

Population Health Risk Assessment and Management: Implications for BSE

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 PrioNet Canada

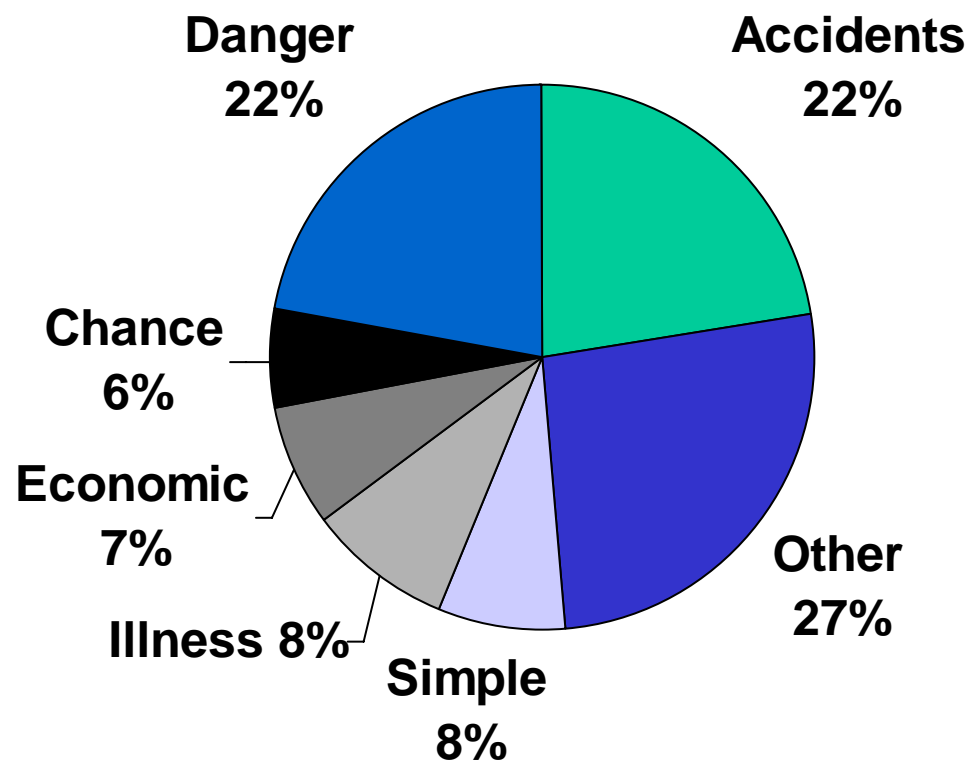


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Outline

- Definition of Risk
- Population Health and Risk Management
- Evaluation of Risk Management Strategies
- Principles of Risk Management Decision Making
- Case study: BSE and vCJD in Canada
- *Development of an Integrated Risk Management Framework for Prion Diseases*

Associations to the Word 'Risk'



Other Includes

Environment	14.0%
Caution	13.6%
Industrial	13.6%
Adventure	12.3%
Games	8.8%
Fire/Explosion	8.1%
Cigarette	6.2%
Sex	5.8%
Children	4.9%
Poison	4.9%
Medical Device	3.2%
War/Weapons	2.3%
Crime	1.3%
Uncertainty	0.6%
Natural Disaster	0.3%

Definitions of Risk

- **Rowe (1977) “...the potential for realization of unwanted...consequences of an event.”**
- **O’Riordan (1979) “Risk...is regarded both as a hazardous outcome and a probability of occurrence.”**
- **The Royal Society of London (1983) “...the probability that a particular adverse event occurs during a stated period of time, or results from a particular challenge.”**
- **US National Research Council (1989) “...risk is the product of a measure of the size of the hazard and its probability of occurrence.”**

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What is 'Risk'?

- *Risk* is a measure of the *probability* of an adverse event occurring and of the *consequences* of that event.

$$\text{Risk} = \text{Probability} \times \{\text{Consequences}\}^P$$

Existing Population Health Risks

Air pollution

Infectious disease

Ionizing radiation

Lifestyle

Pesticide residues

Water pollution

Diet

“Assess and Manage”

Emerging Population Health Risks

Cellular telephones?

Biotechnology products?

Superbug?

Endocrine disrupting chemicals?

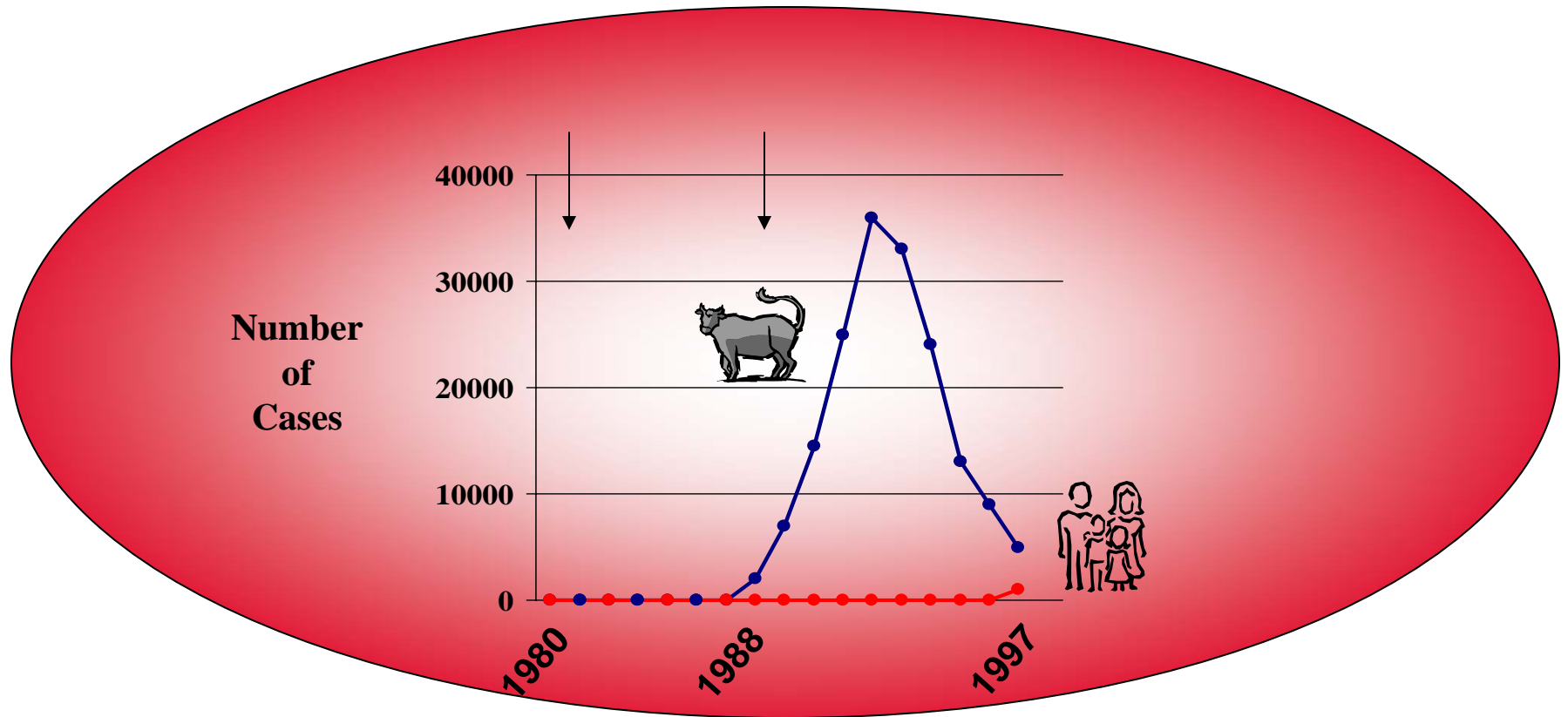
Climate change?

