I. Summary of deadlines

The expected schedule for this application is outlined in the following table. Note that PATH reserves the right to modify this schedule as needed. All parties will be notified simultaneously of any changes by email.

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release of request for applications</td>
<td>15 Jan 2021</td>
</tr>
<tr>
<td>Confirmation of interest due</td>
<td>21 Jan 2021</td>
</tr>
<tr>
<td>Question and answer (submission)</td>
<td>21 Jan 2021</td>
</tr>
<tr>
<td>Question and answer (response)</td>
<td>25 Jan 2021</td>
</tr>
<tr>
<td>Applications due</td>
<td>28 Jan 2021</td>
</tr>
<tr>
<td>Application presentation due</td>
<td>2 Feb 2021</td>
</tr>
<tr>
<td>Applicants notified of decision</td>
<td>8 Feb 2021</td>
</tr>
</tbody>
</table>

II. PATH statement of business

PATH is an international organization that drives transformative innovation to save lives and improve health, especially among women and children. We accelerate innovation across five platforms—vaccines, drugs, diagnostics, devices, and system and service innovations—that harness our entrepreneurial insight, scientific and public health expertise, and passion for health equity. By mobilizing partners around the world, we take innovation to scale, working alongside countries primarily in Africa and Asia to tackle their greatest health needs. Together, we deliver measurable results that disrupt the cycle of poor health.

International development and global health represent one of the greatest opportunities for the impact of digital technologies on a global scale. New technologies, approaches, and tools are emerging daily, unfortunately into a fragmented and immature digital health market landscape that currently limits their promise to transform country health systems and accelerate and amplify progress towards national and global health goals. Learn more at www.path.org.

III. Project background

PATH’s Center of Digital and Data Excellence (CoDE) is working on a project funded by the United States Centers for Disease Control and Prevention (CDC) to develop, implement, use, and evaluate interoperable health information systems to achieve HIV/AIDS and TB epidemic control through improved health informatics policy, governance, workforce capacity, and systems under PEPFAR.

Under this award, PATH is working with CDC’s Health Informatics Team (HIT) under the Global Informatics Collaborative (GIC) to implement several organizational objectives, one of which is the establishment of the necessary policy, governance, and standards frameworks needed to support development of e-Health strategies, information systems, electronic health information exchanges (HIE), and human resources for health. The GIC Technical Assistance Platform (TAP) project is a step towards achieving a digital public health future. The focus of the GIC TAP in its initial year in operation is to address the following current fundamental challenges:
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1. Opening up existing health informatics data 'silos' within and across PEPFAR countries.
   a. Guiding national laws and legal provisions to support digital health informatics initiatives.
   b. Ensuring the confidentiality and security of patient information.
   c. Ensuring consistent HIE standards within and across PEPFAR countries to facilitate electronic data exchange.

2. Ensuring all Country Team leadership, partners, and processes are informatics-savvy.

3. Providing country staff with basic skills to manage informatics contracts and contractors.

4. Tracking and managing PEPFAR's informatics investments.

5. Monitoring and measuring health informatics development progress and impact.

PATH seeks an information technology vendor(s) to develop HIV Info - CS, a case reporting system to support HIV case surveillance (CS) in PEPFAR priority provinces in Vietnam. This will include the implementation of data exchange architecture that allows HIV case reports and subsequent sentinel events to be submitted electronically from multiple data sources into a case report repository, which will support a visualization dashboard (see Figure 1). The vendor(s) will be expected to work collaboratively with several technology partners based in and outside of Vietnam to enhance existing case reporting workflows to support public health CS of HIV in Vietnam. The vendor(s) will be expected to utilize HL7 FHIR and open-source technologies to implement the technical architecture as approved by PATH, US CDC Vietnam, and the Vietnam Administration for HIV/AIDS Control (VAAC) using agile software development methodologies.

