REFLECTING ON DESIGN PRINCIPLES FOR LEARNING

Virtual reality in science education

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1st Electronic Conference on Universe

JOINT WORK

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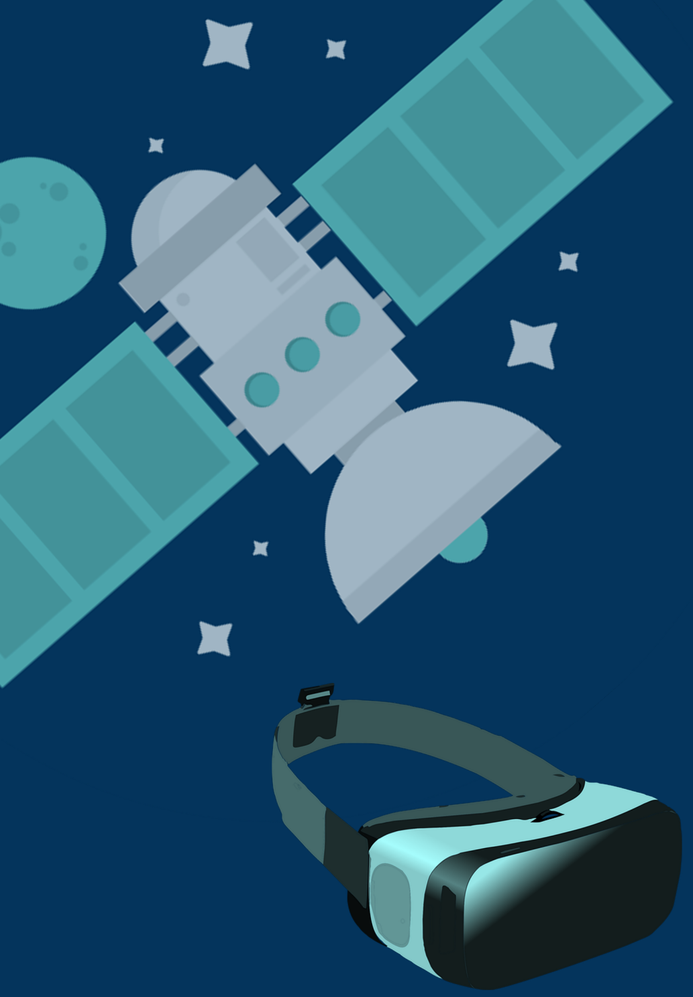
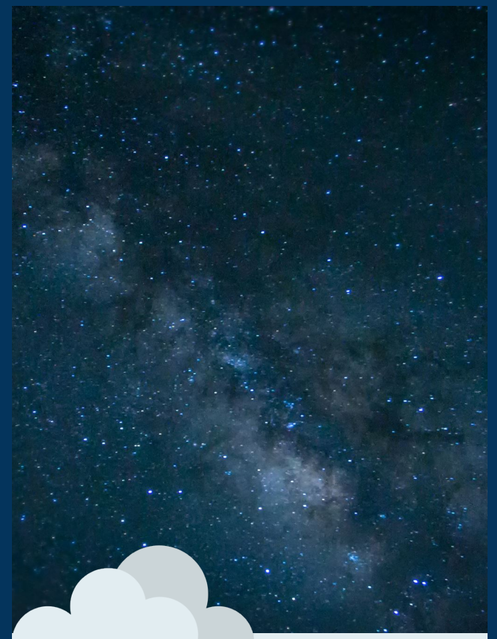


ROAD MAP

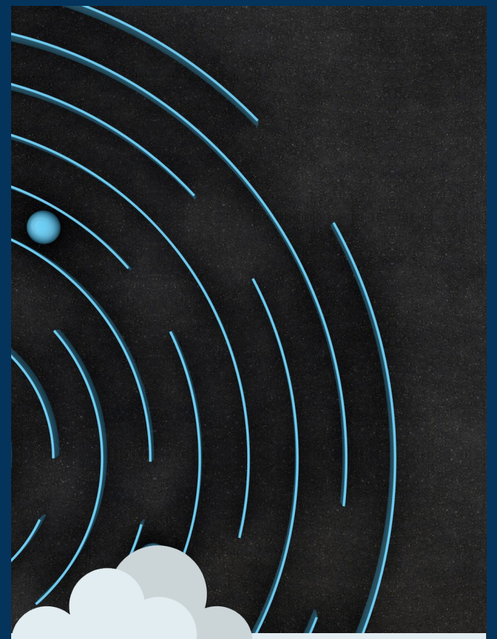


Motivation

Why reflect on design principles?

