

# THE ETRUSCANNING PROJECT:

GESTURE-BASED INTERACTION  
AND USER EXPERIENCE IN THE  
VIRTUAL RECONSTRUCTION OF  
THE REGOLINI-GALASSI TOMB.

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CNR – ITABC

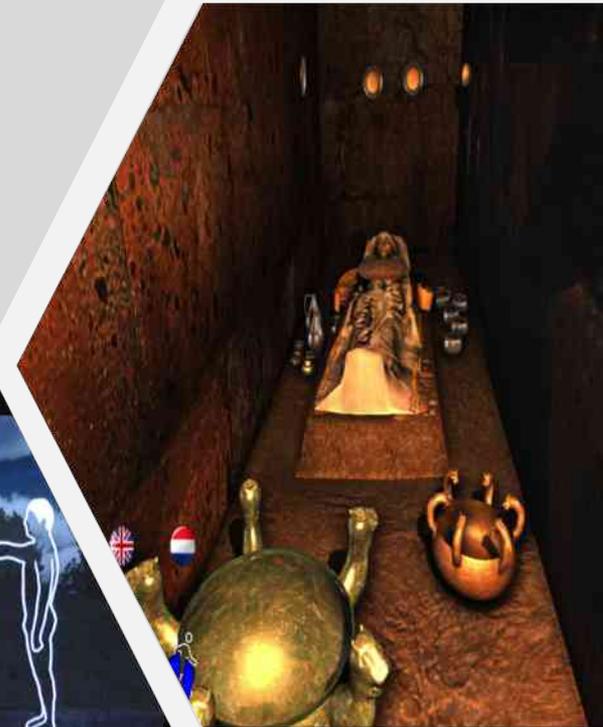
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## Etruscaning European project (Culture 2007)

### AIMS:

to explore the possibilities of new digitization techniques, digital restoration approaches, innovative VR environments in order to re-create and restore the original context of the Etruscan graves

Consortium of museums and research organizations from 3 European countries:  
Allard Pierson Museum and the University of Amsterdam, The Netherlands, coordinator  
CNR-ITABC in Rome, Italy  
Visual Dimension in Ename, Belgium  
National Museum for Antiquities in Leiden, The Netherlands  
Gallo-Roman Museum in Tongeren, Belgium

### Associated partners:

Vatican Museum, Città del Vaticano, Rome  
National Etruscan Museum in Villa Giulia, in Rome  
Scientific consulting: CNR - Iscima  
V-MusT NoE

Duration: MAY 2011 - APRIL 2013

## STUDY CASE: REGOLINI GALASSI TOMB

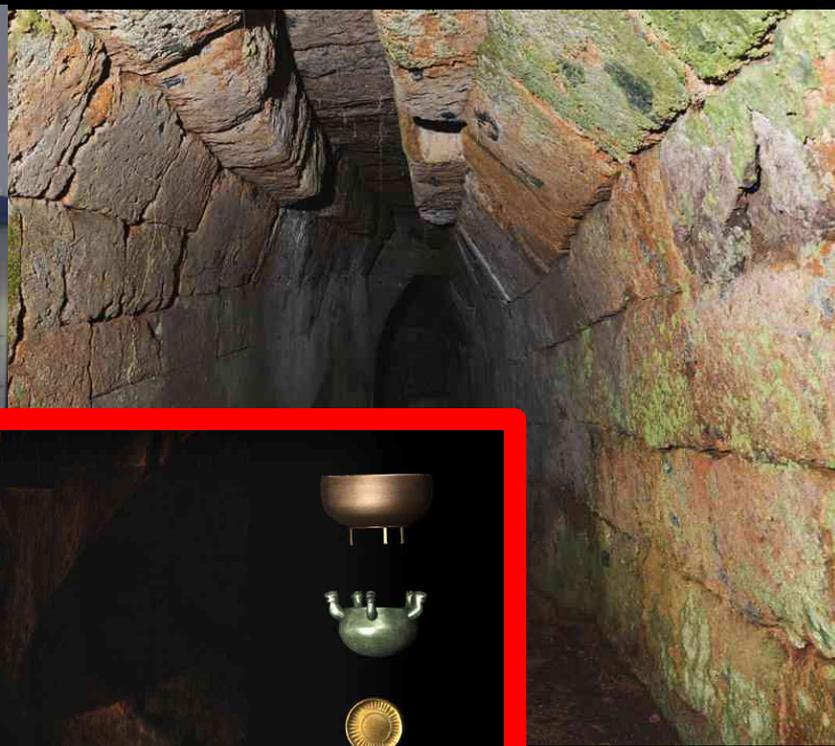
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The funerary goods from this tomb are decontextualized in the Vatican Museum: analytic organization of the exhibition that enhances only in their formal aspect, rather than their intrinsic cultural meaning.



