Implementation science and learning health systems: Pieces of a puzzle

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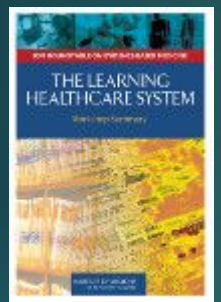
Overview

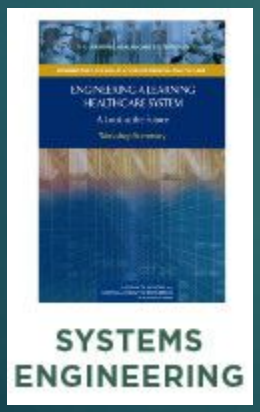
- Brief cartoon versions
  - Learning health systems
  - Implementation science
  - Points of similarity and convergence
  - Points of divergence
- Some of my recent (relevant) work
- Fitting the puzzle together– sort of

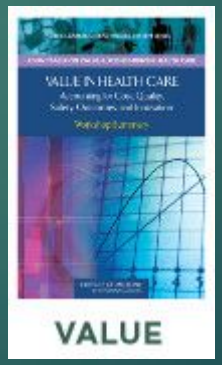
IOM defines a learning health system as

- "… one in which progress in science, informatics, and care culture align to generate new knowledge as an ongoing, natural byproduct of the care experience, and seamlessly refine and deliver best practices for continuous improvement in health and health care"

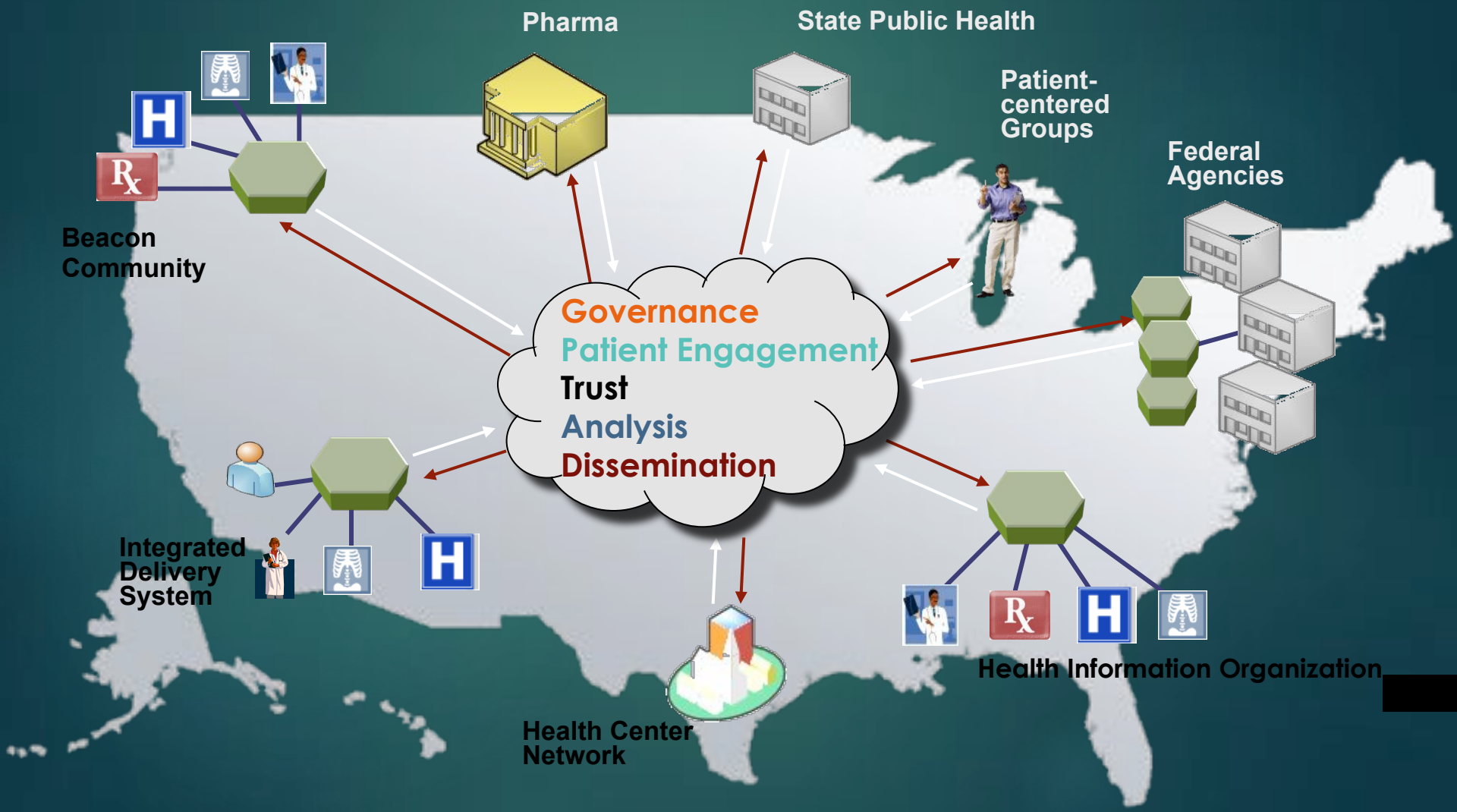
IOM Learning Health System Series 2007 - 2012



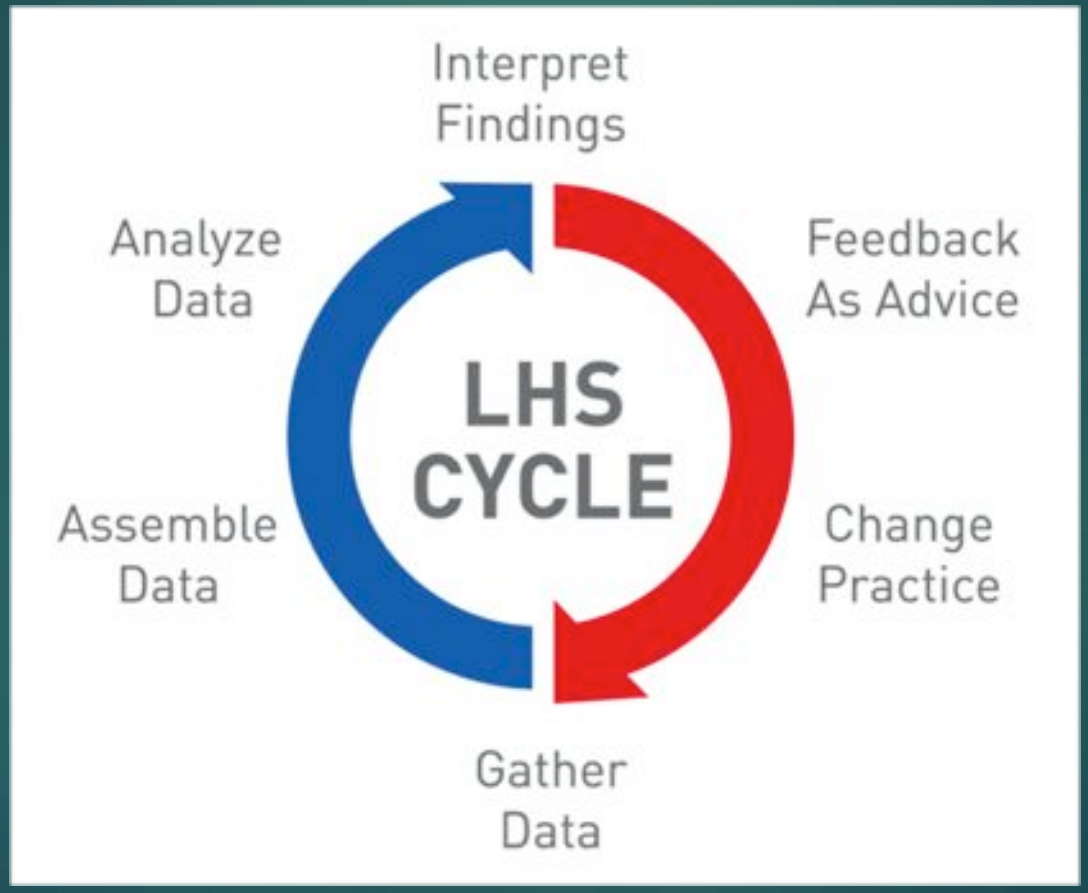




From Chuck's slides: Schema of a Learning Health System



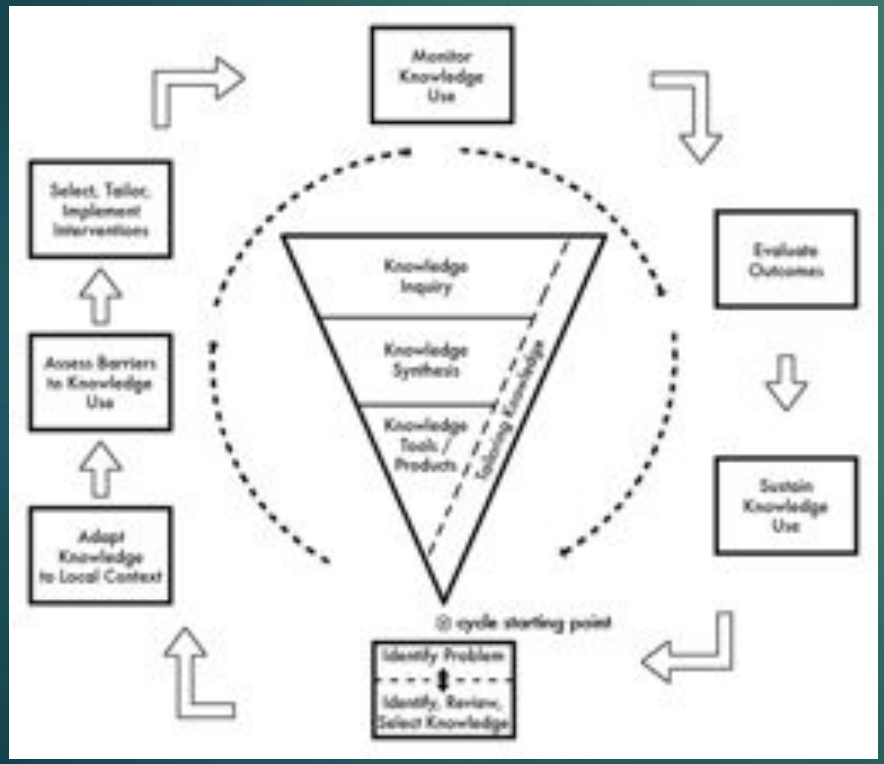
And more from Chuck: the Virtuous Learning Cycle



Not unlike the PDSA cycle from continuous improvement

And…not unlike the Knowledge to Action cycle

A staple of Knowledge Translation (Canada)



Processes

- Identify gaps
- Adapt to local context
- Assess barriers to knowledge use
- Select, tailor and implement interventions
- Monitor knowledge use
- Evaluate outcomes
- Sustained knowledge use

http://ktclearinghouse.ca/knowledgebase/knowledgetoaction

Defining implementation science (IS)

- As defined by the Annual NIH Conference on Implementation and Dissemination, implementation is the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings. Research on implementation addresses the level to which health interventions can fit within real-world public health and clinical service systems.
- Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice. It seeks to understand the behavior of healthcare professionals and other stakeholders as a key variable in the sustainable uptake, adoption, and implementation of evidence-based interventions.
- http://www.fic.nih.gov/News/Events/implementation-science/Pages/faqs.aspx

