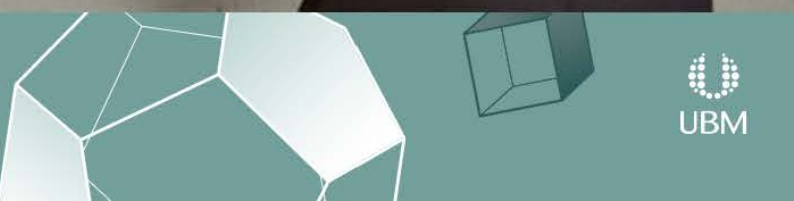


Untethered: Building Apps Beyond Room-Scale

Daniel Plemmons: Senior Interaction Designer
Blake Gross: Software Engineer

Microsoft HoloLens





Microsoft



In large-scale, mixed reality apps:

UI has to adapt to the environment.

Varied distances need varied mechanics.

Aligning the virtual and real worlds requires nuance.

UI has to adapt to the environment.



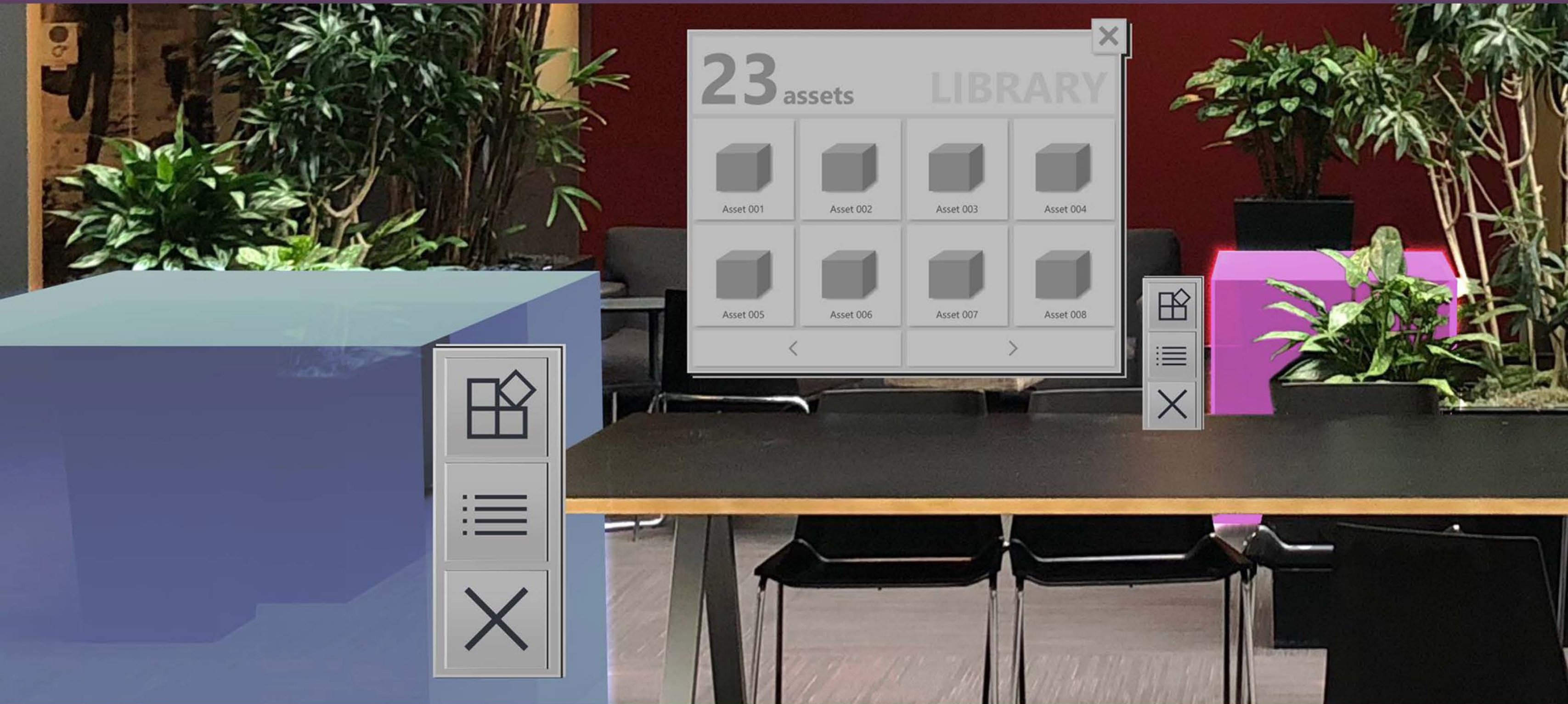
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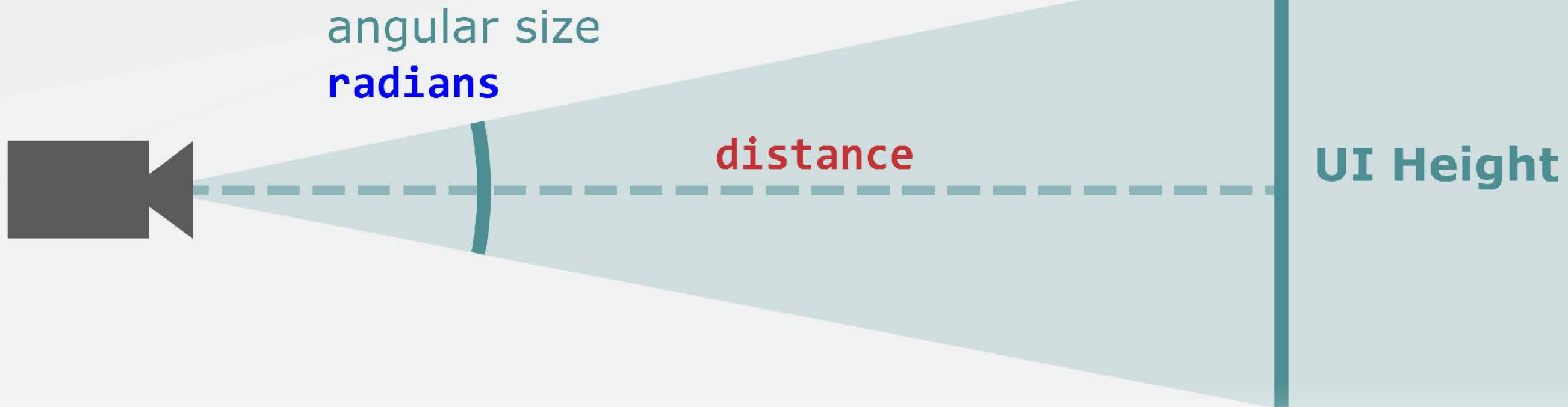
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UI has to adapt to the environment.



$$\text{uiHeight} = 2.0f * \text{distance} * \tan(\text{radians} * 0.5f)$$

UI has to adapt to the environment.



