

Exploring Different Construction Stakeholders' Perception of Human-Robot Collaboration

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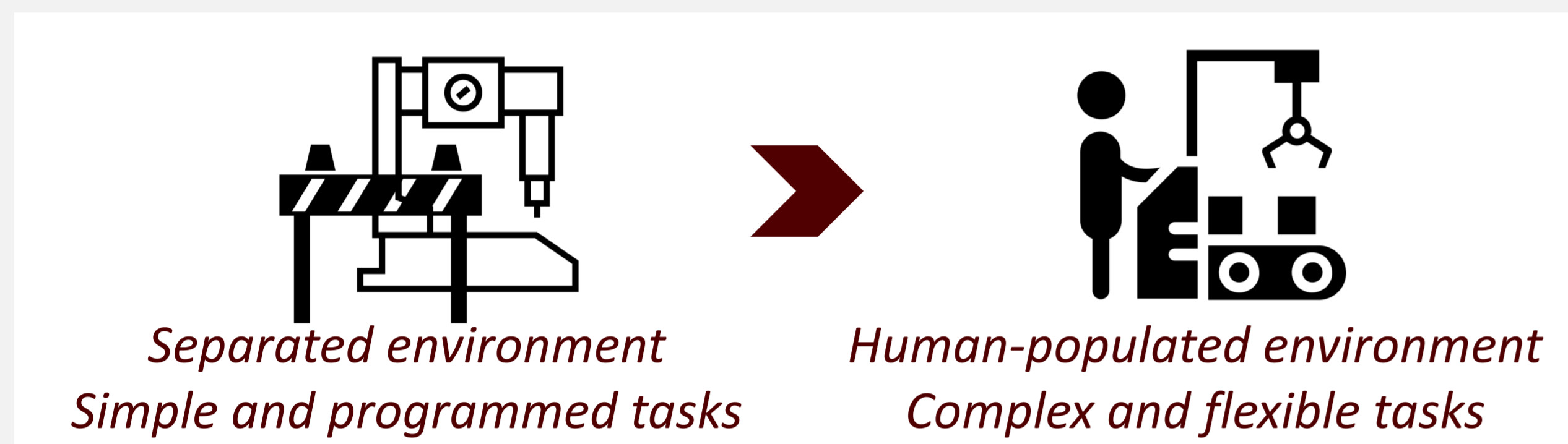
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Introduction

Paradigm shift in robotic technology development

- Emergence of on-site construction robots working with humans



- Need to understand how various stakeholders perceive development and deployment of construction robots for different tasks and situations to achieve successful robot adoption

Research Objective & Contribution

- To investigate how **the contextual factors** (individual, task-related, environmental) associated with different construction professions shape their **perceptions of robots**
- Findings can enable organization / developers to **better design future robots** to promote effective HRI

Research Methodology

- Conducted a qualitative research using in-depth interviews

Table 1. Overview of Participants (n=36)

	Description	Frequency	Sub-group
Job Classification	General Contractor	5	
	Subcon- Manager	14	
	Subcon- Worker	15	
	Civil	1	Structural
	Concrete	8	Structural
	Structural steel	5	Structural
	Façade/windows	1	Structural
	Masonry/Stone/Tile	5	Arch Finishing
	Plastering/Painting	2	Arch Finishing
	Drywall	2	Arch Finishing
	Waterproofing	1	Arch Finishing
M&E	4	Arch Finishing	
Expertise Level	Tech Development	2	
	Intermediate (~10 yr)	8	
	Advanced (11~20 yr)	17	
	Expert (21 ~ yr)	11	

Research Methodology (Con't)

- Participants were asked to indirectly interact with robots based on the exemplary videos and photos and illustrated fictional collaborative scenarios in their own job environment
 - Independent vs. Collaborative robot
 - Assistive vs. Main task executing robot

