User experience of the PANACEA system

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VTI

PANACEA
FITNESS TO DRIVE

PANACEA Final Event
10 September, 2024

How was the PANACEA system evaluated?

UCA

Linköping, Sweden

Setting: real-life evaluation

Target population: autonomous shuttle safety operators

UCB

Thessaloniki, Greece

Setting: simulator studies and semi-real-life evaluation

Target population: taxi drivers and delivery riders

UCC

Donostia, Spain

Setting: real-life evaluation

Target population: Mid-distance and long-distance bus drivers

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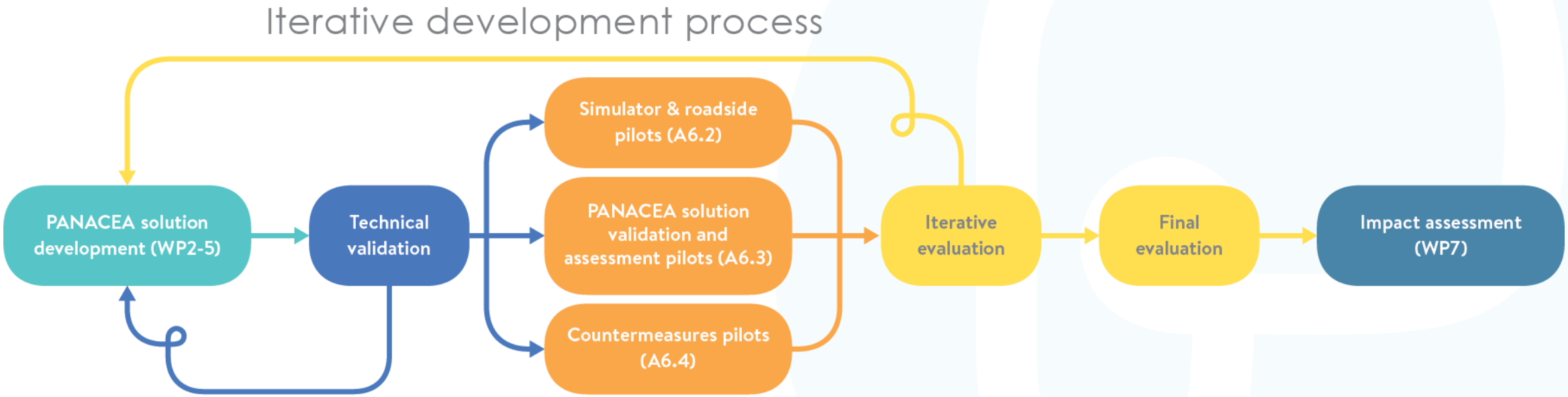
PANACEA Evaluation

Development of an evaluation framework to enable a systematic evaluation of the PANACEA ‘system-of-systems’ in various commercial driver groups.



