

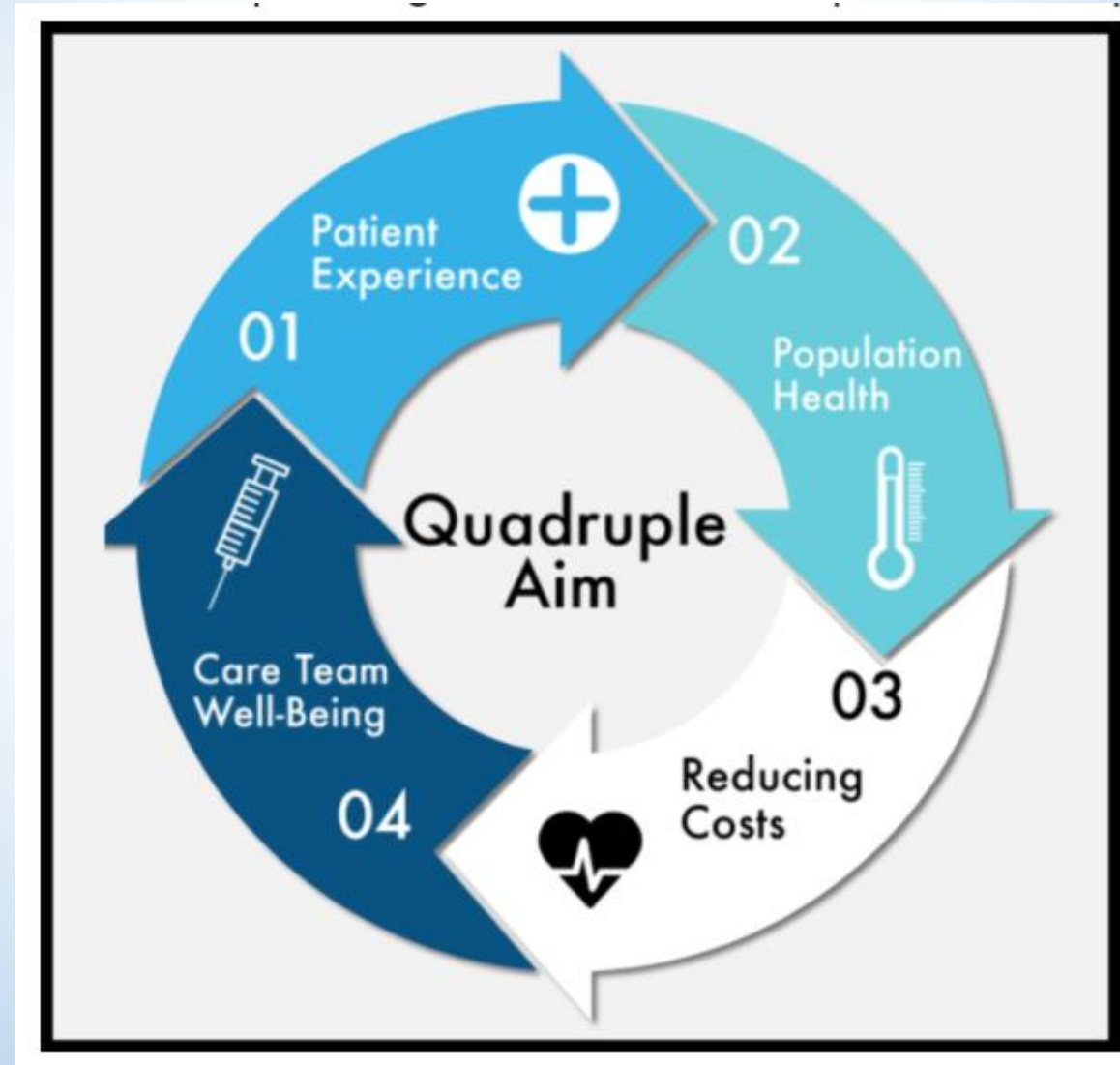
Population Health and Complexity Science. A Leadership Primer

Doron Schneider, MD FACP
Vice President, Population Health Services
Tandigm Health.

Objectives

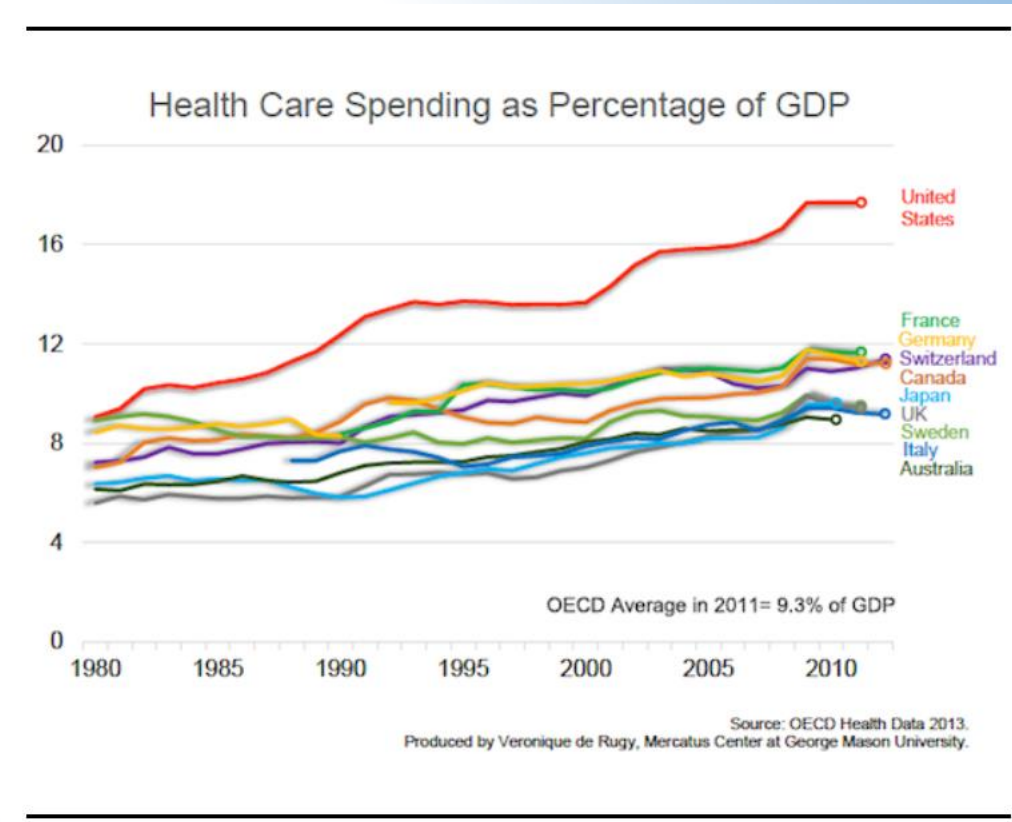
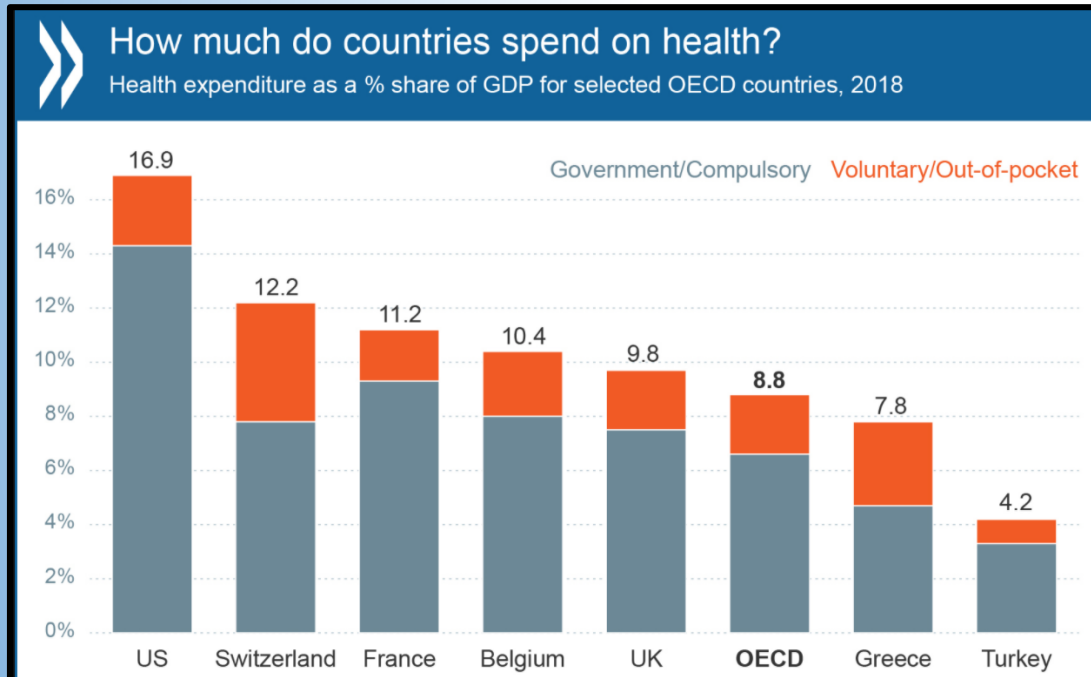
- 1) Describe the current state of health outcomes
- 2) Define complexity science
- 3) Describe healthcare as a complex adaptive system
- 4) Introduce implementation science
- 5) Describe the Cynefin framework for decision making

Our collective goal... Quadruple Aim.



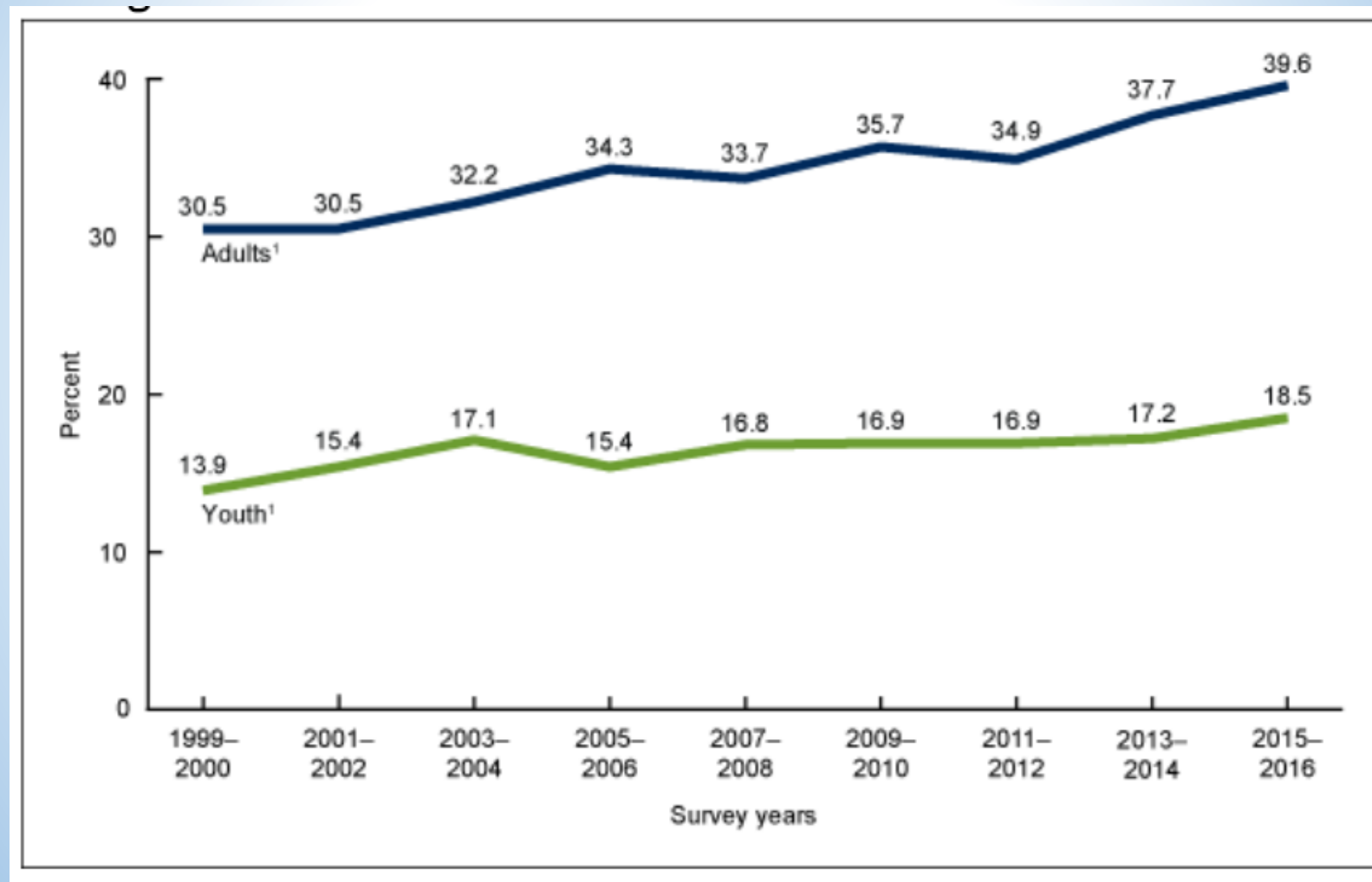
Are We Making Progress?

Spending as share of GDP

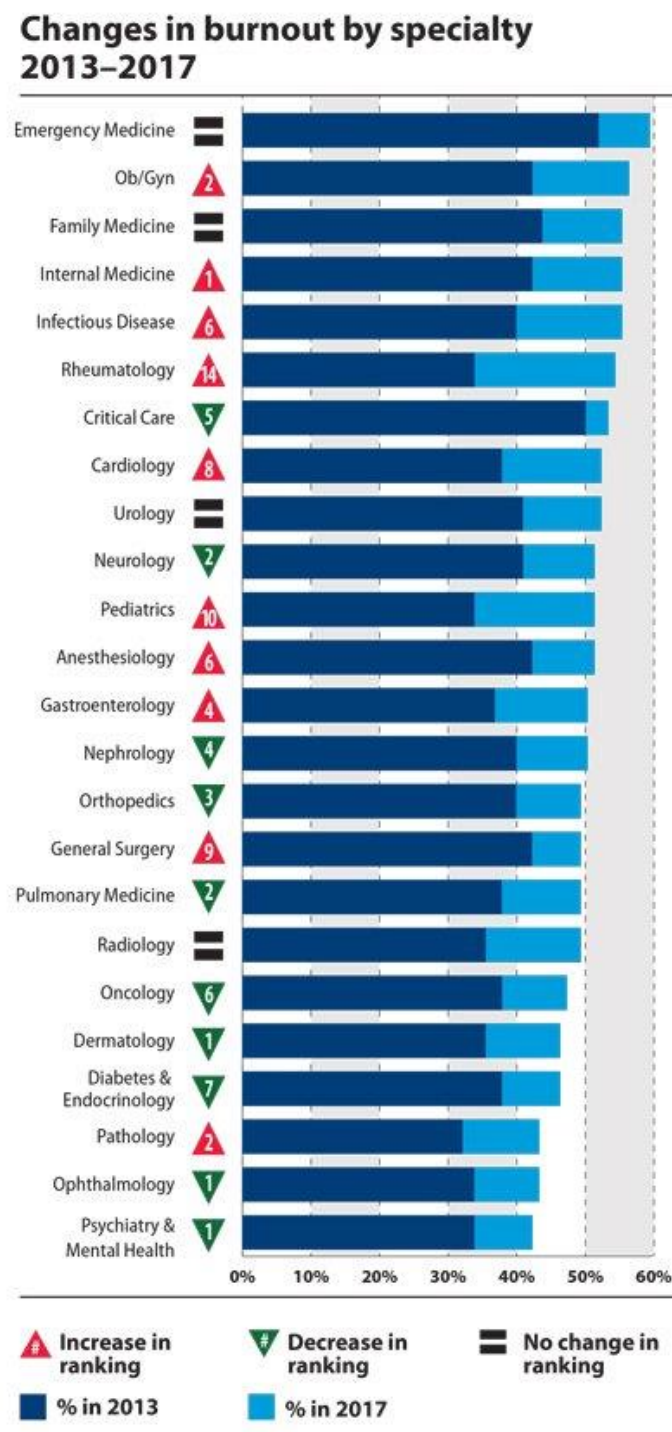


<https://www.oecd.org/health/health-spending-set-to-outpace-gdp-growth-to-2030.htm>

