

# **Virtual Reality and Conversational Agents for Cultural Heritage Engagement**

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**The Future of Education – International Conference**



# Introduction

## Why VR and AI in Cultural Heritage?

- Enhance visitor engagement & interactivity
- Overcome physical access barriers
- Immersive educational experiences







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## Historical and Cultural Context

- **Museo Preistorico dei Balzi Rossi**
  - Important Paleolithic archaeological site
- **Dame du Cavillon**
  - A significant discovery (1872)
  - Human skeleton, ~24,000 years old
  - Rich burial adornments and symbolic red ochre





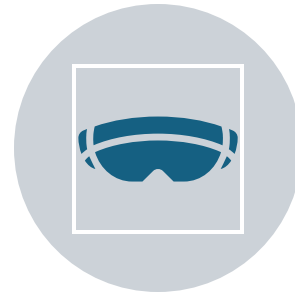




# Project Challenges



Realistic virtual representation  
(historically accurate)



Integration within existing VR environment  
(Unreal Engine)



Natural, fluent conversational interactions



Accurate, reliable historical information

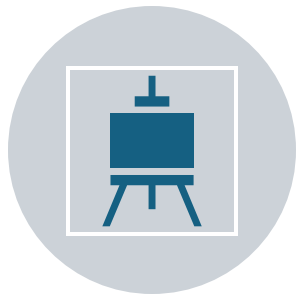
# Methodology and Tools



**Virtual Environment:**  
Unreal Engine



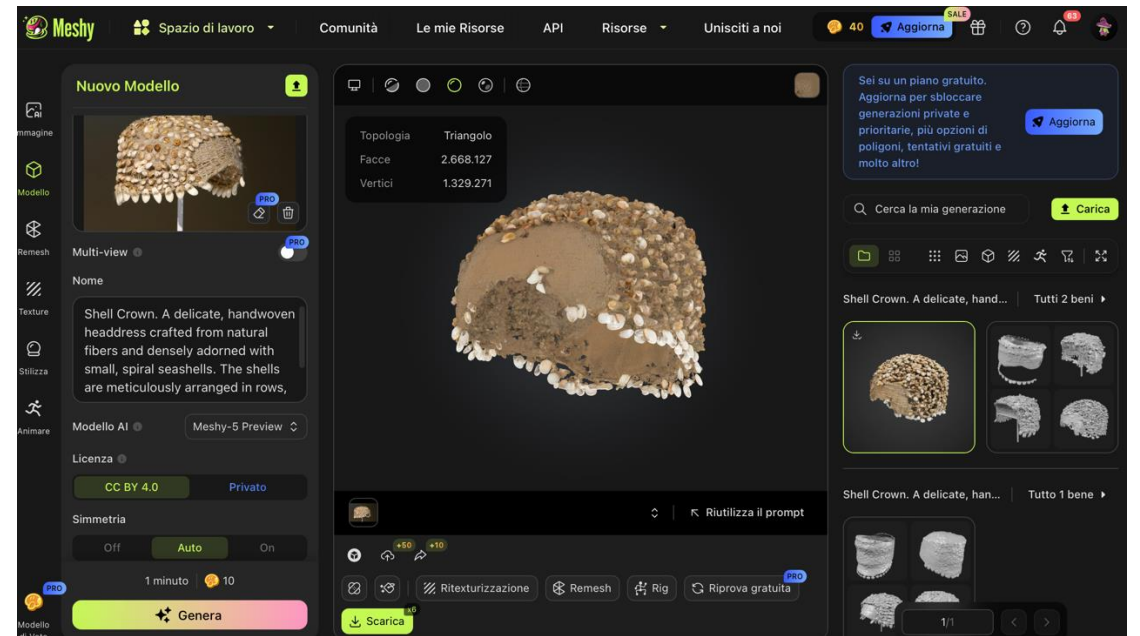
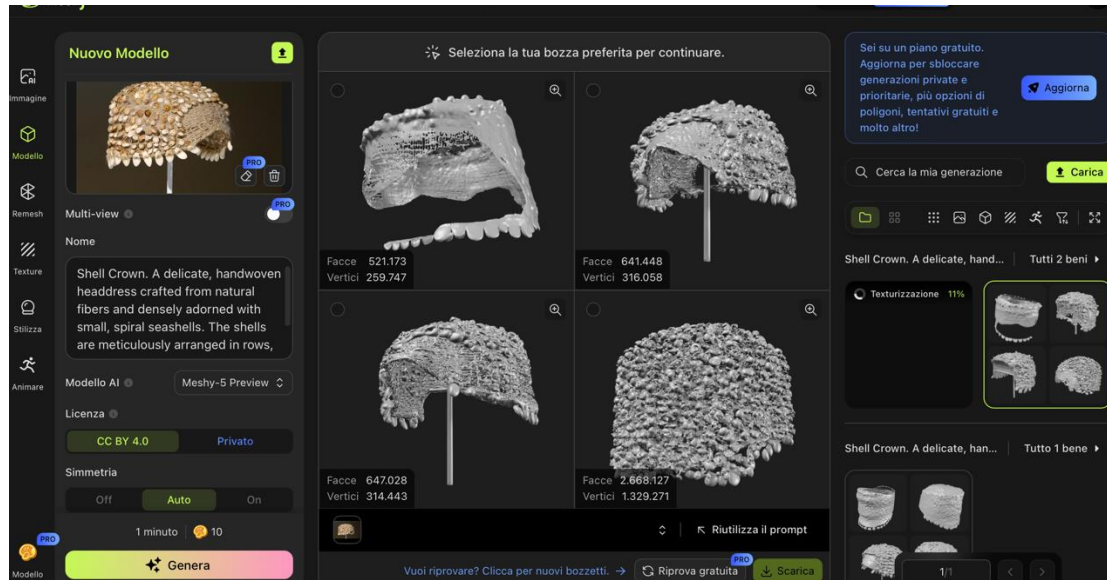
**Character Modeling:**  
MetaHuman Creator