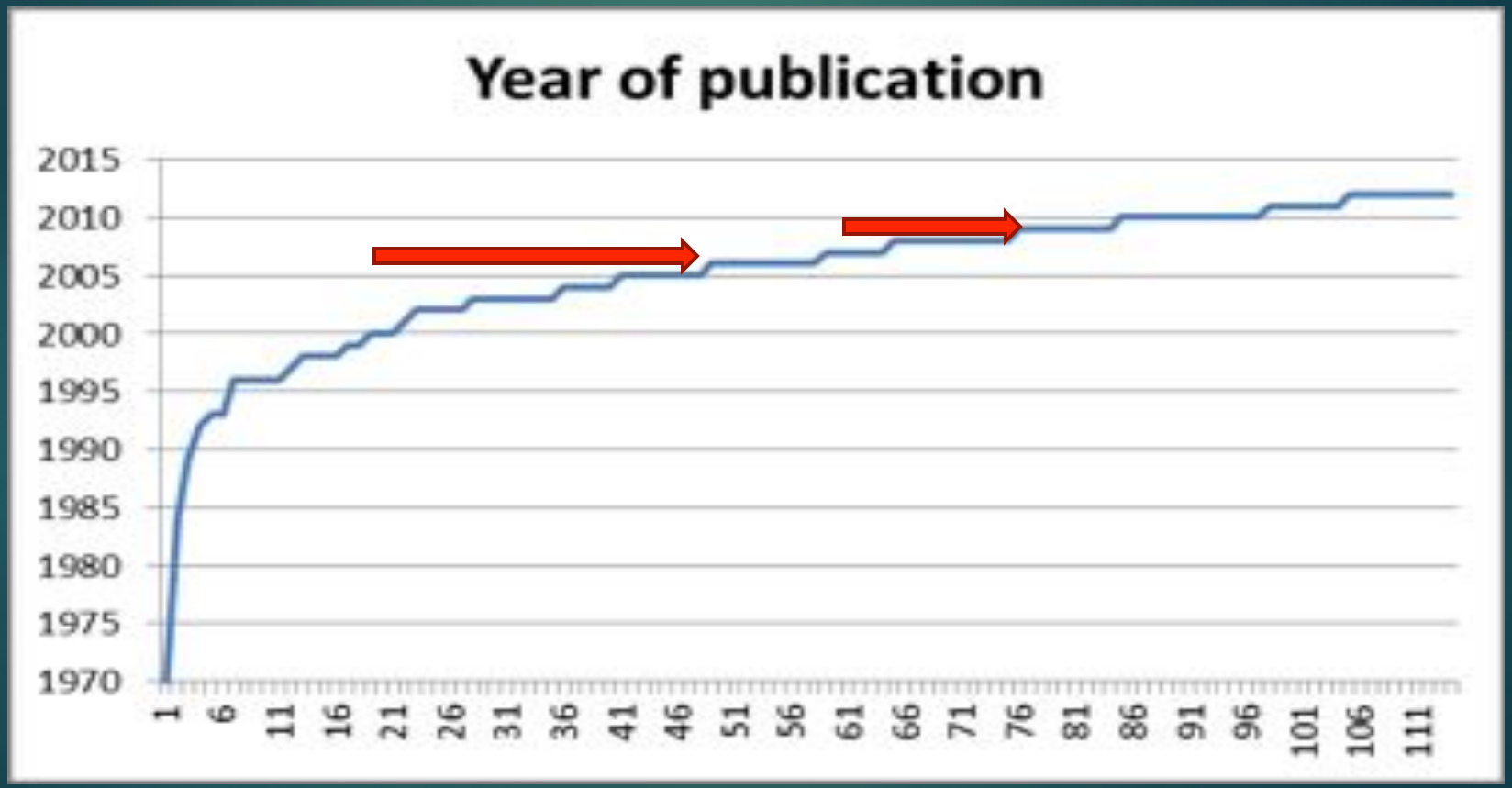
Implementation Science– the journal

www.implementationscience.com

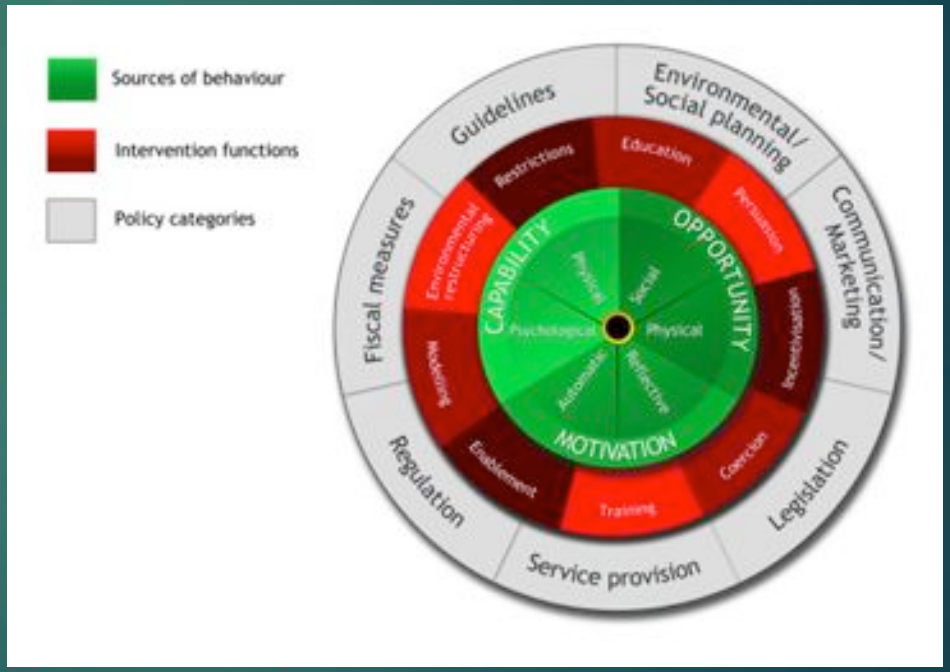
Current state of the science

- Most recent systematic review identified 61 different models or frameworks for dissemination and implementation
  - Tabak RG, Khoong EC, Chambers DA, Brownson RC. Bridging research and practice: models for dissemination and implementation research. Am J Prev Med. 2012 Sep;43(3):337-50. doi: 10.1016/j.amepre.2012.05.024. Review. PubMed PMID: 22898128; PubMed Central PMCID: PMC3592983
- Previous review (2006) found 41
  - Several efforts to consolidate frameworks
  - Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009 Aug 7;4:50. doi: 10.1186/1748-5908-4-50. PubMed PMID: 19664226; PubMed Central PMCID: PMC2736161

Exponential growth curve



The importance of theory: Behavior Change Wheel



Michie et al. *Implementation Science* 2011
http://www.implementationscience.com/content/6/1/42

And more theory

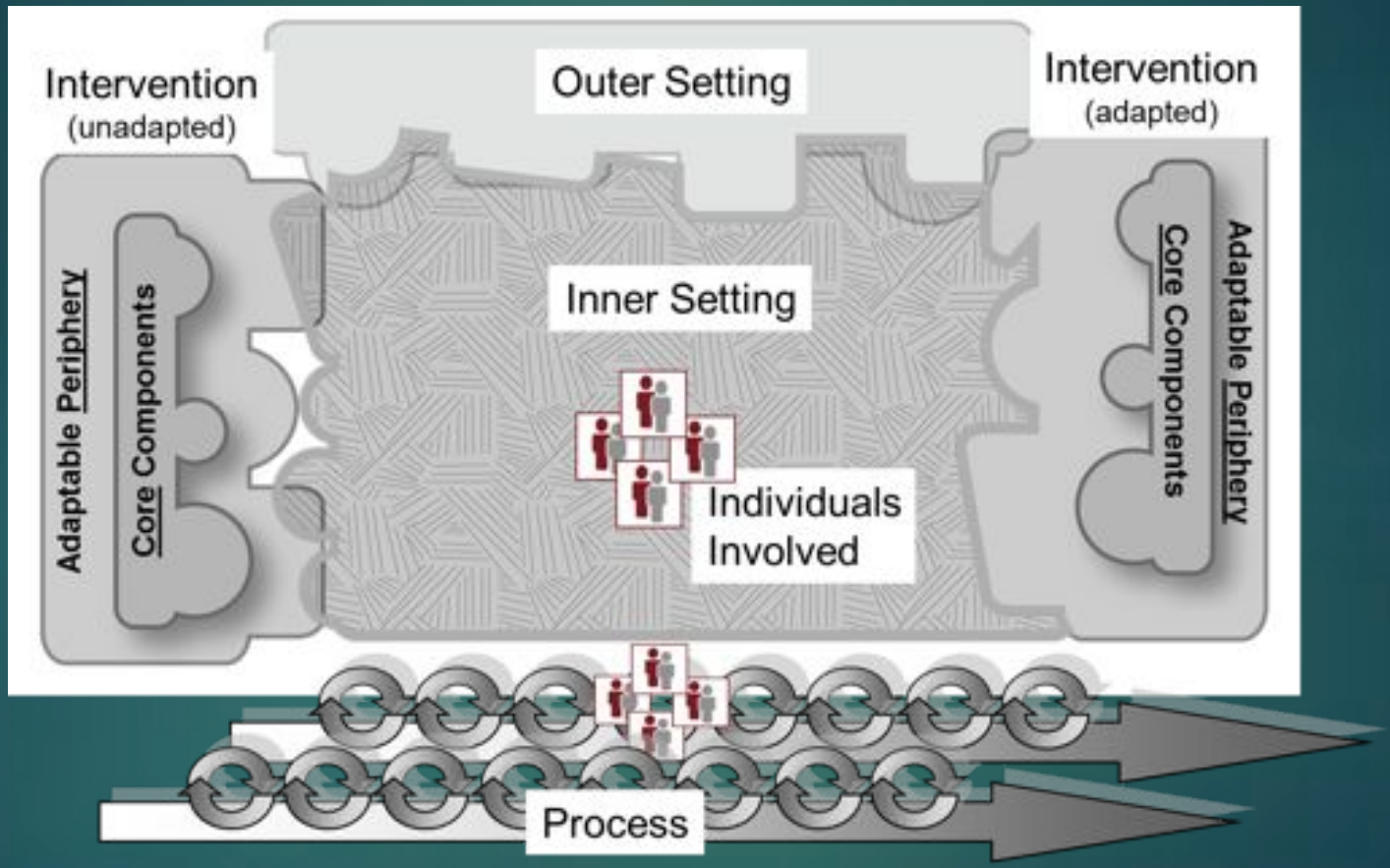
BCT Taxonomy (v1): 93 hierarchically-clustered techniques

