

# A Design Thinking Roadmap for Process Improvement

by  
Mrs. Lymari Castro-Diaz  
Department of Defense  
lcastr2@radium.ncsc.mil



International Council of Systems  
Engineering  
Chesapeake Chapter  
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**Mrs. Lymari Castro-Diaz**  
**Systems Engineer**  
**Department of Defense**

### Contact

Email  
[lcastr2@radium.ncsc.mil](mailto:lcastr2@radium.ncsc.mil)

LinkedIn  
[www.linkedin.com/in/lymaricastro](https://www.linkedin.com/in/lymaricastro)

### Education

- BS. in Physics, UPR
- MEng. in Engineering Physics, Cornell University
- MEng. in Systems Engineering, Stevens Institute of Technology

### Experience

- 22 years of Systems Engineering Experience (3 years in private industry and 19 years in DoD)

### Training

- **Lean and Agile Methodologies**  
Scaled Agile Framework (SAFe), Large Scale Scrum (LeSS), Scrum at Scale, KANBAN, Lean Systems Engineering, Lean Startup
- **Design Thinking Methods**  
Techniques for problem solving using creativity, collaboration using a human-centered design approach

### Certifications

- SAFe Agilist
- SAFe Government Practitioner
- Enterprise Business Agility Strategist
- Scrum at Scale Practitioner
- LeSS Practitioner

# Learning Objectives

Techniques for navigating the unknown

A design thinking process for quickly discovering problems, prioritization of challenges, and ideation of solutions



An approach to combine design thinking with Agile and Lean Startup techniques

An incremental approach to drive change and create a common vision in a large organization

# Background

- 1-year professional development opportunity at NASA
- Lead change effort impacting
  - 1,200 + employees
  - Engineers, Managers, Senior Executives
  - 7 different work roles
  - In the context of a cross-organizational proposal process





# The Need for Change

- Improve a cross-organizational proposal process from the perspective of the engineering organization
  - Long and complex process with many dependencies and interactions across teams
  - Limited resources to do the work
  - Incentive people to work proposals
  - Find ways to be more efficient in the proposal process



# My Challenge

- Unknown organization
- Unknown engineering proposal process
- Become immersed in the culture
- Deliver meaningful results
- Only one year



# The Techniques



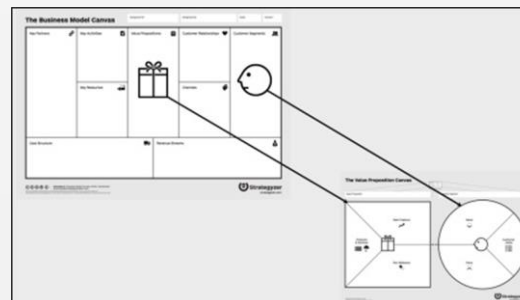
## Agile Practices:

- Ability to quickly adapt to changes
  - 5 timeboxed phases: Assessment, Evaluation, Analysis, Recommendations, Implementation
  - Phases overlapped
  - Incremental delivery
  - Feedback
  - Stakeholders active participants
  - Backlog and process for implementation of recommendations



## Design Thinking:

- Quick problem solving and design of solutions with a human-centered approach
  - Observation
  - Problem discovery
  - Solution exploration



## Lean Startup:

- Understanding the stakeholders
  - Stakeholder Value Proposition Canvas
  - Mission Model Canvas

# Timeboxed Phases



5 months

## Assessment

Objective:

Learn the organization, process, stakeholders, pains, gains, and opportunities by work role



5 months

\*Overlapped  
Assessment Phase



6 months

\* Overlapped Assessment  
and Evaluation



1 month



2 months

## Evaluation

Objective:

Validate the initial findings by specific problem area, create a baseline of the process, and create a common vision for the organization by identifying solutions to most pressing problems. Identify luxuries, quick wins, high value, and strategic solutions

## Analysis

Objective:

Identify common themes and narrow down the scope of the effort  
Note: Analysis overlapped the Assessment and Evaluation phases

## Recommendations

Objective:

Prioritize quick wins and high value solutions as identified during the Evaluation Phase

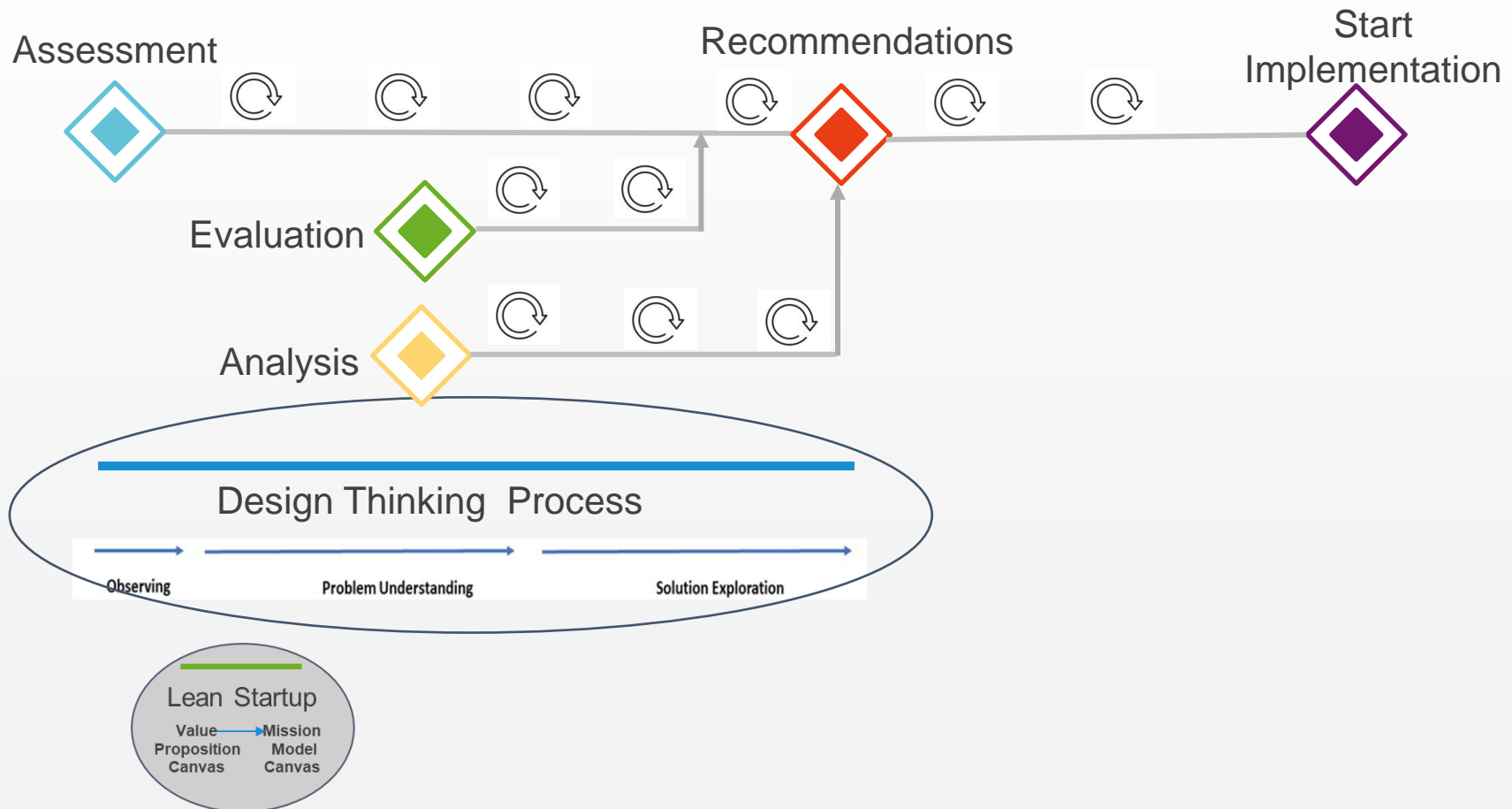
## Implementation

Objective:




