Npuls

Insights
Streaming XR - Needs assessment

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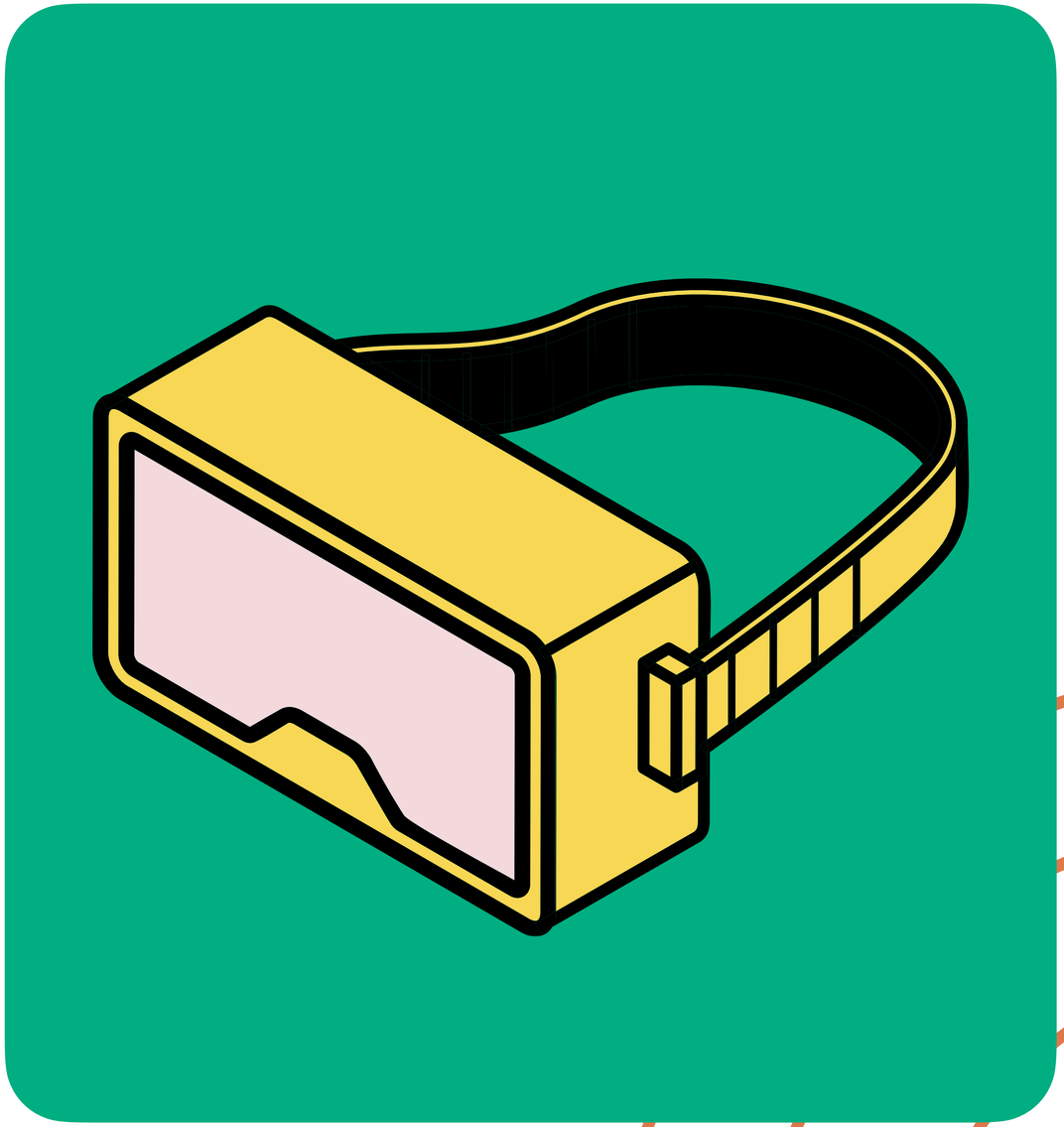
Ineke van Gelder, Edwin Lieftink, Hizirwan Salim

Introduction

In March-April 2024, we interviewed 17 educational professionals who use XR in their teaching practice. In these interviews, we gained an understanding of how they prepare their classes, what is going well and what challenges they face.

Insights from the interviews will help us formulate a recommendation for widespread implementation of streaming XR as a service in tertiary education, based on testing our assumptions about desirability, feasibility and viability.



Needs assesment

Drawing on insights from the needs assessment,

The pilothub XR within Npuls will contribute to draw up a recommendation for widespread use of streaming XR as a service in Dutch tertiary education (vocational education training schools, universities of applied sciences and research universities).

These insights also have added value for the other teams in the XR Pilot Hub, such as those working on the ‘organisation’ and ‘content’ epics.

We want to understand the following:

- Are the potential benefits of streaming XR **of value** to XR lecturers and support professionals?

- How do lecturers and support professionals currently **experience** XR classes?
(what is going well, what are the obstacles they encounter, what do they consider important, how do they make choices, etc.)

- How do lecturers and support professionals **organise** an XR class?
(how many students are taking an XR class simultaneously, do they do it together or alone, which rooms do they use, who supervises these classes, with what hardware and content, etc.)

17 interviews

We explored the context and experiences of a lecturer and/or support professional with XR in interviews of approximately 60 minutes.

We interviewed 17 educational professionals working at publicly funded educational institutions (mbo, hbo and wo):

- from different types of training programmes (hairdresser, architect, nurse, etc.)
- with XR in the curriculum
- with experience in XR classes
- throughout the Netherlands

Summary

Summary

Drawing on the validated and refuted assumptions as well as responses to a nationwide streaming XR service, we have learned the following in this needs assessment:
“Educational professionals do **not immediately have a clear picture** of what a national XR streaming service entails. The comparison with Netflix is quickly made. When it comes down to it, they **prefer mobility** to higher image quality. Sharing XR content is seen as a **good counterbalance to current commercial players** in the market. At the same time, an XR streaming service raises questions about **costs and cost-sharing** between educational institutions that develop XR applications and educational institutions that purchase them. Self-developed XR applications, in particular, are seen as a **unique selling point for the educational institution**. Besides streaming XR content, there is also a need for a collaborative **development environment for customising, enriching and developing** XR applications.”

Assumptions

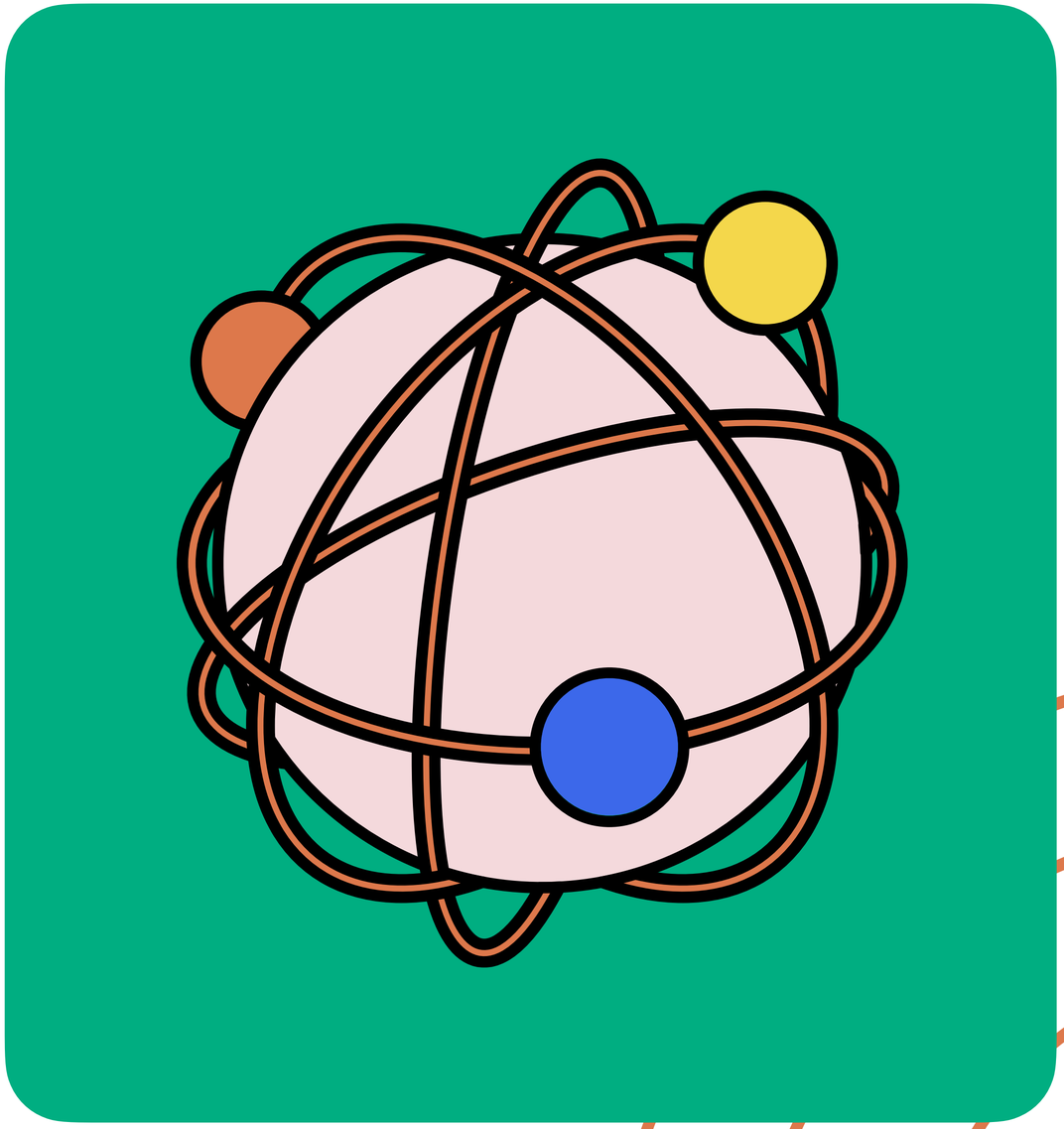
Types of assumptions

Desirability: assumptions about the extent to which we solve a problem – for the user.

Feasibility: assumptions about the workability of the solution – consider for instance organisation, technology, resources.

Viability: assumptions about the extent to which the solution is affordable and scalable.

Assumptions are positively worded, true/false, singular (i.e. do not combine multiple assumptions in one).