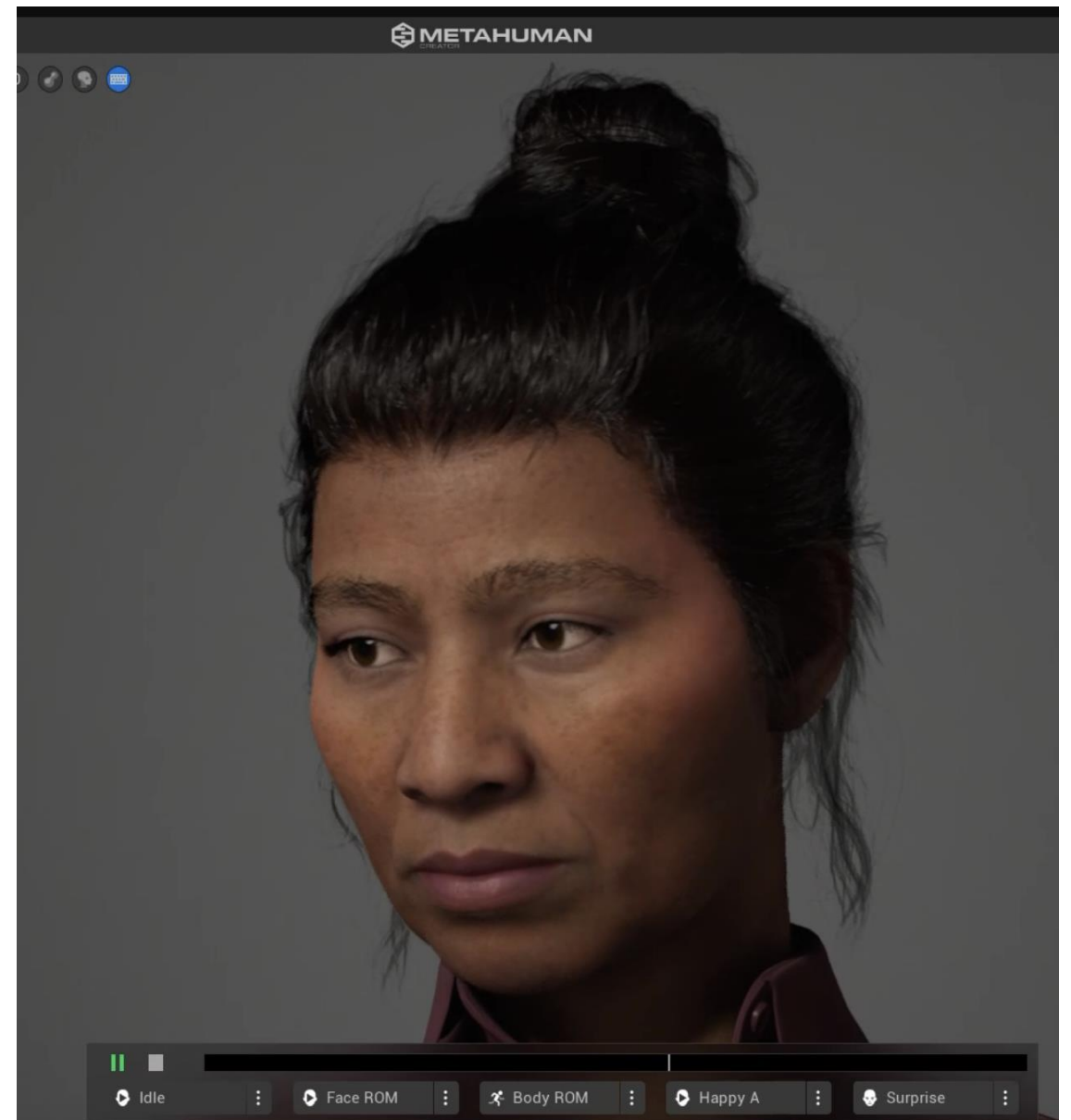
**3D Modeling &  
Animation:** Meshy 3D,  
Blender, Mixamo

