, fishing and remittances. Services, primarily hotels and restaurants[1] accounts for 76.3% of GDP, followed by industry which represents 21.3% and agriculture 2.4% of GDP. In 2017 Hurricane Irma caused severe damages and losses in Anguilla. One life was lost and homes as well as businesses across the island were severely damaged.

In the wake of Hurricane Irma, the Government of Anguilla (GoA) has requested assistance from the Caribbean Disaster Risk Financing Technical Assistance (DRFTA) Program administered by the World Bank Group, and financed by the European Union. This program presents recommendations for cost-effective, disaster risk financing strategies in the Caribbean. The DRFTA also aims to build institutional capacity to mainstream disaster risk financing principles in government operations and to make risk-informed decisions based on a concrete understanding of the exposure of the national Government to disaster losses derived from risk modeling tools. Under the DRFTA, the GoA is seeking to improve their capability to assess the social and financial impacts of disasters through the integration of information systems allowing the production of a statistical database necessary for quantification of disaster damage and loss.

The lead agency for this initiative is the Anguilla Statistics Department, which is the National Statistical Office (NSO) of the country. The mandate of the Statistics Department, is set out in Section 2 of the Statistics Act of 2000:

---

[1] A proxy for the measurement of tourism.

a. to collect, compile, analyse, abstract and publish statistical information relative to the commercial, industrial, social, economic and general activities and conditions of the people who are the inhabitants of Anguilla;
b. to collaborate with all other departments of Government and with local authorities in the collection, computation and publication of statistical records of administration;
c. to take any census in Anguilla; and
d. generally to organize a coordinated scheme of social and economic statistics and intelligence pertaining to Anguilla.

Fulfilling their mandate requires collaboration with many agencies within the GoA. Due to a lack of official policies around data sharing within the GoA, the NSO relies on ad-hoc arrangements with other agencies around the sharing of data. This has resulted in a lack of interoperability between various information systems and has required significant amounts of extra staff time to transform datasets into a form appropriate for the creation of statistics. In the wake of a disaster, these ad-hoc arrangements prove even more difficult.

To produce statistics in the aftermath of a disaster, the process for data sharing needs to be made as seamless as possible, and interoperable systems are key to this. In order to build resilience, access to good data—the right data to inform decisions—is crucial. However, the NSO does not have a clear picture of the available information systems and applications, and the degree to which they are interoperable from a technical, policy, or enterprise culture points of view. The desired outcome of this project would be to create a springboard from which a response can be launched by the GoA to dynamically respond to the need for data to make decisions in a timely manner, with the knowledge and comfort that the data used is quality; mainly coherent and consistent across the system after a disaster.

To this end, the World Bank Group (The Client) is seeking the services of a qualified consultant to undertake a series of tasks outlined within these Terms of Reference. It is expected that much of the work performed as part of these Terms of Reference will be in direct collaboration with Anguilla's NSO. The consultant will also need to work with other consultants and staff employed by the client and will be expected to report directly to the client as defined in the reporting arrangements within these Terms of Reference.

Objectives
The main objective of this assignment is to investigate the feasibility of integrating key systems within the GoA compile an inventory of data and associated systems and begin the process which will be used by the NSO to generate statistics quantifying post-disaster damages, losses and financial expenditures. The goals associated with this objective are:
- Identification of relevant policies and processes associated with data management in the GoA.
- Assessment of the capacity of key GoA departments in the provision of information necessary for the NSO.
- Identification of key datasets and systems within the GoA to necessary achieve the main objective.
- Creation of metadata necessary for the integration of data and systems.

Scope of Work
The consultant is expected to undertake the following tasks:

Task 1 - Review Background Materials and Develop a Work Plan

To assist in the development of a work plan, the consultant will review the following background documents:

a. UN-ESCAP Disaster Related Statistics Framework [2]
b. UN-ECLAC Assessment of the Effects and Impacts Caused by Hurricane Irma Anguilla 2017
c. Sound Statistics for Sustainable Development through Collaboration and Coordination" -- National Statistical System for Anguilla (Government of Anguilla, 2014).
d. GOA – ICT Strategy and Road Map & Population Registration and Identity Management System
e. Other relevant documents as provided by the client or the GoA.

