



Future of Filmmaking

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Agenda



1 Background

2 Study Objectives

3 Insights

4 Opportunities

5 Design Principles

Ready Player One



Ready Player One

VFX Process

Ready Player One



Steven Spielberg

Director

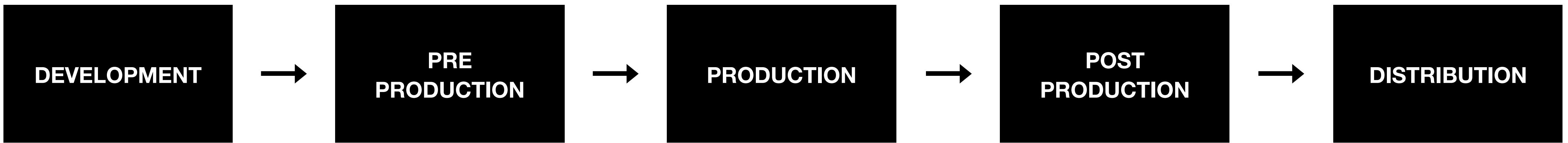


Girish Balakrishnan

Virtual Production Supervisor, Ready Player One

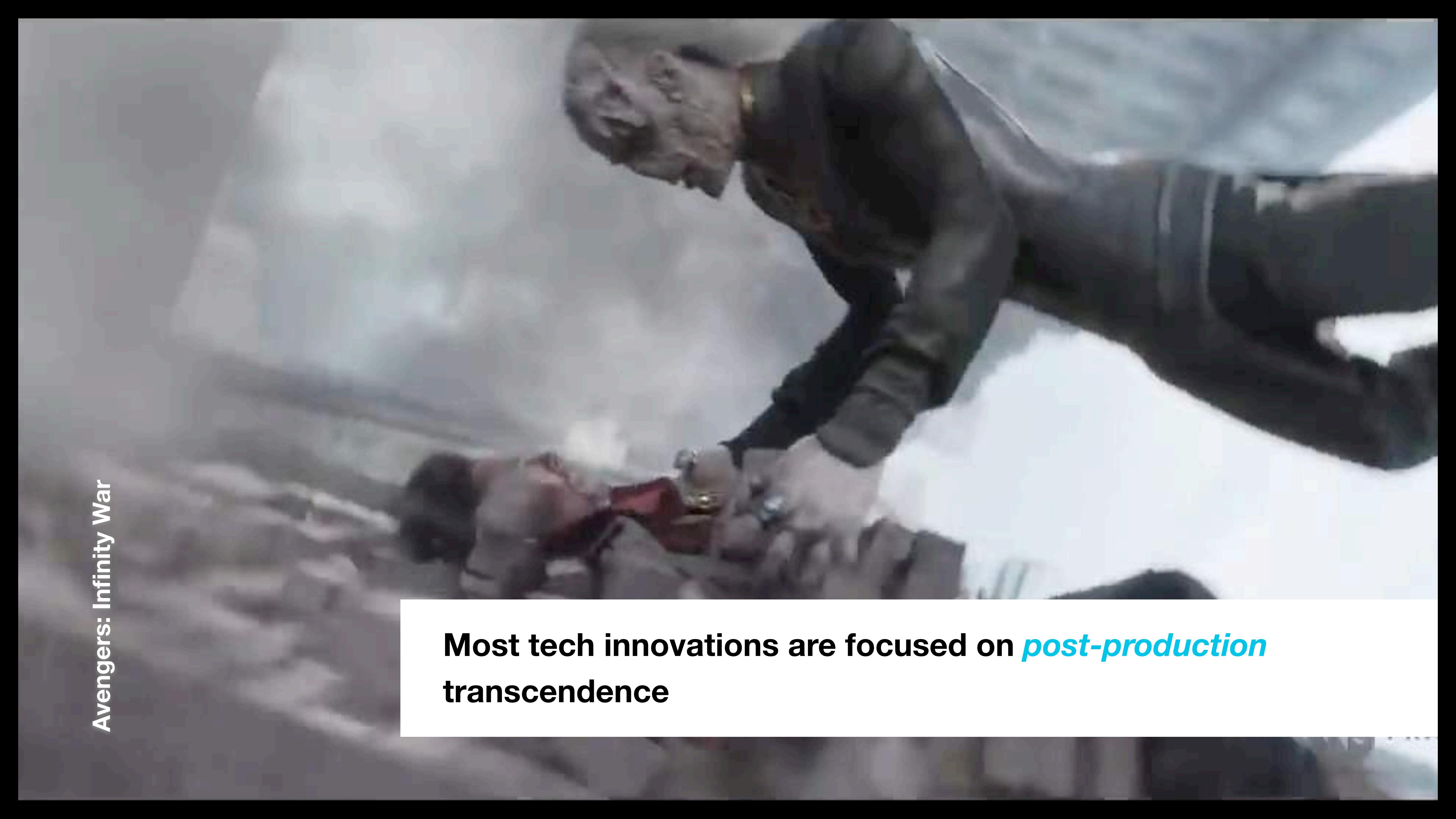
Just to clarify, we used [@oculus Rift](#), [@htcvive](#), and [@Hololens](#) during the filming of [#ReadyPlayerOne](#), not just one headset. Each one was used at a different stage of production.

@_MasterG_

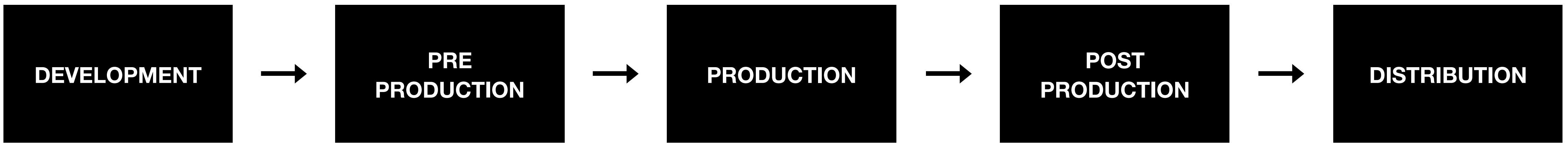


Filmmaking
Process



A dramatic scene from the movie Avengers: Infinity War. Iron Man, wearing his iconic red and gold suit, is shown flying through a dark, cloudy sky. He is looking down at a city below, which appears to be in ruins or under attack. The city lights are visible through the clouds. Iron Man's suit is highly reflective, catching some of the light.

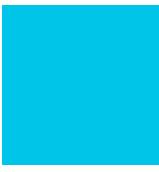
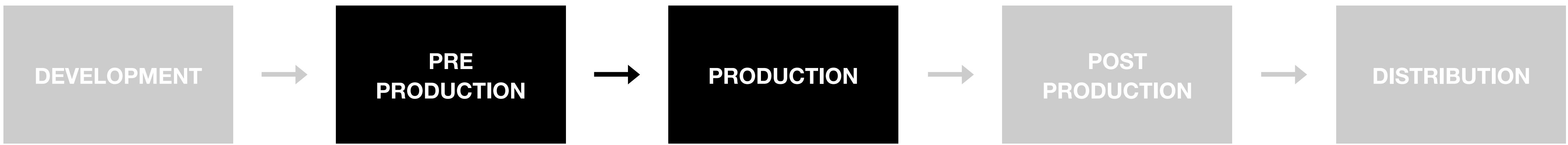
Most tech innovations are focused on *post-production* transcendence



Filmmaking
Process



Filmmaking Process





How might we assist filmmakers to
externalize creative ideas and *collaborate*
with stakeholders?



Study Objectives

■
Jon Favreau explaining action sequences to
Neel Sethi while filming *The Jungle Book*

