GLLP Global Laboratory Leadership Programme

A health initiative by FAO, WHO, WOAH, ECDC, CDC, APHL

Strong leaders for health security

An Overview of the Global Laboratory Leadership Programme

V2 2023

An Overview of the Global Laboratory Leadership Programme

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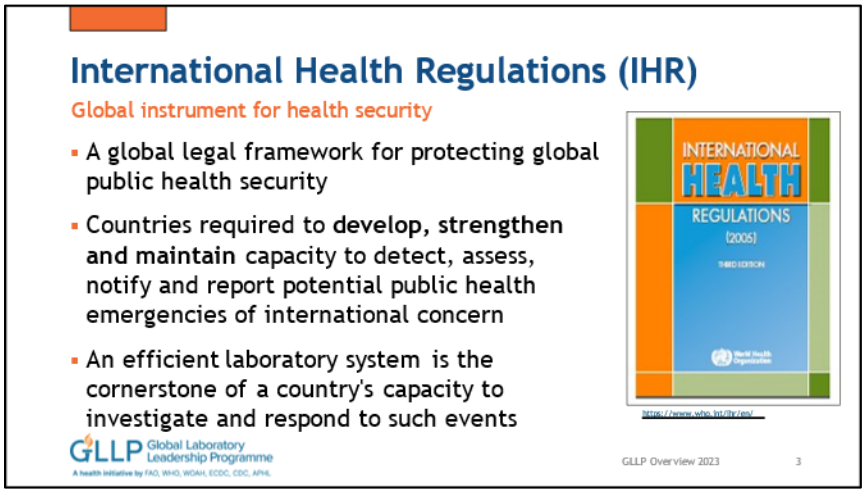
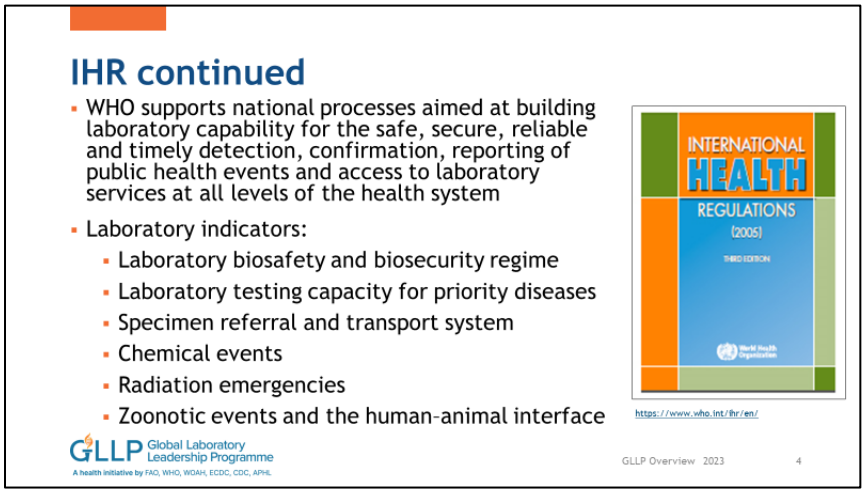
Health governance context





The IHR monitoring and evaluation framework (https://extranet.who.int/sph/ihrmef) consists of four components: mandatory

annual reporting and three voluntary components, viz, after action review, simulation exercise and voluntary external evaluation.

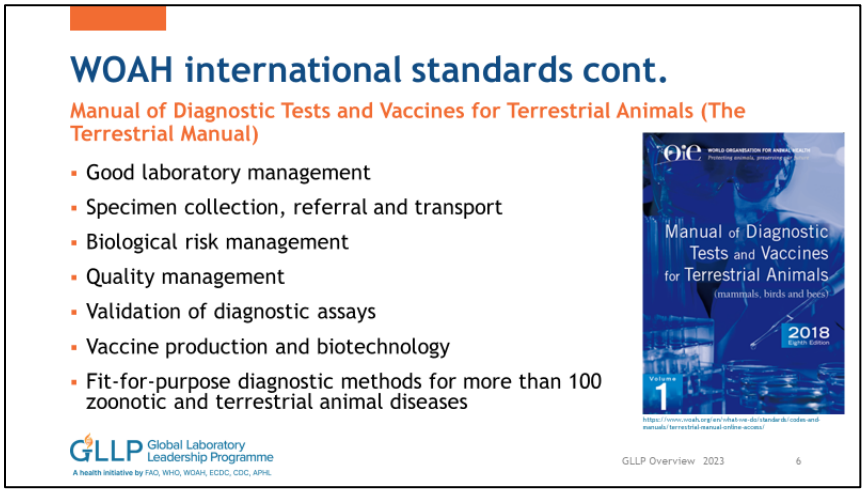
- The mandatory annual reporting is done through the state party self-assessment annual reporting (SPAR) tool. The three indicators listed on the slide are the indicators used to monitor the laboratory capacity in the SPAR. The "laboratory picture" at the country level can be complemented by other sources of information (e.g. from Joint External Evaluations (JEE), laboratory-specific evaluations, simulation exercises).

The World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code (the Terrestrial Code) provides international standards for the improvement of terrestrial animal health and welfare and veterinary public health worldwide.

- The health measures in the Terrestrial Code should be used by the Veterinary Authorities of importing and exporting countries to set up measures providing for early detection, reporting and control of pathogenic agents, including zoonotic ones, in terrestrial animals (mammals, birds, reptiles and bees) and preventing their spread via international trade in animals and animal products, while avoiding unjustified sanitary barriers to trade.
- The Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (the Terrestrial Manual) aims to facilitate international trade in animals and animal products and to contribute to the improvement of animal health services worldwide. The principal target readership includes laboratories carrying out veterinary diagnostic tests and surveillance, plus vaccine manufacturers and regulatory authorities in Member Countries. The objective is to provide internationally agreed upon diagnostic laboratory methods and requirements for the production and control of vaccines and

other biological products. The Terrestrial Manual covers infectious and parasitic diseases of mammals, birds, and bees.

- The WOAH also publishes the Aquatic Animal Health Code and the Manual of Diagnostic Tests and Vaccines for Aquatic Animals.



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Definition of health laboratory/ies

Clinical, diagnostic, medical, public health, animal, toxicological, food safety, environmental or any other laboratories performing testing for the purpose of disease diagnosis, screening, prevention, treatment decisions, surveillance or public health.

Definition adapted from: Laboratory leadership competency framework (who.int)

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Laboratory strengthening focus areas

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Strengthening laboratory services requires an over-arching approach, inclusive of all aspects of laboratories.

Current workforce challenges

Health laboratory workforce challenges

- Lack of specialized training of laboratory professionals in the areas of leadership and management

Laboratory leadership workforce challenges:

- Laboratory science education lacks adequate management training
- Uncertain career path
- Laboratory directors have limited input to national financial planning of health funding

Howard K. Koh, Marsha Jacobson; Fostering public health leadership, Journal of Public Health, Volume 31, Issue 2, 1 June 2009, Pages 199-201, https://doi.org/10.1093/pubmed/fdp032

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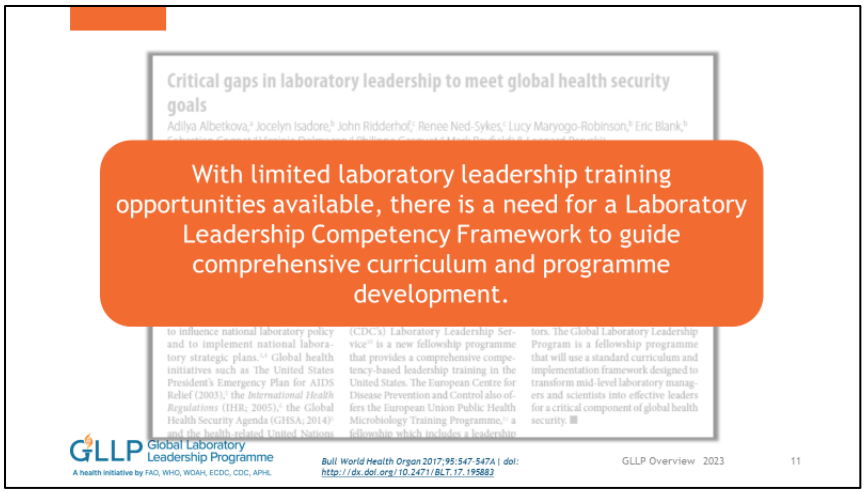
Challenges are likely to differ in different geographic locations. However, some additional aspects to take into consideration especially in low-resources countries are the lack of a specialized workforce and a chronic turn-over of staff.

