

# REQUEST FOR EXPRESSIONS OF INTEREST (CONSULTING SERVICES – FIRMS SELECTION)

**COUNTRY – Trinidad and Tobago**

**OECS Regional Health Project**

Loan No. IDA-D5120

Project No.: P168539

**Assignment Title:** Consultancy for the Development and Implementation of the HL7/FHIR Interface Module in CARPHA instance of Senaite LIMS

**Reference No.** TT-CARPHA-257974-CS-CQS

The Caribbean Public Health Agency (CARPHA) has received financing from the World Bank toward the cost of the OECS Regional Health Project and intends to apply part of the proceeds for consulting services.

The consulting services (“the Services”) include:

Implement the HL7/FHIR protocol in the opensource SENAITE LIMS application and pilot data exchange with one CARPHA Member State; and facilitate the exchange of clinical information patient data among laboratory health information systems. The services are expected to take nine (9) months and intended to start in the year 2021.

The detailed Terms of Reference (TOR) for the assignment is attached to this request for expressions of interest. (See Annex A)

The Caribbean Public Health Agency (CARPHA) now invites eligible consulting firms (“Consultants”) to indicate their interest in providing the Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. The shortlisting criteria are:

- Interested firms must provide experience of having completed at least two (2) contracts similar in scope and nature with sufficient description (including location/country, name of the Employer/Client, type of services provided, period of contract, contract amount, starting and completion dates).
- Availability of appropriate skills/expertise among the consultant's staff to demonstrate technical capability of the firm. The following experts are required for the assignment: **Project Lead** and **Application Developer / Programmer**. The general qualifications, Experience requirements of key staff are provided in the Terms of Reference.

- The consulting firm shall be legally registered by the regulatory authorities and the following documents shall be submitted;

(i) A certificate of incorporation/registration for the firm.

The attention of interested Consultants is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the World Bank's "Procurement Regulations for IPF Borrowers" July 2016 ("Procurement Regulations"), setting forth the World Bank's policy on conflict of interest. In addition, please refer to the following specific information on conflict of interest related to this assignment (i.e., *3.17 of the Procurement Regulations*).

Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected.

A Consultant will be selected in accordance with the **Consultant Qualification Selection method (CQS)** set out in Procurement Regulation.

Further information can be obtained at the address below during office hours 8:00am to 4:00pm Mondays to Fridays. Expressions of interest must be delivered in a written form to the address below by e-mail by 10<sup>th</sup> December 2021.

Caribbean Public Health Agency  
Kern Cassell – Procurement Officer  
16-18 Jamaica Boulevard, Federation Park  
Port-of-Spain, Trinidad and Tobago  
Tel: 1-868-622-4261  
Fax: 1-868-622-2792  
E-mail: [casselke@carpha.org](mailto:casselke@carpha.org)

## **Terms of Reference**

### **Activity 1.2.2.4.1**

#### **Consultancy for the Development and Implementation of the HL7/FHIR Interface Module in CARPHA instance of Senaite LIMS**

##### **1. Background**

The Caribbean Public Health Agency (CARPHA) is a regional Institution of the Caribbean Community, formerly established on July 4, 2011 through the ratification of an Inter-Governments Agreement (IGA) by Heads of Member States of CARICOM in January 2013. The Agency is the Caribbean's collective response to addressing public health issues including those related to Communicable and Non-Communicable diseases; mental health, disaster response, injuries and violence and workers health.

In so doing, CARPHA has subsumed the functions of the previous five Regional Health Institutions (RHI) – The Caribbean Epidemiology Centre (CAREC), the Caribbean Food and Nutrition Institute (CFHI), the Caribbean Health Research Council (CHRC), the Caribbean Regional Drug Testing Laboratory (CRDTL) and the Caribbean Environmental Health Institute (CEHI). The agency began operation in January 2013 with Headquarters in Port of Spain Trinidad and offices in Saint Lucia and Jamaica. CARPHA'S mission is to provide strategic direction, in analysing, defining and responding to public health priorities of Member States to prevent disease promote health and respond to public health emergencies.

Approved in 2019, the [Organisation of Eastern Caribbean States \(OECS\) Regional Health Project](#) (RHP), is a five (5) year project funded by the World Bank. The overall objective of the project is to (i) improve preparedness capacities of health systems for public health emergencies in the OECS region, and (ii) provide a response in the event of eligible crises or emergencies. The OECS RHP is implemented by four CARPHA member states (Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines), CARPHA and the OECS Commission.