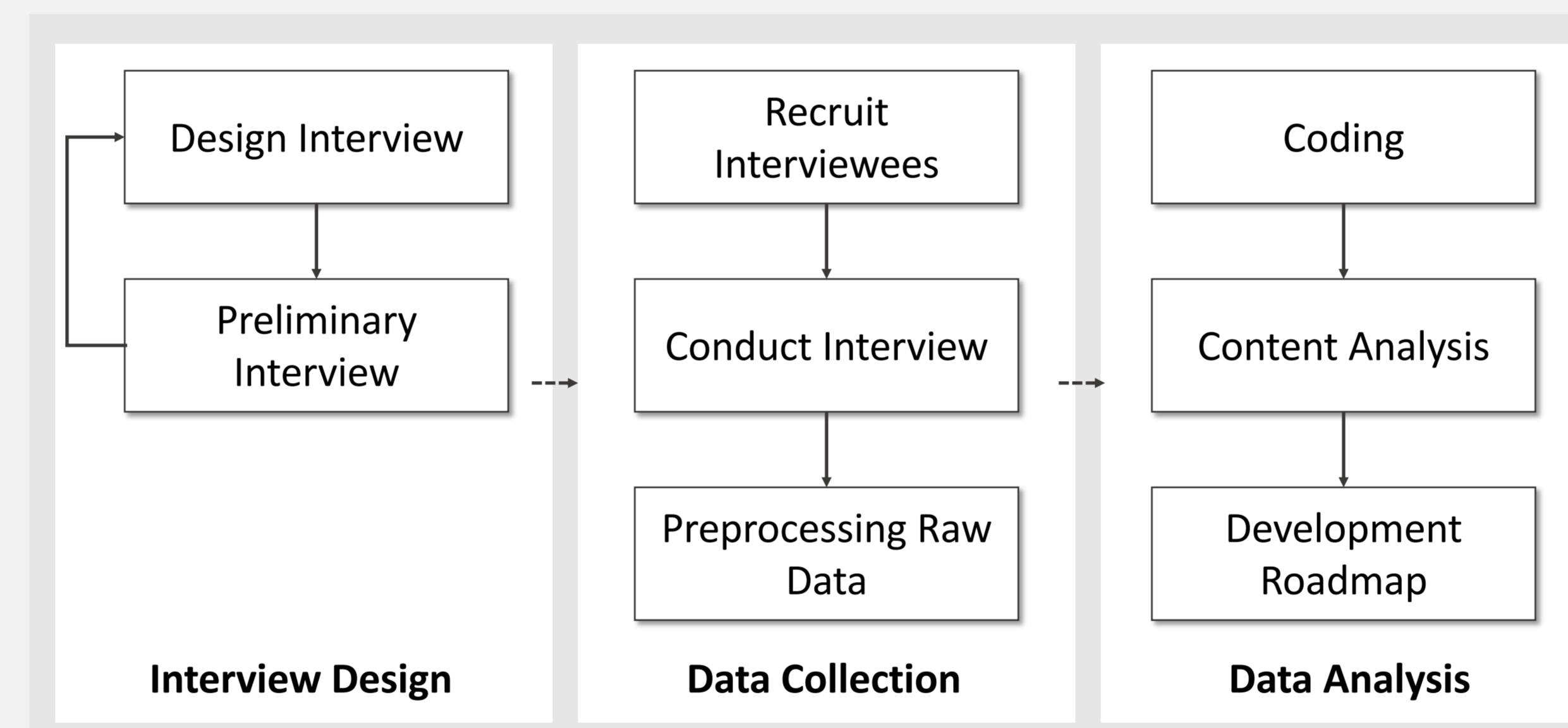
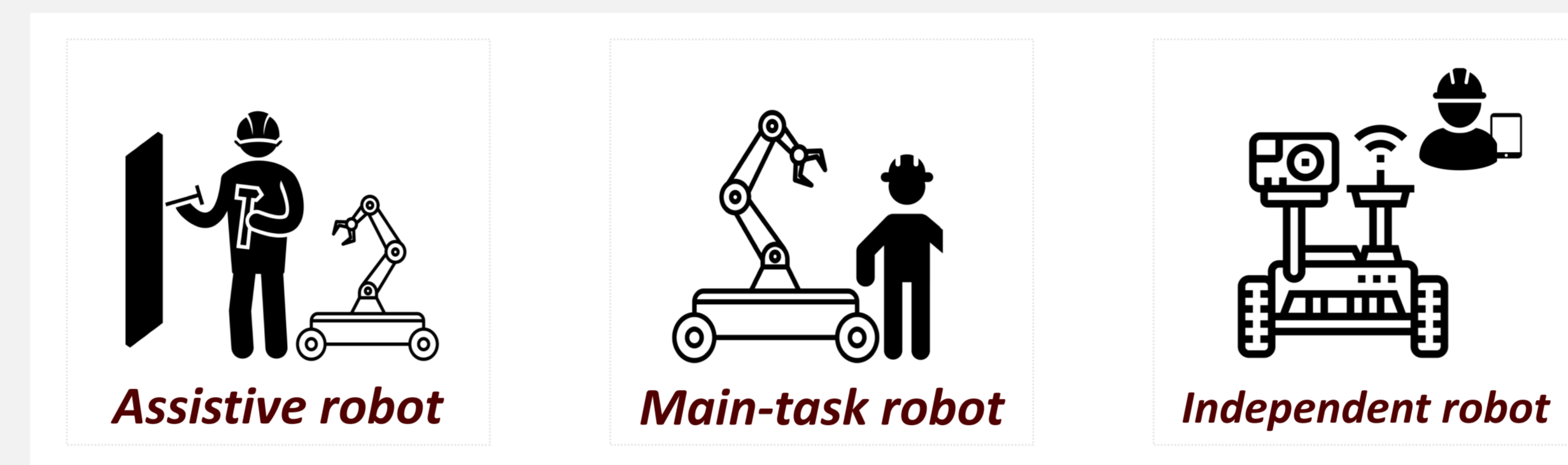
