

Implementation science *S&T into action*

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The issues facing the Arctic – such as climate change, resource development, and social transformations – are complex and interconnected.

Integrative, solutions-oriented, and socially interactive science is needed.

Visioning Workshop Report
Defining Science Priorities for Canada's New Arctic Science Station
May 2008

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“Integrated, solutions-oriented, and socially interactive science and technology”

-Those were marching orders back in 2008 when CHARS convened Canadian experts on Arctic S&T to talk about what the new initiative could be.

S&T that is useful and used

- Visioning workshop (May 2008):
 - “Strengthening use and uptake of S&T”
- CHARS’ mandate (December 2010):
 - “Address pressing issues in Canada’s Arctic by conducting world-class research and delivering excellent and relevant science and technology”
- Technical committees (Fall/Winter 2012/13):
 - Often know the problems, what’s missing are interventions to respond to those problems

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Goal of CHARS

- not only to do world-class S&T but also to work actively to ensure that S&T is used
- in policy, practice, and programs.

Several of the technical committees for the CHARS S&T Plan identified using the knowledge we have to effect change, to solve the problems S&T has identified as a significant gap in the North

- They called for less study, more action

Solutions-driven S&T

- Line of argument from the S&T to outcome trying to achieve
 - Why is that science or technology needed to move forward toward that outcome?
- Doesn't pre-determine what kind of science or technology you need
 - Gap could be basic science (e.g. in North huge demand for basic monitoring)
 - Could be better application of existing knowledge
- Typically requires integration and interdisciplinarity
- Involving end user/client in setting the research question can improve uptake of resultant S&T and, sometimes, the research question
- How the S&T can be, and is, implemented in policy, practice, and programs is part of the research question

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Characteristics of solution-driven S&T

Solutions-driven research requires a particular way of framing research questions and also influences the way research is conducted and the types of research outputs generated.

- It requires being able to make a "line of argument" for the issue in question through the research to be undertaken to the solution envisioned.

Socially interactive research recognises that individuals, institutions and cultures exert powerful influences on the process and interpretation of research and that these influences need to be identified and understood

Science occurs in context

The implementation of S&T to solve problems is, itself, a research question.

North & solutions-driven S&T

- Land-claims and duty to consult obligations – requirements to engage Aboriginal peoples
- Traditional and local knowledge - residents have value to complement “western” S&T
- Timeliness
 - change is happening so fast in Arctic - can't wait 10-20-30 years for S&T to diffuse into policy, programs, and practice
- Precedents, experience to build on – NCP, IPY
- Rate-limiting step in solutions-driven S&T in the North: capacity for engagement and uptake?

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Characteristics of Northern S&T that pre-dispose it to a solutions-driven approach

Tyndall Centre for Climate Change Research in the UK is a pioneer in solutions-oriented S&T.

They have found that serious and sustained engagement and interaction with a research process will cost a stakeholder organisation a substantial amount in time and effort (just as it will require commensurate commitments from the research team).

Developing a truly interactive relationship between stakeholder and researcher whereby there is real learning occurring on both sides is costly. This is true at each stage of the relationship –

- framing the problem,
- selecting the research methods, and
- interpreting the results.

It is easy for both sides in the relationship to use the rhetoric of stakeholder interaction, or ‘co-production of knowledge’. In practise it is much harder to deliver when competing priorities for rare staff time and effort abound.

However, Tyndall has found that where a sustained commitment is forthcoming from both sides, there can be a genuinely fruitful and creative process that adds unique value to the research interaction.

If client engagement is difficult in UK, is it the rate limiting step in the North?

(NCP=Northern Contaminants Program, IPY = International Polar Year)

Solutions-driven S&T

- The bulk of population health research funded in Western countries is about documenting problems and their causes. This identifies:
 - Reasons to intervene
 - Targets for intervention
- HOW to intervene can only be identified by studying interventions: **developing a science of solutions**

Louise Potvin, Université de Montreal

Solutions-oriented research is driven by the desire to interact with, and inform, the world of **decision making**.

Tyndall Centre for Climate Change Research. 2006. Truly Useful: Doing climate change research that is useful for both theory and practice

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In order to understand what is happening in a particular system, we often constrain or control the number of variables at play – simplify the system - to try to discern the key drivers and processes.

- In medical research, this is a controlled experiment.
- In ecology, it could be experimental plots.
- In fisheries management, it could be fisheries equations and statistical analyses of trawl samples.
- In climate change, it could be models.