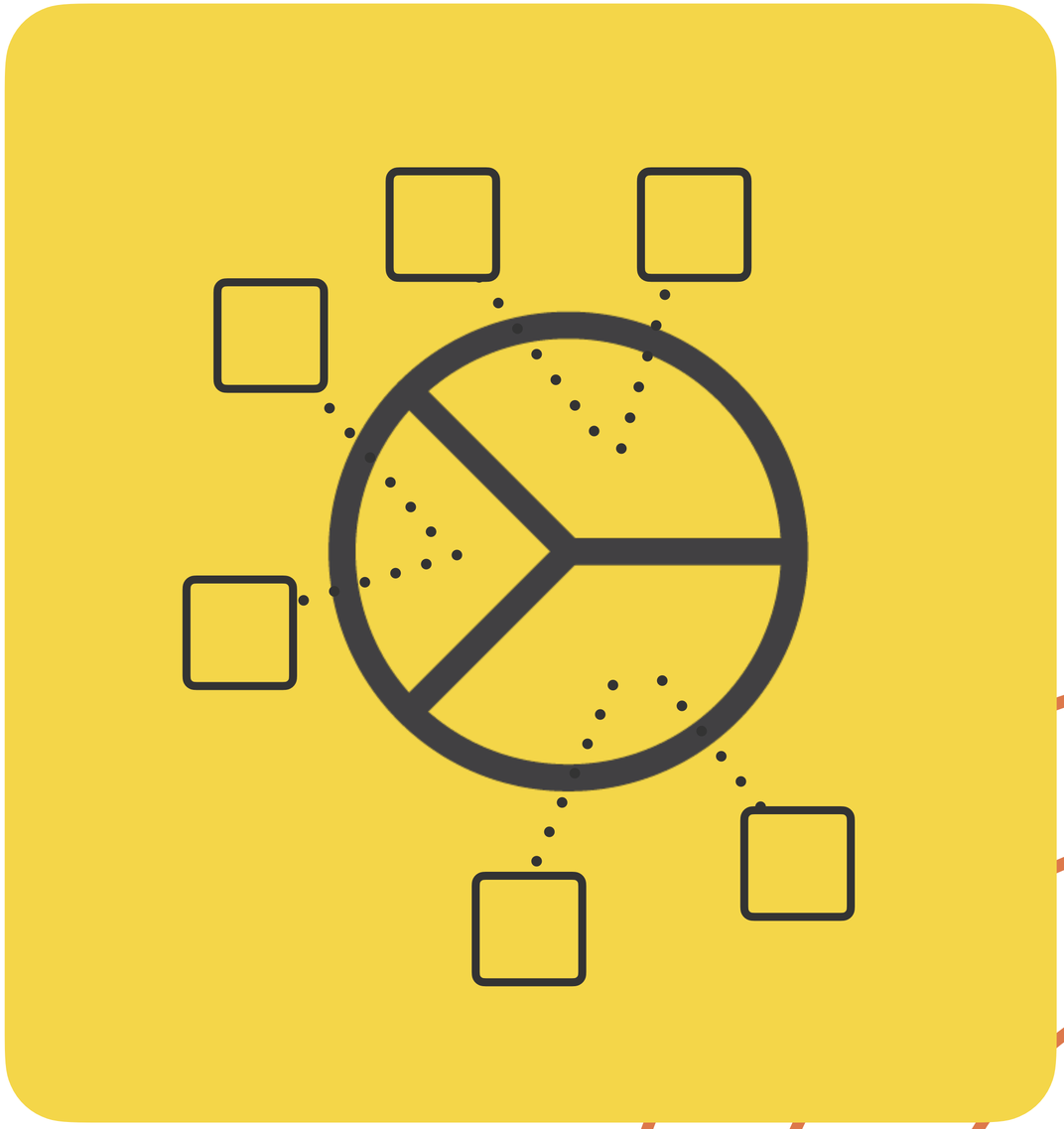
Desirability

01 | Educational professionals would like to prepare a class/practical in which XR is used in less time, without learners in the room.

02 | Educational professionals would like to start a class/practical in which XR is used in less time, with learners in the room.

03 | Educational professionals would benefit from learners being able to remotely take the class/practical in which XR is used.

04 | Educational professionals would like to easily observe learners XR experiences.



Feasibility

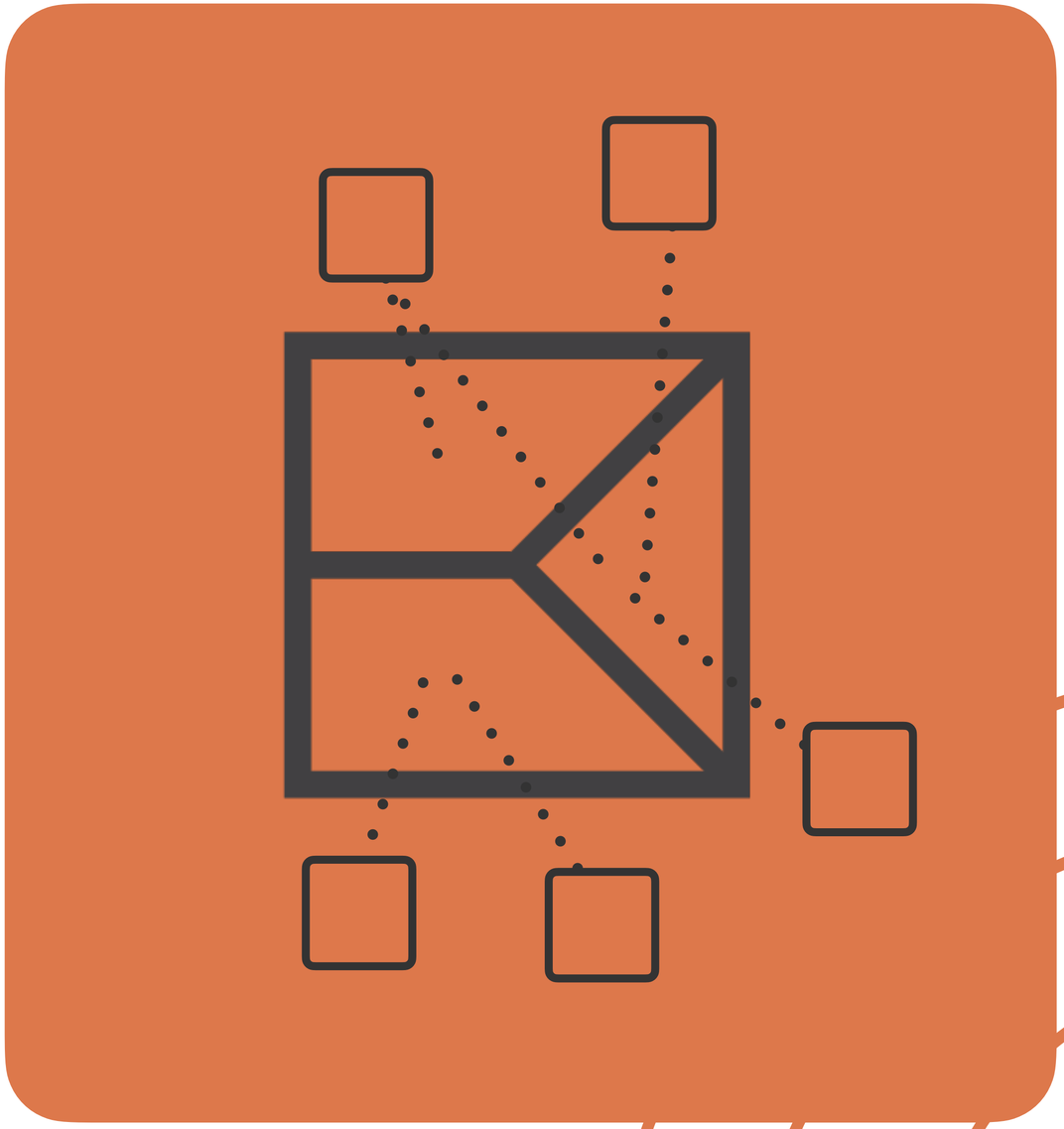
05 | Educational professionals prefer planning their class/ practical in which XR is used in advance.

06 | Educational professionals accept that they depend on a good network connection for a class/practical in which XR is used.

07 | Educational professionals prefer higher image quality with a powerful laptop to lower image quality but being mobile.

08 | Educational professionals want to be able to use all available content irrespective of XR hardware.

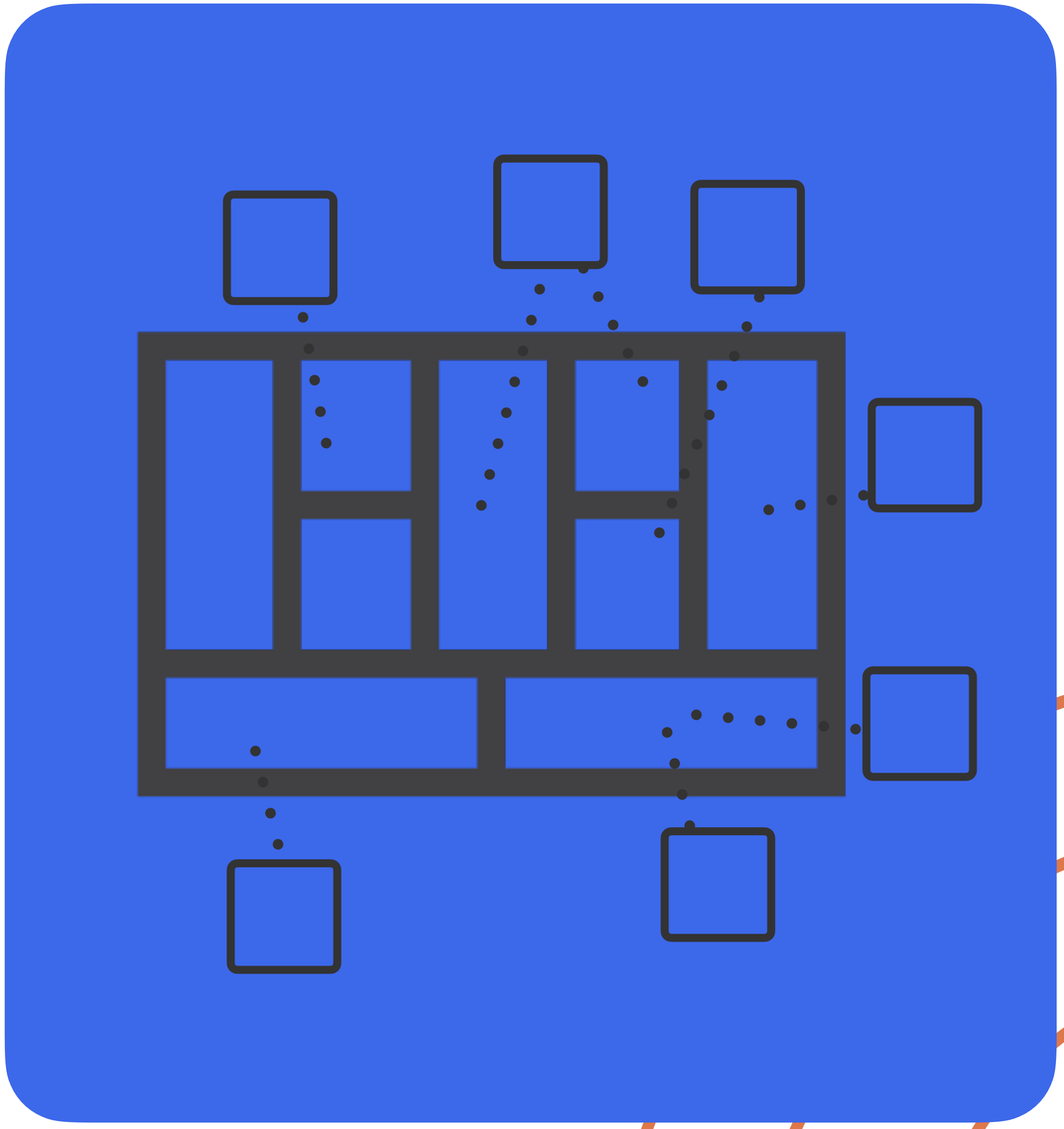
09 | Educational professionals want to offer an XR experience to an unlimited number of learners simultaneously.



Viability

10 | Educational professionals would like to scale up by adding XR experiences for learners to the curriculum.

11 | Educational professionals are enthusiastic about SURF having control over usage data of the XR experience rather than Big Tech.