Source: 1Howard K. Koh, Marsha Jacobson; Fostering public health leadership, Journal of Public Health, Volume 31, Issue 2, 1 June 2009, Pages 199–201, https://doi.org/10.1093/pubmed/fdp032

Article that outlines critical gaps in laboratory leadership to meet global health security goals.

Source: *Bull World Health Organ 2017;95:547–547A | doi: http://dx.doi.org/10.2471/BLT.17.195883*



With a limited number of laboratory leadership training opportunities available there is a need for a Laboratory Leadership Competency Framework to guide comprehensive curriculum and programme development.

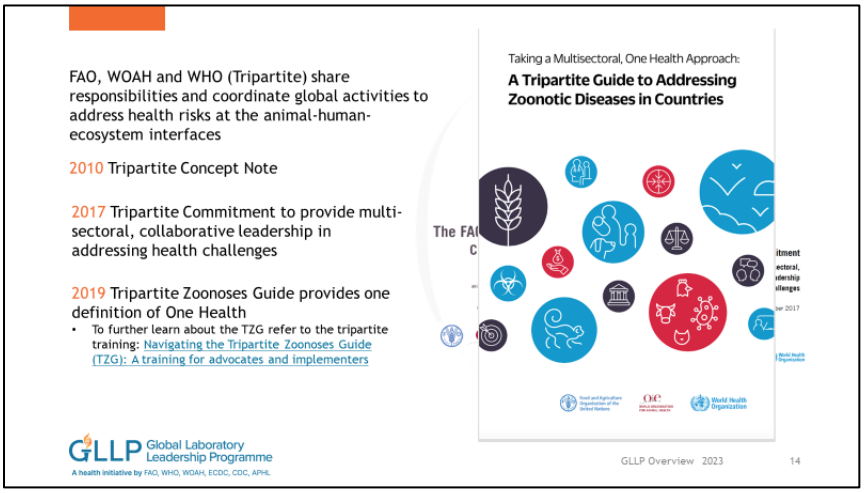
In addition, many of the issues identified are relevant for all sectors, and other audiences can benefit from a cross sectoral training programme.

The One Health approach

- 300 BC - Aristotle: introduced the concept of comparative medicine through his study of common characteristics among different species, including people and other mammals
- 1600s: Giovanni Maria Lancisi, physician and veterinarian, wrote of the important role the environment plays in the spread of diseases to humans and animals. He was the first to recommend the draining of swamps and

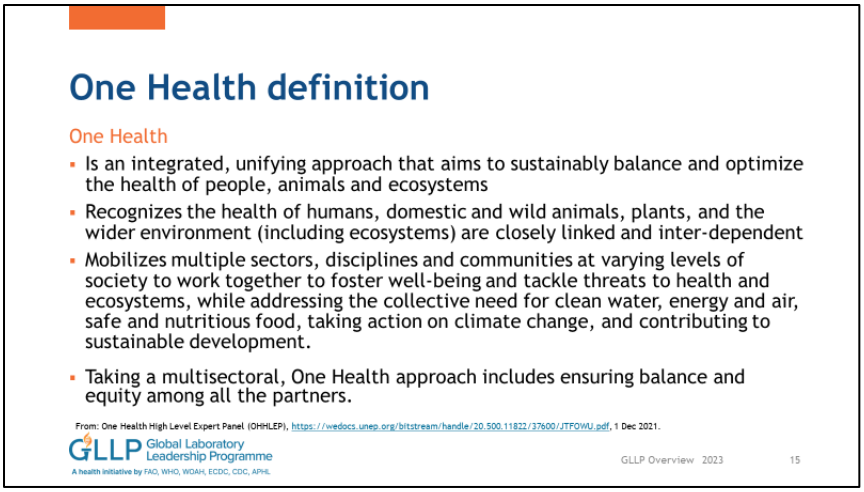
the use of protection against biting insects in the management of human malaria.

- 1800s: Rudolf Virchow coined the term 'zoonosis' and is quoted as saying: 'Between animal and human medicines there are no dividing lines – nor should there be. The object is different but the experience obtained constitutes the basis of all medicine'
- 2004, the Wildlife Conservation Society hosted a conference of international experts in multiple disciplines to discuss and respond to the reported and potential movements of diseases among human, domestic animal and wildlife populations. The symposium resulted in the publication of the 'Manhattan Principles on One World – One Health' whose title led to the coining of the term 'One Health'

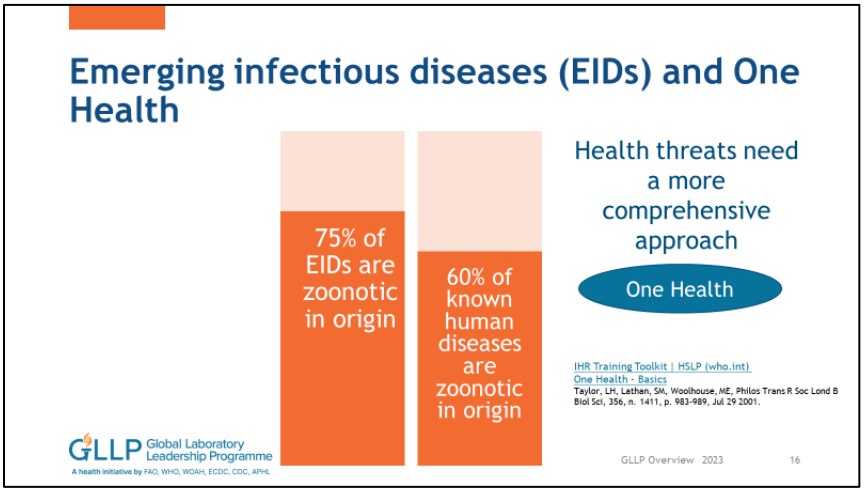


The term 'One Health' has been used for many years. FAO, WOAH and WHO have been working together to share responsibilities and coordinate global activities to address health risks at the animal-human-ecosystems interfaces. In 2019, A Tripartite Guide to Addressing Zoonotic Disease in Countries was published by FAO, WOAH and WHO. The guide provides one definition of 'One Health', but it is not the only definition. There is not one universally accepted definition of One Health.

Reference: https://www.woah.org/app/uploads/2021/03/en-tripartitezoonosesguide-webversion.pdf



There is a need for balance and equity among human, animal and environmental sectors.

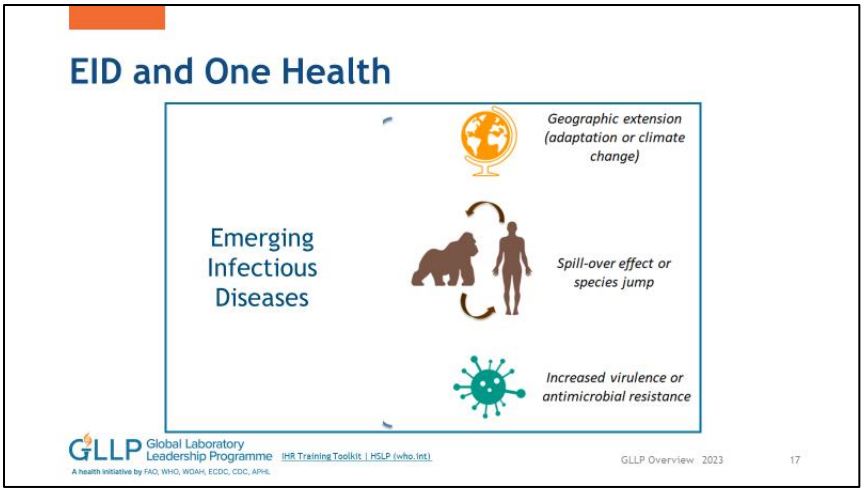


The world is changing and very few urgent health risks stay solely within national boundaries.

Coupled with increases in global traffic and trade, new microbes are detected and old diseases have re-emerged

The World Health Assembly has responded to these changes with a comprehensive IHR revision

Public health, animal health and environmental health threats need a more comprehensive approach: One Health.

