eSHIFT
PARTNER NETWORK

AoS Health: Antimicrobial Resistance
A Platform Approach for AMR Surveillance

Aligning Digital Health Global Goods to Address AMR

The emerging threat of antimicrobial resistance necessitates a coordinated response from the global community. If left unaddressed, resistant pathogens could account for up to 10 million deaths annually and US $100 trillion in global GDP loss by 2050 (amr-review.org). Through the UN Tripartite Alliance for One Health, and initiatives such as the UK Government's Fleming Fund and Global AMR Innovation Fund (GAMRIF), the stage has been set for multi-sectoral and cross-cutting collaboration to address this need. The eSHIFT Partner Network (eSHIFT) has been working alongside the Foundation for Innovative New Diagnostics (FIND) to develop an AMR Surveillance Platform to strengthen countries' ability to capture high-quality AMR data.

What is the AoS Health AMR Surveillance Platform?

There is great strength in reusing and integrating solutions within single well engineered environments. The AoS Health Platform consists of hardware infrastructure (cloud or dedicated), software, configuration, customization and localization of digital health equipment, telecommunications infrastructure and software tools to build sustainable reference implementations of complete systems architectures to address one or more public health needs.

For **AoS Health AMR**, the core AoS Health Platform is enhanced with an orchestrated selection of software, including tools such as DHIS2 and Open Interop, and AMR-specific software components we have engineered based on project needs, guidance from the World Health Organization (WHO), Fleming Fund actors, AMR research and National Action Plans.

eSHIFT envisions a surveillance platform that directly improves global understanding of AMR One Health data management and acts as a catalyst to accelerate progress in countries. The One Health approach suggests that robust and resilient AMR surveillance systems not only require **integration across human, animal and environmental health data sources** but the flexibility to adapt to changing surveillance needs. To achieve these objectives the platform:
- Integrates ongoing efforts with best-fit technology to enable rapid adoption, scalability and sustainability
- Enhances continuously via cross-sectoral collaboration, engagement with public- and private-sector entities, and strong country involvement
- Shares innovations, to ensure that every country benefits from ongoing developments in AMR surveillance, accelerating national readiness and response
- Capitalizes on existing digital health global public goods
- Provides an environment where new data sources from the across the One Health spectrum are integrated within the system
- Provides ongoing digital health leadership in the AMR community to capture evolving surveillance and data aggregation and dissemination requirements and build them into the AoS Health AMR reference implementation.

Project Spotlight | Zambia

Through 2019 and 2020, eSHIFT worked alongside the Zambian National Public Health Institute (ZNPHI), FIND and Blue Frontier to design, develop, and release version 1.0 of the AMR One Health Surveillance Platform in Zambia.

To improve data collection, analysis and data quality in human, animal and environmental health laboratories, the platform provides connected surveillance tools that track and map the emergence of resistance, form the basis of national surveillance programs, and enable the Zambian government to make data-driven decisions. It ensures burden-free implementation for health workers, no new data silos, and long-term sustainability. Additionally, the One Health Surveillance Platform enables each sector (human, animal, environment.) to have a cross-sectoral view of resistance patterns while also enabling a collated, comprehensive view of One Health surveillance data at a national level.

Our Vision for AMR One Health Surveillance

We know that robust AMR One Health surveillance will require integration across data sources; however, the monitoring of AMR is not a standard public health endeavor. As the world comes to understand the emerging threat better, the data model and therefore the requirements of a platform would evolve. Through cross-sectoral collaboration, engagement with public- and private-sector entities, and strong country involvement, we will enhance the platform over time to ensure its sustainability and flexibility to address surveillance needs.

We strongly believe that with international cooperation and collaboration, we can create sustainable, efficient, and practical digital tools which help populations in low- and middle-income countries achieve better health outcomes. We envision a platform-based AMR surveillance solution that will enable any country to pursue its AMR surveillance ambitions regardless of resources. Every country can benefit from the ongoing developments in the AMR surveillance, cost-effectively accelerating innovation to inform better policy decisions.