The consultant will develop a work plan outlining how they will undertake the tasks in these Terms of Reference. The work plan will define the methodology for undertaking this assignment along with the tasks, timeline and final deliverables.
The work plan will be approved by the client before activities begin.

Task 2 - Information Architecture Assessment

The consultant shall assess the GoA agencies defined in the work plan in terms of their digital data management capabilities. This assessment will be used to guide the development a metadata catalogue described in Task 3 of these *Terms of Reference*, which will document individual datasets. The areas to be assessed and reported on by the consultant are as follows:

1. **Data Governance:**

   Data governance concerns the policies and legislation forming the enabling environment for data and information management in the GoA. The consultant will document whether policies exist, how they were brought into existence, whether or not they are being implemented successfully, and if any technical advisory or oversight groups exist which have influence over the creation and administration of these policies. The consultant will report on the following:

   a. Is there any legislation; either passed or in draft form, which applies to data governance practiced by this agency. For instance, Freedom of Information and/or Privacy legislation.
   b. Has the agency implemented any policies with regards to the collection, management and exchange of data; digital or otherwise. Examples may include policies which define who may use datasets and for what purpose as well as roles and responsibilities for the maintenance of datasets. The specifics of these policies will be defined in subsequent sections of these Terms of Reference.
      i. If so; how have these policies been defined; was it defined by the agency and/or have policy makers defined or endorsed the policies? Include any information

---

on either formal or informal policies used by the agency with regards to data governance.

ii. If not; has there been any past attempts to define policies? Include any information available on past attempts at data governance including information on why these were not implemented.

c. Does the agency participate in any data governance bodies; such as steering committees, working groups or other similar bodies which work to define data governance processes? These can be inter-agency, national or international bodies.

d. Does the agency have any formal agreements (i.e. Memorandums of Understanding) with other GoA or other agencies (NGOs/Private Sector) with regards to data collection, management, exchange, etc. These agreements will be documented in detail in a later task.

2. **Data Management Protocols**

In this section, the consultant will report on protocols which are standard procedures concerning data lifecycle management, see the figure below:
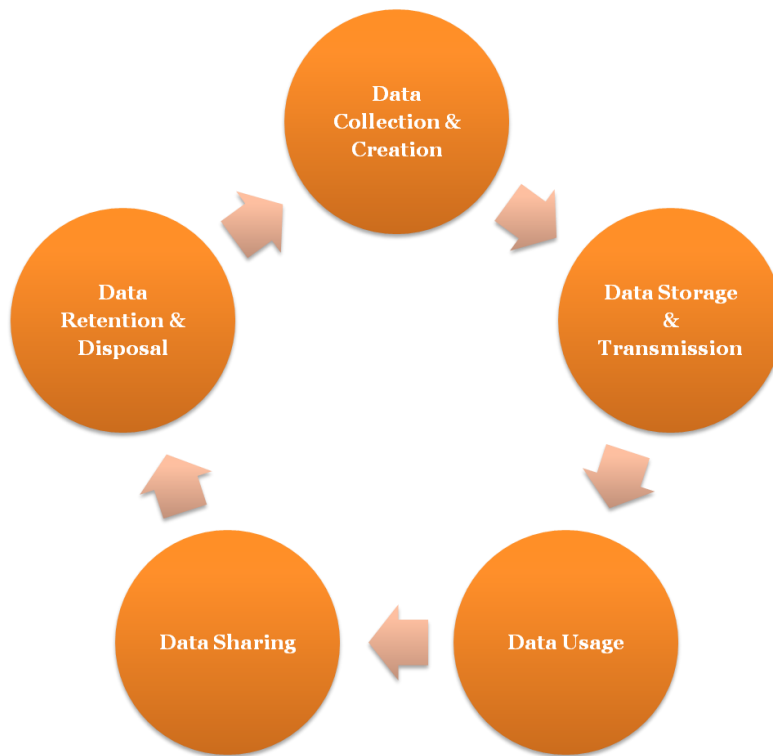

