Introducing the Laboratory system Maturity Monitoring (LMM)

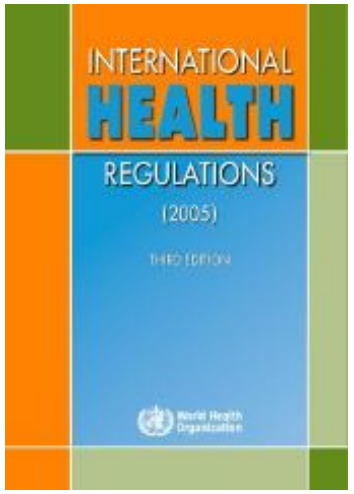
LMM
Laboratory Systems Maturity Monitoring

AfricaCDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

World Health Organization
African Region

Why assess maturity of laboratory systems?

1. **Identifying gaps and tracking progress**
2. **Advancing equitable access** to healthcare,
3. **Integrating diagnostic services**,
4. **Strengthening** overall health system **performance**.
5. **Inform identification** of areas for investment



Universal Health Coverage

AfricaCDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

World Health Organization
African Region

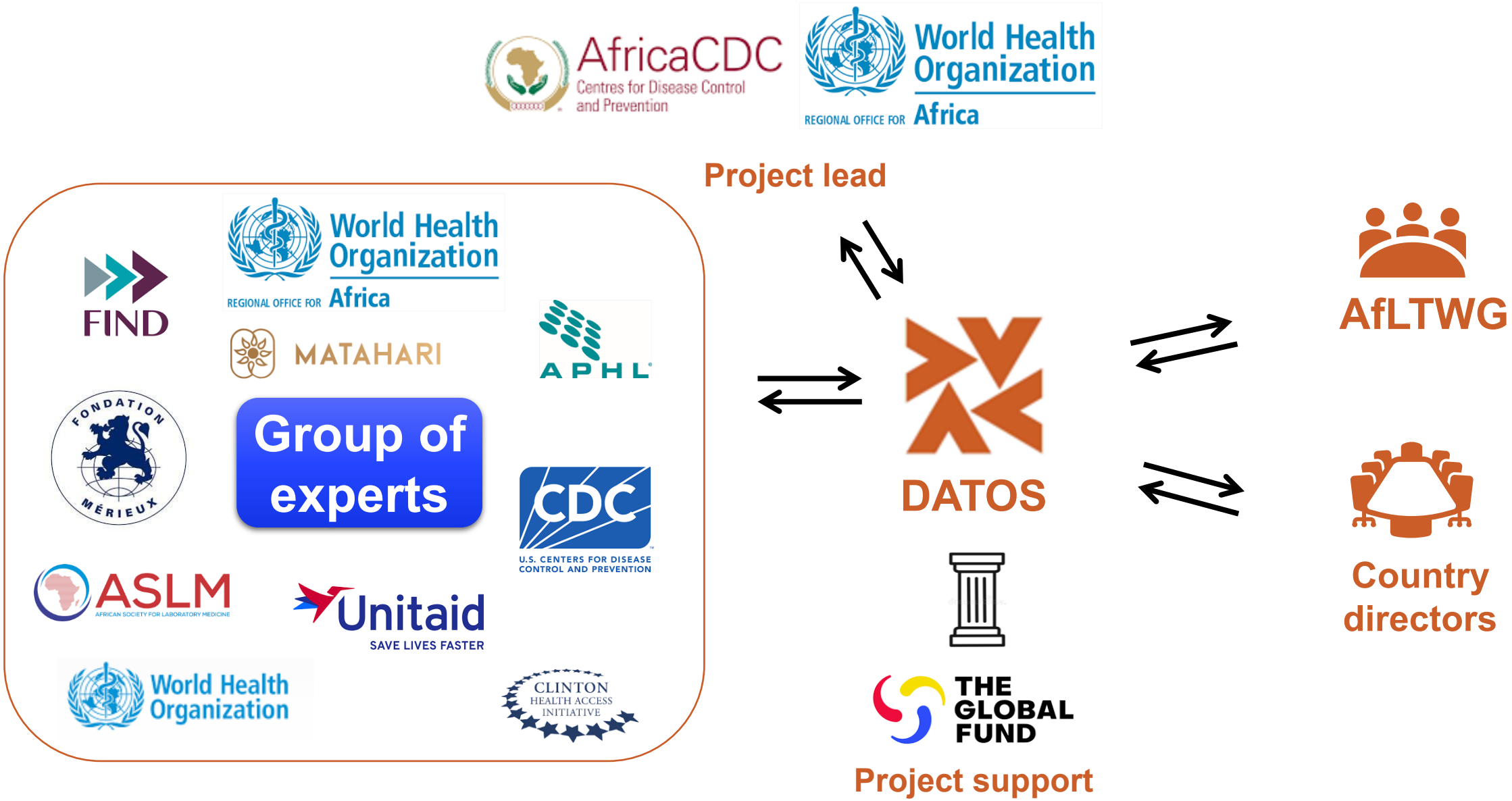
Efforts led by Africa CDC and WHO-AFRO and supported by The Global Fund

- DATOS contracted to develop and pilot the LMM (Stellar)

THE GLOBAL FUND

DATOS
A UNIQUE APPROACH TO LAB STRENGTHENING

LMM development stakeholders



Key definitions

(in-vitro) diagnostics

- **The WHAT?**
- Tools (methods, instruments and reagents) used to identify illnesses or physical conditions

The laboratory system

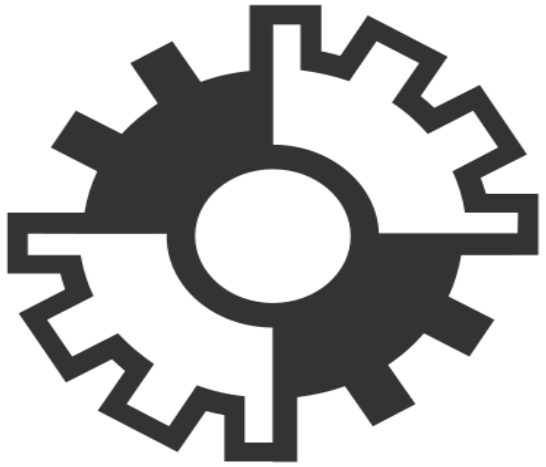
- **The HOW?**
- The underlying structure and processes,
- Encompassing the physical facilities, equipment, quality management, personnel, and computational tools