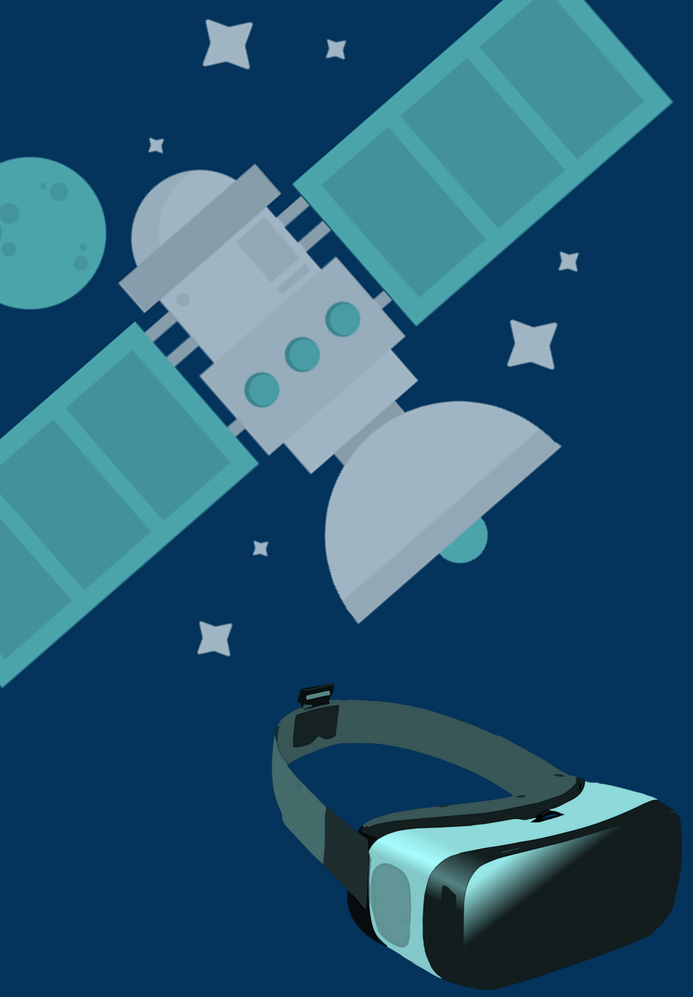
Context

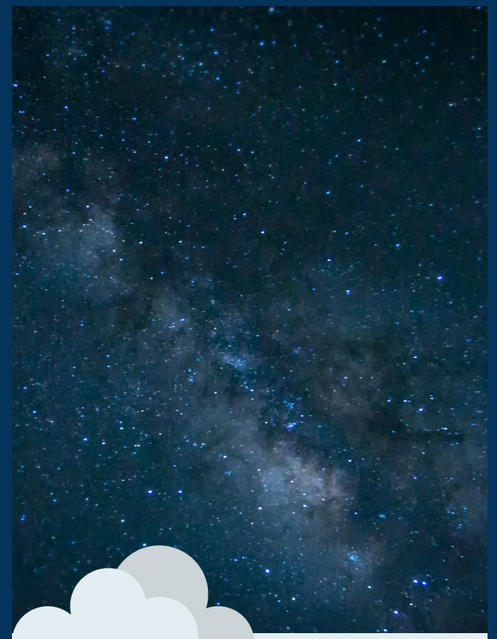
Virtual reality in science education



Findings

Insights through reflection-on-action





Motivation

Why reflect on design principles?

Virtual reality presents exciting opportunities to transform science education.

Visualisations are powerful tools for science learning.

But there is more to VR…

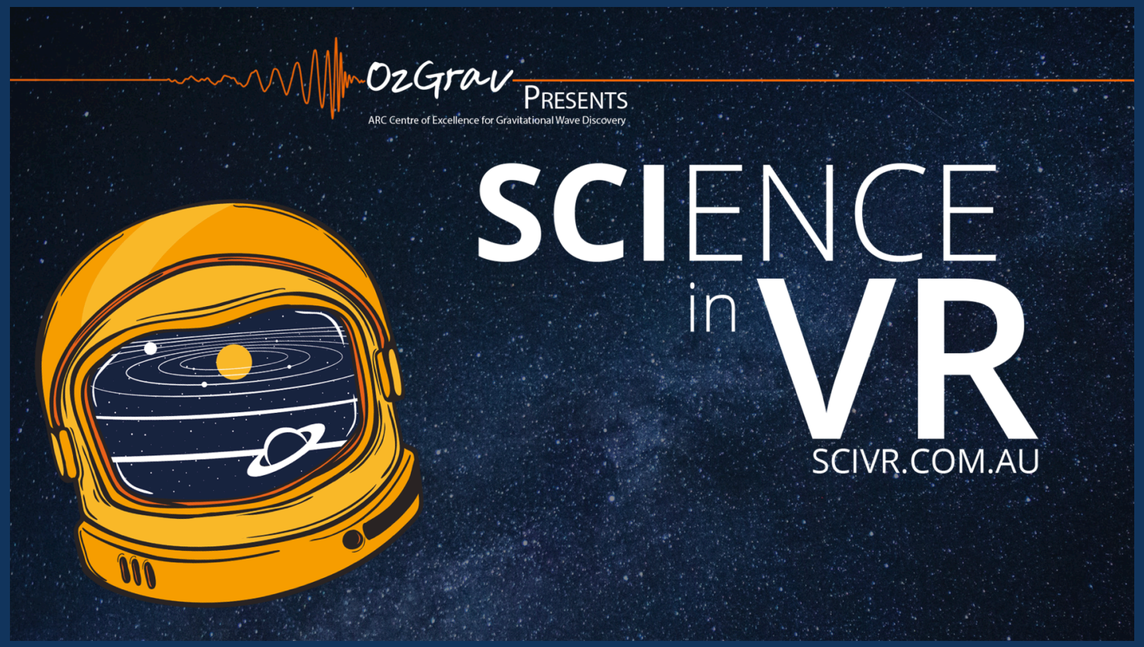
VR creates contexts that are far from our natural sensory capabilities or that are not accessible in the real world.

