SORTING THINGS OUT: DESIGN VS. LEAN VS. SYSTEM THINKING

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Agenda

- **Background and Essentials of the "3 Thinkings" related to Agile oriented product development and wicked problem solving: Design, Lean, and Systems.**

- **Relationships of the 3 Thinkings to each other.**

- **2 TEDTalk Videos from Tom Wujec**

- **Discussion, questions, and insights.**

- **Perhaps an activity??**

Design Thinking

- **IDEO** generally credited with the creation of Design Thinking (designthinking.ideo.com/history).

- Applied broadly in education curriculum development, business process development, product development, software development, and others.

- Universities have played a significant role: MIT D-Lab, Stanford d.school, Northwestern's Segal Design Institute, and Berkeley Haas Innovation Lab.

Design Thinking's 5 Steps

1. **Empathize** with the customer / user
2. **Define** the problem statement clearly
3. **Ideate** ways to address identified unmet needs
4. **Prototype** possible solutions
5. **Test** the product with customer / user for feedback
6. **I add a sixth: Make Ideas Visible! (with credit to Tom Wujec)**

Tom Wujec: Making Ideas Visible

How Might We?

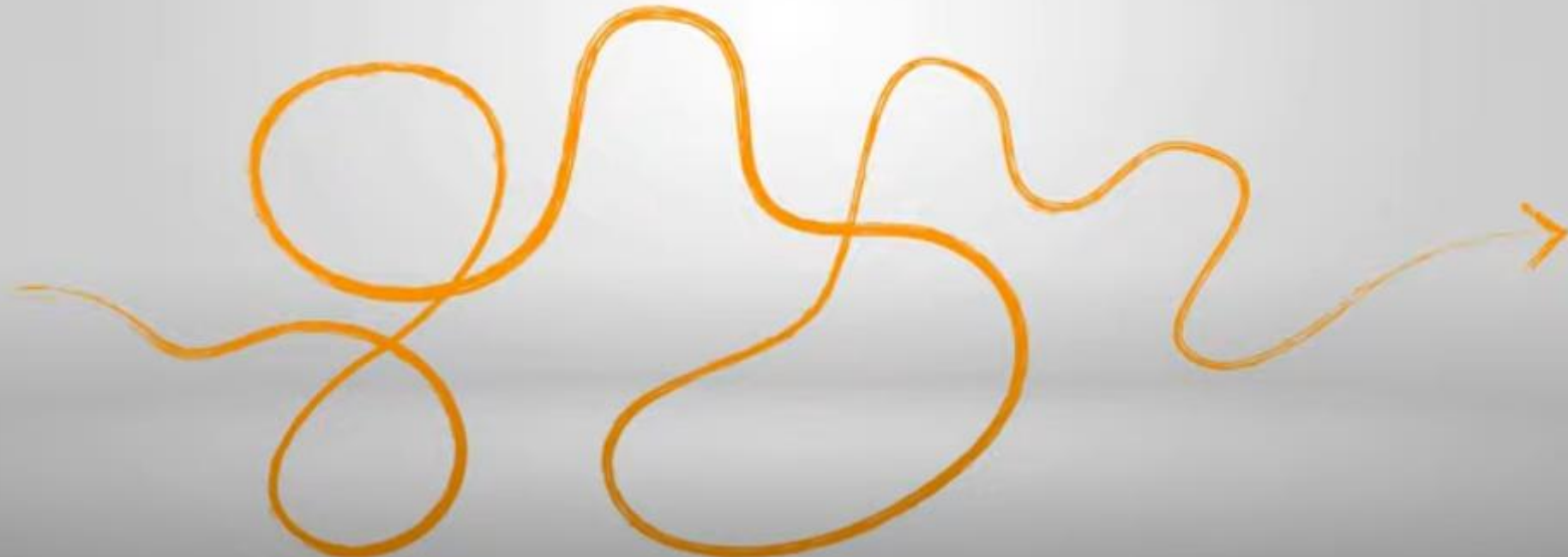## PROTOTYPE

Iterating and testing a solution.

Tools/Methods
- Individual Storyboarding
- Group Storyboarding
- Paper Prototyping
- Digital Prototyping
- 3D Modeling
- Acting it Out
- Testing
- Storytelling

Tools/Methods
- Beautiful Questions
- Stakeholder Mapping
- Context Mapping
- Success Factors Mind Mapping
- Team Work

Plan

EMPATHIZE

Understanding the problem.

