



# **DESIGN THINKING IN ACTION: A DPR CASE STUDY TO DEVELOP A SUSTAINABLE DIGITAL SOLUTION FOR LABOR RESOURCE MANAGEMENT**

*Business Process Improvement Team, Technology and Innovation Department, DPR Construction*

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# Agenda



- Introduction
  - Construction challenge in new era
  - Design Thinking under the context of innovation
  - DPR Construction as an advanced Lean organization to foster innovation
- Case Study
  - The Labor Management Problem
  - Design Thinking approach to develop a user-centered solution
    - Empathy
    - Insights
    - Design
    - Implementation
- Discussion & Conclusion
- Q&A

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# Construction challenges in the new era

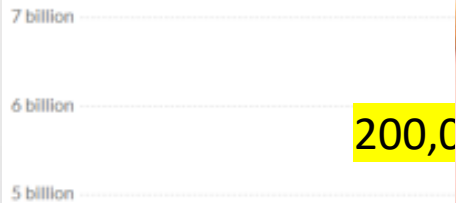


## IGLC 28

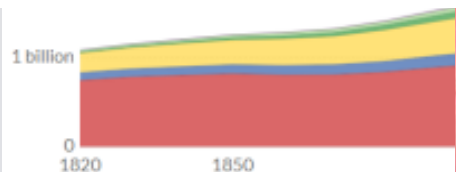
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World population by region

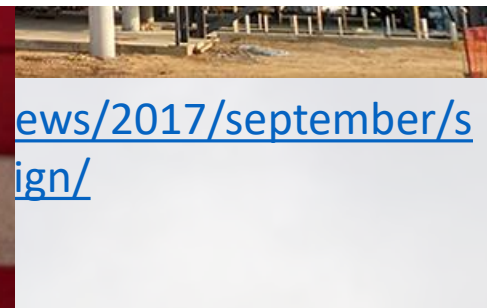


*How can we produce more innovative solutions to disrupt the AEC industry in order to handle the new challenges in the market?*



Source: HYDE (2016) & UN (2019)  
OurWorldInData.org/world-population-growth/ • CC BY

Source: European Commission



<https://www.enr.com/news/2017/september/sign/>

<https://gocontractor.com/blog/construction-workforce-challenges/>

# Design Thinking under the context of innovation



Ambiguity/Un



*"As we emerge from the current crisis, more than ever we must engage in designing the systems of the future integrating technology also striving to provide experiences and guide transformation for people. **So, we need to bring technology and people to design the future systems.**"*

Source: CIDCI Design Thinking Workshop

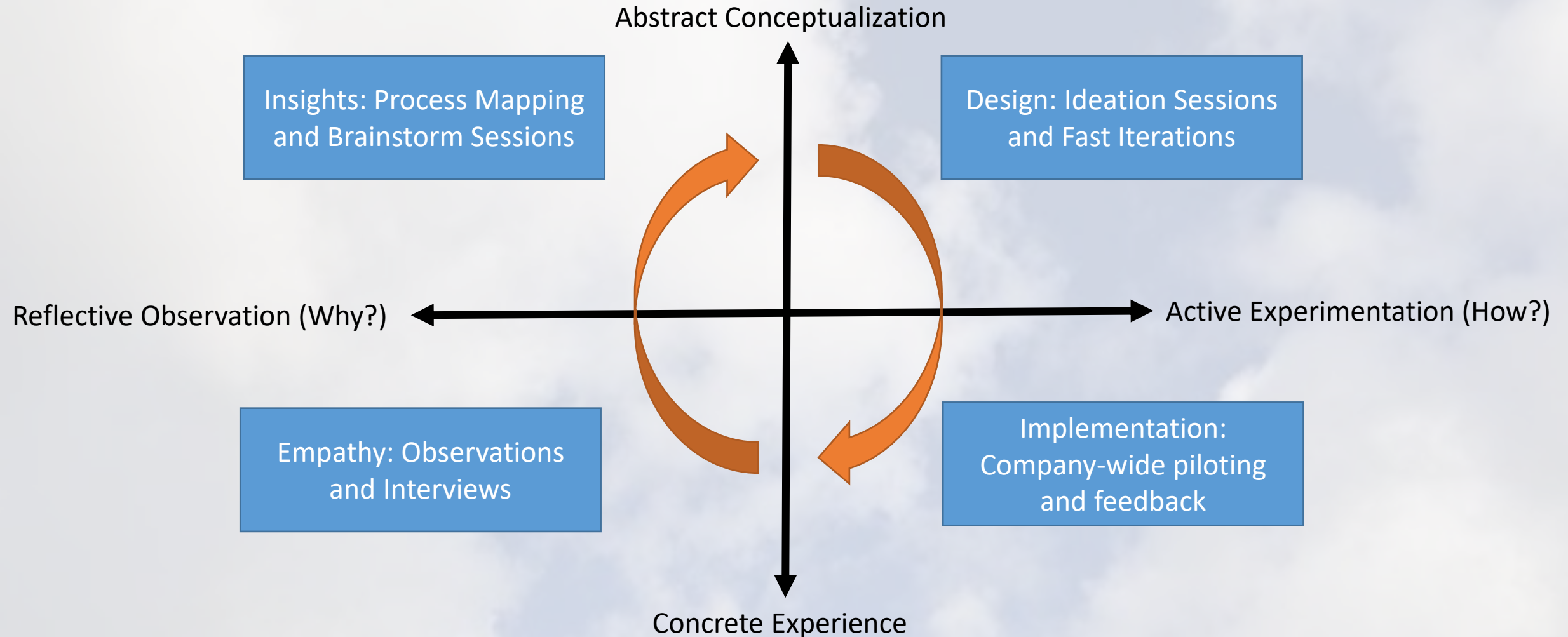
Research

Con

<https://time.com/4378108/driverless-car-study/>

<https://www.businessinsider.com/best-toilet-paper>

# The Design Thinking Approach



# DPR Construction as an advanced Lean organization to foster innovation



DPR Construction is founded by Doug Woods, Peter Nosler and Ron Davidowski with offices in Redwood City, CA, and Sacramento, CA.

