

Young Adults' Perceptions of Safety, Technology, and Everyday Experience in Tram Transport

Findings from Focus Groups

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INTRODUCTION

Tram systems are increasingly **technology-mediated** (automation, AI, surveillance)

User behaviour depends on:

- System interpretability
- Predictability
- Perceived control
- Limited evidence on how these factors interact in **real-world use**

OBJECTIVE

Examine how young adults:

- Perceive and interpret tram systems
- Respond behaviourally to technology
- Experience safety, crowding, and accessibility

METHODS

Design

- Qualitative study (focus groups)

Participants

- N = 31 university students
- Age: 18–30
- Regular tram users

Procedure

- 4 focus groups
- Semi-structured discussions
- Use cases:
 2. Anomaly detection (on-board safety)
 3. Pedestrian–tram interaction
 4. Passenger distribution

(+ accessibility appeared)

Analysis

- Thematic analysis (MAXQDA)
- Hybrid coding:
 - Deductive + inductive
- 4 analytical dimensions:
 - Human–technology interaction
 - Risk & trust
 - Sociotechnical organisation
 - User experience

RESULTS

Human–Technology Interaction

- **Lack of interpretability**
“You don’t really know what the tram is going to do”
- **Uncertainty in system behaviour affects decisions**
“If there were some way to know whether the wheelchair spaces are occupied...”
- **Limits of automation**
“There are things that a machine just won’t be able to interpret”

Risk & Trust

- **Trust depends on predictability**
“If you don’t know what it’s going to do, it makes you feel unsafe”
- **Surveillance creates ambivalence**
“Cameras help... but they’re also watching you”
- **Preference for human oversight**
“I’d rather have someone supervising”

Sociotechnical Organisation

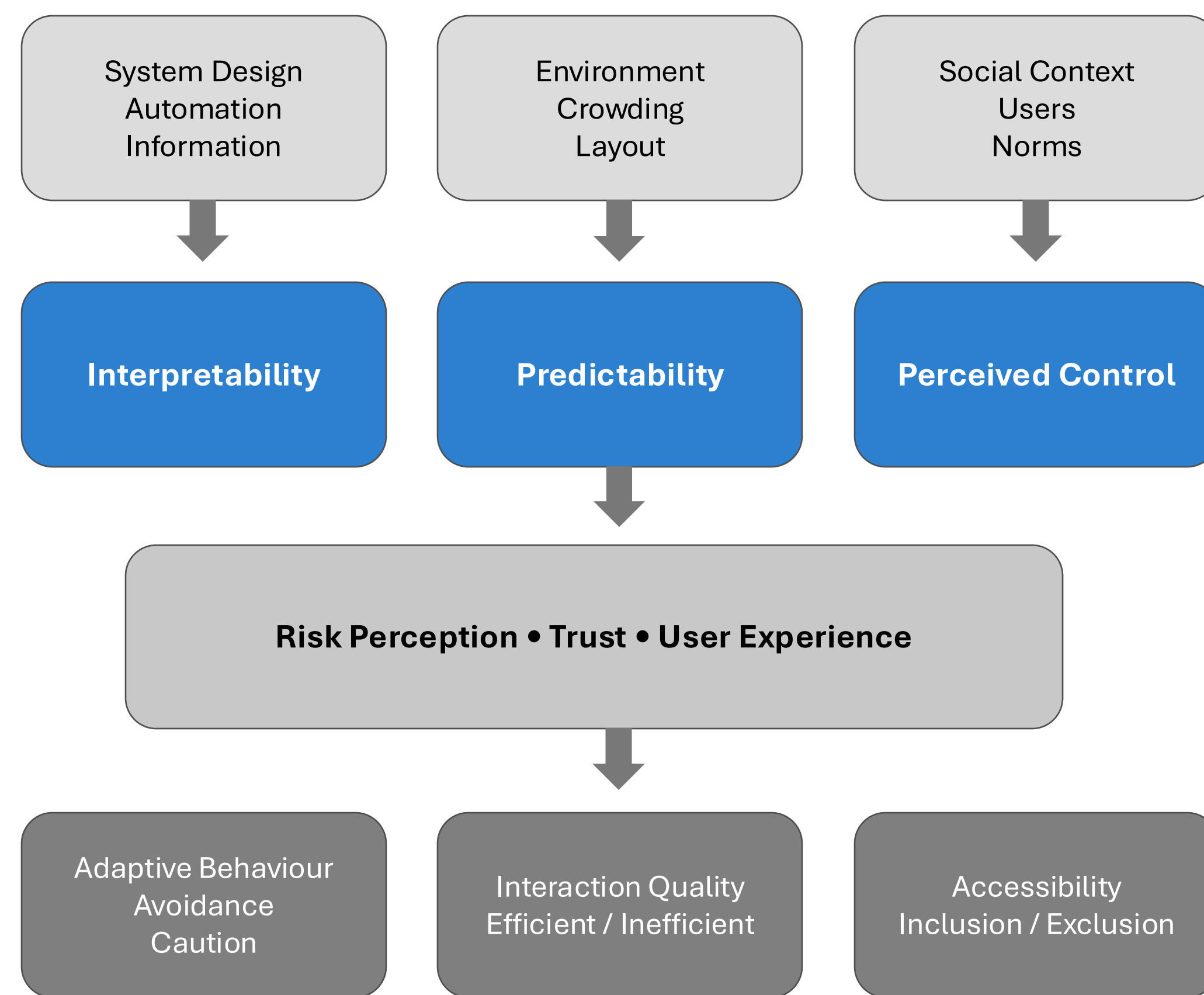
- **Door congestion**
“People gather around the doors”
- **Poor passenger distribution**
“There are areas of the tram that are empty, but no one moves further inside”
- **Inefficiency is behavioural (not structural)**
“Everyone tries to get off through the same door”