This Consultancy is in alignment with Component 1 of the OECS RHP Project, which is representative of the key requirements to support the implementation and coordination of the project. The project activities under Component 1 support efforts to improve health facilities and laboratory capacity. Component 1 is further segregated into Sub Components 1.1 – Health Facilities Infrastructure and Referral Networks and 1.2 – Laboratory Infrastructure and Capacity Building, whereby under this component, the focus will revolve around improving the resilience and capacity of select health facilities and laboratories to provide services to manage a public health emergency, including an emerging disease outbreak, extreme weather event or other disaster. This Consultancy is also expected to contribute towards the fulfilment of the expected outcome of “Improved Preparedness capacities of health systems for public health emergencies in the OECS region”.

Under the OECS RHP, the health systems, of the member countries are similar and in some instances, the gaps identified, in terms of the preparedness capacity are overlapping. Coming out of a rapid needs assessment carried out by the WB, in collaboration with PAHO, shortly after the

Zika outbreak, it was discovered that there were several inadequacies in the infectious disease surveillance, epidemic preparedness and response; one of those being, the *“lack of interoperability of information systems that hampers analysis and utilization of information for decision making and disease mitigation measures.”*<sup>1</sup>

In order to contribute towards an efficient and effective coordinated response to public health emergencies, an open source enterprise laboratory system would enable efficiencies in the areas of technology, performance and control. The platform would allow for equipment integration, automation, reduction of turnaround time, audit, tracibility and data insights.<sup>2</sup>

SENAITE is an open-source LIMS used in enterprise environments and is freely available on GitHub<sup>4</sup> under GNU General Public License v2.0. It currently ships with an integrated RESTful JSON API and has a modular design and clean user interface. It is a derivative work of Bika LIMS software, uses Plone Content Management System, and is built with Python. Health Level-7 (HL7) refers to a set of standards, guidelines, and methodologies by which various systems, in a healthcare context, can transfer clinical and administrative data between software applications of various healthcare providers.

With the recent implementation of a new online Realtime SENAITe Laboratory Information Management System (LIMS) at CARPHA, there is a need for interoperability within the Caribbean region to reduce duplicative data entry and enhance end user workflow. While some CARPHA Member States’ (CMS) LIMS/HIS systems already have HL7 interfaces, it is important to review the current state and examine the data transfer and identify gaps within the interoperability.

CARPHA seeks to implement the [HL7/FHIR protocol](#) to facilitate information exchange between CARPHA SENAITe LIMS application to the (CMS) Laboratory Information Management Systems (LIMSs), for example, SchuyLab LIMS. CMS with LIMS will be able to electronically send sample information to be tested by CARPHA from their LIMS application. CARPHA will perform the requested test on the sample submitted and send the results electronically to the CMS LIMS application using the HL7/FHIR protocols. The data to be transferred includes patient demographic information, including signs and symptoms; submitted with the biological samples for testing.

After testing, CARPHA will submit the results to the sender via the application using the HL7/FHIR protocols.

- i. The solution should establish interoperability between CMS LIMSs and CARPHA, allowing CARPHA to send and receive relevant information between member states’ LIMSs.
- ii. The solution must allow the verification and validation of data.

## **2. Objective(s) of the Assignment**

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<sup>1</sup> World Bank IDA Project Appraisal Document – OECS Regional Health Project

<sup>2</sup> Senaite Enterprise Open Source Laboratory System

The **objectives** of this consultancy are to develop and implement the following

- i.* Implement the HL7/FHIR protocol in the opensource SENAITE LIMS application and pilot data exchange with one CARPHA Member State; and
- ii.* Facilitate the exchange of clinical information patient data among laboratory health information systems

The **purpose** of this consultancy is to ensure that the requisite elements and commitments are in place to provide support for the laboratory data management and monitoring capacity.

### **3. Scope of Services, Tasks (Components) and Expected Deliverables**

To develop and implement the HL7/FHIR protocol to facilitate exchange of data between the CARPHA SENAITE LIMS application and pilot data exchange with one CARPHA Member State (CMS):