Page	Grouping and BCTs	Page	Grouping and BCTs	Page	Grouping and BCTs
1	**1. Goals and planning**	8	**6. Comparison of behaviour**	16	**12. Antecedents**
	1.1. Goal setting (behavior) 1.2. Problem solving 1.3. Goal setting (outcome) 1.4. Action planning 1.5. Review behavior goal(s) 1.6. Discrepancy between current behavior and goal 1.7. Review outcome goal(s) 1.8. Behavioral contract 1.9. Commitment		6.1. Demonstration of the behavior 6.2. Social comparison 6.3. Information about others' approval		12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.3. Avoidance/reducing exposure to cues for the behavior 12.4. Distraction 12.5. Adding objects to the environment 12.6. Body changes
3	**2. Feedback and monitoring**	9	**7. Associations**	17	**13. Identity**
	2.1. Monitoring of behavior by others without feedback 2.2. Feedback on behaviour 2.3. Self-monitoring of		7.1. Prompts/cues 7.2. Cue signalling reward 7.3. Reduce prompts/cues 7.4. Remove access to the reward 7.5. Remove aversive stimulus 7.6. Satiation 7.7. Exposure 7.8. Associative learning		13.1. Identification of self as role model 13.2. Framing/reframing 13.3. Incompatible beliefs 13.4. Valued self-identify

http://www.ucl.ac.uk/health-psychology/research/theories-techniques

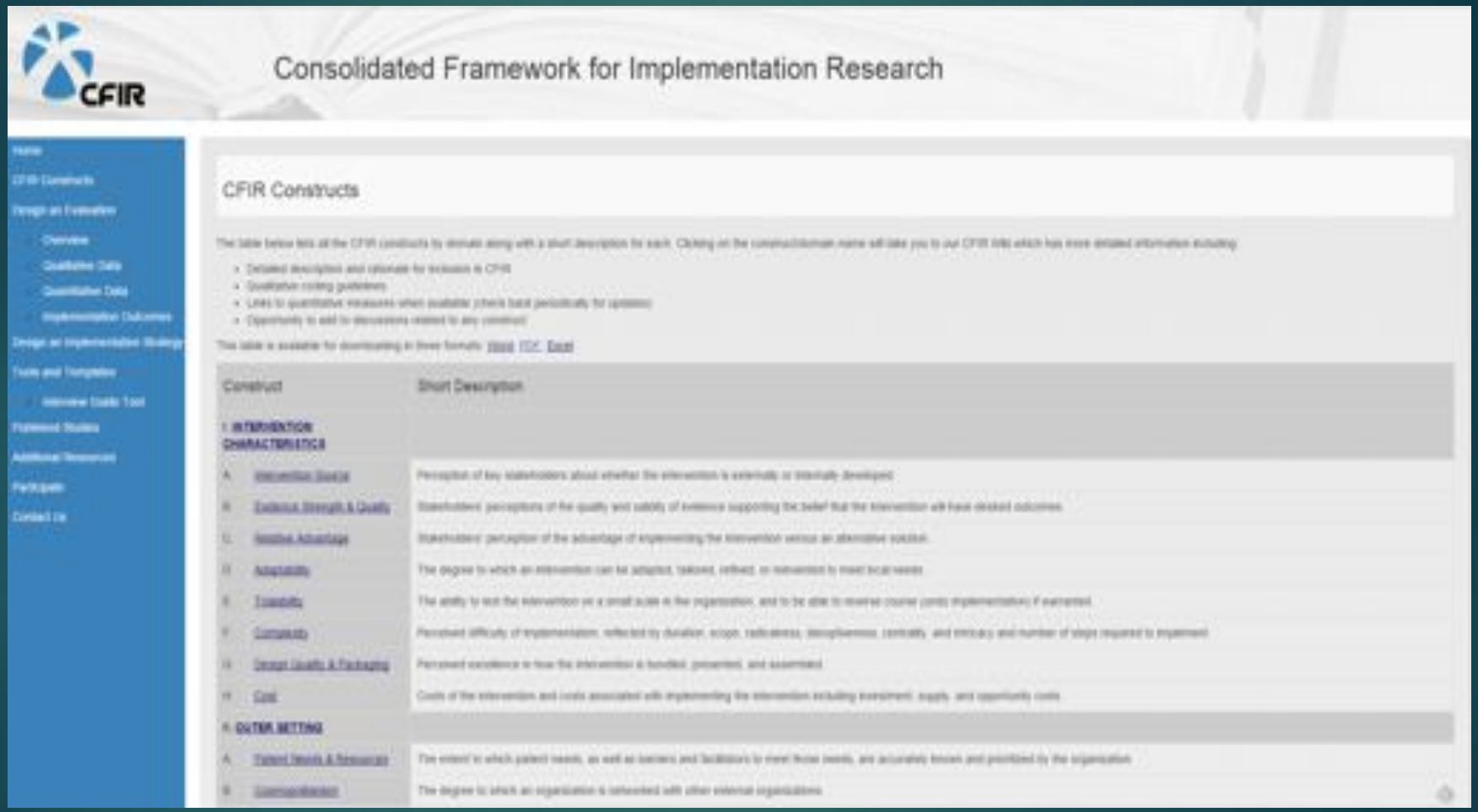
BCT Taxonomy

And more theory



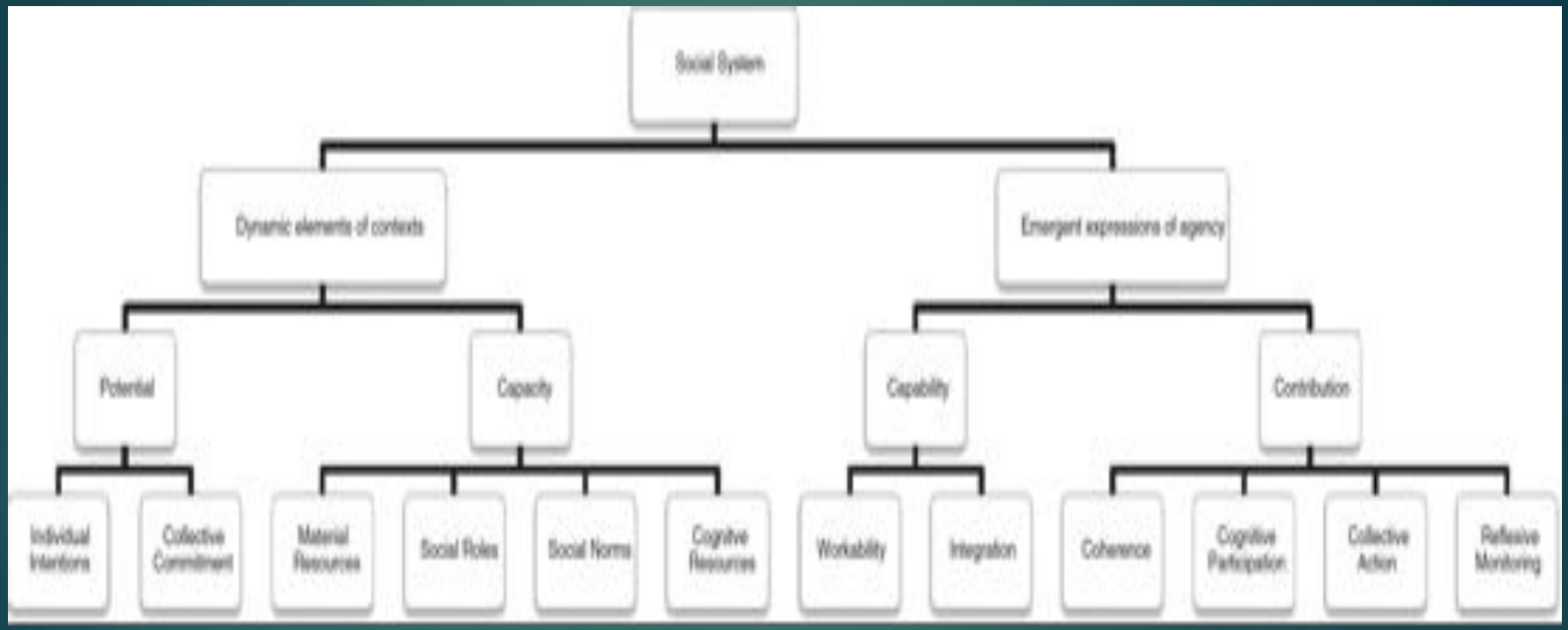
Consolidated Framework for Implementation Research
Damschroder et al. *Implementation Science* 2009
http://www.implementationscience.com/content/4/1/50

And more



http://cfirguide.org/constructs.html

And finally



Carl May: Towards a general theory of implementation
http://www.implementationscience.com/content/8/1/18

No magic bullets: a systematic review of 102 trials of interventions to improve professional practice

Andrew D. Oxman, MD, MSc; Mary Ann Thomson, BHSc(PT);
David A. Davis, MD; R. Brian Haynes, MD, PhD

1995

Still No Magic Bullets: Pursuing More Rigorous Research in Quality Improvement

Kaveh G. Shojania, MD, Jeremy M. Grimshaw, MBChB, PhD

2004

Sales and Schalm *Implementation Science* 2010, **5**:74
http://www.implementationscience.com/content/5/1/74

IMPLEMENTATION SCIENCE

STUDY PROTOCOL Open Access

transfer in long-term care facilities: Protocol for a study

Anne E Sales*[1], Carole A Estabrooks[1] and Thomas W Valente[2]

Sales *et al. Implementation Science* 2014, **9**:161
http://www.implementationscience.com/content/9/1/161

IMPLEMENTATION SCIENCE

RESEARCH Open Access

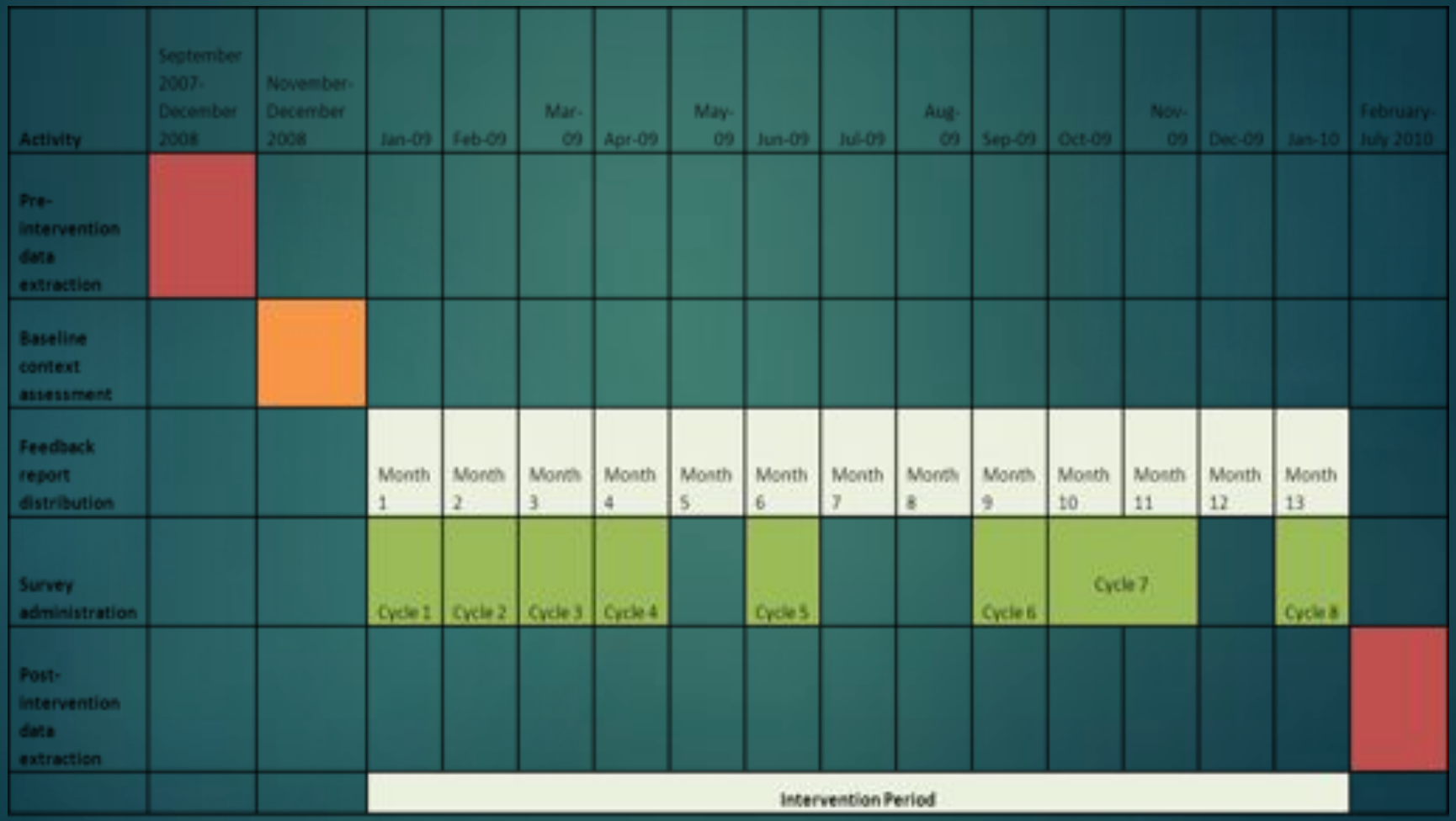
Data for improvement and clinical excellence: report of an interrupted time series trial of feedback in long-term care