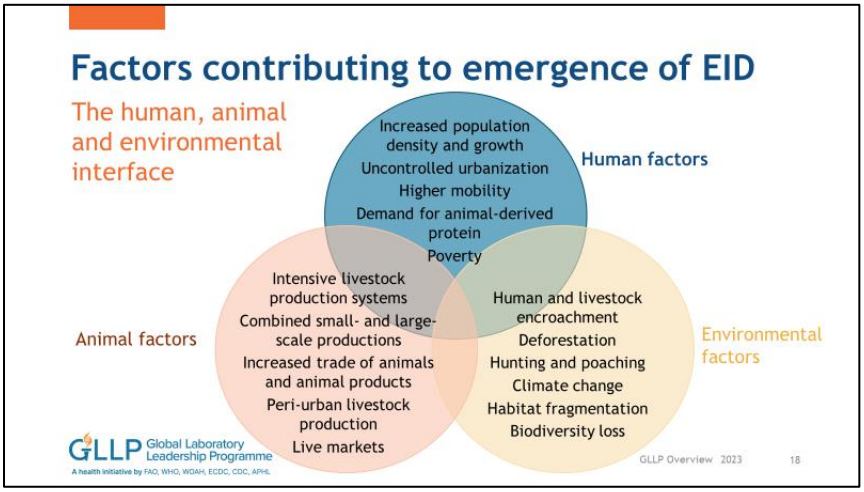


EIDs may emerge for varying reasons related to changes in a specific pathogen, its host specie(s) or the ecosystem in which it is found. These changes may result in:

- A spill-over effect or species-jump which creates new host species
- Acquired genetic attributes, such as antimicrobial resistance or increased virulence
- A geographic extension to new ecosystems (adaptation) or to environments which can afford the pathogen a more favorable condition for growth and proliferation (e.g climate change)

Although emerging infectious diseases are an important component of One Health, the One Health relationships between humans, animals and the environment are complex and actions in one area affect the other areas.

Source: https://extranet.who.int/hslp/build-your-course/modules/ihr-implementation-human-animal-environment-interface-hae



Why have zoonoses come to represent a growing proportion of emerging diseases over the several decades?

To better understand EIDs, attempts at mapping, using data from EIDs since the middle of the 20th century have been undertaken to try to identify and predict where new diseases may emerge.

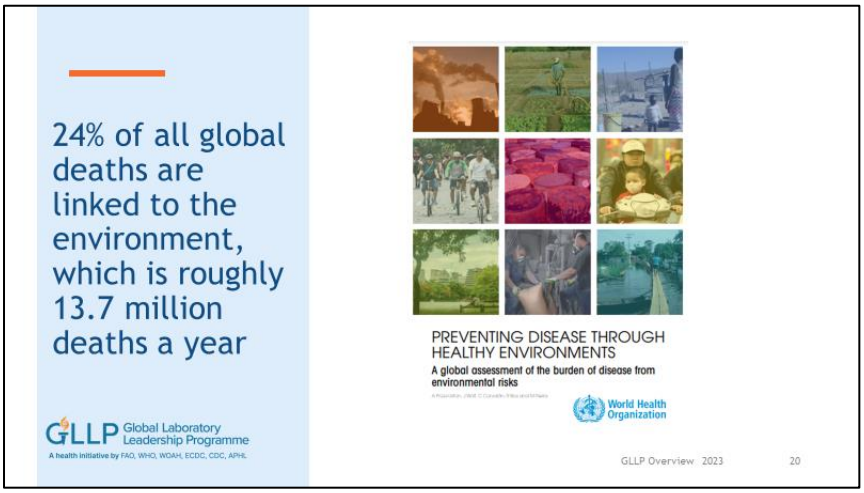
- These have shown that certain areas, or “hotspots”, e.g., the Congo basin in Africa, the Gangetic plains in Asia and the Amazon basin in South America, are more at risk of EID outbreaks than others due to various socio-economic, environmental and ecological factors that coincide to create ideal conditions for zoonotic outbreaks.
- These factors are the result of the evolution of changing relationships between humans, animals and the environment, which have in turn led to new drivers for the emergence of diseases at the interface of all three sectors.

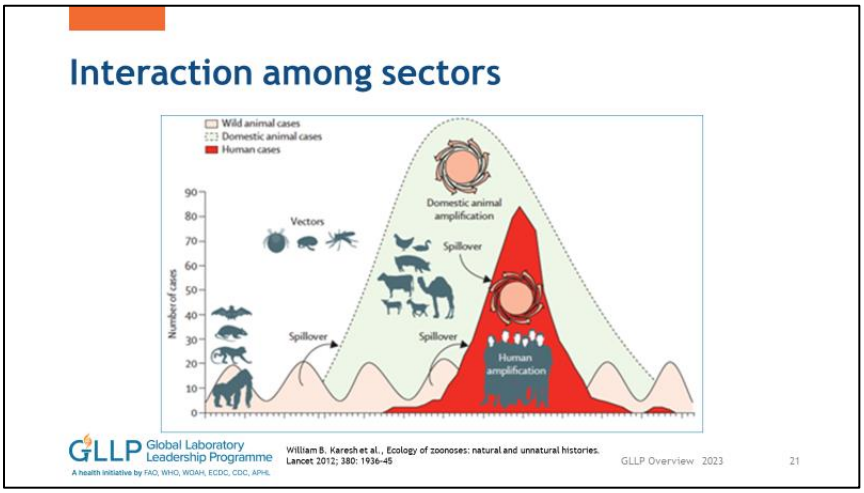
One health is more than just zoonotic disease, or even infectious disease. Zoonotic emerging infectious diseases (EIDs) are by far the most commonly used example when explaining One Health, but we must remember that EIDs are only a part of One Health. They provide a good example that everyone can relate to, especially with the emergence of COVID-19, but we must not restrict our thinking when it comes to understanding how the three sectors interact.

Animal, Human and Environmental health are linked in many other ways. A few examples include:

- Non-zoonotic animal disease can wipe out livestock that provide communities with protein, resulting in human malnutrition
- Animal die offs leave carcasses that, if not disposed of properly, can cause contamination of the water supply

- Declining bee populations will have effects on food availability for animals and humans and will affect plant biodiversity
- Environmental contamination with pollutants may affect animal and human health
- Antibiotic residues in animal feed and/or food for human consumption leading to antimicrobial resistance
- Climate change and extreme weather events can destroy human and animal habitats



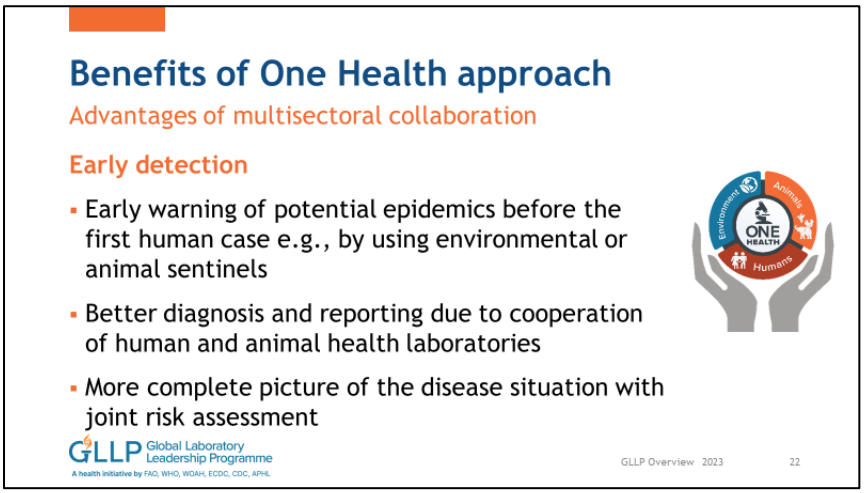


Because of the blurring of the barriers between the three components of this complex system, the zones where they overlap hold a significant potential for EID through spill-overs from one environment to the next.

This figure shows pathogens may be underlying in wild populations with small, undetected outbreaks.

