

# Collaborative Software Exploration with Virtual Reality in ExplorViz

Bachelor's Project Presentation

Daniel König & Malte Hansen

20.09.2018



# Outline

- Motivation
- Concept
- Live Demo
- Evaluation
- Conclusions / Future Work



# Motivation

- Goal: VR mode of ExplorViz [Fittkau et al. 2017] to be collaboratively usable
- Alternative to working as a team in front of a screen
- Analog approach to 3D printed models (but better)
- Geographical independence

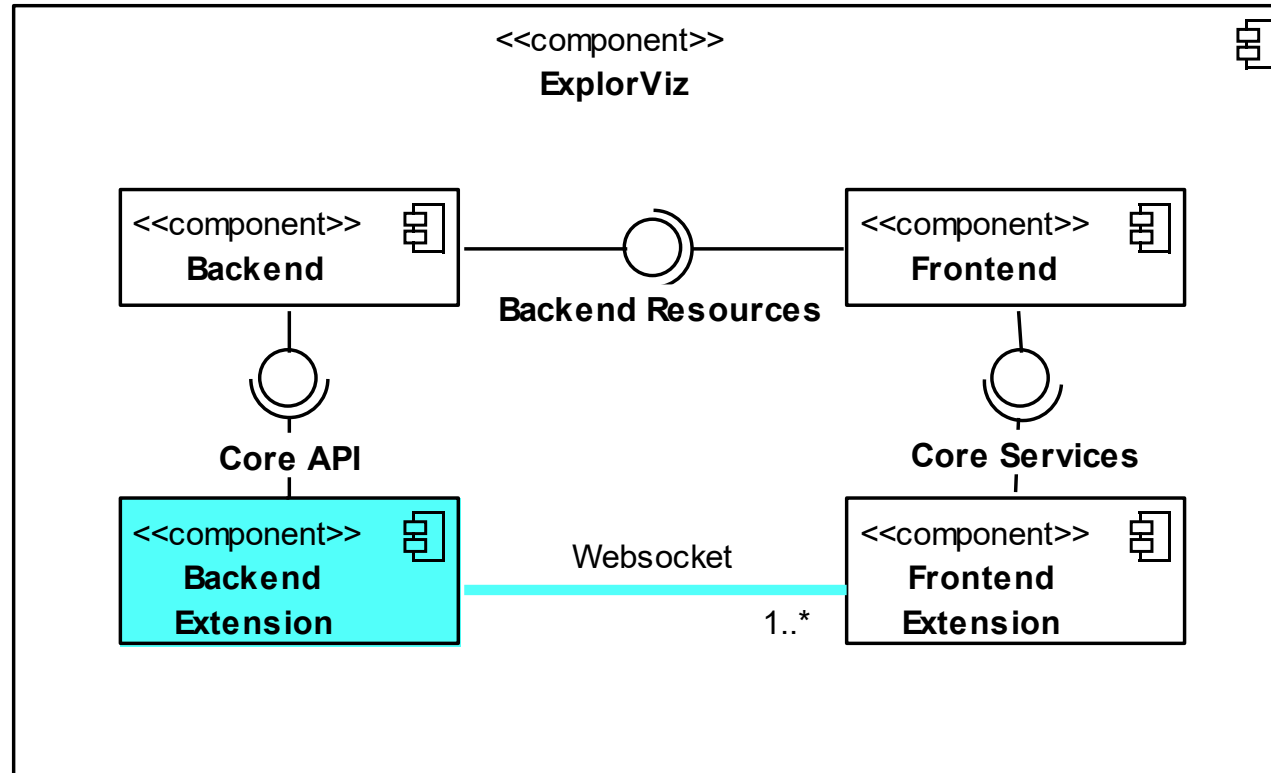


# General Concept

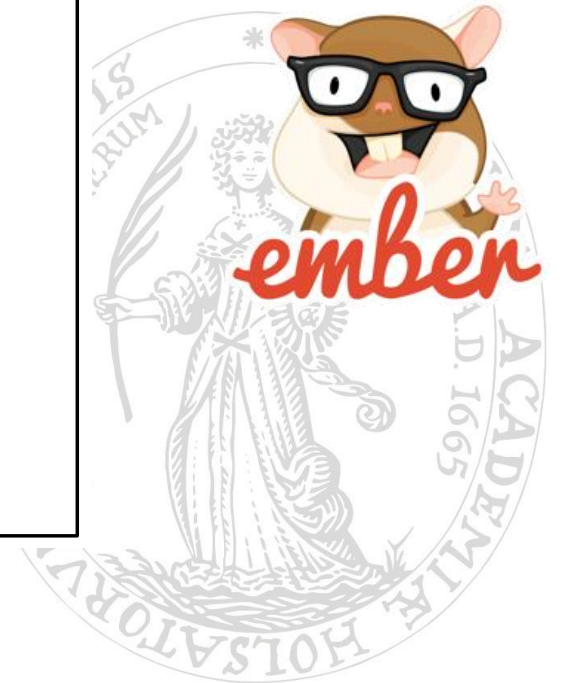
- Users should use the same virtual space
- Synchronization of the users' worlds
- Any user can manipulate landscape and applications
- Users should be able to highlight components for others



