

Final Report to the GHIT Fund | Project ID T2024-256

Research on Japanese Technologies Influencing Global Health Innovation

KPMG AZSA LLC

Peak Value

Next Frontier Advisors (NFA)

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Executive Summary

The project systematically identified, assessed, and analyzed Japan-originated technologies with significant potential to advance global health (GH) innovation in vaccines and related platform and enabling technologies. The analysis identified 5 thematic areas of Japanese strength, along with 4 key findings and 4 recommendations.

Five thematic areas of Japanese strength

Mucosal Immunity Strategies	Vaccine Platform and Adjuvant Technologies	Computationally Enabled Vaccine Design	Manufacturing and Access Innovation	Vaccines for High-burden and Neglected Diseases
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Key findings

①	Japan's vaccine ecosystem demonstrates particular strength in enabling technologies
②	Platform technologies are increasingly being validated through diseases with strong commercial or pandemic relevance
③	Japan's innovation pipeline may extend beyond publicly visible technologies
④	GHIT is well positioned to accelerate the application of enabling technologies to diseases of greatest GH health need

Major recommendations

①	Prioritize investments in technologies that demonstrate potential for cross-pathogen applicability
②	Invest in emerging technologies with transformative potential
③	Address translational bottlenecks to ensure that innovation translates to public health impact
④	Continue to monitor Japan's enabling technology landscape to identify new and emerging technologies

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01

Background and Objectives

Background and Rationale for Focusing on Japanese Innovations

GH continues to face persistent and emerging challenges, and attention has shifted toward platform and enabling technologies – Japan holds advanced capabilities that remain under-leveraged in product development pathways.

Background

- GH continues to face major challenges, including infectious diseases, emerging outbreaks, and the risk of future pandemics. Despite progress in vaccine development, significant gaps remain in access, scalability, and preparedness.
- Attention is increasingly shifting toward platform and enabling technologies that can strengthen vaccine R&D across multiple diseases.
- Identifying and assessing these technologies can strengthen global vaccine R&D pipelines and contribute to more equitable access, particularly in LMICs.

Rationale for focusing on Japanese innovations

- Japan has strong scientific and technological capabilities across academia, public research institutes, and industry. However, despite the potential relevance of many Japanese innovations to GH and vaccines, limited investment, international visibility, and engagement with GH stakeholders have constrained their contribution to global vaccine R&D.
- Post COVID19, however, investments in vaccine R&D have accelerated significantly both by public and private sectors in Japan, and therefore, there is a strong rationale for conducting a systematic landscape analysis of the existing and emerging innovations in Japan at this juncture.

Objectives and Scope of the Project

The project systematically identifies and assesses Japanese innovation with potential to contribute to GH with a particular focus on vaccines and vaccine-related platforms and enabling technologies.

Objectives

- To systematically identify, assess, and analyze existing and emerging Japanese innovation that has the potential to contribute to GH innovation, with a particular focus on vaccines and vaccine-related platforms and enabling technologies.

Scope

- Comprehensive desktop research using publicly available sources
- Identification of a long list of candidate technologies, followed by screening and shortlisting
- Qualitative validation through expert interviews
- Analysis of the relevance of identified technologies to GHIT's strategic priorities

