

Investment case framework for pathogen genomics national planning

WORKSHOP PARTNERS



Asia Pathogen
Genomics Initiative



**CENTRE FOR
PATHOGEN
GENOMICS**

Sydney Infectious Diseases Institute
Centre for Infectious Diseases & Microbiology
WHO Southeast Asia Regional Office (SEARO)
WHO Western Pacific Regional Office (WPRO)
WHO International Pathogen Surveillance Network (IPSN)

Recent advances in genomics transform infectious disease detection and response capacity

Early detection of a new or rare pathogen

- polio, zoonotic spillover, outbreak investigation

Monitor levels of an existing pathogen

- SARS CoV-2 variants, drug resistant bacteria/TB

Assess intervention effects

- vaccine introduction, AMR stewardship



Genomic data:
Building block for
new tools

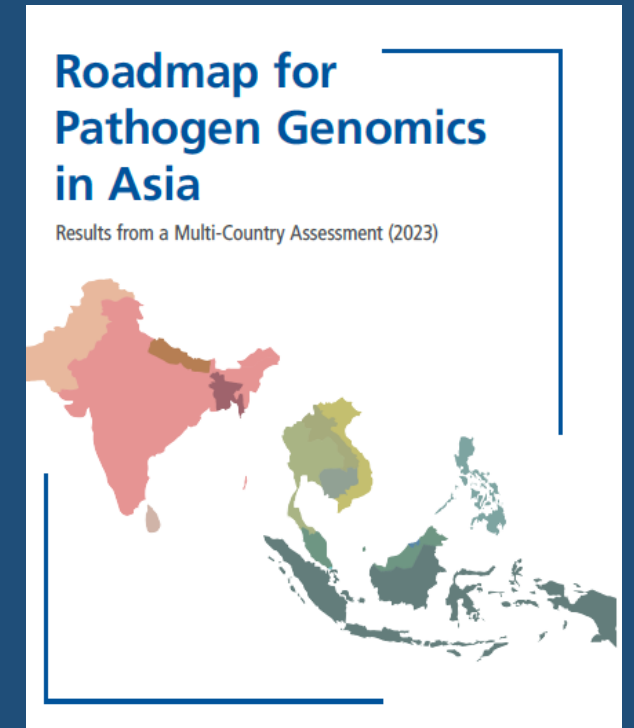
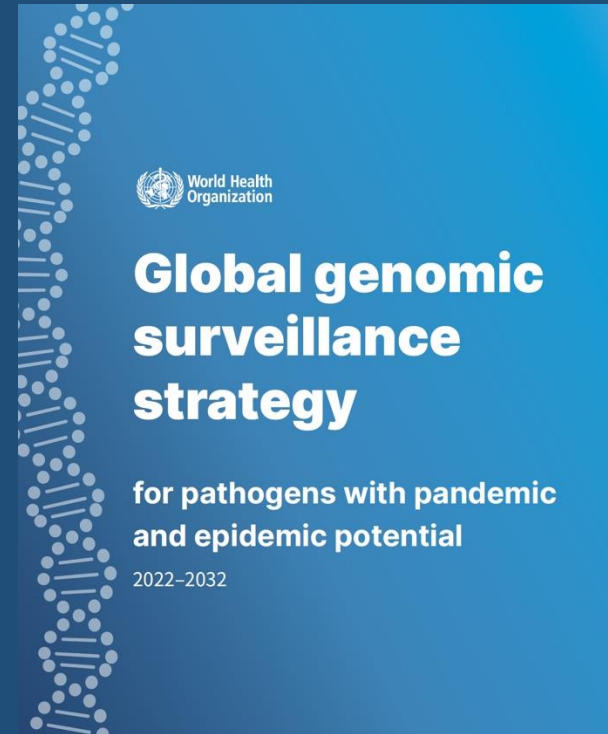


World Health Organization

- Global genomic surveillance strategy

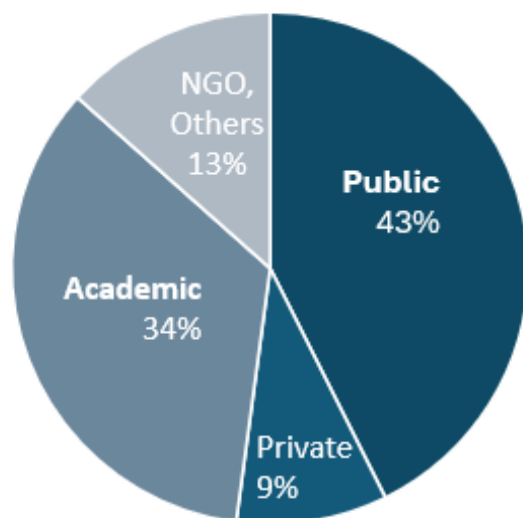
Asia Pathogen Genomics Initiative (Asia PGI)