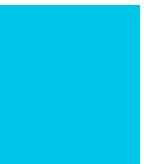




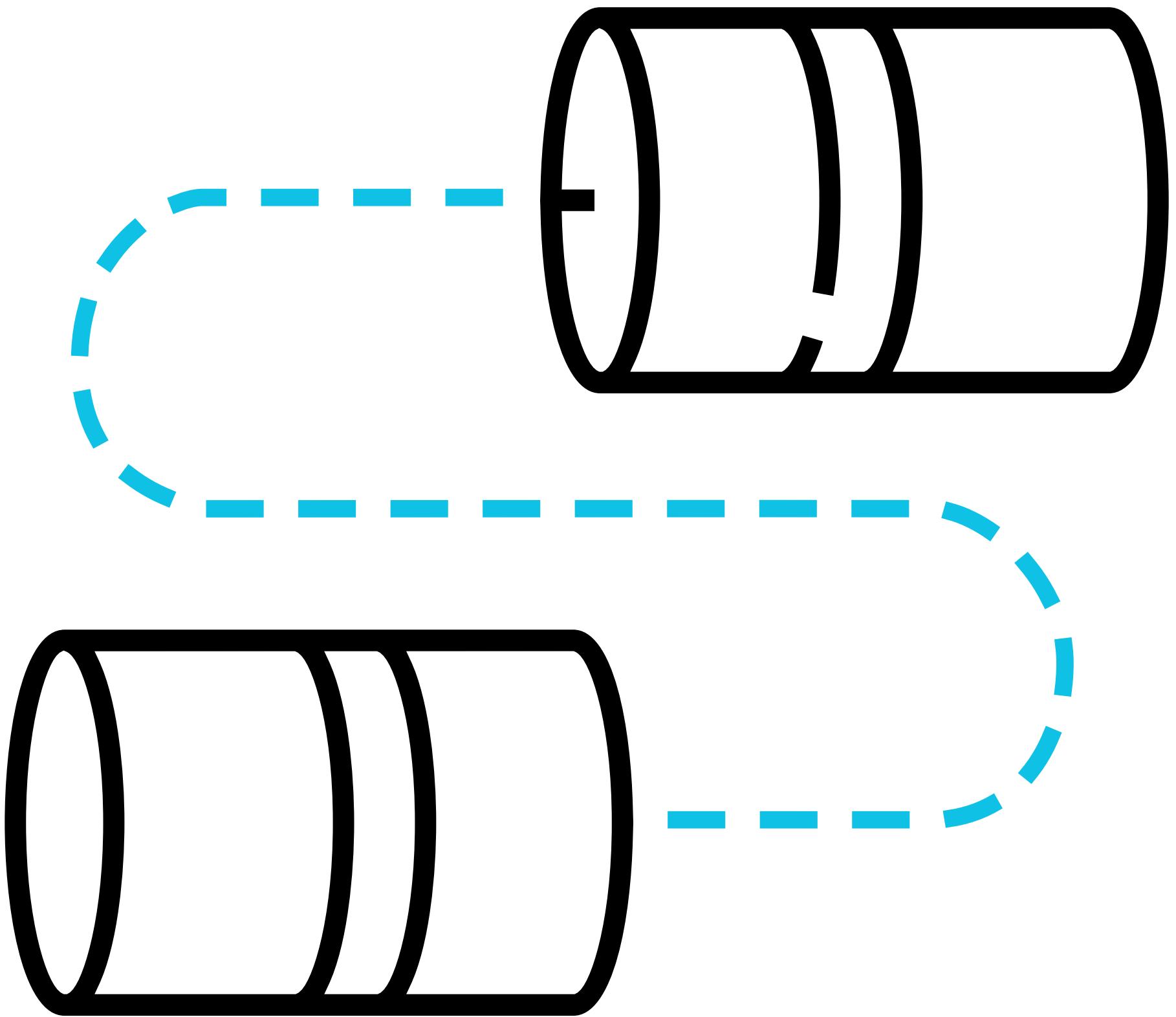
Ideation



Study Objectives

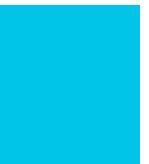


Communication

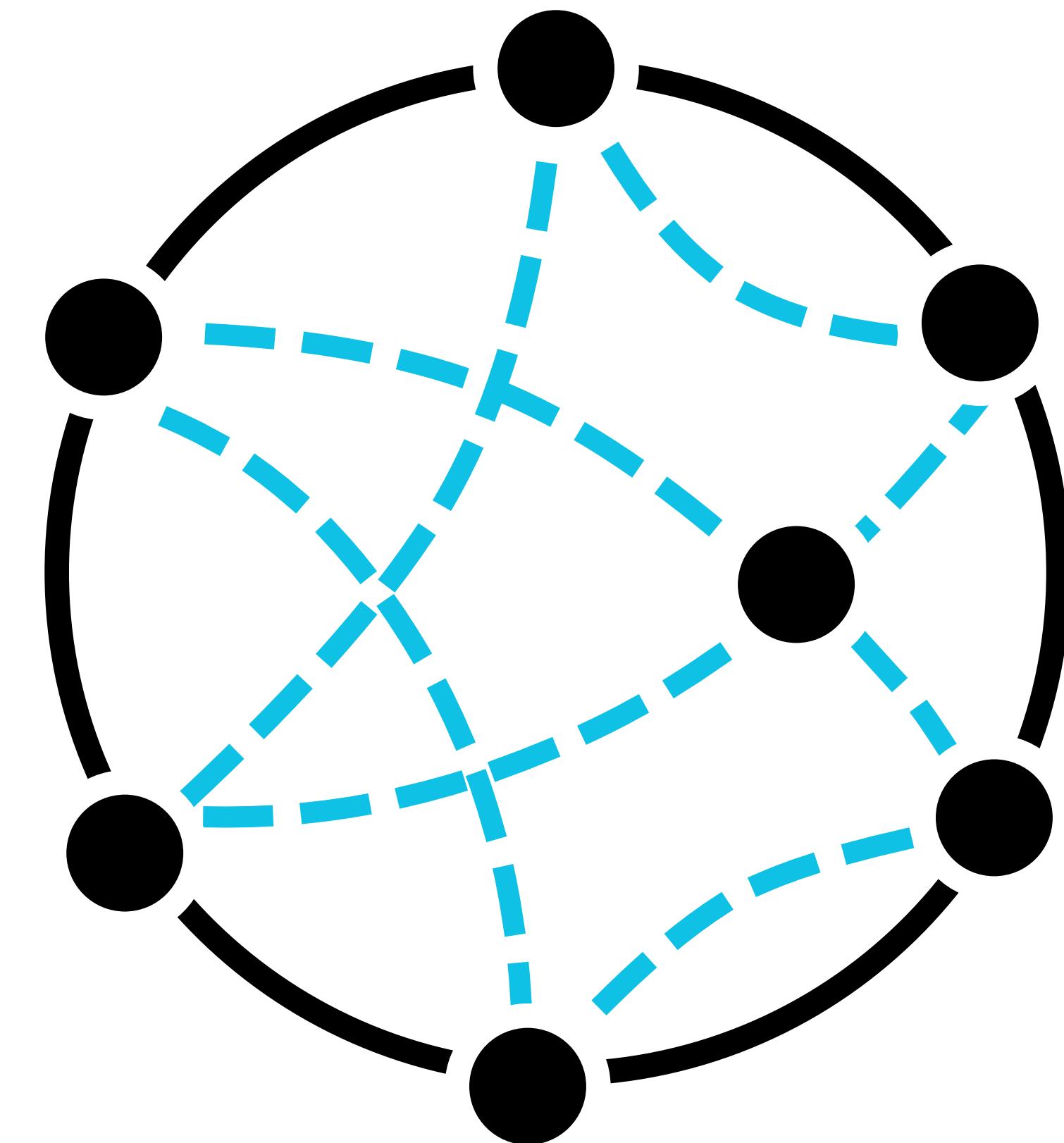


Ideation

Study Objectives



Collaboration



Ideation



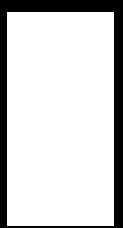
Communication

Study Objectives



Ideation ■ Communication ■ Collaboration

Research Strategy

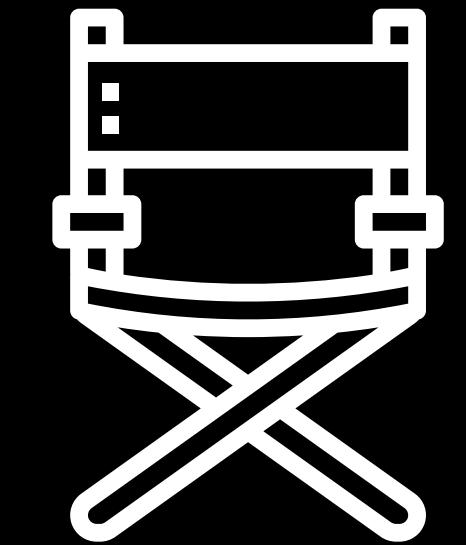




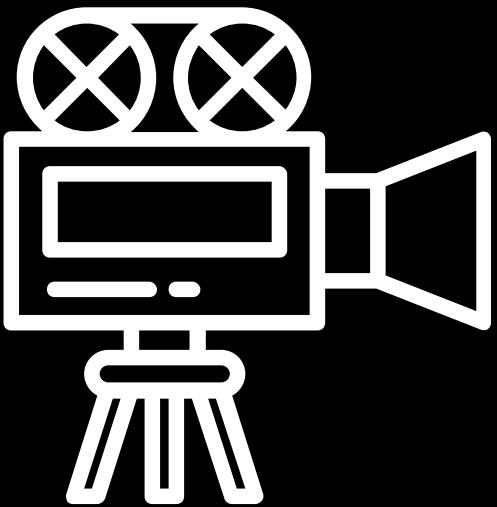
Diversify Participants



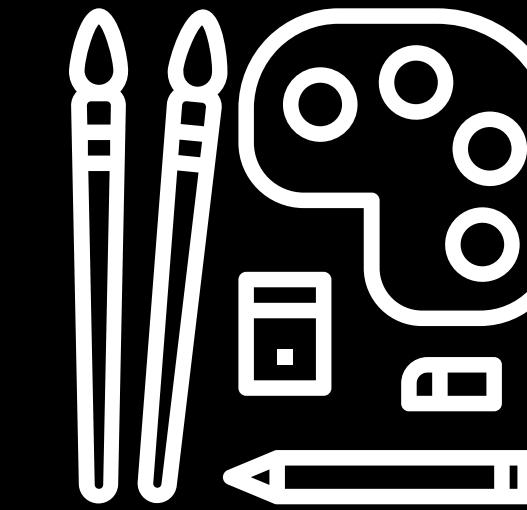
Research Strategy



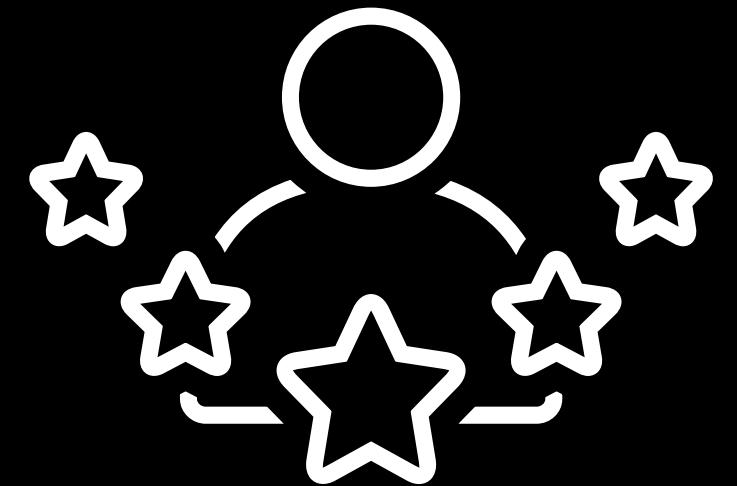
Directors



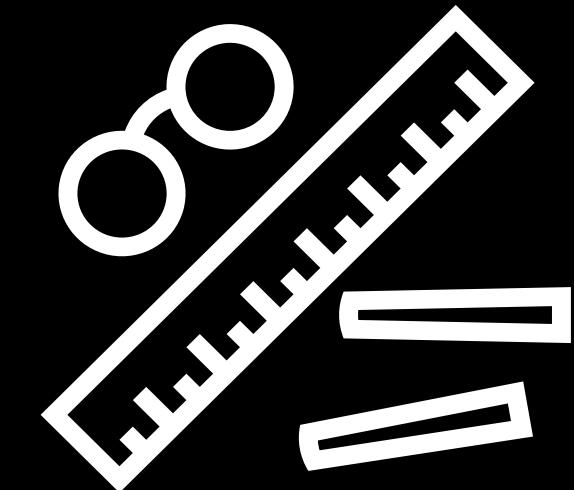
Cinematographers



VFX & Storyboard
Artists



MR Experts



Film Educators



Film Students

Insights

Sir Ian McKellen broke down while shooting *The Hobbit* due to his inability to visualize virtual characters