Obesity Trends

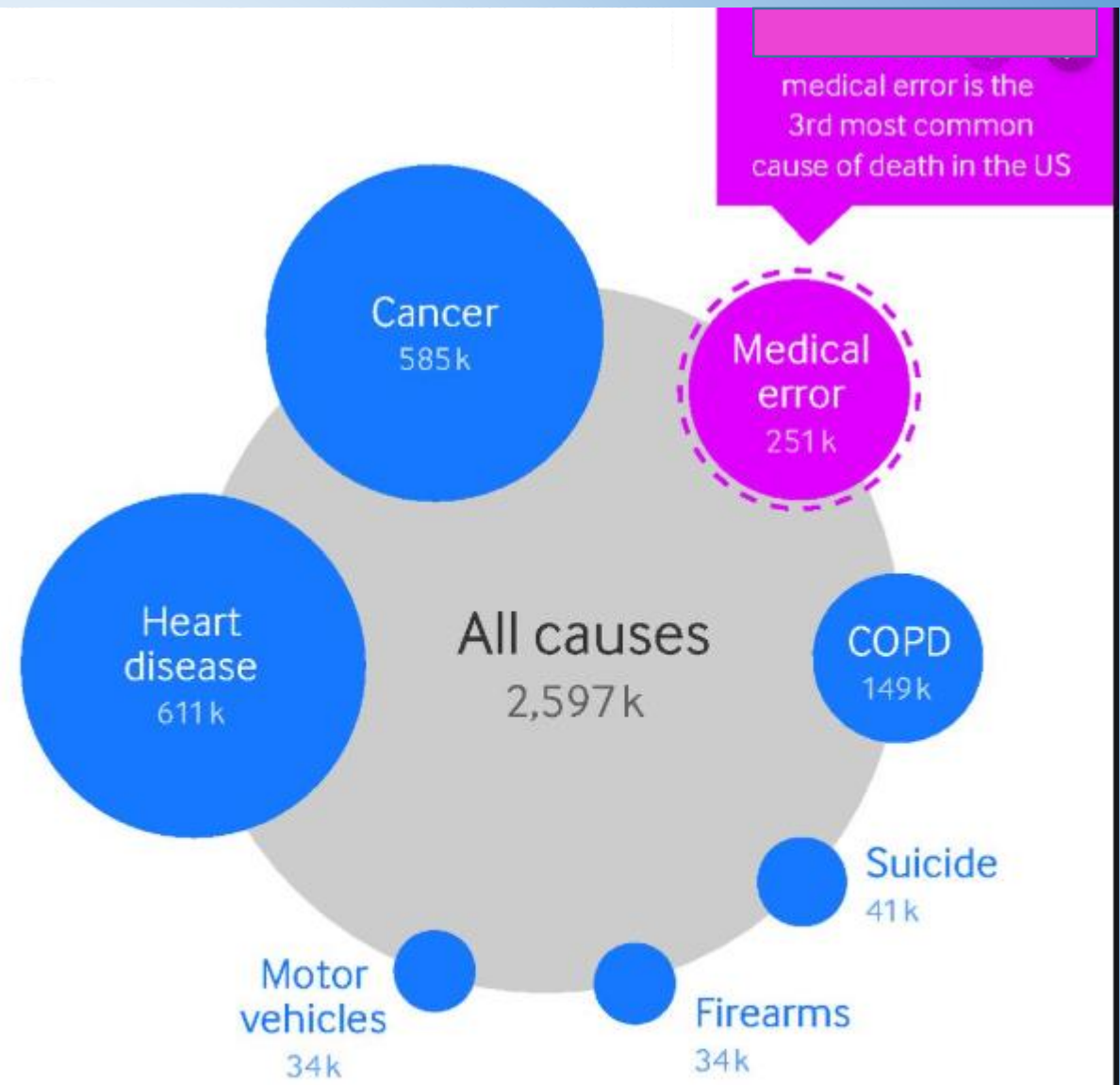


Burnout



Unsafe Care – Affects Quadruple Aim

- 1999: TEIH: 44-98 K deaths a year
- 2016: BMJ: Approx 250 K



Medical error—the third leading cause of death in the US.

Makary et al

BMJ 2016;353:i2139

However, we're not even counting this - medical error is not recorded on US death certificates

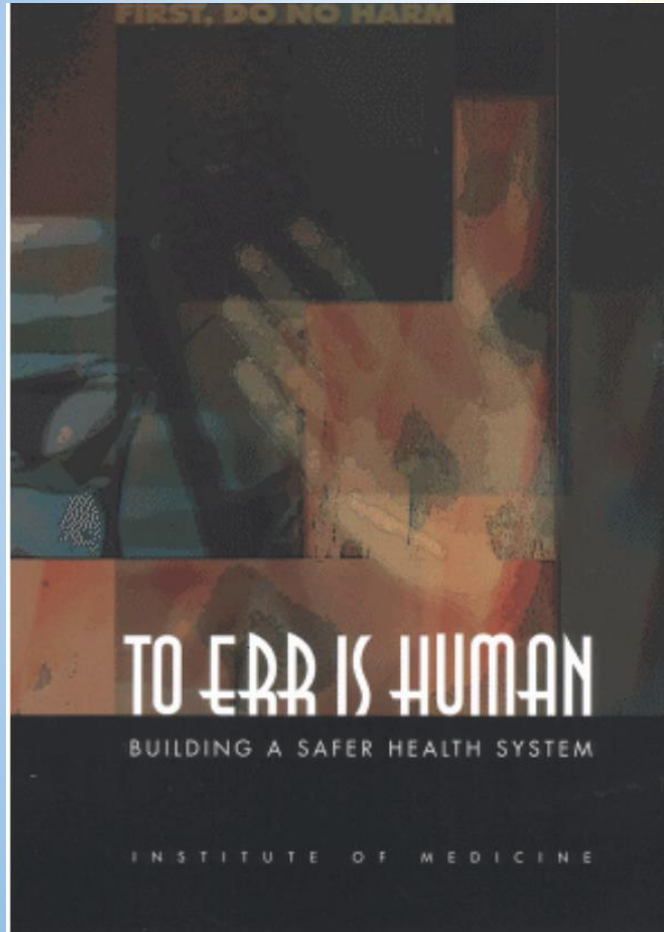
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Data source:

http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf

Patient Safety...

Have we made progress in 20 years?



Seeing
What Others
Don't

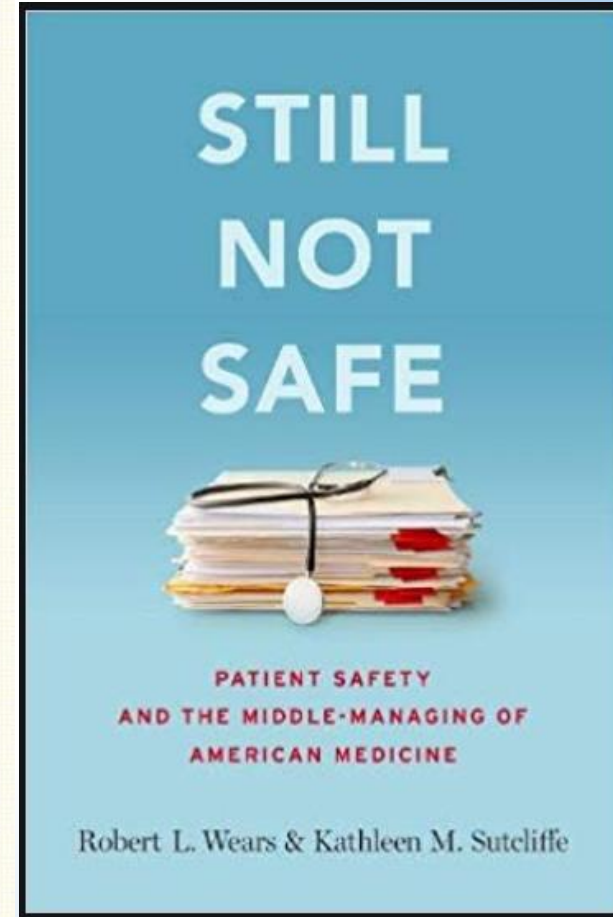


The Remarkable Ways
We Gain Insights

.....

"No one has taught me more about the complexities
and mysteries of human decision-making than Gary Klein."
—MALCOLM GLADWELL

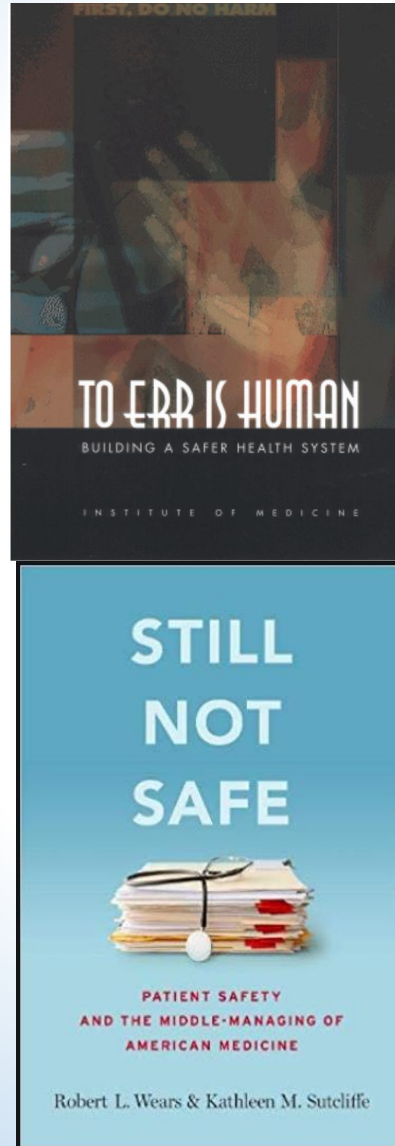
GARY KLEIN



We Need New Ways of Thinking.....

Last 20 years

- Scientific approach
- Rules
- Regulations
- Management centric
(diminished role of
Physicians)

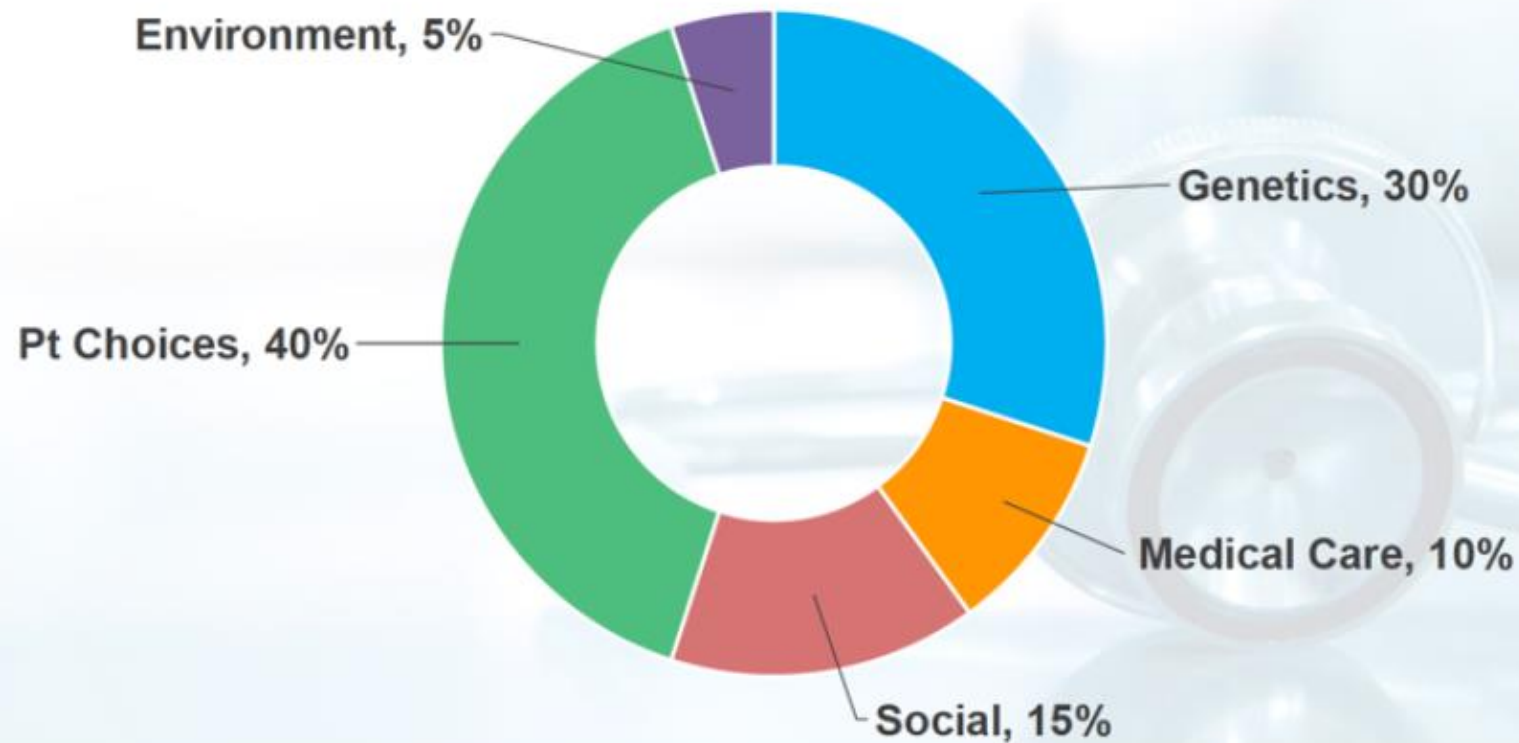


What is needed

- New types of research approach
- Soft sciences (and soft scientists)
 - Qualitative research
 - Anthropology, Sociology, Ethnography
 - Stories
 - Focusing on what makes things go right

We must increase our understanding of systems and complexity

What Determines Health




Population Health and Wicked Problems

- Exact causal mechanisms are obscured and difficult to address
- Effective solutions/interventions are not known
- Policies have not been effective.
- Traditional population health methods and thinking are inadequate to use to solve.

- Examples – obesity, diabetes, substance abuse, falls

Traditional Problem Solving – and Solutioning

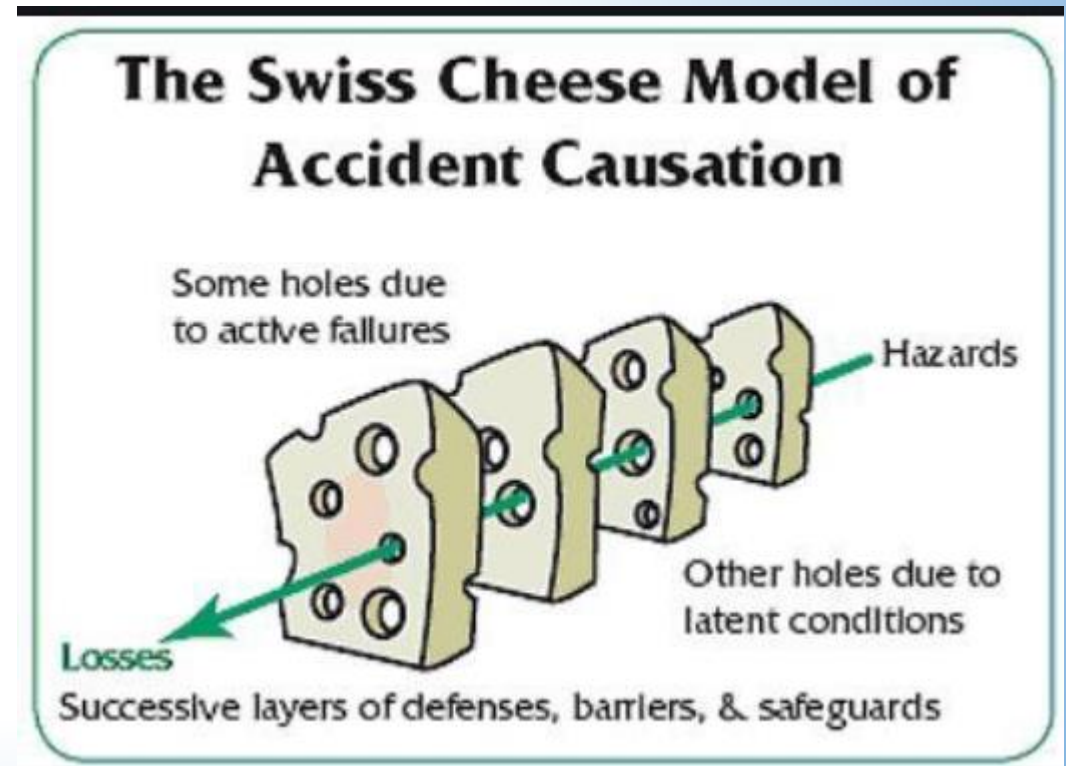
- Has focused on linear thinking
 - Belief
 - Causes are known and understood.
 - Most important ‘contributing causes’ can be identified
 - Interventions to address ‘root causes’ can be developed
 - Interventions can be implemented and....
 - Improvement would unfold!
 - This thinking is
 - Simplistic, reductionist and.....
- (often)  **WRONG!**

Changing Paradigms of Understanding Care (and Accidents)