Anne E Sales[1,2*], Corinne Schalm[3], Melba Andrea B Baylon[4] and Kimberly D Fraser[4]

Data for Improvement and Clinical Excellence (DICE)

- Designed as a 12 month project to deliver feedback reports to all direct care providers in four nursing homes (9 units) in Edmonton, Alberta, Canada
- Provide feedback reports to all staff
  - Previous studies only provided reports to professional staff
- Measure resident outcomes
- Understand how feedback interventions work in LTC settings
  - Measuring social networks and their interaction with the intervention
  - Measuring context using the Alberta Context Tools (not presented)
- Time series design with control (non-intervention) retrospective comparison
  - Interrupted time series using segmented regression analysis
  - Assessment of social networks embedded within study

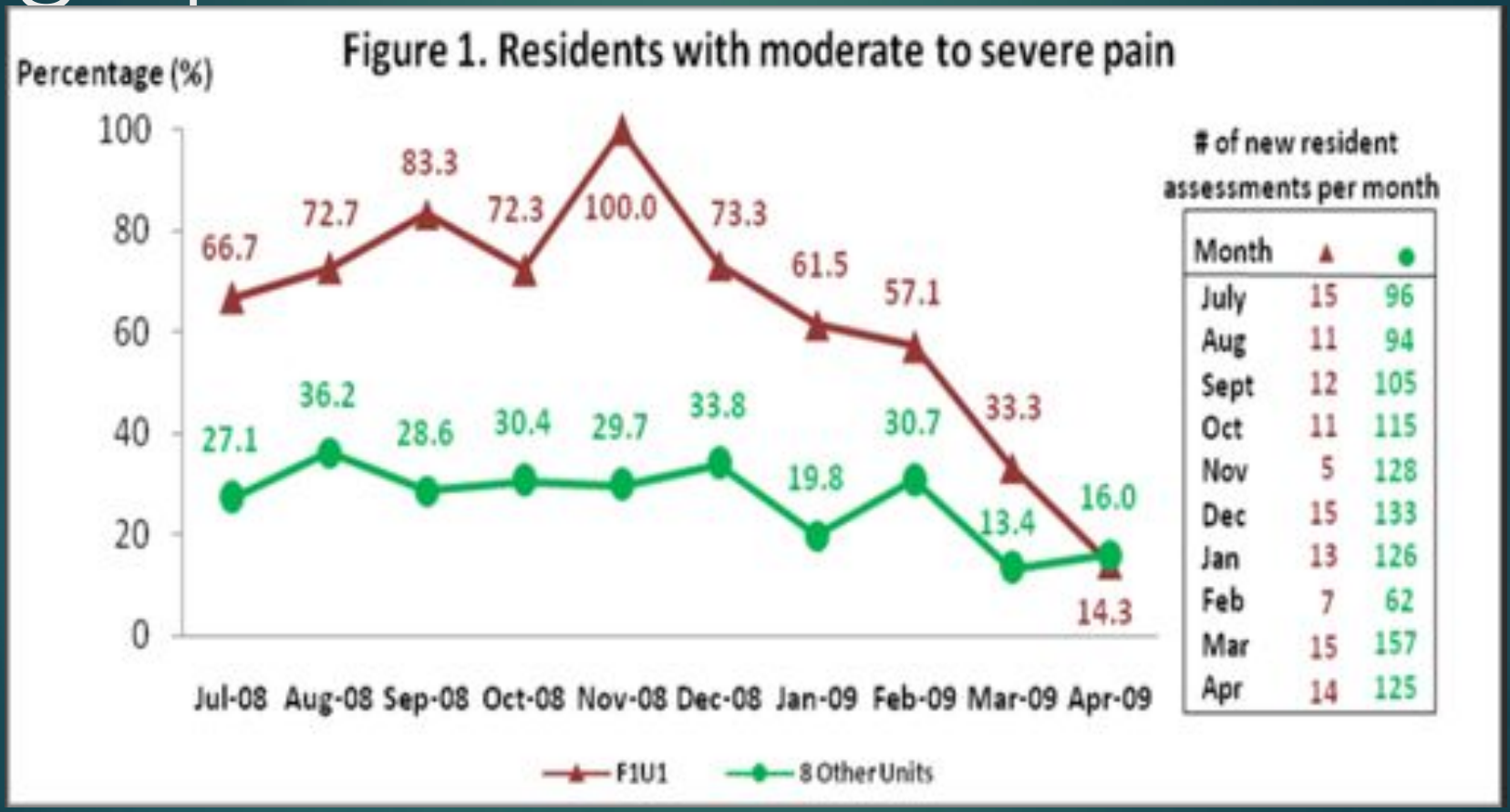
Study timeline



Monthly feedback reports

- 13 month feedback intervention
  - Delivered brief feedback report monthly based on resident outcomes/process measures to all direct care staff on 9 long term care units
  - Measured staff response to feedback reports one week after reports were delivered in most months
- Used Minimum Data Set-Resident Assessment Instrument (MDS-RAI) version 2.0 data about residents
  - Pain assessment
  - Depression screening
  - Falls and fall risk

Example of feedback graph

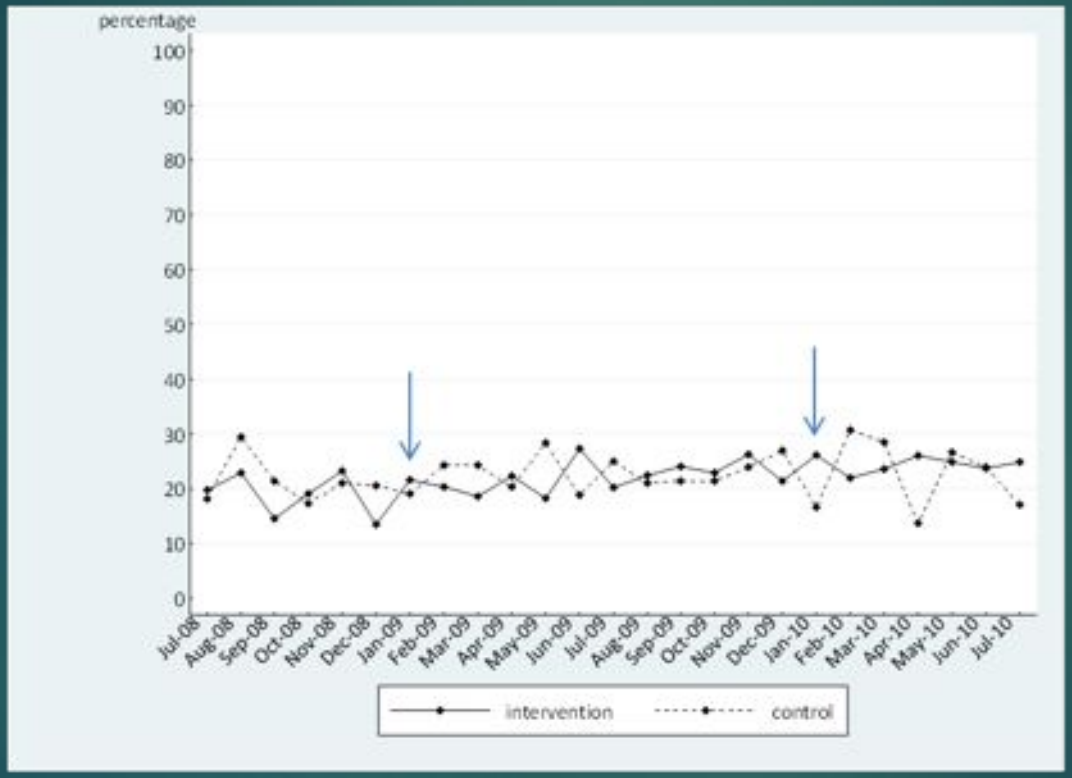


Month	▲	●
July	15	96
Aug	11	94
Sept	12	105
Oct	11	115
Nov	5	128
Dec	15	133
Jan	13	126
Feb	7	62
Mar	15	157
Apr	14	125

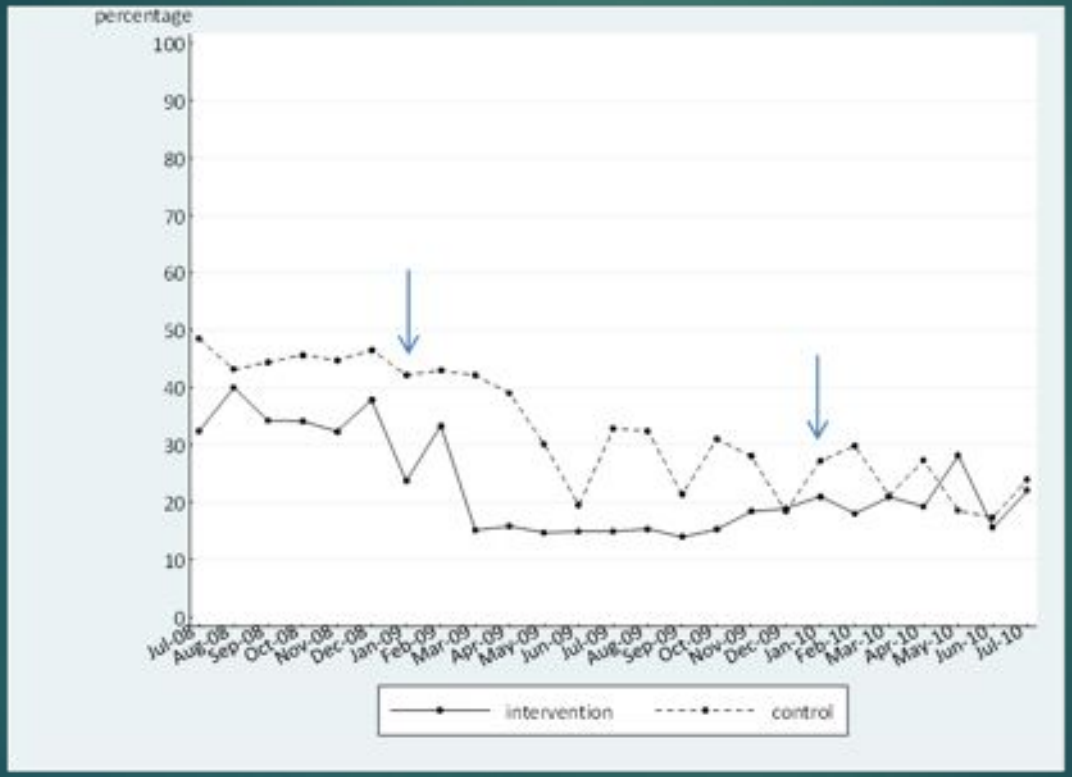
Post-feedback survey

- Anonymous
  - Short demographic section
- Section on perception of feedback report
  - Read
  - Understand
  - Discuss
  - Find useful
  - Take action
- Theory of Planned Behavior section

