PANDEMICS SURVEILLANCE WORKSHOP

24 SEPTEMBER 2007
SINGAPORE

S. RAJARATNAM SCHOOL OF INTERNATIONAL STUDIES
A Graduate School of Nanyang Technological University

NATIONAL SECURITY COORDINATION SECRETARIAT

PANDEMICS SURVEILLANCE WORKSHOP

REPORT OF A WORKSHOP ORGANISED BY
THE CENTRE OF EXCELLENCE FOR NATIONAL SECURITY

WITH THE SUPPORT OF
THE NATIONAL SECURITY COORDINATION SECRETARIAT

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EXECUTIVE SUMMARY

On 24 September 2007, the Centre of Excellence for National Security (CENS), with the support of the National Security Coordination Secretariat (NSCS), organised the Pandemics Surveillance Workshop at Hotel Grand Copthorne, Singapore. The workshop looked at the issues of pandemics surveillance and brought together a stellar cast of international and local thought-leaders to promote learning and sharing about the best practices for this area. The symposium also encompassed an interactive and consultative Roundtable discussion to tap into the collective knowledge of both speakers and participants in order to come up with policy-relevant recommendations for pandemics surveillance.

A total of six eminent experts on this field were featured. For the morning session which focused on the strategic issues of surveillance design, Mr. Michael Moodie, CENS's chief consultant for this area, started the ball rolling with a contextual coverage about the inherent tensions as well as synergies between disease surveillance and state-centric security perspectives. Following that, Dr. David Franz, the former Commander of the U.S. Army Medical Research Institute in Infectious Diseases (USMRID), expounded on the importance of adopting a "species-neutral" scanning approach as well as provided germane policy pointers for effective surveillance. Third, Dr. Ottorino Cosivi, the Head of Preparedness for Deliberate Epidemics Programme at the World Health Organisation (WHO), examined the issue from an international strategic angle, with a particular focus on the WHO's initiatives and perspectives.

During lunch, the workshop had the unique and rare opportunity of hearing from Mr. Koh Peng Keng, Senior Director of the Operations Group at the Ministry of Health, who shared in great length about the practitioner perspective and, in particular, on the "Singaporean" approach to pandemics surveillance.

For the afternoon session which focused on operational approaches to surveillance, Dr. Phil Polgreen, Director of the Emerging Infections Network, gave a highly instructive talk on the potential for prediction markets to forecast infectious diseases activity. The results from pilot studies thus far suggested that prediction markets could well be a conceptual and technological platform with the potential for greatly enhancing pandemics anticipation capabilities. Finally, Dr. Richard Adler, President of DecisionPath Inc, introduced his organisation's modelling and software tool—Infectious Disease Outbreak Decision Support System (IDODSS)—and highlighted its importance for risk management in pandemic preparedness decision support.

The workshop closed with a Roundtable discussion whereby solutions and suggestions to the three broad questions of pandemics surveillance—information, tools and collaboration—were canvassed and debated.

More information on the workshop's contents, other than this report, can be accessed at: www.rahs.org.sg.

WELCOME REMARKS BY HEAD CENS

Associate Professor Kumar Ramakrishna

Kumar Ramakrishna (Head of the Centre of Excellence for National Security) warmly welcomed the speakers and participants of the Pandemics Surveillance Workshop.

Ramakrishna noted that the question of pandemics surveillance is one emergent area whose examination in detail could usefully inform the policymaking and academic community. Indeed, enhanced pandemics surveillance is universally recognised as a critical tool for meeting the ongoing challenges posed by extant and novel infectious diseases and there remains a need to develop better surveillance capabilities so as to identify health hazards in time to prevent them from provoking a national or global pandemics crisis.

Frankly, this task will be by no means easy, for challenges abound in this quest for effective solutions in the early warning of pandemics. For one, in the last 25 years or so, scientists have noted that some 38 diseases have made the jump from the animal realm to the human world in which for every year that goes by—new pathogens or multiple variations of existing threats that infect humans are detected for the first time. According to Mark Woolhouse, a professor of epidemiology at the University of Edinburgh, Scotland, this trend is evidently a worrying one for this is clearly not a sustainable rate for the human race.

There is also the impact of climate change. Increasingly, many health experts have noted the growing nexus between climate change and the emergence and spread of diseases. In particular, the rising average temperature of the earth has been identified as one of the primary reasons explicating the extending ranges and seasons of various tropical disease-carriers, thereby pushing the geographical boundaries of these diseases. The West Nile virus, for example, had never been detected in North America until some eight years ago while dengue fever and the Lyme disease are noted to be heading northwards.

Meanwhile, the realities and dynamics of globalisation, boosted by advances in travel and movement of people and goods, mean that policymakers and analysts are effectively working with shortened reaction times to address a potential pandemics issue. Indeed, pandemics and their impact spread around the globe faster than ever and this "runaway" and trans-national nature of the problem reflect the critical need for states and international organisations to work together and share timely intelligence, strategies and scientific knowledge for effective preventive or mitigating responses.