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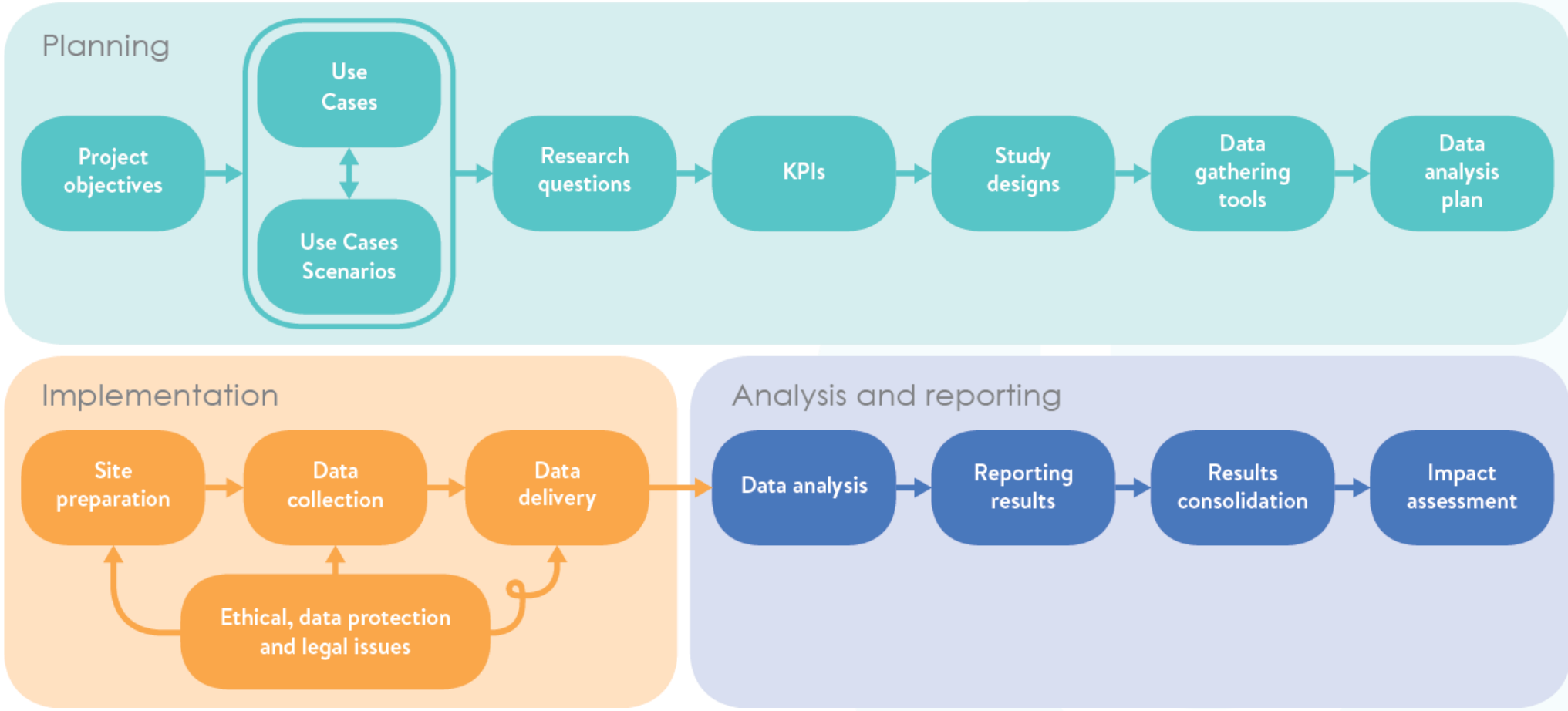
PANACEA Evaluation framework



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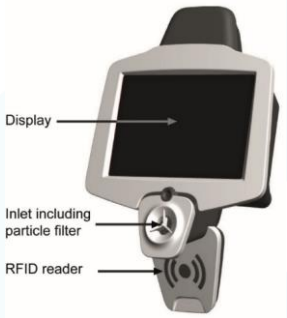
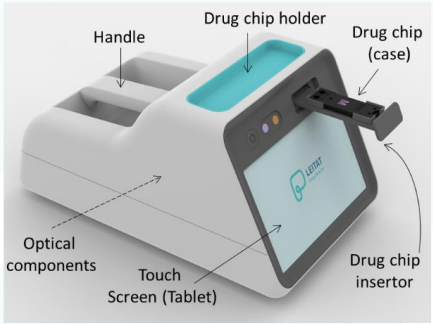
Data gathering tools for evaluation

- Data from PANACEA system
  - Sensor data
  - Usage data from the PANACEA app
- Evaluation tools
  - Objective data
    - Reference sensors
    - Vehicle data
  - Subjective data
    - Questionnaires
    - Focus groups