Provide a roadmap for continuous improvement and for organizational change. Consisted of a Planning Phase and an Execution Phase



# Notional Roadmap



# Design Thinking Definition

-  Framework that provides a human-centered approach for problem solving
-  Set of tools and techniques to focus attention on the most important problems to be solved
-  Can be applied to any type of problem: technical, organizational, or process improvement

# Design Thinking Framework



## Looking

### ETHNOGRAPHIC RESEARCH

- Interviewing
- Fly-on-the-wall Observation
- Contextual Inquiry
- Walk-a-mile Immersion

### PARTICIPATORY RESEARCH

- What's on Your Radar?
- Buy a Feature
- Build Your Own
- Journaling

### EVALUATIVE RESEARCH

- Think-Aloud Testing
- Heuristic Review
- Critique
- System Usability Scale



## Understanding

### PEOPLE & SYSTEMS

- Stakeholder Mapping
- Persona Profile
- Experience Diagramming
- Concept Mapping

### PATTERNS & PRIORITIES

- Affinity Clustering
- Bull's-eye Diagramming
- Importance/Difficulty Matrix
- Visualize the Vote

### PROBLEM FRAMING

- Problem Tree Analysis
- Statement Starters
- Abstraction Laddering
- Rose, Thorn, Bud



## Making

### CONCEPT IDEATION

- Thumbnail Sketching
- Creative Matrix
- Round Robin
- Alternative Worlds

### MODELING & PROTOTYPING

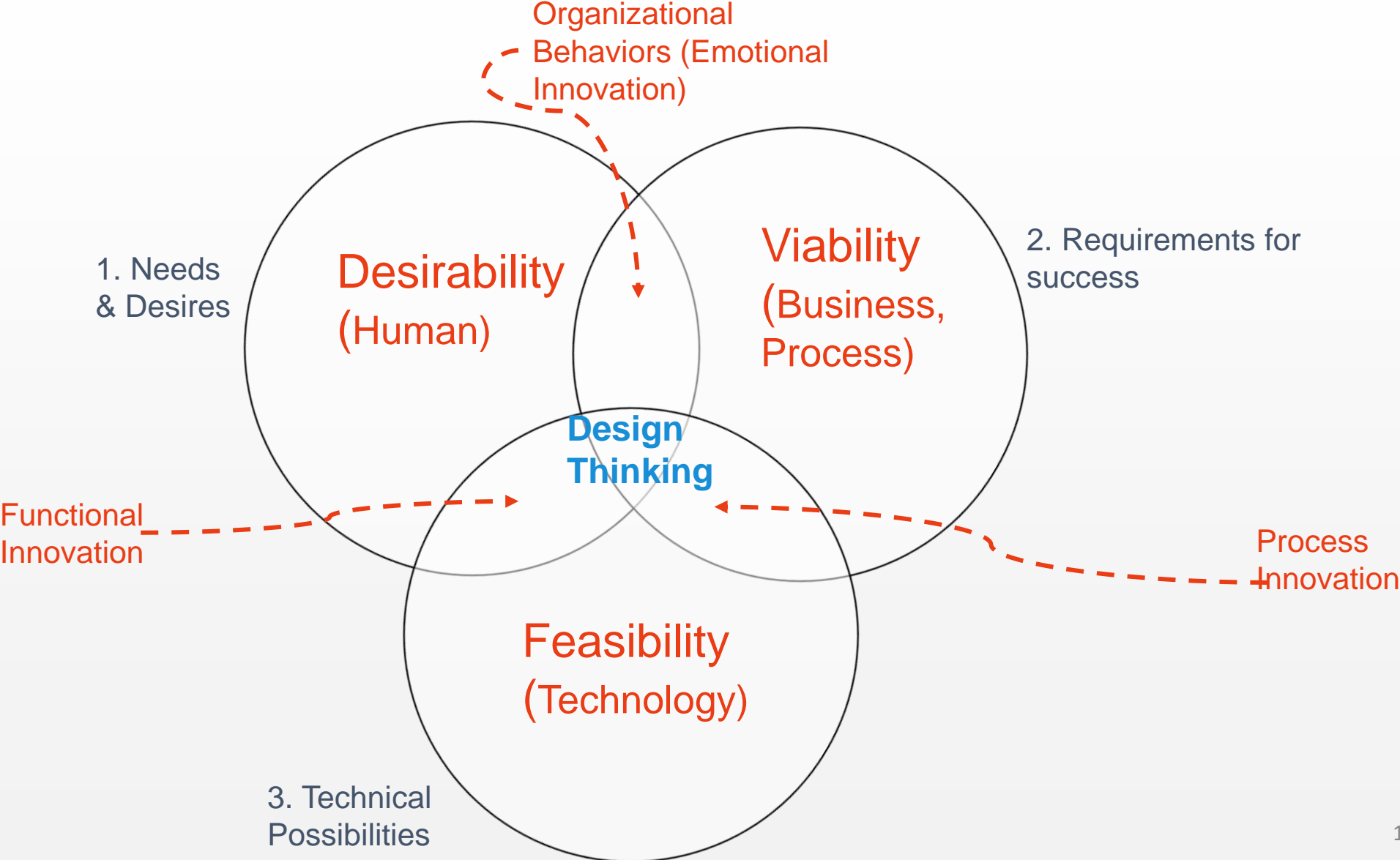
- Storyboarding
- Schematic Diagramming
- Rough & Ready Prototyping
- Appearance Modeling

### DESIGN RATIONALE

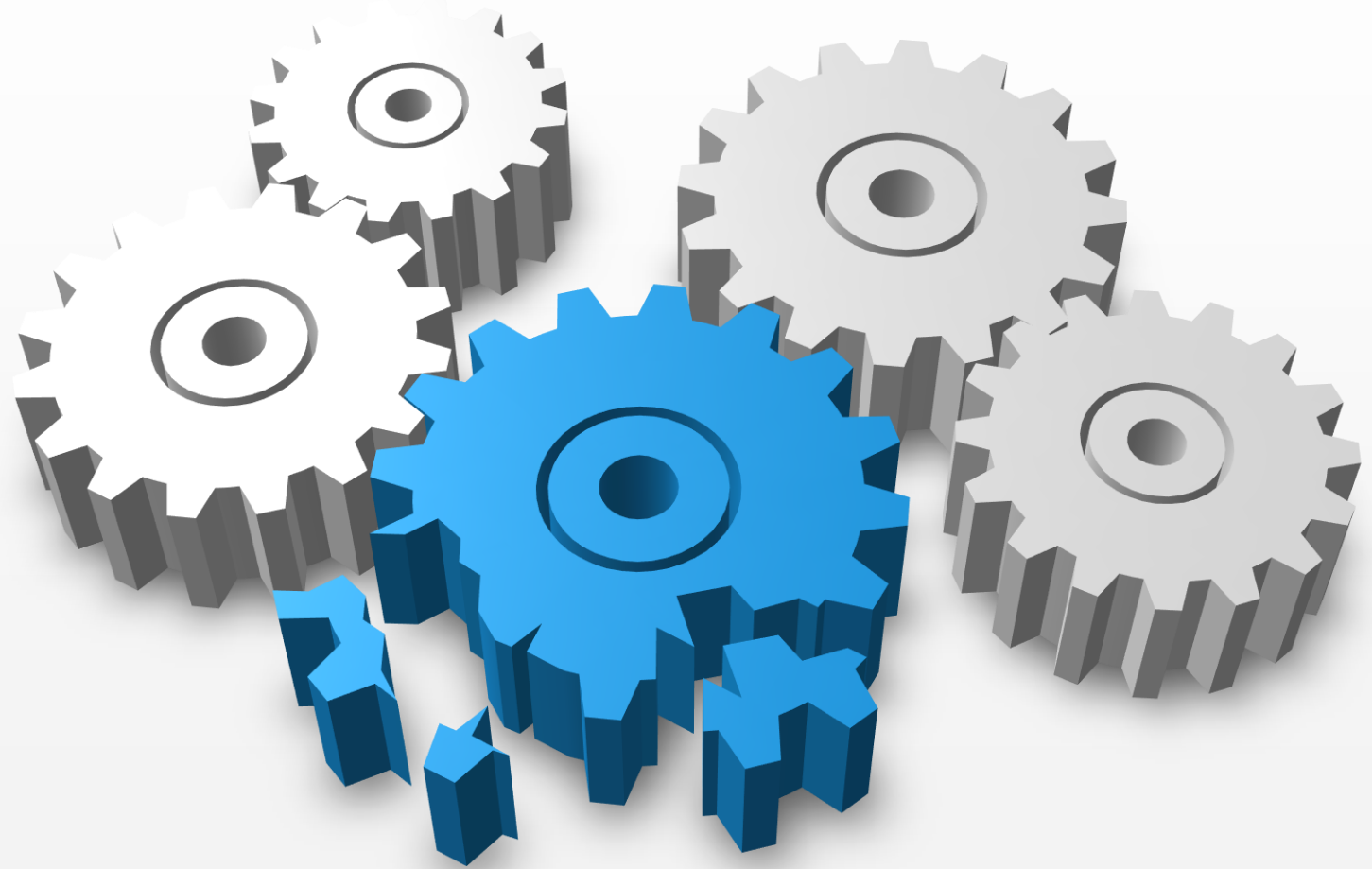
- Concept Poster
- Video Scenario
- Cover Story Mock-up
- Quick Reference Guide

