The role of design in worker-centered technology design

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HCII | Kenneth C. Griffin School of Computer Science | CMU
Berkeley Frameworks Lecture | October 28, 2026

By way of introduction…



Today's talk

- Introduction
- Design foundations
- Design research foundations
- Two cases
  - AI and automation in hospitality
  - Hyundai and Boston Dynamics
- Takeaways: design and governance



Technology is not inevitable; it's designed

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Design foundations

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Design, a creative process (Schön, 1983)

Refection in action: insight that arises from taking a step in a design process

Reflection on action: insight that comes from taking a step back and contemplating the design process

Back talk: how the material a designer is working with "speaks back" to give shape to possibility

Conversation with material: collectively, these actions are the action of design, giving form to something

Design inquiry (Buxton, 2007)

An investigation made using the design process

- Imagining the future
- Giving form through conversation with material
- Repeatedly reframing a problem with many possible solutions
- Refining the solution through iteration

Participatory design (Ehn, 1988)

An ideological movement, founded in democratic values and the right to work

- Innovative Scandinavian approach to design and implementation of workplace technologies
- Tech safety, social effects, rights of unions

Modern conception of design (Pickering)

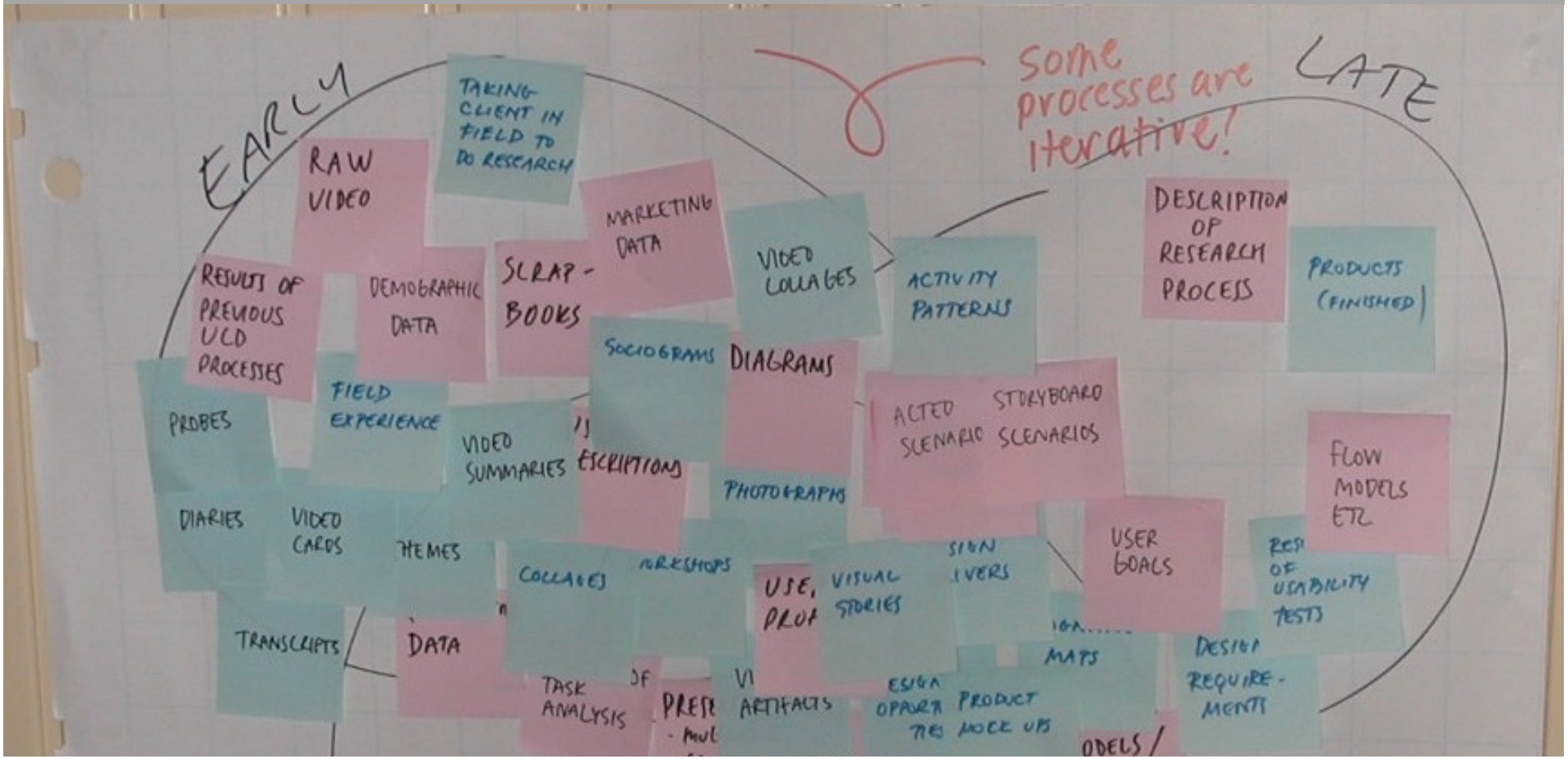
- A modern conception of design is simple
- Non-modern design is a trip into the unknown
- Decenters humanity—people are in a persistent process of interacting with and being shaped by technology



Design research foundations

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Design research = product development