Relevance to GHIT mission

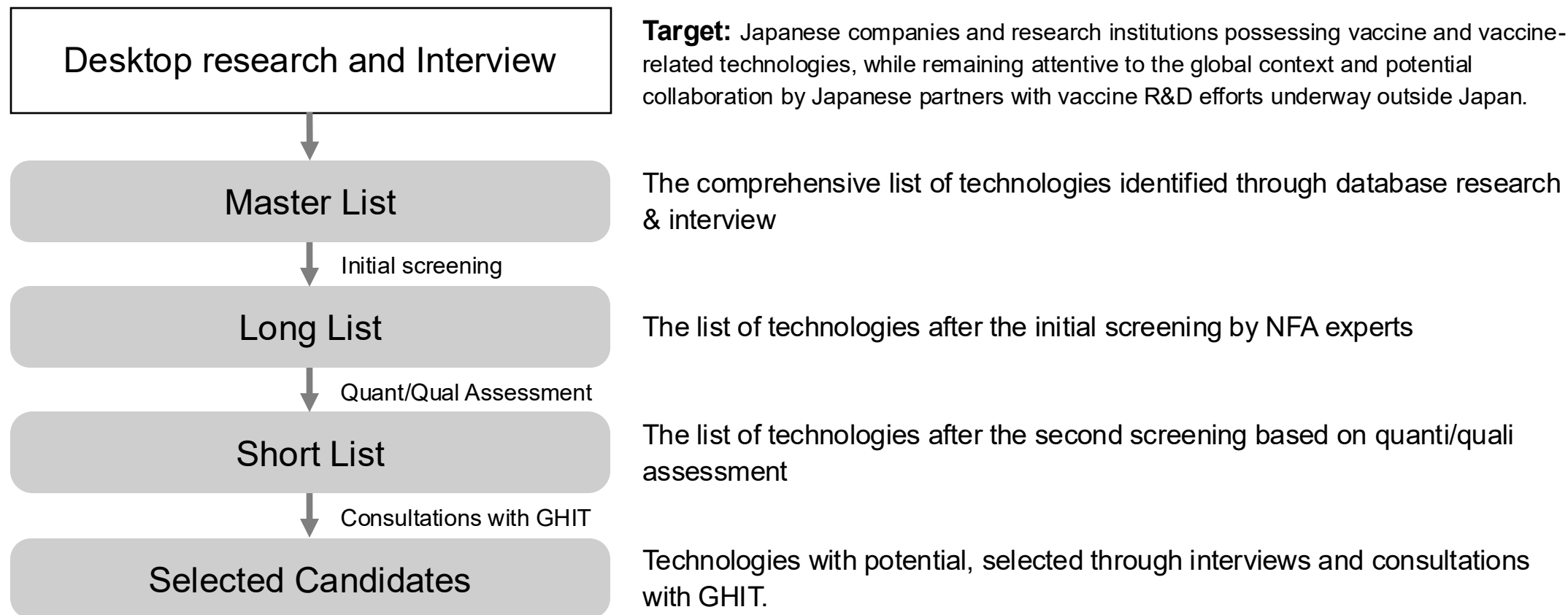
- This project is designed to directly support the mission of the GHIT Fund by strengthening the upstream identification and assessment of technologies that may contribute to future investment opportunities, partnerships, and product development collaborations.
- By providing GHIT with a structured landscape of vaccine-related technologies that currently exist in Japan, the project contributes to:
 - Expanding the pipeline of innovation opportunities relevant to GHIT investments
 - Improving alignment between domestic R&D assets and GHIT's strategic focus areas
 - Facilitating informed engagement between Japanese technology holders and a broader range of global health R&D partners

