



## Advancing OpenELIS Global Shelf-Readiness through Improved Quality Assurance

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### Overview

OpenELIS Global aims to improve its Shelf-Readiness through a transition from a manual software release testing model to a robust, comprehensive, and systematic automated testing process that will improve efficiency and reliability, reduce maintenance costs for the software, and facilitate re-use of OpenELIS Global code by community members. This investment will result in: adoption of the OpenHIE testing framework and tooling for automated testing of OpenELIS; collaboration with the OpenHIE Laboratory Information Systems Community of Practice (LIS CoP) to establish re-usable LIS interoperability test cases; and dissemination of LIS/LIMS software testing protocols, guidance, and learning resources which can be adapted by other global goods communities to improve software testing practices.

### Executive summary

OpenELIS Global is recognized as a leading open-source laboratory information system (LIS), which facilitates delivery of accurate and timely laboratory test results and data to healthcare providers, patients, and public health agencies. OpenELIS Global has been used for nearly a decade in Cote d'Ivoire, Haiti, and Vietnam, and as part of the Bahmni HMIS distribution. The government of Mauritius also recently adopted OpenELIS in its national reference laboratory to manage information related to SARS-CoV-2 diagnostics and pandemic response, and is scaling up to their national network of lab testing in the near future.

The OpenELIS Global team will employ the proposed investment from Digital Square to use the OpenHIE testing framework to develop and implement an automated testing framework for its software development cycle. Moving from manual to automated testing will improve efficiency, lower the cost of maintenance, and most importantly, increase implementer trust in the product. Adoption of a framework will increase the reliability and completeness of software testing. A more robust quality assurance process will help ensure that OpenELIS Global implementers can rely on the software from the moment they download it to the time they deploy it in laboratories.

The OpenELIS Global team plans to collaborate with the OpenHIE community to incorporate the OpenHIE test management platform and automated test tools into its quality assurance processes, using the OpenMRS quality assurance (QA) automated testing approach as our model. We will collaborate with the OpenHIE Laboratory Information Systems community (LIS CoP) to prioritize and develop LIS interoperability test cases around established LIS interoperability specifications published by the LIS CoP that can be reused by other LIS software in the OpenHIE architecture, specifically in the Instant OpenHIE project. In addition, I-TECH will leverage its expertise in creating high-quality training curricula to develop

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a learning session on automated testing for broader global goods consumption, including in the OpenHIE Academy, to aid in disseminating standardized test cases and promoting a shared foundation for quality assurance within the OpenHIE architecture.

## Consortium team

### **The Digital Initiatives Group at I-TECH (DIGI), University of Washington (UW)**

The project team is part of the International Training and Education Center for Health (I-TECH) at the University of Washington (UW). I-TECH is a Center within the UW Department of Global Health (DGH) that leads health systems strengthening initiatives in more than 20 countries. In December 2018, I-TECH launched the Digital Initiatives Group at I-TECH (DIGI), a global health informatics center within I-TECH and the UW DGH, under the leadership of faculty members Nancy Puttkammer and Jan Flowers. The DIGI team brings together experienced I-TECH informatics experts and staff with a broad range of expertise in setting global health informatics standards and leading global goods communities and products at the domain level, as well as, applying those in real-world settings in LMIC in a sustainable, scalable, replicable manner. In addition to the core team members, our center collaborates and harnesses expertise from faculty, staff, and students from the UW's Schools and Departments including Health Sciences, Computer Science and Engineering, Bioengineering, Information Sciences, Business and others.

Related to this proposal, DIGI has been the steward of OpenELIS Global development and national implementations in Haiti and Cote d'Ivoire since 2009 and 2010 respectively, in more than 75 national public health reference labs as well as in large-volume clinical laboratories. In addition, with funding from Digital Square Notice C, DIGI established integration between OpenELIS and OpenMRS using FHIR, and led and published the OpenHIE LIS-EMR architectural specification with the OpenHIE LIS Community of Practice. DIGI faculty and team members are leaders in the global goods communities at large, founding and actively leading the OpenHIE LIS Community of Practice; as well as, serving on the Board of Directors and in strategic leadership roles for both the OpenMRS and OpenELIS communities.

