



# Spatial Computing in Human-Computer Interaction: **Designing a Mixed Reality HMD Experience around Process Mining for Celonis Prospects**

Michael Sodamin

*Master: Robotics, Cognition, Intelligence*

*Supervisor: Prof. Gudrun Klinker, Ph.D.*

*Advisers:*

Linda Rudolph, M.Sc.

Jennifer Brandl, M.Sc.

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# Introduction

Mixed Reality created for Celonis

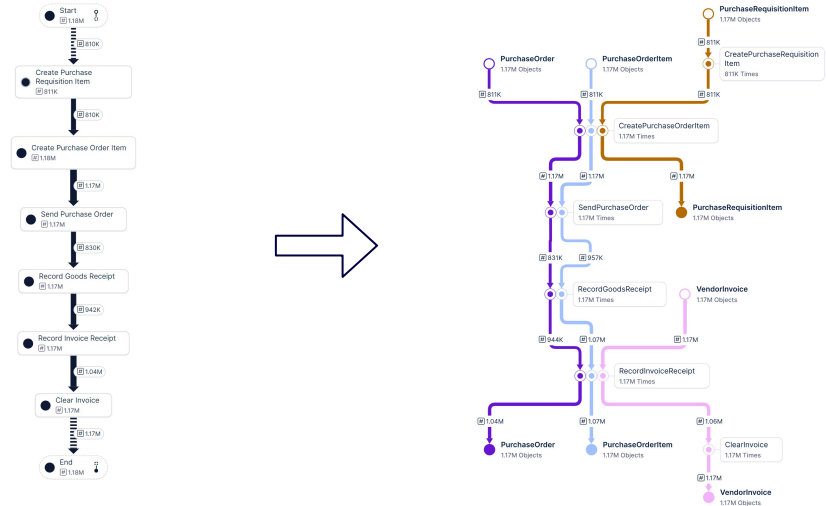


## Business Process Mining:

IT system footprints

- Event log
- Process graph
- Find improvement potentials

## New technology: Object Centric Process Mining (OCPM)



Can Mixed Reality help to **sell** OCPM?



# Motivation

*Why Mixed Reality might be the right tool*



Increase  
Learning

Business advantages of Object Centric  
Process Mining are **hard to explain.**

&

Create  
Excitement

Executive Briefing Centers accelerate  
the sales cycle ensuring customers  
receive an outstanding, and  
differentiated experience. Currently we  
are **lacking innovative experiences.**

**+ Big Deal Sizes**

→ Every interaction might be worth a lot.