Prions?

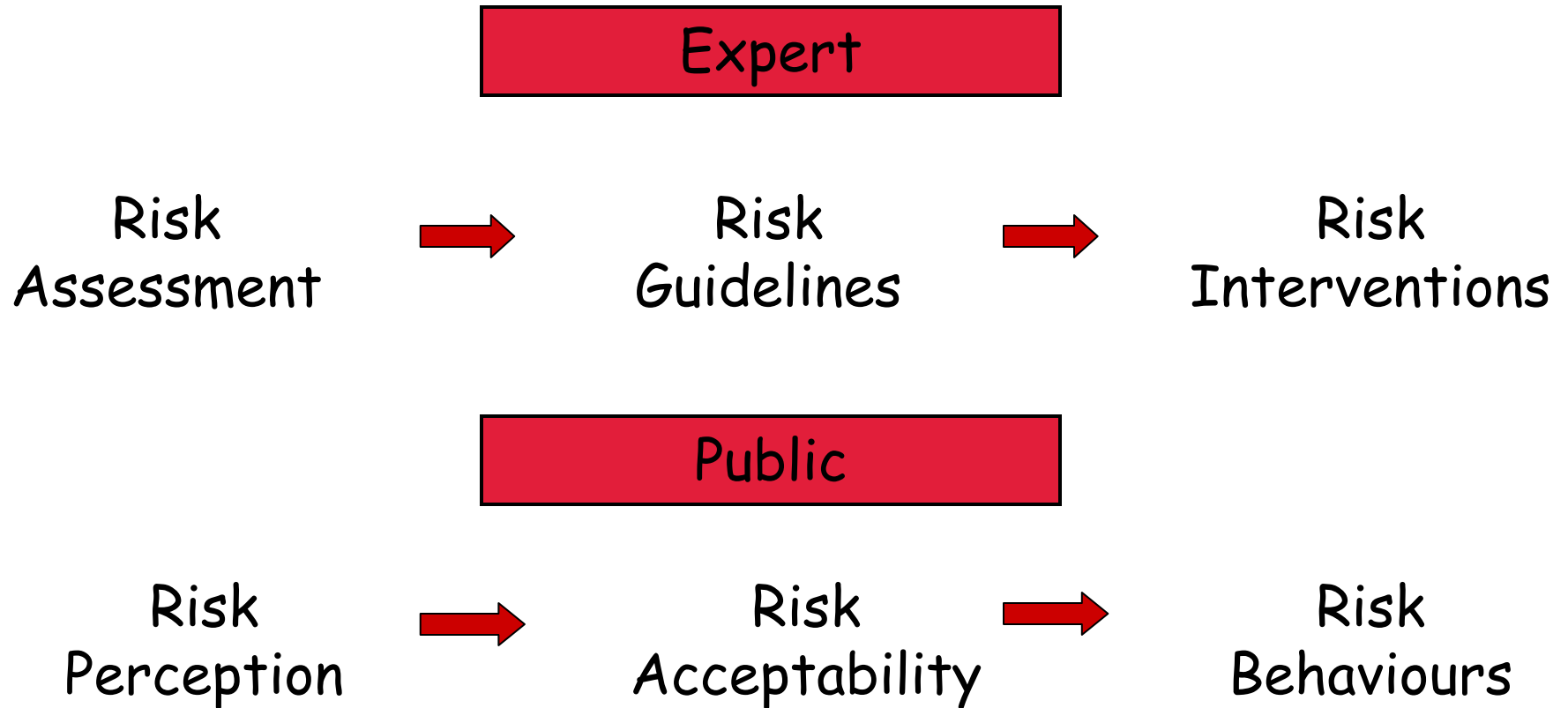
Blood-borne pathogens?

“Anticipate and Prevent”

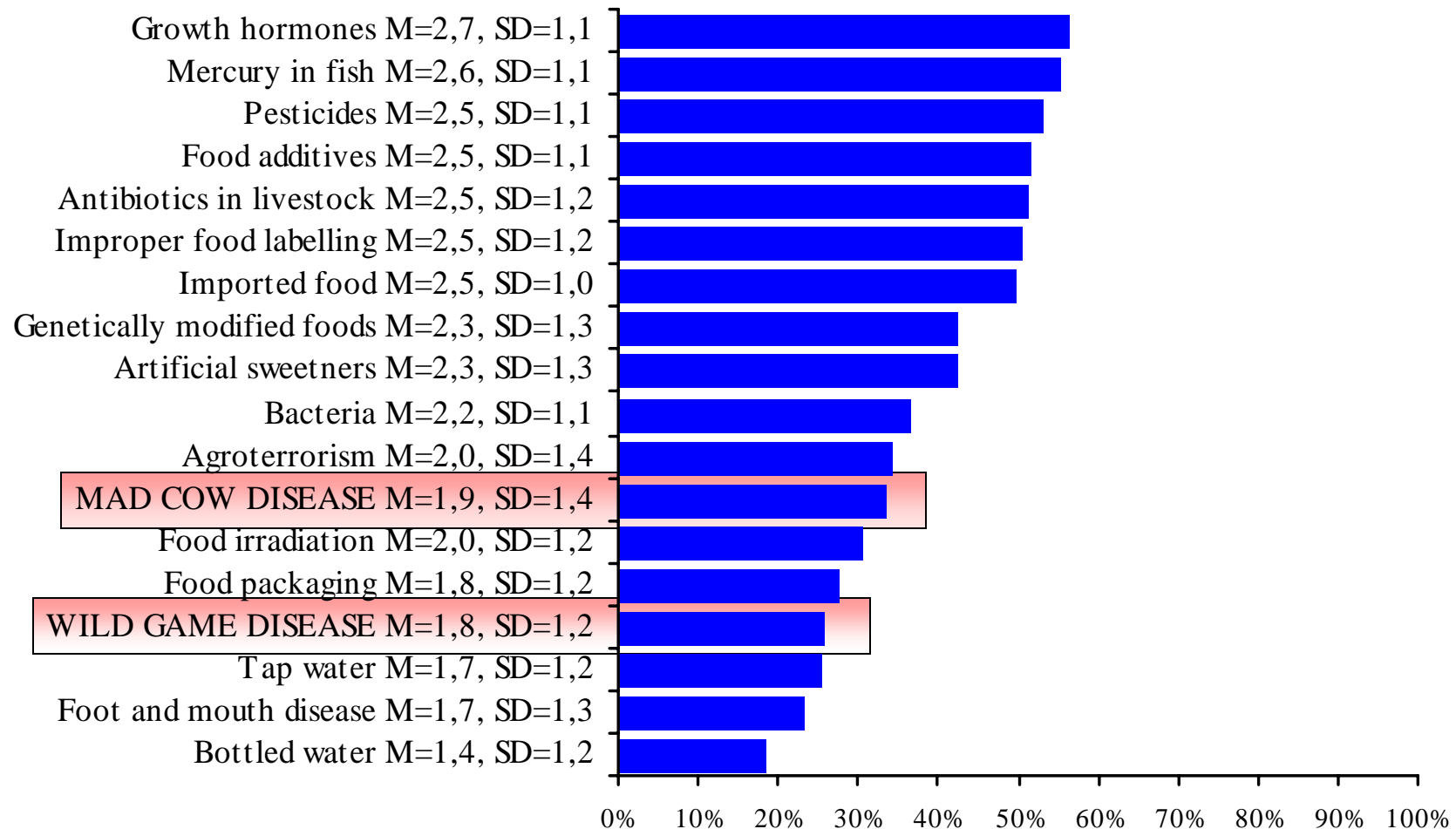
Transmission of Mad Cow Disease to Humans