At the domestic strategic level, developing pandemics early warning capabilities also points towards the need for a "whole-of-society" approach—not just a "whole-of-government" approach—whereby both government agencies and non-government entities have to participate in the surveillance and detection process.

Finally, from the operational perspective, there remains the question of coming to grips with the analysis and management of what is surely a diverse and mountainous amount of data. It is therefore crucial to develop methods and technological platforms that can systemically make sense of incoming data and enhance the surveillance process.

It is for these reasons and challenges that this workshop on pandemics surveillance is organised. Essentially, this workshop seeks to highlight the strategic and operational dimensions of the problem

that must be addressed if pandemics surveillance capabilities are to be meaningfully enhanced. Through this learning, dialogue and brainstorming platform, it is envisioned that participants will be empowered with knowledge that will stand them in good stead for their respective practitioning domains.

MORNING SESSION

Designing an Effective Surveillance System

Disease Surveillance and National Security: Reconciling Tensions, Promoting Synergies

Mr Michael Moodie

Michael Moodie (Consultant and Former Head of Chemical and Biological Arms Control Institute) began his presentation by quoting a U.S. survey finding that the American disease surveillance system is probably incapable of detecting biological attacks in a timely manner. Moodie opined that this assessment is most likely the case for most disease state surveillance systems beyond the United States as well. Increasingly, the cause for concern is the growing nexus between pandemics and bio-terrorism: the deliberate misuse of the life sciences to do massive harm. Moodie observed that, in the last two decades, both health and security perspectives have had a major influence on the way infectious diseases are monitored and assessed.

According to Moodie, there have been three main conceptual shifts in the way national, human and health security issues were dealt with for the past two decades. The first was a change in emphasis from the traditional forms of national security to the notion of human security in the last 10–15 years. Moodie observed that in the 1990s, traditional nation-state security perceptions and applications were challenged by what he noted as "people-centric" ideas, in which the focus shifted towards the security of people at their homes, workplace and communities. This change in perspective significantly influenced the way in which health and, in particular, infectious disease problems were dealt with later.

The second conceptual shift emphasised the intertwining of health and security matters. Moodie stressed that, initially, both the health and security communities were reluctant to regard health as a security issue. However, they did acknowledge that in the late 1990s, there were emerging links between health and security related concerns. Today, the line between health and security issues is no longer distinct; "health security" has become a frequently used term.

The third shift stemmed from the growing realisation that risks associated with biology or life sciences extend not only to chronic and emerging diseases, but also towards the deliberate misuse of chemical and biological weapons. In fact, for the last 10 years, these two facets—on opposite ends of the life sciences risk spectrum—have received the greatest amount of attention. This led to a change in priorities as well as a balancing of human and health concerns against national security imperatives.

Moodie noted that, initially, with the emergence of certain infectious diseases in the late 1980s and early 1990s, lesser focus was placed on the deliberate misuse of the life sciences. Concerns over these infectious diseases were particularly accentuated by the impact of globalisation on the promulgation and transmission of these pathogens. However, by the

late 1990s and early 2003, attention was re-diverted to the deliberate misuse of the life sciences. This was partly due to the increase in bio-terrorism incidents as well as the rising concerns over the proliferation of biological weapons. The anthrax scare and the Tokyo-Sarin gas attacks were two paradigmatic cases in point.

Not surprisingly then, public health started to increasingly take on a more security-focused outlook. Moodie noted, for example, in 2000, the National Intelligence Council has posited that emerging and re-emerging diseases will complicate U.S. and global security for the next 20 years, in which pandemic outbreaks will most likely have a direct impact on the global socio-political fabric. In 2004, the Bush administration laid out the fundamental U.S. strategy for dealing with bio-terrorism in the twenty-first century. Significantly, surveillance and detection are among the key components that have been identified as the basis of this strategy.

Finally, Moodie questioned if a "focal balance" could be struck between surveillance of infectious diseases and the deliberate misuse of life sciences. In other words, attention should not be placed entirely in one area at the expense of the other. The ideal situation would be to consider them jointly but this would require international coordination on health issues as well as better and more effective information sharing.

Species-Neutral Disease Surveillance…and other Opportunities in International Bio-Security

David Franz (Chief Bioscientist, Midwest Research Institute and Former Commander, U.S. Army Medical Research Institute in Infectious Diseases) presented on the impact of transmittable diseases on both animals and humans; and whether viruses or diseases could be detected as early as the point of origin. Franz noted that during an outbreak, situational awareness is critical for optimal response. This entails the sourcing of disease origins—regardless of the species type—as well as efforts to collect and understand the data as quickly as possible.

Dr David Franz

Encouraging increased communication between human, animal and plant health care providers is therefore in Franz's opinion—crucial to outbreak surveillance and containment.

