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Realising the 100 Days Mission:

Accelerating Defence and Health Capabilities for Medical Countermeasures Readiness

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Introduction from Jane Halton, Chair of CEPI Board

The world has entered a period of heightened epidemic and pandemic risk. The increasingly complex threat landscape has been reflected in repeated outbreaks of mpox, Marburg, Sudan virus, Nipah, Chikungunya, and Dengue across multiple regions in recent years, as well as the ongoing and deeply concerning Bundibugyo ebolavirus outbreak in the Democratic Republic of the Congo (DRC).

The response to the humanitarian crisis in the DRC is complicated by the dangerous and difficult security situation in the country. These challenges are compounded by the harmful effects of the outbreak itself on stability and resilience, a reminder of the potential impact of all biological threats when they emerge.

Epidemic and pandemic threats, no matter if they originate naturally, accidentally or deliberately, threaten lives, livelihood and national and international security. This is an asymmetric risk for defence, in that just one such threat can undermine all parts of operational readiness. This can mean the endangerment of civilian and military health systems and the destabilisation of countries, regions, even the world. Against a backdrop of climate change, emerging biotechnologies and global conflict, the risk of biological threats is only increasing.

CEPI and its global partners are driving work on a key part of the solution – the 100 Days Mission to develop vaccines to tackle a new viral threat within just 100 days of its identification. This mission will see benefits across regions and sectors and, crucially, it is achievable. We've already made tremendous progress both during and since the COVID-19 pandemic, developing safe and effective vaccines in a record 326 days. But we can do better.

Modelling suggests that if we had achieved the 100 Days Mission during the Covid-19 pandemic, it would have saved eight million lives and USD 13 trillion to the global economy. CEPI's next strategy, CEPI 3.0, sets out how to make the 100 Days Mission an operational reality by investing in research in the most critical viral families, advancing platform

technologies for vaccine design, and building global networks of laboratories, trial sites and manufacturers that are agile and ready to respond to an emergency, whatever its source.

As biological threats become more complex, frequent and interconnected, we can only prepare for the next crisis if we breakdown siloes and work across sectors. This is increasingly urgent as the risk of misuse of powerful AI technologies grows. Novel threats could be deliberately engineered with potentially serious consequences for society.

The reality is that all these threats will require the same response systems. The capabilities that will achieve the 100 Days Mission will help stop not only natural outbreaks, but also accidental and deliberate ones, from becoming epidemics or pandemics. As such, it is imperative that we work together, and with urgency, across the health, development, research and defence sectors. We must leverage each sector's unique expertise and resources to achieve the 100 Days Mission sooner and ensure systems operate efficiently, to stop future unknown threats.

International leaders are increasingly recognising the urgent need for cross-sectoral collaboration. This is because the benefits of 100 Days Mission capabilities for security and defence are clear: strengthening operational readiness and resilience; protecting the health of military forces and civilians; and enhancing society's collective capacity to prevent, deter and respond to the use of biological weapons – including engineered pathogens.

How can we translate this shared agenda into action? CEPI has partnered with Brown Pandemic Center and RAND to lead this change. Our shared aim is to identify and target those parts of the 100 Days Mission where strengthened cooperation across sectors would make the most difference.

While many countries have enhanced their civilian-military cooperation for national health emergencies, this report takes a unique international perspective. It focuses on how best to develop the rapid medical countermeasures and systems the world needs to prepare for biological threats, wherever and whenever they occur. At CEPI, we are committed to leveraging our unique role as a global, cross-sectoral coalition, to drive this collaboration and protect society from the full spectrum of biological threats.

Jane Halton
Chair of CEPI Board

Executive Summary

The speed at which vaccines and other medical countermeasures (MCMs) can be developed and deployed is critical in determining whether an emerging pathogen is contained or becomes a global emergency. COVID-19 demonstrated both the extraordinary scientific progress made in recent years and the major gaps that remain. Although a safe and effective vaccine was developed in record time it was still not available quickly enough to prevent devastating global health, economic and social consequences. This experience underlined the importance of the 100 Days Mission (100DM), launched by the United Kingdom in 2021 and endorsed by the G7, G20 and global leaders, which calls for vaccines to be ready for initial authorisation and manufacturing at scale within 100 days of recognising a pathogen with pandemic potential. Modelling suggests that had COVID-19 vaccines been available within 100 days, more than 8.3m deaths would have been prevented, along with USD $1.4 trillion in productivity losses due to illness and $63bn in hospitalisation costs.[1]

Achieving the 100DM requires much more than scientific innovation alone. While progress has been made, the mission remains constrained by fragmented financing, uneven regulatory preparedness and limited pre-emergency coordination across sectors during inter-emergency periods. This report provides evidence that the 100DM is not only a public health objective but also a strategic defence and resilience priority. From a defence perspective, biological threats – whether naturally occurring, accidental or deliberate – can undermine force health, operational readiness, economic stability and public trust. In this context, stronger collaboration between the health and defence sectors is essential to build the standing capabilities, innovations, investment mechanisms and operational arrangements needed to make the 100DM achievable. These capabilities are necessarily threat-agnostic, requiring concrete collaboration and coordinated investments among health and defence actors in order to fully achieve them.

This report aims to identify where collaboration between the health and defence sectors would add the greatest practical value to the 100DM. To address this, the report draws on desk-based mapping of health and defence sector capabilities that support the 100DM, stakeholder interviews and an international interactive scenario-based exercise. A consistent finding across the study was that many of the capabilities needed to support the 100DM already exist across civilian and defence systems globally. The challenge is that these capabilities are not adequately financed, connected, governed or exercised in ways that allow them to operate rapidly under emergency conditions. The principal barriers are therefore often operational rather than technical.

The study identified a focused set of priority joint capabilities targets which could offer the greatest value if developed prior to an emergency by the defence and/or civilian health sectors. We looked at capabilities across the 100DM, including but not limited to those that fall specifically within the remit of the Coalition for Epidemic Preparedness Innovations (CEPI). These were judged to be the capabilities most likely to accelerate action and reduce delay in achieving MCMs readiness while also being sufficiently aligned with both defence and public health objectives to make sustained collaboration realistic. In particular, highly prioritised capability areas across the health and defence sectors had three characteristics: (1) clear relevance to existing defence roles and incentives; (2) practical operational value during an outbreak; and (3) feasibility for advancement through pre-emergency investment, standing arrangements or integration measures, rather than requiring wholesale legal or institutional transformation before appropriate actions could be implemented.

Through this study we identified a set of joint capabilities targets in support of the 100DM which showed a high degree of alignment as defence and health sector priorities for collaboration and investment. Among other priorities, our findings showed a strong interest in financing for vaccine R&D, at-risk scale up and manufacturing, as well as for broader MCMs. Safe and secure pre-emergency investments in vaccine-design tools and capabilities, a library of prototype vaccines for priority viral families and delivery innovations for candidate deployment in low-resource civilian and military settings were among the capabilities most highly prioritized by both sectors during our

tabletop exercises (TTXs). Stakeholders pointed to these capabilities as areas where some militaries hold relevant strengths and where there is precedent for interaction between defence, scientific and public health institutions, creating opportunities to leverage ongoing defence sector investments to support faster vaccine R&D and response readiness.

Priority joint capabilities targets

The study identified the following priority capability areas for collaboration in support of the 100DM:

- Financing and standing capability for vaccine and broader MCM R&D, testing, scale up and manufacturing, established before an emergency, to support rapid R&D mobilisation, investigational-dose manufacturing, clinical trials and at-risk manufacturing scale up before final efficacy data are available.
- Early-warning and joint rapid diagnostic development and deployment: develop the next generation of joint early-warning and diagnostic capabilities, including the ability to rapidly deploy strain-specific point-of-care tests.
- Therapeutics co-development: a standing framework for joint defence–civilian development of therapeutics (antivirals, monoclonal antibodies), recognising that a therapeutic may reach affected populations before a vaccine is developed and authorised.
- Regulatory reliance for emergency authorisation: a standing mechanism, agreed prior to an emergency, by which an emergency authorisation issued by a WHO-Listed Authority or via a WHO Emergency Use Listing triggers abridged review by participating national regulatory authorities (NRAs).
- Pre-agreed civil–military logistics and mutual support protocols: pre-agreed arrangements for bidirectional support in a health emergency.
- End-to-end biosecurity and biosafety for samples, research, and response: protocols for biosecurity built into pre-agreed specimen handling for vaccine development and rapid diagnostics.
- Vaccine demand forecasting, allocation principles, public trust and countering mis- and disinformation: a pre-agreed framework for how scarce initial doses are allocated with consideration for ethics, ownership of decision processes, public-transparency mechanisms, and how military personnel are sequenced relative to civilian populations under civilian-led schemes.
- High-containment protocols and joint pathogen characterisation: protocols for defence and

civilian teams to access biosafety levels 3 and 4 (BSL-3/BSL-4) facilities and produce a shared characterisation from scientific and security perspectives.

These priorities reflect a consistent conclusion across the study: the most effective investments are likely to be those that enable existing strengths in order to work together faster, more legitimately and under real-world conditions, including low-trust and operationally constrained environments.

Recommendations for advancing collaboration and investment

To translate these priorities into practical preparedness gains, governments and preparedness actors should focus on the following actions:

1. **Defence and health funders should jointly plan investments in vaccine readiness and the broader 100DM.** Currently, investments are fragmented and often siloed within sectors and across countries and regions. To better prepare for any emerging biological threat – whether naturally occurring, deliberate or accidental – joint planning and coordinated investments will be essential. Such joint capabilities planning also will enhance effectiveness as biological threats are currently rising in the context of fiscally austere budgeting. Collaboration is especially plausible and vital where capability development can be framed as supporting both force protection and wider public health preparedness, including such critical 100DM areas as maintaining operational readiness, protecting deployed forces, monitoring biological threats, supporting civil authorities, and strengthening resilience against both naturally occurring and deliberate biological events.

2. **Defence and health funders should build and sustain pre-agreed standing financing arrangements, in advance of an emergency, for vaccine research and development, scale up, testing and manufacturing.** This includes clarifying how financial risk will be shared, ensuring rapid activation after pathogen detection, and linking financing to access and benefit-sharing principles.

3. **Civilian health and defence agencies should establish standing arrangements for rapid diagnostics and laboratory surge before the next emergency.** Civilian health and defence agencies should establish pre-emergency arrangements for rapid diagnostic development, validation and deployment, including clear protocols for when defence laboratories can increase civilian testing capacity and connect to national and regional laboratory networks.

4. **Governments and preparedness actors should define practical use cases for early-warning innovation before investing at scale.** Governments and preparedness actors should ensure that investment in early-warning technologies is driven by clear preparedness needs and practical use cases. Early-warning innovation should be tied to operational value, public health integration and testing under realistic, low-trust conditions.

5. **Health, defence and emergency management authorities should codify civil–military logistics and mutual support protocols before the next emergency.** Pre-emergency, health, defence and emergency-management authorities should formalise the triggers, authorities, liaison arrangements and support functions that would govern civil–military cooperation during biological crises. These arrangements should be tested through realistic exercises rather than left to ad hoc negotiation.

6. **Regulators, health authorities and defence planners should invest in supporting international mechanisms, emergency authorisation and regulatory coordination for MCM development and deployment before the next public health emergency.** National regulators, health authorities and preparedness actors should establish reliance-based arrangements that enable trusted emergency authorisations to trigger accelerated national review. Regulatory preparedness should be supported through legal frameworks, simulation exercises and regional or international coordination.

7. **Biosafety and biosecurity are critical investment areas before and during a biological emergency.** Defence and health stakeholders should invest in biosafety and biosecurity as an integral part of pandemic preparedness and response. Safe and secure sample handling, transport, research protocols

and cross-border coordination should be built into readiness systems in advance of crises. Funding for biosafety and biosecurity should be an integral component of life sciences and 100DM-related research and development investments.

8. **Health, defence, and government leaders should treat public trust, countering misinformation and disinformation, and criteria for vaccine deployment as preparedness requirements.** Health, defence and government leaders should ensure that allocation principles, community trust, demand generation and the ability to counter misinformation and disinformation are developed as core preparedness functions.

9. **Under-prioritised 100DM capabilities (e.g. tests, therapeutics, PPE) need explicit institutional investments and sponsorship before the next emergency.** Governments and international preparedness actors should identify critical capabilities – particularly therapeutics, diagnostics and personal protective equipment – which lack clear institutional ownership, and assign responsibility, financing and coordination mechanisms before the next emergency.

10. **Governments – including defence and health agencies and organizations – should treat the 100DM as a standing preparedness requirement rather than an emergency ambition.** Governments should recognise the 100DM as a shared preparedness objective across health, defence, finance and emergency management, with clear responsibilities, sustained financing and integration into national preparedness, biodefence and resilience planning.

The 100DM is about more than accelerating vaccine development. It is about whether countries can build the systems needed to detect biological threats earlier, make decisions faster, mobilise capabilities under pressure and protect both populations and national security from increasingly complex risks. Health systems provide the scientific legitimacy, regulatory pathways and public health architecture that make rapid MCM development possible. Defence institutions provide operational reach, secure coordination, surge capability, logistics and resilience in emergency. Neither sector can achieve the 100DM alone. But together, through sustained investment, shared planning and deliberate collaboration, they can turn the 100DM from an aspiration into a credible preparedness capability. In an era of growing biological risk, investment and partnership between health and defence are not supplementary to the mission but are fundamental to delivering it – and to protecting lives, readiness and resilience in the face of the next emergency.