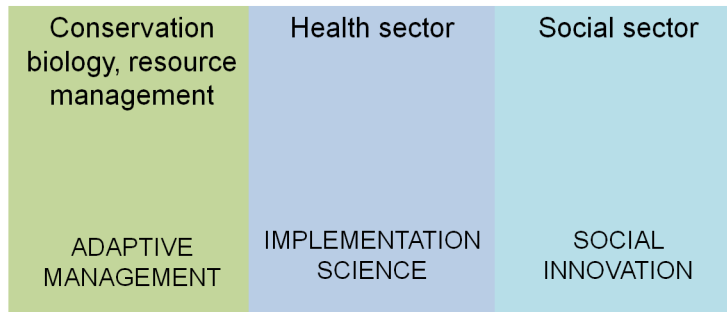
This can be tremendously powerful.

However, when we shift to using our new knowledge to effect change, we often find that we can't control all the variables that we'd like to. Things get messy.

In particular, we've added people, a social dimension to the system.

And, often, the system we're trying to change is the one we're in.

The science of trying to solve real-world problems

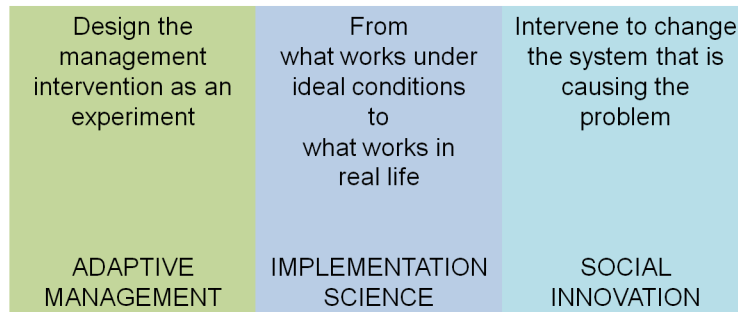


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Different domains have developed different approaches to linking S&T to solutions.

There are likely others, but let's talk about three – as they represent some of the evolution in thinking in this area over the last 30-40 years.

Approaches



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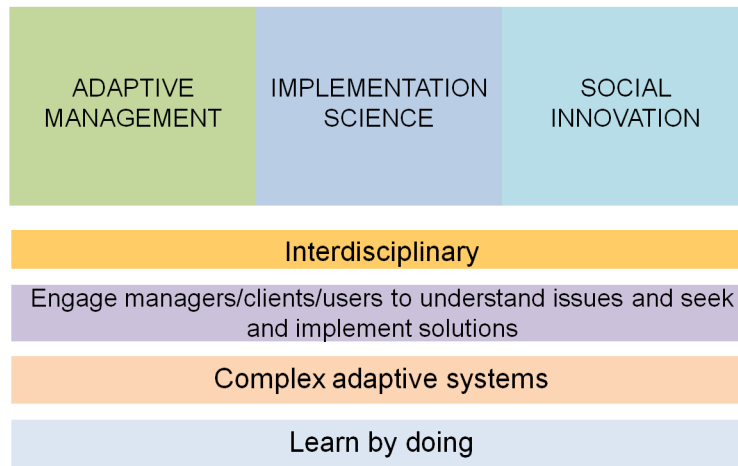
Adaptive management – Holling – 1978

- rooted in the natural sciences – ecology, forestry, land management – turn management into a science experiment
- recognized that often the system you were trying to manage – e.g. a watershed, was unique – no analogue to study
- had to design the management intervention as a large-scale experiment – as an hypothesis to be tested – to learn as you go
- and, critically, to adapt as you learned
- Designing the experiment was challenging, and then putting the monitoring in place, in order to learn from that experiment, proved even more difficult
- But the final step – adaptation - has often proved to be the hardest
 - as shifting the trajectory of a bureaucracy in motion can be extremely difficult
 - especially if it means admitting that your first intervention – your first hypothesis – was wrong
 - Ralph Goodale – while Finance Minister “governments aren’t allowed to make mistakes”

Implementation science ?last 10 years?

- recent recognition in health field – particularly in developing world – that developing the scientific or technological solution to a health problem was only the start of implementing change
- that a lot more attention had to be paid to how that scientific or technological solution was implemented
- For example, World Health Organization has warned that the misuse of antibiotics has made drug resistance more severe and undermined treatments for diseases such as tuberculosis, malaria and gonorrhoea
 - The drugs used to work – we got that science right – it’s how we’ve used them that we got wrong.
- Implementation science represents a “Move away from thinking that the best design comes from a laboratory and sophisticated science only to be degraded by the real world.”
- Implementation science involves the use of scientific methods to produce knowledge about policy or program interventions that have the potential to impact health at the population level.
- Social innovation** – Westley, Zimmerman, and Patton - 2007 – Getting to Maybe
- In the last decade or so, philanthropic organizations focused on funding social change recognized that funding particular programs might help a few people, but that scaling up those programs, or rolling them out more broadly typically required a new approach.
- That new approach is called “social innovation”, and it sets social change firmly in the context of complex adaptive systems.
- It requires both much more nuanced understanding of the conditions that support a particular program’s success, and, more importantly, it focuses on change to the systems in which a particular problem exists.
- So, don’t just adapt the intervention to the current conditions, recognize that the intervention should change the current conditions that created or perpetuate the problem in the first place.
- Micro-finance is an example.

