



**IBC2023**

# Synthetic Humans for Entertainment & Accessibility

Sunday 17th September

13:30-14:30

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RAI

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ITV

## **MODERATOR**

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Innovation Co-Lead  
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## CHALLENGE OVERVIEW & POC OBJECTIVES

Leverage commodity tools to generate photorealistic digital twins of humans that could be used for TV productions and other platform environments

Subsequently, improve entertainment and accessibility going beyond traditional production workflows

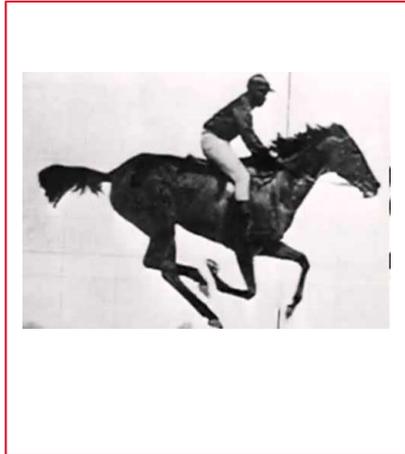
We have chosen to explore both these ideas within one IBC accelerator due to their similar themes and the opportunity to share and leverage the learnings.



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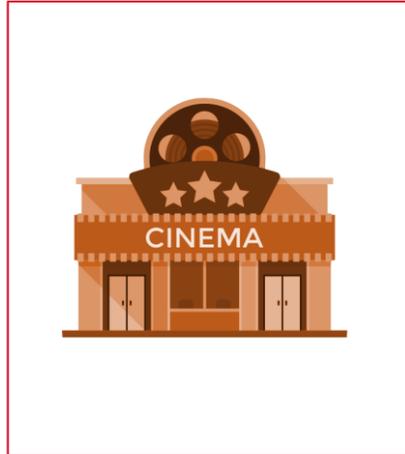
## DEVELOPMENT OF VIDEO AND VOICE

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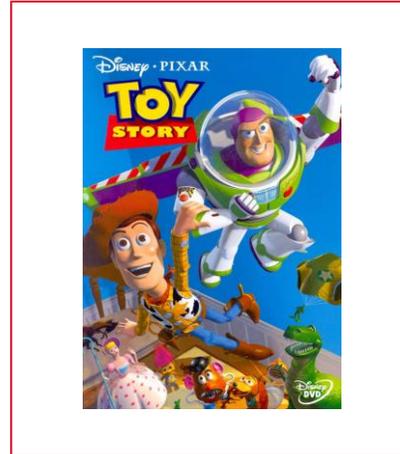
Real image

No voice



Real person

Real voice



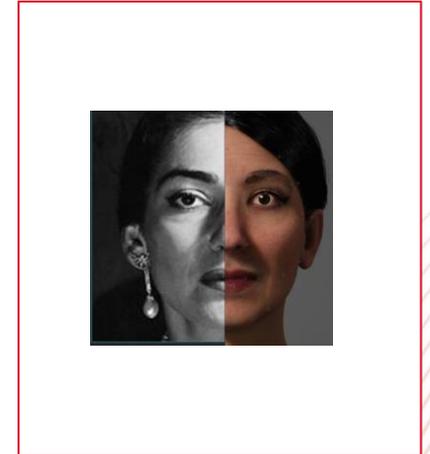
Digital  
animation

Real voice



Synthetic human

Real voice



Synthetic human

Synthetic voice



## Two different use cases based on synthetic humans:

- Workstream 1: Entertainment - create a realistic synthesized, Maria Callas, both in her likeness and voice
- Workstream 2: Accessibility - Look at new ways to scale accessibility including voice synthesis, and tackling lip-sync

Both use Synthetic Humans through motion capture technology to replicate human movements and facial expressions, creating faithful representation of characters.

Deployment of a pipeline for the integration of the synthetic humans to support Multiplatform publishing (e.g., TV programme, Volumetric LED wall, Headset display)