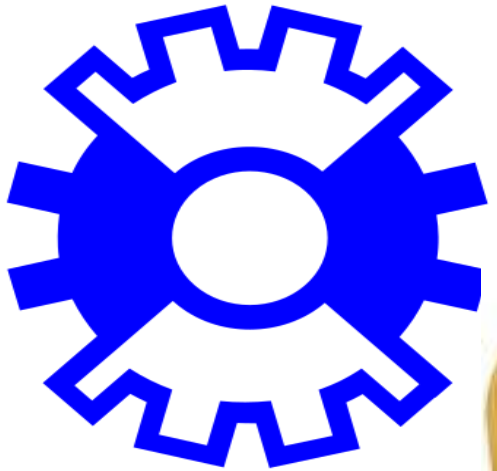
A laboratory network

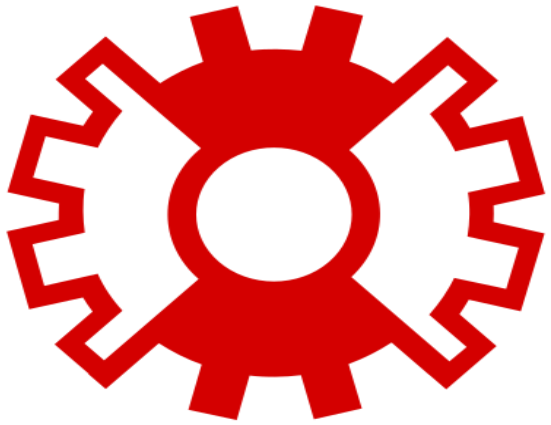
- **The WHERE/WHO?**
- A coordinated group of distinct laboratories, often across geographic regions and organized in tiers,
- Focused on a common goal like disease surveillance or disease control

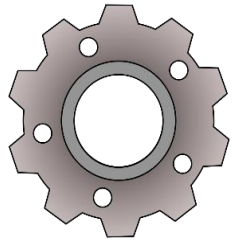
The complexity of measuring systems' maturity