02

Methodology and Result

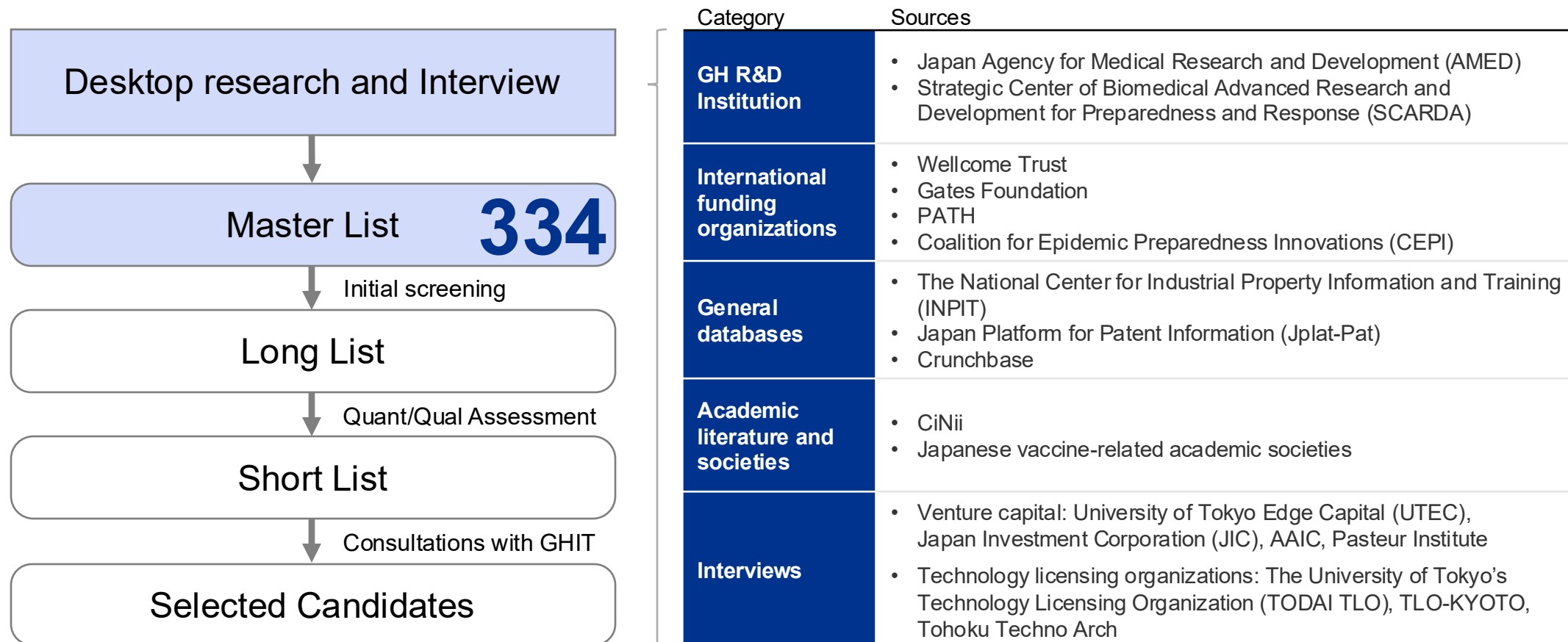
Overall Approach

Based on desktop research using publicly available sources and interviews, the technology selection proceeded in 4 stages – Master List, Long List, Short List and Selected Candidates.



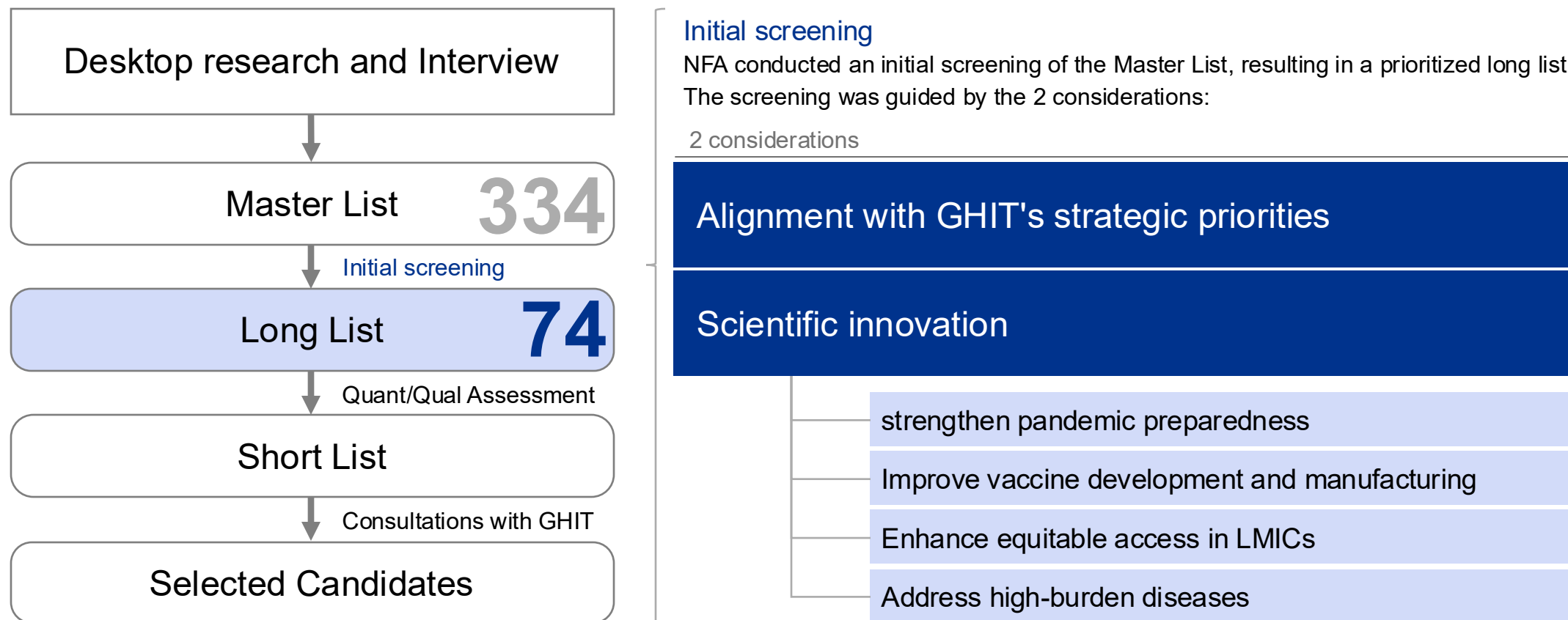
Master List Creation

The Master List comprises 334 technologies identified through desktop research and stakeholder interviews based on the aforementioned information sources.