According to Franz, chronic and infectious diseases have caused more deaths than any other components of the bio-risk spectrum. However, the potential for harm presented by the misuse of dual-use technologies, biological terrorism and biological warfare is potentially catastrophic and thus not to be lightly dismissed. In this regard, after the 11th September attacks as well as the 4th October anthrax incident, the U.S. government became particularly focused on bio-terrorism. Accentuating these concerns was also the notion that infectious pathogens such as mouse pox, polio, H5N1 bird flu variant and smallpox could all be deliberately and genetically modified to produce new and potentially deadly virus strains. Theoretically speaking, there are many possibilities for pathological strains, or to be more specific, dual-use technology, to be misused.

Franz pointed out that, in general, developing nations have placed more focus on infectious disease outbreaks while the developed nations are more concerned with chronic diseases. The emphasis on disease outbreaks rather than bio-terrorism is to be expected in the sense that, historically, chronic and infectious disease outbreaks have claimed more victims than bio-terrorism. According to Franz, there were probably five deaths in 2001 from anthrax poisoning and 16 known deaths from deliberate food intoxication since 1932. On the contrary, annually, approximately 17 million and 35 million people die from infectious and chronic diseases respectively.

Franz stressed that both human and animal infectious diseases could be as a result of naturally occurring pathogens or man-made causes. What is worrying though is that approximately 75 per cent of emerging infectious diseases are zoonotic in nature. This means that there is a high chance that these viruses can be passed on from animal to human and vice-versa: cross-transmission of viruses between both species. As such, Franz underlined the need for what he called "species-neutral" disease surveillance. In this regard, Franz recommended the following policy pointers:

- Diseases must be discovered as early as possible.
- Diseases must be discovered in the host or index species.
- Diseases must be discovered at the geographic location of origin.

The traditional disease surveillance structure, in Franz's opinion, involves the searching of diseases in humans and animals as two separate distinct efforts. Despite several WHO initiatives and new international regulations on health, Franz emphasised that human and animal surveillances have not been integrated satisfactorily enough; the 1999 West Nile Virus outbreak is one ready example that springs to mind.

Franz pointed out that the technology for disease surveillance such as data mining and environmental sensors are already available. The Syndrome Reporting Information System (SRIS) developed in the United States, for example, allows both physicians and veterinarians to feed their observations into the system where alerts would be raised if their sightings suggest early warning patterns of an emerging disease outbreak.

Nevertheless, despite clear technological advances, there is certainly still room for improvement. To this end, Franz raised the following questions as a framework for further discussion and consideration:

- How much information do we really need?
- Why don't we communicate across agencies very well?
- Are there hurdles "within" our countries or "between" them?
- What is the value of "warning" versus "situational awareness"?
- How to down-select from the many systems developed?
- How to make systems truly dual-use?
- How to integrate international systems and information?
- How to protect and ensure patient privacy?
- How to alleviate national concerns about reporting outbreaks?
- How to make data collection truly efficient for the busy clinician?

Franz concluded his presentation by reiterating that international collaboration on disease surveillance is critical and that borders and political issues should never get in the way of a truly effective national surveillance system.

Global Health Security

Dr Ottorino Cosivi

Ottorino Cosivi (Head, Preparedness for Deliberate Epidemics, World Health Organisation) began by discussing some of the health threats in the twenty-first century that the World Health Organisation (WHO) is concerned about, focusing on the notion of globalised health security as it relates to preparedness for deliberate epidemics; as well as examining the newly-revised international regulations (IHR 2005) as a framework for addressing some of these risks.

Cosivi highlighted the World Health Report 2007 and the IHR 2005 as key common policy frameworks for dealing with the risks and threats to public health that exist because of globalisation. IHR 2005, in particular, is an agreed code of conduct to "prevent, protect against, control and provide a public health response to the international spread of diseases in ways that commensurate with and is restricted to public health risks, and in which to avoid unnecessary interference with international traffic and trade". Fundamentally, the full implementation of IHR 2005 by all countries in 2007 is an important step towards improving global cooperation in surveillance and outbreak alerts. It provides a framework for the exchange of information as well as response at both the national and international level. The new regulations also put a lot of emphasis on national capacity, since a prompt response by local authorities is central to reducing the impact of any health incident.