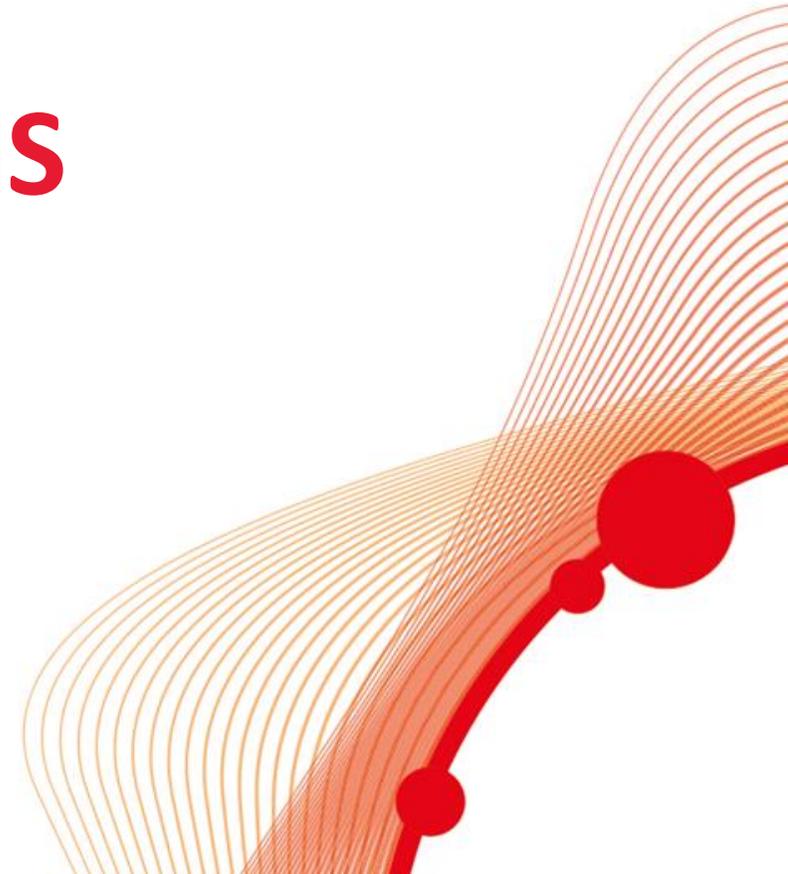


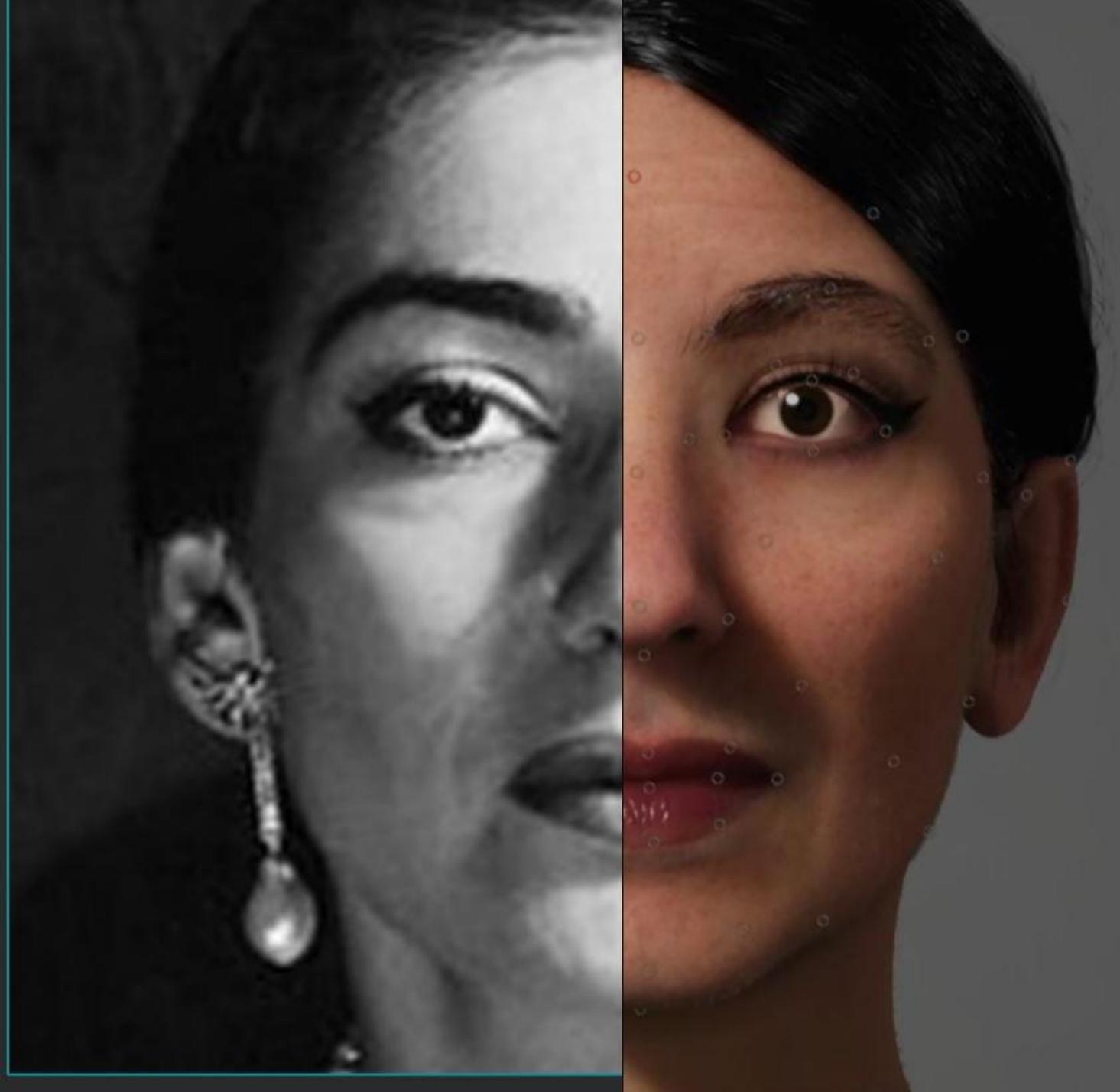
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**WORKSTREAM 1:**

**SYNTHETIC HUMANS**  
**for**  
**ENTERTAINMENT**





# SYNTHESISED MARIA CALLAS



#accelerators2023



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## USE CASE ENTERTAINMENT INNOVATION

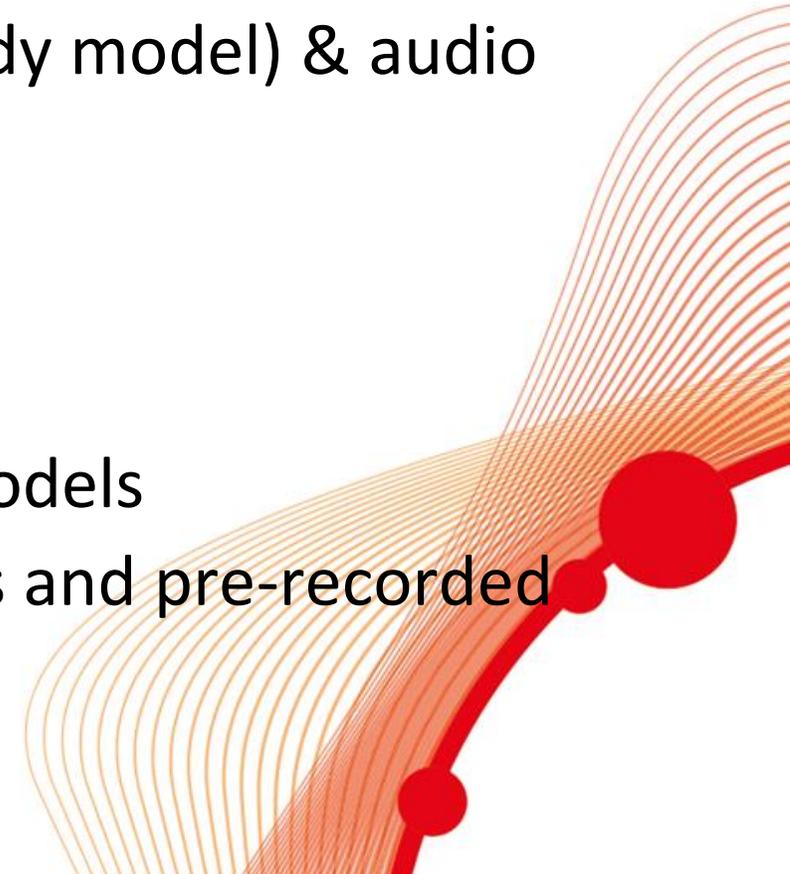
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### Original Objective:

- Leverage Broadcaster's archives: video (face & body model) & audio (voice cloning)

### Challenges:

- **Automated** reconstruction of photorealistic 3D models
- Realistic interaction between animated 3D models and pre-recorded digital twin captured using volumetric studio
- Integration into led studio production (realtime)





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## MANY EMERGING SKILLS NEEDED

