

Risk Assessment for Pandemic Planning

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1 Introduction

Pandemics are outbreak of an infectious disease (epidemics) that spread through the population across a large region. The World Health Organization [1] and European Centre for Disease Prevention and Control [2] provide resources for planning in this area. They provide several examples of mechanisms that may result in pandemics. These include the continual changes in the surface proteins of the influenza virus that may eventually create new strains for which we have limited or no immunity. The WHO conclude that 'With the increase in global transport and communications, as well as urbanization and overcrowded conditions, epidemics due the new influenza virus are likely to quickly take hold around the world'.

WHO Phase	Pandemic Period	Characteristics of Phase
Phase 1	Interpandemic period	No new influenza virus subtypes have been detected in humans
Phase 2		No new influenza virus subtypes have been detected in humans, but an animal variant threatens human disease.
Phase 3	Pandemic alert period	Human infection(s) with a new subtype but no human-to-human spread.
Phase 4		Small cluster(s) with limited localized human-to-human transmission
Phase 5		Larger cluster(s) but human-to-human spread still localized.
Phase 6	Pandemic period	Pandemic: increased and sustained transmission in general population

Table 1: WHO Pandemic Phases

Recent concerns have focused on two particular variants of the influenza virus [3, 4]. In 2003, there were fears that Severe Acute Respiratory Syndrome (SARS) might become pandemic. Rapid action by national and international health authorities helped slow transmission. The disease has not been eradicated, however, and could re-emerge unexpectedly. In February 2004, the H5N1 strain of the avian influenza virus was detected in birds in Vietnam. This increasing fears that the avian influenza virus might combine with a human influenza virus (in a bird or a human) to create a sub-type that was both highly contagious and highly lethal in humans. At present this has not happened and the avian influenza strain remains very inefficient in terms of human to human transmission.

2 Tool Development

Your task in the open assessment is to develop a tool that will help companies to prepare for pandemics. Your system may address any, or all, of the pandemic phases identified by the WHO model, illustrated in Table 1. The aim is to enable senior or middle management to assess the safety related risks that are associated with any outbreak. The design of the tool is entirely open. You may choose to use one of the risk assessment techniques that are introduced during this course, such as Fault Trees or Failure Modes, Effects and Criticality Analysis. Alternatively, you may choose to extend other approaches such as HAZOPs, or to develop entirely new techniques. The key aim is to help organizations assess the likelihood and consequence of hazards that are associated with pandemics. The specific focus must be on identifying safety related risks and ideally to help managers mitigate those risks by appropriate planning before a pandemic reaches phases 5 or 6 in the WHO model.

Just as the design of the risk assessment tool is open, you are also free to use any technologies to support the implementation of your approach. The implementation of the tool could rely on simple web pages generated using HTML, PHP or any other associated technology. Your design may be realized using conventional programming languages. However, the marking scheme will take into account both the

strengths of the design and the effectiveness of the implementation in terms of the support that they offer to the potential end users.

3 Evaluation

It is important that you evaluate your tool for pandemic risk assessment. One means of doing this would be to ask a number of different users to try it out. For instance, one group might be asked to use an electronic risk assessment tool while another uses a paper based form. However, this raises important methodological concerns. Firstly, how would you insure that both groups have the same level of expertise and background knowledge so that any comparisons are fair? Secondly, how would you go about assessing the accuracy of any risk assessments that are produced? Please consult with me before conducting your evaluation so that I can provide advice in answering some of these questions. You should also consult the course handbook and associated web pages that cover the ethical guidelines for user testing.

4 Transferable Skills

This exercise will provide a first-hand introduction to the challenges that face many large organizations as they prepare for pandemics. There is little common agreement on the best approaches to adopt and hence you will be working in an area of active research, which is also a focus for public, government and commercial interest. The exercise will provide some understanding of the problems that can arise in preparing for low probability, high-consequence events. It will also underline the uncertainty that often characterizes risk assessment in safety-critical engineering. Many of the skills provided by this assessed exercise are in scarce supply.

5 Assessment Criteria and Submission Details

This exercise is degree assessed. It contributes 30% to the total marks associated with this course. The body of the report should not exceed fifteen A4 pages. The report must be printed out and must be submitted in a secure binder. It must include:

- A title page containing your contact details (email etc);
- A table of contents and appropriate page numbers;
- A section on the tool that you developed.
- A section on the evaluation method that you used.
- A results sections.
- Conclusions.

In addition to the fifteen pages in the body of the report, you may also include appendices. These should contain the listing of any code used during the study together with suitable acknowledgements for the source of code that has been borrowed from other programmers. The report should be handed in on Thursday 29th November 2007, I will confirm the details in a lecture before the deadline. Please make sure that you keep back-up copies of all of your work and include a plagiarism statement using the standard 'pink form'. The following marking scheme will be applied: 15 for the method; 10 for the results; 15 for the conclusion; 10 for the technical documentation. All solutions must be the work of the individual submitting the exercise and the usual plagiarism form must be attached to all solutions.

References

[1] World Health Organisation, Epidemic and Pandemic Alert and Response (EPR), Accessed 3rd October 2007. <http://www.who.int/csr/disease/influenza/pandemic/en/>

[2] European Centre for Disease Prevention and Control, Accessed 3rd October 2007. <http://www.ecdc.eu.int/>

[3] US National Strategy for Pandemic Influenza: Implementation Plan, Accessed 3rd October 2007. <http://www.whitehouse.gov/homeland/pandemic-influenza-implementation.html>

[3] UK Department of Health, Central Reference Pages for Pandemic Flu, Accessed 3rd October 2007. <http://www.dh.gov.uk/en/PandemicFlu/index.htm>