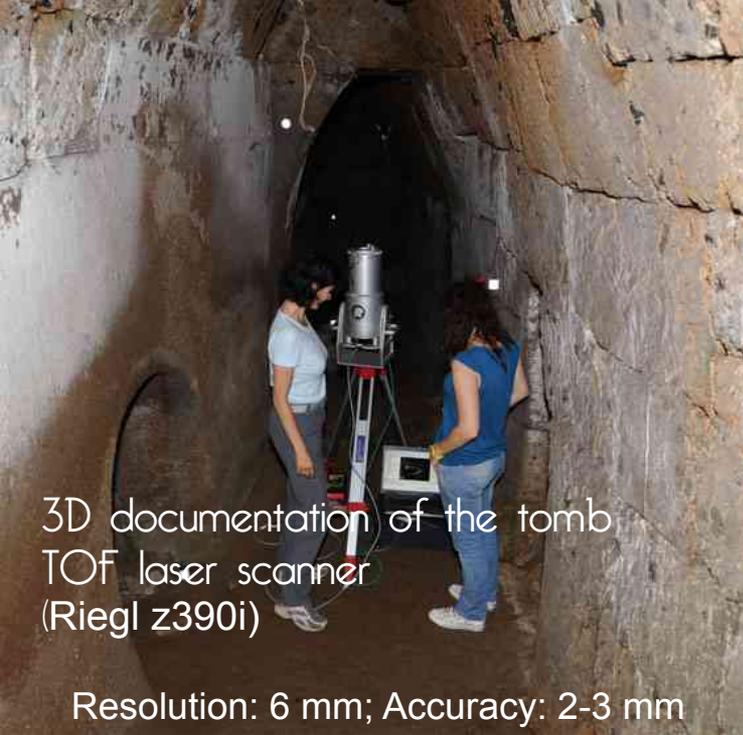
The existing tomb in Cerveteri is empty and not always open to public.



Re-creation of the Regolini Galassi tomb at the moment it was closed, half of the VII century BC

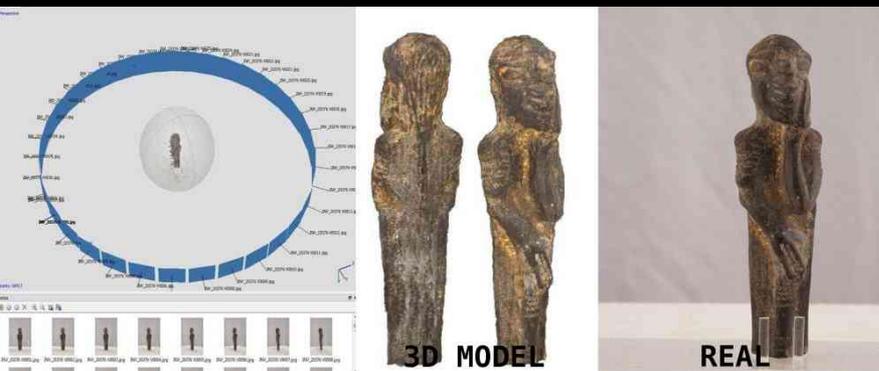
3D models: a tool for interpretation and final communication