***Design a solution with the people***

<https://www.dpr.com/company/history>

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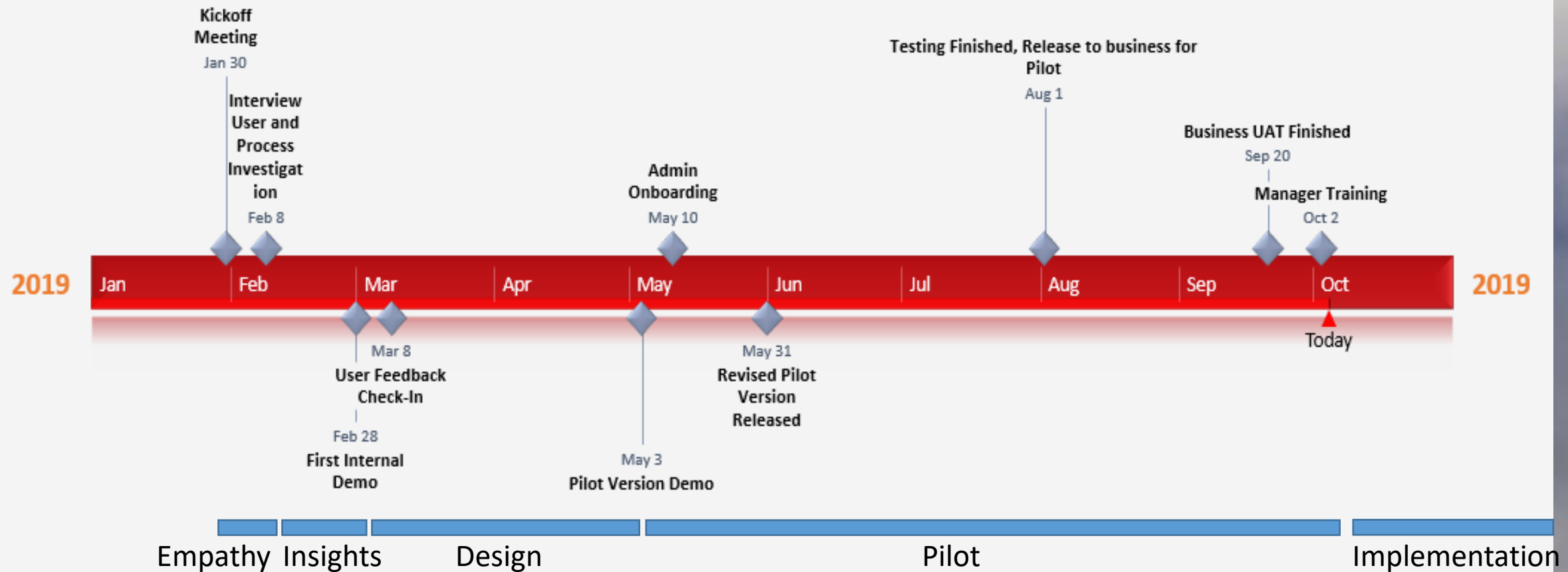
# Project Timeline



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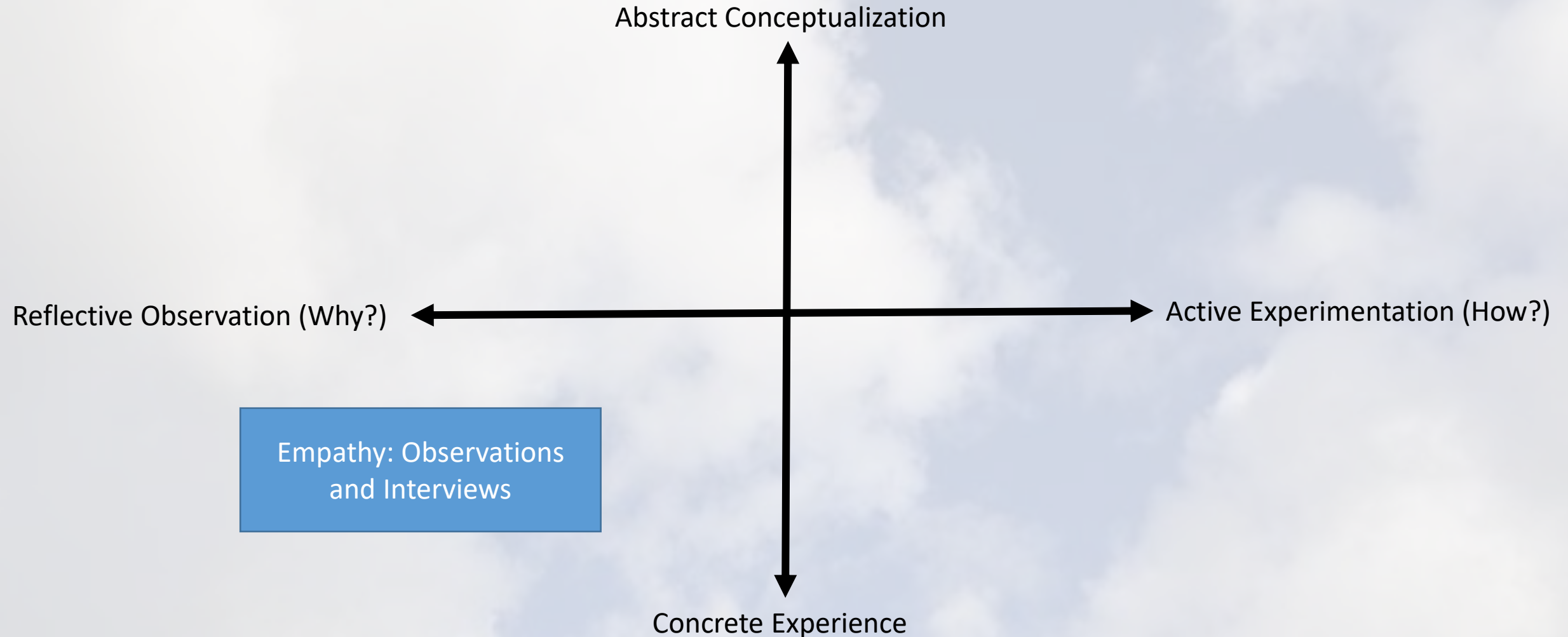
# The Labor Management Problem



- We have a problem with the resource management within the general labor group...
  - No data to show current allocation
  - Managers are making decisions with their memories
  - Etc.

*“We want a tool that is very simple and fits exactly our daily work, not what the others think is going to be useful for us” – Brian O’Kelly, General Superintendent at DPR*

# Empathy: Observations and Interviews



# Observations and Interviews



- Ask question to explore the problem space:
  - What does people want?
  - Get to know WHY?
  - Seek to establish both cognitive and emotional empathy.
  - How does people make sense to themselves?

*Empathy motivates the team to think from the perspective of the user*

# Ethnographic Interviews

- An extended open-ended conversation exploring needs, emotions, and aspirations by eliciting stories.
- A different way to look at the situation.
- Understand other people's life.
- Tongue is like could you please tell me how do you communicate your labor request to the managers?
- <https://www.youtube.com/watch?v=3oCeTkJdjIA&feature=youtu.be>

# Observations and Interviews



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• What do



Record Request



Labor Request

BAY Staffing Meeting

- Go through Pending RFO/Proposal list for project updates
  - Put together team
  - Availability time
  - SSG Status acquisition
  - Update project themselves and
  - Getting new project
- Go through **Precon** project
  - Figure out which
  - Start finish date
  - If it is soft demo
- Go through staffing list
  - Starting with end to forecast for time
  - Go up to 2 weeks
  - PE/Intern/VDC/
  - Capacity tracking 1 week see enough for 1 month
  - Tracking for PTC
  - People's wish list

SAC Staffing Meeting

Haven't had meeting for 4 weeks yet.