- **Regional Roadmap:** 14 country assessment with recommendations to accelerate implementation in Asia

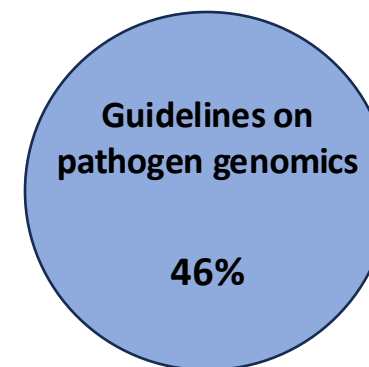
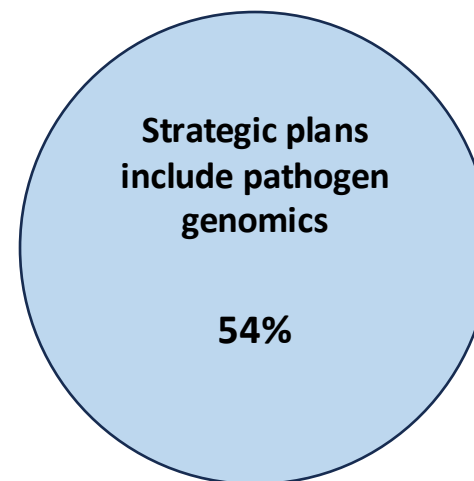
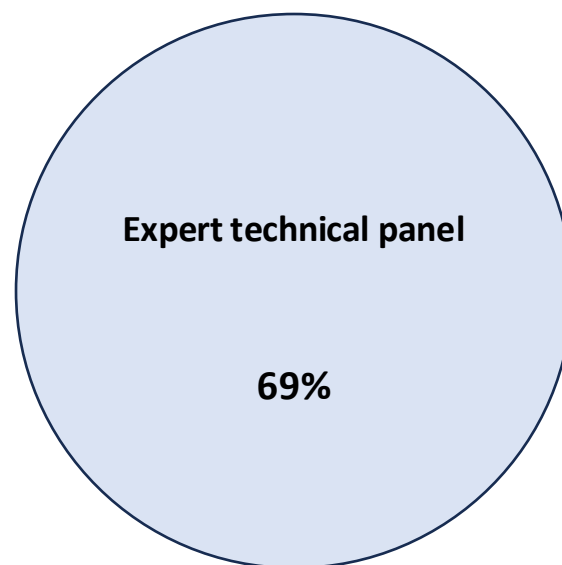


Few countries have national strategic plans in Asia

Partners contributing to pathogen sequencing



Proportion of pathogen sequencing, by partner
Cross-country average



Percentage of countries



What is an investment case?

Framework for accelerating the introduction of high-impact interventions or policies

Informs strategic planning and budgeting

- **Situation analysis:** Defines the goal and system requirements
- **Prioritisation:** Outlines a strategy
- **Cost estimation:** For new inputs
- **Resource mapping:** Align domestic and partner resources around a common approach