UI has to adapt to the environment.

- You don't control the environment
- Accessibility and Physicality
- Angle, occlusion, and distance

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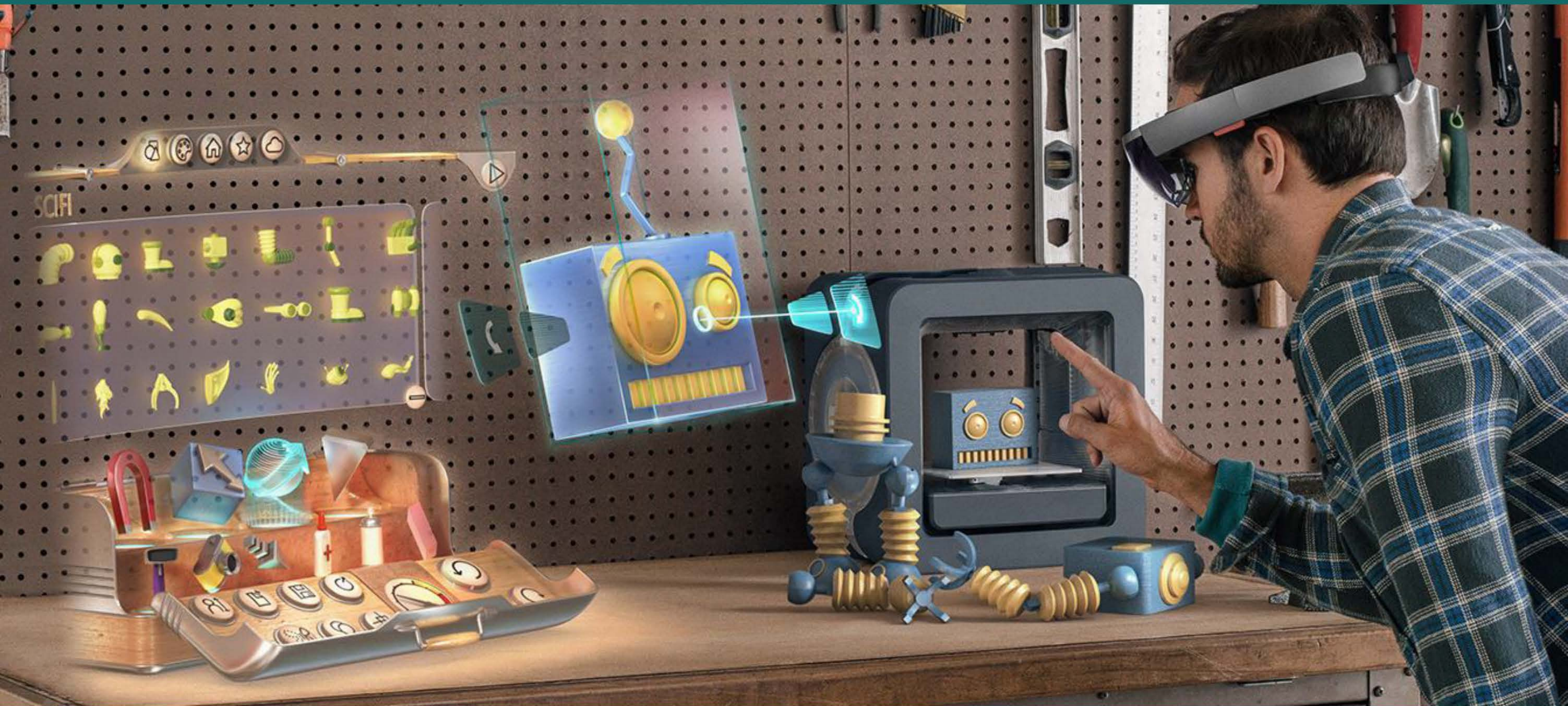
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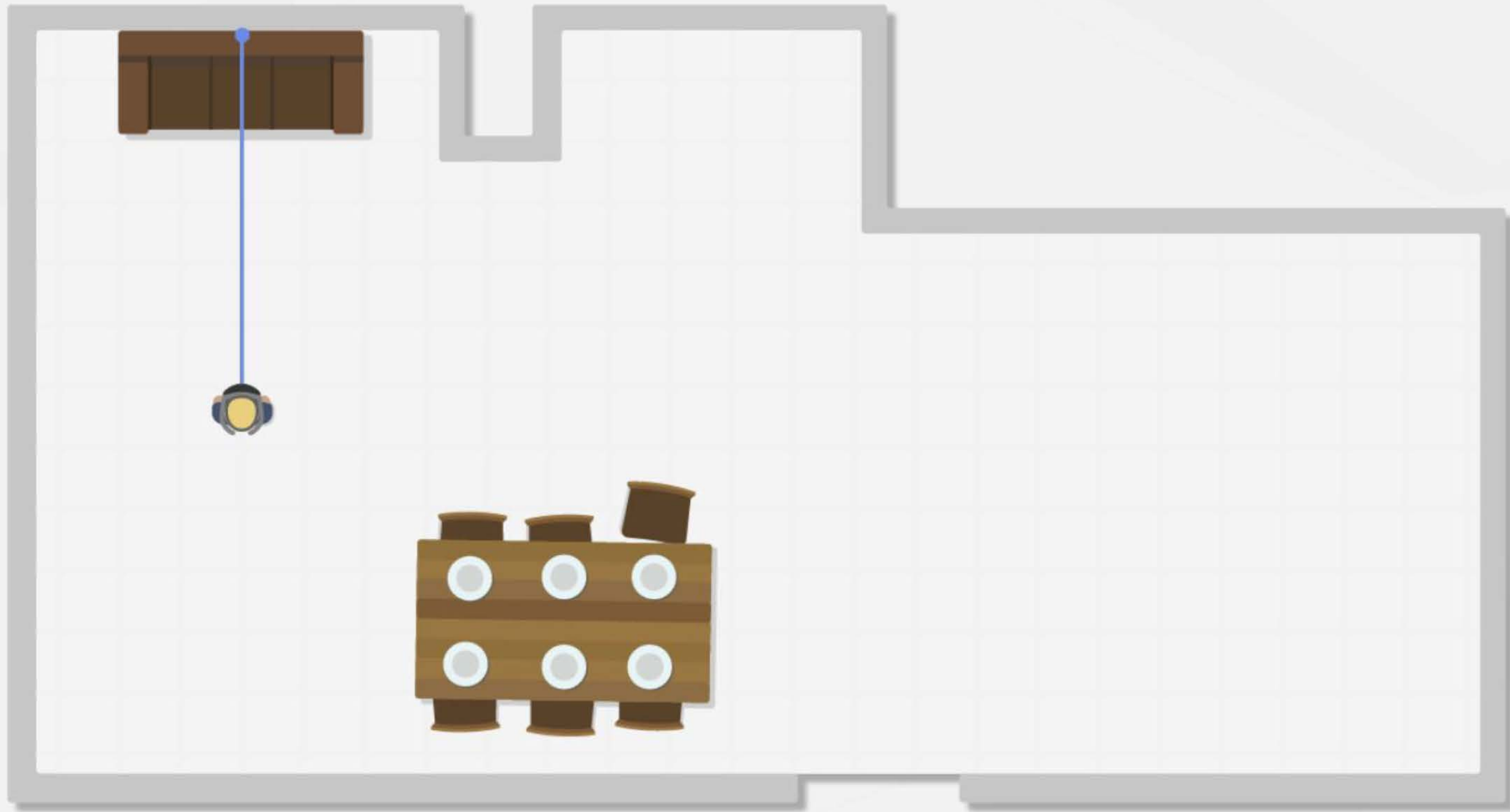
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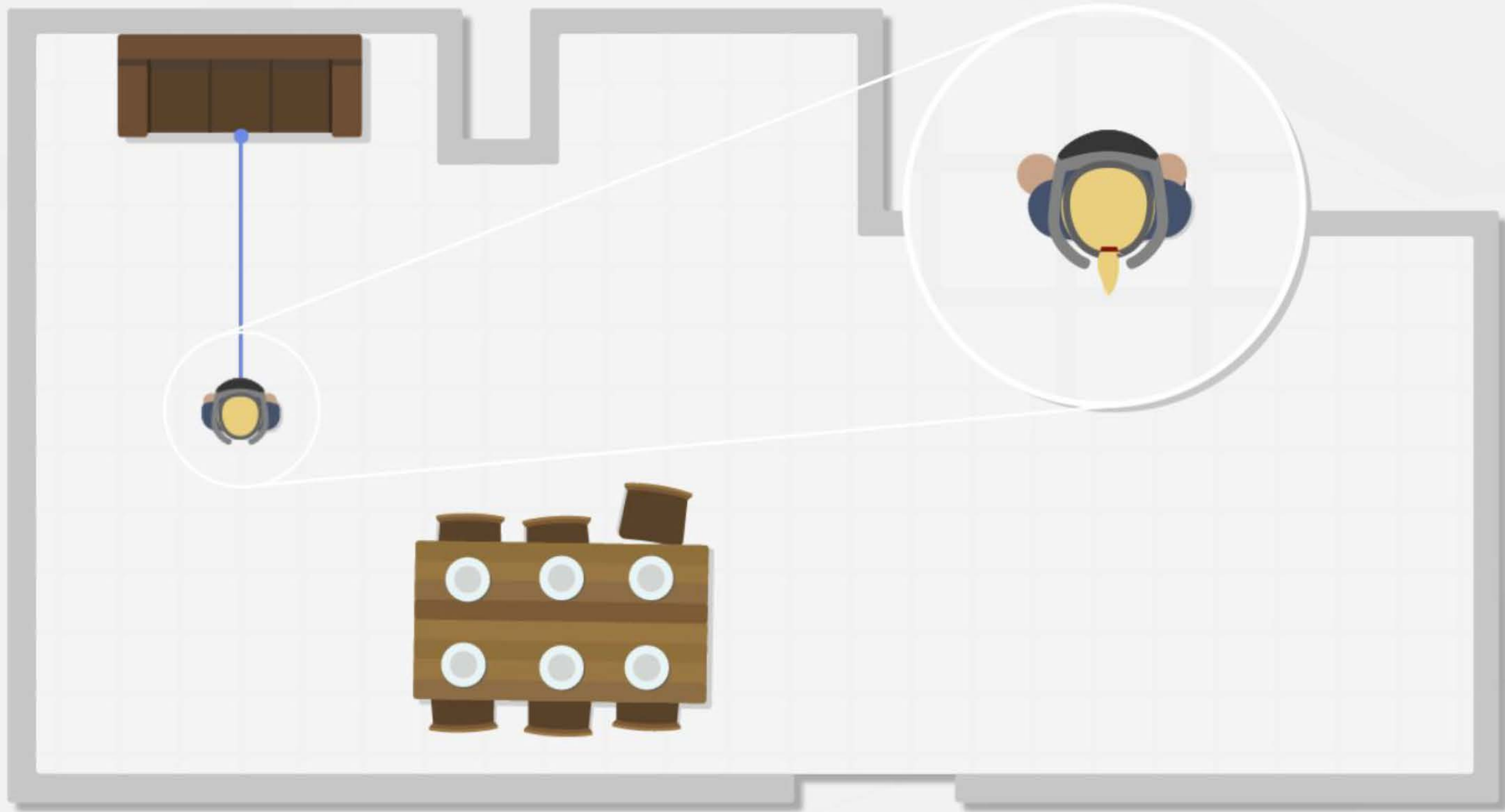
Varied distances need varied mechanics.



