Why "**Deep Thinking**" is not a natural act?

Short answer: **Because we are human!**

Srikanth Ramanujam

Prepared for Systems Thinking Toronto meetup group - 28-Apr-2020

https://www.meetup.com/SystemsThinkingTO/events/270158194/

Fit for purpose survey

bit.ly/STTOF4P103

Please answer Q1 alone now,
but do not submit the form yet.

In connecting the dots, traversing the gaps between fragments and stitching them together – a meaningful whole emerges.

– Nick Sousanis

SRIKANTH RAMANUJAM

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Nowadays, I grapple with questions like:

- How do humans think? Especially in groups. To what end?
- And what triggers or stimulates human curiosity, learning, imagination and creativity? How do we channel such thinking to be most useful?
- What if the models, manifesto's, frameworks, methods, practices, tools and techniques are all biased - and not capable of or insufficient to create the most useful and sustainable organizational human systems?
- How can these be used in concert together in a particular context to realize value - cheaper and faster than the competition can? For survival and resilience.

That's the joy of being me. A constant modeling and cross-connection making steeped in questions and have their answers in science and the artistic humanities - from history, philosophy, sociology, biology, physics, anthropology, psychology and the neurosciences.

The inspiration came from an old talk...

Thanks to Prof. Ricardo Valerdi

On Youtube from 2010:

https://youtu.be/7f1Uh3_lYMA

The slides:

https://www.slideshare.net/ricardovalerdi/why-systems-thinking-is-not-a-natural-act-wpi-colloquim-oct-2-2019

Which made me wonder and “hypothesize”...

- What if all “**Deep Thinking**” was unnatural?
- Why do we think at all?
- Why are associated “**Deep Thinking**” approaches hard? Like Scientific thinking, Systems Thinking, Complex Adaptive Thinking (Lean Thinking, Design Thinking...)
- How to make such thinking valuable, especially in the context of work?
- Can we persist with “**Deep Thinking**” - it is sustainable, and if so “how”?

Agenda as published

Part 1: (60-70 minutes)

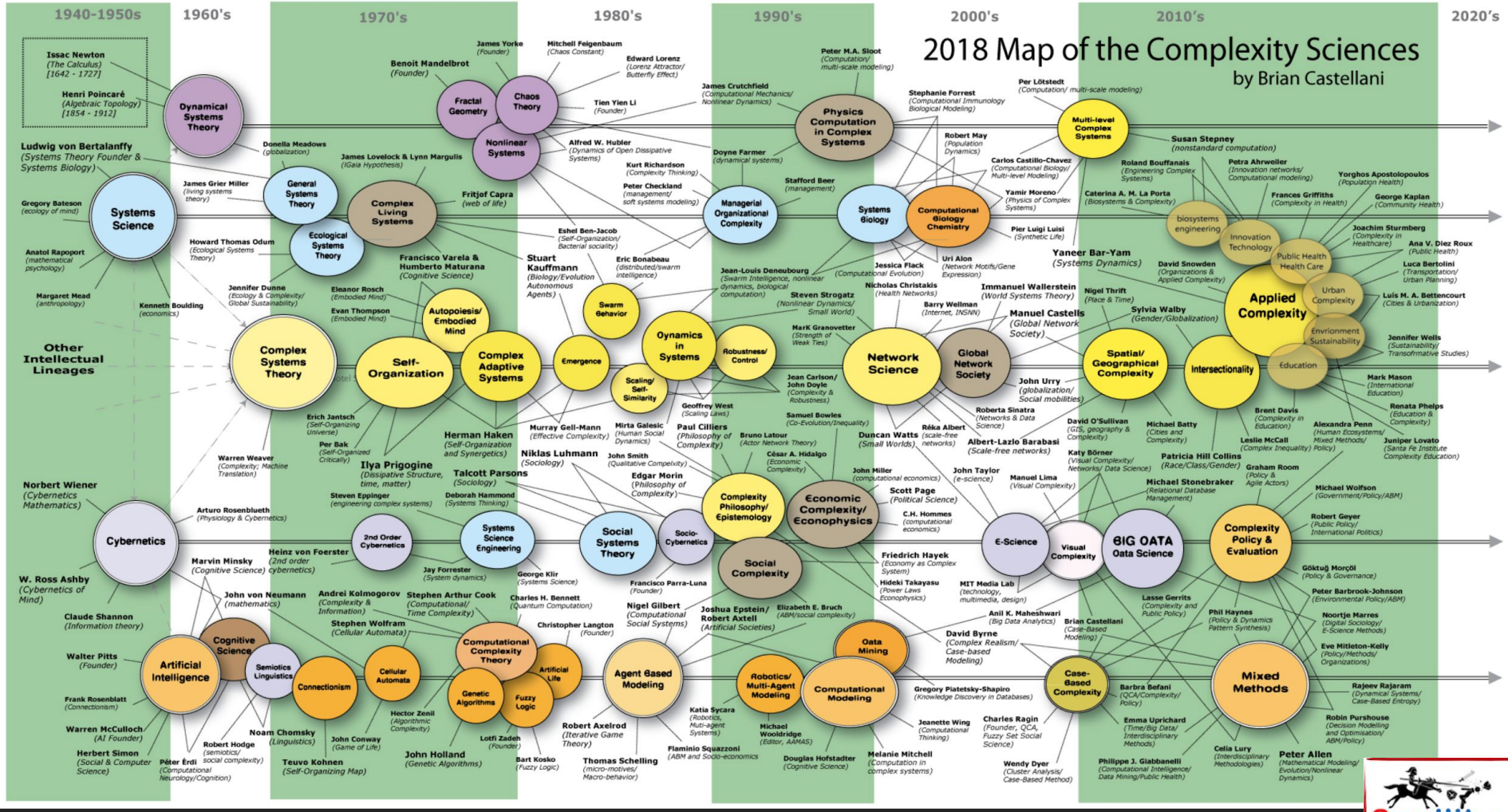
- Introduce concepts, What is thinking?
- Deductive, Inductive, Abductive reasoning
- Introduce System 1 and System 2 thinking
- A brief introduction to various types of (group/work) thinking tools: Systems Thinking, Scientific Thinking and Anthro Complexity

Part 2: (Breakout and regroup summary: 20-30 minutes)

- Break out discussion and document - why it is difficult to apply these tools (slides available)
- Use of 4-8-all (Liberating structures) regrouping based on how many participants register - Bring everyone together to summarize learnings
- Point to further learning resources

Outcomes:

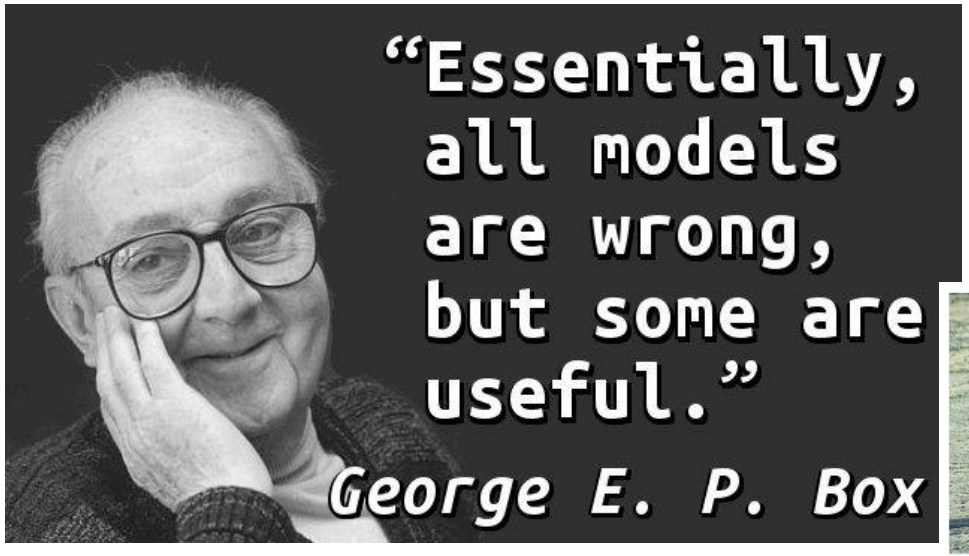
- Types of thinking and when to use
- Thinking tools - Complexity, Systems Thinking and Scientific thinking
- When to use what tool in what context?
- Why is it hard to apply such "**Deep Thinking**" in day-to-day life and at work - summary from the group
- Where do I find more information and/or learn more about these tools and techniques - resources: books, videos, free online courses, blogs for each of the items talked about



https://www.art-sciencefactory.com/complexity-map_feb09.html

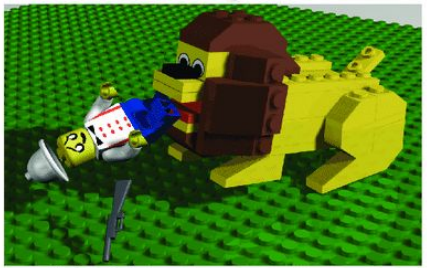
Let’s bound this talk...

- We are going to try to understand how humans generally put thinking to use
- Limit our focus to “**Deep Thinking**” that happens in a group setting and applied in a work context
- Cybernetics, Systems Theory, Systems Science and Complexity theory is a wide field developing extensively over the last 100+ years… so how we condense it to realize some value from it in 90 minutes?
- Model some broad answers and takeaways that could be useful.




reality


conceptual model, description


numerical model


experiment

Close your eyes...

First things first...

Now. What were you thinking about in the last few moments with your eyes closed?

Respond at https://pollev.com/2agility101.

What were you thinking about in the last few moments?

Let’s analyze...

Why did do you think those thoughts occur to you?

Respond at https://pollev.com/2agility101
You can upvote other answers you agree with!

Why did those thoughts occur to you while you waited?

Top

Think quickly...