Long List Creation

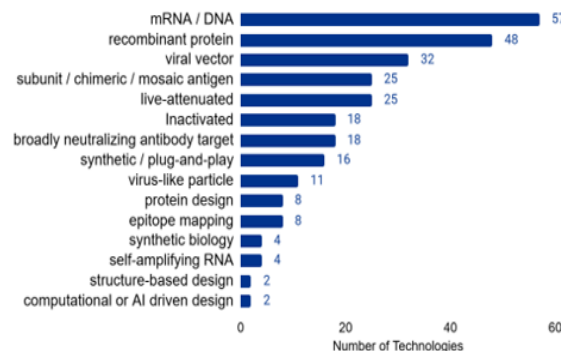
The Long List comprises 74 technologies selected through NFA's initial screening based on 2 key considerations: “Alignment with GHIT's strategic priorities” and “Scientific innovation”.



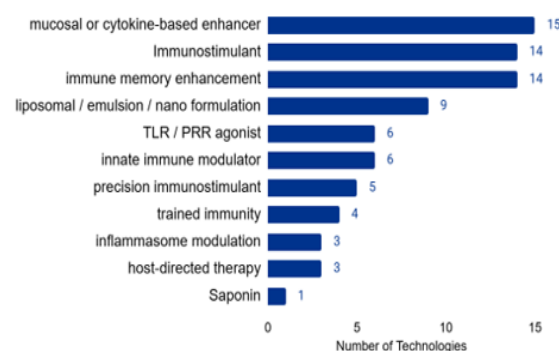
Summary and Analysis: Master List

The Master List was dominated by mRNA/DNA platforms, mucosal enhancers, and oral/nasal/mucosal delivery, reflecting an R&D trend toward local immunity induction at target tissues.