Gap in tools: Need for hand craft

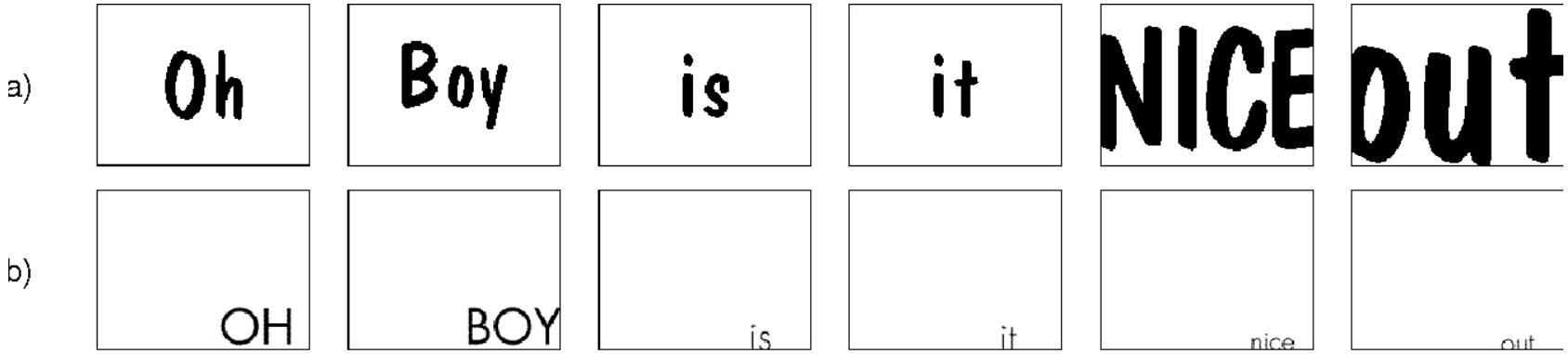


Figure 1. Expressing different emotional tones for the same text

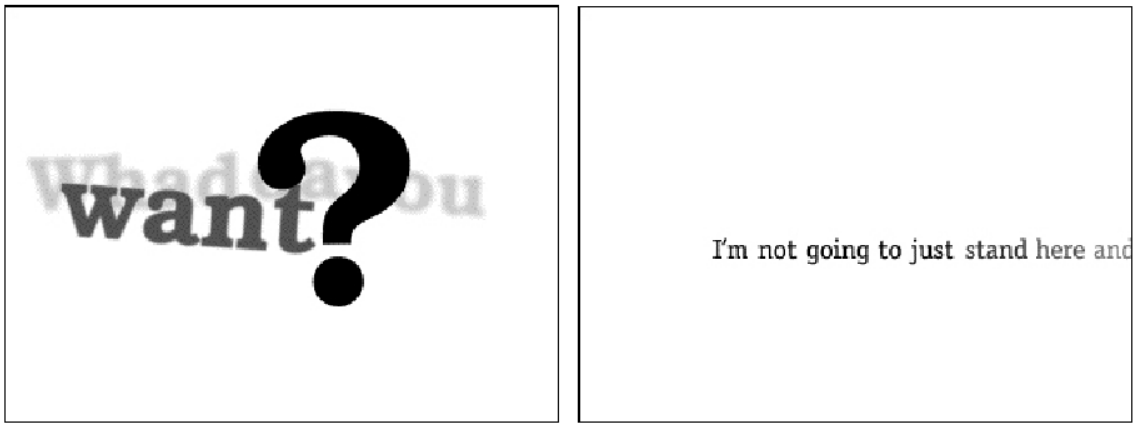


Figure 2. Two characters from the Monty Python "argument clinic" sketch

Joy, fun and pleasure



Speculations on the future



Bill Gaver,
Drift Table

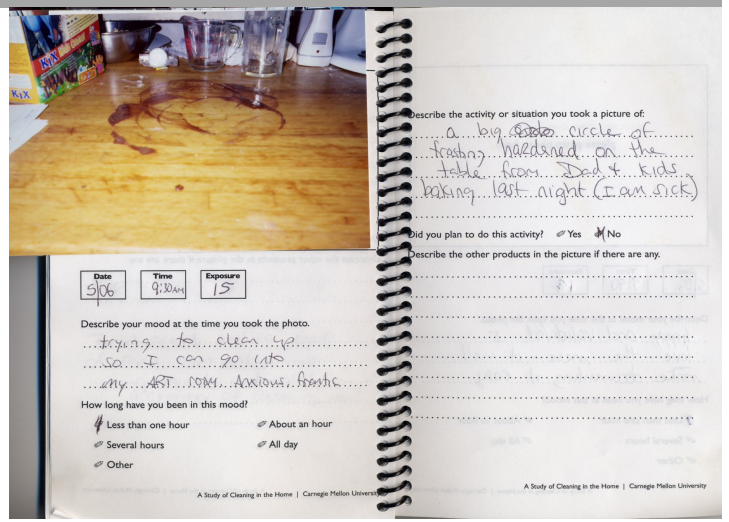
Design research in HCI



Technical opportunities



Gaps in behavioral theory



New artifacts and nascent theories

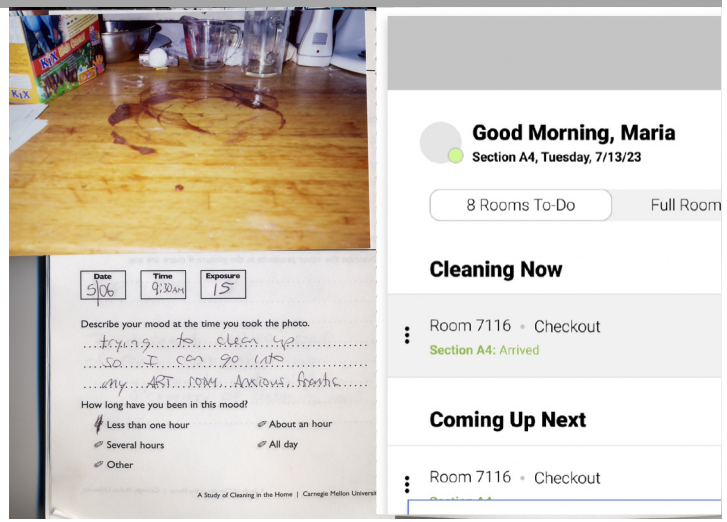