The clockwork metaphor

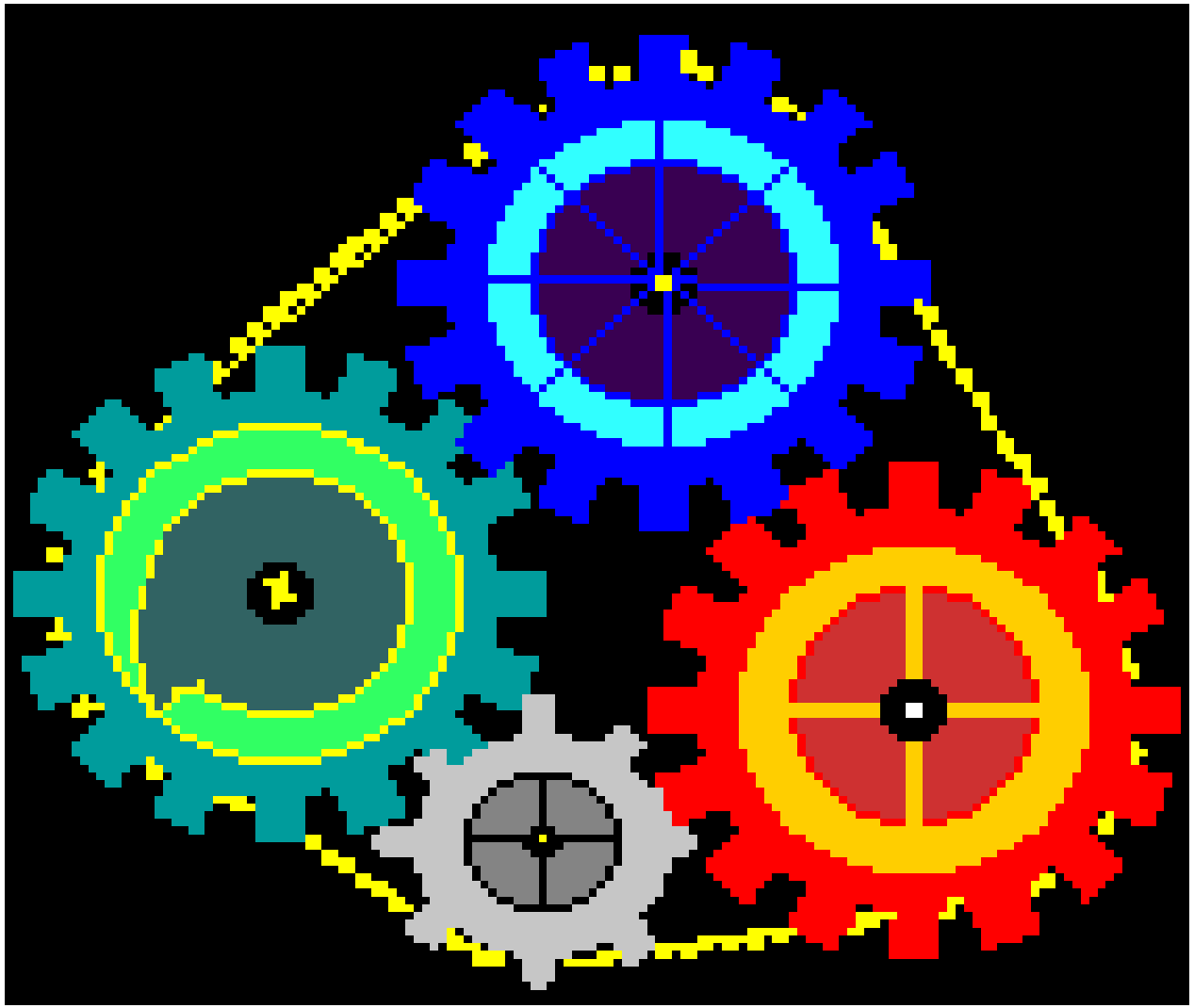


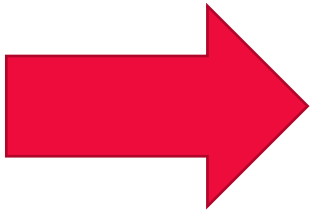






Elements function together as a clockwork: maturity



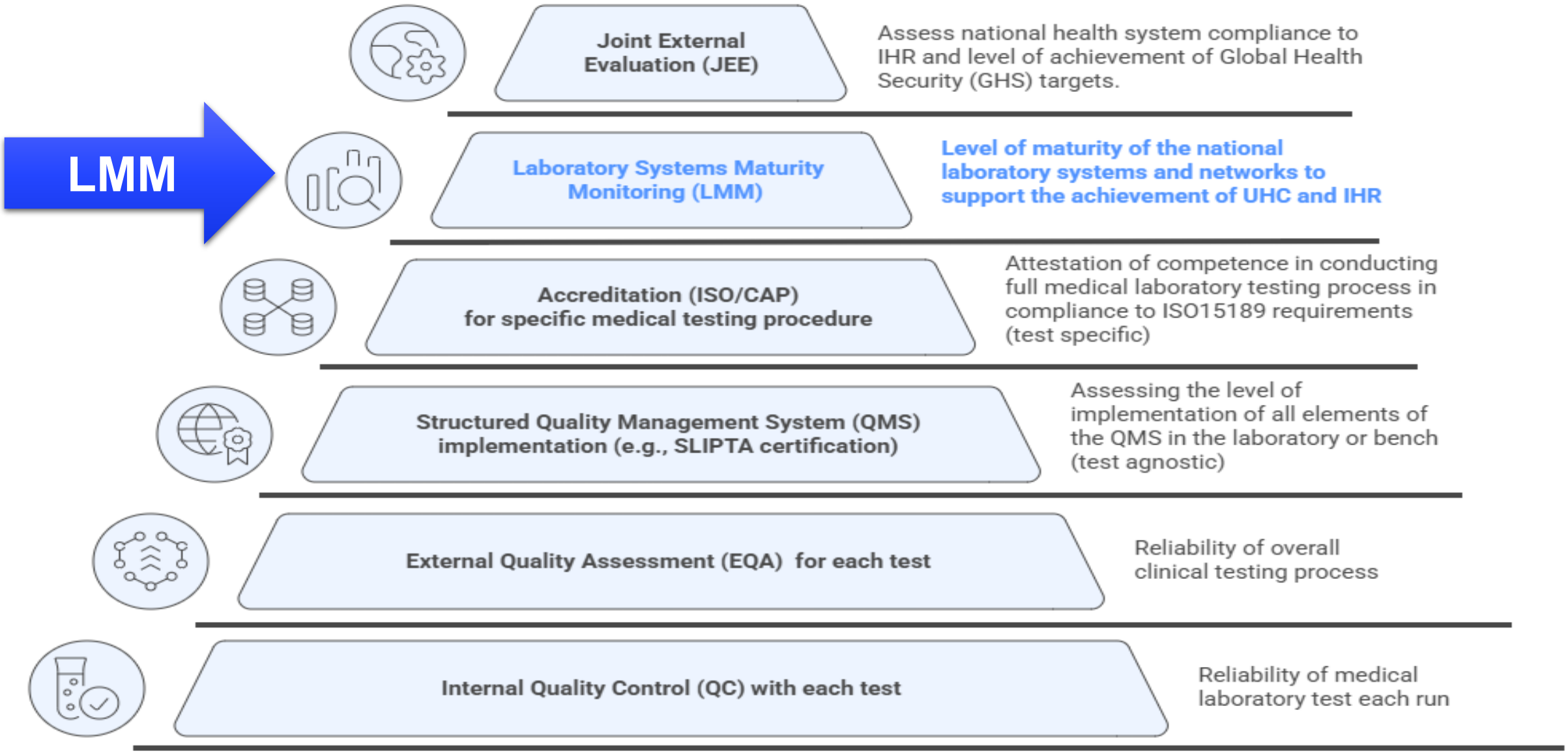


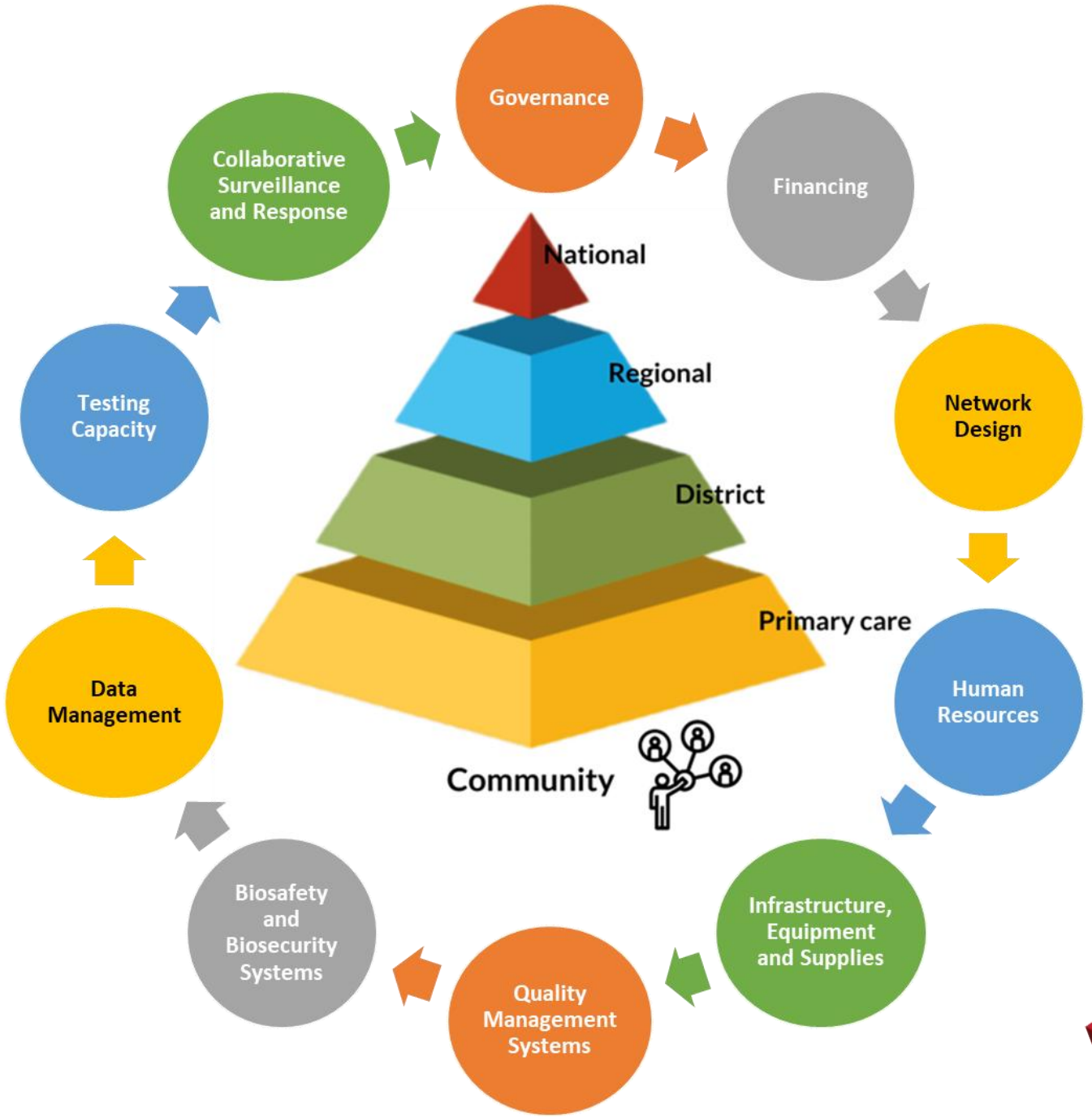
Each clog of the clock is represented by a dimension in the measurement tool