# FROM DATA ACQUISITION TO VIRTUAL MUSEUM



3D documentation of the tomb  
TOF laser scanner  
(Riegl z390i)

Resolution: 6 mm; Accuracy: 2-3 mm

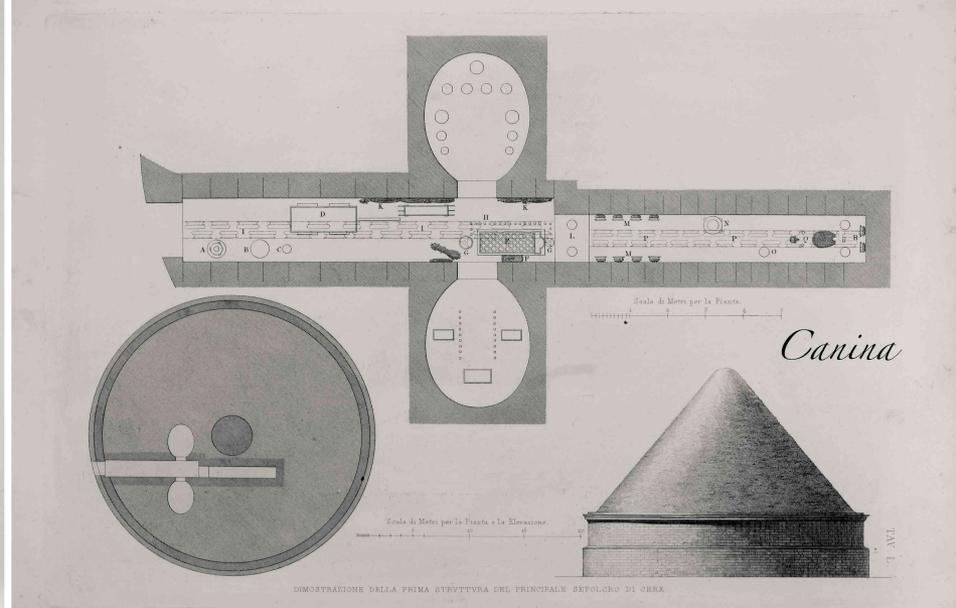
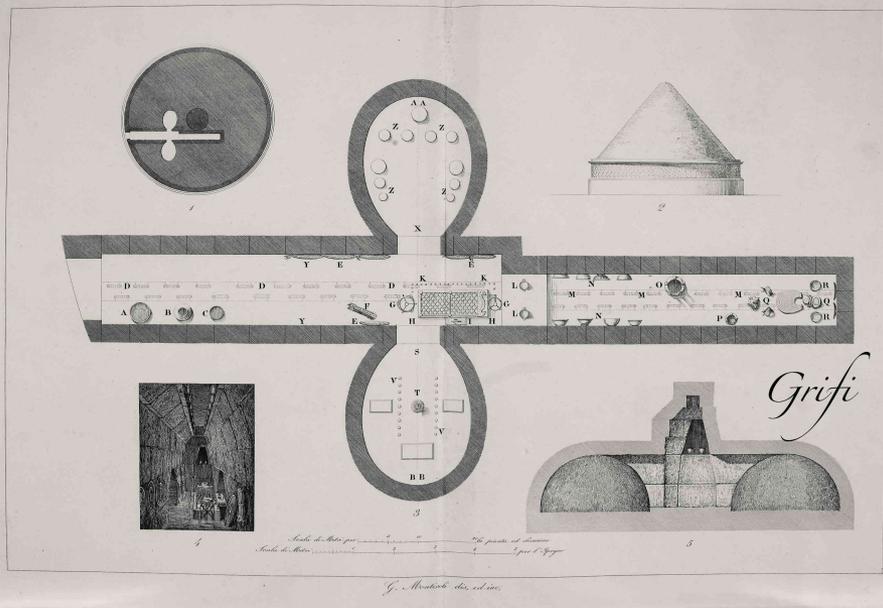