Expert and Public Appraisal of Risk

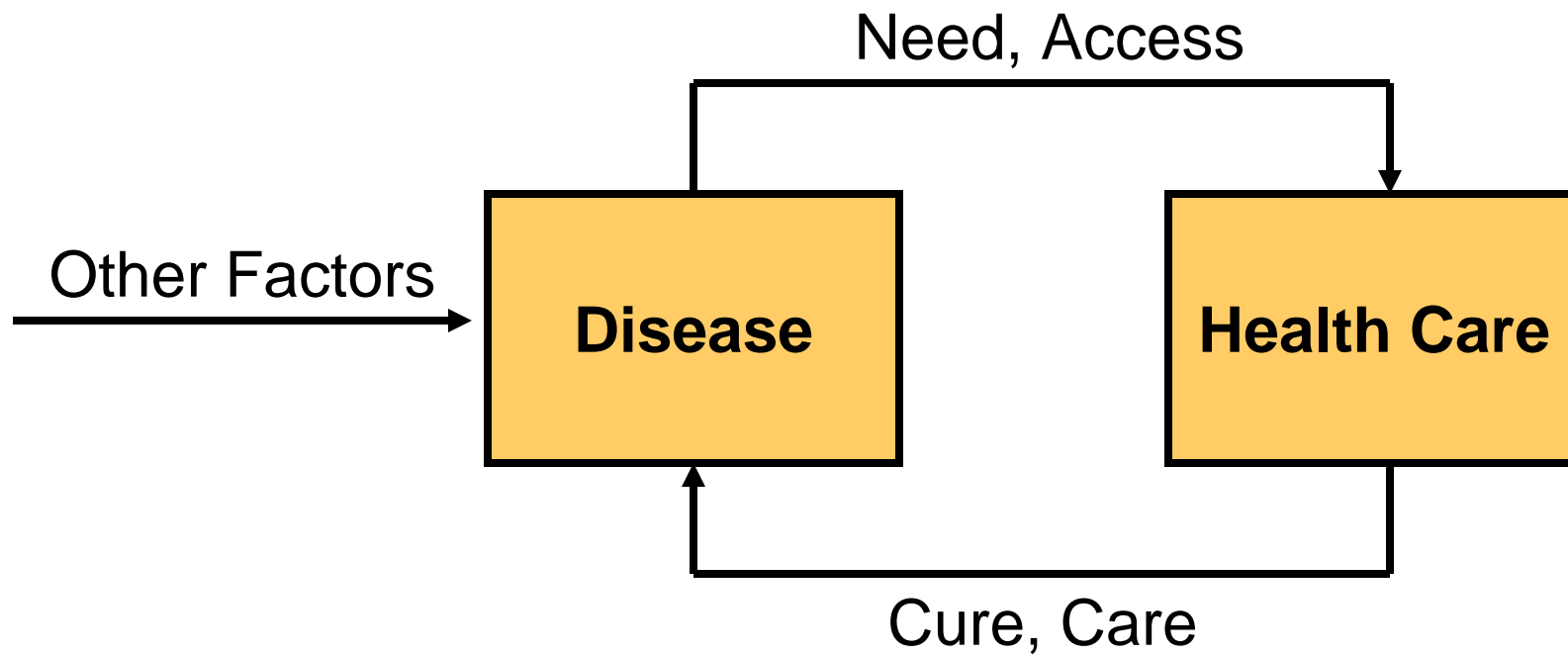


Public Perception of Foodborne Risks

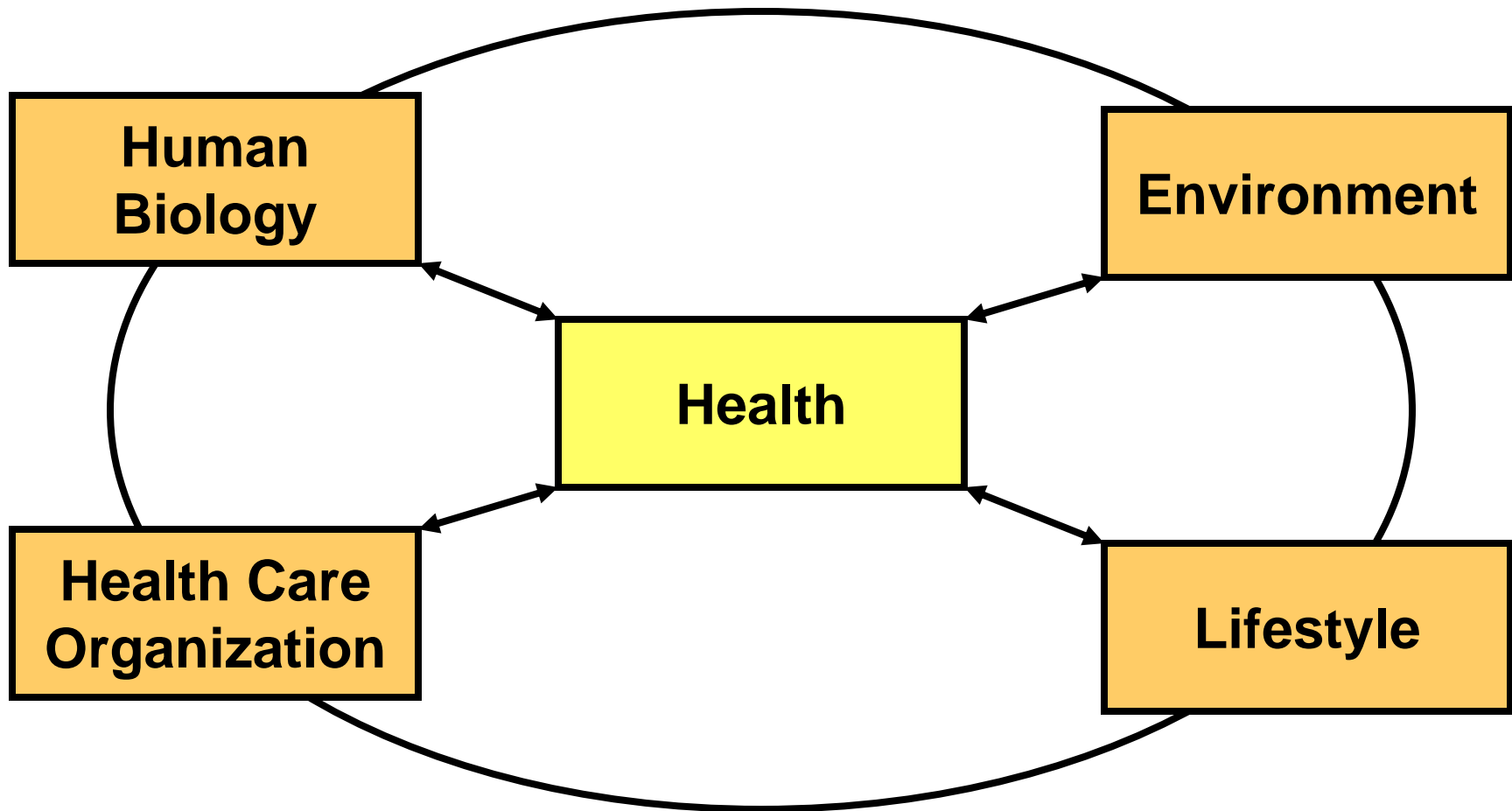


Evolution of Population Health