- A combination of the above-cited factors could lead to a spill over either to humans directly, or to domestic animal populations where the infection may amplify with greater risks of spillover to the human population
- Understanding the drivers of EIDs of zoonotic origins is the first step towards controlling infection at its animal source, before it reaches the human population

Source: William B. Karesh et al., Ecology of zoonoses: natural and unnatural histories. Lancet 2012; 380: 1936–45



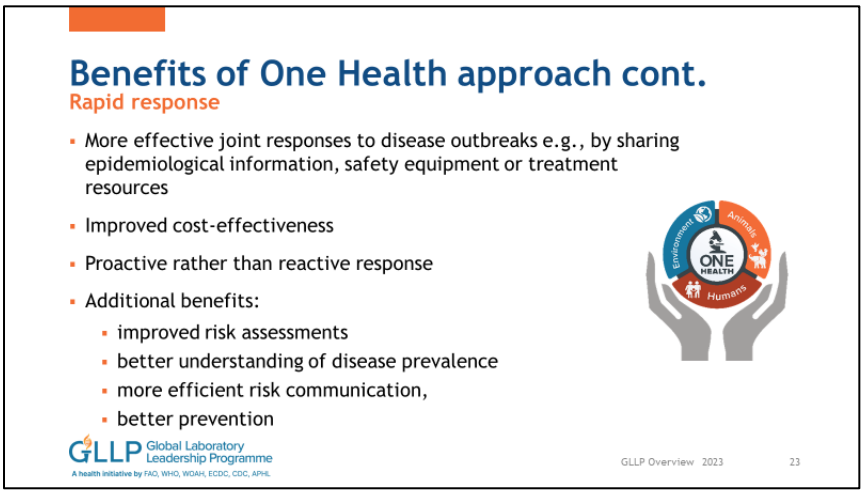
Taking a One health approach holds many advantages for multi sectional collaboration.

Benefits of early detection.

- Early warning of potential epidemics before the first human case e.g., by using environmental or animal health events as sentinels
- Here is an example using Rift Valley Fever (RVF):
- December 1997: 497 unexplained human deaths in Kenya reported to WHO
- Diagnosis: RVF
- 1997: flooding due to significantly more rainfall than normal
- A link was found: the flooding created more breeding places for mosquitoes which in turn spread more RVF
- Therefore, flooding is now an early warning sign for a potential increase in RVF cases.
  References:

- https://www.researchgate.net/publication/19283145_Rainfall_and_Epizootic_Rift_Valley_Fever
- https://www.researchgate.net/publication/11914871_Climate-disease_connections_Rift_Valley_Fever_in_Kenya

- Better diagnosis and reporting due to cooperation of human and animal health laboratories e.g., surge capacity across sectors, by sharing laboratory results, diagnostic kits, specimens, equipment or personnel
- Conducting joint risk assessments with input from relevant sectors and disciplines in order to have a more complete picture of the disease



Benefits of rapid response.

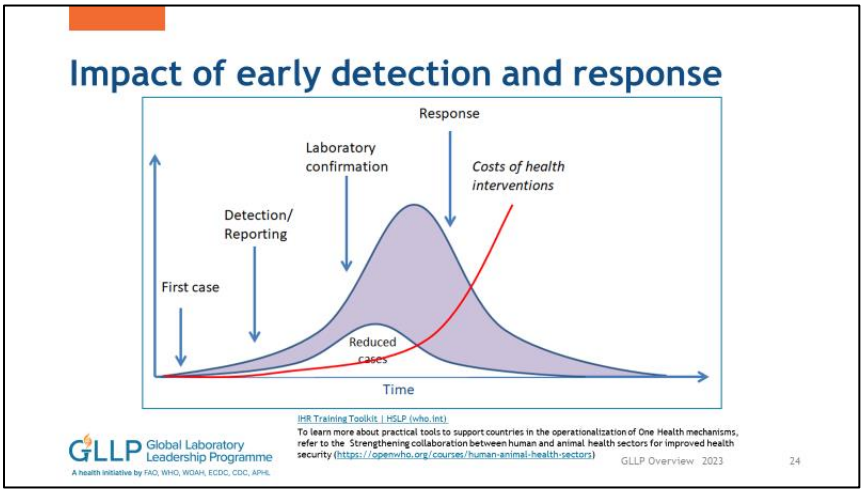
- More effective joint responses to disease outbreaks e.g., by sharing epidemiological information, safety equipment or treatment resources. For example, Surge capacity using laboratories from relevant sectors during major public health events or pandemics such as COVID-19
- Ultimately improved cost-effectiveness due to a more aligned strategy, response and better control of economic side-effects
- Overall more proactive instead of reactive response

  Example of better prevention:

- 2000: Vaccination covered only 50% of children in Chad
- 70% of the population live in rural areas and are poor: Their livelihood is based on livestock
- MoH and Veterinary Services conducted a joint human (polio) and livestock (anthrax, blackleg, pastoralises and CBPP) vaccination campaign

Results: 140 children and women were vaccinated per day (instead of 100 when human vaccination is done alone); cost per vaccinated child: 11.9€ instead of 30.3€ (Cost-sharing initiative)

Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2725911/



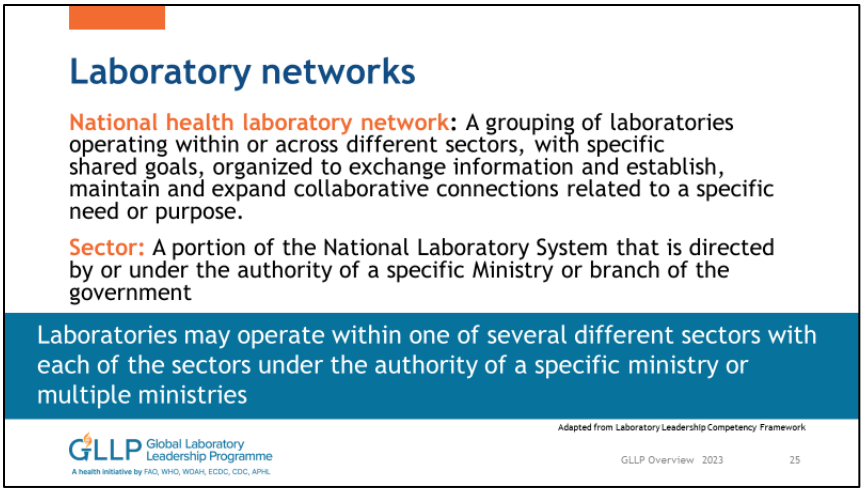
This graph illustrates the impacts of early detection and rapid response.

The later a response, the higher the costs

COVID example: in many countries, veterinarians were summoned to contribute to the response. Many veterinary laboratories are capable of doing the diagnostic tests for COVID and can therefore serve as back up and thereby increase the testing capacity. Since diagnostic testing capacity seemed to be quite a bottle neck in many places, this is a nice example of how (even if COVID had not been an EID), One Health can work.

Conversely, during non-zoonotic avian influenza outbreaks, human health laboratories can serve as overflow capacity for the veterinary sector even though there is no direct public health threat.

Source: https://extranet.who.int/hslp/build-your-course/modules/ihr-implementation-human-animal-environment-interface-hae



A National Laboratory Network is defined as the following for the purposes of GLLP:

A grouping of laboratories operating within or across different sectors, with specific shared goals, organized to exchange information and establish, maintain and expand collaborative connections related to a specific need or purpose.

Laboratory networks are usually but not necessarily:

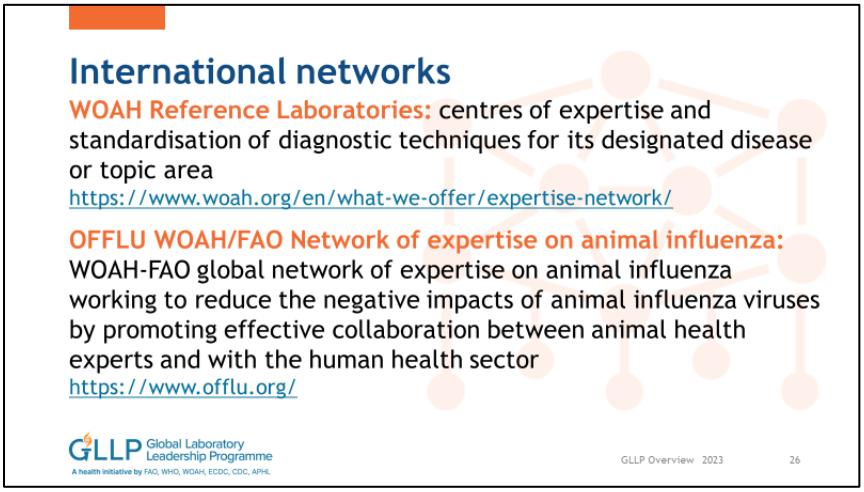
- Set up in a tiered format
- Designed to meet a specific need, e.g., providing diagnostic services, supporting vaccination programmes, monitoring certain diseases or agents, etc.
- Linked with respect to: quality assurance requirements, biological risk management, training and continuing education, sharing data, and standardized testing protocols.
- Within a country, national laboratory networks may comprise one or more of the components that make up the national laboratory system.
- In some settings, even those without a fully developed National Laboratory System, Laboratory Networks may have already been created or are being created to meet specific challenges.

