Thinking Ahead:

An "Early Warning" System for H1N1 Pandemic Impacts

A bio-era Multi-Client Service to Support Commercial Decision-Making

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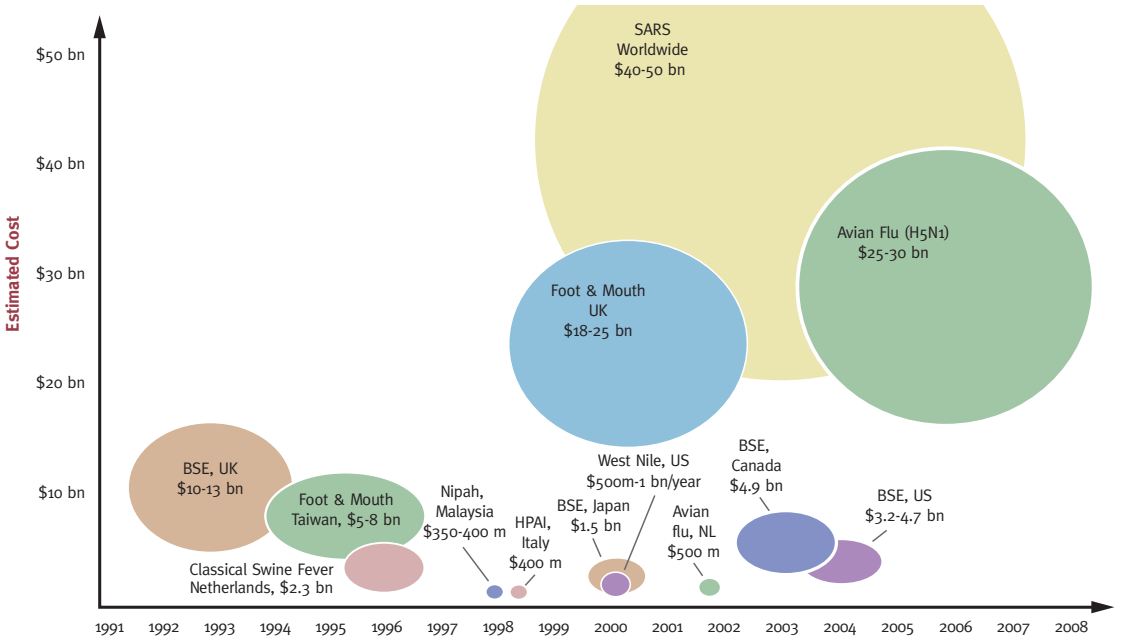
Now that World Health Organization has declared the outbreak of novel variant H1N1 "swine" influenza to be a pandemic, the issue is "so what?" How will the spread of this pandemic influenza affect human societies and economies — even specific markets, industries, and companies?

We know from past experience with SARS and H5N1, and from many studies carried out over the past few years1, that pandemic influenza can have enormous consequences for global trade and travel, with extremely large economic impacts. Precisely because this is so, a systematic approach to developing an "early warning" system with respect to the evolution of the disease event – its current and future trajectory, the local and global implications, and the reactions these provoke – can provide enormous benefits and opportunities to those prepared to act.