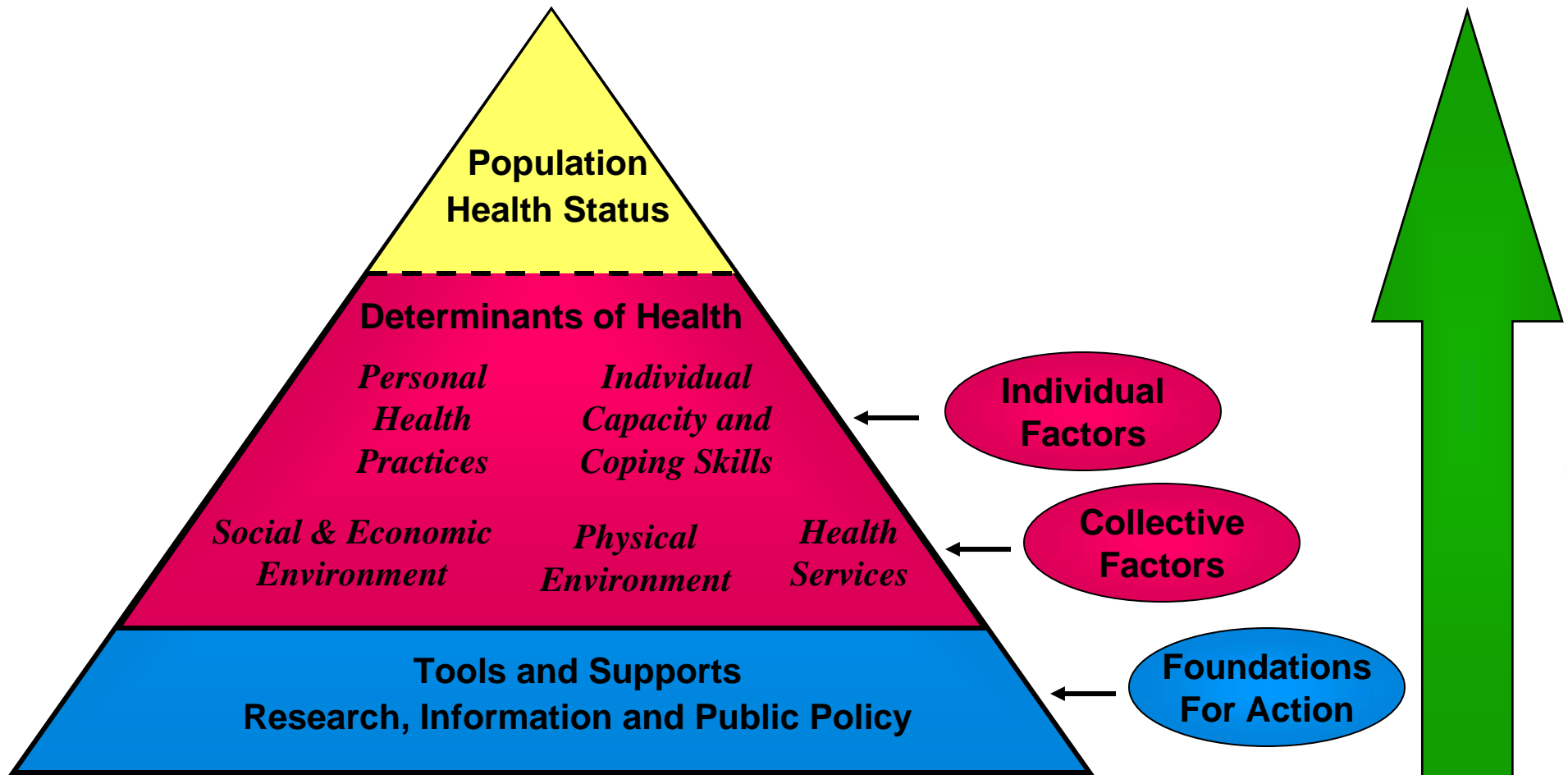
Medical Model



Lalonde Framework (1974)

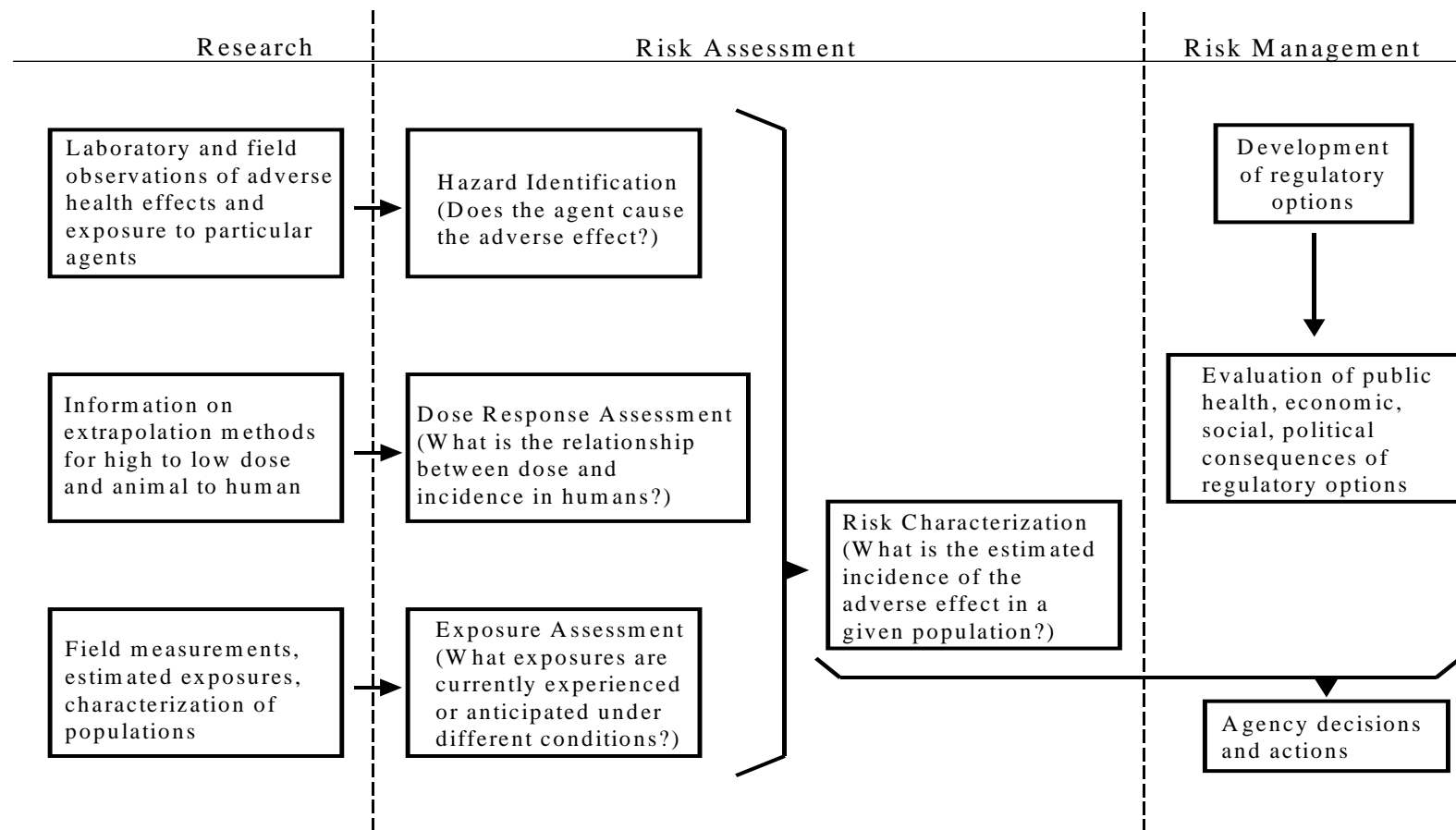


Federal/Provincial/Territorial Advisory Committee on Population Health (1994)