3D MODEL

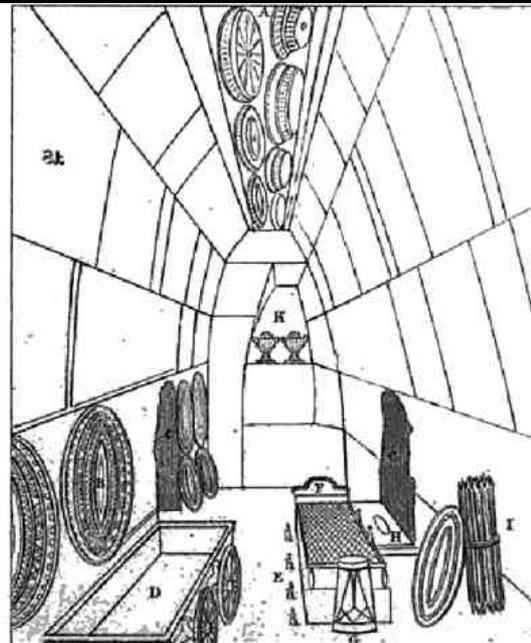
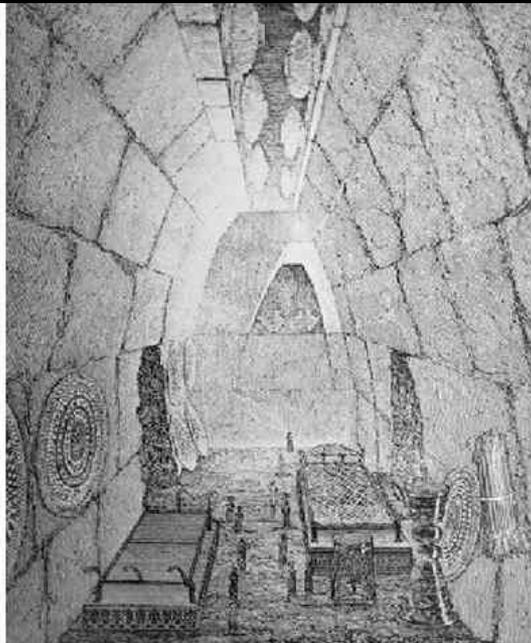
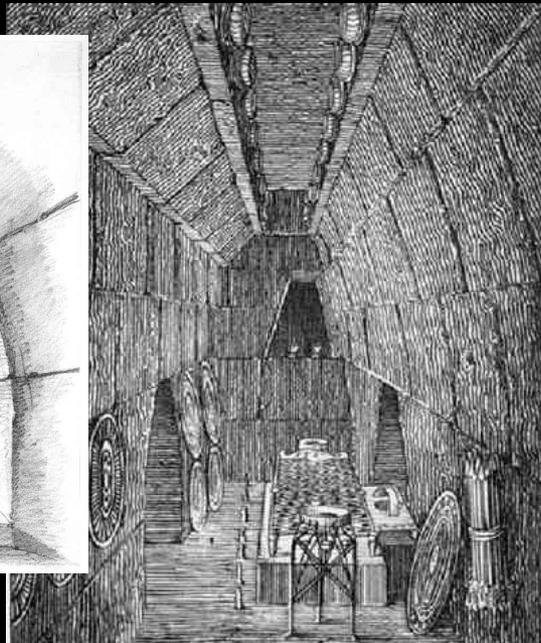
REAL

Digitization of objects through photogrammetry techniques and manual modeling





Literary and iconographic sources analyses



The Antechamber: Grifi (1841), Canina (1838), Hamilton (1841)