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Motion capture



3D model clean up



Skin



Synthetic human creation



Face Building



Digital Clothes Animation



Photo realistic Rendering



Body Animation



Audio to Lip-sync



Audio synthesis

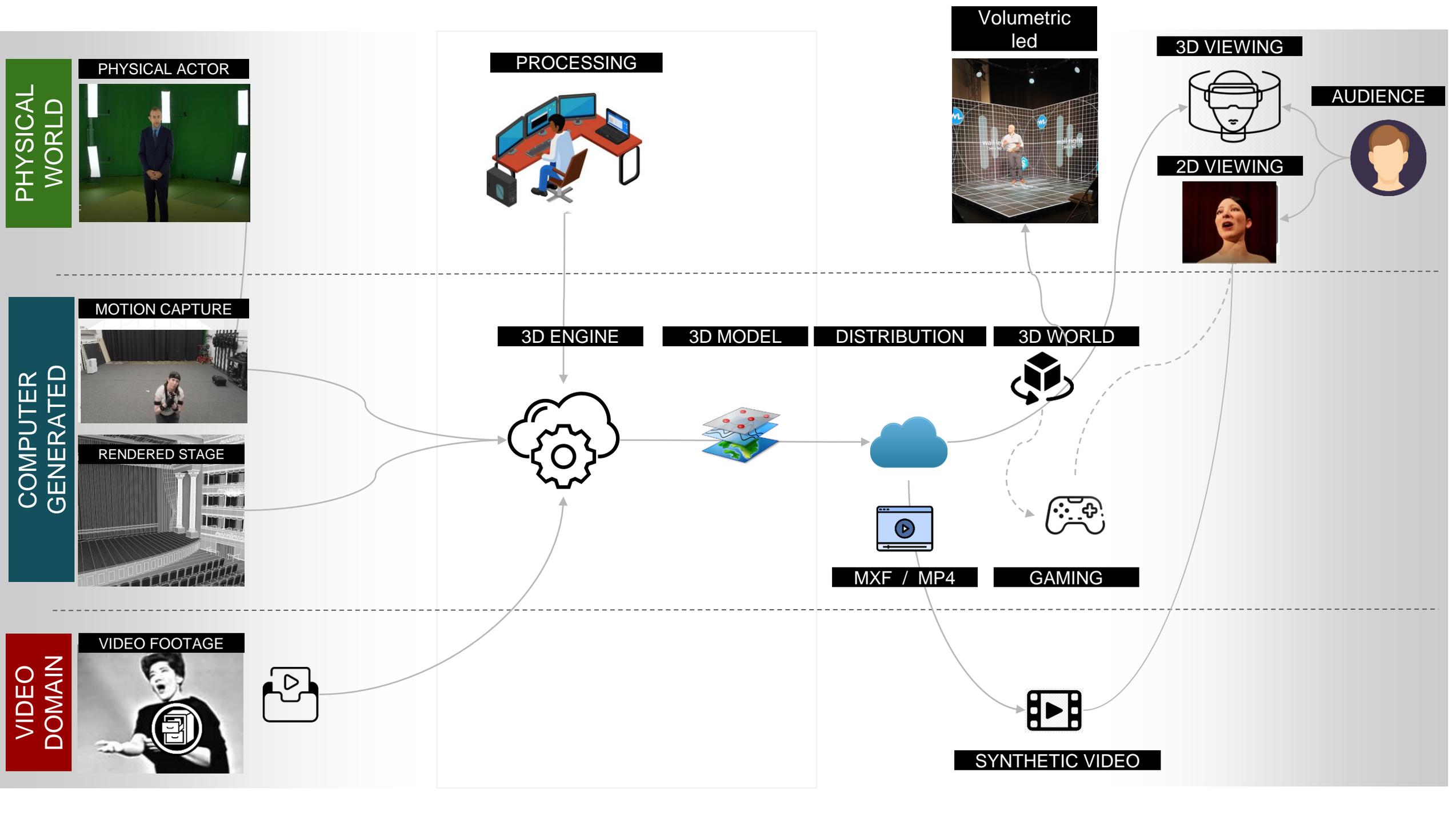


Training from video source



Face Animation

**HOW HAVE THESE BEEN USED IN THESE PROTOTYPES?**

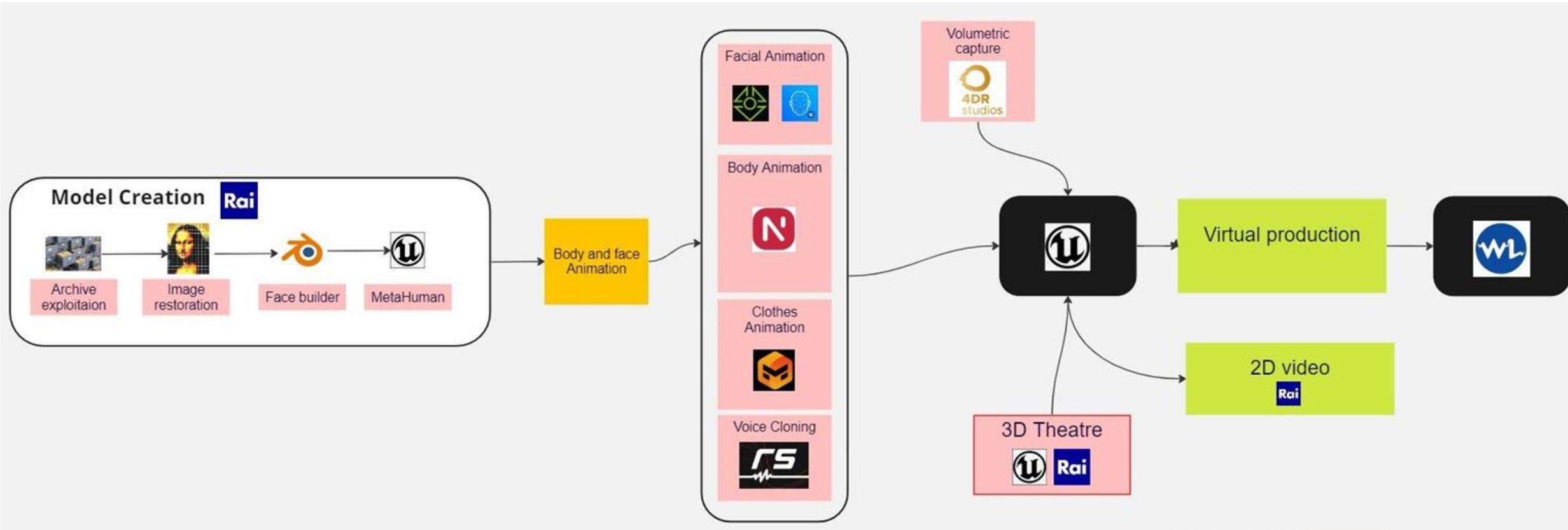




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# WORKFLOW FOR ENTERTAINMENT

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# IBC2023 AUTOMATION: Body orchestrator