Falls didn't change



Pain did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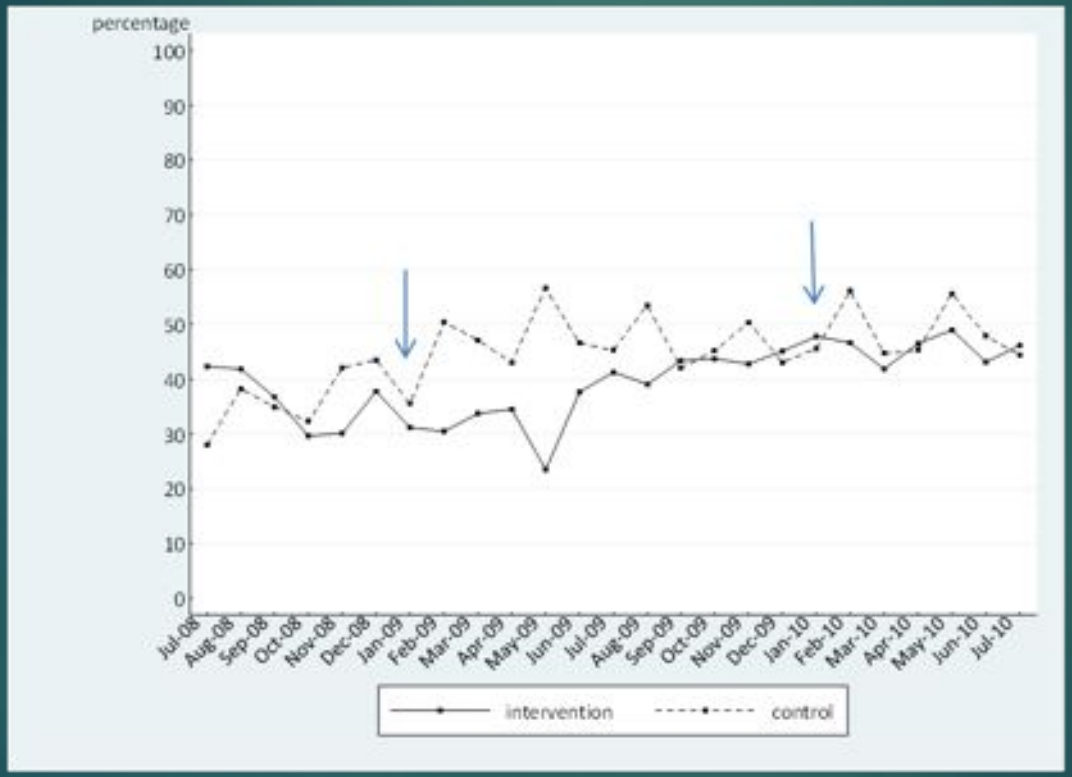
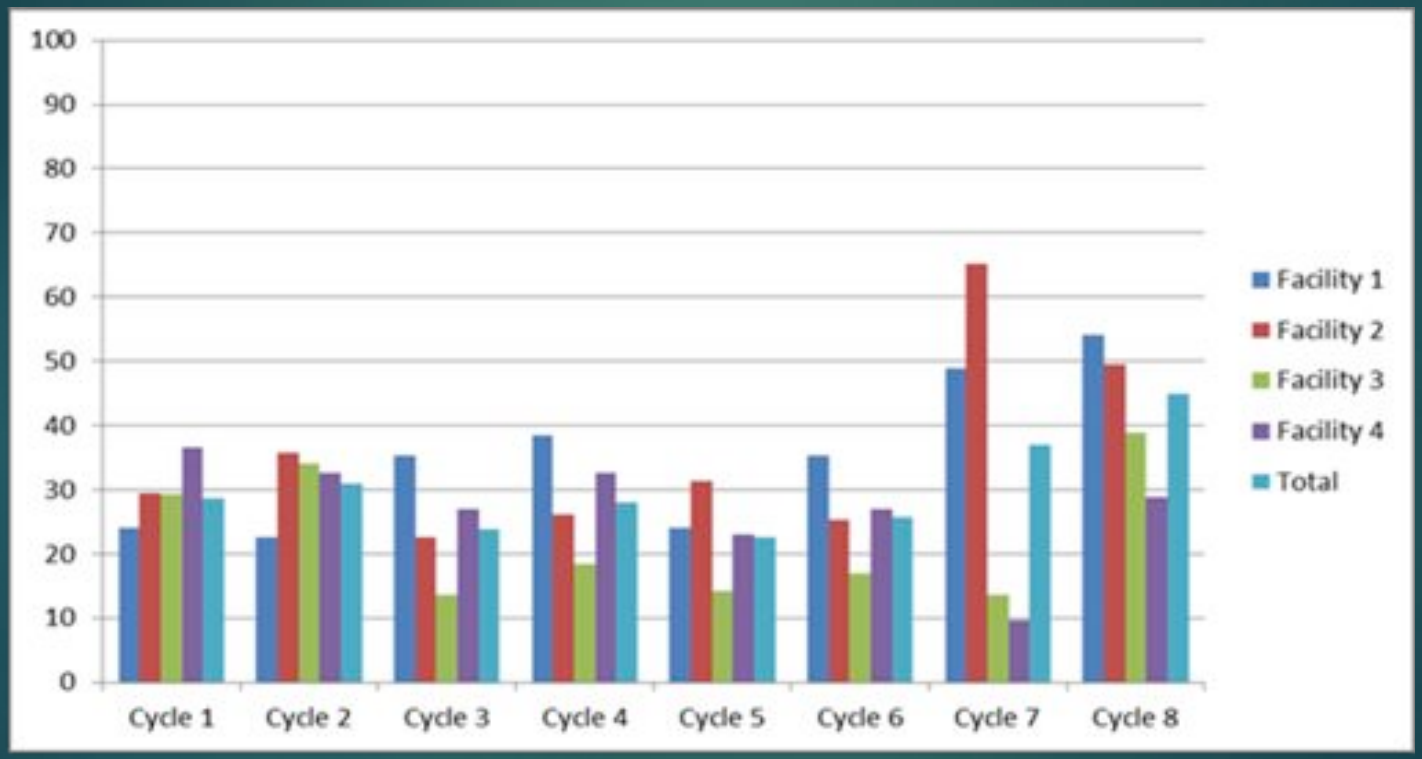
intervention
control