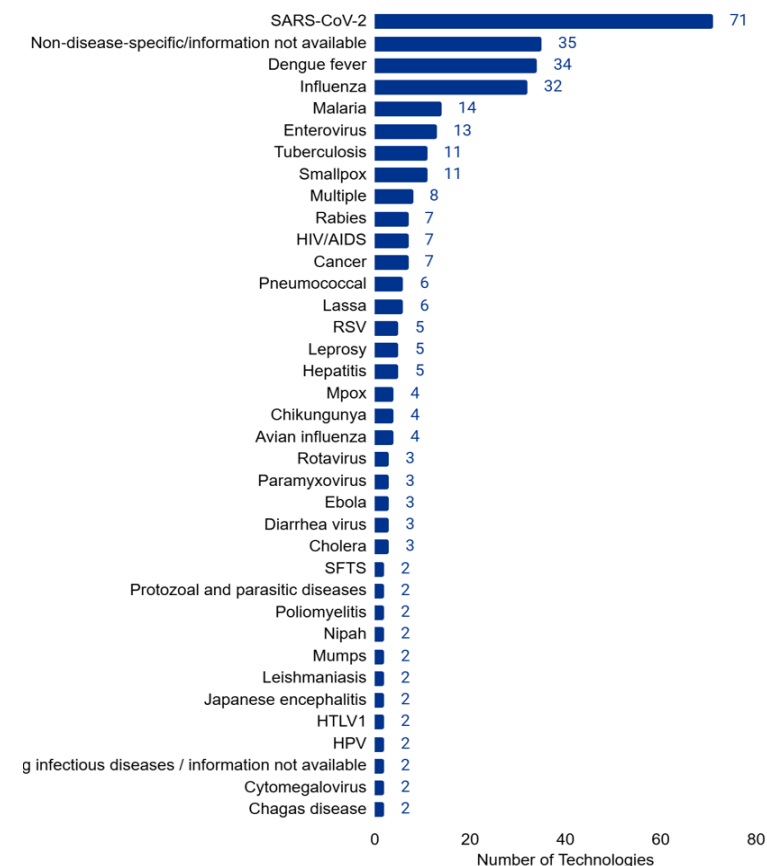
Platforms and Antigen



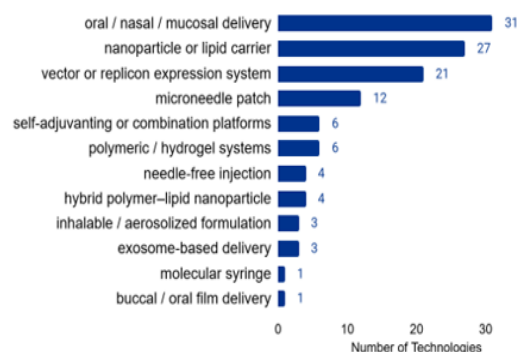
Adjuvants and Immune Modulators



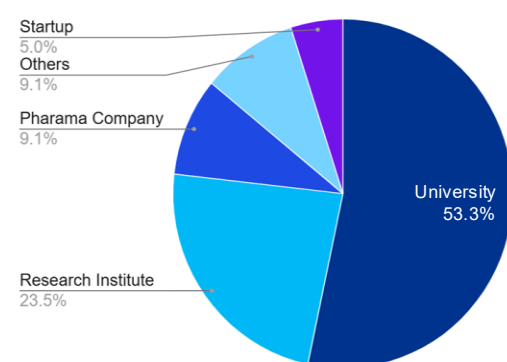
Target Disease Distribution



Delivery and Expression Systems



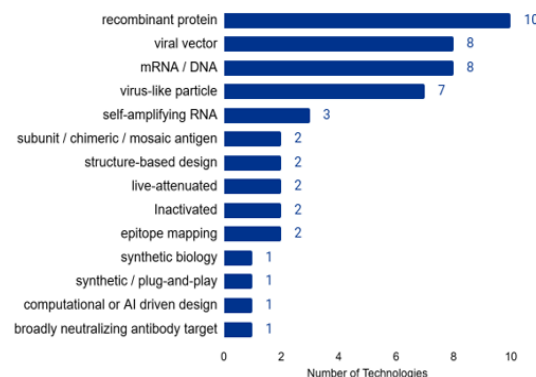
Organization Type



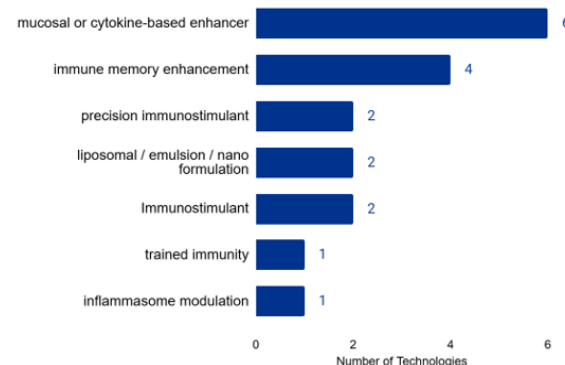
Summary and Analysis: Long List

The Long List showed a technology landscape largely similar to the Master List, except that mRNA/DNA technologies, while still common, were no longer dominant.