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The screenshot displays the Pluxbox Platform interface. At the top, it says "Pluxbox Platform" and "SYNTHETIC HUMANS FOR ENTERTAINMENT AND ACCESSIBILITY". There is a "New process" button and a search bar. Below this is a table of processes:

Title	Started at	Process status
f3b87635-b370-4439-9c98-3484868bebfd	3 days ago	
2f268379-33e6-4c85-a240-1e45a3cd14a5	7 days ago	
ff88a315-3c44-4e91-9371-ee458a30573c	10 days ago	
2d3404c9-31b5-42dd-995b-c131a3ad19c7	14 days ago	
8628389d-adbd-43fb-a981-ad069b61619d	15 days ago	
0dbf3a61-c0de-4740-a720-266ad5ddfe19	15 days ago	
Process 4	1 month ago	
Process 3	1 month ago	
Process 2	1 month ago	



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# Zoom-in | FACE BUILDING

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Object Mode | View | Select | Add | Object | Global | FaceBuilder | Pin Mode

ESC: Exit | LEFT CLICK: Create Pin | RIGHT CLICK: Delete Pin | TAB: Hide/Show

FaceBuilder Options:

- Allow facial expressions: Exposure 0.00, Gamma correct 1.00
- Buttons: Align face, Add Images, Reset camera, Remove all pins
- Model: ?
- Appearance: Pins (Size 7.0, Active area 16.0), Wireframe (0.45), Highlight head parts (checked)
- Texture: ?
- Blendshapes: ?
- Create

Transform Panel:

Location X	0 m
Y	-5.634
Z	-0.1759
Rotation X	90°
Y	0°
Z	0°
Mode	XYZ Euler
Scale X	1.000
Y	1.000
Z	1.000

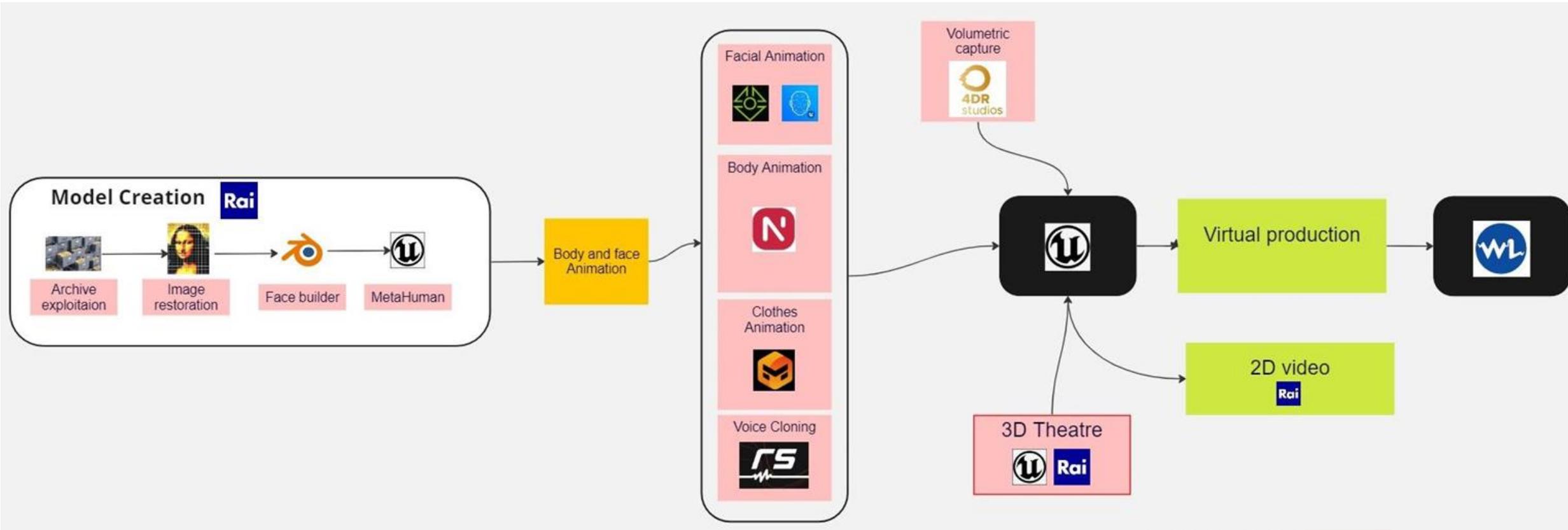
Delta Transform, Relations, Collections, Motion Paths, Visibility, Viewport Display



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# WORKFLOW FOR ENTERTAINMENT

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# Zoom-in | BODY MOTION

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The screenshot displays a motion capture software interface with several key components:

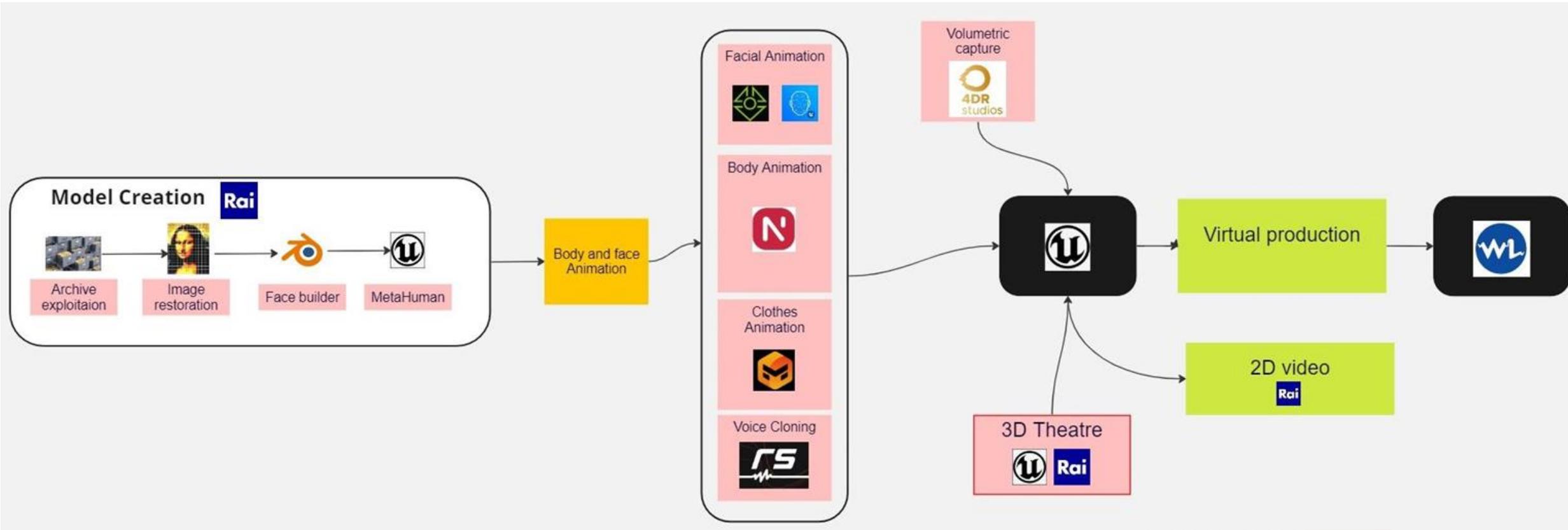
- 3D Viewport:** Shows a white humanoid character model labeled 'chr00' in a dark studio environment with a grid floor.
- Reference Video:** A browser window in the top right shows a video of Maria Callas singing 'Vissi d'arte' from the opera Tosca.
- Camera View:** A bottom-left inset shows a real-world camera view of a person in a dark shirt and khaki pants performing the motion capture in a studio.
- Character Settings:** A panel on the right shows 'chr00' in 'Full Body + Glove' mode at 60 fps.
- Take Information:** A bottom-right panel lists takes such as 'take24\_8\_007' and 'take24\_8\_008'.