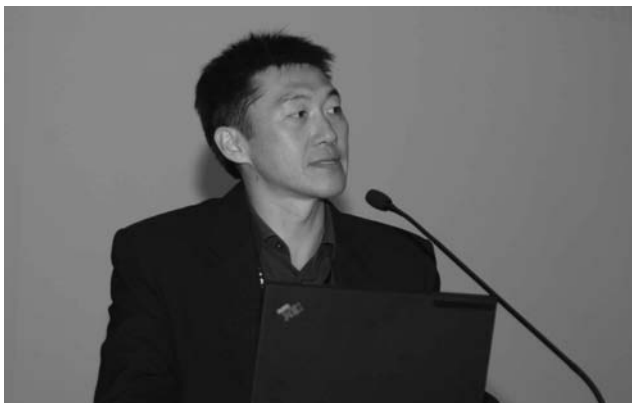
Cosivi stressed that global influenza surveillance is necessary because the world faces distinctly different influenza threats. This includes annual epidemics of disease and death from human flu viruses, the H5N1 situation, and the risk of pandemic influenza. Every country depends upon current knowledge of events and viruses elsewhere to respond to risks at home, and no virus can be fully understood without analysing similar strands from other countries. Cosivi also noted that important and crucial work had been done by WHO's Global Influenza Surveillance Network (GISN) since 1948—the oldest and most complete surveillance network at present.

In regards to the health risks of the deliberate use of biological agents, WHO considers this to fall within the realm of a low-probability, high-consequence event. However, Cosivi admitted that from a policy point of view, it is very difficult to ignore this issue because of the potential amount of damage that such an event could inflict on society.

While the key to effectively dealing with both pandemic and deliberate epidemics is surveillance, the exchange of information between the security and public health domains has been far from ideal given that both sectors have differing roles and attitudes towards the collection and dissemination of information. In the face of a pandemic or deliberate epidemic, the public health community needs information to be disseminated quickly and efficiently to those who need to take action. On the other hand, the security communities tend to treat information as classified data that entails only limited dissemination.

Cosivi closed by discussing the implications of the current life sciences research and development on global health security. While a lot is expected from the life sciences, especially in terms of genetic engineering, to provide a better quality of life, there are unavoidable risks involved because of the potential for "dual-misuse". Yet, if the risk management mechanisms that are put in place are too restrictive, it could mean the gratuitous impairing of the free development of science. At the same time, there also needs to be a "safety net"—or at least the perception of one—so as to maintain the public's confidence in science. Cosivi hopes that WHO's neutral public health outlook will provide a measure of perspective to member states.

Influenza Pandemic Surveillance and Response in Singapore



Mr Koh Peng Keng

Koh Peng Keng (Senior Director, Operations Group, Ministry of Health, Singapore) discussed Singapore's risk management approach to pandemics surveillance and response. He pointed out that the infectious disease surveillance system of Singapore is very much grounded in a larger risk management framework which includes hazard identification, risk assessment, and risk administration, all of which are girded by a robust risk communication strategy.

The integrated surveillance system that Singapore has in place is geared towards the detection of unusual clusters of illness for both humans and animals. It operates along the same lines as many other countries or cities of comparable size with the surveillance system being a mix of external and local surveillance, backed up by international collaboration. This surveillance—which is real time—is essentially performed by the Ministry of Health (MOH). If an outbreak threat is detected, analysis is quickly performed to examine the outbreak's epidemiological and virological features; additional analysis is then performed to assess the possible impact as well as the local preparedness of the city-state itself.

Koh went on to share more about the concept behind Singapore's Pandemic Response Plan. Essentially, the key idea is to mitigate the consequences of a pandemic through infection control, healthcare management, and chemoprophylaxis, while at the same time, practising social distancing and vaccinating the population as soon as the vaccine becomes available. Because influenza is difficult to stop once effective community transmission starts, the Pandemic Response Plan also aims to (i) maintain essential services in Singapore in order to limit social and economic disruptions; (ii) reduce morbidity and mortality through treatment of all influenza-like cases; and finally (iii) slow down the spread of influenza so as to reduce the surge impact on healthcare and other vital systems.

Singapore's Pandemic Response Plan uses a colour-coded risk management approach in monitoring pandemics, progressing from green at one end of the scale to black at the other end. In the early stages of a pandemic, when the spread is limited, pre-pandemic response calls for effective surveillance encompassing border control measures (e.g. temperature screening) to detect the importation of cases with novel influenza strains. Meanwhile, containment through the isolation of cases and quarantine of contacts will be conducted.

When a disease develops into the pandemic stage with widespread infection (a "red" state on Singapore's risk management scale), the plan shifts to an emphasis on mitigating the impact of the pandemic wave. This involves the effective delivery of care by the healthcare system using outpatient management to treat all those with flu-like symptoms while creating a separate system to treat all non-flu patients. Inpatient management will be limited to severe cases only. Fundamentally, this stage of the risk management approach requires a whole-of-government response and strong public communications in order to maintain essential services (such as the provision of Tamiflu prophylaxis) and—depending on the severity—enable serious social distancing measures if needed (such as the closing of public schools or public gathering places like cinemas).

Koh also outlined some of the challenges to pandemic surveillance. The first problem is related to the issue of gathering timely accurate data while trying to figure out gaps in collection efforts. Second, analysis and interpretation of data remains problematic given that past trends may not be indicative of future events, or there may be too few data points to draw conclusions.