Structure of the LMM

10 Dimensions	35 Components	66 Questions
Governance	• Institutional capacity • National policies and plans • Legal and regulatory framework	• Q1 • Q2 • Q3 • Q4
Financing		
Data management		
Diagnostic network design & functions		
Quality management system		
Infrastructure, equipment and supplies	• Infrastructure • Equipment and supply • Supply chain	• Q1 • Q2 • Q3
Testing capacity		
Biosafety and biosecurity systems		
Human resources	• HR governance • HR strategies • Staffing • Education & Training • Community Health workers	• Q1 • Q2 • Q3 • Q4 • Q5
Collaborative surveillance & response		

Medical Laboratory Systems Quality continuum





Stages

1. no system in place
2. system start up/establishment
3. system support
4. system strengthening
5. system sustainability

Drivers of maturity

- Cost-effectiveness
- Integration
- Optimization
- System resilience
- Communities

1.1.1	Does the Ministry of Health have (an) organizational unit(s) in charge of laboratory coordination?
Aspirations:	Same as component aspiration
Definitions:	Sufficiently resourced: equipment and work lo
Additional remarks:	The laboratory coordin **management level dec all sectors and prograr** The governance structu different levels. It overs implementation. It is re research sectors, natic laboratory sector of the It must be separate fro such as national norms network, continued tra
Source(s) of verification:	Provide the organogran

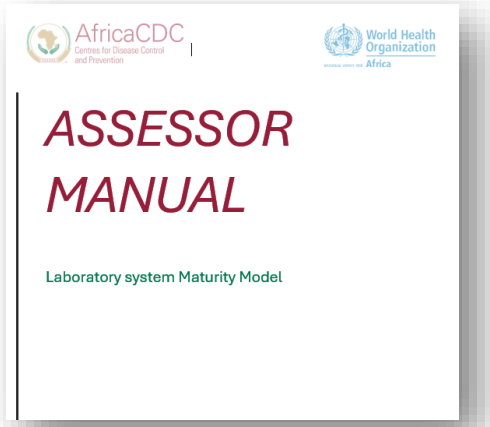
A laboratory governance structure has been set up within the Ministry of Health, with qualified staff,

Scoring guidance

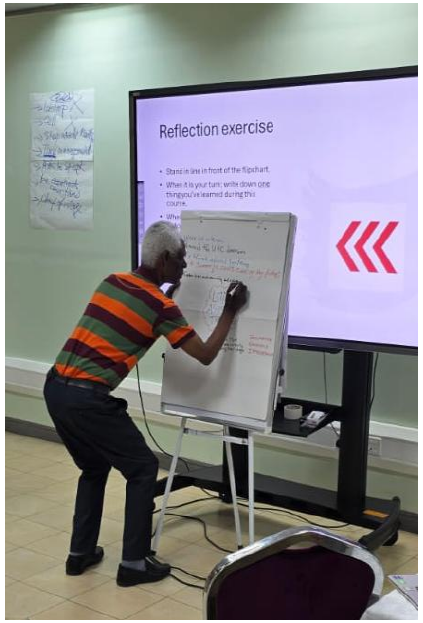
Scores should be assigned according to the following criteria:

- **Score 1:** Assigned when there is **no coordination** with other sectors involved in the demand and supply of health laboratory services.
- **Score 2:** Assigned when **coordination exists** between partners but is **informal** and not documented.
- **Score 3:** Assigned when **coordination is formalized** through mechanisms such as an agreement, memorandum of understanding (MoU), or Terms of Reference (ToR).
- **Score 4:** Assigned when there is **formalized coordination** involving both **governmental and non-governmental partners**.
- **Score 5:** Assigned when the country meets the criteria for **Stage 4**, and **tasks are harmonized** under the frameworks of **UHC and IHR**.

Stage	Description	Stage	
1	There is no organizational unit in charge of laboratory coordination.		
2	There are one or several entities in charge of laboratory coordination.		
3	There is at least one entity but not at senior management level within the MoH. There is an official mandate, defined Terms of Reference, setting of targets and coordination mechanisms with relevant sectors involved in the demand and supply of medical laboratory services.		
4	The entity is a directorate or a department, representing laboratory services at top management level of the MoH with the private sector included in oversight.		
5	All of before, and the entity is sufficiently resourced.		



A pool of 22 certified LMM assessors is available through Africa CDC and the WHO-AFRO



Practical training conducted during the LMM assessment of Uganda in December 2025.

AfricaCDC
Centres for Disease Control and Prevention

World Health Organization
Africa

Certificate No: ACDC-LAB-26/00-01/-22

Certificate of Participation

This certificate is presented to

Osborn Otieno

for your participation in a five-day training on the Laboratory Maturity Monitoring (LMM) evaluation.

Signed by:
Dr Yenew Kebede Tebeje
Acting Director,
Centre for Laboratory Diagnostics and Systems,
Africa Centres for Disease Control and Prevention

Signé par :
Dr Sheick Oumar Coulibaly
Medical Officer,
Diagnostic and Lab Services,
World Health Organization,
Regional Office for Africa

December 4, 2025

An entity of the African Union

https://africacdc.org/download/the-laboratory-systems-maturity-monitoring-lmm/

Selection and engagement of countries:

- Through Africa CDC and the WHO-AFRO (LMM secretariat)
- ***Entry points***: Governance unit of laboratory services (e.g):
  - sous-direction des laboratoires de la DPML (sous – directeur des laboratoroire)
  - National public health institute (Director of the institute)
  - Department of National Health Laboratory and Diagnostic Services (Commissioner)