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Abbreviations

100DM	100 Days Mission
AI	Artificial intelligence
API	Active pharmaceutical ingredients
AFRIMS	Armed Forces Research Institute of Medical Sciences
ASEAN	Association of Southeast Asian Nations
BSL-3/BSL-4	Biosafety level 3/biosafety level 4
CBRN	Chemical, biological, radiological and nuclear
CEPI	Coalition for Epidemic Preparedness Innovations
COMEDS	Committee of the Chiefs of Military Medical Services in NATO
GEIS	Global Emerging Infections Surveillance
GMP	Good manufacturing practice
IBBC	Institutional Biosafety & Biosecurity Committee
IPPS	International Pandemic Preparedness Secretariat
INDOPACOM	United States Indo-Pacific Command
JIHS	Japanese Institute for Health Security
HIS-TAG	Health Security Interface Technical Advisory Group in WHO
LMIC	Low- and middle-income countries
MAFHS	Malaysian Armed Forces Health Services
MBT	Mitigating Bio Threats Program in ASEAN
MCM	Medical countermeasure
NCMI	National Center for Medical Intelligence
NRA	National regulatory authority
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PPE	Personal protective equipment
R&D	Research and development
SCARDA	Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response
SOTLK	Finnish Defence Forces' Centre for Military Medicine (Sotilaslääketieteen keskus)
TVLA	Tanzania Veterinary Laboratory Agency
UN	United Nations
UN C-M	Coord UN Civil-Military Coordination
WHO	World Health Organisation
WRAIR	Walter Reed Army Institute of Research

Chapter I.

Introduction

The speed at which vaccines and other medical countermeasures (MCMs) against pandemic threats are developed and deployed is critical and can determine whether a pathogen with pandemic potential is contained early or becomes a full-scale global pandemic. COVID-19 pandemic, caused by SARS-CoV-2, demonstrated both how far the world has come and how far it still has to go. A safe and effective vaccine against SARS-CoV-2 was rolled out through emergency regulatory authorisation just 326 days after the viral genome was first published in January 2020 – an extraordinary scientific achievement. However, this timeline was still insufficient to prevent COVID-19 from becoming a global pandemic. Modelling by Imperial College London showed that had a safe and effective vaccine for SARS-CoV-2 been available within 100 days, an estimated 8.3m excess deaths could have been avoided by the end of 2021, along with $1.4 trillion in productivity losses due to illness and $63bn in hospitalisation costs.[1]

1.1. The 100 Day Mission

Against this backdrop, the United Kingdom (UK) launched the 100 Days Mission (100DM) in 2021 during its G7 presidency. The 100DM calls for vaccines to be ready for initial authorisation and manufacturing at scale within 100 days of initial recognition of a pathogen with pandemic potential. The 100DM has been endorsed by the G7, G20 and global leaders, and has been supported by the International Pandemic Preparedness Secretariat (IPPS), which will complete its work at the end of 2026.[2]

While progress has been made towards the 100DM, it is not yet achievable and the mission itself has been viewed primarily as a health and development mission rather than as a mission equally critical to force protection, security and resilience.[3] Research and development (R&D) pipelines remain under financial pressure and there is declining investment in MCMs. The latest implementation report of the 100DM highlights that the plan's aims cannot be achieved through siloed action but require coordinated regulatory efforts, integrating regional ecosystems to produce MCMs and requiring innovative and sustained financing and shared resilience measures across countries.[3] Collaborative approaches maximise efficiency and innovation by reducing duplication and leveraging capabilities across partners. Given the current landscape of biological risks – encompassing increased spillover from natural origins, the proliferation of high-containment laboratories and the associated risk of accidental exposure or release, and heightened biosecurity threats from global instability and emerging biotechnologies – collaboration is more critical than ever.[3]

1.2. CEPI 3.0 and investment in the 100DM

The Coalition for Epidemic Preparedness Innovations (CEPI) has taken a leading role in driving the 100DM forward and has articulated a strategy to accelerate vaccine development. The CEPI 3.0 Strategy[4] takes a capabilities-driven approach, focusing on tools and systems that enable a pathogen-agnostic rapid MCM design, development, and manufacturing. This is a paradigm shift from the world's previous priority pathogen-driven approach and opens new practical avenues for collaboration. It champions the 100DM and the acceleration of vaccine development as ambitious but not-so-distant goals which can be accomplished by (1) adopting a viral-families rather than a strain-specific approach to vaccine development; (2) creating vaccine platforms for research, manufacturing and regulatory processes which can be readily adapted; and (3) supporting ready-to-activate networks and capabilities which can be scaled up during emergencies. It also identifies the support structures required to accomplish the 100DM, which are organised into capabilities under five functional areas: (1) early detection and initiation; (2) accelerated vaccine development; (3) regulatory and policy readiness; (4) resilient supply capabilities; and (5) crosscutting capabilities such as AI, equitable access and embedding biosecurity into pandemic preparedness.[5] These support structures centre around speed, scale and equity considerations and include leveraging artificial intelligence (AI) in R&D, using next-generation technologies to improve low- and middle-income country (LMIC) utility, development speed and cost of goods, creating end-to-end road maps to convene early-access discussions, embedding biosecurity principles across

R&D, investing in country and frontline research capabilities to improve equity, and strengthening engagement with the defence and security sectors.

The CEPI 3.0 Investment Case shows that further investment of $3.6bn is needed to achieve this vision, including $2.5bn in additional funding beyond the $1.1bn that has already been secured.[4] While achieving this target will be challenging in a resource-constrained environment, it is critical to progress the 100DM and achieve greater preparedness for future pandemics. This must be done prior to an emergency as CEPI's integrated viral-family approach to vaccine development will take considerable time to implement, with 40 viral families recognised as infecting humans.[6] This gap in investment to progress the 100DM presents an opportunity to look outside of public health in order to reflect on the wide range of shared objectives that the 100DM helps advance, from economic outcomes to security and defence goals.

1.3. Civil–military shared objectives and the 100DM

Global spending on defence is increasing due to rising political uncertainty,[7] with global military expenditure as a share of gross domestic product in 2025 at its highest level since 2009 (2.5%) and increases of 14% in Europe and 8.1% in Asia and Oceania since 2024.[8] This presents an opportunity for defence to bolster support for pandemic preparedness in alignment with key defence objectives and capabilities. The most recent implementation report for the 100DM articulates this opportunity, identifying defence capabilities that can support the 100DM at a time when spending in global health is decreasing and investment in preparedness is at risk.

Pandemics contribute not only to health risks but also to security risks by affecting force health, generating an asymmetric risk to forces, disrupting civil order and resilience, generating health and economic inequalities, and creating opportunities for bad actors to implement disinformation campaigns and influence public trust. In instances where health-security risks are biologically engineered or stem from biosecurity faults, the stark alignment between civil and military objectives becomes clear.

The 100DM promises to build security against epidemics and pandemics and contributes to key defence goals around preparedness and resilience.

The role of the military in pandemics is already widely recognised.[9] NATO, for example, has called for allies to strengthen civil preparedness and has pointed to the COVID-19 pandemic as an example of the defence sector's role in societal resilience.[10] The United Nations (UN) Office for the Coordination of Humanitarian Affairs (OCHA) has also formalised joint engagement through the UN Civil–Military Coordination (UN C-M Coord) programme.[11] This sits within a wider international shift towards whole-of-society and whole-of-government approaches to pandemic preparedness, with a growing number of government adopting this logic.

Civil–military cooperation in health tends to intensify during crises, as it did during the COVID-19 pandemic.[12] However, pre-emergency joint investment in pandemic preparedness remains comparatively underdeveloped. This results in gaps in civil–military joint capabilities to support pandemic preparedness, despite aligned objectives and complementary capacities. While the defence sector holds key capabilities which can contribute to faster investigation, development, manufacturing and deployment of vaccines and other MCMs, the systems that underpin this in the civil and military sectors are not well integrated with one another and are shaped by different mandates, funding structures and institutional cultures.[13]

Developing vaccines, therapeutics and diagnostics soon after a pathogen is identified can drastically reduce the scale of the pandemic – or even prevent outbreaks from progressing to large-scale events completely – meaning that systems which enable speed are paramount. Strategic alignment of civil–military objectives and capacities related to vaccine development would contribute equally to the 100DM, force health protection, and civilian and societal resilience for deliberate and accidental – as well as naturally occurring – threats.

1.4. Aims of the study and study limitations

Despite recognised alignment between civil and military objectives and capabilities related to

pandemic preparedness, there has not been a systematic delineation of the capabilities required by the defence sector and public health sector in support of the 100DM. For example, it is unclear what capabilities would add the most value to vaccine and broader countermeasures readiness, which capabilities are realistically usable by both civil and military communities under emergency conditions, and where defence and public health priorities already overlap sufficiently to support joint action.

To help fill this evidence gap, CEPI commissioned a team of researchers and experts at RAND and Brown University's Pandemic Center to design a simulation exercise to identify the joint defence and health capabilities that should be prioritised to accelerate vaccine readiness and support delivery of the 100DM. This work aims to inform collaboration and investment opportunities between sectors in order to make the 100DM an operational reality.

This work was designed as an exploratory, decision-support exercise rather than an exhaustive assessment of all relevant capabilities. The desk research provided a high-level mapping of strategic alignment based on publicly available information and therefore did not capture all capabilities, particularly those in the defence sector that are classified, operationally sensitive or undocumented. In addition, the review focused mainly on documents available in English, creating a geographic bias in the documents reviewed. The analysis was structured around CEPI's existing 100DM framework and the interview and exercise components drew on purposive expert participation and a scenario-based design intended to test and refine priorities rather than simulate real-world decision making or provide representative coverage across all countries and institutions. As a result, the findings should be understood as indicative of plausible areas for collaboration and joint capability development, with further work needed to assess operational, legal, financial and governance feasibility in specific contexts.

1.5. Structure of report

This report presents the findings of a study comprising three complementary components: capability mapping, stakeholder interviews and an interactive scenario-based exercise (simulation exercise). These components were designed to identify opportunities for defence–public health collaboration, assess their operational relevance and feasibility, and identify priority joint capabilities targets which could accelerate vaccine readiness under the 100DM.

The study began with capability mapping, informed by a review of the published and grey literature, to identify existing defence and civilian health capabilities relevant to the 100DM. Semi-structured interviews with defence, public health and policy experts were then conducted to assess the comparative value of these capabilities, identify barriers to collaboration and refine the initial capability landscape. Finally, an interactive scenario-based exercise was used to explore investment trade-offs under realistic outbreak conditions and identify capability areas which were considered both operationally valuable and feasible for joint investment.

Chapter 2 presents the priority joint capabilities targets identified through the interactive scenario-based exercise. Chapters 3 and 4 present the underlying evidence from interviews and desk research, respectively, that informed the design and development of the exercise. Chapter 3 analyses stakeholder perspectives on opportunities, barriers and priority capability areas for collaboration, while Chapter 4 presents findings from the desk research–based capability mapping. Finally, Chapter 5 synthesises the findings into recommendations and proposed next steps for strengthening defence–public health collaboration in support of vaccine readiness under the 100DM.

Chapter 2.

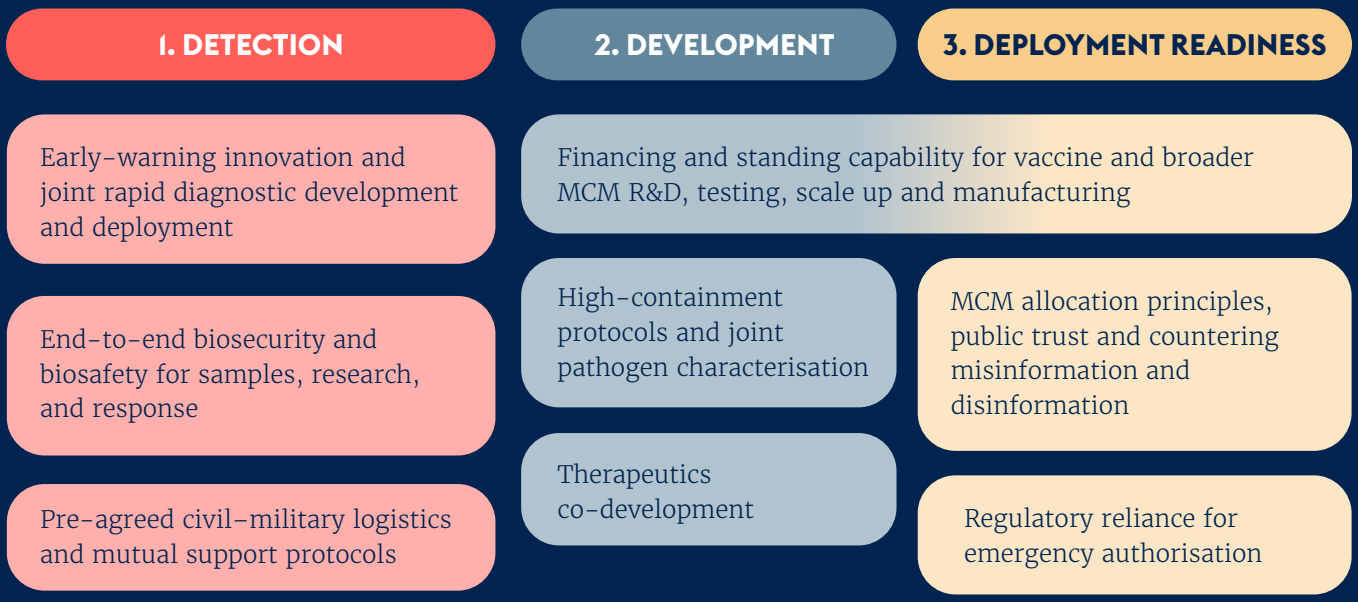
Priority joint capabilities targets to advance the IOODM

In June 2026 during the Global Health Security Conference in Kuala Lumpur, Malaysia, senior defence and health leaders from Asia, Europe, Africa, and North America participated in the '100 Days Mission Under Pressure', an interactive scenario-based exercise convened by **CEPI**, **RAND** and the **Brown Pandemic Center**. The purpose of the exercise was to identify key defence and health capabilities to support the development of MCMs in advance of a biological emergency, exploring where alignment exists, where gaps remain and how best to drive cooperation. The exercise built on findings from desk research (Chapter 4) and stakeholder interviews (Chapter 3) which identified potential areas for collaboration across defence and civilian health capabilities and used a fictional but plausible biological crisis unfolding across three phases: detection, development and deployment readiness, aligned to the 100DM timeline. Participants from the defence and civilian health sectors worked in facilitated groups to discuss trade-offs and prioritise joint capabilities targets using a set of pre-developed capability cards and a constrained token-based system. The exercise was designed to reveal areas of convergence and divergence between sectors, identify structural gaps in cross-sector preparedness and test the robustness of candidate joint capabilities targets under emergency conditions. A final prioritisation process was then used to generate a ranked shortlist of priority joint capabilities targets areas for future investment.