Commonalities?

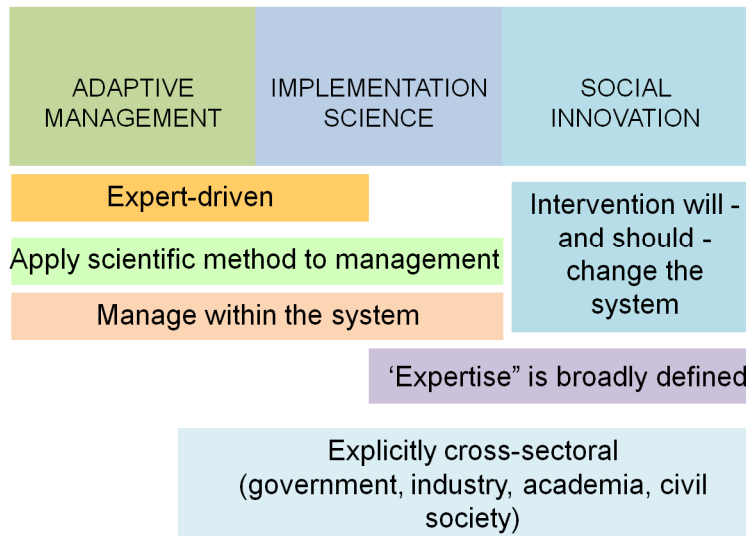


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Caveat – simplifications

AM has evolved since 1978

...and differences?



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Wicked problems

I believe that there is ample evidence that systems approaches and management are inappropriate for the complex ("wicked") problems that are most important today.

There are several reasons.

Problems such as the conservation of world forest resources, the conservation of endangered and threatened species, and global climate change require a complex mixture of considerations.

Each problem involves a host of traditional academic disciplines and other sources of knowledge and understanding.

Perhaps most important, they cannot be separated from issues of values, equity, and social justice.

Don Ludwig. 2001. The era of management is over. Ecosystems 4: 758-764.

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The Tyndall Centre suggests that it is easier for organisations to pose questions about climate change than it is for a research process to answer them.

This is because any "solutions" to climate change are multifaceted, conditional and always framed in terms of political and social acceptability.

Science can't "solve" climate change.

Answering real-world, "wicked" problems is messy.

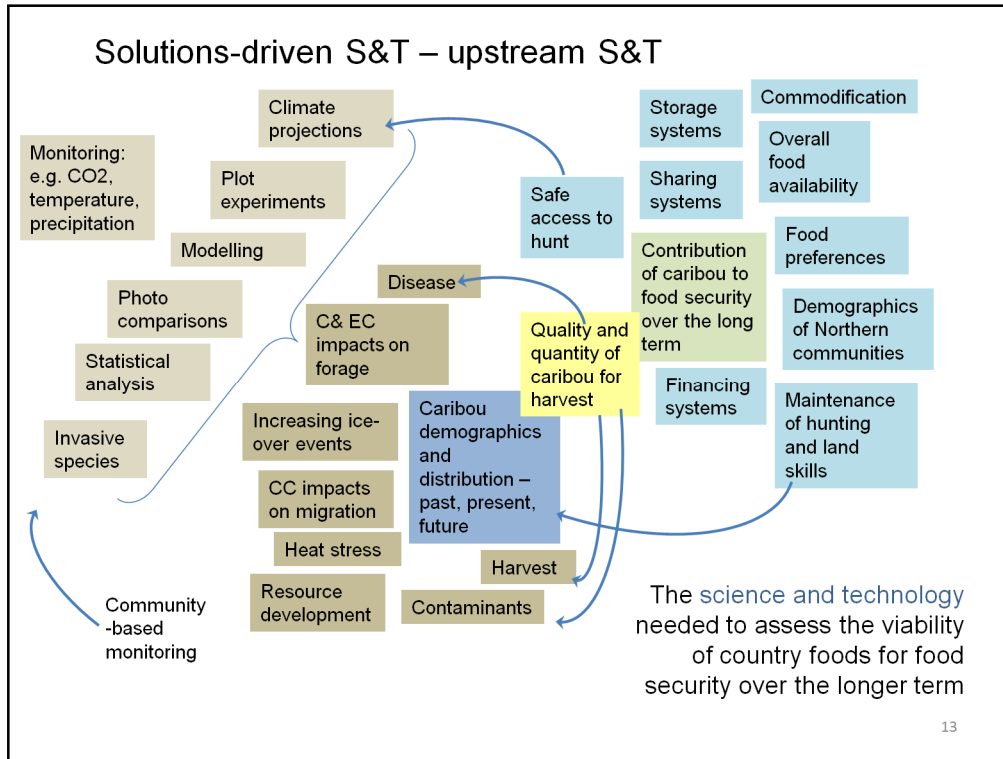
Science can inform solutions.