VR transforms interactions with scientific concepts into embodied experiences.

VR promotes spatial abilities, practical skills, and inquiry learning.

www.ozgrav.org

There is a lot of VR out there – resources, lesson plans, research, …



What goes into the design process?

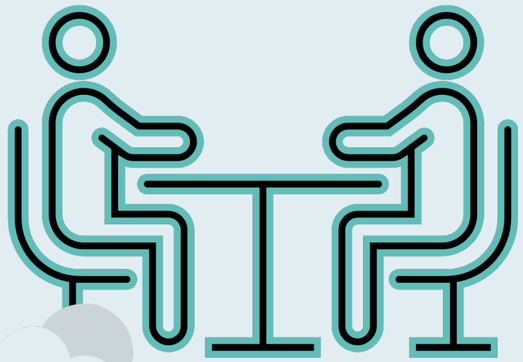
Which decisions are made? On what basis?

With which goals in mind?

Our goal: reflect on decisions that inform the design process & articulate design principles

Reflective practice

Reflection-on-action allows examining design practices critically (Schön, 1983).

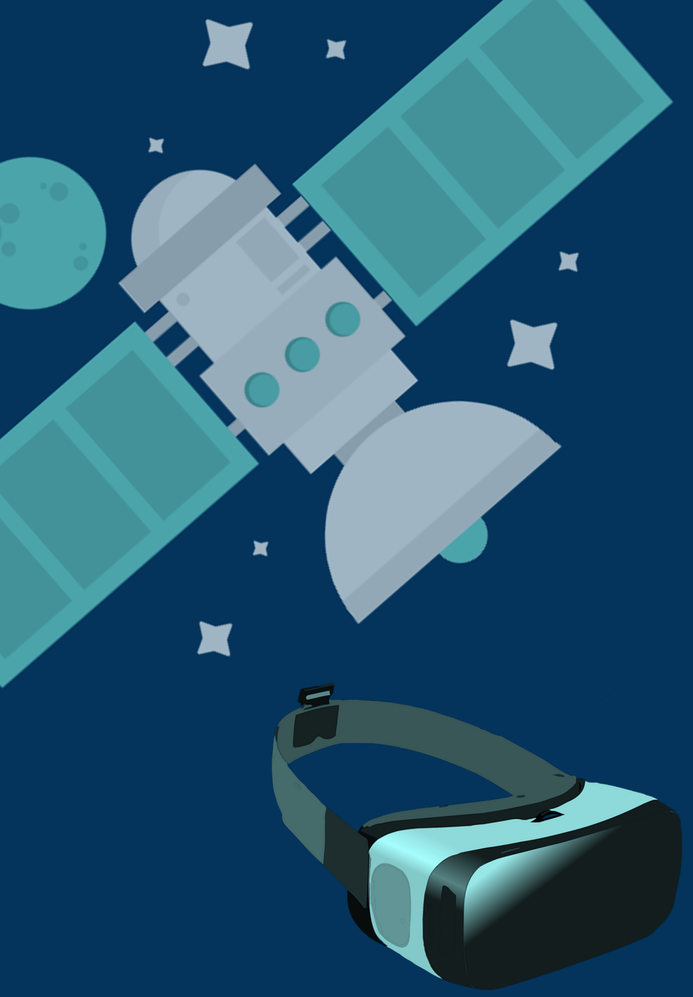


Dialogue

We unpack decisions through a dialogue between researchers & practitioners.

Perspectives

We articulate design aspects from multiple perspectives (users, facilitators, developers,...)



Context

Virtual reality in science education

This work is a follow-up study to a project that set out to study engagement with VR…

How do visitors engage with a virtual reality tour at a science festival?

INTERNATIONAL JOURNAL OF SCIENCE EDUCATION, PART B
https://doi.org/10.1080/21548455.2020.1857458

Routledge
Taylor & Francis Group

OPEN ACCESS Check for updates

Exploring participant engagement during an astrophysics virtual reality experience at a science festival