Public health approach to pathogen genomics

High priority pathogens



One Health approach



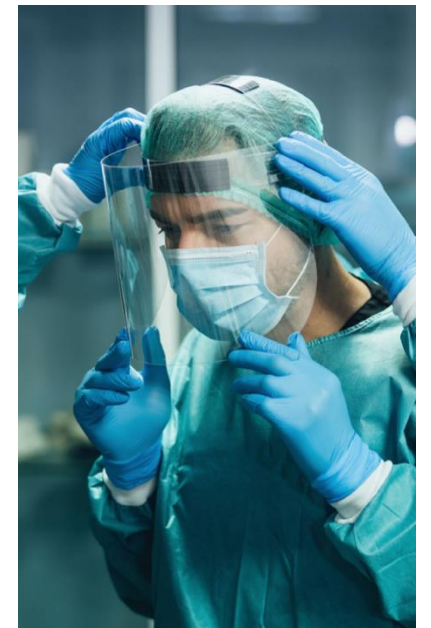
Cost-sensitive system design



Real time information

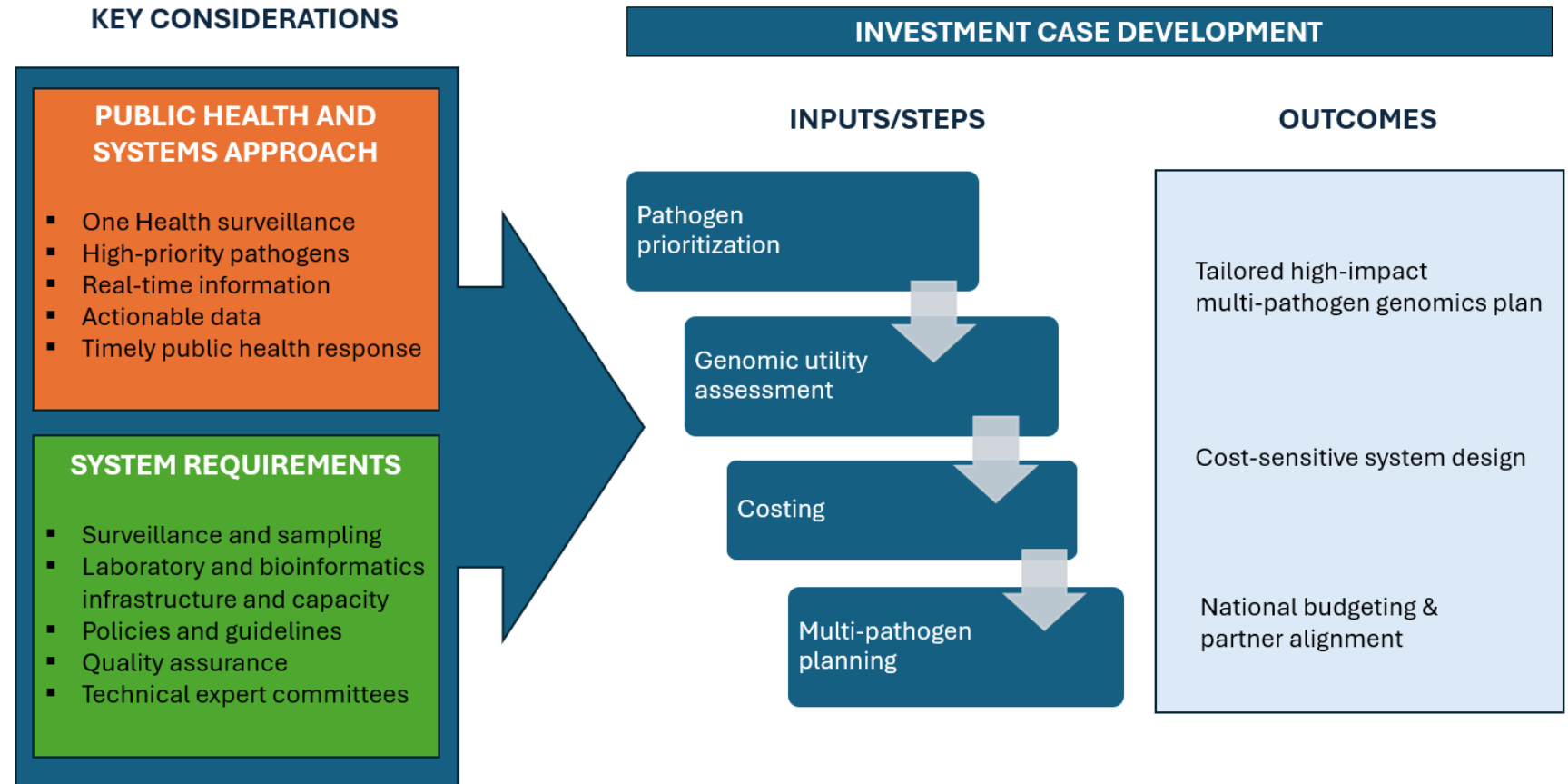


Public health action

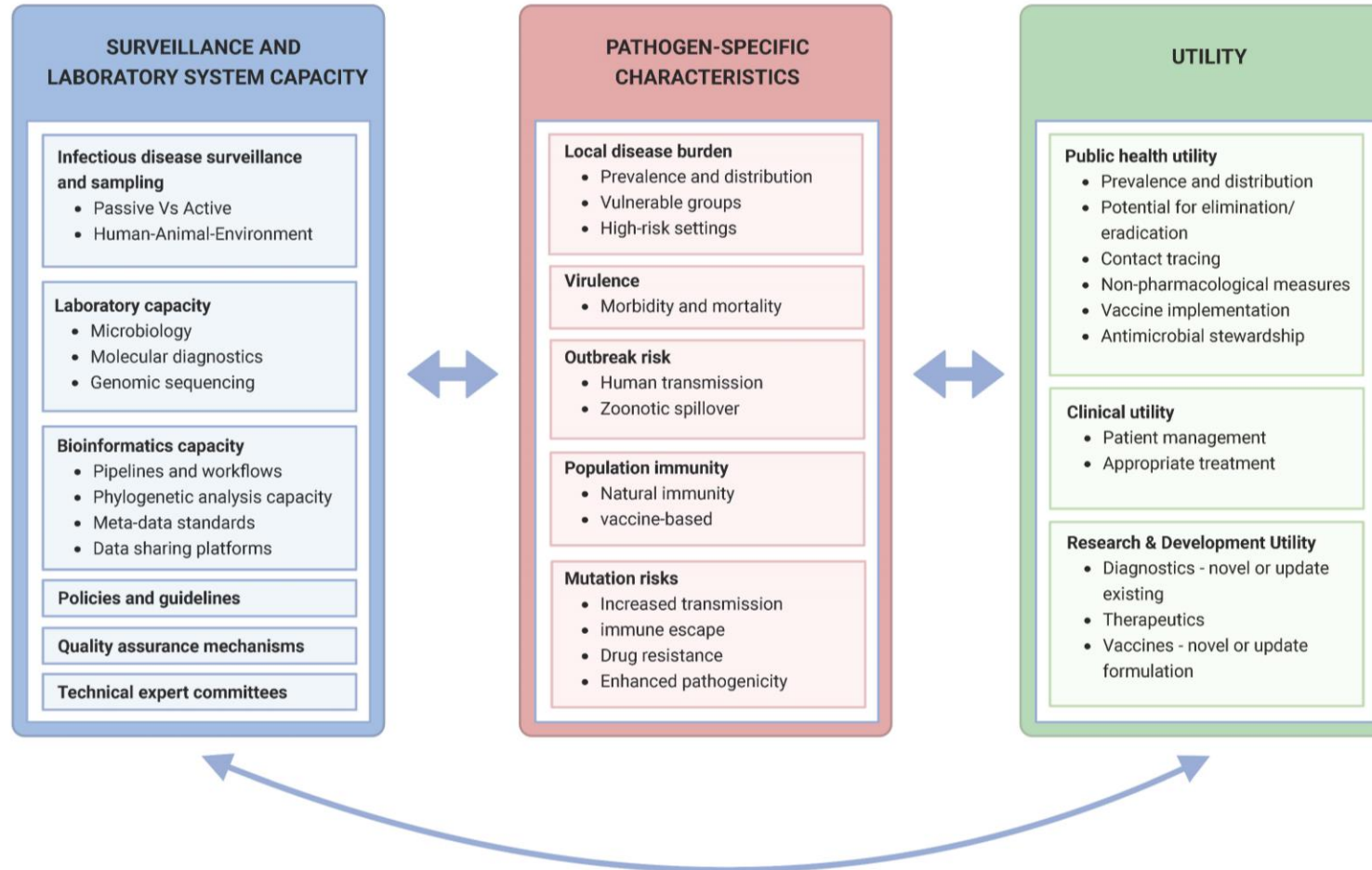


An alternative investment case for pathogen genomics

- Alternative approach that **considers public health objectives and system requirements and benefits**
- *What public health approaches?*
- *What are the system requirements?*
- *What are the inputs and outcomes?*



Key considerations: System requirements



Step 1: Capacity assessment

	LIMITED CAPACITY	MODERATE CAPACITY	HIGH CAPACITY
SURVEILLANCE AND SAMPLING	Passive and ad hoc	Passive and active - moderate coverage	Passive and active - high coverage
LABORATORY AND BIOINFORMATICS	Minimal	Modest scale, slow turnaround time	Well-established, rapid turnaround time
POLICY AND GUIDELINES FOR PATHOGEN GENOMICS	Absent, or present only for SARS-CoV-2	Present for some pathogens	Clearly outlined for endemic and novel pathogens
QUALITY ASSURANCE MECHANISMS	Absent	Some national accreditation; no external quality assurance (EQA)	Well-established national accreditation and EQA
TECHNICAL EXPERT COMMITTEES	Absent	Established	Well-functioning
	Limited utility of genomics	Genomics supports infectious disease control efforts	Genomics supports infectious disease control & elimination



Step 2: Pathogen prioritisation

Country

Pathogen:

I. General Questions			
1	Genomic capacity	Availability of in-country genomics capacity	Yes
2	Screening availability	Availability of routine diagnostic testing to identify the pathogen	Yes

If both answers are "Yes", proceed to the next section.

