Terms of Reference

Developer: O&E Model Interface

Title: Developer: O&E Model Interface

Contract type: Consultancy

Org. Unit: ARC

Duty Station: Remotely based

Background:

Emerging infectious diseases pose an increasing threat to health and economic development in Africa. In the past few years, the international community has moved towards a robust and well-coordinated response approach towards public health emergencies. Despite this, and other improvements in the increased speed of detection and response, rapid deployment of medical countermeasures and vaccines, the presence of timely access to funding in respect to many PHE remains unpredictable. In the circumstances where funding is secured, it is largely on an *ad hoc* basis and after occurrence of an event of a given magnitude. Slow and unpredictable funding amplifies both the risk and impact of outbreaks. Any delays in mounting an effective response leads to escalation of outbreak with sustained transmission leading to loss of life, socio-economic disruption of the communities and negative impact on the nation's development agenda.

The African Risk Capacity Specialized Agency of the African Union[1] (ARC) provides financial tools and infrastructure to help African Union (AU) Member States manage natural disaster risk and improve the way predictable natural disasters are responded to on the continent by reducing the time it takes for assistance to reach those affected through early, local response. ARC achieves this by bringing together three critical elements that create a powerful value proposition for its participants: early warning, contingency planning and insurance. Together this package provides governments with access to immediate funds for early and planned responses to support vulnerable populations in the event of disasters. This vehicle allows ARC to help its Members

[1] *The ARC design and establishment phase was managed by the United Nations World Food Programme (WFP), under a MoU with the African Union Commission, and WFP continues to provide administrative services support to the ARC Agency through an administrative services agreement, including procurement services for the purposes of this tender and contract.*

build capacity to lead their own responses and reduce their reliance on the international appeals process for assistance over time. More critically, however, reduced response times save the lives and livelihoods of those affected and protect development gains, essential for growth and building a more disaster-resilient Africa for the future.

Following the Ebola crisis that ravaged West Africa, African Ministers of Finance requested the ARC Secretariat in March 2015 to develop a product to address countries' financing needs to contain outbreaks of viruses and diseases common to the African continent, and in the event of spread or secondary transmission.[2] In the case of Ebola, financing was only mobilized (depending on the affected country) 4-9 months after the first cases were reported. According to ARC and its partners' analysis, beginning the Ebola response just two months earlier could have reduced total number of deaths by 80%[3] in Liberia and Sierra Leone. In March 2014, the WHO issued an Ebola appeal for USD 4.8 million dollars to contain the virus[4]; by September 2014 the UN issued an appeal for nearly USD 1 billion to halt the spreading outbreak.[5]

The design of this product is based on four distinct but related workstreams, Risk Profile, Contingency planning, Disease model with trigger definitions and a cost benefit analysis. ARC's O&E programme is designed to address many of the problems inherent in early response for disease outbreaks and epidemic response by:

- Establishing a pool of cost-effective capital that can be rapidly deployed
- Ensuring countries acknowledge O&E by tying declaration of epidemiologic events reported through verifiable sources to immediate financial payouts
- Facilitating better health systems strengthening and preparedness (e.g. through better surveillance mechanisms and incentivized contingency planning)
- Promoting pan-African and sub-regional solidarity and coordination
- Linking the African Union's and its partners' investments in the strengthening of health systems, country preparedness and the African Centre for Disease Control into a full ecosystem for pandemic risk management on the continent.

To achieve this, ARC has contracted two firms (Metabiota Inc, and Health Systems Consult Limited) and one consortium (affiliated to Mailman School of Public Health, Columbia University) to support the development work through four workstreams;

- Risk profiles and preparedness/capacity assessments of in two countries (Guinea and Uganda);

[2] *Addis Ababa Resolution L9, 30 March 2015*
[3] *http://www.nytimes.com/interactive/2014/11/04/health/visuals-ebola-model.html?_r=1*
[4] *http://www.who.int/csr/disease/ebola/evd-outbreak-response-plan-west-africa-2014.pdf*
[5] *https://docs.unocha.org/sites/dms/CAP/Ebola_outbreak_Sep_2014.pdf*

- Contingency Planning Standards and Guidelines for O&E response in Africa as well as assistance in applying these guidelines to the development of operations plans for two pilot countries; and
- A methodology for modelling and indexing outbreak and epidemic risk that can eventually underpin parametric insurance contracts to ARC Member States.
- Economic and the Cost benefit analysis of the investment in ARC O&E product.