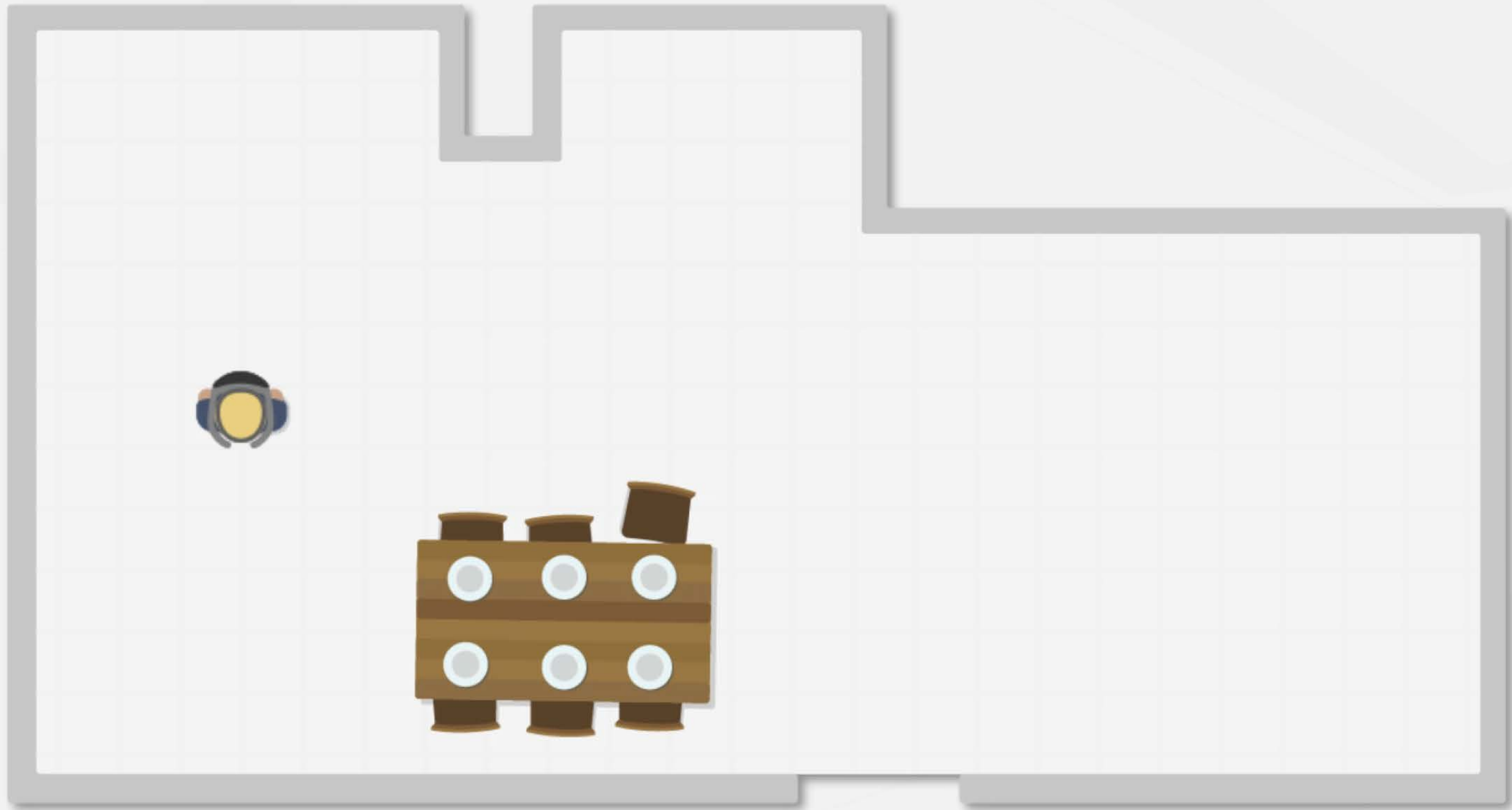
Varied distances need varied mechanics.