If John can drink a barrel of water in 6 days, and Mary can drink a barrel of water in 12 days, how many days do they take together to drink one barrel of water?

Respond at https://pollev.com/2agility101.
Just answer with the number, no units.

Think quickly...

Jerry was both the 15th highest and the 15th lowest ranked student in his class. How many students are there in his class?

Respond at https://pollev.com/2agility101.
Just answer with the number, no units.

Think quickly...

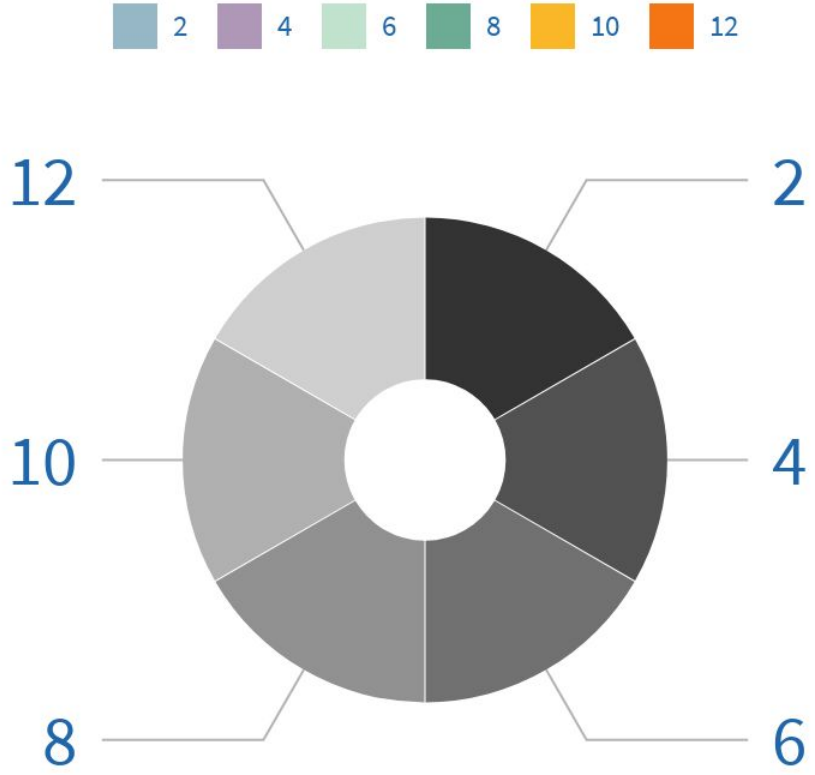
A man buys a pig for $60, sells it for $70, buys it back for $80, and sells it finally for $90. How much has he made?

Respond at https://pollev.com/2agility101.
Just answer with the number, no units.

Think quickly...

If John can drink a barrel of water in 6 days, and Mary can drink a barrel of water in 12 days, how many days do they take together to drink one barrel of water?

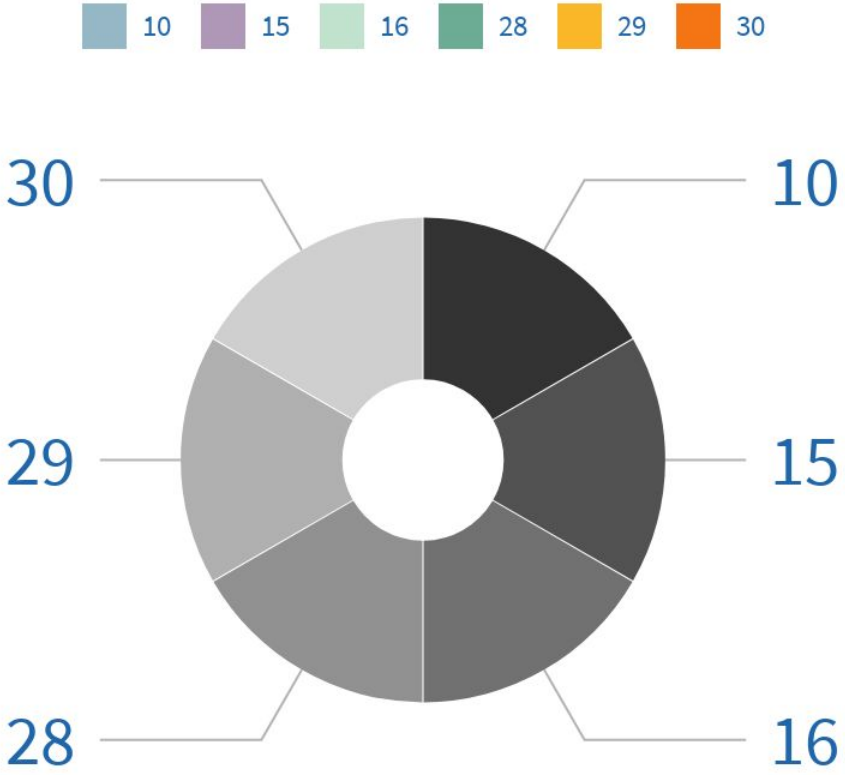
Barrel Question



Think quickly...

Jerry was both the 15th highest and the 15th lowest ranked student in his class. How many students are there in his class?

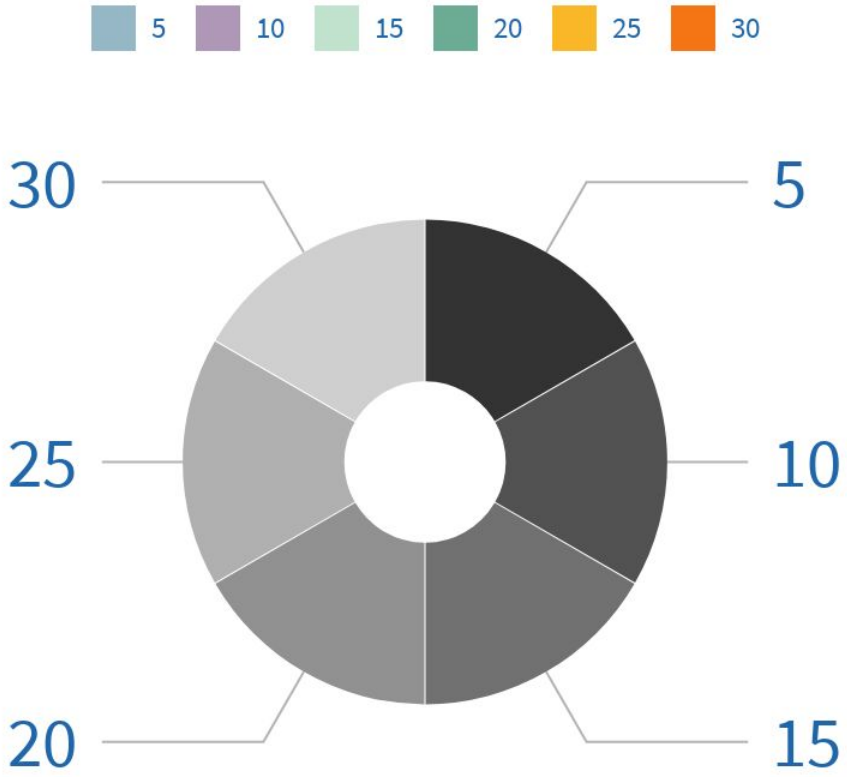
Student Question



Think quickly...

A man buys a pig for $60, sells it for $70, buys it back for $80, and sells it finally for $90. How much has he made?

Pig Question



Meet Linda

Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Which of these statements are most likely true about Linda?

Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

1. Linda is a teacher in elementary school.
2. Linda works in a bookstore and takes yoga classes.
3. Linda is a bank teller and is active in the feminist movement
4. Linda is active in the feminist movement.
5. Linda is a psychiatric social worker.
6. Linda is a member of the League of Women voters.
7. Linda is a bank teller.
8. Linda is an insurance salesperson.

Respond at https://pollev.com/2agility101.
Pick **two** statements that you think best describes Linda.

Which of these statements is most likely to apply to Linda?

Linda is a teacher in elementary school.

Linda works in a bookstore and takes Yoga classes.

Linda is a bank teller and is active in the feminist movement

Linda is active in the feminist movement.

Linda is a psychiatric social worker.

Linda is a member of the League of Women voters.

Linda is a bank teller.

Linda is an insurance salesperson.

What is “thinking”?

- the process of using one's mind to consider or reason about something;
- using thought or rational judgment;
- have a particular opinion, belief, or idea about someone or something

What are the benefits of thought?

- **Thought** encompasses an "aim-oriented flow of ideas and associations that can lead to a reality-oriented conclusion"

- Thinking allows humans to make sense of, interpret, represent or model the world they experience, and to make predictions about that world

So what?

“We use thinking as a way to apply our knowledge to creative problem solving”

“For collective “**Deep Thinking**”, we make use practice of frameworks, methods, techniques and tools to our advantage that allows better application of knowledge and continuous learning for more creative problem solving”

Fast vs Slow thinking...