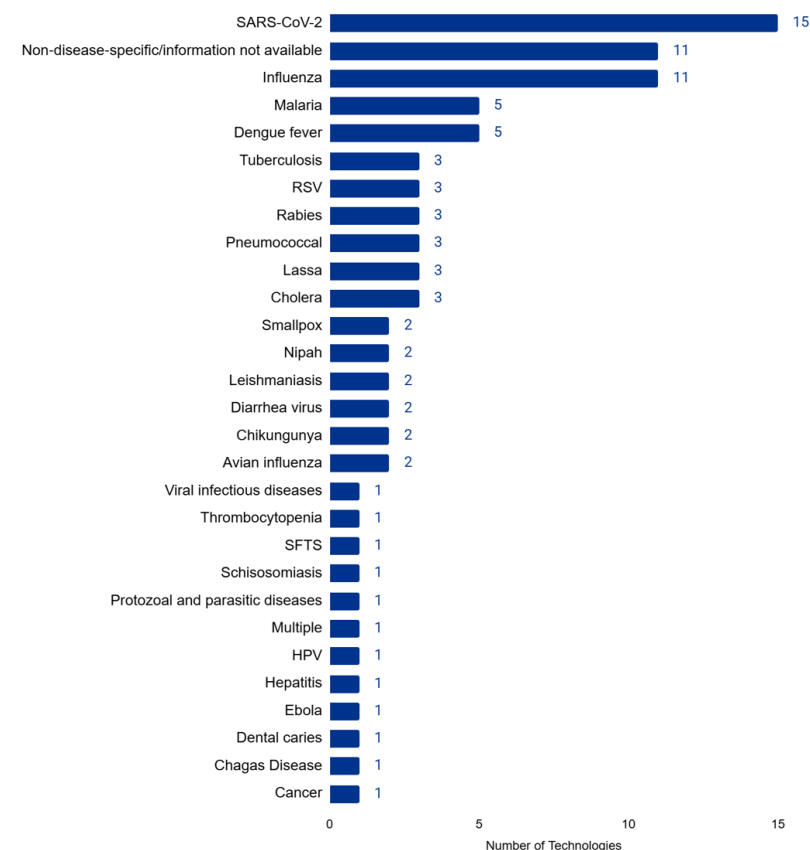
Platforms and Antigen



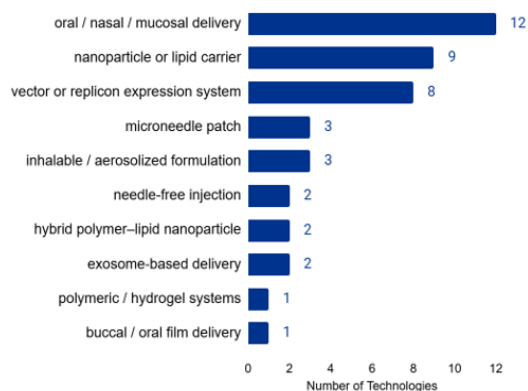
Adjuvants and Immune Modulators



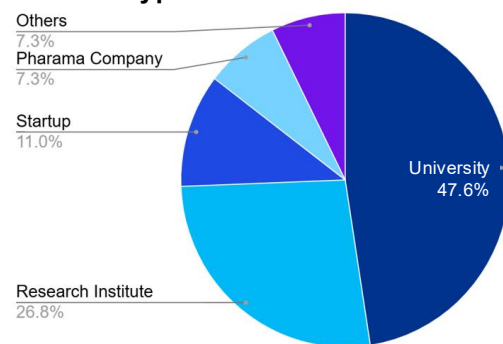
Target Disease Distribution



Delivery and Expression Systems

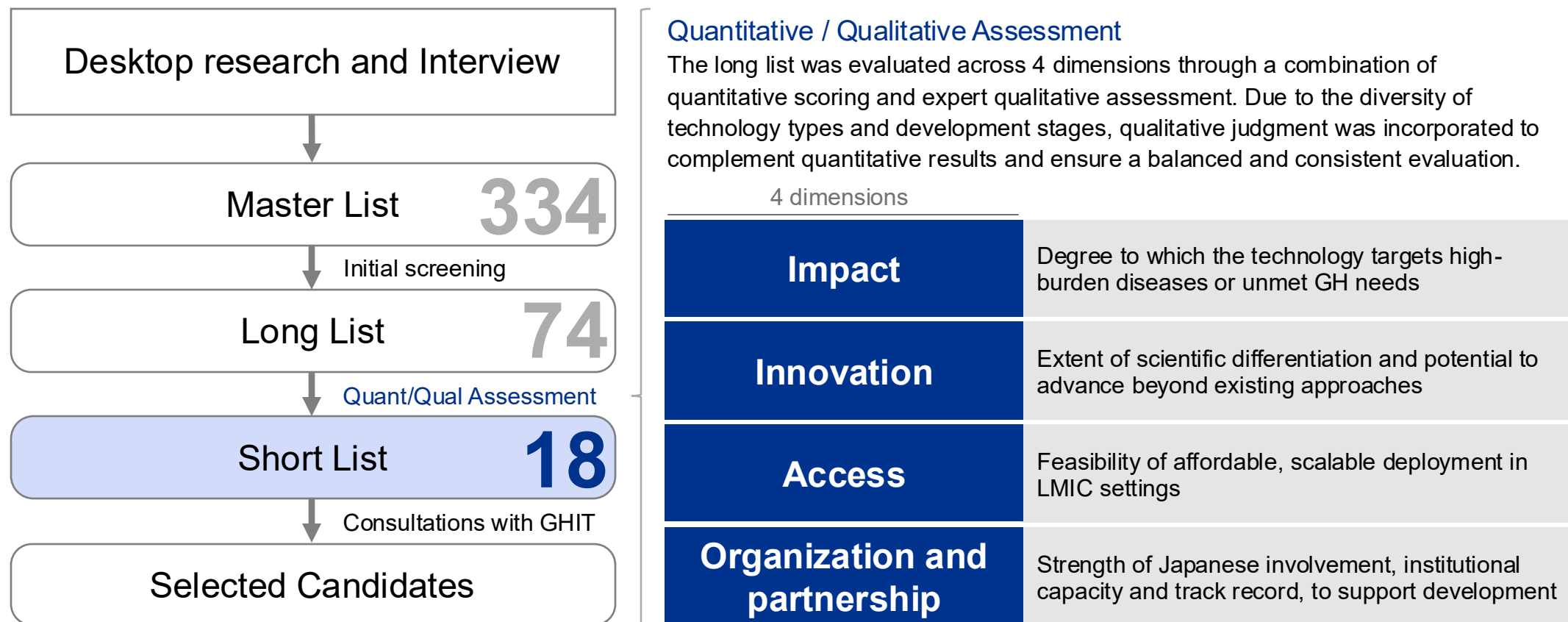


Organization Type



Short List Creation

The Short List comprises 18 technologies selected from the Long List through a 4 dimensional assessment combining quantitative scoring and expert qualitative assessment.



