BIOSECURITY WORKING PAPER 1

Proposal for a New UK National Institute for Biological Security

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EXECUTIVE SUMMARY

We are currently witnessing the devastating impact that natural disease outbreaks can have on our health and economy. The coronavirus pandemic highlights the need for the UK to transform its level of preparedness against biological threats.

But in our response, we cannot simply 'prepare to fight the last war' and focus on pandemic preparedness alone. We know from national security risk assessments and our Biological Security Strategy that we remain vulnerable to accidental and deliberate biological threats, which risk even worse consequences than the ongoing pandemic.

To achieve the level of safety that the UK public will demand in the wake of the current pandemic, **we recommend the creation of a National Institute for Biological Security**. The Institute would go above and beyond the new UK Joint Biosecurity Centre and would be tasked with addressing the highest priority biological threats faced by the UK, regardless of their origin.

Sitting adjacent to the government, the Institute would provide strategic direction over policy and technical solutions, along with national-level coordination and integration of expertise from a wide range of disciplines. It would also complement the proposed new UK ARPA by fulfilling a think-tank like function that delivers insights on new areas of opportunity and promising solutions.

In short, the Institute's mission would be to ensure the biological security of the UK.

To achieve this, it would focus on the five areas of highest priority:

1. Prevent and counter the threat of biological weapons from both state and non-state actors, treating them as a comparable security challenge to nuclear weapons;
2. Develop effective defences to biological threats, helping bring horizon technologies (especially pathogen-blind diagnostics) to technical readiness;
3. Promote responsible biotechnology development across the world; and
4. Develop talent and collaboration across the UK biosecurity community, cementing the UK as a world leader in science and innovation.

We set out each of these four priorities in further detail below.

THE INSTITUTE'S FOUR PRIORITIES

1. Prevent and counter the threat of biological weapons from both state and non-state actors

Biological weapons pose risks to global security similar to nuclear weapons, and advancing biotechnology will increase this danger over the forthcoming decades.

Very rapid developments are being made in synthetic biology and biotechnology, which could give state and non-state actors the ability to design and create new pathogens, or increase the destructive power of existing biological agents. For example, a pathogen that has been designed to have the incubation period of HIV, the lethality of Ebola, and the contagiousness of measles could infect and subsequently kill hundreds of millions of people before we were able to detect it. State actors are relatively neglected compared to non-state actors, and yet will increasingly pose a greater share of the risk.

The government already invests effort here, principally through its security and diplomatic services. Nonetheless, this threat is neglected relative to its importance and deserves further emphasis. The Institute would champion this concern in government, provide an interface between government, academia and civil society, and serve as a 'think tank' for how the pre-existing 'web of prevention' can be improved.

2. Develop effective defences to biological threats

Our current suite of interventions to a novel biological threat can either be rapidly deployed (e.g. non-pharmaceutical interventions) or can be highly effective (e.g. vaccines), but not both. Innovative technologies both now and in the future can help close this gap, and should be urgently prioritised for development.

The UK has a world-leading biotechnology sector, and the planned UK ARPA may also contribute to technological development in this area. The Institute would complement these efforts by providing strategic direction to coordinate such efforts across these institutions. This could include authoring a roadmap for 21st-century biosecurity, scoping out new biodefence applications of horizon technologies[1], and outlining how opportunities can be brought to technical readiness (e.g. the use of metagenomic sequencing to pathogen blind diagnostics and comprehensive environmental biosurveillance).

[1] For example, IARPA's 'Finding Engineering-Linked Indicators' (FELIX) program was germinated by discussions on using machine learning to detect genetic engineering hosted externally by In-Q-Tel's B.Next

3. Promote responsible biotechnology development across the world

Biotechnology has the capacity for immense good and harm. Scientific mishaps have caused outbreaks before: for example, 2007 saw a foot and mouth disease outbreak of laboratory origin in the UK, the last known cases of smallpox and SARS were both caused by laboratory exposures, and the 1977 influenza pandemic was caused by a strain closely related to those isolated in the 1950s, suggesting an anthropogenic origin.

Both the rate and causes of laboratory accidents are necessary prerequisites for a better safety culture, yet they are poorly understood. Further, biological information, alongside biological materials, can be a security concern. 'Dual-use' research can inadvertently give bad actors good ideas, or discover new threats we are vulnerable to without discovering how they can be protected against.

The Institute would take a leading role in coordinating efforts to address these concerns, developing new initiatives (e.g. 'no-undercut' rules for scientific funding or journal publication), and championing safer biological science internationally.

4. Develop talent and collaboration across the UK biosecurity community

Achieving biological security will require a multi-sectoral effort. There is a clear need to strengthen links between government, academia, civil society, and private industry. There is also a need to strengthen the biosecurity community outside government, and to develop individuals with the right skills to work both inside and outside government.

As a recognised centre of excellence within government, the Institute would be ideally placed to satisfy these two needs, in particular by focusing on developing and retaining a robust talent pipeline into the UK biosecurity community. This would help cement the UK as a world leader in science and innovation.