# Goal

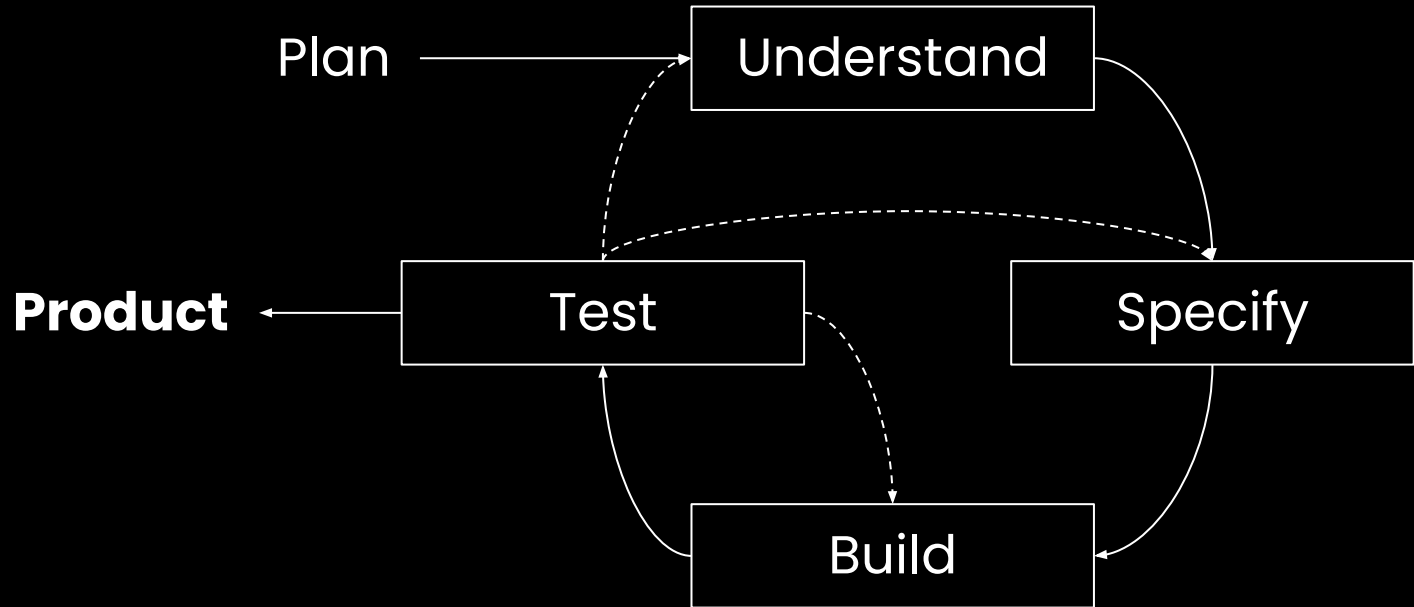
*Of this thesis*

Research  
**requirements**  
and **goals**

Create a  
**Mixed Reality**  
**experience**

Test for **learning**  
and **excitement**

# Methodology



[1] Adapted from: ISO 9241-210:2010 / Norman, D. A. (2013). The design of everyday things. MIT Press.

# Community building

*Evening event helped me build allies and find user-testers*



## Empathise / Understand

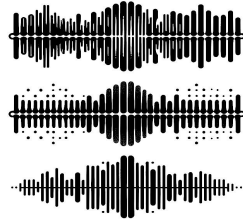
- Input talk
- Testing headsets
- Collecting ideas





## Literature Review

- Often focused on virtual physicality



## Interviews

- Direction, focus, OCPM product vision understanding
- Sales, not Product

**Sieglinde C-LEVEL**

**DEMOGRAPHICS**

- 40-50
- White
- US & Germany

**MOTIVATION**

- Expansion of Caelaris investment after first successes
- Wants quick return on investment as part of their digital transformation journey

**JOB TITLE**

- Head of (Global) C&E
- Chief Information Officer and close below

**Information required**

- Does Caelaris fit for the changes?
- Does Caelaris bring the value?
- How do I get Caelaris up in my organization?

**Background knowledge**

- Rapid of changes through many the standard process
- Some case studies of other customers
- There might have been some challenges of slow adoption and complicated sales from existing, diverse investments

**Organizational Goals**

- Improve Bottom, Top and Green Line
- Increase technology spend
- Increase control of their operations

**Individual Goals**

- Build a career on the strategic investment in Caelaris

**VR Experience**

- Used a headset on a trade show once

## Personas

- Senior level
- No headset experience

Requirement ID	Requirement Type	Name	Description	Priority	Status	Assignee
REQ-001	Feature	VR Training	Users can interact with 3D models of components in a virtual environment.	High	In Progress	John Doe
REQ-002	Feature	AR Maintenance	Users can view AR overlays on physical equipment to receive maintenance instructions.	Medium	Not Started	Jane Smith
REQ-003	Feature	VR Safety	Users can experience VR safety scenarios to learn about potential hazards.	High	Not Started	John Doe
REQ-004	Feature	AR Inspection	Users can use AR to inspect equipment for defects and record findings.	Medium	Not Started	Jane Smith
REQ-005	Feature	VR Simulation	Users can simulate complex tasks in a virtual environment to practice skills.	High	In Progress	John Doe
REQ-006	Feature	AR Assistance	Users can receive AR assistance from a virtual expert during complex tasks.	Medium	Not Started	Jane Smith
REQ-007	Feature	VR Collaboration	Users can collaborate in a virtual environment to solve problems and share knowledge.	High	In Progress	John Doe
REQ-008	Feature	AR Guidance	Users can receive AR guidance from a virtual expert during complex tasks.	Medium	Not Started	Jane Smith
REQ-009	Feature	VR Training	Users can interact with 3D models of components in a virtual environment.	High	In Progress	John Doe
REQ-010	Feature	AR Maintenance	Users can view AR overlays on physical equipment to receive maintenance instructions.	Medium	Not Started	Jane Smith
REQ-011	Feature	VR Safety	Users can experience VR safety scenarios to learn about potential hazards.	High	Not Started	John Doe
REQ-012	Feature	AR Inspection	Users can use AR to inspect equipment for defects and record findings.	Medium	Not Started	Jane Smith
REQ-013	Feature	VR Simulation	Users can simulate complex tasks in a virtual environment to practice skills.	High	In Progress	John Doe
REQ-014	Feature	AR Assistance	Users can receive AR assistance from a virtual expert during complex tasks.	Medium	Not Started	Jane Smith
REQ-015	Feature	VR Collaboration	Users can collaborate in a virtual environment to solve problems and share knowledge.	High	In Progress	John Doe
REQ-016	Feature	AR Guidance	Users can receive AR guidance from a virtual expert during complex tasks.	Medium	Not Started	Jane Smith