The AoS Health AMR Surveillance Platform
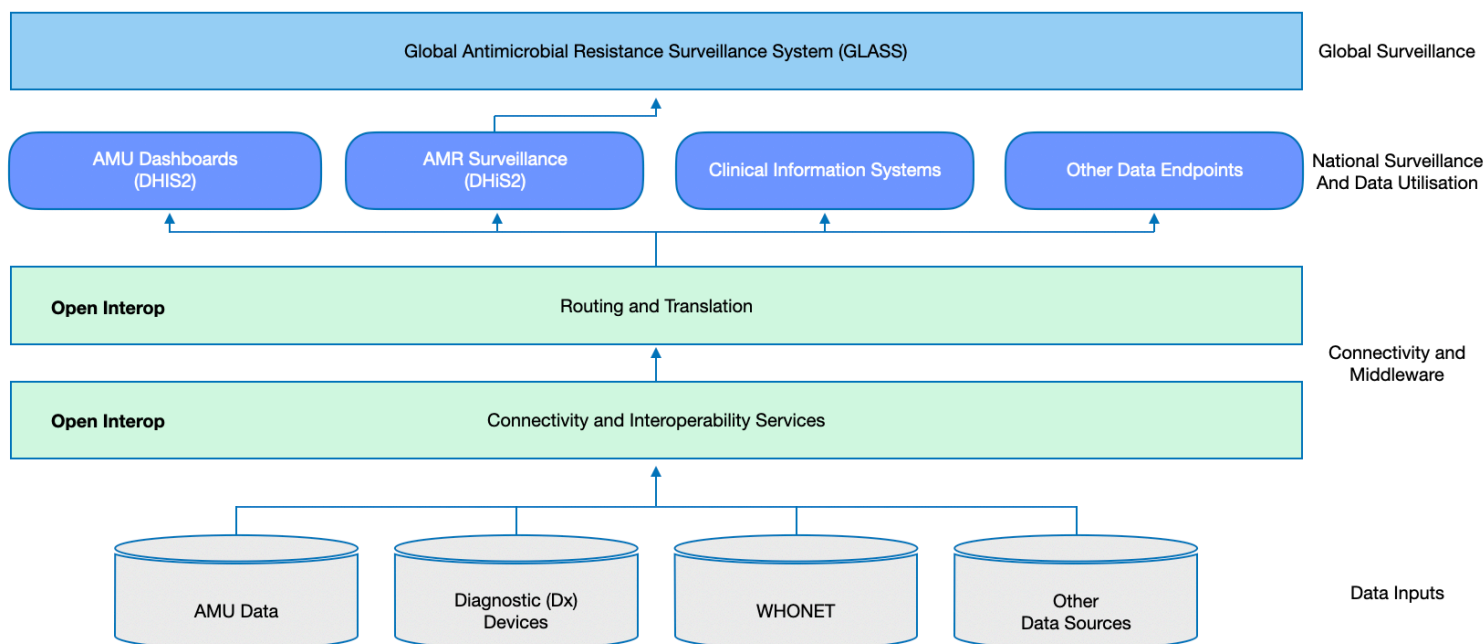
Next Steps

As we work towards scaling the AoS Health Platform for AMR and other public health issues, we have identified a list of essential elements that are part of our strategy to scale successfully:

- Continue to strengthen the platform to include additional features. For example, we plan to implement a one-click deployment functionality for all tools and applications included in the software suite. Develop an implementation and deployment documentation framework to reduce barriers to broader use
- Identify and configure internal tools for evaluation of AMR surveillance
- Establish robust support mechanisms to ensure sustainability
- Develop comprehensive training programs for configuration and use of the platform
- Expand the suite of supported software and open source tools that are included in the platform
- Increase engagement with stakeholders, and build a community of practice that establishes a mechanism for stakeholders to benefit from ongoing enhancements and improvements made in other implementations.
- Expand collaboration with public- and private-sector stakeholders, and raise funds to implement these next steps

AoS Health: AMR Specific Platform Features

CAPABILITIES	BENEFITS
AMR Surveillance	Collection of antimicrobial susceptibility test (AST) results
One Health	Data endpoints for human, animal and environmental health
Antimicrobial Usage	Data endpoint for antimicrobial usage and import/export data
Connected Diagnostics	Automated transmission from AST diagnostic devices and Laboratory Information Systems (LIS)
Middleware	Integrated middleware solution for AMR data transmission (Open Interop)
WHONET Integration	Automated integration with WHONET
GLASS Reporting	Custom application for automating the generation of GLASS reports
Breakpoint Management	User managed cut-off points for automated AST interpretation using either CLSI or EUCAST breakpoint standards
GIS and Trend Maps	GIS visualizations for location-based AMR trends
Customization	The installation process is ideal for self-service deployments as well as consultancy led operations
	Easily customized for specific country contexts

AoS Health: Capabilities and Benefits that Address Global and National Health Needs

CAPABILITIES	BENEFITS
Health system information	Rich integrated and interoperable deployments
	Tools and services to facilitate the needs of health information and health information management systems in diverse country settings
Data analysis and business intelligence	Tailored to specific health systems settings
	AoS data experts may configure the platform for specific collection and aggregation needs
	Workshops and training may also be provided in data use and the full information lifecycle
Data Capture/ Integration, Management, Processing	Data capture via well-regarded tools such as DHIS2 Aggregate, DHIS2 Tracker Apps, APIData capture via well-regarded tools such as DHIS2 Aggregate, DHIS2 Tracker Apps, API
	Full database management including pre-configured security, encryption
	Data backup (encrypted) and replication services
	Additional statistical packages such as R, Stata and others may be integrated depending on specific needs
Global Goods	The platform consists of open or free to use under license components
	Allows LMICs and MoH's to adopt the platform and control data flow. AoS Health follows the Digital Investment Principles.
Empower End-to-End Implementations	As a baseline, each platform comes working and pre-configured with a reference implementation of one or more vertical health solutions; AMR solution can co-exist within the infrastructure used by other digital health systems
	Turnkey offerings that can be deployed for specific use cases such as TB, AMR, and Malaria
	Continuous integration of improvements and innovation benefitting all users
Interoperability	Middle-ware provides ETL and standard integrations for DHIS2, WHO Net/GLASS, HL7 FHIR
	Connectivity to diagnostic instruments via HL7, ASTM, POCT1A and a restful API
Department to Department and Government to Government	Enterprise service bus, mediator services may be implemented to ease interoperability between disparate information systems across health organizations or intergovernmental/ministerial data exchange requirements
	Full transactional auditability and transactional flow control (access rate management) may be implemented

Partners:

eSHIFT has been fortunate to collaborate with these organizations on the development of the AoS Health AMR Surveillance platform. We look forward to partnering with other organizations as we work towards our common goal of improved health systems.