Reference: <https://www.luma-institute.com/about-luma/luma-system-explore-methods/>

# The Value of the Design Thinking Process

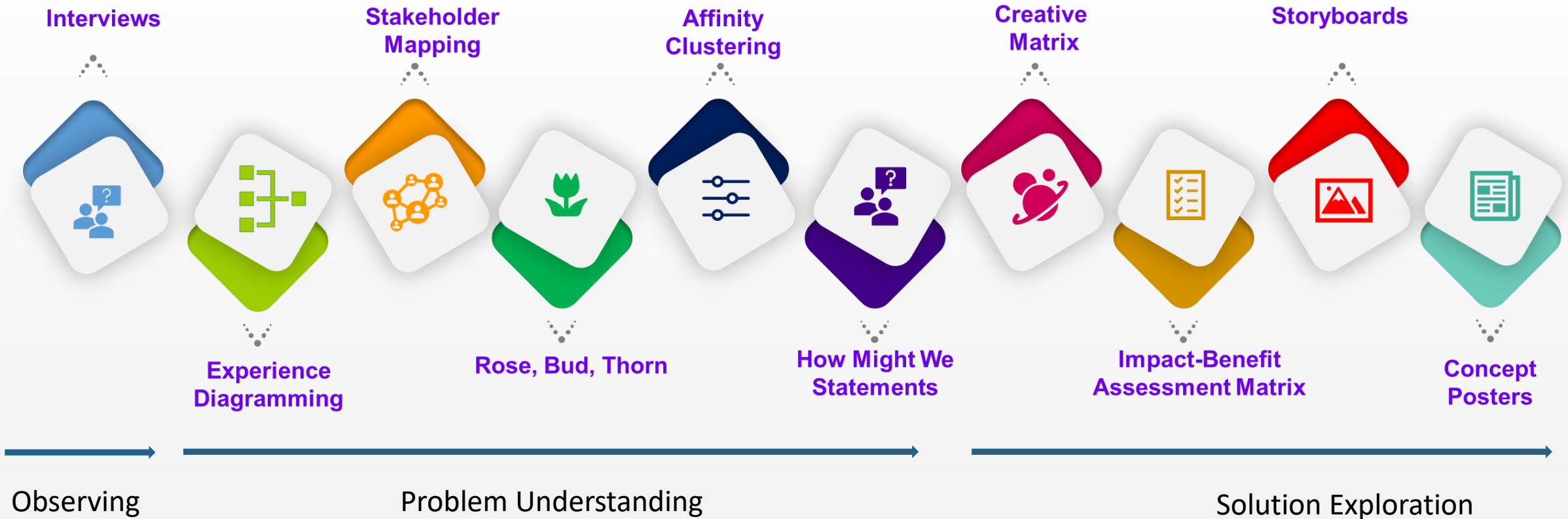


# Assessment, Evaluation, Analysis Phases





# Design Thinking Techniques





# 1. Interviews



## Structured Interviews

Fast learning about the various work roles, their pains, and gains

2 hrs  
per interview

### Example of Questions:

#### Stakeholder Role:

1. Tell me about your role in the organization.
2. How much time do you spend working the proposal process

...

#### Problem Discovery (pains)

1. What is the hardest part of your role?
2. What tasks take most of your time?

...

#### Problem Validation:

1. Tell me about your last experience working with the proposal process
2. How important is for you to fix this problem?

....

#### Opportunity Discovery (gains)

1. Is there anything that can be done differently to make your job easier?
2. What do you think of making changes to the process?

#### Opportunity Validation

1. Do you see any barriers to change the process?

## Benefits

Provided insights about the:

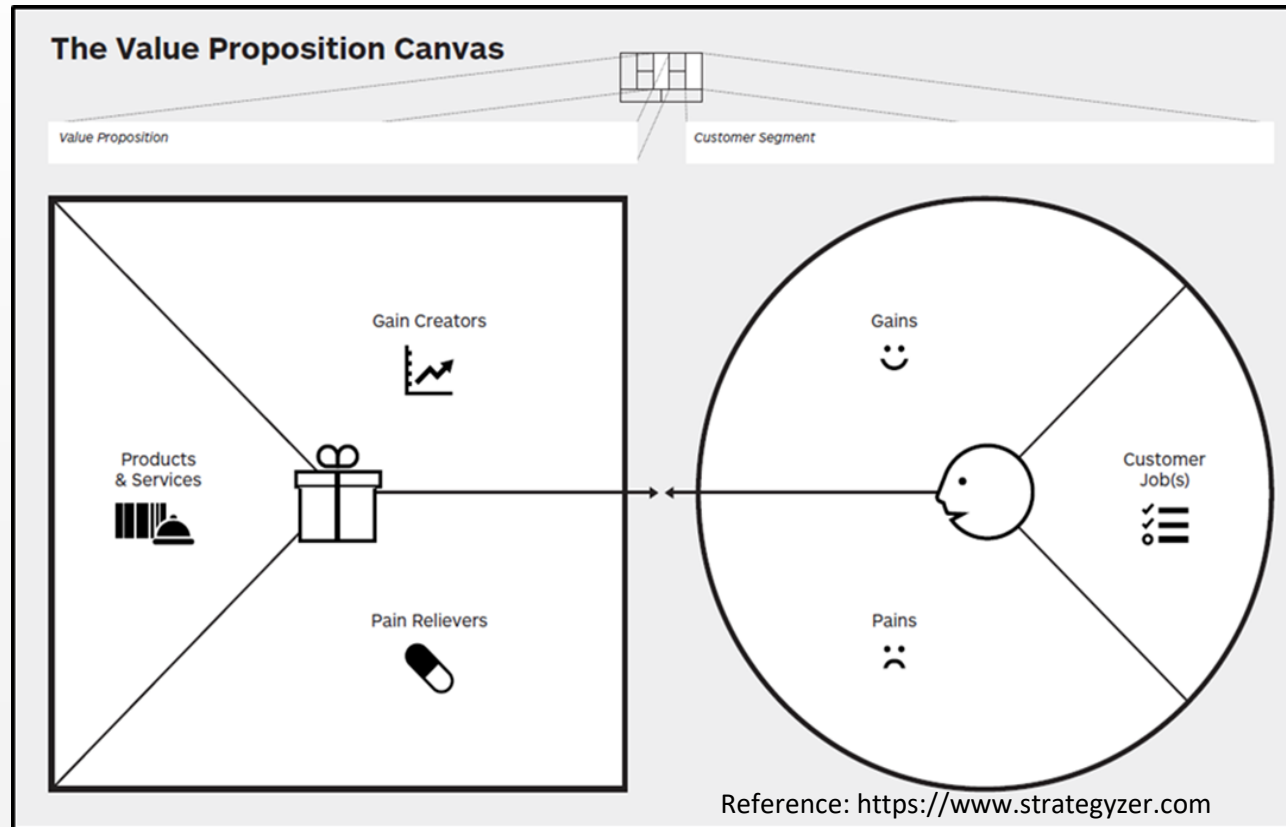
- Stakeholder roles
- (High level) Problems (i.e. pains) discovery
- Opportunities (i.e. gains)