Note: Laboratory Networks may also exist at the international scale, with some national laboratories being members both of an international network as well as being part of the “national laboratory system”.

Source: Adapted and expanded upon from the GLLP definition of “Laboratory Network” provided in the Laboratory Leadership Competency Framework.

Sector: A portion of the National Laboratory System that is directed by or under the authority of a specific Ministry or branch of the government.

Note: For the purposes of GLLP training and the understanding of a national laboratory system, it is important to recognize and acknowledge that laboratories may operate within one of several different sectors. Each of these sectors are usually under the authority of a specific ministry or multiple ministries.



Example: OFFLU's objectives:

- To exchange scientific data and biological materials (including virus strains) within the network, to analyse such data, and to share such information with the wider scientific community
- To offer technical advice, training and veterinary expertise to Member Countries in order to assist in the prevention, diagnosis, surveillance and control of animal influenza
- To collaborate with the WHO influenza network on issues relating to the animal-human interface, including early preparation of human vaccine
- To highlight influenza research needs, promote their development and ensure coordination

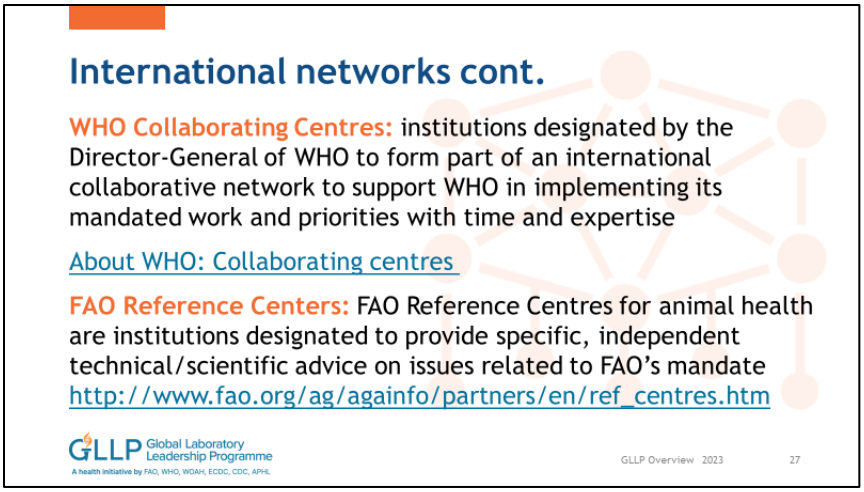
  Source: https://extranet.who.int/hslp/build-your-course/modules/ihr-implementation-human-animal-environment-interface-hae

OFFLU:

- http://www.offlu.net/index.php?id=1

WOAH Reference Laboratories:

- https://www.woah.org/en/what-we-offer/expertise-network/

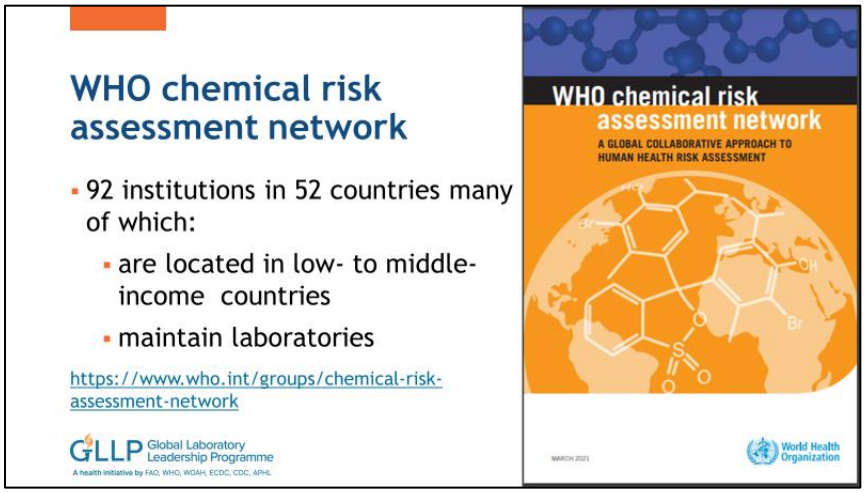


The WHO Collaborating Centres (CCs) are institutions designated by the Director-General of WHO to form part of an international collaborative network set up by WHO in support of its programme at all levels. The WHO's network of WHO CCs brings together 822 highly regarded academic and scientific institutions in over 80 countries to support WHO in implementing its mandated work and priorities with time and expertise.

Source: https://www.who.int/about/partnerships/collaborating-centres

The FAO Reference Centers for animal health are institutions designated to provide specific, independent technical/scientific advice on issues related to FAO's mandate.

http://www.fao.org/ag/againfo/partners/en/ref_centres.htm

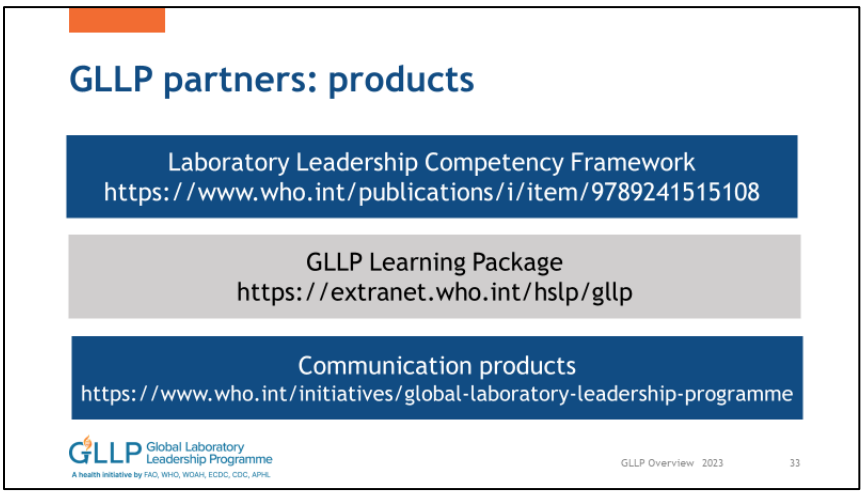


GLLP: A partners collaboration

Specialized training in leadership and management is needed to help laboratory directors and senior laboratory managers worldwide ensure that

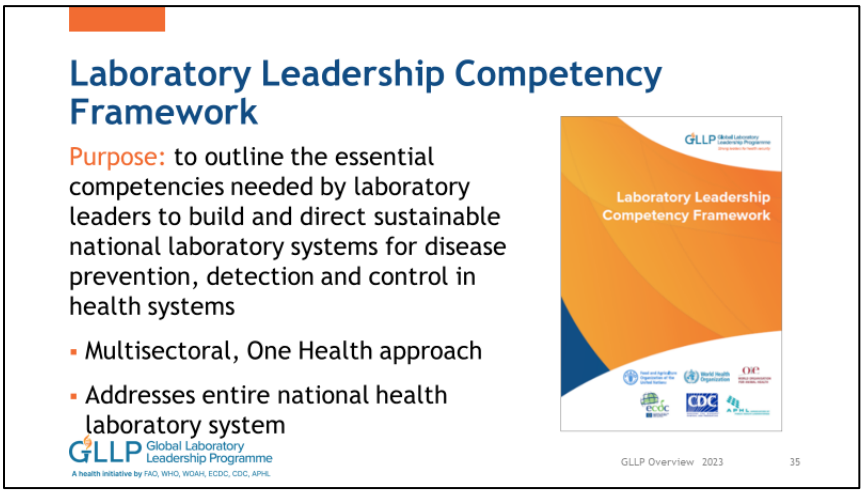
laboratories can effectively fulfill their critical role in the detection, prevention and control of diseases. The GLLP collaborative initiative was formed to respond to this need.