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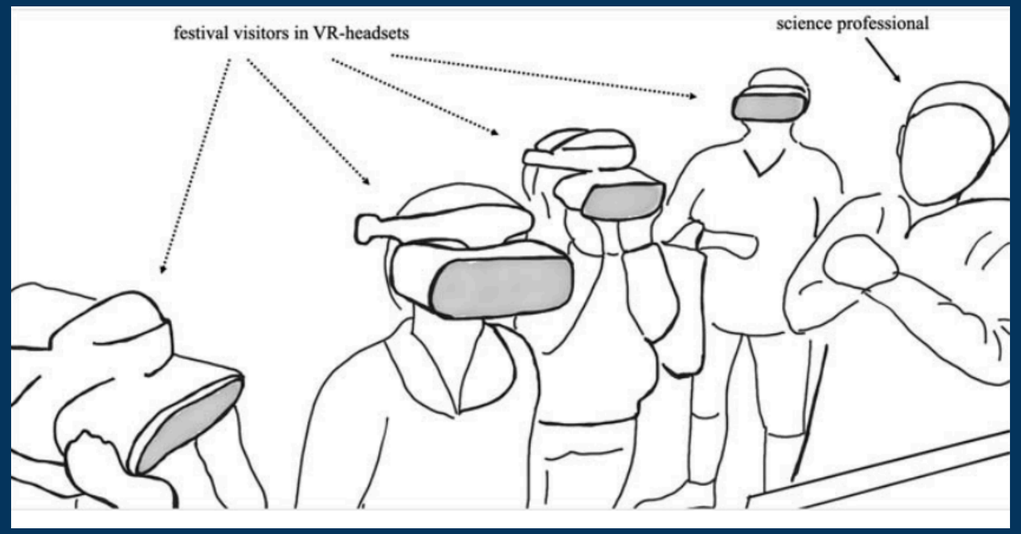

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THE UNIVERSITY OF MELBOURNE

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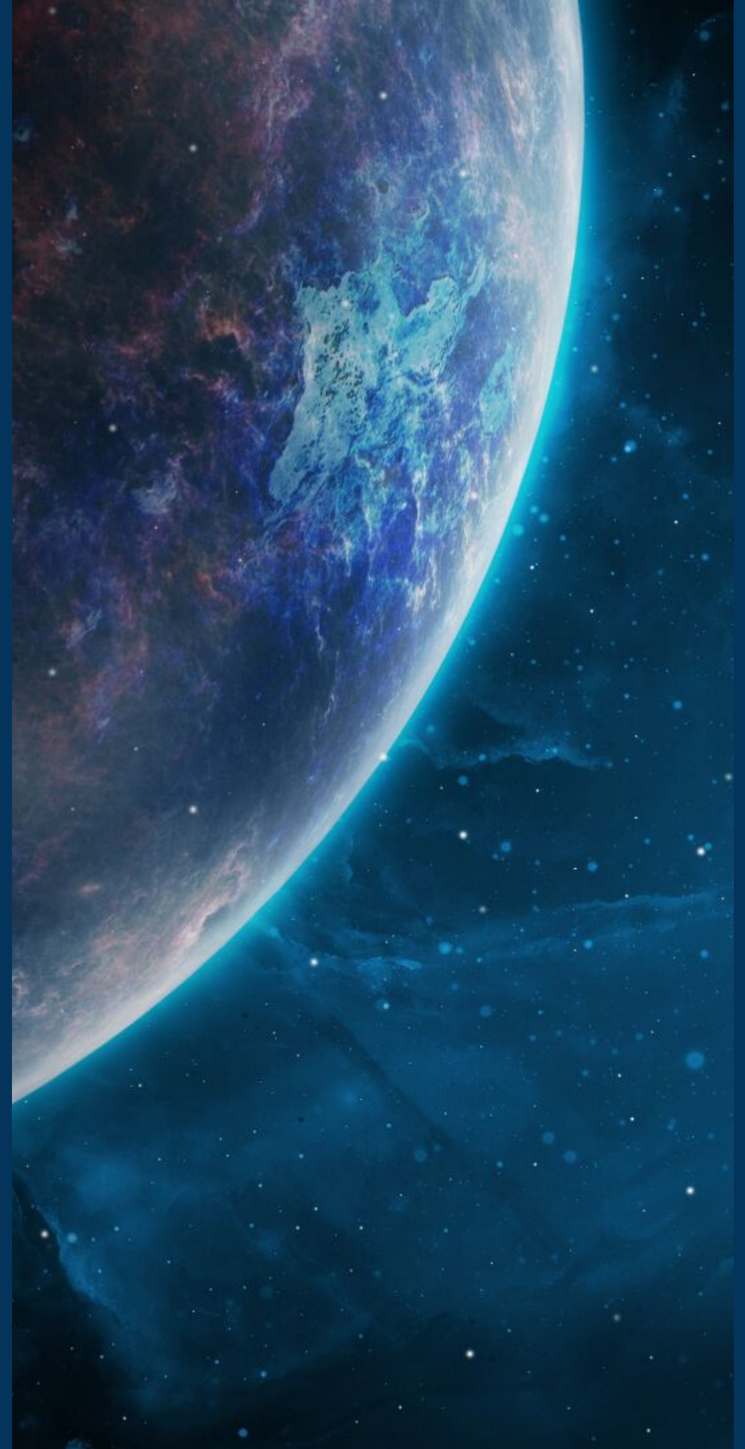
Australian Government
Australian Research Council