Where does S&T play in implementation science and social innovation?

1. Informing design of interventions (policy, program, practice)
2. Evaluating intervention
 - Effectiveness
 - Impact
 - Learning on how system in question works
 - Learning on how to intervene

NOT – leading intervention

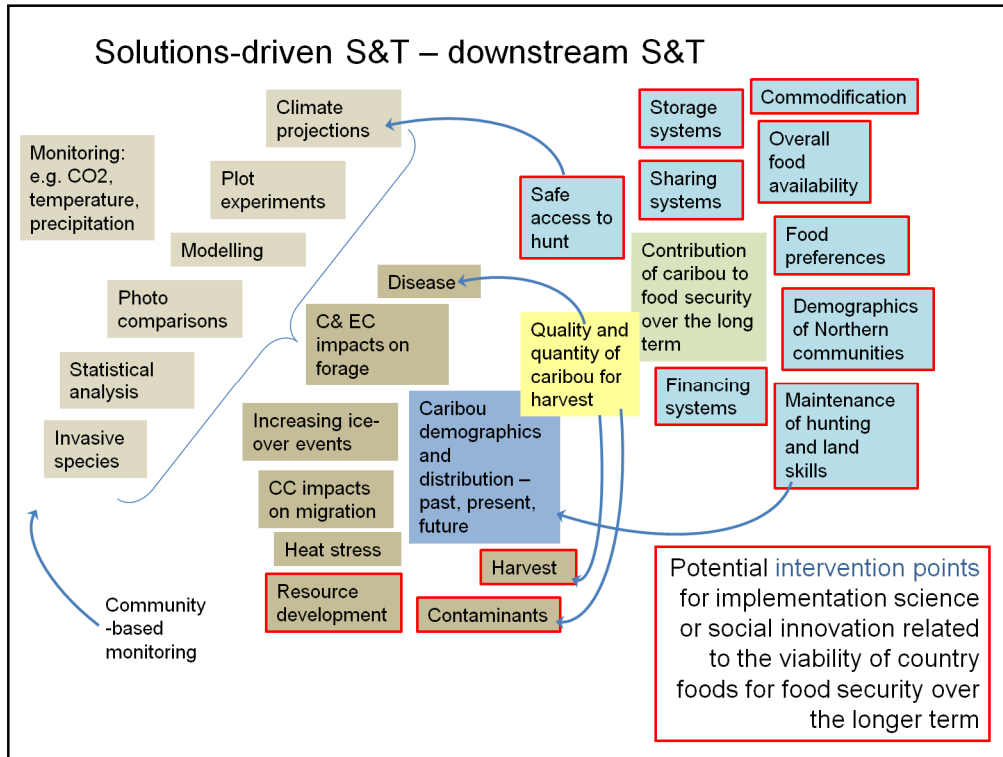
- Need implementation partner(s)



S&T to understand the “problem” and inform action

All of these activities are S&T and all within the scope of CHARS – natural, physical, social, economic, health, technology

- 1) understanding of key drivers and processes
- 2) Past, present, and projected trends



Where can S&T be used to inform action?

Interventions points are where people can undertake activities to effect change in some aspect of the systems.