Results

Assumption 01

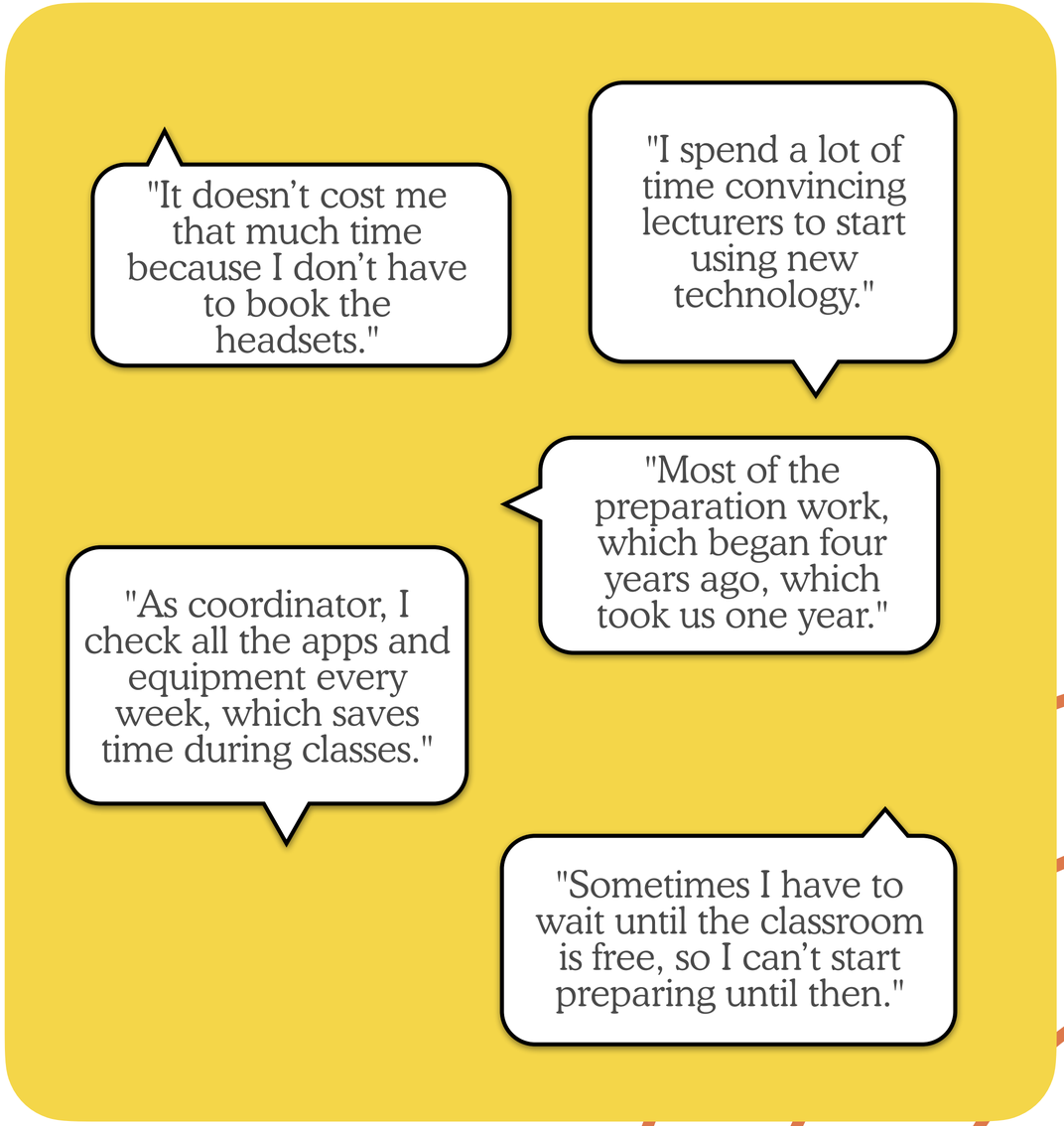
Educational professionals would like to ***prepare*** *a class/ practical in which XR is used in* ***less time, without learners in the room****.*

Validated 4 | **Refuted 9** | Not clear 4

Educational professionals indicate that they generally do not spend much time preparing for a class/practical in which XR is used. They are usually the coordinators of the room and/or XR headsets, so they are in control.

Moreover, they seem to have accepted that preparing a class/ practical in which XR is used simply takes a little more preparation. The enthusiasm and motivation of learners in these classes are more than worth it.

The biggest efforts in terms of preparation start several years before the first class: searching for or developing XR applications yourself, didactic preparation with lecturers, IT rights, network configuration, licences, accounts, and so on.



Assumption 02

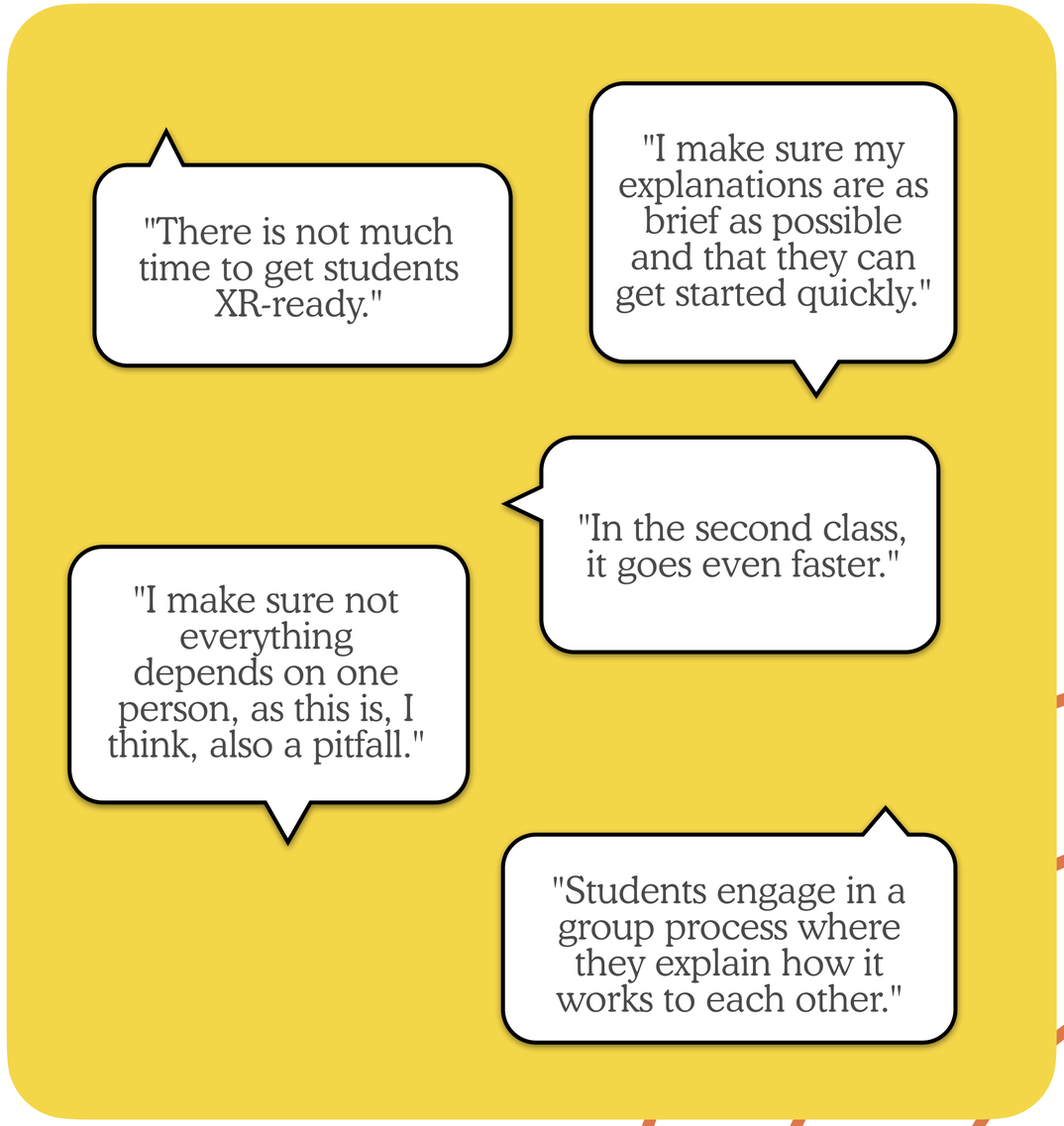
*Educational professionals would like to **start** a class/practical in which XR is used in **less time, with learners in the room**.*

Validated 0 | **Refuted 15** | Not clear 2

Most educational professionals have agreed on a division of roles with the lecturer, assistant and, if applicable, IT administrator.

Some combine an explanation on how to use the headsets and the XR application with an explanation of the assignment for learners not using XR headsets.

Roughly half of the professionals we interviewed have a fixed room for XR classes, while the other half have to arrange for the room to be reconfigured before or at the start of the class. By having IT administrators manage the glasses, they avoid hassles at the start of a class.



Assumption 03

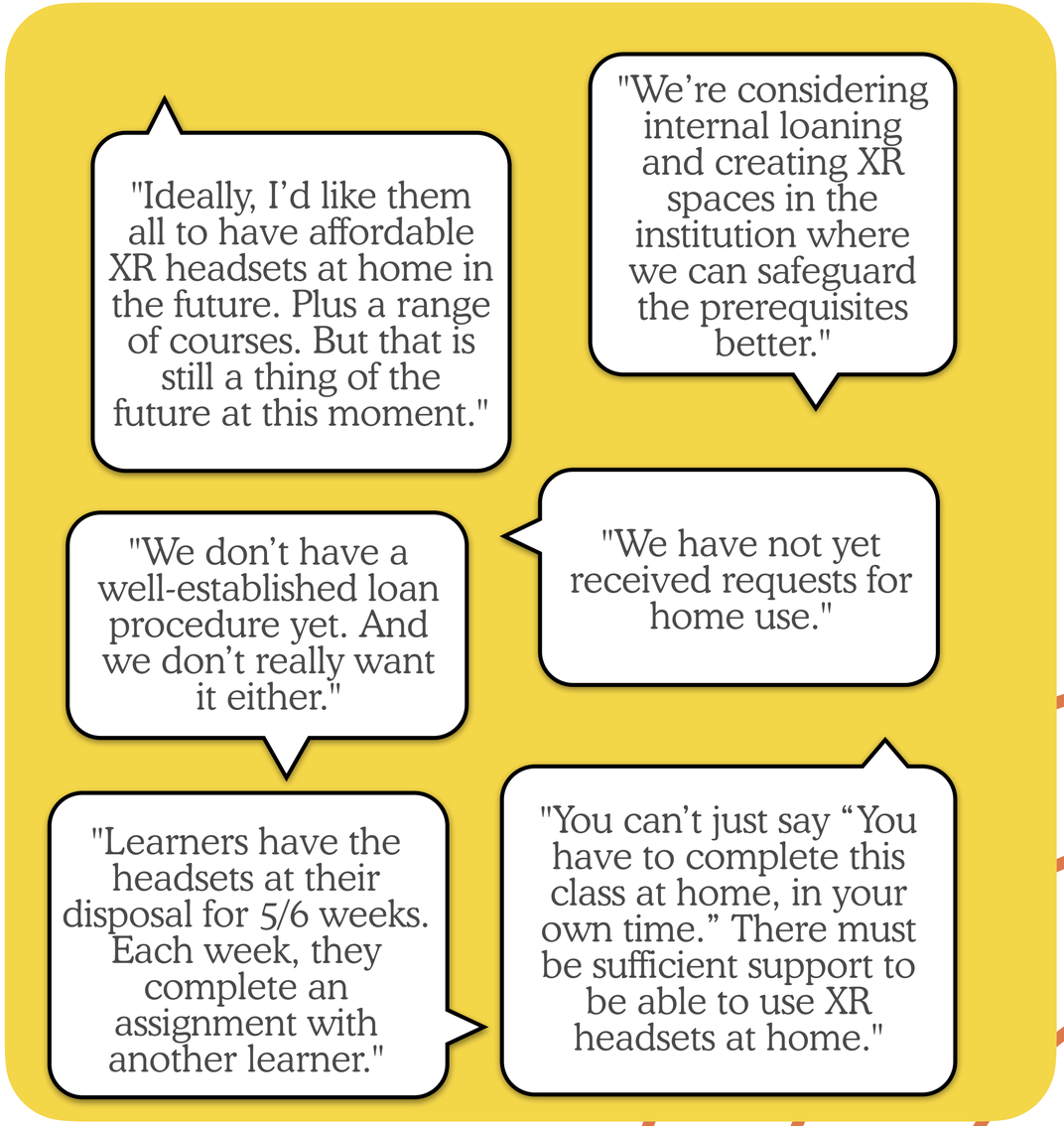
Educational professionals would benefit from ***learners being able to remotely take the class/practical*** *in which XR is used.*

Validated 6 | Refuted 5 | Not clear 6

Most of the educational institutions we interviewed do not yet offer XR headsets on loan to learners. By way of exception, XR headsets are offered on loan to research teams.