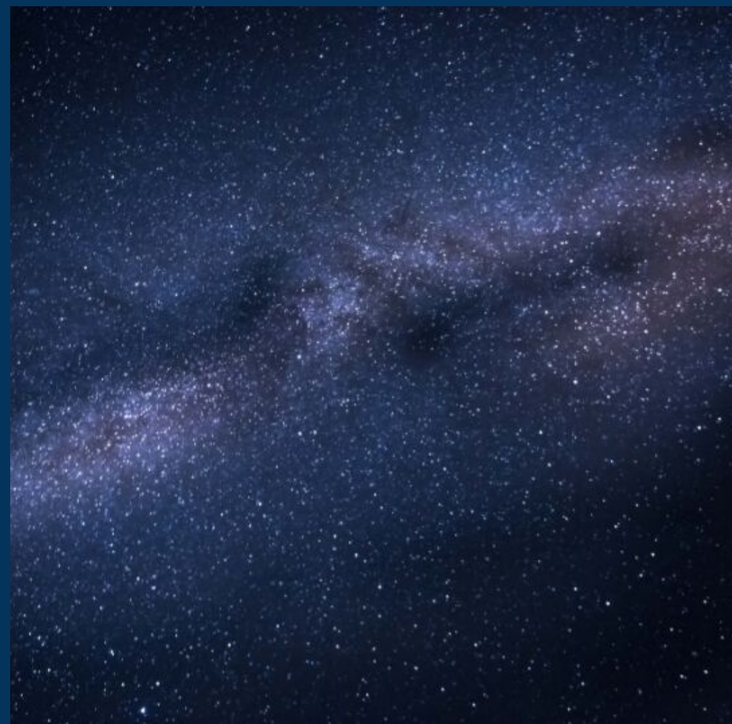
Vision of OzGrav: To inspire young people to take up careers in science & technology.

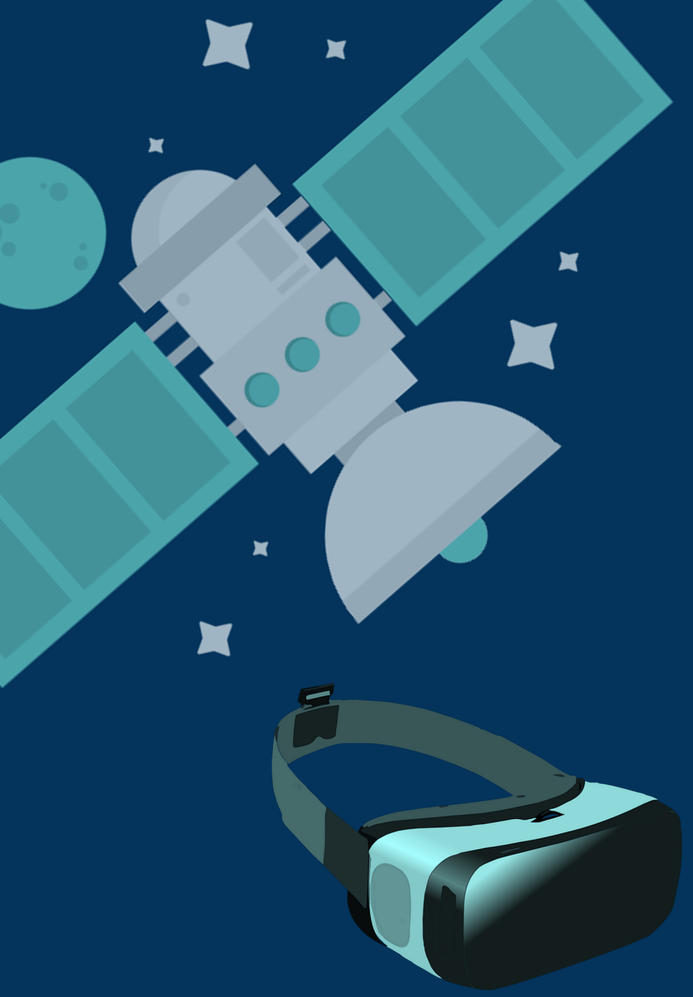
The OzGrav education and public outreach team is an interdisciplinary team of science educators, science communicators, astrophysicists & VR developers that develop education & outreach programmes to educate the public about the nature of our universe.

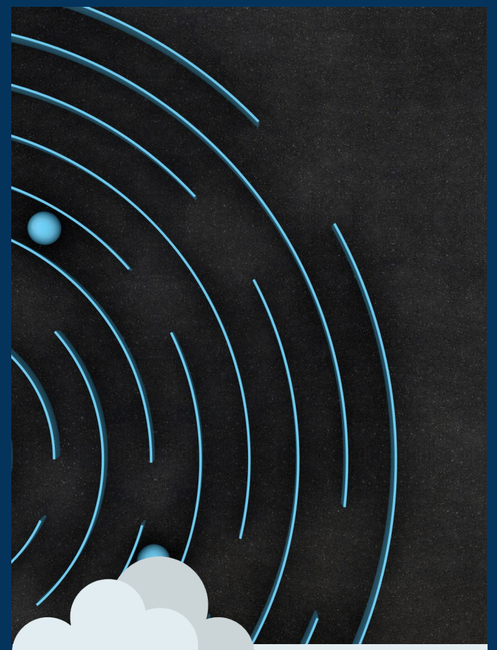
A focus group interview with the OzGrav EPO team serves as the starting point for our design dialogue.

We draw on secondary data collected at a science festival to illustrate key aspects of the design decisions.