Tools/Methods
- Ethnographic Research Plan
- Personas
- Empathy Mapping
- Journey Mapping
- Sense-making Affinity Mapping
- Key Insights

Select

DESIGN THINKING

Tools/Methods
- Semifinalist Selection
- Idea Cards
- Wild World Graph
- Dot Voting
- Stakeholder Value Mapping

Re-frame

Tools/Methods
- Create a reframed HMW base on empathy insights.

IDEATE

Exploring solutions.

Tools/Methods
- Solutions A-Z
- First Burst Affinity Mapping
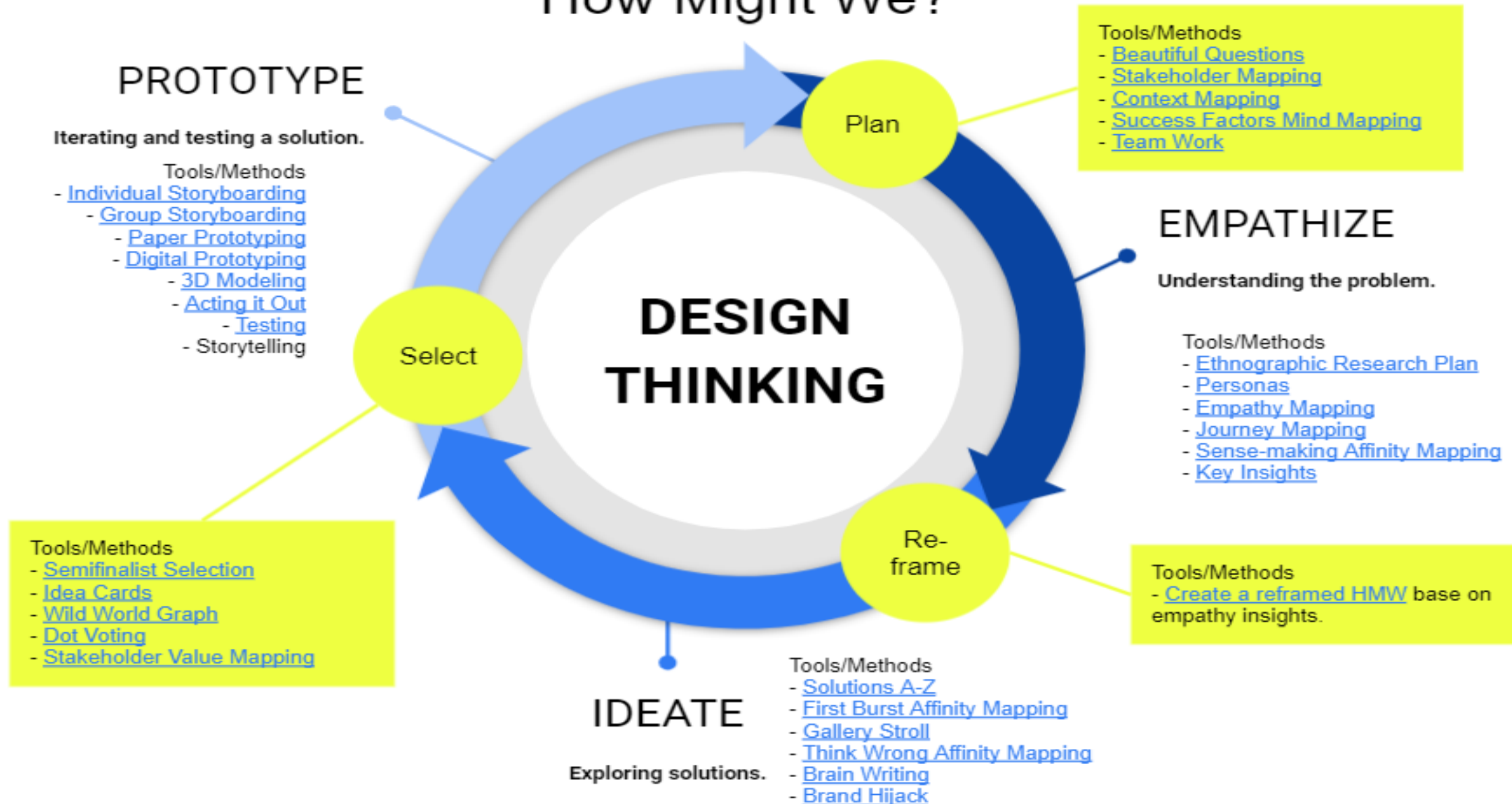- Gallery Stroll
- Think Wrong Affinity Mapping
- Brain Writing
- Brand Hijack