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# WORKFLOW FOR ENTERTAINMENT

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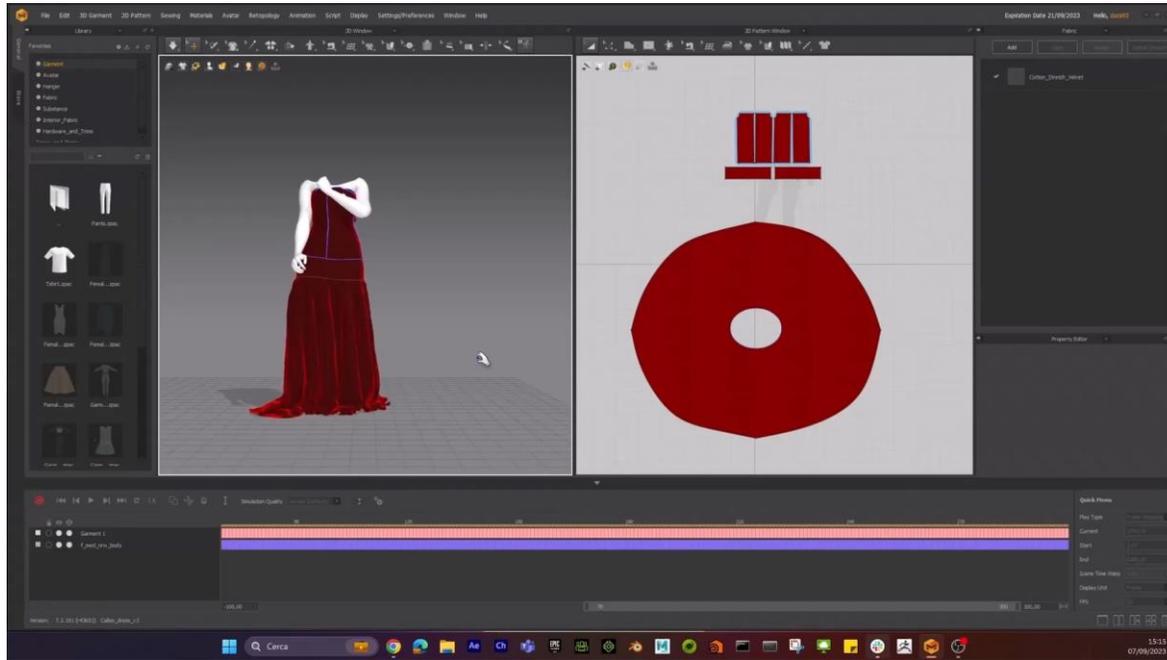


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## Zoom-in CLOTHES ANIMATION

## Zoom-in BODY VOLUMETRIC CAPTURE

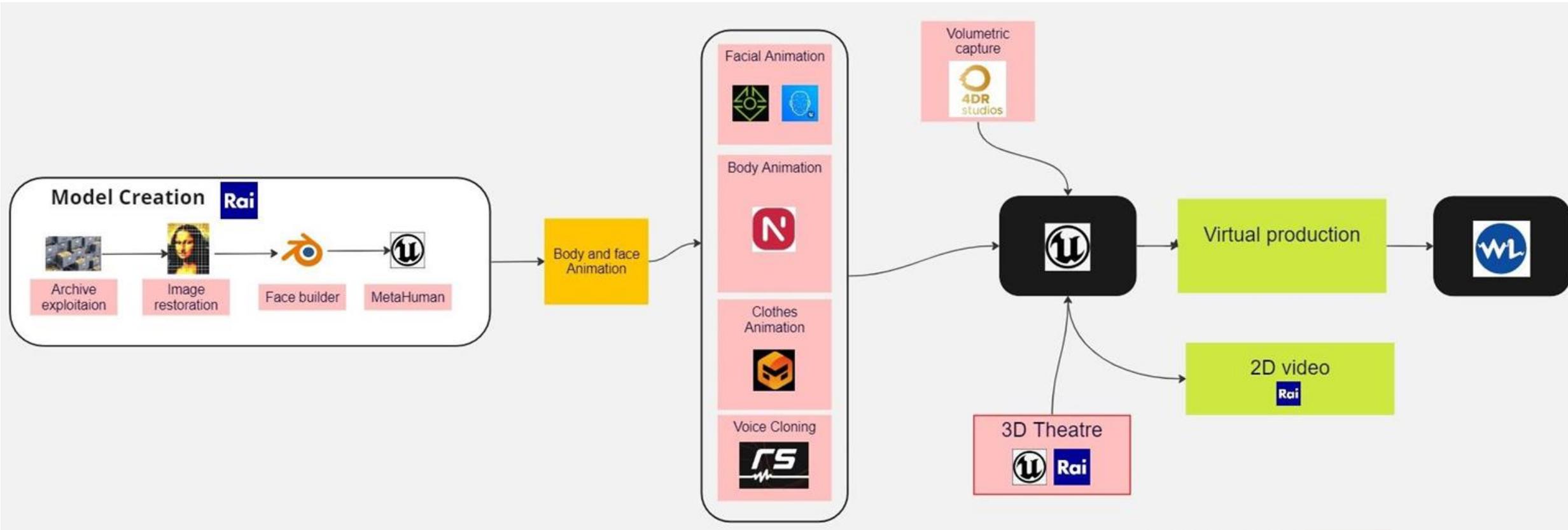




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# WORKFLOW FOR ENTERTAINMENT