# Concept - Components

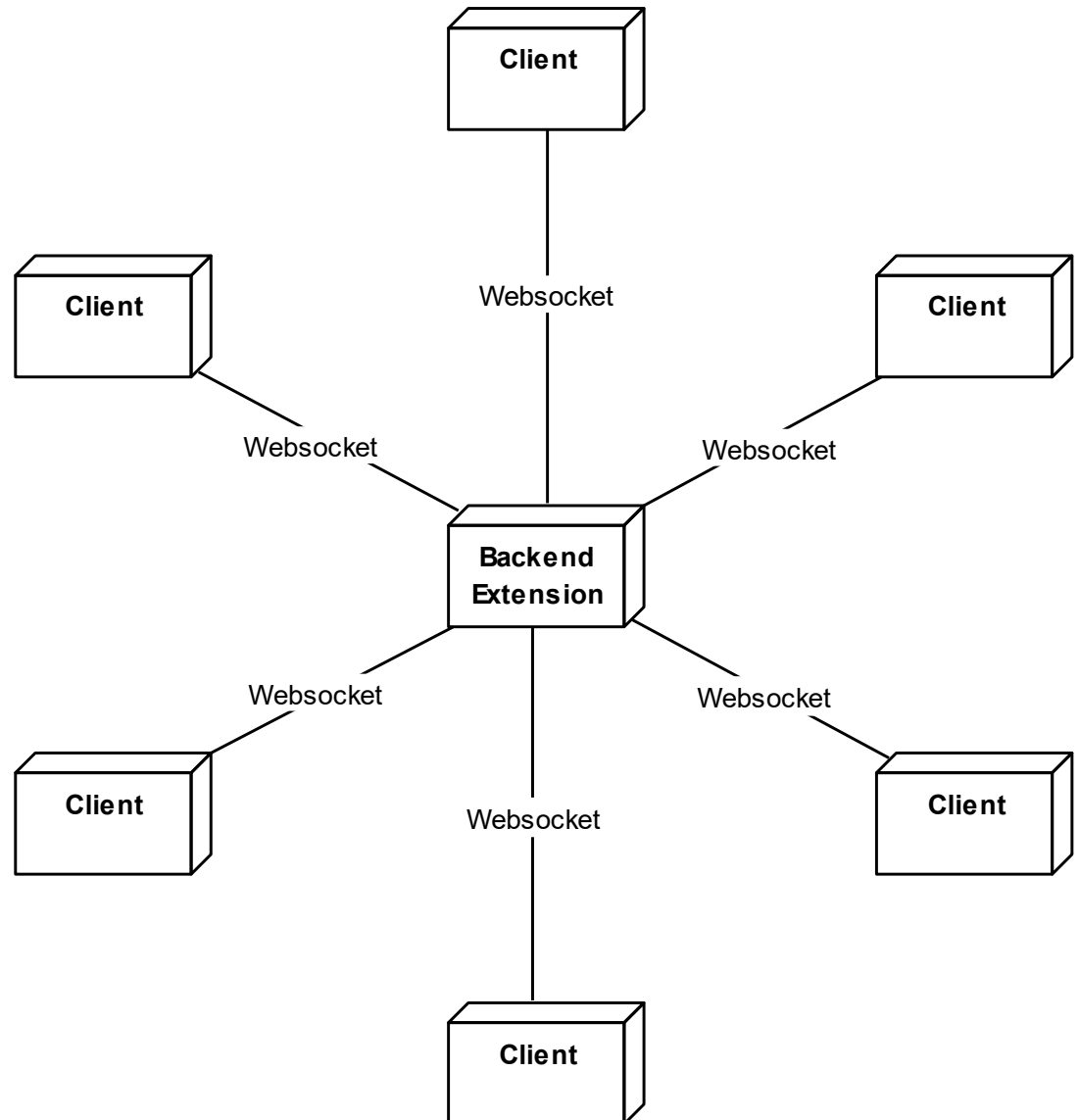


[Zirkelbach et al. 2018]

