Desktop / laptop version Facilitator guide

Reviewed 2026

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Whole slide deck or whole document Description: User uses the whole slide deck or whole document AS IS, without any modification	No additional citation required
Full slide or full page Description: User incorporates a full slide or a full page into their own slide deck or document	*"© 2025-2026 Micron Technology, Inc. All Rights Reserved. Used with permission."*
Portion of a slide or portion of a page Description: User copies a portion of a slide or a portion of a page into a new slide or page	This is not allowed

Desktop / laptop version Facilitator guide

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Table of Contents

Desktop / laptop version facilitator guide – goal and objectives

Goal

- The goal of the desktop / laptop version is to provide an engaging experience when Virtual Reality headsets are not available or convenient

- The goal of the DRAM Memory module is to provide an engaging environment to learn about binary data and how that data gets stored in a DRAM memory array

- The goal of the Equipment Technician module is to provide an engaging environment to learn about the cleanroom and specifically about the critical role of Equipment Technicians

- The goal of this guide is to provide educators/facilitators with the necessary tools to confidently install and facilitate these experiences

Objectives

- Introduce how small the structures in a memory array are

- Present the different component of a memory array in a 3D environment to facilitate the appreciation of the scale and connections between structures

- Experience dressing up for the fab and understand why the order is key to minimize contamination

- Become an Equipment Technician for a day and observe some of the critical tasks this role performs

Target Audience

- Middle school, high school, community college, college, and adults.

- Elementary 3rd to 6th grade: recommend shrinking room, binary activity and smock room experiences only

- Interns, NCGs (New College Grads), and new employees in many technical roles at Micron need to understand these concepts
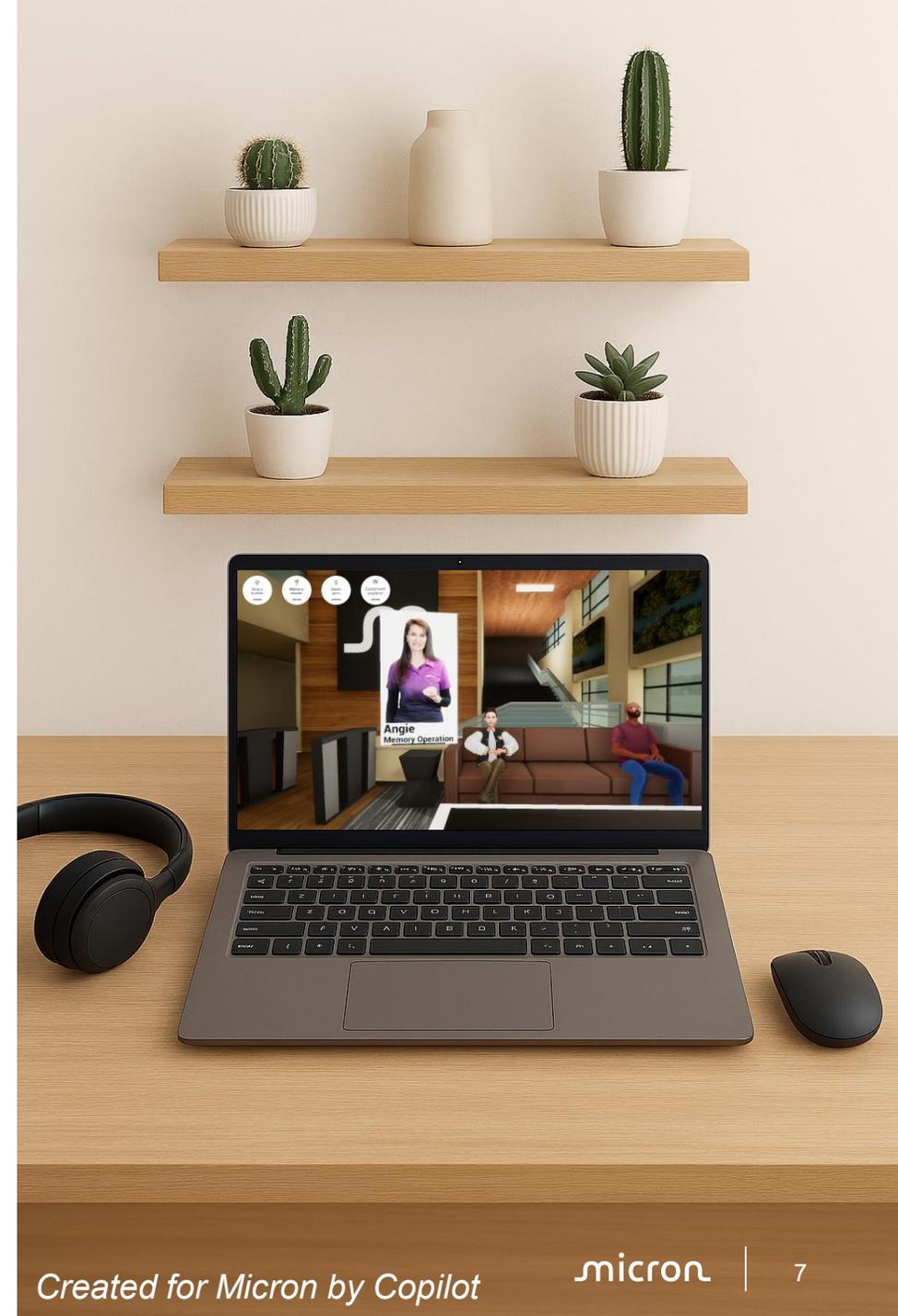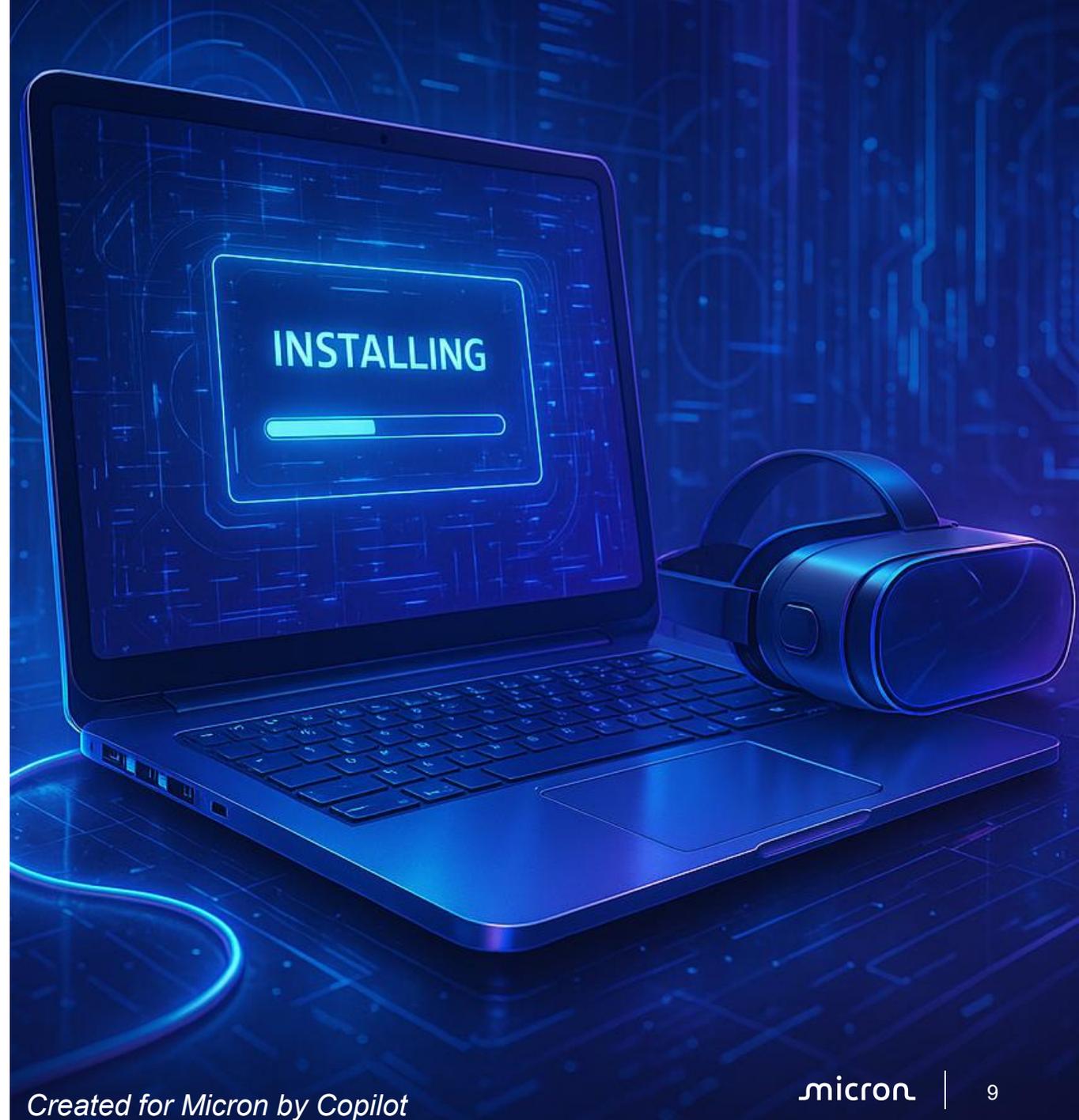
How to obtain the desktop / laptop installation files

Steps to obtain the desktop / laptop installation files

- The desktop / laptop installation files are not currently available in the Micron Educator Hub due to file size

- To obtain the files, please send a message requesting them via the Micron Educator Hub Contact Us form

- Contact Us form direct link: https://www.micron.com/educatorhub/#contact

- Please share an official school or institution email address

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How to install the desktop / laptop version