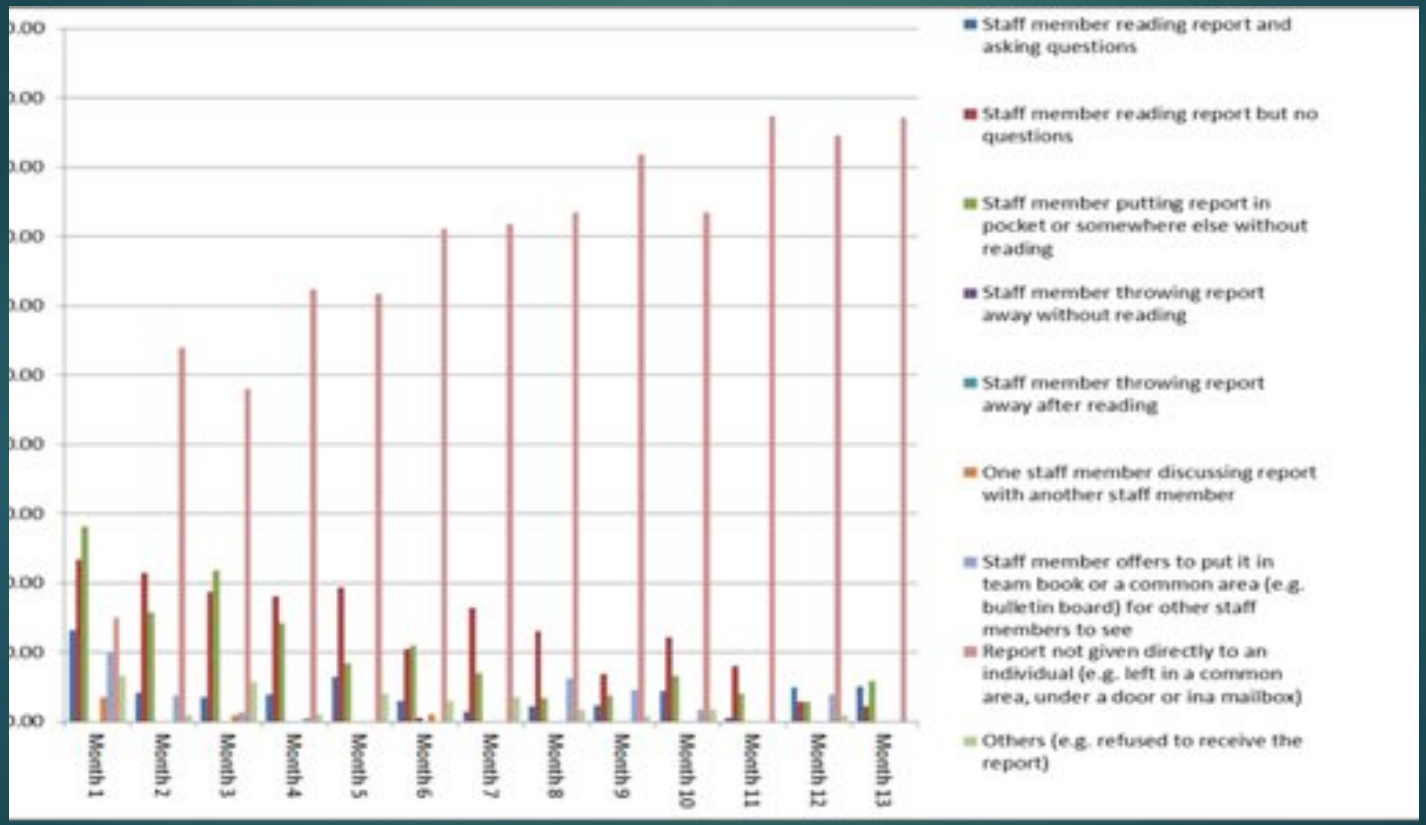
But depression went the wrong way



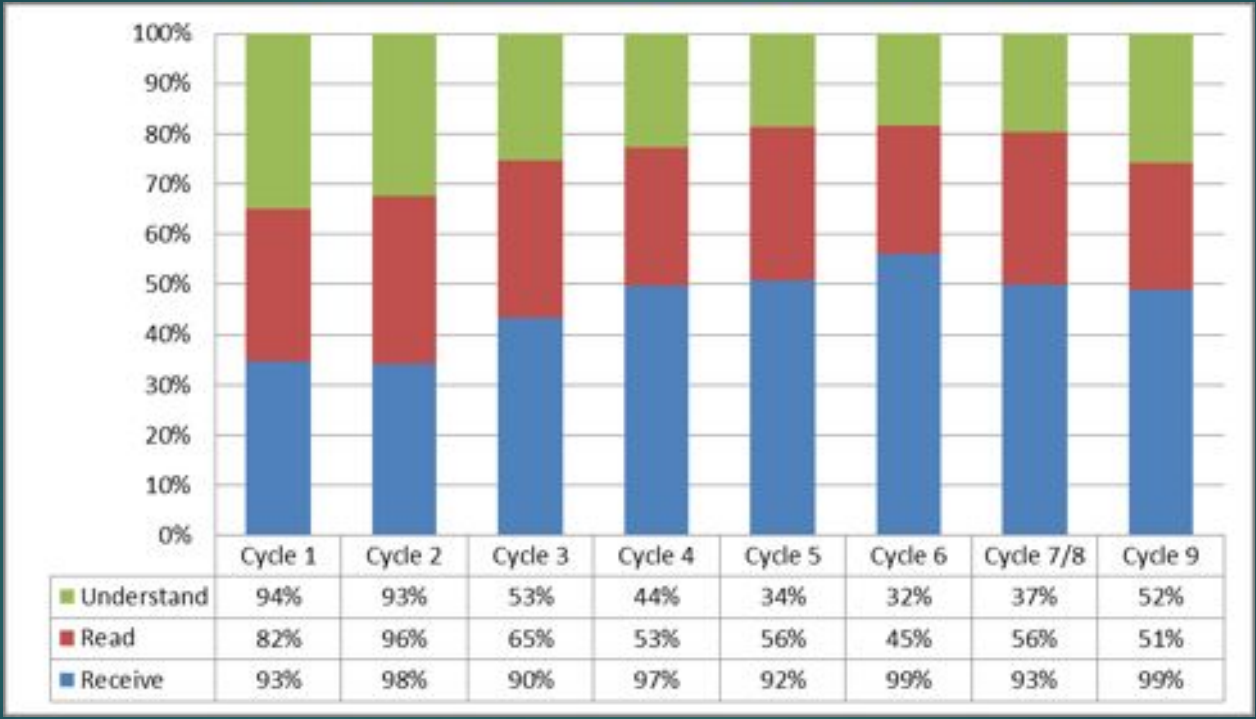
Response rates varied by time and place



Observed behavior changed over time

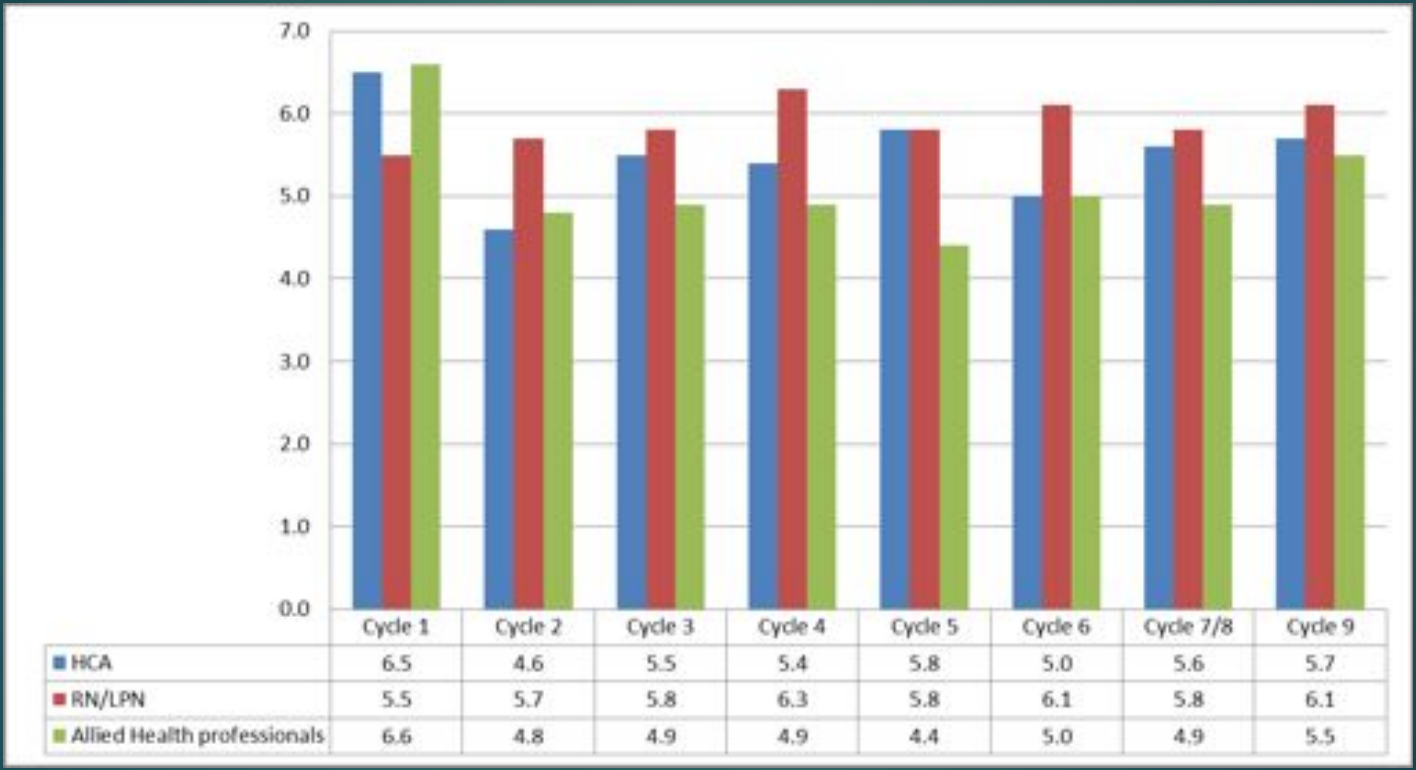


Participants received, read and understood the reports



	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6	Cycle 7/8	Cycle 9
Understand	94%	93%	53%	44%	34%	32%	37%	52%
Read	82%	96%	65%	53%	56%	45%	56%	51%
Receive	93%	98%	90%	97%	92%	99%	93%	99%

Participants intended to change behavior

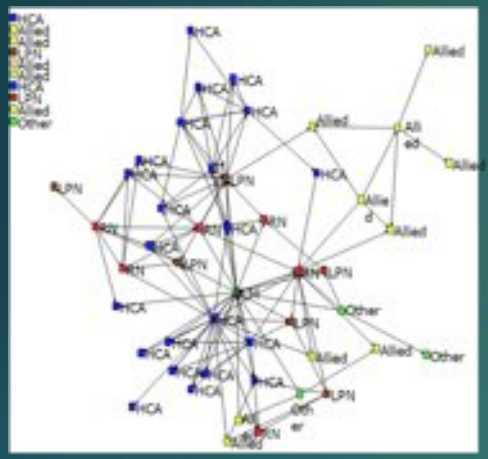


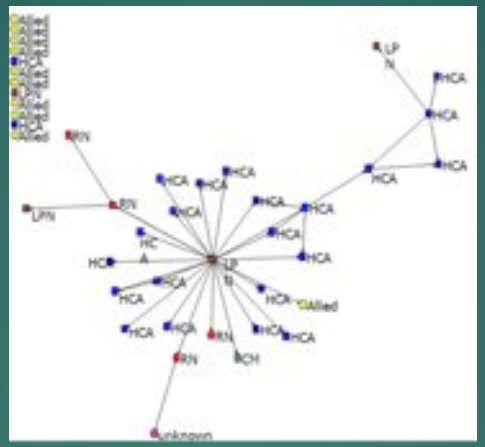
	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6	Cycle 7/8	Cycle 9
HCA	6.5	4.6	5.5	5.4	5.8	5.0	5.6	5.7
RN/LPN	5.5	5.7	5.8	6.3	5.8	6.1	5.8	6.1
Allied Health professionals	6.6	4.8	4.9	4.9	4.4	5.0	4.9	5.5

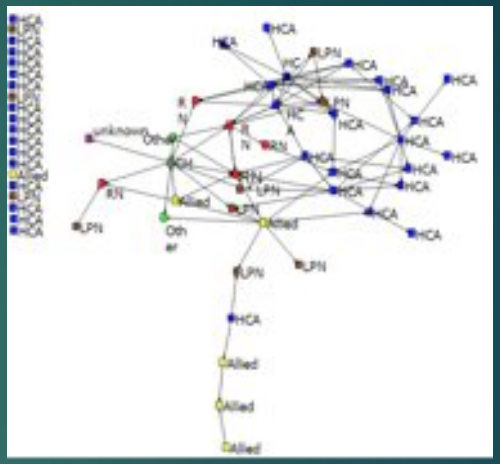
Social network methods

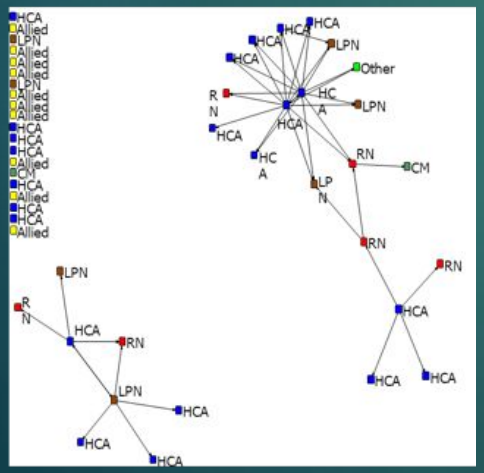
- Paper survey, hand distributed
- Obtained lists of all staff working on the six nursing units as well as staff working on multiple units
  - Unit based staff are mostly nursing staff (registered nurses, licensed practical nurses, health care aides)
  - Multiple unit staff are mostly allied health professionals (occupational therapy, physical therapy, pharmacy, social work)
- Asked questions about five types of networks
  - Relevant to this discussion: "Who did you discuss the feedback report with?"

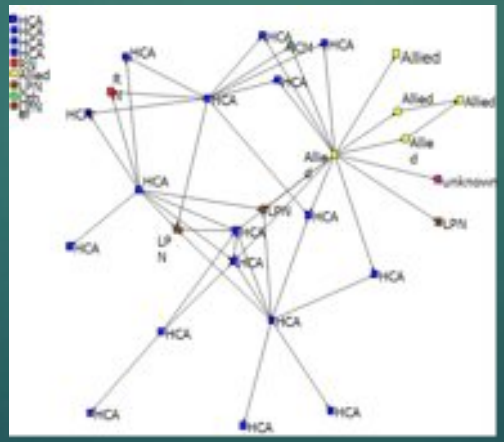
Networks discussing feedback report varied widely by unit