1 Understanding Space

2 Visualizing Virtual Objects

3 Business Viability



Insights

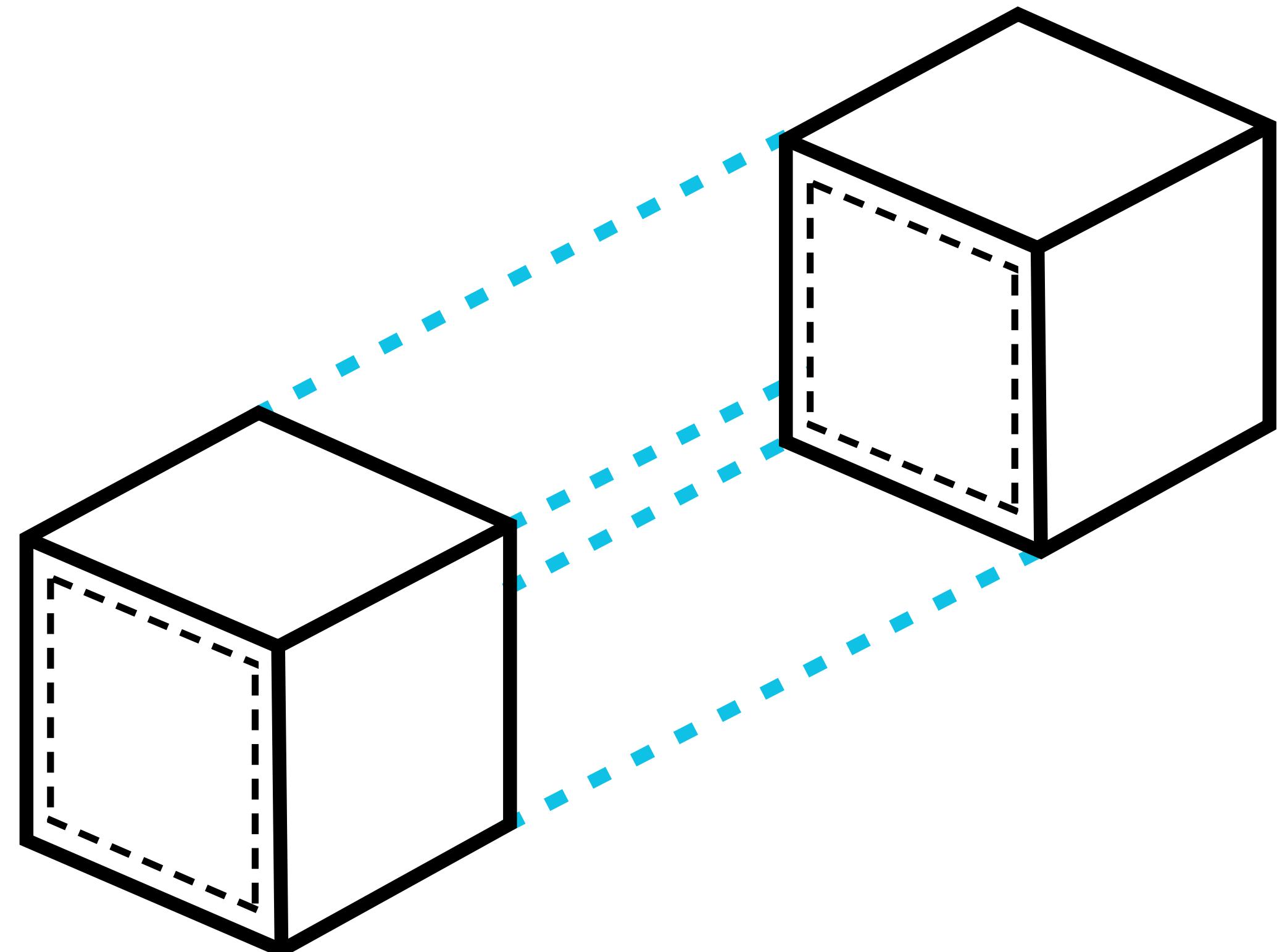


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1

Understanding Space

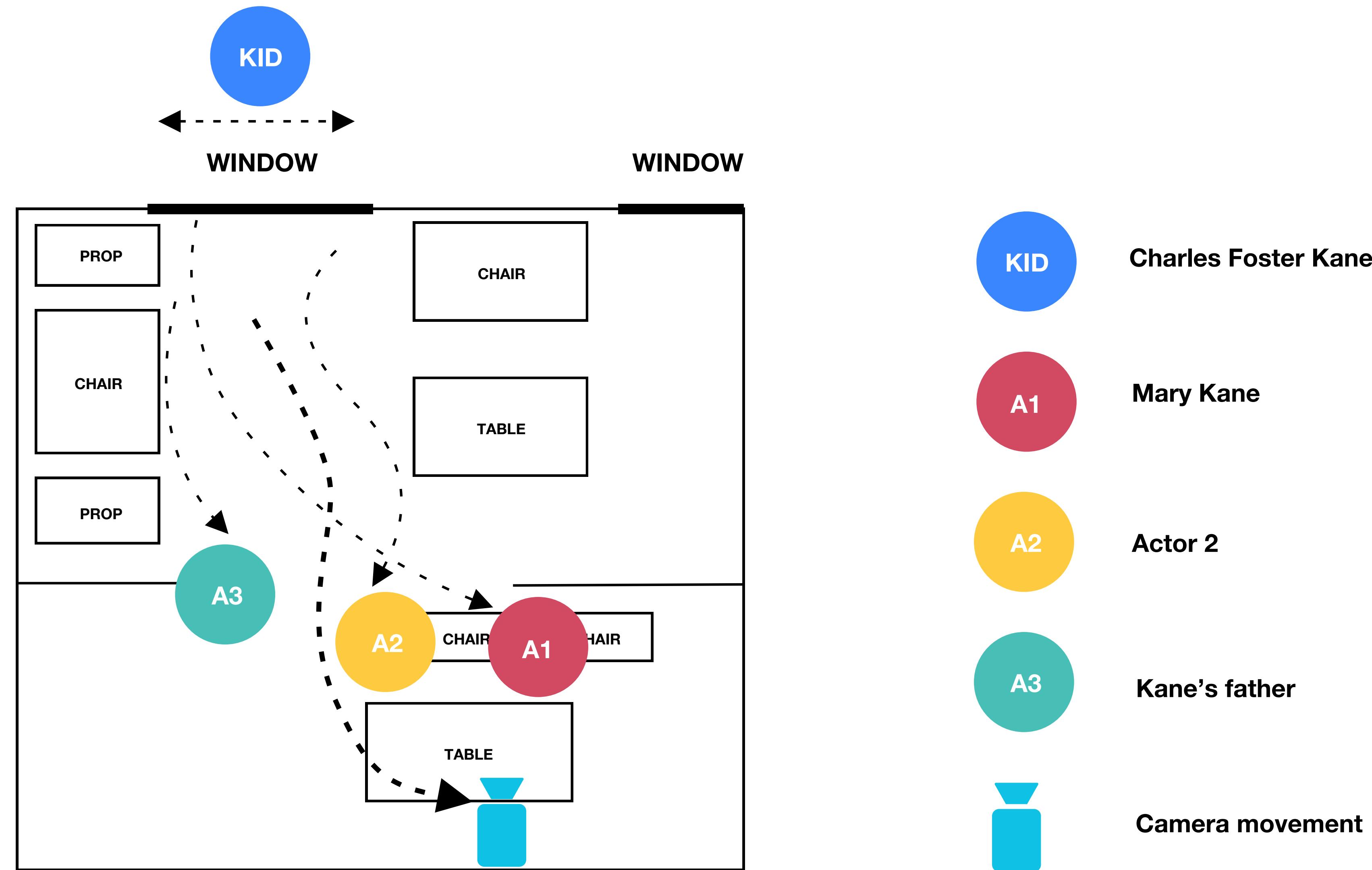


Insights ■ Understanding Space

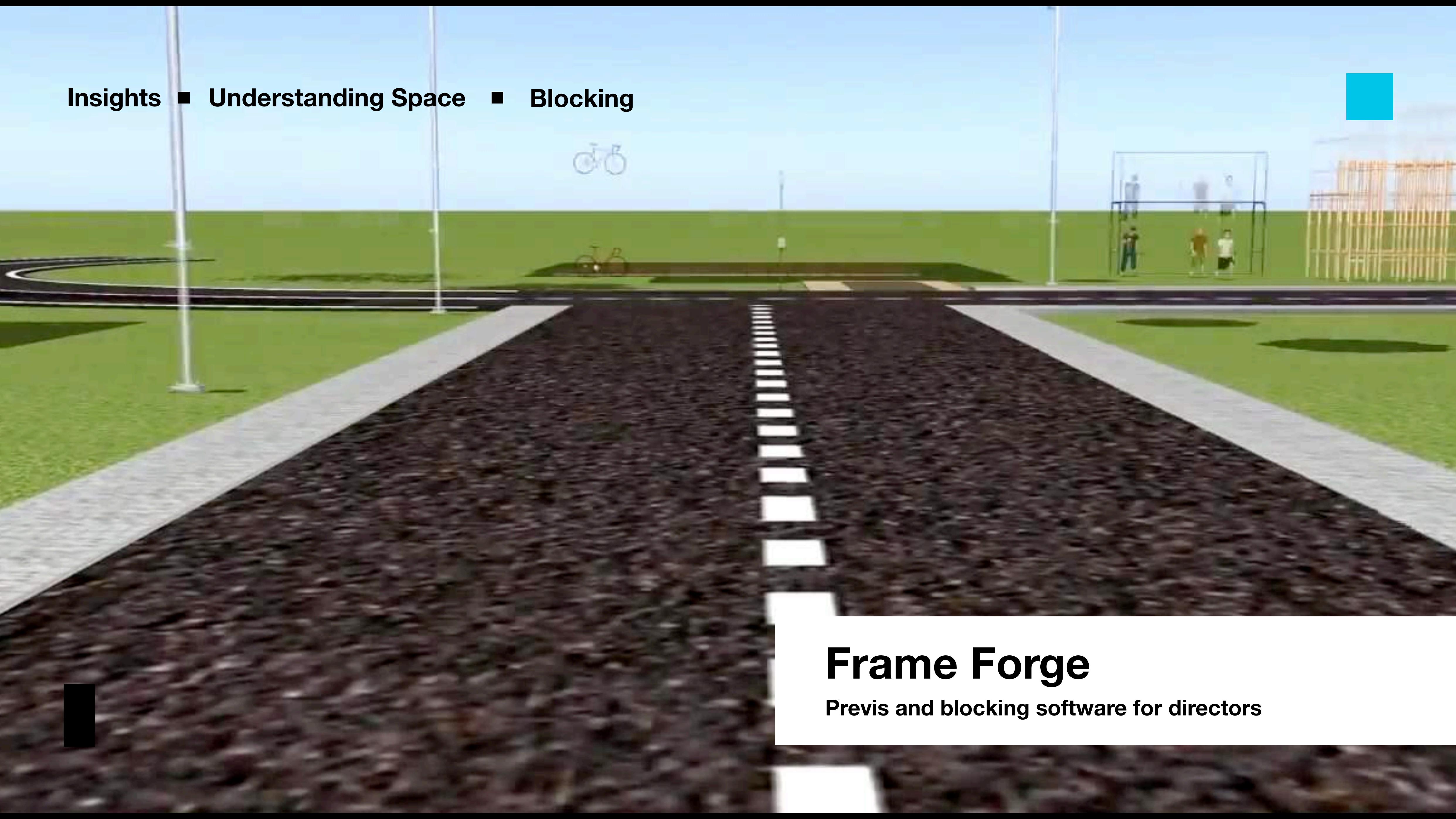
Citizen Kane

1. Blocking

Insights ■ Understanding Space ■ Blocking



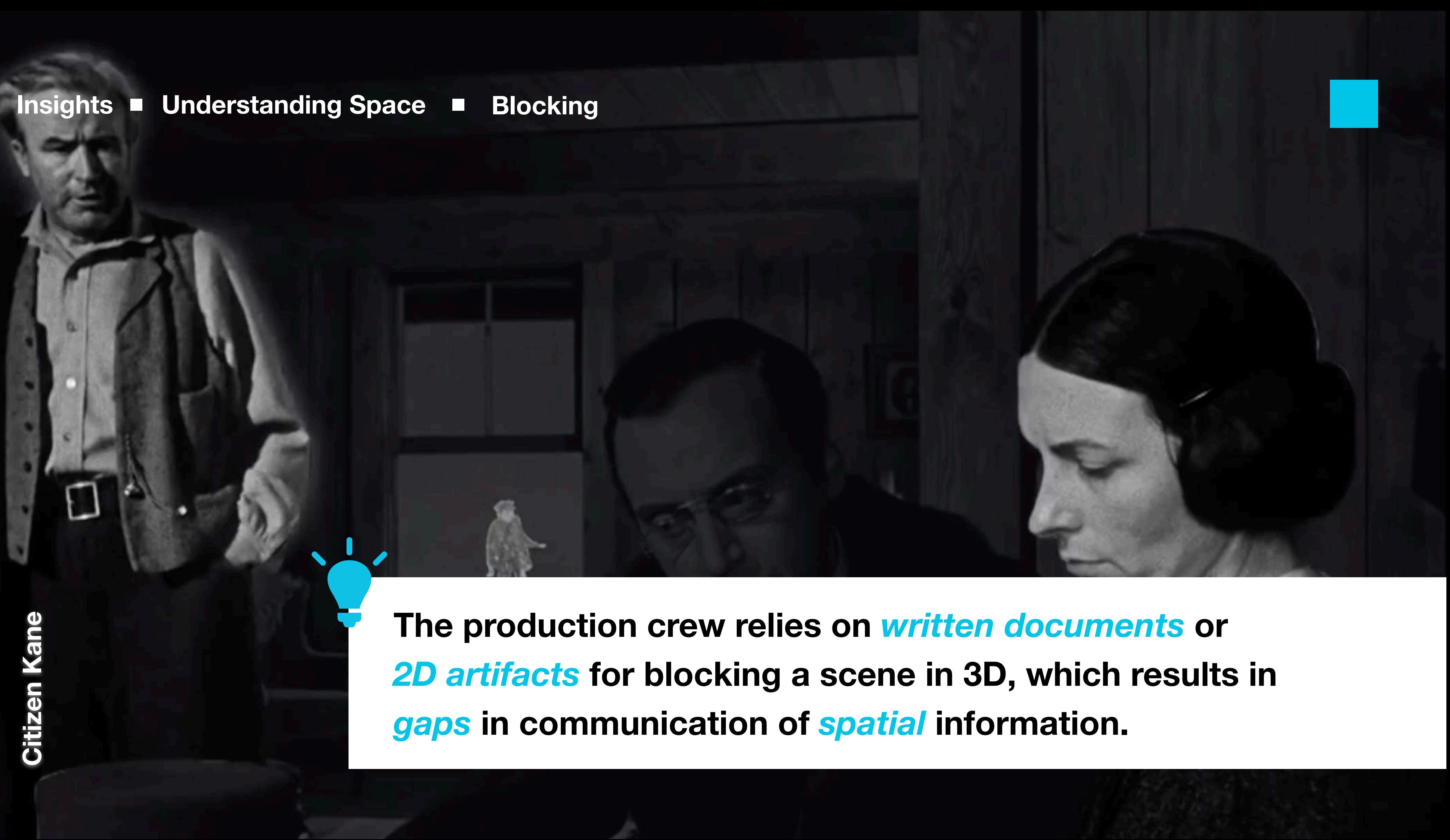
Insights ■ Understanding Space ■ Blocking



Frame Forge
Previs and blocking software for directors



The production crew relies on *written documents* or *2D artifacts* for blocking a scene in 3D, which results in *gaps* in communication of *spatial* information.

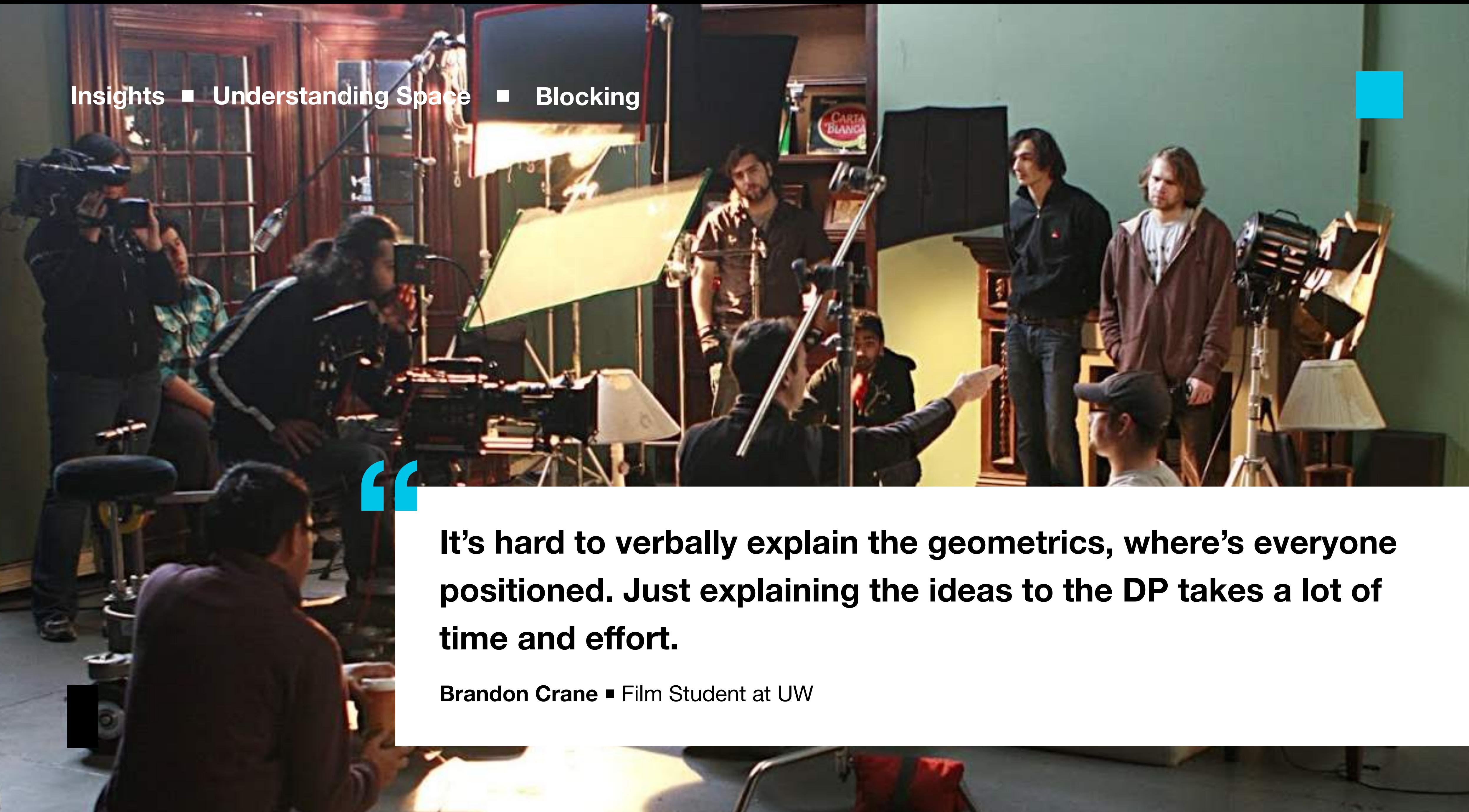


Insights ■ Understanding Space ■ Blocking

“

It's hard to verbally explain the geometrics, where's everyone positioned. Just explaining the ideas to the DP takes a lot of time and effort.