At a number of institutions, there has not been any demand for headsets on loan or there are practical constraints, such as network issues. Educational professionals also indicate that with some XR applications, lecturer observation, supervision, interaction/collaboration, post-class discussions with peers mean that classes can only be given at the educational institution.

Looking to the future, educational professionals see opportunities for distance learning/exams. They also suggest leasing schemes to avoid the situation where only learners who can pay for XR headsets themselves can use XR applications at home.



Assumption 04

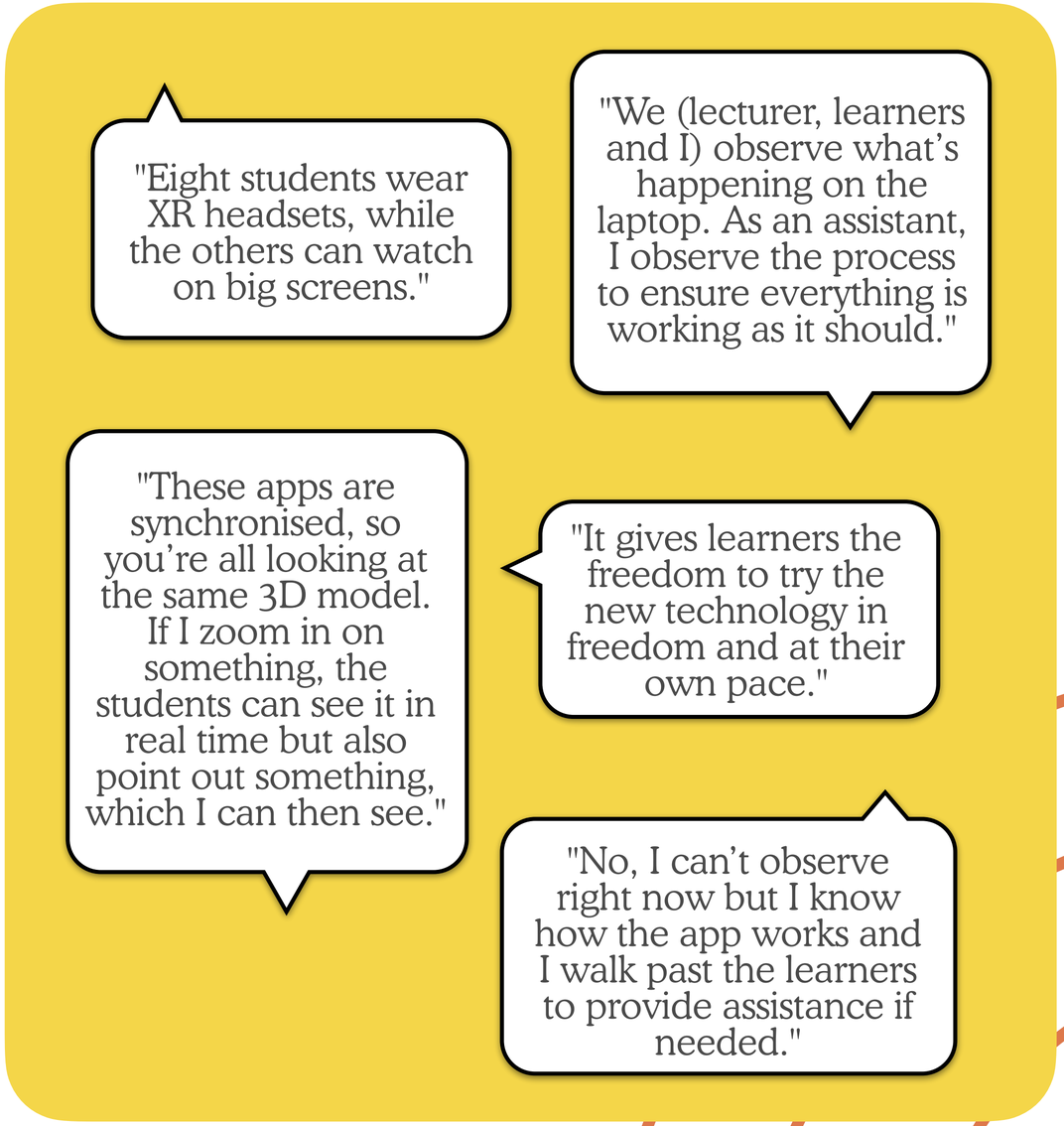
Educational professionals would like to **easily observe** *learner's XR experiences.*

Validated 10 | Refuted 2 | Not clear 5

Most of the educational professionals observe the learners' progress so that they can provide additional instructions, get them back on track if something goes wrong or if learners have overlooked something. This is standard practice at some institutions, while at others they first ask the learners if they can do so.

Group size does play a role here: the larger the group, the harder it is to observe the progress of all learners. The need to observe also varies by XR application. Sometimes educational professionals deliberately do not observe learners to give them the freedom and safety to try it out themselves.

Sometimes XR devices are linked and the lecturer participates with learners to point out additional things, or the lecturer observes to provide targeted feedback afterwards.



Assumption 05

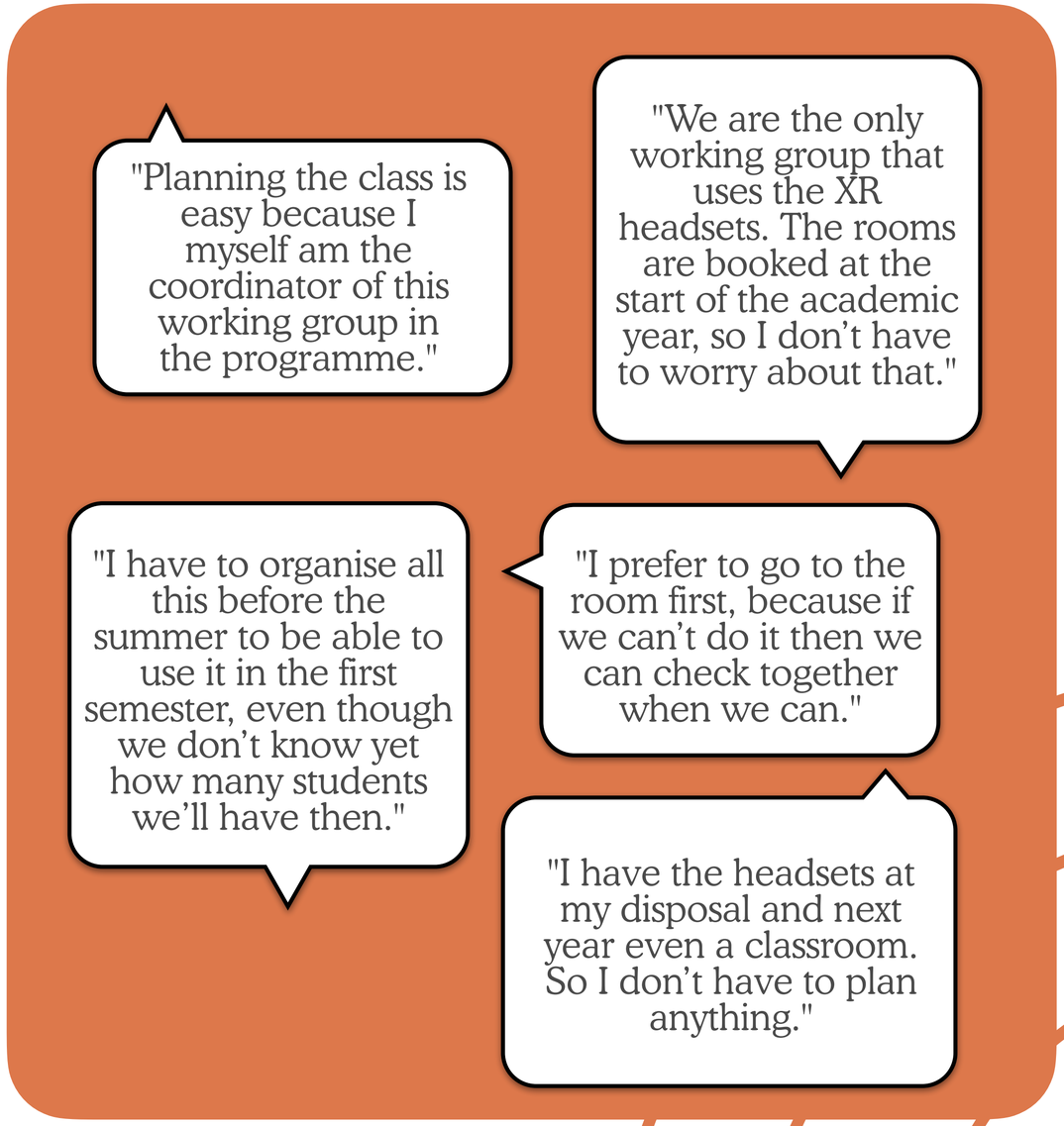
Educational professionals prefer **planning** *their class/practical in which XR is used* **in advance**.

Validated 5 | Refuted 2 | **Not clear 7**

Educational professionals who are the coordinators of the lab and headsets themselves have full control and do not consider planning/scheduling as ‘planning’.

Educational professionals who depend on others for scheduling, a room, equipment and headsets experience hassles as they have to request these things early on and look for a suitable free classroom, arrange for an assistant, etc.

Some prefer planning ahead because there is so much to organise. Others prefer planning ahead because it gives them full control.