# 1-a. Value Proposition Canvas



## Value Proposition Canvas

Mapping of problems and potential opportunities for improvement by work role



## Benefits

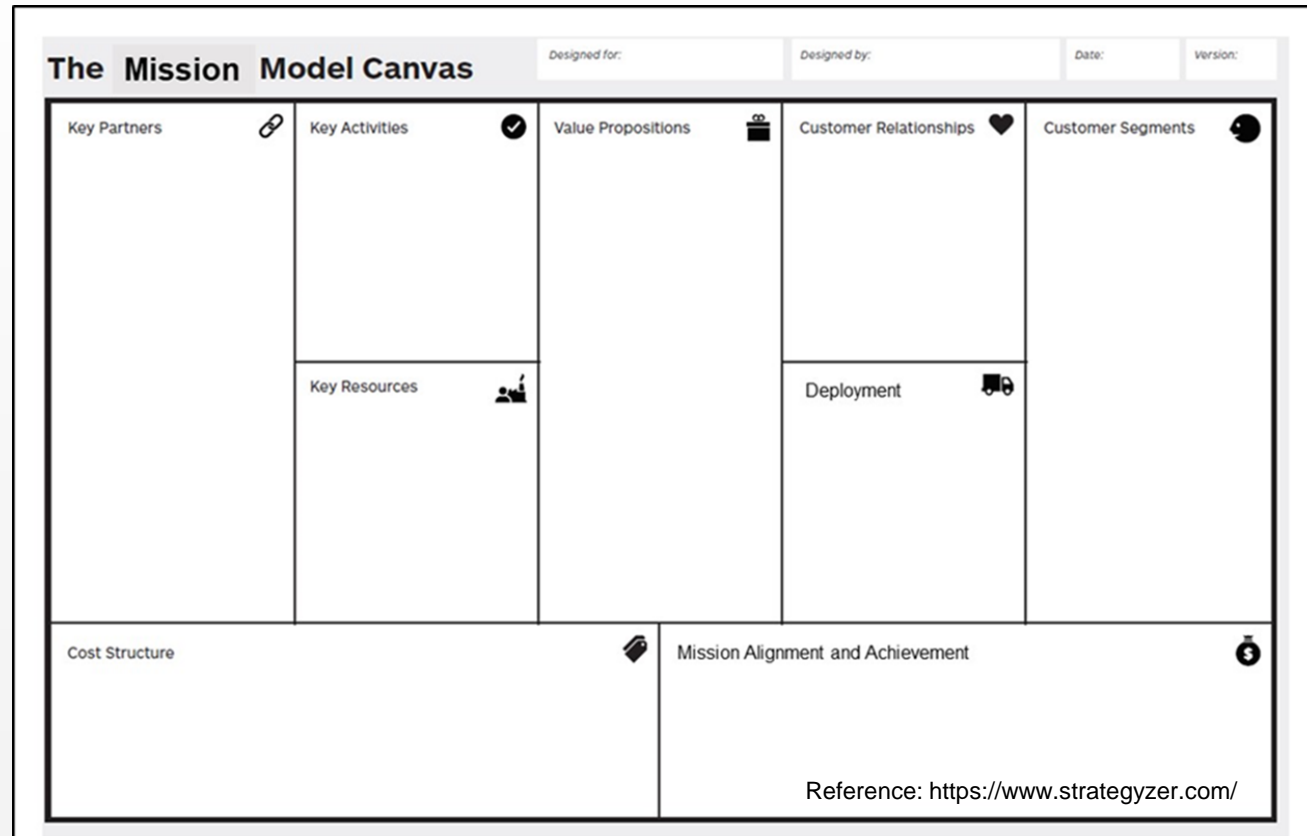
- Visualization of pains and gains for each stakeholder role
- Problem-solution fit

# 1-b. Mission Model Canvas



## Mission Model Canvas

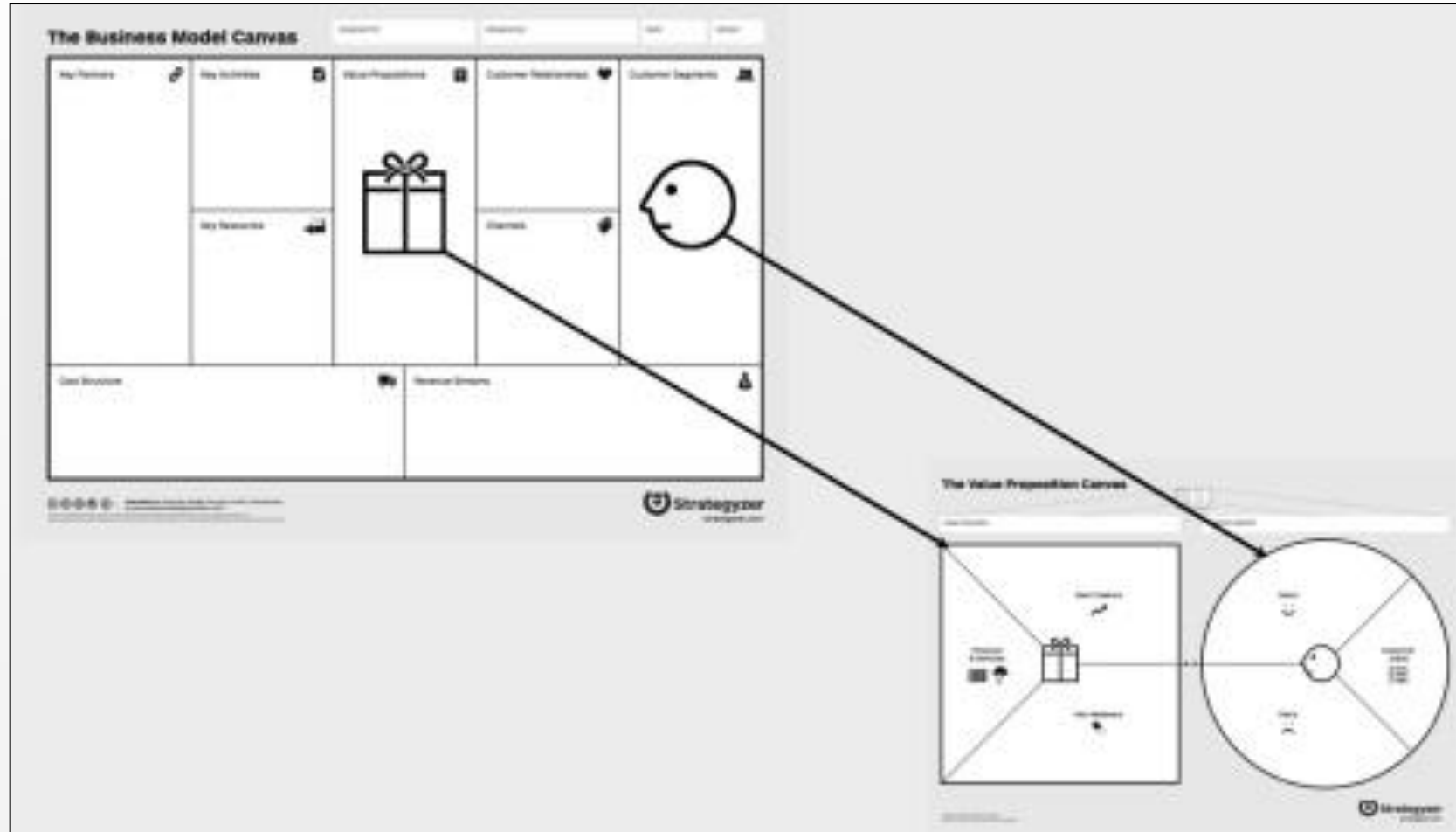
Frame the problems to be addressed



## Benefits

- Visualization of what needed to be changed in the organization and the process in each problem area