- Favour fast thinking (opinions, judgement, partial data match) rather than slow deliberate thinking
- Our brain has been built to conserve energy… human evolution has built us with biases and logical fallacies
- We use heuristics for problem solving
- Biases makes us human, it is built for human advantage and survival
- Slow deliberate thinking is hard
- We are all capable of novelty and creativity

https://en.wikipedia.org/wiki/List_of_cognitive_biases

https://www.visualcapitalist.com/wp-content/uploads/2017/09/cognitive-bias-infographic.html

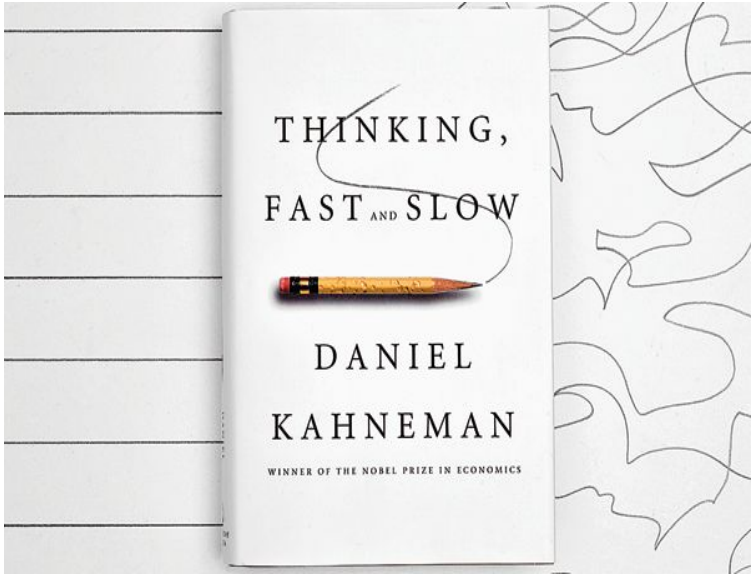
If you broaden your scope of thinking then… there are radical new ways of looking at things — *Dave Snowden*

Dive Deeper -

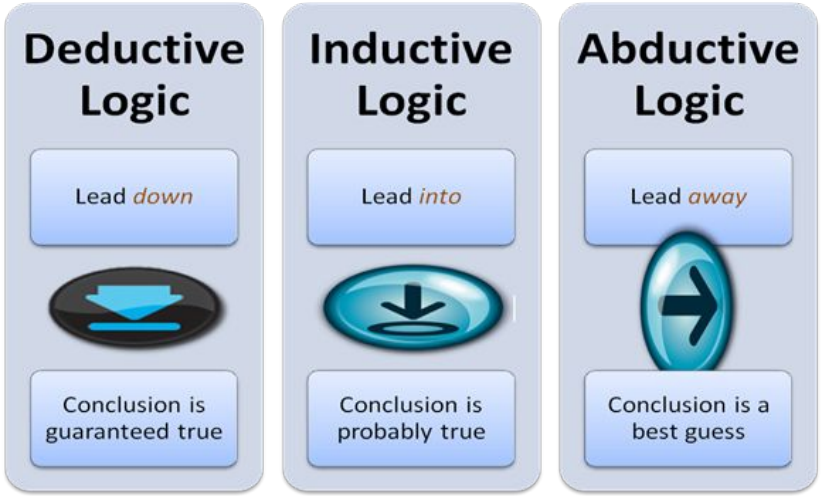
The Linda Story comes from Daniel Kahneman's *Thinking Fast and Slow*

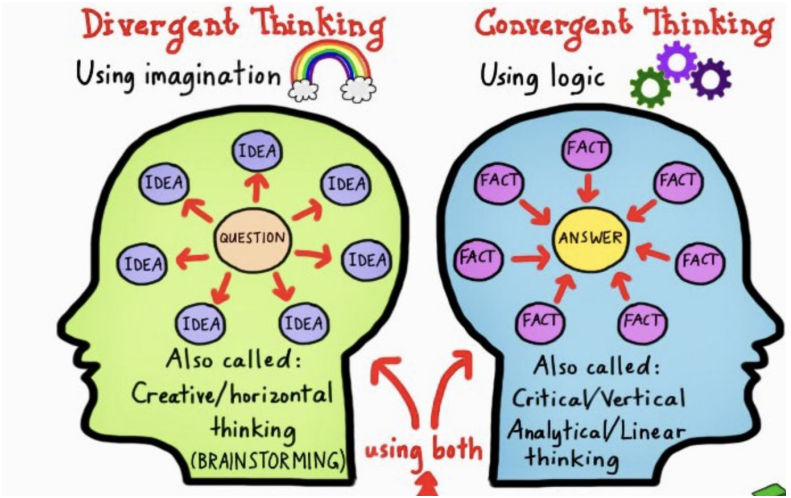
He won the Nobel award for Economics in 2002.

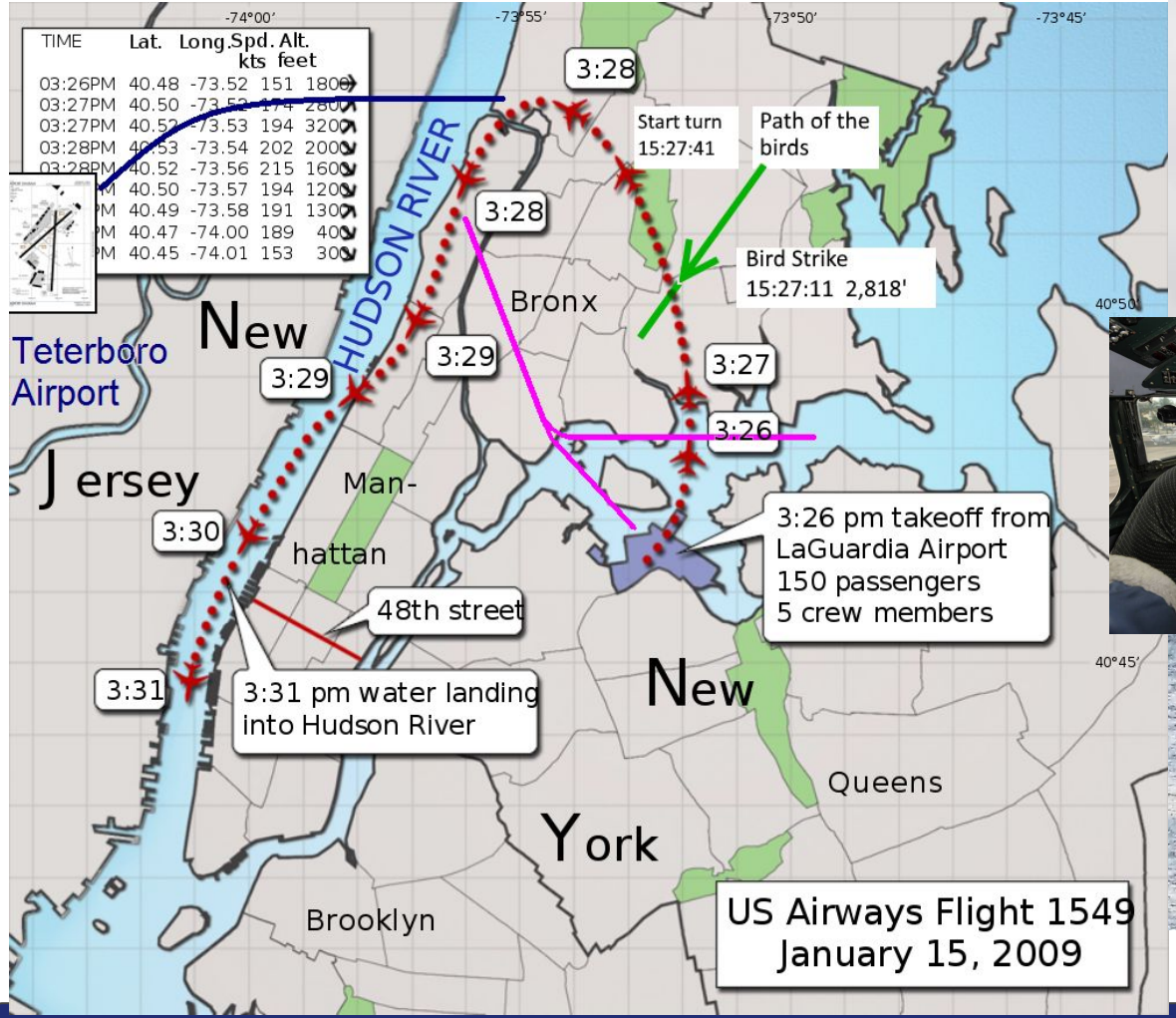
Thinking Fast and Slow talks about System 1 ("gut", instinctive thinking) vs System 2 (deliberate cognition) and the inherent biases with each.



A combination of logical and creative thinking







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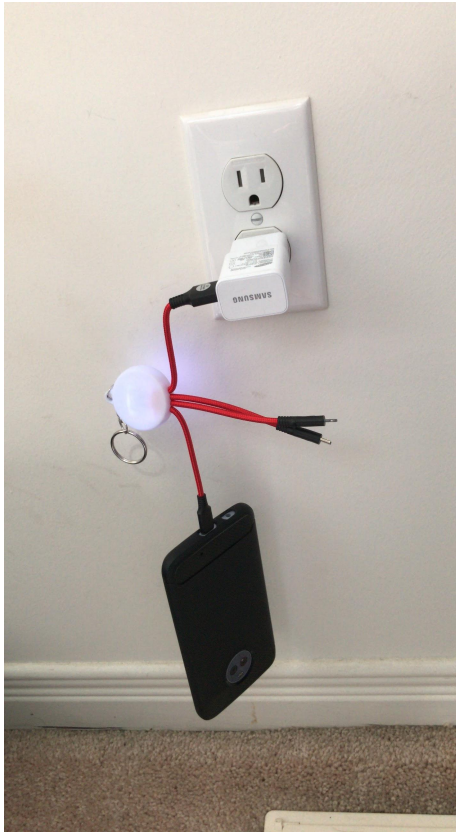
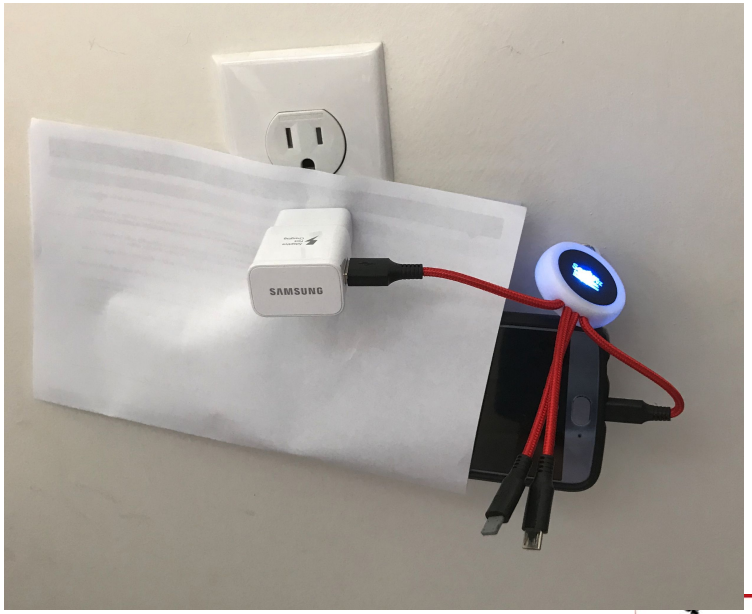
We connect the dots to solve...

