



research in public health systems and services

Using Complexity Science to Improve Public Health Systems and Services in Canada

Marjorie MacDonald & Bernie Pauly

University of Victoria

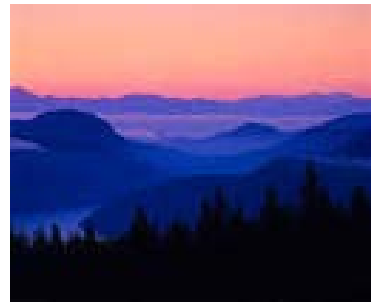
2015 PHSSR Keeneland Conference

- Michael Smith Foundation for Health Research of British Columbia (MSFHR)
- Public Health Agency of Canada (PHAC)
- Canadian Institutes of Health Research (CIHR)
 - Institute of Population and Public Health
 - Institute of Health Services and Policy Research
 - Institute of Aboriginal People's Health

Partners



Victoria, BC Canada



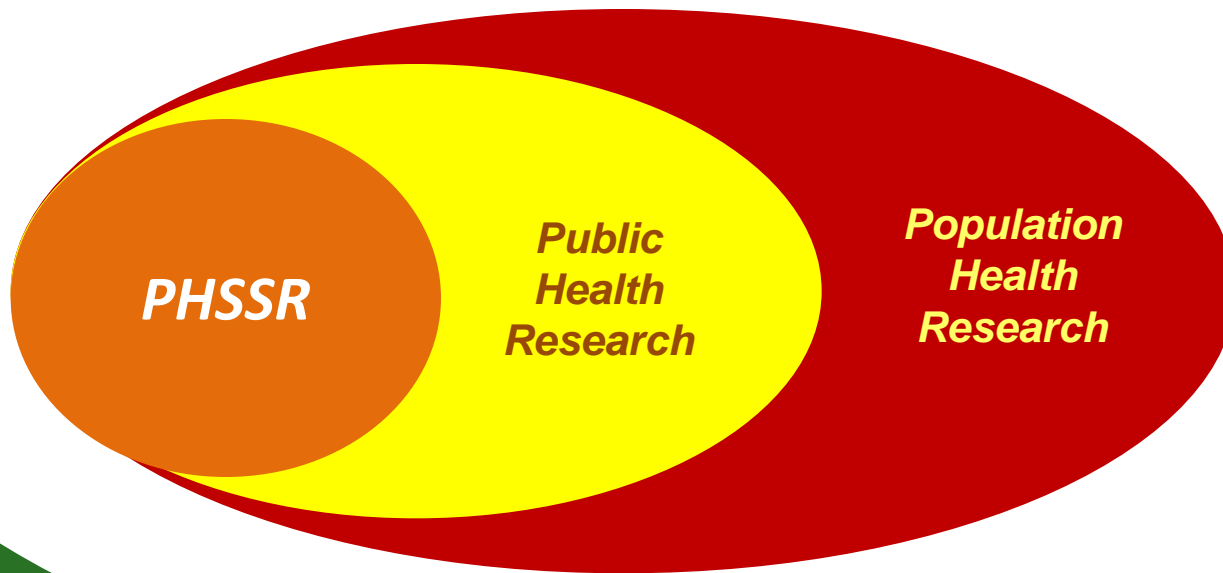
Purpose

- To describe the collaborative development of a program of research on Public Health Systems and Services (PHSSR) that is based on a complex adaptive systems framework
- Inspired by work of our PHSSR colleagues from the US, our research began in 2006 in BC and has expanded to Ontario, across Canada and is now linking up with colleagues in the US

What is PHSSR?

Public health systems and services research (PHSSR) is defined as *“a field of study that examines the organisation, funding and delivery of public health services within communities, and the impact of these services on public health”*

Mays, Halverson & Scutchfield, 2003, p, 180



Background

- A series of PH Emergencies in Canada (SARS, tainted blood scandal, Walkerton water contamination)
- Loss of public health infrastructure
- Need identified to define core functions of PH
- Need to renew and reform PH Systems
- Renewal process initiated across the country

Background

- Core Functions Framework developed in BC as the centerpiece of PH system renewal
- Interdisciplinary team of researchers, decision makers, and practitioners created with infrastructure funding
- Think Tank held to develop initial PHSSR priorities

CORE FUNCTIONS FRAMEWORK

Public Health Strategies

Health Promotion

Develop healthy public policy; advocate/create supportive environments; strengthen communities; develop personal skills; build partnerships

Health Protection

Legislate, Regulate, Tax, Inspect, Enforce, Punish

Preventive Interventions

Immunize, Screen, Counsel, Support behaviour change, Treat

Health Assessment & Disease Surveillance

Public health epidemiology, clinical epidemiology, health lab networks, analysis and dissemination

Core Programs

Health Improvement

Programs that work to reduce a wide range of health problems. Includes a focus on reproductive health, healthy development, creation of healthy communities, enabling adoption of healthy patterns of living, food security, and promotion of mental health.

Disease, Injury, & Disability Prevention

Programs that focus on specific diseases, disabilities, and injuries that contribute significantly to the burden of disease (e.g. chronic diseases, injuries, mental health problems, problem substance use, violence, communicable diseases, prevention of the adverse effects of health care)

Environmental Health

Programs that work to protect people from environmental hazards, both from natural causes and human activity (e.g. clean water and air, safe food, healthy community design, other community environmental health issues)

Health Emergency Management

Programs that ensure the public health sector is fully prepared and able to respond effectively to severe outbreaks of communicable disease, natural or human-induced disasters, major accidents, terrorism, etc.)