User Experience

- **Crowding → stress**
“I get very anxious in small spaces”
“You can barely breathe”
- **Avoidance behaviour**
“If I can, I just don’t take it”

BEHAVIOURAL PROCESS MODEL

System factors → shape **perception** → which drives **behaviour**



DESIGN IMPLICATIONS

- 1. Improve Interpretability**
 - Provide clear, real-time system information
 - Make system states visible and understandable
- 2. Increase Predictability**
 - Communicate system intentions and behaviour
 - Reduce uncertainty in user–system interaction
- 3. Support Coordination**
 - Use spatial cues and signalling
 - Guide passenger distribution and Flow
- 4. Enhance User Experience**
 - Address crowding and discomfort
 - Reduce stress and improve perceived control
- 5. Ensure Accessibility**
 - Design for real conditions of use
 - Consider diverse users in high-density scenarios

CONCLUSION

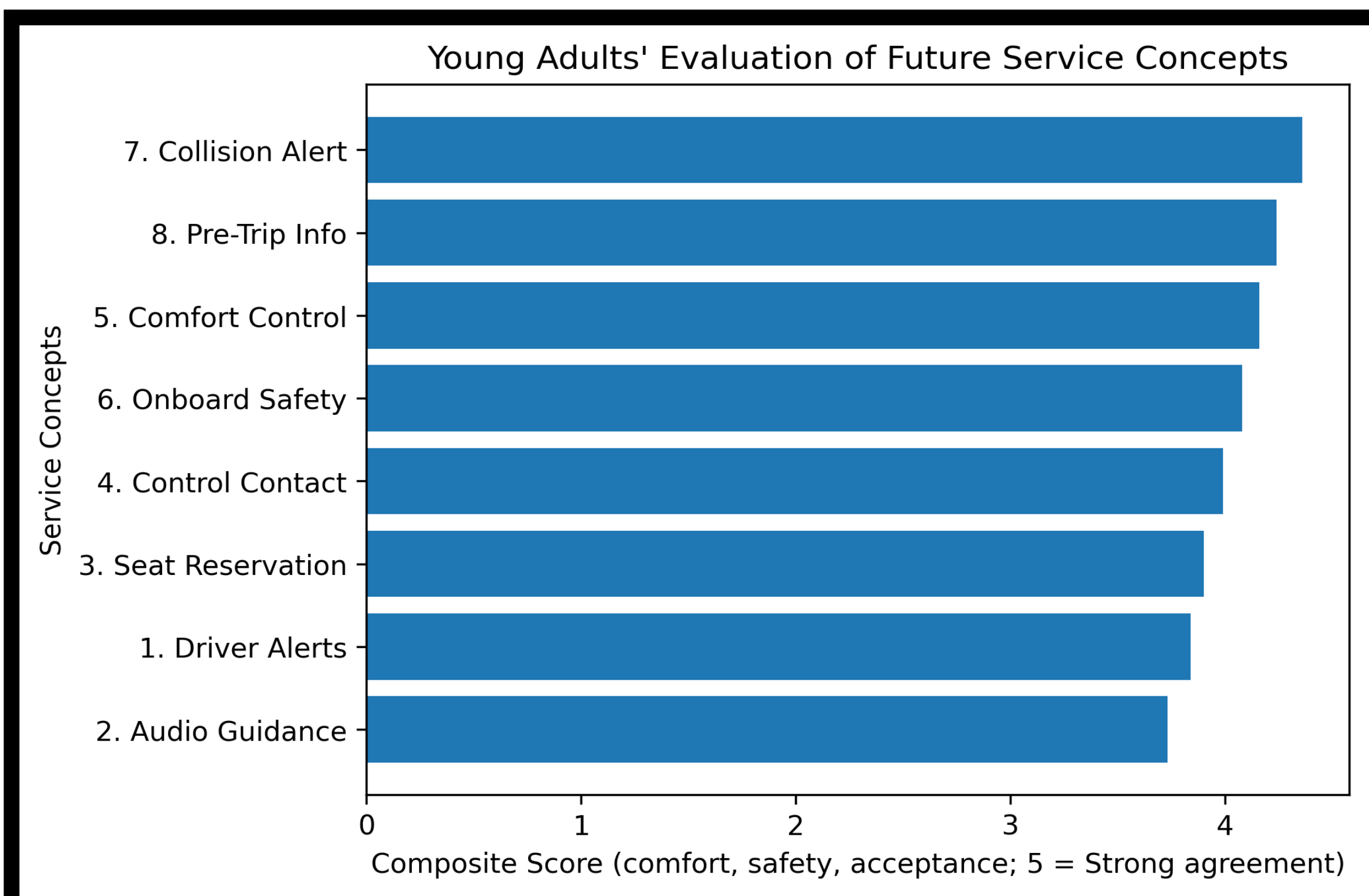
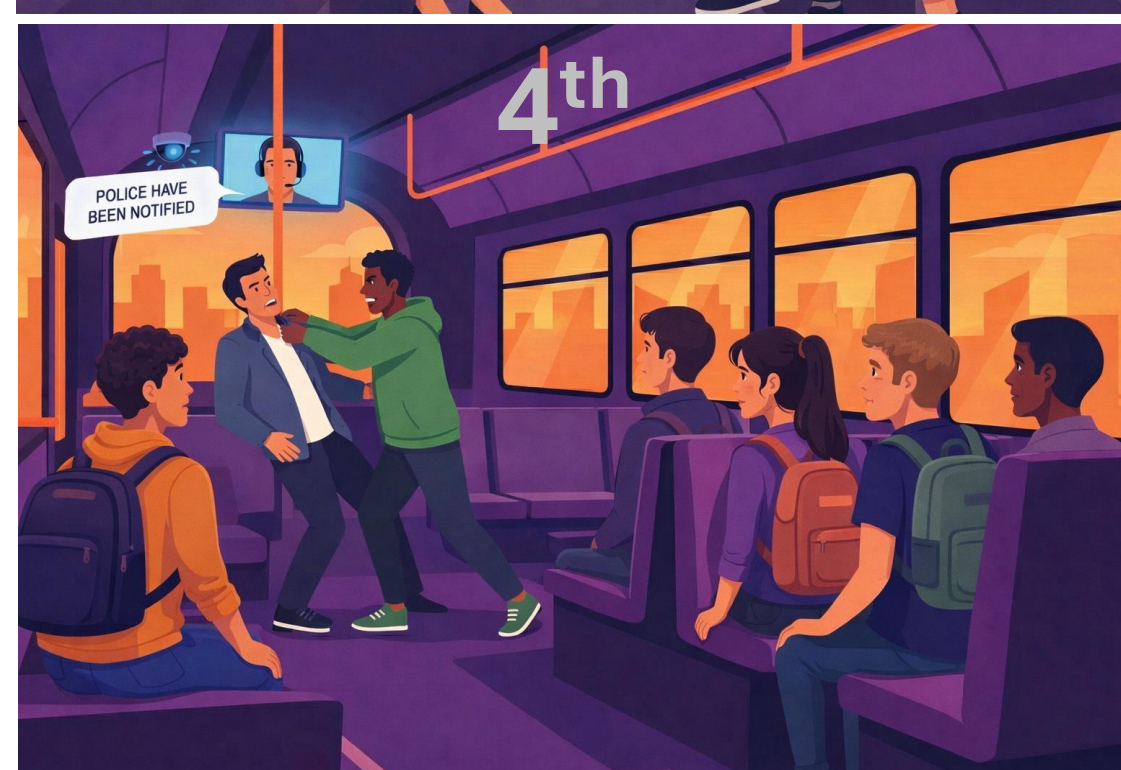
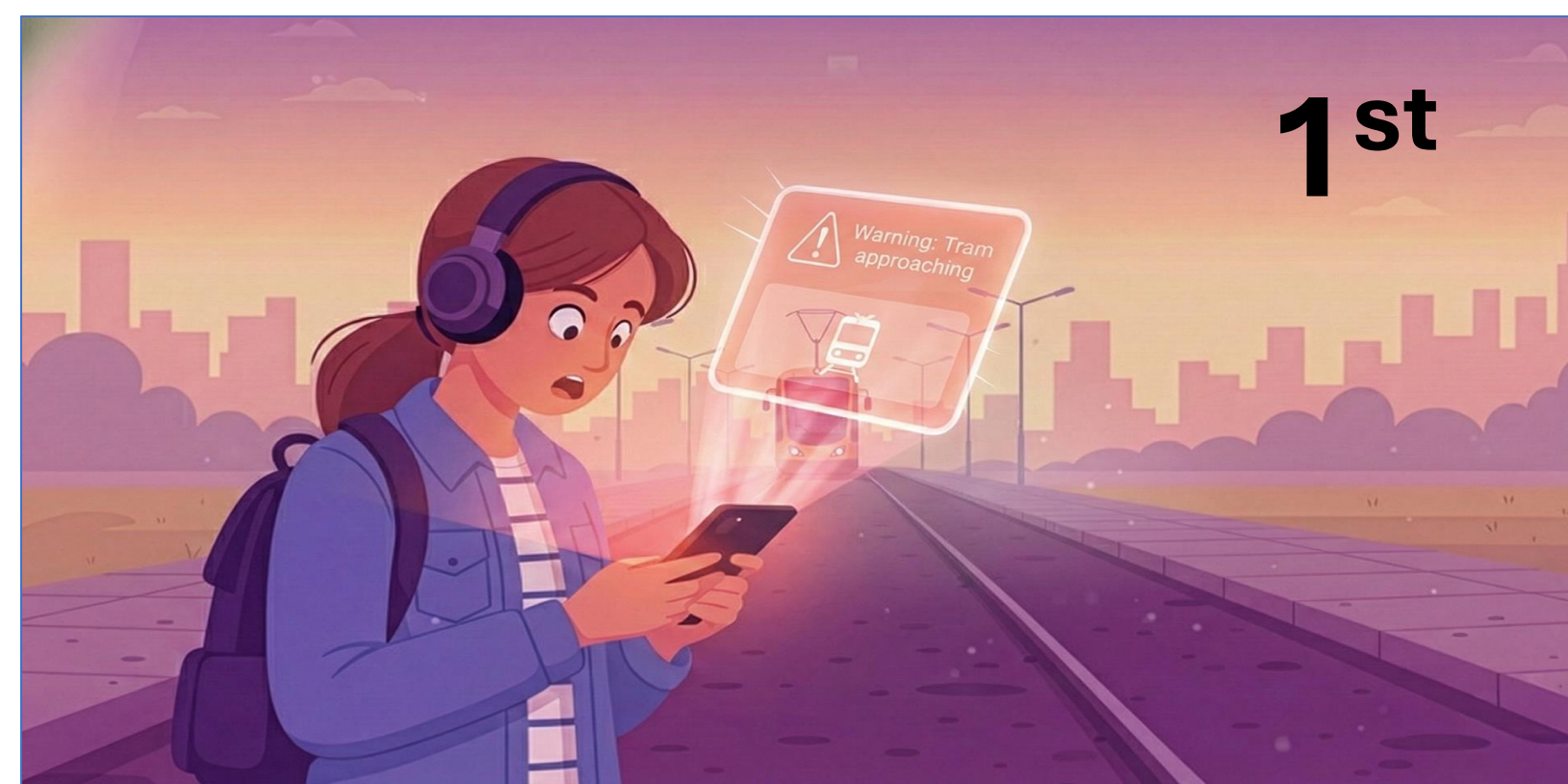
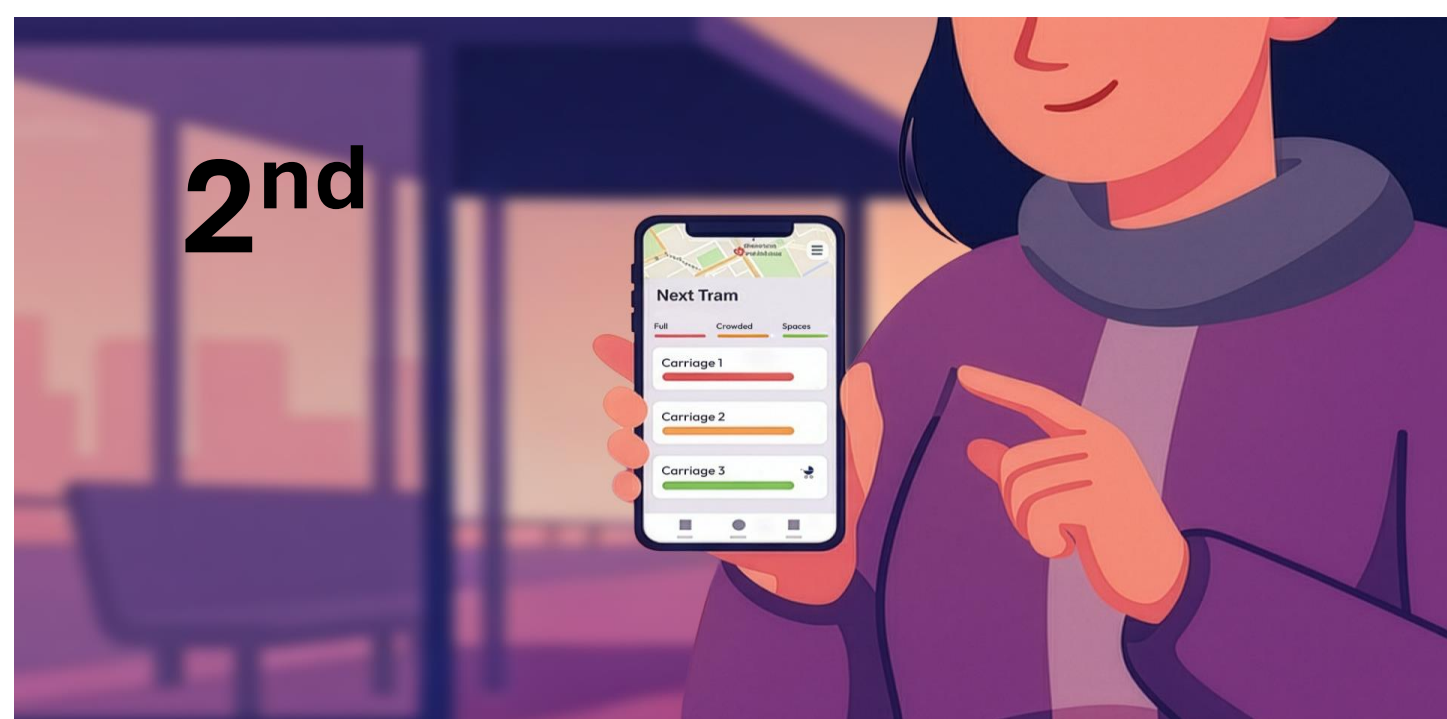
Tram systems are sociotechnical environments
Behaviour appears from interaction between:

- System design
- Environment User perception

Key mechanisms:

- Interpretability
- Predictability
- Coordination

→ Improving these factors supports:
Safer interactions
Better user experience
More inclusive transport systems



+ BONUS INFO:
Service Concept Survey
N=50 Spanish Tram users
University students
Age = 18-23 years
Gender: 90%



Designing for behaviour is essential for safe and effective transport systems

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