

Planning for Remote Risks

Jonathan D. Moreno, Ph.D.

Dimensions of Risk I

- Probability – Likelihood
- Magnitude -- Severity

Dimensions of Risk II

		Probability	
		High	Low
Magnitude	Low	Seasonal influenza	Walking under a bird dropping
	High	Floods	Airplane crash, nuclear disaster, toxic spill

Dimensions of Risk III

- Natural
- Anthropogenic
- Mixed cases?

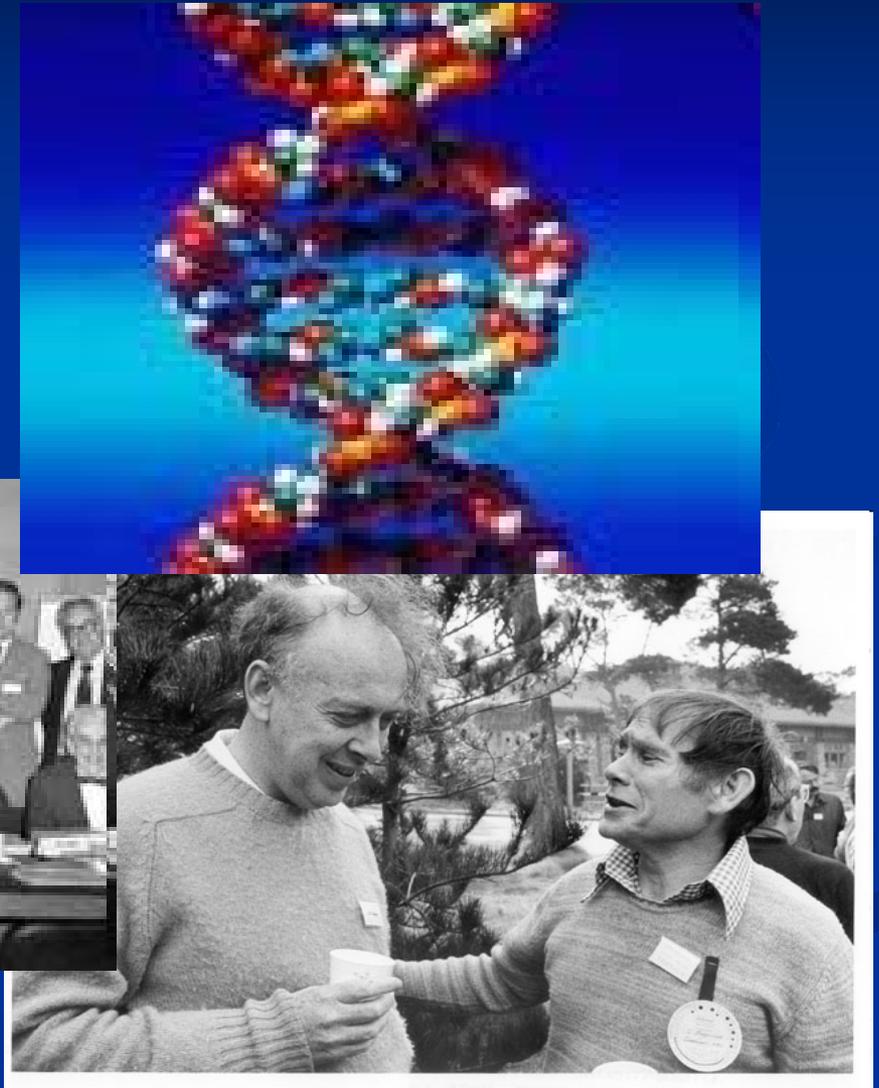
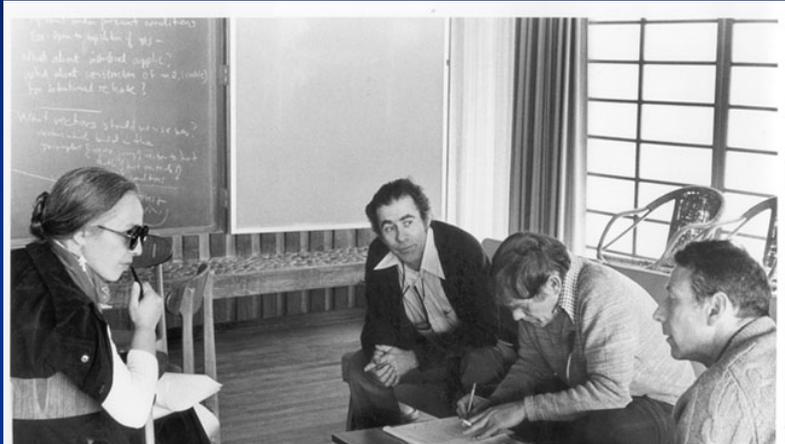
- Suppose that synbio poses a risk that is
 - Very low probability
 - High magnitude