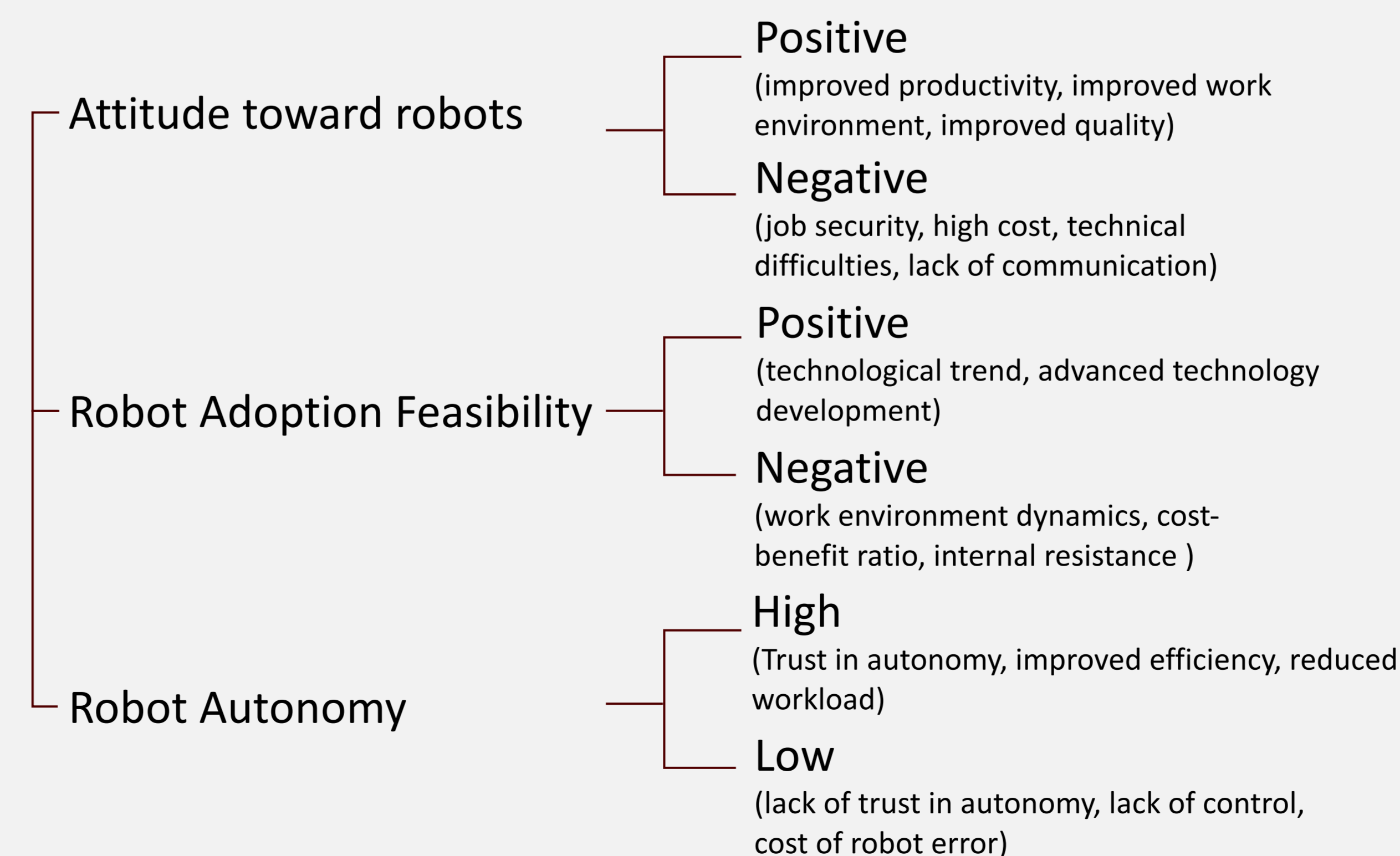