Design Thinking Uses Familiar Tools

- **9 Whys** – **a variation of 5 Whys**
- **Empathy Maps**
- **Open Space and Idea Maps**
- **Personas**
- **User Journey Mapping** – **associated to task / work process**
- **Brainstorming, Dot Voting, Roman Voting, Affinity Grouping**
- **SCAMPER:** **Substitute, Combine, Adapt, Modify, Put to another use, Eliminate and Reverse**

voltagecontrol.com/blog/the-best-design-thinking-exercises-for-any-phase-of-a-project

Naturally, You Can Get Educated In Design Thinking

- **I went through Florida State University's Design Thinking Workshop given at Illinois State University**

- **MIT Executive Education 3 Month Online Certification: $3,300 (exec.mit.edu/s/)**

- **IDEO University Foundations and Advanced: ~$1,000 each (www.ideou.com/products/design-thinking-certificate)**

- **Cornell University Design Thinking Certification – 6 courses: $3,600 (ecornell.cornell.edu/certificates/)**

Lean (Thinking)

- **Toyota is generally credited with creating *lean* in the 1950's.**

- **Jim Womack and Daniel Jones are credited with creating the term in 1996 in their book, *Lean Thinking* about the Toyota TPS.**

- **They (along with Daniel Roos) first discussed lean production in 1990 in *The Machine That Changed the World*.**

- **Womack and Jones distilled "lean" down to 5 elements:**
  1. **Specify the value desired by the customer.**
  2. **Identify the value stream and identify and eliminate any waste occurring to provide it.**
  3. **Make the product flow continuously through remaining value-added steps.**
  4. **Introduce *pull* rather than *push* between all steps.**
  5. **Continuously improve process so that the number of steps and the amount of time and information needed to add value reduces.**