This chapter presents the report's main findings: the priority capability targets identified through the simulation exercise and supporting analysis. Participants converged on a set of capabilities which would offer the greatest practical value if invested in and developed by the defence and civilian health sectors before an emergency arises. These were the capabilities seen as most likely to reduce delay along the pathway from pathogen detection to MCM development and deployment readiness, while also being sufficiently aligned with defence and public health incentives to make sustained collaboration plausible.

A consistent message across the exercise was that the principal barriers to achieving the 100DM are not solely scientific, nor strictly dependent on the pathogen or its origin. In many cases relevant capabilities already exist across civilian health and defence systems. The challenge is that they are not financed, connected, governed or exercised in ways that allow them to operate rapidly and legitimately under emergency conditions, nor are scientific and technological innovations being sufficiently harnessed. For these reasons the priority areas identified by participants (Figure 1) focused less on creating wholly new capabilities and more on establishing standing arrangements, financing mechanisms, protocols and shared readiness functions to allow existing strengths to be mobilised in time.

Figure 1. Joint capabilities across the 100DM: Stakeholder priority areas by readiness phase



In the following sections we expand on participants' prioritisation of the various capabilities, including how these could be implemented, the trade-offs required and existing gaps.

2.1. Highest-priority joint capabilities targets for immediate action

2.1.1. Financing and standing capability for vaccine and broader MCM R&D, testing, scale up and manufacturing

The strongest finding from the exercise was the need for financing arrangements and sustained standing investment in the capabilities required to move rapidly from pathogen identification to investigational product, clinical testing and manufacturing at scale. Participants across both the health and defence sectors ranked this as the top priority. The clearest message was that the 100DM cannot be met if key parts of the development and manufacturing pathway continue to depend on ad hoc emergency financing, sequential decision making or assumptions that industry will absorb major risk without clear pre-existing commitments.

This priority joint capability target refers to assured financing and standing readiness, established before an emergency, to support rapid R&D mobilisation, investigational-dose manufacturing, clinical trials and manufacturing scale up before final efficacy data are available. It includes financing for vaccine design tools, adaptable platform technologies, prototype libraries, clinical preparedness, manufacturing readiness and delivery innovations that improve usability in both civilian and military settings. It also includes the capacity to absorb the financial risk of producing material that may not ultimately be authorised.

Participants stressed that investigational-dose manufacturing readiness is a critical component of this capability. The 100DM cannot be achieved if clinical trials are delayed because small GMP-grade (good manufacturing practices) batches of a novel candidate are not available quickly enough. Similarly, at-risk scale up was viewed as essential if a vaccine is to be available early enough to change the course of an outbreak. This makes financing architecture a core preparedness capability rather than a downstream implementation issue.

Participants also strongly prioritised pre-agreed, shared financing arrangements across defence and health to support manufacturing before approval is certain. These include mechanisms such as advance market commitments, volume guarantees and at-risk funding to de-risk early manufacturer investment, alongside a shared understanding of which civilian and defence facilities could contribute to manufacturing surge. Such arrangements were seen as particularly important given that current funding systems largely support activity in the civilian health sector and the defence sector in parallel rather than through joined-up mechanisms which can accelerate development and scale up across both sectors.

Benefit sharing was identified as an essential feature of this priority joint capability target. Participants argued that if the countries that detect and report outbreaks early believe they will be last in line for doses or other countermeasures, incentives for rapid reporting deteriorate. Financing arrangements therefore need to be linked from the outset to practical access and benefit-sharing principles, both within affected countries and globally.

Participants pointed to international capabilities and networks, including CEPI and broader allied R&D, financing, manufacturing and regulatory partnerships, as important vehicles for structuring these investments ahead of an emergency. Such mechanisms were seen as especially valuable because they can connect capabilities across sectors and geographical regions, including those where vaccine candidates may be relevant to both civilian and military populations. Overall, the exercise suggested that financing and standing readiness for MCM development is the single most important enabling joint capability target if the 100DM is to become operationally plausible.

2.1.2. Early warning and joint rapid diagnostic development and deployment

A second major priority area was early warning and joint diagnostic readiness. Participants from both sectors emphasised that no part of the 100DM can function effectively if health and defence

actors are unable to identify what is happening in affected populations early and accurately enough to inform response, clinical management and MCM development.

Participants prioritised the need to fund and establish, in advance of an emergency, the next generation of joint early-warning capabilities, tools and innovations across the defence and civilian health sectors. This included AI-enabled tools for pattern detection and pathogen evolution, environmental and wastewater surveillance, and systems for identifying unusual biological events, including possible laboratory incidents. At the same time, participants emphasised the need for a standing joint capability to develop and deploy diagnostics rapidly, including point-of-care tests, strain-specific assays, specimen-handling protocols, pre-positioned regional sequencing capacity and fast-track routes for validation and use.

Although both sectors viewed this area as a priority, there were differences in emphasis. Defence participants placed greater weight on early-warning innovation, including more technically ambitious capabilities such as AI-supported pathogen evolution tools, environmental sensing and lab-incident detection. Health participants were also interested in these capabilities but were more cautious about their maturity, cost and operational usability. They placed greater emphasis on practical diagnostic and laboratory integration, particularly pre-agreed arrangements which would allow defence laboratories to augment civilian testing and participate in regional networks under compatible biosafety, biosecurity and quality standards.

Despite these differences, participants converged on the importance of diagnostic readiness as an immediate common need. The findings therefore suggest a two-part priority: first, a practical joint diagnostic capability which can be activated quickly in the early phase of an outbreak; and, second, strategic investment in early-warning innovation where defence may be particularly well placed to underwrite capabilities which both sectors would use.

2.1.3. Therapeutics co-development

Participants across both sectors supported a standing framework for joint defence–civilian therapeutics development, including antivirals and monoclonal antibodies. This was seen as particularly important because therapeutics can provide an earlier intervention option in rapidly evolving outbreaks, including where vaccine development is still underway or candidates have yet to be authorised.

Participants also noted that therapeutics are an under-prioritised capability, having often lacked a clear international institutional home for emergency financing, manufacturing and access compared with vaccines. This means that while therapeutics co-development is a strong candidate for future investment, the first requirement may be clearer institutional design and sponsorship rather than immediate large-scale expansion. The recent call for a Therapeutics Development Coalition was therefore seen as relevant in addressing this gap.

2.1.4. Regulatory reliance for emergency authorisation

Regulatory reliance for emergency authorisation emerged as another priority capability area. Participants viewed this as a pragmatic and high-value governance solution to one of the most persistent bottlenecks in the 100DM pathway: the time lost when products that are sufficiently mature for emergency use in one jurisdiction must still pass through separate reviews before they can be used elsewhere.

The priority identified in the exercise was not wholesale regulatory redesign. Rather, participants favoured the establishment of a standing mechanism under which emergency authorisation by a WHO-Listed Authority, or through WHO Emergency Use Listing, could trigger abridged or facilitated review by participating partner regulatory authorities. The purpose of such a mechanism would be to reduce sequential and duplicative review during crises without removing national decision-making authority.

Participants prioritised regulatory reliance more strongly than broader regulatory innovation and harmonisation. This appeared to reflect a preference for a targeted, operationally useful mechanism which could be implemented with relatively limited cost and institutional disruption. Reliance was attractive because it offers a practical route to acceleration even in fragmented regulatory environments, particularly in regions with multiple

authorities and limited mutual recognition. Participants noted that reliance arrangements should be designed to be resilient, with support from regional and national authorities rather than dependence on a single institutional pathway.

2.1.5. Pre-agreed civilian–military logistics support and mutual support protocols

Participants also prioritised pre-agreed logistics, coordination and mutual support arrangements between the defence and civilian health sectors. The central message was that support relationships during an outbreak should not depend on improvisation. What matters is not broad agreement in principle that the sectors should work together but codified arrangements that define how and when support is activated, who is responsible for what, and what legal and operational interfaces apply.

This priority joint capability target area includes protocols that would provide bidirectional support during a health emergency. Military support to civilian authorities might include surge medical staff, field laboratory capability, strategic lift, warehousing, secure transport, communications resilience or supply-chain support. Civilian support to defence may include access to hospital beds and oxygen capacity, sequencing and epidemiological support, public health contact tracing, and integration into national response structures when military platforms or deployments are affected.

Participants drew heavily on lessons from COVID-19 in emphasising that these support arrangements need to be codified and exercised before an emergency arises. Defence logistics and surge capabilities already exist in many settings but activation often remains ad hoc, negotiated case by case or constrained by unclear triggers and authorities. The priority, therefore, is less about creating entirely new logistics capability than about establishing the standing protocols, roles, interfaces and legal arrangements that would allow these capabilities to be mobilised quickly and legitimately.

2.1.6. End-to-end biosecurity and biosafety for samples, research, and response

The exercise highlighted biosafety and biosecurity for samples and research as a more significant priority than the initial capabilities mapping (described in Chapter 4) had suggested. Defence participants introduced these capabilities during the exercise, emphasising that outbreaks involving novel pathogens create vulnerabilities that may be exploited deliberately while also increasing the operational risk associated with handling, transporting and analysing biological materials under pressure.

Across both sectors there was support for protocols, standards and resources that would allow emerging pathogens to be transported, researched and handled safely and securely during an emergency. These include sample transport arrangements, research safeguards, agreed standards for cross-sector work, and cross-border coordination where required by high-consequence settings. Participants also noted that biosafety and biosecurity are integral to diagnostic readiness, since rapid testing and specimen movement inevitably involve risk if governance and operating procedures are not already in place.

Rather than being treated as peripheral safeguards, biosafety and biosecurity emerged as enabling conditions for speed. Without trusted arrangements for safe and secure handling of samples and research, cross-sector collaboration may slow or stall at precisely the point when acceleration is most needed.

2.1.7. Vaccine demand forecasting, allocation principles, public trust and countering misinformation and disinformation

Participants also prioritised a set of enablers related to legitimacy, trust and allocation. A key lesson from the exercise was that deployment failure is not simply a function of inadequate supply or logistics. Even where a vaccine or other MCM exists and can be transported to a particular setting, the response may still fail if dose allocation is perceived as illegitimate or if populations do not trust the product or the institutions involved in delivering it.

For this reason, participants agreed that equitable access and public trust should be treated as preparedness requirements rather than downstream communication issues. In practical terms, this means developing principles-based allocation frameworks, public transparency mechanisms and civil–military decision interfaces

for dose-constrained settings before the next emergency. Participants did not believe that priority groups could be fixed fully in advance since these depend on the pathogen, mode of transmission and epidemiology. However, they did see value in agreeing the principles, processes and institutional interfaces that would govern allocation decisions under pressure.

Participants from both sectors also stressed the need to set up a joint capability to counter misinformation and disinformation and support public confidence in vaccination. The implication is that trust support cannot be a generic messaging plan but needs to be developed in advance, adapted to institutional and regional context, and built into deployment planning as seriously as logistics or warehousing.

2.1.8. High-containment protocols and joint pathogen characterisation

The exercise also underscored the importance of arrangements for high-containment laboratory access and joint pathogen characterisation, although defence and health participants did not prioritise these capabilities in exactly the same way.

Defence participants placed a high value on protocols for access to high-containment facilities and joint working across sectors and countries, recognising that many such facilities are civilian and that access can be difficult to arrange rapidly during an emergency. Participants emphasised that these protocols would need to cover biosafety and biosecurity oversight, scheduling, shared standards and practical rules for collaboration rather than relying on ad hoc access negotiations.

Health participants, meanwhile, placed greater emphasis on joint pathogen characterisation: standing arrangements through which defence teams and civilian genomic and epidemiological experts could jointly develop a shared early assessment of the pathogen, including transmissibility, severity and possible origin. This was seen as important because scientific and security assessments often sit in separate communities, even though early operational decisions may depend on bringing them together. Defence participants were more sceptical about how usable such joint analytical arrangements would be under actual emergency conditions, particularly when origin is ambiguous or information is sensitive.

These differing views suggest that both capabilities are important but that further work may be needed to clarify their operational design, feasibility and value under pressure.