In the spirit of One Health, six leading organizations are collaborating to develop the tools needed to develop laboratory leaders with the knowledge and skills needed to advance their laboratory systems.



The Laboratory Leadership Competency Framework

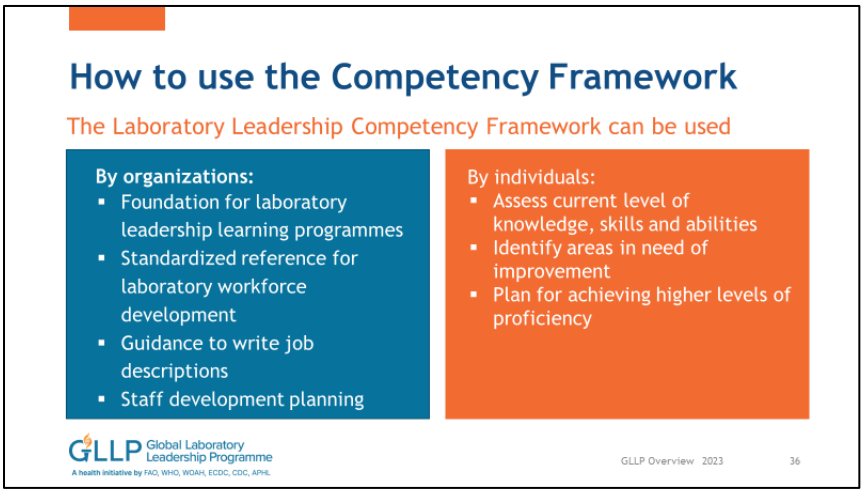
The GLLP Partners first collaboration was the development of the Laboratory Leadership Competency Framework.

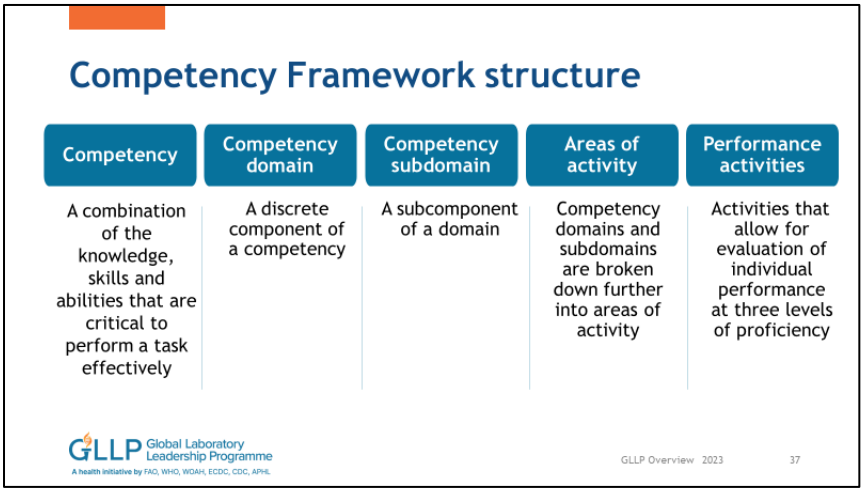


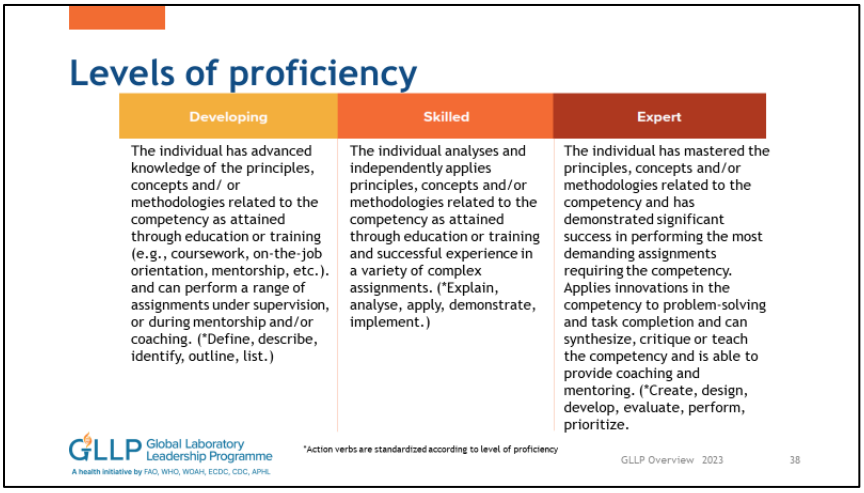
The purpose of the Framework is to outline the essential competencies needed by laboratory leaders to build and direct sustainable national laboratory systems for disease detection, control and prevention in health systems

- This Framework takes a multisectoral One Health approach addressing the entire “National health laboratory system”, defined in the context of the Framework as network(s) that includes human, animal, environmental, agricultural, food, aquatic and chemical laboratories in support of health systems

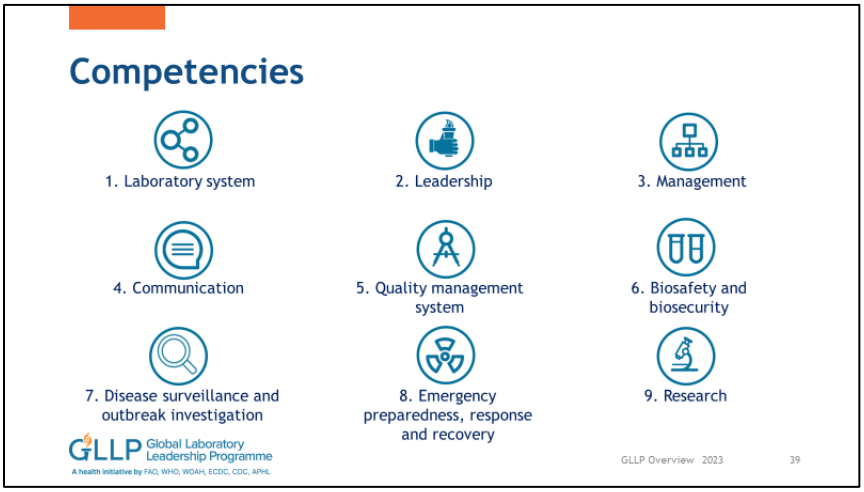
- Accordingly, this Framework provides a strong orientation to the One Health approach, recognizing that improving coordination between human, animal and environmental health sectors has reciprocal benefits and will lead to stronger health systems





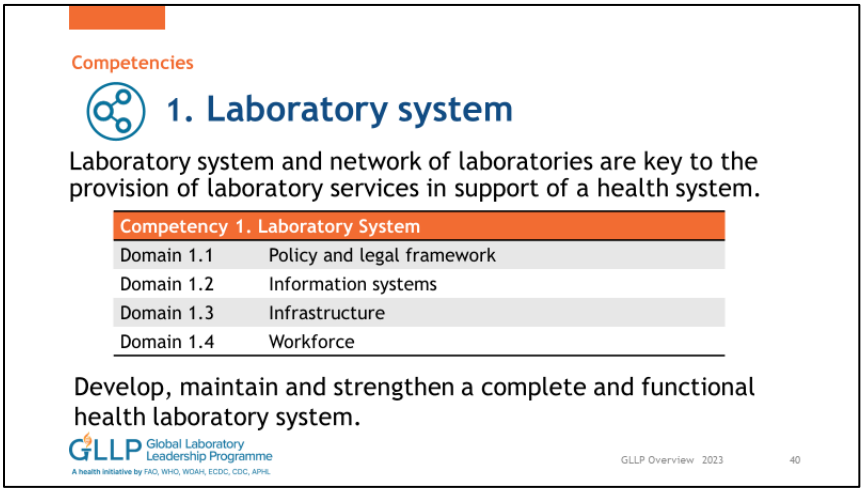


For each competency, there are three levels of proficiency: developing, skilled and expert.



The competencies are presented here in the order they are in the framework.