Brandon Crane ■ Film Student at UW



Insights ■ Understanding Space

Thor: Ragnarok

2. Production Design



Production designers rely on *physical 3D models* for designing studio sets as photos and concept art do not provide spatial context.

Insights ■ Understanding Space ■ Production Design



Harry Potter and
Chamber of Secrets

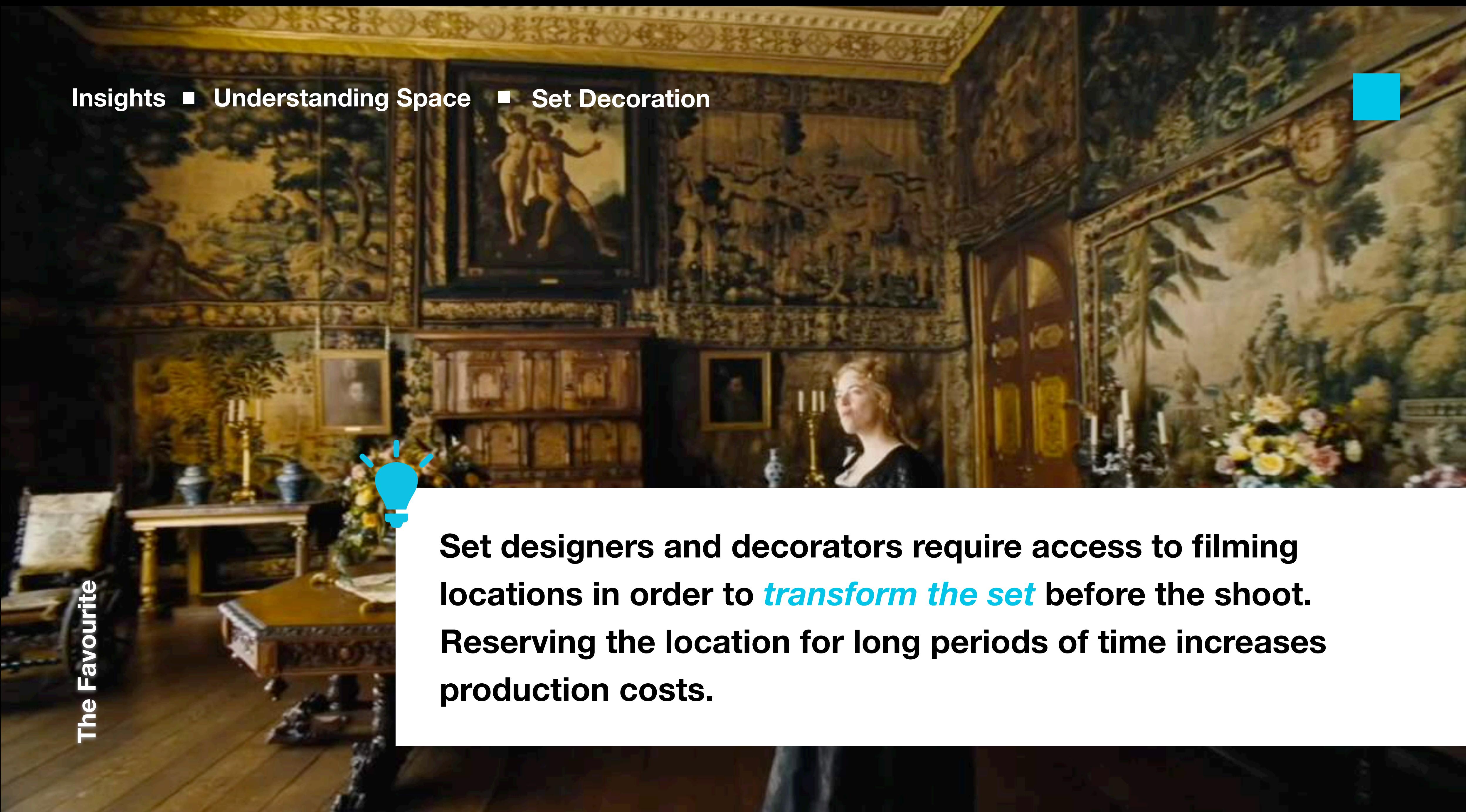
The analog style of having a physical model that everyone can look at, around the table is immensely helpful.

Scott Baker ■ Set designer, Black Panther

3. Set Decoration



Set designers and decorators require access to filming locations in order to *transform the set* before the shoot. Reserving the location for long periods of time increases production costs.

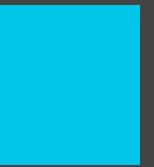


“

Trying to create our world in a believable way, when you have so many actual limitations from a location, is really complex.

Fiona Crombie ■ Production Designer, The Favourite

4. Low fidelity assets



Lower fidelity of computer-generated characters and objects allows for *faster experimentation* of its *location*, *scale*, and *movement*.



Thomas Furness

Expert ■ MR Pioneer



...it was mainly scaled, they wanted to have enough in the troll so that the scaling was right. It didn't have to be the perfect troll... they can do that after the fact.



1 Understanding Space

2 Visualizing Virtual Objects

3 Business Viability



Insights

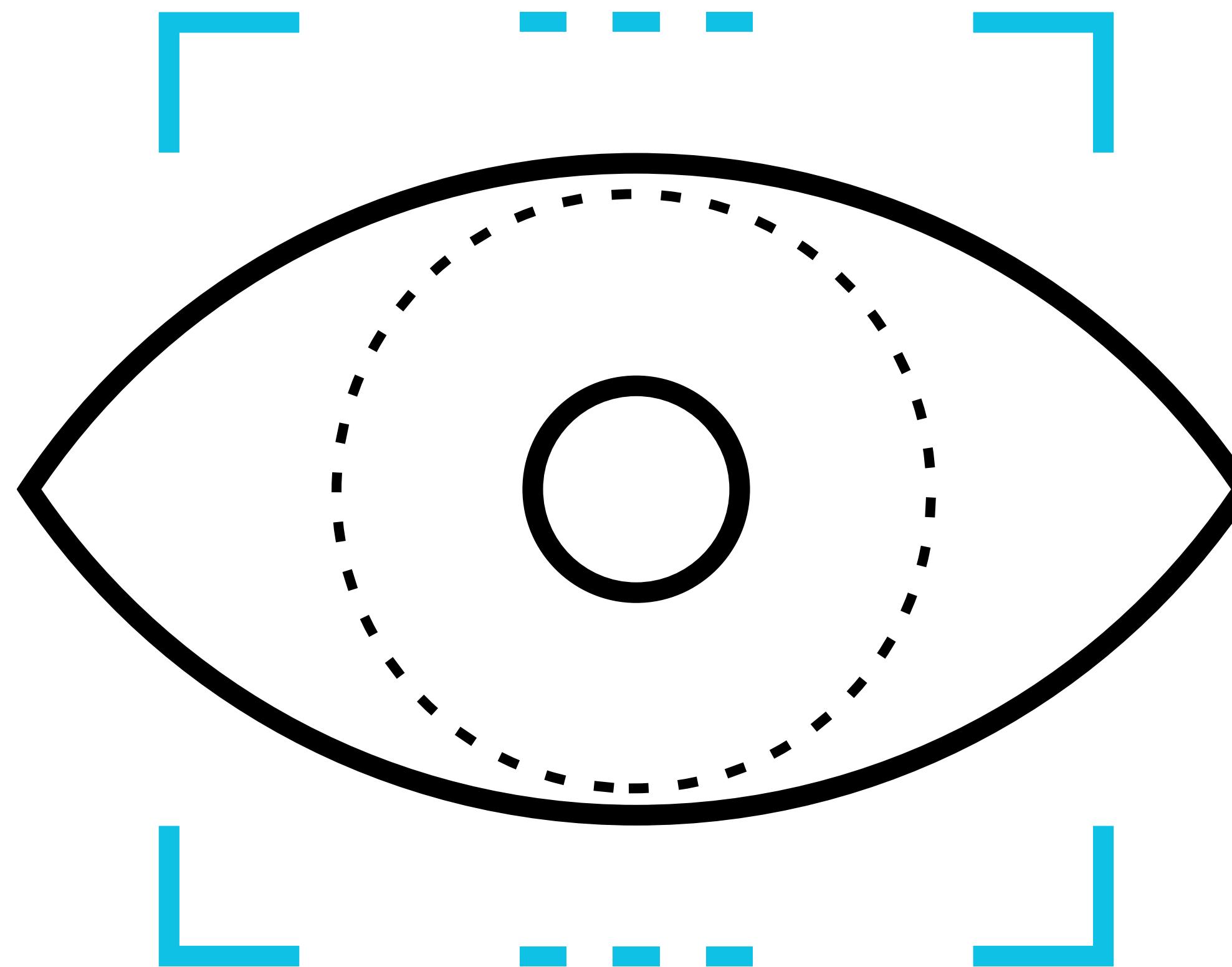


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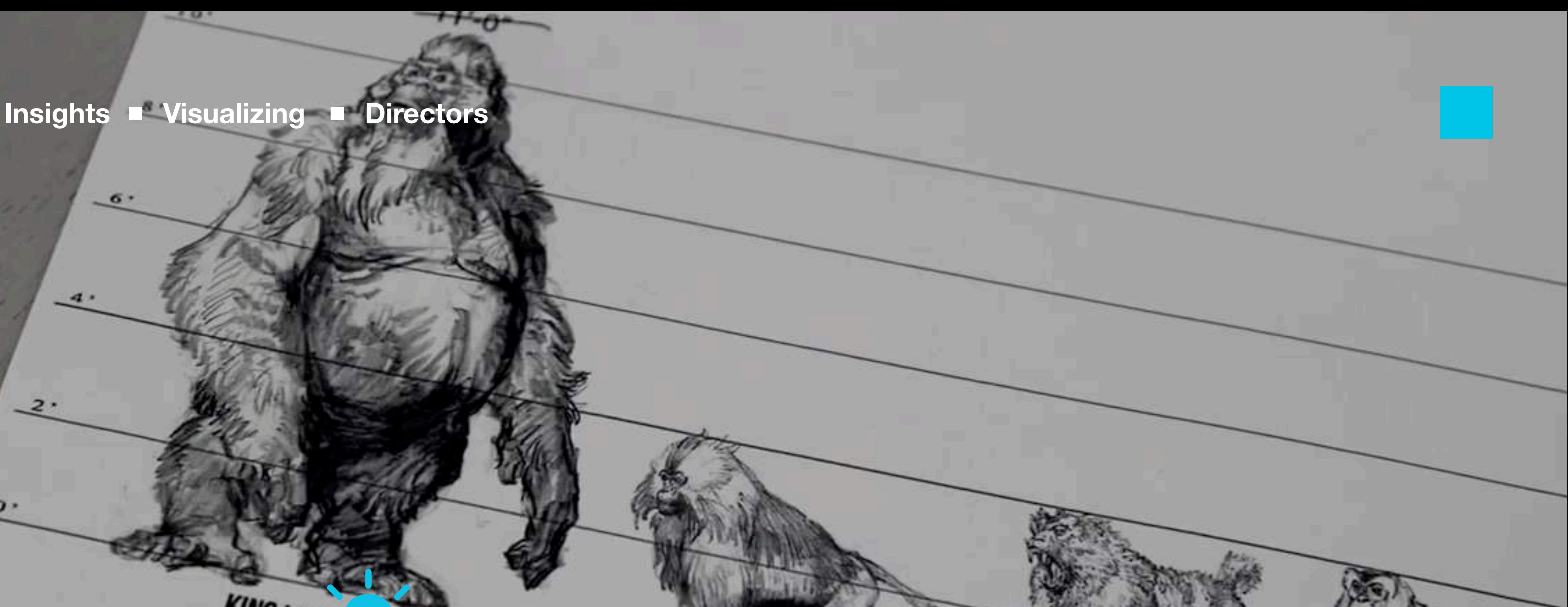


2

Visualizing Virtual Objects



5. Directors



During pre-production, directors face difficulty **experimenting** with the movement, scale, and position of characters using current **2D pre-visualization** tools.