Problem?

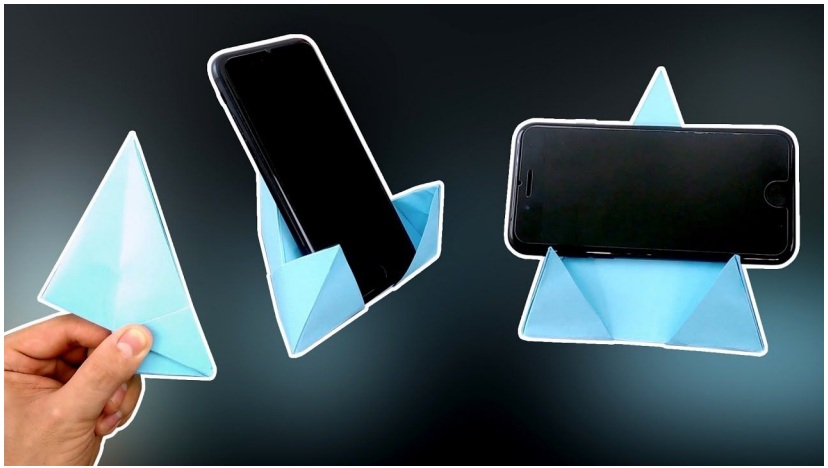


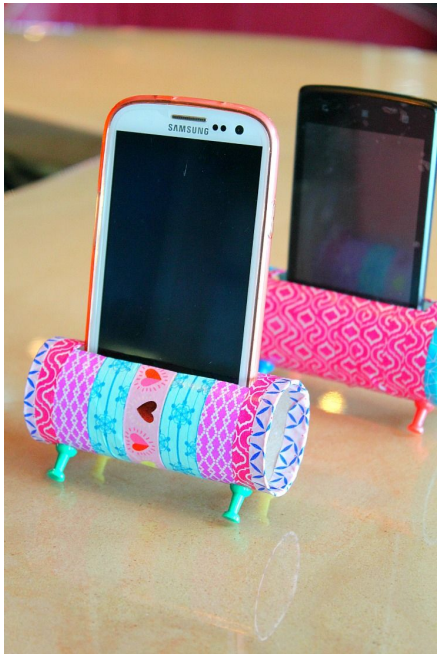
Solution!



And to create and innovate...

Origami Cell phone stand





Mobile phone stand

using toilet paper rolls

And adapt to survive (e.g. COVID-19)

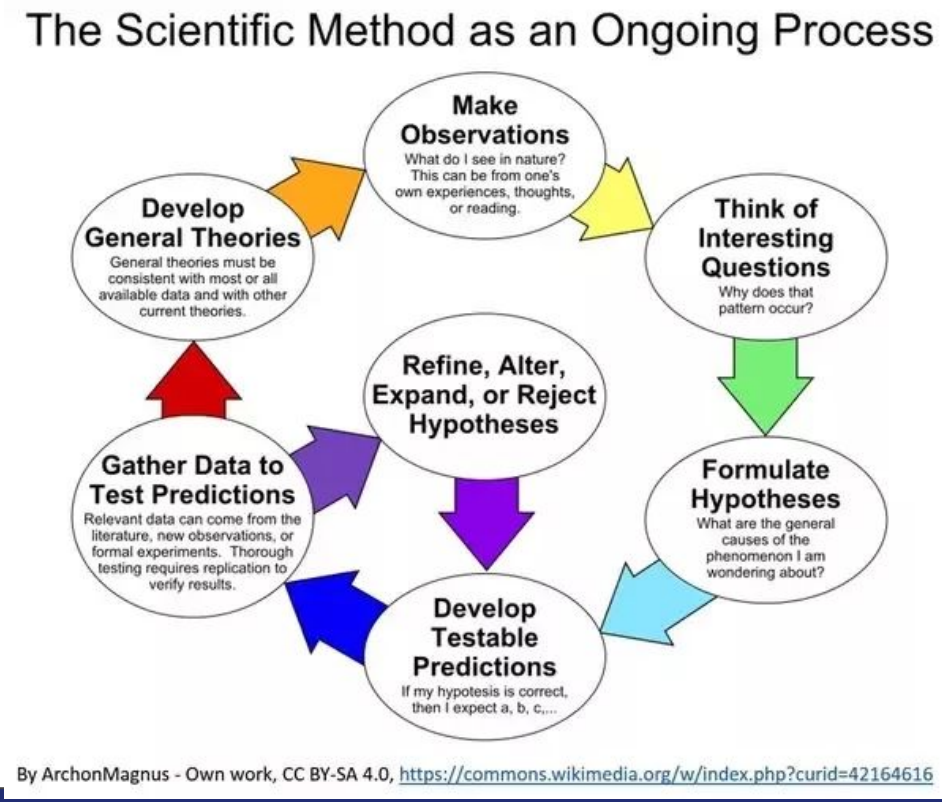
Questions?

Let’s shift our “Thinking” to some “**Deep Thinking**” approaches

With a brief intro to:

- Scientific Method
- Systems Thinking
- Decision making with Cynefin

Scientific Method



The scientific method is an empirical method of acquiring knowledge that has characterized the development of science since at least the 17th century.

Principles:

- **Careful observation** - applying rigorous skepticism about what is **observed,** given that cognitive assumptions can distort how one interprets the observation.
- It involves **formulating hypotheses**, via **induction**, based on such observations;
- **Experimental and measurement-based testing** of **deductions** drawn from the hypotheses
- and **refinement** (or elimination) of the hypotheses based on the experimental findings.

What type of thinking does scientific thinking require?

Requires logical analytical thinking

Requires creative thinking

Requires synthesis, a combination of both

Let’s build a car

Only from scrap parts!

What are the challenges with making a car with a random set of parts?

Top

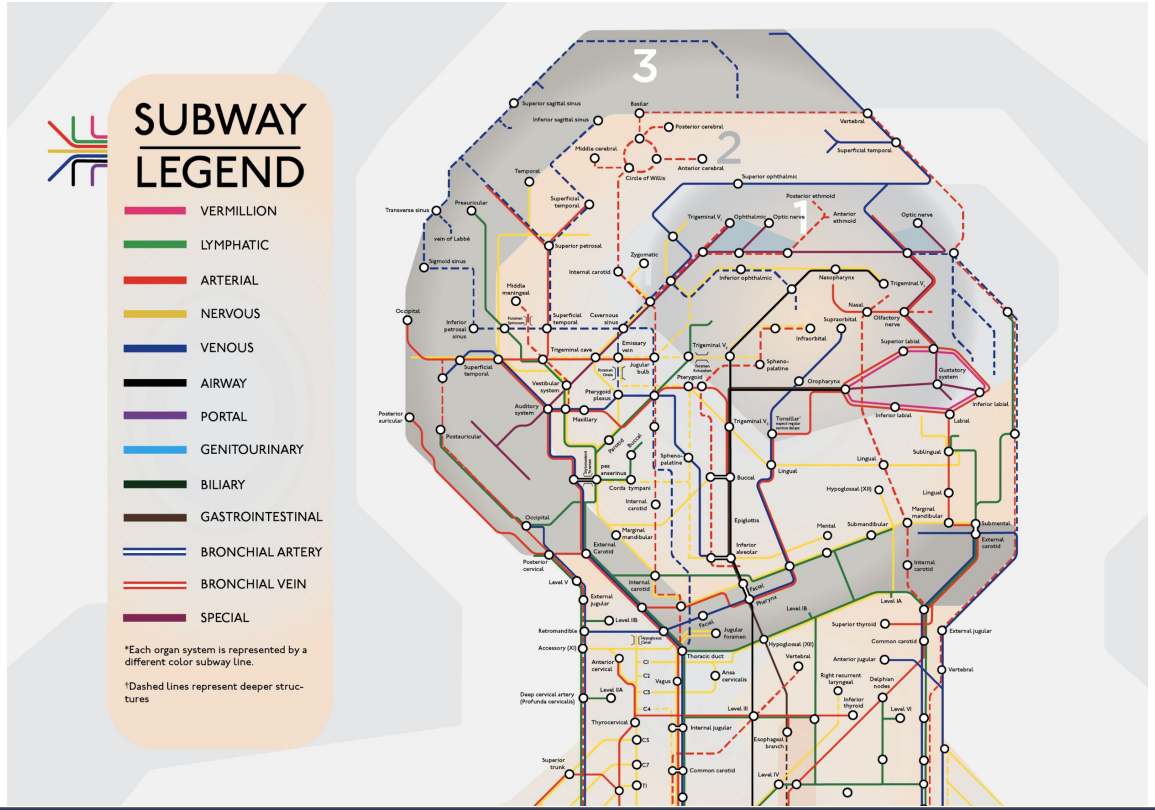
Systems Thinking

Systems Thinking is not a framework or a met
the ways of thinking holistically.