Design Research in HCI



Technical opportunities



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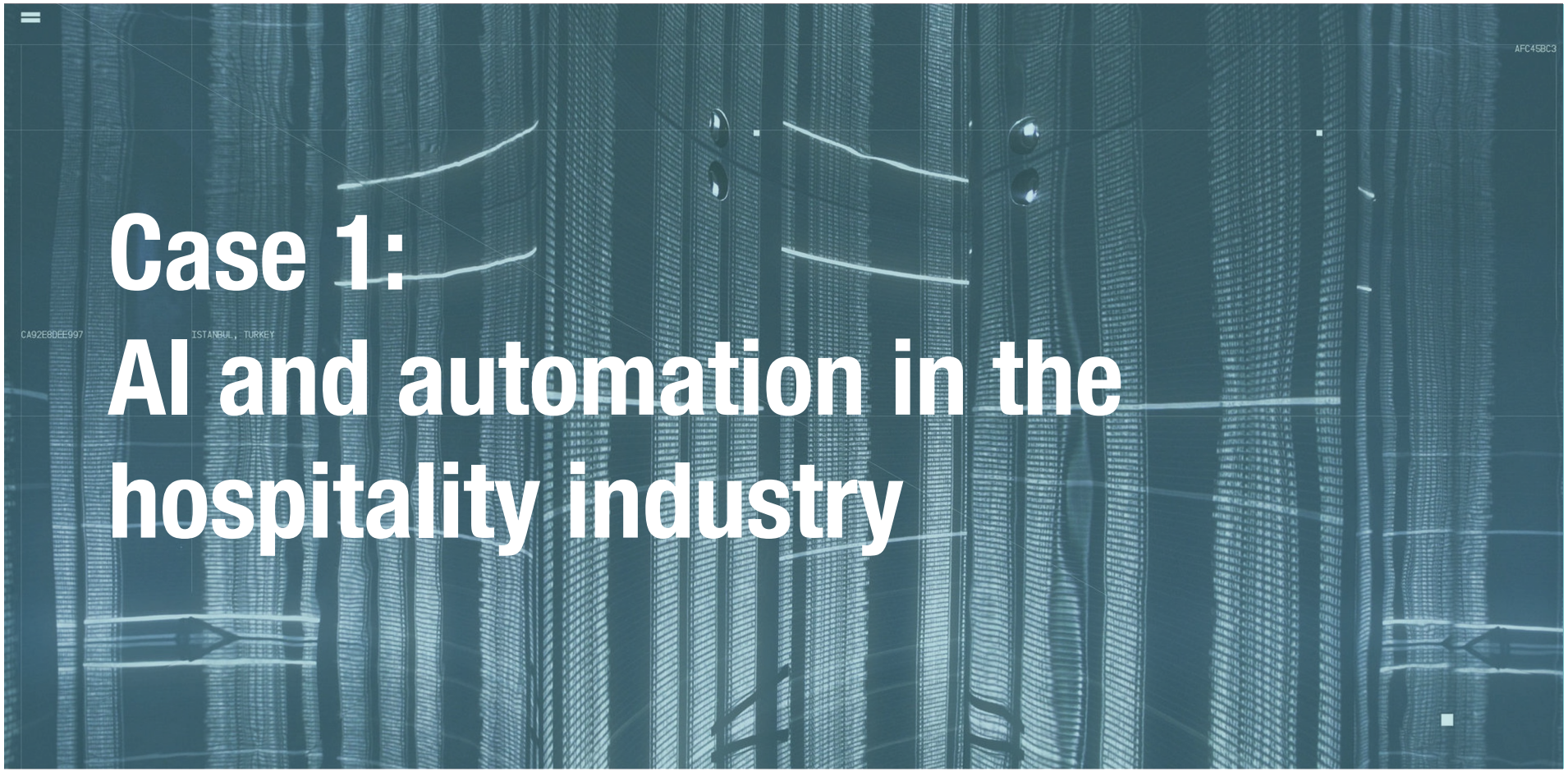


New artifacts and nascent theories

Resources for policy and governance

When is design research good?

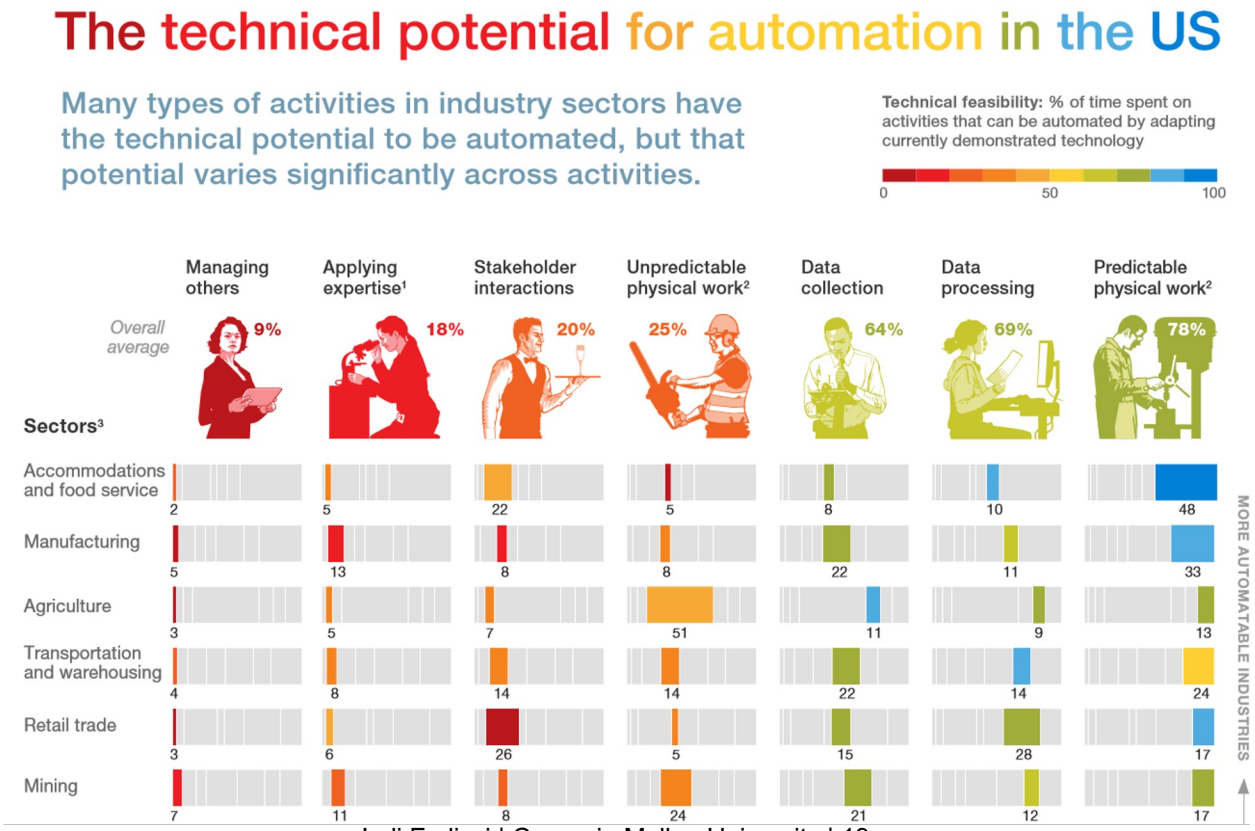
- Technology does not exist
- No social norms around its use
- What people say they want and what they actually want are different
- Tight spaces for engineers and computer scientists to understand what to build