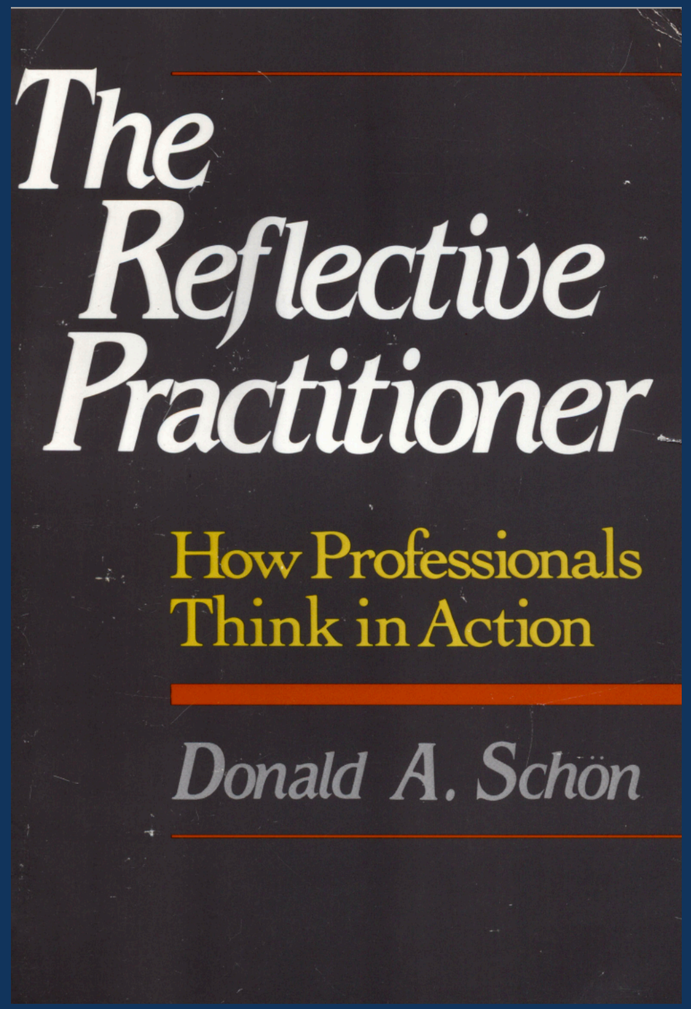


Findings

Insights through reflection-on-action

Here, we focus on two out of five design aspects that we have identified as being crucial.

Reflection-on-action describes the retrospective reflection on practices to analyse and interpret the knowledge that practitioners use “in action”.



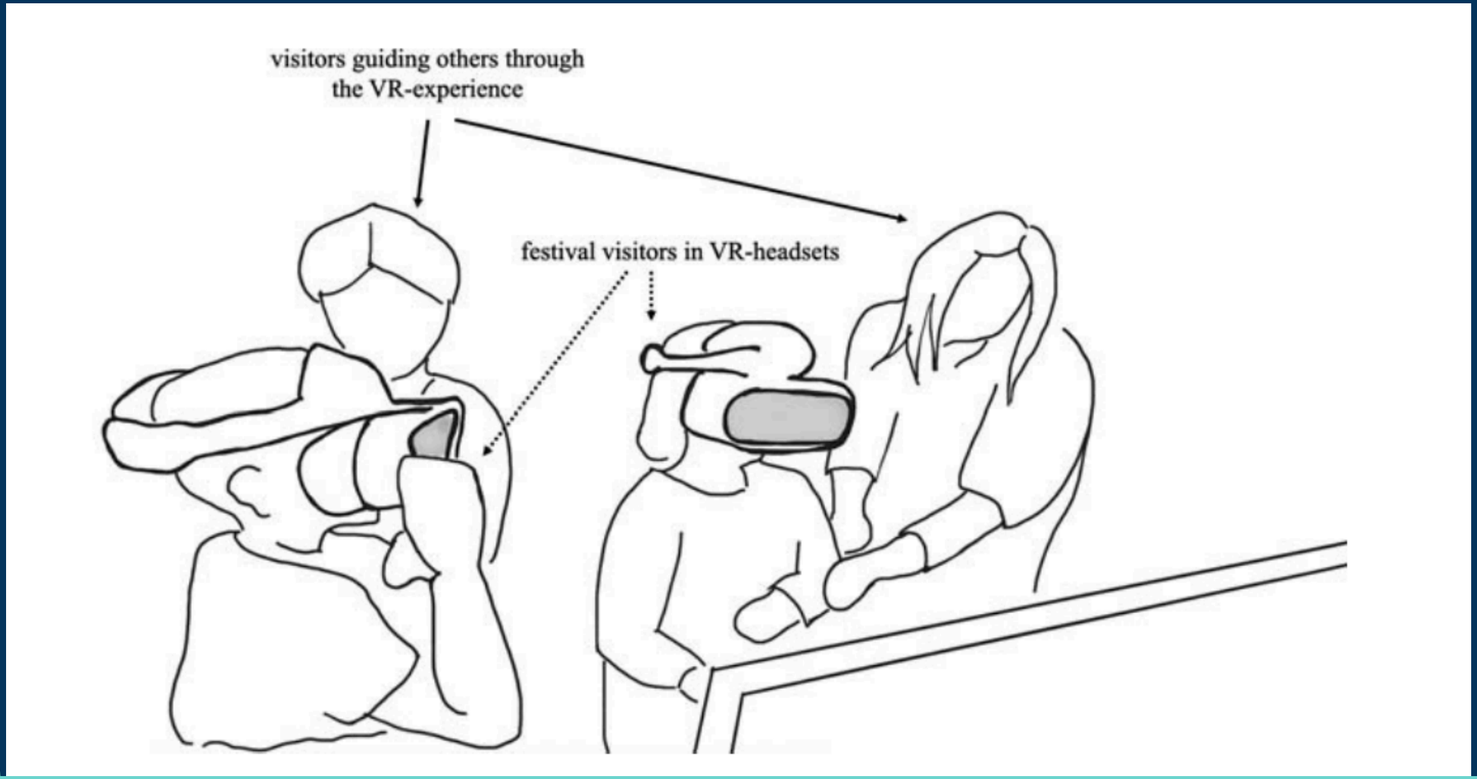
Donald A. Schön. (1983). The reflective practitioner. New York: Basic Books.