Economic Impact of Selected Infectious Diseases



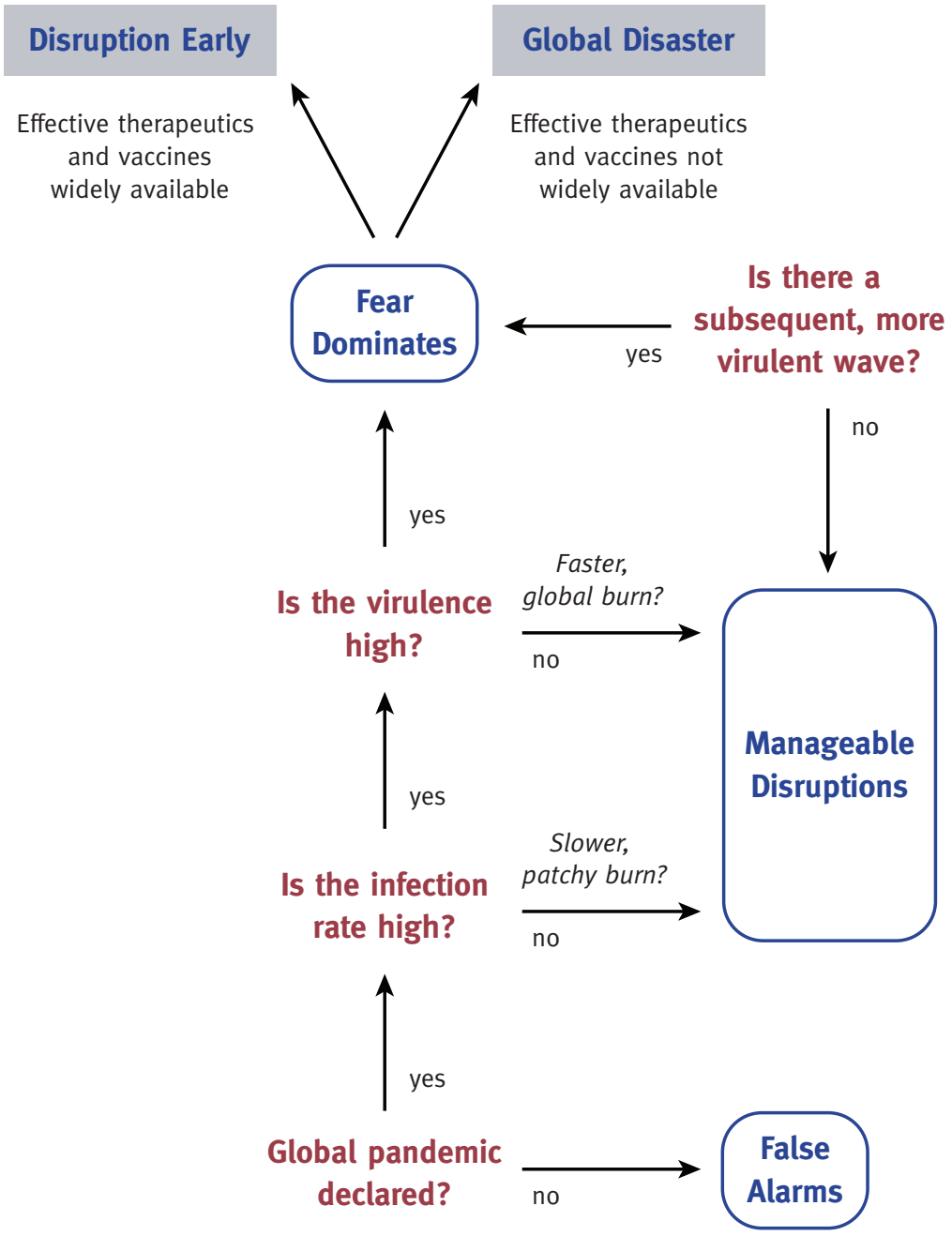
Figures are estimates and are presented as relative size.

Bio-era has developed just such an approach to tracking and reporting on the evolution of the H1N1 disease event in a manner designed to support market-based decision-making. We believe a systematic scenarios-based approach to monitoring, analyzing and reporting on the unfolding pandemic can provide significant advantages and benefits to business decision-makers.

Source	Estimated Economic Damage from a Pandemic	Comments
U.S. Centers for Disease Control (Meltzer, Cox, Fukuda; 1999)	• Cost to U.S. economy $71–167 billion (1995 dollars); $88–206 billion in current dollars	Widely cited in the press and by other analysts; based on estimates of primary costs derived from case numbers, hospitalizations, and deaths, and the associated costs for each of these events. Assumes 89,000–207,000 deaths and 314,000–734,000 hospitalizations in the US.
U.S. Health and Human Services (Pandemic Influenza Strategic Plan; November 2005)	• $181 billion in direct and indirect health costs alone (not including disruptions in trade and other costs to business and industry) for a moderate pandemic with no interventions	Earlier press reports indicated that HHS estimated costs of a "worst case scenario" (1.9 million deaths and 8.5 million hospitalizations) to be $450 billion for the U.S. economy
Asian Development Bank (November 2005)	Asian implications: • Mild shock: $99 billion in lost consumption, $14 billion in death and incapacity; losses equal 2.6% of GDP • Severe shock: $297 billion in short term losses or 6.8% of GDP	Both cases assume a relatively mild pandemic, with an infection rate of 20% and a case fatality of 0.5%. In the more severe scenario, the psychological impact on demand and consumption is greater.
World Bank (Brahmbhatt; November 2005)	• Total costs to the world economy could reach $800 billion	Assumes a case fatality rate of less than 0.1% in the U.S.
ING Bank (October 2005)	• "Large swathes of economic activity could simply cease." • "A realistic scenario might involve GDP declines of tens of percent." • "...fear of infection leading to drastically altered behavior would result in the greatest economic damage."	Assessment by a leading European bank.
Conference Board of Canada (October 2005)	• "A flu pandemic on a large scale would throw the world into a sudden and possibly dramatic global recession."	No quantitative estimates.
BMO Nesbitt Burns (August, October 2005)	• Cites CDC estimates in 1995 dollars • "Depending on [a pandemic's] length and severity, its economic impact could be comparable, at least for a short time, to the Great Depression of the 1930s."	A report produced by BMO Nesbitt Burns; widely cited by the media.