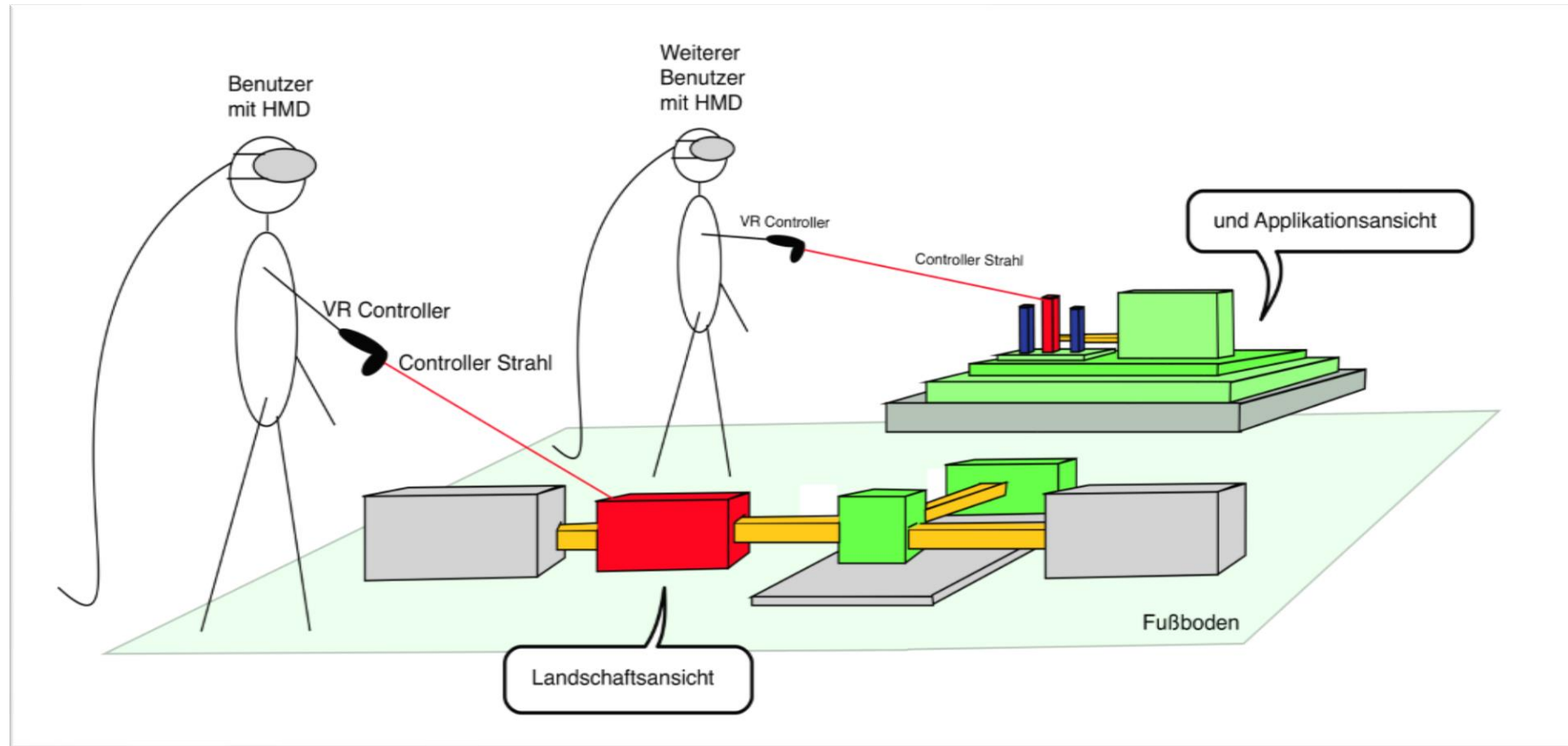


# Concept - Architecture

- Star topology
- Backend saves latest state of landscape and applications
- Connection via WebSockets
- JSON as data interchange format



