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Executive Summary

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AVIAN INFLUENZA PRE-PANDEMIC PROCUREMENT:
RECOMMENDATIONS FOR THE US FEDERAL GOVERNMENT

Final Report – ESD.10

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Executive Summary

Many experts fear that an influenza pandemic will occur in the near future. There is currently much debate about how the US should best prepare. Previous US responses give only minimal guidance as the last major influenza pandemic occurred nearly a century ago—before flu viruses had ever been isolated.

An influenza pandemic could spread quickly, and working estimates are that 30% of the US population will be infected - although the virulence of the virus will greatly affect mortality rates amongst those infected (HHS, 2005). Comprehensive pre-pandemic planning is needed, and in October 2005, the Bush Administration launched the National Strategy for Pandemic Influenza Preparedness and Response. A cornerstone of this strategy is government procurement of resources that will be needed in the event of a pandemic influenza outbreak. For example, \$1.76 billion, out of the \$7.1 billion that the President requested for the National Strategy will be "spent on increasing vaccine production." (Agnuwobi, 2006). A wide range of state and federal government agencies, as well as private industries, are engaged in efforts to limit the impact of an avian influenza pandemic on the US.

In this report, we survey the technologies available for surveillance, diagnosis, containment, treatment, and prevention of an AI pandemic in humans. We focus our analysis on those technologies that the US government might need to procure prior to or during a pandemic. We perform a comparative market analysis and reach conclusions about which technologies the government needs to procure. Finally, we discuss the challenges the government may encounter in procuring adequate supplies prior to an AI pandemic.

In conducting our research, we were guided by the following four framing questions:

- 1) What technologies are important to procure in order to reduce the impact of pandemic influenza?
- 2) What has impacted the availability of these technologies?
- 3) What policies should the US adopt or implement to ensure the availability of the critical technologies needed to reduce the effect of pandemic influenza?
 - a) What challenges face the adoption or implementation of these policies?

Upon the emergence of a pandemic virus, immediate demand surges can be expected. Anticipating shortages, governments have already begun to stockpile key technologies such as antivirals and facemasks. However, even with adequate funds for purchasing supplies, market conditions will render some technologies unavailable without other government interventions. Government procurement can improve the supply of technologies needed for pandemic response.

The markets for the technologies relevant to avian influenza vary significantly in terms of their competitiveness, cost to entry, regulatory environment, and degree of excess manufacturing

capacity, among other factors. The ability of the government to procure supplies of technologies, and the urgency for doing so, depends heavily on the market conditions for each technology. Our analysis matches each technology with specific procurement policy options and considers the various stakeholders involved in procurement. In the various phases of the pandemic, different technologies will be most relevant. In addition, technologies are used in a range of different contexts.

In order to consider these technologies holistically in the context of the evolution of a global pandemic, the committee developed a technology map framework to guide our analysis. Technologies were mapped onto the framework using two dimensions: pandemic phases and types of action. We considered seven pandemic phases spanning from limited animal outbreaks to major human outbreaks; the types of action were detection, observation, containment, treatment and prevention.

Critical technologies that the government might want to procure prior to a pandemic were derived from an extensive literature review and from feedback provided by experts throughout the field of pandemic preparedness. After analyzing the role and specific strengths of each, the committee placed each technology on the map. The technology map allowed us to understand the various interdependencies between technologies and the relative importance of these technologies in each phase.

In looking holistically at the set of technologies, we observed that technologies targeted at containment, treatment and prevention are, in general, unlikely to be adequately supplied by the market in the event of a pandemic. Government pre-pandemic preparations are especially important for these technologies including vaccines, antiviral drugs, facemasks, and ventilators.

In contrast, we found that technologies for diagnosis and observation will likely be provided by the market in adequate supply. In addition, we found that procurement of these technologies is less relevant to pre-pandemic preparedness as they have only minimal roles in emergency response.

In light of our analysis, we make five recommendations.

Recommendation 1: Government should limit research and development support for technologies that are adequately provided through market forces.

We recommend that the government focus research and development funding on those technologies that are not supported fully by the market. Research and development funding is most critical when conditions do not exist for the competitive production and development of technologies in the market. There are many demands on the funding that has been made available for pandemic influenza, and this recommendation calls for careful prioritization of this funding.

Conditions for competitive production and development of diagnostic tests are in place. There appears to be no shortage in the supply of these tests and production could be significantly

increased if demand were to increase. However, for technologies such as vaccines and antivirals, there is a clear need for government support of R&D efforts.

We suggest that this recommendation could be implemented through a formal mechanism that allows scientists, economists, public health officials, and health care providers to work together to establish research priorities with respect to influenza preparedness.

Recommendation 2: Government must stockpile critical technologies that are available.

