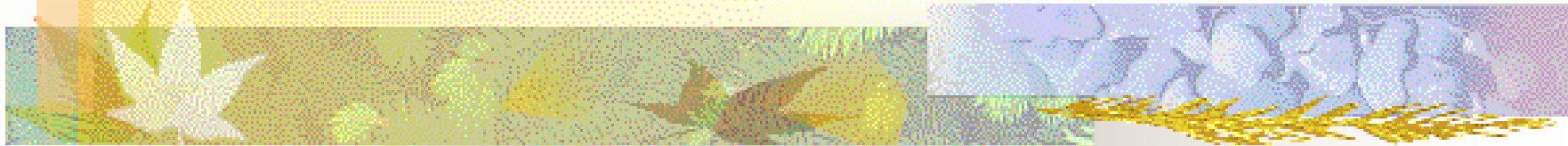


The Difference between Safety in Simple, Complicated and Complex Systems



System Safety Society, Ottawa, May 2012

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Agenda

- Patient Safety as context for talk
- Differences between simple, complicated and complex
- FLO – front-line ownership approach
 - Complexity Science
 - Positive Deviance
 - Liberating Structures – ie. TRIZ



*“When the world is predictable
you need smart people.*

*When the world is unpredictable
you need adaptable people.”*





*Is Patient Safety about
being smart or adaptable?*



Safety and Quality – 2 views


Need to decrease variability

- QUALITY AS CONFORMITY & RELIABILITY

Need to increase variability

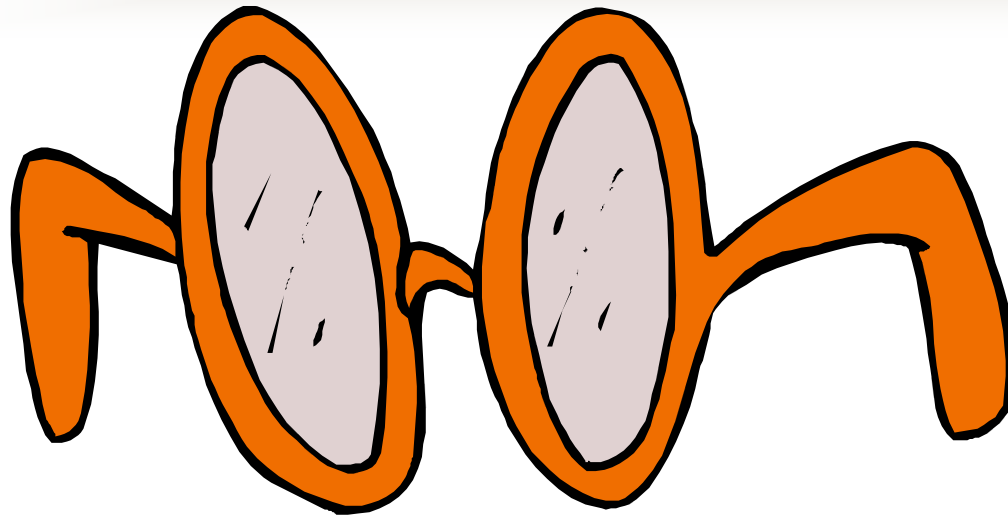
- QUALITY AS INNOVATION & MEETING UNIQUE NEEDS

- Both are important



“The range of what we think and do is limited by what we **fail** to notice. And **because** we fail to notice **that** we fail to notice, there is little we can do to change, **until** we notice how failing to notice shapes our thoughts and deeds.”

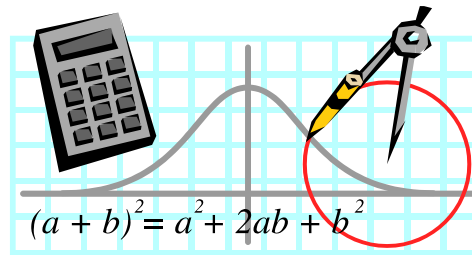
Scottish psychiatrist, Ronald Laing



“You don't see something until you have the right metaphor to let you perceive it”. Thomas Kuhn