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Installation

1 Once you have received the installation files, open a file browser and locate the downloaded compressed zipped folder

2 Mouse right-click and choose *Extract All…*

3 Browse to the location where you want to extract the files (or use the default location)

4 Click on *Extract*
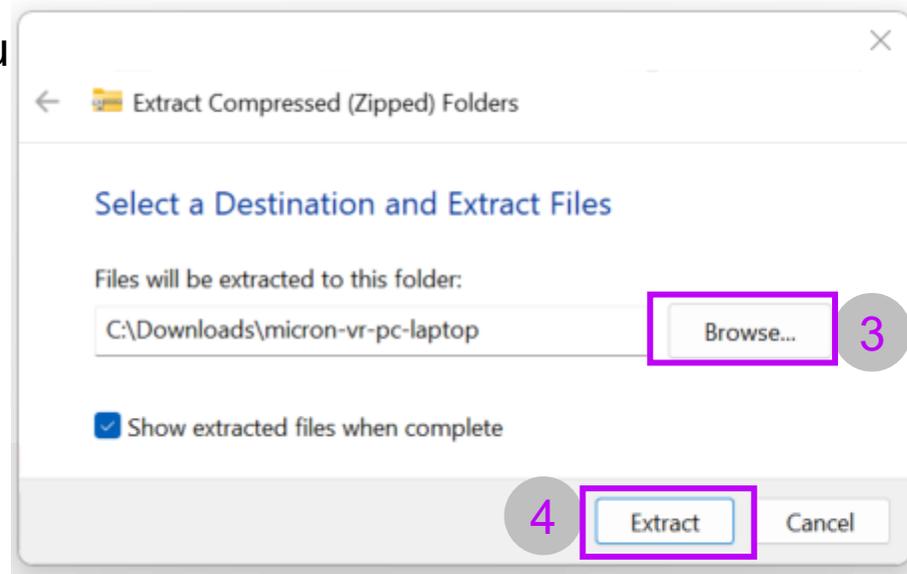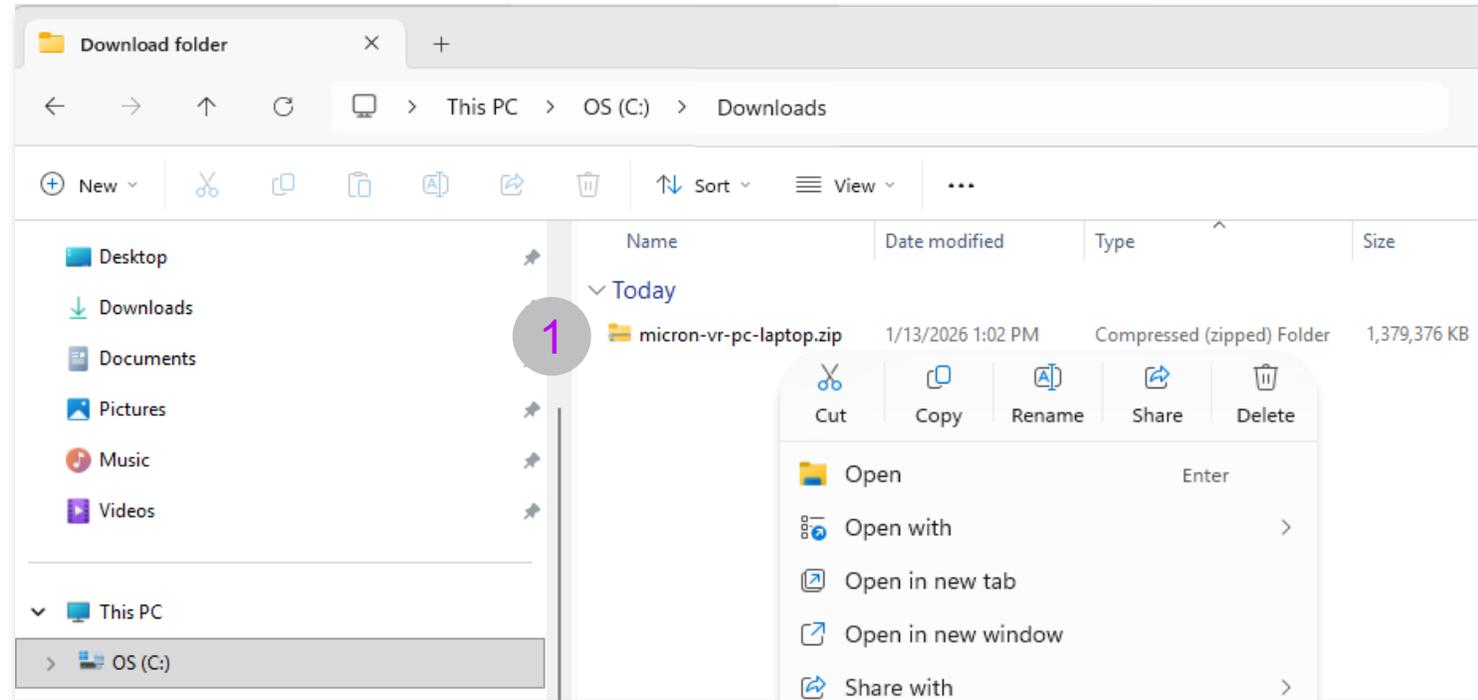
Installation (cont')

5   Navigate to the extracted folder and double-click on the folder

6   Locate the executable (exe) file and double click on it to start the experience

Note: On initial launch, the program presents Third-Party Software Terms and Conditions
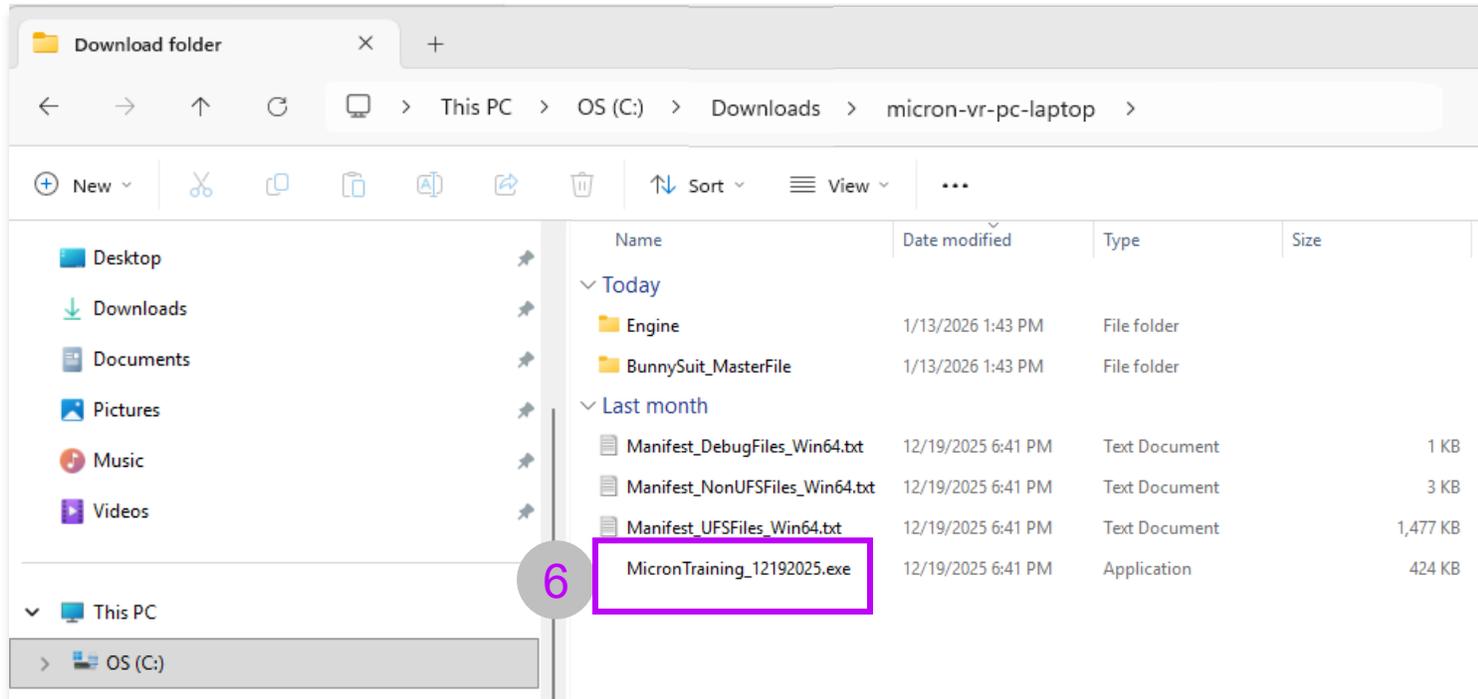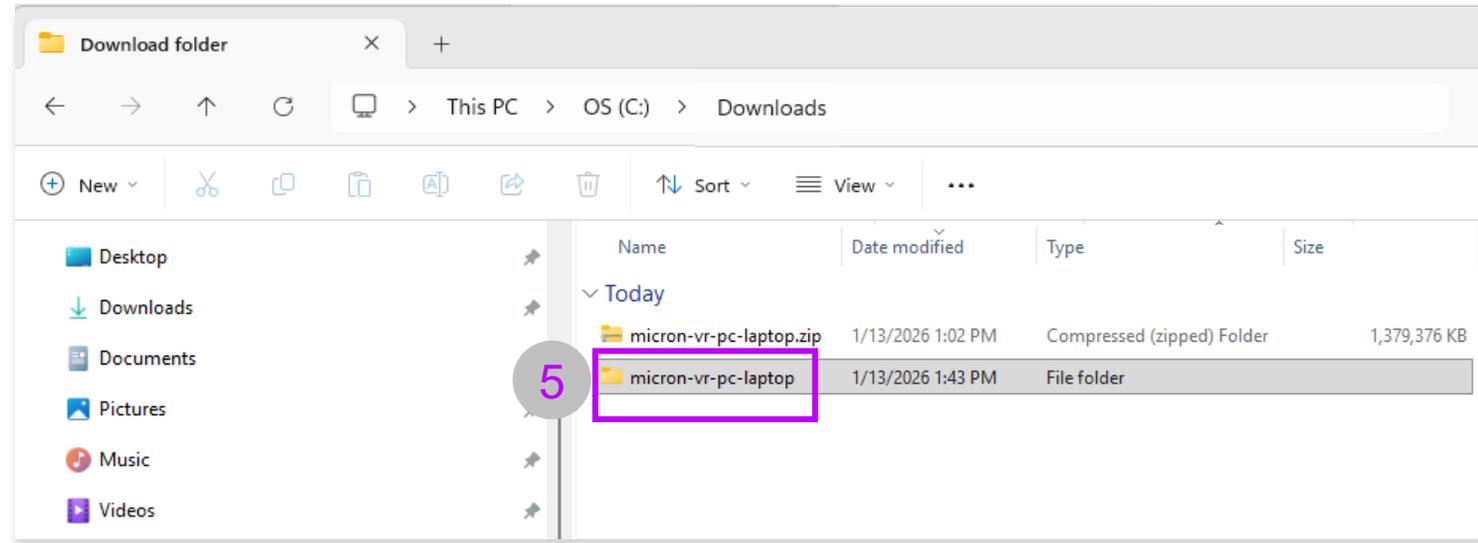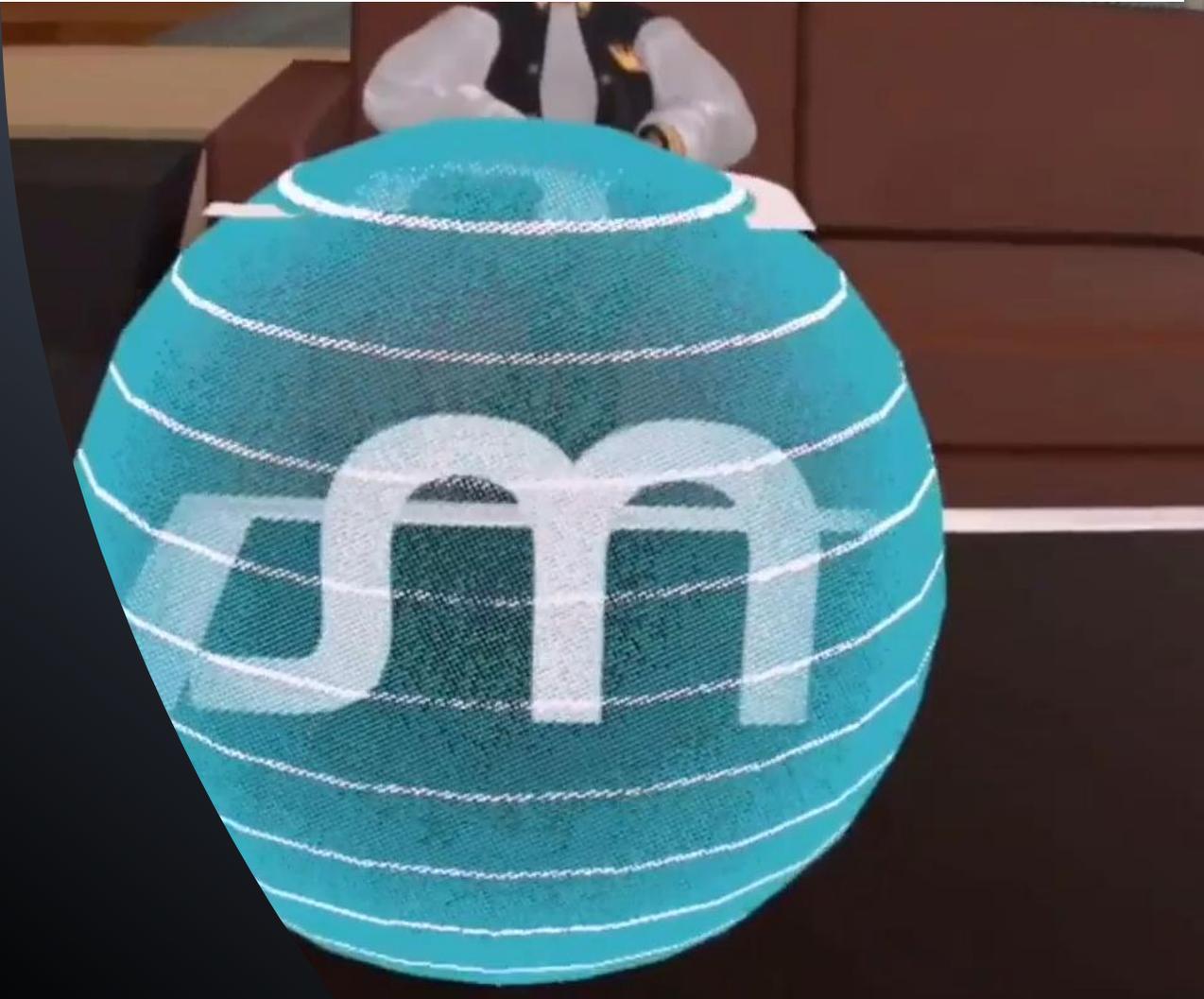
Desktop shortcut

The next steps are optional. These steps describe how to create a desktop shortcut to the application.