2.2. Additional joint capabilities targets to strengthen readiness along the pathway

The exercise also considered several capabilities that were regarded as important but were not as highly prioritised for immediate investment during these discussions by both sectors. In most cases this was not because participants viewed them as unimportant. Rather, it reflected doubts about political feasibility, operational usability or the maturity of the institutional arrangements required to make them work in emergency conditions. In some cases it also reflected the scenario at hand, which was international in scope and suggested the need for defence-sector actors to work with health partners across more than one country – a more challenging situation than sharing across sectors within the context of a single country or national setting. These capabilities included:

- **Defence laboratory surge capability and network participation**. Health participants placed high value on pre-agreed protocols which would allow defence laboratories to augment civilian testing and participate in civilian and regional laboratory networks during outbreaks. However, this did not rise to the top of the defence group's priorities, suggesting that the practical role, incentives and governance model for such integration may require further discussion.
- **A framework for transferring defence-developed vaccine platform technologies into civilian development pipeline**s. In addition, participants did not highly prioritise a framework for transferring defence-developed vaccine platform technologies into civilian development pipelines. While the concept was recognised as potentially valuable, defence participants were sceptical about its usability in practice given export control and classification constraints. Instead, they favoured broader

investment in platform technologies through international mechanisms and the development of general principles to guide defence involvement.

- **Bidirectional near-real-time pathogen data sharing**. Although data sharing between defence and civilian health actors was recognised as a major challenge, neither group strongly prioritised bidirectional near-real-time pathogen data-sharing protocols. Participants acknowledged the importance of data sharing for outbreak control, but some questioned whether such arrangements were realistic in the current geopolitical environment. The discussion suggested that future work in this area may need to proceed on low-trust assumptions, focusing on narrow, usable and resilient mechanisms rather than highly ambitious integration models.

These findings are important because they show that the priority set identified in this report is not simply a list of every capability that matters but is a more selective set of capabilities judged to be both valuable and sufficiently feasible to pursue for coordinated investment prior to an emergency.

2.3. Crosscutting implication: prioritising capabilities that work in real-world conditions

A final message running through the exercise was that no single model of defence–public health collaboration will fit all countries, regions or outbreak scenarios. The appropriate role of defence depends on the strength of civilian health systems, the legal mandate of military institutions, levels of trust in government, and whether the surrounding context is politically high trust or low trust.

In settings with strong civilian health systems, defence may play a narrower support role focused on specialised logistics, surge capacity or technical assets. In lower-capacity settings, defence may be indispensable in basic outbreak response including supply movement, vaccine delivery and continuity of care. Likewise, visible military involvement may support trust in some contexts and undermine it in others.

For this reason, participants tended to prioritise capabilities that remain useful under a wide range of conditions and do not depend on ideal cooperation in order to add value. Financing mechanisms, diagnostics, regulatory reliance and mutual support protocols were particularly attractive because they can still function even where political trust, technology transfer or data sharing are constrained. This suggests that the most feasible approach to achieving the 100DM is not to assume a perfectly integrated system but to invest first in capabilities that are operationally robust under stress, adaptable across contexts and able to reduce delay even when cooperation is partial.

The following chapter explains why these areas emerged as the most plausible joint capabilities targets, drawing on stakeholder views about comparative advantage, feasibility and the conditions under which defence–public health collaboration is most likely to succeed.

Chapter 3.

Why these areas emerged as priorities: stakeholder perspectives on feasibility, value and joint action

This chapter explains why the capabilities outlined in Chapter 2 emerged as the most plausible priority joint capabilities targets between the defence and civilian health sectors. Building on findings from the desk-based capabilities mapping (Chapter 4), which identified a wide opportunity space, stakeholder interviews suggested that not all parts of the 100DM pathway are equally amenable to sustained collaboration prior to an emergency. Some capabilities were seen as more investable because they map clearly onto existing defence missions, have an obvious operational value and can be justified in both force protection and public health terms. Others were viewed as important in principle but harder to position within defence incentives, more politically sensitive or more dependent on institutional arrangements which remain underdeveloped.

To better understand which synergies were most viable, 11 expert stakeholders across defence, public health, health security and national security were consulted in semi-structured interviews. Only two of these stakeholders later participated in the scenario-based exercise. These discussions were used to test the findings of the desk-based capabilities mapping, assess comparative advantage across sectors, identify bottlenecks and explore where integration was both useful and feasible. They also helped narrow a broad theoretical opportunity space into a smaller set of collaboration areas which stakeholders believed could realistically be advanced prior to an emergency.

Across the interviews a consistent pattern emerged. The joint capabilities targets most likely to attract support were those where defence relevance was direct, operational and easy to articulate. Stakeholders were generally most positive about collaboration where it built on functions the defence sector already performs, such as threat detection, secure coordination, surge support, logistics and operation under uncertain or degraded conditions. Capabilities that required defence actors to engage more deeply in areas seen as belonging primarily to civilian public health institutions were viewed as less promising entry points for collaboration.

3.1. Characteristics of capabilities most suitable for joint investment

A clear message from the interviews was that collaboration is most plausible where capability development can be framed as supporting both force protection and wider public health preparedness. Stakeholders repeatedly stressed the importance of identifying areas where defence does not need to be persuaded to adopt an entirely new mission but can instead see the 100DM as relevant to goals it already holds: maintaining operational readiness, protecting deployed forces, monitoring biological threats, supporting civil authorities and strengthening resilience against both naturally occurring and deliberate biological events.

In practice, this means that the most promising capability areas are those with three characteristics. First, they have clear relevance to existing defence roles and incentives. Second, they offer practical operational value during an outbreak rather than relying on abstract or long-term arguments alone. Third, they appear capable of being advanced through pre-emergency investment, standing arrangements or integration measures rather than requiring wholesale legal or institutional transformation before they can be used.

These characteristics help explain why the final priority set described in Chapter 2 leaned toward areas such as financing, diagnostics, early warning, logistics and mutual support protocols. These are capabilities that can be understood as enabling faster and more effective emergency action across both sectors while also being compatible with how defence institutions tend to organise resources and justify investment.

3.2. Areas of strongest alignment between defence and health

The area most frequently identified by stakeholders interviewed in advance of the scenario-based exercise as suitable for collaboration was early detection and initiation of pathogen characterisation for therapeutic targets. In particular, stakeholders highlighted the

capability to rapidly leverage, interpret and translate pathogen, outbreak and disease data in ways that support forecasting, threat characterisation and early operational decision making. This was seen as an area of clear shared interest as it aligns closely with existing defence functions around force protection, biosurveillance and CBRN (chemical, biological, radiological and nuclear) threat characterisation, while also serving core public health needs in outbreak intelligence and response.

Stakeholders noted that although some defence biosurveillance and CBRN capabilities were developed primarily with deliberate threats in mind, the practical distinction between deliberate and naturally occurring biological hazards is often less important at the stage of early detection. Capabilities built to identify and characterise one can frequently contribute to identifying and characterising the other. This was seen as important because it suggests that some of the strongest opportunities for collaboration do not require creating wholly new capabilities but rather connecting and adapting capabilities that already exist for mutual benefit.

A second area of relatively strong alignment concerned technology, innovation and the ability to support rapid vaccine and biologics scale up. Stakeholders pointed to the capability to rapidly scale vaccines and biologics through technology transfer and advanced preparedness planning as an area where some militaries hold relevant strengths and where there is precedent for interaction between defence, scientific and public health institutions. More broadly, stakeholders observed that militaries often continue to invest in scientific and technological capabilities even where these are not designed specifically for outbreak response. This creates opportunities to leverage those investments to support faster vaccine R&D and response readiness.

Interviewees also stressed that such collaboration would require clearer articulation from public health actors of where defence capabilities would be useful and why sustained pre-emergency partnership is in defence's own interest. These opportunities are therefore more likely to be realised where public health can frame the operational value of collaboration in terms that align with defence priorities.

Logistics and distribution were also identified as an important area of alignment. Stakeholders noted that defence actors often maintain robust logistics, operational and distribution capabilities that could be used to support vaccine deployment and wider emergency response. While these capabilities do not directly shorten the scientific process of developing a vaccine, they are critical in ensuring that products can be moved, stored and delivered rapidly once available. As a result, logistics was seen as a practical and credible area for collaboration, particularly in emergency conditions where civilian systems may need surge support or access to secure transport and supply-chain infrastructure.

3.3. Areas where collaboration is more difficult

The interviews also highlighted areas of the 100DM pathway where collaboration is likely to be more difficult, either because defence and public health roles are less aligned or because the political and institutional barriers are higher.

The clearest example was regulatory and policy readiness. Stakeholders generally viewed capabilities in this area – particularly engagement with regulatory authorities to enable emergency authorisation and influence over vaccine policy from authorisation through to post-approval surveillance – as more firmly located within civilian public health systems. The main reason given was that these functions sit in parts of the system where public health authorities have both the formal mandate and the relevant expertise, while defence has less direct incentive to engage. However, defence actors need to align their authorisation to public health government authorities to minimise time lost in secondary authorisation for troop usage and viewed regulation as an area where collaboration would be beneficial.

A second challenge raised by multiple stakeholders concerned differences in target population and institutional purpose. Defence institutions are primarily organised around protecting military personnel and maintaining mission readiness whereas public health organisations are focused on population-wide benefit. This difference does

not preclude collaboration but does shape where defence buy in is easiest to secure. Capabilities framed primarily around equitable access, inclusive partnerships or broad public benefit were sometimes seen as harder to position as defence priorities unless the link back to force protection or operational continuity was made explicit.

At the same time, some stakeholders observed that the distinction should not be overstated. Militaries are likely to depend, in practice, on MCMs that have been developed, tested and authorised for wider population use. From this perspective, joint capabilities targets that strengthen population-level vaccine readiness also strengthen defence preparedness. However, stakeholders made clear that this argument often needs to be stated directly if sustained defence engagement is to be secured.

3.4. Crosscutting enablers of successful collaboration

Beyond specific capability areas, the interviews uncovered a number of crosscutting enablers which help explain why some forms of collaboration appear more feasible than others.

One important theme was the need for a shared vocabulary and conceptual framing. Several interviewees noted that defence and public health actors often use similar terms but attach different meanings or priorities to them. As a result, even technically compatible capabilities may remain institutionally disconnected if the sectors do not describe the problem in ways that are mutually intelligible. This suggests that collaboration depends not only on capability alignment but also on the ability to articulate that alignment in language that resonates across both sectors.

Related to this, stakeholders emphasised that public health actors need to be able to explain more clearly how pandemic preparedness capabilities contribute to defence missions. In the absence of that framing the 100DM can be perceived primarily as a public health or development agenda rather than one that also serves force health protection, operational resilience and national security.

Regional and contextual variation was another recurring theme. Stakeholders stressed that defence institutions differ considerably in legal mandate, operational role, public legitimacy and relationship to civil authorities. Likewise, health-system strength and trust in state institutions vary significantly across countries and regions. This means that a capability which appears straightforward and useful in one setting may be politically sensitive or operationally unrealistic in another. Effective collaboration therefore depends on designing arrangements that are sensitive to national and regional context rather than assuming a single model of defence–health integration.

3.5. Implications for prioritisation

Taken together the stakeholder interviews help explain the shape of the priority set that emerged from the tabletop exercise. Capabilities were more likely to be prioritised where they aligned clearly with existing defence missions, offered direct operational value during an outbreak and could be advanced through practical pre-emergency arrangements rather than ambitious institutional redesign. This helps explain why financing, diagnostics, early warning, logistics and mutual support arrangements featured prominently while capabilities such as broader regulatory innovation, highly ambitious data-sharing arrangements or some forms of technology transfer were treated more cautiously.

The interviews also highlight that the main challenge is identifying areas where complementarity can be turned into durable collaboration under realistic political and institutional conditions. In this sense stakeholder perspectives helped validate the broader mapping of defence and civilian health capabilities and distinguish between the wider universe of potentially relevant capabilities and the smaller subset that appears most feasible and valuable for joint investment.

The next chapter situates these findings within that wider capability landscape, showing how the priority areas identified through the exercise relate to the broader system of interdependent functions required to achieve the 100DM.

Chapter 4.

The wider capability landscape underpinning the 100DM

The priority capability investments identified in Chapter 2 sit within a broader system of interdependent functions required to achieve the 100DM. This chapter situates those priorities within the wider capability landscape across the civilian health and defence sectors, showing that the 100DM depends on a linked set of capabilities spanning early detection, vaccine and MCM development, and deployment readiness. The analysis also shows that many of the required capabilities already exist across the two sectors. The central challenge is that they are unevenly distributed, not routinely connected and often difficult to activate jointly under emergency conditions.

Prior to the 100DM scenario-based exercise, capabilities relevant to the 100DM were mapped across eight capability areas alongside a crosscutting innovation capability that supports all phases. For analytical purposes these were grouped into three broad phases: detection, development and deployment readiness. This mapping was used to identify where civilian public health and defence systems hold complementary strengths, where dependencies exist between them, and where systemic gaps may limit rapid action. The details of the capability mapping and how these relate to the capabilities used for the scenario-based exercise are provided in Annex A.

Definitions proved important as we approached the mapping exercise. The term 'global health security' was originally intended to accelerate alignment between sectors, recognising the impact that infectious disease outbreaks could have on international peace and security as well as force health.[14] Unfortunately, in some contexts it has inadvertently served as an impediment, given how governments define and delegate 'security' and 'defence'. To this end we elected to use 'defence' as the 100DM capabilities we are seeking to identify and align typically reside within ministries of defence or related ministries/departments with responsibility for national defence. Conversely, 'security' can evoke ministries of security, with responsibility for internal security, law enforcement and other related functions, which typically have less overlap with the 100DM.