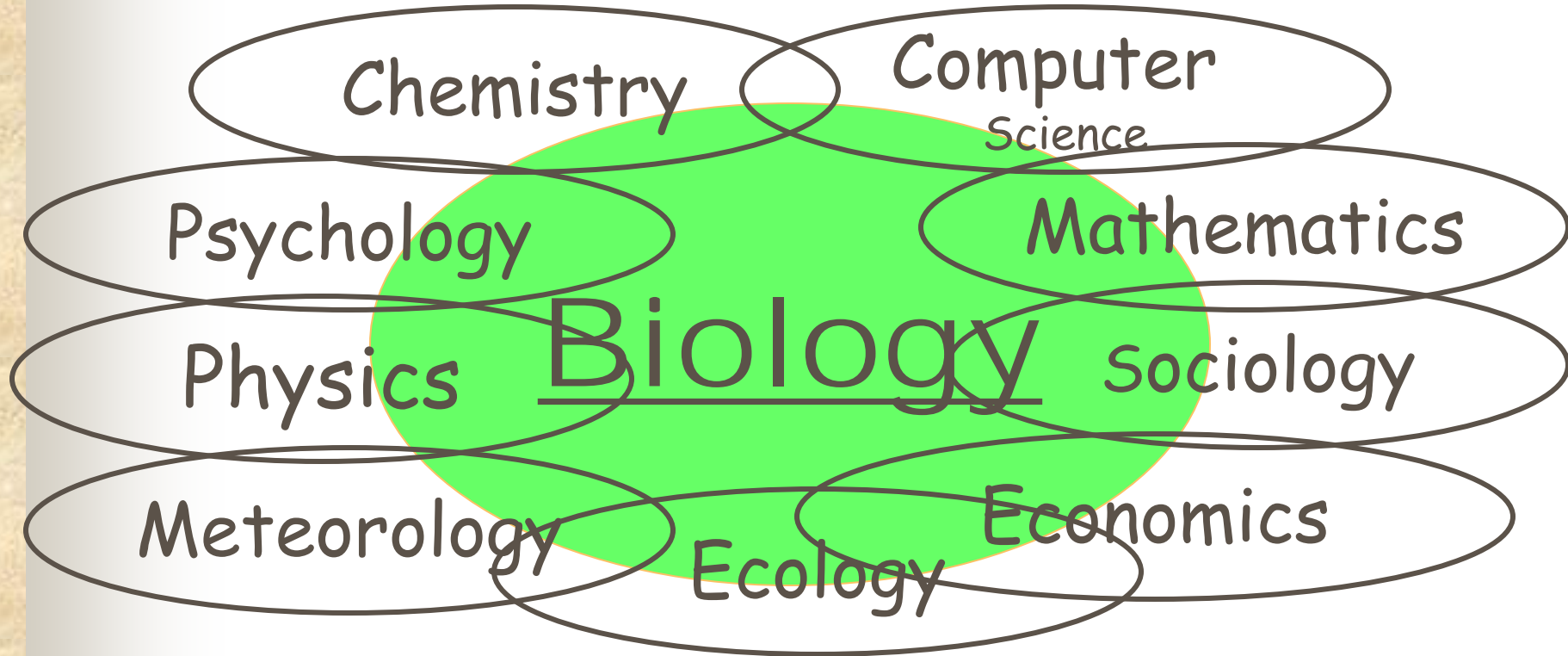
“Believing is seeing.” Karl Weick

Before Complexity

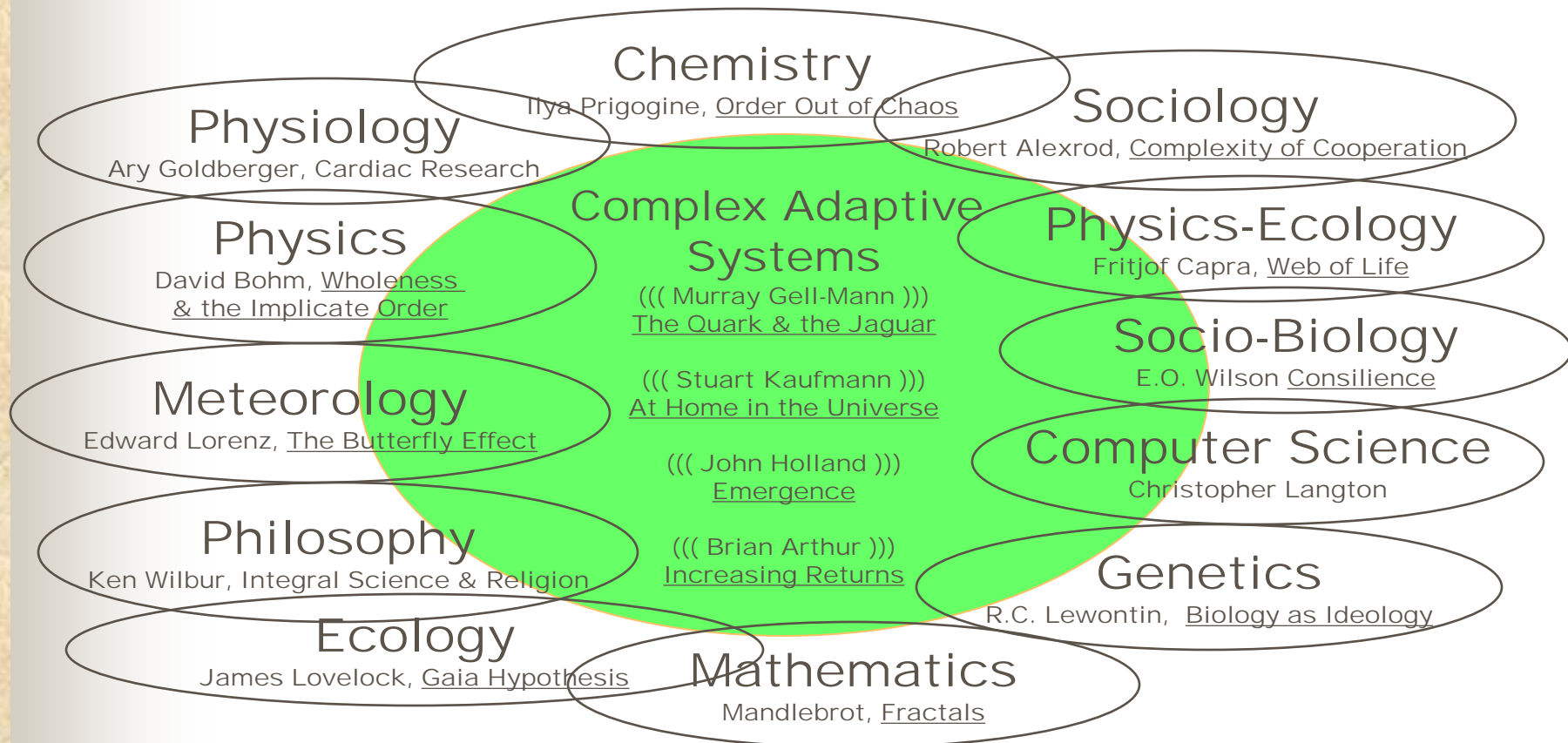


- Scientists believed the future was knowable given enough data points
- Dissecting discrete parts would reveal how everything -- the whole system -- works
- Phenomena can be reduced to simple cause & effect relationships
- The role of scientists, technology, & leaders was to predict and control the future