Population & Equity Lenses

System Capacity

Health information systems, health human resources, core competencies, research, planning, performance management, legislation

Key Events in Development of PHSSR in Canada

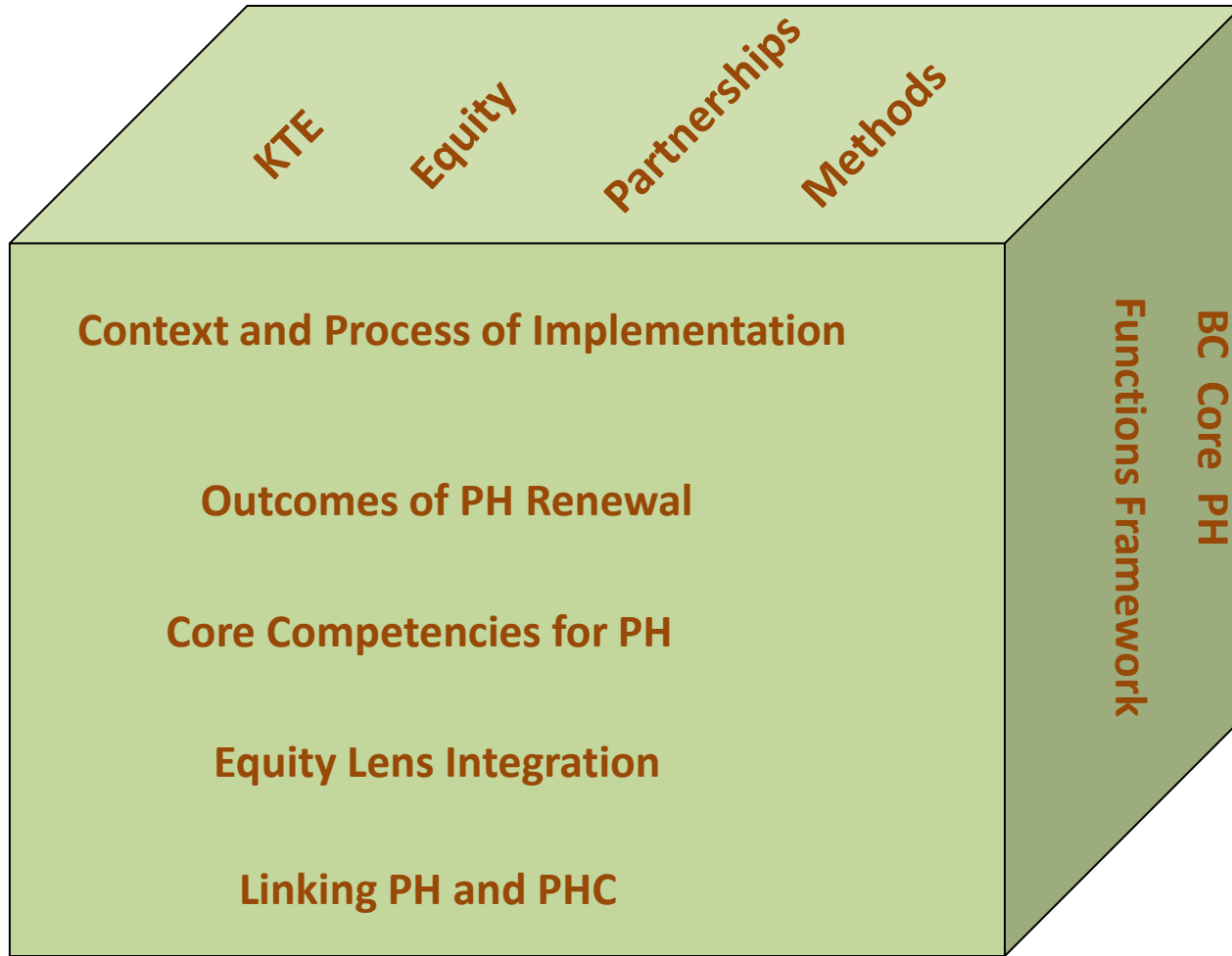
- 2007 – Initial BC Think Tank to develop a provincial PHSSR research agenda
- 2009 – Renewal of PH Systems (RePHS) grant
- 2009 – IPPH Strategic Plan
- 2011 – National Think Tank to develop a pan-Canadian PHSSR research agenda
- 2012 – Ontario Think Tank to develop an Ontario-specific PHSSR agenda
- 2014 – Follow-up BC Think Tank to renew PHSSR agenda and reconceptualize CPFRI



research in public health systems and services

Products of 2007 Think Tank

- A framework and time-ordered set of research priorities to guide proposal development
- Conceptualization of CF Framework as a population health intervention grounded in a complex adaptive systems perspective
- Leveraged \$5M for research 2006-2011
- Expansion to include province of Ontario



Population Health Interventions

- **Population health interventions** are policies or programs within the health sector or between sectors that have the potential to impact health at the population level.
- PHIs are often provided through public health services, or they may involve collaboration across sectors.
- The defining characteristic is population health impact.

Population Health Interventions

- In 2009, following the development of our initial research agenda, the IPPH Strategic Plan was released, confirming and supporting our proposed direction
- They argued that we need to understand population health interventions and the systems into which they are implemented as complex adaptive systems and suggested new methodologies were needed

Complex Adaptive Systems



Agents

Interconnections

Self Organization

Emergence

Co-evolution

(Anderson, 2005)

Research Implications

- From a practical level, we need to identify or develop research methods that are congruent with CAS concepts, and that also make space for the explicit values base of public health
- In doing so, we need to address the notion of context
 - Context as social structure (target of intervention)
 - Context as system (system in which intervention is implemented)