1. How do you design for collaboration and social interaction in the context of VR-learning?

Although many view VR as an individual technology, there is compelling evidence that VR environments can lead to richer and more effective collaborative learning.

”I would like them to experience it as a group event, not as an individual isolated thing. So, I’d be more interested in people getting together like we have with the big events and having a shared experience than somebody sitting at home just looking at stuff.”

As technology develops, we recognise more opportunities for collaboration and social interaction between participants within and across virtual experiences, for example by allowing participants to communicate with each other inside and outside of the virtual spaces.



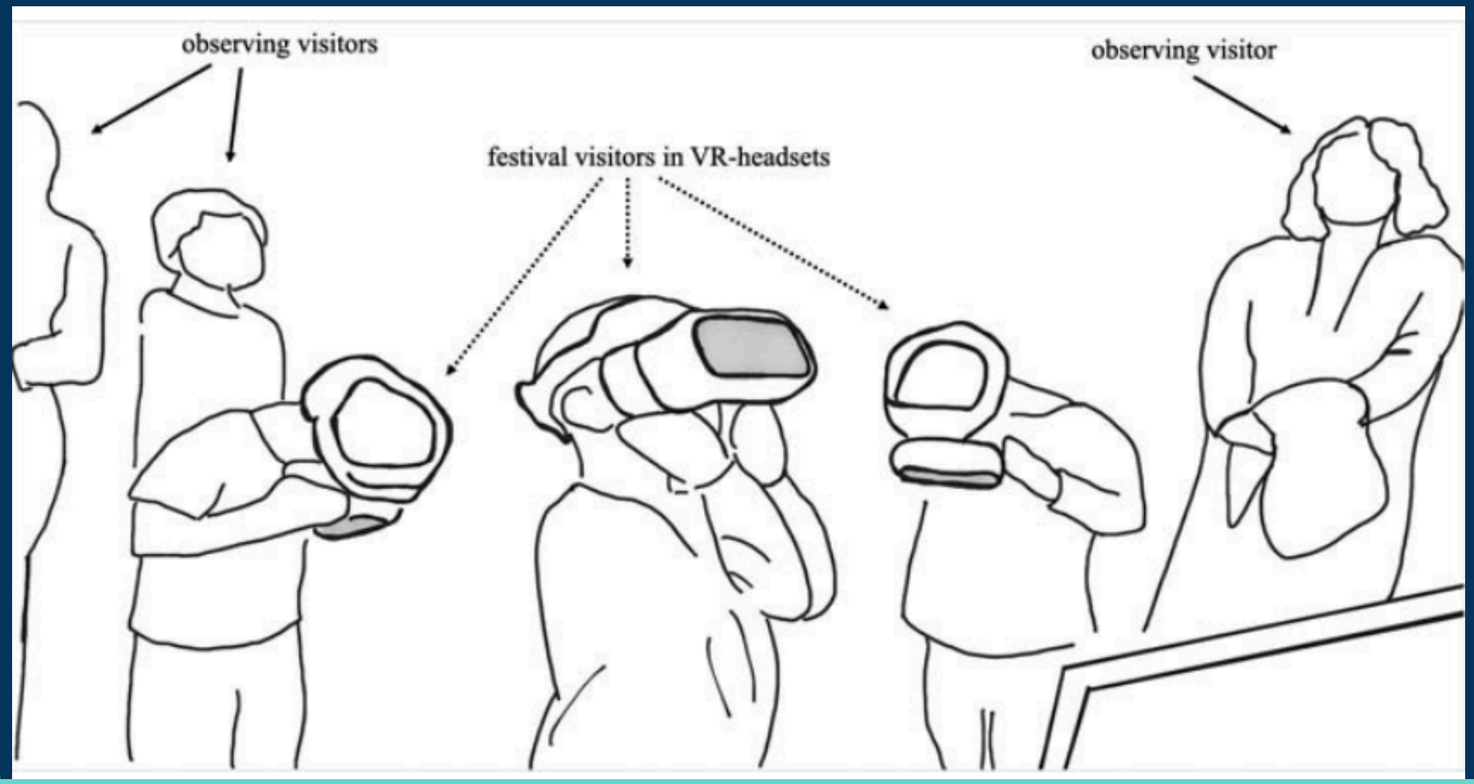

STARS ARE GAS
STARS ARE
STARS ARE
STARS DIE
BIG!