In sum, Koh reiterated that the aim of the surveillance system built in Singapore is to give a clearer picture of public health risk so as to enable better-informed decision making. While such events inevitably require a whole-of-government response, Koh is confident that the emergency planning community in Singapore is adept at inter-agency cooperation even though there may be differing views and backgrounds among the agencies.

AFTERNOON SESSION

Operational Approaches to Pandemics Surveillance

Using Prediction Markets to Forecast Infectious Disease Activity

Dr Phil Polgreen

Phil Polgreen (Director of the Emerging Infections Network) presented on the use of prediction markets to forecast infectious disease activity. Polgreen highlighted that prediction markets have accurately forecasted the outcomes of a wide range of future events, including sales of computer printers, elections, and the U.S. Federal Reserve's decisions about interest rates. Polgreen also gave a historical account of prediction markets, showing how they have been used in other contexts. In particular, it was argued that prediction markets' prediction records have been substantially superior to other alternative mechanisms.

Polgreen then illustrated the application of prediction markets for pandemic surveillances, citing research results from a pilot study in Iowa. Evidence from this study suggests that prediction markets can accurately predict state-wide seasonal influenza activity by up to two to four weeks in advance using clinical data volunteered from participating healthcare workers. Incidentally, these participants were not rooted, involved or had any experience in any traditional surveillance organisations.

The information revealed by prediction markets suggests they will be useful for informing treatment, prevention, and response decisions. More importantly, it gives agencies extra lead-time to prepare for an impending seasonal influenza activity. At the same time, these agencies are also able to refine their existing surveillance capabilities at all three systemic levels: local, regional and global. Currently, the University of Iowa as well as the ProMED Mail Network are already operating prediction market platforms to forecast the likelihood of H5N1 related events around the world.

In terms of the criterion for effective use of prediction markets to forecast events, Polgreen emphasised three key tenets: (i) the event needs to be empirically verifiable (e.g. an election); (ii) the event needs to have inherent uncertainty embedded into it; and (iii) there must be disparate beliefs or information about the event among the market participants. Fundamentally, the challenges of prediction markets are about asking the right questions, identifying the right participants, designing a useful interface, and finally, encouraging participation.

To clarify the common misperceptions about so-called "similarities" between prediction markets and surveys, Polgreen stressed the inherent strengths of prediction markets over surveys. First, surveys are generally more

costly. Second, surveys often involve the methodological need to ascertain which factor should be weighted more—an enterprise that intrinsically encompasses a certain degree of subjectivity. Third, prediction markets have the advantage of allowing users to identify and factor in individuals who are better predictors.

Polgreen concluded his presentation by highlighting upcoming future developments for prediction markets. One involves the opening and expansion of more local seasonal influenza markets with a real-time surveillance system. Another forthcoming endeavour will be the use of prediction markets for effective prediction of sexually-transmitted diseases (STD) rates in Sweden.

A Software Platform for Pandemic Preparedness Decision Support

Dr Richard Adler

Richard Adler (President of DecisionPath Inc.) briefed on his firm's Infectious Disease Outbreak Decision Support System (IDODSS) and highlighted its importance for risk management in pandemic preparedness decision support. Adler began by stressing the need to take action and pro-activeness to handle the main problems of improving decision support for pandemic surveillance. In this respect, IDODSS helps to facilitate proactive decision making by incorporating a dynamic "what-if" framework that integrates both situational modelling and behavioural simulation analysis. By leveraging on available knowledge, IDODSS provides a low risk and "fail-safe" virtual environment for practitioners to test their response plans. This sense-and-respond mode will be extremely important and valuable for real-time crisis support.

In terms of critical decision support, there are essentially two components: readiness and reactive situational planning. The former models outbreaks, formulates responses, and assesses the impacts. It also includes "portfolio" management of proactive investments and programmes. For the latter, the planning process involves depiction of emerging outbreaks, selection and tailoring of response strategies, and lastly, adaptation as outbreaks evolve.

Adler suggested three reasons for difficulty in preparedness, namely: (i) complex trade-offs among many alternatives; (ii) difficulty of outcome anticipation; and (iii) errors are likely to be costly and irreversible. For the case of pandemic preparedness, anticipating outcomes will be especially problematic because of pandemics' long time frames; incomplete and uncertain information; diverse stakeholders with different adaptive behaviours; and dynamic situations and interactions. Indeed, all of the above mentioned concerns require active support across the entire decision making lifecycle (Decide, Plan, Execute, Monitor, and Revise).

Adler emphasised that IDODSS is about bridging the gaps between pandemic outbreaks and plans. To this end, IDODSS applies a unified analytic framework by integrating epidemiology and intervention models; incorporating adaptive modelling technique; and exploiting available data. The incorporation of adaptive model accounts for outbreak-induced impairment of response capabilities and behavioural dynamics while the exploitation of available data (e.g. patient case records) enhances the overall state of situational awareness.