Assumption 06

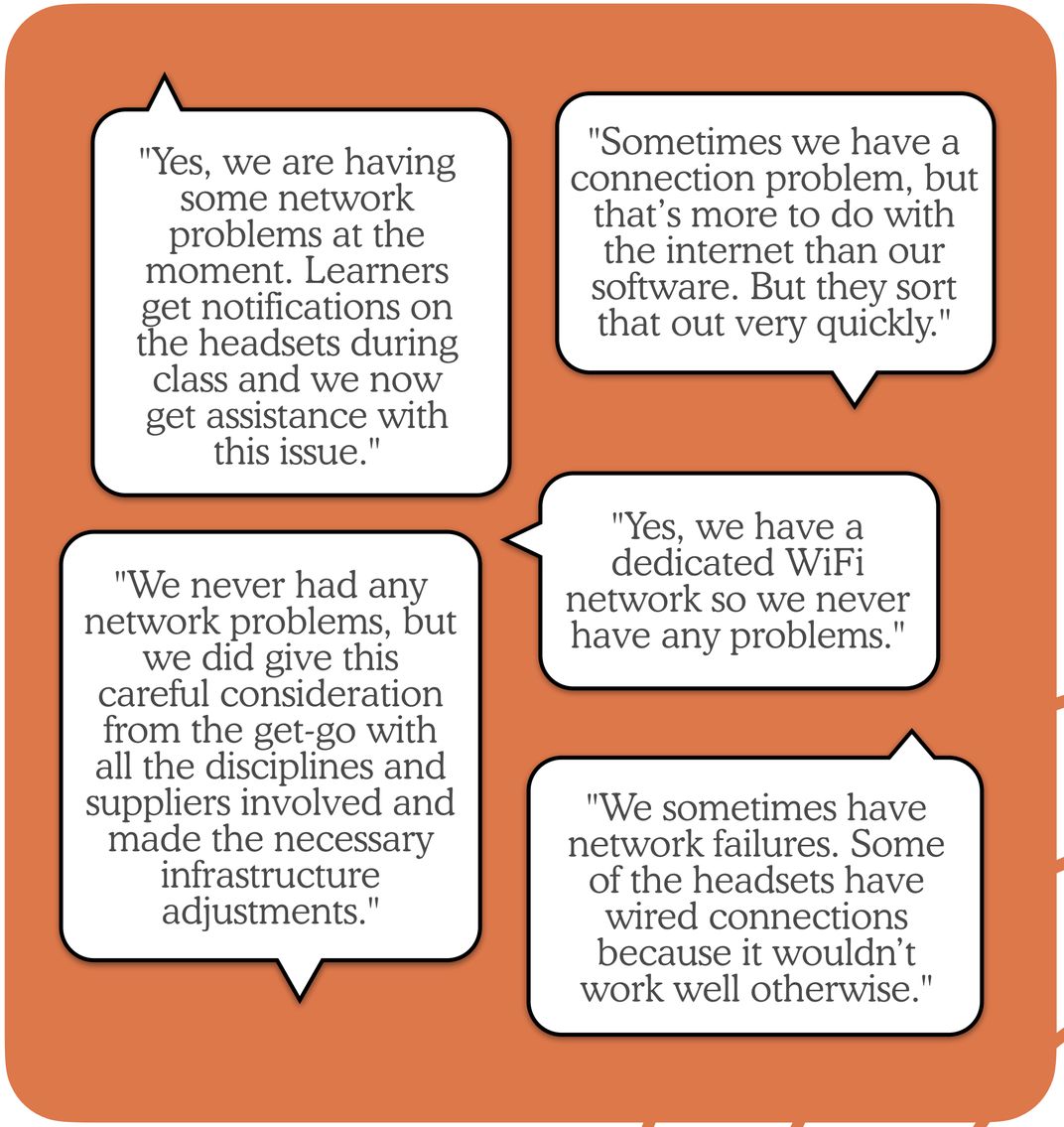
*Educational professionals **accept** that they **depend** on a **good network connection** for a class/practical in which XR is used.*

Validated 12 | Refuted 3 | Not clear 2

Educational professionals mainly mention failures they experience in network connectivity and how they resolve these issues. Almost all the educational institutions we interviewed have taken precautions, such as a separate WiFi network, a wired setup or standalone headsets only, personal fallback hotspots, or a network separate from the institution's to avoid scheduled updates and adjustment of settings.

A number of institutions explicitly choose to use the headsets without a network connection.

Some mention network connection problems related to wireless streaming. Usually the IT department is called in for network configuration and troubleshooting.



Assumption 07

*Educational professionals **prefer higher image quality** with a powerful laptop to **lower image quality** but **being mobile**.*

Validated 5 | **Refuted 8** | Not clear 4

Educational professionals indicate that they don't want to be hindered by cables and a heavy laptop. When it comes to scaling up XR in the institution, it is convenient to be mobile.

Educational professionals point out that with large groups of learners and an intensive XR schedule, it is not feasible to charge the XR headsets in between sessions.

Some educational professionals said that since they don't have that many XR headsets yet, it should be possible for the headsets to be used at different locations for classes and demonstrations.

Assumption 08

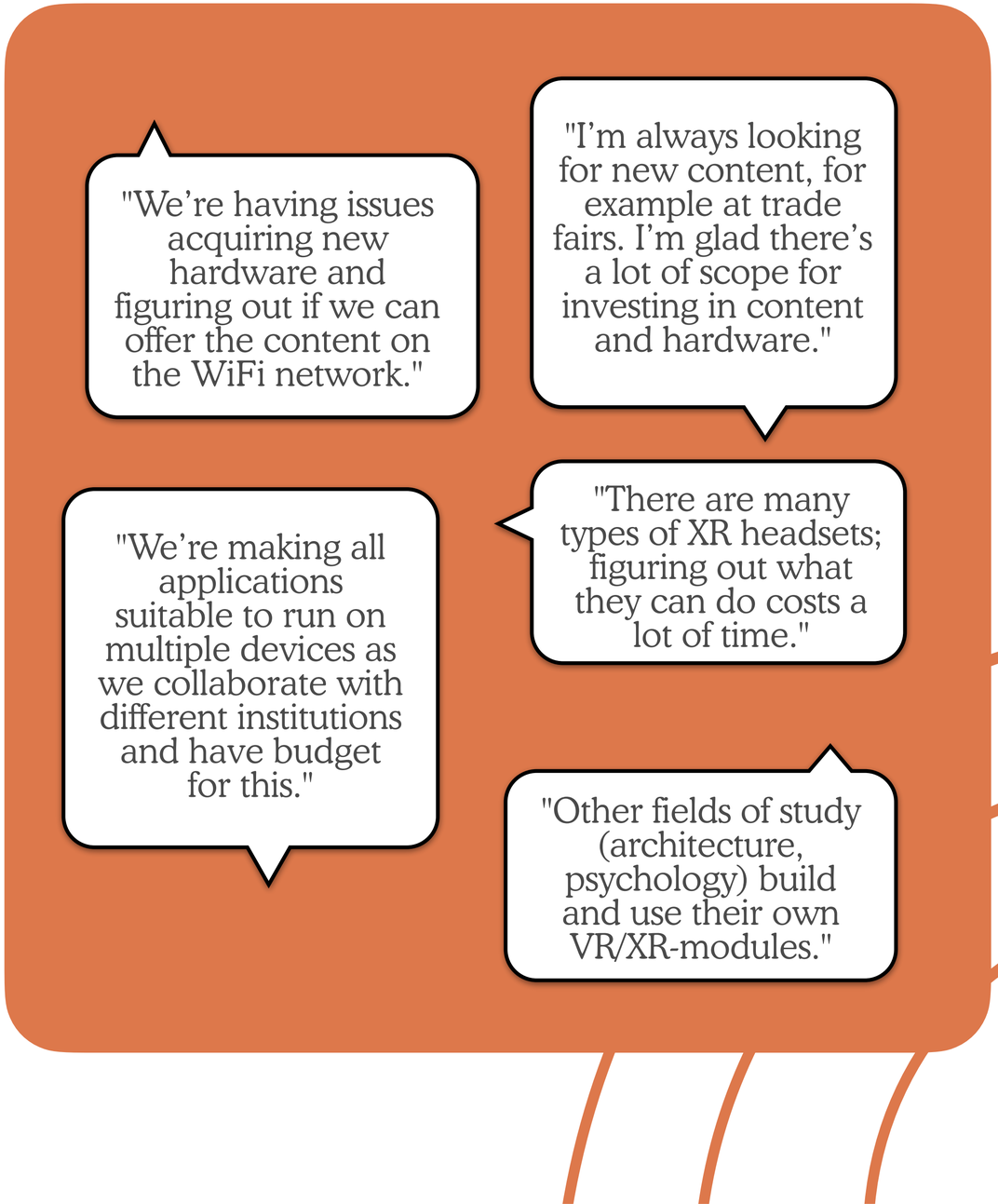
*Educational professionals want to be able to use **all available content** irrespective of XR hardware.*

Validated 8 | Refuted 3 | **Not clear 6**

Educational professionals indicate that they usually build their own XR modules or XR environment, which allows them to take XR hardware specifications into account.

Educational professionals see the added value of a public library so that they don't have to purchase content from different companies. They want to share more content in the public domain.

Educational professionals say that they are looking at what they can develop in co-creation with other institutions.



Assumption 09

Educational professionals want to offer an XR experience to an ***unlimited number of learners simultaneously****.*

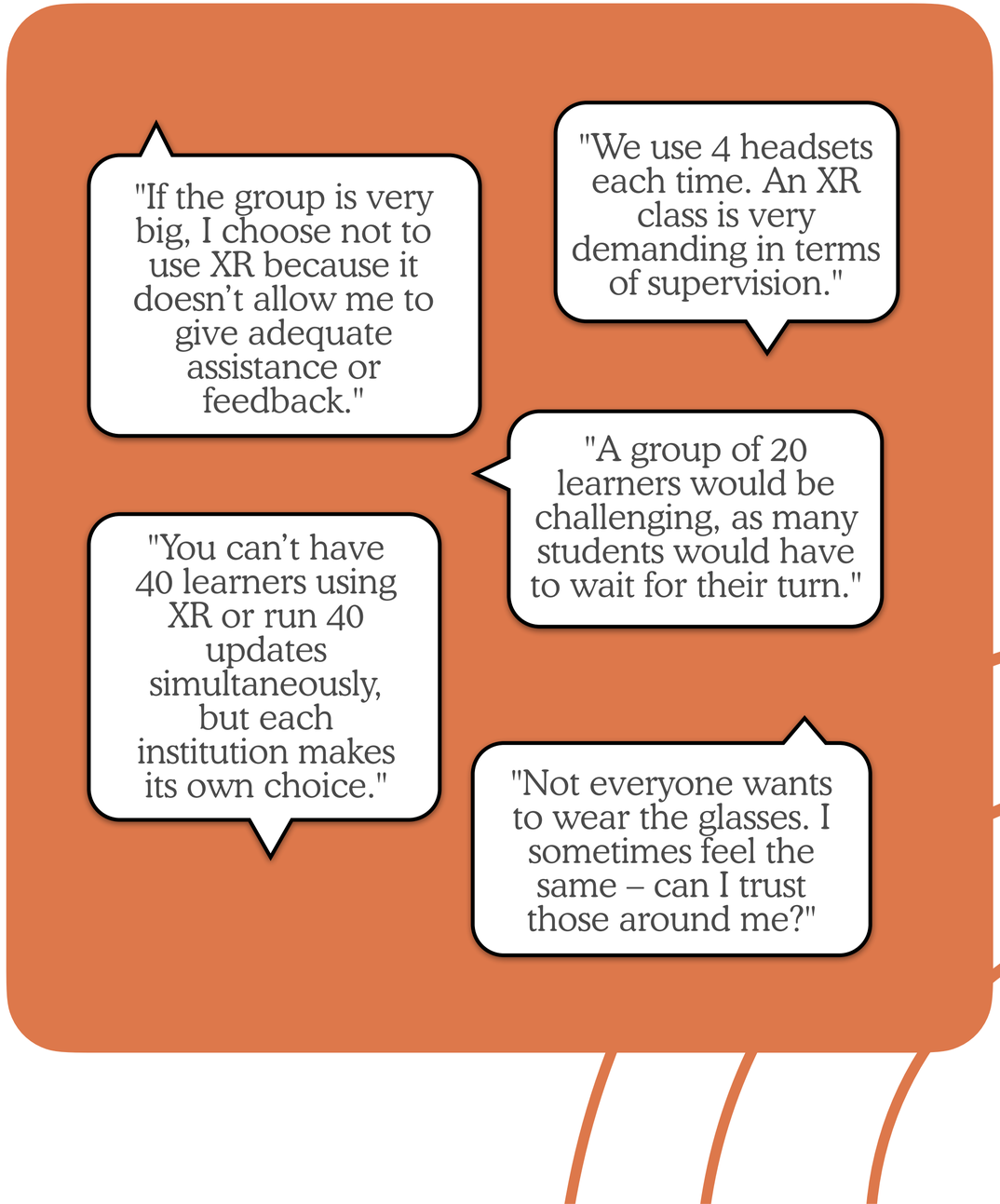
Validated 1 | **Refuted 7** | **Not clear 9**

The number of learners simultaneously completing an assignment with XR headsets varies between four to ten. Sometimes the group of learners in an XR classroom is bigger than that.