# Relationship of Value Proposition Canvas and Mission Model Canvas





# Benefits of the Interviews



- Quickly learned about the organization and the process to be improved
  - Created **engagement** in the process improvement effort
  - Began to build **trust**
  - **Identified high level common themes** of for problems for only one group (i.e. management team) of the organization
  - Identified notional ideas for potential solutions
- 

- There was so much more to be discovered!
  - Complexity of the process and of the organization
  - Culture of the organization
  - Deeper understanding of the problems
  - Solutions that work for the entire organization

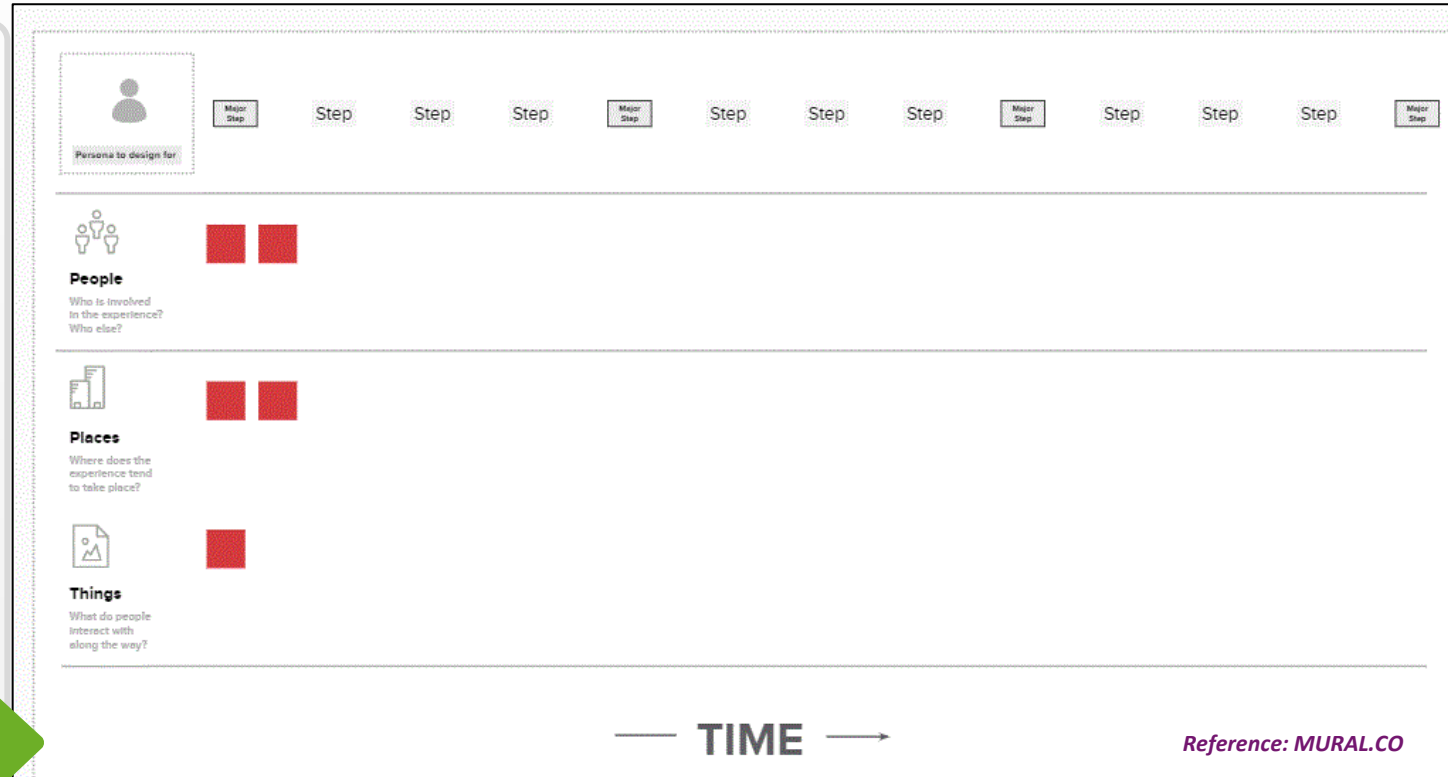


# 2. Experience Diagramming



## Experience Diagramming

Summary of the current state of the process to be improved



## Benefits

- Visualization of workflows, participants, decision points, critical activities, and dependencies
- Show the 'undocumented' process

# Other Challenges

- Needed to identify solutions that worked for all groups of the organization
- Design thinking techniques were new in the organization



# An Incremental Design-Thinking Approach

- Workshops 1 & 2:  
Problem discovery & solutions exploration for targeted roles



- Workshop 3:  
Solution exploration for the entire organization



## Benefits:

- Slow introduction of new techniques
- Address the concerns of specific groups in the organization
- Stakeholders discover and prioritize the most urgent problems
- Stakeholders ideate solutions that work for them
- Blend the perspectives of the 3 stakeholder groups in the organization
- Create a common vision for the future

# **Problem Discovery and Prioritization**







# 4. Rose, Bud, Thorn



## Rose, Bud, Thorn

Identification of positive, negative, and potential opportunities for improvement

1 hr



Reference: MURAL.CO

## Benefits

- Deeper insight into the challenges and opportunities for improvement
- Everyone provided input