- Staffing list, sorted by roles and names
  - What day are the people will be available, updates?
  - What are the next assignment for people?
  - What are the projects that are looking for people?
  - Update on the request dates? What type of the work? Tags?
  - What are the people's current task? Which phase is the project? Which way the project is heading (ramping up or down)? So we can estimate availability
  - For the incoming scope of the project, estimate for the FTE needed, discussion done during the meeting
  - What type of the project, who is currently on the project as PM/PX?
  - People's name spelling???
  - Is the assignment completed? Is the person already report to the project?
  - Incoming RFPs?
  - Where are the interns? Are they back?
  - Who has been assigned? Is there an overlap?

How does the action items are being recorded and communicated to the team?

- Especially when you have the layoffs
- On the bench vs overhead charge

Project Teams

al labor group?

Excel versioning problem, which file is the latest?

Staffing notes: for memos and action items, keep a log of it.

Rest of the people in the meeting is just consulting

Differentiate request using TBD PM#1, PM#2

Records of meeting decisions/Promises?

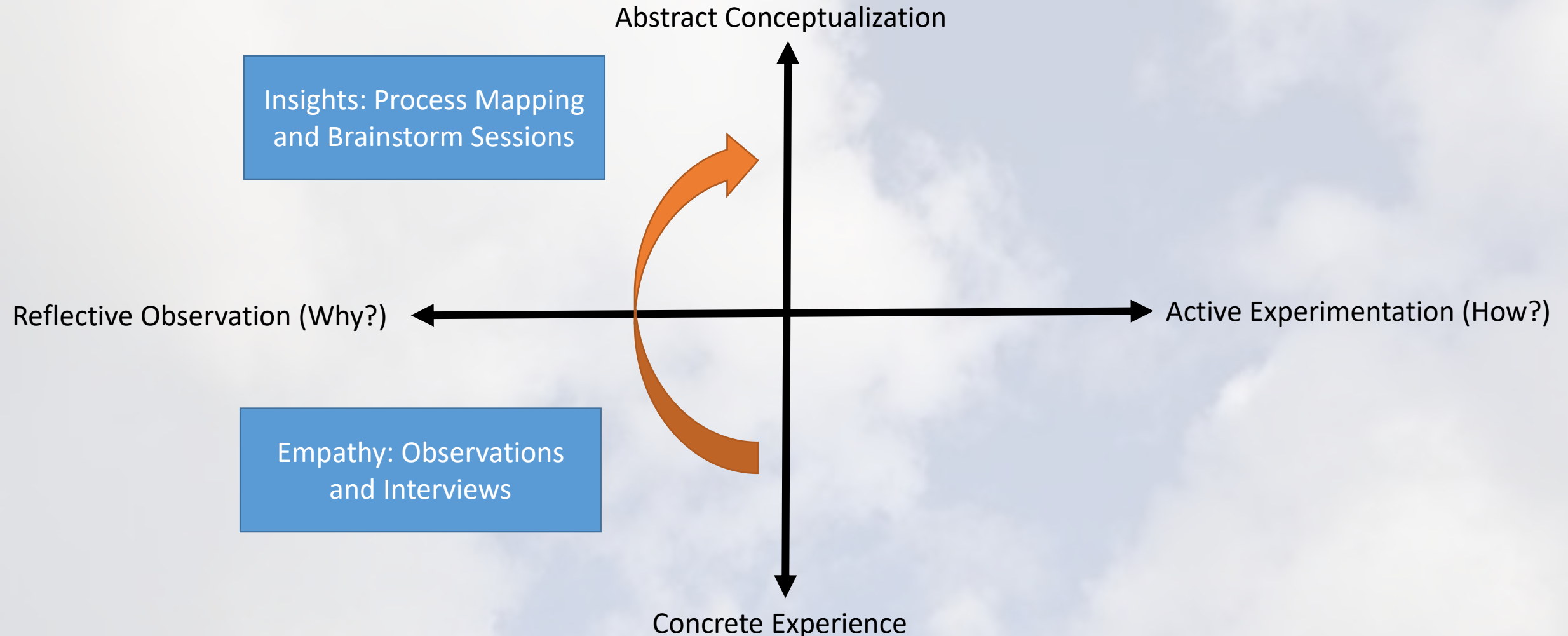
Project info? Project tasks info?