Summary and Analysis: Short List

18 high potential technologies were identified across 5 thematic areas. The short list was composed mainly of platform and enabling technologies, rather than conventional single-product vaccine candidates.

No	Technology	Organization	Category
1	Bacterial Membrane Vesicle (MV/OMV) Mucosal Vaccine Platform	Japan Institute for Health Security (JIHS)	Mucosal / Platform
2	Next-generation nanogel spray vaccine targeting respiratory viruses	Chiba University	Mucosal
3	cCHP Nanogel Nasal RSV Vaccine (SHe-PspA)	Nagasaki University / The University of Tokyo / Chiba University	Mucosal
4	Polyplex mRNA Mucosal Vaccine	The University of Tokyo	Mucosal / Platform
5	Inhaled mRNA vaccine (nanoball)	Nagasaki University	Mucosal
6	Transgenic rice-based oral vaccine platform (MucoRice)	Chiba University	Mucosal / Platform
7	Marker-free rice-based oral vaccine platform (MucoRice line 19A)	Chiba University	Manufacturing / Access
8	AI-Designed Universal Vaccines for Tropical Diseases (Malaria & Dengue)	NEC Oncolmunity AS / Nagasaki University	AI / Computational / Structural
9	Microneedle patch vaccine platform (K3 adjuvant)	The University of Osaka	Manufacturing / Access
10	Development of a next-generation mock-up vaccine using an intradermal needle-free vaccination device	Kumamoto University	Adjuvant / Immune Modulation
11	CD22-Targeting Precision Immunostimulant (Inflammation-Free Vaccine Adjuvant)	Tokyo Medical and Dental University	Adjuvant
12	Computational / AI-driven vaccine design platform	NEC Corporation	AI / Computational / Structural
13	Computational/AI-driven Epitope Optimization and Rational Antigen Design	JIHS	AI / Computational / Structural
14	Inhalant mRNA vaccine delivered via iPSC-derived respiratory epithelial cell exosomes (HiREC-Ex)	HiLung Inc.	Mucosal
15	Intranasal BC-PIV/DS-Cav1 RSV Vaccine	Sapporo Medical University / BioComo Inc. / Mie University	Mucosal
16	Rhoptry-Associated Membrane Antigen (PvRAMA) Blood-Stage Vaccine	Ehime University	Pathogen Specific
17	AI-Designed Broadly Protective Betacoronavirus mRNA Vaccine	NEC Corporation / NEC Oncolmunity AS	AI / Computational / Structural
18	AlphaVLP Platform	VLP Therapeutics Japan, Inc.	Vaccine Platform