I-TECH also brings to the project the expertise in laboratory systems in LMIC, through our Laboratory Systems Strengthening (LSS) Team. Led by Dr. Lucy Perrone, a public health laboratory advisor specializing in infectious disease diagnosis, surveillance and response, and laboratory capacity building in LMICs, the team leverages partnerships within UW and with external collaborators globally on supporting laboratory capacity building. The team's mission is to improve laboratory operations for optimal patient care and treatment, disease surveillance and response, and biosecurity. The team has conducted training and mentoring in laboratory leadership and management, supported policy development for laboratories, and worked with reference and clinical laboratories on advancement toward accreditation. As part of reinforcing good laboratory practice, the team has also supported customization and implementation of LIS for improved information management within the laboratory. The LSS team is available to contribute expertise in the fit between LIS and laboratory workflows and systems to the proposed project.

Specific team members and their roles on the project are listed below, and the CVs of these team members are appended.

Jan Flowers, Faculty Co-Lead (Role: Principal Investigator): Ms. Flowers has led informatics organizations and teams for over 20 years, focused on technology policy and law, health information systems evaluation and maturity modeling, open source communities of practice building, health technology engineering and implementation, patient centered technologies and mHealth, and standards-based interoperability for improved care at the point of service, surveillance, and program monitoring. Ms. Flowers serves on the board of directors for both OpenMRS and OpenELIS Foundations, and the founder of the OpenHIE LIS Community of Practice, which develops and shares common standards and best

practices amongst the open-source LIS community. She holds an MS in Health Law and Policy from the University of California San Francisco jointly with UC Hastings Law School, and a BS in Psychology from the University of Washington.

Carli Rogosin, MIA, Senior Digital Health Specialist (Role: Project Manager- Work packages 1-3; Work Package 3 Lead): Ms. Rogosin is a specialist in software design and testing processes, and in strategies for human capacity development in digital health. Her expertise includes curriculum development, training, and evaluation, primarily in laboratory and health systems development and strengthening. She is skilled in designing new software features based on user feedback and managing the software quality assurance process. She has also worked on stakeholder engagement and sustainability for health systems projects. She led the capacity building component of the Zimbabwe Data Improvement Project and guided the team towards deployment and implementation and managed a project funded by PATH/Digital Square to create out-of-the-box solutions for data exchange between OpenELIS and OpenMRS and between OpenELIS and OpenLMIS. She holds a Master of International Affairs degree from Columbia University and is fluent in French

Casey Iiams-Hauser, OpenELIS Product Owner (Role: Technical Lead): With more than 11 years of experience leading OpenELIS Global, Mr. Iiams-Hauser leads the OpenELIS Global team in design, development and testing, as well as installation and deployment. He manages OpenELIS security upgrades, testing and release of OpenELIS. He holds his Master of International Affairs from Columbia University School of International and Public Affairs, and is proficient in French.

Christina White, Senior Digital Health Specialist (Role: Technical Lead): Ms. White is a software engineer with more than 10 years of experience in health information systems development, deployment, administration and support. She has experience translating clinical workflows into informatics systems requirements, integrating paper-based workflows into electronic systems, and health information systems standardization and interfacing. She also specializes in User interface/User interaction (UI/UX) design and development, and has collaborated on human computer interaction studies. Additionally, she has experience with health systems database architecting, MVC frameworks, development and execution of full scope testing protocols, registration modules, and lab information systems adaptation and implementation. Ms. White holds a Master's of Science in Cultural and Environmental Resource Management from Central Washington University and a Bachelor's of Science in Bioengineering from the University of Washington.

Greg Rossum, Senior Software Developer (Role: Developer). Mr. Rossum provides technical analysis and software development with OpenELIS, TrainSMART, and other open source software products as part of the DIGI team. He is the primary software engineer for OpenELIS, and led the effort to convert the OpenELIS Java framework from Struts I to Spring to enhance software security. He also contributed to the OpenELIS interoperability project funded by PATH/Digital Square to demonstrate interoperability between OpenELIS and OpenMRS using FHIR resources. He has worked on multiple health informatics projects in Haiti, Botswana, Namibia and Cote d'Ivoire. He holds a degree in Computer Science from the University of Calgary.

Lucy Perrone, Assistant Professor (Role: Laboratory Domain Expert): Dr. Lucy A. Perrone is a public health laboratory advisor specialized in infectious disease diagnosis, surveillance and response, and laboratory capacity building in resource-limited countries. Dr. Perrone has years of experience in these areas and has worked in multiple countries worldwide since 2009. Her areas of expertise include infectious disease diagnosis and surveillance, laboratory systems and capacity building, and improving human resources for health. Dr. Perrone is skilled in infectious disease epidemiology, evaluation of infectious disease surveillance programs, quality assurance of laboratory testing, developing international guidelines for the prevention and control of infectious diseases, as well as the training and mentoring of medical laboratory staff. Dr. Perrone is currently the Director of the Certificate Program in Laboratory Leadership and Management at the University of Washington.