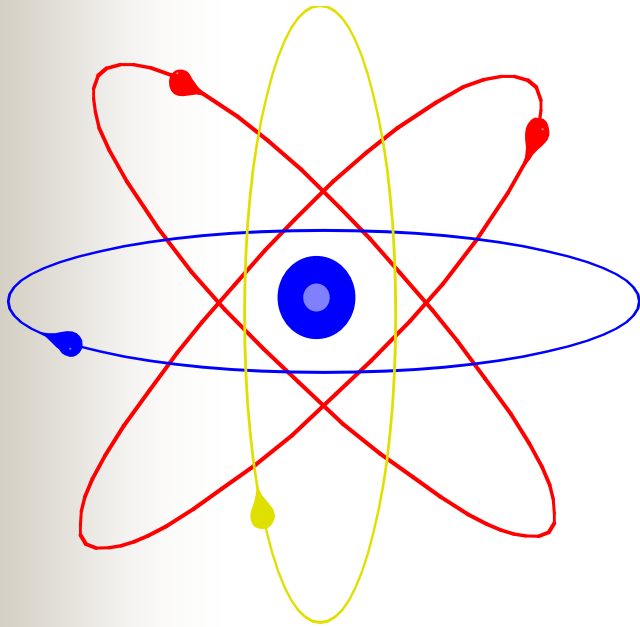
Surprising Convergence of Disciplines



Surprising Convergence

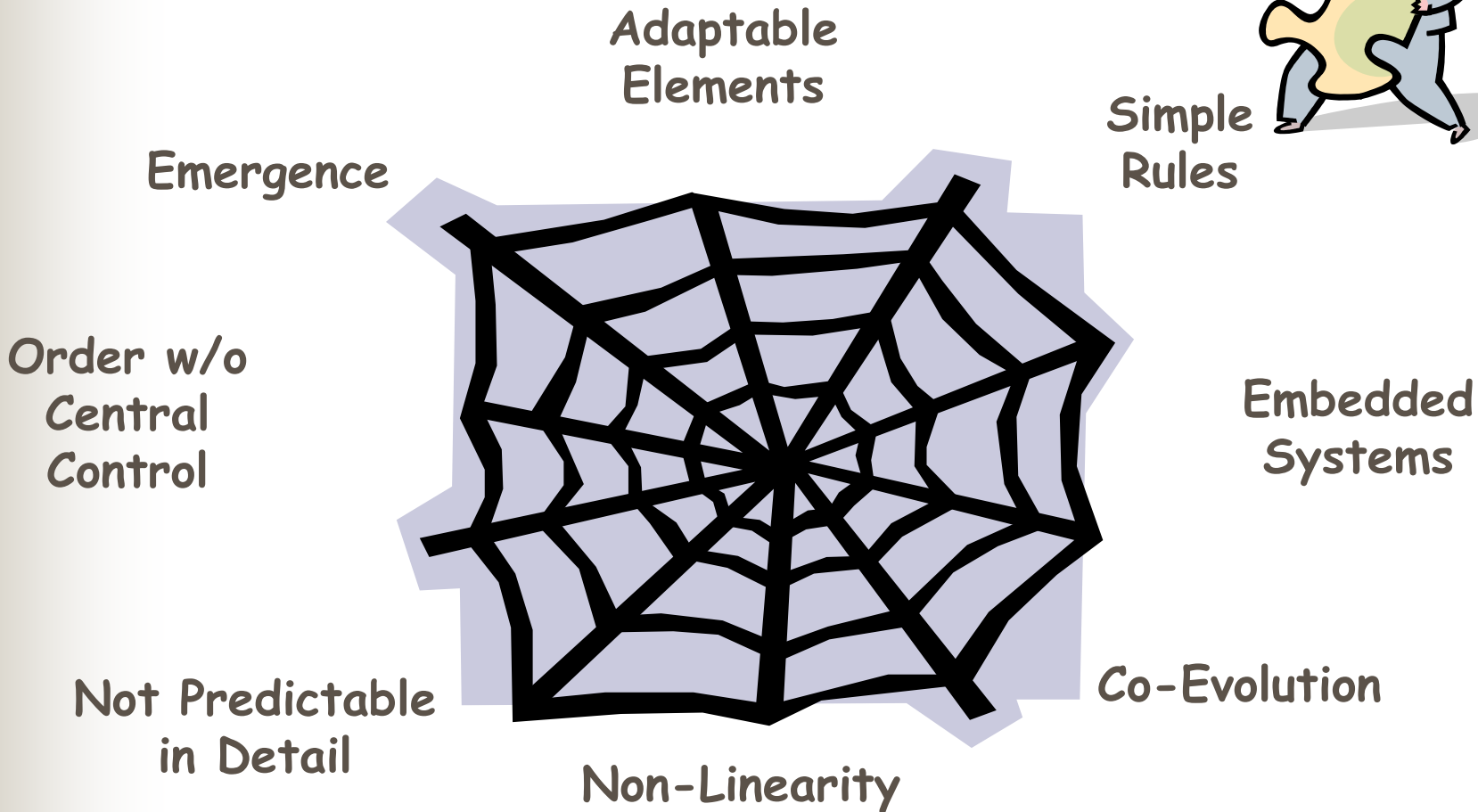
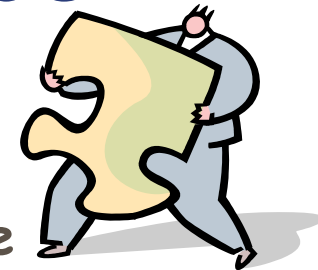



From Physics Envy To Biology Envy



Common observations...

Interdependent Attributes





“ In complex adaptive systems, the “parts” (in the case of US health care, this includes human beings) have the freedom and ability to respond to stimuli in many different and fundamentally unpredictable ways.

For this reason, emergent, surprising creative behavior is a real possibility.