4.1. The 100DM as a system of interdependent capabilities

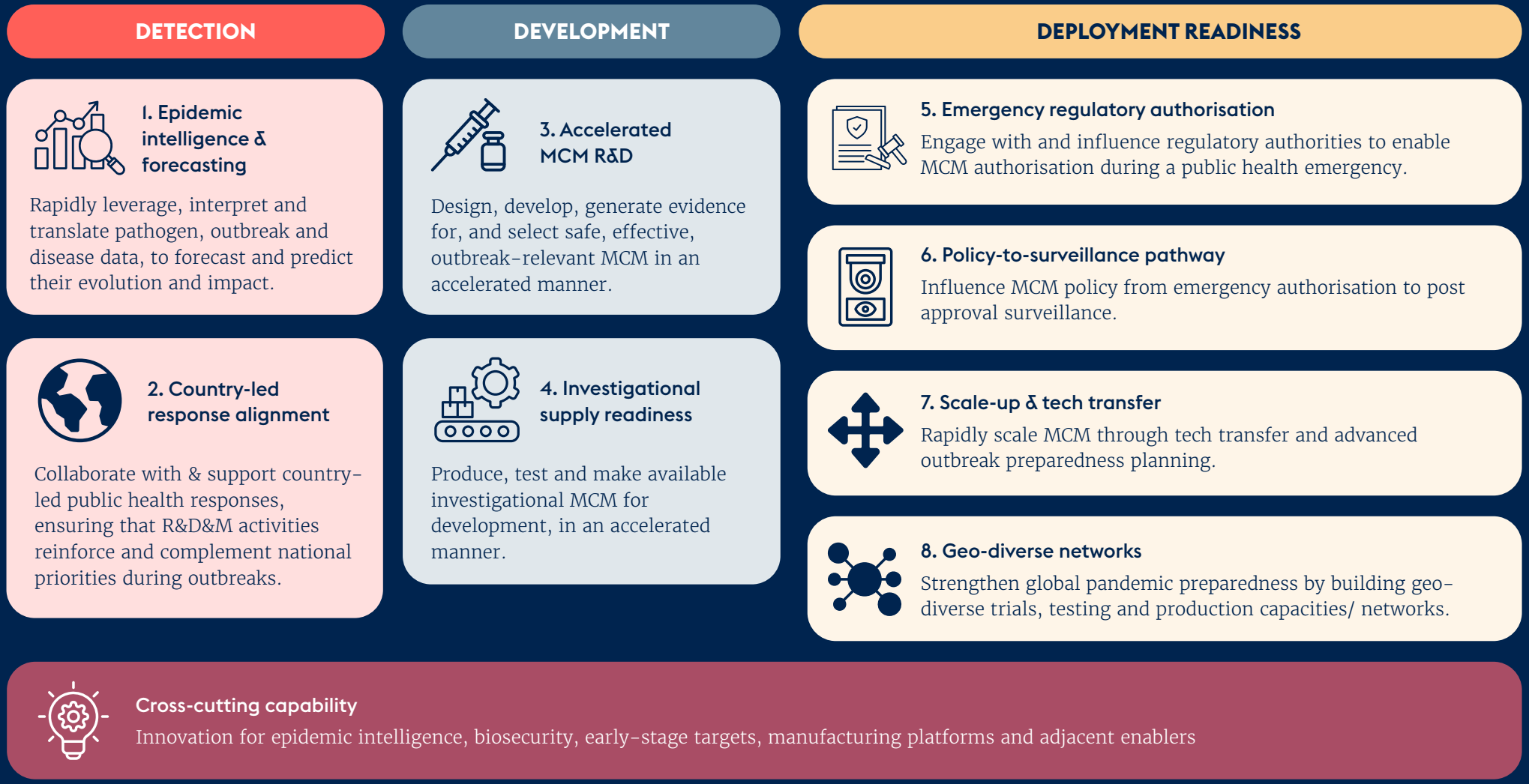
The 100DM is built on capabilities that are needed across three phases: (1) detection of the outbreak, (2) development of effective MCMs, and (3) deployment of MCMs to populations.

The detection phase covers the capabilities needed to identify emerging biological threats rapidly, interpret their significance and translate that information into operational action. This includes pathogen and outbreak surveillance, pathogen characterisation, data integration and analysis, outbreak forecasting, threat assessment, and coordination with country-led public health response and international coordination mechanisms. Early detection is critical because it determines how much time remains for containment, response and MCM development.

The development phase covers the capabilities required to move from pathogen characterisation to viable vaccine candidates and investigational products at speed. It includes scientific discovery, access to platform technologies, pre-clinical development, high-containment testing environments, clinical evidence generation and pilot-scale GMP production of investigational materials. It also includes the legal, technical and institutional arrangements needed to move quickly between these stages. Development is the core challenge of the 100DM: compressing the pathway from target identification to a candidate that can enter human testing and regulatory review.

Deployment readiness covers the capabilities needed to authorise, manufacture at scale and distribute vaccines rapidly once a candidate shows promise. This includes emergency regulatory pathways and rolling review, technology transfer, manufacturing scale up, supply-chain resilience, and geographically distributed trial, testing and production capacity which can be activated in the region of emergence. Deployment readiness is what allows products to be tested, authorised and made available quickly enough to alter the course of an outbreak.

Figure 2 Capability areas underpinning the 100DM pathway



Across these phases the capability mapping shows that the 100DM depends on a chain of interdependent functions rather than on any single breakthrough capability. Weakness in one area, whether early detection, investigational supply, regulatory review or manufacturing scale up, can slow the whole pathway. Preparedness for the 100DM is therefore best understood as a systems problem requiring coordinated capability along the full pathway from detection to deployment.

4.2. Existing capabilities across the civilian public health and defence sectors

The mapping showed that civilian public health systems and defence organisations hold different but potentially complementary capabilities along this pathway.

Civilian health systems provide the core public health architecture on which the 100DM depends. This includes disease surveillance networks, genomic sequencing and pathogen characterisation, epidemiological modelling and investigation, public health emergency operations centres, research institutions, trial networks, regulatory authorities, pharmacovigilance systems, and formal relationships with the WHO, CEPI, regional health bodies and manufacturers. These are the capabilities that provide scientific legitimacy, regulatory oversight, population-level evidence and the institutional basis for country-led action.

Defence, by contrast, tends to hold capabilities that are strongest in operational reach, resilience, secure coordination and execution at speed under emergency conditions. These include CBRN surveillance and threat-assessment systems, secure communications infrastructure, deployable medical units and field laboratories, strategic airlift and cold-chain logistics, high-containment laboratories, military biomedical research and development institutions, pilot bioproduction facilities, industrial surge management tools and pre-positioned overseas laboratory and research networks. Defence also brings command structures, planning disciplines and an ability to mobilise resources rapidly during crises.

These capabilities are complementary across all three phases of readiness. In detection, defence systems can provide breadth of scanning, forward presence and threat-oriented situational awareness while civilian systems provide the depth of pathogen characterisation, genomic analysis and epidemiological interpretation needed to validate and understand a novel threat. In development, defence contributes specialised R&D assets, high-containment capability and some pilot-scale manufacturing while civilian systems provide ethical oversight, regulatory pathways, access to trial populations, R&D laboratory infrastructure, standards and the large-scale evidence generation needed to move from a military-relevant product to one usable more broadly. In deployment readiness, defence can support logistics, strategic lift, supply-chain resilience and pre-positioned infrastructure while civilian systems remain central to authorisation, vaccine policy, safety monitoring, procurement legitimacy and public trust.

4.3. Systemic gaps limiting joint readiness

The mapping identified three broad types of systemic gap that limit the ability of existing capabilities to operate as a coherent readiness architecture: (1) interoperability, (2) governance, and (3) sequencing and dependency gaps.

The first gap relates to interoperability. Civilian and defence systems often collect, classify and use information differently. Biosurveillance outputs are not routinely shared in near real time and manufacturing, supply and logistics planning often proceeds in parallel rather than through a unified readiness model. This makes it harder to use the full capacity of both systems during emergencies, even where complementary capabilities exist.

The second gap relates to governance and access. High-value assets exist in both sectors but these assets are not always accessible to the other through standing arrangements prior to an emergency. This applies to data sharing, access to high-containment facilities, activation of military support to civilian health emergencies, the contribution of defence intelligence to risk assessment, and access to manufacturing infrastructure. In many instances,

the problem is less the absence of capacity than the absence of pre-agreed legal frameworks, protocols and liaison mechanisms that would allow this capacity to be used quickly and legitimately.

The third gap relates to sequencing and dependency. The 100DM requires multiple functions to operate in parallel rather than in series. Surveillance must connect quickly to R&D, pre-clinical work to investigational manufacturing, clinical trials to regulatory review, and early authorisation to post-authorisation surveillance and scale up. Yet institutional arrangements still often assume sequential movement and case-by-case negotiation, creating avoidable delay along the pathway.

These gaps also reveal a pattern of mutual dependence. Defence depends on civilian health systems for pathogen characterisation at scale, public health analytics, ethical and regulatory legitimacy, vaccine development, access to affected populations and the international standards architecture that makes a product globally usable. Civilian health systems, in turn, depend on defence for secure logistics, deployable infrastructure, surge support, access to certain high-containment and biodefence R&D assets, and the ability to operate rapidly in difficult environments. Neither sector therefore holds the full capability chain alone.

4.4. Where defence goals already align with 100DM capability needs

The mapping also identified three areas where defence goals and the capability needs of 100DM already align, creating a practical basis for joint capabilities target development: (1) rapid detection of biological threats, (2) concerns about MCM development, and (3) deployment readiness.

The first area relates to the rapid detection of biological threats. Many defence strategies place strong emphasis on force protection and operational readiness in the face of biological risks. Defence biosurveillance mechanisms such as the Global Emerging Infections Surveillance (GEIS) programme and the National Center for Medical Intelligence (NCMI) illustrate the scale of capability already directed towards this goal. Global partnerships between individual nations also exist, such as that between the Finnish Defence Forces' Centre for Military Medicine (SOTLK) and the Tanzania Veterinary Laboratory Agency (TVLA), who have partnered in an ongoing collaboration to improve Tanzania's biodetection capacity. Coordination among military medical services during the COVID-19 pandemic, including through structures such as the NATO Committee of the Chiefs of Military Medical Services (COMEDS), further demonstrated the value of defence coordination in detection and situational awareness. At the same time the mapping showed that a challenge lies in the speed and format of information flow between military medical services and civilian health authorities. This suggests that pre-agreed protocols for data sharing and joint analysis could advance both defence objectives and the 100DM.

A second area of alignment concerns MCM development. Defence strategies often place emphasis on protecting military personnel and civilians against CBRN threats and emerging infectious disease, creating overlap with the development and deployment phases of the 100DM. Defence actors in several settings have strengthened biodefence R&D, pilot manufacturing capability and scientific partnerships in pursuit of these goals. Examples include SCARDA in Japan, established to strengthen strategic vaccine research and preparedness, and the Walter Reed Army Institute of Research (WRAIR) in the United States, which maintains pathogen-agnostic vaccine development platforms, BSL-3 laboratories, GMP pilot manufacturing capability and extensive overseas research partnerships. The Armed Forces Research Institute of Medical Sciences (AFRIMS) is a partnership between WRAIR and the Royal Thai Army which maintains specimen transport and cold chain across over 30 field sites in Thailand, Nepal, Cambodia, Vietnam and Bangladesh. These examples show that defence holds assets relevant to rapid vaccine development. However, the mapping also showed that defence's ability to realise its own objectives in this area is often limited by how effectively it can connect to civilian R&D systems, including access to trial populations, civilian data and investigational dose-manufacturing infrastructure.

Alignment is particularly visible in deployment readiness. The experience of Operation Warp Speed demonstrated how integrated civil-defence

action can compress timelines when development, manufacturing and logistics are managed in parallel rather than sequentially. Through collaboration between the US Department of Health and Human Services, the Department of Defense and private industry, Operation Warp Speed combined financing, clinical trials, large-scale manufacturing and logistics support to accelerate access to vaccines for both military and civilian populations. The relevance of this example is not that it can be replicated exactly everywhere but that it shows how timeline compression depends on prior alignment between scientific, manufacturing, financing and operational functions.

Overall, these alignments suggest that there is a practical opportunity for joint capabilities development where defence goals already overlap with the requirements of the 100DM. This is not an argument for militarising pandemic preparedness or for assuming that defence can fill every gap. Rather, it points to a targeted set of enabling capabilities which either connect assets already held separately across the two sectors or establish shared arrangements where neither side currently has what is needed.

4.5. Implications for joint capabilities development

Some of the opportunities identified through the mapping involve linking existing capabilities more effectively. Examples include connecting defence biosurveillance systems to civilian genomic surveillance, integrating military health data into national pharmacovigilance systems, aligning defence logistics with civilian clinical-trial supply chains, or using pre-positioned defence laboratory and trial infrastructure to support civilian preparedness in regions of likely emergence.

Other opportunities involve developing genuinely joint capabilities from the outset. These include pre-agreed legal and technology transfer frameworks for dual-benefit R&D, standing civil–military activation protocols, common data standards, shared readiness planning for manufacturing, facilitated regulatory reliance arrangements, and regular joint exercises to test whether these arrangements function under compressed timelines.