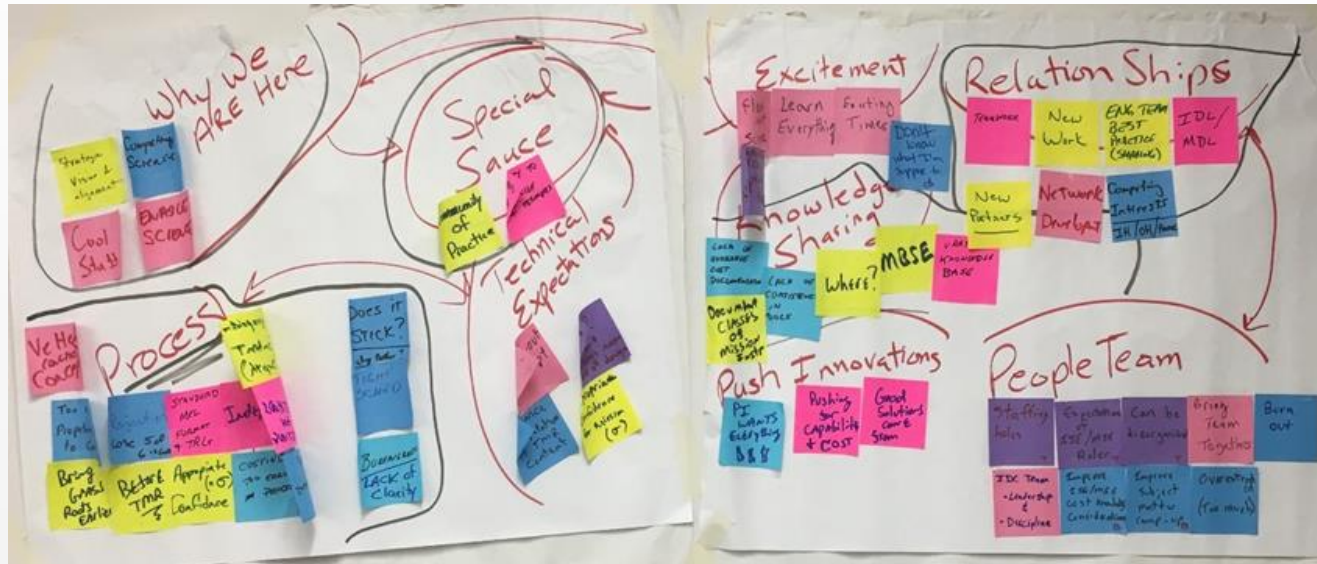
# 5. Affinity Clustering



## Affinity Clustering

Group the positive, negative, and opportunities by their similarities

1 hr



## Benefits

- Collective understanding of common themes and their relationships



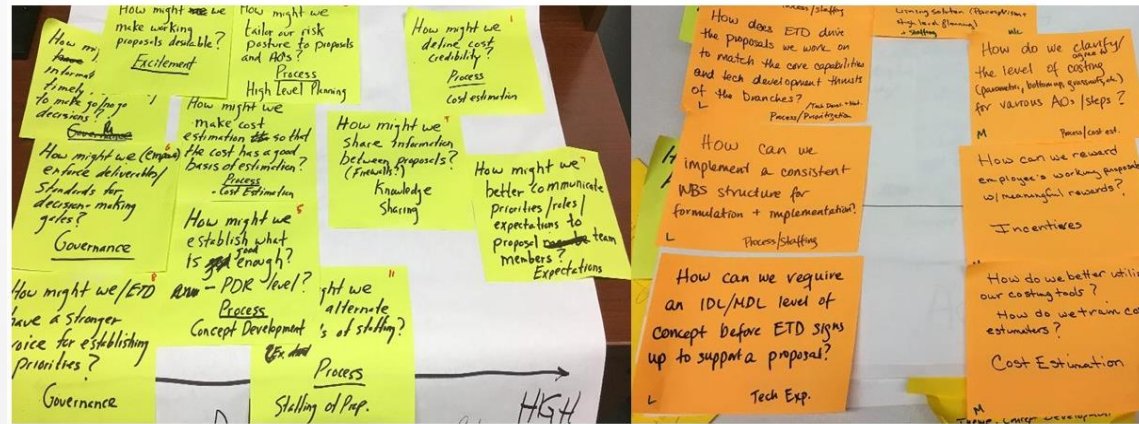
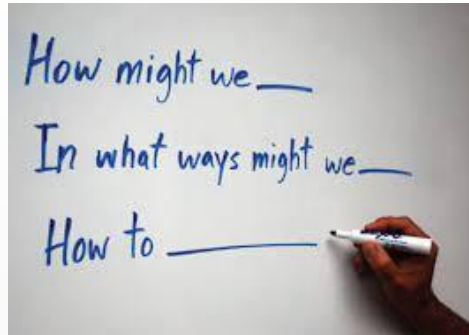
# 6. "How Might We" Statements



## HMW Statements

Framing of problem statements

30 mins



## Benefits

- Encourage diversity of thinking for problem solving focusing on the common themes