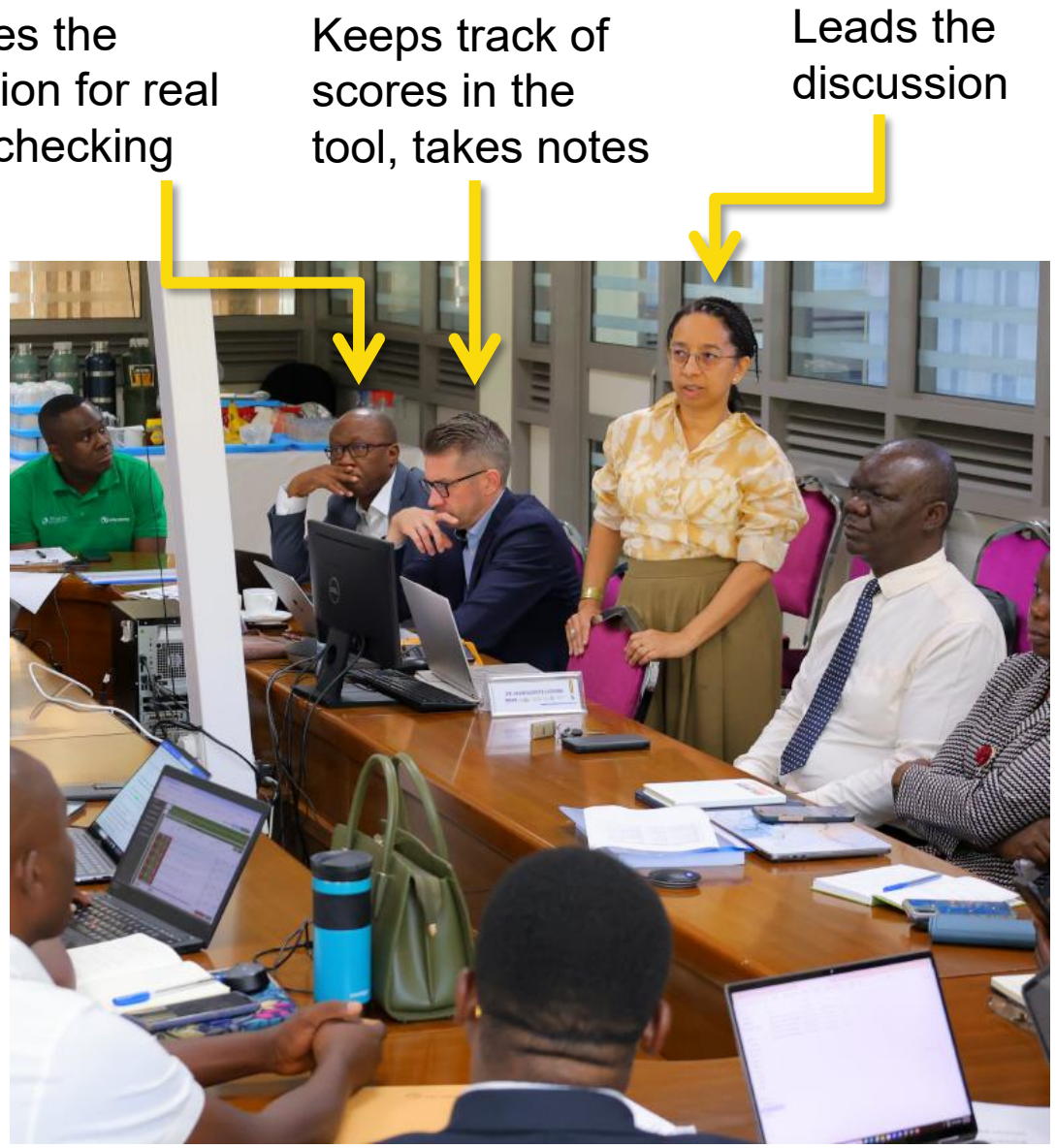
Recommended membership of the assessment committee chaired by Head of Laboratory Directorate (or equivalent)

→ **~25 members**

- Director National Public Health Laboratory
- Director(s) of National Reference Lab(s)
- Representative of laboratory training schools/ Universities
- Representative of private laboratories
- Representative from the MoH data/statistics unit
- Representative of Human Resources for Health
- Representative of vertical programs (HIV, TB, Malaria, etc.)
- The International Health Regulation (IHR) focal point in the country or national representative of the EOC
- Representative from the national regulatory authority
- Representative from the community/civil society
- Technical and financial partners in the laboratory sector (national and international)
- Any other person deemed relevant to the assessment exercise

LMM Process

- Aligned with the JEE process
- 3 external assessors
- Country pre-populate the tool and collect supporting evidence
- 2 days of assessment in plenary. Response by consensus
- Restitution on Day 4 to all stakeholders
- Final report within a month



4 days in country (**2.5 days** plenary)

Report after **1 month**

How is the scoring done? Highlighting the weaknesses

3 Questions

1 Question

1 Question

Dimension 8: Data management	Maturity Score	
8.1: Collection, analysis and reporting	2	53%
8.2: Data management	2	
8.3: Security and confidentiality	4	

8.1.2 Are there national regulations for laboratory data management?

Stage	Description
1	There are no national requirements for the collection and reporting of diagnostic, laboratory, or network performance data.
2	National regulations for the management of diagnostic, laboratory, **or** network performance data have been established but not implemented.
3	National regulations for the management of diagnostic, laboratory, **and** network performance data have been established and are partially implemented.
4	National regulations for the management of diagnostic, laboratory, and network performance data have been established and are implemented across all tiers.
5	Stage 4 and regulations are regularly reviewed and updated to ensure relevance and effectiveness and compliance with national or international requirement for data security, privacy and confidentiality.

8.2.1 Has a comprehensive and adaptable digital laboratory Information management system (LIMS) been established and deployed with staff trained to effectively managed the system?

Stage	Description
1	No electronic LIMS has been implemented.
2	Electronic LIMS have been implemented at national level and some other tiers. The LIMS are primarily used for patient test ordering and tracking, sample management and identification, result entry, validation, and reporting and comply with national or international requirement for data security, privacy and confidentiality.
3	Stage 2 and LIMS at some tiers are connected and interoperable with the HMIS and other data management systems and used for data capture from equipment and quality control, inventory and reagent management, and aggregation of diagnostic and performance data as per country requirements.
4	Stage 3 and LIMS are implemented at all laboratories across the network as per country requirements.
5	Stage 4 and the LIMS are adaptable to meet the current and future needs of the national health laboratory network and system.

What does the scoring mean?