Educational professionals point out that good didactics in terms of explanation, supervision, reflection, connecting with theory and connecting with practice (work placement) require a limited group size.

As an educational professional, you also have to be able to monitor the physical safety of a learner wearing the headsets.

Educational professionals also mention that the costs of acquiring XR headsets are currently a limiting factor, both for the programme and for learners.



Assumption 10

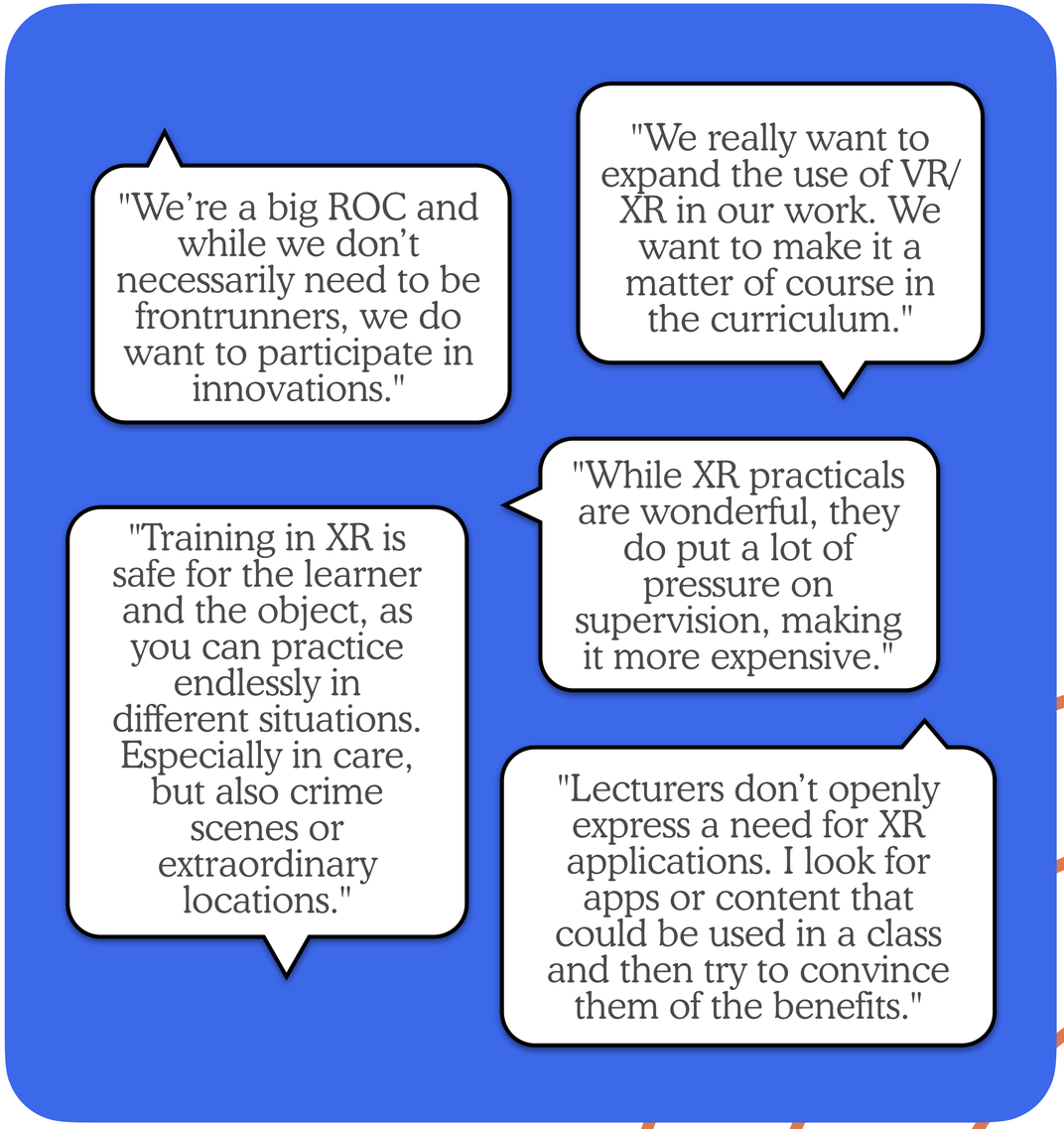
*Educational professionals **would like to scale up** by adding XR experiences for learners to the curriculum.*

Validated 9 | Refuted 3 | Not clear 5

Educational professionals say that XR complements education. There are no series of classes yet. You can't wear XR headsets the whole day.

Although the number of classes/practicals with XR is growing, continued motivation of lecturers to use XR is necessary.

Educational professionals see learners' enthusiasm for XR as a reason to scale it up; they point out that it makes the classes much livelier. Learners feel more freedom to practise and are less afraid to make mistakes.



Assumption 11

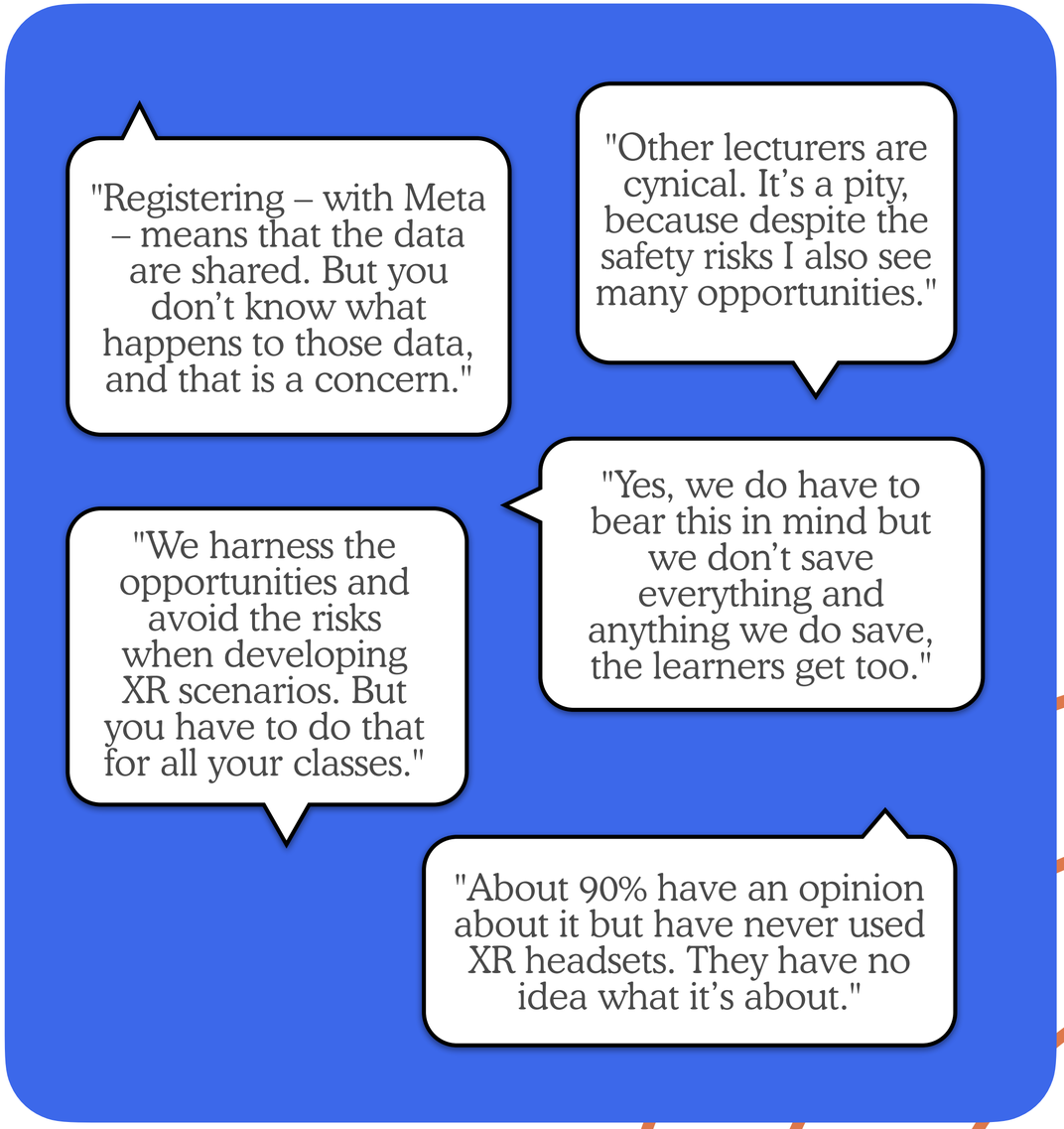
*Educational professionals are **enthusiastic** about **SURF having control** over **usage data** of the XR experience rather than Big Tech.*

Validated 0 | Refuted 0 | **Not clear 17**

Most of the educational professionals that were interviewed say that setting up good user data rules and safeguarding the privacy of learners are extremely important.

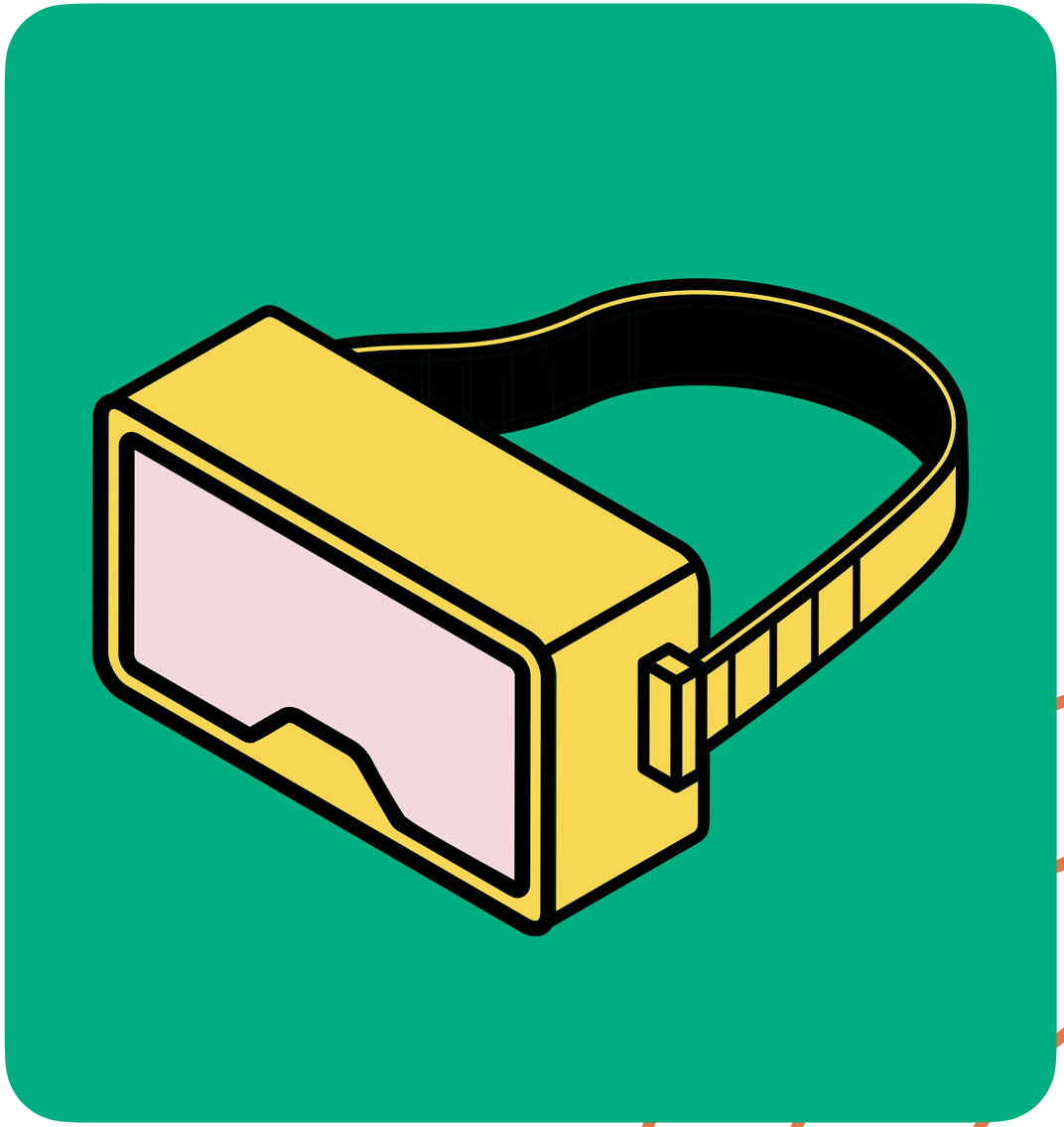
Not a lot of attention was given in this round of interviews to validate whether the participants are enthusiastic about SURF having control or playing a role with respect to usage data.