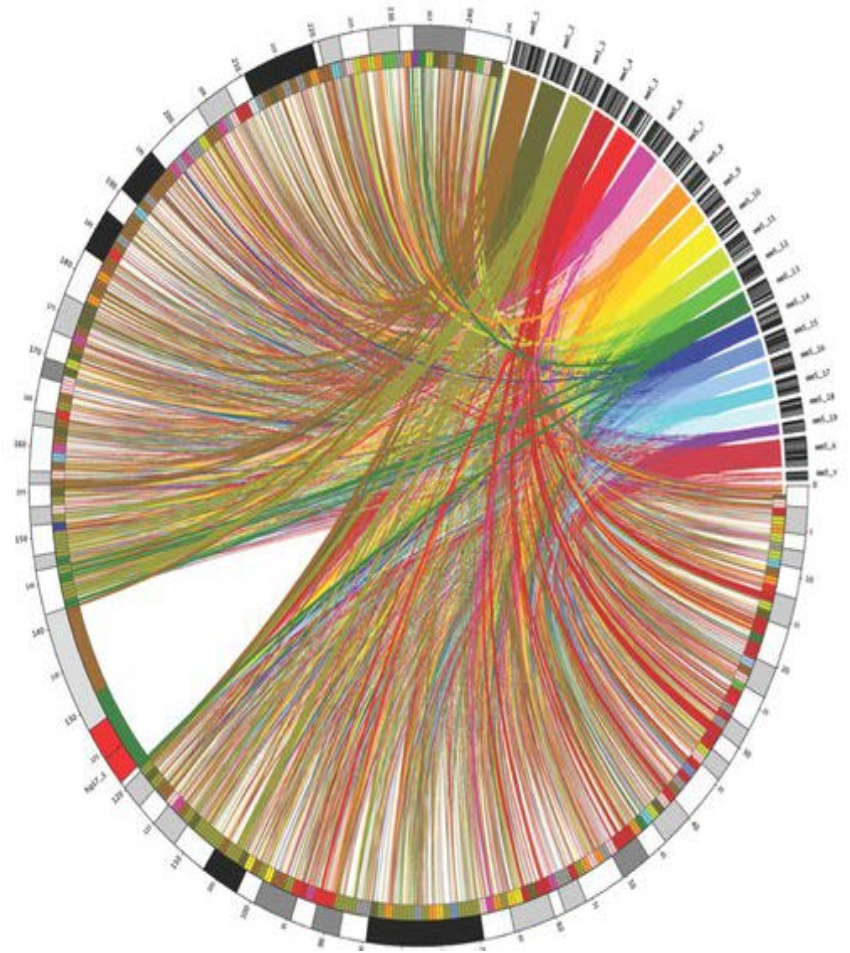
We need methods that will account for:

- the recursive nature of interventions
- multiple interconnected and non-linear relationships
- Alternative conceptualizations of causality
- The ongoing and dynamic nature of change
- The embeddedness of interventions in their contexts
- The nature of context and its relationship to interventions
- Emergent patterns and structures
- Network development and behaviour

Methodological Approaches to Studying CAS

The use of visual and collaborative methods to map and study complexity: case study

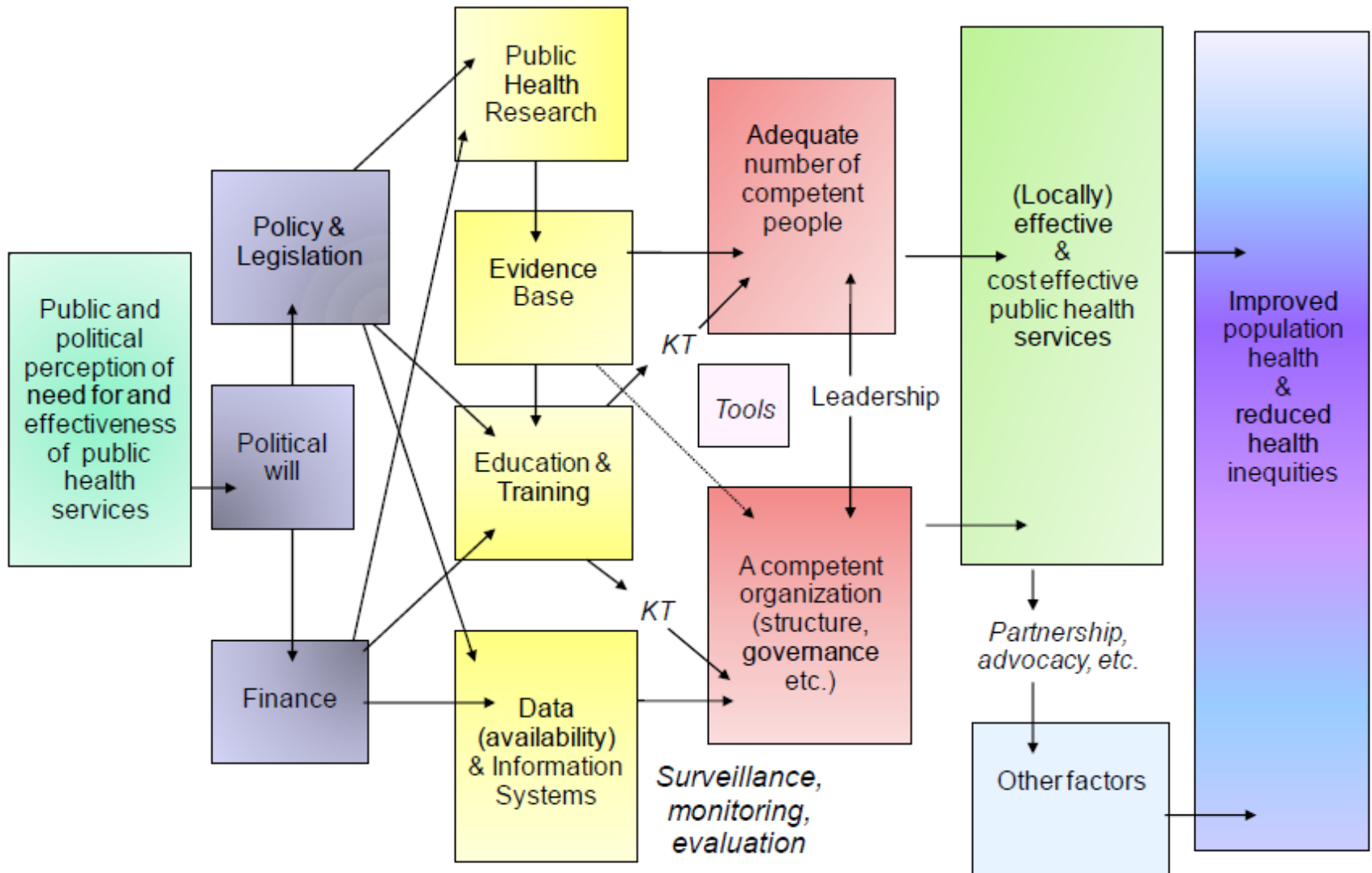
- concept mapping
- situational analysis mapping
- social network analysis
- systems dynamic modelling
- realist synthesis
- exploiting NVIVO functions to map interconnections in qualitative data