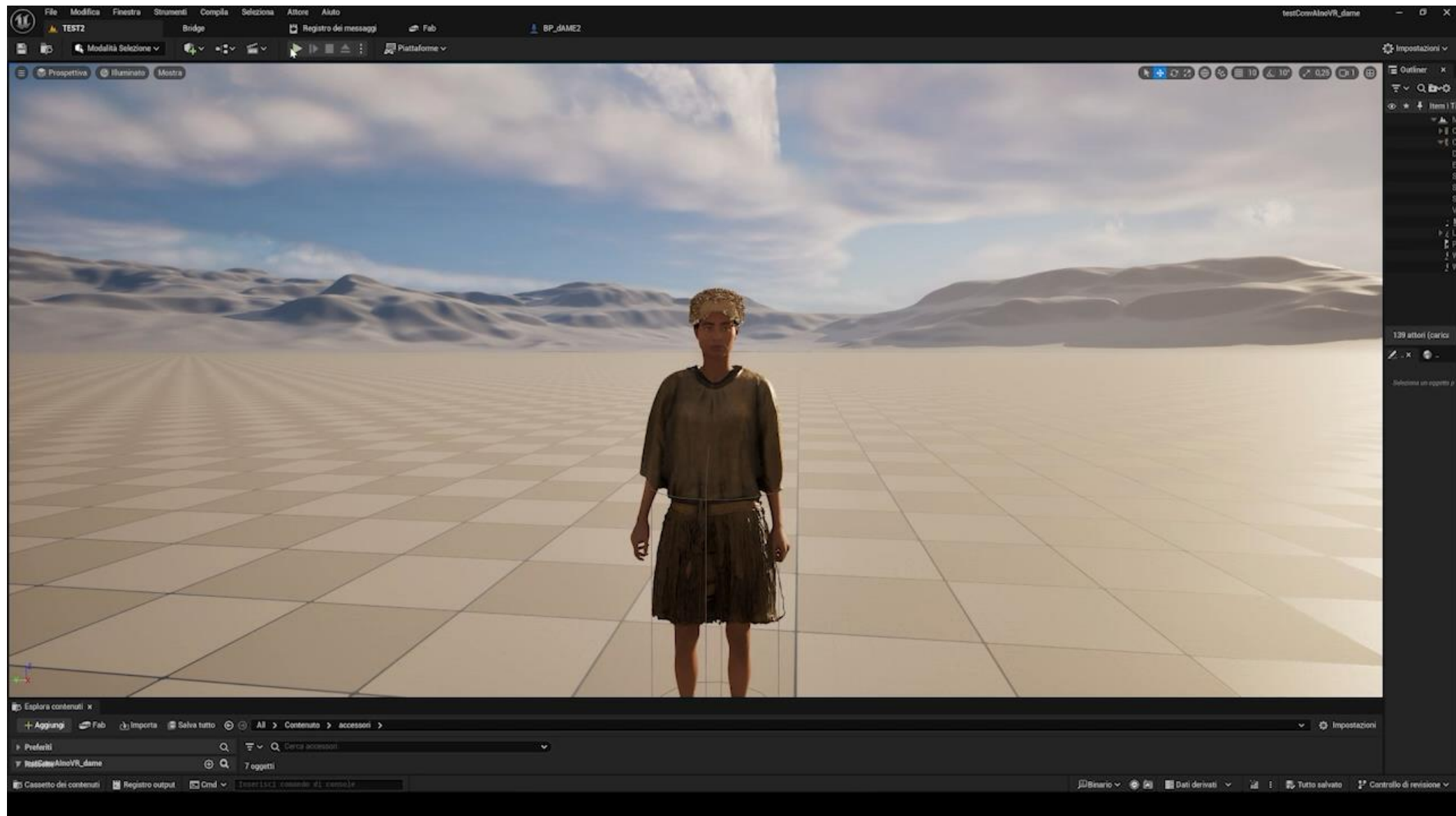


**Conversational AI:**  
ConvAI & Inworld Studio











# Project Workflow



# Integration of Conversational Agents



## **ConvAI**

Knowledge Bank (verified  
historical info)

Automatic lip-sync animations

## **Inworld Studio**

Knowledge Filters (strict  
narrative control)

Multilingual capabilities  
(Italian, English, French)



# Testing Approach

Two main tests conducted:

- **Animation Testing**
  - Evaluated realism, smoothness, and synchronization with speech.
  - Refined in Unreal Engine (animations, lip-sync).
- **Dialogue Testing**
  - Compared two conversational agents: **ConvAI** and **Inworld Studio**.
  - Measured response latency, information accuracy, and fallback effectiveness.
  - Conducted scripted test sessions (knowledge-based & out-of-scope queries).

# Evaluation Results

## **Response Latency:**

Average 1–2 seconds (acceptable pauses, smooth user experience).

## **Information Accuracy:**

High consistency: scored 4–5 on Likert scale (verified archaeological corpus).

## **Fallback System:**

Approximately 90% correct handling of out-of-scope queries.  
Minimal instances of brief guesses before fallback.



# Limitations & Open Challenges

Small user group for  
evaluation

Restricted access to  
Inworld Studio (new  
pricing model)

Dependence on  
stable internet  
connectivity for real-  
time interactions

# Future Directions

## **Next Steps**

- Expanded evaluation with larger user base
- Full VR environment integration and testing
- Enhanced conversational realism and context responsiveness
- Wider applicability for museum and educational scenarios



# Conclusion & Impact

Successfully  
combined VR and AI  
for cultural heritage

Demonstrated  
significant potential  
for educational and  
cultural engagement

Approach applicable  
to other historical  
contexts and  
institutions

# Bibliography

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8. **ConvAI** and **Inworld Studio** official documentation portals, accessed 12 May 2025.

*(Full reference list available in the printed paper.)*

*Thank you for your attention –  
questions are welcome!*



# Contacts

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## **Project partners & support**

- Museo Preistorico dei Balzi Rossi (Ventimiglia, IT)
- University of Genoa – Departments DLCM & DIBRIS