



Accessibility in XR in Higher Education

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Problem Statement

Due to the recent pandemic that caused global shutdowns, schools and universities had to turn to different styles of learning that did not require face-to-face participation. The immediate shutdowns showed how unprepared most colleges and universities were for online classes and how to properly handle them but also how inaccessible most programs were.

When schools and universities switched to mandated online learning, a lot of students lost out on the social interaction that comes with being in a school setting.

We will be researching the University of Tampa students who are currently in the Film, Animation, and New Media Program (FMX), on whether XR is a tool that can be used for accessibility due to visual imparity and see if it can be used in other programs like biology and medicine.

Our research question will answer if XR can be used by people with visual imparities and how it can be imprved.



Research Questions

1. Is XR Technology accessible in higher education for people with visual imparities at The University of Tampa?

2. Could the University of Tampa community be positively or negatively affected by the inclusion of XR in classrooms and recruitment methods if it is not currently utilized?



What is XR?

XR, cross reality, or extended reality, is a catchall term for several different but related technologies. It rolls together similar acronyms like VR (virtual reality), AR (augmented reality), and MR (mixed reality).



The industries already utilizing XR technology are: gaming, product design and development, sales and marketing, and training.

Extended Reality (XR) Technologies and Devices



Virtual Reality (VR) - users are fully immersed in a simulated digital environment.



Augmented Reality (AR) - virtual information and objects are overlaid on the real world. Think of popular mobile games like *Pokémon GO*.



Mixed Reality (MR) - digital and real-world objects co-exist and can interact with one another in real-time.

Survey Questions



- 1) Do you know what Extended Reality (XR) means? On a linear scale from 1-5.
- 2) What is Extended Reality (XR) used for? Please explain.
- 3) Do you currently utilize Extended Reality (XR) technology in your classes? On a linear scale from 1-5.
- 4) Out of the different Extended Reality (XR) technologies, which one do you utilize the most? VR, AR, or MR? (VR - Virtual Reality, AR - Augmented Reality, and MR - Mixed Reality)
- 5) If you do not currently utilize any of the different Extended Reality (XR) technologies: VR, AR, or MR (VR - Virtual Reality, AR - Augmented Reality, and MR - Mixed Reality) which one do you know the most about?
- 6) Do you believe the University of Tampa has good accessibility for people with visual imparities? Some examples of visual imparities would be color blindness, low vision, light sensitivity, albinism, etc.



7) Do you have any suggestions on how accessibility can be better implemented throughout the University of Tampa, specifically for people with visual imparities? Please Explain.

8) Do you think Extended Reality (XR) could be used in other departments? Please explain why or why not.

9) Do you think Extended Reality (XR) will promote gestural interfaces and interactions, or not? For context, a gestural interface is an interface where computers use gestures of the human body, typically hand movements, but in some cases other limbs can be used.

10) Do you believe the University of Tampa will further invest money and resources into Extended Reality (XR) or other technologies to further enhance education in the classroom? Please explain your reasoning.



Interview Summary/Reflection

"If it were affordable and accessible," they explained, "then we could reach millions and share information and virtual tours of campus to so many prospective students worldwide."

Participant C

"Unfortunately no, the equipment is not there yet, we are able to use our iPhones or an iPad but not everyone has an iPhone or an iPad so there are still technological limitations and price limitations. If we want to use something like true XR technology like the HoloLens because it's 3,000 dollars or if we want to use the new Meta Quest it's still 1,600 dollars, which is why these technologies are still being used by commercial enterprises". - Participant A

"It could be beneficial to any student in any department because it can better their education and help them learn about new perspectives that they might not have had before"

Participant D

"The games are cheaper and more easily accessible on their phone". - Participant B

"Technology made it powerful for human beings to travel places in the metaverse while their actual body is in its place, hence this imaginable power could perhaps supports accessibility, but time and tools are critical". - Participant E

Data Collection and Results



We sampled from the Film, Animation, and New Media (FMX) and Communications (COM) departments, as well as faculty members from the FMX department, to gather most of our data. We also sampled the staff in the undergraduate recruitment and event planning department to gauge their opinions. The Sample population we were able to gather was 14, who agreed to take our survey, and then we interviewed the 4 people who all consented to a recorded Zoom interview.