- Purpose – to develop a national agenda for PHSSR
- Brought together a diverse group of PH researchers, practitioners, decision makers and funders to collaborate on a PHSSR agenda that expanded on the initial work in BC
- Products – a draft framework and logic model

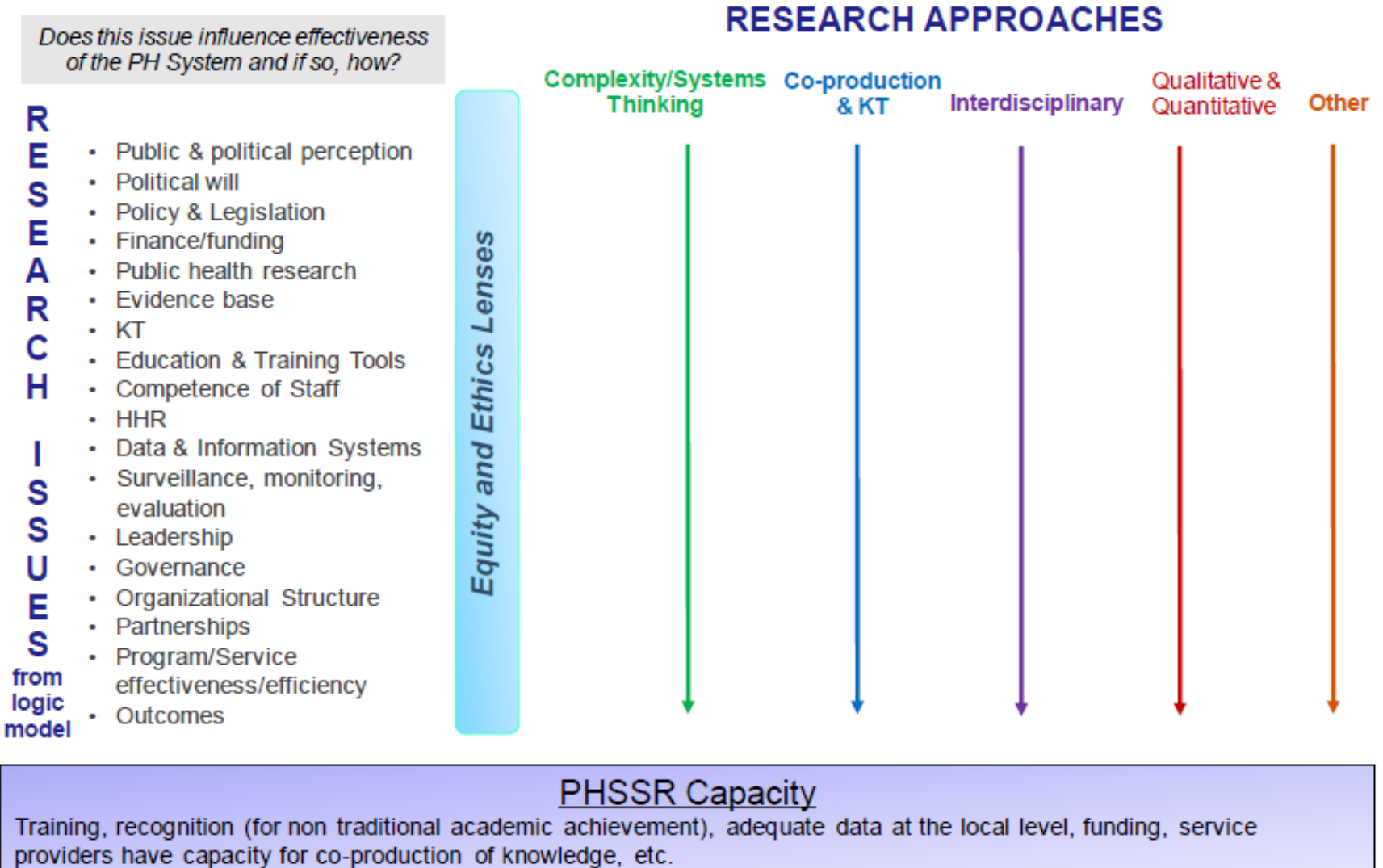
DRAFT Public Health System Performance Logic Model

A well performing (effective) public health system delivers efficacious public health services efficiently as its contribution to improving population health while reducing health inequities.



DRAFT Framework for a Public Health Systems & Services Research Agenda

Purpose: To develop and transfer knowledge about the factors that lead to the provision of effective (local) public health services.