Other key IDODSS's capabilities include quick modelling of environmental conditions, defining alternate scenarios, defining prospective intervention strategies, projection of likely outcomes of strategies across scenarios, analysis of individual projections, and finally, comparison of projections. For projection comparison, it is based on key performance metrics such as fatalities, survival rates, costs, public health capacities, and infrastructure.

IDODSS handles the key challenge of diverse situational forces by unifying complementary simulation paradigms in one framework. This entails the generation of

situation-specific scenarios whereby facts and assumptions are explicitly stated. Candidate decisions are then derived from these scenarios.

Adler opined that the future direction for IDODSS lies in incorporating dynamic networks to model evolution over time. Dynamic networks can analyse changes in structure (e.g. populations of nodes and links change) and intensity (e.g. links/relationships) which static networks cannot achieve. Relevant applications for dynamic networking include, for example, the spread of contagion at the micro-level and the likely efficacy of prospective containment strategies. Meanwhile, other possible future developments are the replacement of compartmentalised models with dynamic network epidemiological models and to adopt a bottom-up analytical approach (rather than top-down).

In conclusion, IDODSS enhances decision processes by (i) incorporating best practices of what to think about; (ii) analysing and identifying superior strategies; and (iii) looking at adaptation capabilities to inevitable environmental changes. Not only do these features help in risk reduction; but more importantly, they enhance confidence and consistency in decision support.

ROUNDTABLE DISCUSSION

Participants at the Roundtable Discussion

The discussions for the Roundtable centred on three broad areas of pandemics surveillance, namely: information, tools and collaboration.

With regards to information gathering, it was observed that much has been focused on building integrated national surveillance systems to provide stakeholders with information in a timely manner. Following from this, there are two key questions. What then are the types of information required? How should information on pandemic outbreaks be disseminated into the public domain?

It was noted that public dissemination of information on pandemic outbreaks could have a negative impact on a country's prestige. A state's interests could be better served if it responded to a pandemic crisis in an efficient and honest manner that meets the expectations and standards of the international community. Reflecting on the Chinese management of the SARS outbreak, it was opined that the state's slow response in addressing the problem was chiefly responsible for the difficulty in containing its spread. Nevertheless, there are encouraging signs that the SARS crisis has had a positive impact on China's handling of subsequent health issues, such as its acknowledgement of the HIV problem. Moreover, it is not unusual that large and diverse countries face bigger challenges in managing and containing the outbreak of infectious diseases.

It was also pointed out that there were two dimensions to situational awareness: medical surveillance and the international component. On the latter, there were concerns that information was not transmitted and shared across borders. For more efficient responses, there needs to be a formal methodology of data recording and information-sharing rather than mere rhetoric advocating its necessity. To this end, it was pointed out that the ProMED Mail Network is one such system. As far back as 1995, it has been gathering information from informal sources such as news wires and NGOs and feeding them back into the community. Currently, it continues to receive good information from reliable confidential sources to detect trends more efficiently. For such endeavours to be sustainable, countries should be encouraged to be more forthcoming with information.

There was also concern that an over focus on current strains of pathogens may result in the obscuring of nascent ones. While countries may be at present

concerned with SARS and bird flu—and rightly so—there may well still be other unacknowledged pathogens out there that may possibly instigate the next pandemic. There is hence a need for countries to ensure that their surveillance system is not just able to monitor the pathogens deemed as current threats but also the non obvious and "under-the-radar" types—also known as "faint signals". Yet, on this issue, it was sometimes observed that healthcare personnel do identify emergent patterns and bring them to the attention of authorities but are not taken seriously. Hence, there is also a need to improve channels of communications between those at the frontlines of healthcare and at the policymaking level. What is more, once a problem has been identified, there is the further challenge of clarifying the roles of each agency involved as well as the specific actions to be taken.

Moving to the issue of tools, the role of prediction markets was debated. Specifically, how useful are they? What are the traits necessary for those who are detecting these trends? Should field experts dominate or should there be a group of people with diverse abilities and backgrounds?

It was pointed out that involving both specialists and a broad group of people with diverse backgrounds and knowledge in analysing trends would be ideal. There is also the important need to avoid over reliance on prediction market tools due to limitations such as the impact of anonymity. In fact, to fully appreciate such tools involves recognising its limitations, for example, the point at which diminishing returns are reached.

Addressing questions on the reliability of analyses from prediction markets—that could be influenced by popular media and compromised by speculators—it was acknowledged that attempts at influencing prediction assessments were unavoidable. However, these platforms have been proven thus far to be self-regulating as opinions posted have been balanced with contrarian views. Nevertheless, it was conceded that the concept of a futures market has yet to be developed into a tool that goes beyond providing information.

Another question raised pertained to the relative importance of tools and trained analysts. Could tools be effective if the analyst did not have a so-called "theory of the world"? In response, it was opined that tools and theories were only effective in making sense of a phenomena with hindsight but not for looking forward. While past data allows us to identify trends in viral outbreaks, the mere presence of the same pathogens today does not necessarily equate to the same exact outcomes; one example being the severity of the outbreak. That said, there is always place for sound theories or underlying concepts in order to make better sense of the incoming information. Indeed, one of the aspects of good surveillance should be about understanding as much available knowledge on the topic before sensible analysis and strategies can be devised.