Case 1: AI and automation in the hospitality industry

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Carnegie Mellon University

Hospitality in danger of automation



A worker-centered partnership

Preparing workers for a future of automation

Ensure that worker voice, safety, agency, and wellbeing are considered alongside technological innovation.

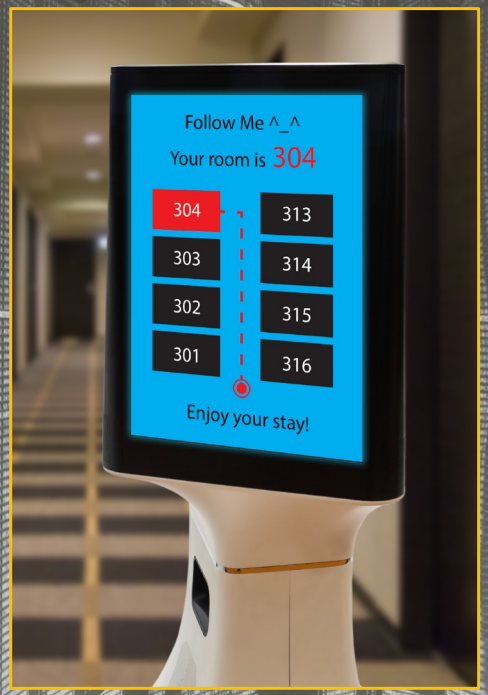
Research Questions:

- How are AI and automation changing hospitality work? What do workers experience when new technologies are introduced?
- How can workers participate in technology design and deployment? How can worker perspectives inform bargaining and governance?

AI and automation in the hospitality industry



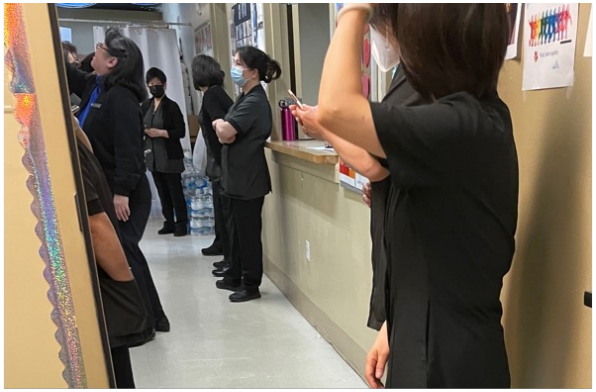




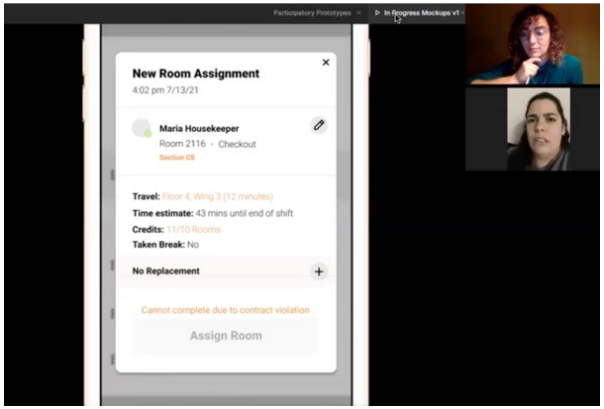




Research approach



Observation at Hotels across the US
Conducted observation and interviews with housekeepers, supervisors, and IT staff at properties in Las Vegas, San Francisco, Chicago, among others



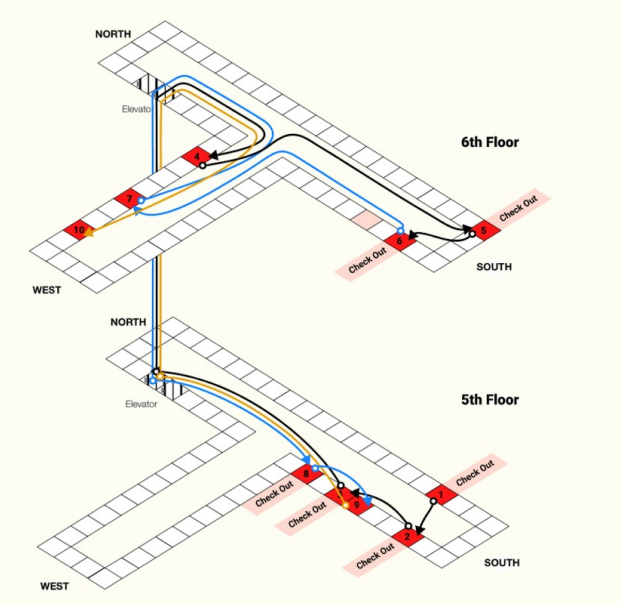
Workshops & Collaborative Prototyping
Facilitated co-design workshops with dozens of housekeepers, and follow up prototyping sessions to refine design concepts