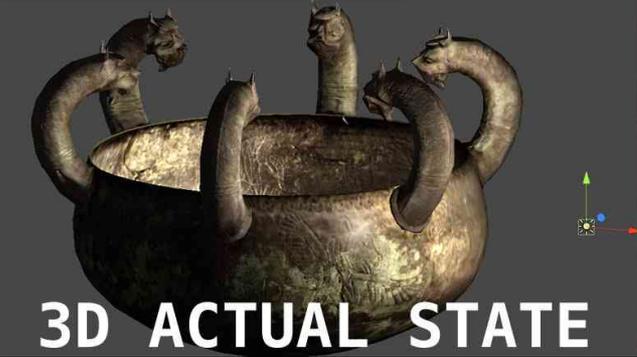
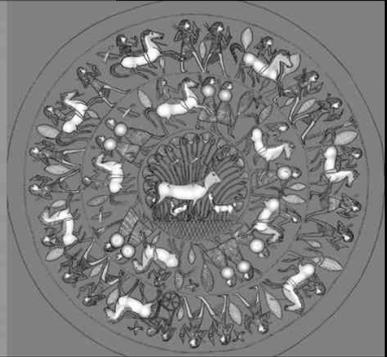
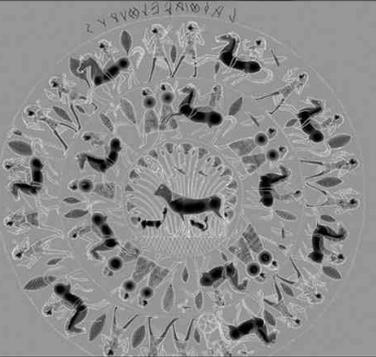
**3D RESTORED**



**REAL**



**3D RESTORED**



**3D ACTUAL STATE**



**REAL**

Digital restoration

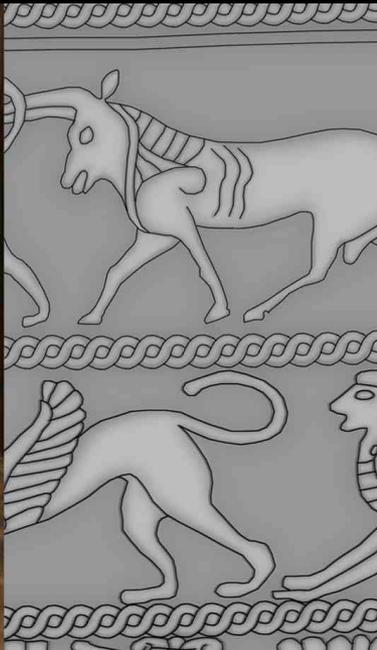
on the base of interpretation  
of fragments  
and typological similarities