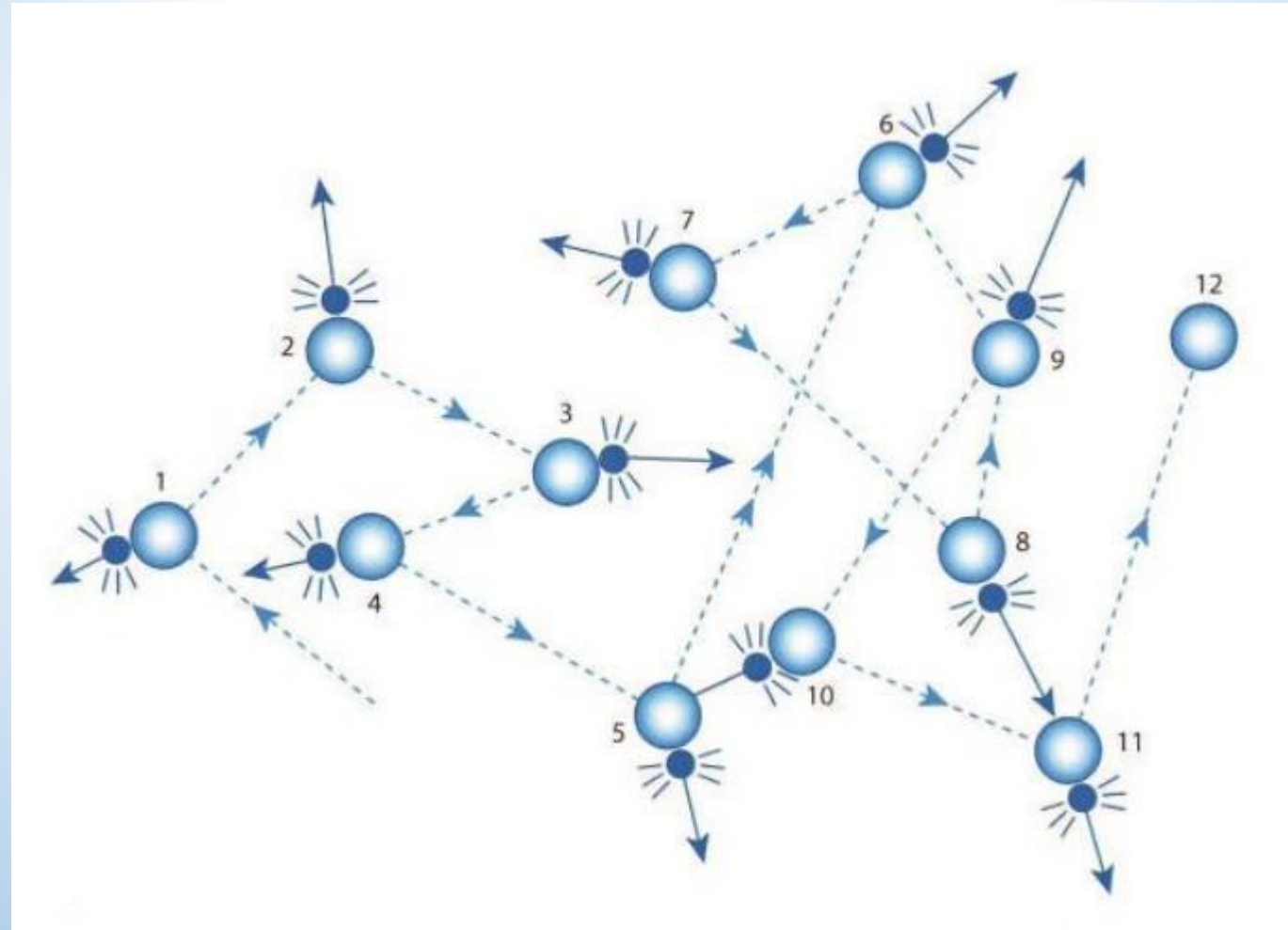
From Linear Thinking



To Some Systems theory

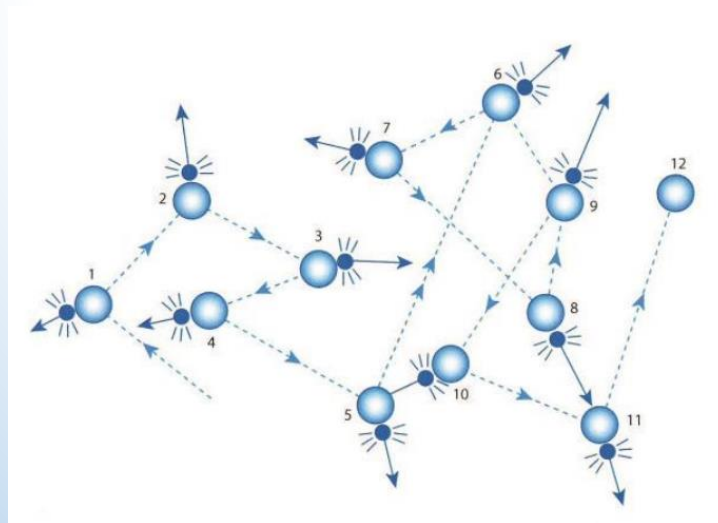


Complexity Theory – Outcomes (Including Safety) is a Property of the System – Emergence



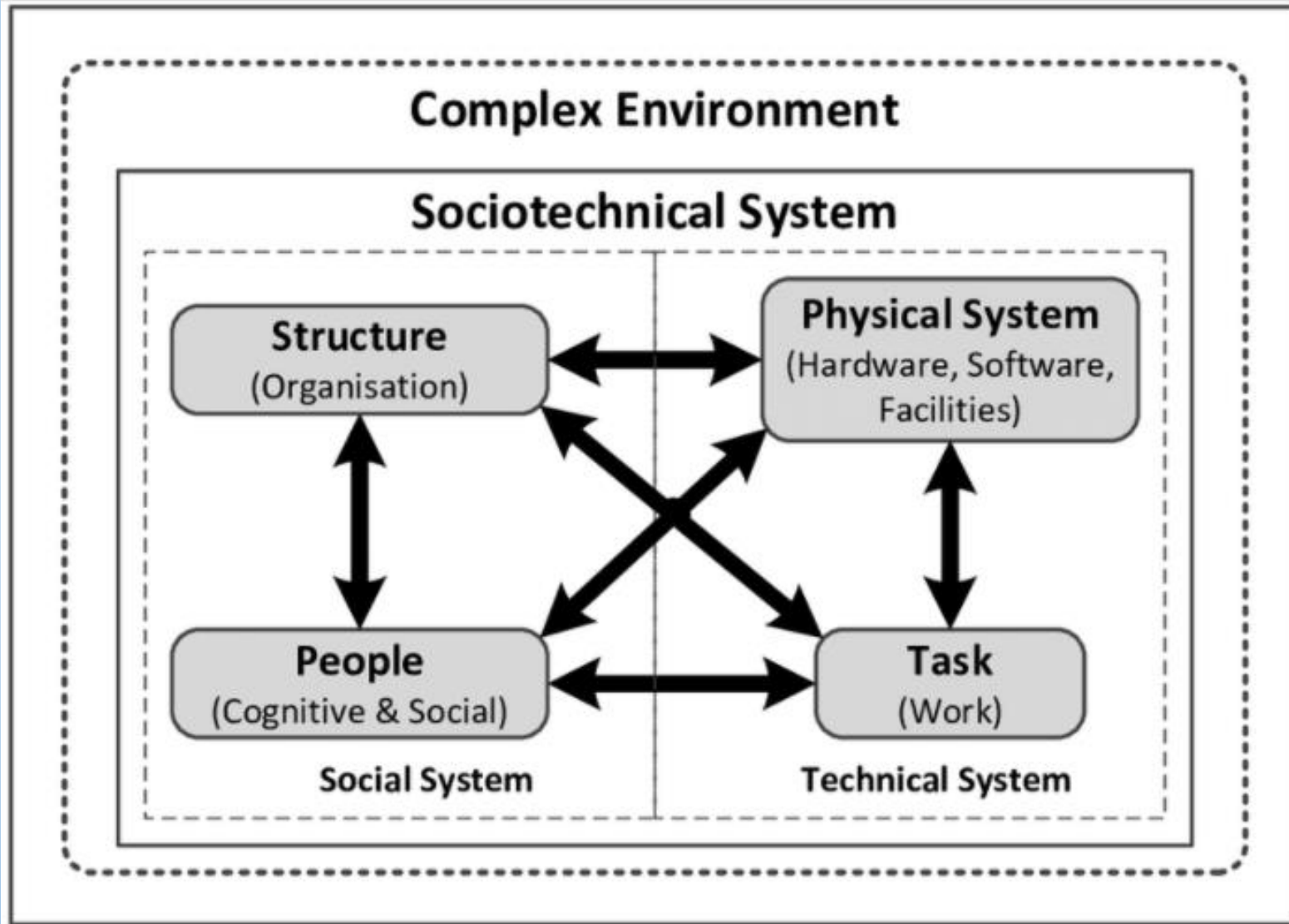
Healthcare is a Complex Adaptive System (CAS)

“a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected such that one agent’s actions change the context for other agents”



Agents: person, molecule, species, nursing unit, organization, etc etc

Our Healthcare System(s)



Complexity Science

- Helps in the study of systems (and their behavior/outcomes) that are only partially understood by traditional scientific insights.

Examples of complex systems

- Stock markets, forests, immune systems, termites colonies, weather
- Human body, hospitals.....

Leaders who understand
complexity science – approach
leadership in an entirely different
way...

Our collective experience.....

Strategic plans – fail to produce intended results
(assumptions of future conditions that were wrong)

Policies – that don't produce intended results

Interventions – don't succeed (despite a lot of effort!)



Frustration

Traditional vs Complexity Science

Traditional Science

- Built on Newtonian ideas
- Dominant metaphor is the *machine*
- Can be explained as the sum of its parts
- Parts are affected by simple predictable forces/laws
- If you understand the forces you can control and predict the output
- Parts don't have 'choice' or self determination

Complexity Science

- No single theory or idea
- Study of complex adaptive systems
- Look at the relationships between parts
- The whole is greater than the sum of its parts!
- Highly interdisciplinary – biologists, anthropologists, economists, sociologist, management theorists
- Trying to understand living, adaptable, changeable systems

We need to change majors!

Physics

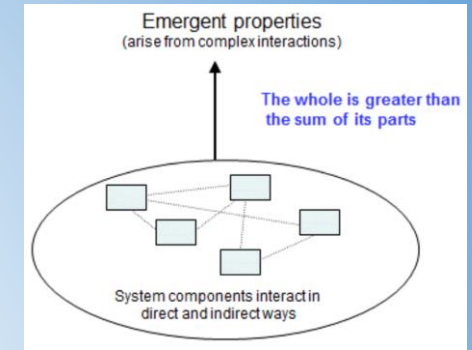
- Rigor
- Immutable
- Based on equations, simple models and laws

Biology

- Messy, unpredictable, disorderly, unstable
- Always changing
- No equations and simple models

Move from studying how organizations should behave to understanding how they actually behave

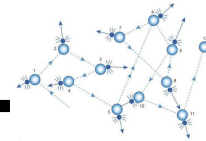
Complex Adaptive Systems



Dependent on History /
Initial Conditions



A: Angular (non linear)
E: Emergent phenomena
I: Interdependent
O: Organizing by self |
U: Unpredictable



Evolution of whole
greater than sum of
parts

[[[[[[Time and Space]]]]]]



Compression of Time.

Is your network.....

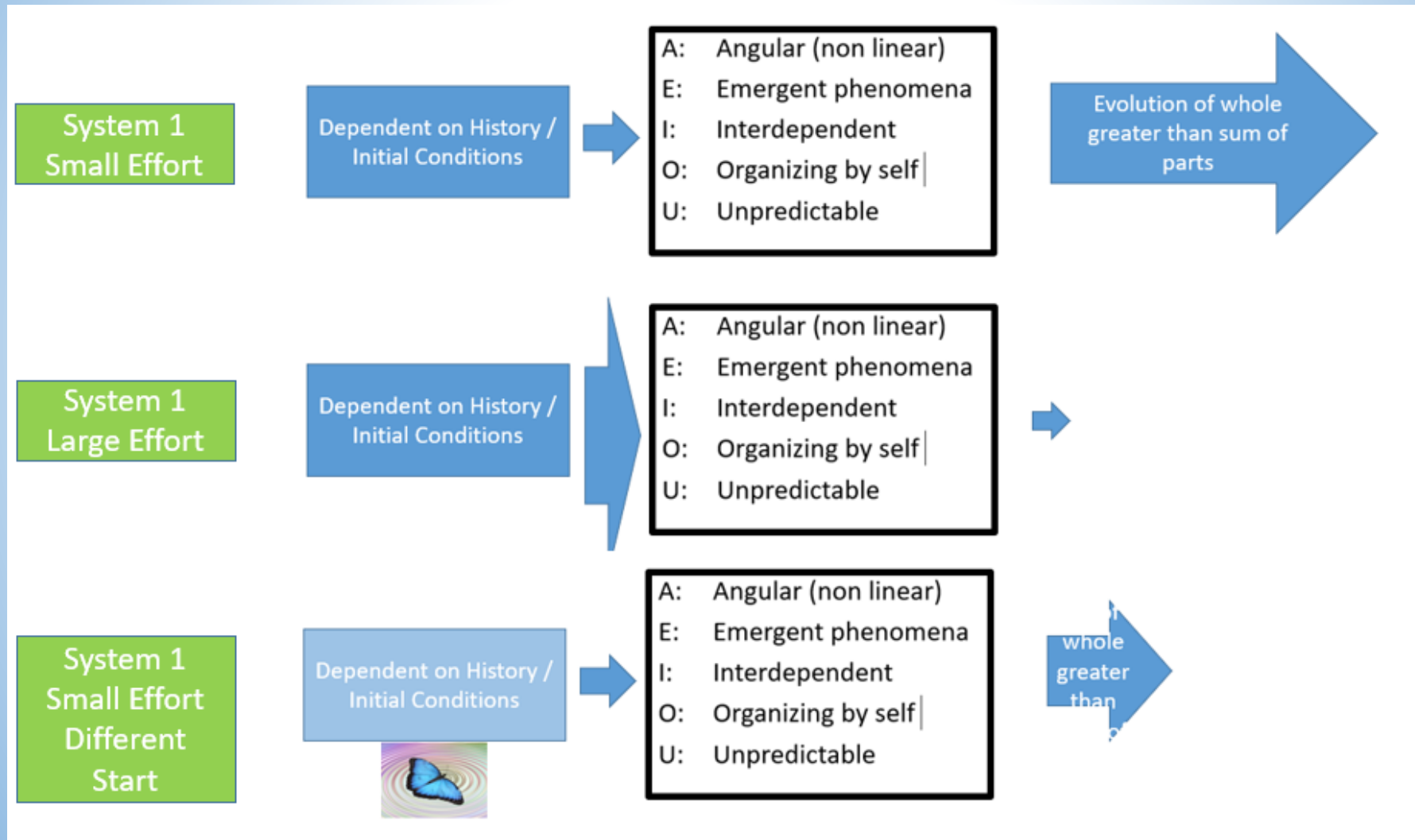
**Enabling immediate interactions with
'agents' for self organization**



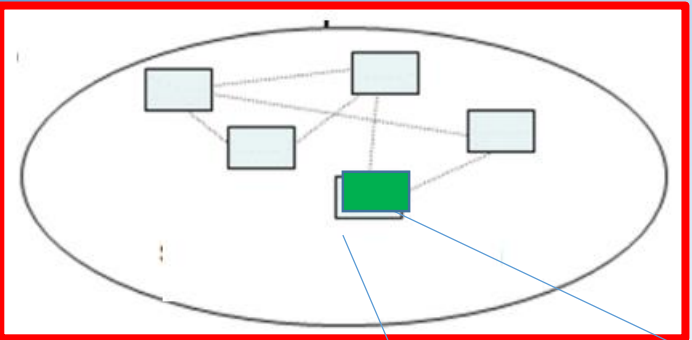
**Using slow, planned meetings with
centralized control?**



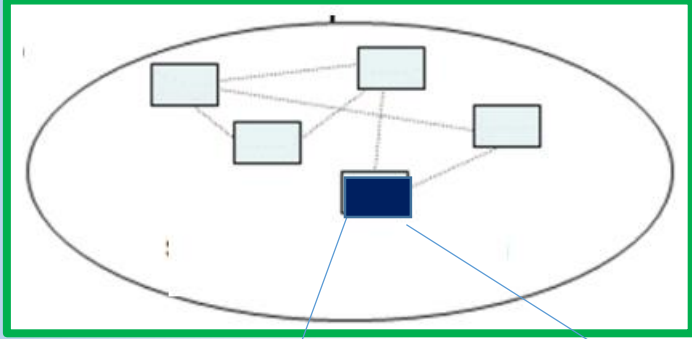
Different Outcomes:



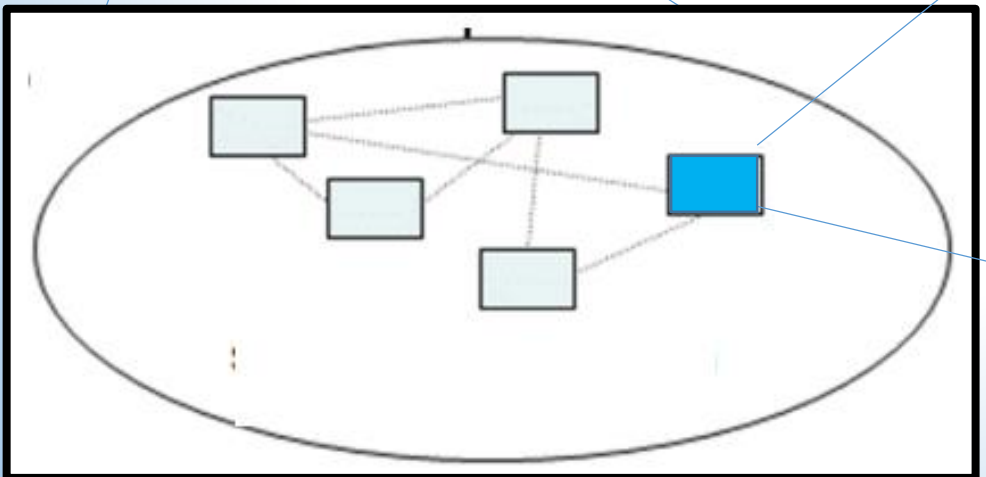
Each Complex Adaptive System is nested in another Complex Adaptive System!
Pearl: Study the macro and micro