The mapping therefore pointed not simply to a wide field of possible collaboration but to a more specific conclusion: that preparedness gains are most likely where joint investment focuses on enabling functions that connect the system.

4.6. How the broader mapping informed the priority set

The broader capability mapping identified many areas where defence and civilian health capabilities are complementary. However, resources are limited and not all gaps are equally urgent, feasible or politically tractable. Some areas are more mature, better aligned with defence incentives or more readily operationalised through existing national and alliance frameworks. Others depend on more difficult changes to law, regulation, funding or institutional culture.

For that reason, the purpose of the subsequent stakeholder interviews and tabletop exercise was to move from a broad opportunity space to a smaller set of capability areas where there is both clear value and a realistic basis for joint action prior to an emergency. The priority joint capabilities targets presented in Chapter 2 should therefore be read as a subset of this wider landscape: not the only capabilities that matter, but the ones judged most likely to deliver practical gains toward the 100DM under real-world conditions.

Chapter 5.

Conclusions, recommendations and next steps

This report has argued that it is vital for both the defence and health sectors to invest in the 100DM. This coordination will be essential to improve resilience and readiness – and ultimately to protect society – in a new era of increasingly frequent, complex and connected biological risks.

Several clear themes emerged across the exercise, interviews and desk research:

- **The capabilities required to advance the 100DM are inherently threat agnostic.** Participants repeatedly noted that the same financing, detection, development and delivery infrastructure needed to respond rapidly to one biological event would also strengthen preparedness for naturally occurring outbreaks, accidental releases and deliberate biological attacks. This strengthens the case for investing in durable, crosscutting capabilities rather than pathogen-specific systems. Highly prioritised capability areas across the health and defence sectors possess clear relevance in relation to existing defence roles and incentives, practical operational value during an outbreak, and feasible opportunities for progress through pre-emergency investment, standing arrangements or integration measures.
- **Delivering the 100DM requires joint defence–health investment in enabling capabilities.** The capabilities needed to prevent, detect and respond to disease threats and to develop, manufacture and deploy MCMs cannot be built effectively through health financing and capabilities alone, nor can they be achieved in fragmented silos. The strongest case for future investment is therefore in a targeted set of enabling capabilities which are jointly planned, financed and exercised across defence and civilian health systems, supported by shared protocols, mutual support arrangements and, where feasible, integrated planning and financing mechanisms.
- **Sustained financing and standing capability are key to vaccine and broader MCM readiness**. Participants placed the highest priority on pre-agreed financing and investment arrangements for MCM R&D, investigational-dose manufacturing, clinical testing, at-risk scale up and large-scale manufacturing, including support for vaccine-design tools, prototype libraries, platform technologies, delivery innovations, advance market commitments and volume guarantees. Multilateral mechanisms such as CEPI were seen as especially valuable in de-risking investment, linking capabilities across sectors and geographical regions, and supporting joint planning before an emergency occurs.
- **Early warning, diagnostics and laboratory capability are critical shared readiness functions.** Participants highlighted the importance of combining next-generation surveillance technologies with standing diagnostic and laboratory capacity, including AI-enabled surveillance tools, environmental and wastewater monitoring, rapid diagnostics and defence laboratory surge support. These capabilities were seen as essential to generating shared situational awareness, enabling earlier response, and creating the conditions for faster MCM development.
- **A further set of enabling capabilities is needed to accelerate development and deployment once a threat is identified**. These include regulatory reliance mechanisms, investigational-dose manufacturing readiness, shared high-containment protocols, therapeutics co-development, and pre-agreed logistics and mutual support arrangements. Participants emphasised the need for peacetime pre-emergency arrangements for regulatory cooperation, logistics, sample movement, biosafety and biosecurity, and cross-sector support, rather than relying on ad hoc crises measures.
- **The main bottlenecks are often related to governance rather than technical constraints.** Participants repeatedly identified capabilities and assets that already exist within the civilian health and defence sectors but are not routinely connected through peacetime protocols, financing mechanisms, legal frameworks, common standards or access arrangements. The challenge is therefore not only to build capability but to ensure that existing capability can be activated quickly, legitimately and at scale when time matters.
- **Some critical capabilities remain institutionally under-owned**. Diagnostics, therapeutics and personal protective equipment were repeatedly identified as lacking a dedicated international mechanism for emergency financing, manufacturing and delivery comparable to those that exist for vaccines. Therapeutics in

particular drew cross-sector support as they may reach affected populations before a vaccine is authorised but still lack a sufficiently clear coordinating architecture.

- **Preparedness planning should assume low-trust conditions rather than ideal cooperation**. Participants cautioned against relying on assumptions of open data sharing, seamless technology transfer or automatic cross-sector access given the real constraints posed by export controls, classification rules, leak risks and nationally protective behaviour during crises. A key implication is that priority should be given to capabilities that remain functional under both high- and low-trust conditions.
- **Public trust, information integrity, equity and benefit sharing are core preparedness functions**. Participants stressed that even effective vaccines and strong logistics will have limited impact if public confidence is insufficient to ensure uptake, if misinformation and disinformation undermine deployment, or if allocation is perceived as illegitimate. Equity and benefit sharing were also seen as essential to encourage early detection and reporting, and should therefore be built into preparedness design in advance.

5.1. Recommendations for advancing defence and health sector investment to realise the 100DM

5.1.1. Defence and health funders should jointly plan investments in vaccine readiness and the broader 100DM

Currently, investments are fragmented and often siloed within sectors and across countries and regions. Joint planning and coordinated investment will be essential to better prepare for any emerging biological threat, whether naturally occurring, deliberate or accidental. Such joint capabilities planning will also enhance effectiveness, as biological threats are currently rising in the context of fiscally austere budgeting. Collaboration is especially plausible and vital where capability development can be framed as supporting both force protection and wider public health preparedness, including such critical 100DM areas as maintaining operational readiness, protecting deployed forces, monitoring biological threats, supporting civil authorities and strengthening resilience against both naturally occurring and deliberate biological events.

Suggestions for implementation include:

- Defence and health ministries could establish joint planning processes to identify priority investments in vaccine readiness and across the wider 100DM including areas of shared strategic interest such as surveillance, platform technologies, clinical testing capacity, manufacturing readiness and deployment.
- Defence and civilian health funders could develop shared investment frameworks or roadmaps to guide coordinated spending on dual-use capabilities relevant to both operational readiness and public health emergency response.
- National security, health and finance stakeholders could align planning assumptions, preparedness objectives and investment timeframes so that vaccine readiness and broader 100DM capabilities are developed and sustained more coherently.
- Regional and international preparedness partners could support cross-country coordination on investment priorities, particularly where shared capabilities, pooled procurement or distributed manufacturing networks would strengthen collective readiness.
- Defence organisations could identify biodefence and force protection investments that also contribute to wider national preparedness, while health sector partners could identify public health capabilities that may be strengthened through collaboration with defence.

5.1.2. Defence and health funders should build and sustain pre-agreed standing financing arrangements, in advance of an emergency, for vaccine research and development, scale up, testing and manufacturing, as well as other MCMs

The strongest finding from the exercise was that standing financing arrangements from the defence and health sectors are critical in enabling the

100DM. Defence and civilian-health stakeholders agreed on the need to have standing financing for rapid R&D, investigational-dose manufacturing, clinical testing and at-risk scale up, alongside a practical model for who bears financial risk – for vaccines as well as the other components of the 100DM. These recommendations build on and are consistent with those of the 2025 High Level Independent Panel of the G20.[15] This will require pre-emergency financing that can be activated immediately after pathogen detection, standing access to investigational-dose manufacturing capacity, a risk-sharing framework for manufacturing before trial results are known, and benefit-sharing principles that preserve incentives for early reporting and cooperation.

Suggestions for implementation include:

- Health and science ministries, together with preparedness funders, could lead on designing, capitalising and maintaining financing mechanisms to enable vaccine R&D, scale up, testing and manufacturing. Similar arrangements could also be developed to benefit other critical 100DM components such as diagnostics and therapeutics.
- Finance ministries could determine how governments absorb or distribute failure risk from at-risk scale up and manufacturing.
- Defence ministries and biodefence funders could identify where defence investment can strengthen capabilities that simultaneously support force protection, operational readiness and national preparedness.
- Preparedness organisations and manufacturing partners could help structure and operationalise pre-agreed standing financing arrangements to support vaccine R&D, scale up, testing and manufacturing. These would, however, not be a substitute for government-backed financial commitment.

5.1.3. Civilian health and defence agencies should establish standing arrangements for rapid diagnostics and laboratory surge before the next emergency

The 100DM depends on rapid diagnostic capability early in an outbreak. Countries therefore need pre-agreed mechanisms for diagnostic development, validation and deployment including arrangements for when defence laboratories can augment civilian testing capacity and connect into civilian and regional laboratory networks. Civilian systems provide laboratory standards, epidemiological interpretation and public health integration; defence provides field laboratories, surge capacity and operational reach. The priority is to ensure these assets can be used together without negotiating access, standards or referral pathways during emergency.

Suggestions for implementation include:

- Public health agencies and laboratory networks could establish shared procedures, referral pathways and quality requirements for defence laboratory support to civilian testing.
- Defence laboratory, CBRN and medical organisations could define what testing, surge and field laboratory capabilities can be made available under standing arrangements.
- Health ministries and emergency management authorities could incorporate defence laboratory surge into preparedness planning and exercises.
- Regional public health coordination bodies could support cross-border laboratory interoperability where outbreaks are likely to require regional surge support.

5.1.4. Governments and preparedness actors should define practical use cases for early-warning innovation before investing at scale

Early-warning innovation was seen as strategically important but more contested than diagnostics. Technologies such as environmental and wastewater surveillance, lab-incident detection and AI-supported analysis may strengthen earlier recognition of biological threats but only if they are tied to clear operational and public health use cases. Investment would therefore be driven by preparedness need rather than by technology push alone.

Suggestions for implementation include:

- Health ministries, public health agencies and scientific advisers could define where early warning tools would materially improve outbreak detection and response.
- Defence biosurveillance, intelligence and CBRN actors could identify which early warning capabilities are most relevant to force protection and biological threat awareness.
- Research funders and innovation agencies could support early-warning innovation only where pathways to operational use and public health integration are clear.
- Preparedness planners could test whether these capabilities remain useful under low-trust conditions and constrained data sharing.

5.1.5. Health, defence and emergency management authorities should codify civil-military logistics and mutual support protocols before the next emergency

The report found that defence support to outbreak response is often useful but often ad hoc rather than pre-planned. Realising the 100DM before the next emergency requires codified arrangements for military support to civilian vaccine-relevant response functions including sample transport, cold-chain support, laboratory deployment, field logistics and other surge functions. The aim is to ensure defence logistics can be activated quickly, legitimately and under clear civilian leadership.

Suggestions for implementation include:

- Health ministries and emergency management authorities could identify which outbreak response functions may require defence support and under what conditions.
- Defence ministries, military medical services and operational planners could define the assets, triggers and authorities for providing that support.
- Civil–military coordination mechanisms could establish standing liaison arrangements and decision procedures before an emergency.
- Exercise leads and preparedness planners could test these protocols through realistic outbreak scenarios rather than relying on paper arrangements alone.

5.1.6. Regulators, health authorities and defence planners should invest in supporting international mechanisms for emergency authorisation and regulatory coordination for MCM development and deployment before the next public health emergency

The study identified jurisdictional fragmentation as one of the key bottlenecks between vaccine development and deployment. Realising the 100DM requires regulators to build reliance-based mechanisms before the next emergency, rather than improvising them during emergency situations. This would require having agreements under which emergency authorisation by trusted regulators or WHO pathways can trigger facilitated review elsewhere, conduct routine preparedness exercises that test rolling review and reliance under compressed timelines, and develop regulatory data-sharing systems that support parallel rather than sequential review.

Suggestions for implementation include:

- National regulatory authorities could establish and operationalise reliance agreements, including predefined criteria, legal frameworks and procedures for expedited review during public health emergencies.
- Health ministries could provide the political backing for cross-border reliance arrangements and the legal authorities needed to implement cross-border regulatory reliance during emergencies.
- WHO and regional regulatory groupings could support the implementation of regulatory coordination mechanisms such as common frameworks, technical alignment and facilitated review pathways.
- Defence stakeholders could contribute operational requirements, threat assessments and coalition interoperability considerations, where relevant, while recognising that regulatory decision making remains a civilian responsibility.
- Preparedness actors such as CEPI could invest in regulatory preparedness through technical assistance, simulation exercises, evidence generation and support for reliance implementation, while recognising that regulatory authority remains with national and regional regulators.

5.1.7. Biosafety and biosecurity are critical investment areas before and during a biological emergency

The exercise showcases the importance of integrating and resourcing biosafety and biosecurity capacities as a key component of preparedness and health emergency response. The defence discussion emphasised both the importance of preventing deliberate and accidental outbreaks but, equally, noted that novel outbreaks can create opportunities for adversaries to exploit. Mitigating this risk requires practiced and sufficiently financed approaches for safely and securely transporting biological samples, protocols and resources that allow emerging pathogens to be transported, researched and handled safely and securely during an emergency. This includes sample transportation arrangements, research safeguards and agreed standards for cross-sector and potentially cross-border work in high-consequence settings.

Suggestions for implementation include:

- Defence and health stakeholders could invest in biosafety and biosecurity as a key element of health security and pandemic prevention, preparedness and response.
- Preparedness actors could invest in biosecurity and biosafety measures as a critical and integrated portion of detection and response capacity. CEPI's biosecurity program is an exemplar, but few organizations fund these approaches as a requirement for doing business – something that needs to change.