**REAL**



**3D RESTORED**



## VR APPLICATION – 1° VERSION 2011

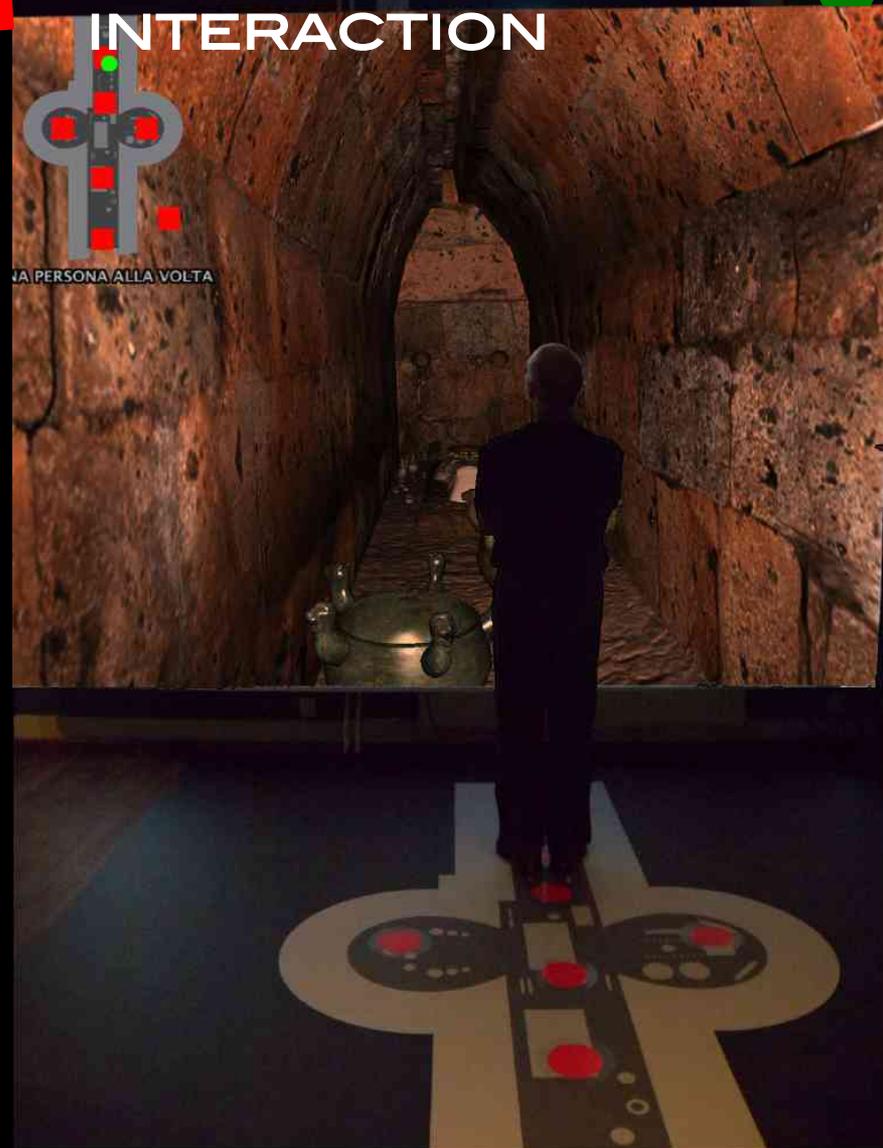


### Interactive exploration of the story through Natural interaction

The public explore the virtual tomb, get near the artifacts, listen to narrative contents directly from the voices of the prestigious etruscan personages buried inside, the princess and the warrior, to which such precious objects were dedicated.

## GESTURE - BASED INTERACTION

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ALLARD PIERSON MUSEUM, AMSTERDAM  
October 2011 - March 2012