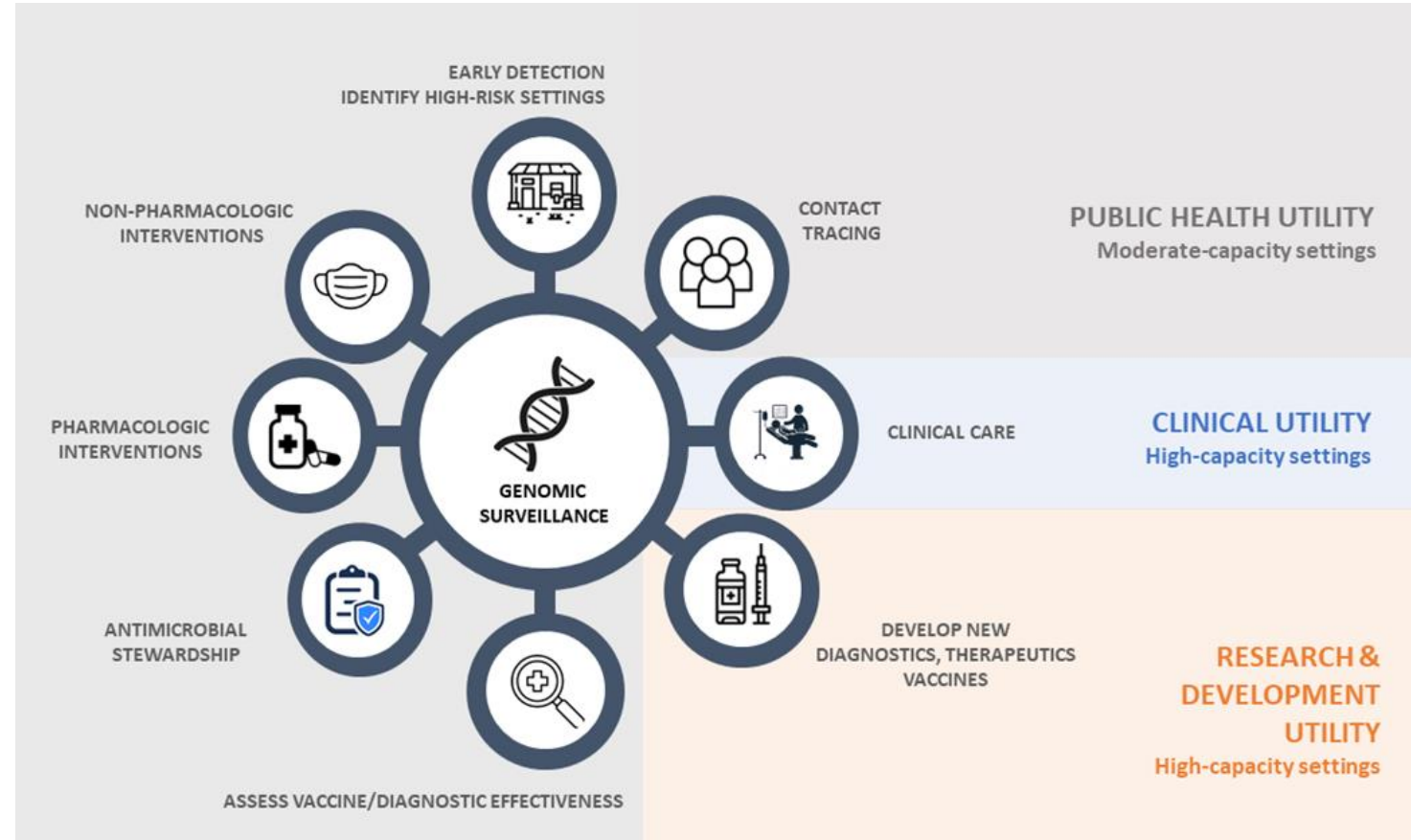
- Pathogen list is country specific
- WHO pathogen/pathogen grouping list

II. Genomic prioritization			
A	Diagnostic test coverage	Estimated % of suspected clinical cases tested with laboratory diagnostic test	20%
B	Pathogen significance	Prevalence	20%
		Transmission rate (R0)	1 - 2
		Case Fatality Ratio (CFR)	13%
C	Mutation significance	Increase in transmissibility	Low
		Increase in disease severity	High
		Vaccine escape/ mismatch	Medium
		Antibiotic/ antiviral resistance	High
D	Economic significance	Direct economic impact (outbreak response and/or prevention)	Medium
		Indirect economic impact (loss of productivity and/or economic growth)	Medium
E	Outbreak Threat	Potential risk or likelihood of a sudden and widespread occurrence of disease caused by the pathogen	High
F	Genomic utility	Public Health Utility	
		Early detection/identification of high risk settings	High
		Non-pharmacologic interventions	Medium
		Contact tracing	High
		Antimicrobial stewardship	High
		Clinical Utility	
		Pharmacologic interventions	Medium
		Diagnostic effectiveness	High
		Clinical Management	High
		Commercial/R&D Utility	
		Develop new diagnostics, therapeutics, vaccines	Medium