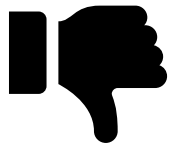
- ❑ The country has a mechanism in place to collect and report electronic laboratory data
- ❑ The mechanism is supported by a regulation aligned with international standards for patient care and surveillance

Build on that

- ❑ However, the data collection and reporting only covers test request and return of results
- ❑ No regulation and mechanisms are in place for collecting data on the performance of the laboratory network (e.g)
  - Status of equipment
  - Quality control
  - Stock management
  - Aggregated data on diagnostics

Work on this

Good for the disease programmes and patient management

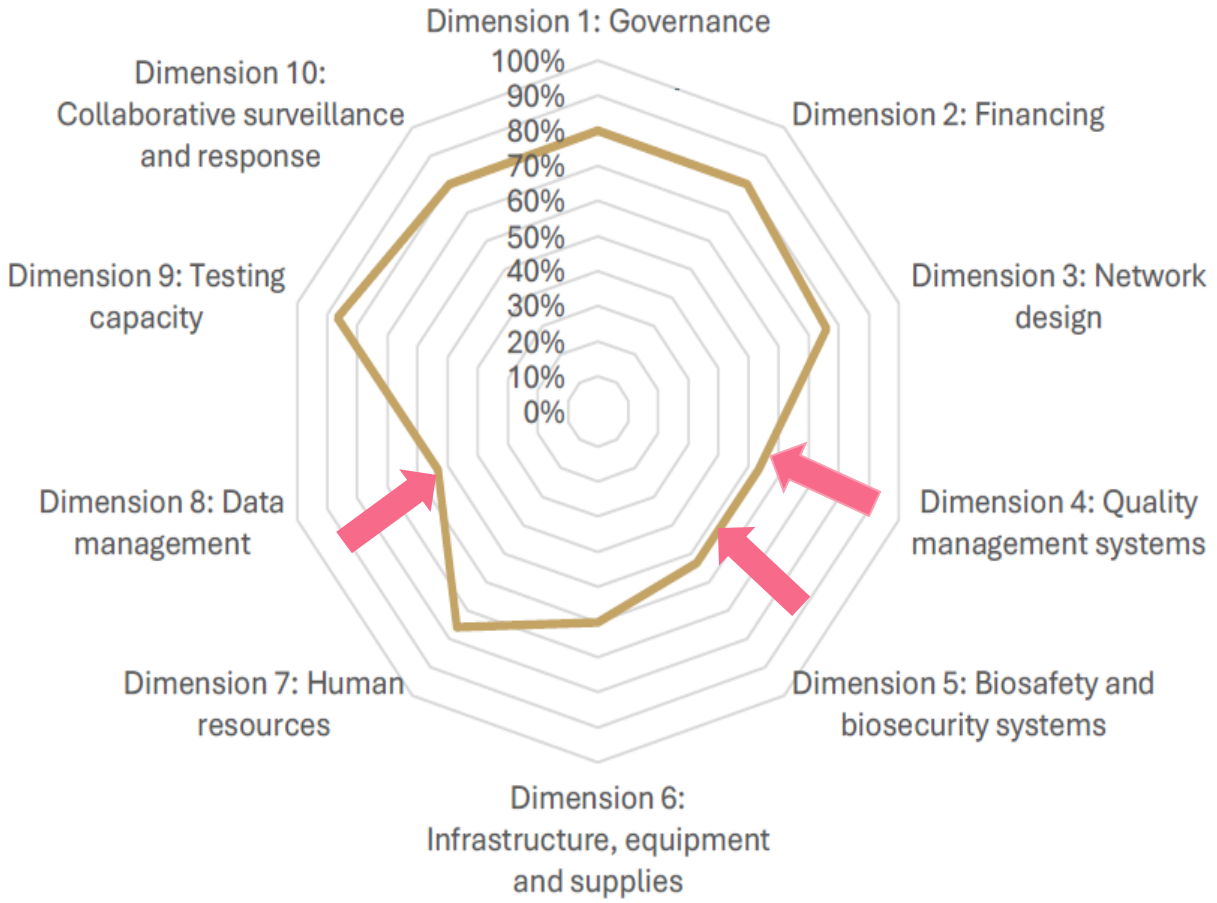


Gaps to manage the stocks of supplies, functionality of equipment and conduct continuous improvement and expansion of the diagnostic network

How do the LMM evaluation outcomes look like?

Example

Laboratory System Maturation		
Dimension 1: Governance	**Maturity Score**	**Progress**
1.1. Institutional capacity	4	80%
1.2. National policies and plans	5	
1.3. Legal & regulatory framework	3	
Dimension 2: Financing	**Maturity Score**	
2.1: Budget development and negotiation mechanisms	4	80%
2.2: Sources of funding	3	
2.3: Expenditure and income monitoring and accountability mechanisms	5	
Dimension 3: Network design	**Maturity Score**	
3.1: Organization of the tiered network	4	76%
3.2: Coordination & management	5	
3.3: Geographical distribution	2	
3.4: Specimen referral system	4	
3.5: Optimization and continual improvement	4	
Dimension 4: Quality management systems	**Maturity Score**	
4.1: Quality control and assurance	3	53%
4.2: Licensing, certification & accreditation	3	
4.3: National laboratory quality infrastructure	2	
Dimension 5: Biosafety and biosecurity systems	**Maturity Score**	
5.1: Biorisk management	3	53%
5.2: Biorepositories	2	
5.3: Waste management	3	
Dimension 6: Infrastructure, equipment and supplies	**Maturity Score**	
6.1: Infrastructure	3	60%
6.2: Equipment and supplies	3	
6.3: Supply chain	3	
Dimension 7: Human resources	**Maturity Score**	
7.1: HR governance	4	76%
7.2: HR strategies	4	
7.3: Staffing	3	
7.4: Education and training	3	
7.5: Community health workers	5	
Dimension 8: Data management	**Maturity Score**	
8.1: Collection, analysis and reporting	2	53%
8.2: Data management	2	
8.3: Security and confidentiality	4	
Dimension 9: Testing capacity	**Maturity Score**	
9.1: Essential diagnostics	4	87%
9.2: Testing modalities	5	
9.3: Integrated diagnostic delivery	4	
Dimension 10: Collaborative surveillance and response	**Maturity Score**	
10.1: Strategy	5	80%
10.2: Laboratory (surge) capacity integration for timely outbreak response	3	
10.3: AMR	3	
10.4: Genomic sequencing strategies	5	
Overall laboratory system maturity		**71%**