7   Right-click on an empty area of the desktop and select *New*

8   Then select *Shortcut*

9   Click on *Browse. N*avigate to the .exe file (not shown)

10   Then click on *Next* to rename the shortcut if desired and select *Finish*

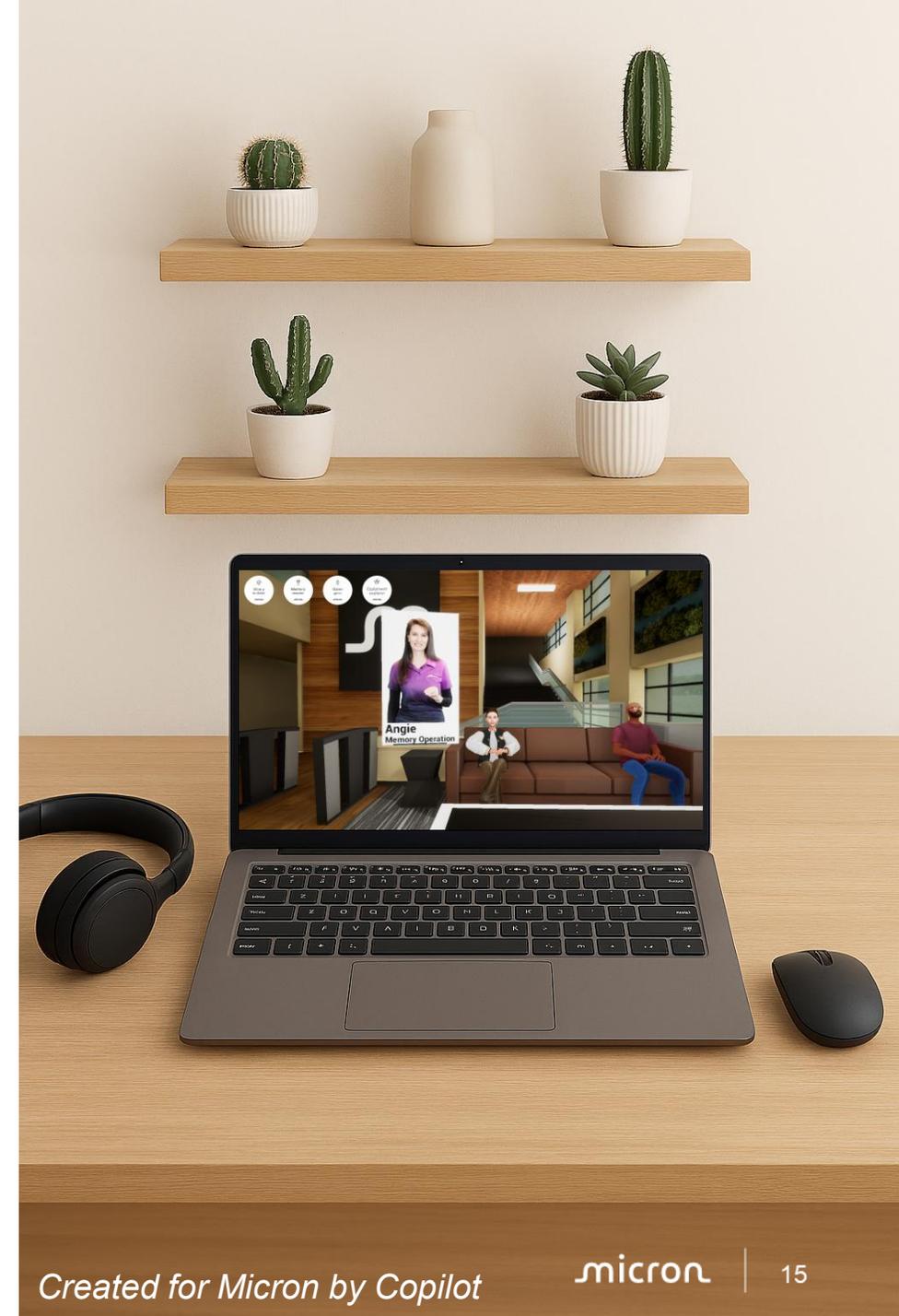**11**   The desktop shortcut will be created
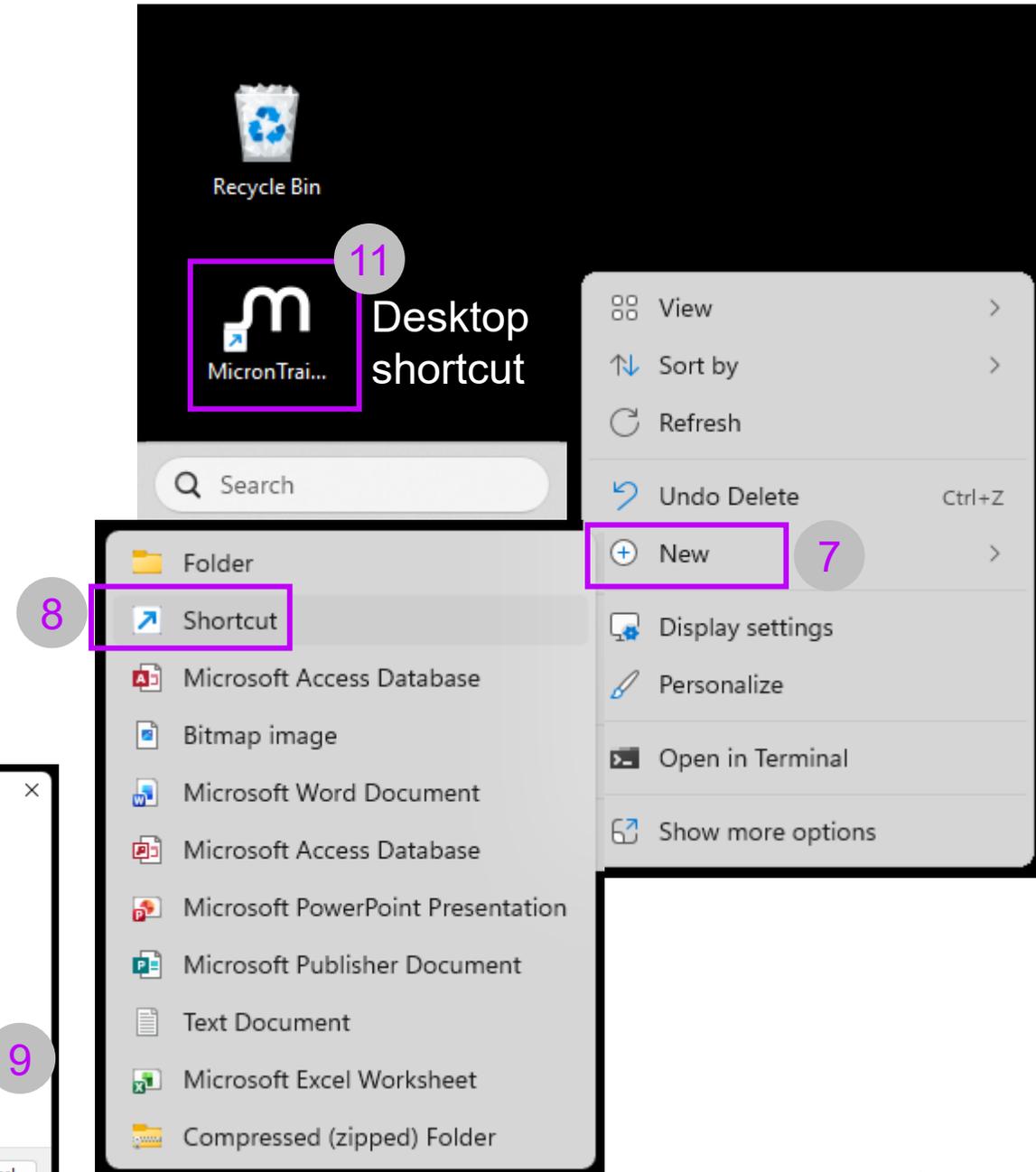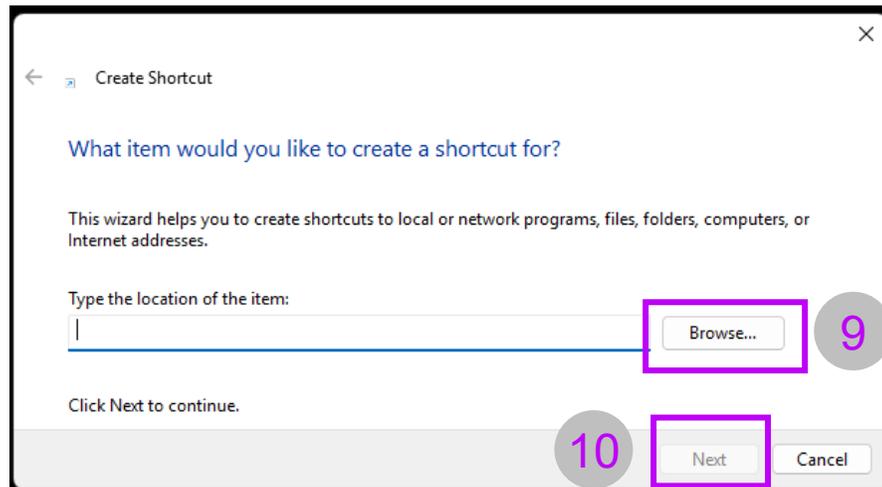
How to interact with the experience

Another option to exit is to press the Q button on your keyboard for the Main Menu, and click Exit.
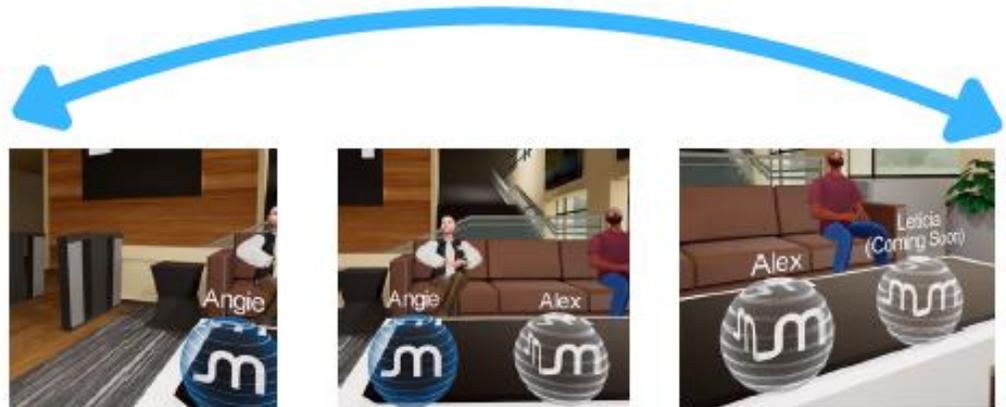
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Desktop / laptop version

- A desktop / laptop version of the experience is provided and discussed in this document. This version provides the same interactivity as the Virtual Reality version.