# Ideation of Solutions





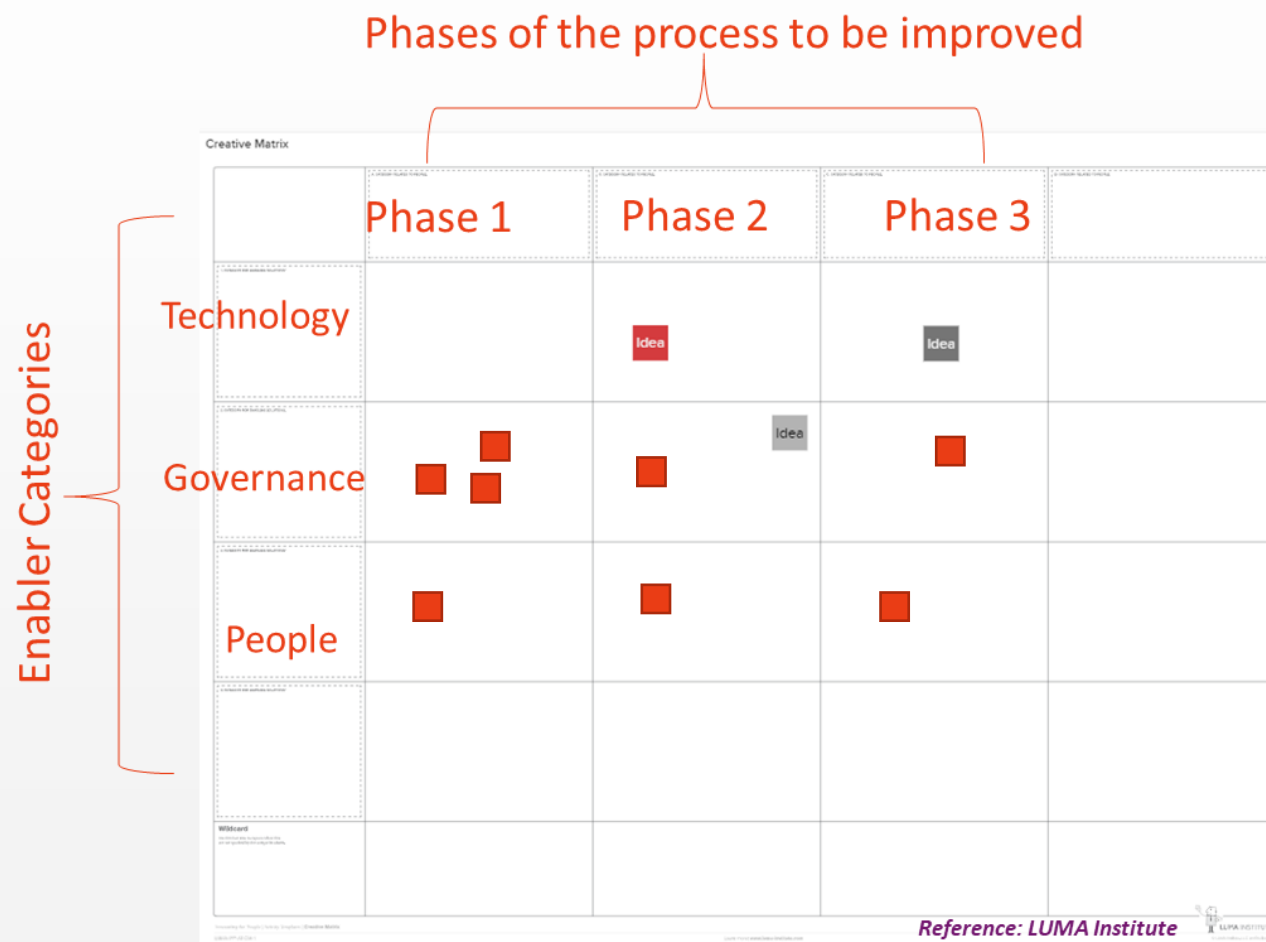
# 7. Creative Matrix



## Creative Matrix

Quick generation of ideas at the intersection of different categories

30 mins

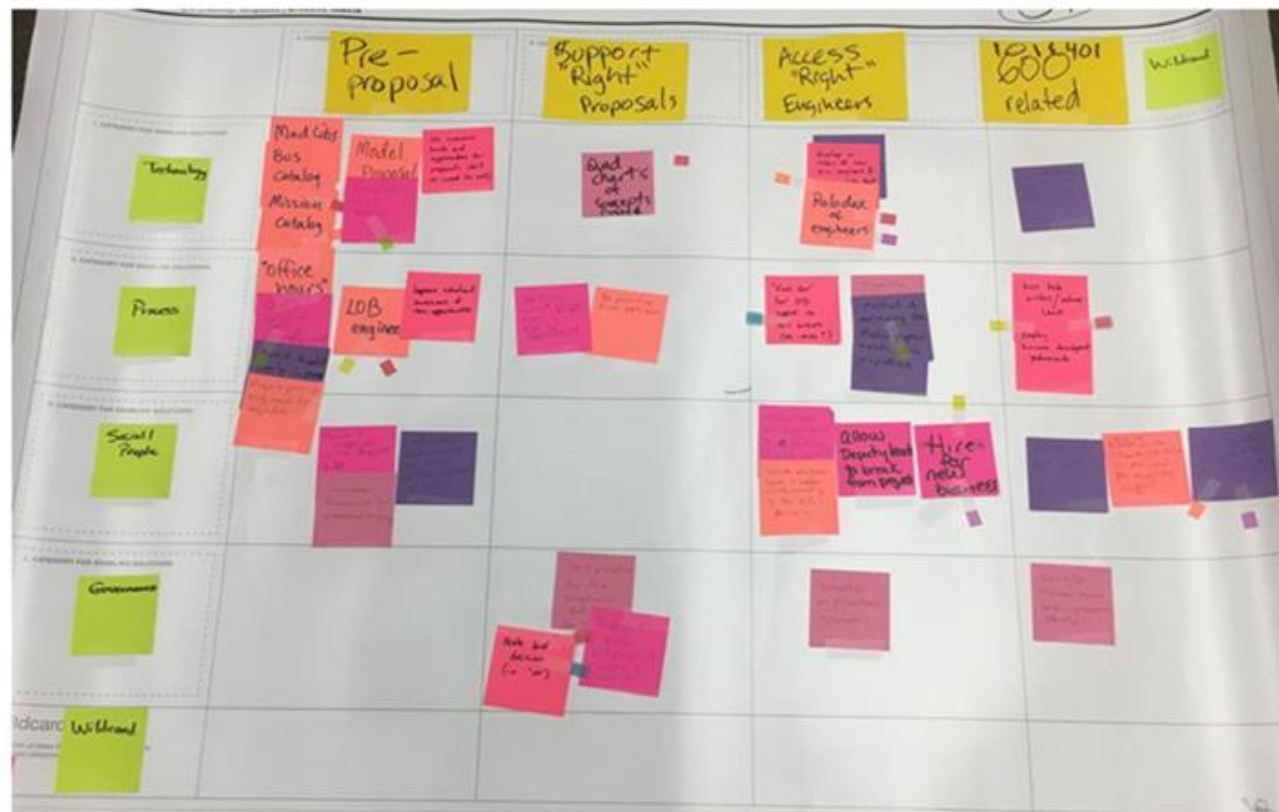


## Benefits

- Promote discussion and divergent thinking with input from all team members



# 7. Creative Matrix Example





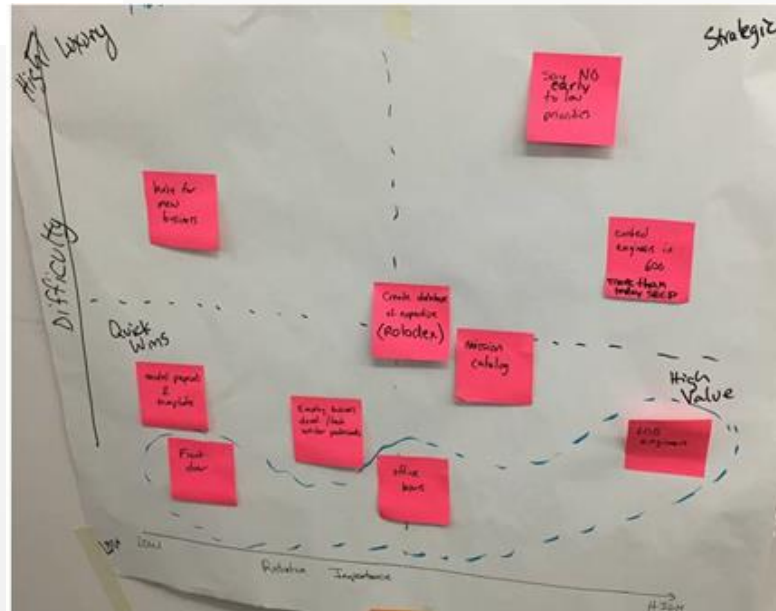
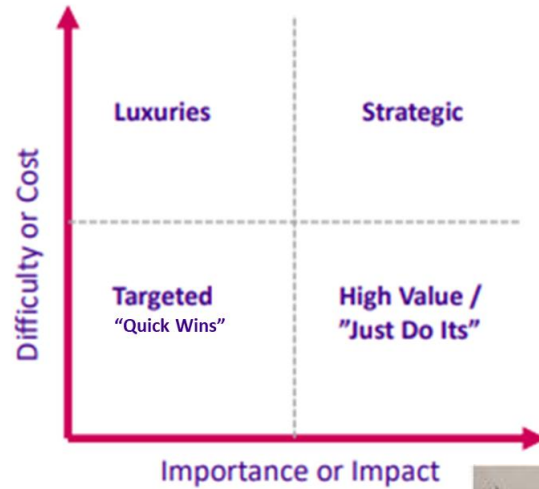
# 8. Importance-Difficulty Matrix



## Importance-Difficulty Matrix

Identification of the most impactful ideas

30 mins



## Benefits

- Relative ranking of potential solutions by their value
- Creation of an action plan
- Show relationships of potential solutions



# 9. Storyboards



## Storyboards

Sketch the future state of high value solutions

1 hr



## Benefits

- Visualization of the future stakeholder experience in the improved process for selected high value solutions



# 10. Concept Posters





## Concept Posters

Illustration of the main points of an idea for implementation

1 hr


WHAT IS IT CALLED?  
This is a title...


WHAT IS THE BIG IDEAS? 

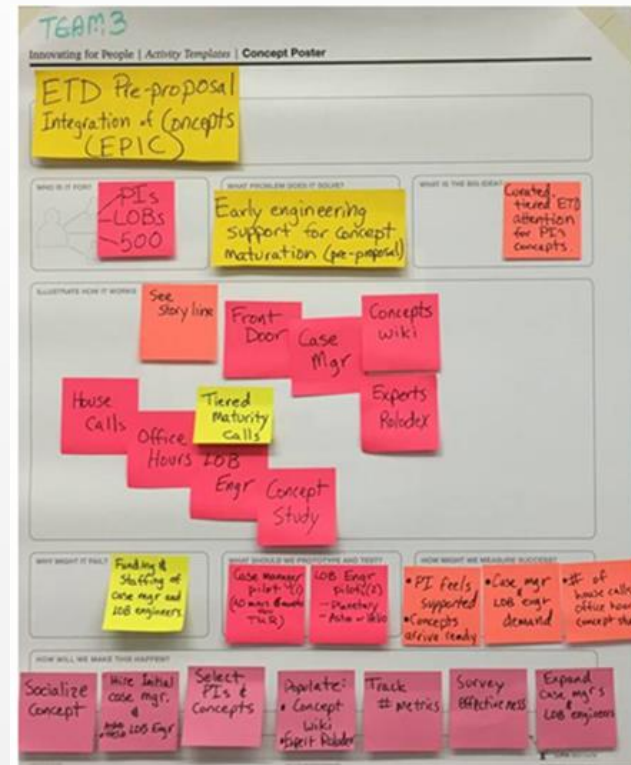
WHO ARE THE KEY STAKEHOLDERS?  


HOW DOES IT WORK? ILLUSTRATION

WHY MIGHT IT FAIL?      WHAT CAN WE PROTOTYPE AND TEST?      HOW WILL WE MEASURE SUCCESS?