IV. Scope of work

A. Objectives

The main objective of this work is to support the Vietnam Ministry of Health (MOH), VAAC, and US CDC Vietnam to upgrade systems and data reporting standards to create an open-source, standards compliant data exchange architecture for the HIV CS use cases, and to enhance existing case-based reporting system(s) using HL7 FHIR standards. To achieve this objective, the vendor may need to provide support and feature development in HIV Info. A secondary objective will be to ensure that this data exchange architecture can be utilized to support related use cases according to the other programmatic priorities of VAAC.

The successful vendor(s) is expected to apply to one or more workstreams in support of HIV case reporting workflows according to Figure 1 (System Components) and Figure 2 (Sequence Diagrams). Further technical requirements will be developed under the OpenHIE Implementation Guide for HIV Case Reporting (https://openhie.github.io/hiv-ig/toc.html).
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Figure 1. Case reporting workflows – System Components (Phase I).

Figure 2. Case reporting workflows – Sequence Diagrams.
These workstreams are:

- **Workstream 1 – Data Normalization Services**: The vendor will support the normalization from multiple data reporting systems. Priority data reporting systems include HIV Info, OPC Assist Online, eClinica and expand to provide capability for reporting from other systems (e.g. HTC-eLog and HIV IMS) in nine provinces. The vendor will develop extract, transform, load (ETL) processes as mediators within the interoperability layer to transform incoming data from point of service systems into a standardized (FHIR Questionnaire) data report, which will be sent to the Case Report Repository. The vendor will also support the development of mobile case reporting applications to support case reports from offline or facilities using paper-based workflows. For the mobile app development, the vendor is expected to make use of Google’s Android FHIR Structured Data Capture (SDC) library which provides user interfaces and data management services for FHIR Questionnaires.

- **Workstream 2 – Case Report Repository Infrastructure**: The vendor will support the implementation of a case report repository components (HAPI, Elastic Search, Kibana, and PowerBI) based on the Instant OpenHIE infrastructure using docker, Kubernetes. In the first phase of the work, the vendor is expected to work closely with the Instant OpenHIE developers to create Instant OpenHIE packaging of these components for deployment in Vietnam. This will include providing a de-identification service for removing personally identifiable information from the Case Report Repository before it is made available to the Data Mart. Subsequent phases of this work will include providing patient de-duplication services to the Case Report Repository by linking to a Client Registry/Master Patient Index which adheres to the PRIM standards and ensuring HIV lab results are reported into the Case Report Repository from LabConn and OpenELIS.

- **Workstream 3 – Data Visualization and Analysis**: The vendor will work with VAAC, CDC and other stakeholders on developing analytic tools and visualizations based on the Data Mart.

All workstreams are expected to proceed through three main phases as follows:

- **Phase 1**: February 2021 through April 2021
  - Design initial requirements gathering business model and functions and documentation (work with CDC, VAAC and other stakeholders).
  - Implement base system infrastructure using a microservice architecture (Instant OpenHIE).
  - Provide priority data transformation services for HIV Info, OPC Assist Online, and eClinica for case reporting with expansion to other systems in subsequent phases (e.g. HTC-eLog and HIV IMS).
  - Deploy prototype/demo version of visualization for testing and early feedback of visualizations to support CS programmatic priorities and to support data quality analysis of reporting systems. Power BI should be prioritized as a visualization tool.

- **Phase 2**: May 2021 through July 2021
  - Detail system architecture (with implementation planned in Phase III) for linking CS systems to the following services
    - Patient registry: to support record linkage and patient de-duplication services according to API in the PRIM profile.
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- Facility registry: to standardize facility metadata such as facility identifiers according to the API in the mCSD profile.
- Terminology service: to support access and centralized management to relevant codings and terminologies (e.g. ICD, LOINC, SNOMED GPS) according to the API in the SVCM profile.
- Provide user role, authentication and authorization services across CS components with Single-Sign On (SSO).
- Provide administration through system monitoring and management services.
- Plan for migration of provincial data from existing systems by developing a change management plan based on data quality and completeness assessments and documentation of current case reporting workflows.