- Close caption can be turned on or turned off in the desktop / laptop version – similar to the VR version

- These are some scenarios where the desktop/laptop version can be a good approach
  - Participant has vertigo (VR not recommended)
  - Participant gets dizzy when using VR headsets
  - Participant needs to wear glasses that cannot fit in VR headset
  - No VR headsets/not enough VR headsets for all participants

- It is recommended to use an external mouse for this version - although participants using a touchpad have also provided good feedback

- When facilitating multiple participants in a shared space, it is also recommended to provide headphones to each participant.

Mouse Controls in desktop / laptop version

Move the mouse to change your view

The Micron Lobby / The Micron Orb

- Once the experience starts there is a cinematic video of avatars entering into a Micron lobby

- Once the avatars are seated, the Micron blue orb shown above appears. This interactive symbol is used throughout the experience. Participants must engage with the orb to begin.

- Using the mouse as explained in the next slide, aim the Selection Laser by moving the mouse onto the orb to complete the selection

Mouse Controls in desktop / laptop version

- Perform these three steps to interact with objects
- This can be used to Teleport through doors, to Interact with Orbs, to Select Items & Locations on Maps and Quizzes

1 Left-click on your mouse to activate the Selection Laser

2 Aim the Selection Laser by moving the mouse on top of your Selection

3 Release the left-click on your mouse to complete the Selection
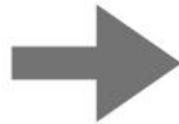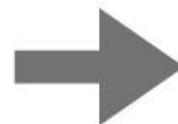
Control Instructions also embedded in the experience
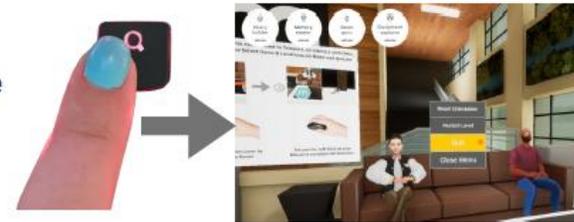
Pause and Exit instructions in the desktop / laptop version

- To **pause the experience** and switch to a different application in your desktop or laptop, use the Alt + Tab combination

- To exit the application, press the Esc key on your keyboard at any time

- The application can also be exited at any time by pressing the q key on your keyboard and choosing the Exit option *(See section Advanced Navigation)*

Close Captions in the desktop / laptop version

- Participants can turn on close captions or turn them off at any point during the experience

- Use the c key in the keyboard. Press the c key once to turn on the close captions, and press the key again to turn them off.
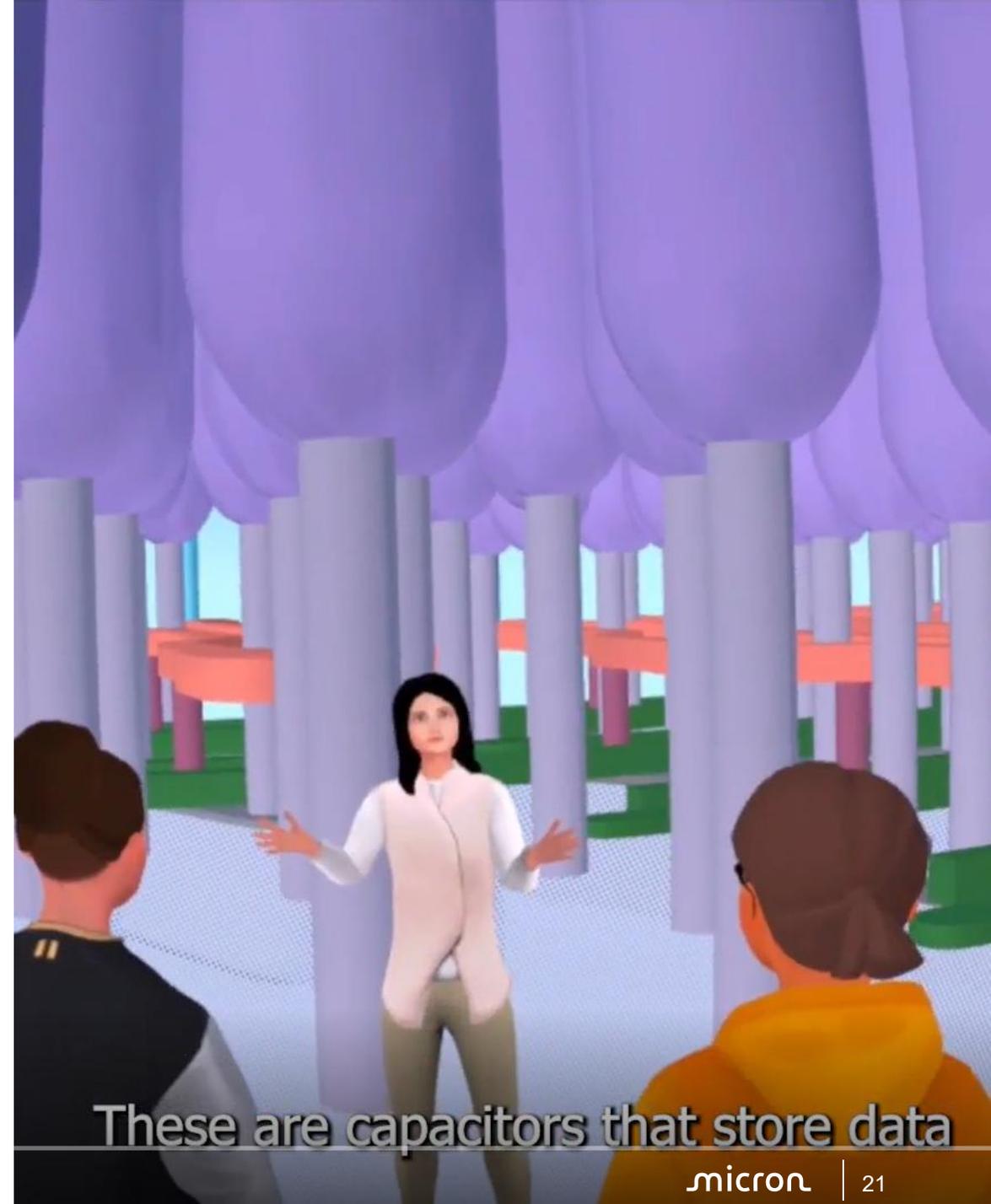
These are capacitors that store data

Description of experiences

The Micron Lobby

- Once the Micron orb in the lobby is activated, two intro videos will play in sequence:
    1. Angie's intro video (~20 seconds)
    2. Alex's intro video (~20 seconds)

- After both videos conclude, the participant selects a Micron orb:
    - Either the orb of their choice, or
    - The orb indicated by the facilitator

- Experience Duration
    - Angie's experience: ~15 minutes
    - Alex's experience: ~15 minutes

- Important Note: if a participant selects a different experience than the one indicated by the facilitator, the facilitator may:
    - Allow the participant to continue with the selected experience, or
    - Ask the participant to exit and restart the experience (Refer to the *Exit Instructions* slide)

Description of experiences
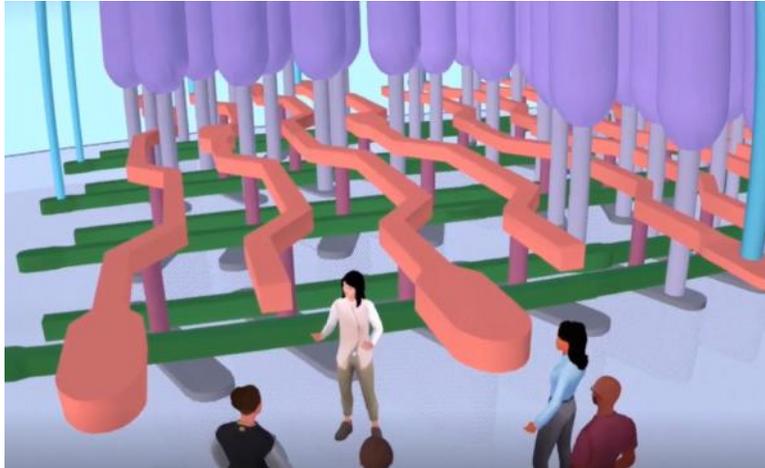
DRAM Memory ~15 minutes

Angie guides us through a shrinking room experience that helps visualize the incredibly small scale of semiconductor memory circuits. As we shrink down to the nanometer scale, we enter a DRAM memory array, where we learn how binary data works and where that data is physically stored—inside very tall capacitors. This immersive experience introduces the structure and operation of DRAM in an engaging and intuitive way.


Equipment Technician Role ~15 minutes

Alex invites us to learn about the Equipment Technician role. First, he demonstrates the proper gowning procedure required before entering the fab. Participants then follow the correct gowning sequence themselves before entering the fab alongside Alex. Inside the fab, Alex explains key concepts related to the area where he works and its importance in the manufacturing process. To conclude, he walks us through a preventive maintenance task, showing how Equipment Technicians help keep operations running smoothly.
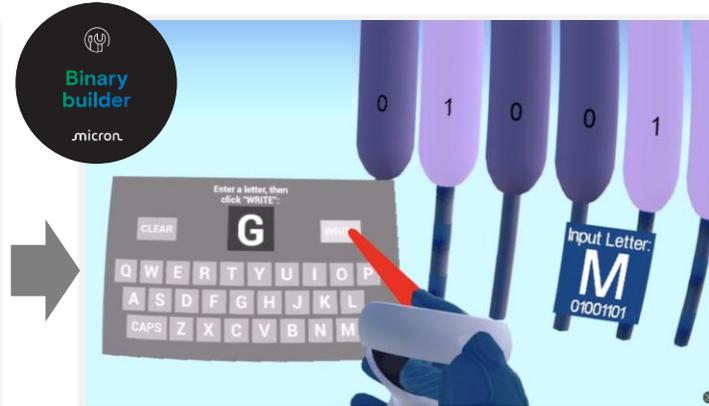
Angie: memory operation story board

Angie takes us into a "shrinking room" where different objects of known dimensions appear as we shrink to the nanometer scale.
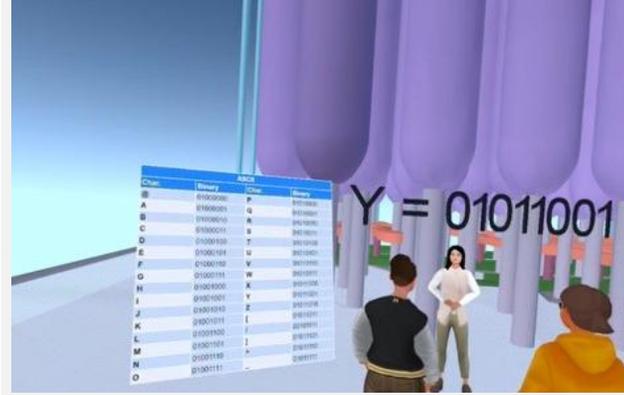
Then we enter into a nanometer scale DRAM memory array where we first learn about binary data.