Evolution of Risk Assessment

U.S. National Research Council (1983)



U.S. Presidential/Congressional Commission on Risk Assessment and Risk Management (1997)



An Integrated Framework for Risk Management and Population Health

Population Health

Regulatory

Economic

Advisory

Community

Technological

Multiple Interventions

Health Risk Policy Analysis
Evidence Based Policy

Health Risk Science
Determinants and Interactions

Biology
and
Genetics

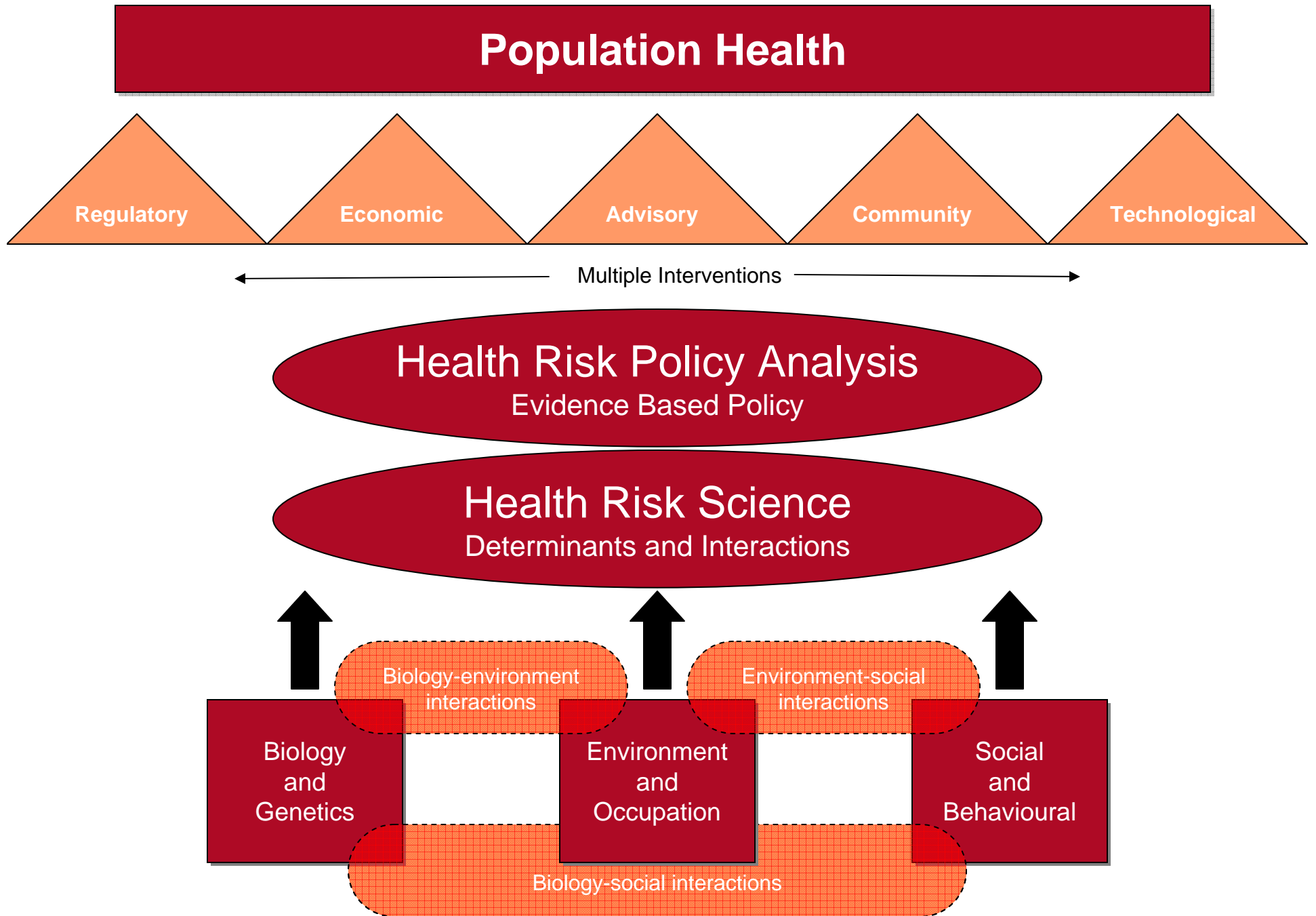
Biology-environment
interactions

Environment
and
Occupation

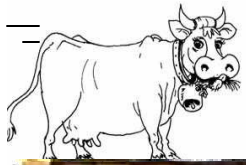
Environment-social
interactions

Social
and
Behavioural

Biology-social interactions



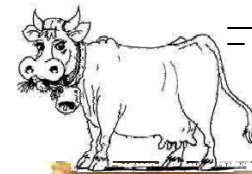
Risk
Perception



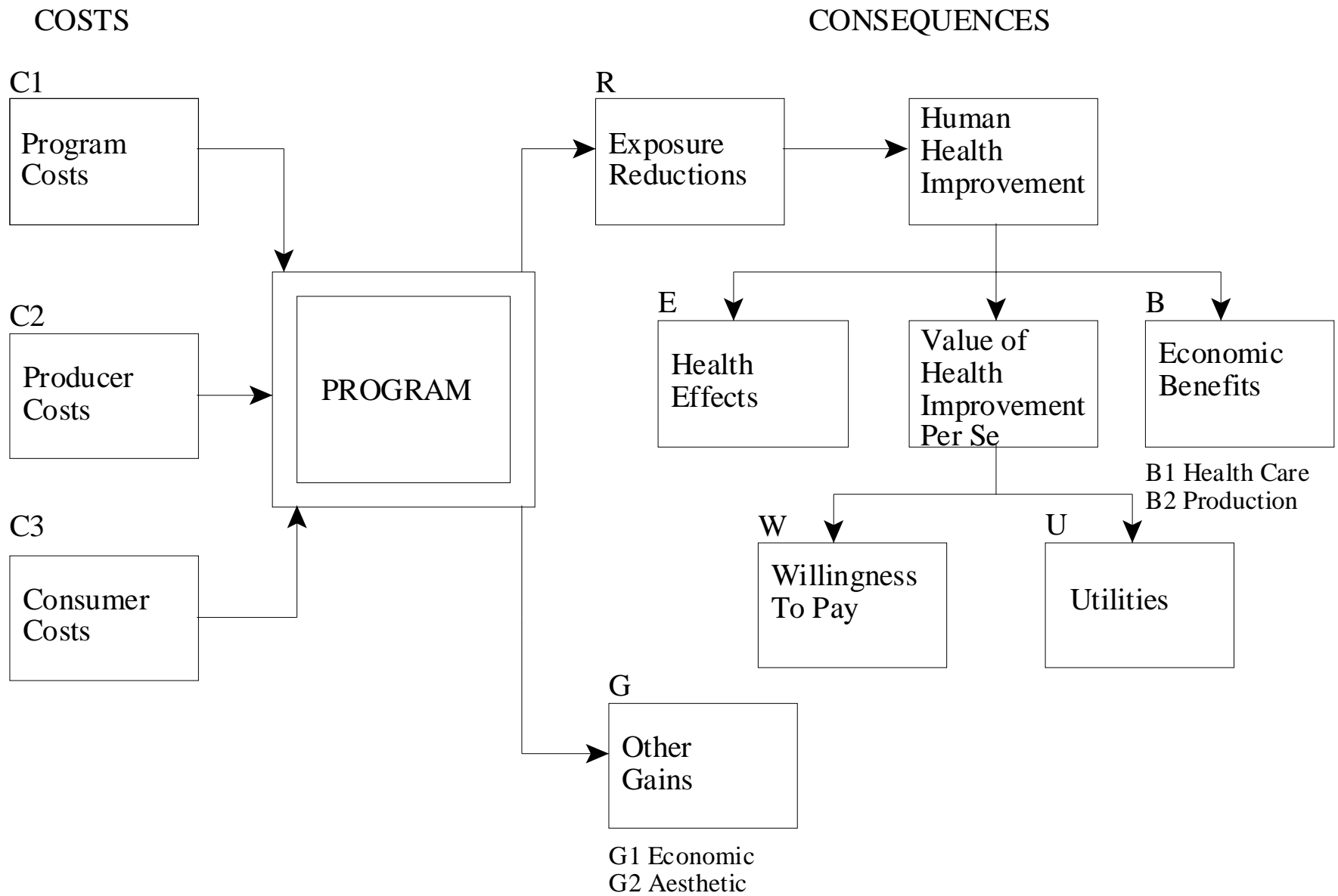
Risk
Analysis



Risk
Management



Risk Management Program Evaluation



Decision Analysis

- Cost-effectiveness analysis (CEA)
- Cost-utility analysis (CUA)
- Cost-benefit analysis (CBA)
- Other analyses:
 - Risk analysis
 - Risk/risk analysis
 - Risk/benefit analysis

Principles of Risk Management Decision Making

Precautionary Principle

- ‘Better safe than sorry’ principle
- A tool to aid decision-making in the face of uncertainty
- Origins in European environmental regulation
- Present in over 20 international laws, treaties, protocols and declarations
- Application to health risk management?
 - Currently unclear