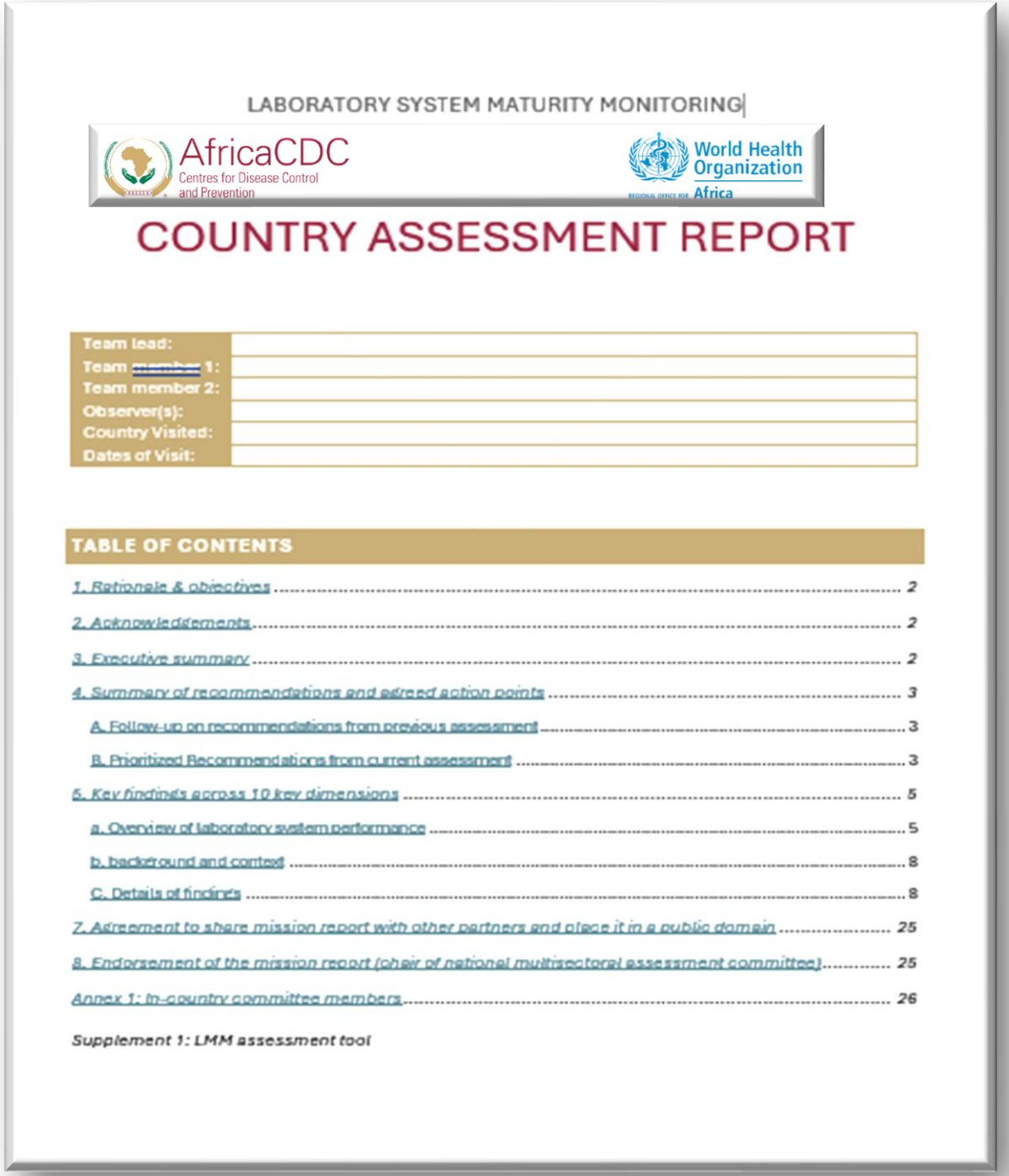
Overall system strengthening

Stage	
1	1. no system in place
2	2. system start up/establishment
3	3. system support
4	4. system strengthening
5	5. system sustainability

Dimension 1: Governance	1.1. Institutional capacity (4)	1.2. National policies and plans (5)	1.3. Legal & regulatory framework (3)		
Dimension 2: Financing	2.1: Budget development and negotiation mechanisms (4)	2.2: Sources of funding (3)	2.3: Expenditure and income monitoring and accountability mechanisms (5)		
Dimension 3: Network design	3.1: Organization of the tiered network (4)	3.2: Coordination & management (5)	3.3: Geographical distribution (2)	3.4: Specimen referral system (4)	3.5: Optimization and continual improvement (4)
Dimension 4: Quality management systems	4.1: Quality control and assurance (3)	4.2: Licensing, certification & accreditation (3)	4.3: National laboratory quality infrastructure (2)		
Dimension 5: Biosafety and biosecurity systems	5.1: Biorisk management (3)	5.2: Biorepositories (2)	5.3: Waste management (3)		
Dimension 6: Infrastructure, equipment and supplies	6.1: Infrastructure (3)	6.2: Equipment and supplies (3)	6.3: Supply chain (3)		
Dimension 7: Human resources	7.1: HR governance (4)	7.2: HR strategies (4)	7.3: Staffing (3)	7.4: Education and training (3)	7.5: Community health workers (5)
Dimension 8: Data management	8.1: Collection, analysis and reporting (2)	8.2: Data management (2)	8.3: Security and confidentiality (4)		
Dimension 9: Testing capacity	9.1: Essential diagnostics (4)	9.2: Testing modalities (5)	9.3: Integrated diagnostic delivery (4)		
Dimension 10: Collaborative surveillance and response	10.1: Strategy (5)	10.2: Laboratory (surge) capacity integration for timely outbreak response (3)	10.3: AMR (3)	10.4: Genomic sequencing strategies (5)	

What recommendations come out of the evaluation?

Reports shared with country MoH, country team, Funder, Africa-CDC and WHO-AFRO



LABORATORY SYSTEM MATURITY MONITORING

AfricaCDC Centres for Disease Control and Prevention

World Health Organization Africa

COUNTRY ASSESSMENT REPORT

Team lead:	
Team member 1:	
Team member 2:	
Observer(s):	
Country Visited:	
Dates of Visit:	

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Example of some priority recommendations and their targets

Key Findings (consolidated observations)

Strength (*e.g*)

- Strong governance
- Specimen referral
- Number of laboratories accredited
- Biosafety coordination
- Etc…

Gaps (*e.g*)

- Coordination at lower level
- Coverage of accreditation in private sector, at lower level
- Participation to EQA
- Inconsistent utilities
- Missed opportunities for testing integration

Targeted recommendations to:

- MoH & Ministry of Finance
- National laboratory coordination & Ministry of gender, labor and social development & Civil services
- National health laboratory & Diagnostic services
- MoH & National Drug Authority (NDA)
- Human resources & Training institution
- Procurement and supply chain (national medical stores
- National laboratory coordination & private sector laboratory & professional associations

Ex. of recommendation addressing Human Resources

3. MINISTRY OF HEALTH (MOH) / NATIONAL LABORATORY COORDINATION (NHLDS) IN COLLABORATION WITH MINISTRY OF GENDER LABOUR & SOCIAL DEVELOPMENT/CIVIL SERVICE/LABOR DEPARTMENT

Recommendation	Expected impact
Update staffing norms and develop a plan to fill key laboratory positions based on workload.	Optimization of staffing of laboratory and diagnostic facilities in line with test demand.
Establish a national continuous professional development (CPD) program with mandatory periodic refresher training.	Addresses staff shortages, keeps workforce up-to-date with new technologies.
Deploy targeted recruitment and retention incentives for HC III/IV laboratory staff (e.g., hardship allowances, career-path ladders).	Mitigates staffing gaps at lower tiers, improves service continuity.