We get to practice how to store a single character (8 bits) into capacitors in a DRAM memory array. We earn the **Binary builder badge** along the way!

Next, we learn about the different components of a DRAM memory array, and we learn about the WRITE operation (how to write a 0 or a 1 in a capacitor).

Once Angie concludes the explanation we walk with her inside the memory array, and we get the chance spend a moment looking up, down, and around before the next step.
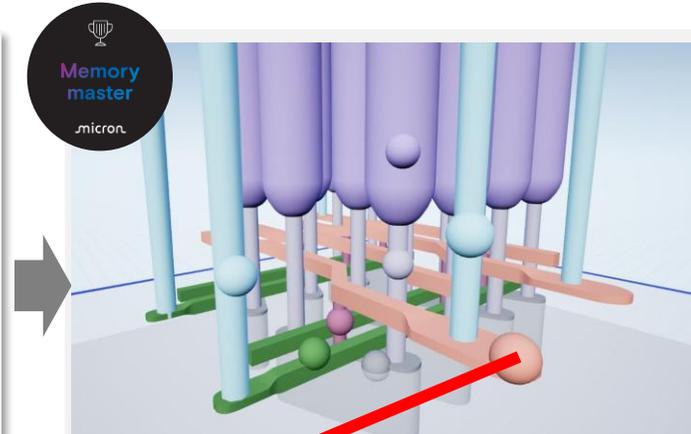
We next answer several quiz questions to check our understanding of DRAM memory and earn the **Memory master badge**!
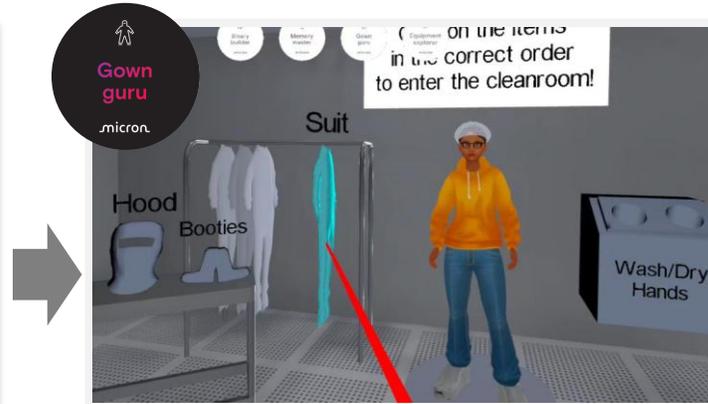
Back to the Lobby where we can repeat the adventure or choose a new adventure.

# Alex: gown room and cleanroom story board

Alex takes us into the Gown Room where we learn the several steps to dress up correctly before entering the cleanroom to prevent introducing contamination.

Then we enter the Smock Quiz Room where we dress an avatar in the correct order to check understanding of the gowning process and earn the **Gown Guru badge**!


Then we enter the cleanroom where Alex explains the responsibilities of Equipment Technician role and introduces us to the fab area where he works (the Chemical Mechanical Planarization Area).
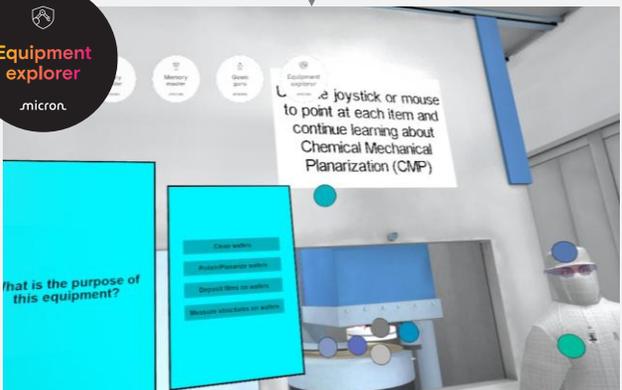
Next, we answer several quiz questions to check our understanding and earn the **Equipment explorer badge**!

Next turn left where you will see two doors. You can go back to the Lobby, or you can continue learning about the Equipment Technician role.
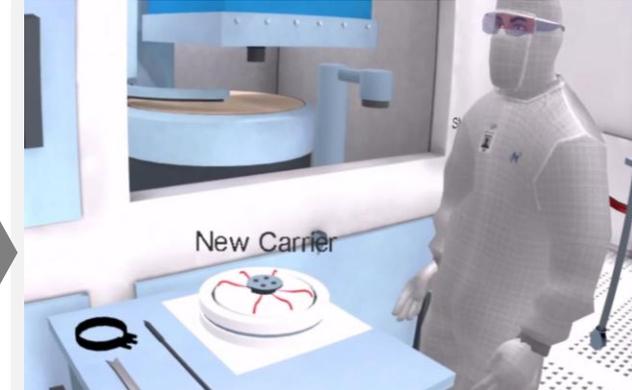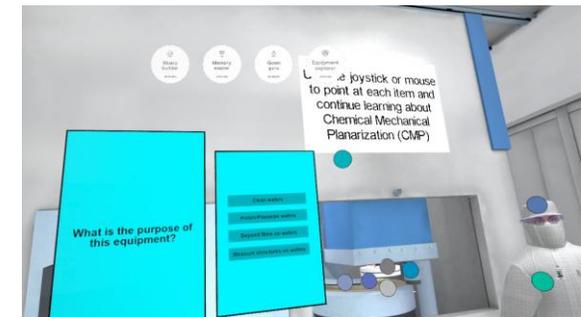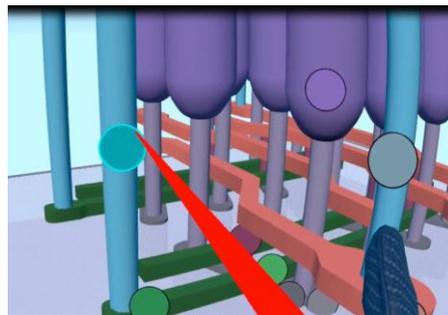

If we choose to continue, Alex shows step by step how he performs a preventive maintenance task. Today we learn how to change a "carrier" in a Chemical Mechanical Planarization tool he is responsible for.

Back to the Lobby where we can repeat the adventure or choose a new adventure.
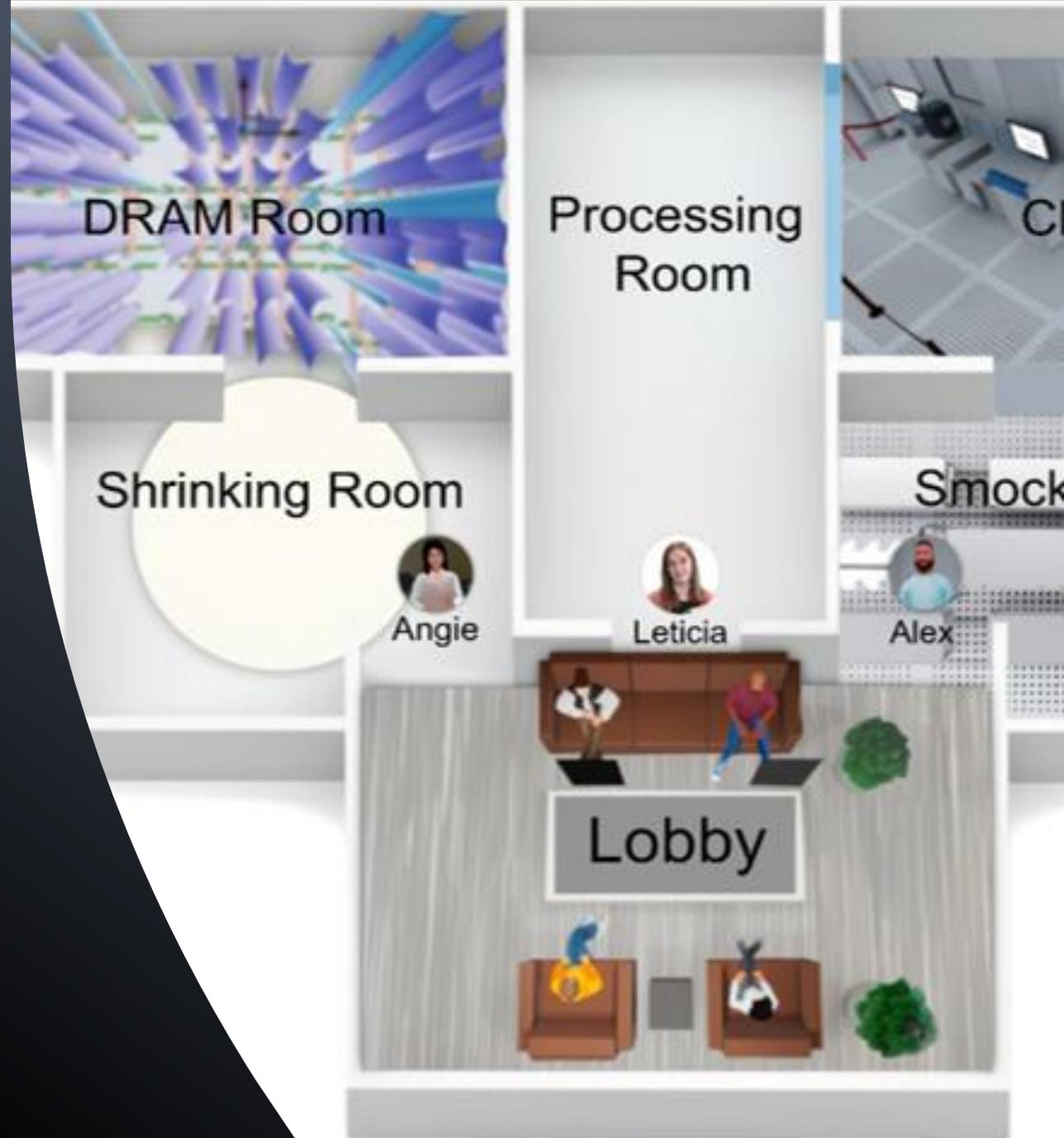
Stickers for each activity completed

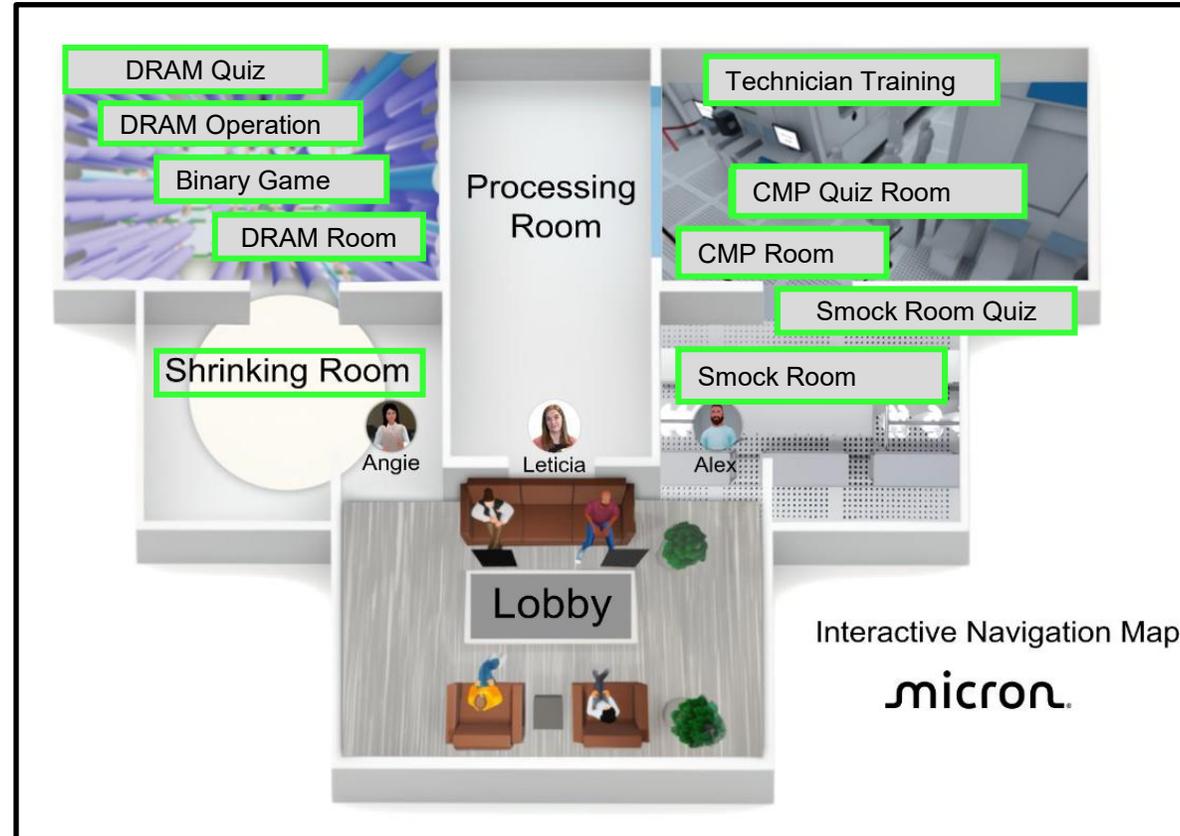Sticker design available for printing

Advanced navigation

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How to navigate to different rooms (recommended only for facilitators to use)