Phase 3: July 2021 through August 2021

- Begin implementation of routine case reporting starting in two provinces with expansion of case reporting capabilities to nine provinces.
- Support the linkage to a Client Registry (and if applicable the Master Patient Index (MPI) ) and system as part of a larger identity management strategy under the system architecture detailed in Phase 2.
- Support the integration of one lab information systems with data sources as appropriate.
- Develop reports for the epidemiological surveillance of HIV / AIDS by following requirements as outlined in VAAC Circulars 09/2012/TT-BYT and 03/2015/TT-BYT and Circular 02.
- Support the integration of additional HIS system source as appropriate.
- Finalize user manual and administration guides.
- Develop plan to expand implementation to full cover all systems in the nine provinces as well as plans to expand to provide support for all PEPFAR-funded provinces.

The vendor(s) will assist PATH to build digital capacity for VAAC staff around data input, access, and use within CS for nine provinces. Several areas need to be addressed:

- Data entry must conform to the data standards adopted for the CS.
- Guidelines, standard operating procedures and consent forms must be developed that will govern the collection and use of sensitive data such as personally identifiable information (PII) and ensures data security while data are in transit, with emphasis on minimizing the use and collection of PII.
- Data sharing/use agreements need to be established with the respective system users and owners that will be providing data for the CS.
- Processes need to be put in place to ensure data completeness and accuracy. This may require the creation of data audit reports and supplemental training provided to staff on how to take corrective action to improve data accuracy based on the data audit reports.

All work undertaken that is of a technical nature must be accompanied with a quality assurance (QA) plan, including system integration and end-to-end testing. Applicants are required to unpack the approach
they envisage applying to QA for the work proposed and describe the approach in their response to this RFA. Tools and software used or developed must provide evidence of quality.

Testing must include tests that confirm that the system operates correctly as well as handles error conditions gracefully.

Applicants are encouraged to approach the implementation of solutions from a validation and verification perspective and will be required to outline their approach to testing, validation, and verification in their proposal. The successful applicant will be required to provide a documented QA and testing strategy and plan that outlines the QA approach and high-level testing scenarios that will be undertaken. Test case development can proceed once the QA strategy and plan is approved.

Applicants are encouraged to leverage, use, and contribute towards industry standards of testing, QA, and development. This includes using tools/approaches such as automated testing frameworks, regression testing, smoke testing, functional testing, integration testing, data-quality tests etc.

PATH will provide an initial prioritized requirements definition document for the CS as a basis for the selected applicant to update and maintain as a HL7 FHIR Implementation Guide. Applicants will be required to review existing documentation and provide a full set of technical documentation for any of the solutions designed and developed. This is inclusive of all business cases, requirements documentation (functional and non-functional), technical design documentation, basic product/solution hardware requirements and operational platform requirements, performance and scalability designs and tests. All technical work must be outlined in requirements documents (functional and non-functional) prior to development or undertaking work. These support the development of appropriate testing and QA approaches and documents the development of acceptance criteria.

Any systems interacting with other systems or tools that exchange data must provide a documentation set that outlines the following in order to facilitate integration into an enterprise setting that manages sensitive data:

1. The API definition and protocols and data exchange formats.
2. The network and data exchange protocols, ports, and endpoints.
3. A list of data that will be exchanged on each of the endpoints.
4. A full list of expected error codes and error messages that are associated with the exchange.

In addition to technical documentation, each system is to be supported with the appropriate operations documentation, namely installation and configuration documentation as well as a documented set of installation notes with accompanying check points to validate that all services/tools and leveraged services are installed and operating as expected. Applicants will be expected to develop training, support, and technical operation material that will facilitate the ability of technical users and administrators at the VAAC staff to troubleshoot and operate CS, processes and procedures as required. This is inclusive of administrator, technical-user, and end-user guides and ensuring that implementation teams have the appropriate information to leverage to support implementation and user training.
B. Responsibilities

Context and purpose:

- Work with the CS Technical Working Group (TWG) to understand the business need and functionality of the CS system and other data management systems such as eClinica, OPC Assist, and MPI, etc.
- Utilize this knowledge to create, upgrade, and refine the CS System for Vietnam to shared/exchange data into CS data warehouse following digital health international standard.
- Work closely with PATH staff, based both in and outside of Vietnam.
- Develop centralized national system for HIV case surveillance.