Potential double assignment identified

Requests currently captured by the emails



# Insights: Process Mapping and Brainstorm Sessions



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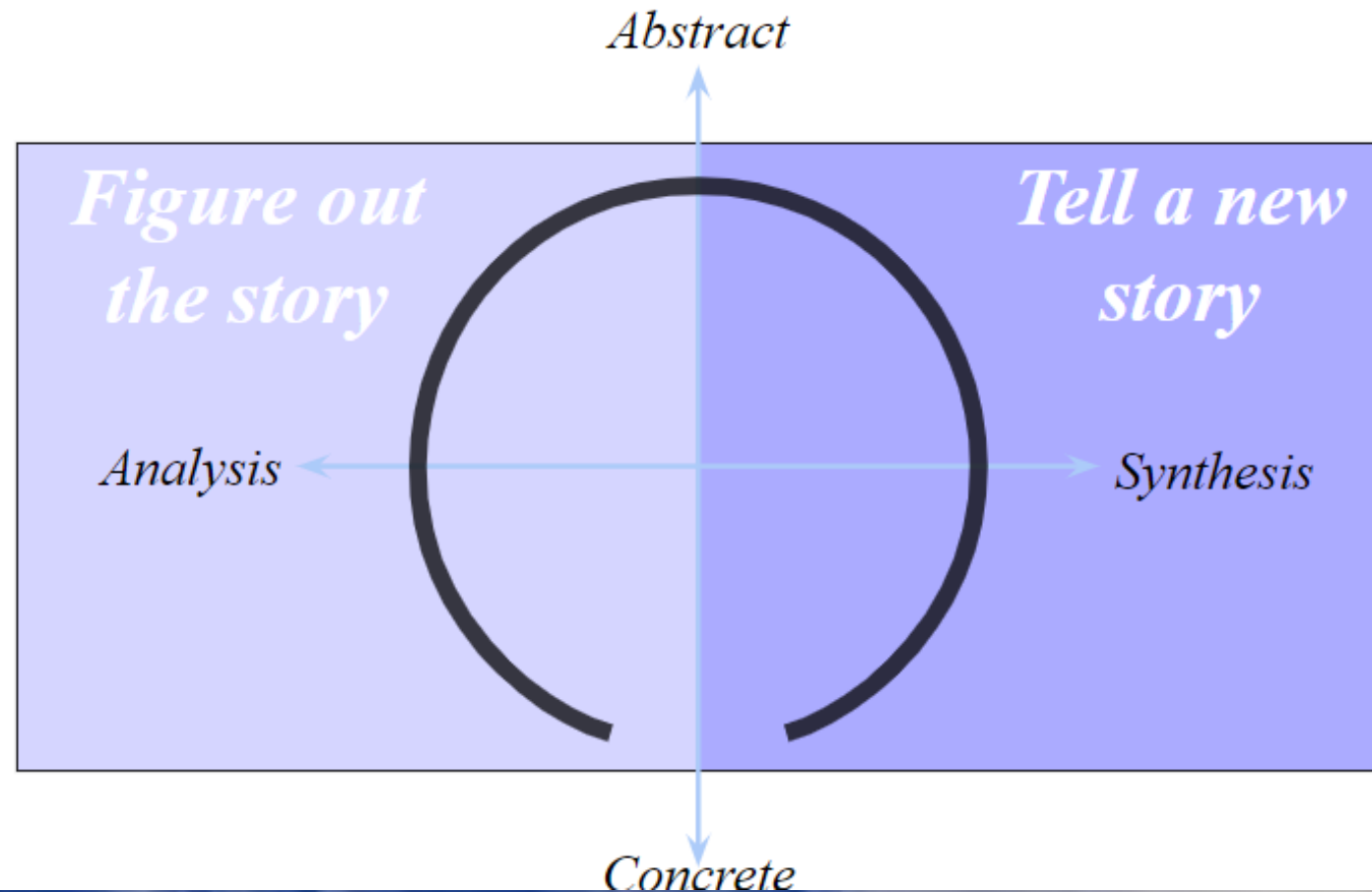


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Customer-focused Design  
Develops New  
Customer  
Stories



# Approaches



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To visualize any type of information on any project:	To visualize information associated with an organization or business:	To visualize information associated with understanding customers and users:
Mindmap	Business model canvas	Empathy map
Timelines	Process flowcharts	Customer journey map
2x2s	Swimlane diagrams	2x2s mapping behavioral extremes
Affinity diagrams	Eco-system maps	

Source: CIDCI Design Thinking Workshop

# Map the story with process mapping



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# Generate Insights



Headcount Fluctuates



No Forecast Data



Information Exchange  
fly in the air



Slow turn around  
time due to decision  
making is slow

*How might we generate consistent and reliable data in the process of labor dispatching and forecast without disrupting the current process?*