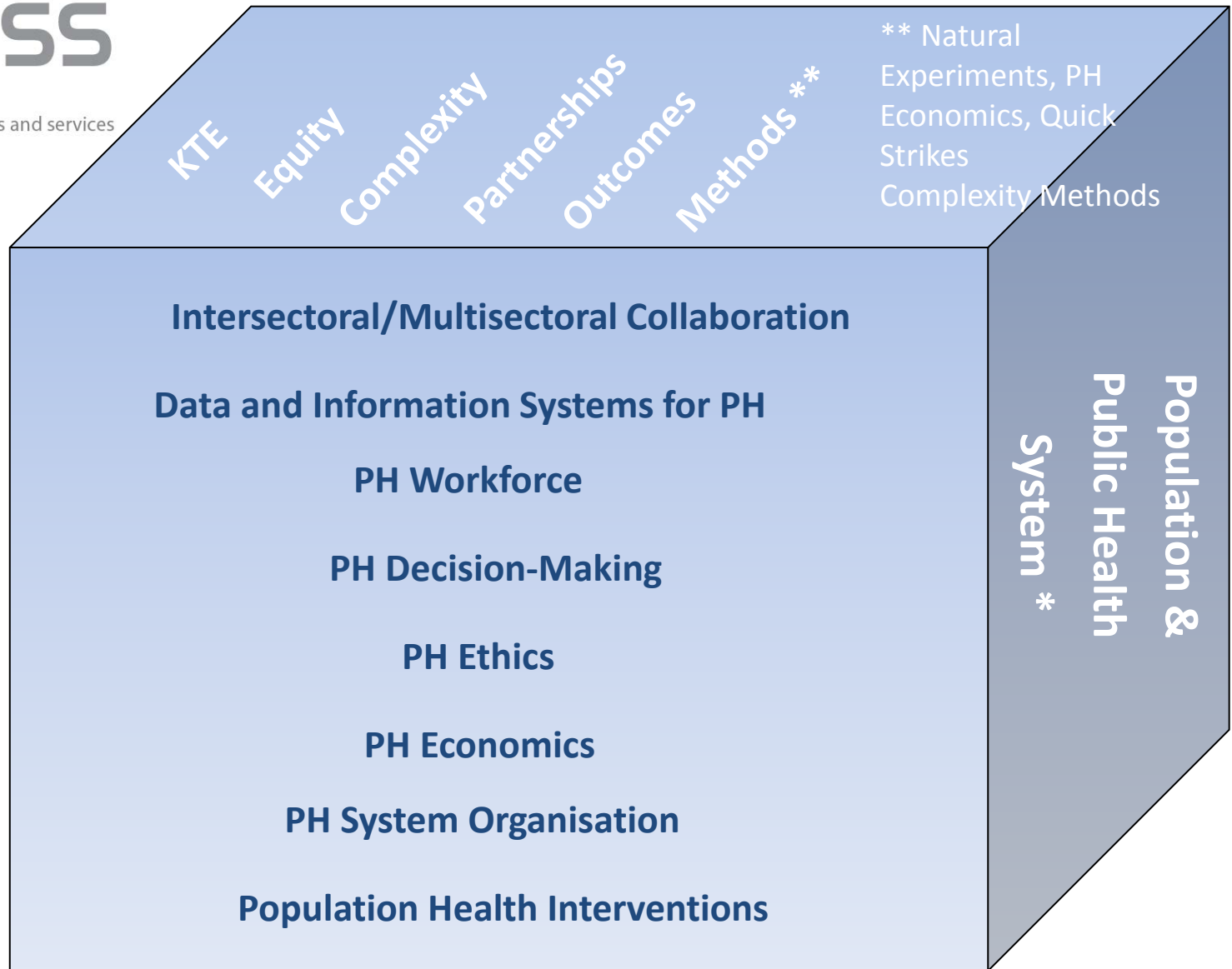


2014 Think Tank for Renewal of BC PHSSR Agenda

- Purpose
 - to reconceptualize and re-brand CPHFRI
 - To develop a renewed five year research agenda



* The collective infrastructure and actions of individuals and public, private and voluntary organizations that contribute to local, regional, provincial, national and global health and wellness through promotion, prevention and protection.



** Natural Experiments, PH Economics, Quick Strikes Complexity Methods

KTE
Equity
Complexity
Partnerships
Outcomes
Methods **

Intersectoral/Multisectoral Collaboration

Data and Information Systems for PH

PH Workforce

PH Decision-Making

PH Ethics

PH Economics

PH System Organisation

Population Health Interventions

System *

Population & Public Health

Studying CAS: Case study

- Study 'phenomena' in context
- Data collection at multiple levels
- Can capture contextual influences on PHI's
- Explain relationships among actions and outcomes (naturally occurring variations)
- Test Theoretical propositions



research in public health systems and services

Principal Investigators: Marjorie MacDonald, Trevor Hancock, Bernie Pauly, University of Victoria and Warren O'Briain, BC Ministry of Health

ON Academic Lead: Ruta Valaitis, McMaster University

ON Decision-maker Lead: Heather Manson, PHO

Funder: CIHR New Emerging Team Grant (2009-2014)



renewal of public health systems

Purpose


To examine the implementation and impact of public health renewal processes using two public health programs as exemplar cases - chronic disease prevention/healthy living and sexually transmitted infection prevention across the two provinces.

Overarching Research Questions

Question 1: What factors/contexts influence or affect the implementation of these policy interventions?

Question 2: What have been the impacts/effects of these policy interventions on: staff, the organization, the populations served, other organizations, and communities?

Cross-cutting Research Questions

- a) equity – how is an equity lens applied in the core programs/standards?
 - b) public health human resources – what are the implications of these policy interventions for PHHR?
 - c) primary care/public health collaboration – how do these sectors collaborate? What influences the success of these collaborations?
- 
- A decorative graphic at the bottom of the slide consists of a dark green wave shape on the left that transitions into a grey wave shape on the right.