Such behavior can be for better or worse: it can manifest itself as either innovation or error.

Crossing the Quality Chasm,
Institute of Medicine



Simple

Complicated

Complex

Following a Recipe

A Rocket to the Moon

Raising a Child

Simple

Following a Recipe

Complicated

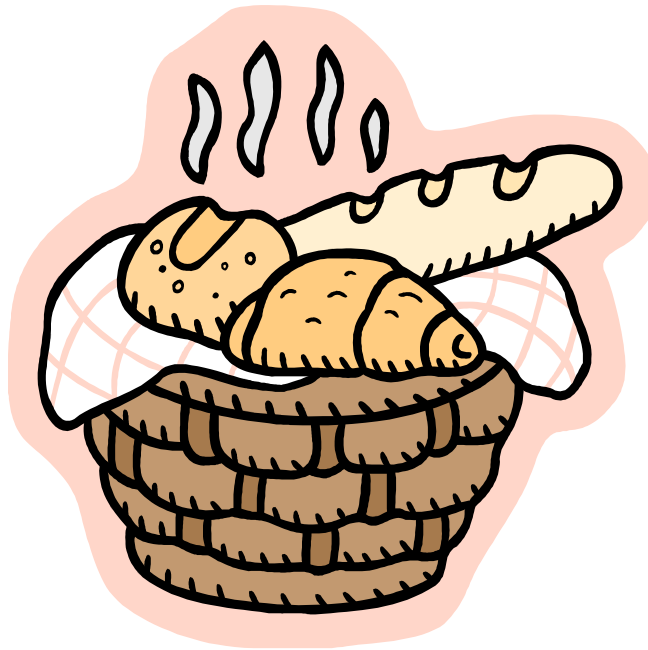
A Rocket to the Moon

Complex

Raising a Child

- The recipe is essential
- Recipes are tested to assure replicability of later efforts
- No particular expertise; knowing how to cook increases success
- Recipe notes the quantity and nature of “parts” needed
- Recipes produce standard products
- Certainty of same results every time