Figure 1: Data Lifecycle Processes

a. The consultant will indicate whether data lifecycle management is known and/or applied by the agency. If it is applied, document the processes. Documentation should include procedures for each data lifecycle process.

i. For data collection and creation, the consultant will indicate if there are defined roles and responsibilities for data collection as well as any standard procedures.

ii. For data storage and transmission, the consultant will indicate if there are access restrictions and security measures used around the storage and transmission of information, such as encryption. Also indicate if there are data backup and recovery procedures.

iii. For data usage the consultant will indicate if there any procedures to monitor data usage and gather feedback from end users.

iv. For data sharing, the consultant will detail all data sharing arrangements, both formal and informal, with other agencies both within the GoA and outside (NGOs/Private Sector). Indicate the details of the arrangement (agencies and datasets involved, frequency of sharing, method of data delivery, steps taken to transform the data for sharing, any liability statements/disclaimers provided when data is shared). Provide a diagram of all sharing relationships, including the agencies involved, datasets exchanged and the direction of information exchange (producer/consumer).

v. For data retention and disposal, the consultant will document how frequently datasets are erased and whether there are any defined disposal techniques (i.e. overwriting deleted datasets).

b. If processes are partially applied, the consultant will indicate and document which and how they are applied, as outlined above for each data lifecycle process.

3. **Personnel Capacity:**

For this section, consultant will report on personnel in the agency who perform roles related to data management. The consultant will answer the following:

a. Are these roles formally defined through job descriptions? Include relevant job descriptions. Indicate whether the data role is the primary role of the person.

b. If not formally defined, are there persons acting in this role informally? Include details on why this role has not been made formal, if possible.

c. Are the staff in the roles described above permanent or temporary (i.e. contract staff)?

d. Does the agency rely on personnel from other agencies for data management? Indicate which agencies and the role of the personnel from the other agencies

4. **Data Management Infrastructure:**

The consultant will report on the physical hardware and software used by the agency to manage data. Answering the following questions:

4.1 Information Formats:

a. Does the agency manage information primarily in a digital or paper-based format? Estimate what proportion of records are kept digitally vs on paper.

b. For paper-based information, the consultant will indicate if there are standard forms used and if there is a filing system.

c. The consultant will indicate if there are any planned or on-going digitization efforts for paper-based information along with the party responsible for carrying out these efforts (if known) and the expected date of completion.

4.2 Connectivity and Storage:
b. Is the agency connected to the GoA network and the Windows Domain? If not, indicate how internet connectivity is provided to the agency and if there are other domain services used.
c. Does the agency operate any servers for hosting data or use any services outside of the GoA network for this purpose? If outside services are used, indicate what services and how they are used.

4.3 Data Management Software:

a. What software is used by the agency for the management of data?
b. Indicate the storage format(s) for digital data (i.e. Microsoft Excel Documents, SQL database tables, shapefiles).
c. Estimate the total size on disk of digital data stored and managed by the agency with a breakdown of size by data format(s), if applicable.
d. List all relevant software packages along with the version of software, and the owner of the software.
e. The consultant will indicate whether there are regular software upgrades applied and whether there is someone designated as responsible for upgrading/updating the software or whether automatic upgrades are utilized.