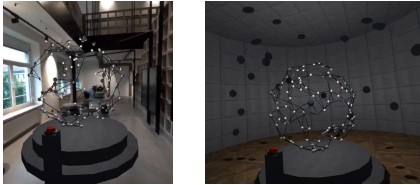
## Requirements

- 32
- Must, could, out-of-scope



## I.

### MR vs VR



- Mainly MR (safer)
- Short VR (immersive)

## II.

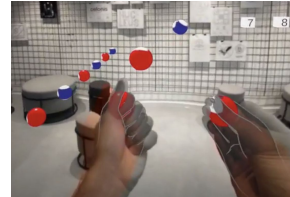
### ~~Eye Tracking~~ (Quest Pro)



- Interesting
- But needs calibration

## III.

### Hand Tracking / Grabbing



- Good enough

## IV.

### Technical Setup



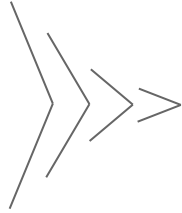
- Model View Controller
- Learned a lot



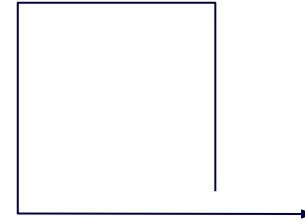


# Methodology

*Focus and iterative story creation*



- **Set focus:**  
Quest 3 - Focus on  
Interaction & Excitement,  
natural and easy to navigate  
with solid story



- **Iterative improvements**  
About 40 ongoing  
short-tests



# Implementation

*Experience Demo*



# Evaluation

*3 kinds of evaluation*



## **Semi structured ongoing user-tests**

Celonis employees

## **Structured extensive user-test**

15 Celonis employees and partners  
Approximate target group

## **Realistic tests with customers**

4 individuals, 2 customers  
target group





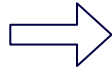
# Evaluation

# Ethical Considerations

*Low Risk: Standard Measures*

## Low risk:

- Extremely low cyber sickness
- Adults
- Voluntary



## Measures taken:

- Anonymized
- Consented
- Recording without faces
- Epilepsy warning

## Celonis

- Chief Design Officer
- General Manager Sales DACH
- Director Executive Briefing Center

### Departments:

Services, Partner Management, Academic Alliance, Consulting, EBC, PnE, Labs, Marketing, Sales

## Partner

- Senior Manager
- Team Lead
- Consultant

## Customer

*Big to large energy company:*

- SVP Customer Value
- VP Customer Base
- Process Analyst

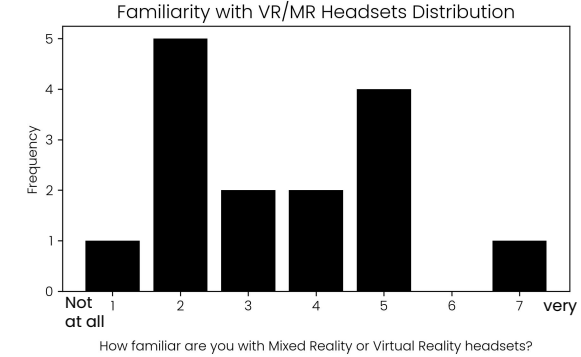
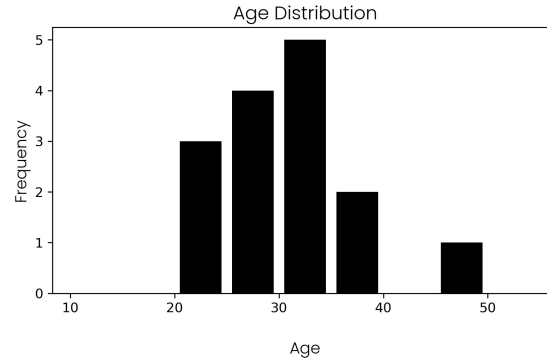
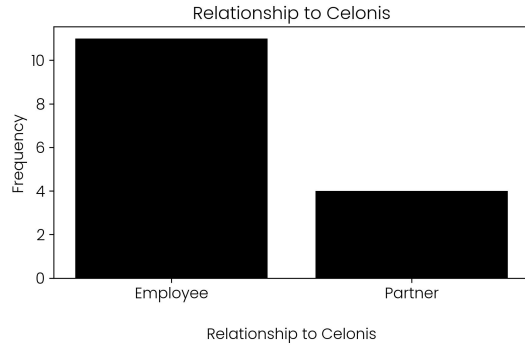
*Big manufacturing company:*