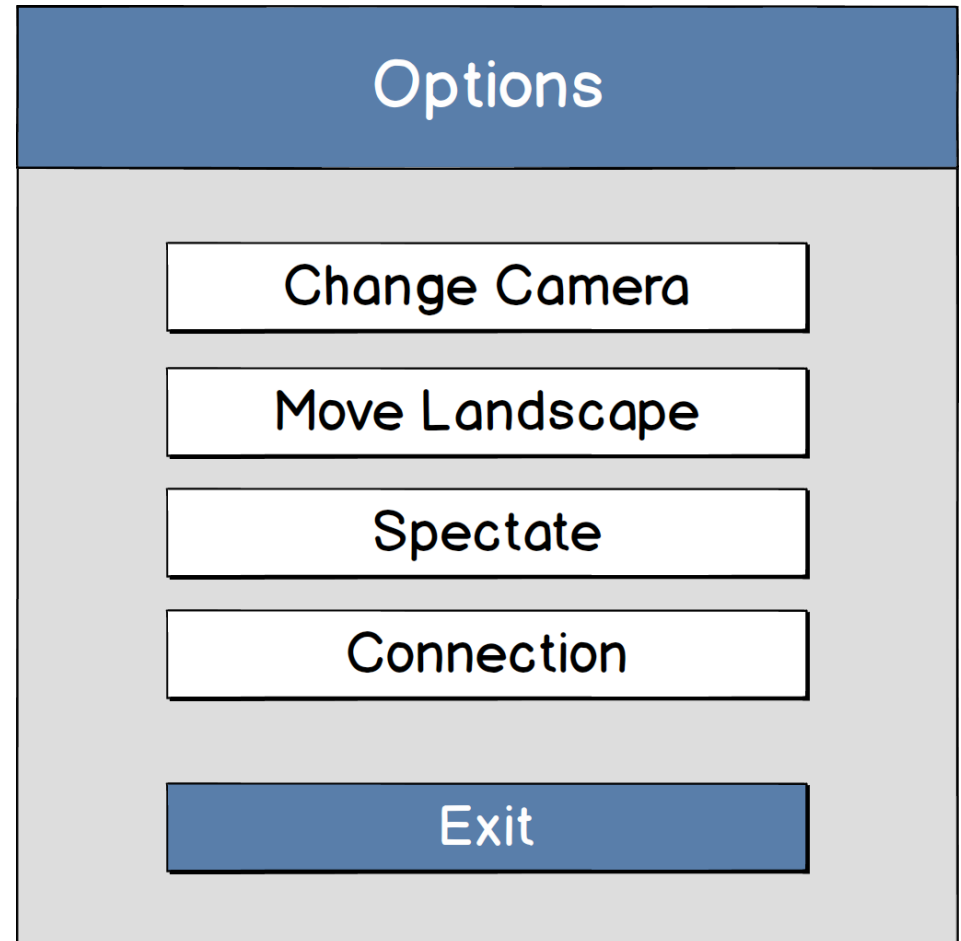
# Concept Visualization



Concept Drawing [Häsemeyer 2017]

# Concept - Menu

- Add additional functionalities
- Make available via menu
- Menu attached to left controller
- Interact using right controller





# Concept – Text Overlays

- Inform users about connection updates
- Add hints for improved usability

New connection from user  
**admin**

No data available for application  
**databaseConnector**

# Live Demo



# Evaluation – Procedure

- Gather personal data
- Give introduction to ExplorViz and controls
- Training phase with small landscape
- Read them tasks
- Probands rate the user experience



# Evaluation – Experimental Setup

- 3 computers in same room connected via LAN
  - 1 running ExplorViz backend
  - 2 running ExplorViz frontend with VR
- Oculus Rift with 3 sensors, 2 controllers
- HTC Vive with 2 base stations, 2 controllers



# Evaluation – Participants (preliminary)

- 20 participants (10 groups of two)
- Average participant:
  - 25 years old, male
  - Studies computer science
  - Experienced with object-oriented programming
  - No experience with ExplorViz or VR
  - Knew the other participant in their group



# Evaluation – Results & Discussion (preliminary)

- Very positively rated:
  - Impression to be in the same virtual room
  - Movement of application
  - Absence of nausea during non-spectating phase
  - Intuitive movement
  - Amount of text overlays



# Evaluation – Results & Discussion (preliminary)

- Very positively rated:
  - Movement synchronization (without delay)
  - Highlighting
  - Menu structure
  - VR extension suitable for teamwork



# Evaluation – Results & Discussion (preliminary)

- Mixed rating of spectating feature
  - 6 probands felt nausea or alike, all of which are afraid of heights
- Bigger study needed for more significant correlations





# Conclusions

- VR mode now supports collaborative software exploration
- Usability improvements by adding overlays and customizations
- Usability validated through conducted evaluation



# Future Work

- Further usability improvements (e.g. options to switch left/right controls)
- Tutorial for beginners
- Further studies with more participants
- Augmented reality

Thank you for  
your attention!



# References

- [Häsemeyer 2017] T. Häsemeyer. Kollaboratives Erkunden von Software mithilfe virtueller Realität in ExplorViz. Bachelor thesis. Kiel University, Sept. 2017.
- [Fittkau et al. 2017] F. Fittkau, A. Krause, and W. Hasselbring. Software Landscape and Application Visualization for System Comprehension with ExplorViz. Information and Software Technology 87 (2017).
- [Zirkelbach et al. 2018] C. Zirkelbach, A. Krause, and W. Hasselbring. On the Modernization of ExplorViz towards a Microservice Architecture. In: Combined Proceedings of the Workshops of the German Software Engineering Conference 2018. CEUR Workshop Proceedings, Feb. 2018.