- Essential competencies needed for laboratory leaders to build sustainable national laboratory systems that improve disease detection, control and prevention efforts in health systems around the world
- Broad knowledge base of effective laboratory quality management practice to ensure quality laboratory services at all levels.
- Skills to improve visibility and awareness of laboratory capabilities and value
- Communication skills required for effective leadership



Competencies

2. Leadership

Leadership is essential for success in the fast-paced, changing environment of health laboratory systems.

Competency 2. Leadership	
Domain 2.1	Strategic planning
Domain 2.2	Organizational leadership
Domain 2.3	Critical thinking, problem-solving and decision-making
Domain 2.4	Partnerships and coalition building
Domain 2.5	Ethics and integrity

Motivate and inspire a group of people to act towards achieving a common goal.

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Competencies

3. Management

Strategic management of materials and personnel is necessary for success. Without sound management, leadership vision cannot be attained.

Competency 3. Management	
Domain 3.1	Laboratory management
Domain 3.2	Resource management Subdomain 3.2a Budget and financial management Subdomain 3.2b People management

Effectively and efficiently achieve quality laboratory results using available resources.

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Competencies

4. Communication

Appropriate communication in all forms is vital for successful leadership and management.

Competency 4. Communication	
Domain 4.1	General communications skills
Domain 4.2	Proposal writing
Domain 4.3	Communication with media
Domain 4.4	Risk communication
Domain 4.5	Scientific communication

Communicate laboratory related information in a clear and concise manner adjusted to the level and type of audience.

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Competencies

5. Quality management system

The cornerstone of a successful laboratory system is quality results that are reliable, repeatable and timely to allow effective decision-making.

Implement and sustain a culture of quality in laboratory operations.

Competency 5. Quality Management System	
Domain 5.1	Process management Subdomain 5.1a. Sample management Subdomain 5.1b Process control
Domain 5.2	Document and record management
Domain 5.3	Equipment and consumables
Domain 5.4	Purchasing and inventory
Domain 5.5	Nonconforming events management
Domain 5.6	Assessments Subdomain 5.6a Audits Subdomain 5.6b External Quality Assessment Subdomain 5.6c Norms and accreditation
Domain 5.7	Continual improvement
Domain 5.8	Customer focus

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Competencies

6. Biosafety and biosecurity

Strong leadership is needed to ensure the necessary safeguards are in place to protect from biosafety or biosecurity breaches.

Competency 6. Biosafety and Biosecurity	
Domain 6.1	Biosafety
Domain 6.2	Biosecurity
Domain 6.3	Shipment of dangerous goods including nonbiological goods

Ensure optimal management of the risks related to biological and chemical hazards.

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Competencies

7. Disease surveillance and outbreak investigation

Laboratory data are essential for accurate disease surveillance, detection and investigation.

Competency 7. Disease Surveillance and Outbreak Investigation	
Domain 7.1	Surveillance
Domain 7.2	Outbreak investigation

Management of a health surveillance system including outbreak detection and response.

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Competencies

8. Emergency preparedness, response and recovery

Emergencies require sufficient planning and preparation across involved sectors for an adequate and coordinated response.

Competency 8. Emergency Preparedness, Response and Recover	
Domain 8.1	Preparedness
Domain 8.2	Response
Domain 8.3	Recovery

Prepare for, respond to and recover from an emergency.

Competencies

9. Research

Laboratory research is a critical part of effective and innovative laboratory management and contributes to laboratory development and sustainability.

Competency 9. Research	
Domain 9.1	Health research
Domain 9.2	Innovation and development

Plan, conduct and analyze hypothesis-driven investigations.

Content example: communication

Domain 4.1: General communication skills

Domain 4.2: Proposal writing

Domain 4.3: Media media

Domain 4.4: Risk communication

Domain 4.5: Scientific communication

Domain 4.1 General communication skills

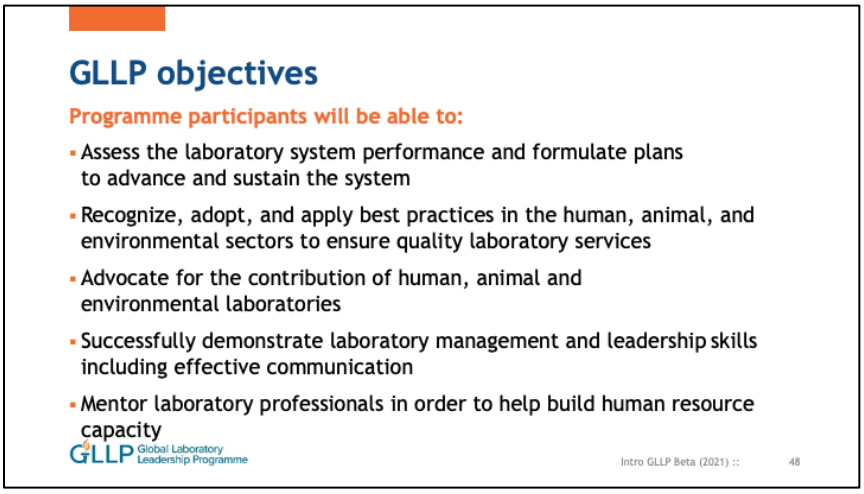
4.1.1 **Oral communication (see also 1.2.4, 9.1.5)**

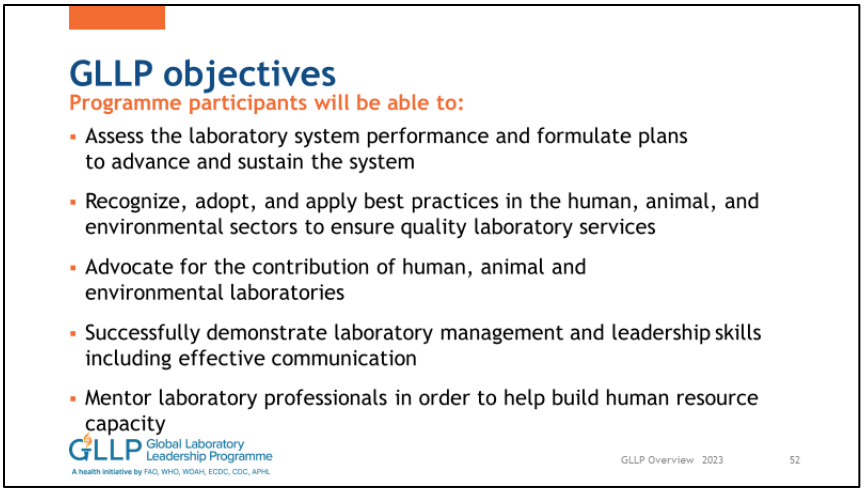
Performance activities	
Developing	Describe effective oral communication skills.
Skilled	Demonstrate effective oral communication skills.
Expert	Develop pathways for subordinates to strengthen oral communication skills.

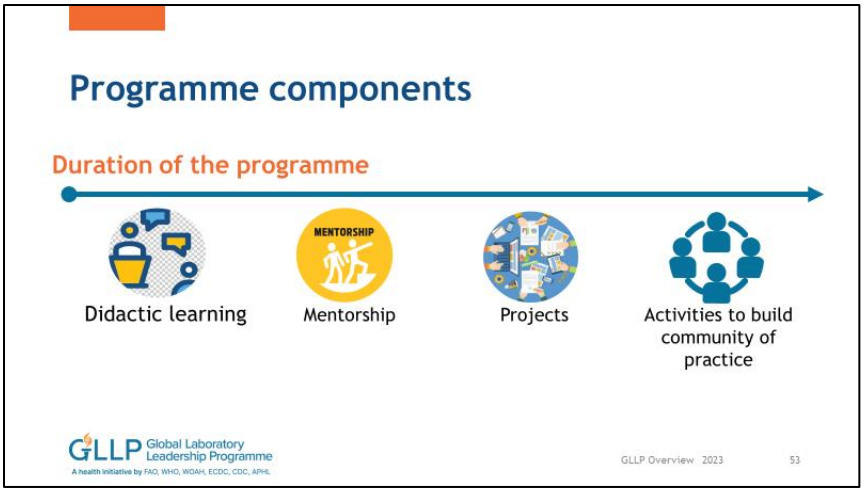
4.1.2 **Written communication**

Performance activities	
Developing	Describe principles of effective written communication.
Skilled	Apply principles of effective written communication.
Expert	Evaluate training in principles of effective written communication.