Varied distances need varied mechanics.



Varied distances need varied mechanics.



Varied distances need varied mechanics.

- Not all interactions work at all distances
- Use research and observation
- Different interaction distances often mean different goals

In large-scale, mixed world apps:

UI has to adapt to the environment.

Varied distances need varied mechanics.

Aligning the virtual and real worlds requires nuance.

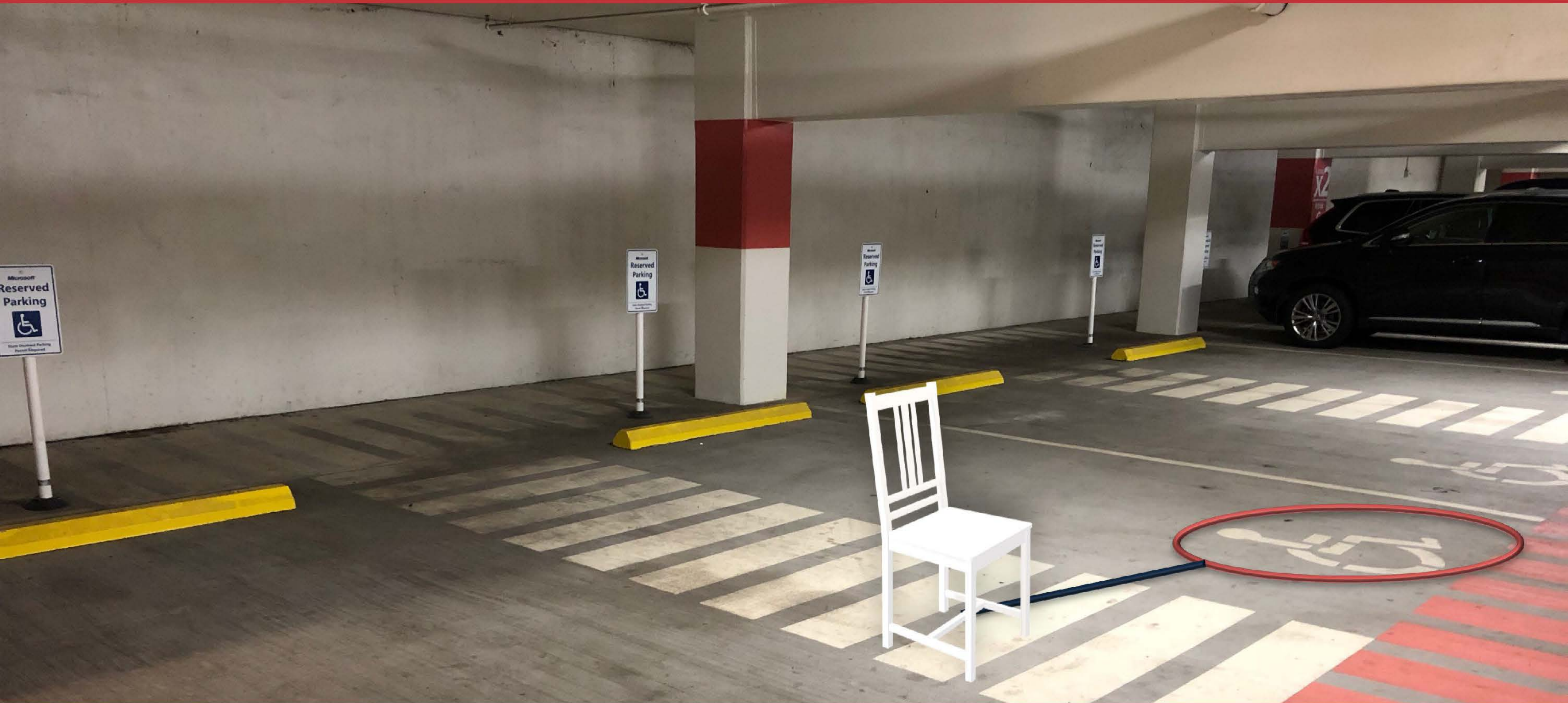
In large-scale, mixed world apps:

UI has to adapt to the environment.