 - Widespread debate regarding the definition, scope and implementation of the principle
 - 14 different interpretations currently in use worldwide

Rio Declaration

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 15,
Rio Declaration on Environment and Development, 1992

Required Conditions

*Where there **1.** threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

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Required Conditions

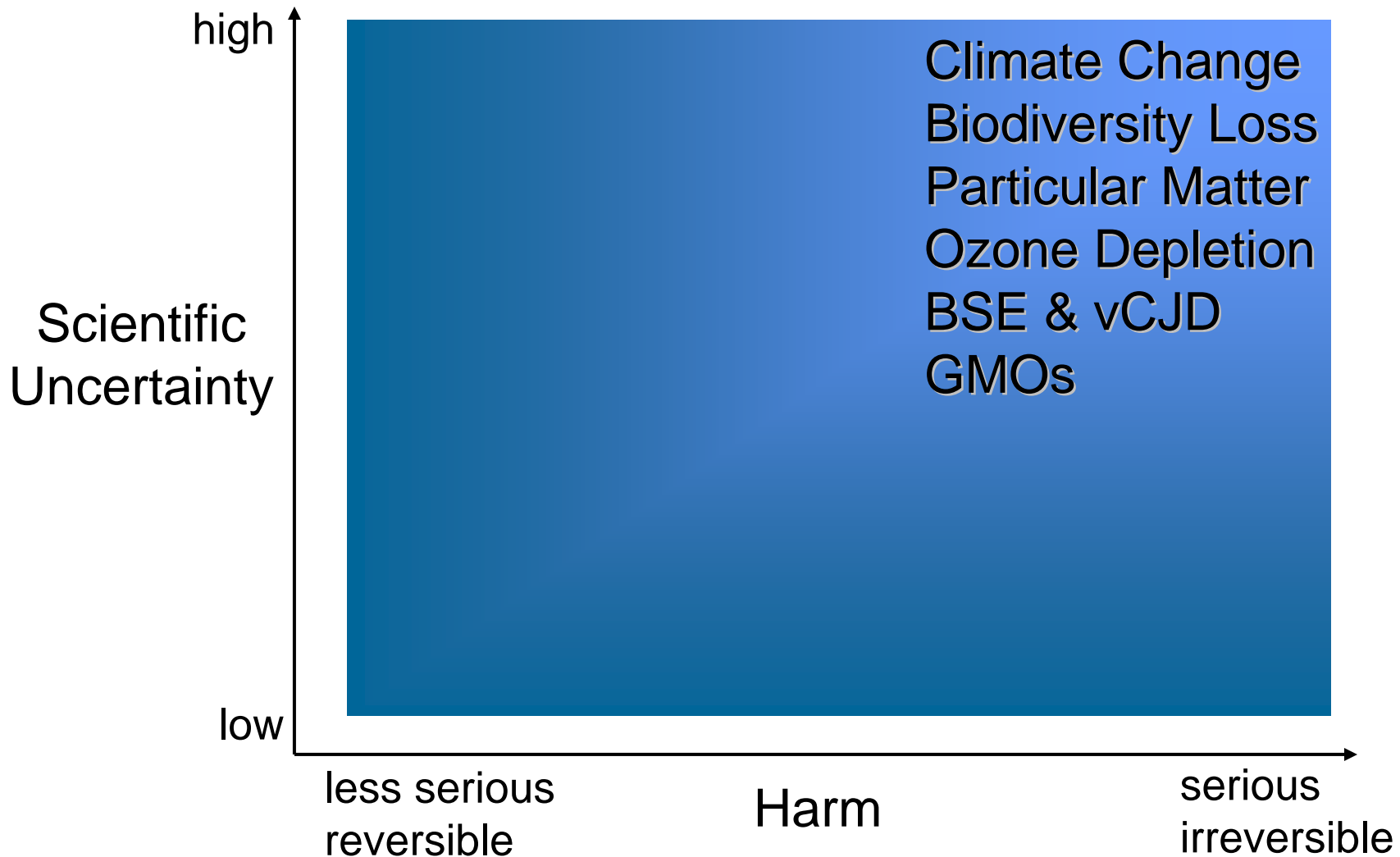
Where there is 1. *the threat of (serious or irreversible) damage*, 2. *lack of full scientific certainty*, shall not be used as a reason for 3. *postponing or preventing*

Areas of Uncertainty

- i. Probability of harm
- ii. Consequences of harm

4. *The ability / power to make a decision about preventive measures*

Applicable Risk Issues



The Precautionary Principle: *Proceed with Caution!*



"The Committee's decided to ban further research until it can be proven your 'wheel' poses no threat to the environment, society or public health."

Risk-based Decision Making

- Expend risk management resources in proportion to the level of (demonstrated or anticipated) risk

In contrast to the precautionary principle, risk-based decision making requires evidence of risk before intervention.

Unlike the precautionary principle, the level of effort expended to control risk is related to the level of demonstrated risk.