# VR APPLICATION – 1° VERSION 2011

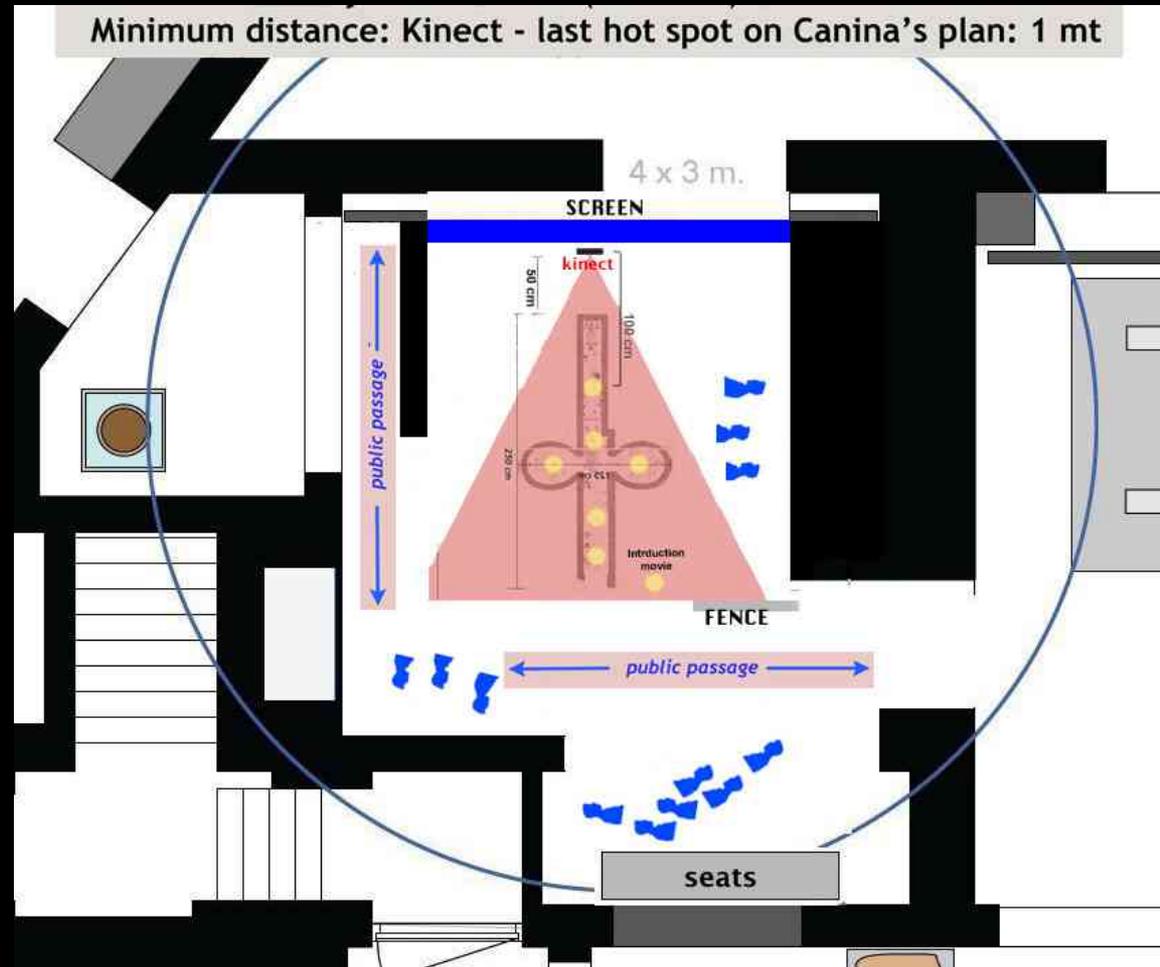
Unity 3D

Kinect sensor for motion capture.

The system has been derived from the new generation of games, but for the first time it has been applied to Virtual reality environments dedicated to the CH

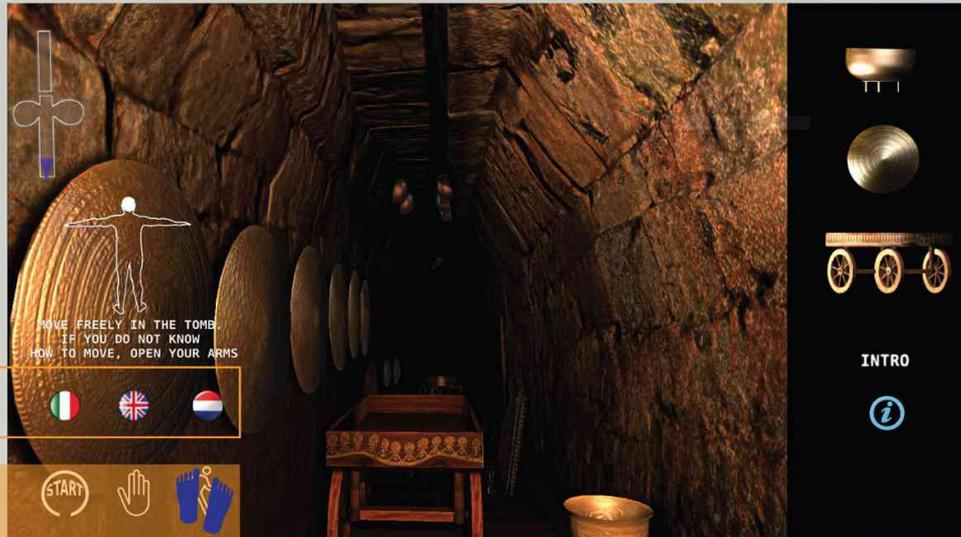
The framework to interface Kinect and the computer is OpenNI

No calibration needed: the only input is the user's movement and position on the floor, no other gestures are used.