2. How do you negotiate roles while being a participant or observer in the VR experience?

What does it mean to participate in a VR experience?
How can we build trust so that participants don’t feel as if they are on display?

“We do work with people in VR, and we have to be cognizant that the experience may be different and may not always be good for everyone. So, when we are working with groups, we have to remind them ‘you don't have to do this’. And that's why we have the screen casting, so people can still get the experience without being in it. Ideally, we provide a safe space for it and we have this risk assessment that we do, tell them that if they don't feel well, that they can just lift it off their heads or raise their hands. (…) I think those are a useful reminder that everyone will have a different experience in VR.”

Participants that do not wear VR-headsets can guide those in the VR environment by posing questions or prompting them to explore features of the virtual space. This way, the experience becomes a shared experience across the VR environment, the screencasting, and the physical space. Everyone can be involved.

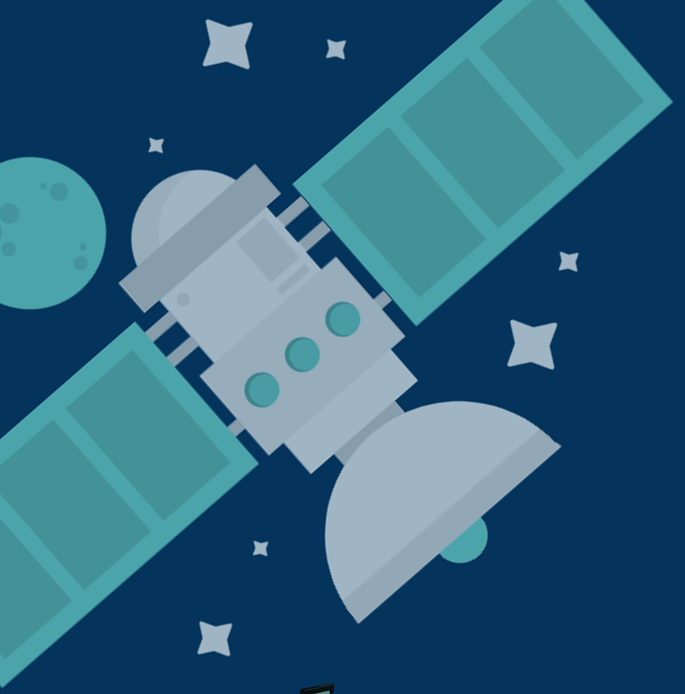


There is more to explore…

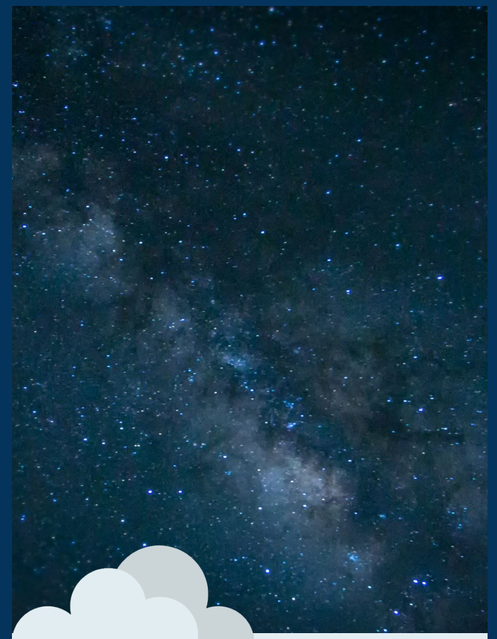
How do participants draw on their embodied experience to orient themselves in virtual spaces?

How can we find a balance between visual richness & accessibility of the experience?

What are limitations of what VR can visualise?



SUMMARY

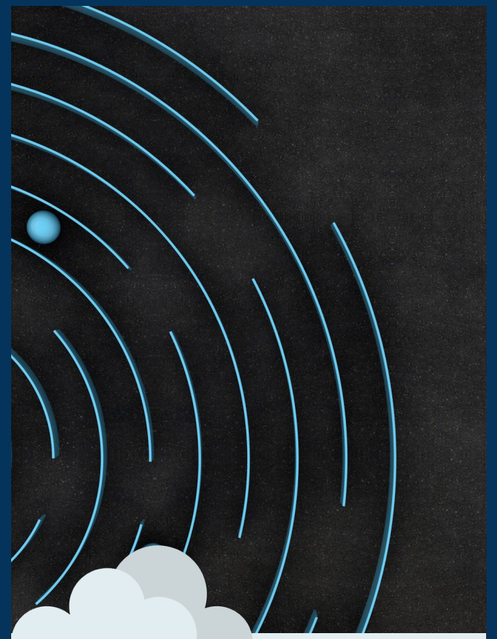


Motivation

We aim to shed light onto the actual design process &design principles.

Context

This work is grounded in the EPO programme of OzGrav.



Findings

We identify key aspects through dialogue & reflection-on-action.

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Research

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