‘Mad Cow Disease’ in Canada



- Canada has been challenged both economically and socially by BSE since the first indigenous Canadian case was confirmed in May 2003 in a 6-year old Albertan beef cow.

BSE and vCJD in Canada

- BSE Cases in Canada:
 - 1993: 1 imported cow from UK
 - 2003: 2 -1 case diagnosed in Canada on May 20, 2003 + 1 case diagnosed in the U.S. on December 23, 2003 and confirmed as having been imported from Canada.
 - 2006: 5 reported cases
 - 2007: 3 reported cases
 - **2008: 3 reported cases**
- vCJD Cases in Canada:
 - 2002: 1 patient, who had multiple stays in the UK during the outbreak of BSE
 - While in the UK, the patient ate processed meat products known to carry a high risk of BSE transmission if the products are made from infected cows.

BSE Risk Management in Canada

- 1997: CFIA banned the use of brains, spinal cords and other parts, known as specified risk materials (SRM), in cattle feed. The feed ban also applied to the remains of sheep, goats, bison, elk and deer.
- 2003: Slaughterhouses were to dispose of all SRMs from the bodies of cattle older than 30 months.
- 2004: New regulations to prevent animal parts linked to BSE from being fed to pets and livestock such as chicken or pigs (not only cows and sheep).
- 2006: Cattle tissues capable of transmitting BSE were banned from all animal feeds, pet foods and fertilizers.
- 2007: CFIA introduces enhanced feed ban.

vCJD Risk Management in Canada

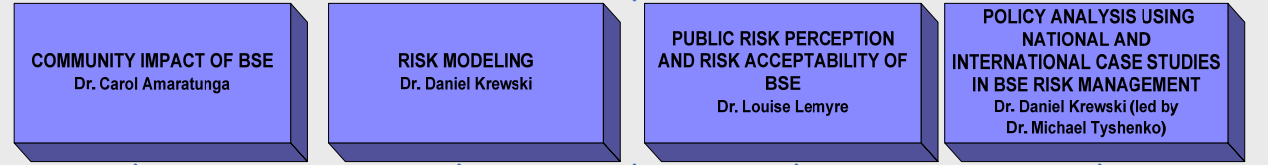
- People not eligible to donate blood or plasma if they spent a cumulative total of ≥ 3 months in U.K. or France between 1980 and 1996, or a cumulative total of ≥ 5 years in Western Europe (outside U.K. or France) since 1980.
- People not eligible to donate blood or plasma if have had a blood transfusion in the U.K., France or Western Europe since 1980.

Development of an Integrated Risk Management Framework For Prion Diseases

INTEGRATED RISK MANAGEMENT FRAMEWORK FOR BSE
(McLaughlin Centre for Population Health Risk Assessment, University of Ottawa)

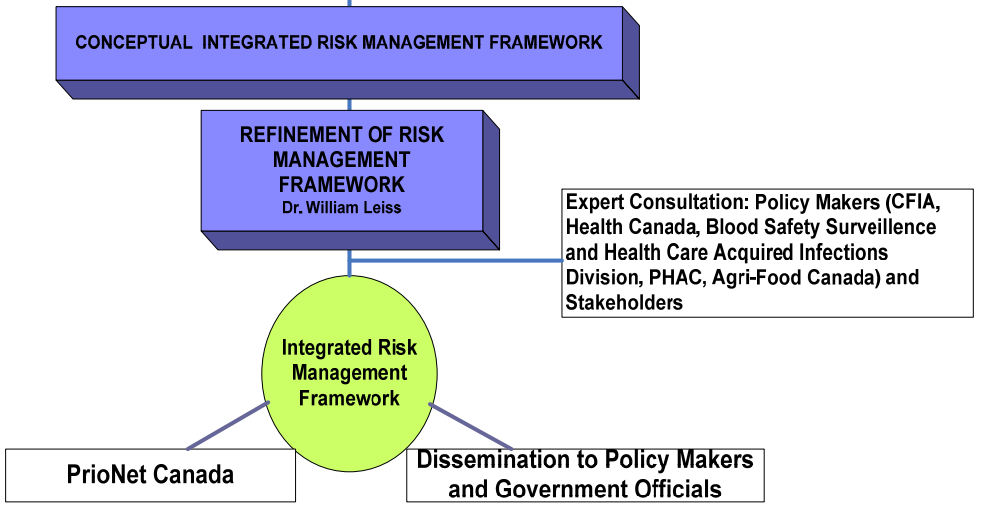
Theme Leader: Dr. Maura Ricketts, PHAC	Co-Investigators: Dr. William Leiss, Uottawa Dr. Carol Amaratunga, UOttawa Dr. Louise Lemyre, UOttawa Dr. Michael Tyshenko, UOttawa	Highly Qualified Personnel's: Dr. Sam Kacew, UOttawa Paul Boutette, UOttawa Dr. Nataliya Karyakina, UOttawa Dr. Wenran Jiang, U of Alberta Dr. Natalia Shilnikova, Uottawa	Post-doctoral fellows: Dr. Mustafa Al-Zoughool David Cottrell	Research Coordinators: Dr. Shalu Darshan Sarah Crowe	Partners: Dr. Robert Clarke, PHAC; Dr. Brian Evans, CFIA; Dr. Fonda Munroe, CFIA; Dr. Noel Murray, CFIA; Dr. Susie ElSaadany, PHAC; Mr. Bob Hills, Health Canada
Associate Theme Leader: Dr. Michael Mehta, U of Saskatchewan			Graduate Students: Roxanne Lewis Nawal Farhat Margaret Wilson		
Principal Investigator: Dr. Daniel Krewski, UOttawa					

PAHOWHO LATIN AMERICA BSE CASE STUDY



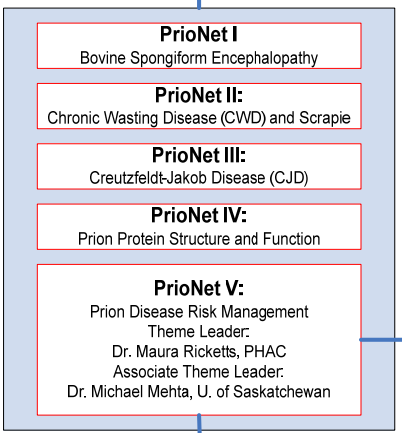
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| <ol style="list-style-type: none"> 1. Preliminary literature reviews and synthesis on the socioeconomic impact of BSE 2. Preliminary surveys of farm crisis call lines and agricultural informational service centers 3. Series of four cross country focus groups with members of rural households 4. Knowledge Exchange Workshop | <ol style="list-style-type: none"> 1. Systematic review of existing literature on risk projection models 2. Assessment and refinement of BSE risk projection models 3. Evaluation and Suggestion of Policy options | <ol style="list-style-type: none"> 1a. Review and synthesis of literature on psychosocial impact of BSE 1b. Psychosocial case studies 1c. Mapping of psychosocial framework 1d. Psychosocial gap analysis 2. Focus groups with emphasis on risk acceptability issue 3. National Survey of Public Perception of BSE | <ol style="list-style-type: none"> 1. Initial literature scan 2. Compilation and analysis of policy initiatives in high incidence regions (EU and North America (USA/Canada) and low incidence/no incidence region (Asia, Australia, South America and Middle East) 3. Integration of international aspects of BSE risk management into our risk management model |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