Workers' experience: Algorithmic management



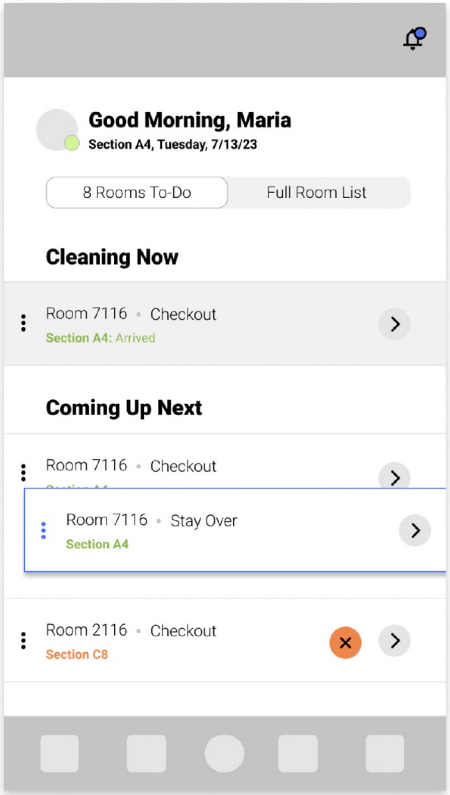
- AM systems determine which rooms are cleaned, in what order, and how labor is allocated
- Workers often cannot see their full assignments, reorder work effectively, and lack understanding of how decisions are made

What worker participation revealed



- Workers, managers, developers, and hotel leadership viewed the same technology differently
- Comparing perspectives revealed competing priorities
- Many challenges stemmed from design, implementation, and training decisions
- Worker knowledge surfaced opportunities for improvement that other stakeholders overlooked

Designing alternatives with workers



- Workers sought greater control over room sequencing
- Workers and researchers developed a self-sequencing alternative
- Technology redesigned to support—not replace—worker judgment
- Worker participation improved transparency, autonomy, and workplace outcomes

(Spektor et al, 2023)

From participation to governance

Worker voice shaped both the technology & the rules governing its use.





- Worker experiences revealed limitations of AMs
- Co-design generated alternatives such as self-sequencing
- Union translated these ideas into bargaining demands
- Contract language institutionalized worker voice in technology decisions

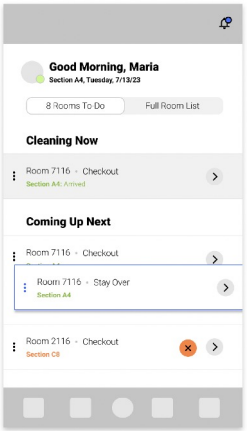
How was design research helpful here?

Reframing: getting to the assumption behind the assumption





Developing Raw materials for bargaining





Prototyping a preferred future state



Takeaways from this work

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Hospitality: Design to AI governance



Hospitality: Design to AI governance



PRESS RELEASE

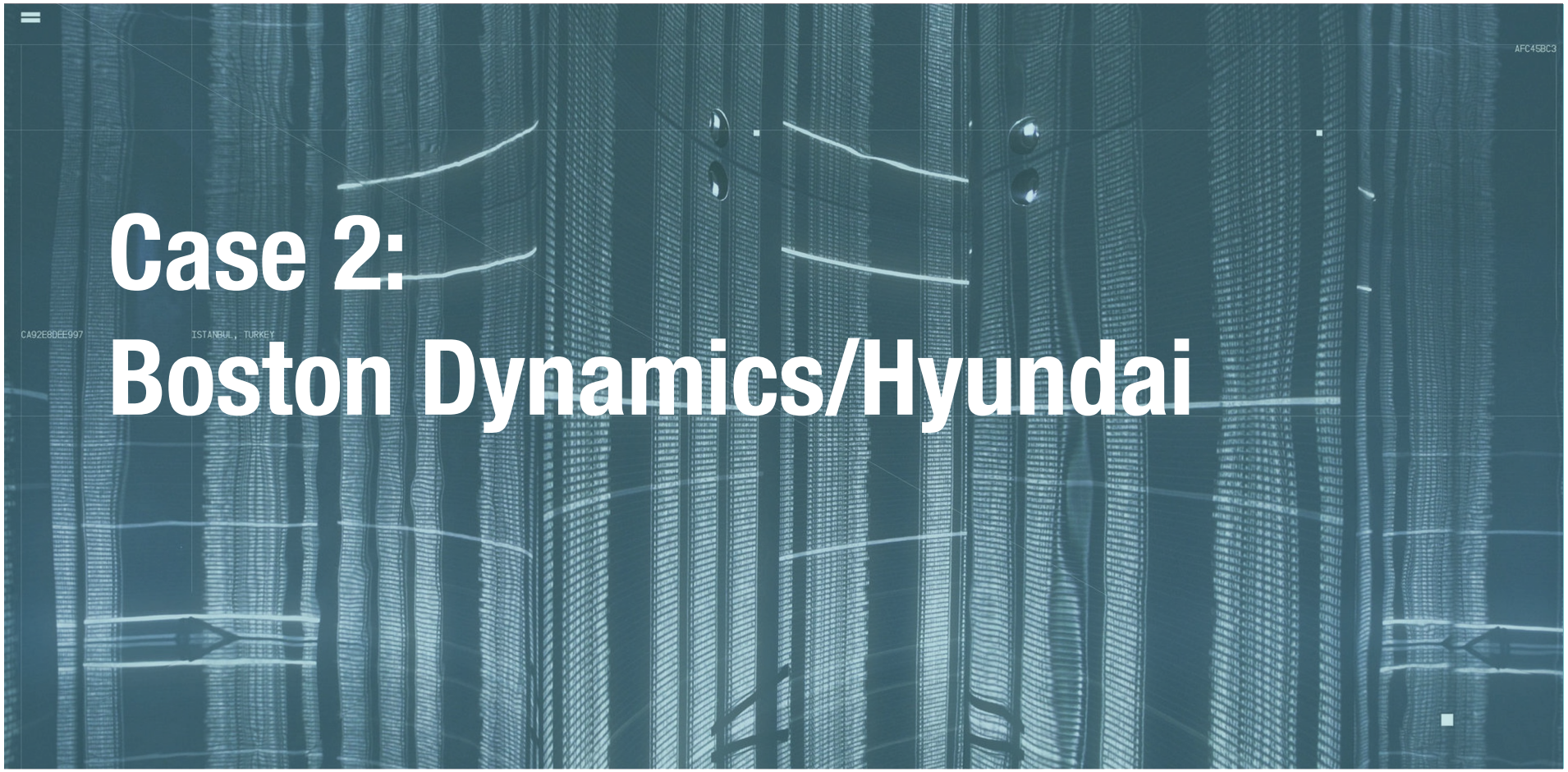
AFL-CIO and Microsoft Announce New Tech-Labor Partnership on AI and the Future of the Workforce