Hospitals



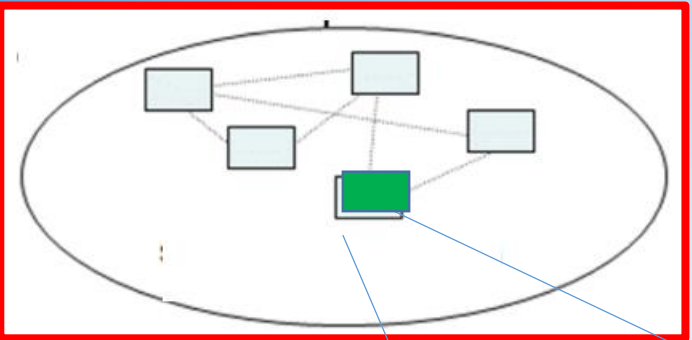
Nursing Units



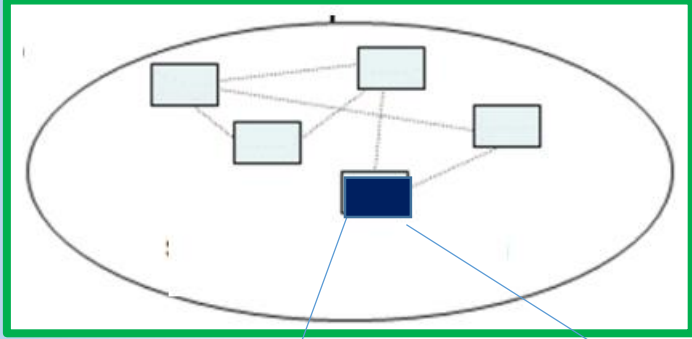
Staff



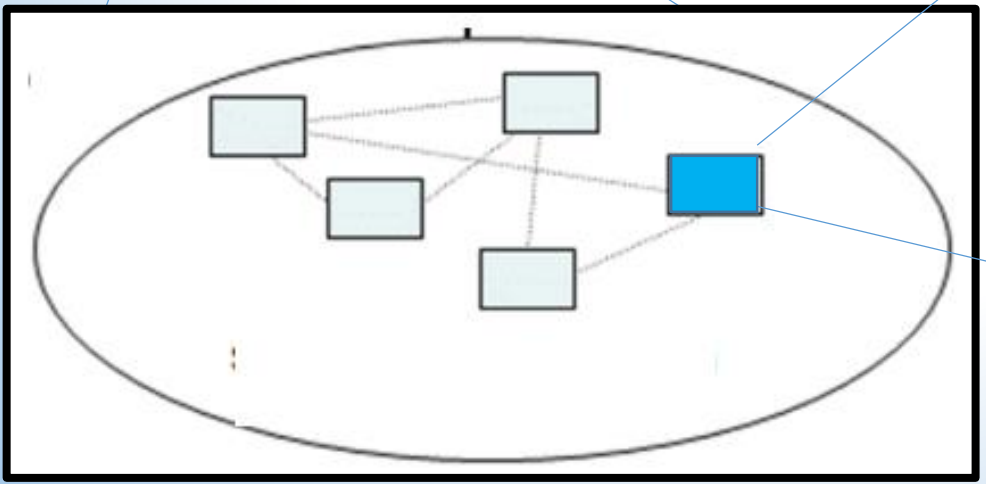
Each Complex Adaptive System is nested in another Complex Adaptive System!
Pearl: Study the macro and micro



Network Regions



Offices



Staff



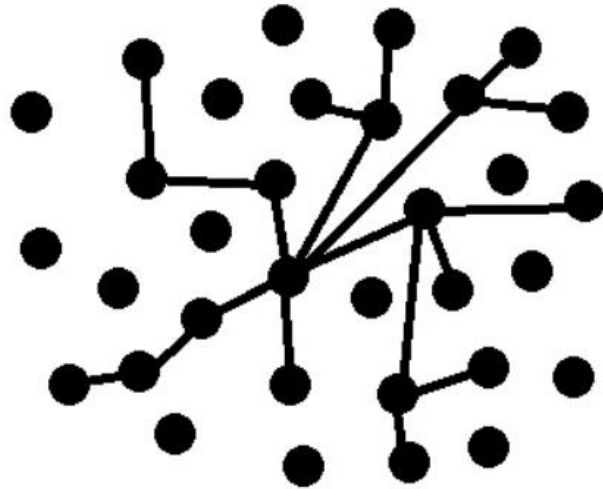
To really understand complexity (and your systems)

- Move from quantitative to...
- Qualitative methods (Soft Research Methodology - SRM)
 - Ethnography / Sociology / Psychology
 - Case studies
 - Case comparison / time series analysis
 - Social surveys
 - Simulation and network analysis
 - Soft Systems Methodology

**Agents are
Interacting:
Use Mixed
Methods**

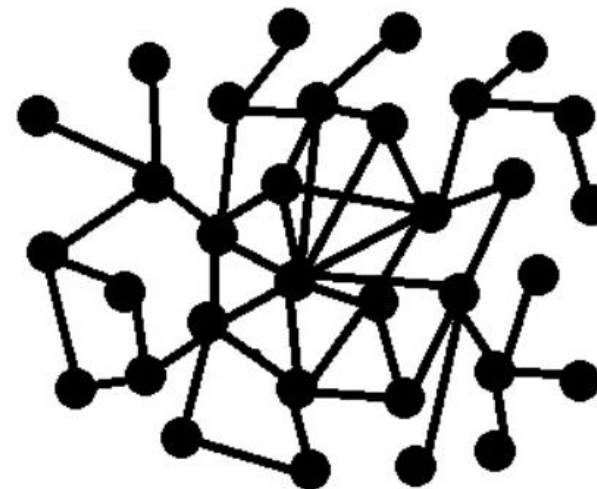
Byrne DS. Complexity theory and the social sciences: an introduction. New York, NY: Routledge; 1998.

Social Network Analysis



weak network

unintegrated individuals,
individuals held to network by
only one relationship, network
overreliant on star figures



strong network

all individuals integrated, many
individuals held to network by multiple
relationships, reliance on star figures
diminished by relationships unrelated
to star figures

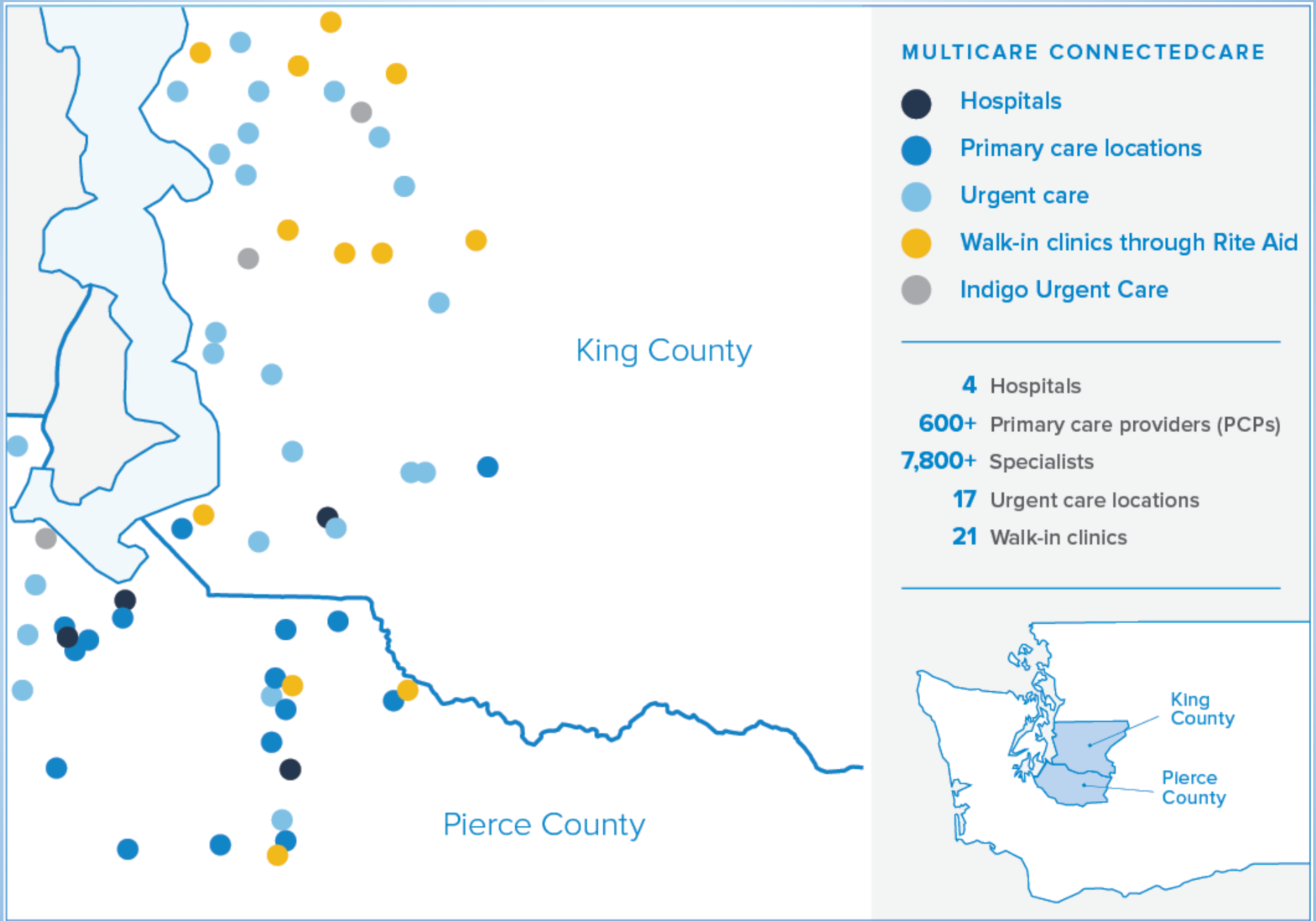
<https://imperiumadinfinitem.wordpress.com/2017/04/23/social-network-theory-basics/>

Social Network Analysis

Helps you understand....

- Strength of relationships between agents
 - Why certain ideas/beliefs are widely shared (or not)
 - Why certain implementations are successful (or not)
 - Why certain innovations succeed and are spread (or not)!





So you have a problem..

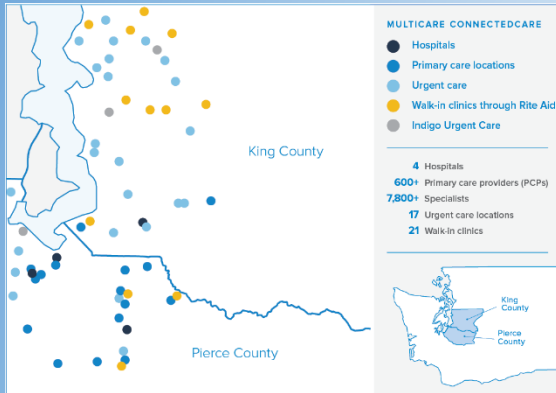
And you think you have a solution.....

- You select an 'approach' to fix your problem.
- A tactic/tool/technique is developed – with hope for positive impact
- Implementation must occur in many microsystems (PCP offices, Nursing units etc)

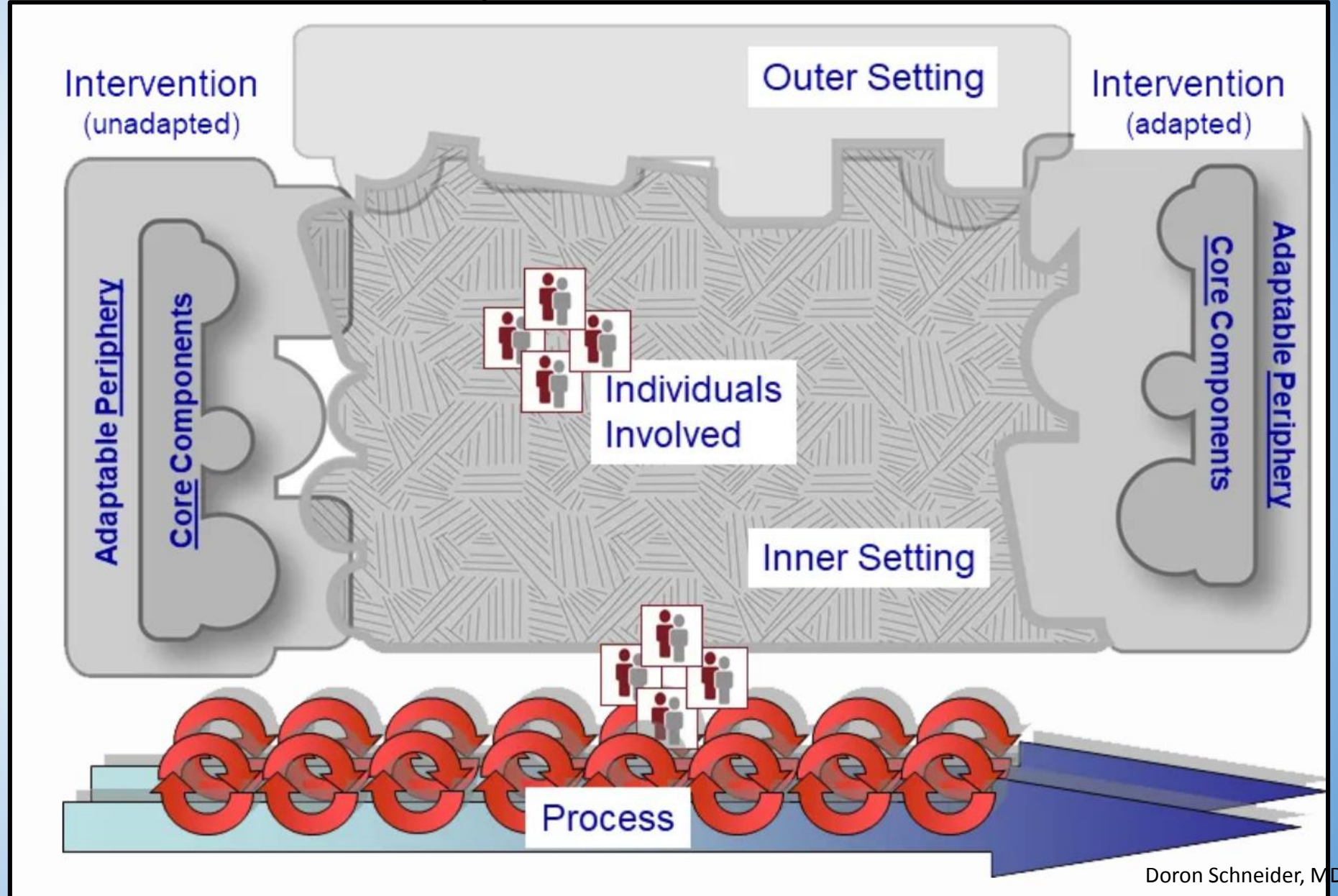
Not So Easy

- Implementation Science: microsystems are not machines.
- Unlike a machine – a part can't be easily added, swapped out, or eliminated to fix the problem
- A framework for understanding is required

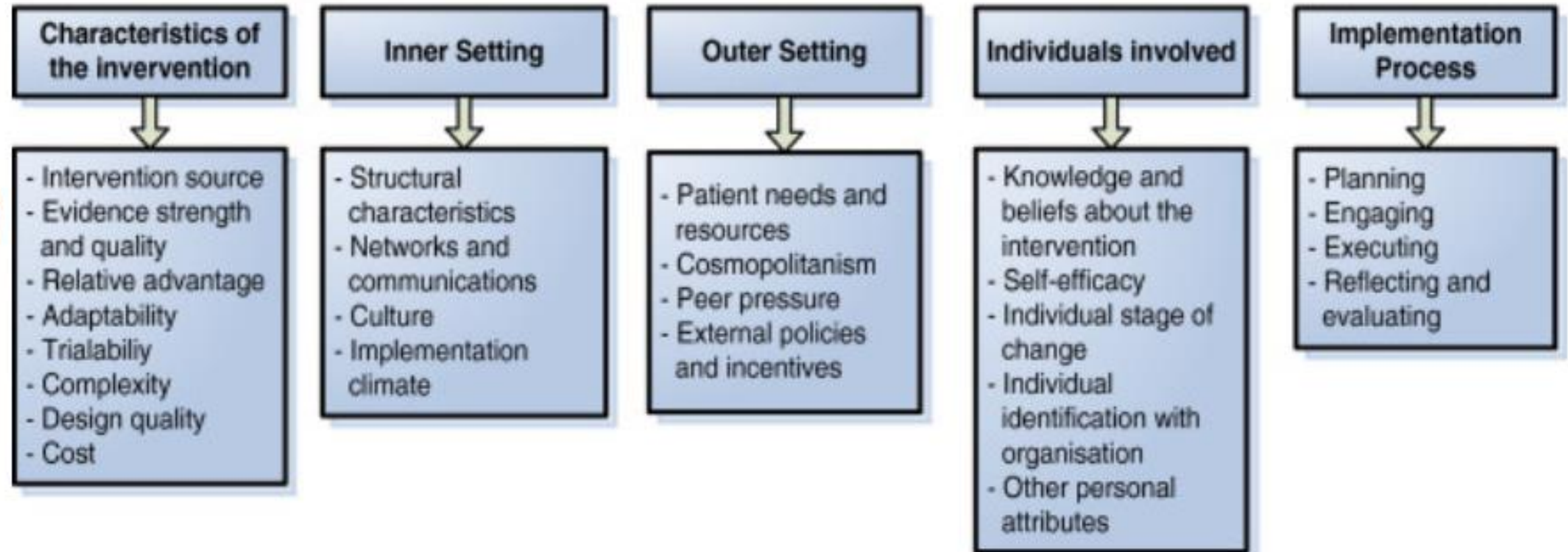
Consolidated Framework for Implementation Research