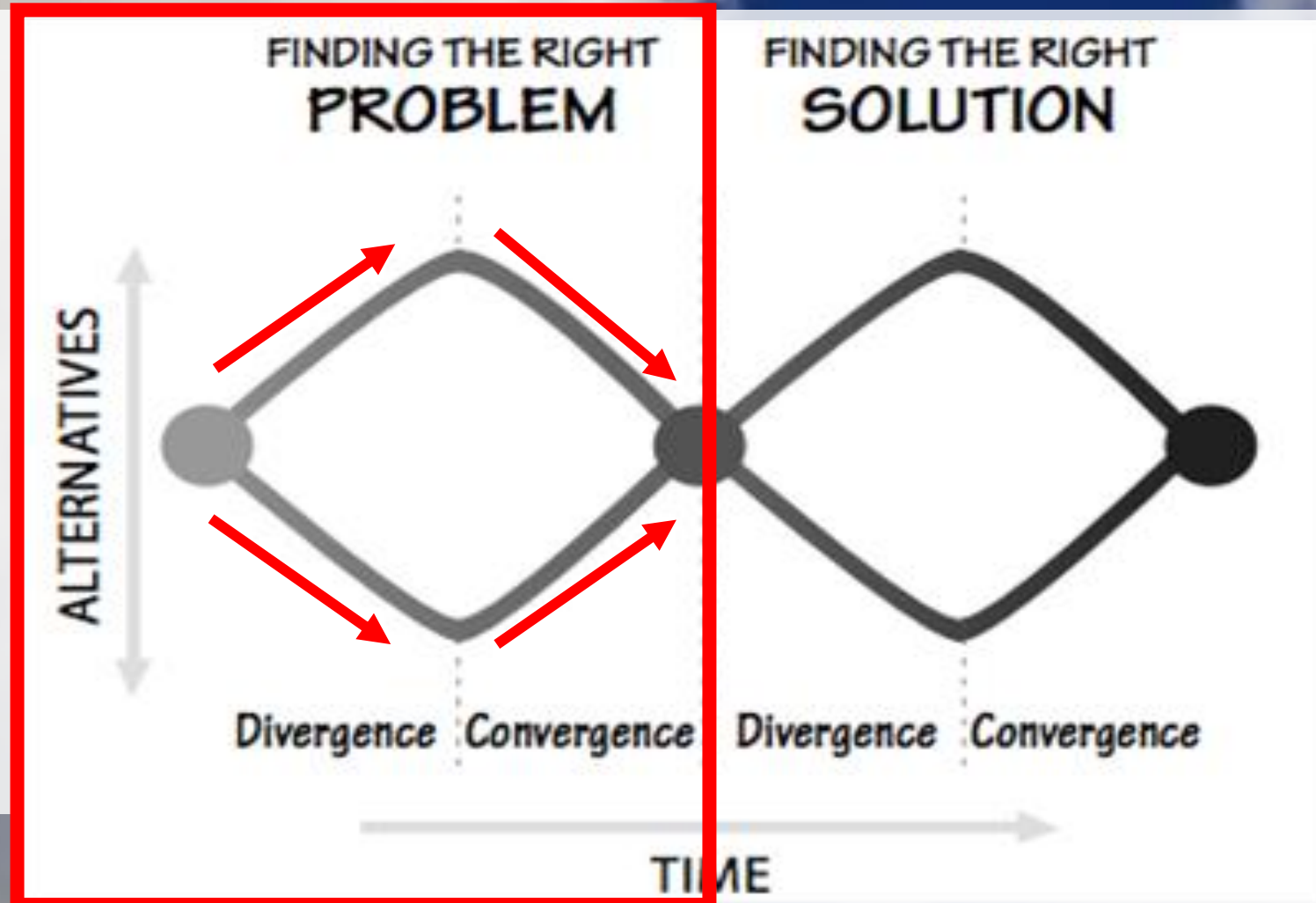
# Diverge and Converge



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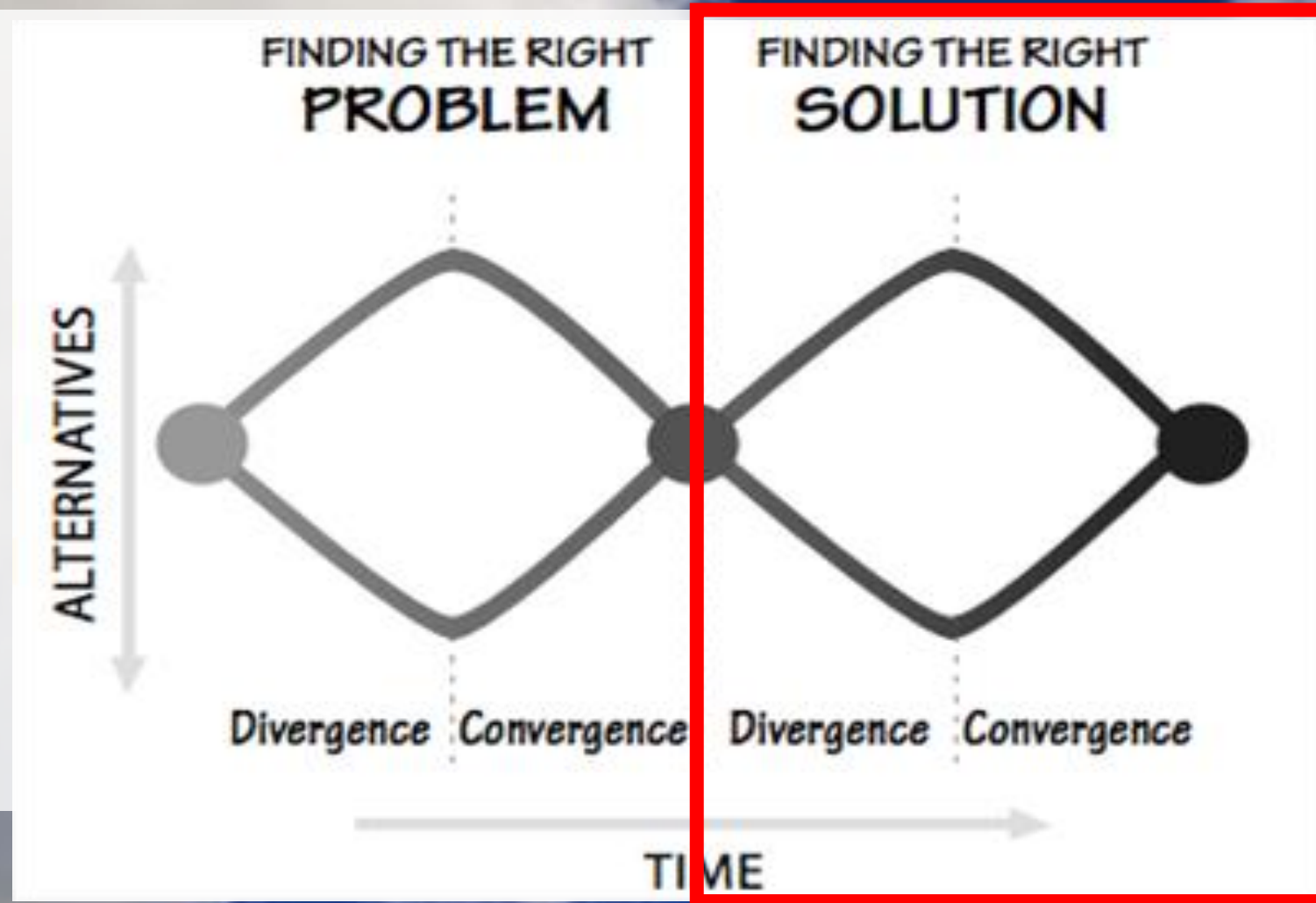
# Solution Space



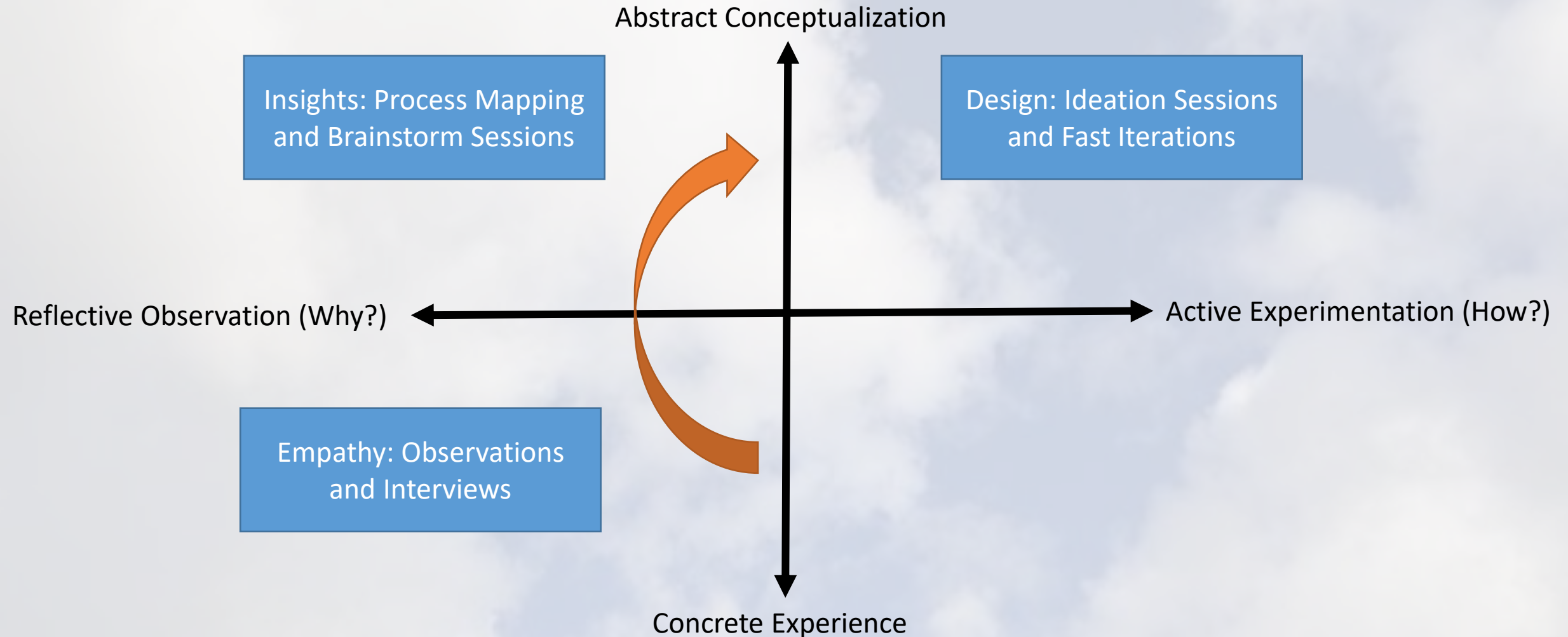
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# Design: Ideation Sessions and Fast Iterations