System development:

- Develop a national case surveillance system (web app) based on the existing management systems, such as HIVInfo, OPC Assist, eClinica, HTC-eLog, HIV IMS, or MPI and follow MOH regulations such as Circulars 09/2012/TT-BYT and 03/2015/TT-BYT.
- Develop the system with tentative timeline: seven months from 1/Feb/2021 to 31/Aug/2021.
- Develop the system based on open-source code.
- The CS system requires applied microservices architecture design for future smooth expansion and upgrade.
- Develop a user-friendly interface that can be easily accessed and used by health workers.
- Authorize access rights to ensure the confidentiality and security of patient information.
- Develop the patient ID codes for data extraction.
- Develop the application programming interface (API) to exchange and collect data with other health information systems (HIS) or HIV systems implemented in Vietnam.
- Deploy the CS system in up to nine PEPFAR-targeted provinces in Vietnam.
- Develop system analysis and standard operating procedures for health facilities.
- Develop HIV CS system according to data and software architecture as approved by PATH.
- Develop application programming interface (API) to exchange data with the national master patient index (MPI) and an open-source Client Registry using the HL7 FHIR API.

System transition:

- Train staff from the VAAC and provincial CDCs to use the CS system at provincial levels, using a training-of-trainers model.
- Hand CS system over to VAAC for ongoing management and use, including training on system maintenance, user, and system documentation and source code.
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Preference/advantages:

- Experience in development and implementation of national and subnational health information systems, particularly supporting HIV system for VAAC, is plus.
- Experience in implementation of at least two projects relating to microservice architecture.
- Experience in implementation of health systems using HL7-FHIR to facilitate data interoperability/exchange with relating systems.

C. Deliverables

The vendor(s) will deliver a case reporting system for CS including the following services:

- Manage patient ID information in alignment with the FHIR standards.
- Manage the medical and clinical terminology according to FHIR standards (e.g., Sharing Valuesets, Codes, and Maps [SVCM]).
- Manage user accounts for health service providers.
- Manage detailed CS information on a web-based platform.
- Ensure case reporting adheres to circulars supporting the right to view and extract reports and monitoring the health care operations of the whole system.
- Use a SSO module for user authentication and develop API and connection documents to the three parties to use the authentication module SSO.
- Conduct system monitoring and management (e.g., system hardware health check, services health check...).
- Define APIs and standardized documents are ready to connect and exchange with the third party (e.g. HIS, LIMS, OPC Assist, PDMA).
- Mobile (Android) case reporting data capture application using the Google FHIR Andoird Structured Data Capture library.

The HIV Info – CS system will include the following requirements:

- Allow for account management and authorization at different levels (i.e., national, regional, provincial and district).
- Provide automation scanning tool for data de-duplication and alert
  - Include testing frameworks for Case Report Repository security, privacy and data exchange requirements.
  - Applied Face recognition “eKYC (Know Your Customer)” for patient registry.
  - Store the system and data in the cloud in accordance with MOH privacy and security regulations.
  - Applied barcode for service order transfer letter.
  - Test and analyze results after piloting the system.
D. Timeframe
February 2021 – August 2021

V. Application instructions

A. Financial instructions

PATH will evaluate the quoted prices and hourly rates. No analysis will be performed on quotes determined as non-responsive or if the technical quote is determined to be technically unacceptable. The price/business evaluation will be conducted in accordance with the quoted utility-based solution and proposed labor categories, their rates and Evaluation Matrix. PATH will conduct an analysis to determine if all quoted prices are reasonable. This evaluation is conducted with the expectation of adequate price competition and will rely heavily on market forces to determine whether proposed prices are fair and reasonable. The comparison of proposed prices in response to this solicitation is the preferred and intended price analysis technique.