Key Systems Principles (thru Russell Ackoff)

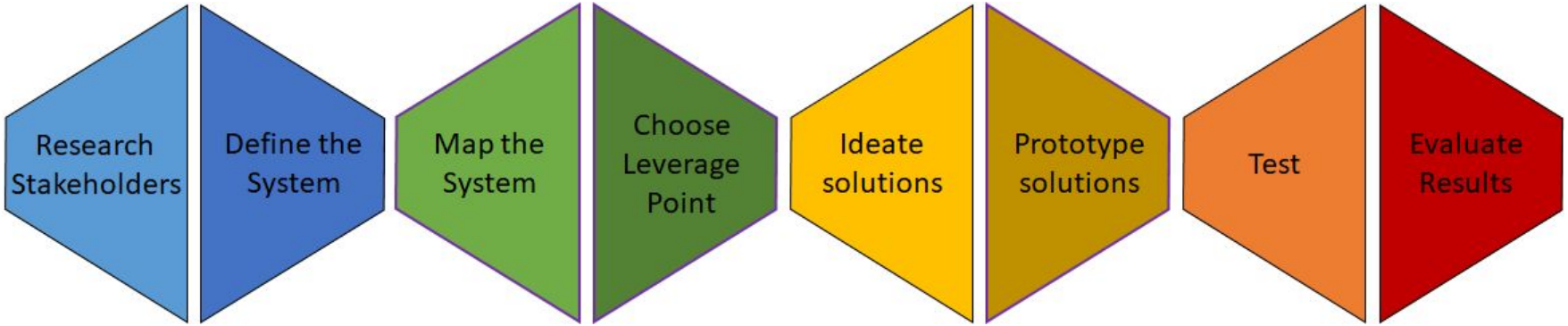
- **System** - is a whole defined by its function in a larger system of which it's a part of
- Every system is contained in a larger system being an essential functional part
- If you apply **analysis** to a system by taking it apart, it loses all its essential properties, and so do its parts.
- A system is never the sum of its parts. It is the product of the interactions of its parts.

Example - human body as a system



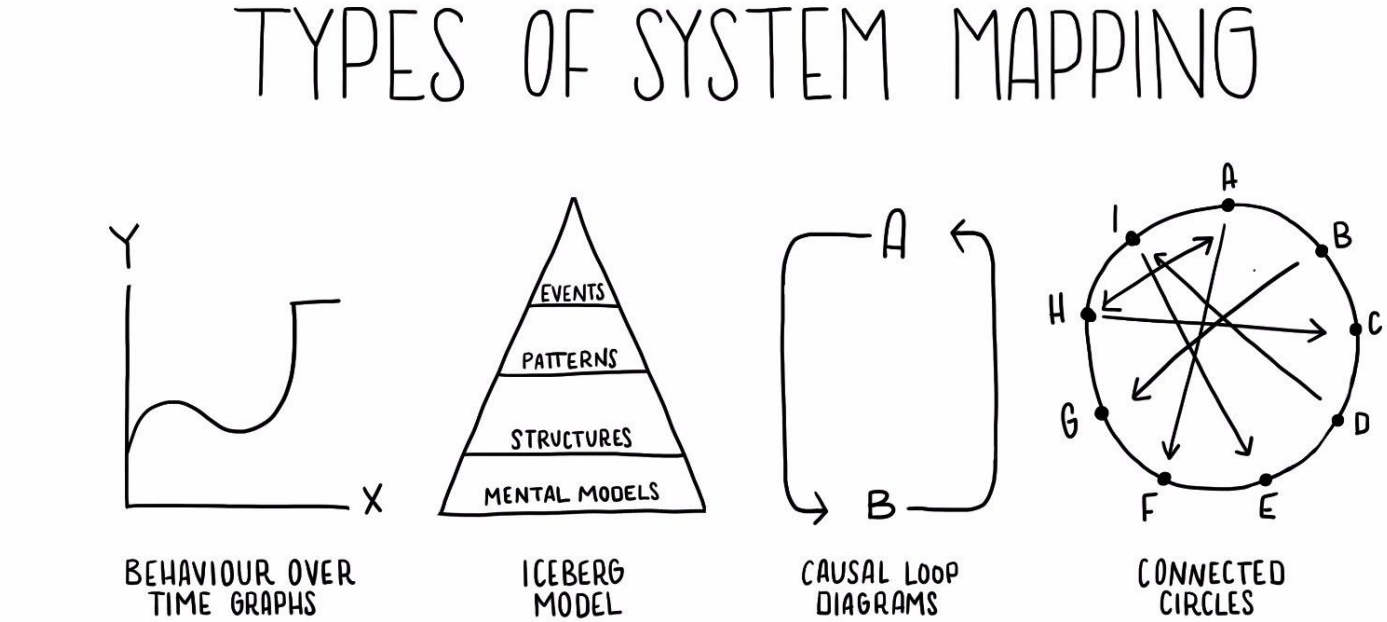
https://www.visualcapitalist.com/wp-content/uploads/2018/11/human-anatomy-subway-map.html

Approach to Systems Thinking (iterative steps)



- Research stakeholders
- Map (model) the system
- Discuss the model from different perspectives (Synthesize)
- What might be the multi-order impacts in potential system to any change introduced?
- Find possible leverage points that could introduce valuable change
- Ideate
- Prototype solutions
- Test solutions by deploying
- Evaluate results - improve again

How to model for conversations?



DISRUPT DESIGN

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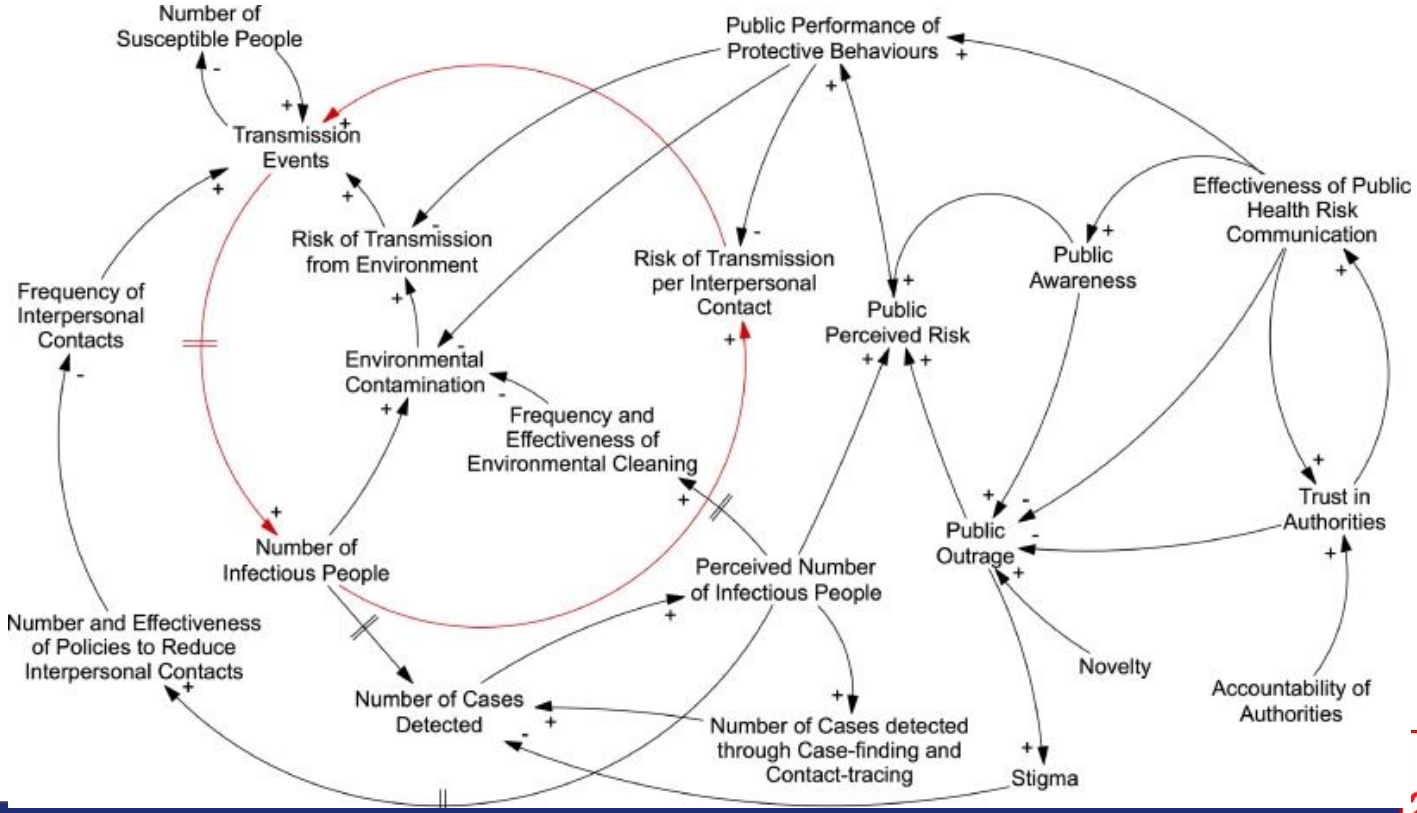
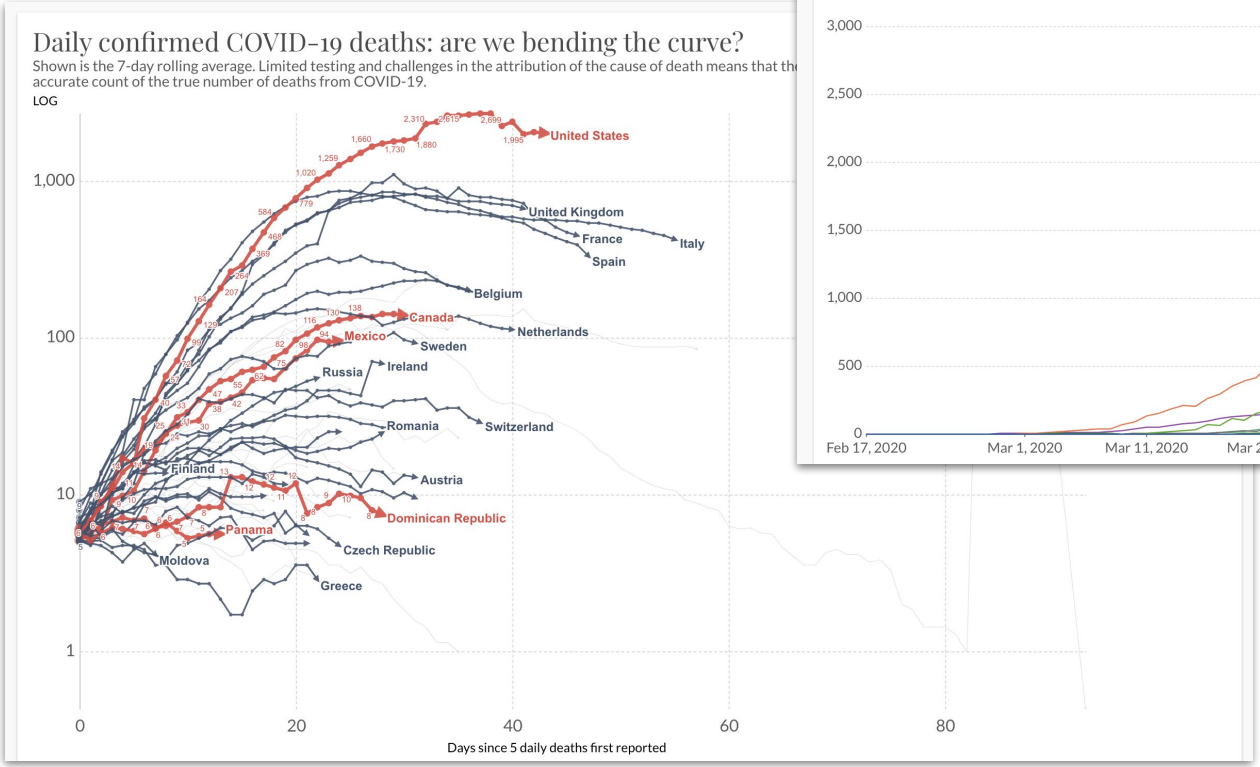
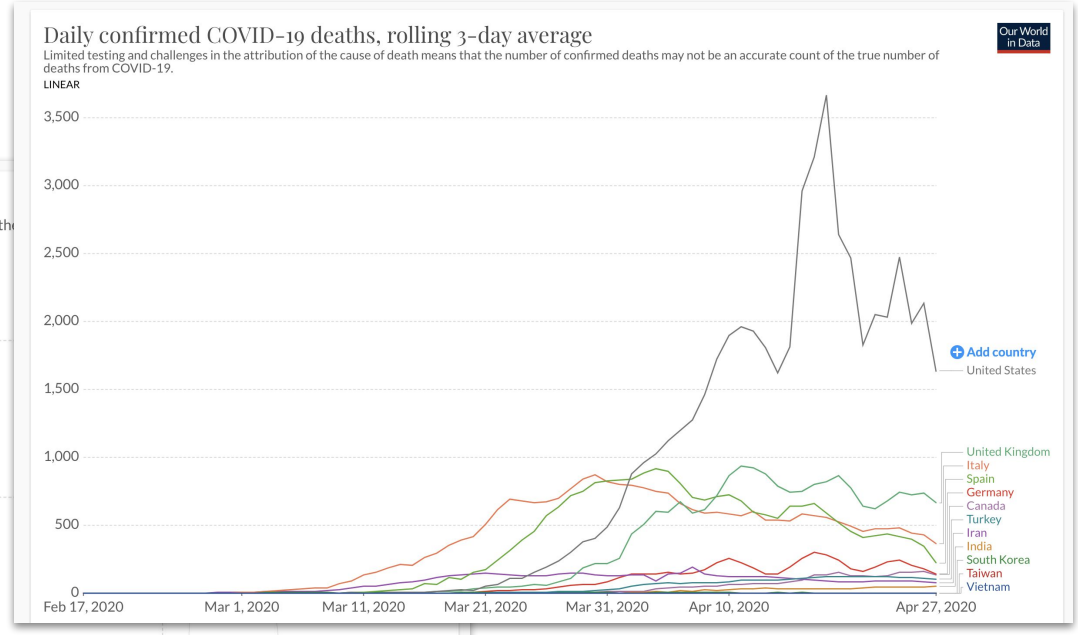
Example of a causal loop diagram (CLD)