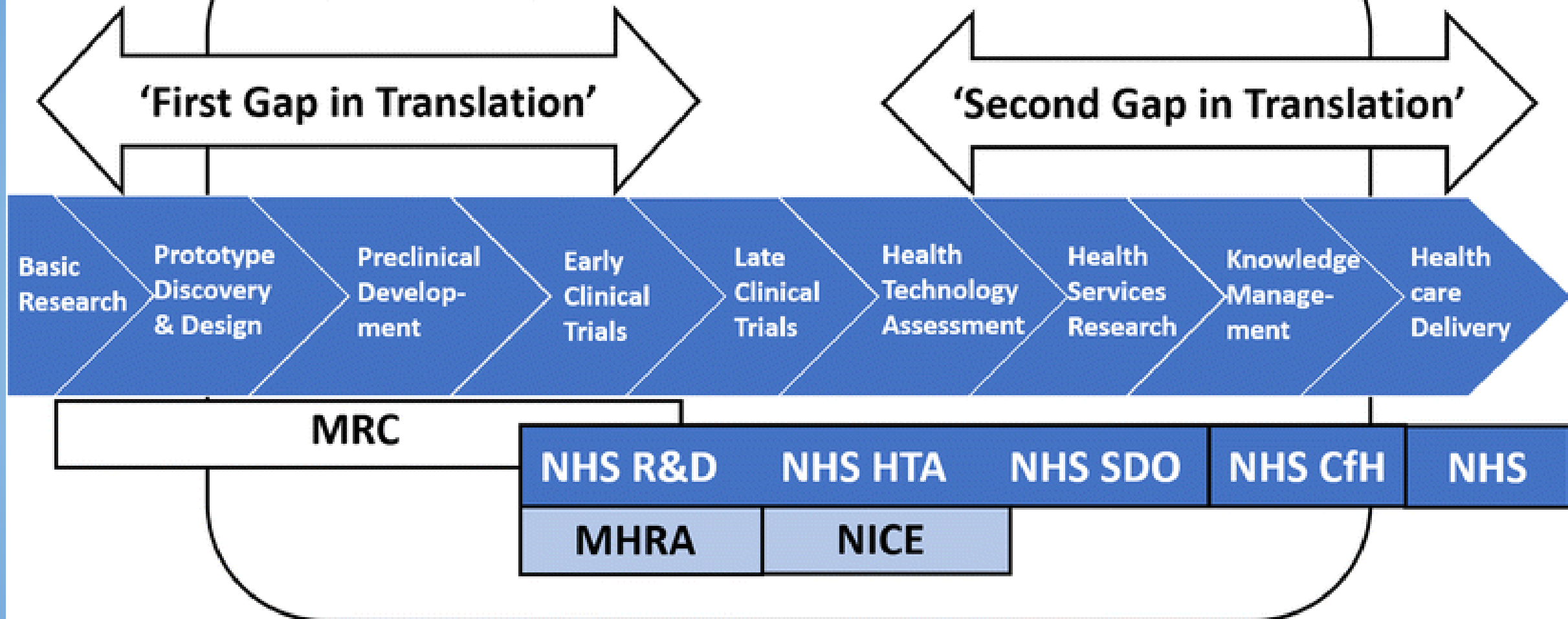
Primary care locations



Implementation



Critical Path within UK health research



MRC: Medical Research Council; **NHS R&D:** National Health Service Research and Development; **NHS HTA:** NHS Health Technology Assessment programme; **NHS SDO:** NHS Service and Delivery Organisation research programme; **NHS CfH:** NHS Connecting for Health; **MHRA:** Medicines and Healthcare products Regulatory Agency; **NICE:** National Institute for Health and Clinical Excellence

THE INNOVATION

e.g., Relative advantage;
Potential for reinvention; Risk;
Nature of knowledge required

SYSTEM ANTECEDENTS FOR INNOVATION

e.g., Structure; Size/maturity; Absorptive capacity for new
knowledge; Pre-existing knowledge/skills base; Receptive
context for change; Leadership and vision

SYSTEM READINESS FOR INNOVATION

e.g., Tension for change; Power
balances; Monitoring and
feedback

COMMUNICATION AND INFLUENCE

DIFFUSION (informal,
unplanned)

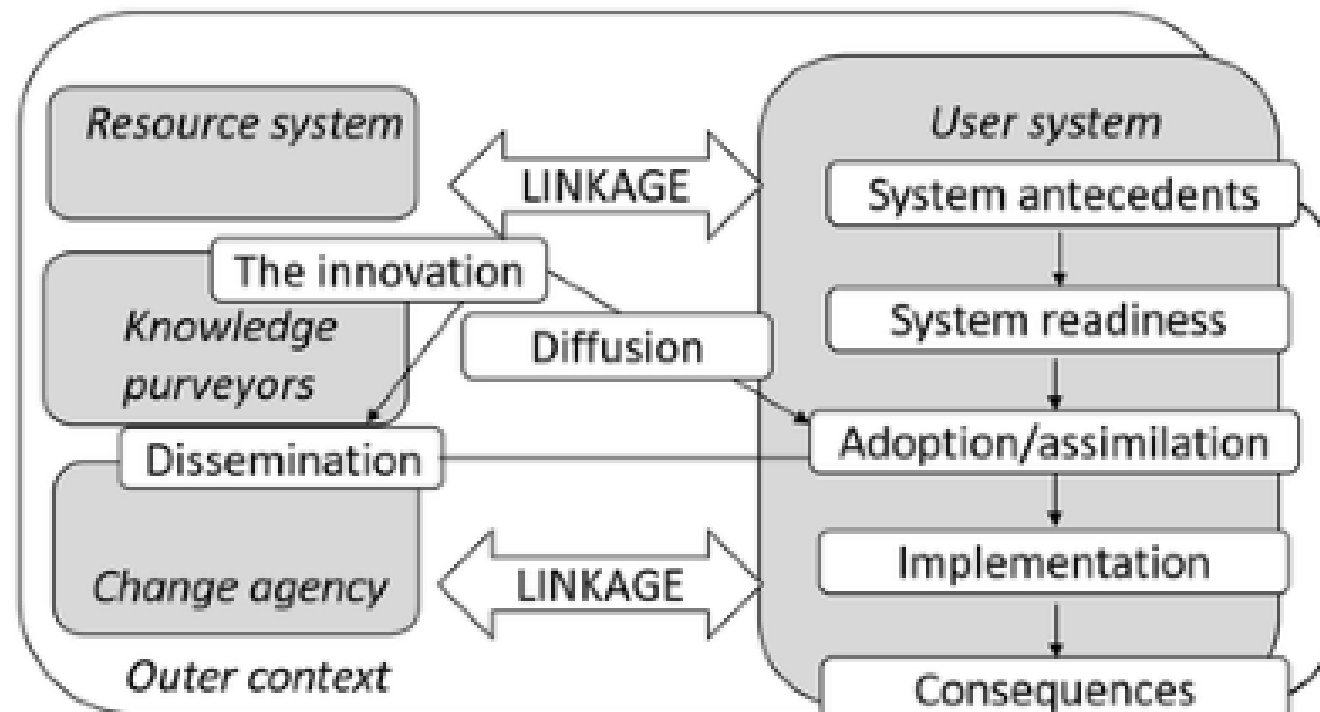
↑ Social networks;
Homophily; Peer
opinion

↓ Marketing; Expert
opinion; Boundary
spanners; Change
agents

DISSEMINATION (formal,
planned)

THE OUTER CONTEXT

e.g., Socio-political
climate; Inter-
organizational norm-
setting & networks



THE ADOPTER

Needs; Motivation;
Values and goals; Skills;
Learning style; Social
networks

ASSIMILATION

Complex, non-linear
process
'Soft periphery'
elements

THE IMPLEMENTATION PROCESS

e.g. Decision-making
devolved to front line
teams; Hands-on
approach by leaders and
managers

LINKAGE

Design stage: Shared meanings and mission; Effective
knowledge transfer

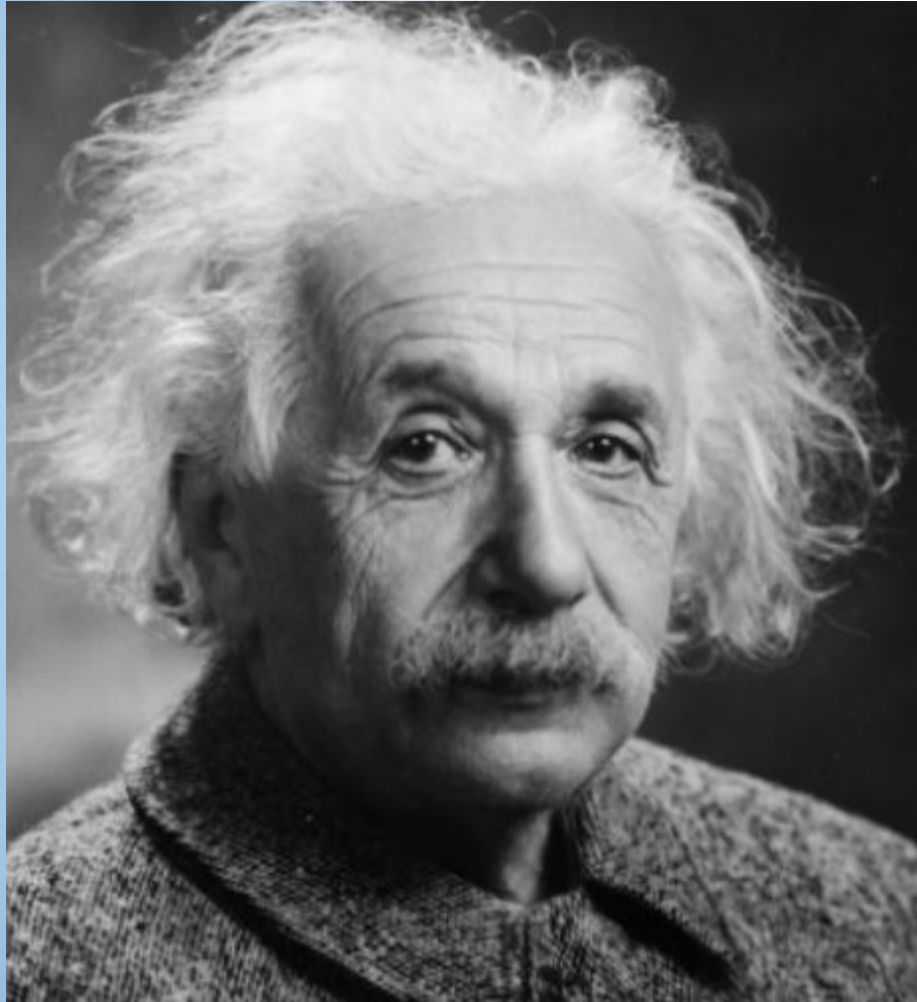
Implementation stage: Communication and information

Do we think our idea is really going to change the system and lead to improvement?

- Each person is an independently acting agent
- Has own attitudes, knowledge beliefs
- Each agent changes based on interactions with others
- Interactions are internal to the microsystem – and are affected by how the microsystem interacts with other microsystems.
- Its complex....

- Leaders must understand the realities on the ground!

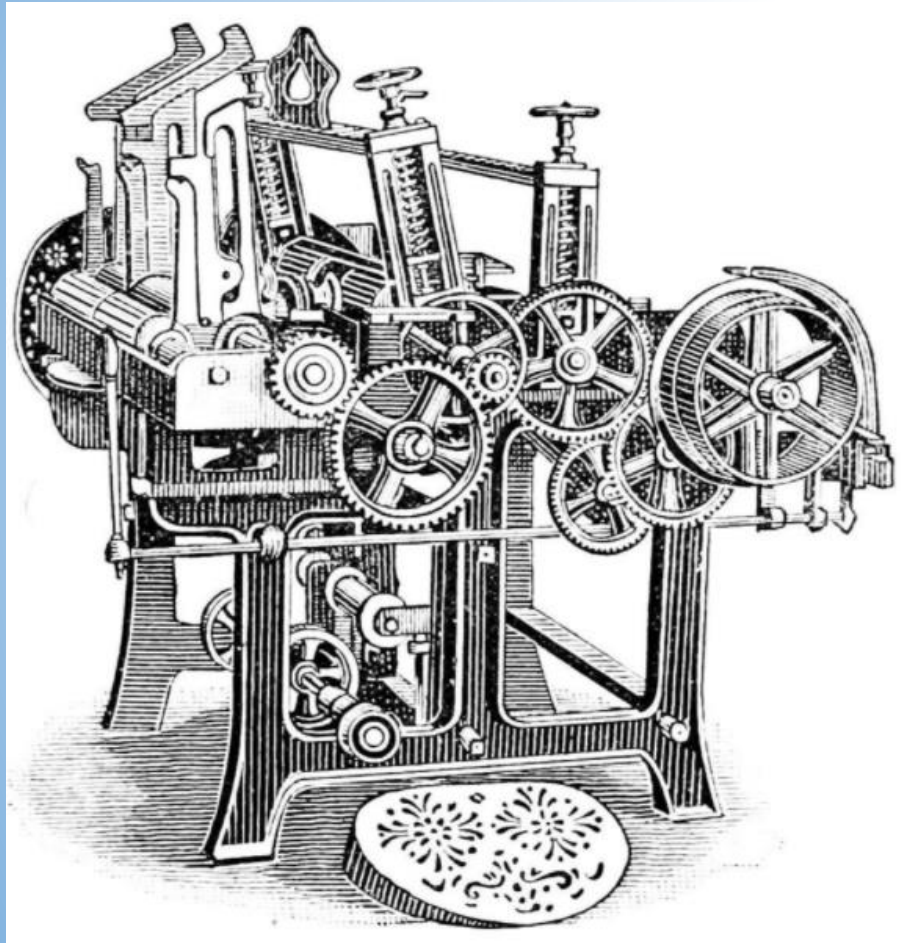
Leadership and a new way of thinking.....



We can't solve
problems by using
the same kind of
thinking we used
when we created
them.