## **OpenHIE Laboratory Information Systems Community of Practice (LIS CoP)**

The LIS CoP is an OpenHIE sub-community bringing together laboratory informatics experts and software teams to advance LIS/LIMS best practices and standards for use in digital health implementations. The LIS CoP collaborated closely with DIGI in Notice C in the OpenLIS-OpenMRS integration work that led to the publication of the OpenHIE LIS-EMR architectural pattern. The LIS CoP is co-founded by a DIGI faculty co-lead.

## **Background or Problem Statement**

OpenELIS Global is gaining traction as an open-source laboratory information system for use in LMIC. It currently operates in four countries, with the potential to expand to many more. Previous Digital Square investment has led to OpenELIS interoperability with the electronic medical record OpenMRS and the logistics and supply chain management system OpenLMIS. With the potential for more deployments at scale, OpenELIS Global seeks to improve the overall quality of its product through automated quality assurance processes in software testing.

The proposed work would take place principally in Seattle, USA, at the headquarters of the OpenELIS Global team. It would involve collaboration, primarily in terms of input and feedback, from globally disparate communities with significant membership from LMIC, including the OpenHIE community.

This project would be the first initiative to automate testing for OpenELIS Global, and once this work is completed, the basic automated testing framework would be finished. Ongoing work to add to the test case library and make iterative improvements would take place out of scope.

## **Digital Health Technologies**

### **OpenELIS Global**

Strong laboratory systems are critical for detecting outbreaks of infectious diseases, monitoring chronic diseases, and measuring pathogen resistance to antibiotics, among other clinical care and public health applications. Laboratory information systems (LIS) help ensure accurate, reliable, accessible, and traceable data. The OpenELIS Global software is an open enterprise-level laboratory information system built on open source web-based technologies that has been tailored for low-and-middle income country public health laboratories. The OpenELIS software serves as both an effective laboratory software solution and business process framework. It supports the effective functioning of public health laboratories for best laboratory practice and accreditation. OpenELIS is currently being used in two national scale implementations, in Haiti and Côte d'Ivoire, with more limited implementations in a handful of other countries and upcoming expansion to new locations.

OpenELIS Global runs on Ubuntu (16.04) LTS with PostgreSQL database. It has both HL7 and FHIR APIs for data exchange, and has standards-based interoperability built for exchange specifically with OpenMRS, OpenLMIS, and specific one-directional connectivity with a suite of laboratory test analyzers. More information regarding OpenELIS is available at <http://openelisglobal.org/>.

### **OpenHIE Test Management Platform**

OpenHIE utilizes the Cucumber Studio test platform for open source projects to be able to build the business test case and trigger automated test scripts for conducting comprehensive and systematic software testing. The test platform has solely been utilized by OpenMRS QA team thus far, founded and led by the DIGI faculty co-lead, and is still early in understanding its full potential. The test management

platform will require additional exploration and use by global goods community members such as the OpenELIS team and the LIS Community of Practice in order to become a de facto standard for the global goods interoperability test management platform.

## Use Cases and User Stories

### Use Cases

1. Testing and release of OpenELIS Global codebase by the DIGI stewardship team:

The OpenELIS development team currently employs a team of testers to manually test OpenELIS release candidates. After implementing this project, the majority of testing will be automated using a standardized set of test cases. The OpenELIS leads will coordinate and execute testing for each release candidate. The testing manager would set up the automated testing framework and support processes. Then, the team would check for any additional features that require new test cases, adding to the system if necessary. Then the testing manager would run the automated tests. Individual story testing may still take place manually. Overall, the automated testing process will likely reduce cost and time to complete testing by a significant measure, with testing results of a higher level of accuracy and consistency, especially across releases.

2. Branching OpenELIS Global codebase for specific local needs:

OpenELIS Global is open-source and available to the public. A party who wishes to download and deploy OpenELIS Global, or fork the code, could participate in the Testing Framework training and/or access the training materials and then implement the OpenELIS Global testing framework and test cases as part of their implementation.

3. Implementing a LIS other than OpenELIS Global:

Developers of any other LIS could participate in the Testing Framework training and/or access the training materials. They could then adapt or directly implement the generalized test cases as part of an automated testing set-up for their LIS software.

4. Learning about OpenHIE and Testing Frameworks:

Anyone interested in testing frameworks or particularly in the OpenHIE Testing Framework could participate in or have access to the training and associated materials through various dissemination channels. This would further their learning and understanding of the topic.