However, some educational professionals stressed that a class/practical in which XR is used is no different in terms of the treatment of usage data than a normal class without XR.



XR-streaming-service

XR-streamingservice



At the end of some of the interviews, we asked participants what they thought about an XR streaming service offered by SURF.

It was not immediately clear to all participants what such an XR streaming service offers, how it works and what is needed in the educational institution to facilitate this. Other participants mentioned a number of specific wishes or benefits in respect of such a service.

The participants stated the following under:

- Essential
- Benefits
- Ambiguities

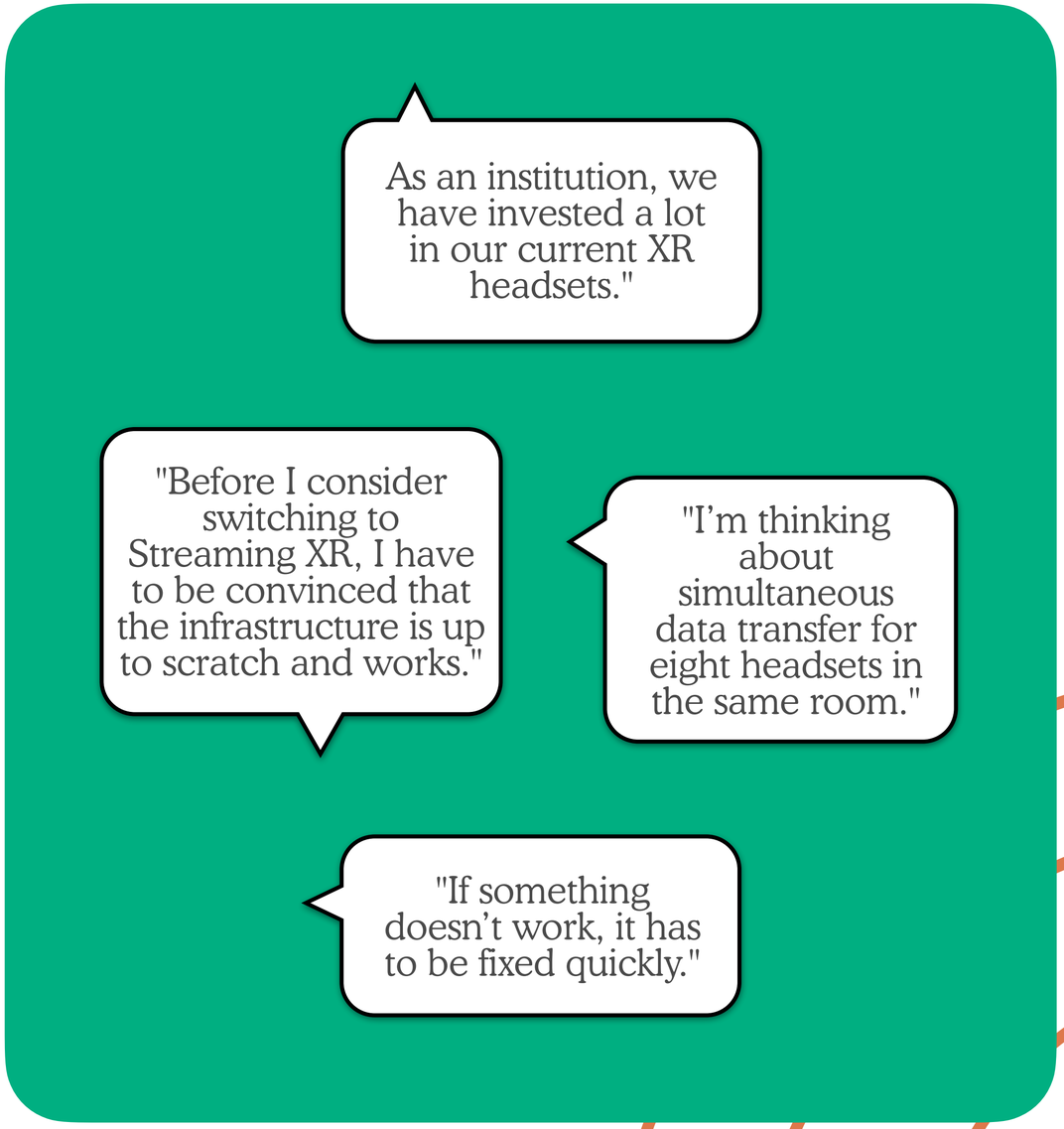
Results

Essentials (1 of 2)

- **Compatibility**
  It is crucial that the content offered by an XR streaming service connects/works with all glasses used in our institutions.

- **Internet connectio**
  Clarity on what requirements such a streaming service places on the infrastructure and internet connection at the educational institution is essential.

- **Support**
  It is vital to include support for the service.

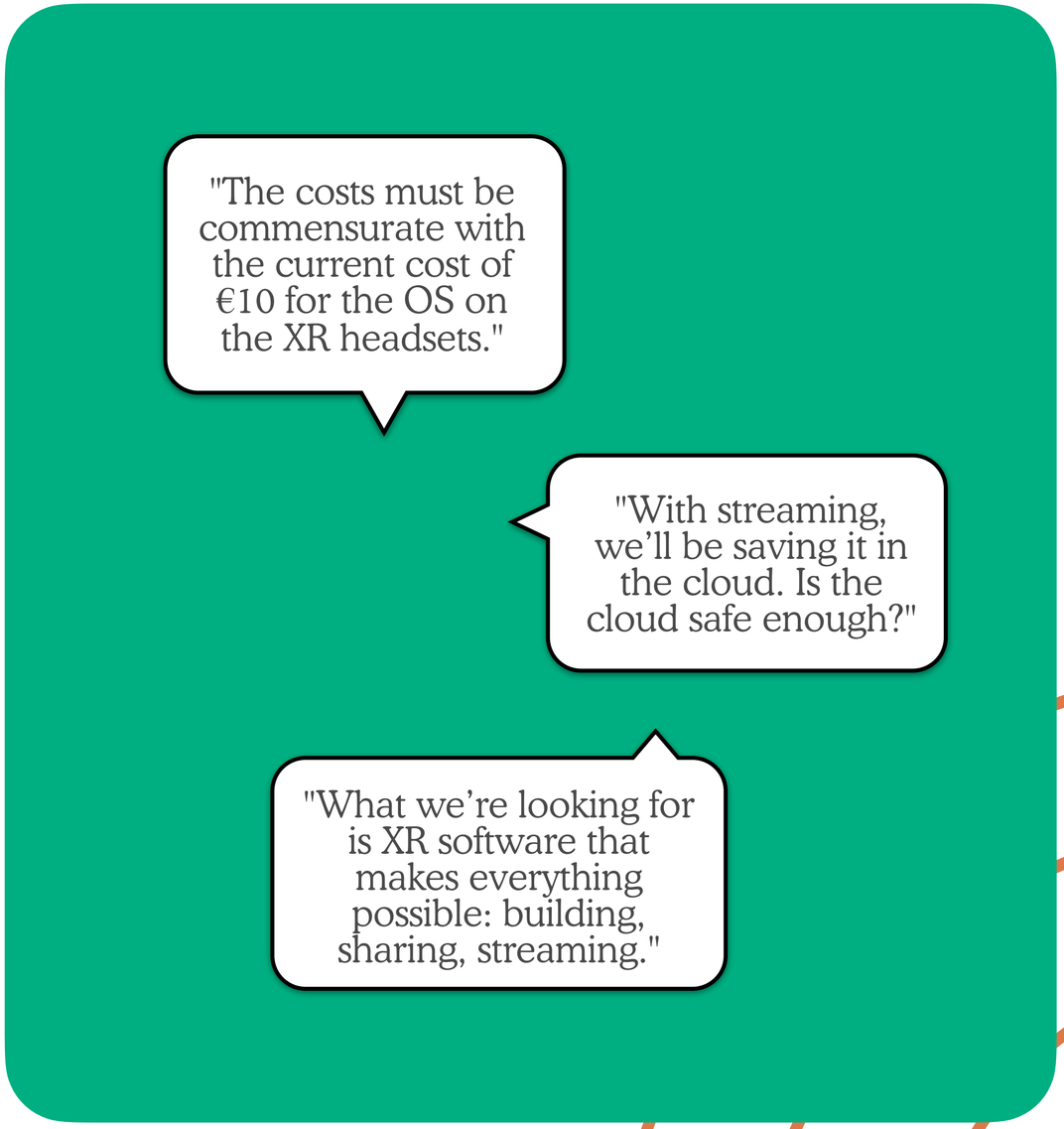


Essentials (2 of 2)

- **Costs**
  There are, understandably, costs related to an XR streaming service. It is important to be clear about cost-sharing between educational institutions that develop content and educational institutions that only purchase content.

- **Safety**
  It is vital that the cloud in which everything is stored is secure and that access to certain XR applications on XR headsets can be shielded for learners.

- **Development environment**
  Having an XR streaming service doesn't get us there yet – critically, such a service should also provide a development/ build environment for XR scenarios and XR applications.