- **Known**



Simple

Following a Recipe

zThe recipe is essential

zRecipes are tested to assure replicability of later efforts

zNo particular expertise; knowing how to cook increases success

zRecipes produce standard products

zCertainty of same results every time

Complicated

A Rocket to the Moon

- Formulae are critical and necessary

- **Sending one rocket increases assurance that next will be ok**

- **High level of expertise in many specialized fields + coordination**

- Separate into parts and then coordinate

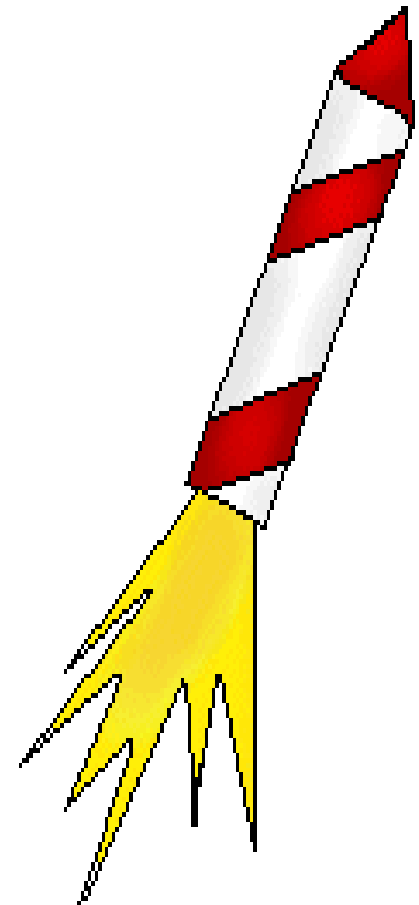
- **Rockets similar in critical ways**

- High degree of certainty of outcome

- **UNKNOWN**

Complex

Raising a Child



Simple

Complicated

Complex

Following a Recipe

z The recipe is essential

z Recipes are tested to assure replicability of later efforts

z No particular expertise; knowing how to cook increases success

z Recipes produce standard products

z Certainty of same results every time

A Rocket to the Moon

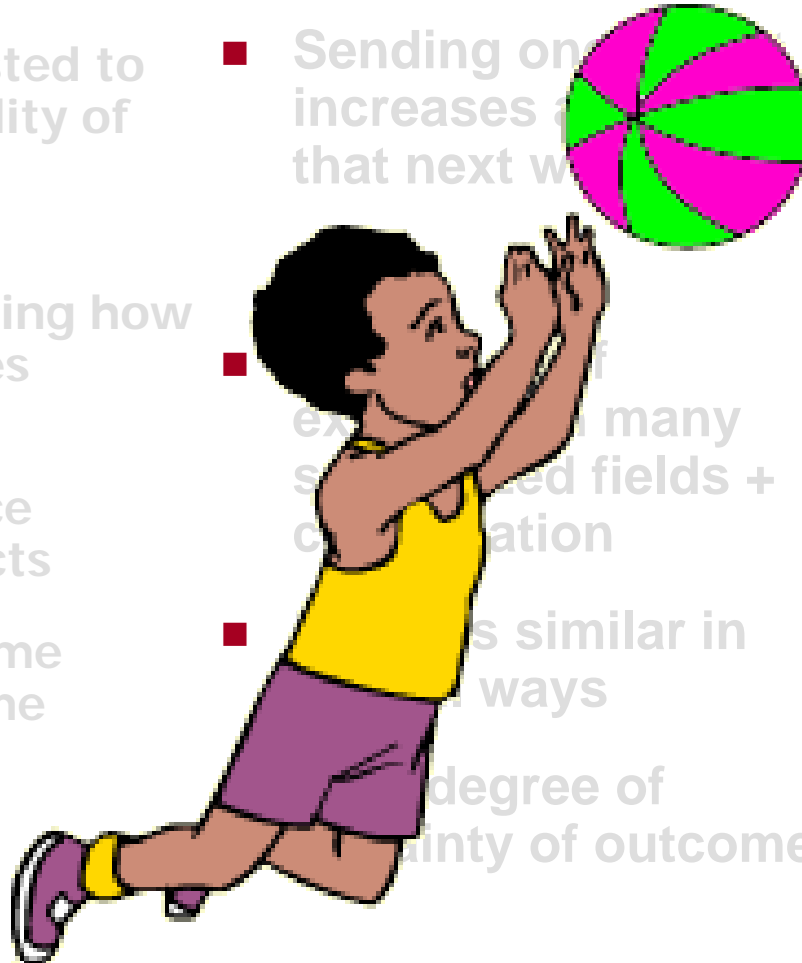
■ Formulae are critical and necessary

■ Sending one rocket increases the number of that next week

■ Expertise in many specialized fields + coordination

■ Systems similar in many ways

■ Degree of uncertainty of outcome



Raising a Child

■ Formulae have only a limited application

■ Raising one child gives no assurance of success with the next

■ Expertise can help but is not sufficient; *relationships are key*

■ Can't separate parts from the whole

■ Every child is unique