Figure 1. Overview of Research Process

Data Analysis

- Analyzed based on **content analysis method**



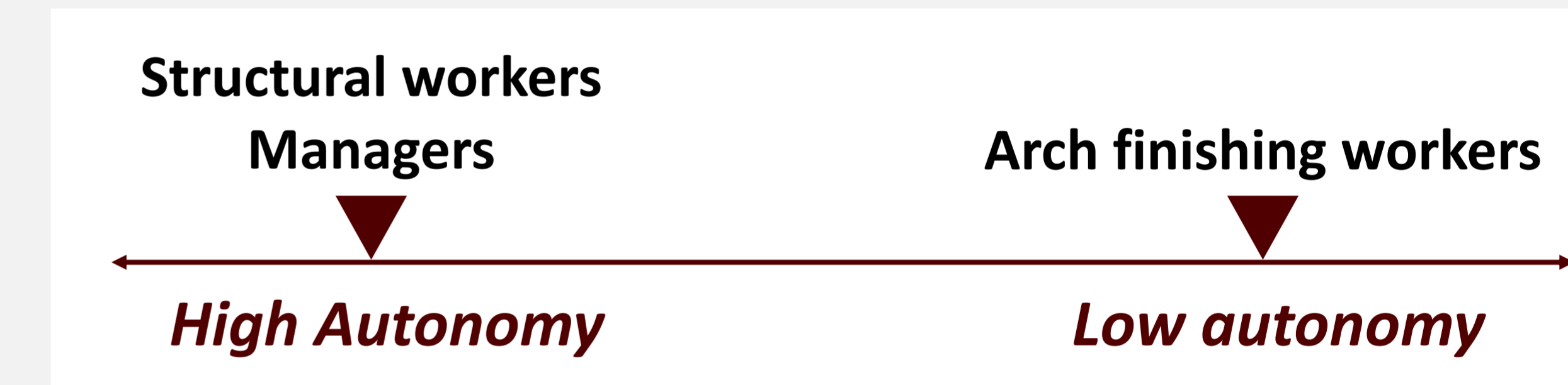
Result

Different perceptions among stakeholders' groups

- **Desired robot role and perceived robot capability**



- **Desired robot autonomy and perceived benefits**



Discussion

- **Technological anxiety** was only apparent in the subcontractor worker group.
- The presence of robots in the workplace did **not pose significant psychological safety threats** to workers.
- Participants preferred to form **social interaction with robots** and showed **propensity to anthropomorphism** in robot appearance.

Limitation and Future Work

- **Limitation:** consider only one-to-one human robot interaction; scope of work covers only building project (excluding infrastructure project)
- **Future work:** extend the findings to multi interactions and further explores the contextual factors

Acknowledgements

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