Communicating to the 3D and previs animators what kind of shots they [director] want to see can be a frustrating and a slow process from their perspective. They wish for the control to let them create the shots themselves in an intuitive way without having to know how to operate 3D software.

Marijn Eken • Founder of ScreenSpace Lab

Insights ■ Visualizing ■ Directors

Spatial Collaboration in Mixed Reality

A dark, blurry background image showing a scene from the movie "Avengers: Infinity War". The image is dominated by dark, smoky, and fiery tones, with some glowing orange and red light visible, suggesting a chaotic or battle-worn environment.

Insights ■ Visualizing

Avengers: Infinity War

6. Actors & camera crew

Insights ■ Visualizing ■ Actors & camera crew

Avengers: Infinity War



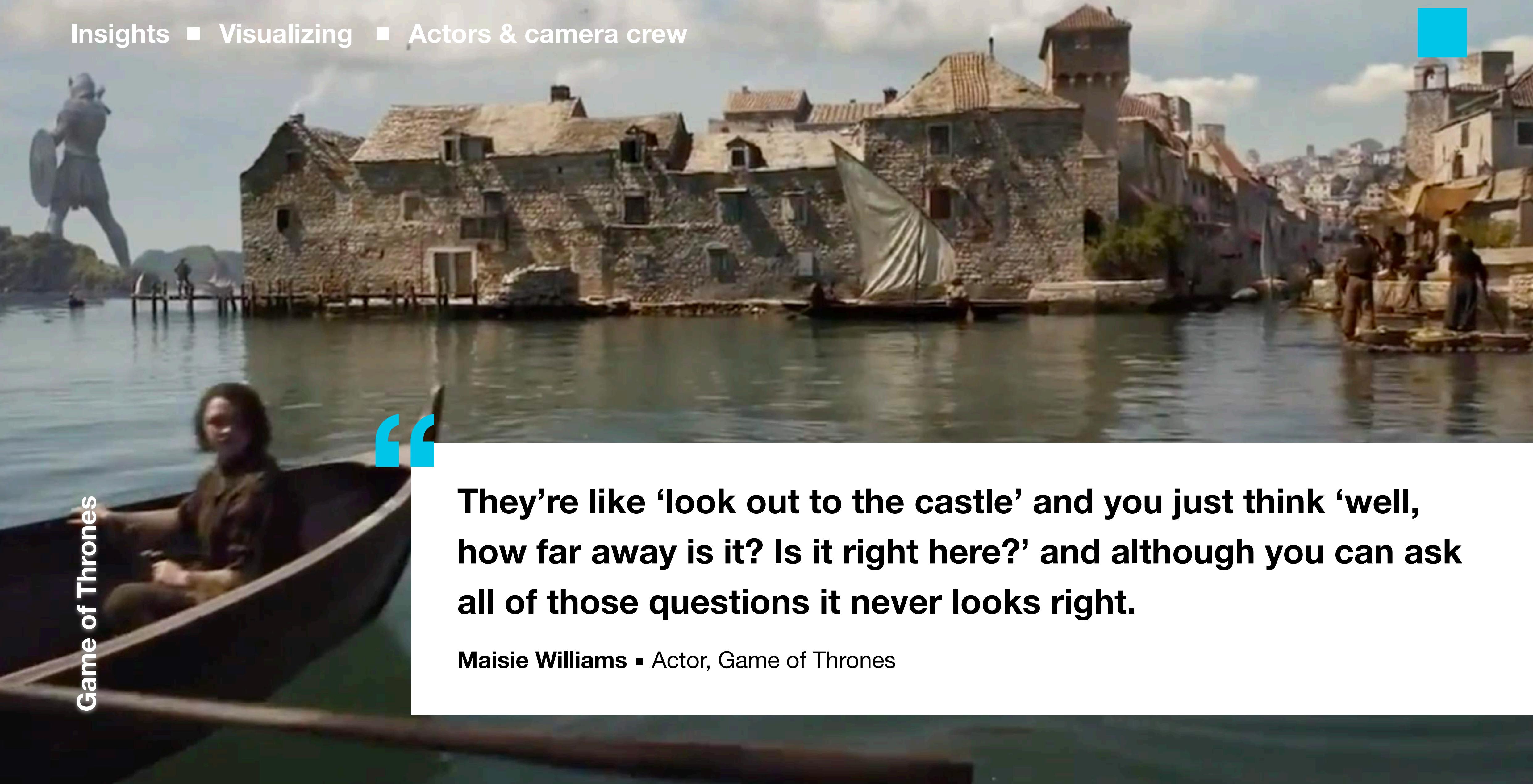
Insights ■ Visualizing ■ Actors & camera crew

Game of Thrones



While shooting on set, actors and camera crew cannot
envision computer-generated characters and objects.

Insights ■ Visualizing ■ Actors & camera crew



“

They're like 'look out to the castle' and you just think 'well, how far away is it? Is it right here?' and although you can ask all of those questions it never looks right.

Maisie Williams ■ Actor, Game of Thrones



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Insights

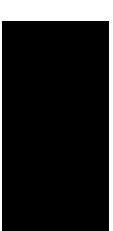
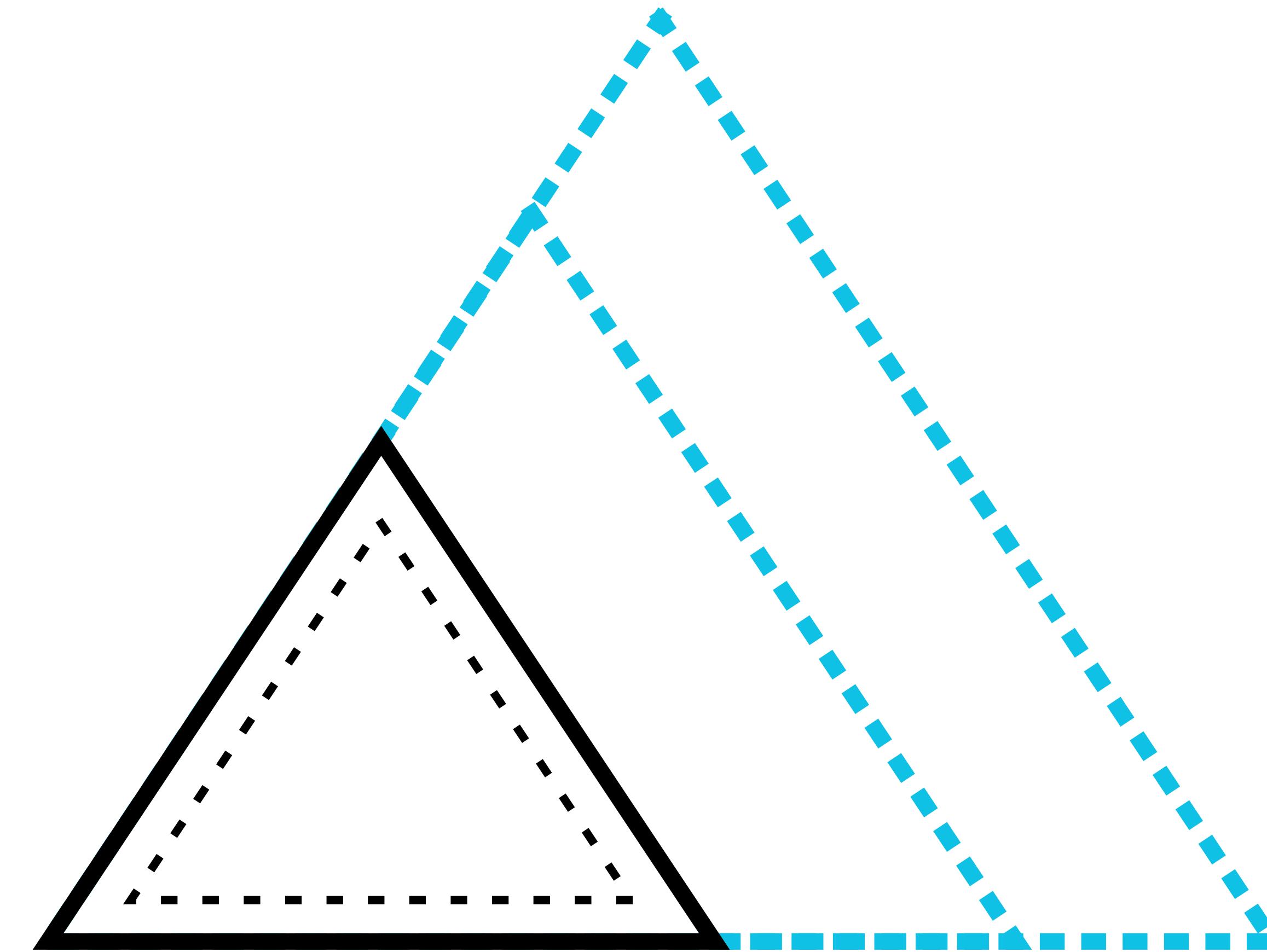


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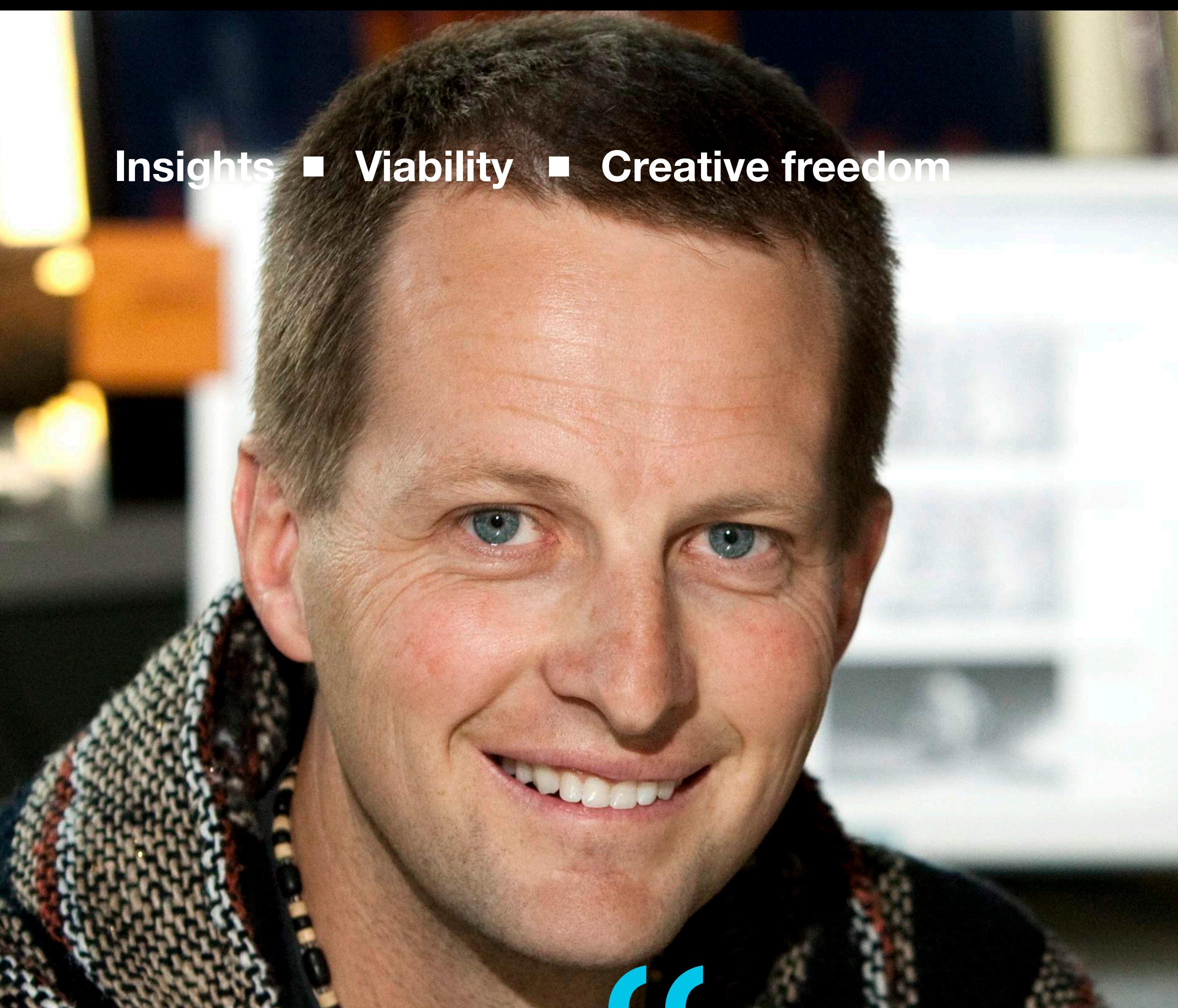
Insights

3 **Viability**





7. *Creative freedom* during filmmaking is oftentimes *constrained* by time and budget.

A close-up portrait of Ryan Woodward, a man with short brown hair and blue eyes, smiling warmly at the camera. He is wearing a dark-colored, patterned sweater over a black t-shirt. A small blue speech bubble icon is positioned near his chin.