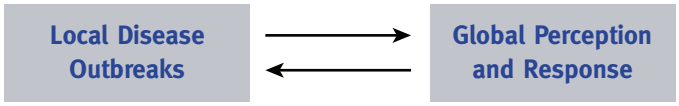
The bio-era H1N1 Pandemic Scenarios Framework

A critical component of such a system is a scenarios framework that identifies the key uncertainties and bounds the range of plausible outcomes. Bio-era has already structured a scenarios framework in outline (see graphic below), and will further refine and elaborate the framework with the active participation of service members.



Managing Complex Uncertainties

The unfolding of the H1N1 pandemic will be an enormously complex and uncertain event, driven by the on-going iteration between the local experience of the disease and the global perception and response to the unfolding pandemic:



Each will affect and influence the other — local events will shape global perceptions and drive global responses, while global perceptions and responses in turn, will shape and influence the character and experience of local outbreaks. Moreover, both the local and global levels will arise through a complex interaction and integration of three principal dimensions of the event:

1. **Physical spread of the virus and the disease.** Like the weather, the character of disease is always experienced locally. The H1N1 virus is continuously changing and evolving. Single strand RNA viruses (like influenza) are notoriously sloppy in replicating themselves (they have no self-checking and correcting mechanism) and enormously variable. Each infected cell within the trillions of cells making up a human body can produce on the order of 100,000 copies of the virus prior to bursting, with no two copies of the replicated virus being exactly alike. At the same time, we know that the evolving virus will affect different populations of people, with different genetic, socio-economic and cultural contexts — differently. As a result, monitoring the characteristics of local disease outbreaks can be an important "early warning" of how the virus may be changing, and how local perceptions of the degree of threat posed by the virus may be changing. For example, we already know that local disease outbreaks in Manitoba native communities are resulting in a much higher incidence of severe disease. It is likely that this is due to particular genetic and cultural factors associated with native Inuit communities, and not because of a specific change in the genetic makeup of the virus. Local severity of the disease can be expected to heighten local fears, but in this case, the heightened local fear within the Inuit community is probably not likely to heighted global perceptions of fear significantly.