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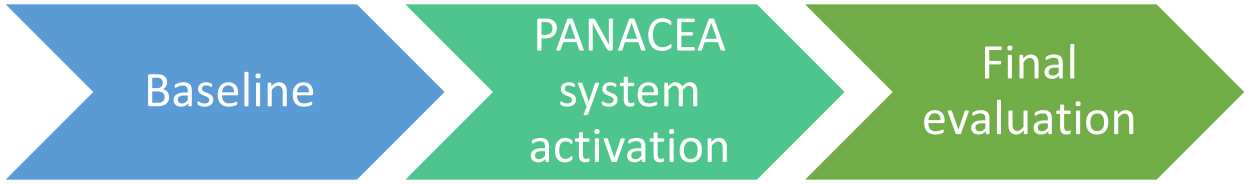
UCA Evaluation

- 8 autonomous shuttle safety operators and 2 managers
- 2 EasyMile shuttles, Linköping, Sweden
- 9 weeks baseline, 6 weeks activation, 3 weeks evaluation



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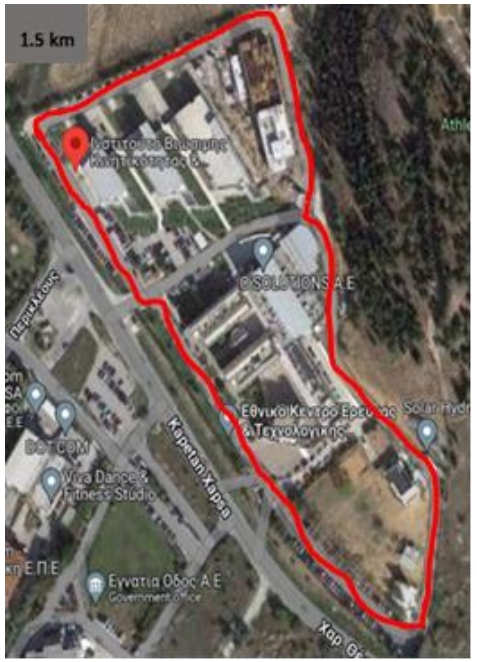
UCB Evaluation

- Car and motorcycle simulator study with 20 taxi drivers and 20 delivery service riders
  - Two sessions– one focusing on alcohol, the other on stress and fatigue
- 5 + 5 tested instrumented car and motorcycle at the CERTH premises
- Drug testing with methadone and benzodiazepine users
- Operators received a demonstration of PANACEA web app and countermeasures



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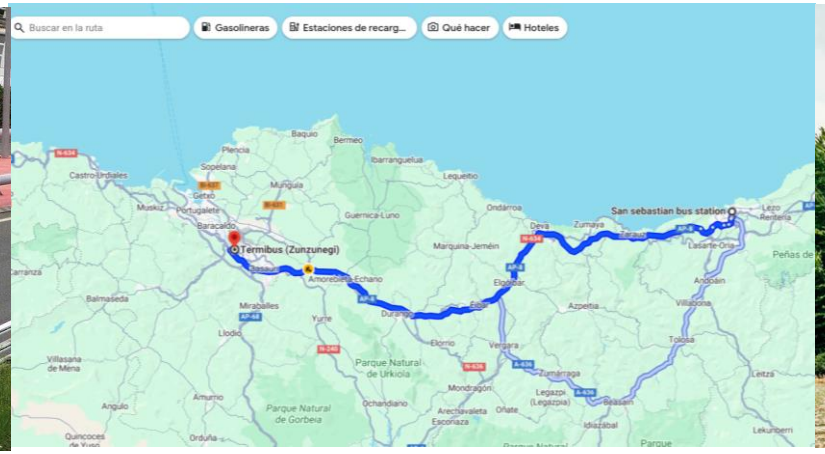
UCC Evaluation

- 20 mid-distance and 4 long-distance bus drivers, 2 operators
- Real-life operations of the bus service from Donostia to Bilbao and a long-distance route between Donostia and Paris
- Selected parts of the PANACEA system were used (not the mobile app)



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User experience of the PANACEA system

Focus groups with drivers and operators and questionnaires (UCA, UCC)

"The alcohol sensor ensures the driver is sober"

- Overall usability was positive
- Trust and willingness to use were lower than expected
- Few fatigue events and no severe stress or alcohol consumption situations were detected in real-life evaluations.