Lean Process Thinking

5. Seek perfection

1. Identify value

Lean

4. Establish pull

2. Map the value stream

3. Create flow
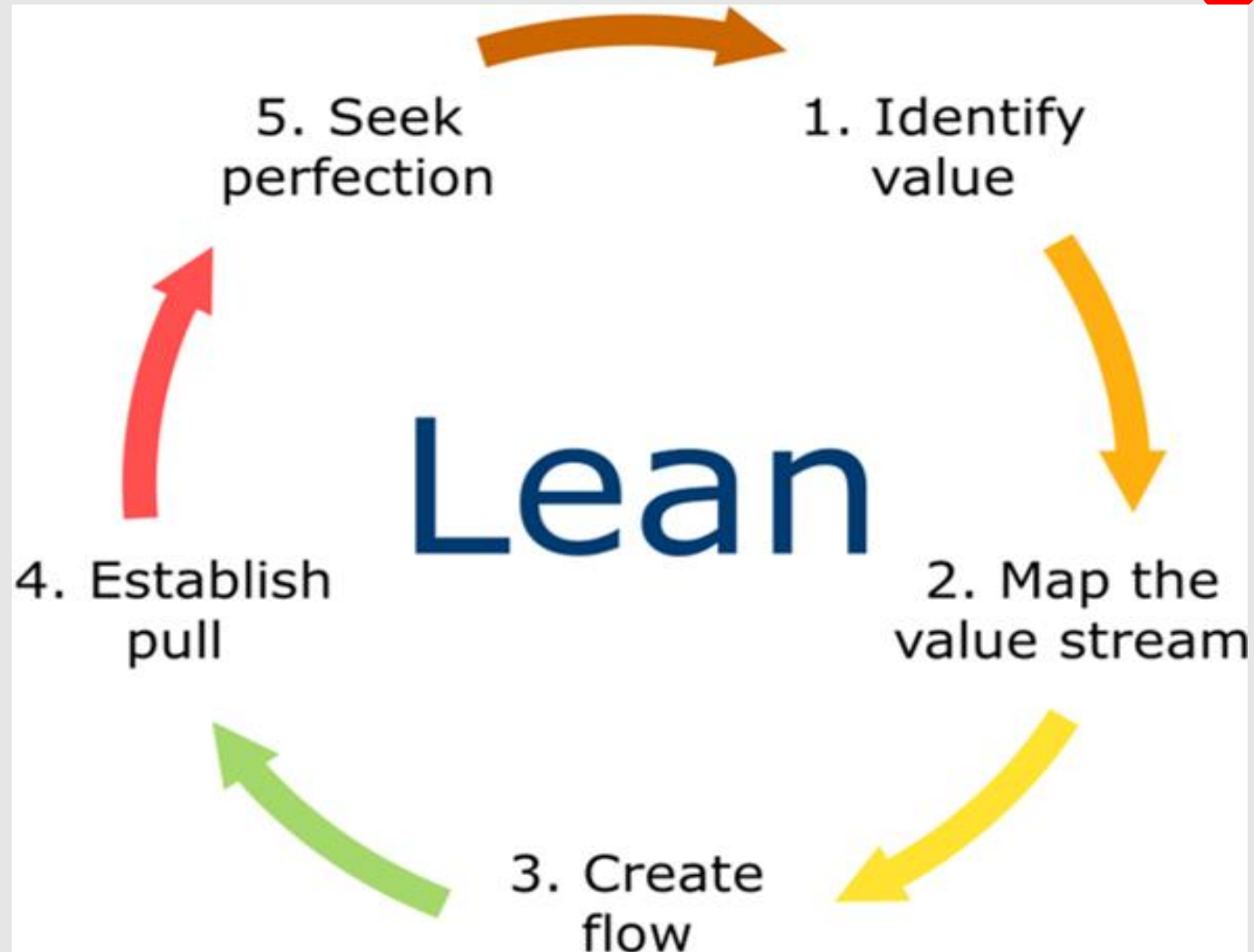
Lean Thinking

- **An essential element in Lean is *value stream mapping***

- **Mapping value streams can be (is) difficult and requires in-depth analysis of process steps, tasks, or activities that add or don't add value (waste)**

- **For a thorough discussion of lean analysis, see the University of Cambridge Lean website: (www.iitoolkit.com/improvement/lean.html#page3)**

Lean and Six Sigma

- **Lean is often associated with Six Sigma. Six Sigma was developed with a very specific goal: reduce variation and defect rates.**

- **Lean is focused on eliminating waste and improving flow.**

- **Lean Six Sigma ostensibly combines the two and theoretically seeks to eliminate 8 kinds of (familiar) wastes:**

  1. **Defects** – Products that don't meet quality standards

  2. **Overproduction** – Exceeding demand or producing more than was ordered or needed

  3. **Waiting** – Process bottle-necks and downtime

  4. **Non-Utilized Talent** – Ineffectively using or misallocating people

  5. **Transportation** – Inefficient shipping methods

  6. **Inventory** – Holding on to a surplus of product or raw material

  7. **Motion** – Unnecessary moving of product, material, or people

  8. **Extra Processing** – Doing more work than is needed

The Seven Wastes of Software Development

- **Partially done work.** Something that is not done. E.g. untested code, undocumented or not maintained code.

- **Extra features.** Something that is not really needed.

- **Relearning (waste of knowledge).** E.g. forgetting decisions, re-trying solutions already tried, the inability to utilize the knowledge of other people.

- **Handoffs.** Passing the information/work to someone else, getting information/work from someone else.

- **Task switching.** How many other tasks people need to do. E.g. the amount of projects done simultaneously.

- **Delays.** Waiting for something.

- **Defects.** Something that does not meet the targets, or is not what it is supposed to be. E.g. software bugs, incorrectly implemented business requirements.

Poppendieck & Poppendieck, 2007. *Implementing Lean Software Development: From Concept to Cash*. Addison-Wesley.

Naturally, You Can Get Educated In Lean (Thinking), too!