6. HUMAN-RESOURCES & TRAINING INSTITUTIONS

Recommendation	Expected impact
Standardize curricula for all laboratory cadres and embed competency-based assessments.	Improves skill consistency, facilitates mobility across tiers.

System considerations when addressing for any stakeholder working to improve Laboratory workforce

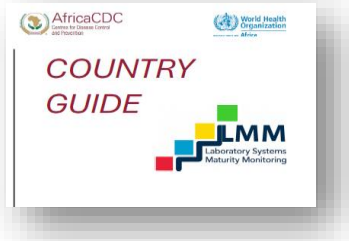
What are countries thinking of the tool and doing with the results?

- Follow-up action coordinated by the PS
- Results presented to the MoH
- Action plan validated by MoH with short term and long-term activities
- Contextualization of the results using the GIS mapping data of the lab network
- Revision of the laboratory strategic plan
- Collaborate with the WHO country office for HRH development

- LMM is superior to other tools (SLIPTA, JEE) → root causes of gaps
- Data management is a critical root cause
- Action plan (short term (operational) versus long term (strategic)
- Advocacy for resource mobilization from various donors

- LMM superior to DNO, TB network assessment to understand the laboratory system
- Brings heads of institution not the committee to understand the system in and out
- Results presented to the director general
- Strategic plan revised
- Roadmap for the laboratory TWG
- Advocacy for funding at the level of the MoH →GC8
- Informed the implementation plan of the MoU with USG (biorepositories, testing of outbreak prone pathogen)

How to initiate LMM in your country?



(1) Country **expresses willingness** to undergo LMM assessment

(2) **Funding** for the assessment is identified and mobilized

(3) Country reaches out to **Africa CDC and WHO AFRO** through the LMM secretariat

(4) Following **Approval**

(5) Country forms the **assessment committee**

(6) **3 LMM assessors identified** by Africa CDC and WHO AFRO are proposed to country

(7) Assessors are **contracted**

(8) Assessors lead **preparation with oversight** from the LMM secretariat (2- 4 weeks before country visit)

(9) **Assessment is conducted**

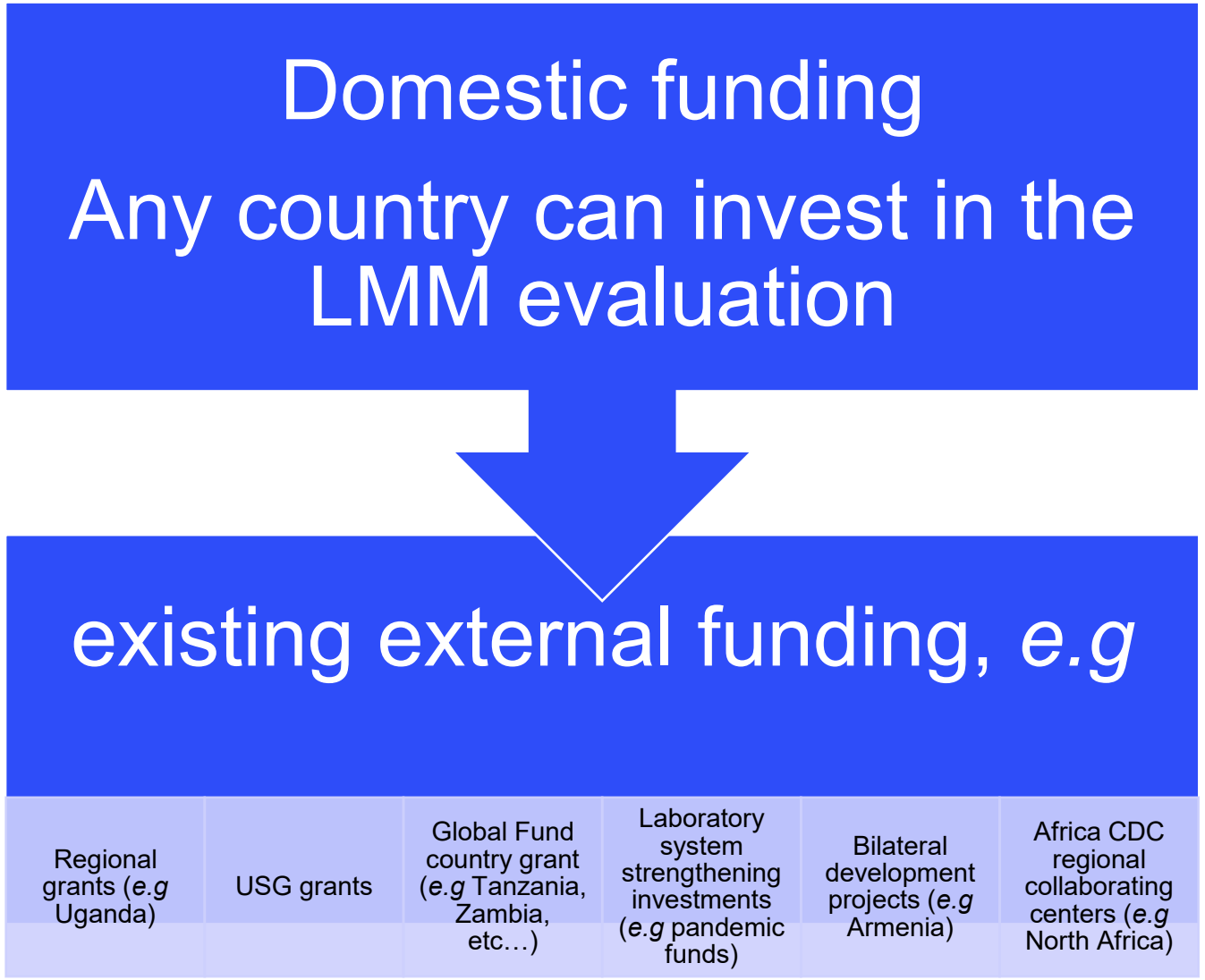
(10) **Validated report is shared** with country , TGF, Africa CDC and the WHO-AFRO (30 d. after the assessment)

(11) Country Utilize the LMM results for strategic planning and fund raising

How can the assessment be funded?

What are the cost drivers of the assessment?

- **Cost between USD 30-40k Costs related to**
  - Travel and fees of the 3 assessors
  - The local workshop of the LMM assessment committee *(WHO country office or Africa CDC may be in the position of offering venue)*




Thank you!