"no matter how much the app 'says' that [I'm tired], it's up to the driver to stop"

- Some subsystems/sensors had low user satisfaction due to longer measurement times or more frequent maintenance
- All operators willing to try the system if improvements were made

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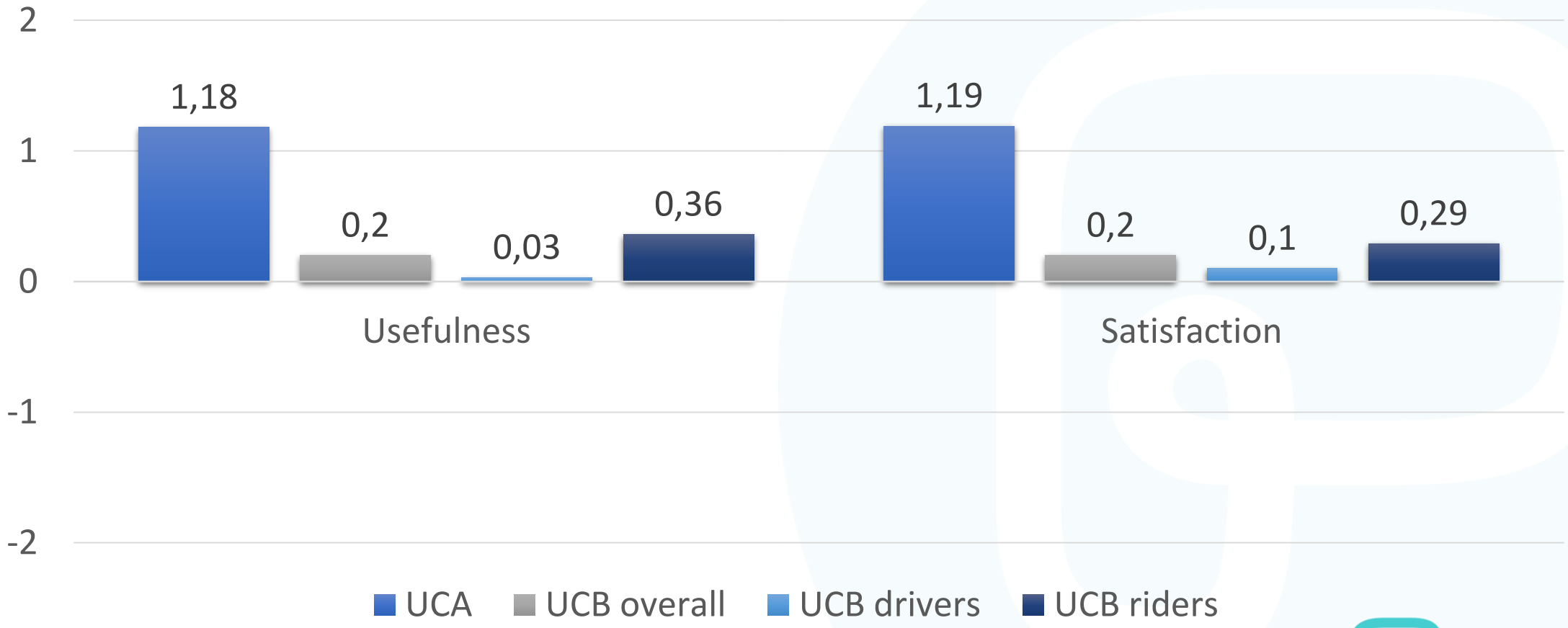
User experience of the PANACEA system