~ Albert Einstein

Healthcare is *not* a machine

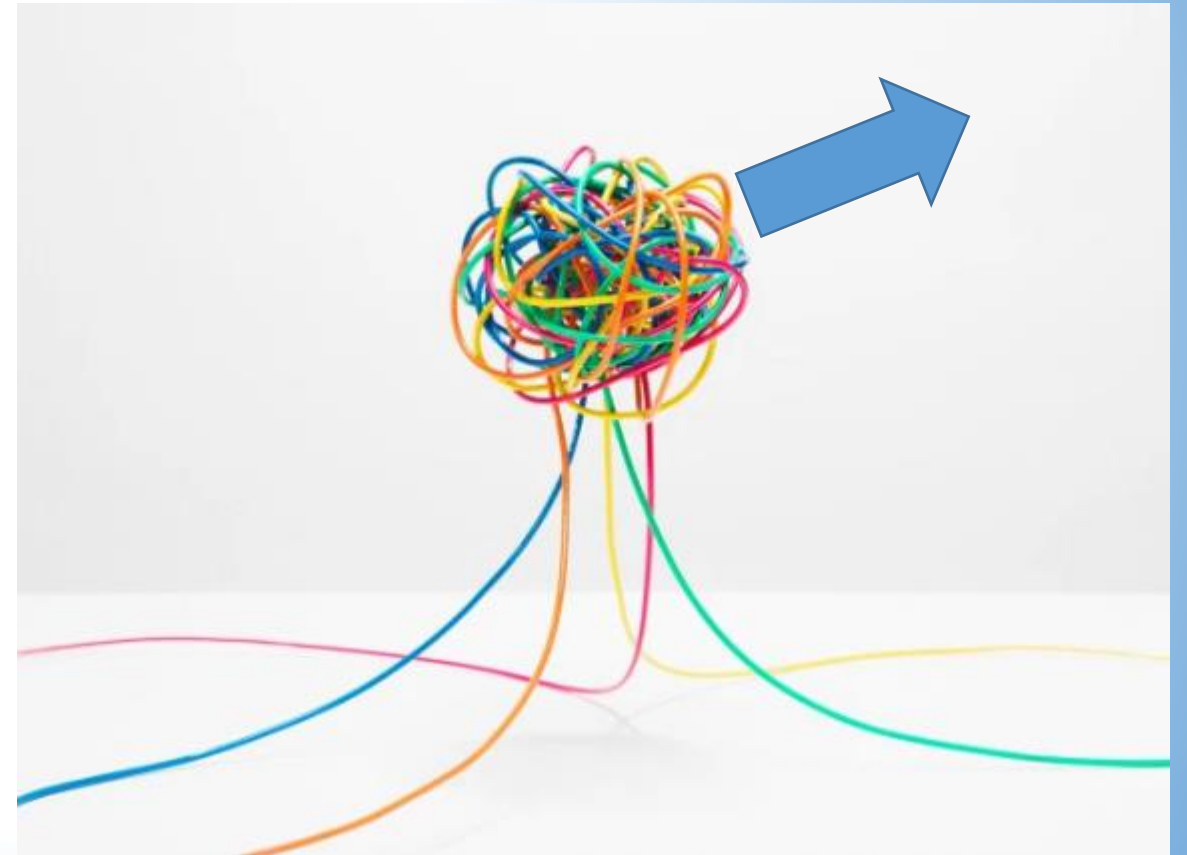


https://commons.wikimedia.org/wiki/File:PSM_V39_D312_A_gilling_machine.jpg



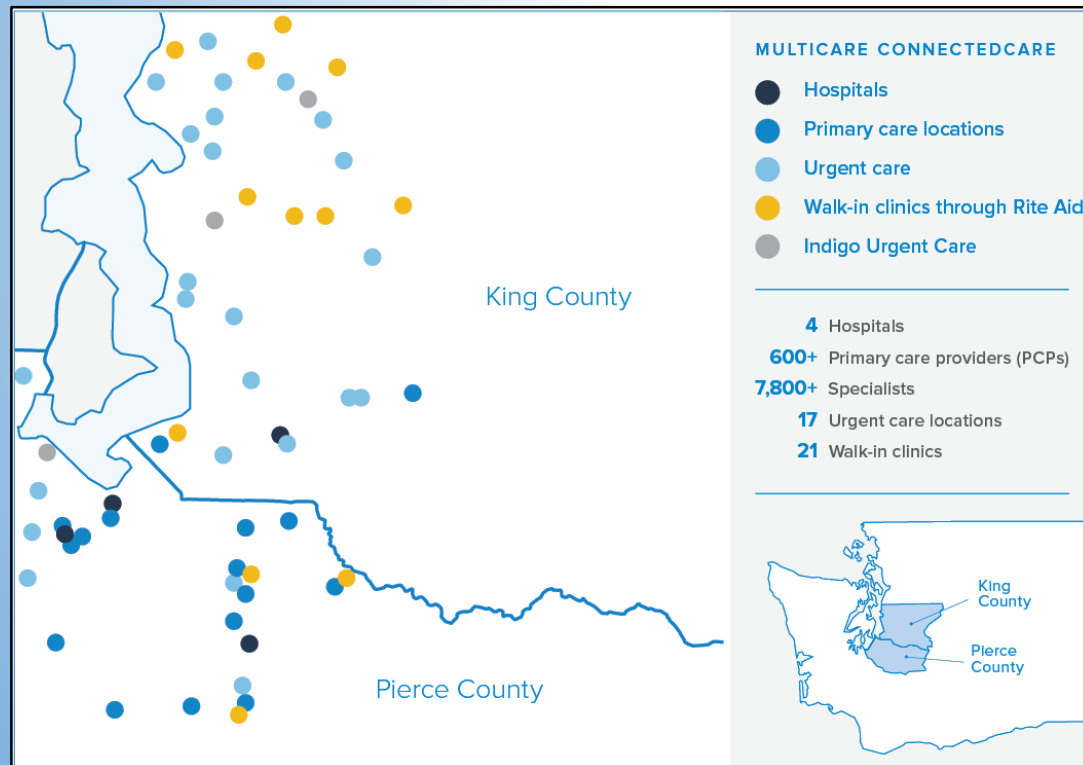
<https://www.industryweek.com/operations/media-gallery/21966444/bright-red-robots-a-glimpse-inside-the-tesla-plant-slideshow/slideshow>

We have moved away from the linear production line - to complexity

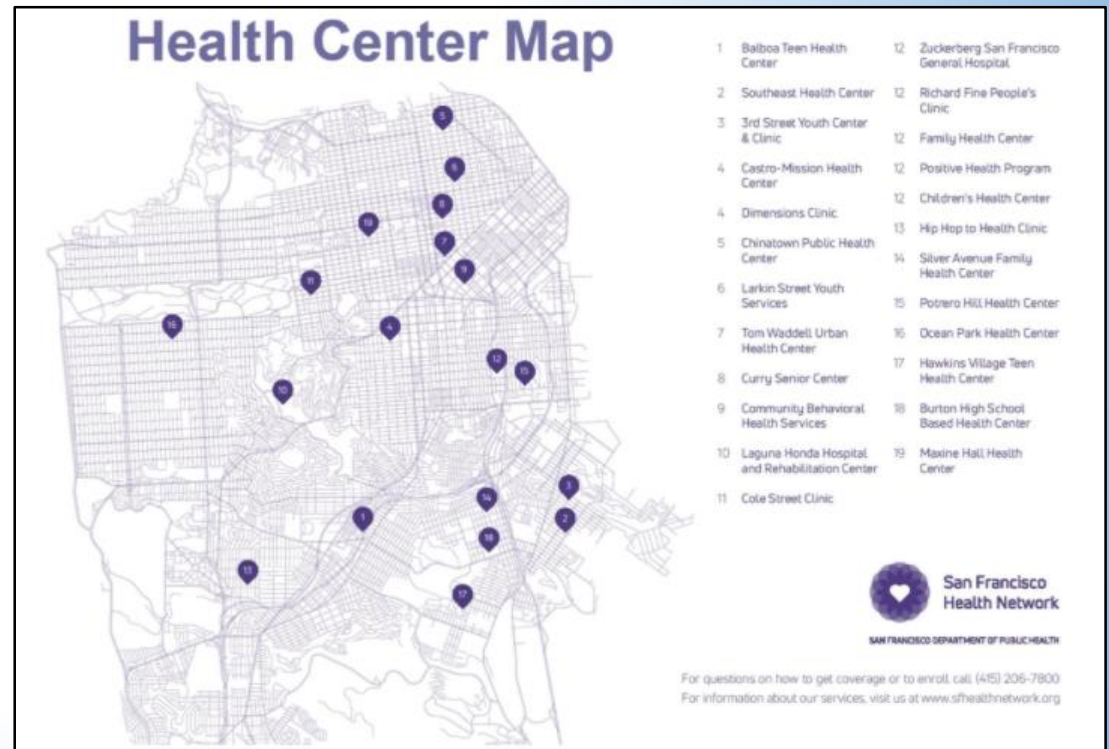


Population Health – Our Systems Are Not All The Same

Network A



Network B



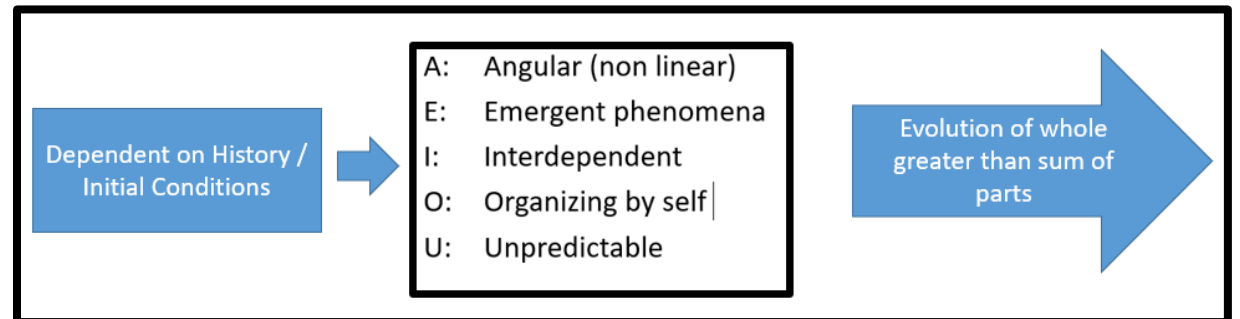
Complexity Theory: Why “Change” is Hard

- Systems are more than the sum of their parts.
- The parts (agents/participants) – work through relationship building, networking and making sense of their own surroundings.
- Agents – do not behave in linear ways and do not respond in a 1:1 fashion to interventions.
- Participants self organize, co-evolve and adapt dynamically
- Participants respond haphazardly to rules from above – but they create, or already have culturally, their own...
- If put under pressure – they are often resilient and impervious to change!
- Change ‘emerges’ from new interactions – that are dependent on previous interactions.



Path Dependence and Trust

- Interactions today are dramatically affected (? Determined) by interactions of the past
- Leaders who build 'trust' between parties today are more likely to have the results they desire in the future



So What Framework Can
Today's Leader Use to
Address Problems?

Introducing The Cynefin Framework

Harvard Business Review

Decision Making | A Leader's Framework for Decision Making


DECISION MAKING

A Leader's Framework for Decision Making

by David J. Snowden and Mary E. Boone

From the November 2007 Issue

Summary Save Share Comment 6 Print \$8.95 Buy Copies



Cynefin framework....

Four types of problems/ scenarios

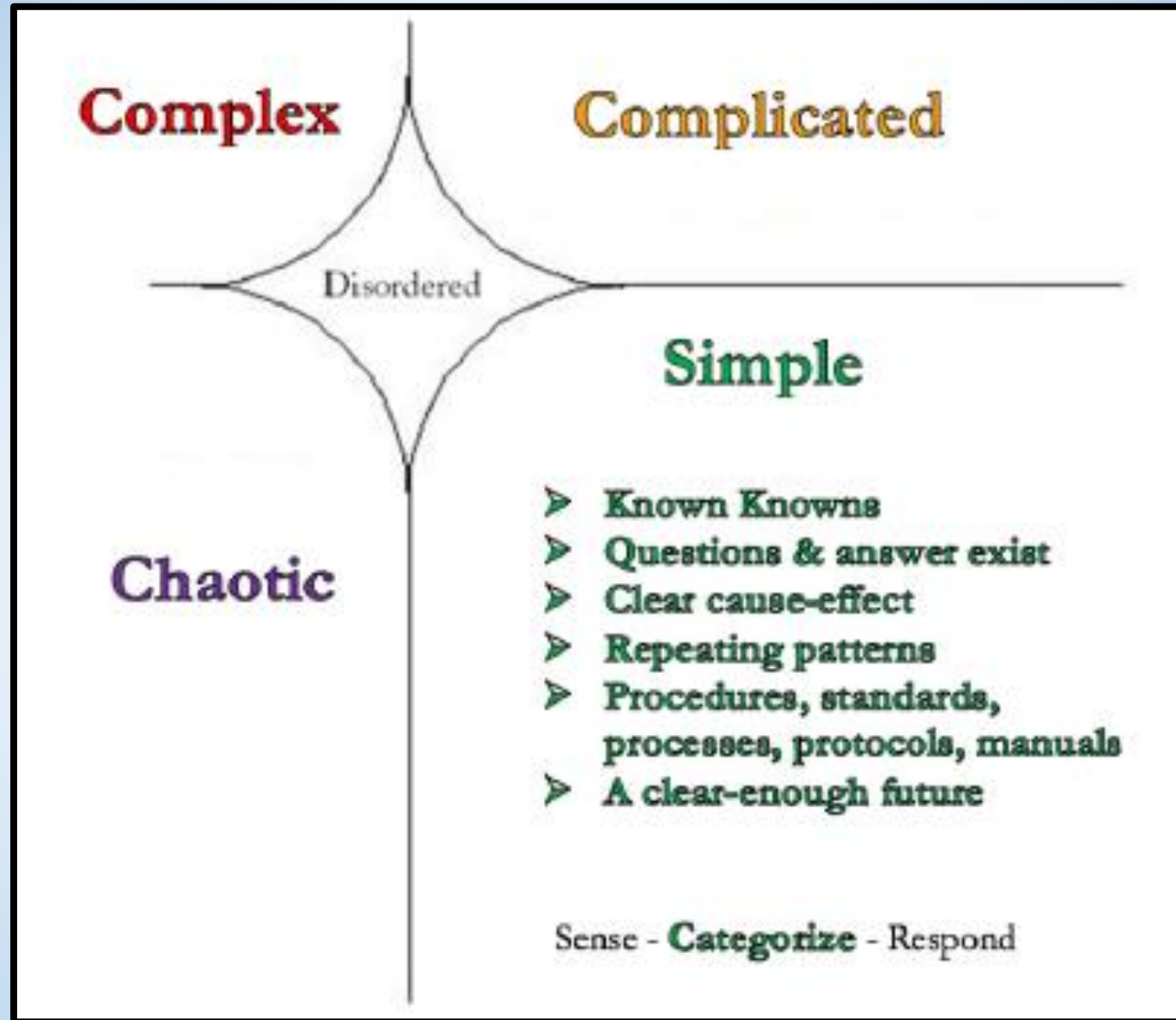
- Simple and Complicated
 - Ordered universe where cause and effect relationship are perceivable and the right answers are determined by facts
 - Fact based management
- Complex and Chaotic
 - Unordered and no apparent cause and effect relationship
 - The way forward is determined on the basis of recognizing emerging patterns
 - Pattern-based management

Leadership Action Patterns –

Should depend on the nature of the problem.

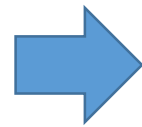
- **Simple:** Sense, Categorize, Respond (Best practice)
- **Complicated:** Sense, Analyze, Respond (Good practice)
- **Complex:** Probe, Sense, Respond (Emergent Practice)
- **Chaos:** Act, Sense, Respond (Novel Practice)

Simple



Simple Problems

- Best practices: focuses on efficiency and ‘process’ (production line)
- Best solved through “command and control” style of leadership
- Solutions are obvious



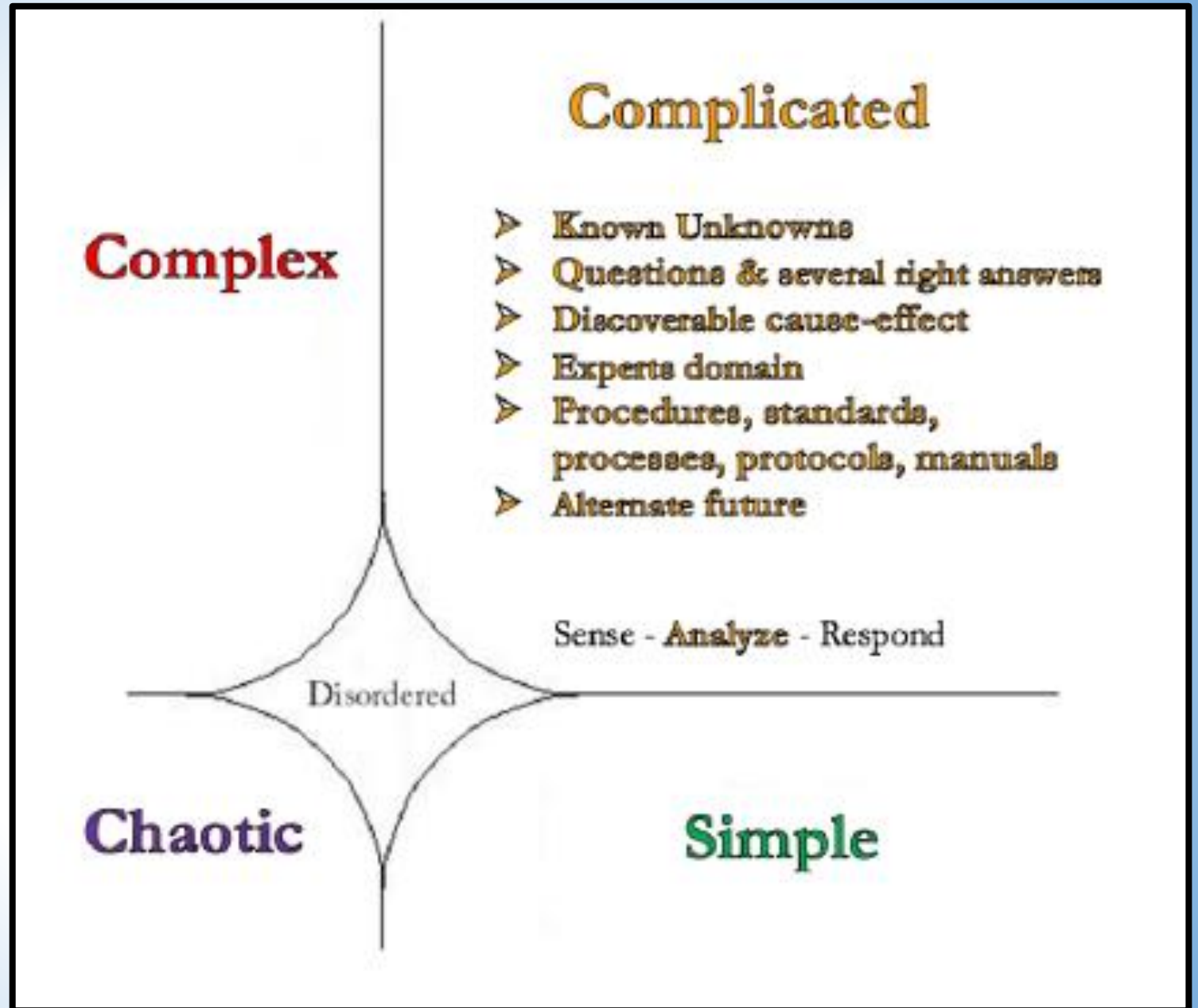
Fractured arm:
Surgery

Simple Problems:

Leader Skills and Competencies

- The leader can answer the 5 Ws: Who, What When, Where, Why
- Sort the issue into the correct category
- Respond with tried and true procedures
- Delegate and give instructions – and communicate clearly
- Correct use of technical vocabulary to reduce ambiguity