December 11, 2023

New AI alliance will educate workers, incorporate labor's voice in tech development and help shape policy that supports workers

The American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) and Microsoft Corp. on Monday announced the formation of a new partnership to create an open dialogue to discuss how artificial intelligence (AI) must anticipate the needs of workers and include their voices in its development and implementation. This partnership is the first of its kind between a labor organization and a technology company to focus on AI and will

Insights from worker-centered design research have informed broader efforts to ensure workers have a voice in the development, deployment, and governance of AI, including the *AFL-CIO's Workers First Initiative on AI* and the *AFL-CIO–Microsoft partnership* on the future of work.



Case 2: Boston Dynamics/Hyundai

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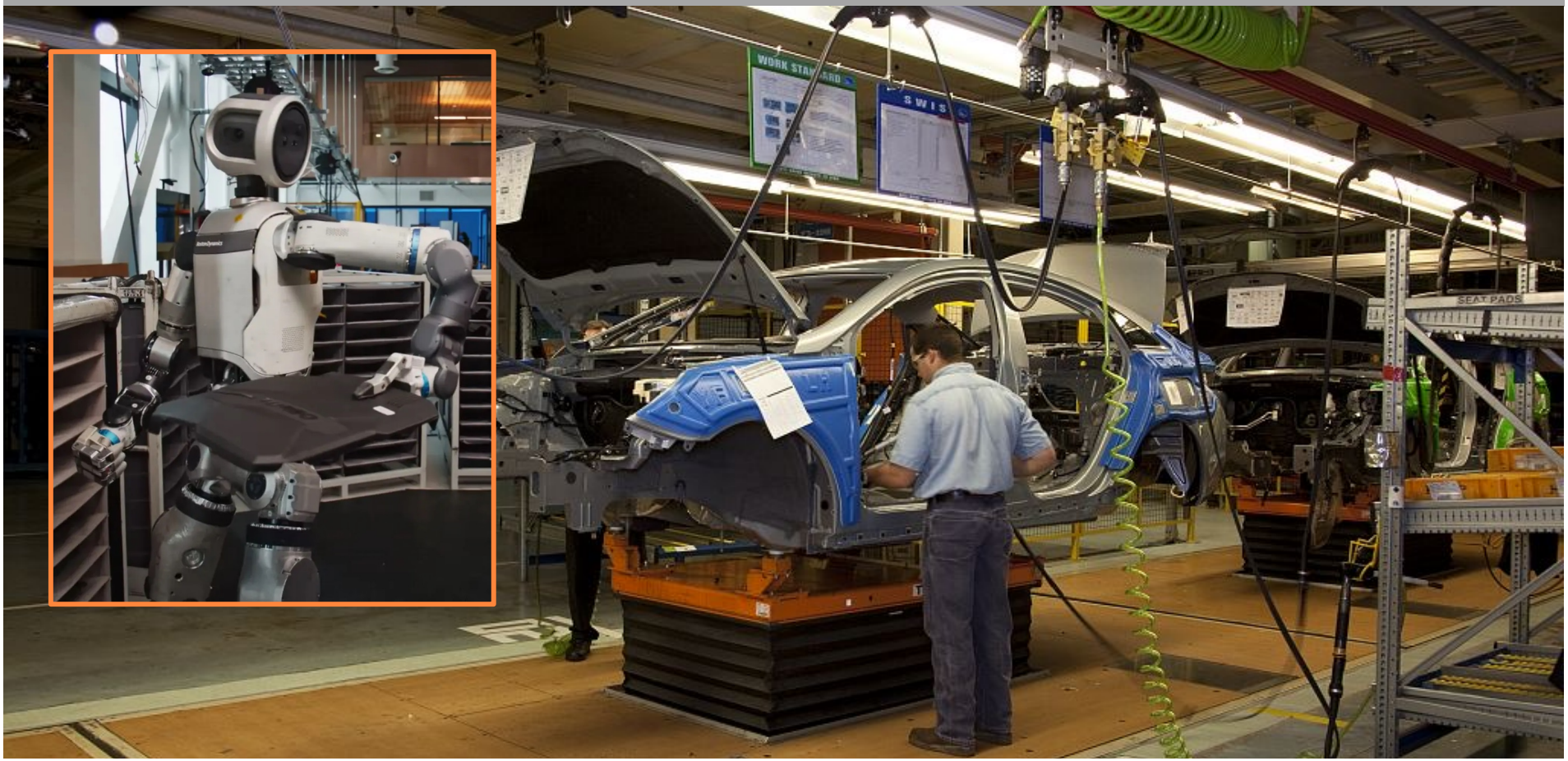


https://bostondynamics.com/news/hyundai-motor-group-completes-acquisition-of-boston-dynamics-from-softbank/