WHAT'S THE PRICING MODEL?      WHAT'S OUR BUDGET & TIMELINE?  
\$  

Innovating for People | Activity Template | Concept Poster 



## Benefits

- Understanding of what was needed to implement an idea
- Created a common vision for the future of the improved process

# Recommendations Phase



# Implementation Phase

## Planning

- Long term strategic plans
- Near-term action plans
- Roadmap of activities for process improvement



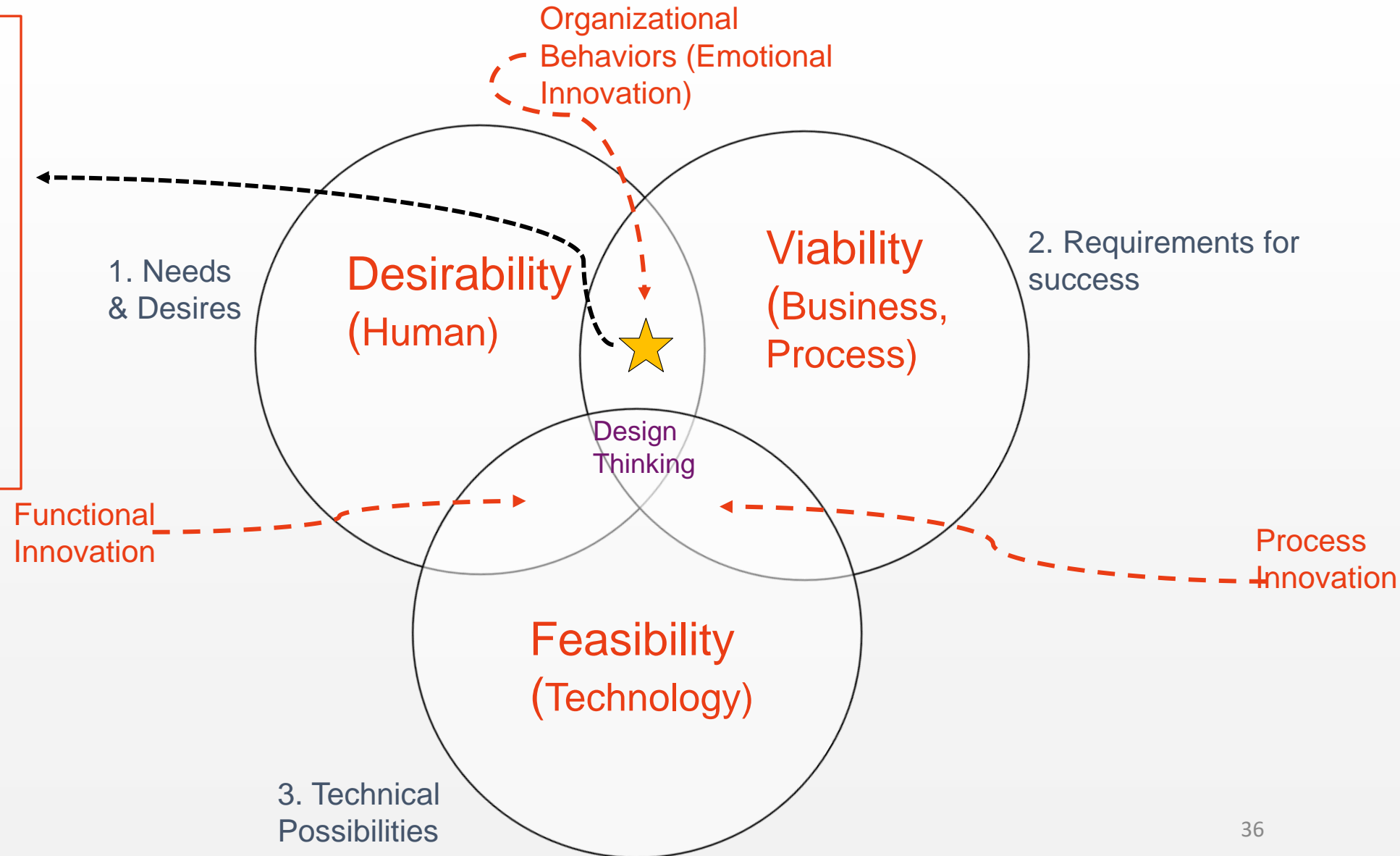
## Execution

- Backlog of tasks
- Repeatable process for continuous improvement

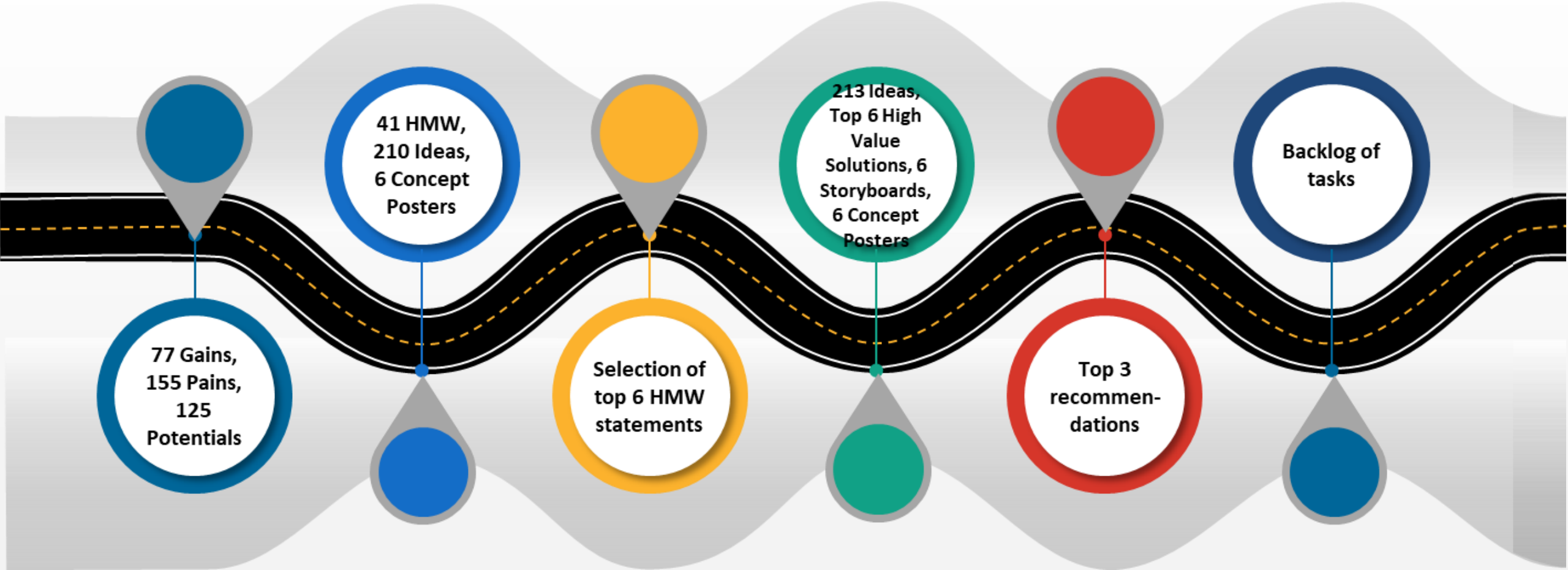


# Small Steps Towards Long Term Impact

- New methods and tools for collaborating sharing knowledge across teams
- New ways for motivating the workforce and recognizing employees for their work in a more timely manner
- A new approach to engage earlier in the engineering proposal process



# The Results of the 1-Year Roadmap



Assessment, Evaluation, Analysis Phases: incremental approach with Design Thinking, and Lean Startup

Recommendations Phase

Implementation Phase






# Overcoming Resistance

- Unknown techniques
- Talk about emotions and feelings
- Organizational Culture



- Incremental sessions, provide resources and data
- Make it fun! Provide an alternate approach
- Validate the needs of every stakeholder group

# Key Takeaways

-  Introduce new techniques in increments
-  Tailor the approach to the needs of the organization
-  Gather frequent feedback and adjust as needed to meet the needs of the organization
-  Do not stop with recommendations, provide a plan for action
-  Get people excited for change by showing them new techniques

# Resources & References

## Design Thinking Books:



## Design Thinking Websites:

LUMA INSTITUTE<sup>SM</sup>

<https://www.luma-institute.com/>



<https://www.ideo.com/>



<https://www.interaction-design.org/>

## Design Thinking Tools/Apps:

miro

<https://miro.com/>

M U R A L

<https://www.mural.co/>

## Experience Report about this Case Study:

<https://www.infoq.com/articles/design-thinking-organizational-change/>



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thank  
you