5. **Data and Metadata Standards:**

Data and metadata standards concern the organization of data and information products within an agency. The consultant will report on the following:
a. Existence of data classification schemes and taxonomies (see Figure 2). As part of this task, the consultant will take note of the templates which the NSO has developed for the compilation of statistics from the target agencies. For instance, the NSO uses the International Standard Industrial Classification (ISIC)[3] for the collection and organization of information required for the System of National Accounts (SNA). The NSO has worked with data producing agencies in Anguilla to train them on how to structure their data in a way appropriate for the development of statistics.
   a. How is the data organized?
      i. Is there a consistently applied logical scheme for data organization (naming scheme, filing scheme, etc…)?
      ii. Is there a tagging or classifications scheme used for datasets?
      iii. Are there any templates utilized for data managed by the agency?
         1. Has the NSO produced a template for data managed by the agency? If so, is the template being used? If not, why?

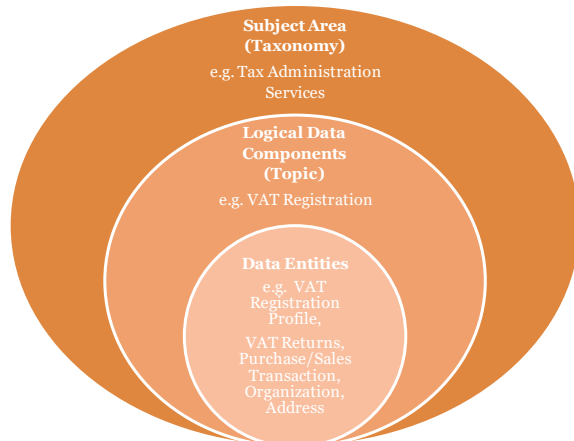[3] https://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf

Figure 2: Example Data Taxonomy

    b.   Does Metadata Exist?

          i.   Is there an international standards-based metadata profile used by the agency (i.e. Dublin Core[4] or LAMP[5])? Are all datasets managed by the agency documented as per the profile?

         ii.   If there is no international standards-based profile, is there an agency or GoA specific metadata profile used? If so, provide details.

    c.   Is there a data dictionary, register, or similar document which provides descriptions of datasets and associated attributes? If so, provide details.

Task 3 - Develop a Metadata Catalogue

In this task, the consultant will use the outputs from Task 2 of these Terms of Reference to begin the development of a metadata catalogue with the guidance of the Senior Statistical Data Management Consultant. This catalogue will be used to document all datasets managed by the NSO and the other agencies participating in the information architecture assessment. The resulting catalogue will provide a standards compliant way of documenting datasets which will be compatible with metadata catalogue server software and allow for the integration of data and systems.

3.1 Adapt a Metadata Profile

The consultant will work with the World Bank Task Team to define a metadata profile based on an international standard such as the Generic Statistical Information Model, SDMX, DCAT, Dublin Core or ISO 19115 or a combination of profiles appropriate for various data types. The consultant will note that there is currently no standard mapping between statistical and geospatial metadata profiles and both cover data types beyond statistical and geospatial information. Every metadata profile is based on a set of terms used to describe units of information. The choice of terms used in a profile is either defined by a national/regional standards agency; such as INSPIRE[6] or defined specifically for the agency/domain. If a metadata profile has not yet been defined for Anguilla, or the currently defined profile is not practical to

---

[4] https://dublincore.org/specifications/dublin-core/

[5] https://www.ipgh.org/assets/lampv2_eng.pdf

[6] https://inspire.ec.europa.eu/Technical-Guidelines2/Metadata/6541

use, the consultant will define a set of standards-based metadata terms and associated definitions and present these in a table format for review and approval.

The profile should be set up to document a variety of data types including documents, geospatial datasets, spreadsheets, and other data types as determined necessary in Task 2 of these Terms of Reference.

The profile will initially be limited to the minimum required for the agencies assessed in this consultancy. The consultant is advised to use a profile compatible with a Catalog Services for Web (CSW) server such as pycsw[7] or a similar statistical standards-based metadata server.