Data Graphs

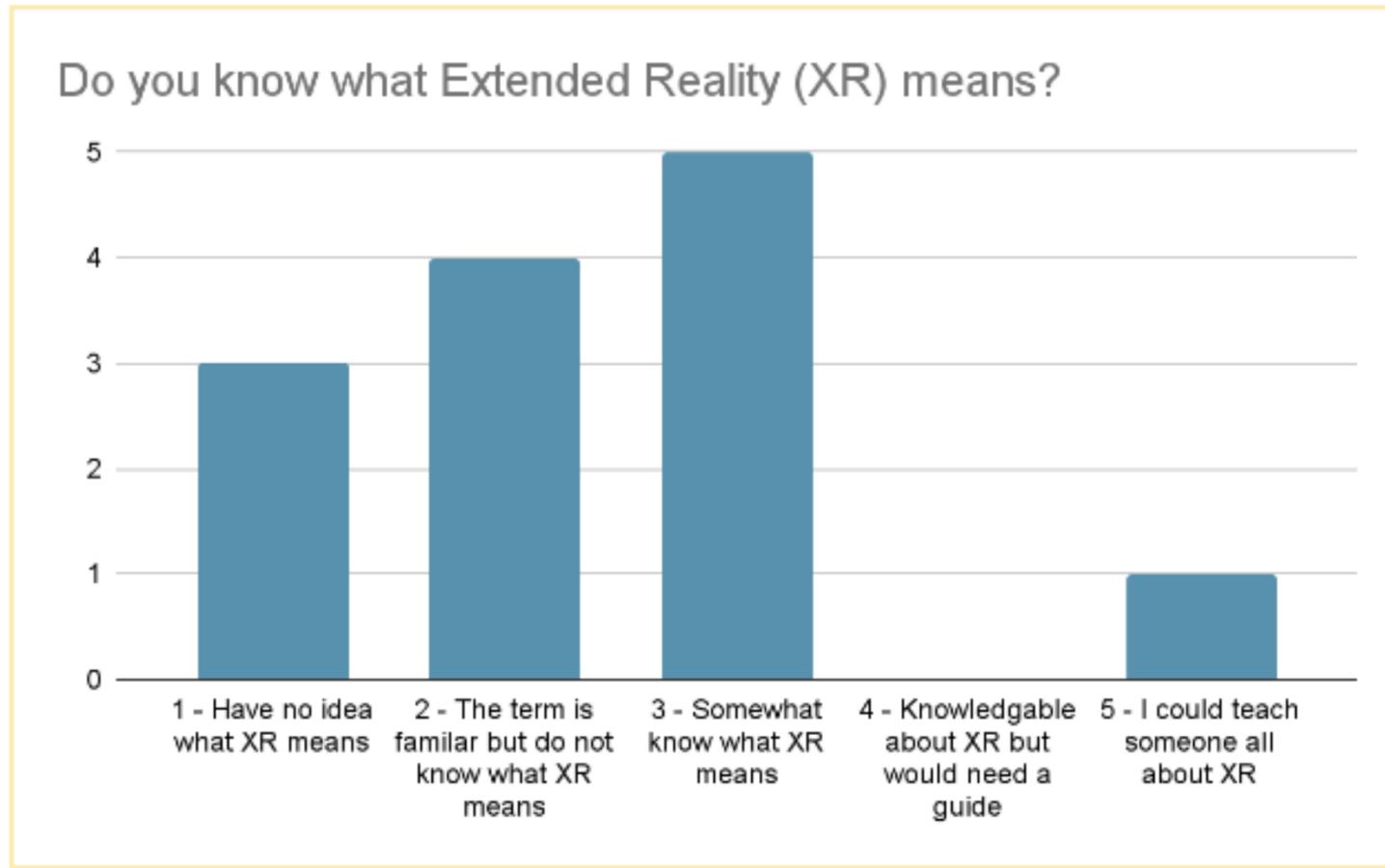


Figure 1. The range is from 1 - 5, the number 5 being "I could teach someone all about XR" and 1 is having no idea what XR means.