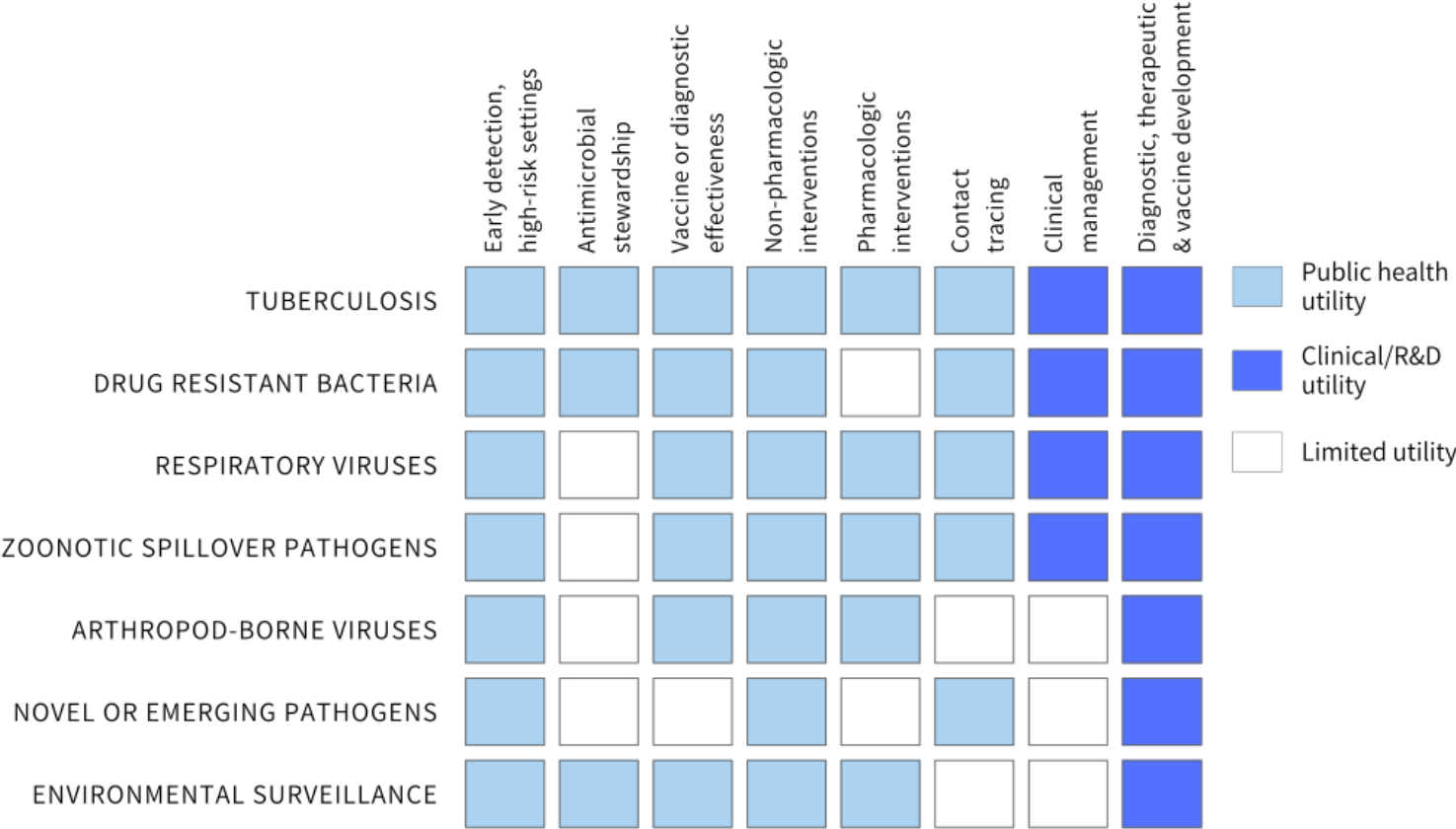


Step 3: Genomic utility assessment

There is a range of utility for pathogen genomics



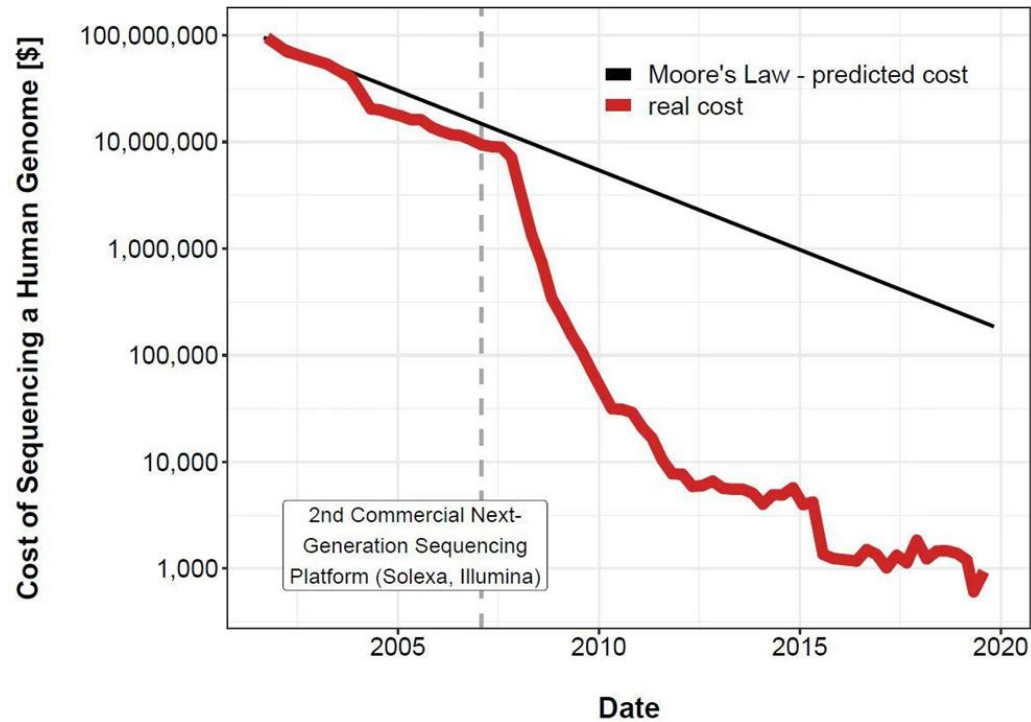
The utility of genomics differs by pathogen