At minimum, the metadata profile assembled should allow documenting the following:

- Dataset name
- Dataset creator
- Dataset owner
- Responsible Agency
- Creation date
- Last updated
- Format
- Sharing terms and restrictions
- Keywords/Tagging
- Applicable licensing terms/copyright
- Description/Abstract
- Dataset location (URL and/or Physical Address)
- Attributes and Attribute types and definitions

3.1.2 Develop a Metadata Workbook

The consultant will use spreadsheet software to assemble a metadata workbook based on the profile developed in Task 3.1.2 of these *Terms of Reference* and the inventory of datasets from all agencies participating in this assessment. The workbook will contain a spreadsheet with rows corresponding to individual datasets and the columns corresponding to metadata tags from the profile. The spreadsheet will also contain hyperlinks to the datasets where they are available through the GoA network or through the general internet, where possible. The spreadsheet will contain validation and filtering capability to allow for sanitized input of metadata and searching.

The workbooks will also contain spreadsheets with; definitions of the metadata tags, and possibly mapping between statistical/geospatial metadata profiles/tags.

3.2 Assist with Training GoA Officers on Metadata Maintenance

The consultant will work with the World Bank Task Team provide training to government on the maintenance of the metadata worksheet including searching, entering, and updating metadata. It is expected that the consultant will assist in the provision of a manual of standard operating procedures for metadata maintenance for training participants.

---

[7] https://www.ogc.org/standards/cat

Task 4 - Assist with the Integration of Datasets to Produce Statistics

The consultant will work together with the Senior Statistical Data Management Consultant, to identify datasets required to produce statistics for the assessment of post-disaster damage and loss. For reference, the UN-ESCAP Disaster Related Statistics Framework provides a series of statistical tables (as Annexes) which document the social and economic impact of disasters. The PDNA produced in the wake of Hurricane Irma also contains examples of statistical information which needs to be derived post-disaster. The feasibility of using datasets identified in Tasks 2 and 3 in these Terms of Reference to produce statistical tables similar to those presented in the UN-ESCAP Framework will be investigated by the World Bank Task Team. If found to be feasible, the consultant will support the creation of the tables.

Task 5 - Final Report

The consultant will assist the World Bank Task Team in the composition of a final report documenting the process and outcomes of this project.

Expected Deliverables

Task 1:
- Approved Work Plan

Task 2:
- Completed Information Architecture Assessment for all agencies as per the approved work plan. Presented as a written report.

Task 3:
- Approved Metadata Profile with a Terms and Definitions table.
- Completed Metadata Worksheet for all agencies as per the approved work plan
- Training manual for metadata worksheet

Task 4:
- Inputs for the integration task, as required by the Task Team Lead and other team members.

Task 5:
- Inputs for the final report, as required by the Task Team Lead.

Travel: The assignment may include travel to client countries as required under the task assigned. Travels and expenses will be paid in full by the World Bank.

Required Qualifications

- Master's Degree, or equivalent, in Computer Science, Statistics, Economics, Information Systems, Business or related field. A Bachelor's degree, or equivalent, and at least 5 years of relevant professional work experience may also be considered.

- At least 5 years of professional work experience in a data systems and management, statistics, economics, and/or programming role.

Preferred Qualifications

- Demonstrable professional experience in business analysis is an asset.
- Demonstrable professional experience in data management and/or data science is an asset.
- Experience with Statistical Information Systems and/or data standards is an asset.
- Experience with metadata standards is an asset.
- Experience in the Caribbean region is an asset.

Reporting Arrangements

The consultant will work in collaboration with the World Bank Task Team for this assignment as well as the Government of Anguilla's Statistics Department.

The consultant will be expected to report regularly to the TTL and the Task Team on their progress and flag any obstacles which may hinder the completion of tasks as soon as they come up.

The client's Task Team Lead (TTL) for this assignment is Ms. Mary Boyer. Payments will be authorized, based on the successful completion of expected deliverables, by the TTL.

Duration and Estimated Time Input

The duration of the consultancy is 60 working days and is expected to start in October 2020

The closing date for applications is August 3, 2020.

Application Submission
Applications headed with the reference "**Data Systems Consultant – Anguilla"** should be submitted directly to the contact details below:

mboyer@worldbank.org