Do you currently utilize Extended Reality (XR) technology in your classes?

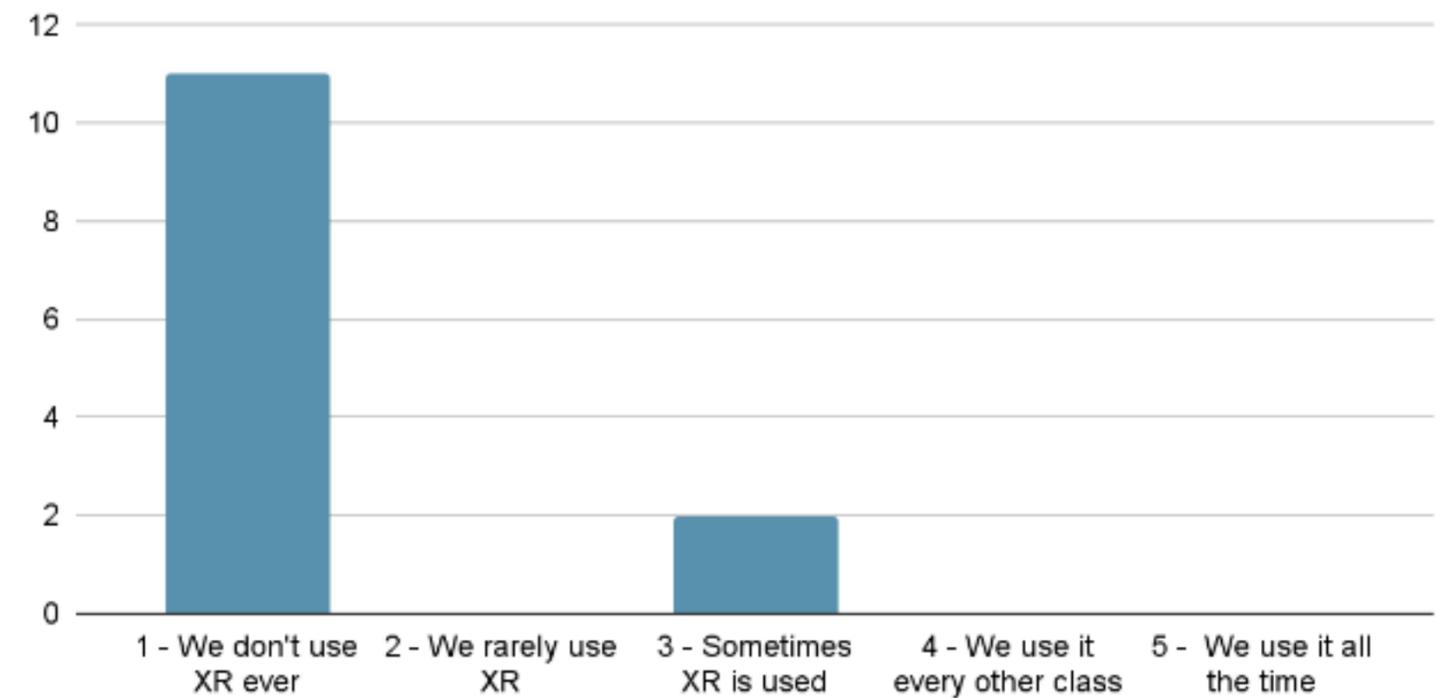


Figure 2. The range is from 1 - 5, the number 5 being "we use XR all the time" and 1 being "we don't use XR ever".