■ Uncertainty of outcome remains

■ **UNKNOWABLE**

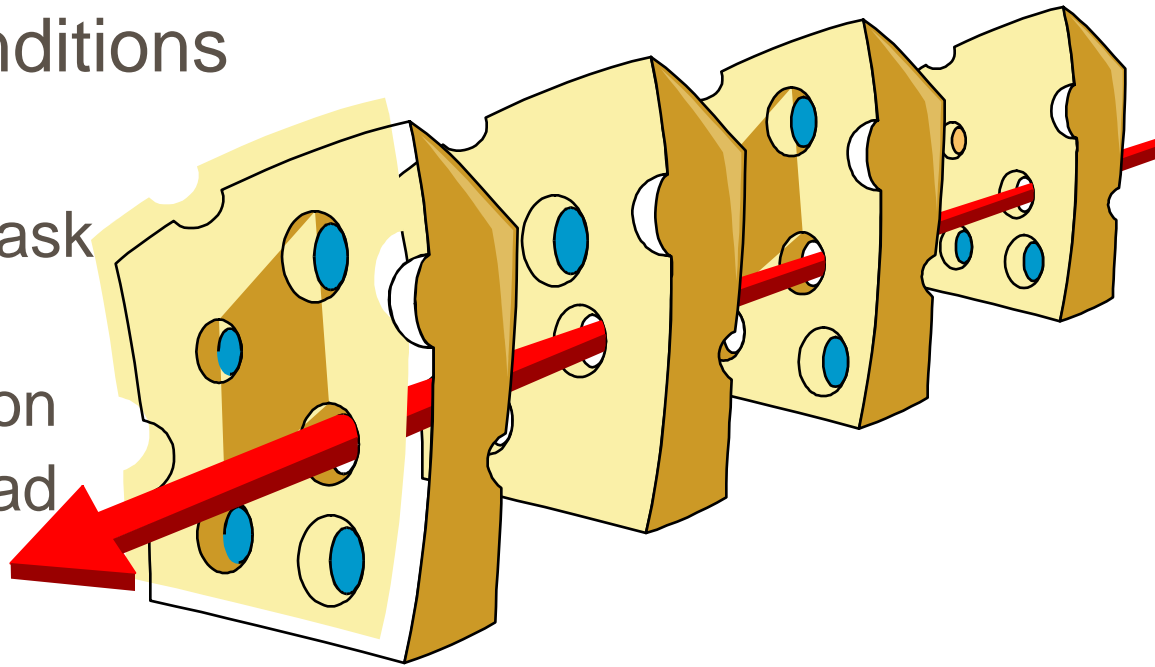
Patient Safety

- Goal is to reduce harm, injury

- Error producing conditions

(from Reason, 2001):

- Unfamiliarity with task
- Shortage of time
- Poor communication
- Information overload
- Poor instructions
- Etc..



- Swiss Cheese Model – “gaps” – system



The Patient Safety Problem - Simple

- People are making mistakes
- Hire the best
- Create rules to correct behaviors
- Tell people to follow rules
- If non-compliance, shine light
- Get rid of or correct “bad apples”



Patient Safety *- complicated*

- To err is human (slips, trips and lapses)
- Refocus on system problems
- Decrease reliance on memory and other faulty human aspects
- Standardize, routinize, reduce variability
- Human factors engineering
- Safety culture

Reminder of nature of complex systems

- Interdependence – cause and effect less clear
- Unpredictability
- Emergence
- Embedded systems
- Nonlinearity
- Distributed control
- **RELATIONSHIPS ARE KEY**





Patient Safety

- Complex

- Relationships are key
- Focus on Humans – not just as “error producers” or faulty machine parts
- Communication focus
- Include full system into processes – patients, families, clerical staff, etc.
- Look at patterns - simple rules that hold system
- Role of surprise and emergence – what is working/why



Patient Safety - Superbugs

- Infection control practitioners frustrated
- Healthcare workers
 - “know”
 - don’t act consistently