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# THE GREAT MARIA CALLAS



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**WORKSTREAM 2:**

**SYNTHETIC HUMANS**  
**for**  
**ACCESSIBILITY**





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USE CASE : ACCESSIBILITY

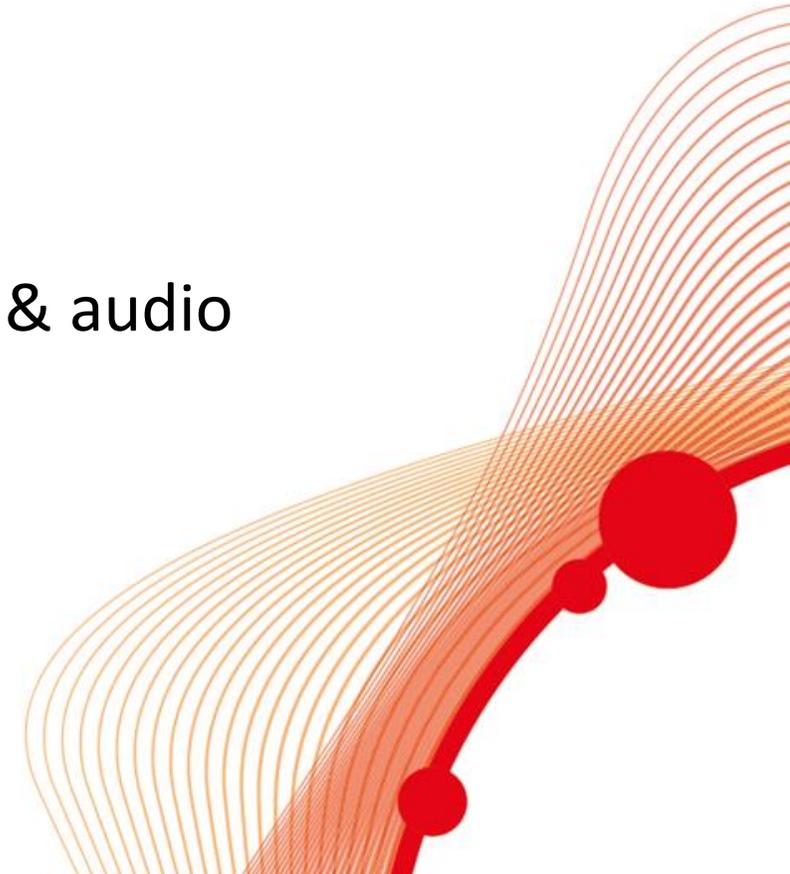
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Original objective:

- Develop ways to scale creation of accessibility to accompany the growth in content

Challenges:

- **Automated** text-to-voice synthesis for enabling voice & audio description
- Develop lip-sync to be able to enable lip reading
- BSL-presented weather forecasts
- Standardisation and Commercial considerations





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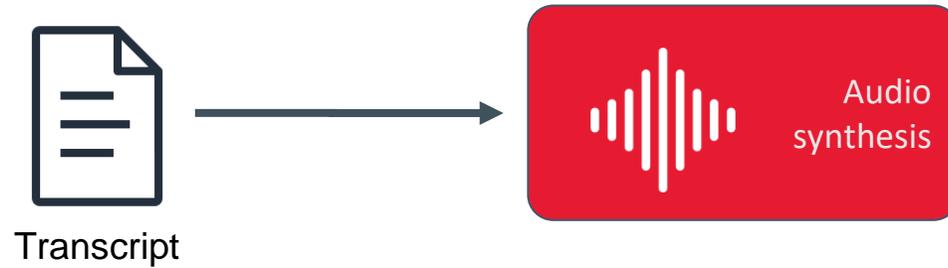
# ACCESSIBILITY WORKFLOW

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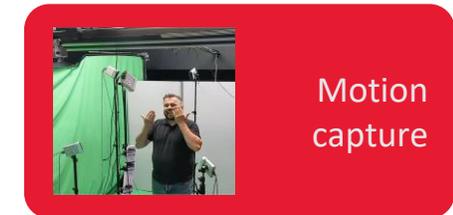
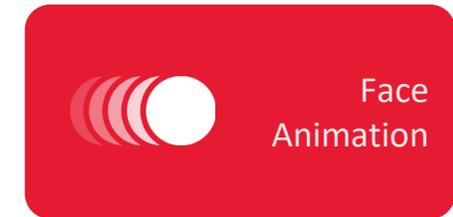
## Avatar creation