5.1.8. Health, defence and government leaders should treat public trust, countering misinformation and disinformation, and criteria for vaccine deployment as preparedness requirements

The study found that even where vaccines and other MCMs exists and can be physically delivered, response can fail if allocation is perceived as unfair or if public confidence is insufficient to achieve uptake. Realising the 100DM prior to an emergency therefore requires that deployment planning addresses legitimacy alongside supply and logistics. This would entail principles-based allocation frameworks that can be adapted to the epidemiology of a specific event, pre-agreed civil–military decision interfaces for dose scarcity and deployment support, standing approaches for public trust, demand generation and response to mis-information and disinformation, and context-specific planning in terms of when defence visibility supports uptake and when it undermines it.

Suggestions for implementation include:

- Health ministries and public health agencies could lead on principles-based allocation frameworks and public communication strategies to establish trust before crises occur, as well as incorporating deployment legitimacy into preparedness planning and exercises.
- Defence stakeholders could engage with health ministries and public health authorities in planning where military populations, logistics or visibility are likely to matter.
- Governments could establish or strengthen cross-sector communication arrangements for responding rapidly to misinformation and disinformation while maintaining transparency and public trust.
- Community engagement actors, trusted local leaders and delivery partners could co-develop context-specific communication, demand generation and community engagement strategies before emergencies occur.
- Community engagement actors, trusted communicators and delivery partners could be involved before an emergency to shape realistic uptake strategies.

5.1.9. Under-prioritized 100DM capabilities (e.g. tests, therapeutics, PPE) need explicit institutional investment and sponsorship before the next emergency

The study showed that some critical capabilities remain 'orphaned' or under-owned. More specifically, stakeholders found that diagnostics coordination, therapeutics, PPE and certain deployment enablers did not have clear ownership. Similarly, exercise participants across health and defence strongly prioritised therapeutics co-development as a key capability for achieving the 100DM. The 100DM cannot be realised pre-emergency if these gaps are left as diffuse responsibilities. Filling this gap would require explicit identification of – and investment in – capabilities that lack an institutional home, with the assignment of lead responsibility and accountability at national, regional or global levels and targeted coordination mechanisms where no single actor can reasonably own the full function.

Suggestions for implementation include:

- Defence and health agencies and organizations could prioritise investments in co-development and the deployment of therapeutics, diagnostics and PPE.
- Governments and international preparedness actors could identify capabilities that lack clear institutional ownership and assign lead responsibility before the next emergency.
- Health-sector organisations could take on formal stewardship of those 'orphan' capabilities which are primarily public health functions, including establishing long-term governance and preparedness plans.
- Defence stakeholders could contribute to investment where 'orphan' capabilities are relevant to force protection, operational continuity or civil support, while avoiding duplication of civilian leadership.
- Preparedness funders, international conveners and civil society organisations could use financing, convening power, advocacy and accountability mechanisms to promote clearer institutional ownership where responsibilities remain diffuse.

This report has shown that the 100DM depends on a small number of cross-sector capabilities which will not emerge spontaneously but which must be deliberately designed, financed, governed and routinely exercised before the next emergency. The most feasible path forward is therefore selective, disciplined and mission-focused: invest where defence and civilian health goals already align; build mechanisms that work under conditions of time pressure and low trust; and focus first on capabilities

that remain useful even when ideal cooperation fails. Without this pre-emergency settlement the 100DM will remain a compelling ambition. With it, it becomes a plausible preparedness capability.

5.1.10. Governments – including defence and health agencies and organizations – should treat the 100DM as a standing preparedness requirement rather than an emergency ambition

The 100DM will not be realised if it remains everyone's ambition but no one's standing responsibility. Governments should treat the 100-day vaccine readiness challenges as a shared preparedness objective across health, defence, finance and emergency management, and assign responsibilities accordingly. This would require formal recognition that 100DM readiness is part of biological preparedness and national resilience, supported by a clear division of labour across ministries, agencies and countries before an emergency, as well as routine inclusion of vaccine readiness in preparedness strategies, biodefence planning and national exercises.

Suggestions for implementation include:

- Health and defence sector actors and funders could support a targeted set of 100DM capabilities which are jointly planned, financed and exercised across defence and civilian health systems, supported by shared protocols, mutual support arrangements and, where feasible, integrated planning and financing mechanisms.
- Heads of government, cabinet offices and national security councils could set and oversee the cross-government mandate.
- Health ministries could lead on public health strategy, regulatory coordination and integration with pandemic preparedness plans.
- Defence ministries could define and finance areas where military capabilities support 100DM, especially in detection, logistics, biosecurity, manufacturing support and support to civil authorities.
- Finance ministries could establish or strengthen sustainable financing arrangements that support preparedness before crises rather than relying on emergency appropriations.

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Annex A. Research methods

A.1. Desk research for capabilities mapping

The aim of this module was to identify existing capabilities in the civilian health sector and the defence sector that are relevant to the 100DM with the aim of determining where existing capabilities could be leveraged for investment between health and defence. The approach was as follows:

1. A preliminary assessment was conducted to identify the capabilities needed to deliver the 100DM and where collaboration may be possible.
2. This assessment was reviewed alongside CEPI's theory of change and the 100DM strategy to better understand the relevant capabilities and potential areas for collaboration.
3. A data-collection framework was developed to enable researchers to systematically capture evidence from desk research. The framework aimed to capture information on the 100DM capabilities as assessed by CEPI, existing public health and defence sector capabilities, existing defence priorities and where they align to 100DM capabilities, and priority joint capabilities areas of interest.
4. Desk research was conducted by scanning publicly available information on public health and defence strategies, plans, programmes and initiatives and then mapping them against 100DM capabilities. Our aim was not to conduct an exhaustive overview of all existing capabilities across both sectors but rather to develop a broad understanding of the strategic objectives of each sector, where these align with the 100DM and what capabilities exist to support achieving these objectives.
5. Once existing capabilities and sector goals were mapped to the 100DM capabilities, the project team held a two-hour analysis workshop, including senior defence and public health experts, to assess where integration was feasible, which capabilities were more conducive to collaboration, where gaps exist and where the 100DM aligns with defence-sector priorities.
6. Following the workshop the findings were synthesised into eight capabilities areas where defence capabilities and civilian health capabilities are complementary and could be strengthened through integration or collaboration.

A.2. Key Informant Interviews

Expert stakeholders across defence, public health and health security were consulted in order to better identify synergies between the defence and public health sectors that were most viable for collaboration. The interviews were via videocall, were semi-structured and lasted for 45–60 minutes.

Prior to the interviews, stakeholders were presented with the capabilities mapping developed through desk research. Interviews were then used to validate the findings and fill gaps related to the distinction of roles, capabilities and priorities between civilian health and defence actors. Interviews identified areas where collaboration between health and defence actors would best enable meeting the 100-day target, as well as identifying important distinctions, ambiguities and conflicts in the language used for joint capabilities.

Interviewees represented a broad geographical spread and a variety of organisations. An overview of participating nations is shown in Table 1.

Table 1. Country and organisation of participating experts in key informant interviews

Country	Organisation(s)
Canada	Global Affairs Canada
Finland	Finland Ministry of Defence
Ethiopia	Africa CDC
Malaysia	Institutional Biosafety & Biosecurity Committee (IBBC)

Country	Organisation(s)
Malaysia	ASEAN Mitigation of Biological Threats
Portugal	Portuguese Army Biological and Chemical Defence Laboratory/WHO HSI-TAG Health Security Interface Technical Advisory Group
UK	UK Health Security Agency
UK	UK Health Security Agency
USA	API Innovation Center
USA	US Department of War
USA	US Defence Health Agency

The desk research and interviews were used to design an interactive scenario-based exercise, as described in the following section.

A.2.1. Interview protocol

Theme 1. Interview background and role

- Could you briefly introduce yourself? Specifically, your professional experience and how it intersects with biosecurity, preparedness, and pandemic response?
- What are your (or your organisation's) main responsibilities and goals in biosecurity?

Theme 2. Functional areas

As mentioned, CEPI has identified five functional areas needed to deliver the 100DM. We will now explore each of these areas and their alignment to defence goals.

1. Area 1: early detection and initiation

a. CEPI have outlined the following capabilities as needed to deliver the 100DM:

- Rapidly leverage, interpret and translate pathogen, outbreak and disease data, to forecast and predict their evolution and impact.
- Collaborate with and support country-led public health responses, ensuring that research, development and manufacturing activities reinforce and complement national priorities during outbreaks.

2. Area 2: accelerated vaccine development

b. CEPI have outlined the following capabilities as needed to deliver the 100DM:

- Design, develop, generate evidence for, and select safe, effective, outbreak-relevant vaccines and biologics in an accelerated manner.
- Produce, test and make available investigational vaccines and biologics for development in an accelerated manner.

3. Area 3: regulatory and policy readiness

c. CEPI have outlined the following capabilities as needed to deliver the 100DM:

- Engage with and influence regulatory authorities to enable vaccine authorisation during a public health emergency (based on risk–benefit assessment of limited or alternative clinical data, and to facilitate ongoing rolling regulatory review)
- Influence vaccine policy from emergency authorisation to post-approval surveillance.

4. Area 4: resilient supply capabilities

d. CEPI have outlined the following capabilities as needed to deliver the 100DM:

- Rapidly scale vaccines and biologics through tech transfer and advanced outbreak preparedness planning.
- Strengthen global pandemic preparedness by building geo-diverse trials, testing and production capacities/networks.

For each of these, ask interviewee:

- Is there regional investment already in this area? Any defence/health sector collaboration towards capabilities?

- Do you see opportunities for further collaboration in the future?
- Are there defence goals that would benefit from these capabilities? If so, what are the defence goals that could be met by having these capabilities?
- What existing capabilities in the defence sector could be leveraged to deliver the 100DM capability? Is this capability amenable to collaboration or integration with public health capabilities?
- If so, how?
- If not, what are the barriers to integration?

Theme 3. Collaboration

1. Integration and synergy

a. Looking across the functional areas – early detection, accelerated vaccine development, regulatory readiness, resilient supply – where do you see the strongest synergies between defence and public health goals?

b. In your view, where does defence add unique value within national or global health-emergency response?

c. Where would collaboration offer the biggest time or efficiency gains toward the 100-day goal?

Closing question

a. We have reached the end of our questions. Is there anything else you would like to add that would be informative for our project?

A.3. Interactive scenario-based exercise

To stress-test and refine which capabilities should be prioritised for investment, RAND Europe, Brown University and CEPI designed and delivered an interactive scenario-based exercise at the Global Health Security Conference in Kuala Lumpur, Malaysia on 9 June 2026.

The '100 Days Mission Under Pressure' was a structured, scenario-based, tabletop exercise for up to 20 senior officials from the defence and civilian health sectors. It used an unfolding fictional but plausible biological emergency, played out across three rounds, to identify priority joint capabilities targets that would strengthen detection, development and deployment within the 100DM timeframe.

Each round corresponded to a phase in the 100DM timeline: detection (days 0–10), development (days 10–60), and deployment-ready (days 60–100). A game director presented the scenario in plenary across three rounds. After each scenario inject, participants were split into two pre-assigned groups (A [defence] and B [civilian health]) for facilitated discussion and selection of capability cards as area of investment. Each group received a set of capability cards representing capabilities they could choose to invest in prior to an emergency to ensure better preparedness for a future outbreak (using the fictional outbreak of the scenario as the basis). Table 2 presents an overview of participants involved in the exercise, including their allocated group in the exercise, the country they represented, their name and their affiliated organisation. Table 3 presents the capabilities identified through desk research and interviews as current gaps that would benefit from future investment to support pandemic preparedness and the 100DM, mapped against CEPI's theory of change functional areas and 100DM capabilities.

Each group also received tokens that allowed them to invest in the different capabilities per round. Each round had a maximum value of six tokens that could be invested and each capability card had a value assigned to it. Participants were also able to invest in a 'wildcard' which represented a capability they considered a priority joint capabilities target but which was not already included in the predetermined set of capability cards. This approach meant that participants had to discuss and consider the trade-offs of investing in different capabilities within a restricted budget. The split of participants into a civilian health group and a defence group allowed the exercise to uncover areas of tension between sectors and areas of shared priorities. Following each round the groups reconvened in plenary to report back on their discussion and selection of capability cards, allowing the game director to explore convergences and divergences between the two groups.

Once all three rounds were concluded a final prioritisation exercise produced a ranked shortlist

of priority joint capabilities targets across the room. In this final prioritisation, each participant (as individuals not groups) received three priority dots and were asked to place dots on the cards they personally saw as having the highest priority, with no more than two dots allowed on any single card.

The exercise identified where existing defence and civilian health capabilities and priorities are aligned and exposed structural gaps in cross-sector capability infrastructure. It also produced a shortlist of priority joint capabilities targets which directed the recommendations made in this report for the infrastructure that needs to be in place before the next emergency.