Complicated Problems



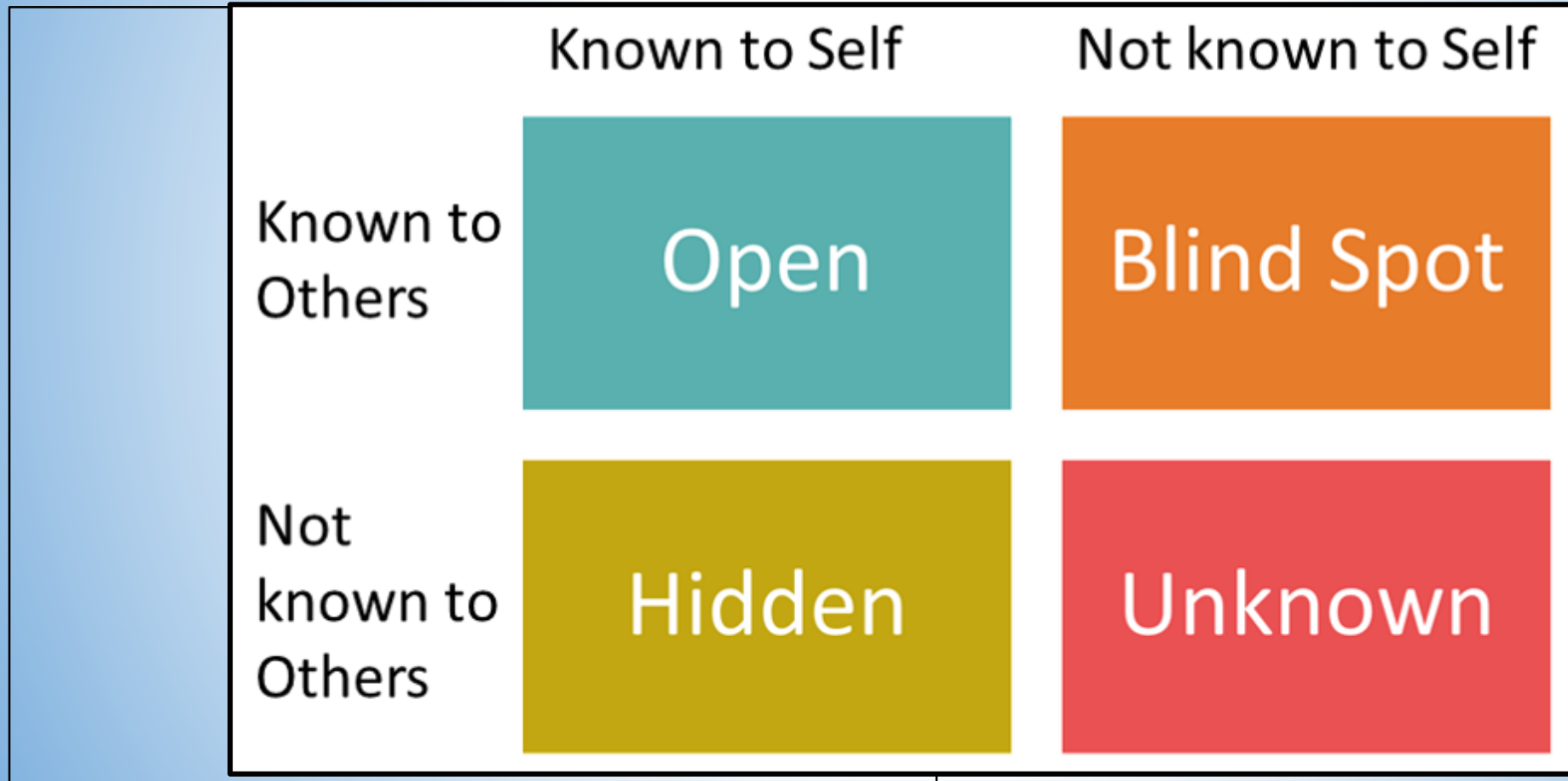
Complicated Problems



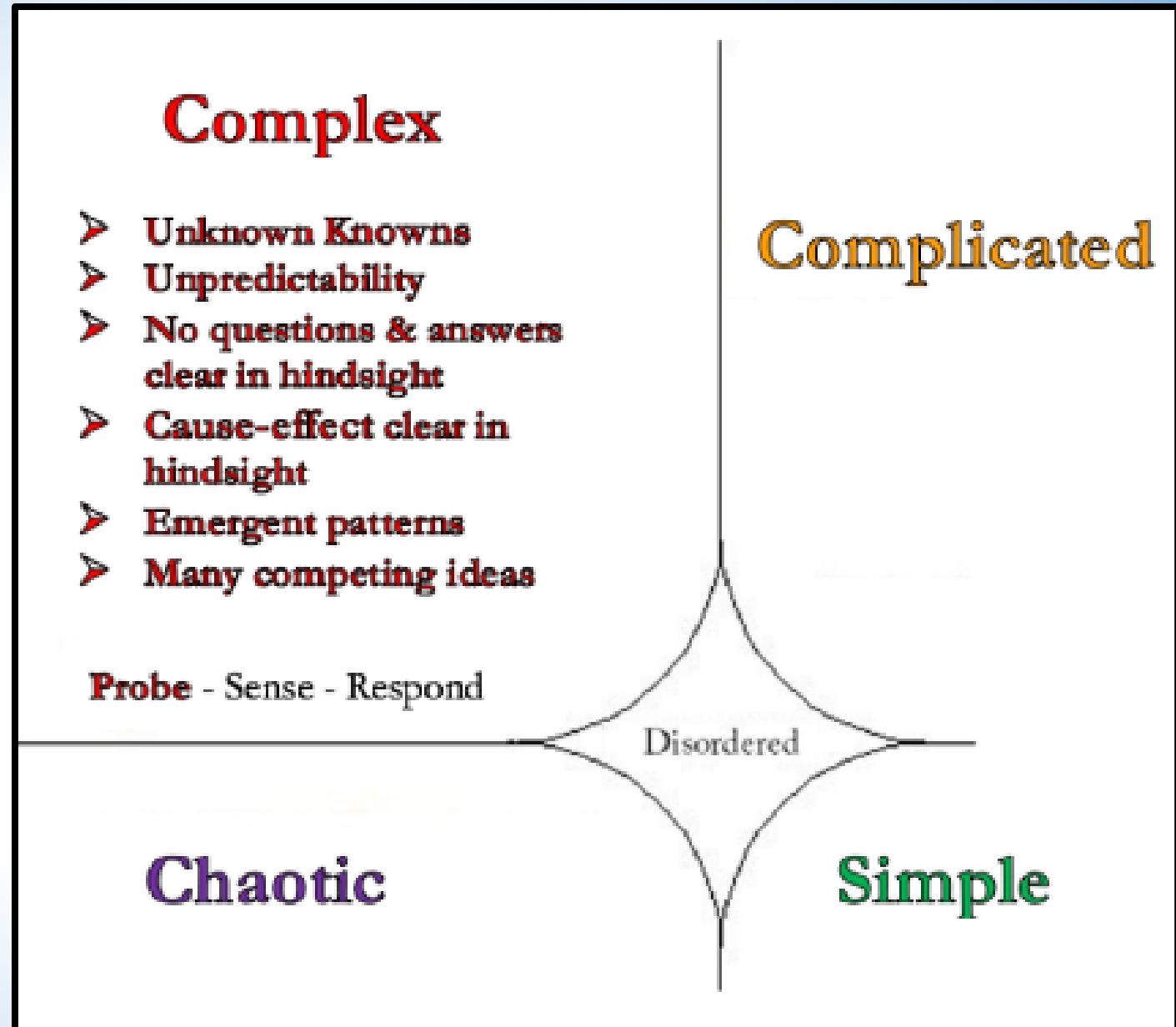
- Leaders need to **sense** , **analyze** and **respond**
- Expert opinion (gained) often required. *Networking*
- Deep knowledge and experience are key
- Put forward a design, build and implement new structure or process
- Problem solving and change is incremental

Don't let the perfect be the enemy of the good....

Complicated Problems: Johari Window



Complex Problems



Leadership/Management in Complex System

- Perceived patterns can be perceived by not predicated
- Leaders are confronted by a range of potential futures – with a range defined by a limited number of key variable
- Critically important is the growth of the leaders **networking**
- A leader should patiently allow the path forward to reveal itself instead of imposing a course of action.
- A leaders should probe to make the patterns more visible before taking action.
- Allows for creativity, new business models and innovation. **FAIL FAST, LEARN FAST and SAFE FAIL.**

The New Requirements: Adaptive Leadership

- Older thinking
 - People that are being led are assembled as **mindless machine extensions** performing impersonal processes. Very mechanical.
 - **Attention focused *only* on activities**, job descriptions that are detailed and constraining, roles are rigid, policies are oriented towards control of what people can't do
- New thinking: Adaptive leadership
 - Attention focuses on value added outcomes. Job descriptions are broad to allow flexibility, roles are fluid and attitude is to encourage people to take a “can do” mindset to find solutions (discretionary effort)

Adaptive Leadership

- Allows for individuals to feel responsible and active player in the organization
- Leads to motivation and commitment for the work
- Can trigger and lead to peak performance
- Allows for discretionary effort to be added

Pathological	Bureaucratic	Generative
Power oriented	Rule oriented	Performance oriented
Low cooperation	Modest cooperation	High cooperation
Messengers shot	Messengers neglected	Messengers trained
Responsibilities shirked	Narrow responsibilities	Risks are shared
Bridging discouraged	Bridging tolerated	Bridging encouraged
Failure leads to scapegoating	Failure leads to justice	Failure leads to inquiry
Novelty crushed	Novelty creates problems	Novelty implemented

Leaders Need to Encourage Design Thinking

- Open discussions where people generate innovative ideas to help leaders in decisions and strategies are welcome.
- Dissent and diversity is encouraged
- Leaders monitor for emergence because outcomes are unpredictable
- User specifications or requirements are not fully understood and defined up front.





Share



Add to list



Like



Recommend

Simon Sinek | TEDxPuget Sound

How great leaders inspire action



17:49



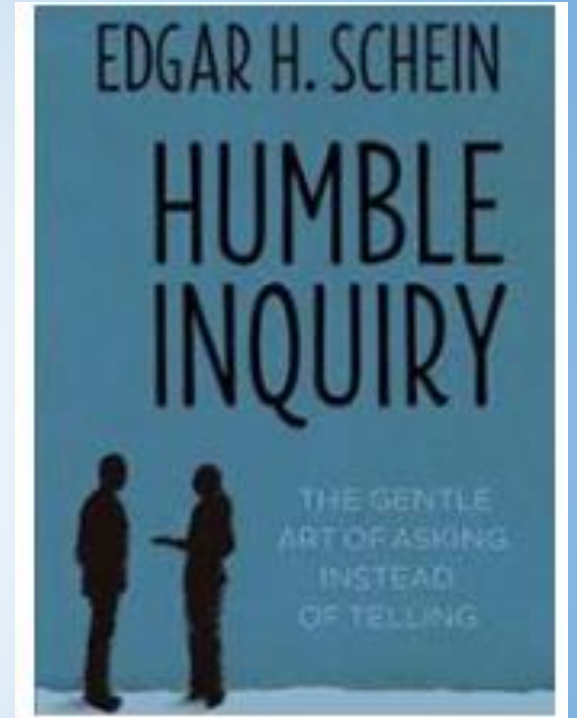
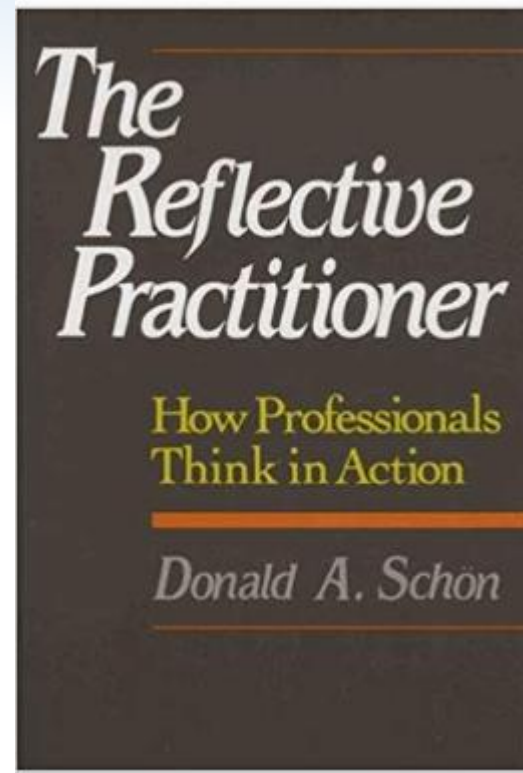
Conversational Leadership: An Approach for Complexity



the
WorldCafe[™]

Complexity

- Listen and observe for emerging patterns, ideas
- Schoen – Reflective Practitioner
- Edgar Schein – Humble Inquiry

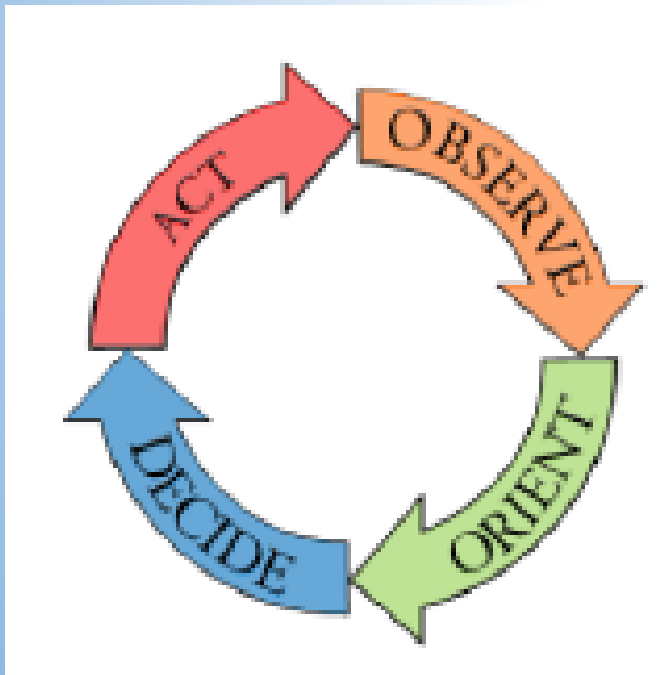


- Search for *Epoche*: the suspension of judgment and refraining from a conclusion prematurely

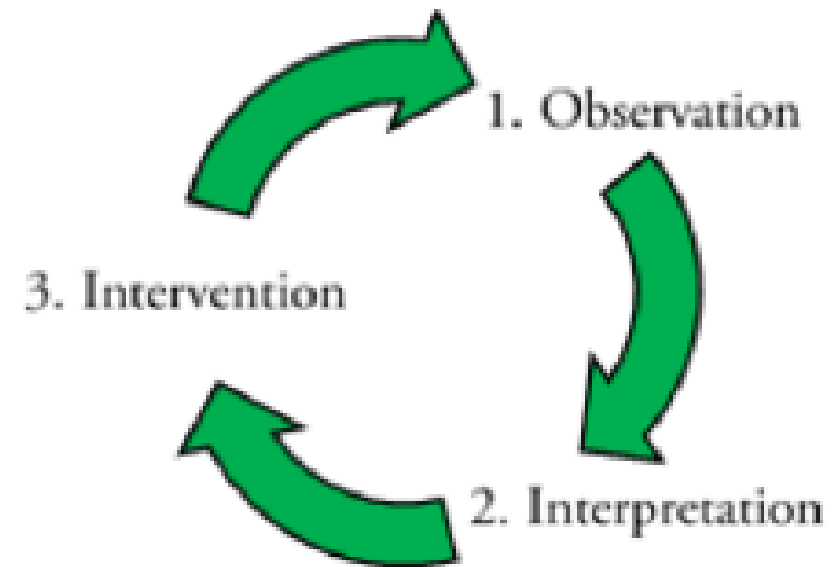


Models of Leadership For Complexity

OODA Loop



Adaptive Leadership Model



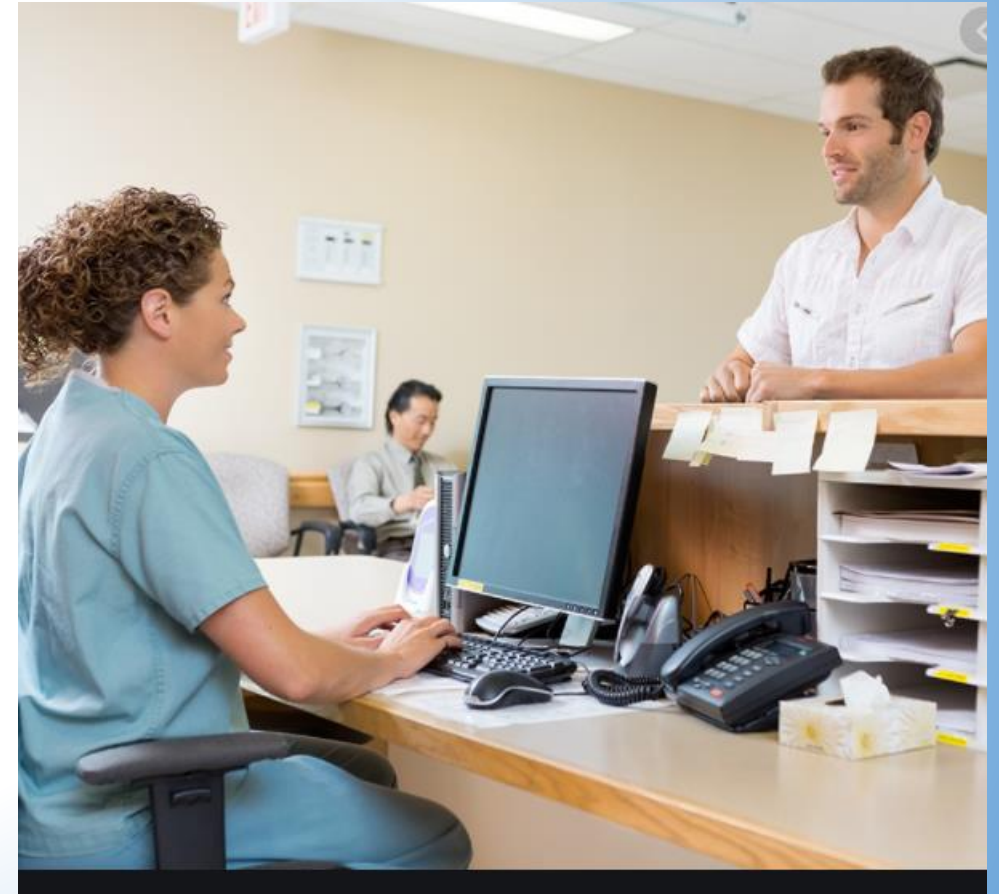
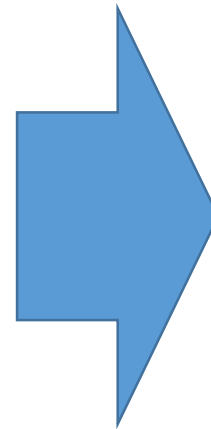
Solutions can not be imposed. They emerge

If we are to really improve population health....