The project, currently in the pilot phase is implemented in three major phases, *Table 1*. The first phase (2018-19), is intended to develop O&E product tools and templates for production of risk models, disease spark and spread models, index and trigger design, and contingency planning standards & guidelines. Phase II (2020-2021) which will focus heavily on testing the viability, validity, robustness, and sensitivity of the tools and templates will see greater private sector engagement and roles in premium financing and live insurance. In addition to greater private sector engagement, will target more countries from 2 to up to 5. The third phase (2022-23) onwards seeks to scale up the O&E insurance product, in collaboration with strong private sector involvement and offer parametric insurance based on the product to more AU Member States, projected 12-15) in line with ARC Best-Practices. The African Risk Capacity is in the process of developing an additional product outbreaks and epidemics) to offer early and targeted financing to African Union Member Countries for selected disease pathogens (Ebola, Marburg, Lassa Fever and Meningitis). The O&E product is scheduled to be launched by June 2019. The product's selected diseases affect over forty countries in Africa, of which based on a purely epidemiological analysis, 15 have been identified as most suitable for the product, these are, ***Benin, Burkina Faso, Cameroon, CAR, Cote d'Ivoire, DR Congo, Ethiopia, Ghana, Guinea, Kenya, Mozambique, Nigeria, Senegal, Sierra Leone, Uganda*****.** Due to ecological, population dynamics, and health systems factors, these countries according to a WHO mapping are among the most prone to frequent public health outbreaks and emergencies of infectious nature.

Problem Statement:

ARC contracted Metabiota Inc, who put together a cross-disciplinary team of epidemiologists, actuaries, and data scientists to create an expansive set of event catalogs that reflects outbreak frequency and severity in Guinea and Uganda. This epidemic risk model incorporates the latest scientific knowledge to assess the risk associated with outbreak events. Analyses conducted based on model results explore the probabilistic variability of key parameters such as geographic site of disease emergence, transmissibility, how travel impacts disease spread, and public health preparedness. The risk management tools are developed from a workflow with three key components:

(a) derivation of global disease spread models structured upon current epidemiological science and high-performance computing,

(b) compilation of event catalogs that capture frequency and severity of plausible epidemic scenarios, and

(c) translation of these data into risk analytics tools.

ARC has received this as a package written in R code, with a user guide for installation. However there is no suitable user interface provided. Running the software therefore requires familiarity with running command line scripts, which is an inconvenience to those without this knowledge. A user-friendly interface is required to be able to run the software commands.

Aim and Scope of Work:

The aim of this assignment is to develop a user interface for the O&E disease Model, which will be used to run the scripts that were developed in R programming language in a user-friendly manner.

The scope of work includes the following:

1. the development of a software interface that will allow the ARC O&E staff to run the R scripts provided as part of the O&E disease model;
2. Ensuring that the source code is well documented and can be further developed by other developers;
3. Preparing a user guide that allows for the understanding and usage of interface developed.
4. Demonstrating the use of the interface to staff of ARC.
5. Display historic and near-real time data on disease outbreaks and epidemics for covered pathogens
6. Display results from model catalogs
7. Display subnational and pathogen specific preparedness metrics, capacities, etc

The user-interface can be developed in any suitable language, e.g. Java, C#, Python, etc.

Outputs:

The outsourced consultant(s) must deliver the following;

1. An operational user interface for the O&E disease model which can:
    a. Display historic and near-real time data on disease outbreaks and epidemics for covered pathogens;
    b. Display results from model catalogs;
    c. Display subnational and pathogen specific preparedness metrics, capacities, etc
2. Report outlined how the interface was developed (including the software architecture)
3. User guide for the interface;
4. Well documented source code for the software package developed.
5. One day training of ARC staff members.

Academic Requirements and Experience:

- *BSc / MSc Degree in Computer Science or related or Degree in Biostatistics / Health Statistics or related field with knowledge in developing graphical user interfaces*

Desired Skills and Competencies

- *6-10 years of demonstrable experience in developing graphical user interfaces in Python, C# or Java;*
- *Familiarity with graphical user interface for R programming language and RStudio*
- *Strong computing skills*
- *6-years' experience in relevant sector.*

Languages:

- Good oral and written proficiency in English, French is a plus

Duration:

The contract will run for an initial 3 months, renewable based on additional need.

How to apply:

Interested candidates should send their cv and cover letter to:
robert.agyarko@africanriskcapacity.org and copy henry.bosa@africanriskcapacity.org