Pertaining to the question of collaboration, it was noted that advocacy for a whole-of-government—in fact, a whole-of-society approach—to more efficient surveillance has been strong. Despite this, what are some of the practical steps that could be taken to better connect the security and health agencies?

One plausible suggestion is to develop software based on social network technology to first keep track of the expertise that people usually turn to. The next step then involves the setting up of forums for communities of practice involving experts, facilitators and practitioners. One such example is the Global Futures Forum (GFF) setup to foster international connection among various communities with common interests. In this regard, GFF currently has ongoing forums on themes such as global disease outbreaks and non-proliferation.

However, while these platforms and technology seem promising, it was lamented that not many stakeholders are willing or able to invest in it, although its potential is acknowledged and many are keen to benefit from it. Hence the development of such tools and platforms should be tailored to the busy schedules of practitioners and also be more user-friendly so as to encourage active participation.

Note: "Chatham House" rules were applied for this discussion so as to enable for a free-spirited and creative dialogue; discussants are thus not named in this report.

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WORKSHOP PROGRAMME

Monday, 24 September 2007

0900 **Welcome Remarks By Head Cens, Assoc Professor Kumar Ramakrishna And Mr Michael Moodie**

MORNING SESSION – DESIGNING AN EFFECTIVE SURVEILLANCE SYSTEM

0920 **Michael Moodie (Consultant and former Head of Chemical and Biological Arms Control Institute),** *"Disease Surveillance and National Security: Reconciling Tensions: Promoting Synergies"*

0955 Q&A Chaired by Assoc. Prof Kumar Ramakrishna

1010 Coffee/Tea Break

1030 **Dave Franz (Chief Bioscientist, Midwest Research Institute and Former Commander, U.S. Army Medical Research Institute in Infectious Diseases),** *"Species-Neutral Disease Surveillance and Other Opportunities in International Biosecurity"*

1105 Q&A Chaired by Assistant Prof Norman Vasu

1120 **Ottorino Cosivi, (Head, Preparedness for Deliberate Epidemics, World Health Organisation),** *"Global Public Health Security"*

1155 Q&A Chaired by Assistant Prof Norman Vasu

LUNCH TALK

1210 **Koh Peng Keng (Senior Director, Operations Group, Ministry of Health, Singapore),** *"Influenza Pandemic Surveillance and Response in Singapore"*

Chaired by Assoc. Prof Kumar Ramakrishna

AFTERNOON SESSION – OPERATIONAL APPROACHES TO PANDEMICS SURVEILLANCE

1400 **Phil Polgreen (Director of the Emerging Infections Network),** *"Using Prediction Markets to Forecast Infectious Disease Activity"*

1435 Q&A Chaired by Assoc. Prof Joseph Liow

1450 **Richard Adler (President, DecisionPath),** *"A Software Platform for Pandemic Preparedness Decision Support"*

1525 Q&A Chaired by Assistant Prof Bernard Loo

1540 Coffee/Tea Break

1600 **Roundtable Discussion**

1700 End of Workshop

ABOUT CENS

The Centre of Excellence for National Security (CENS) is a research unit of the S. Rajaratnam School of international Studies (RSIS) at Nanyang Technological University, Singapore. Established on 1 April 2006, CENS is devoted to rigorous policy-relevant analysis of a range of national security issues. The CENS team is multinational in composition, comprising both Singaporean and foreign analysts who are specialists in various aspects of national and homeland security affairs.

Why CENS?

In August 2004 the Strategic Framework for National Security outlined the key structures, security measures and capability development programmes that would help Singapore deal with transnational terrorism in the near and long term.

However, strategising national security policies requires greater research and understanding of the evolving security landscape. This is why CENS was established to increase the intellectual capital invested in strategising national security. To this end, CENS works closely with not just other RSIS research programmes, but also national security agencies such as the National Security Coordination Secretariat within the Prime Minister's Office.

What Research Does CENS Do?

CENS currently conducts research in three key areas of national security:

- Risk Assessment/Horizon Scanning

The art and science of detecting "weak signals" emanating from the total security environment so as to forewarn policymakers, the private sector and the public about approaching "shocks" such as terrorism, pandemics, energy crises and other easy-to-miss trends and ostensibly distant events.

- Social Resilience

The capacity of globalised, multicultural societies to hold together in the face of systemic shocks such as diseases and terrorist strikes.

- Transportation Security

The security of land-based, aviation and maritime transport networks and increasingly, the total supply chain vital to Singapore's economic vitality.

How Does CENS Help Influence National Security Policy?