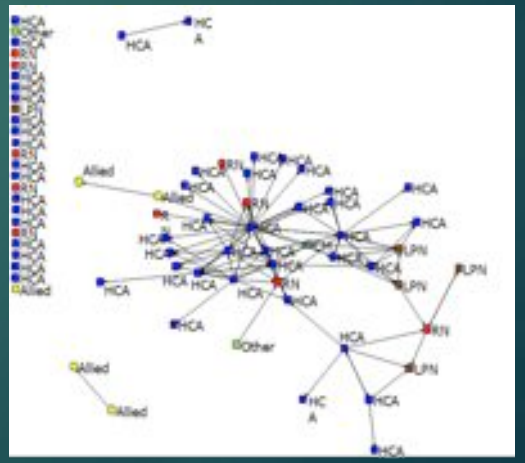


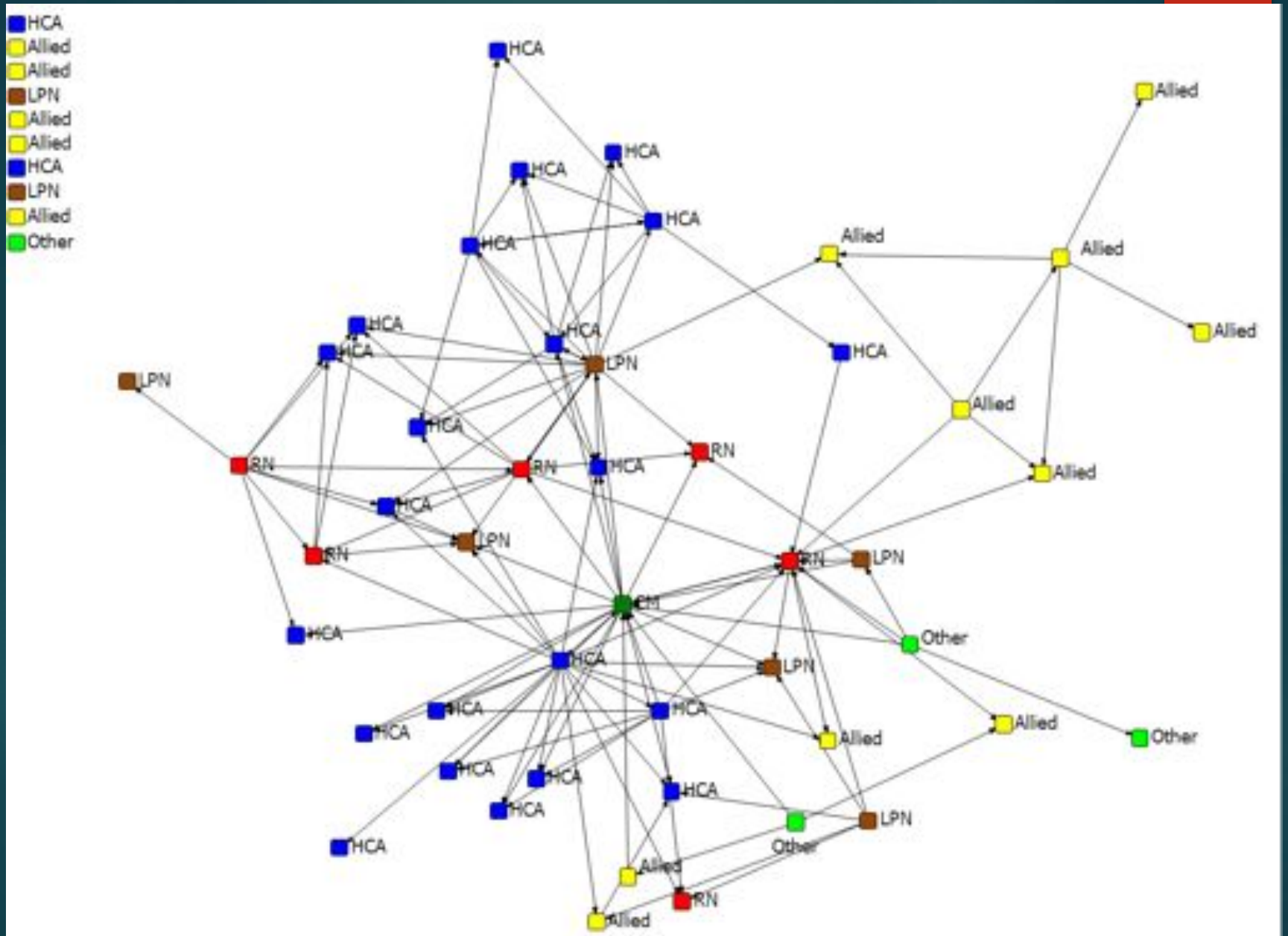








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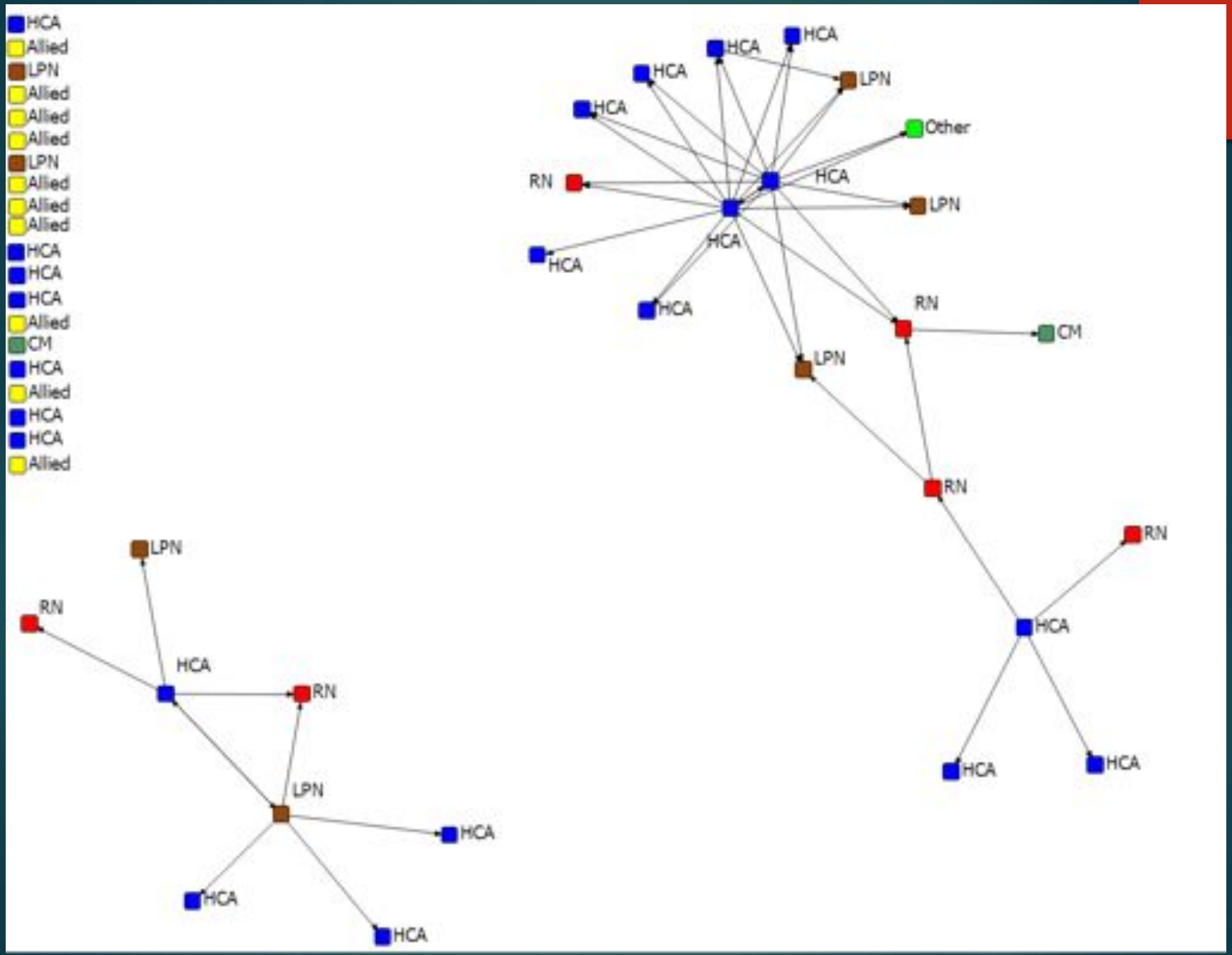
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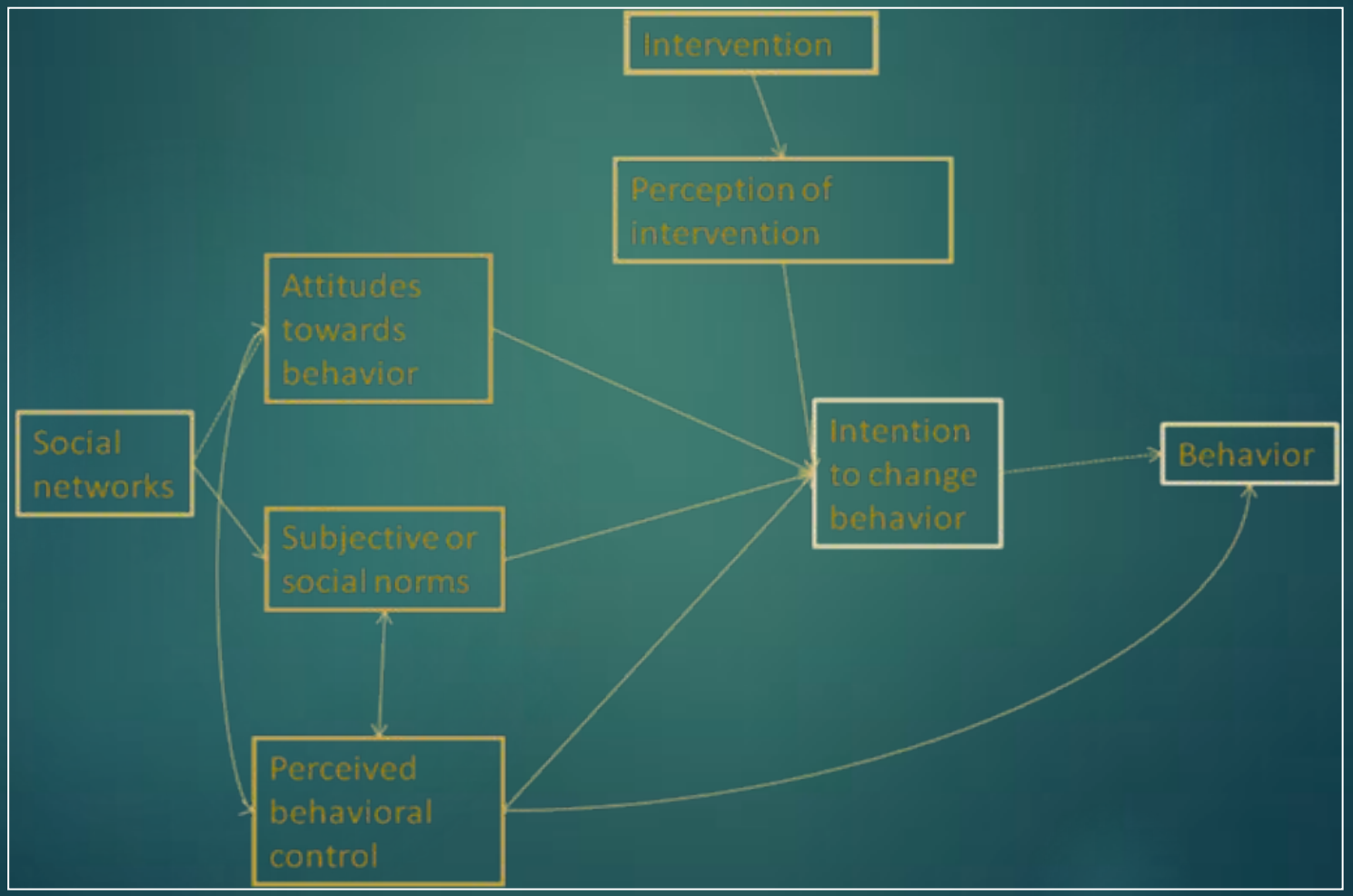
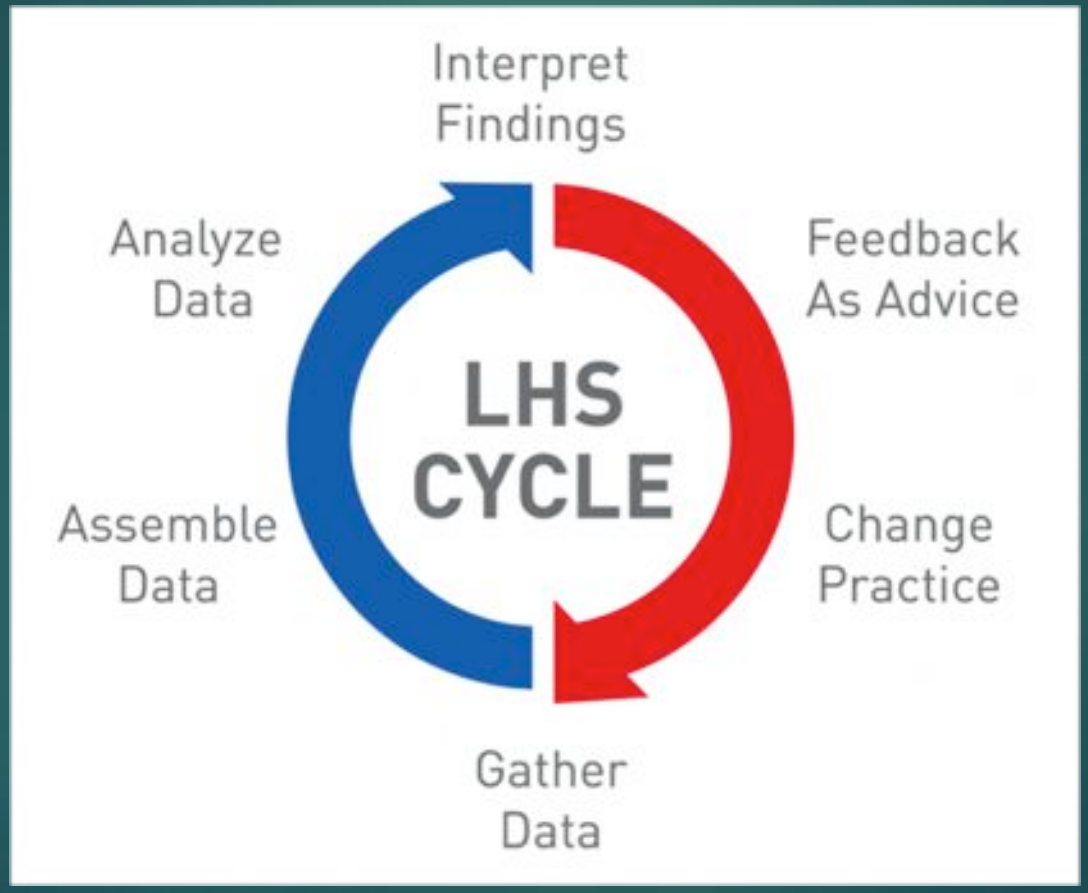
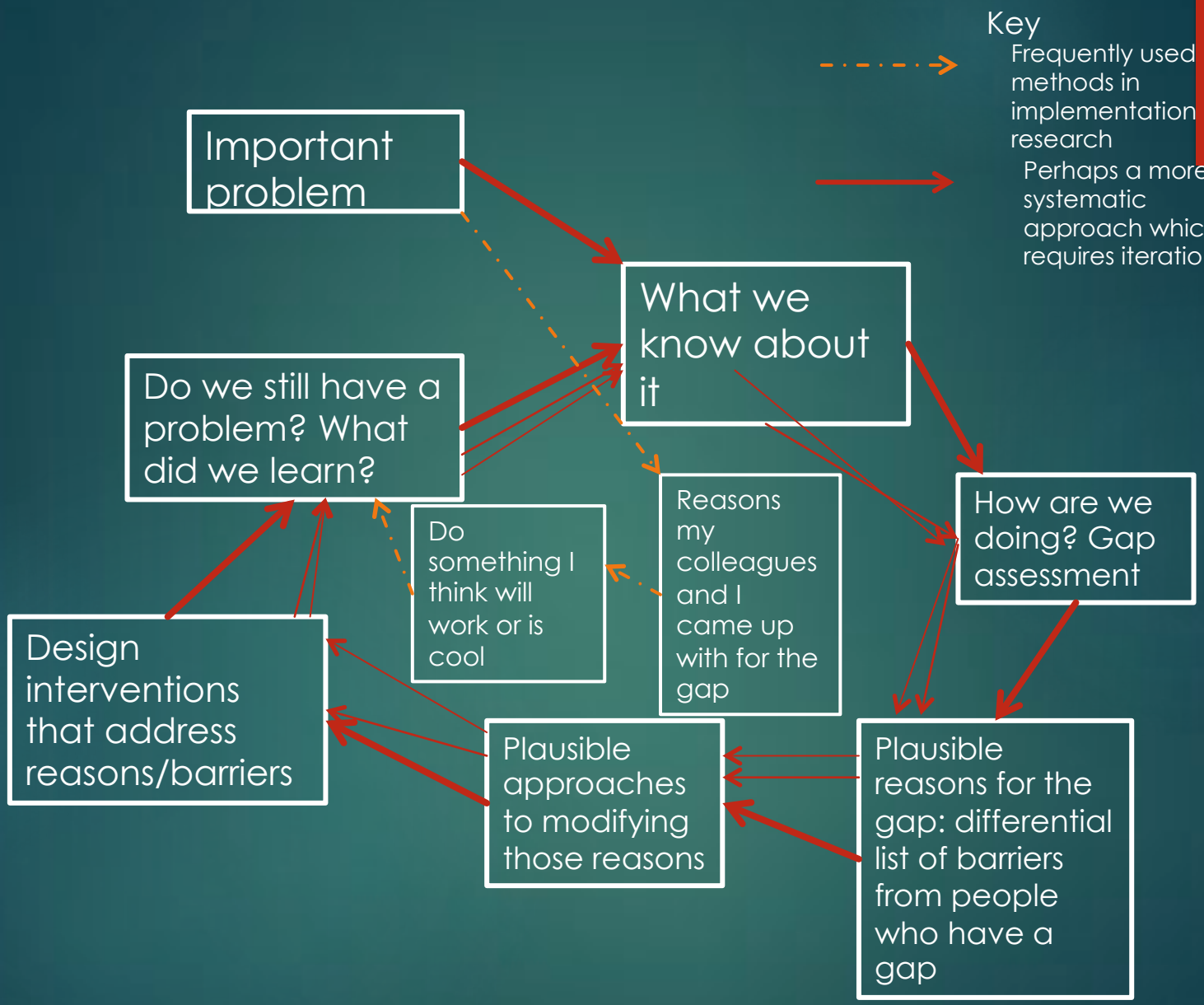
Why did we think this matters? TPB