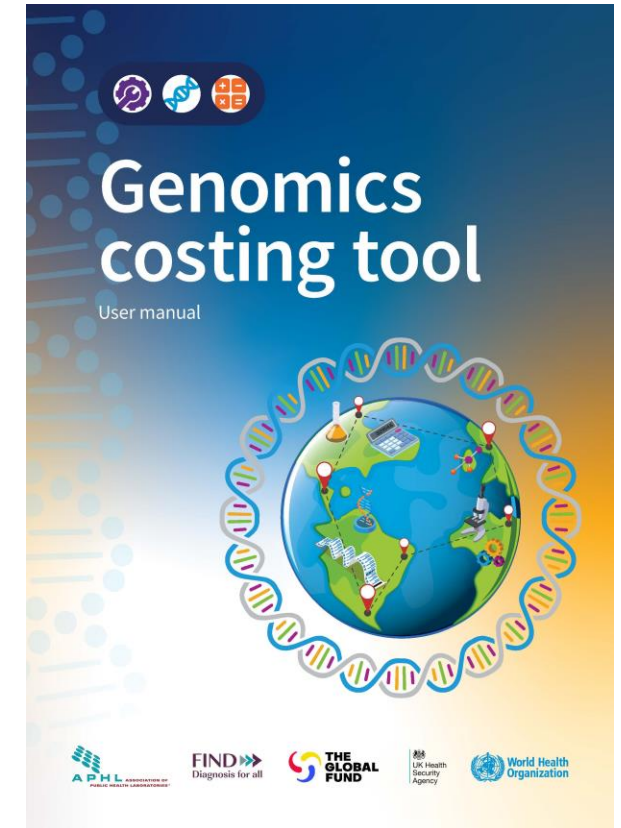
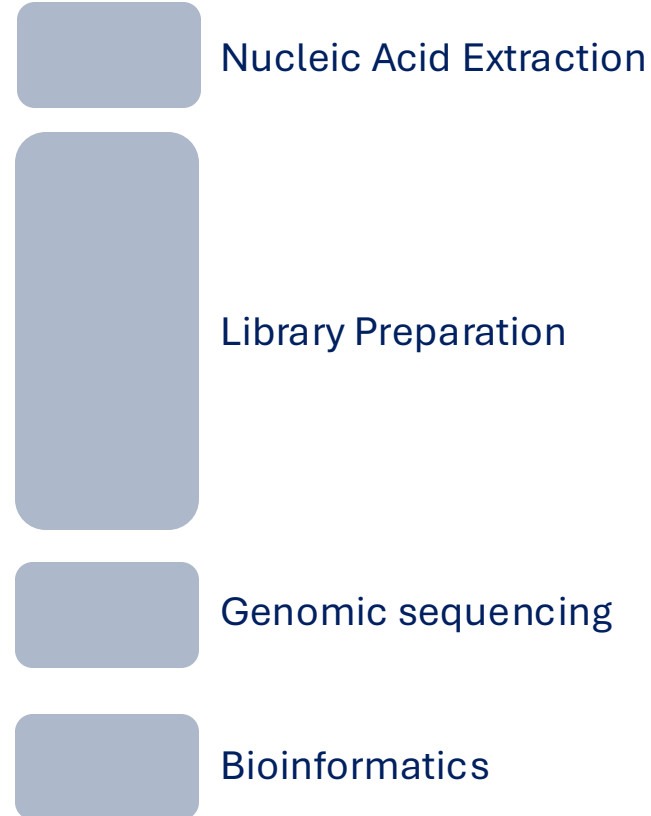
More than 1 genomic utility for pathogens/pathogen groups