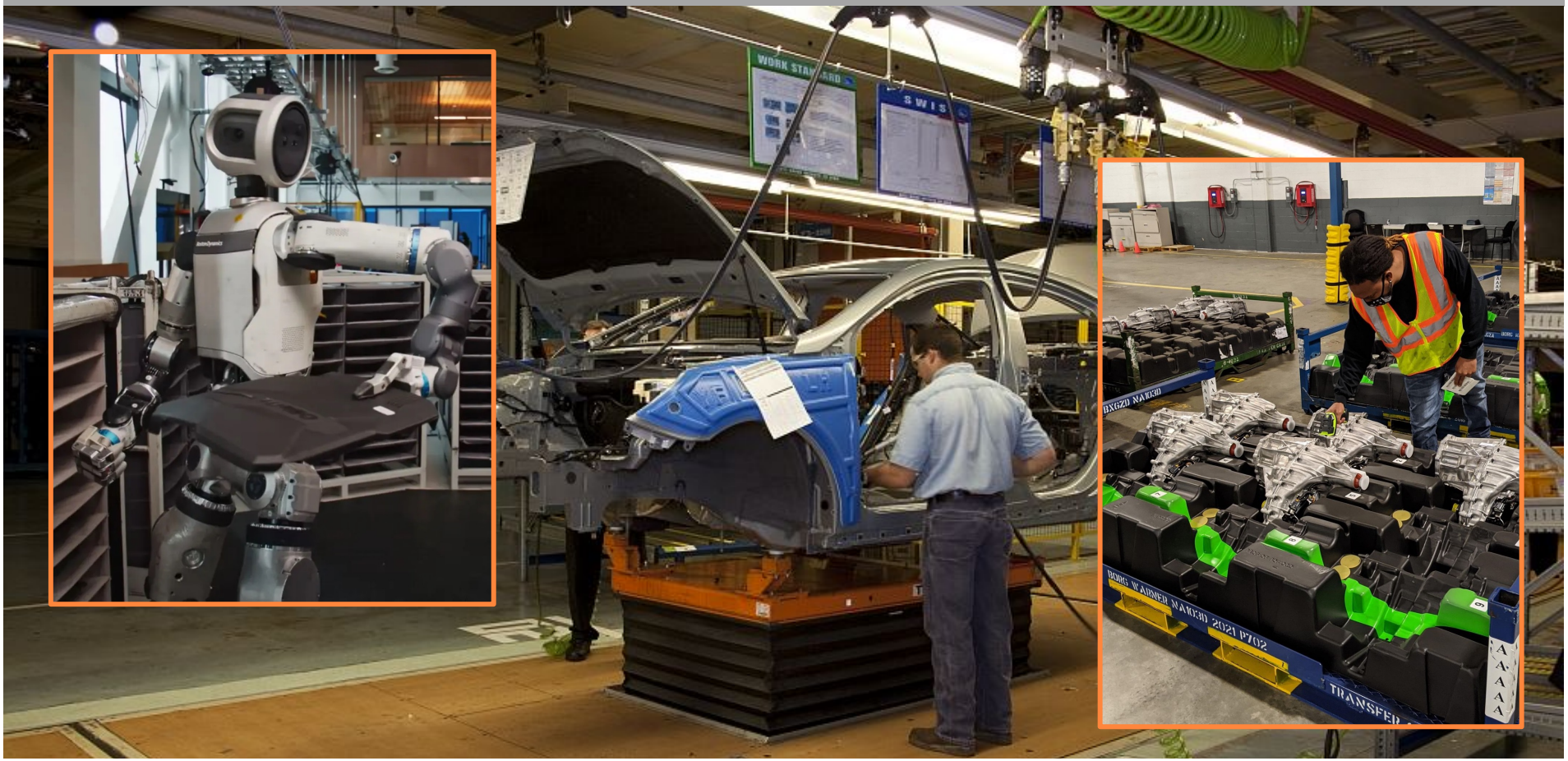
Light humanoids are part of a larger system

- Light humanoid robots
- OEMs and steel production
- Manufacturing sites
- Channels to train and develop workers
- Data collected from workers
- Models built from worker data

Automotive manufacture, automatable (?) work



Automotive manufacture, automatable (?) work



What are the assumptions?



- The context for automation was strong
- The technology is feasible
- The business case is viable
- Workers are on board and will participate
- But assumptions were not tested

Reframing


prime
amazon


ups
Worldwide Services
Low Emission
Hydraulic Hybrid

AI Mismatches



- A tool to help explore unintended harms in technology development
- Surface key risk factors before resources are committed to building a product

Comparison: CLEAR vs. Fraud Detect



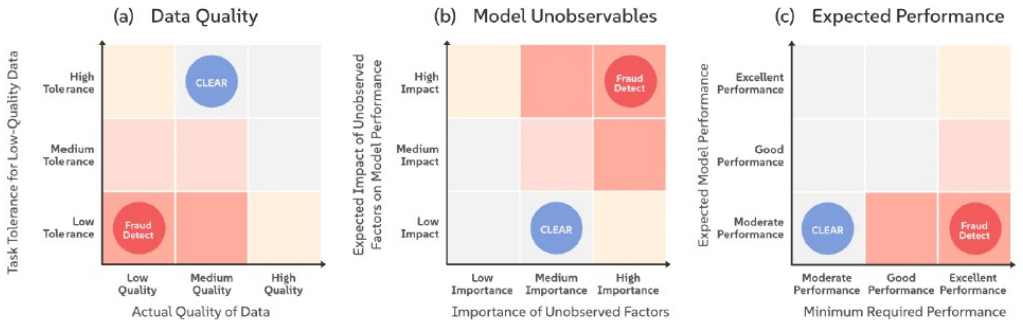


Fig. 12. Case Study 3 [CLEAR vs. Fraud Detect] - Data Quality, Model Unobservables, and Expected Performance analysis