Dr. Michael Gardam, Paige Reason, Liz Rykert, Leah Gitterman and ... me



FLO – Front Line Ownership

- Complexity Science
- Positive Deviance

Techniques – Liberating Structures



Attributes of the FLO approach

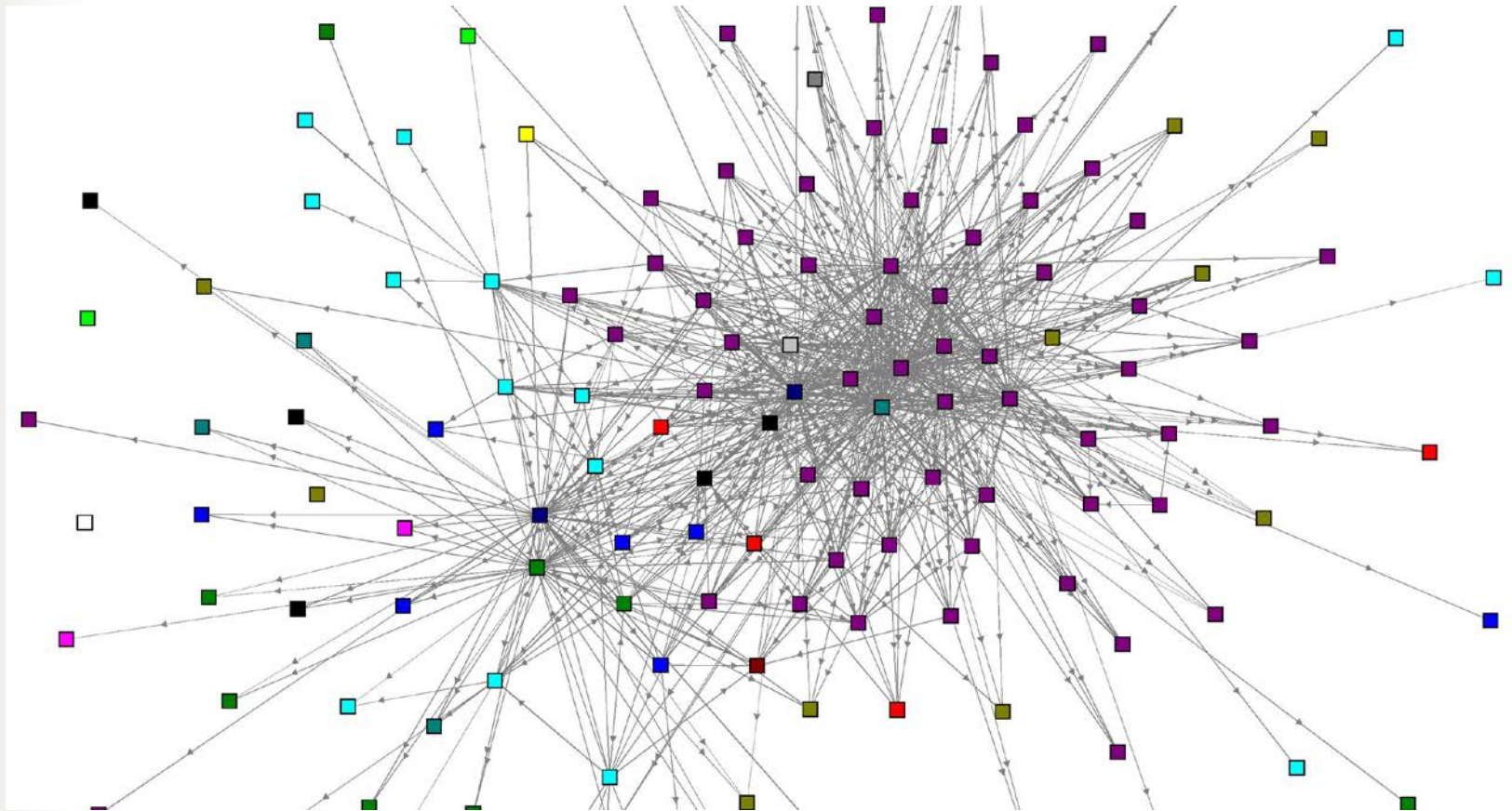
- Flexible approach that is not consistent (adapts over time) but is coherent
- Uses recombinations of existing methods
- Aims to bring about sticky change
- Ownership not Buy-In
- Engaging, fun
- Set overall goals but enables local approaches to reach the goals