Insights ■ Viability ■ Creative freedom

Ryan Woodward

Expert ■ Storyboard Artist, Thor 2

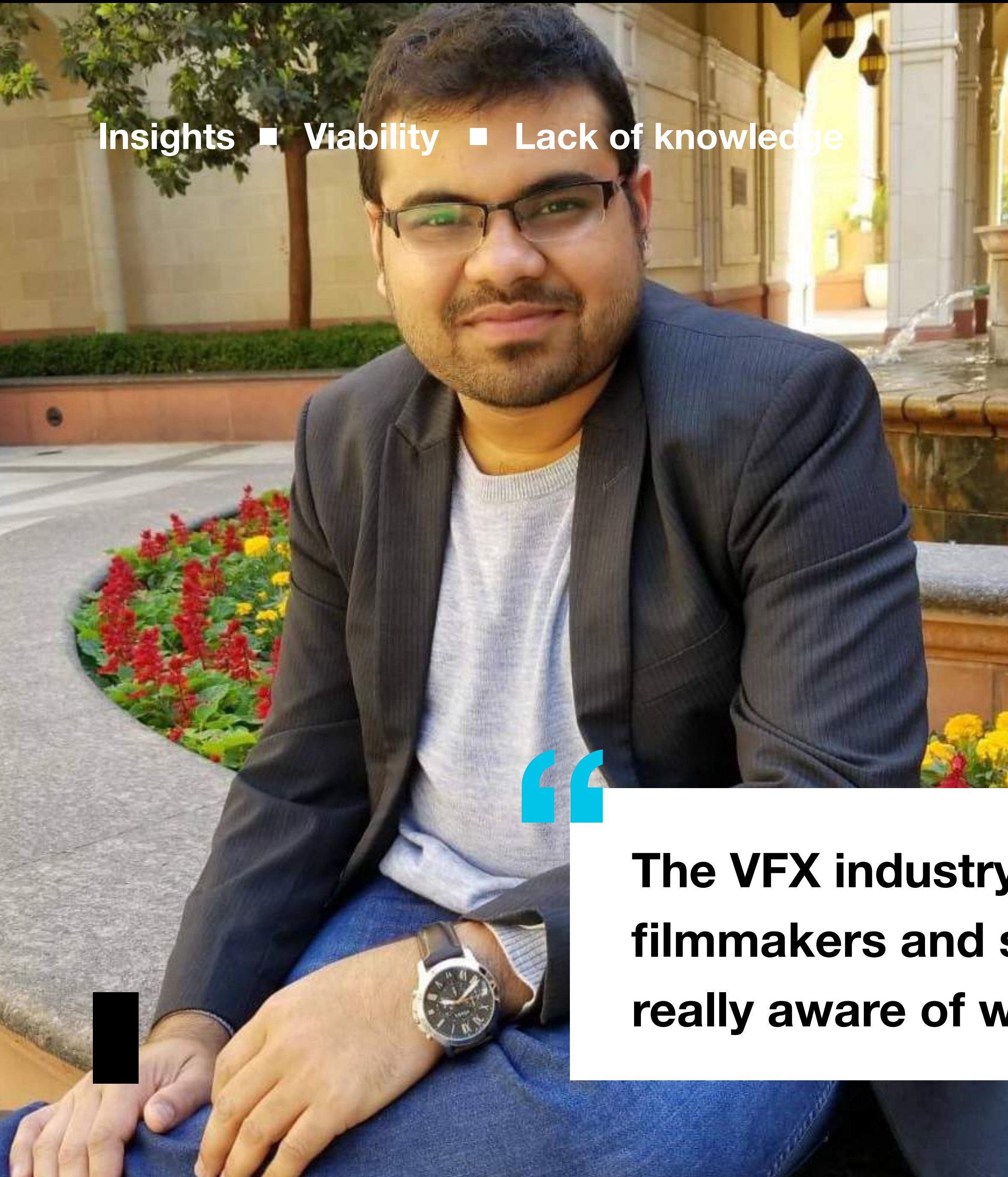
I storyboarded in a way that completely blew up the budget of the film.



Big productions are adopting and innovating new media technology. However, small productions have limited access to these technologies due to the *lack of resources, knowledge, and best practices.*

8.

of resources, knowledge, and best practices.



Insights ■ Viability ■ Lack of knowledge

Sura Kalyan

Expert ■ VFX Artist, Detective Pikachu

The VFX industry is catered towards studios, not indie filmmakers and smaller studios [...] most directors aren't really aware of what technology can do for them.



1 Understanding Space

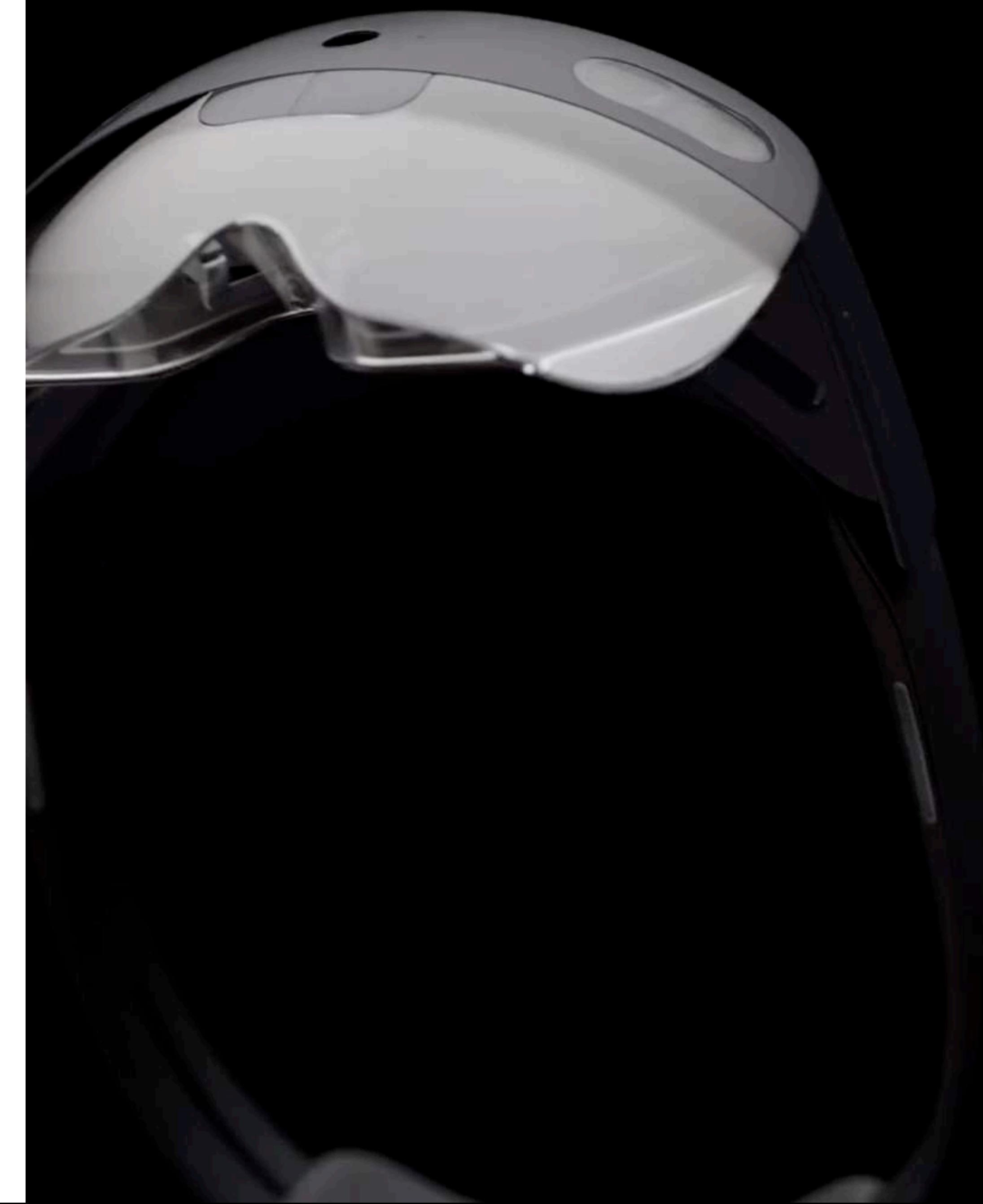
2 Visualizing Virtual Objects

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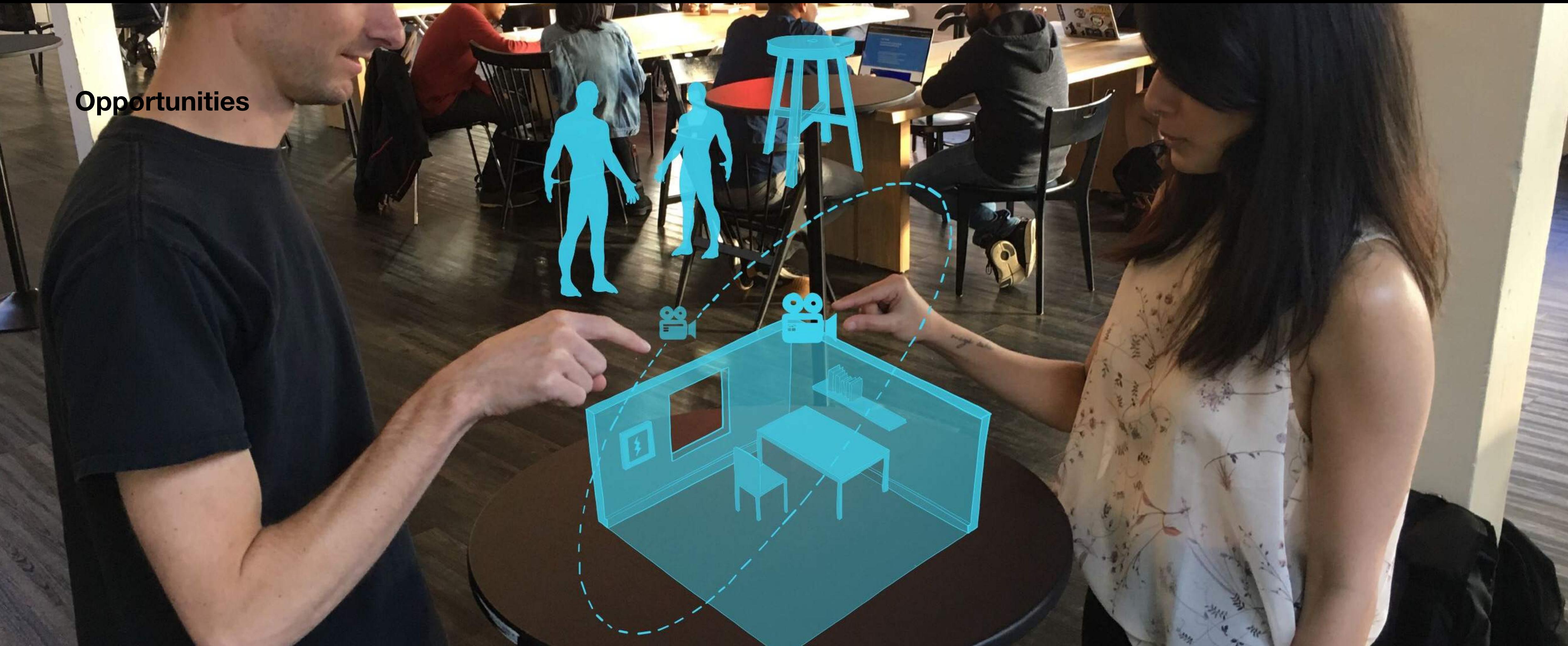


Opportunities

HoloLens 2



Opportunities



1. Miniature 3D Set

Opportunities

2. Spatial location mapping



Opportunities



3. Visualizing CGI

Opportunities ■ Linking back to MRW



1 Layout

2 Guides

3 Remote Assist

4 SR mesh or Surface Reconstruction



Opportunities ■ Linking back to MRW

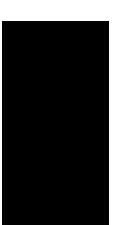


1 Layout

2 Guides

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Opportunities ■ Linking back to MRW