Data Graphs

Out of the different Extended Reality (XR) technologies, which one do you utilize the most? VR, AR, or MR? (VR - Virtual Reality, AR - Augmented Reality, and MR - Mixed Reality)

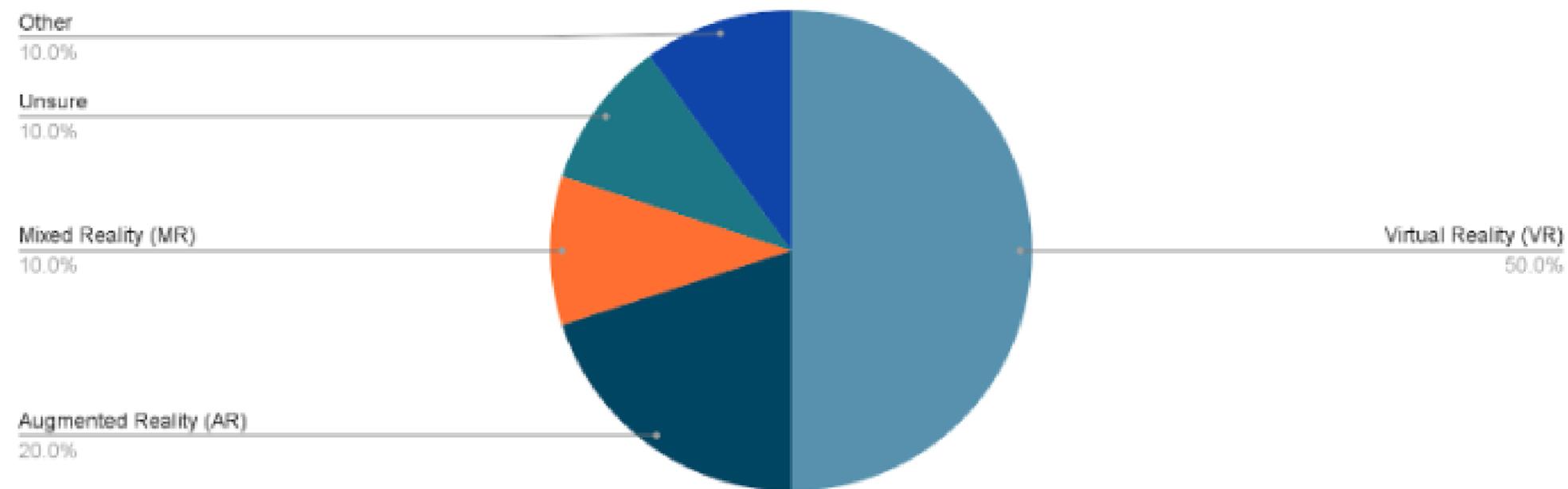


Figure 3. Shows a Pie Graph of the different Extended Reality (XR) technologies that are utilized most.

Data Analysis

To analyze the data, researchers first examined the cumulated results from the survey. Bar graphs and Pie graphs were used to summarize the information and made it easier to visualize how XR is used in higher education. These statistical graphs and charts were created on the results page of our Google Survey.



Results/Findings

Throughout the survey and interview process, we found that the term XR is not as commonly known as one of its components–Virtual Reality (VR.) We also found that the students and faculty agree that XR technology is not fully accessible to individuals with visual imparities and that could be greatly improved. As more high-fidelity XR devices are created and are still in the process of creation, immersive experiences continue to expand their capabilities through the extension of the field of view (FOV), higher device refresh rates, unpopular display definitions as well as more advanced body, face, hand and most important “eye-tracking”. All these features support the creation of environments with real-life levels of realism, which will lead to further improvement in visual impairments.