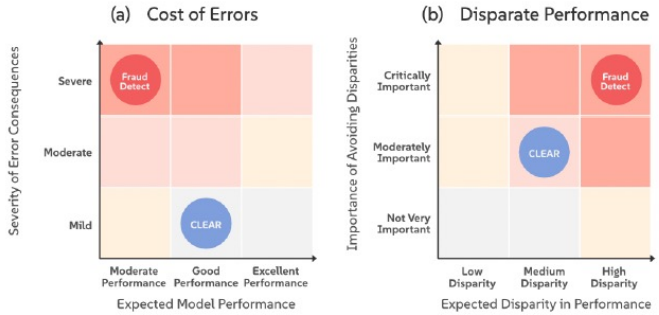


Fig. 13. Case Study 3 [CLEAR vs. Fraud Detect] - Cost of Errors and Disparate Performance analysis

How could design research be helpful here?

Reframing: workers as essential points in data collection system



Participation to governance: workers participate in bringing the vision to life

AI Mismatches: thinking forward and backward about break points



Implications from this work

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Design and governance

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Combining approaches from HCI and labor

Technology is a series of choices that can be designed.

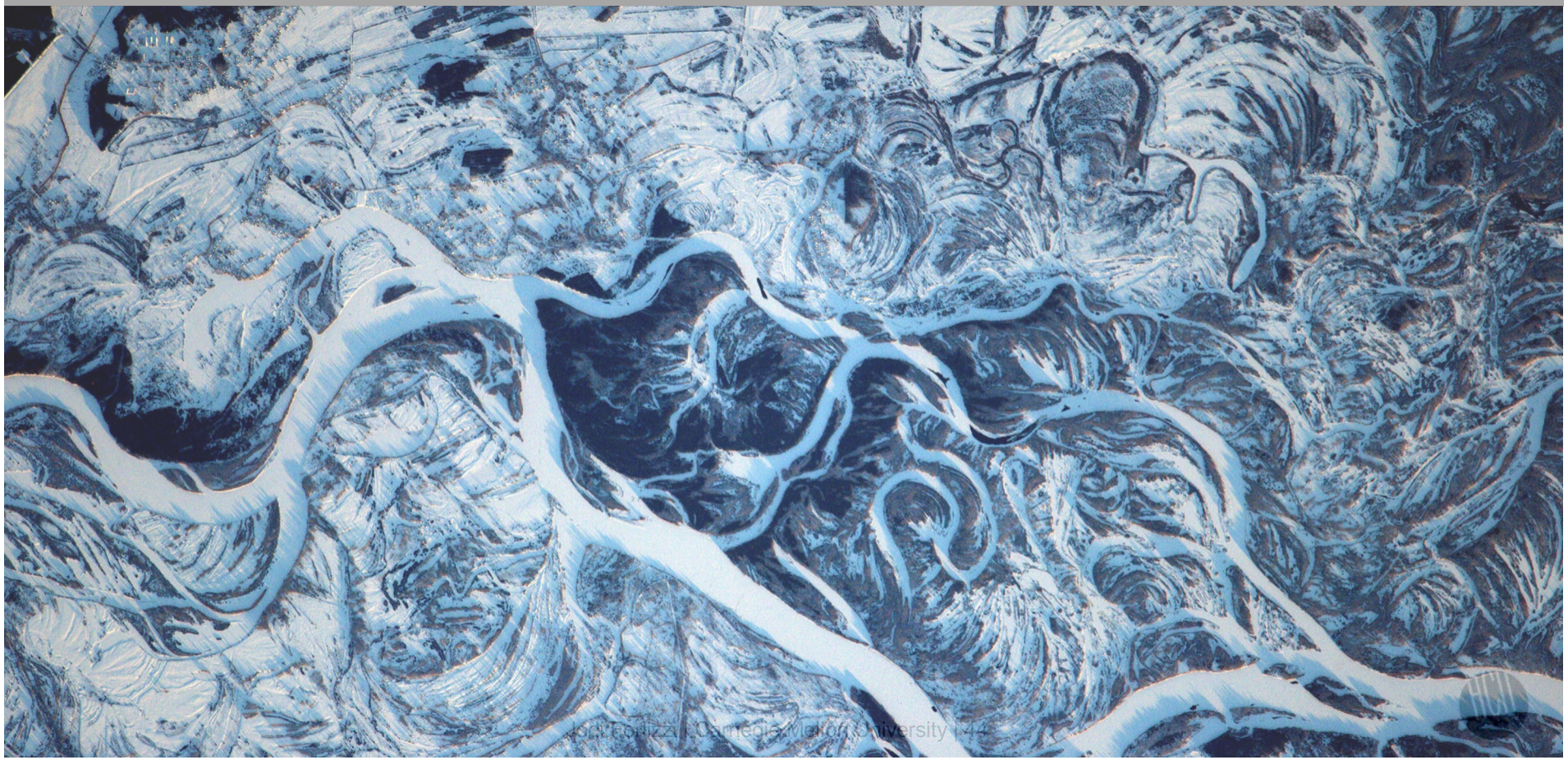
HCI
- Individual stakeholders
- Tech impacts studied during design and development
- Emerging governance

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Labor
- Labor forces
- Tech impacts studied downstream
- Anticipatory governance

Policy and bargaining shape the design of workplace technology.

In conclusion…



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