- VP Supply Chain

**Representative, senior** target group *or* **stakeholders** of the project.

# Demographics of quantitative results

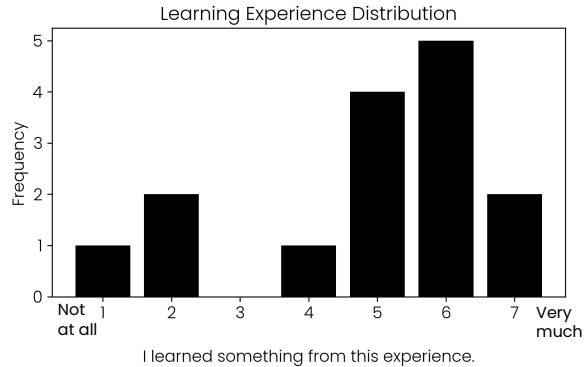
Full user test participants: 15 (4 partners, 11 celonauts)



A **diverse, medium** representative group.

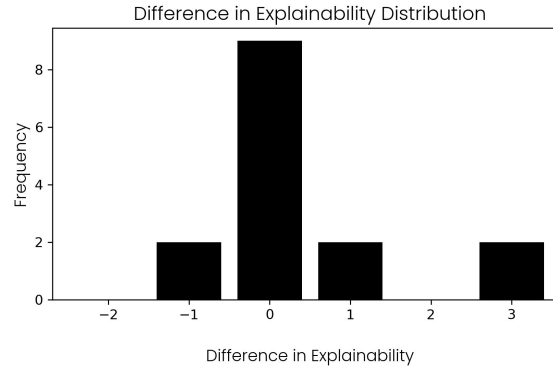
# Quantitative Results

Learning factors



Avg: 4.9

- Most participants say they learned something



Up 0.4 points

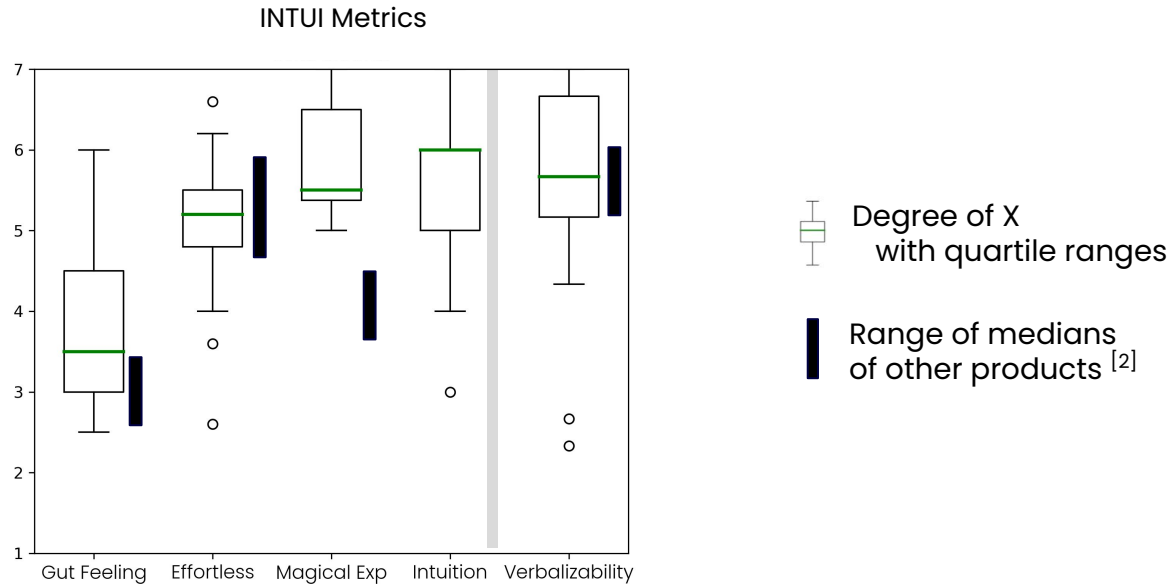
- But they don't feel more confident to explain OCPM