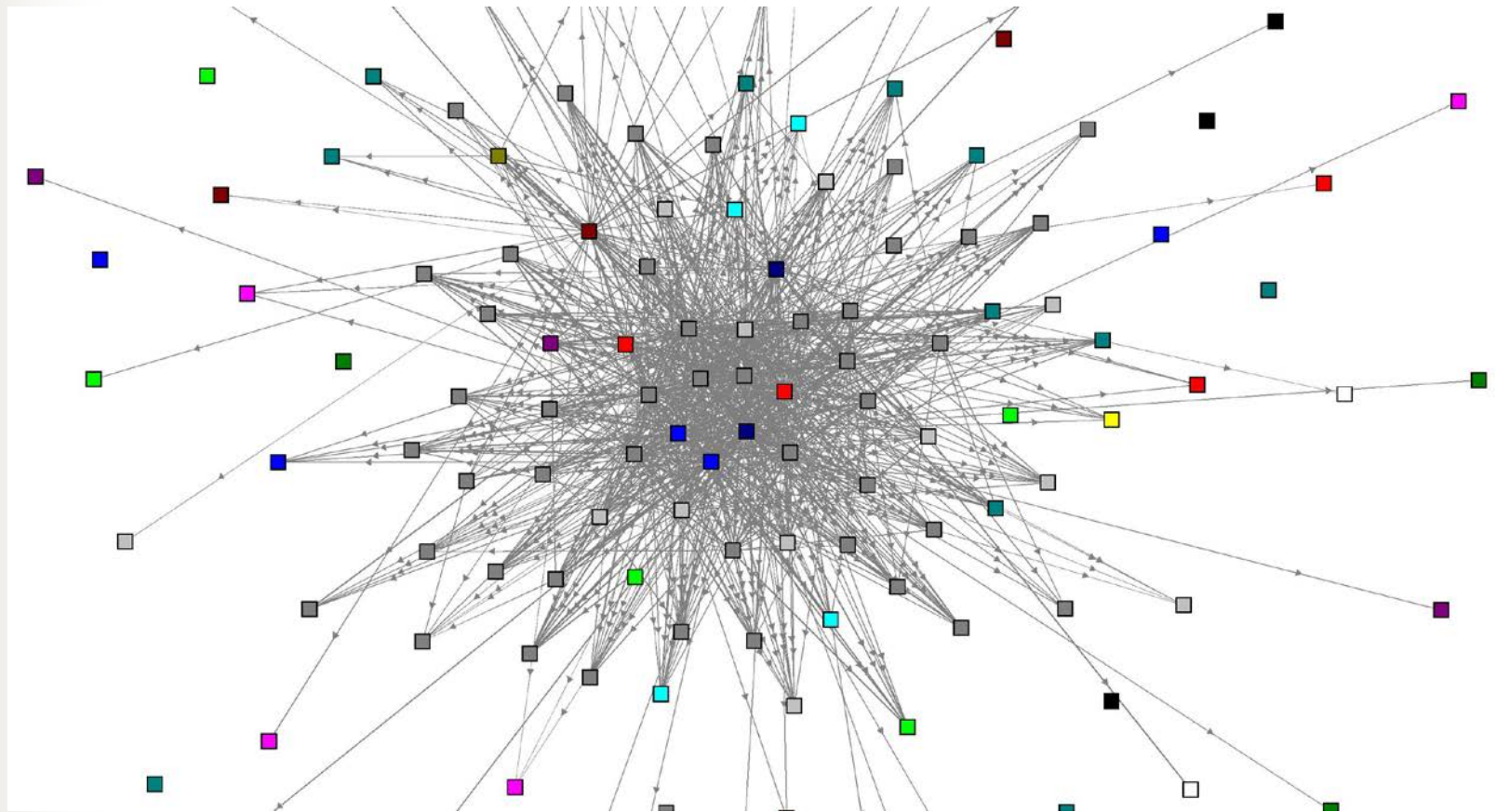
“Serious” Fun

- Improv
 - Acting – not just talking
- TRIZ
 - Create a system that can reliably deliver the worst possible result

Pre-intervention (Hospital A)



*Post Intervention – 88%
increase in links per node*






Paradoxes

Traditional HC culture

- Evidence-based (scientific proof)
- Information & data are trusted
- Leaders need to “step up”
- Top-down leadership from traditional leaders

Emergent Culture (FLO)

- Practice-based evidence (social proof)
- Stories & relationships are trusted
- Leaders need to “step back”
- Bottom-up leadership from the front line



“I focus more on relationships now whereas before it would have been information... I am more cognizant of the interaction, the relationship and the information I provide back as potentially fueling further quality improvement.”

■ Infectious Disease Physician

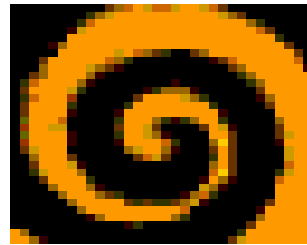
Implications for Safety & Quality Improvement



- Develop a collectively mindful culture
 - Preoccupied with near misses
 - Valuing expertise over rank
 - Operationally sensitive to unexpected events
- Tune to, notice, and build on “what works”
 - Don’t assume that a “best practice export” will fit your unique context



“Time is too short and things are too bad for pessimism.”




Dee Hock, CEO emeritus, VISA and social change activist in education and health care



Trying TRIZ

- In your group, select one participant's organization for exercise
- Brainstorm how you can reliably create a system that will deliver the worst possible results – the worst safety record.
- Specify structures, practices, investments, and roles that would **reliably** create the unwanted result selected .(Hint – ignore reality for now)

- 
- Once you have designed your “ideal” adverse system, compare this system with the current system.
 - Where is your real system “designed” to create errors or unsafe conditions.



Questions for discussion

- How can you use the idea of the two logics of anticipation/prediction and resilience/adaptability to improve safety in your organization?
 - Which logic dominates your industry?
- How can our attempt at increasing safety and reliability inadvertently decrease resilience/adaptability?