### User Stories

As an OpenELIS software developer, I want to be able to have my code quickly systematically tested once it is integrated into the development branch so that I know if there are issues I need to fix before I can consider that work completed.

As an OpenELIS software tester, I want to be able to systematically test the OpenELIS Global products, even if I am new to OpenELIS Global.

As an OpenELIS implementer, I want to know that the products I am installing are rigorously tested and bug-free so that I do not experience system issues during installation or implementation that can slow or delay my work plans and deliverables, and affect future funding.

As an OpenELIS implementer, I'd like to make sure that features or changes that I requested work the way that I expect and need them to work before I install the product at the site.

As an OpenELIS user, I want to be able to use the system without bugs so that I am not interrupted or having to find workarounds to do my work.

As a stakeholder in the public health system, I want to feel confident that I can make critical and timely decisions based on the data within the systems that are implemented.

## Objectives and Activities

### **Work package 1: Implement Automated Test Portfolio for OpenELIS Global**

The OpenELIS team will define an approach to identifying, prioritizing, and developing OpenELIS test cases and automated testing using the OpenHIE testing management platform, with the OpenMRS QA team's automated testing approach serving as the model. The team will collaborate with other members of the OpenELIS Global community to identify the high priority test cases and develop a strategy for addressing those prioritized. The team will engage the OpenHIE LIS CoP to ensure the test cases written in Gherkin can potentially be used by other LIS products in their testing strategies. Using a consultative process, the team will draft and finalize test cases and document test libraries. Each component of the development, adaptation, and testing process will be assigned a deadline and have accompanying documentation of the process and outcome. Evaluation of the test portfolio produced will consist of running OpenELIS Global through the testing and documenting the results as compared to manual testing of similar test cases. As part of these activities, the team will work with other OpenELIS Global community members to understand how to use and contribute to the OpenELIS Global test portfolio.

**Objective 1.1:** Develop documented OpenELIS test cases and automated testing using the OpenHIE test management platform

**Activity 1.1.1:** Define the strategy for automated testing, and work with the OpenELIS Global community and LIS CoP to identify and prioritize test cases for automation.

**Activity 1.1.2:** Create test cases and develop automated tests within the OpenHIE test platform.

**Activity 1.1.3:** Evaluate the testing portfolio.

**Activity 1.1.4:** Document the OpenELIS Global test portfolio.

**Objective 1.2** Build capacity in OpenELIS Global (OEG) community members for creating test cases.

**Activity 1.2.1:** Conduct an orientation webinar for OEG community members to introduce the test case development process.

**Activity 1.2.2:** Conduct 1-2 working sessions with OEG community members to review and practice applying the test case development process.

### **Work package 2: Building a Portfolio of Generalized LIS Test Cases**

Collaborate with the LIS CoP to establish a portfolio of automated generalizable LIS/LIMS interoperability test cases for the OpenHIE framework, and use of LIS/LIMS products in the Instant OpenHIE product. The team will lead the collaboration of members in the LIS CoP to create a LIS testing roadmap of prioritized test cases to be developed in the OpenHIE test management platform. The team will use the LIS CoP's standard requirements for an LIS/LMIS software in LMIC to frame what test cases are likely to

exist in any LIS/LIMS solution as a starting point for those included in the roadmap. In addition, the team will hold community working sessions to build capacity in the LIS CoP community to build a set of those prioritized test cases in Gherkin, and in some cases, automate those tests using an automated test framework such as Selenium. The working sessions are anticipated to result in a small set of test cases ready for inclusion in the LIS/LIMS test portfolio within the OpenHIE test management platform. Lastly, the team will collaborate closely with the Instant OpenHIE project team to design and execute a strategy for testing a small set of LIS/LIMS interoperability test cases, using OpenELIS as the reference software.

**Objective 2.1:** Create a community road map within OpenHIE LIS CoP for interoperability test cases

**Activity 2.1.1:** Define the purpose, objectives, and norms for the use and maintenance of the road map.

**Activity 2.1.2:** Regularly, and as needed, update the road map.

**Objective 2.2:** Develop reusable test cases within the OpenHIE test management platform, and automate those tests for OpenELIS as the reference software, including documented shared practices and coding standards, testing tools and libraries.

**Activity 2.2.1:** Convene monthly working sessions with LIS COP and other interested members; the outcome of the working sessions is draft versions of a set of test cases built within the test management platform and a limited set of automated tests.