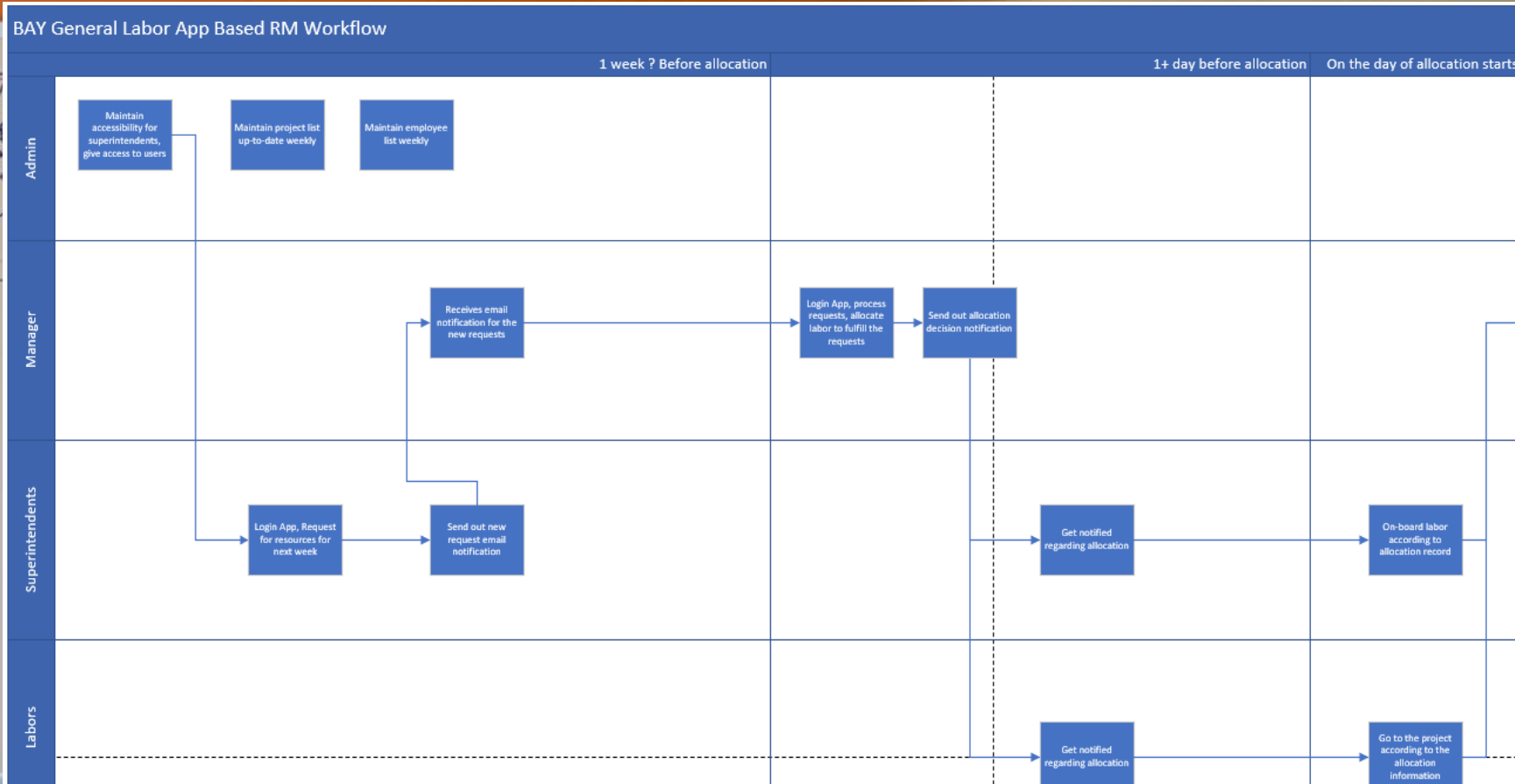
# Ideation Sessions



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Create/Full  
CURRENT  
LIST of EMP