2) Navigation Map opens

Interactive Navigation Map

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1) Press the **e key** on your keyboard to open the navigation map

Note: to exit Navigation Map press on **e key** on keyboard again

3) Left-click on your mouse to activate the Selection Laser

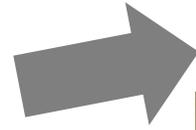4) Aim the Selection Laser by moving the mouse on top of your room Selection

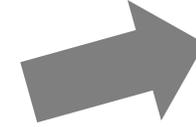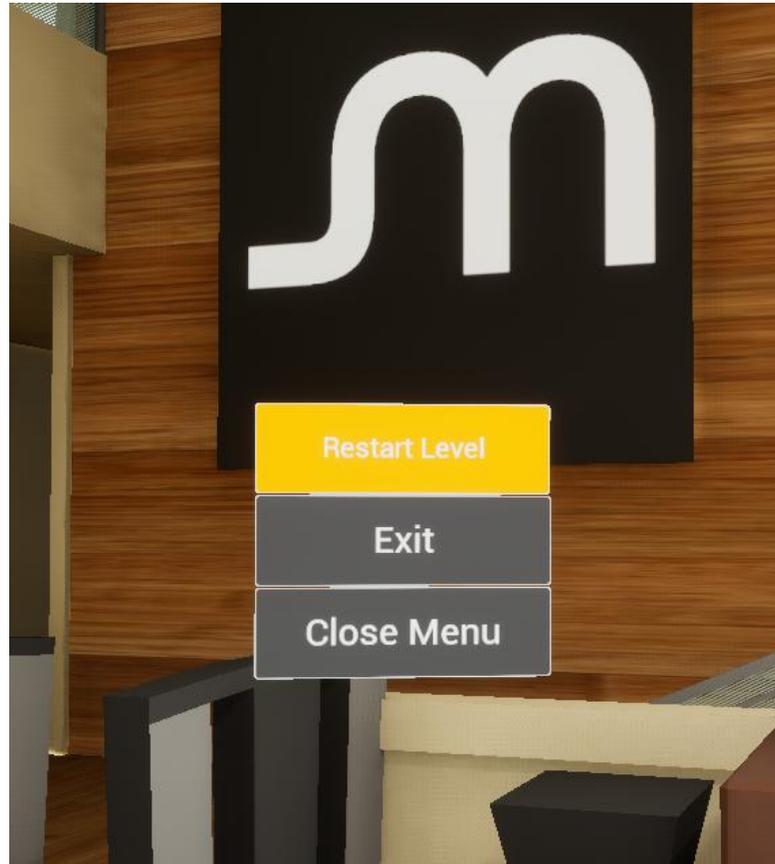5) Release the left-click on your mouse to complete the Selection

How to use the Main Menu
(recommended only for facilitators to use)

1) Press the q key on your keyboard for the Main Menu

Note: to exit Main Menu press on q key on keyboard again

2) Main Menu opens

3) Left-click on your mouse to activate the Selection Laser

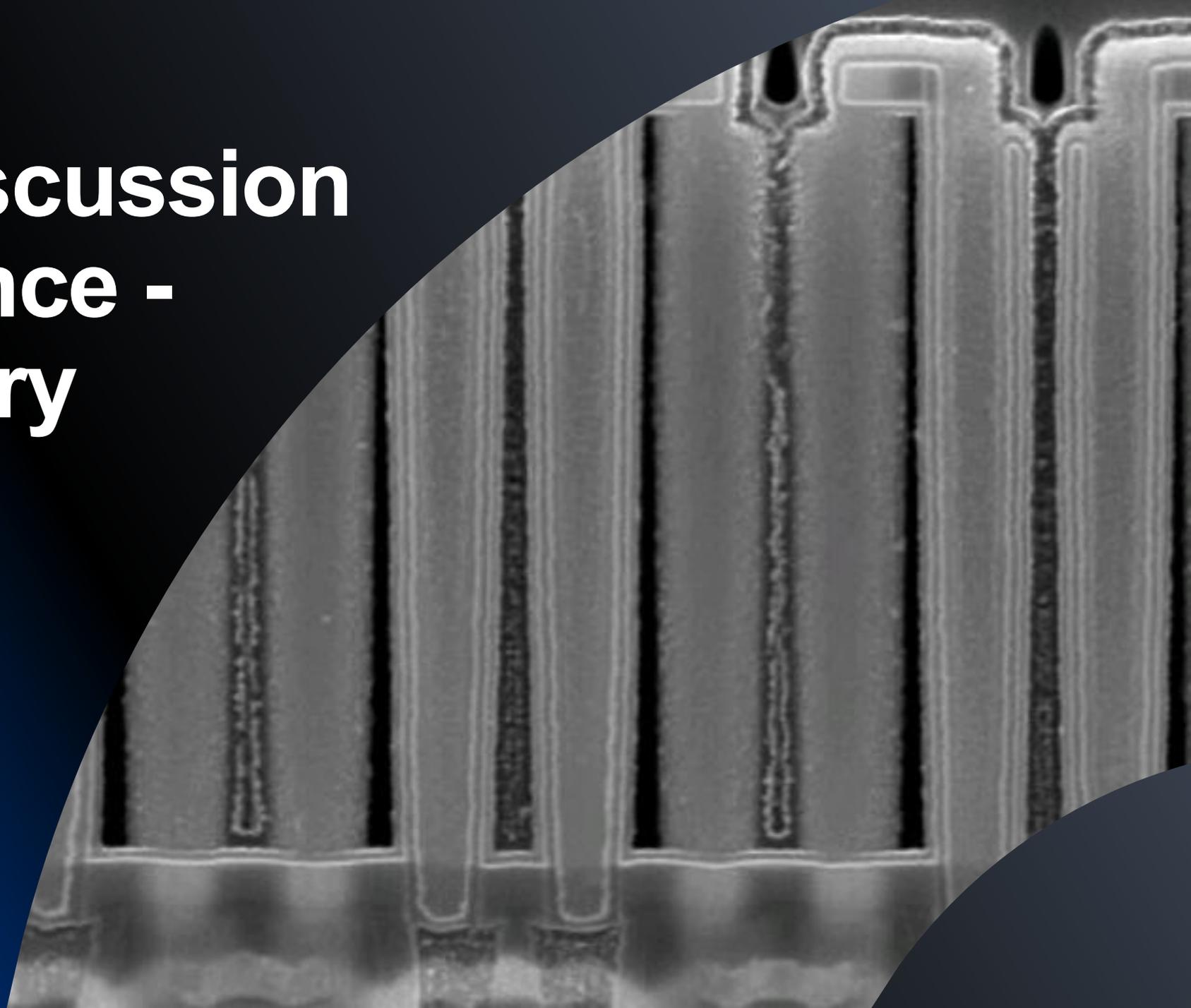4) Aim the Selection Laser by moving the mouse on top of your Selection

5) Release the left-click on your mouse to complete the Selection

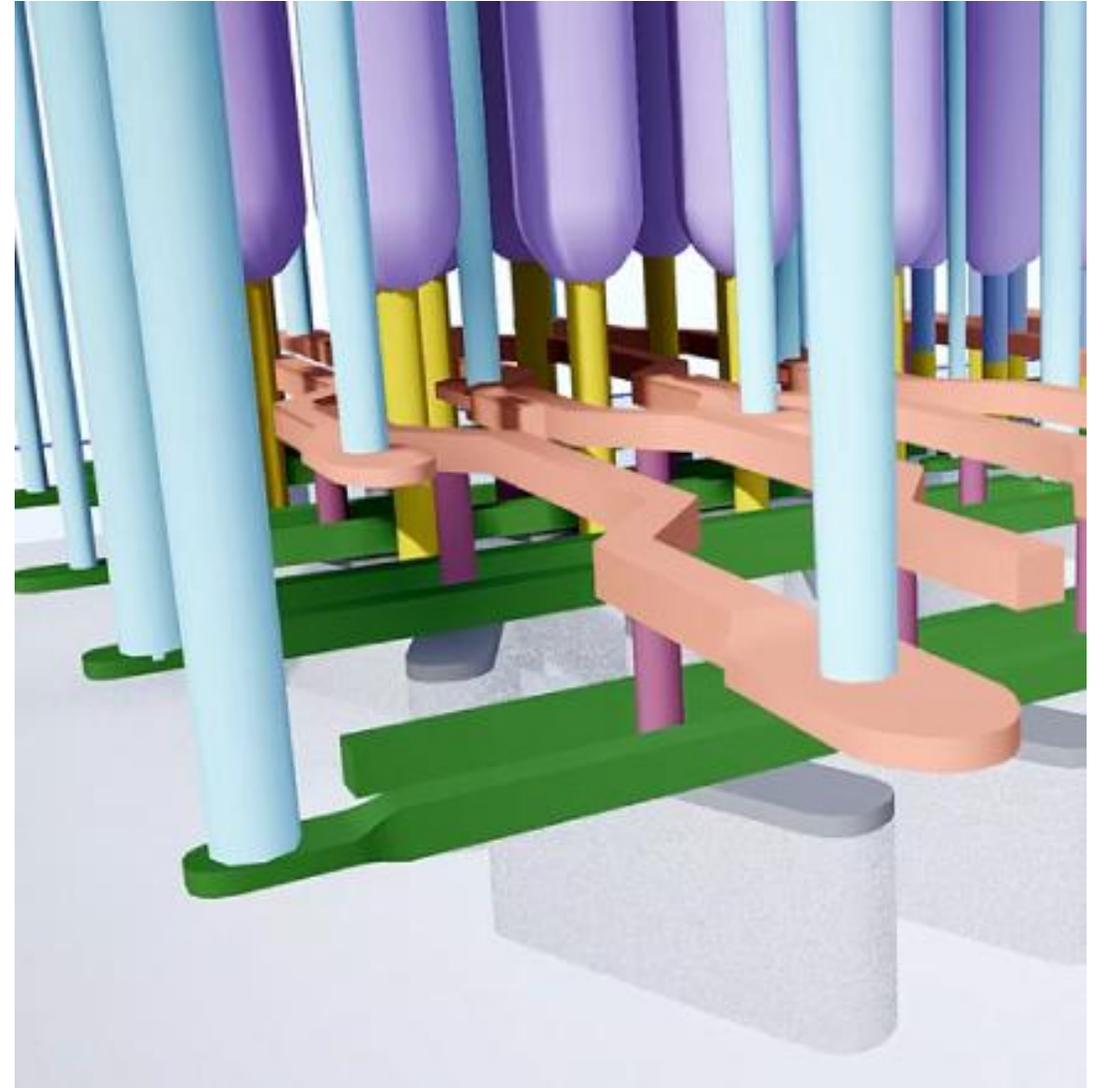# Topics for discussion after experience - DRAM Memory

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DRAM memory discussion/disclaimers

– Memory arrays **do not** have open gaps between components/structures. All devices/structures are protected by insulation and are all **compacted** (crunched) together.