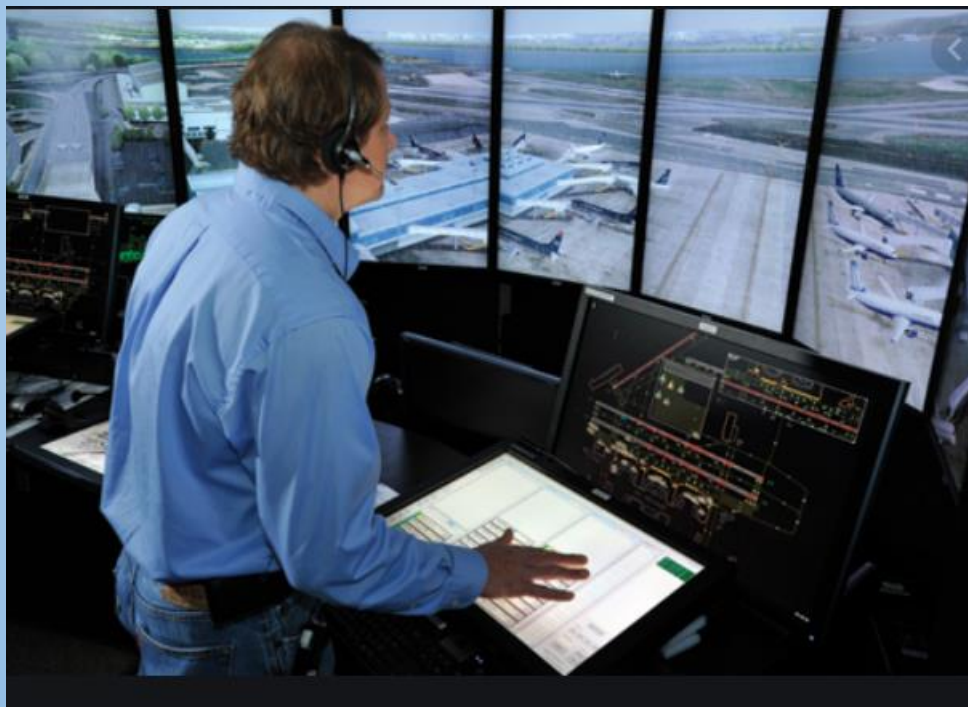
Go Look

Understand the Work

Quality & Safety Measure	Score Release Date	Worst Performing Hospital in US	Average Performing Hospital in US	Best Performing Hospital in US	Hospital 1's grade:	Hospital 2's grade:	Hospital 3's grade:	Hospital 4's grade:	Hospital 5's Grade:
		A	B	C	D	F			
Foreign Object Retained After Surgery	Fall 2012	0.3	0	0	0	0	0	0	0.2
	Spring 2012	0.4	0	0	0	0	0	0	0.1
Air Embolism	Fall 2012	0.1	0	0	0	0	0	0	0.1
	Spring 2012	0.1	0	0	0	0	0	0	0.1
Pressure Ulcer - Stages 3 and 4	Fall 2012	1	0.1	0	0	0	0.2	0.7	0.7
	Spring 2012	1	0.1	0	0.3	0.1	0.2	0.8	0.8
Falls and Trauma	Fall 2012	2.1	0.5	0	0.2	0.3	0.7	0.3	0.8
	Spring 2012	2.3	0.6	0	0.3	0.3	0.4	0.4	0.7
CLABSI (Central Line Associated Blood Stream Infection)	Fall 2012	2.5	0.6	0	N/A	0.3	1.4	0.9	0.7
	Spring 2012	2.8	0.6	0	N/A	0	N/A	1	0.6
PSI 4: Death From Serious Treatable Complications After Surgery	Fall 2012	163.8	113.6	54.9	116.8	95.1	111.6	110.5	107.8
	Spring 2012	167.3	116.1	48.6	108.1	115.3	109.9	115.7	106.8
PSI 6: Collapsed Lung Due to Medical Treatment	Fall 2012	0.8	0.3	0.1	0.3	0.5	0.3	0.3	0.6
	Spring 2012	0.9	0.4	0.1	0.3	0.5	0.3	0.3	0.6
PSI 11: Breathing Failure After Surgery	Fall 2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Spring 2012	22.1	10.2	1.7	15.4	8.5	10.1	13.5	10.6
PSI 12: Postoperative PE/DVT	Fall 2012	11.9	4.5	1	2.8	4.2	2.9	9.9	3.8
	Spring 2012	13.3	5.4	0.6	4.9	5.6	3.5	14.8	5.2
PSI 14: Wounds Split Open After Surgery	Fall 2012	2.7	1	0.2	0.6	1.3	2.4	0.7	0.5
	Spring 2012	3.7	2.2	1.2	2	2.5	3	1.7	1.7
PSI 15: Accidental Cuts or Tears From Medical Treatment	Fall 2012	4.2	2	0.4	1.8	2.5	1.7	4.2	3.3
	Spring 2012	4.9	2	0.3	1.3	1.8	2.3	4	3.3



Do We Control or do We Influence?



Going to the Gemba

- Do we understand **the people** who are doing the work
 - Their attitudes, beliefs, understanding of the why? Their interactions with others. The culture
- Do we understand **the processes.**
 - How much variation s there? How much is dependent on the person, the conditions on the ground.

If we don't – we may think we have simple problem – when in fact it may be complex!

The Difference: Complicated vs Complex

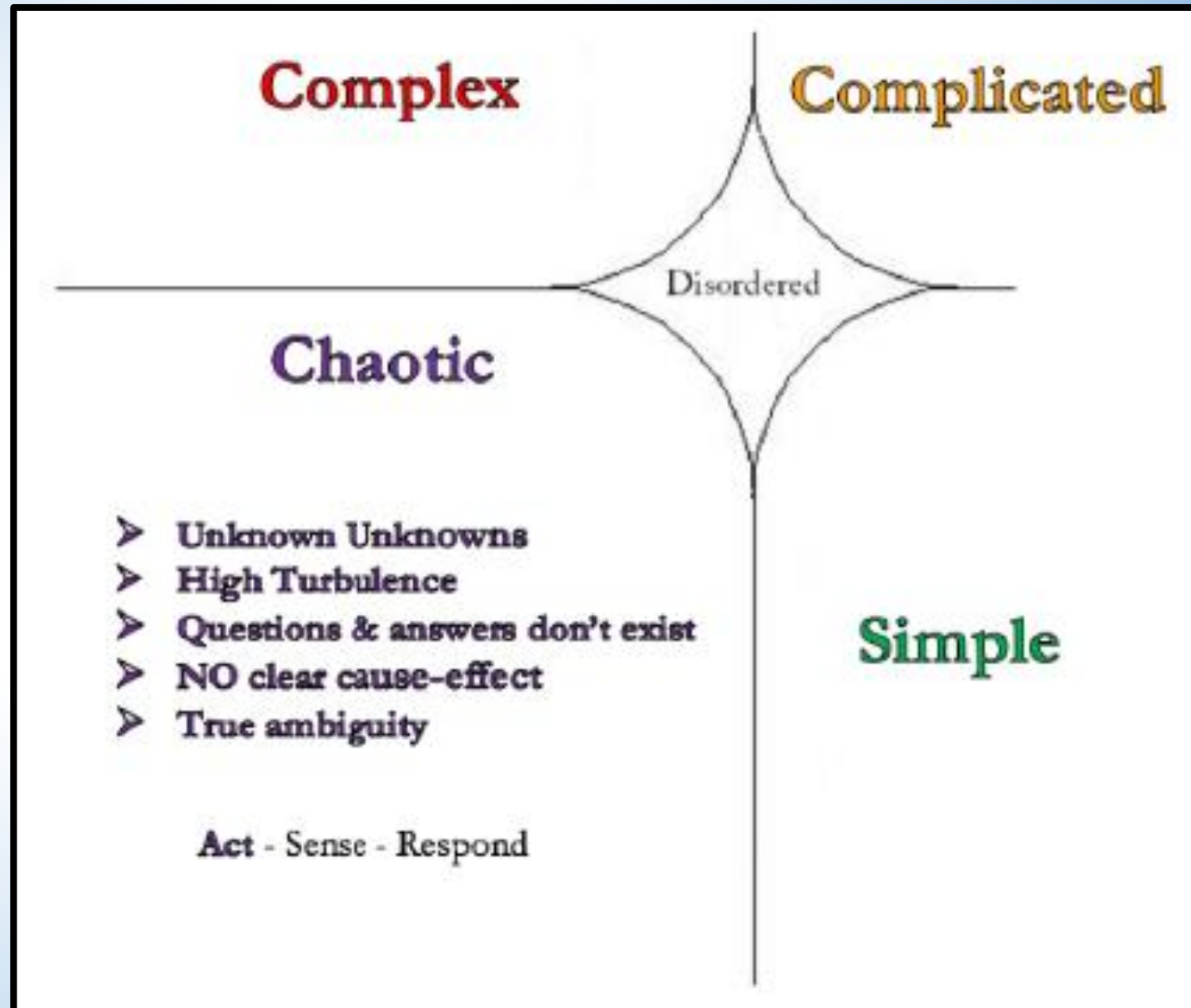
- Complicated matters, as technical problems, have solutions in the current know-how through the organization's current structures, procedures, and ways of doing things.

(how do we optimally care for the GI bleed patient in the ER)

Complex adaptive challenges can only be addressed through changes in people's priorities, beliefs, habits and loyalties.

- Complex challenges forces us to move beyond authoritative expertise to **mobilize discovery.**

Chaotic



Chaos: Leader Best Practices

- Only a “super hero” can fix the problem
- Rapid, decisive action is required to
 - reduce the turbulence,
 - sense where there is stability
 - transform from chaos to complexity so that patterns can be discerned
- Allows leaders to impel innovation and novel practice

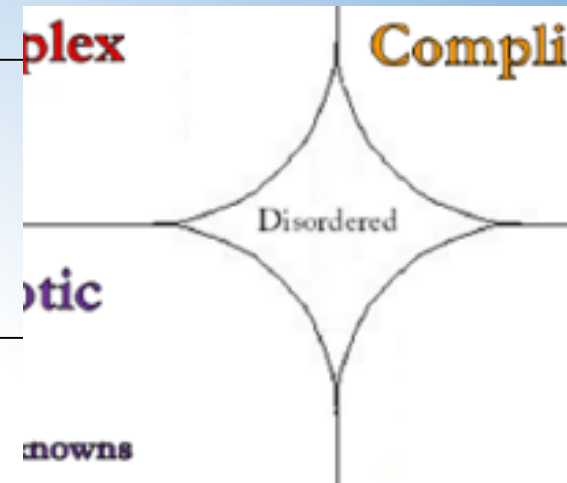
Leaders should select a reliable *manager* or *crisis management team* and allow them to do things differently. If you wait for the crisis to be over – the chance for innovation is gone.

Chaos



Landing every plane in the US within minutes

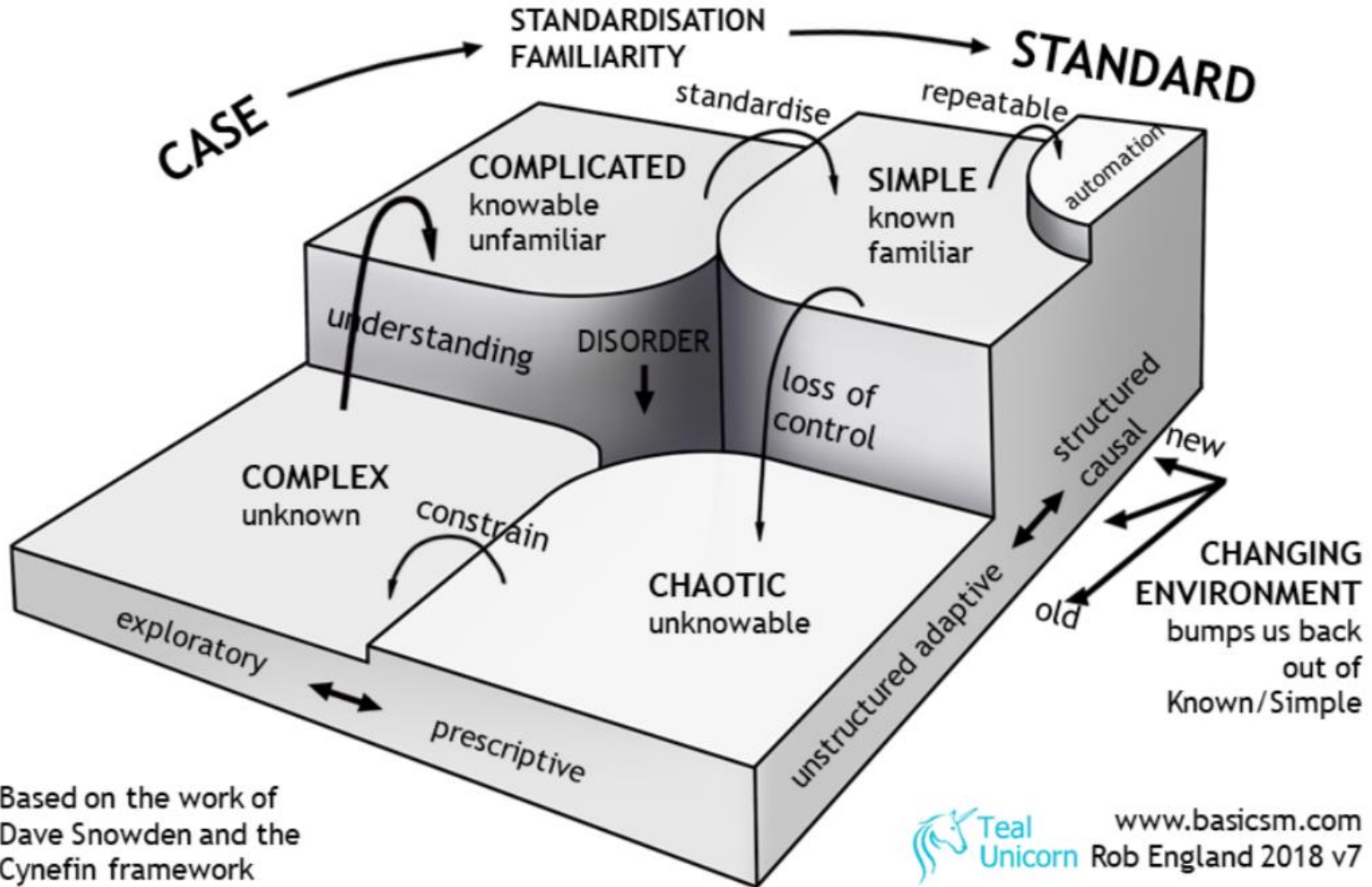
In the Center: Disordered



- Order seekers: Try to create or enforce rules
- Experts: try to seek and conduct additional research to accumulate new data
- Politicians seek to expand and increase the effectiveness of their network
- Dictators – seeing it as chaos – seek absolute control.

People seem to pull issues towards the context they feel most empowered by their capabilities and perspectives.

CYNEFIN & STANDARD+CASE



Based on the work of Dave Snowden and the Cynefin framework



www.basic-sm.com
Rob England 2018 v7

Leadership Has a Problem . Now What?

- Identify what quadrant a particular issue currently resides in
- Change leadership style/tactics based on the quadrant
- Prepare the organization for the different quadrants and how to transition between each
- Emotional intelligence to move easily between quadrants

Questions:

Does your network leadership.....

- Go to the frontlines to understand the context
 - Use deliberative design to share best practice
 - Encourage self organization
 - Implement tactics using implementation science
 - Use a leadership framework like Cynefin
- Use a generative approach
 - Recognize the solutions come from groups
 - Built excellent feedback loops to fail forward fast.
 - Think they think they have more control than they do!
 - Think that 'causes' of problems can all be written down?

Leadership Styles

Complex Adaptive Systems

- Are open, responsive
- Offer alternatives
- Collaborative, co-participative
- Connected
- Adaptable
- Acknowledge paradoxes
- Engaged, continuously emerging
- Value persons
- Reduce rules
- Help others
- Listeners

Traditional Systems

- Controlling
- Repeat the past
- Are in-charge
- Autonomous
- Self preserving
- Resist change / bury contradictions
- Disengaged (nothing ever changes)
- Value Positions
- Set rules
- Make decisions
- Knowers

CFIR

CAS

Micro

Questions?

A
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Macro

Chaos

Cynefin