PATH will also compare the proposed prices to historical prices paid for the same or similar services and the independent government cost estimate. Other techniques and procedures may be used to ensure quoted prices are fair and reasonable. A cost realism analysis will be performed to determine whether the quoted Level of Effort is realistic for the work to be performed, reflects a clear understanding of the requirements and is consistent with the unique methods of performance set forth in the company’s technical quote.

Required elements

The Cost Application must include a budget narrative, detailing the cost and cost basis applied in generating the application and describe the reasonableness of each proposed cost. The Cost Application must also include a detailed budget that is itemized along the cost categories defined below. This detailed budget should be submitted in an unlocked Excel spreadsheet and must include the following information:

1. Personnel: at minimum, the budget should detail:
   o All proposed staff/positions with daily rates.
   o Total number of days in total level of effort according to key staff.
2. Itemization of all other costs (e.g., agency costs, service tax, administrative costs, supplies, etc.).
3. Estimated schedule of other anticipated expenses (travel, subawardee resources, supplies, outside resources, etc.).
4. Details of all subcontracting out of work, this includes proposed consultants as well as proposed subawardees.

The Cost Application shall begin with a summary budget detailing costs in the following categories:

<table>
<thead>
<tr>
<th>Description</th>
<th>Workstream 1</th>
<th>Workstream 2</th>
<th>Workstream 3</th>
<th>Total Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td></td>
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<tr>
<td>Fringe Benefits</td>
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<tr>
<td>Travel</td>
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<tr>
<td>Equipment</td>
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<tr>
<td>Supplies</td>
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<tr>
<td>Other Direct Costs</td>
<td></td>
<td></td>
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<tr>
<td>Contractual</td>
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<tr>
<td>Consultants</td>
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<tr>
<td><strong>Total Direct Costs</strong></td>
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<tr>
<td>Indirect Costs</td>
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<tr>
<td><strong>Total Project Costs</strong></td>
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</tbody>
</table>

**Special Note on Prohibition on Certain Telecommunication and Video Surveillance Services or Equipment**

Procurement of telecommunications or video surveillance equipment and services produced by Huawei Technologies Company, ZTE Corporation, Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, and Dahua Technology Company, or any other company, including affiliates and subsidiaries, owned or controlled by the People's Republic of China is strictly prohibited under this solicitation and applications will not be funded.

**Special Note on Indirect Costs**

Indirect costs are overhead expenses incurred as a result of the project but not easily identified with the project’s activities. These are administrative expenses that are related to overall general operations and are shared among projects and/or functions. Examples include executive oversight, existing facilities costs, accounting, grants management, legal expenses, utilities, and technology support.

If your organization includes indirect costs in the budget, you must provide a Negotiated Indirect Cost Rate Agreement with the US Government or three years of audited financials to PATH to validate the use of this rate.

**B. Technical instructions**

Provide a narrative on your technical approach to accomplish objective(s) identified in the Scope of Work identified in section IV, including:

- Description of technical approach which includes:
  - Problem statement and solution approach.
  - A description of how your solution will accomplish each of the subtasks in this application.
  - A description of how your solution will scale to growing needs of users across the globe.
o Potential obstacles and plans to overcome them.

- Notional workplan for your chosen workstream(s), aligned to the subtasks in this application with illustrative timeline to meet deliverables
  
  o This work plan should include illustrative results and describe specific interventions to achieve those results. The illustrative work plan should describe specific interventions (activities) planned for the relevant tasks and should include a timeline providing target dates for achievement of milestones and illustrative results.

- Identification of major internal and external resources.

- Past performance information sheets demonstrating.
  
  o Profile of relevant corporate qualifications.
  
  o Profile of relevant experience and examples of related work.
  
  o Applicants may provide any information on awards or certifications.