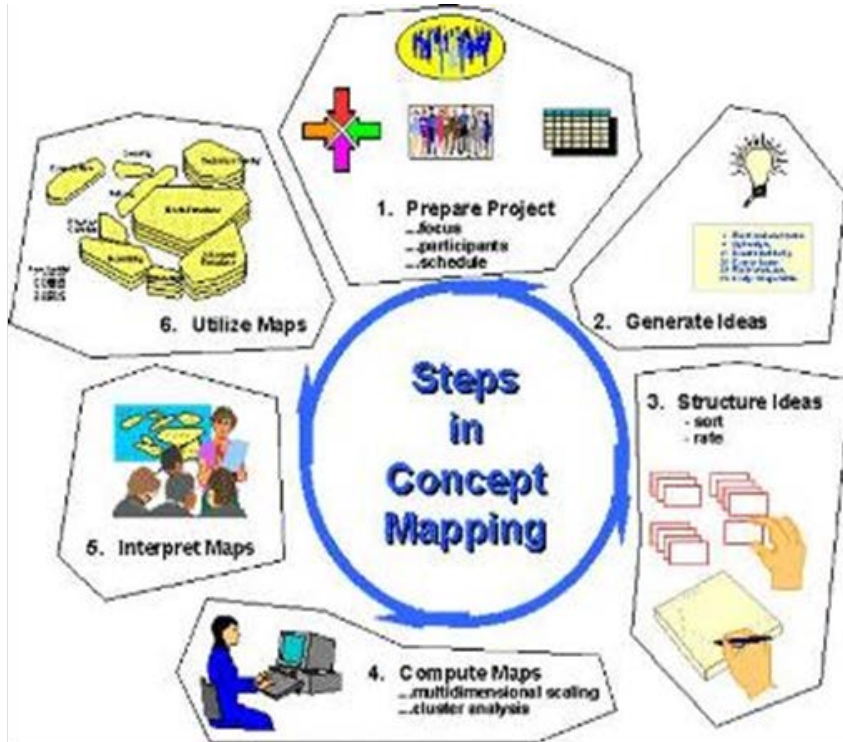
Methodological Approaches

- Overall: Multi-Case Study Design:
Chronic Disease/Healthy Living and STI programs in BC and Ontario
Collaborative Approach
- Situational Analysis (Clarke, 2005)
 - Maps context and relationships
- Concept Mapping (Trochim)

Concept Mapping: Evidence and Equity

- A structured conceptualization process used to develop a framework of participants' understanding of a particular concept and the processes related to the concept
 - Done in 3 phases:
 - brainstorming
 - sorting and rating
 - interpretation

CM: Evidence



- **Brainstorming:**
Prompt: Effective strategies to support the integration of evidence into public health practice and/or decision making are...
- **Sorting and Rating:**
Done online and participants sorted 27 statements into groups

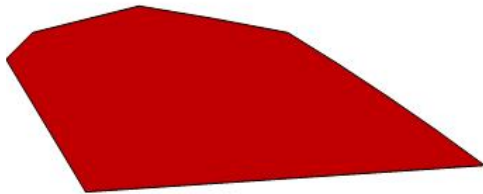
Concept Map

Concept Map:
Effective strategies to incorporate evidence into public health practice and decision-making



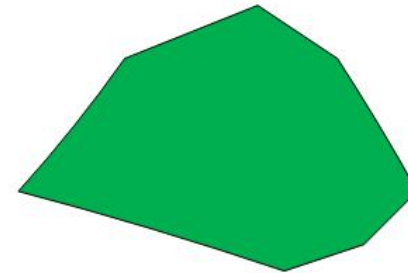
Cluster 4

Supporting relevant,
public health specific
evidence



Cluster 3

Structural supports for
developing, accessing and
using evidence



Cluster 1

Fostering innovation,
learning and an evidence-
informed public health
culture



Cluster 2

Building staff capacity

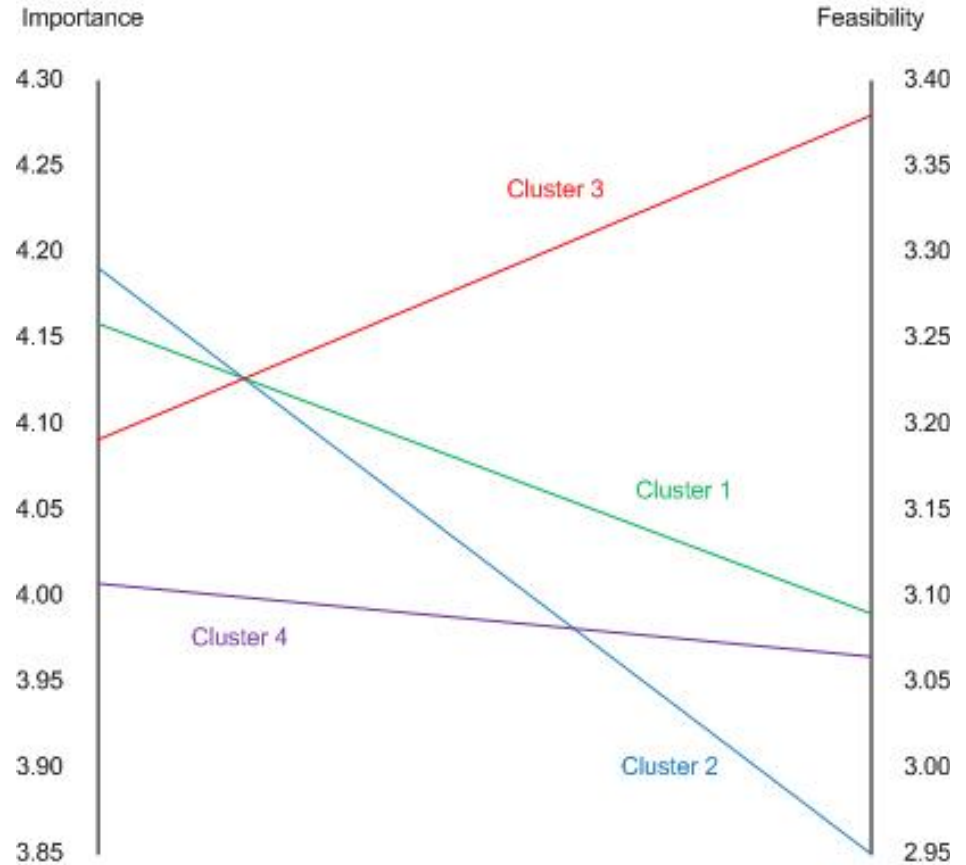
Pattern Matching: Importance and Feasibility