FRAMEWORK COMPONENTS



PrioNet V: PRION DISEASE RISK MANAGEMENT PROJECT FRAMEWORK

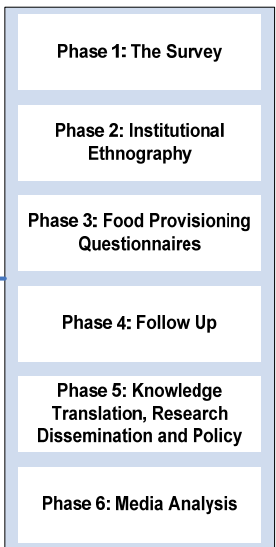
PrioNet Canada
Scientific Director: Dr. Neil Cashman
Executive Director: Dr. Patricia McNicol
Chair, Board of Director: Dr. Donald Rix
Administrative Centre: The University of BC and Vancouver Coastal Health Research Center



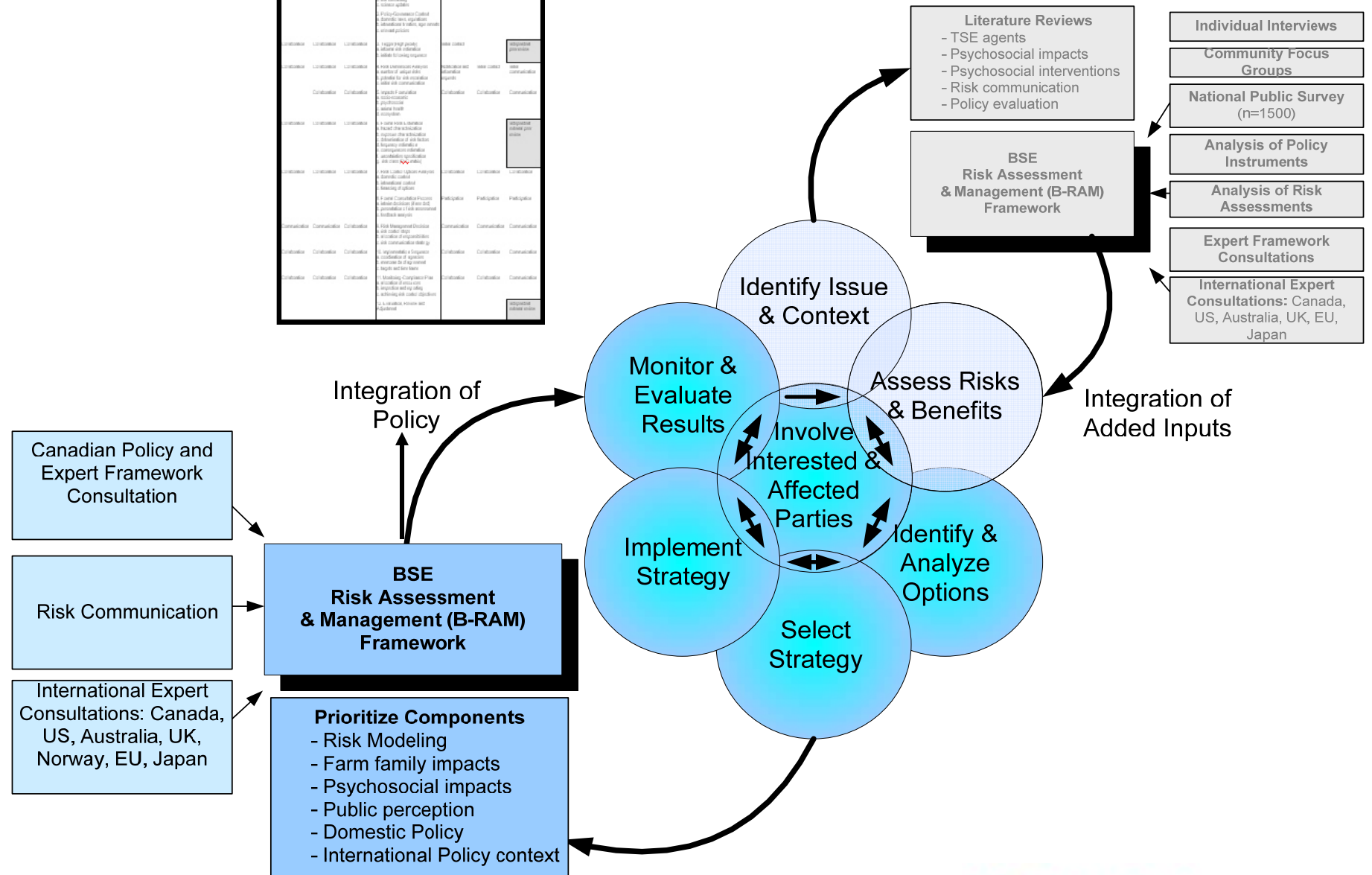
COHORT STUDY OF THE IMPACT OF PRION DISEASE ON FARM FAMILY COMMUNITY HEALTH

Principal Investigators:
Dr. Wilfreda Thurston, U of Calgary
Dr. Carol Amaratunga, U of Ottawa

Co-Investigators:
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Dr. Barbara Clow, Dalhousie University
Dr. Elaine Enarson, Brandon University
Dr. Lorraine Greaves, BC Center of Excellence for women's Health
Dr. Louise Lemyre, U of Ottawa
Dr. Lynn McIntyre, U of Calgary
Dr. Stephen McLachlan, U of Manitoba
Dr. Lynn Meadows, U of Calgary
Dr. Tracey O'Sullivan, U of Ottawa
Dr. Frances Shaver, Concordia University
Dr. Alan Smart, U of Calgary
Dr. Josephine Smart, U of Calgary
Dr. Cora Voyageur, U of Calgary
Collaborator's:
Margaret Haworth-Brockman, Prairie Women's Health Centre of Excellence
National Coordinator:
Madhu Sindhwani



1. The Government of Canada's Policy			2. The Government of Ontario's Policy		
Ministry	Year	Policy	Ministry	Year	Policy
Health Canada	2007	Health Canada's BSE Policy	Health Canada	2007	Health Canada's BSE Policy
Health Canada	2008	Health Canada's BSE Policy	Health Canada	2008	Health Canada's BSE Policy
Health Canada	2009	Health Canada's BSE Policy	Health Canada	2009	Health Canada's BSE Policy
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Health Canada	2014	Health Canada's BSE Policy	Health Canada	2014	Health Canada's BSE Policy
Health Canada	2015	Health Canada's BSE Policy	Health Canada	2015	Health Canada's BSE Policy
Health Canada	2016	Health Canada's BSE Policy	Health Canada	2016	Health Canada's BSE Policy
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Health Canada	2018	Health Canada's BSE Policy	Health Canada	2018	Health Canada's BSE Policy
Health Canada	2019	Health Canada's BSE Policy	Health Canada	2019	Health Canada's BSE Policy
Health Canada	2020	Health Canada's BSE Policy	Health Canada	2020	Health Canada's BSE Policy
Health Canada	2021	Health Canada's BSE Policy	Health Canada	2021	Health Canada's BSE Policy
Health Canada	2022	Health Canada's BSE Policy	Health Canada	2022	Health Canada's BSE Policy
Health Canada	2023	Health Canada's BSE Policy	Health Canada	2023	Health Canada's BSE Policy
Health Canada	2024	Health Canada's BSE Policy	Health Canada	2024	Health Canada's BSE Policy
Health Canada	2025	Health Canada's BSE Policy	Health Canada	2025	Health Canada's BSE Policy



Integrated Risk Management Framework for Prion Diseases
will be presented by William Leiss, PhD, FRSC, OC