– Cylindrical connections such as cell contacts and digitline contacts are **much shorter** than shown and not actually cylinders (cylinder shape was convenient to illustrate contact but it is not the actual shape of some contacts).
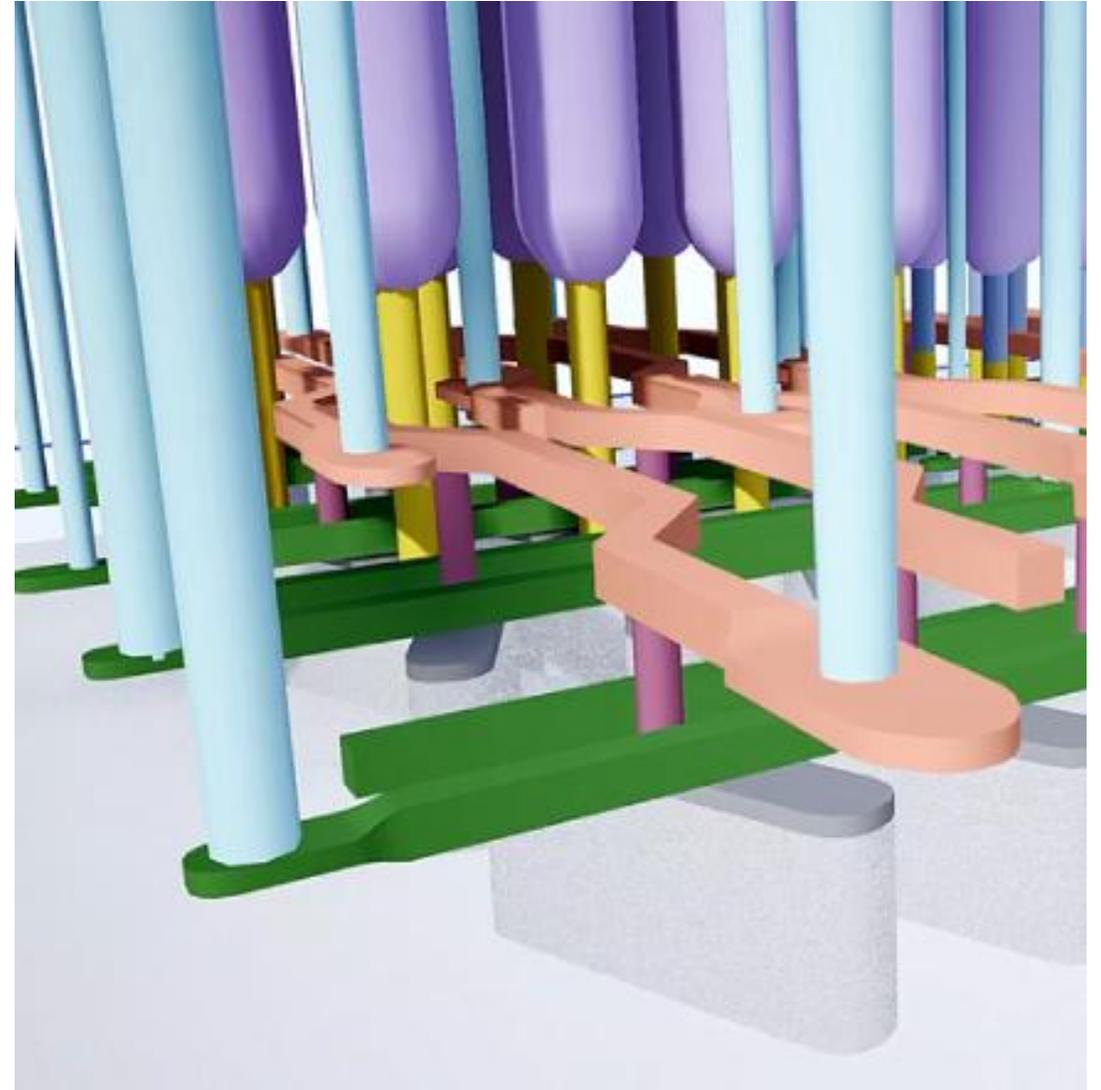
DRAM memory discussion/disclaimers

- The wordlines today are buried *below* the silicon surface. The wordlines shown here are built on top of the silicon which is an older technology to facilitate the explanation.

- Current capacitors are taller and skinnier than shown. They have a high 'aspect ratio'. What is aspect ratio?

- Today, digitlines are straight (no weaving). Best for tiny features, tight control, and repeatability.

DRAM memory discussion
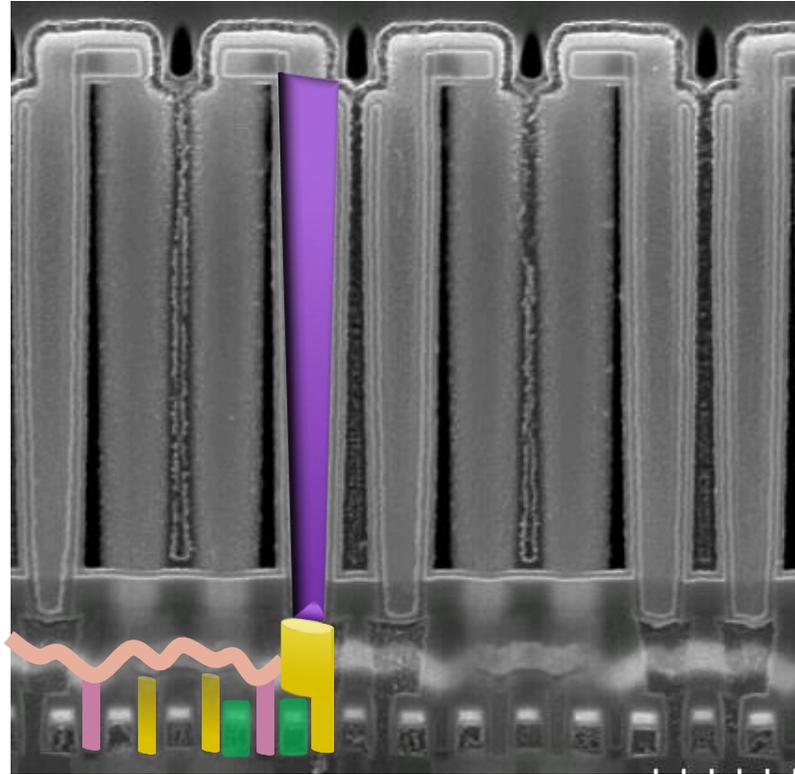
This Scanning Electron image of an older DRAM memory array (similar to the technology shown in the experience) may have some recognizable features. What can you identify?
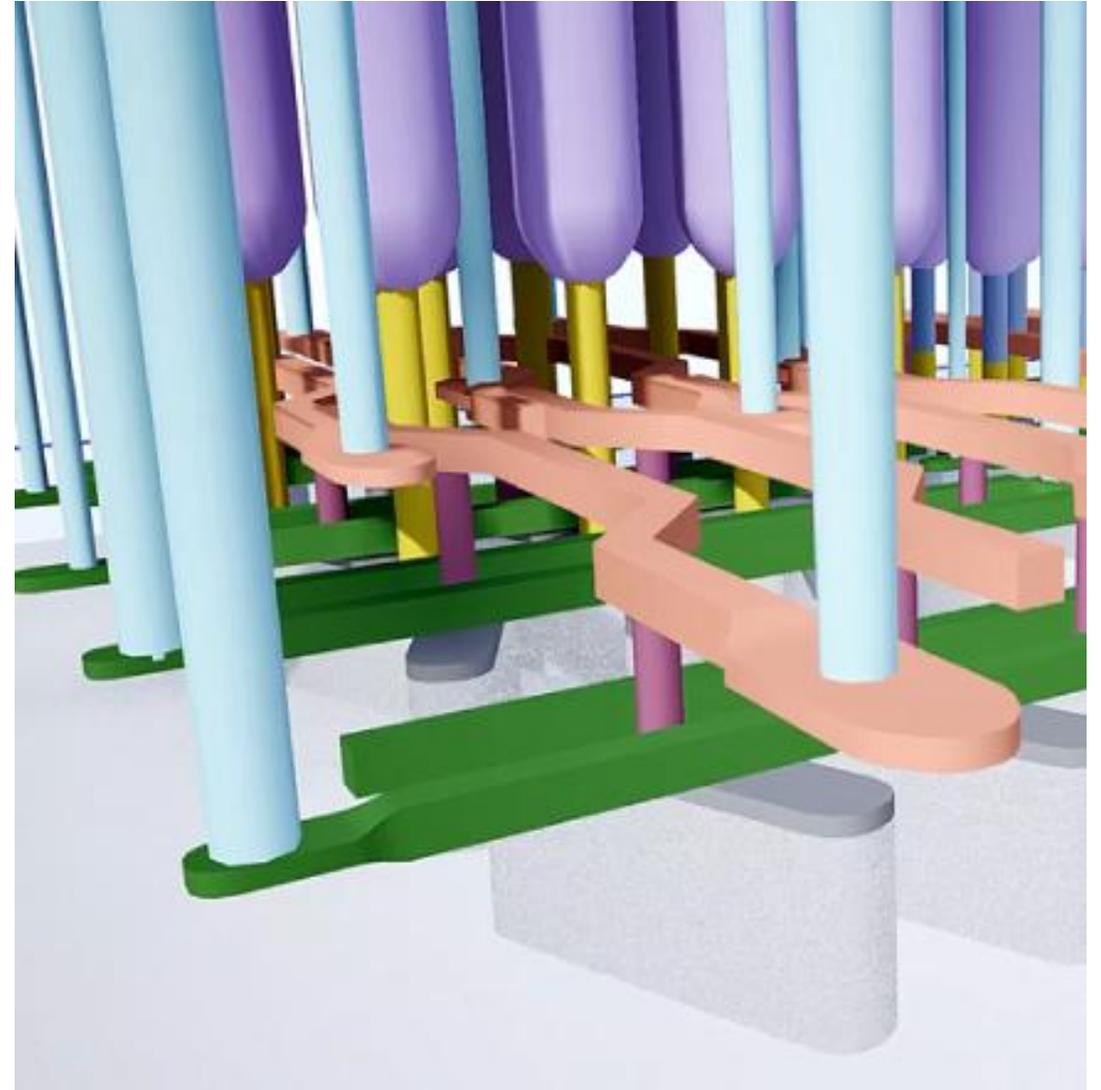
Topics for discussion after experience - Equipment Tech

Fab Equipment Tech Role

🔧 **CMP (Chemical Mechanical Planarization) is one of 10 fab areas**

📌 **Equipment Technician roles in all 10 fab areas**
- See list of areas on the right

🛠️ **What Do Equipment Technicians Do?**
- Maintain, troubleshoot, and calibrate advanced fab equipment

🎓 **Education or Experience**
- Ideal candidates familiar with one or more: electrical & mechanical systems, mechatronics, robotics, microelectronics, reading and interpreting schematics