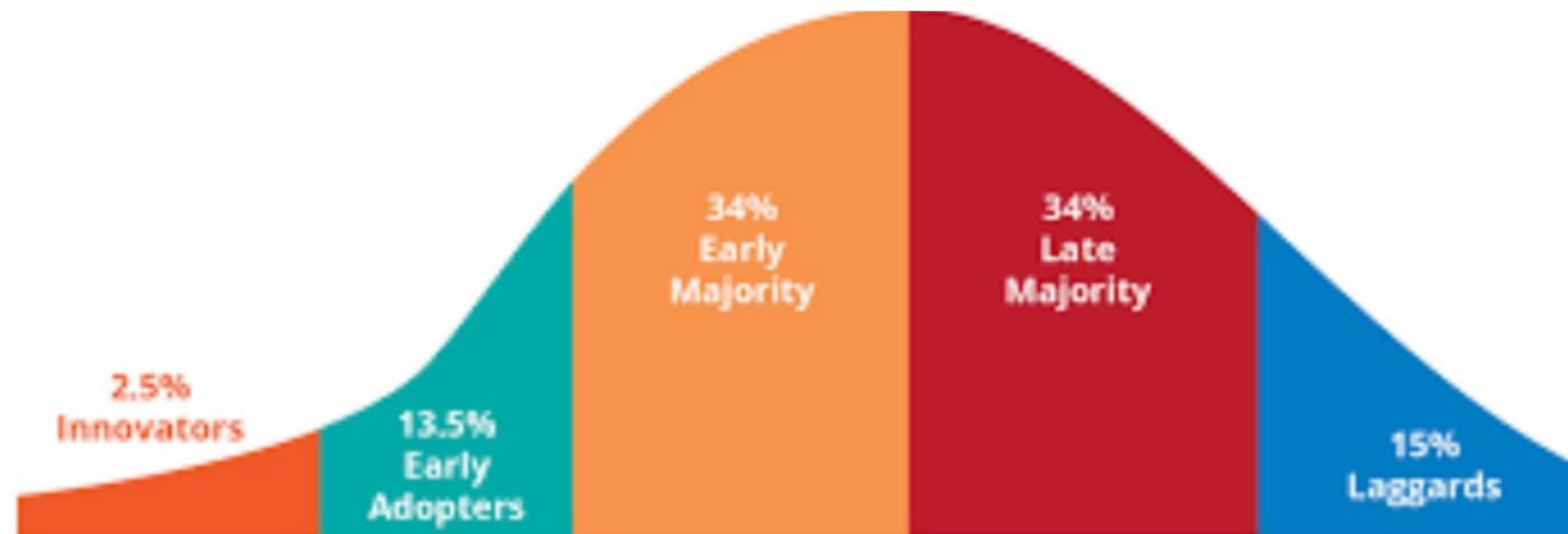


Figure A above shows an example of Roger's Diffusion of Innovation Theory (2018.)

Results



XR is not a term many recognize, which explains why these technologies are not widely available or accessible at UT.



XR technology is not fully accessible to individuals with visual imparities and that could be greatly improved.



VR is most recognizable—we came to the conclusion that VR is the “well-known” and widely popular of the given XR technologies.

Limitations

This study was limited to the student body and staff at The University of Tampa to try and gauge where XR is currently used on campus if students and staff are aware of its capabilities, and if it is found accessible to students, and to the UT community with visual disabilities. Because our research is limited to one non-profit, Private University; we cannot say our data is the standard for other universities.

Conclusion

The majority of people who took the survey have very low knowledge (somewhat to no idea) of what Extended Reality (XR). This begins to explain why these technologies are not widely available or accessible at UT, as the majority of students, staff, and faculty surveyed started with minimal understanding and background knowledge of XR.