Table 2. Interactive scenario-based exercise participants

Group	Country	Name	Organisation
A	Australia	Lt Col. Alyson Auliff	Staff Officer, Strategic Health Workforce Frameworks, Joint Health Command, Australia Department of Defense
A	Australia	Hon. Prof. Jane Halton	Chair, CEPI Board
A	Canada	Mr Trevor Smith	Deputy Director & Senior Program Manager, Global Affairs Canada
A	Finland	Ms Outi Kuivasniemi	Deputy Director for International Affairs, Ministry of Social Affairs and Health
A	Malaysia	Lt Gen Dato' (Dr) Zulkeffeli bin Mat Jusoh	Director General, Malaysian Armed Forces Health Services (MAFHS)
A	New Zealand	Brig. Dr Charmaine Tate	Surgeon General, New Zealand Defence Force
A	Senegal	Col. Abdou Rajack Ndiaye	Director of Health Service of the Armed Forces, Senegal Armed Forces
A	UK	Mr Laurie Thraves MBE FRGS	Deputy Director and Head, National Situation Centre COBR; Head of Cabinet Office Geography Profession, Cabinet Office, UK Government
A	USA	Ms Jessica Bell	Director of Biosurveillance, United States Department of War
A	USA	Capt. Elizabeth Garza	CDC Liaison to INDOPACOM
B	Belgium	Mr Laurent Muschel	Director, Deputy Head of Service, Health Emergency Preparedness & Response (HERA), European Commission
B	Finland	Ms Laura Rissanen	State Secretary, Ministry of Social Security, Finland
B	France	Dr Ludy Prapancha Suryantoro	Unit Head for Multisectoral Engagement for Health Security, World Health Organization
B	Japan	Dr Teiji Takei	Executive Director (BOD), Director-General of the Bureau of Health Security and General Coordination, Japan Institute for Health Security (JIHS)
B	Malaysia	Dr Chee Heong Chong	Senior Health Advisor for ASEAN (MBT) Mitigating Bio Threats Program

Group	Country	Name	Organisation
B	Malaysia	Ms Faizatul Lela Jafar	Director of Risk Management Center and Biosafety Officer, Malaysia Institutional Biosafety & Biosecurity Committee (IBBC)
B	Thailand	Dr Nakorn Premsri	Director of the Thai National Vaccine Institute/ASEAN AVSSR
B	UK	Mr Benjamin Wakefield	Specialist Senior Advisor, Cabinet Office, United Kingdom
B	USA	Dr Jennifer Nuzzo	Director of the Pandemic Center, Professor of Epidemiology at the Brown University School of Public Health
B	USA	Dr Seth Berkley	Senior Adviser to the Brown Pandemic Center, Adjunct Professor of the Practice in the Department of Epidemiology, Brown University School of Public Health

Table 3. Predetermined capability cards for the scenario-based interactive exercise mapped against CEPI functional areas and 100DM capabilities

Phase	Tabletop exercise (TTX) capability cards	100DM capability	Functional area
Detection	**Card 1.1. Bidirectional pathogen data-sharing protocol**. A standing protocol for near-real-time exchange of pathogen-related data and its oversight, between allied and national defence systems and civilian genomic surveillance. This would include agreed data formats, agreed roles and responsibilities, with clear routes of liability and classification status for ambiguous-origin data.	Rapidly leverage, interpret and translate pathogen, outbreak and disease data to forecast and predict their evolution and impact.	Early detection and initiation.
	Card 1.2. Joint pathogen characterisation. A standing arrangement (agreed methods, data sharing, cleared analysts) for defence teams and civilian epidemiological and genomic teams to jointly produce, in the early window, a shared characterisation of the pathogen (transmissibility, severity, strain identification) and an assessment of its origin (natural, accidental, deliberate), recognising that the scientific and security pictures often sit in separate communities today.	Rapidly leverage, interpret and translate pathogen, outbreak and disease data to forecast and predict their evolution and impact.	Early detection and initiation.
	Card 1.3. Civil–military mutual support protocol. Pre-agreed triggers, command relationships and engagement that would provide bidirectional support across the defence and health sectors in a health emergency. For example, military to civilian: surge medical staff, field laboratory and logistics capacity. Civilian to military: hospital beds and ICU/oxygen for cases a vessel cannot hold, sequencing a ship cannot do, public health contact tracing.	Collaborate with and support country-led public health responses, ensuring that R&D&M activities reinforce and complement national priorities during outbreaks.	Early detection and initiation.

Phase	Tabletop exercise (TTX) capability cards	100DM capability	Functional area
	Card 1.4. Early-warning innovations. Fund and stand up, in advance of an emergency, the next generation of joint early-warning capability, tools and innovations that provide data about emerging outbreaks across the defence and civilian sectors. This includes AI tools to predict pathogen evolution, environmental and wastewater surveillance, and lab-incident detection mechanisms.	Rapidly leverage, interpret and translate pathogen, outbreak and disease data to forecast and predict their evolution and impact.	Early detection and initiation.
	Card 1.5. Defence laboratory surge and network participation. Pre-agreed protocols for defence laboratories to augment civilian testing in an outbreak and to participate in civilian and regional laboratory networks, with biosafety and biosecurity protocols and QA harmonised to WHO standards in advance.	Collaborate with and support country-led public health responses, ensuring that research, development and manufacturing activities reinforce and complement national priorities during outbreaks.	Early detection and initiation.
	Card 1.6. Joint rapid diagnostic development and deployment. A standing joint diagnostic capability across defence and health actors, including a pathway to develop and rapidly field one or more strain-specific and point-of-care tests when existing respiratory diagnostic panels fail to identify the cause of illness: pre-agreed specimen handling, pre-positioned regional sequencing capacity, and agreed assay-development and fast-track regulatory routes.	Design, develop, generate evidence for and select safe, effective, outbreak-relevant vaccines and biologics in an accelerated manner.	Accelerated vaccine development.
Development	**Card 2.1. Vaccine platform transfer and intellectual property framework (defence to civilian sector).** A pre-agreed framework so that defence-funded vaccine platform technologies – plug-and-play systems such as mRNA, viral vector or protein nanoparticle that deliver different antigens on a standard backbone – can enter fast-tracked civilian vaccine development pipelines (national and foreign) without negotiating export-control requirements, intellectual property or other terms each time.	Engage with and influence regulatory authorities to enable vaccine authorisation during a public health emergency (based on risk–benefit assessment of limited or alternative clinical data and to facilitate ongoing rolling regulatory review).	Regulatory and policy readiness.
	Card 2.2. Financing for vaccine R&D, scale up and testing, e.g. AI-enabled vaccine design, prototype library and delivery innovation. Invest, prior to an emergency, in vaccine-design tools and capabilities (with biosafety and biosecurity oversight), a library of prototype vaccines for priority viral families, and delivery innovations (thermostability, needle-free administration) so that a candidate can be adapted in days and is usable in low-resource civilian and deployed military settings alike.	Rapidly scale vaccines and biologics through tech transfer and advanced outbreak preparedness planning.	Resilient supply capabilities.

Phase	Tabletop exercise (TTX) capability cards	100DM capability	Functional area
	Card 2.3. Investigational-dose manufacturing readiness. Pre-agreed standing capability to make small, GMP-grade investigational batches of a novel candidate for pre-clinical and clinical use so that trials are not held up waiting for material.	Produce, test and make available investigational vaccines and biologics for development in an accelerated manner. Rapidly scale vaccines and biologics through tech transfer and advanced outbreak preparedness planning.	Accelerated vaccine development. Resilient supply capabilities.
	Card 2.4. Shared high-containment protocols. Established protocols for high-containment (BSL-3/BSL-4) access and joint working across sectors and countries, recognising that most such facilities are civilian. These shared protocols would cover biosafety and biosecurity oversight, scheduling and shared standards rather than one sector granting another access.	Engage with and influence regulatory authorities to enable vaccine authorisation during a public health emergency	Regulatory and policy readiness.
	Card 2.5. Clinical trial network integration. Pre-agreed integration of defence trial sites, capabilities and reach, and civilian/CEPI clinical preparedness networks, sorting regulatory, ethical and data-sharing frameworks, with access to representative populations and pre-clinical/animal-model capacity.	Produce, test and make available investigational vaccines and biologics for development in an accelerated manner. Influence vaccine policy from emergency authorisation to post-approval surveillance. Strengthen global pandemic preparedness by building geo-diverse trials, testing and production capacities/networks.	Accelerated vaccine development. Regulatory and policy readiness. Resilient supply capabilities.
	Card 2.6. Therapeutics co-development. A standing framework for joint defence-civilian development of therapeutics (antivirals, monoclonal antibodies), recognising that a therapeutic may reach affected populations before a vaccine is developed and authorised. Kept separate from the vaccine cards so that the two tracks are visible.	Design, develop, generate evidence for and select safe, effective, outbreak-relevant vaccines and biologics in an accelerated manner.	Accelerated vaccine development.
Deployment ready	**Card 3.1. Facilitated regulatory reliance**. A standing mechanism, agreed prior to an emergency, by which an emergency authorisation issued by a WHO-Listed Authority or via WHO Emergency Use Listing triggers abridged review by participating partner NRAs.	Engage with and influence regulatory authorities to enable vaccine authorisation during a public health emergency (based on risk–benefit assessment of limited or alternative clinical data and to facilitate ongoing rolling regulatory review).	Regulatory and policy readiness.
	Card 3.2. Regulatory innovation and harmonisation. Prior to an emergency, investment in harmonised and innovative regulatory pathways across partner authorities: abridged and adaptive approval routes, joint review, and a standing channel for defence-held risk information to inform civilian risk-benefit decisions where origin is ambiguous.	Collaborate with and support country-led public health responses, ensuring that research, development and manufacturing activities reinforce and complement national priorities during outbreaks.	Early detection and initiation.

Phase	Tabletop exercise (TTX) capability cards	100DM capability	Functional area
	Card 3.3. Manufacturing financing and at-risk scale up. Pre-agreed shared financing across defence and health to let large-scale manufacturing begin before approval is certain: advance market commitments, volume guarantees and at-risk funding that de-risks early manufacturer investment alongside a shared map of defence and civilian facilities able to produce at scale. (Modelled on the COVAX/Gavi at-risk financing and AMC mechanisms.)	Produce, test and make available investigational vaccines and biologics for development in an accelerated manner.	Accelerated vaccine development.
	Card 3.4. Defence logistics support for deployment. Pre-agreed arrangements for the defence sector to support civilian vaccine deployment where asked: warehousing, secure transport, supply-chain tracking, communications resilience, with triggers, command relationships and exit clearly defined in advance.	Produce, test and make available investigational vaccines and biologics for development in an accelerated manner. Strengthen global pandemic preparedness by building geo-diverse trials, testing and production capacities/networks.	Accelerated vaccine development Resilient supply capabilities.
	Card 3.5. Joint allocation and access framework. A pre-agreed framework (not a fixed priority list, which depends on the pathogen and who it most affects) for how scarce initial doses are allocated: the ethical principles, the decision process and who owns it, public-transparency mechanisms, and crucially how military personnel and allied forces are sequenced relative to civilian populations under a civilian-led scheme.	Strengthen global pandemic preparedness by building geo-diverse trials, testing and production capacities/networks.	Resilient supply capabilities.

A.4. Study limitations

This study has several limitations that should be considered when interpreting its findings, as follows:

- The desk research was intentionally scoped as a high-level capabilities mapping exercise rather than an exhaustive assessment of all relevant public health and defence capabilities. It relied on publicly available English-language strategies, plans, programmes and initiatives, meaning that some capabilities – particularly those that are classified, operationally sensitive, unpublished, rapidly evolving, in other languages or not captured in formal documentation – were not identified. This limitation is especially relevant for the defence sector, where capabilities, priorities and operational arrangements are not always publicly visible. As a result, the mapping should be understood as an indicative overview of strategic alignment and potential complementarities rather than a comprehensive inventory of existing capabilities.
- The study's conceptual framing was informed in part by CEPI's preliminary assessment of the capabilities needed to deliver the 100DM. While this provided a necessary foundation for structuring the analysis, it may also have shaped the scope of inquiry and the way capabilities were categorised. In practice, this means the study was designed primarily to assess alignment with an existing theory of change and strategy rather than to independently derive an alternative capability framework from first principles.
- The key informant interviews were based on a purposive sample of expert stakeholders and were intended to validate and refine the desk research rather than provide representative coverage across countries, institutions or

sectors. Although interviewees reflected a range of geographical locations and organisational perspectives, the number of participants was limited and some regions, institutional types and operational viewpoints were under-represented. The findings from interviews therefore reflect informed expert judgement but should not be interpreted as representative of all defence or civilian health actors.

- The interactive scenario-based exercise was designed as a structured, exploratory prioritisation tool rather than a simulation of real-world decision making. Its findings are therefore shaped by the assumptions embedded in the fictional scenario, the design of the exercise, the capability cards pre-selected by the research team and the token-based prioritisation process. Although participants could introduce additional priorities through a wildcard option, the exercise may have channelled discussion toward a defined set of options. This may have constrained consideration of capabilities, governance arrangements or investment approaches not included in the exercise design.
- The study focused on identifying areas of strategic alignment and potential joint investment rather than testing the operational, financial, legal or ethical feasibility of implementing specific capability models in practice. As such, the analysis highlights promising areas for collaboration, but further work would be required to assess cost, governance, ownership, accountability, interoperability and implementation barriers in detail.
- These limitations mean that the study should be read as an exploratory and decision-support exercise which identifies plausible areas for future collaboration and investment rather than as a definitive assessment of all available capabilities or a fully validated implementation blueprint.

Co-authorship reflects the intellectual input and partnership across the three organisations. CEPI conceptualised the collaboration and focus of the study. RAND led the research and game design and execution. The Brown Pandemic Center organised the exercise and contributed to conceptualisation and game design. The exercise was co-facilitated by stakeholders from all three organisations.

The Pandemic Center at Brown University is working to prevent, reduce vulnerabilities and increase resilience to pandemics, other biological emergencies, and the harms they pose to health, peace, security, and prosperity. Find out more at ThePandemicCenter.org

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