- **Lean is a course in my MBA program at Louisiana State University. Many universities offer Lean certificates.**

- **Many certification courses are associated with Lean Six Sigma**

- **Lean Enterprise Institute offers a variety of non-Six Sigma trainings (www.lean.org/Workshops/OnlineLearning.cfm)**

- **Shingo Institute at GPMB (https://www.shopgbmp.org/virtual-gbmp-events.html)**

Systems Thinking

- **Systems thinking** **has been defined as** *the ability or skill to perform problem solving in complex systems.* It has been characterized as both a **skill** and an **awareness**.

- Systems can be an *open* (flows of information, energy, and/or matter between the system and its environment and adapts to change) or *closed* (completely isolated from its environment.)

- **Systems** may be categorized as *ordered*, *complex*, and *chaotic*. Ordered systems can be further subcategorized as **obvious** and **complicated**.

Systems Thinking

- A **complex system** is an entity with both interrelated and interdependent parts.

- **Changing one part of a system affects other parts and the entire system.** This can result in largely **unpredictable behavior**, though **patterns** often emerge.

- In **chaotic systems**, effect of change is totally unpredictable.

- In **ordered systems**, effects of change can be predicted through **reductionism / positivism**.

Systems Thinking

- **MIT Sloan professor Jay Forrester** is generally credited with creation of the concept of *Systems Thinking* as it applies to organizations in 1956, when he created the Systems Dynamic Group

- **Ludwig von Bertalanffy** was one of the first to conceptualize the term *Systems Theory* through his 'Organismic Biology' theory in the 1920s.

- More recently, complexity has been framed into the Cynefin Sense-making Framework by David Snowden, PhD. He synthesized the three system domains of complexity (ordered, complex, and chaotic) into a transitionary model to assess (i.e. *sense*) where a particular problem resides.

Complex

The relationship between casue and effect can only be perceived in hindsight

probe - sense - respond

Emergent practice

Complicated

The relationship between cause and effect requires analysis or some other form of investigation and/or the appication of expert knowledge

sense - analysis - respond

good practice

disorder

novel practice

The relationship between cause and effect at system level

act - sense - respond

Chaotic

Best practice

The relationship between cause and effect is obvious to all

sense - categorise - respond

Obivous

COMPLEX

Characteristics: Flux and unpredictability; no right answers; unknown unknowns; many competing ideas; need for creative approaches; pattern-based leadership.

Approach: **PROBE** **SENSE** **RESPOND**

Designing a road for emerging future technologies and climate change.

COMPLICATED

Characteristics: Expert diagnosis required; cause-and-effect relationships not apparent; more than one right answer; known unknowns; fact-based management.

Approach: **SENSE** **ANALYZE** **RESPOND**

Designing a structural system; sizing a pump; selecting an asphalt mixture.

DISORDER

CHAOS

Characteristics: High turbulence; no clear cause-and-effect relationships; unknowables; many decisions to make and no time to think; high tension; pattern-based leadership.