Varied distances need varied mechanics.

Aligning the virtual and real worlds requires nuance.

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Aligning the virtual and real worlds requires nuance.

Lever Arm Effect

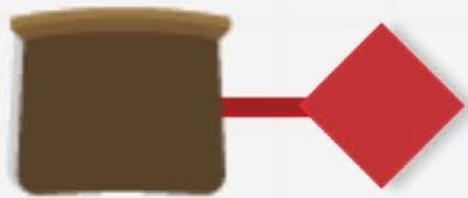
Aligning the virtual and real worlds requires nuance.

Lever Arm Effect



Aligning the virtual and real worlds requires nuance.

Lever Arm Effect



Aligning the virtual and real worlds requires nuance.

Lever Arm Effect



Aligning the virtual and real worlds requires nuance.

Hologram to Hologram Consistency

Increased lever arm error

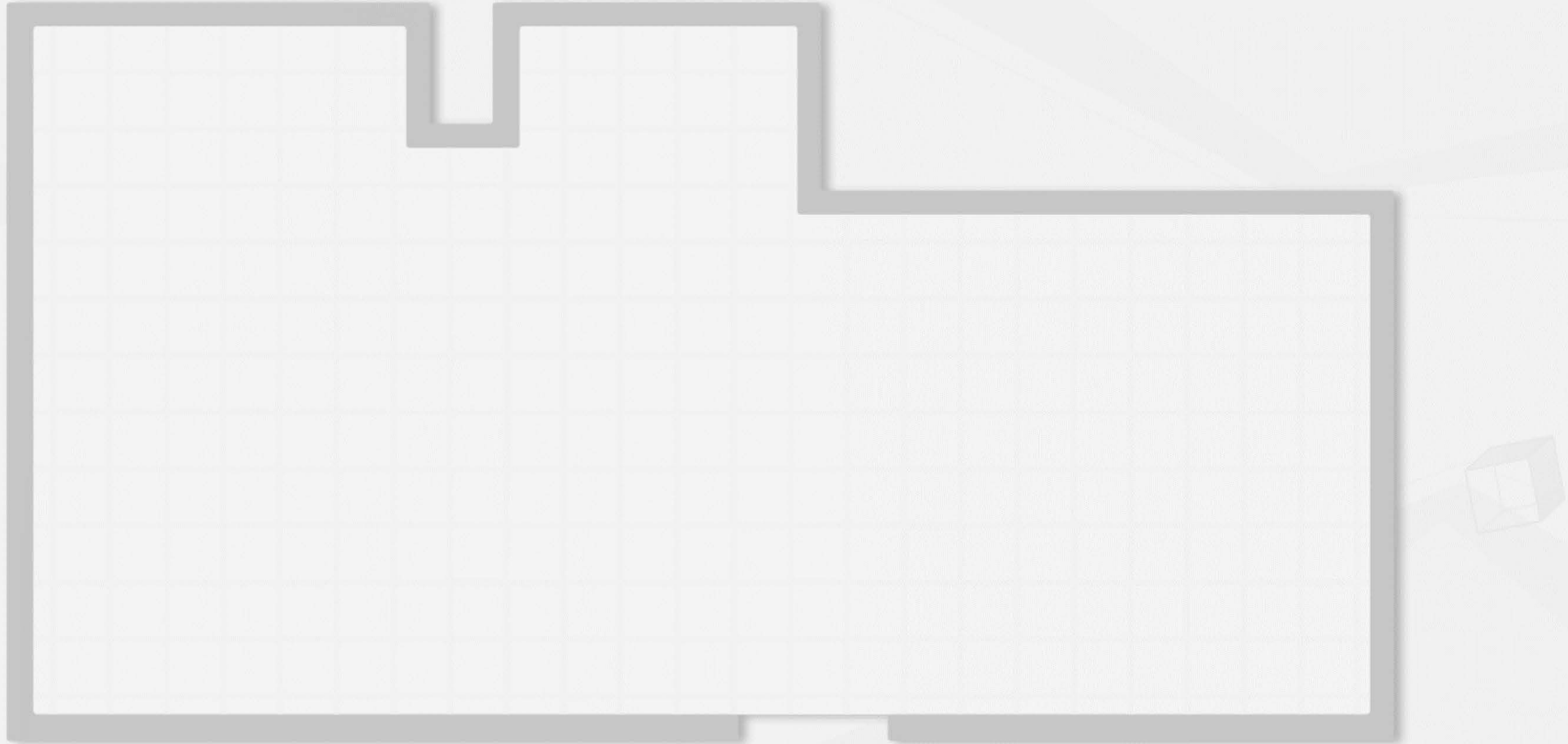
Holograms are consistent relative to each other.