Technology Acceptance (Van Der Laan), -2 to 2



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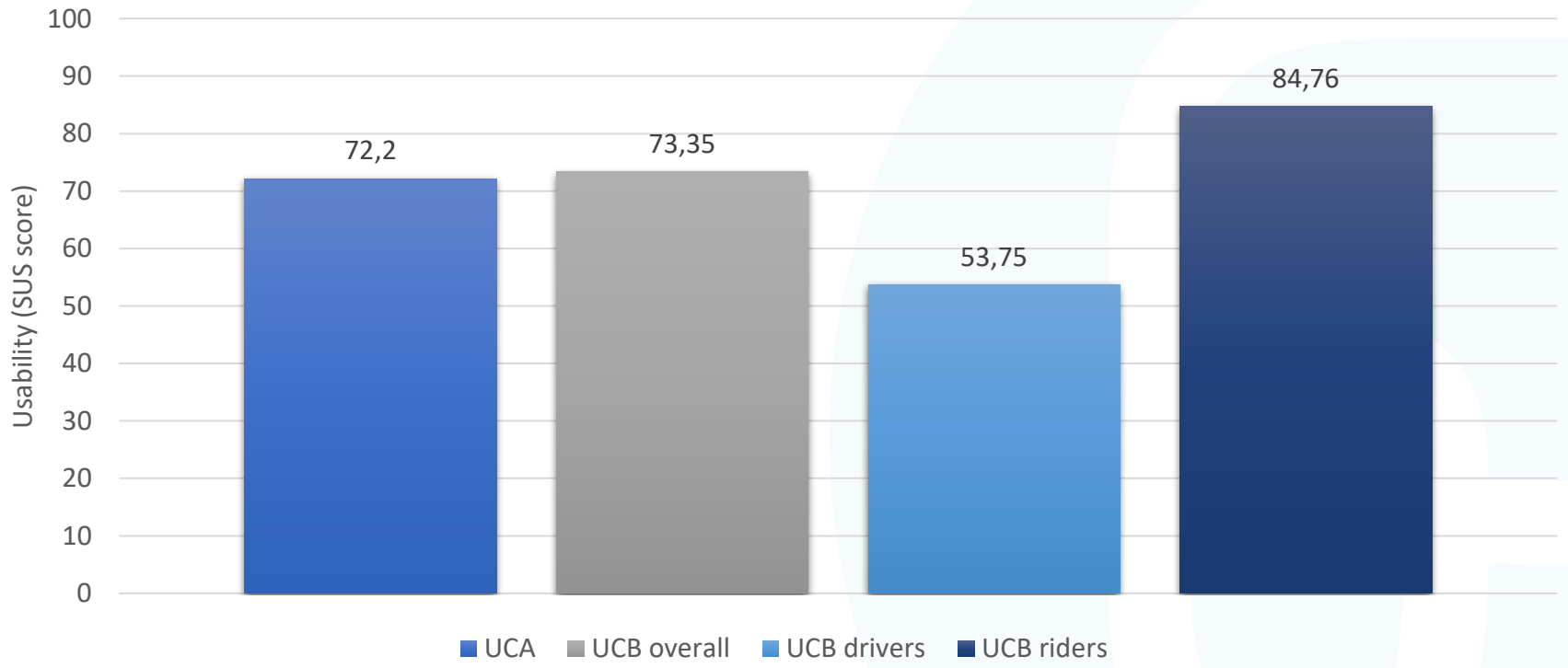
User experience of the PANACEA system

System Usability Scale (SUS), 0-100, target 70



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User experience of the countermeasures

- Drivers/riders liked the idea of a system assisting them with their self-awareness (e.g. of fatigue/stress) and providing information to their operator(s) for shift management
- Operators welcomed having overview data of their drivers but wanted data management tools to assist with this.