GLLP: The programme

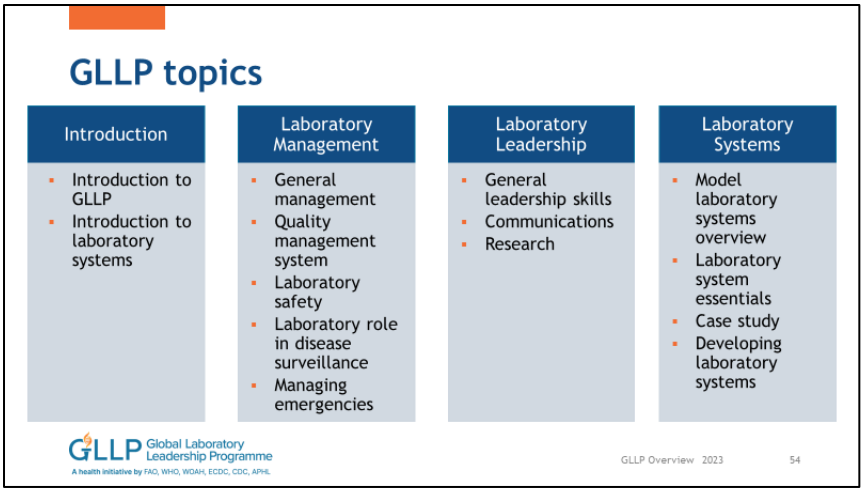






The programme consists of 4 components, didactic learning sessions, mentorship, individual projects and development of a community of practice.

- Each component of the programme is implemented throughout the duration of the programme but components may be more or less intensive at various times and will depend upon the individual programme schedule.

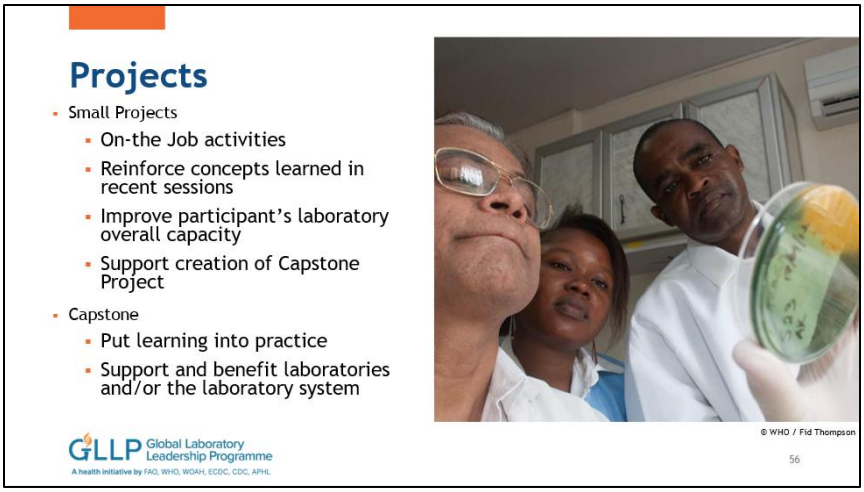


The GLLP is based on the Laboratory Leadership Competency Framework that identifies nine critical laboratory leadership competencies. The GLLP organizes those nine competencies into four programme sections:

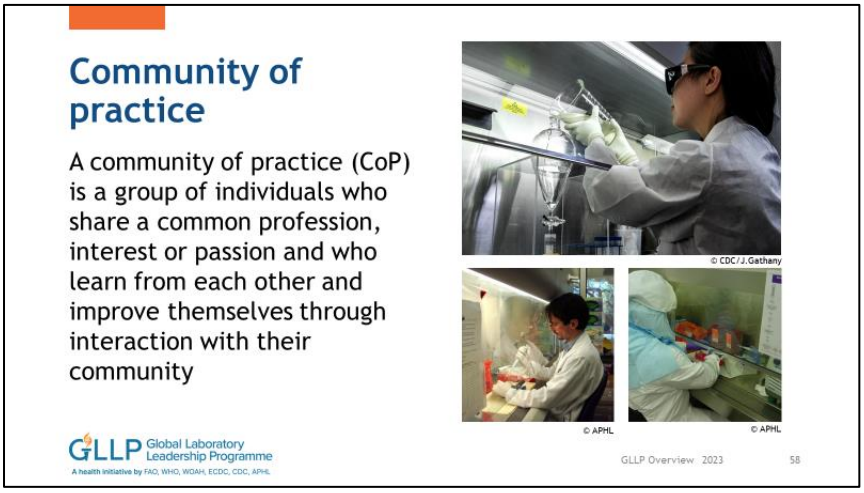
- Introduction
- Laboratory Management
- Laboratory Leadership
- Laboratory Systems

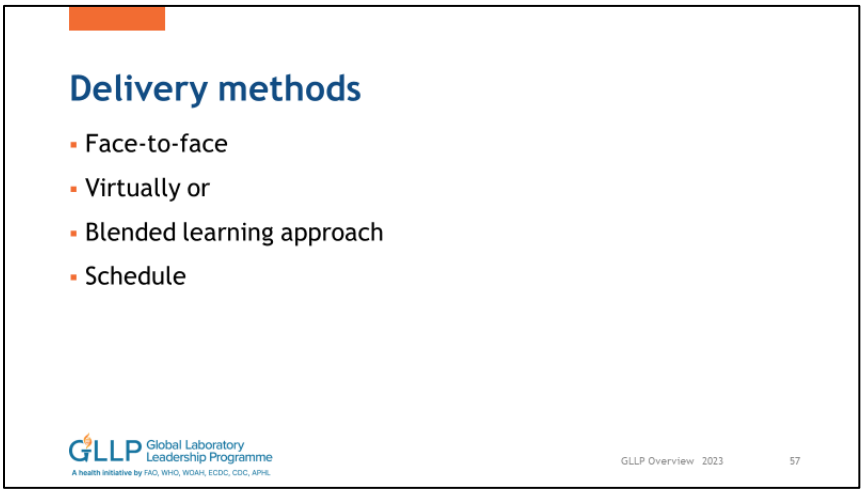
Each section is composed of various units and units are broken down into modules.

Mentorship is an integral part of the programme.



Projects will put learning into practice and benefit the laboratory and/or laboratory system.





Teaching methods

- A combination of methods will be used, based on adult learning principles:
  - Using your own experiences and knowledge to learn more
  - Highly interactive: plenary exercises, group work, individual exercises
  - Different types of exercises, e.g., brainstorm, test, quiz, role-play, discussions, etc.
  - Learning from each other

Activity-based learning

- Between face-to-face sessions, complete on-the-job projects supported by mentors as needed

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Evaluation and certificate

- Evaluation of participant learning will be conducted throughout the programme, using a combination of methods and tools such as:
  - Pre- and post-tests
  - Presentation/grading of on-the-job assignments/projects
  - Structured observation of participant by instructors
- Participants will receive a certificate of completion of the relevant GLLP modules upon completion of the programme

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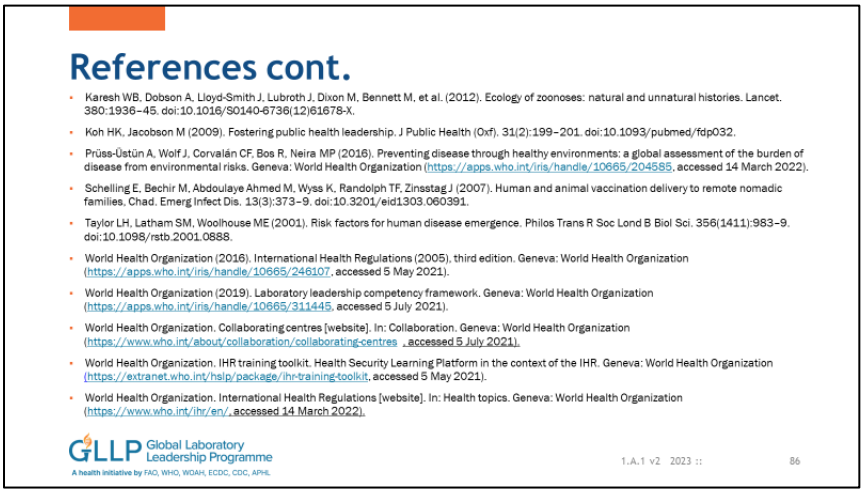

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