*How should we plan for VLP/HM risks? Degree of concern?
Societal investment? Prioritizing?*

New Orleans and Amsterdam



VLP/HM Risks in Bioethics



Emerging Risk

“...a risk that is new, or a familiar risk in new or unfamiliar conditions (e.g., the re-emergence of the polio virus). Emerging risks are issues that are perceived to be potentially significant but which may not be fully understood and assessed, thus not allowing risk management options to be developed with confidence.....*[C]onventional approaches to projecting loss size, relative frequencies or probability distributions over time or severity of consequences are ineffective.* Indeed, it is often difficult to establish causality between the source of the emerging risk and its consequences using conventional technical or scientific data.” (emphasis added)

International Risk Governance Council

Examples of Anthropogenic Emerging Risks

- The Bovine Spongiform Encephalopathy (BSE) epidemic in the UK
- Electromagnetic fields (e.g., mobile phones and power lines)
- Fisheries depletion and collapse
- Genetically modified crops

Figure 1: Deficits relating to assessing and understanding risks

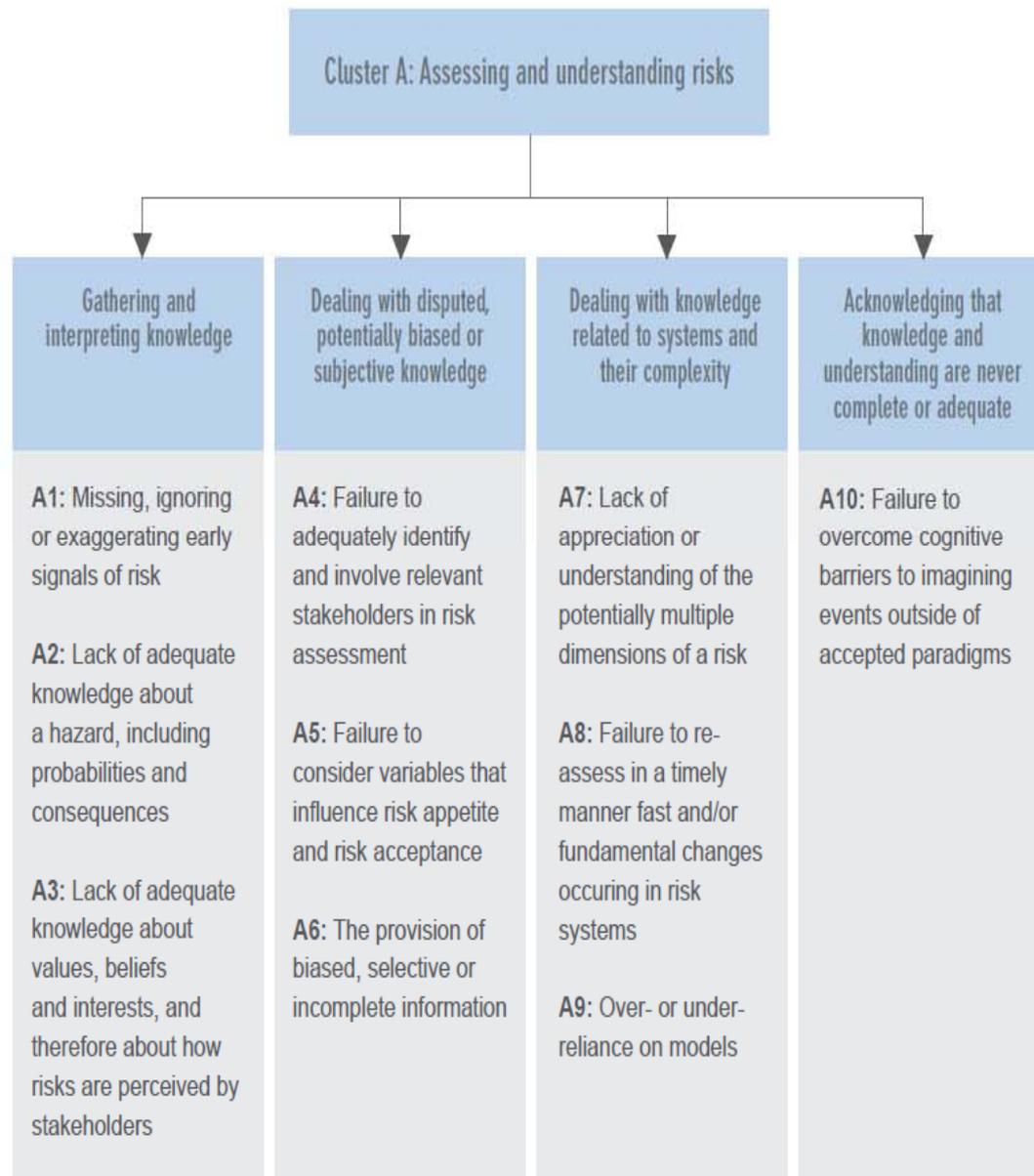
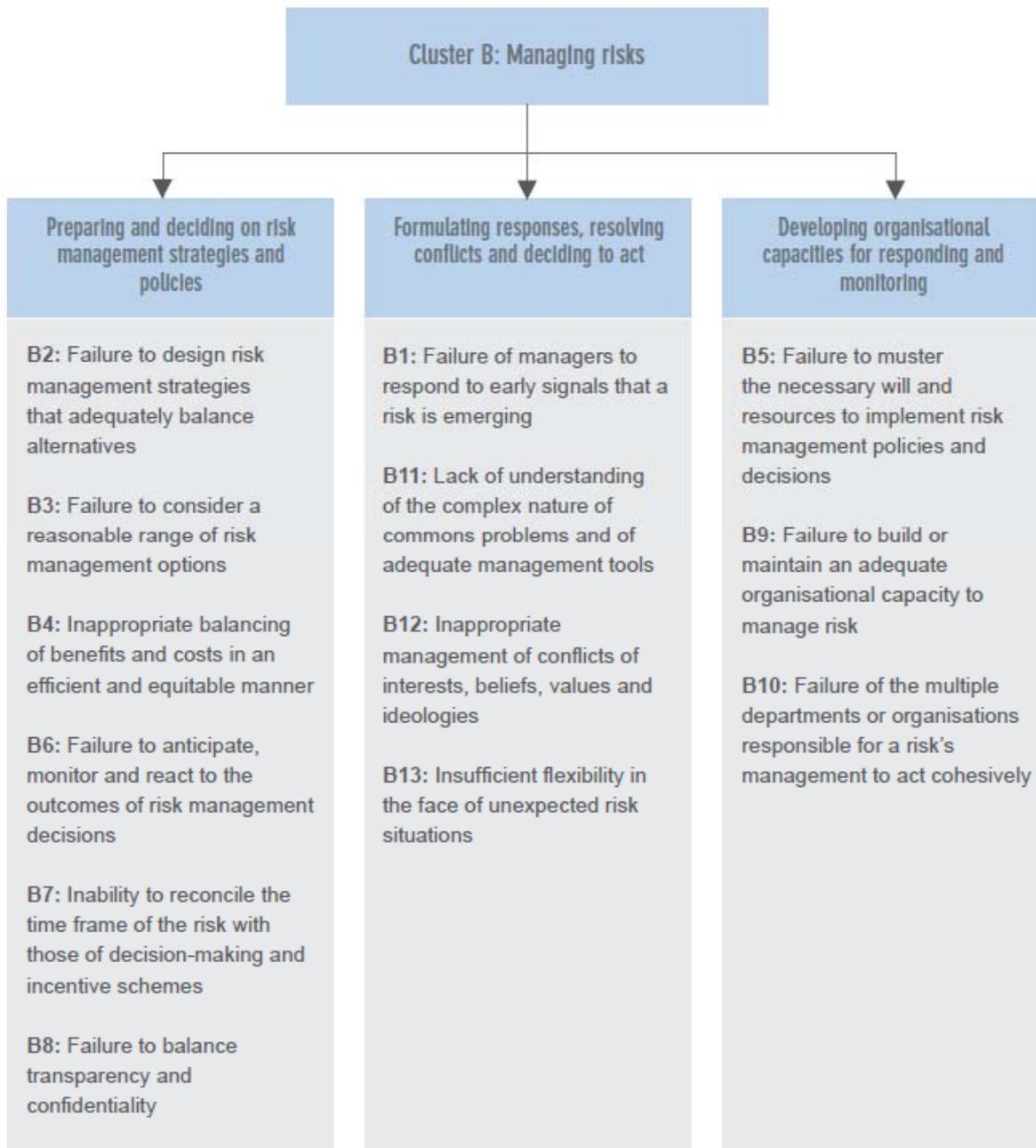