Those interventions could be

- Policy – e.g. Country foods are key to food security in the North
- Regulation – e.g. of harvest levels, transportation routes and season for mining operation, POPs
- Program – e.g. educational promotion of country foods as good option for health and nutrition
- Funding or financing – e.g. subsidy for equipment and vehicles for hunting, infrastructure investment for plants to process and distribute country foods
- Social norm - e.g. sharing of food with elders and those in need in community

Key lessons from implementation science

- Identify the actors
 - Civil society, private sector, public administration, foundations, institutions
- Integrate multi-disciplinary perspectives to capture complexity
- Engage actors in research
- Open and transparent communications between research and all actors
- Strategic knowledge translation to support redistribution of power among structurally different actors
- Be aware of impact of research apparatus on system

(Louise Potvin, UMontreal)

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- Identify the actors – who can enable (or block)
- Integrate multi-disciplinary perspectives to capture complexity
- Engage actors in research – to inform design of intervention and increase potential for success
- Open and transparent communications between research and all actors – to build trust, credibility
- Strategic knowledge translation to support redistribution of power among structurally different actors – tune information to different groups capacity to intake and use, build capacity
- Be aware of impact of research apparatus on system

Key lessons from social innovation

- 'Scaling' social innovations is not about growing programs or organizations, but about increasing their impact in ways that are appropriate to different contexts.
- Even successful projects can rarely be 'duplicated'
- What is required is a deep knowledge of what works - and why - so that the essence can be preserved while allowing for flexibility and adaptation to different circumstances.
- Aim for 'next practice' not 'best practices'
- Innovation requires risk, experimentation, freedom to fail, and the chance to learn from failure and the unexpected
- Conventional evaluation and accountability stifle innovation
- Collaboration across sectors requires concerted effort

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Although the term 'social innovation' has spread quickly, along with notions of complex adaptive systems and related concepts, it is not clear that its use is leading to, or associated with, transformational change.

Even successful projects can rarely be 'duplicated'; what is required is a deep knowledge of what works - and why - so that the essence can be preserved while allowing for flexibility and adaptation to different circumstances.

Conventional evaluation methods, which test outcomes against set objectives, can stifle innovation, which requires risk, experimentation, freedom to fail and the chance to learn from failure and the unexpected.

Collaboration across sectors requires concerted effort to overcome differing organizational norms and values. It requires a commitment to social learning that includes the ability to adapt one's own viewpoints and practices.

What sort of organization is required to support social innovation?

- Social “venture capitalist”
 - Fund the people and the passion not the project
 - Take risks
 - Be willing to fail
 - Study the system well enough to follow your intuition
- Network hub
 - Make information flow
 - Facilitate relationships (fund the arrows not just the boxes in the org chart)
- Convenor
 - Support dialogue and sustained interaction across perspectives
- Bridge the divide
 - Marry reflection and action
- Evaluator
 - Learn to improve, not learn to prove

Adapted from Westley, Zimmerman, and Patton 2007

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Which is not to say that CHARS should be an agent for social innovation per se.

But if CHARS wants to inform solutions, it needs to understand how they can be realized.

The Tyndall Centre experience has also revealed difficult tensions arising from the solutions-oriented and socially interactive approaches to research (‘coproduction’) being pursued.

One can think of this in terms of a continuum between curiosity-driven research at one end and call-down consultancy at the other. Co-produced research clearly sits somewhere in the middle of this spectrum, perhaps slightly more towards the consultancy end if the engagement process and the influence of stakeholders are taken seriously.

Yet at what point on this continuum does research become consultancy or advocacy?

At what point does research that ‘meets the needs of business and government’ cease being research that can be defended in front of critical peer review?

What is the balance of power in the negotiation between researcher and stakeholder in setting the research agenda, in selecting the methods, or in interpreting the results?

Who's doing it?

IMPLEMENTATION SCIENCE

WHO Task Force on Research Priorities for Global Health and the Health Equity Agenda

- Influence of globalization factors and processes on country policy
- Effect of societal and political structures and their relationships
- Inter-relationships between individual-level factors and social context
- Characteristics of the health care system that influence health equity
- Effectiveness of policy interventions to reduce health inequity

CIHR Institute of Population and Public Health – Strategic research priorities

- Implementation systems for population health interventions

SOLUTIONS-DRIVEN S&T

Tyndall Centre for Climate Change Research

- Scientifically integrative, solutions oriented, and socially interactive

SOCIAL INNOVATION

MaRS Discovery District

- Science, technology, and social innovation

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- Social Innovation Generation

Waterloo Institute for Social Innovation and Resilience

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Some examples we could learn from.

Caveat – all new – all learning as they go.

A different take on “cutting edge”

CHARS

- Where does CHARS fit on the implementation science/social innovation spectrum?
- Lessons from both
- Functions and roles of CHARS' staff
 - Researchers?
 - Co-producers?
 - Brokers?
 - Knowledge mobilizers?
- Programming at the Station
- What CHARS expends resources on (funding, staff time, infrastructure)
- Governance implications
 - How the Station and its S&T program are run
 - Who makes decisions about S&T program

*Lack of development is not a
state of the economy.
It is a state of mind.
Societies do what societies think.*

Spencer Beebee. 2011. Cache.