Importance

<u>Rank</u>		<u>Mean</u>
1	Cluster 2	4.19
2	Cluster 1	4.16
3	Cluster 3	4.09
4	Cluster 4	4.01

Feasibility

<u>Rank</u>		<u>Mean</u>
1	Cluster 3	3.38
2	Cluster 1	3.09
3	Cluster 4	3.07
4	Cluster 2	2.95



Equity Lens in Public Health (ELPH)

Co-PI's: Bernie Pauly RN, Ph.D

Marjorie, MacDonald, RN, Ph.D

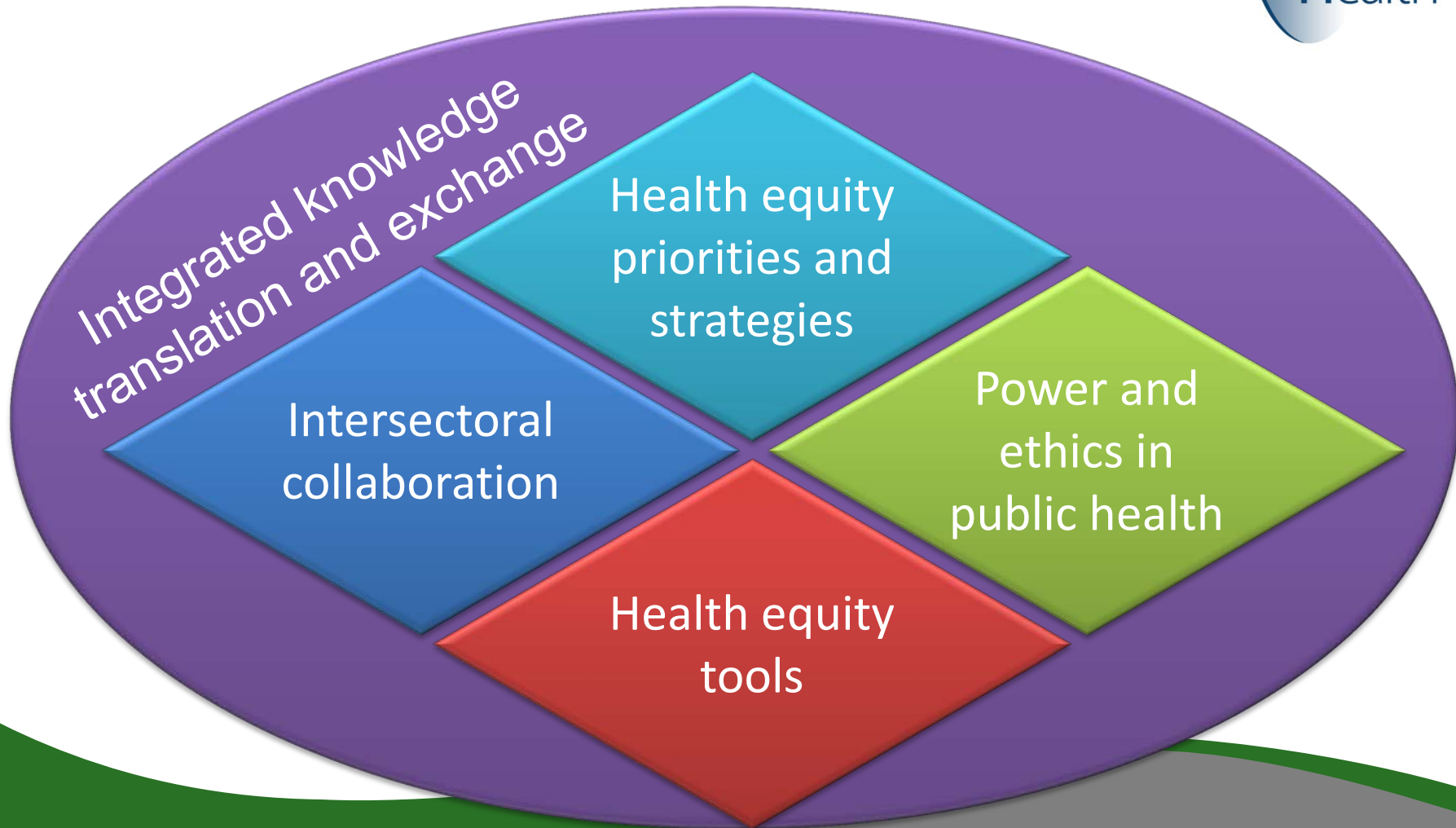
Trevor Hancock, MD, MSc.

Warren O-Briain, Ministry of Health

Purpose: guide and inform learning about the integration of an equity lens in public health and to contribute knowledge of health inequities reduction.

www.uvic.ca/elph

Four Inter-Related Studies





Health equity priorities and strategies

1. Is health equity identified and prioritized across the health authorities
2. Contextual influences on organizational systems level priority setting and health equity goals
3. Specific public health strategies to reduce health inequities in programs promoting mental health and preventing harms of substance use
4. Changes over time



Indigenous Equity Framework of Relational Environments

Dr. Charlotte Reading
Dr. Jeannine Carriere

**Core
Environments**

**Stem
Environments**



**Root
Environments**



Centre for Aboriginal
Health Research

A blue diamond shape with a white-to-blue gradient, containing the text "Study 2" in a white sans-serif font.