**Activity 2.2.2:** Regularly solicit feedback from the larger community, including LIS COP, OpenHIE community, OpenELIS community, on the draft test cases and automated tests.

**Activity 2.2.3:** Test the test cases and automated tests using OpenELIS in the Instant OpenHIE project or other determined environment.

**Activity 2.2.4:** Revise, finalize, and document the test cases and automated tests as part of the OpenHIE test management platform.

**Activity 2.2.5:** Disseminate the testing portfolio through the OpenELIS, OpenHIE, and LIS CoP community wikis, blogs, conferences, and webinars, as appropriate.

### **Work package 3: OpenHIE Automated Testing Training Package**

The OpenELIS Global team will develop a training session on OpenHIE automated testing. The team will work with subject matter experts to design and develop relevant, engaging content for skill building in rigorous QA processes, automated testing, and using the OpenHIE test framework. The session materials will be made available for dissemination via the OpenHIE Academy, and other potential digital health and global goods web-based forums and training packages.

**Objective 3.1:** Develop “OpenHIE Automated Testing” training session and education/training materials

**Activity 3.1.1:** Conduct an informal assessment with the global goods community to identify the target audience and their learning needs for training.

**Activity 3.1.2:** Identify key competencies and associated learning objectives related to skill building for QA processes and automated testing using the OpenHIE testing framework

**Activity 3.1.3:** Design session (develop session map and identify main training approaches)

Activity 3.1.4: Develop session content in collaboration with subject matter experts (identify pre-existing content, develop training content and activities, invite review and feedback, design template for all materials)

**Activity 3.1.5:** Package all session materials including participant, trainer, and implementer/host materials.

**Objective 3.2:** Identify potential avenues of dissemination of the training package

**Activity 3.2.1:** Develop outline for adapting the session to an online platform.

**Activity 3.2.2:** Identify digital health and global goods-related avenues for dissemination and outreach, including the OpenHIE Academy.

## Community Feedback

The consortium will coordinate with OpenHIE LIS COP and other OpenHIE sub communities to schedule working sessions in order to identify and collaboratively develop reusable test cases and automated tests. This work will be led as an initiative within the LIS COP. The OpenELIS Global team will conduct continuous outreach to implementers and developers for feedback, such as posting on OpenHIE forums and other community forums. The OpenELIS team will also get community approval for contributing missing workflows to the OpenHIE testing framework.

Specific outreach activities will focus on cultivating ownership of the business-acceptance side of the testing process.

## Schedule

See next page



Activity	Team	Quarter		
	Location	Months 1-3	Months 4-6	Months 7-9
	Month/Qtr	1	2	3
Work planning and scheduling; background gathering (all work packages and objectives)	DIGI team	X Month 1		
Define the strategy for automated OEG testing (A.1.1.1)	DIGI team with LIS CoP	X Month 1-2		
Identify and prioritize OEG test cases for automation (A 1.1.1)	DIGI team with LIS CoP	X Month 1-3		
Develop OEG test cases and automated tests (A.1.1.2)	DIGI team with LIS CoP	X Month 3	X Month 4-5	X Month 7-8
Evaluate the testing portfolio (A.1.1.3)	DIGI team with LIS CoP			Month 7-8
Finalize OEG portfolio of tests (A 1.1.4)	DIGI team			X Month 8-9
Conduct orientation webinar (A 1.2.1)	DIGI team			X Month 8
Conduct working sessions (A 1.2.2)	DIGI team			X Month 8-9
Convene first working session for Road Map definition (A 2.1.1)	DIGI team	X Month 1		
Review and update Road Map (A2.1.2)	DIGI team with LIS CoP	X Month 2-3	X Month 4-6	X Month 7-9
LIS COP working sessions for test cases (A 2.2.1)	DIGI team with LIS CoP	X Month 1-3	X Month 4-6	X Month 7-9

Feedback on draft test cases (A 2.2.2)	DIGI team with stakeholders		X Month 4-6	X Month 7-8
Test the test cases (A 2.2.3)	DIGI team		X Month 6	X Month 7-8
Finalize test cases portfolio (2.2.4)	DIGI team			X Month 8-9
Disseminate final portfolio (A 2.2.5)	DIGI team			X Month 9
Conduct informal assessment (A 3.1.1)	DIGI team		X Month 4	
Identify competencies and LOs (A 3.1.2)	DIGI team		X Month 4	
Public feedback on competencies and LOs	DIGI team with stakeholders		X Month 4	
Design session (A 3.1.3)	DIGI team		X Month 5	
Develop session content (A.3.1.4)	DIGI team		X Month 6	X Month 7-8
Review of session content	DIGI team with stakeholders			X Month 8-9
Package training materials (A3.1.5)	DIGI team			X Month 9
Develop adaptation outline (A.3.2.1)	DIGI team			X Month 9
Identify dissemination outlets (A 3.2.2)	DIGI team		X Month 6	X Month 7-9