1 Layout

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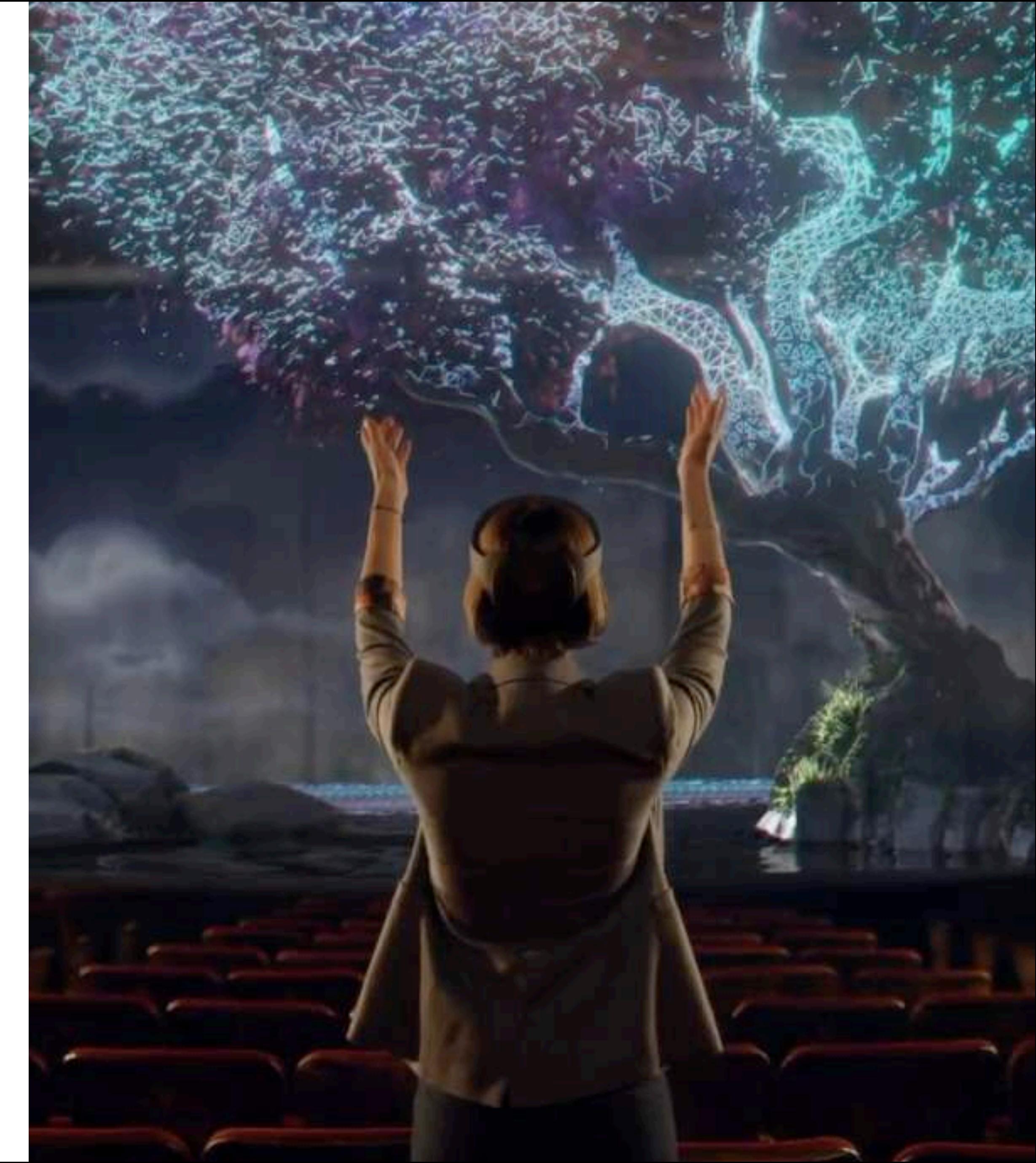
3 Remote Assist