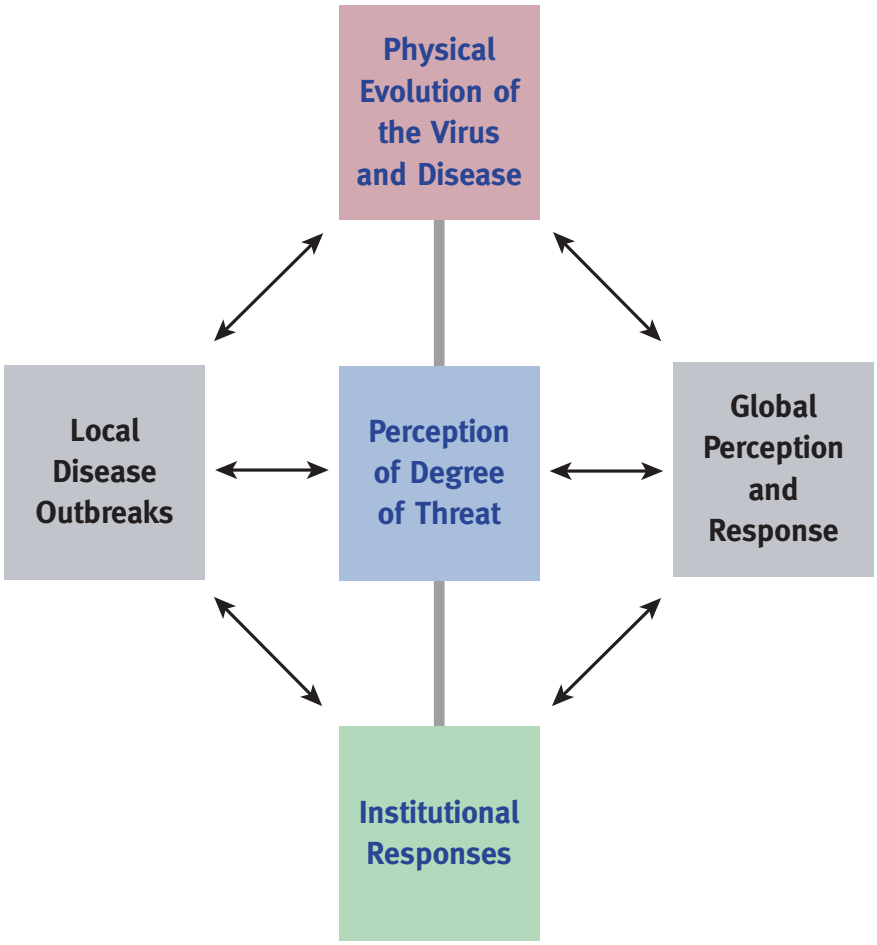
2. **Perceptions of threat.** We know that perceptions of the degree of threat (fears) posed by the disease can(1) vary widely from location to location and over time, (2) spread much faster and in advance of the actual disease, and (3) cause tremendous economic impacts and disruption. The degree of fear — provoked by local outbreaks, rumors, misinformation, and facts — can resonate and amplify (or not) through global media and the reactions and responses of other institutions. Monitoring, analyzing, and reporting on perceptions and fears of the disease — at both the local and global level — especially as they are associated with local disease outbreaks — will be critically important for anticipating the unfolding pandemic, and for understanding how economies and markets are likely to be affected. For example, we have already had reports of fear in Buenos Aires overwhelming public health capacity in advance of the arrival of the disease (see http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20090610/Argentina_Flu_090610?s_name=&no_ads).

3. **Institutional Responses.** The evolution of the H1N1 disease event (and the fears provoked), will drive responses from both private and public sector actors. Moreover, the actions taken will have significant consequences for the future trajectory of the disease event, and the economic and market impacts.

Quarantines, school closures, curtailment of trade and travel, curfews, seizure of countermeasure stockpiles — all are possible (if not likely) actions—which will be taken by governments and other institutional actors as the disease event progresses. Early warning on such actions, and their potential consequences — is an important component of the system we are proposing.

Systematic monitoring, analysis, and synthesis of emerging developments across all three of these aspects of the emerging pandemic — from the local to the global level — is crucial for providing businesses with actionable insight into developing events.

Conceptual Overview of "Thinking Ahead" H1N1 Pandemic Early Warning System



The bio-era "Thinking Ahead" Response

In response, bio-era is launching a rapid response, multi-client service on the implications for business and the economy of pandemic influenza arising from the current outbreak of H1N1 — and how to adapt. The service is modeled on bio-era's earlier Avian Influenza "Thinking Ahead" service, but will focus on emerging events and developments over the coming six month period, the implications for markets, industries and participating businesses, and evaluating response options.

Service Goals

Under the direction of bio-era President, Steve Aldrich, the service will deliver independent, expert tracking and analysis of the business significance of developments within a broader scenarios framework. The service will help participants better anticipate and respond to the impacts of an emerging pandemic. Specific service goals are to:

- Inform participants on important business impacts of an H1N1 influenza pandemic
- Identify the key implications for participants
- Deliver a transparent scenarios framework suitable for interpreting the significance of unfolding events
- Improve commercial decision-making within an environment of conflicting information, rumor and fear
- Evaluate the significance of events as they unfold for selected markets, industries and participating companies

Service Deliverables

Deliverables for the service will be responsive to emerging client needs. Enrollment by an organization in the service will deliver:

- The bio-era H1N1 flu scenarios framework and logic.
- Regular bio-era written updates on developments, and analysis of the implications and what to watch for ahead.
- Access to bio-era staff and experts via the web or telephone
- Unlimited individual enrollment in a secure, on-line, service workspace for on-demand access to service resources
- Participation in periodic bio-era webinars providing expert analysis and insight. The teleconferences and webinars are designed to interactively educate, and promote dialogue among participants about emerging issues, and their potential implications.