The experience should **not** be a **standalone OCPM learning.**



# Quantitative Results

INTUI Score

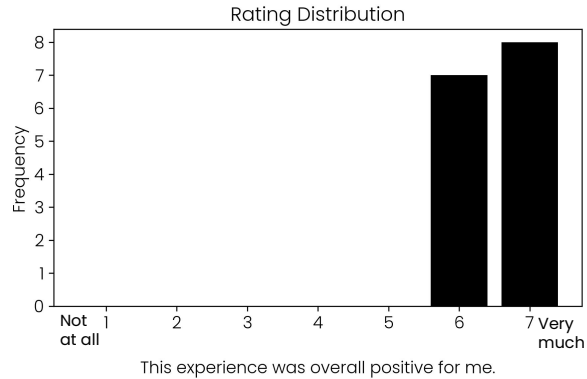


*Exceptionally high median compared to other INTUI tested products*

The experience is **very intuitive** and **magical** compared to other products.

# Quantitative Results

Overall rating



**All** participants think the experience **can be shown in the current state** to customers, partners, and celonauts.

- Very high rating\*

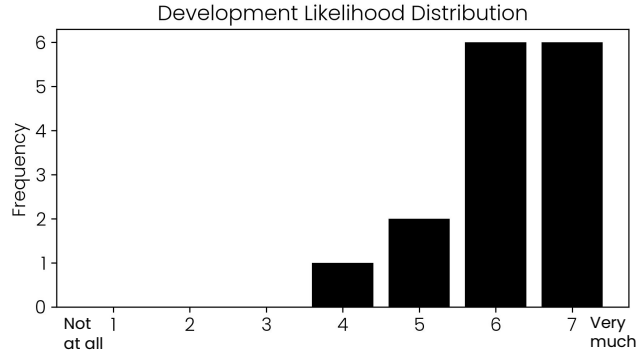
It is a **very well liked** experience.

\*Biases:

- Creator asked rating
- Technology excitement

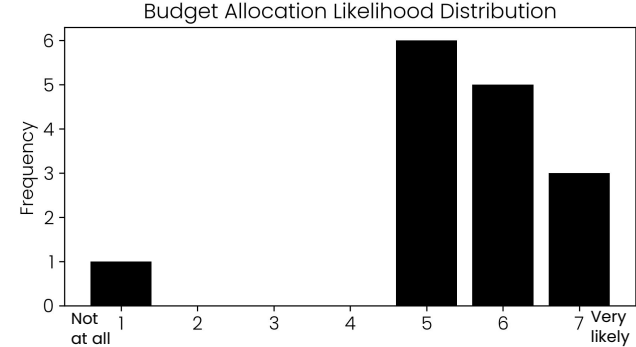
# Quantitative Results

## Budget allocation



In addition to the current state, the experience should be considered to be developed further.

- Should be developed further



How likely would you be to allocate budget or headcount to investigate Mixed Reality for Celonis?

- High bias towards allocating budget

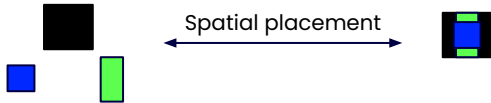
Further **investment** should be **allocated**.

# Qualitative Results

## Experience

- Natural **interactions** extremely positive

- Cognitive **overload**



- Non-optimal **subtitle placement**

- **Exploration** level



- Analysed 3 **specific** points where people got stuck

## Setup

- Showing **live screencast** to colleagues **stressful**?
- **Multi User Support** for time efficiency?

# Qualitative Results

## Content

- Didactically well perceived
- 9 min good length
- **Individualization** wanted

## Additional Areas

- Events
- Academic:
  - Academic partner days
  - Guest lectures

## Bugs

- 1 trigger failed once
- Button presses unintentionally aborted

# Future Steps

Celonis wants to invest



## 1. Sales

- Additional **requirements** beyond thesis scope
- Use and make it **stick**:
  - Train sales staff
  - Get to customer meetings and events

## 2. Academic Alliance

- Expansion plans
  - Potentially hire Unity dev working student
- **Tests** scheduled with the “*Godfather of Process Mining*” **Professor**
- Discussion:  
Exhibition in **German Museum**



# Conclusion

*Learnings and contribution*



- Can the **experience** be a **standalone learning**? - No
- Are there **good MR usages** to **improve sales**? - Likely, but not tested
- Can **Community Building** help create **relevance**? - Likely, but not tested
- Is Mixed Reality a way to **spark excitement** in professional sales? - Likely
- Can Quest 3 experiences be perceived as **intuitive** and **magical**? - Yes
- Is Celonis willing to **allocate additional funds**? - Yes





**Thanks to my Advisers**  
for their great support!