Five thematic areas of Japanese strength

**Mucosal Immunity
Strategies**

**Vaccine Platform and
Adjuvant Technologies**

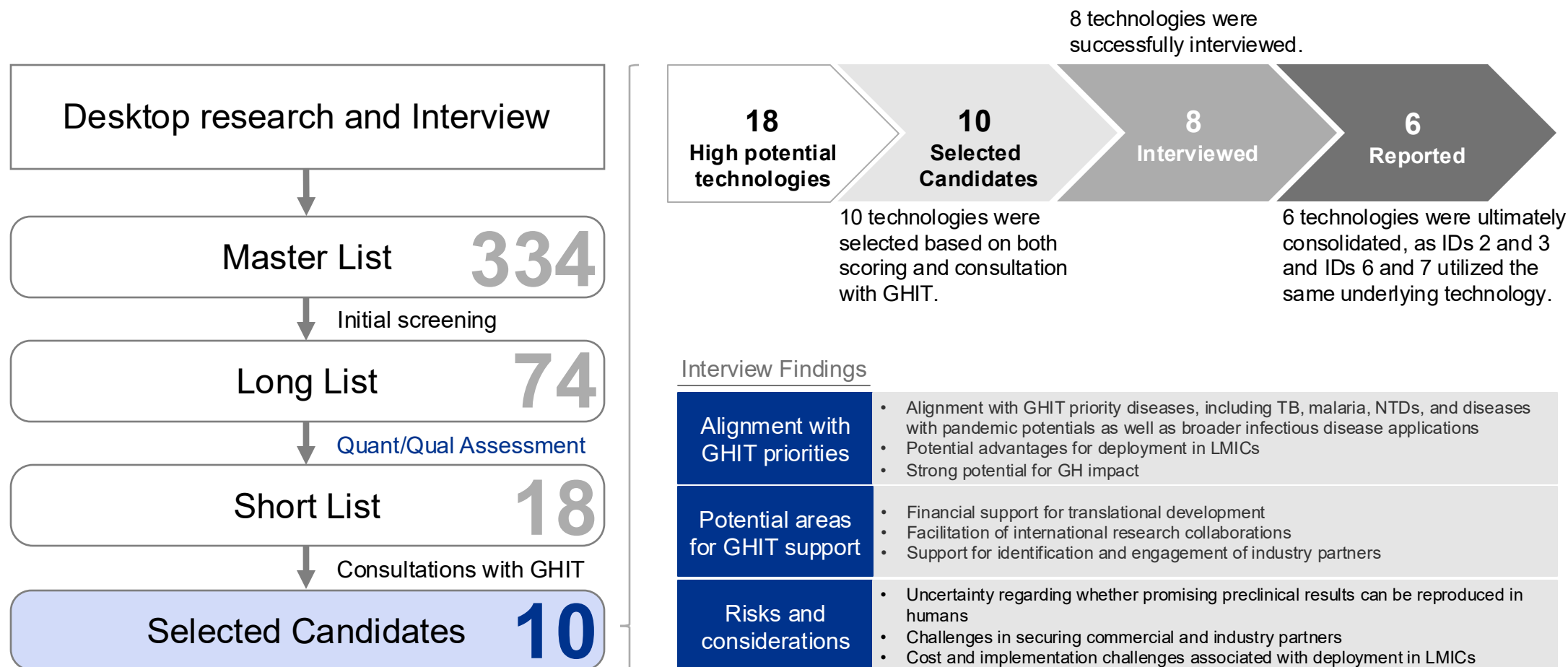
**Computationally
Enabled Vaccine Design**

**Manufacturing and
Access Innovation**

**Vaccines for High-
burden and Neglected
Diseases**

Selected Candidates

The Selected Candidates comprise 10 technologies prioritized from the Short List through consultation with GHIT, of which 8 were successfully interviewed.



03

Implications for GHIT Fund and Conclusion

Key Findings

A holistic evaluation of the landscape review yielded 4 key findings for the GHIT Fund.

Key Finding 1

Japan's vaccine ecosystem demonstrates particular strength in enabling technologies

Japan's vaccine ecosystem is distinguished by enabling technologies, particularly mucosal vaccine platforms, with the potential to enhance vaccine accessibility and impact across multiple diseases.

Key Finding 3

Japan's innovation pipeline may extend beyond publicly visible technologies

Many promising Japanese technologies may remain under the radar until later stages of development, particularly where commercial pathways are unclear. Earlier and more proactive technology scouting could help identify high-potential innovations at a stage where support can have the greatest impact.

Key Finding 2

Platform technologies are increasingly being validated through diseases with strong commercial or pandemic relevance

Identified technologies are being developed for diseases of certain commercial demand, which has established clinical pathways. These technologies may subsequently be adapted to diseases with high public health burden but more limited commercial incentive.

Key Finding 4

GHIT is well positioned to accelerate the application of enabling technologies to diseases of greatest global health need

Findings suggest opportunities to support broadly applicable enabling technologies and accelerate their translation to high-burden diseases in LMICs through platform adaptation, translational partnerships, and product development support.

Conclusion and Recommendations

The 4 recommendations draw on the landscape review and stakeholder interviews, and set out how GHIT can operationalize the key findings.

1

Prioritize investments in technologies that demonstrate potential for cross-pathogen applicability

Platform technologies with broad applicability can leverage existing investments and provide new solutions to priority GH challenges, particularly in areas where Japan has strong technological capabilities.

2

Invest in emerging technologies with transformative potential

Emerging technologies such as AI-enabled vaccine design, structural vaccinology, and systems immunology have the potential to transform vaccine R&D. Strategic investment in domestic capabilities and global collaborations could help accelerate innovation and strengthen Japan's next-generation vaccine ecosystem.

3

Address translational bottlenecks to ensure that innovation translates to public health impact

Addressing cross-cutting translational bottlenecks, such as disease models, manufacturing capabilities, and clinical validation pathways, could accelerate the progression of promising technologies and increase their public health impact.

4

Continue to monitor Japan's enabling technology landscape to identify new and emerging technologies

A structured horizon-scanning approach could help identify emerging technologies, new partnerships, and opportunities to apply Japanese innovation to high-burden infectious diseases.



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