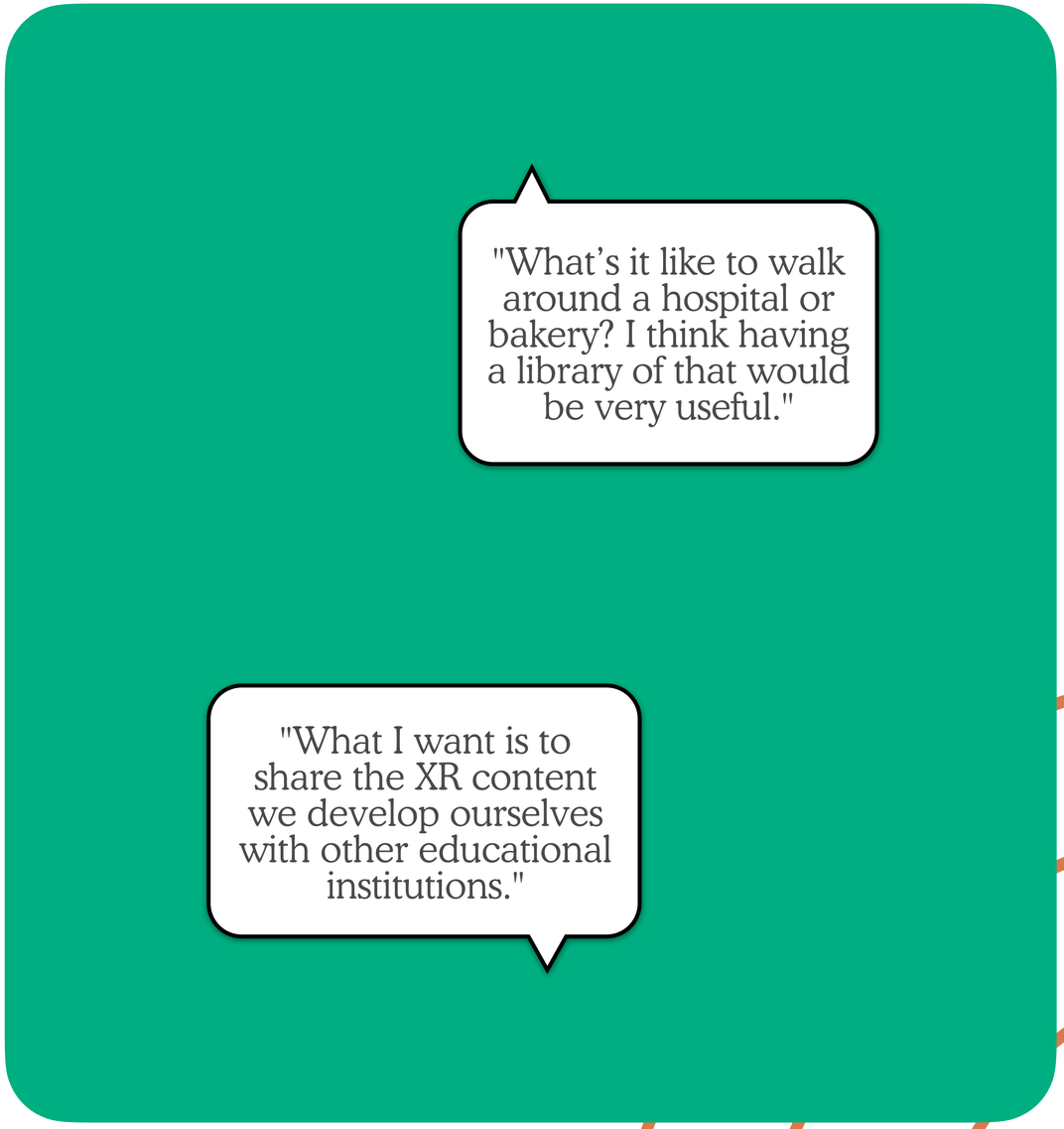


Advantages (1 van 2)

- **Public library to share XR applications**
  With a public library, educational institutions can share self-developed XR applications in the public domain.

- **Less individual purchasing**
  Educational institutions have less need to purchase all XR applications individually from different companies.

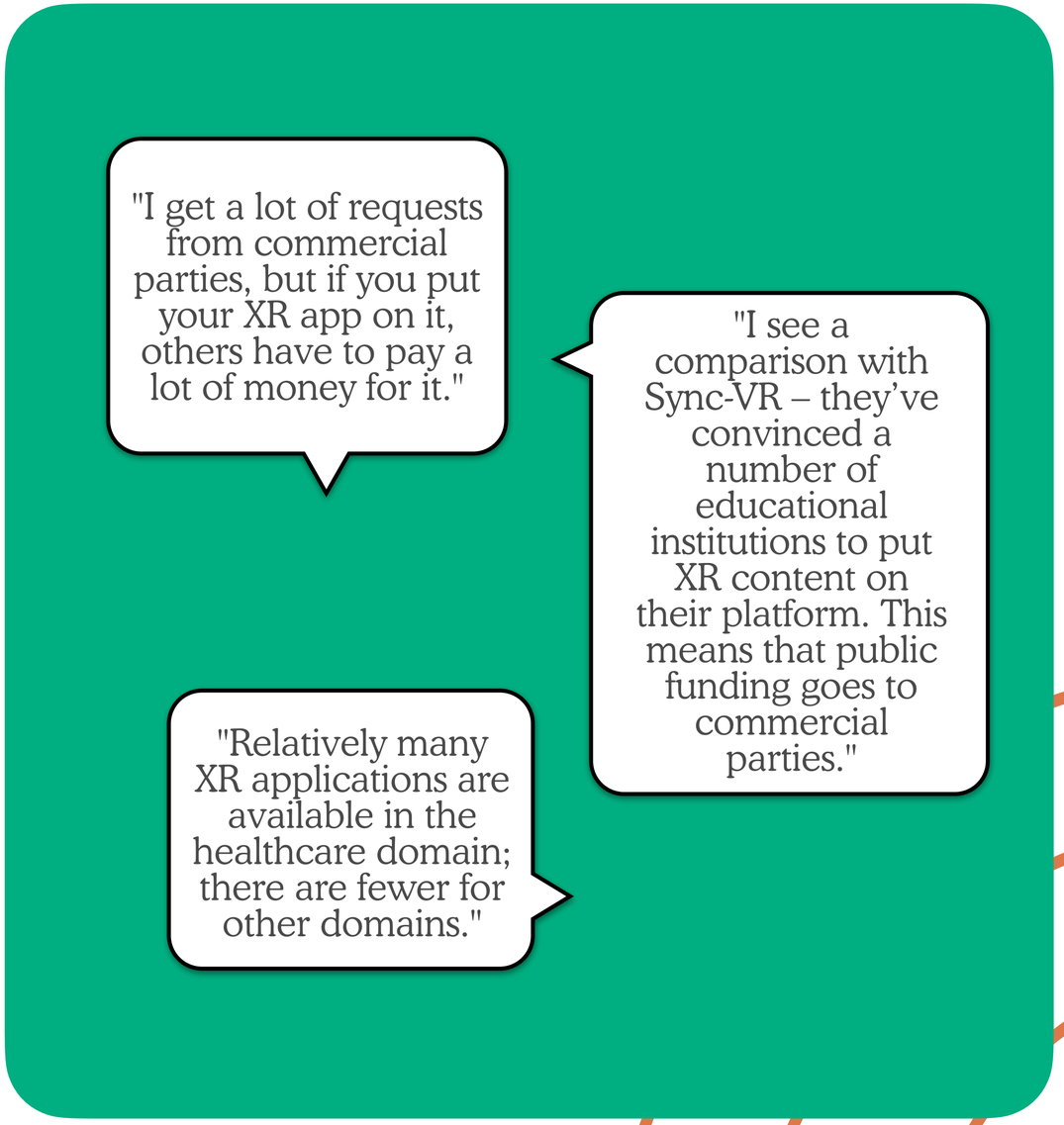
- **Role of Npuls in creating framework/platform**
  Establishing the framework for the service and setting up and rolling out the platform can be a valuable role for Npuls.



Advantages (2 van 2)

- **No more public funding to commercial parties**
  A number of educational institutions now share self-developed XR applications on a commercial party's platform. This means that public funding goes to commercial parties, which would not be the case if we had a national public XR offering.

- **Domains with fewer offerings**
  A public library could offer more XR applications for domains where there are currently fewer offerings.



Ambiguities (1 van 2)

- **Maximum number of simultaneous sessions**
  What does such an XR streaming service mean for data traffic and the number of XR sessions that can take place in a classroom simultaneously? What should we do to prevent XR headsets from freezing? Do we have to download XR applications on the XR headsets for optimal performance?

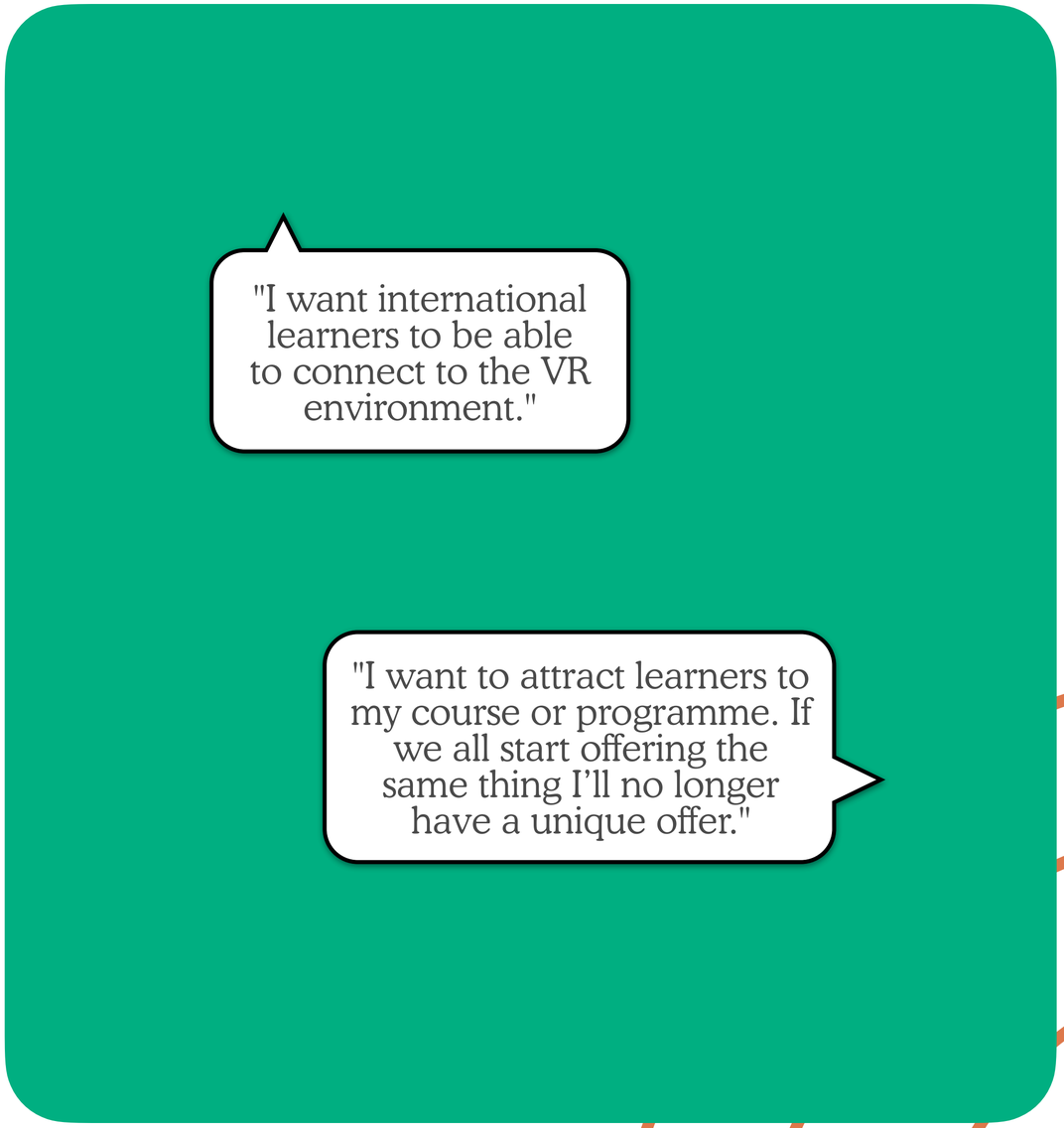
- **Developing XR applications for widespread use**
  In what way can educational institutions develop XR applications that can also be used at other educational institutions? How should they deal with house style, learning objectives, didactic guidance, highly customised XR application for a specific situation, etc.?

Ambiguities (2 van 2)

- **National or international**
  Do educational institutions share their XR applications with institutions in the Netherlands or internationally?

- **XR as a unique offer**
  What does an XR streaming service mean for educational institutions that want to use XR as a unique offer to attract learners?

- **What are the benefits of XR compared to downloading?**
  It is not always immediately clear what the benefits are compared to the current situation. One benefit mentioned is no longer having to download the XR application onto the headsets and fewer screen glitches.



Thank you for your attention