The timeframe governing the emergence of a pandemic is highly uncertain. As a result, private companies have little incentive to significantly increase production before a pandemic emerges. Even in those industries that have significant production capabilities, such as facemasks and ventilators, there will be a delay between the pandemic emerging and any significant increases in production. Therefore, it is critical that the government stockpile the supplies that are likely to be needed immediately upon the outbreak of a pandemic. Stockpiling targets for technologies such as ventilators should be reexamined in light of our analysis.

Recommendation 3: The US government should actively provide markets for critical technologies where a market does not currently exist.

For pandemic vaccines as well as new antivirals government should actively participate in the creation of markets for critical technologies both by supporting their production and through demand stimulation. Potential policies include advance purchase agreements and the creation of award systems for prototype vaccine development. These policies could give companies the confidence to invest in what would otherwise be a risky investment. In addition, expanding current seasonal flu vaccine programs could provide immediate demand incentives to expand capacity or improve manufacturing efficiency.

Setting an appropriate timeline that ensures the government receives products while they could still be of use is essential. However, a timeline that is too rigid could reduce willingness on behalf of pharmaceutical companies to commit to development. In order to achieve their desired end, these agreements must adequately balance the need for rapid production with reasonable consideration of possible delays.

In the case of awards for vaccine development, vaccine manufacturers would be encouraged to develop prototype vaccines based on strains similar to the one likely to cause a pandemic. The manufacturers would carry out clinical trials on these vaccines and receive regulatory approval. Then once a pandemic emerged the companies could submit applications to regulatory agencies considering the new vaccines simply ‘variants’ of their previous products rather than entirely new vaccines (requiring the same rigorous clinical studies and approval processes).

Finally, it may be possible to increase pandemic vaccine supply indirectly by expanding current seasonal flu vaccine programs. The expansion of seasonal flu vaccine programs would provide a guaranteed market for manufacturers of seasonal vaccines, and encourage near term

capacity expansion or improved yields within existing plants. Additional capacity created through this process could then be used to produce greater quantities of pandemic vaccines if a pandemic emerges. A primary challenge to this approach is that it would require increased buy-in from citizens in order to be successful. If the government is not able to successfully encourage demand increases for seasonal influenza vaccines, it will have wasted valuable resources. In addition, it will be difficult for the government to predict in advance the potential capacity expansion that might result from increasing the demand for influenza vaccines, so it is likely that this policy is best used as a complement to other policies for increasing demand.

Recommendation 4: The US Government should institute emergency fast-track approval and liability protection for vaccine and antiviral manufacturers.

Development of a vaccine targeted at pandemic AI cannot commence until the pandemic virus strain has been isolated, and development alone is likely to take on the order of six months. Thus, it will be necessary to use fast-track approval for a new vaccine in order to provide for production and distribution that is as rapid as possible after the onset of the pandemic. In addition, the importance of vaccines in limiting the loss of lives during a pandemic warrants liability protection for manufacturers. Similar treatment is also necessary for new antiviral drugs. Current reliance on one antiviral drug leaves antiviral resistance as a large vulnerability. Alternative antiviral drugs should be considered for fast track approval by the FDA.

The public's safety should be the dominant consideration in the implementation of this recommendation. A balance must be struck between protecting pharmaceutical companies from unforeseeable problems with new drugs and encouraging strict adherence to quality manufacturing practices. Liability protection should not exempt companies from damages due to reckless development strategies or unsafe manufacturing environments.

Recommendation 5: The government should provide incentives for manufacturers to increase domestic manufacturing capacity of critical technologies.

If pandemic influenza reaches the US, it will probably already have affected other parts of the world. Pandemic emergencies abroad will likely lead to international supply chain disruptions. Foreign manufacturing facilities may not fulfill contracts if the country in which they are based experiences a pandemic crisis. Without domestic manufacturing capacity, the US cannot ensure adequate supplies of vaccines, antiviral drugs, and other crucial AI technologies.

Increasing domestic manufacturing capacity requires that the government provide economic incentives to manufacturers of critical technologies. These incentives should encourage both domestic and foreign manufacturers to expand or build plants in the US. Incentives should also address production time. For example, advance purchase agreements might take into account manufacturing time by having the government pay more to vaccine companies if they produce vaccines faster. Alternatively, the government could directly subsidize manufacturing expansion, or provide tax incentives to entice foreign firms to build plants in the US.

Another advantage of domestic manufacturing capacity is increased government scrutiny and response. For example, British vaccine manufacturer Chiron discovered contamination in several influenza vaccine batches in 2004. The US government stopped importation of Chiron's vaccines, leaving the US with only half its expected supply (Pearson, 2004). Had this problem occurred in a US facility, the FDA may have been able to respond quickly and work with the manufacturer to resolve the problem, thereby preventing the supply disruption.

Government policy already addresses this recommendation to some degree. The government recently gave \$1 billion to five vaccine manufacturers to install domestic vaccine plants that use new, efficient cell-based production methods. Additionally, the government has negotiated with Roche to increase its antiviral production capacity on US soil over the next several years.