🏭 **No Fab Experience? No Problem!**
- Most roles do not require prior fab experience
- On-the-job training is provided

💡 **What Makes a Great Equipment Technician?**
- Strong troubleshooting and problem-solving aptitude
- Good communication and teamwork skills

🚀 **Ready to Join?**
- Check out current openings: careers.micron.com

Fab Areas

- CMP (Chemical Mechanical Planarization)
- CVD (Chemical Vapor Deposition)
- Diffusion
- Dry Etch
- Implant
- Metrology
- Photolithography
- PVD (Physical Vapor Deposition)
- RDA (Real-Time Defect Analysis)
- Wet Process
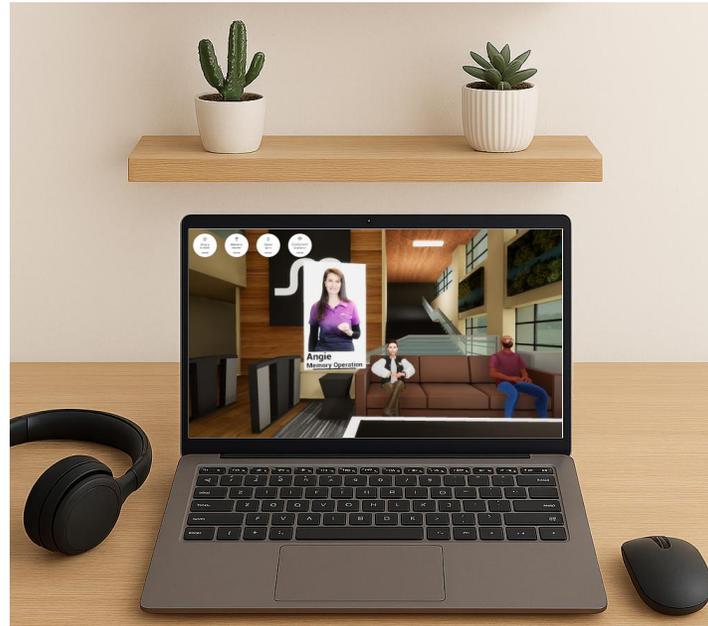
Multiple delivery formats

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Three versions for broad access

1 Virtual Reality version

2 Desktop / laptop version
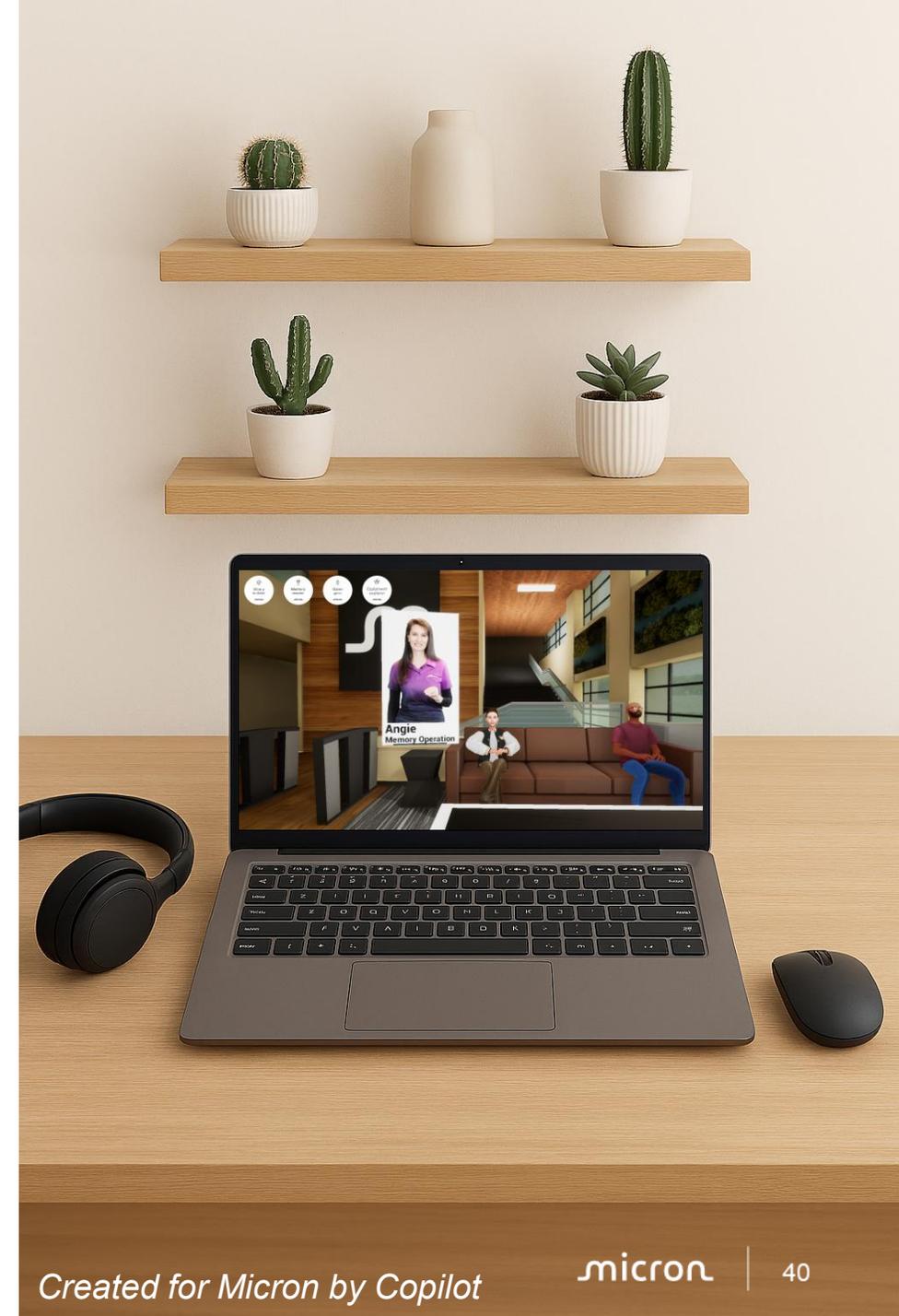

3 Video version

Virtual Reality version

- The most immersive experience

- This version provides the same interactivity as the desktop / laptop version

- Close caption can be turned on or turned off in the VR version – similar to the desktop / laptop version

- These are some scenarios where the VR version may not be a good approach. In these cases, the other versions may be a better fit.
    - Participant has vertigo (VR not recommended)
    - Participant gets dizzy when using VR headsets
    - Participant needs to wear glasses that cannot fit in VR headset
    - No VR headsets/not enough VR headsets for all participants

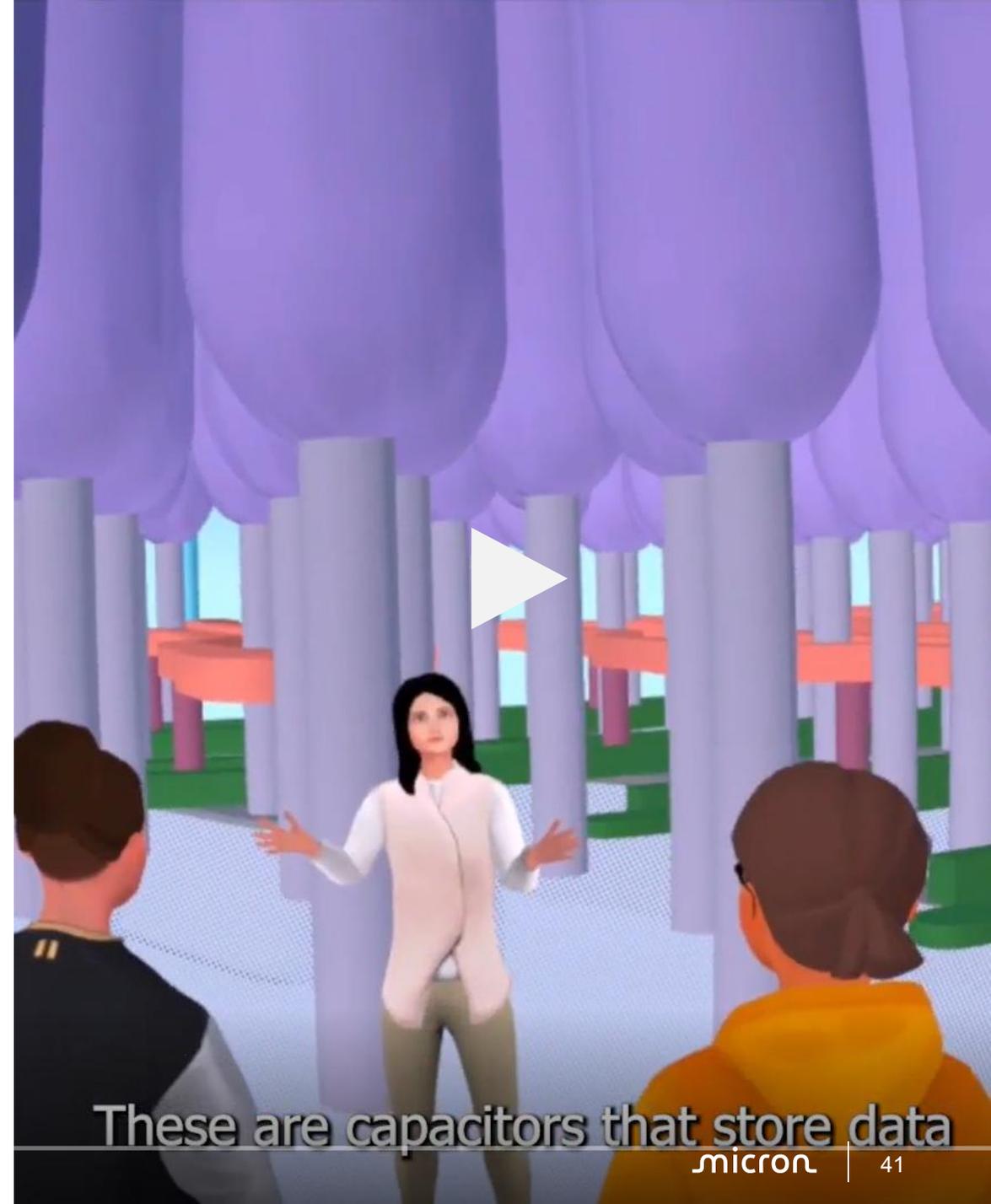- A separate installation/facilitator guide is provided for the VR version

Desktop / laptop version

- A desktop / laptop version of the experience is provided and discussed in this document. This version provides the same interactivity as the Virtual Reality version.

- Close caption can be turned on or turned off in the desktop / laptop version – similar to the VR version

- These are some scenarios where the desktop/laptop version can be a good approach
    - Participant has vertigo (VR not recommended)
    - Participant gets dizzy when using VR headsets
    - Participant needs to wear glasses that cannot fit in VR headset
    - No VR headsets/not enough VR headsets for all participants

- It is recommended to use an external mouse for this version - although participants using a touchpad have also provided good feedback

- When facilitating multiple participants in a shared space, it is also recommended to provide headphones to each participant.

Video version

- There are two mp4 **videos** of the experience that can be watched in a desktop, laptop, tablet, etc.:
  - Video without close captions
  - Video with close captions

- These are some scenarios where video version can be a good approach
  - Participant has vertigo (VR not recommended)
  - Participant gets dizzy when using VR headsets
  - Participant needs to wear glasses that cannot fit in VR headset
  - No VR headsets/not enough VR headsets for all participants

- Drawback: the videos do not have interactivity

- Advantage: the videos can be paused, rewind, fast forward, and watched at different speeds (the VR version does not have these options)

These are capacitors that store data

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