## Text to Voice



## Voice to Lip-sync animation





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CAPTURE AND RENDER

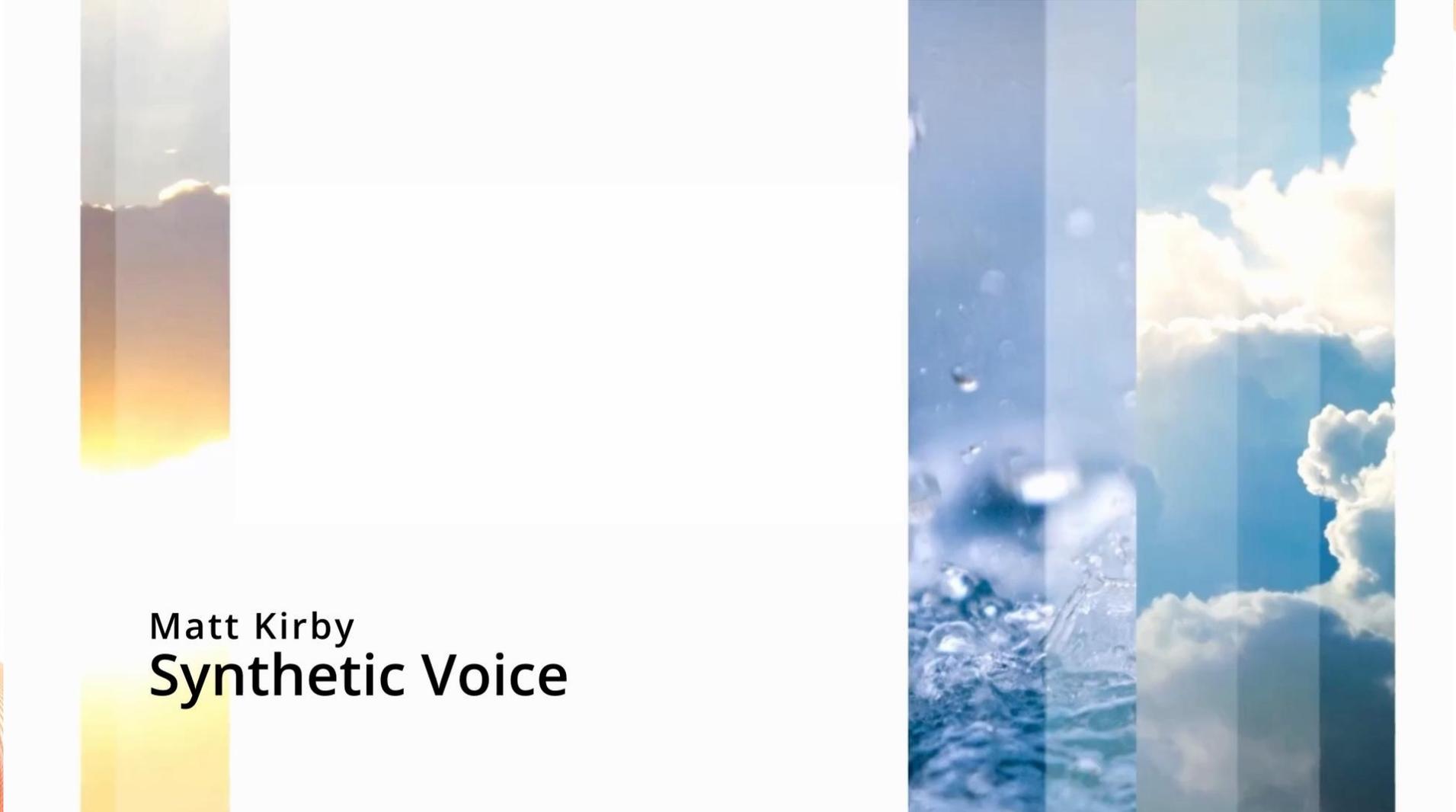


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**VOICE SYNTHESIS EXAMPLE**



Matt Kirby  
**Synthetic Voice**



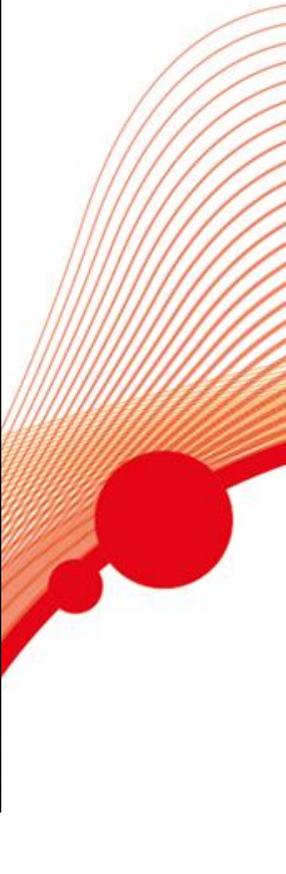
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OUT OF THE BOX, LIP-SYNC

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Darren Altman: Voice Actor  
**Matteus: Virtual Matt Kirby**





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**TEAM LEARNING POINTS & FUTURE WORK:**

**SYNTHETIC HUMANS**

**for ENTERTAINMENT & ACCESSIBILITY**





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## KEY LEARNING POINTS

1



How was the quality of audio and video from the archives?

**Quite a challenge to create 3D models and upscale video**

2



**How accurate was the animation and cleanup?**

***Entertainment:* Motion capture is mature and body movement is natural and required limited cleanup**

***Accessibility:* Body, facial expression and lip patterns are good enough for specific use cases.**

Hand and finger mocap requires lots of manual correction.

Production time:

Cleaning up a mocap is x3 as long as vs capture.

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## KEY LEARNING POINTS

3



### How was the text-to-voice synthesis?

Workflows are pretty common now and voices are realistic, and can have ranges of emotion and variation.

Production time: Negligible

4



### How was the modelling and clean-up?

Avatar modelling: Rapid advances but still challenging, requiring manual sculpting. Model validation.

Production time: 80/20 rule applies

5



### How good was the Lip-sync?

Accuracy depends on accent, depends on trained voices

Lip-sync to music or sung voice challenging as lip-sync technology optimised for speech.

Lip-sync not as accurate for accessibility, not always detailed in an avatar. Breaking down domain silos.