Intersectoral collaboration

1. Who do public health practitioners engage with inside of the health authority on health equity issues related to mental health promotion and prevention of substance use problems?
2. Who does public health engage with outside of the health authority on health equity issues related to mental health promotion and prevention of substance use problems?
3. Who are prominent actors/organizations in social networks for promotion of health equity?
4. What opportunities exist to strengthen intersectoral engagement in the inclusion of health equity in programs to promote mental health and prevent harms of substance use?
5. How does this change over time?



Assessing the Theoretical and Practical Utility of Health Equity Tools

1. What health equity tools are available?
2. What is the theoretical relevance of available tools?
3. What is the practical utility of available tools?

Health Equity Tools

www.uvic.ca/elph

ACHEIA

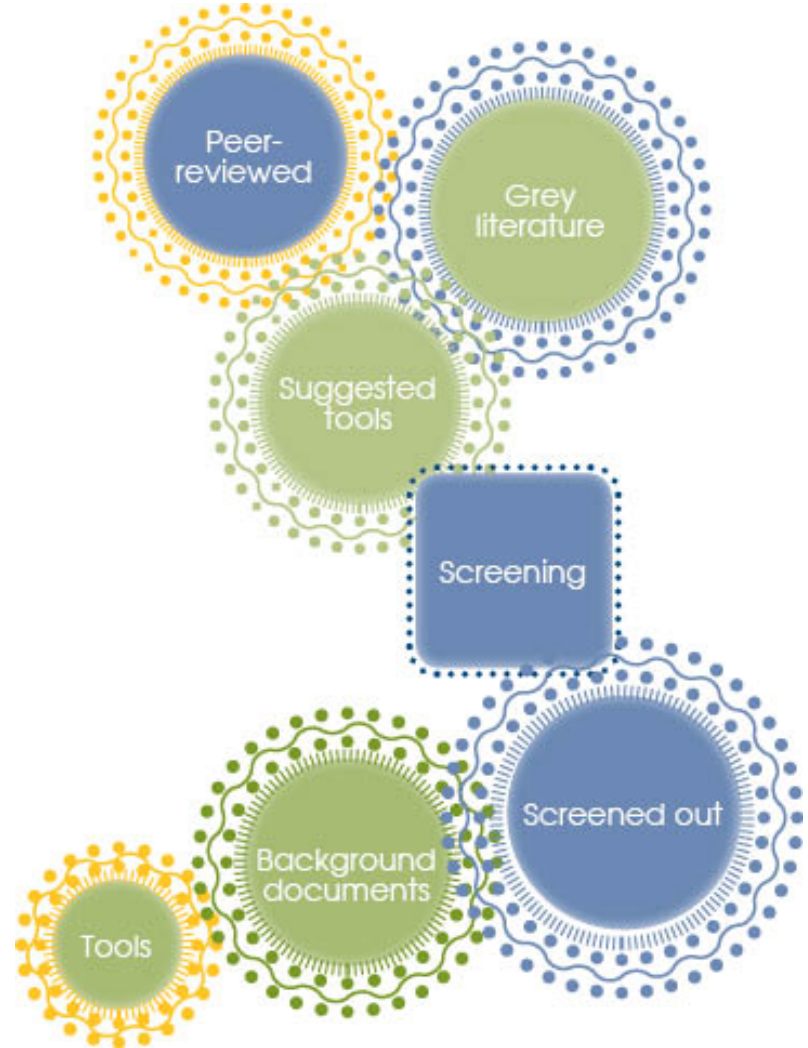
Equity-Focused Health Impact Assessment Framework

The Equity Gauge
Concepts, Principles, and Guidelines

EQUITY Framework for Health

First Steps to Equity
Ideas and Strategies for Health Equity in Ontario, 2008-2010

The Health Equity Assessment Tool: A User's Guide



38 HE Tools



Applying clinical epidemiological methods to health equity: The equity effectiveness loop

Purpose

To inform the development and evaluation of population health interventions and policies across socioeconomic gradients.

Who would use it?

National and international organizations, such as the World Health Organization.

Description

The "equity effectiveness loop" framework is intended to highlight equity issues and factors that influence health equity gaps as part of assessing health needs, effectiveness, and cost effectiveness of population health interventions and policies; The loop consists of five steps arranged in a circle:

1. Burden of illness and aetiology
2. Equity effectiveness
3. Economic evaluation
4. Knowledge translation and implementation
5. Monitoring of programme

Key words: assess health equity gaps, knowledge translation, population health intervention, program planning, socio-economic status

Applications

The author applies the framework in two examples: nets treated with insecticide for malaria prevention and total joint arthroplasty for osteoarthritis.

Reference

Tugwell, P., de Savigny, D., Hawker, G., & Robinson, V. (2006). Applying clinical epidemiological methods to health equity: The equity effectiveness loop. (Review). *British Medical Journal*, 332(7537), 358-361.

Concept Mapping: Practical Criteria

To be useful, a health equity tool should...





research in public health systems and services

With Acknowledgement to..



CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada



**Public Health
Agency of Canada**

**Agence de santé
publique du Canada**

United States PHSSR

- Thought leaders in creating a new field of research, now maturing
- Methodological rigor with more traditional research methodologies
- Capitalizing on health system transformation to evolve the PHSSR agenda
- Relatively resource rich which contributes to innovation
- Rich and accessible data base and data sources

Canada PHSSR

- In its infancy with relatively few committed researchers
- Foregrounding equity and integrated knowledge translation
- Methodological innovation with complex systems research approaches
- Lack of access to data and data bases
- Privacy legislation a significant barrier