- Staffing plan accompanied by Curriculum Vitae (CV) for key technical positions.
  
  o Offerors must include a staffing plan in accordance with the Cost Application personnel requirements, including specific position titles and the approximate level of must for each position.

C. Evaluation criteria

The following is a list of significant criteria against which applications will be assessed. The criteria are listed in order of priority; however, they are not weighted.

1. Technical approach that conforms to all of the components listed in Section IV above (40 points)
  
  o Description of technical approach.
  
  o Timeline to meet the deliverables.
  
  o Identification of major internal and external resources.
  
  o Qualifications
    
    o Profile of relevant experience and examples of related work.
    
    o Staffing plan accompanied by CVs for key technical positions.
    
    o List of certifications possessed by each key technical personnel.
    
    o Number of years in business.

2. Experience - to be validated by past performance references (15 points).

3. Experience with health informatics standards (e.g. ICD, HL7 FHIR, LOINC, SNOMED), open-source technologies, and open-source software development practices - to be validated by past performance references (15 points).

4. Costs - as detailed in Section V (30 points).
D. Instructions and deadlines for application

PATH contacts

Procurement contact: Anh Ngo, ango@path.org
Technical/program contact: Dr. Hien Le, hienle@path.org

Confirmation of interest

Please send a brief statement acknowledging receipt of this solicitation and your intent to respond no later than 21 January 2021. Please send the confirmation to the contacts listed in Section V.D.1 above.

Application submission

Completed applications should be submitted by email to the contacts listed above. The subject line of the email should include the RFA number and the name of your organization.

We advise that you send files in commonly recognized Microsoft formats. We will not accept responsibility for resolving technical transmission problems with applications. A hard copy of the application should not be sent. Your application should only include information specific to accomplishing the scope of work. Additional information submitted outside of the application requirements will be reviewed at PATH’s discretion only. Elaborate materials, artwork, or other information not directly related to the scope of work are not suggested.

VI. Terms and conditions of the solicitation

A. Notice of non-binding solicitation

PATH reserves the right to reject any and all applications received in response to this solicitation and is in no way bound to accept any application.

B. Confidentiality

All information provided by PATH as part of this solicitation must be treated as confidential. In the event that any information is inappropriately released, PATH will seek appropriate remedies as allowed. Applications, discussions, and all information received in response to this solicitation will be held as strictly confidential, except as otherwise noted.

C. Conflict of interest disclosure

Suppliers bidding on PATH business must disclose, to the procurement contact listed in the request for applications, any actual or potential conflicts of interest. Conflicts of interest could be present if; there is a personal relationship with a PATH staff member that constitutes a significant financial interest, board memberships, other employment, and ownership or rights in intellectual property that may be in conflict with the supplier’s obligations to PATH. Suppliers and PATH are protected when actual or perceived
conflicts of interest are disclosed. When necessary, PATH will create a management plan that provides mitigation of potential risks presented by the disclosed conflict of interest.

D. Communication

All communications regarding this solicitation shall be directed to appropriate parties at PATH indicated in Section VIII. A. Contacting third parties involved in the project, the review panel, or any other party may be considered a conflict of interest and could result in disqualification of the application.

E. Acceptance

Acceptance of an application does not imply acceptance of its terms and conditions. PATH reserves the option to negotiate on the final terms and conditions. We additionally reserve the right to negotiate the substance of the finalists’ applications, as well as the option of accepting partial components of an application if appropriate.

F. Right to final negotiations

PATH reserves the option to negotiate on the final costs and final scope of work and reserves the option to limit or include third parties at PATH’s sole and full discretion in such negotiations.

G. Third-party limitations

PATH does not represent, warrant, or act as an agent for any third party as a result of this solicitation. This solicitation does not authorize any third party to bind or commit PATH in any way without our express written consent.

H. Application validity

Applications submitted under this request shall be valid for 90 days from the date the application is due. The validity period shall be stated in the application submitted to PATH.