4 SR mesh or Surface Reconstruction



Design Principles

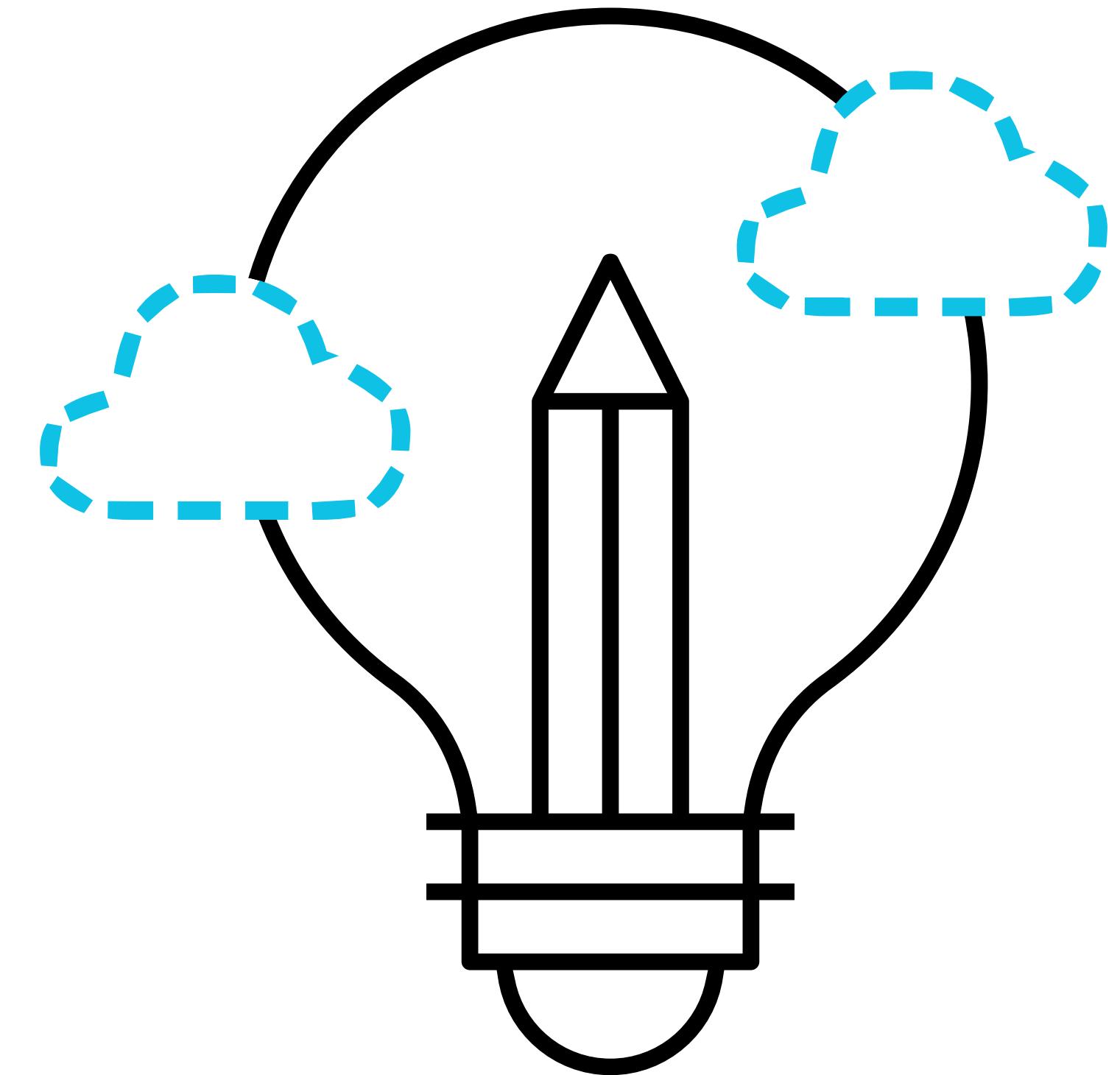
HoloLens 2



Design Principles

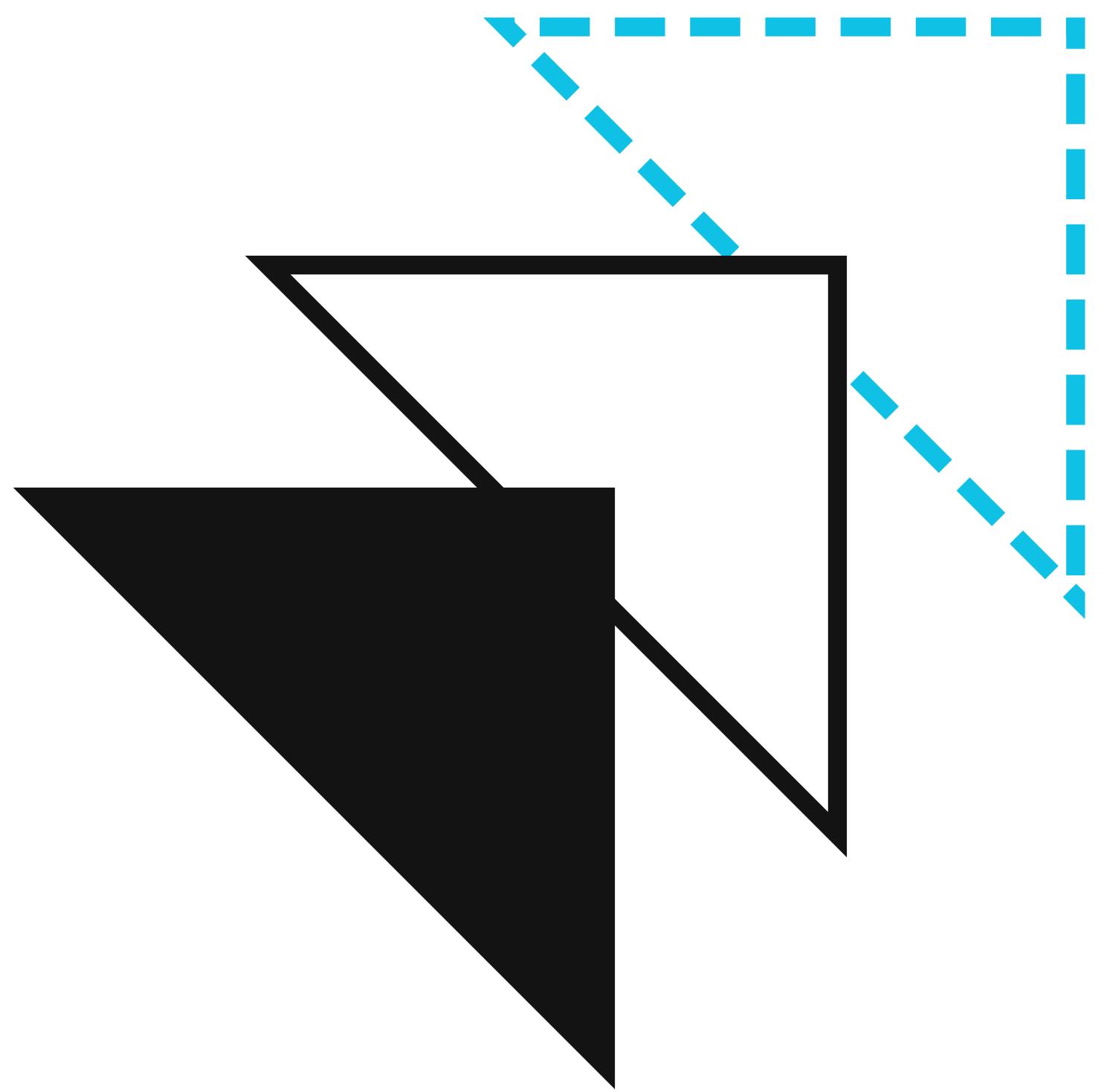


**Explore
creative ideas**

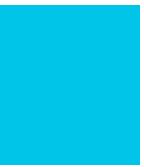


Design Principles

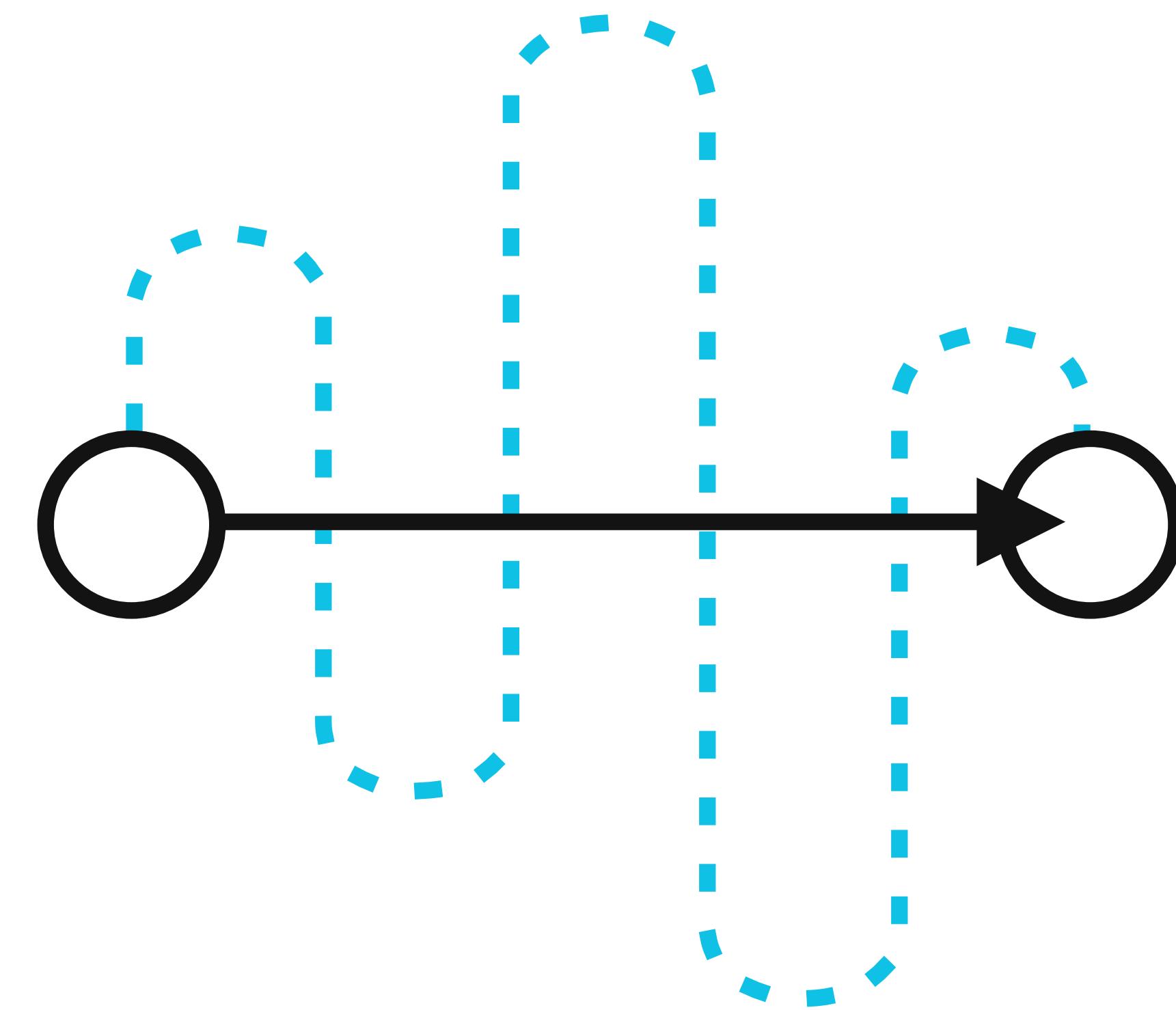
Prioritize velocity
over fidelity



Explore creative ideas



Acknowledge resource constraints



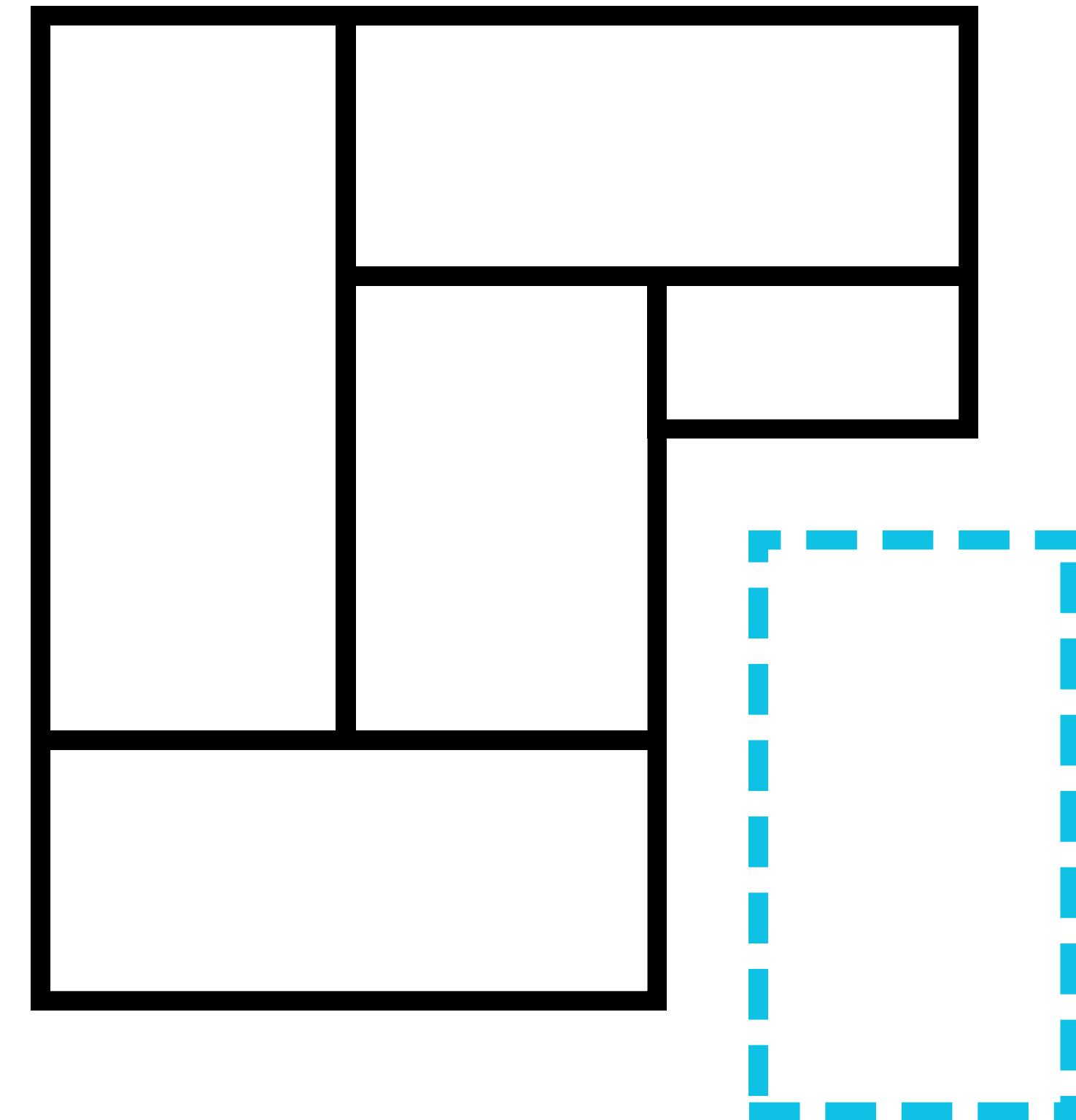
Explore creative ideas

■ Prioritize velocity over fidelity

Design Principles



Provide easy integration



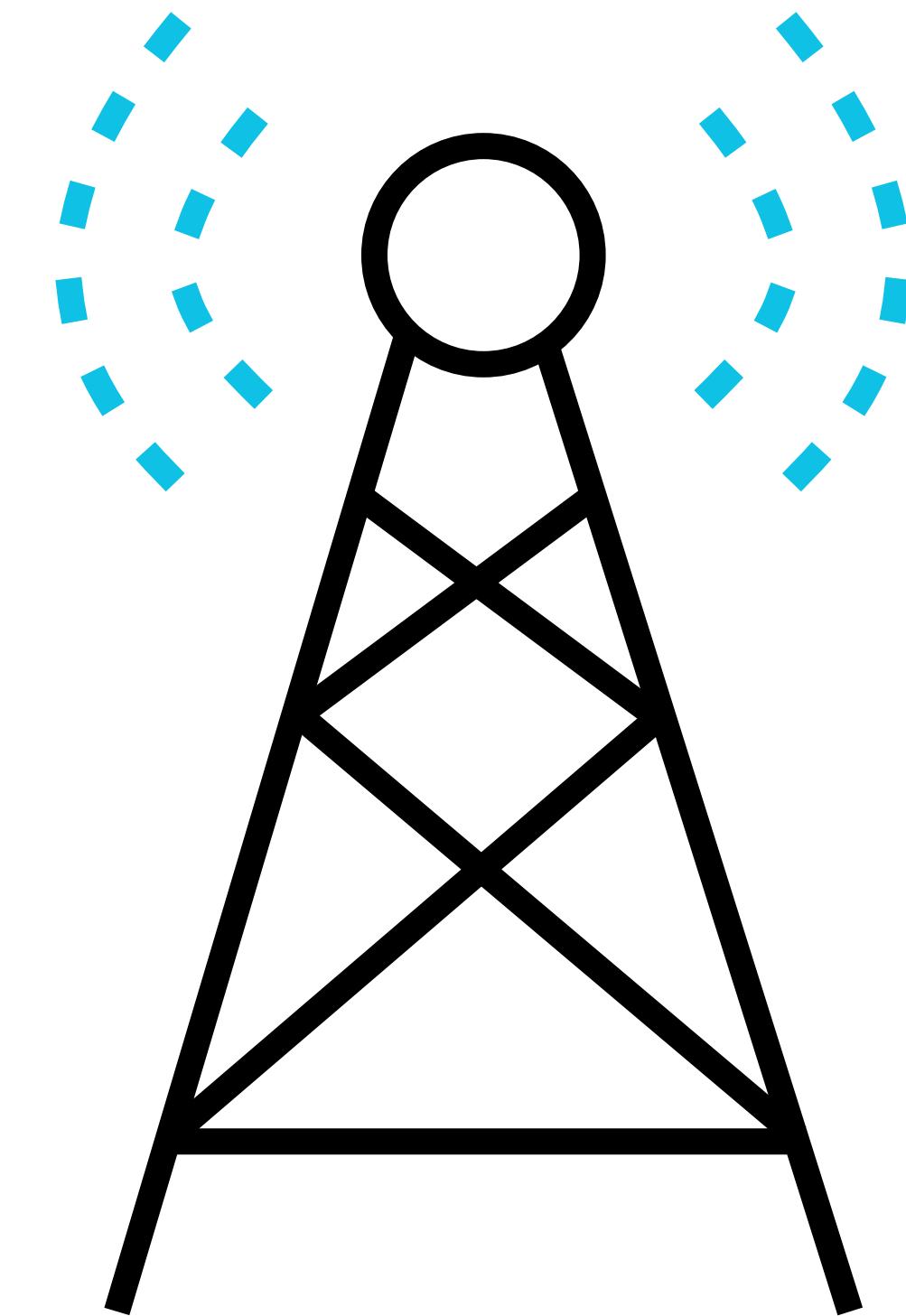
- Explore creative ideas

- Prioritize velocity over fidelity

- Acknowledge resource constraints



Facilitate communication

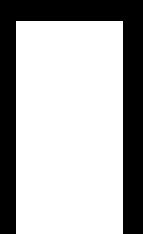
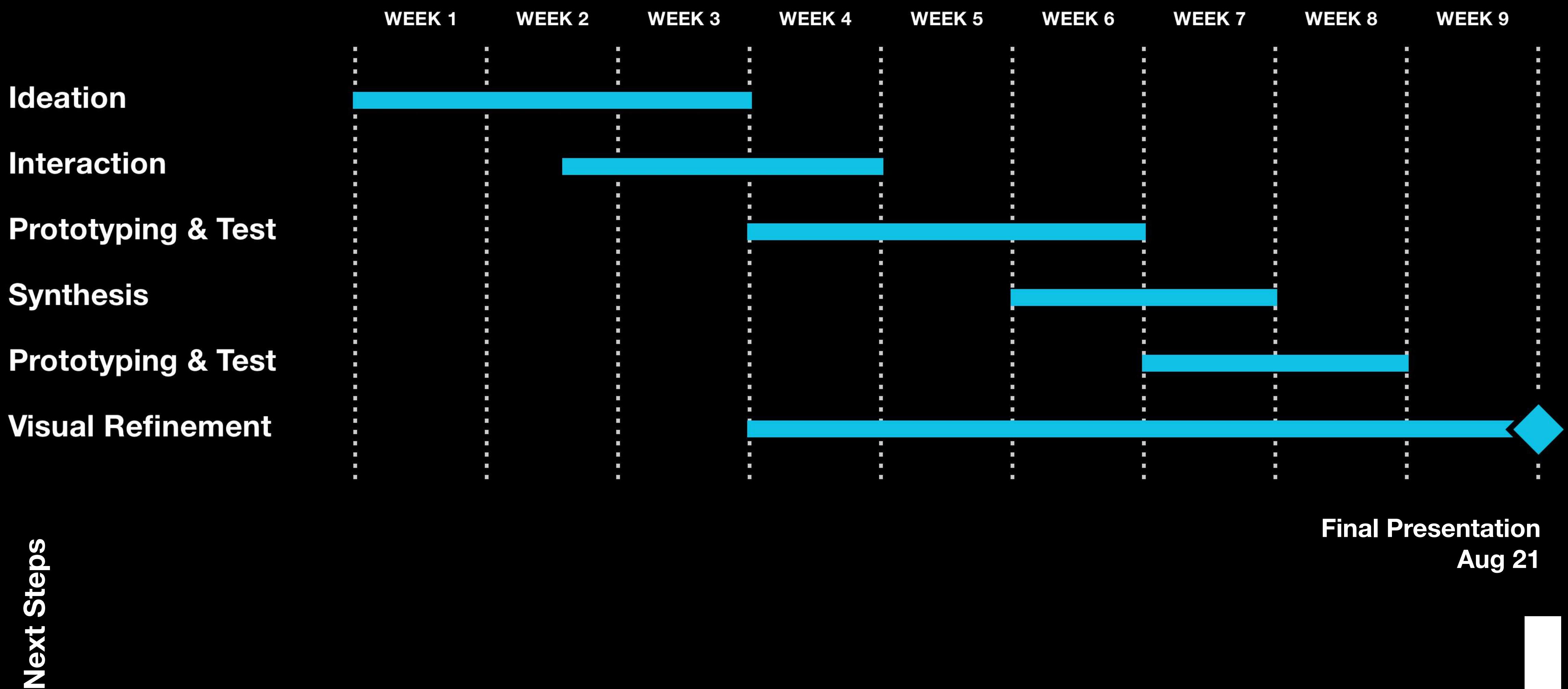
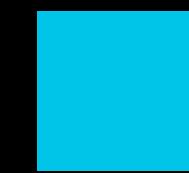


- Provide easy integration
- Explore creative ideas
- Prioritize velocity over fidelity
- Acknowledge resource constraints

Design Principles



- Provide easy integration ■ Facilitate communication
- Explore creative ideas ■ Prioritize velocity over fidelity ■ Acknowledge resource constraints



the show must go on