Progress over time chart





What type of thinking does systems thinking require?

Requires logical analytical thinking

Requires creative thinking

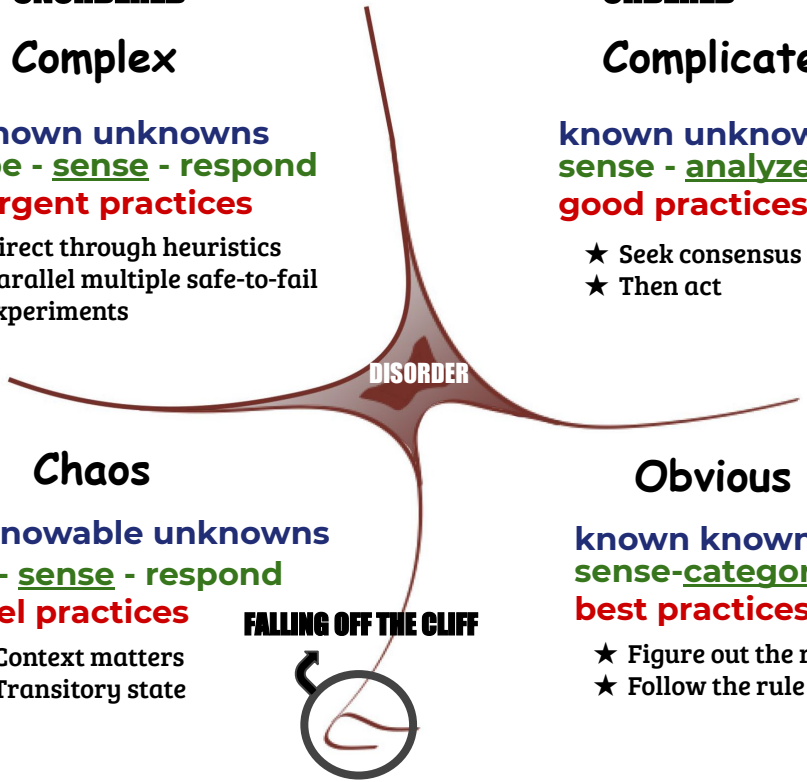
Requires synthesis - a combination of both

Requires big picture thinking

Requires fixing parts of the system

Requires fixing the interaction between parts of the system

CYNEFIN Framework



'Cynefin' is Welsh for habitat, pronounced kuh-NEV-in.

What type of thinking does the Cynefin adaptive thinking framework recommend?

Requires logical analytical thinking

Requires creative thinking

Requires synthesis, a combination of both

Context matters based on the domain you're in

Questions?

Break out and summary

In the context of what you learnt so far, would it be possible to practice “**Deep Thinking**”? How could one apply thinking frameworks, methods and practices?

Let’s synthesize…

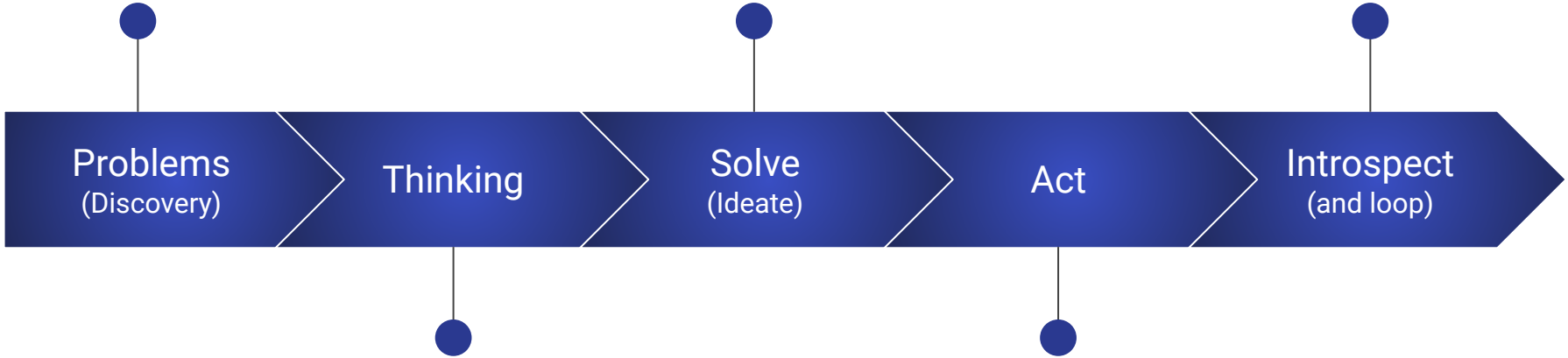
- In break out groups of 4-8 - slides are provided in chat link
- Find a scribe, discuss and summarize key learning points of the group: 8 minutes
- You will be merged next with a second group. Find a common scribe. Align your summaries: 8 minutes
- Main group: We will get together and the scribes will do a final summary of learnings

What are you taking away from this session?