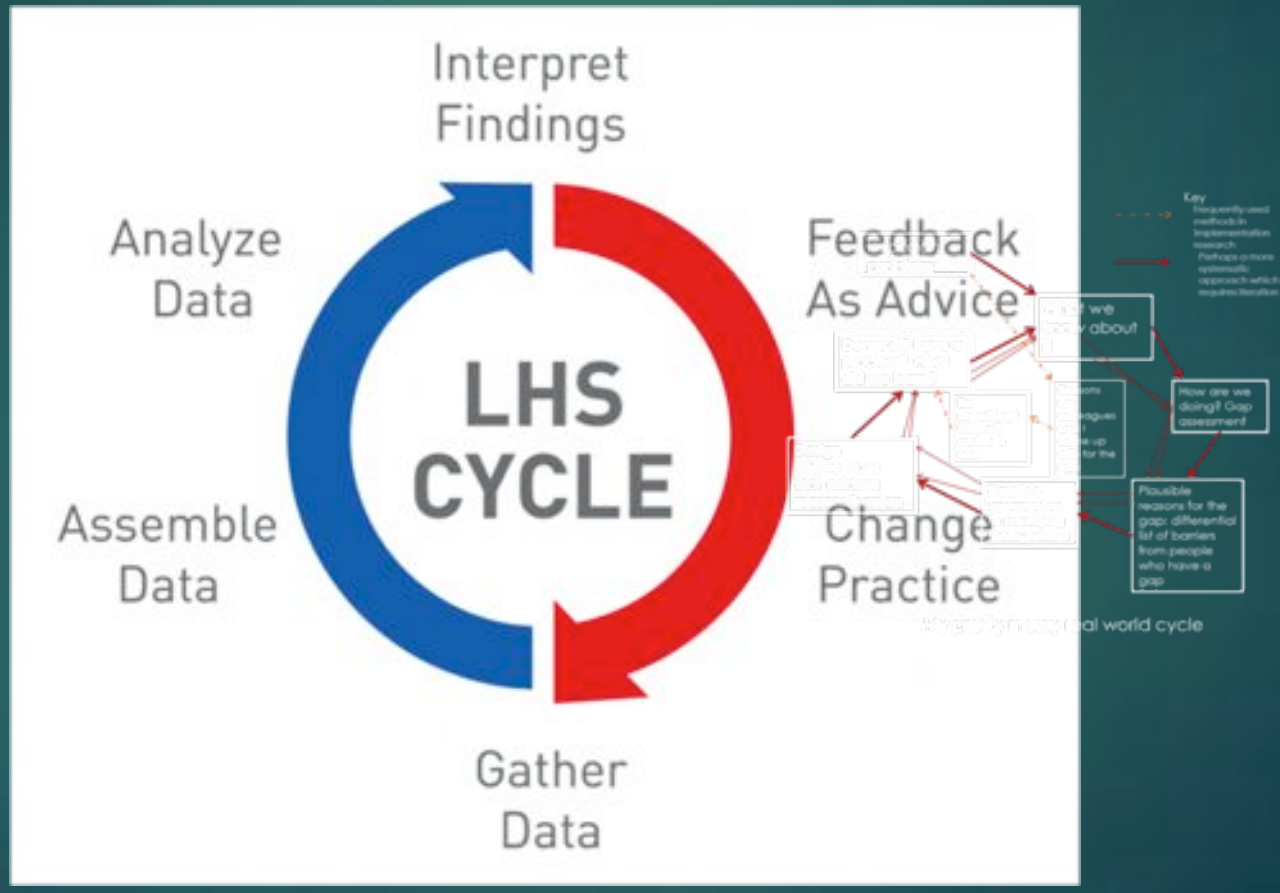
Revisiting the virtuous cycle



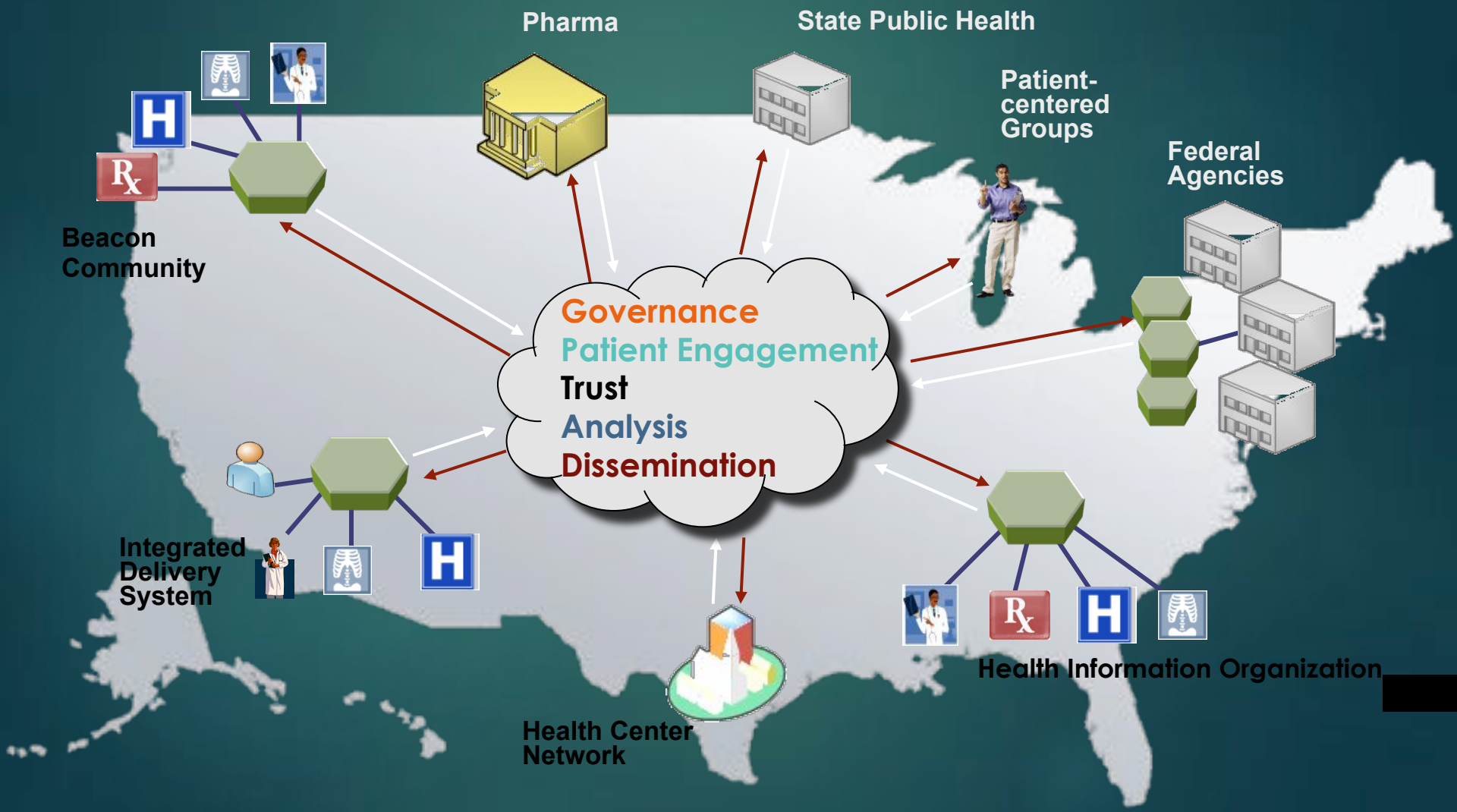


My pretty messy real world cycle

Revisiting the virtuous cycle



Fitting into the broader picture



Doing this work is like being in a thunderstorm

For a long time…