Figure 2: Deficits relating to managing risks



Responding to VLP/HM Risks

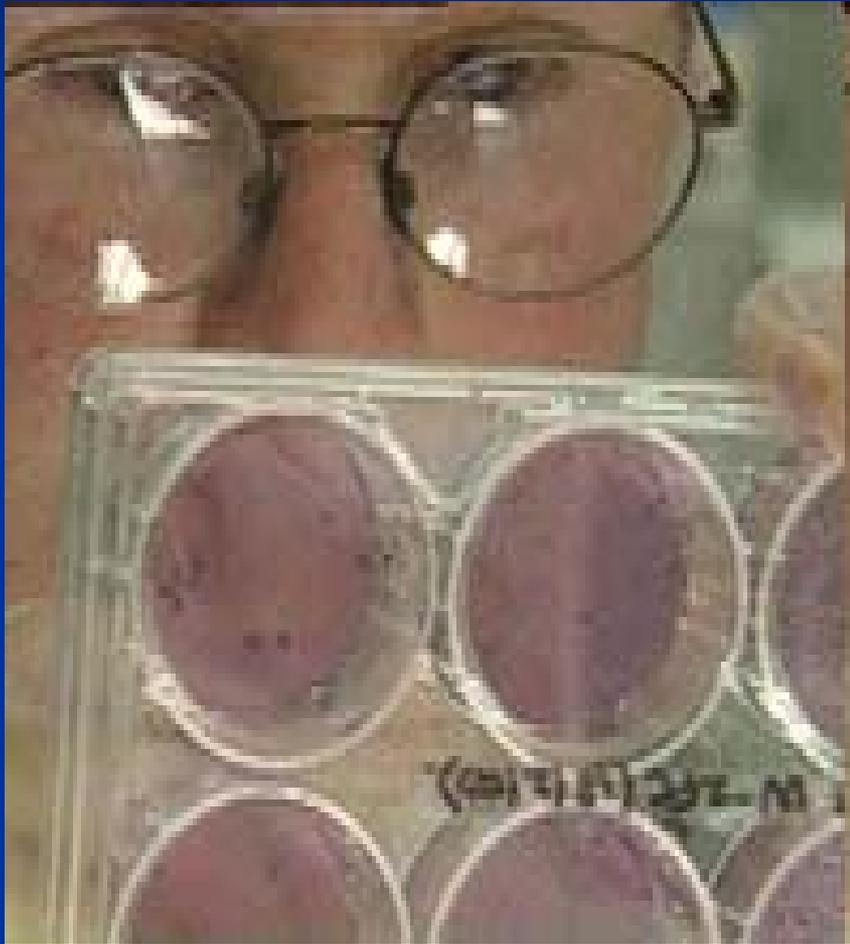
- Systematic bias: Individuals are very bad at assessing their personal risks; so are societies
- Because of the very rarity of VLP/HM incidents, inductive risk assessment methods, trial and error don't work
- Lack of evolved biological and cultural coping mechanisms

Very Low Probability/High Magnitude Events

- VLP/HM events: 1 case in hundreds or even a thousand years
- I am *not* asserting that synbio poses even a modest likelihood of creating a HM risk
- But suppose it presents a VLP/HM risk

In an VLP/HM, emerging risk scenario, how great an investment should society make in planning governance strategy?

Anthropogenic VLP/HM Risk



In 2000 Australian scientists unintentionally created a modified mousepox virus with 100% mortality while trying to design a contraceptive virus for mice for use in pest control.

Existential Risks

- Are of **extremely low probability** but **extremely high magnitude**

“...an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential.”

- N. Bostrom, *Journal of Evolution and Technology*, Vol. 9, March 2002.

Why Worry about Existential Risks?

- Continue the human project
- Satisfy religious commitments

Should we establish the ultimate hedge fund?