All thinking is to solve problems. "**Deep Ethnography**"

Do not converge on a solution/design early. Better design requires "**Deep Design**" - context matters

For "**Deep learning**" to improve knowledge, constant introspection and change required



"Deep Thinking" includes both logical and creative thinking - application of thinking tools and practices (facilitated in a group setting)

Better ideation leads to better build and validation. "**Deep Work**" requires practice of various methods in concert and constant market feedback loops

Some common requisites to apply “**Deep Thinking**”

Slow your thinking. Requires application of both logical and creative thinking (abduction/novelty)

Think big picture, execute the small keep the big in context, focus on interactions of parts/agents

Focus on flow and effectiveness, not efficiencies (Breathing room required for creativity/innovation)

Poverty, paucity, stress and forced into a corner are drivers for abduction

How to reduce biases or think in-spite-of biases - using heuristics, rituals and facilitation

Constant unlearning and relearning the new

Diversity and inclusion matters (but knowing how to direct collective human potential)

Theory informed principles before practice of various methods

Requires extensive facilitation and coaching

Distributed leadership with backstage leadership

Teams (of teams) with channeled collaboration and cooperation

Questions?

Fit for purpose survey

bit.ly/STTOF4P103

Please complete Q2-6 now, and submit your answers

“The ability to destroy your ideas rapidly instead of slowly when the occasion is right is one of the most valuable things. You have to work hard on it. Ask yourself what are the arguments on the other side. It’s bad to have an opinion you’re proud of if you can’t state the arguments for the other side better than your opponents. This is a great mental discipline.”

-- Charlie Munger of Berkshire Hathaway

Warren Buffett (89) with Charlie Munger (96)

Additional slides and material

Definitions...

- A ***model*** seeks to represent reality, or more appropriately some aspect of the world. It allows for simulation and exploration without encountering the irreversibility of reality. The cliche rightly says that all models are wrong, but some are useful, but the cliche is linked to the nature of a model and its claims; it is not a universal statement.
- A ***framework*** provides a way, or better ways, of looking at the world or an aspect of the world. Ideally a framework provides different perspectives on an issue. It allows things to be looked at from those perspectives. They can be social constructs, based on research or derived from some body of underlying theory.
- A ***method/technique*** represents a defined process or processes which if followed produce defined results. It may incorporate other methods and may have ideological aspects associated with its adoption or rejection but at its heart it provides a repeatable way of achieving results which reduced the need to reinvention (that can be good or bad by the way)
- A ***manifesto*** is an ideological statement of how things should be, or more frequently how they should not be. Such documents generally represent themselves, with varying degrees of “likeness to truth”, as revolutionary or transformational in nature.
- A ***tool*** is something that can be used in support of implementing a method or a technique - a device/object/software used to carry out a particular function in an occupation or pursuit.
- An ***approach*** is a way of dealing with something

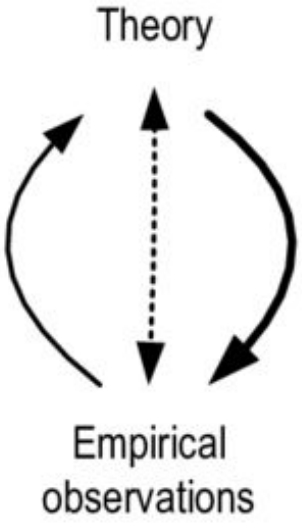
https://cognitive-edge.com/blog/of-shoes-and-ships-and-sealing-wax/

Biases and fallacies...

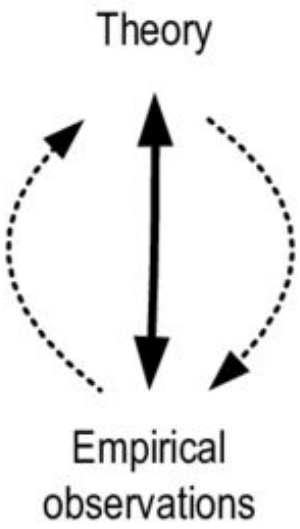
And yet we will… it is not about eliminating them, it is about working with them, to make the best of it.

Whole research process
Abductive

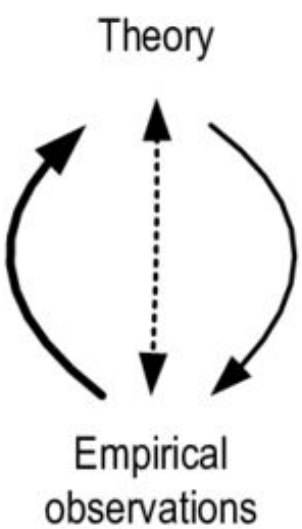
Research phase 1
Mostly deductive, partly inductive



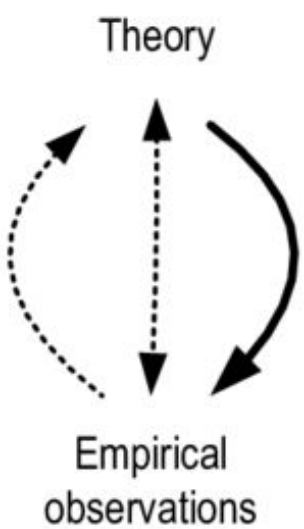
Research phase 2
Strongly abductive



Research phase 3
Strongly inductive, partly abductive



Research phase 4
Deductive



Side-by-Side:

Design Thinking & Systems Thinking

Design Thinking

USER-FOCUSED: prioritizes deeply understanding the problems of a core group of users

SOLUTION-ORIENTED: culminates in a prototype for a solution that can be tested with real people

ASPIRES FOR DELIGHT and USE: works to build solutions that meet the needs of real users

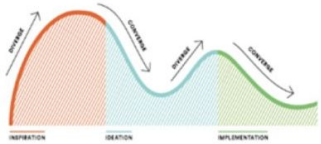


Image Credit: IDEO.org

BOTH!

THOUGHTFUL: both emphasize understanding problems before building solutions

NON-LINEAR: both prioritize gaining input from people and then iterating upon your ideas in a cyclical fashion

INNOVATIVE: both look for new approaches based on previously undetected needs or patterns

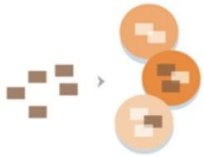


Image Credit: The Omidyar Group

Systems Thinking

SYSTEM-FOCUSED: prioritizes understanding the factors and dynamics that make up a complex problem

PROBLEM-ORIENTED: focuses on developing a nuanced understanding of a problem through the creation of a systems map

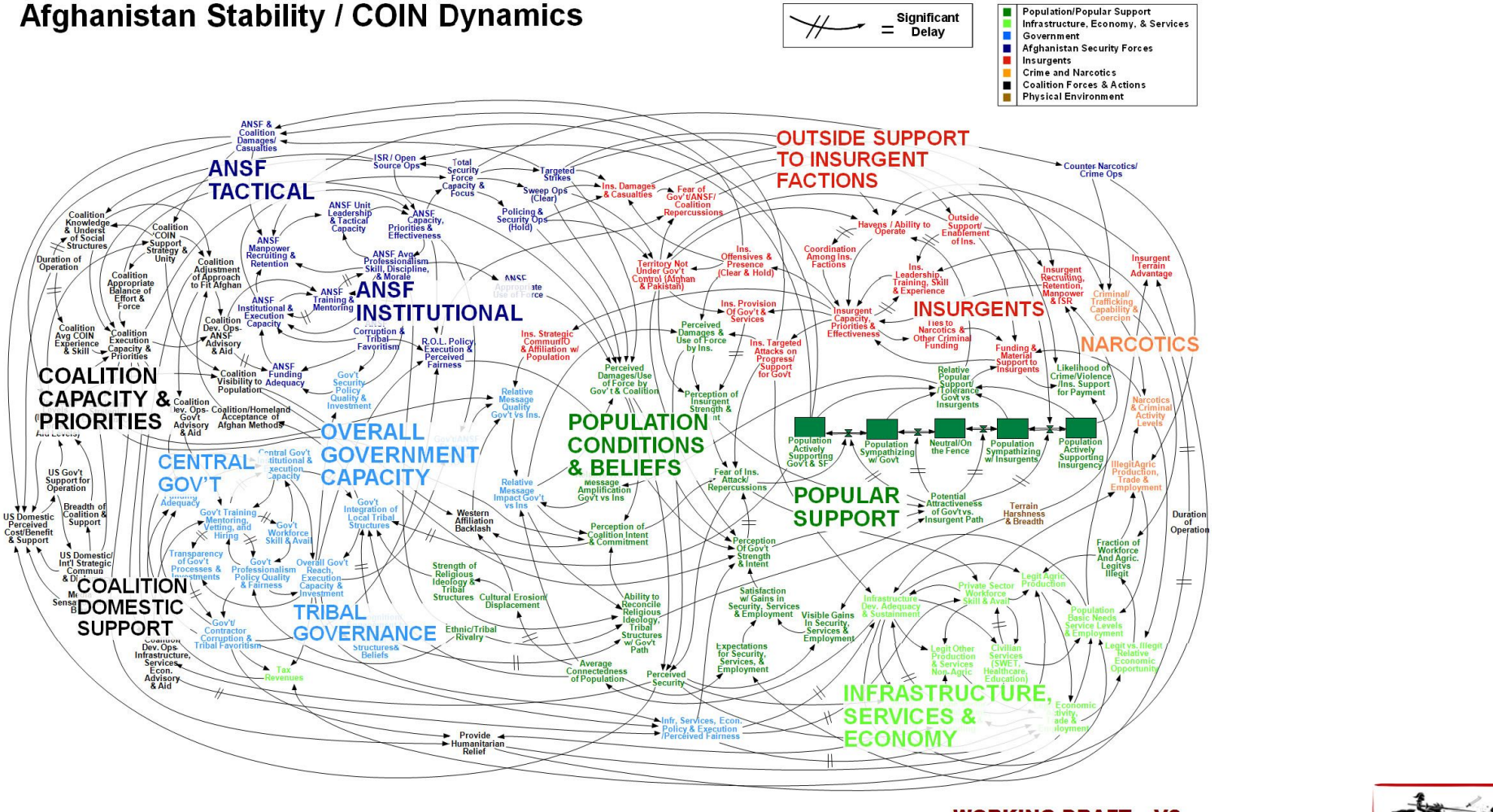
ASPIRES FOR HEALTH: works to build solutions that do not create unintended consequences but instead foster healthy dynamics