Hologram to Physical Space Consistency

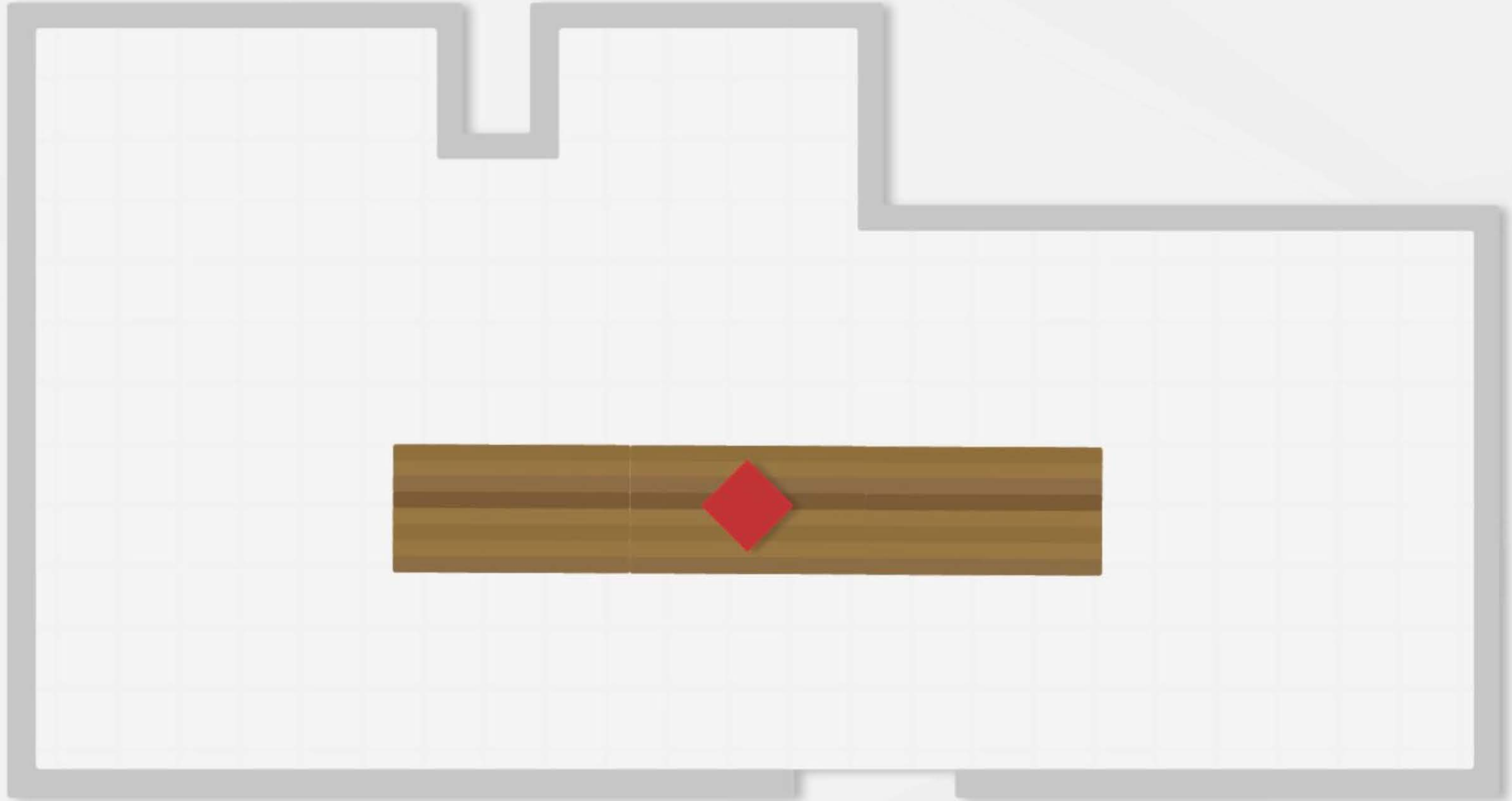
Reduced lever arm error

Holograms shift relative to each other.