- i.* Engage in an initial briefing with relevant CARPHA personnel to discuss the scope of work to be undertaken, the approach, and any other issues about the Project upon commencement of the Consultancy.
- ii.* Assessment and Gap analysis of requirements: Conduct thorough requirement analysis of all participating systems and facilitate data exchange in a standard format from multiple formats (i.e. API, HL7, FHIR, Fast Healthcare Interoperability Resources, etc.). The system should have the flexibility to take data in batch mode or real-time mode based on the need and status of the peripheral systems.
  - a.* The analyst performs a gap analysis based on the client's current information system environment and the new system to be implemented. The gap analysis guides the conformance profile that defines the interface.
  - b.* Scopes the interfacing project.
  - c.* Complete interface specifications
  - d.* Sign Off interface specifications
- iii.* The solution should facilitate interoperability between CMS LIMSs (e.g. Schuyllab ) and CARPHA LIMS (SENAITE), allowing CARPHA to send and receive relevant lab sample information between member states LIMSs using the HL7/FHIR protocol.
- iv.* The solution must allow the verification and validation of data, including error correction.
- v.* The solution should allow the exchange of data in different formats where HL7/FHIR protocols are available. e.g. CSV,txt etc.
- vi.* The Firm must implement all necessary security to ensure data security compliance, including user role-based authorization.
- vii.* The solution must maintain audit logs of transactions.
- viii.* The solution must implement open-source software.
- ix.* Coding and Configuration: Solution Design, System Customization, and development for all components to achieve the above.
  - a)* Uses the Sign off interface specifications and other documentation (such as database mapping) to code and/or configure the interface.
- x.* Simulation Testing:

- a. Validates the interface against sample — read simulated — messages. Once the interface can successfully send and/or receive simulated messages under test conditions, it is implemented to the test site for integration testing.
  - b. Create and run tests with clinically realistic data, based on your messages.
  - c. Create test data from production data, removing confidential patient data and protected health information
  - d. Send and receive text messages; simulate your production environment
- xi. Implementation Go-Live:
  - a) Implement the production system.
  - b) Monitor the interface intensely, to fix issues as they arise.
- xii. Post Implementation Support:
  - a. After live implementation, provider IT teams need to ensure the interface continues working as expected, fixing all bugs.
- xiii. The final report must be provided along with the corresponding invoice and application source code uploaded to the GITHUB (Repository).

NB – A Schematic Representation of interoperability between CMS LIMSs and CARPHA can be found at Appendix I.

#### **The Expected Deliverables are:**

##### **Result 1: Inception Report, including a detailed Workplan, developed and submitted for the approval of the IT Manager**

- 1.1. Engage in an initial briefing with the IT Team as well as other relevant staff of CARPHA to discuss the scope of work to be undertaken, the approach and any other issues pertaining to the Project upon the commencement of the Consultancy.
- 1.2. Discuss and agree on the approach and the methodology for the work to be conducted.
- 1.3. Prepare and submit for the approval of the IT Manager, an Inception Report which includes a detailed Workplan with the timelines for the specific project activities and the methodology for the activities
- 1.4. In the report, the Firm shall describe e.g. initial findings, including UI Designs, workflow, and Business Process Diagram/definition

##### **Result 2: Interim Progress Report, including details on the proposed activities, completed activities and recommendations, developed and submitted for the approval of the IT Manager**

- i. Engage with the IT team and report on the execution of activities outlined in the detailed Workplan

- ii. Describe the progress made in the development of the app; the demonstrate the explanation of the new app, the modifications to be made based on the comments made by the Client, as well as progress made in making the modifications and plans to complete the modifications

**Result 3: Draft Final Report, including details on the scope of work completed during the time of engagement, a summary of achievements and recommendations, developed and submitted for the approval of the IT Manager.**

- i. Prepare and submit for the approval of the IT Manager, a Draft Final Report which includes details related to the execution of the scope of work, the detailed workplan, achievements and recommendations.

**Result 4: Final Report, including details on the scope of work completed during the time of engagement, a summary of achievements and recommendations, incorporating comments from the engagement of the IT Team developed and submitted for the approval of the IT Manager**

- i. Prepare and submit for the approval of the IT Manager, the Final Report, incorporating the comments and recommendations.
- ii. Complete a pilot with one CARPHA Member State where samples for testing can be submitted electronically to CARPHA Senaite application and the result returned to the CARPHA Member State LIMS
- iii. The final report must include the application source code and detailed documentation uploaded to a source code repository such as Github.

#### **4. Team Composition & Qualification Requirements for the Key Experts:**

##### **(A) Key Expert – Project Lead**

##### **Academic Qualifications**

- I. Bachelor's degree in Computer Science, Software Engineering, Mathematics or Computer Information Systems.

##### **Technical Expertise:**

- i. Working knowledge of two or more programming languages, preferably in-demand ones such as HL7/FHIR, SQL, Java, JavaScript, C# or C++, Python, ZODB object database, PHP, Ruby on Rails, or iOS.

##### **Specific Experience:**

- i. Minimum of 3-5 years of experience in the use of programming language, including:
  - o An understanding of principles of secure, stable software design.