Through policy-oriented analytical commentaries and other research output directed at the national security policy community in Singapore and beyond, CENS staff members promote greater awareness of emerging threats as well as global best practices in responding to those threats. In addition, CENS organises courses, seminars and workshops for local and foreign national security officials to facilitate networking and exposure to leading-edge thinking on the prevention of, and response to, national and homeland security threats.

How Does CENS Help Raise Public Awareness of National Security Issues?

To educate the wider public, CENS staff members regularly author articles in a number of security and intelligence related publications, as well as write op-ed analyses in leading newspapers. Radio and television interviews have allowed CENS staff to participate in and shape the public debate on critical issues such as risk assessment and horizon scanning, multiculturalism and social resilience, intelligence reform and defending critical infrastructure against mass-casualty terrorist attacks

How Does CENS Keep Abreast of Cutting Edge National Security Research?

The lean organisational structure of CENS permits a constant and regular influx of Visiting Fellows of international calibre through the Distinguished CENS Visitors Programme. This enables CENS to keep abreast of cutting edge global trends in national security research.

For More on CENS

Log on to www.rsis.edu.sg/cens for more information.

ABOUT RSIS

The S. Rajaratnam School of International Studies (RSIS) was established in January 2007 as an autonomous School within the Nanyang Technological University. RSIS's mission is to be a leading research and graduate teaching institution in strategic and international affairs in the Asia Pacific. To accomplish this mission, it will:

- Provide a rigorous professional graduate education in international affairs with a strong practical and area emphasis
- Conduct policy-relevant research in national security, defence and strategic studies, diplomacy and international relations
- Collaborate with like-minded schools of international affairs to form a global network of excellence

Graduate Training in International Affairs

RSIS offers an exacting graduate education in international affairs, taught by an international faculty of leading thinkers and practitioners. The teaching programme consists of the Master of Science (MSc) degrees in Strategic Studies, International Relations, International Political Economy, and Asian Studies as well as an MBA in International Studies taught jointly with the Nanyang Business School. The graduate teaching is distinguished by their focus on the Asia Pacific, the professional practice of international affairs, and the cultivation of academic depth. Over 150 students, the majority from abroad, are enrolled with the School. A small and select Ph.D. programme caters to advanced students whose interests match those of specific faculty members.

Research

RSIS research is conducted by five constituent Institutes and Centres: the Institute of Defence and Strategic Studies (IDSS, founded 1996), the International Centre for Political Violence and Terrorism Research (ICPVTR, 2002), the Centre of Excellence for National Security (CENS, 2006), the Centre for the Advanced Study of Regionalism and Multilateralism (CASRM, 2007); and the Consortium of Non-Traditional Security Studies in ASIA (NTS-Asia, 2007). The focus of research is on issues relating to the security and stability of the Asia-Pacific region and their implications for Singapore and other countries in the region. The S. Rajaratnam Professorship in Strategic Studies brings distinguished scholars and practitioners to participate in the work of the Institute. Previous holders of the Chair include Professors Stephen Walt, Jack Snyder, Wang Jisi, Alastair Iain Johnston, John Mearsheimer, Raja Mohan, and Rosemary Foot.

International Collaboration

Collaboration with other professional Schools of international affairs to form a global network of excellence is a RSIS priority. RSIS will initiate links with other like-minded schools so as to enrich its research and teaching activities as well as adopt the best practices of successful schools.

ABOUT NSCS

The National Security Coordination Secretariat (NSCS) was set up in the Prime Minister's Office in July 2004 to facilitate national security policy coordination from a Whole-Of-Government perspective. NSCS reports to the Prime Minister through the Coordinating Minister for National Security (CMNS). The current CMNS is the Deputy Prime Minister Professor S. Jayakumar, who is also Minister for Law.

NSCS is headed by Permanent Secretary (National Security and Intelligence Coordination). The current PS(NSIC) is Mr Peter Ho, who is concurrently Head of Civil Service and Permanent Secretary for Foreign Affairs.

NSCS provides support to the ministerial-level Security Policy Review Committee (SPRC) and Senior official-level National Security Coordination Committee (NSCCom) and Intelligence Coordinating Committee (ICC). It organises and manages national security programmes, one example being the Asia-Pacific Programme for National Security Officers. NSCS also funds experimental, research or start-up projects that contribute to our national security.

NSCS is made up of two components: the National Security Coordination Centre (NSCC) and the Joint Counter-Terrorism Centre (JCTC). Each centre is headed by a director.

NSCC performs three vital roles in Singapore's national security: national security planning, policy coordination, and anticipating strategic threats. As a coordinating body, NSCC ensures that government agencies complement each other, and do not duplicate or perform competing tasks.

JCTC is a strategic analysis unit that compiles a holistic picture of terrorist threat. It studies the levels of preparedness in areas such as maritime terrorism and chemical, biological and radiological terrorist threats. It also maps out the consequences should an attack in that domain take place.

More information on NSCS can be found at **www.nscs.gov.sg**

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