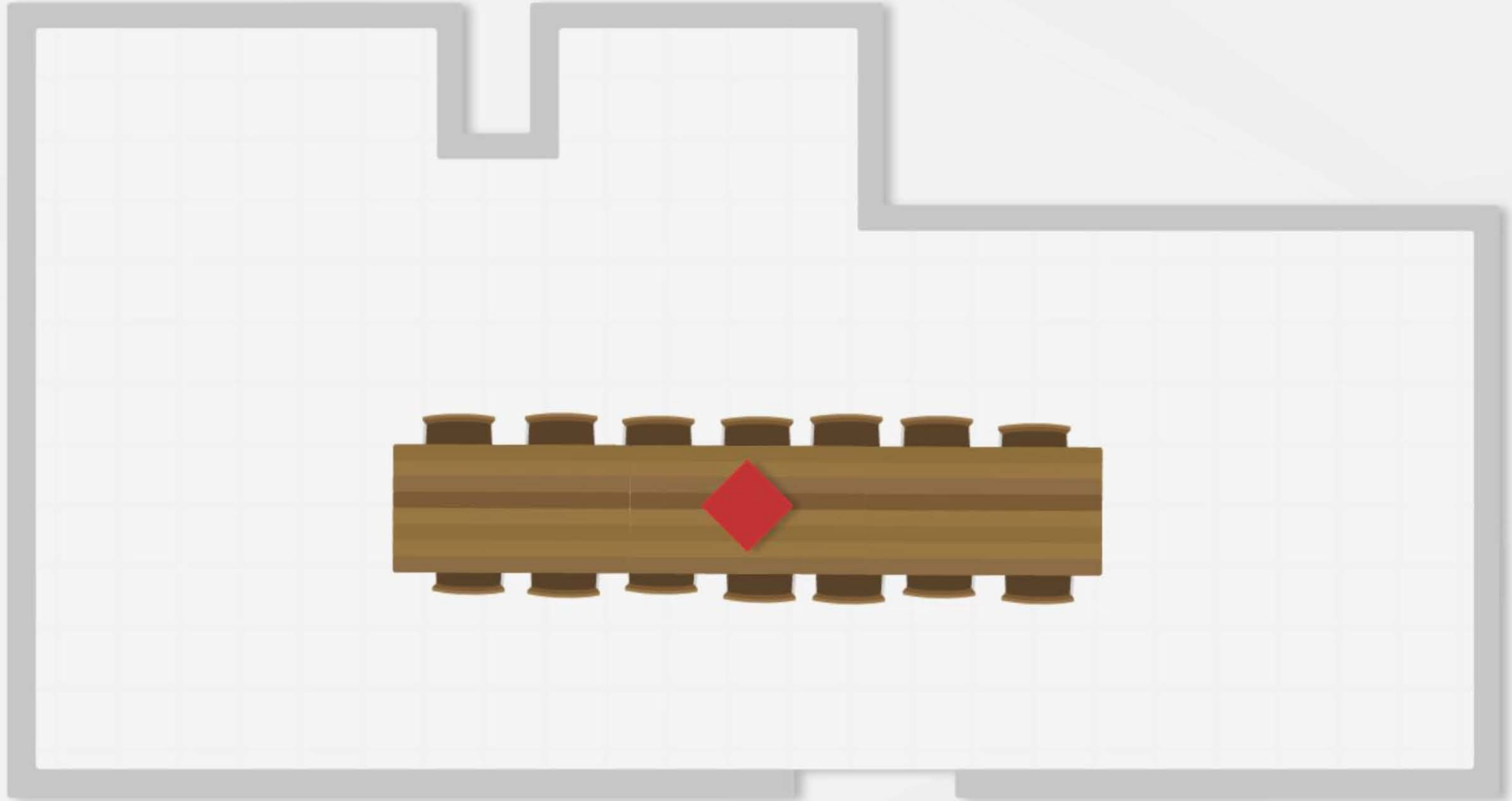
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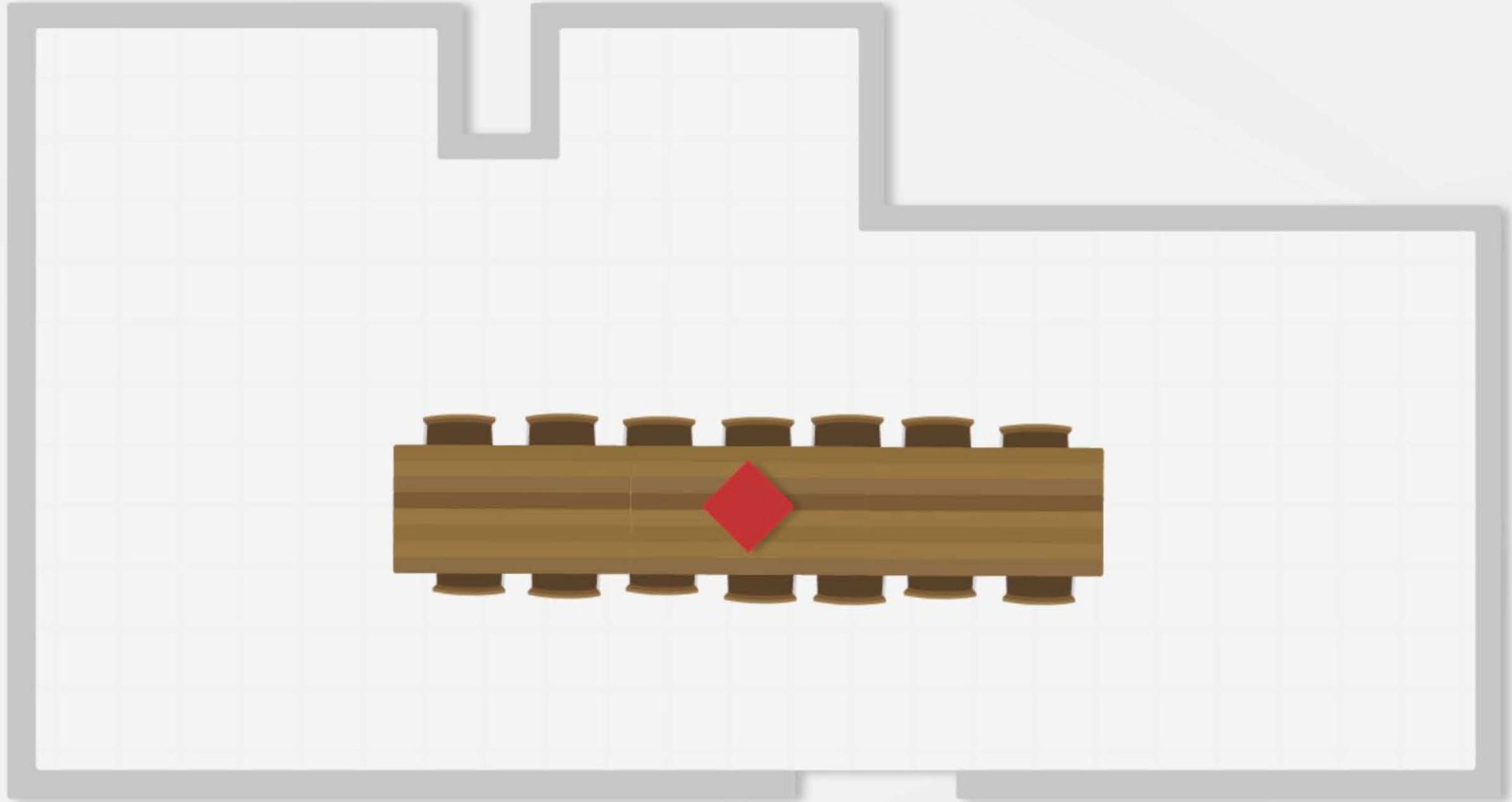
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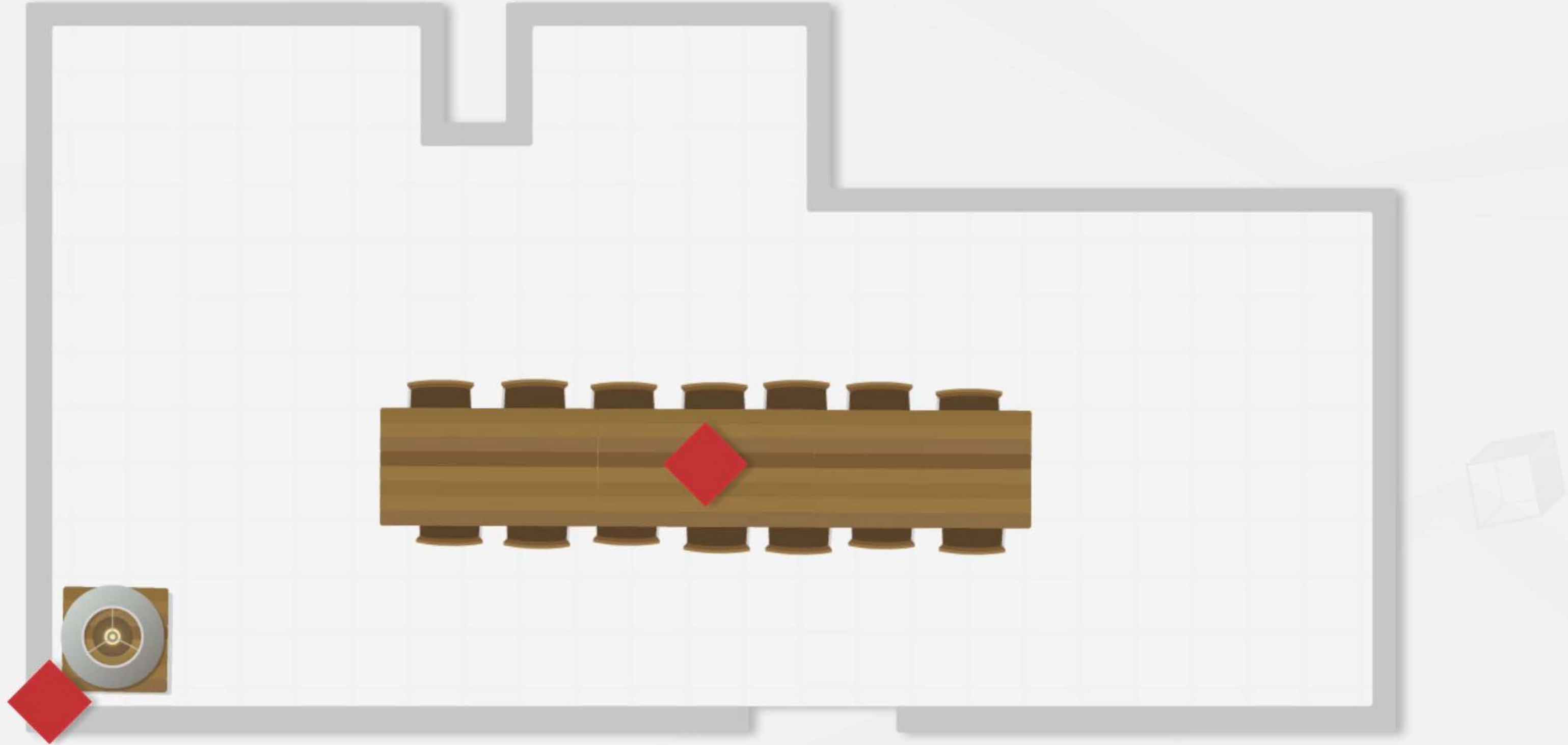
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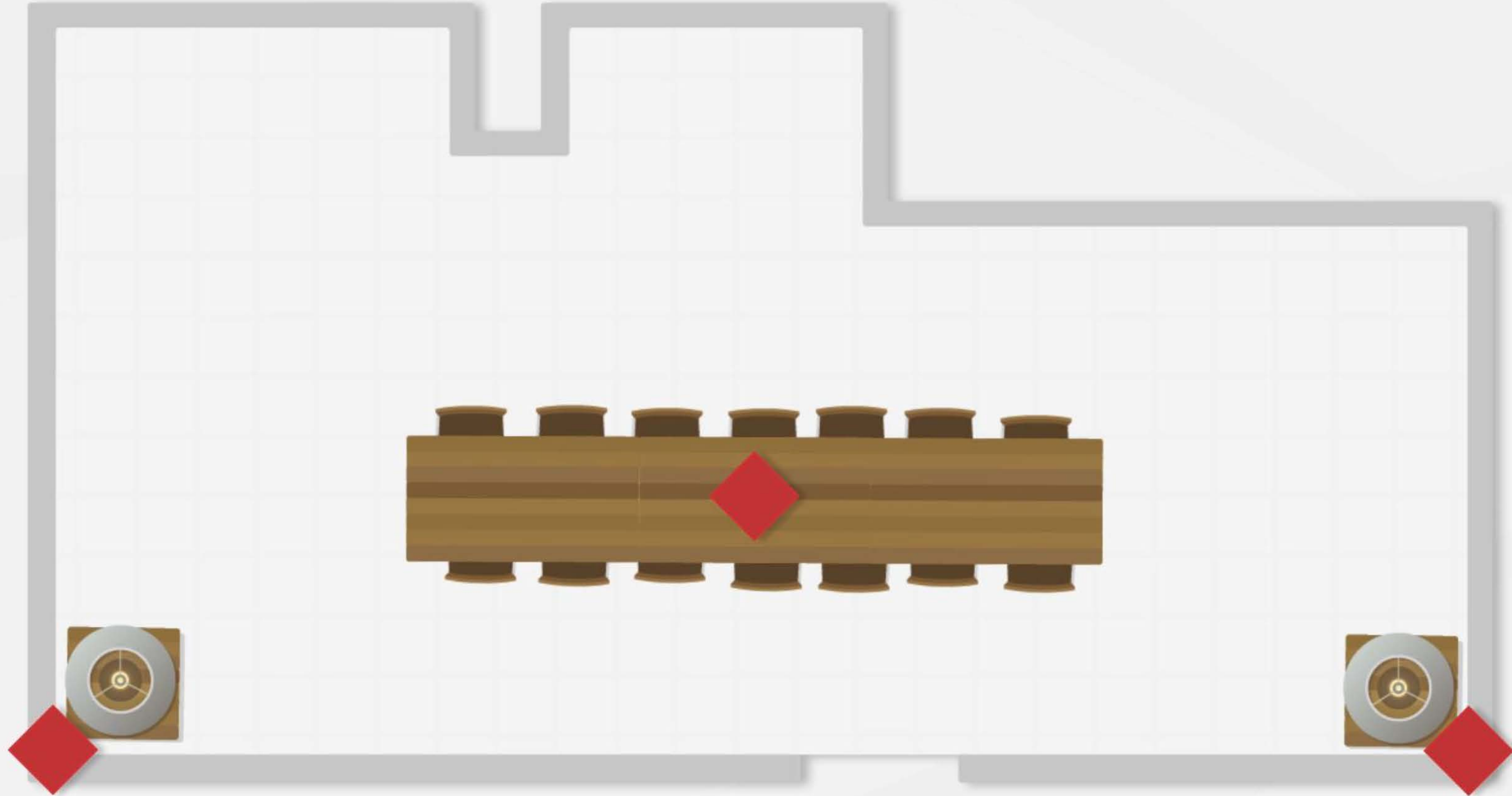
Aligning the virtual and real worlds requires nuance.



Aligning the virtual and real worlds requires nuance.



Aligning the virtual and real worlds requires nuance.



Aligning the virtual and real worlds requires nuance.

- Lever arm effect
- Hologram to Hologram consistency
- Hologram to physical space consistency

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Aligning the virtual and real worlds requires nuance.

Questions?

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@BlakeDGross

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@RandomOutput

<http://careers.microsoft.com>

References

Milgram taxonomy:

http://etclab.mie.utoronto.ca/publication/1994/Milgram_Takemura_SPIE1994.pdf

Anchors Best Practices:

https://developer.microsoft.com/en-us/windows/mixed-reality/spatial_anchors