Approach: **ACT** **SENSE** **RESPOND**

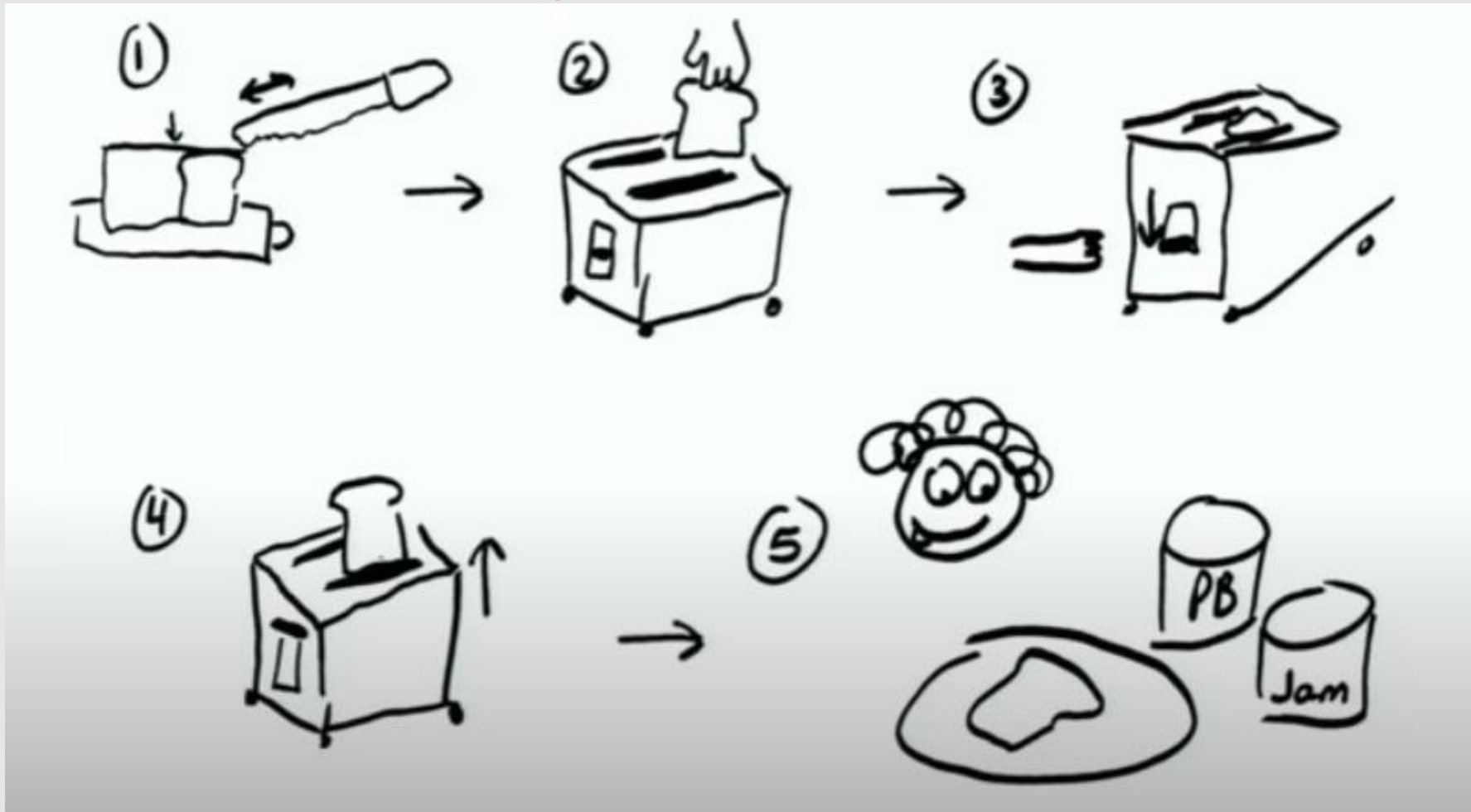Providing infrastructure services right after a disaster.

SIMPLE (or OBVIOUS)

Characteristics: Repeating patterns and consistent events; Clear cause-and-effect relationships evident to everyone; right answers exist; Known knowns; Fact-based Management.

Approach: **SENSE** **CATEGORIZE** **RESPOND**

Titrating chemicals at a water treatment plant.

SENSE	Assess the facts of the situation
CATEGORIZE	Organize the facts
RESPOND	Formulate a response based on established practice
ANALYZE	Investigate options available
PROBE	Explore options
ACT	Take action

https://www.cognitive-edge.com

Tom Wujec: Using *Making Toast* to Solve System Problems

Of Course, You Can Get Educated In Systems Thinking, too!

- **Dave Snowden's organization Cognitive Edge: (www.cognitive-edge.com/learning-and-training)**

- **MIT xPro: $1,149 (learn-xpro.mit.edu/system-thinking)**

- **eCornell: $3,600 (ecornell.cornell.edu/)**

- **Harvard The Art and Practice of Systems Thinking: $2,900 (online-learning.harvard.edu/course/art-and-practice-systems-thinking?delta=0)**

Relationships of the Thinkings

- **All 3 provide tools for approaching problem solving and incorporate feedback and learning** – essentials in modern product development.

- **Lean and Design are practice and process based. Systems is theory and philosophy based, though processes exist.**

- Toyota's Taiichi Ohno said of Lean, ***Don't think with your head, think with your hands***. The same may be said of Design Thinking.

- Though Systems Thinking, Design Thinking, and Lean operate from different perspectives, they are complementary and are based on familiar insights.

- An understanding of Systems Thinking (and sensing in which domain the work resides) improves the learning curve of Lean and Design Thinking techniques.

Discussion / Questions