- Name & ID
- Role / SK
- E.I.N
- Dept. Code

Request

Project

Skill

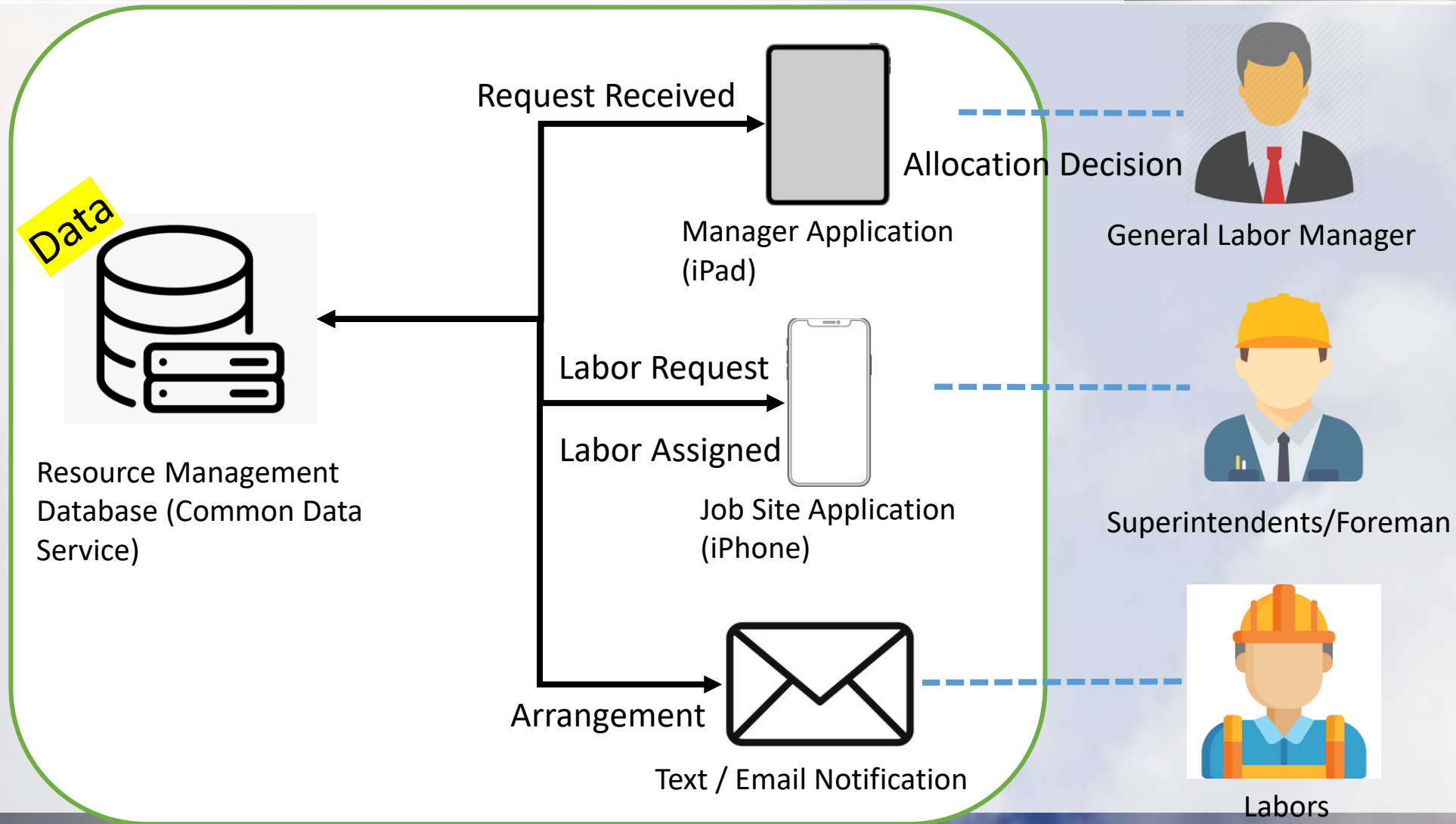
# People

S.D

E.D

# New System Schema

Low-Code Application Platform



# Low-Code Application Platform

- Create application software through graphical user interfaces and configuration instead of traditional coding.
- Enables “Citizen Developer” to create applications with model-driven logic.
- Low initial cost of setup, training, deployment and maintenance.
- Enables fast iteration to test design ideas for MVP.



# Prototypes and iterations



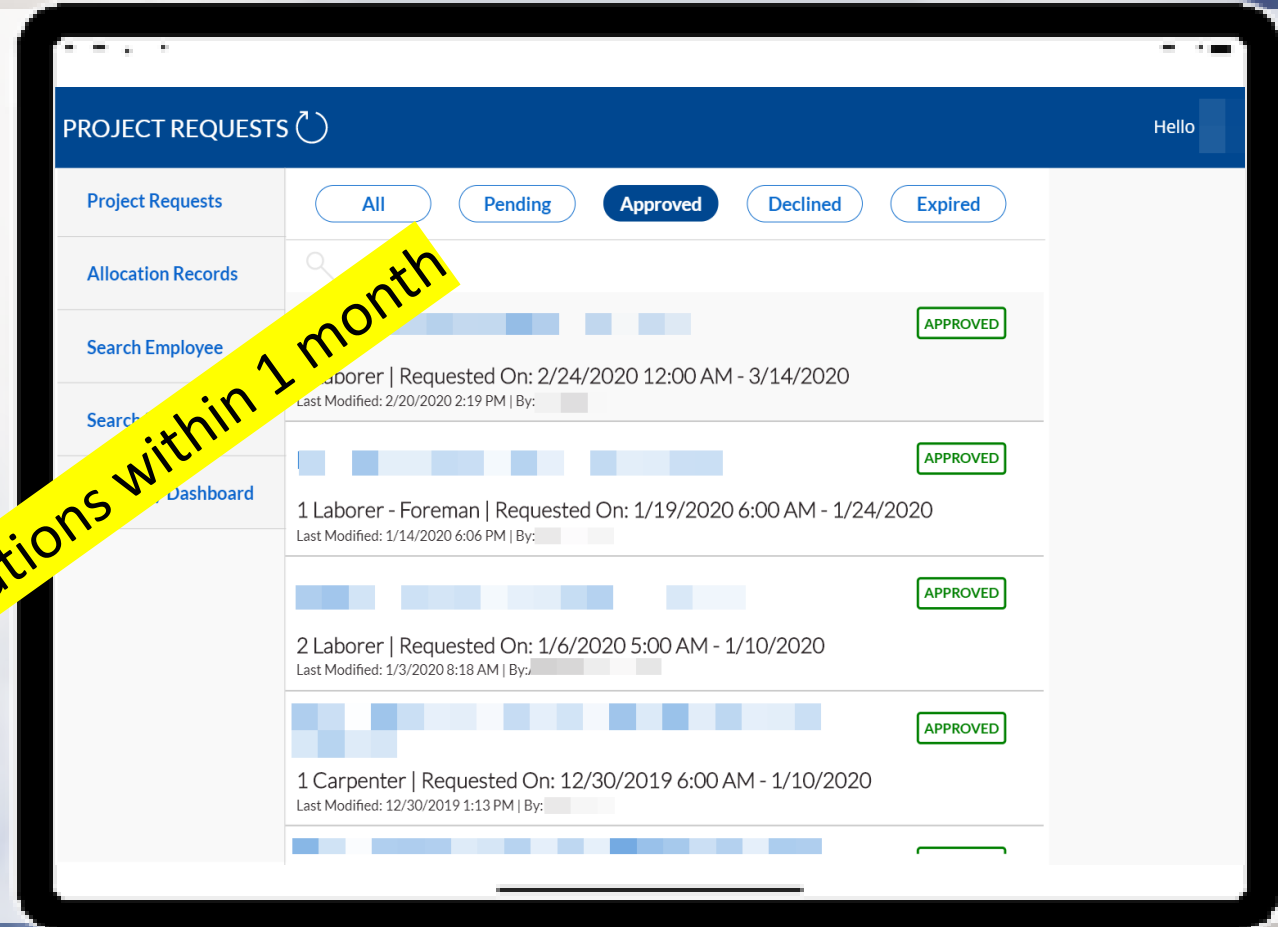
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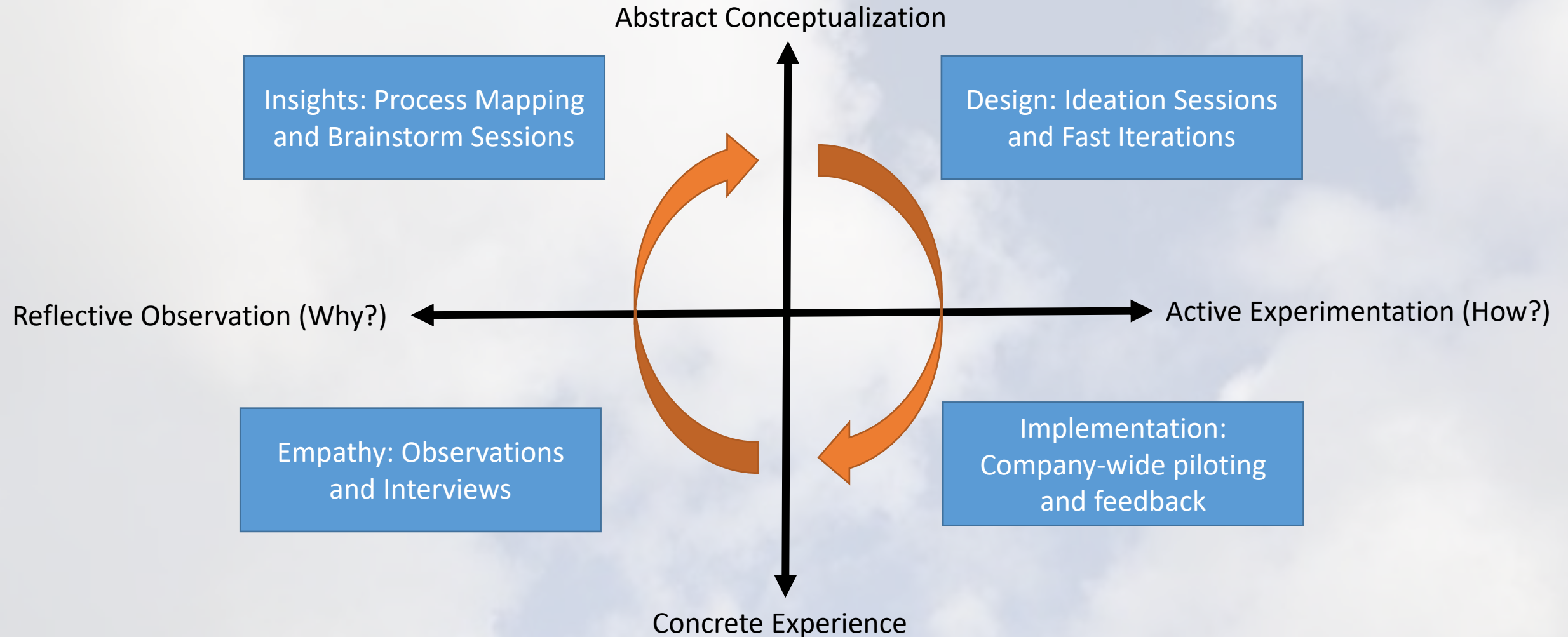
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132 iterations within 1 month