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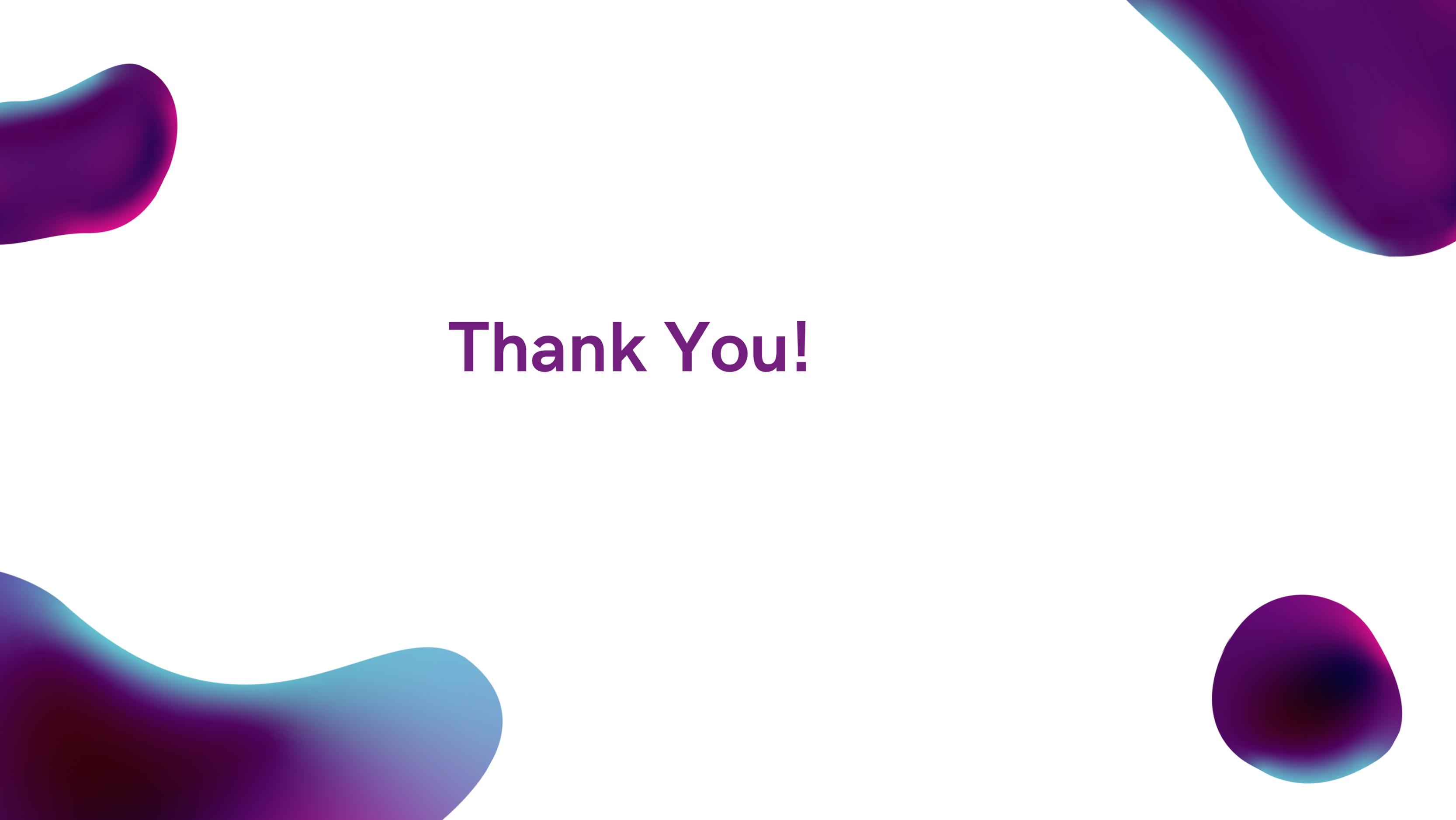
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The background features four abstract, organic shapes in shades of purple and blue. One shape is in the top-left corner, another in the top-right, a larger one in the bottom-left, and a circular one in the bottom-right. The word "Questions?" is centered in the middle of the page.

Questions?

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Thank You!