- Suggested improvements:
  - More personalization
  - Sensors and countermeasures quicker to use
  - Integration into existing operator systems

"we humans are so different, this system may not be able to suit everyone"

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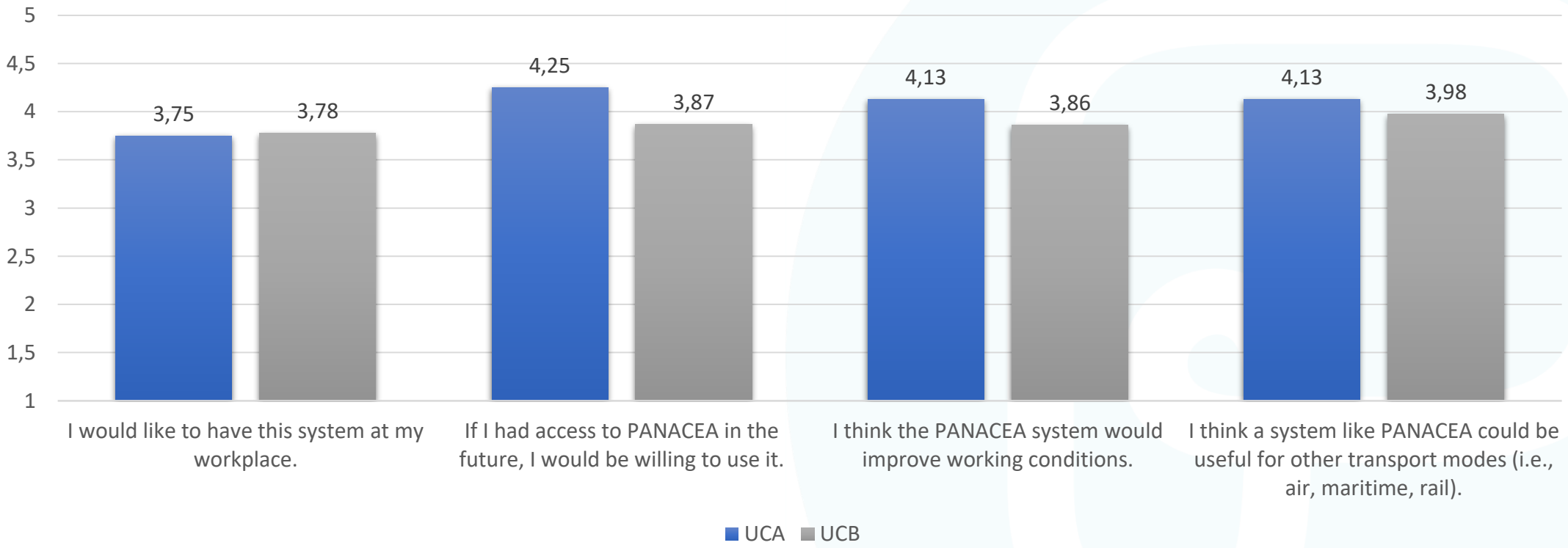
User experience of the PANACEA system

1=completely disagree to 5= completely agree



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Barriers

- App based systems are problematic for drivers without company smartphones
- Time consuming measurements and countermeasures are hard to fit in a busy schedule
- Cultural and societal differences in the attitudes towards monitoring systems
- Resistance to change routines or to do additional tasks
- Feeling uncertain about who has access to the data

“integrating it into a busy shift is the real test”

“No, I'm paid to drive, and that's what I know how to do”

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Lessons learned and further development

- Further refinement of sensor technologies is needed to improve the PANACEA solution's effectiveness in real-world applications
- Longer assessment period needed to evaluate long term effects
- Transparency on who has access to what data is important
- Previous experience with technology introduction affects participant engagement and recruitment
- Communication and education of benefits of using a fitness-to-drive assessment system is important to create engagement
- Safety rather than blame culture essential to establish trust between driver and operator

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Conclusions

"The system's focus on fatigue management and health monitoring is exactly what's needed to support our drivers' well-being"

Despite some technical hurdles, participants showed a positive attitude towards the system, believing it can enhance future road safety.

The comprehensive countermeasures targeting both drivers and fleet operators are among the most effective.

The PANACEA system's holistic approach and innovative solutions have the potential to enhance safety and health in the transportation industry.

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Thank you!

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