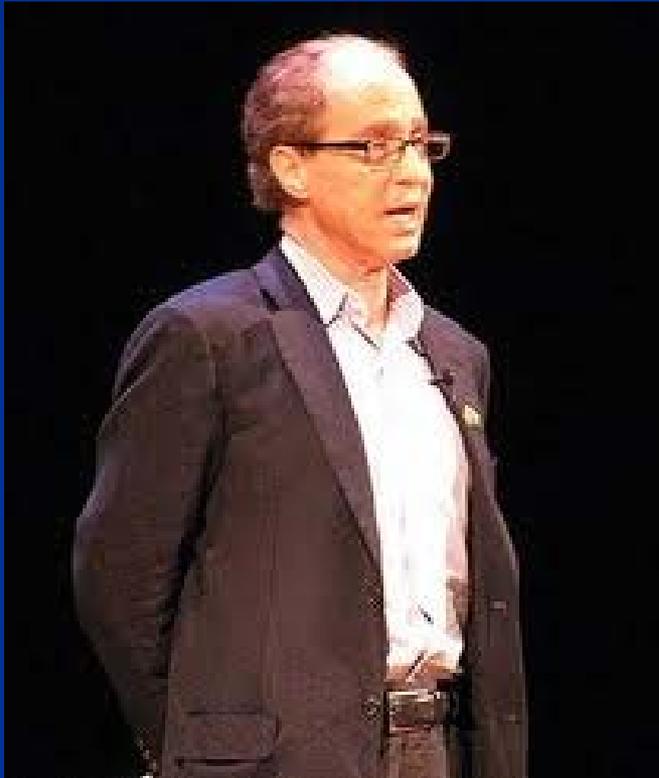
Existential Risks

The Toba eruption, present-day Sumatra, 74,000 years ago

- Blocked out sunlight for six years.
- Global temperatures dropped by as much as 28 degrees
- Ice age that lasted around 1,800 years.
- During this period humans came very close to becoming extinct.
- May have been only 500 mating pairs remaining



Will Humanity Survive the Century?

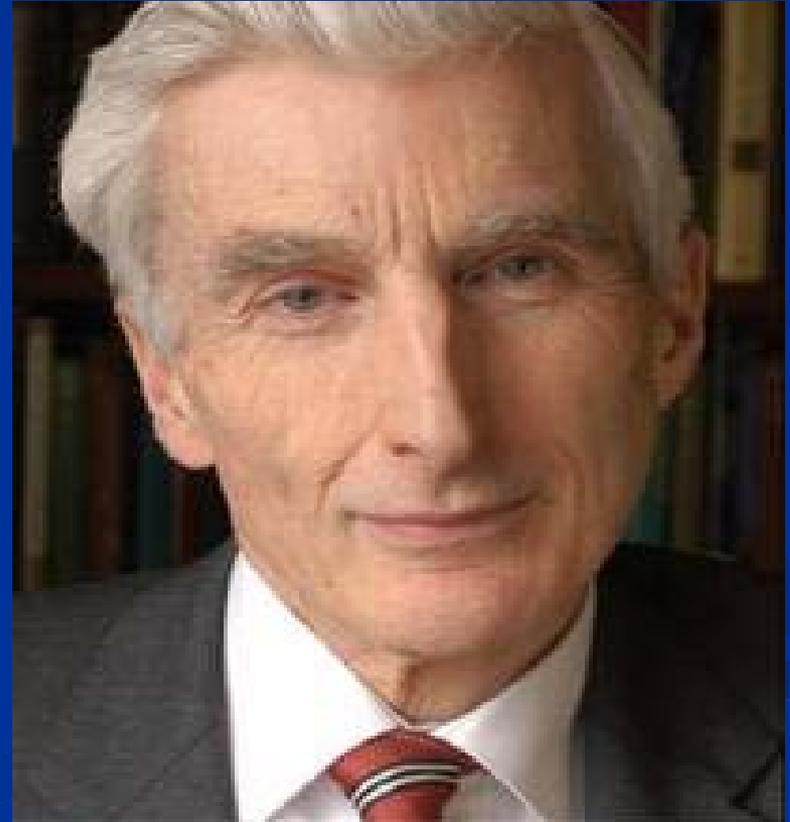


- “The same technologies set are empowering us to reprogram biology away from cancer and heart disease, could also be use by a terrorist to reprogram a biological virus to be more deadly or more communicable.”
 - Ray Kurzweil

Will Humanity Survive the Century?

Sir Martin Rees

- Estimates probability of human survival to next century at 50%
- "Even a few pioneering groups, living independently of Earth, would offer a safeguard against the worst possible disaster—the foreclosure of intelligent life's future through the extinction of all humankind."



Will Humanity Survive the Century?

- "The survival of the human race depends on its ability to find new homes elsewhere in the universe because there's an increasing risk that a disaster will destroy the Earth."

■ Stephen Hawking



Responses?

- More research on VLP/HM risk governance needed
- Goal should be an acceptable worst case scenario
- For anthropogenic risks
 - Nonproliferation regimes need to be reviewed or established
 - Considering magnitude, non-conforming nations may be subject to sanctions, even use of force



Concept note

Risk Governance of Synthetic Biology

Acknowledgements

- Nick Bostrom
- International Risk Governance Council
- Jason Schwartz