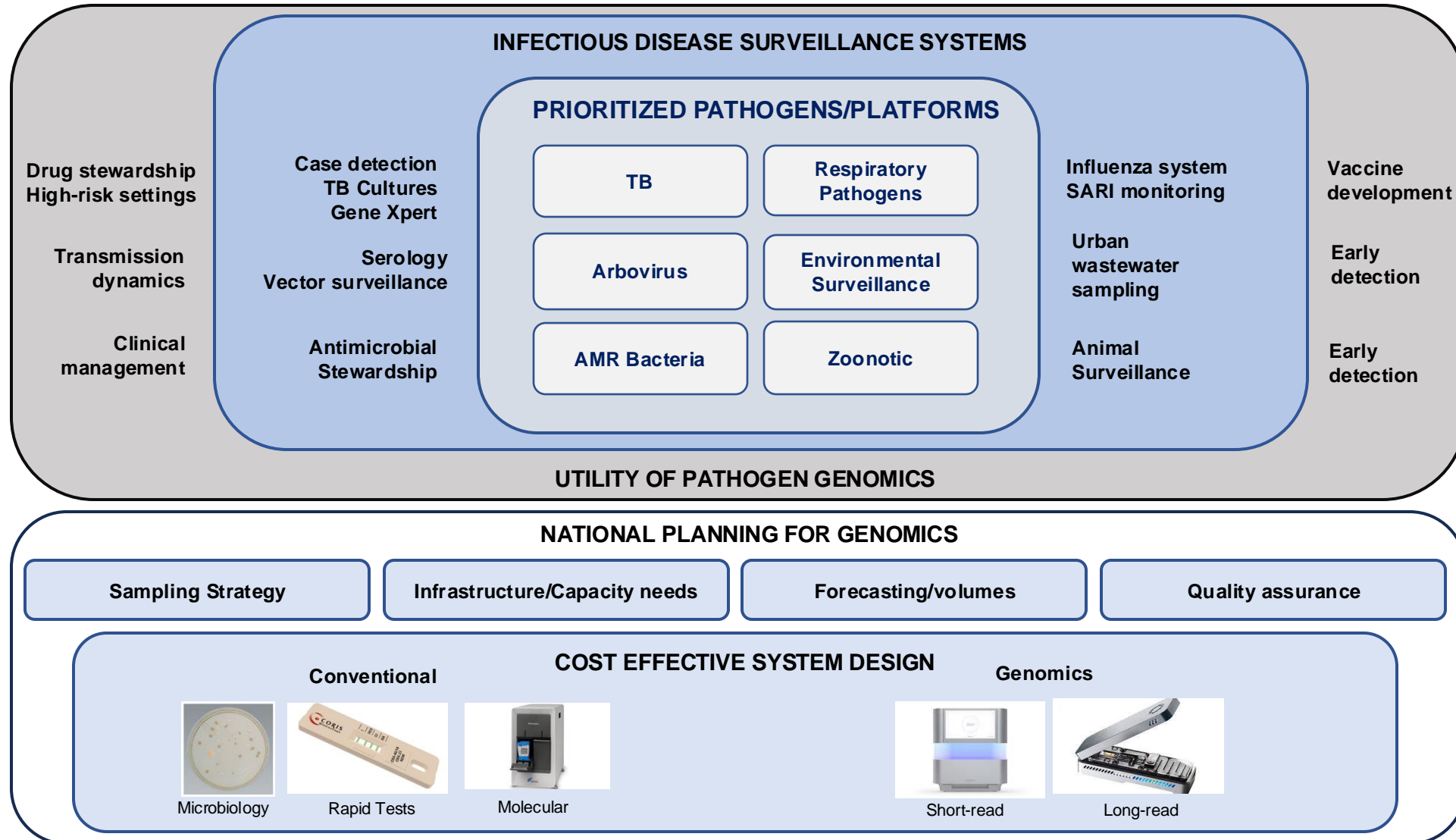
Step 4: Costing of NGS related equipment



Steps and cost-drivers



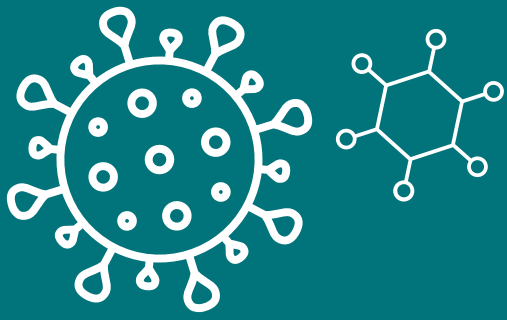
Step 5: Multi-pathogen planning



Summary

- Pathogen genomics is a ground-breaking new tool
 - Enhanced disease surveillance
 - Public health, clinical and R&D (commercial) utility
- Investment case framework
 - Targeted and costed approach to accelerating adoption and scale
- Context based prioritisation of pathogens essential
- Integrated multi-pathogen approaches increase impact and reduce costs





Thank you

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