Secure Platform: Secure On-line Workspace

To fully enable global participation in the service, bio-era has secured a password protected, collaborative workspace hosted by PowerSteering Software. The bio-era-branded Swine Flu workspace is designed to support collaborative contributions and information exchange among enrolled participants, while keeping all contributions fully private to the participants, organized and easily accessed. Once enrolled, service participants will be invited to establish a personal password and profile. The workspace enables participants to:

- access relevant research documents and web-postings
- participate in group discussions
- privately communicate with bio-era or other service participants
- receive email alerts with links to documents and discussion items posted to the workspace (and to turn off such alerts if desired)

Enrollment Fees

- Enrollment is for a six month term of service
- Renewal after 11/01/09 available on a month-to-month basis
- Complete and submit the enrollment form online and you will be contacted to discuss fees.
- Discounts available for non-profit and small companies.

Service Timetable

- Invitation to private and secure bio-era "Thinking Ahead" workspace featuring library resources, threaded discussion, document sharing, access to bio-era staff and service participants (upon enrollment)
- Analyses of Current Developments — distributed electronically and posted to the "Thinking Ahead" workspace regularly as events warrant
- Webinars — Inaugural event July 15, 2009 at 12:00 noon eastern time (periodic thereafter)
  - Subject: "Thinking Ahead: A Scenarios Framework for H1N1 Pandemic"
- Bio-era scenarios framework report — distributed prior to August 1, 2009
- Initial term of service continues through October 31, 2009.
- Options for service renewal begin November 1, 2009

Service Faculty

Stephen Aldrich, *President, bio-era,* is the founder of bio-era, and a business and strategy analyst with extensive experience in scenario planning applications to pandemic preparedness. Steve is an authority on applying scenario planning to business decision-making. He has worked closely with many companies and institutions on their pandemic plans and is the author or co-author of numerous bio-era reports on emerging infectious disease and pandemic impacts, including "Thinking Ahead: The Business Significance of Avian Influenza", and "Thinking Ahead: Using Scenarios in Pandemic Preparedness."

Dr. William Karesh, D.V.M., *Vice President, Wildlife Conservation Society,* is one of the world's leading authorities on zoonotic disease emergence, the principal administrator of the Global Avian Influenza Network Surveillance program (GAINS), and the originator of the WCS, "One World, One Health"™ initiative. Dr. Karesh is also the author of the book Appointments at the End of the World, and Co-Chair of the IUCN SSC Veterinary Specialist Group.

Philip Alcabes, *Associate Professor, Hunter College's School of Health Sciences,* is the author of *Dread: How Fear and Fantasy Have Fueled Epidemics from the Black Death to Avian Flu,* published by Public Affairs Books. He is a skeptical scientist whose work challenges the conventional wisdom about health, disease, and risk. Alcabes was trained as an infectious-disease epidemiologist and studied epidemic contagion, especially AIDS and tuberculosis, for two decades. Drawing on his experience as an epidemiologist, he examines the history of disease control and the ethics of public-health policy making from a scientist's perspective. Among his essays on epidemic history and society's responses to contagion are "The Bioterrorism Scare," "The Ordinariness of AIDS," "What Ails Public Health?," and "Heart of Darkness: AIDS, Africa, and Race."

David Vidal, *Vice President, Corporate Social Responsibility, The Conference Board,* has led the Conference Board's efforts to better understand the implications of pandemic influenza for large corporations, and is the principal author of the action report, "Are Businesses Doing Enough to Prepare for a Pandemic." David has held a number of positions at the Council on Foreign Relations, The Partnership for New York City, the U.S. Department of State, The New York Times, and The Associated Press. Vidal is a Fellow of the Royal Society for the Encouragement of the Arts, Manufactures & Commerce, and a member of the Council on Foreign Relations, a Fulbright Scholar, and a White House Fellow.

To enroll or for more information, please:

- visit the bio-era website at http:www.bio-era.net/
- call Steve Aldrich at 781.956.3034
- email saldrich@bio-era.net

References available upon request. Examples of bio-era research are available on the bio-era website at http://ww.bio-era.net.