Production time: 1.5x real time



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**BUT WAIT, THERE'S MORE!**

**TALENT ID: RESPONSIBLE UTILITY & VALUE**

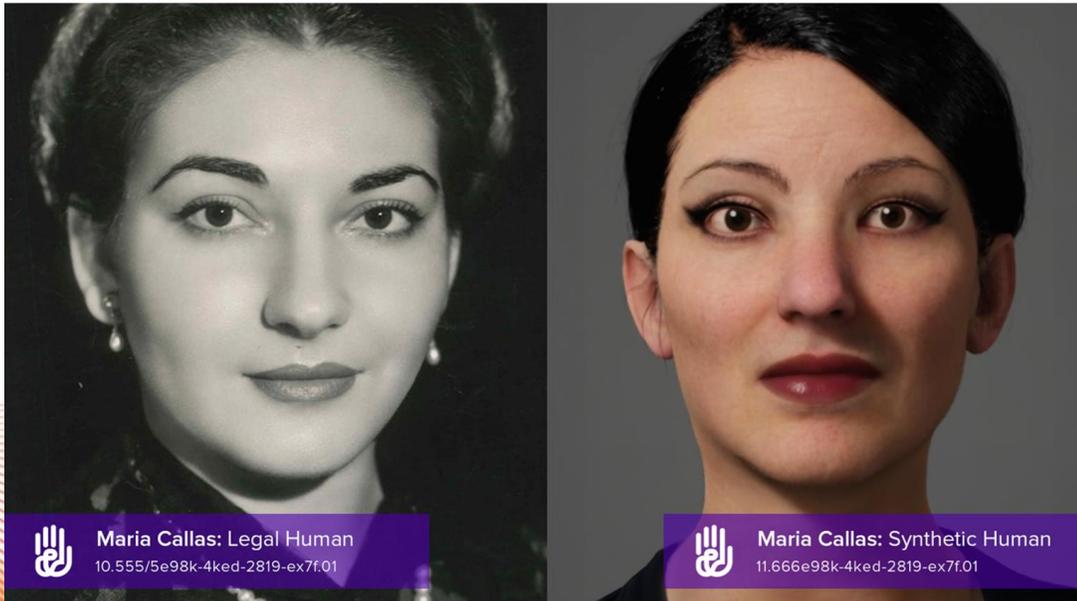




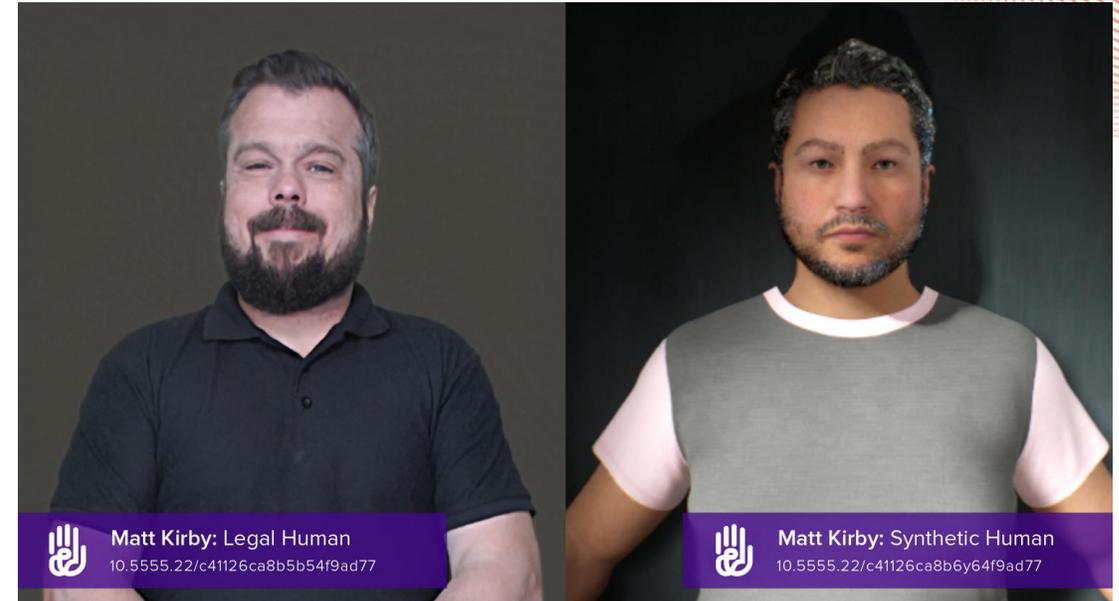
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# TRACKING & PROTECTING DIGITAL DATA/IDENTITIES

## Talent Moves Into Virtual



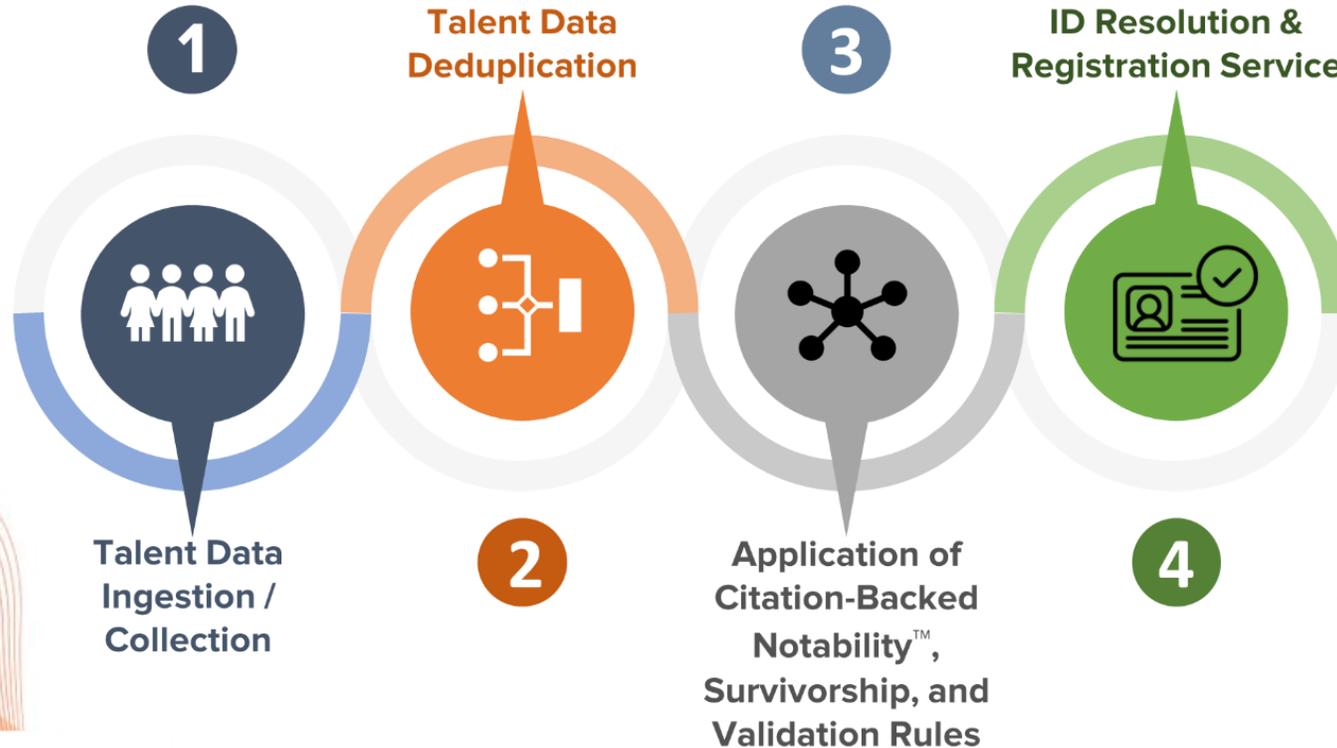
## Talent Moves Into Virtual





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# TALENT ID WORKFLOW FOR VIRTUAL AND FICTIONAL HUMANS & SYNTHETIC HUMANS



- **Provenance:** Guard Against Deep Fakes
- **Accounting:** Talent Appearance Tracking for Royalty, Residuals and Participations
- **Security:** Drive personal identifiable information out of Transactions (e.g. Gov. Issued ID's)





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## **FUTURE POTENTIAL OF SYNTHETIC HUMANS**

- Current **production quality is improving** for our broadcast applications (compared to gaming, Hollywood, etc)
- **Multiplatform and multiple devices** can be addressed
- **Reusable, sustainable 3D assets**, for all media: (eg: new formats, remote production/comms, fan & avatar interaction etc)
- Further **automation & integration** is required to improve democratization and scale production
- Develop a general-purpose **speech to lip-readable and/or signing avatars** service



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**GOING FORWARD**

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## Industry calls to action

- **Reusability**
- **Standardisation**
- **Ecosystem Maturity**
- **Talent Identification**



**Industry “Living Review”  
PDF Document**

Learning points and  
industry calls to action



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**CONTINUE THE DISCUSSION HERE AT IBC**

Come to the Accelerator Zone project POD, to...

- Meet the Team!
- Workflow challenges in detail & live demos
- Future accessibility discussions and technologies
- Tracking Talent ID
- White Light demo (at D&B stand across from Pod)

Go to the IBC website project page for:

- Highlight Videos
- White Paper
- Sign Language Avatar videos
- Workflow PDFs





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& Accessibility**

**Thank You**

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