## Deliverables

<b>Deliverable</b>	<b>Month/Quarter Due</b>
Work Package 1, Objective 1, Activity 1 <ul style="list-style-type: none"> <li>• A defined strategy for automated testing</li> <li>• Prioritized list of test cases for automation</li> </ul>	<b>Q1</b>
Work Package 1, Objective 1, Activity 2 and 3 <ul style="list-style-type: none"> <li>• Draft test cases</li> <li>• Notes from working sessions</li> <li>• Results of portfolio evaluation</li> </ul>	<b>Q3</b>
Work Package 1, Objective 1, Activity 4 <ul style="list-style-type: none"> <li>• Final OpenELIS Global testing portfolio</li> </ul>	<b>Q3</b>
Work Package 1, Objective 2, Activity 1 <ul style="list-style-type: none"> <li>• Link to recorded webinar</li> <li>• Copy or presentation materials</li> <li>• Attendance list</li> </ul>	<b>Q3</b>
Work Package 1, Objective 2, Activity 2 <ul style="list-style-type: none"> <li>• Notes from working sessions</li> </ul>	<b>Q3</b>
Work Package 2, Objective 1, Activity 1 <ul style="list-style-type: none"> <li>• Road Map for developing test cases and automated tests</li> <li>• Documented norms for managing Road Map</li> </ul>	<b>Q1</b>
Work Package 2, Objective 2, Activity 1 <ul style="list-style-type: none"> <li>• Documented notes from working sessions or links to posts</li> </ul>	<b>Q2</b>
Work Package 2, Objective 2, Activity 1 <ul style="list-style-type: none"> <li>• Draft test cases and automated tests</li> </ul>	<b>Q2</b>
Work Package 2, Objective 2, Activity 2 <ul style="list-style-type: none"> <li>• Documented feedback and revisions based on community feedback</li> </ul>	<b>Q3</b>
Work Package 2, Objective 2, Activity 4 <ul style="list-style-type: none"> <li>• Final portfolio of test cases and automated tests</li> <li>• Proof of dissemination through multiple channels</li> </ul>	<b>Q3</b>
Work Package 3, Objective 1, Activity 1 <ul style="list-style-type: none"> <li>• Informal assessment report including:               <ul style="list-style-type: none"> <li>○ Dates, location, participants of assessment sessions/outreach</li> </ul> </li> </ul>	<b>Q2</b>

<ul style="list-style-type: none"> <li>○ Assessment questions</li> <li>○ Assessment results</li> </ul>	
Work Package 3, Objective 1, Activity 2 <ul style="list-style-type: none"> <li>• List of session competencies and learning objectives</li> </ul>	<b>Q2</b>
Work Package 3, Objective 1, Activity 3 <ul style="list-style-type: none"> <li>• Session map</li> </ul>	<b>Q2</b>
Work Package 3, Objective 1, Activity 4 <ul style="list-style-type: none"> <li>• List of subject matter experts</li> <li>• Link to draft training content</li> </ul>	<b>Q2</b>
Work Package 3, Objective 1, Activity 5 <ul style="list-style-type: none"> <li>• Link to final training materials including participant materials, trainer materials, and implementer/host materials</li> <li>• Uploaded to previously identified channels (e.g. OpenHIE Academy website)</li> </ul>	<b>Q3</b>
Work Package 3, Objective 2, Activity 1 <ul style="list-style-type: none"> <li>• Online adaptation outline</li> </ul>	<b>Q3</b>
Work Package 3, Objective 2, Activity 2 <ul style="list-style-type: none"> <li>• List of dissemination targets (locations, dates, contact people, reason for targeting)</li> </ul>	<b>Q3</b>

## Global Good Maturity Model Assessment

For OpenELIS Global (last updated 9 June 2020):



[https://docs.google.com/spreadsheets/d/1iJ\\_neuWZKjWjj4Wm8KWnpVgkwyG8oR6rBb2PAoFik/edit#gid=0](https://docs.google.com/spreadsheets/d/1iJ_neuWZKjWjj4Wm8KWnpVgkwyG8oR6rBb2PAoFik/edit#gid=0)