- An understanding of the software development process and lifecycle, including the design-develop-test-release-maintain cycle, and long-term lifecycle support and maintenance.
- ii. Exposure to and understanding of development methodology (Agile, Scrum) and development platforms or environments.

**General Experience:**

- I. Demonstrated experience working in an analytical environment
- II. Proven organizational, multi-tasking, and problem-solving skills.
- III. Proven organizational, project management, multi-tasking, and problem-solving skills.
- IV. Demonstrated experience with various computer systems
- V. Demonstrated experience with FHIR and HL7
- VI. Familiarity with the Open Source Environment
- VII. Demonstrated experience leading similar projects

**Languages**

- I. Excellent knowledge of English – written and spoken

**IT Skills**

- I. Ability to effectively use a computer and utilize software programmes such as Microsoft Office Word, Excel, PowerPoint, Outlook

**Other Requirements**

- I. Ability to work with the organisation's challenging expectations, including addressing urgent requests.
- II. Ability to work as a member of a team with good inter-personal communication skills.
- III. Familiarity with the CARPHA's mandate and activities in the Caribbean Region as well as with CARPHA Member States.
- IV. Experience in working in health care database shall be considered as an advantage

**(B) Team Member – Application Developer / Programmer**

**Academic Qualifications**

- I. A Bachelor's degree in Computer Science or related field. A working knowledge of programming languages such as HTML, Java, C++ and PHP.

**Technical Expertise:**

- I. Experience in application and software development.
- II. Knowledge of software design and programming principles.

- III. Knowledge of Laboratory Information management Systems and Health Information System.
- IV. Experience in project management.

**General Experience:**

- i. Experience in working in health care database shall be considered as an advantage
- ii. Ability to use programming language
  - a. Understanding of principles of secure, stable software design.
- iii. Understanding of the software development process and lifecycle, including the design-develop-test-release-maintain cycle, and long-term lifecycle support and maintenance.
- iv. Demonstrated experience with FHIR and HL7
- v. Familiarity with the Open Source Environment
- vi. Knowledge of various computer systems

**Languages:**

- i. Excellent knowledge of English – written and spoken

**IT Skills:**

- i. Knowledge of two or more programming languages, preferably in-demand ones such as SQL, Java, JavaScript, C# or C++, Python, ZODB object database, PHP, Ruby on Rails, or iOS.

**Other requirements:**

- i. Excellent written and interpersonal communication with meticulous attention to detail.
- ii. Excellent organizational, project management, multi-tasking and problem-solving skills

**5. Reporting Requirements and Time Schedule for Deliverables**

- I. The intended start date is March 2021 for a period of nine (9) months from this date.
- II. The assignment will be carried out under the direct supervision of the IT Manager at CARPHA, who will be responsible for approving all Reports of the Firm.
- III. Reports will be submitted in an electronic format to the IT Manager at CARPHA.

<b>Table 1 Reporting Schedule and Deliverables</b>		
<b>Name of Report</b>	<b>Deliverable</b>	<b>Timeline</b>
Inception Report	I. Report will be no more than 12 pages and will include summaries of meetings with CARPHA and other relevant staff II. Report will also include detailed workplan with the timelines for the specific project activities and the methodology for the activities.	2 weeks from start of the contract.
Interim Progress Report	I. In the Report, describe progress made with the execution of the scope of works, challenges encountered and action to be taken to address challenges as well as a summary of the data/information gathered and preliminary findings. II. The Report will be no more than 12 pages	4 weeks from the start of the contract
Draft Final Report	I. In the Report, the describe progress made with the execution of the scope of work, challenges encountered, and action taken to address challenges. II. The Report will be no more than 12 pages and will include as Annexes. III. Incorporate the Client's comments on the Interim Progress Report, including on the updated versions of the Manuals, into the Draft Final Report	One month before the end of the period of implementation
Final Report	I. Same specifications as the Draft Final Report. II. Incorporate the Client's comments on the Draft Final Report	Seven days after receipt of comments on the draft final report

## 6. Client's Input and Counterpart Personnel

- i. Services, facilities and property to be made available to the Firm by the Client include:
  - a. Access to the server (remote)
  - b. No office accommodation will be provided by the Client.
  - c. The Firm shall be required to provide their own personal computers (e.g. laptop or tablet) and Internet connectivity for use during this project
- ii. Professional and support counterpart personnel to be assigned by the Client to the Firm's team:  
None

## Appendix 1

Figure 1 – Schematic Representation of interoperability between CMS LIMs and CARPHA