Image Credit: The Omidyar Group

Chart by Amy Ahearn

https://medium.com/@conductal/beyond-design-thinking-the-systemic-design-thinking-framework-8d4952271222

Afghanistan Stability / COIN Dynamics



WORKING DRAFT – V3

US-Army General: "it's dangerous because it creates the illusion of understanding" (*New York Times*)

Cynefin as a decision tool - Summary

Domain	How to decide	Thinking	Through	Leadership
Obvious	S-C-R	Categorize	Following rules	Structured management
Complicated	S-A-R	Analysis	Concurrence of multiple experts	Defer to expert practices
Complex	P-S-R	Synthesis / Abductive	Multiple experiments	Servant Leadership
Chaos	A-S-R	Act first, based on context	Answers from other domains	Decisive but delegating

Scientific Method	Systems Thinking	Cynefin Complex approach
• Identify a problem • Use expertise to hypothesize • Define experiments • Conduct experiments • Evaluate results • Adjust and revisit hypothesis • Repeat until something valuable arises	• Gather the right people • Model the system and its interactions - apply tools • Imagine potential states • Discuss potential improvements including multi-order cause and effects scenarios • Determine experiments • Conduct experiments • Evaluate results • Repeat to steer systems towards something more valuable state	• Start with where you are • In complexity you use a diverse group of people for ideas (or) distributed ethnography by collecting narratives • Requires novelty and obliquity • Probe-Sense-Respond • Manage with heuristics • Determine multiple parallel safe-to-fail experiments • Keep focus on adjacent possibles • Conduct these experiments (act, then retrospect) • Amplify success, dampen failure • Continue sensemaking

Lean-Agile Values & Principles Tag Cloud

SHIFTUP

This tag cloud was created using the following sources

1 Categorical Imperative
2 Pillars of TPS
2 Pillars of The Toyota Way
2 Rules of Personal Kanban
3 Laws of Agile
3 Pillars of Scrum
4 Values of the Agile Manifesto
4 Values of Software Craftsmanship
4 Imperatives of Heart of Agile
4 Guiding Principles of Modern Agile
4 Core Values of SAFe
5 Principles of Organic Agile
5 Values of Scrum
5 Values of XP
6 Core Principles of Kanban
6 Views of Management 3.0
6 Principles of DevOps
7 Principles of Lean Development
7 Principles of ITIL
7 Principles of Agile People
7 Principles of Sociocracy 3.0
8 Principles of Product Development
9 Principles of DSDM
10 Principles of SAFe
10 Principles of LeSS
12 Principles of Beyond Budgeting
12 Principles of the Agile Manifesto
12 Principles of Ecosystem Thinking
14 Principles of the Toyota Way
14 Points of Deming

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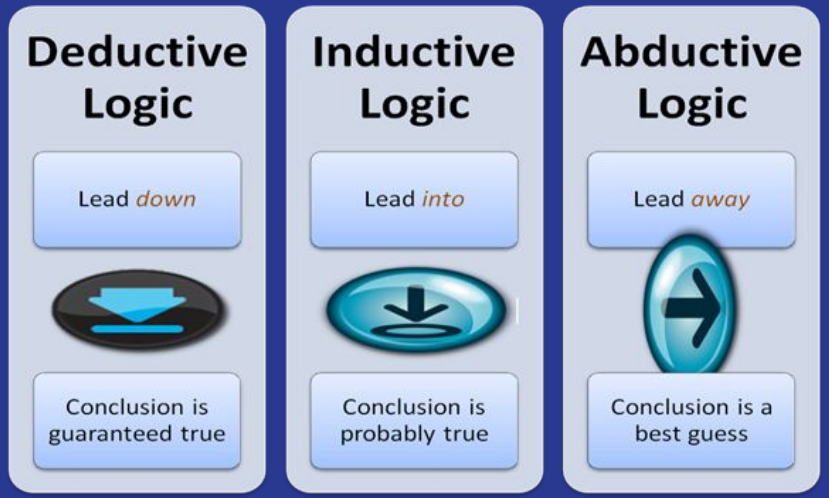
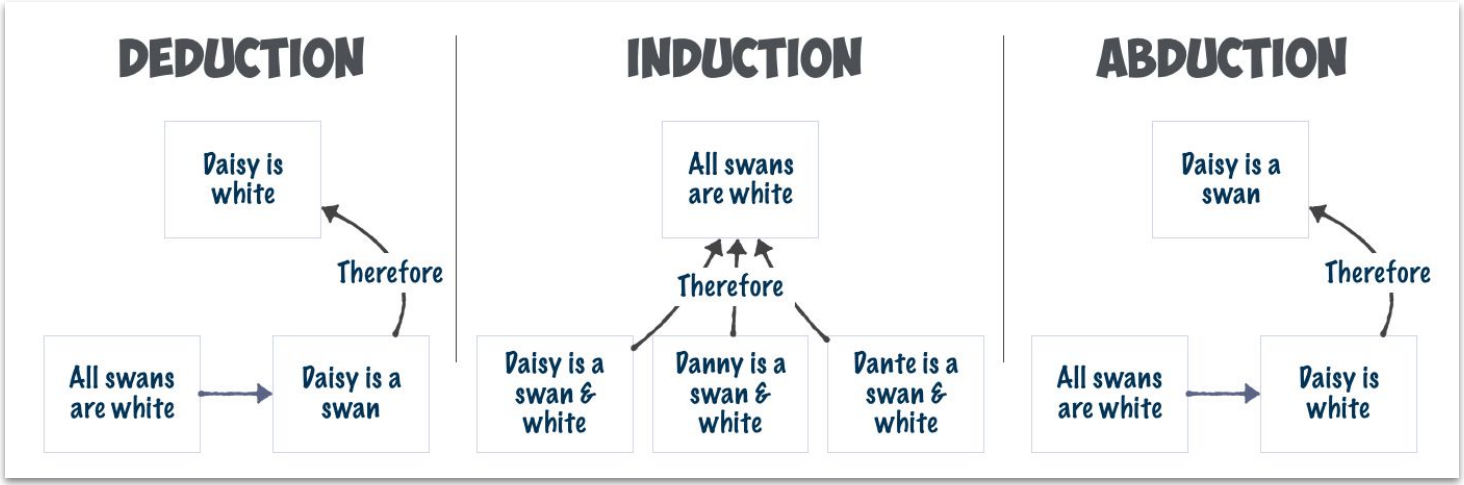
3 broad types of logical reasoning

Deductive, Inductive and Abductive

While we think, we use various logical reasoning approaches to come to a conclusion/design a solution



Reasoning



Narrowing choices

Logical thinking

More analysis

Widening choices

Creative thinking

More synthesis

Predictive **Probable** **Possible** **Plausible**

Deductive reasoning (get to “the answer”)

Deductive reasoning is a type of deduction used in science and in life. It is when you take two true statements, or premises, to form a conclusion. For example, A is equal to B. B is also equal to C. Given those two statements, you can conclude A is equal to C using deductive reasoning. And is always true.

- All dolphins are mammals.
- All mammals have kidneys.
- Using deductive reasoning, you can conclude that all dolphins have kidneys.

More examples:

- All numbers ending in 0 or 5 are divisible by 5. The number 35 ends with a 5, so it must be divisible by 5.
- All birds have feathers. All robins are birds. Therefore, have feathers.
- It's dangerous to drive on icy streets. The streets are icy now, so it would be dangerous to drive on the streets.
- All cats have a keen sense of smell. Fluffy is a cat, so Fluffy has a keen sense of smell.
- Cacti are plants, and all plants perform photosynthesis. Therefore, cacti perform photosynthesis.
- Red meat has iron in it, and beef is red meat. Therefore, beef has iron in it.
- Acute angles are less than 90 degrees. This angle is 40 degrees, so it must be an acute angle.
- All noble gases are stable. Helium is a noble gas, so helium is stable.

Inductive reasoning (probable, possible)

The term inductive reasoning refers to reasoning that takes specific information and makes a broader generalization that's considered probable while still remaining open to the fact that the conclusion may not be 100% guaranteed.

In other words, you're making an educated or informed guess based on the information or data that you have. It might sound right, but that doesn't mean it is right.

- **Inductive Generalizations** (using small sample) - The left-handed people I know use left-handed scissors; therefore, all left-handed people use left-handed scissors.
- **Statistical Induction** (small sample) - Since 95% of the left-handers I've seen around the world use left-handed scissors, 95% of left-handers around the world use left-handed scissors.
- **Causal Inference** - In the summer, there are ducks on our pond. Therefore, summer will bring ducks to our pond.
- **Analogical Induction** - Mary and Jim are left-handed and use left-handed scissors. Bill is also left-handed. Conclusion: Bill also uses left-handed scissors.
- **Predictive Induction** - future using the past. In the past, ducks have always come to our pond. Therefore, the ducks will come to our pond this summer.
- The cost of goods was $1.00. The cost of labor to manufacture the item was $0.50. The sales price of the item was $5.00. So, the item always provides a good profit for the stores selling it.
- Every windstorm in this area comes from the north. I can see a big cloud of dust in the distance. A new windstorm is coming from the north.

Abductive reasoning (plausible)

The Logic of Maybe

Abductive reasoning is a form of logical inference which starts with an observation or set of observations then seeks to find the simplest and most likely explanation for the observations. This process, unlike deductive reasoning, yields a plausible conclusion but does not positively verify it. Abductive conclusions are thus qualified as having a remnant of uncertainty or doubt, which is expressed in retreat terms such as "best available" or 'most likely.

Put differently, Abduction is drawing a conclusion using a heuristic that is likely, but not inevitable given some foreknowledge.

e.g., I observe sheep in a field, and they appear white from my viewing angle, so sheep are white. Contrast with the deductive statement: "Some sheep are white on at least one side"