# Implementation: Company-wide piloting and feedback

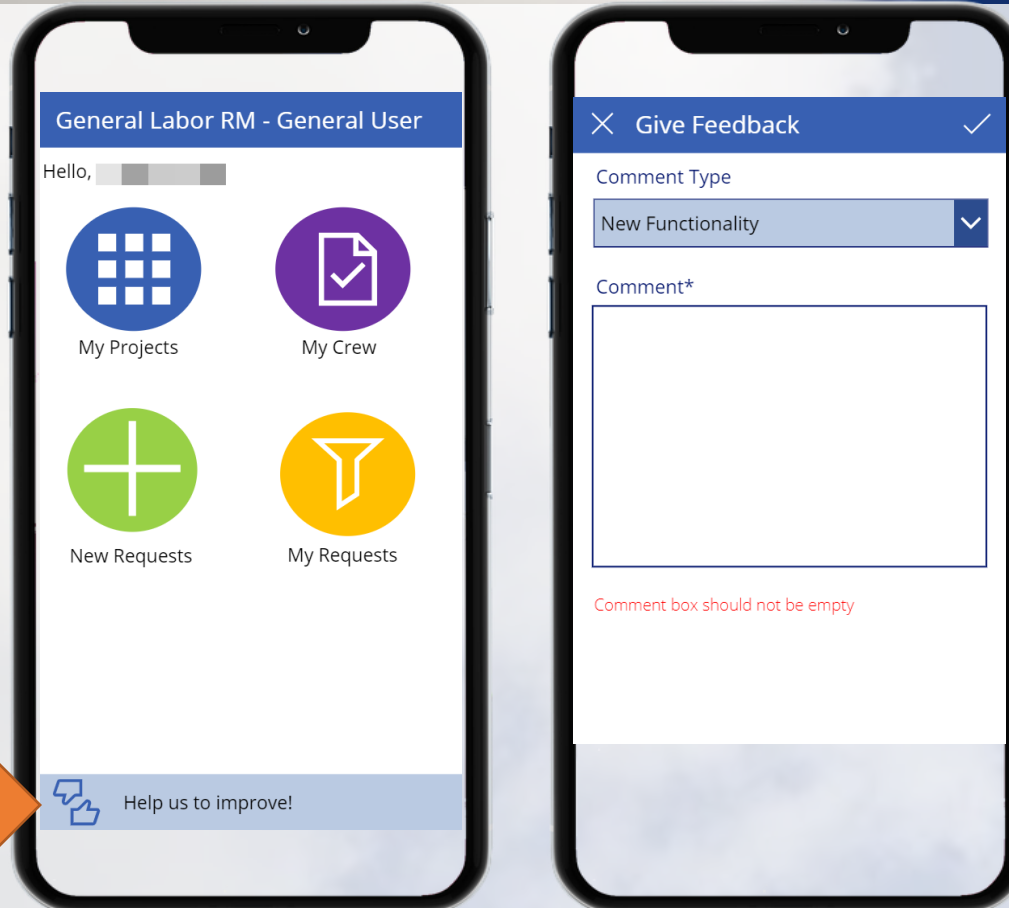


# Pilots

- Volunteered early testers.
- Identify champions within the group to support.
- Word-of-mouth wisdom.
- Collect feedback.

Always work with our people to refine the product

# Implementation: Company-wide Piloting and Collecting Feedback



*"Super simple, I don't need training, I can find out by myself, it's great!" – Superintendent*

*"We like it so far; it changes our way to work." – Labor Manager*

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# Discussions

- Ethnographic interviews and shadowing users helped to build empathy and strengthened the perception of the user story.
- Visualization (e.g. whiteboard sessions) is important in the process to convert the cognitive sensation into insights and detailed problem statements
- Prototype with the Low-Code Application Platform shortened the turn around time to address design alternatives with high quality, which motivated early testers to participate in the design process.
- “Word-of-mouth” wisdom from committed individuals helped with the innovation diffusion.
- Pull vs Push

# Conclusion

- Design a solution “with the user” instead of “for the user”.
- The Design Thinking approach fully solicited the problem space to understand the user needs and explored the design spaces to find the best solution for the users.
- Low-Code Application Platform has great potential to foster innovative digital solutions due to reduced cost and training efforts.
- In-house development provided full flexibility to develop a sustainable solution with intensive user engagement, need more time to test the sustainability and governance perspectives.

Q&A



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# Thanks!