# ETRUSCANNING 3D

VR APPLICATION – 2° final VERSION



Scegli la lingua  
Choose the language

Scegli l'azione  
Choose the action

Inizia il Tutorial  
Start the Tutorial

Seleziona  
Select

Esplora  
Explore

Una persona alla volta

One person at a time

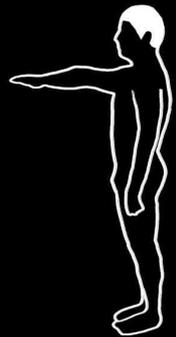
Per esplorare la tomba usa i movimenti del tuo corpo. Il punto blu rappresenta la tua posizione: muoviti fino a coprire una delle icone sullo schermo.

*Use your body movement to explore the tomb. The blue point represents your position: walk until one of the icons is covered.*

**VR APPLICATION – 2° final VERSION**



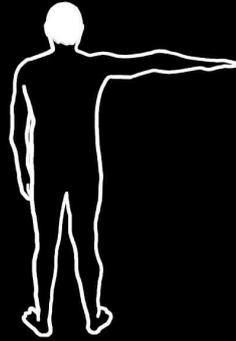
VATICAN MUSEUMS  
since the 4th of April 2013



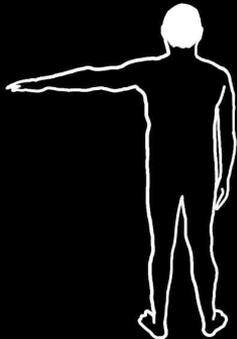
AVANTI



INDIETRO



RUOTA A DESTRA



RUOTA A SINISTRA



GUARDA IN BASSO



GUARDA IN ALTO



Research oriented to the definition of a proper grammar of gestures  
Simple to use for every kind of public



## EMOTIONAL INVOLVEMENT

Science + Art + Technology = Communication  
Embodiment, evocative and sensorial immersion

Natural interaction  
Storytelling  
Illumination  
Camera behaviors  
Soundscape....

Tests on public to improve the system

Science Festival in Genova, october 2012  
Archaeovirtual 2012





1° AWARD  
ARCHAEOVIRTUAL,  
A NEW INTERACTION  
NOVEMBER 2012

1° AWARD  
ITALIAN HERITAGE AWARD  
COMMUNICATION AND DISSEMINATION OF CH  
4 OCTOBER 2013



# UX EVALUATION



User experience activities give support to the study of specific aspects of a digital product as in the production phases and after its *mise en scène*.



- ✧ Experiments in Labs
- ✧ Testbeds
- ✧ Public openings



A detailed grid of indicators for a good UX evaluation is hard to find since there are many different dimensions to consider when choosing the evaluation approach.



- ✧ Starting goals
- ✧ Methods
- ✧ Target
- ✧ Location
- ✧ Granularity of desired data



Recently some evaluation studies conducted in DCH domain showed different approaches and methods when analyzing the success of a digital product.



- ✧ “Cognitive Walkthrough” methods
- ✧ Degree of immersion
- ✧ Behavioral and social aspects.



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## ARCHEOVIRTUAL 2011

- ✓ 13 observations
- ✓ 7 interviews
- ✓ 34 written surveys

### GOALS



Explore social and behavioral aspects by studying:

- ✧ Design
- ✧ Usability
- ✧ Overall involvement
- ✧ Content

### TOOLS



- ✧ Direct interviews
- ✧ Written surveys
- ✧ Observation sessions

Capture *indicators* of

- Sense of presence
- Sense of immersion
- Educational benefits

### METHOD



- ✧ Users
- ✧ Developers
- ✧ Experts in ICT

Collect data and match the results in order to find out similarities and differences.



## IMMERSION

The arrangement of the installation space, the environment, and the context into which the installation was placed had a definite impact on the user's sense of it.



- ✧ 58% of testers felt a high level of immersion
- ✧ 39% medium immersion
- ✧ 3% low immersion.



## CONTENT

The information provided by the application was clearly structured and easy to understand.



- ✧ 70% of testers found the content to be accessible and referable to users' level of knowledge of such historical topics.



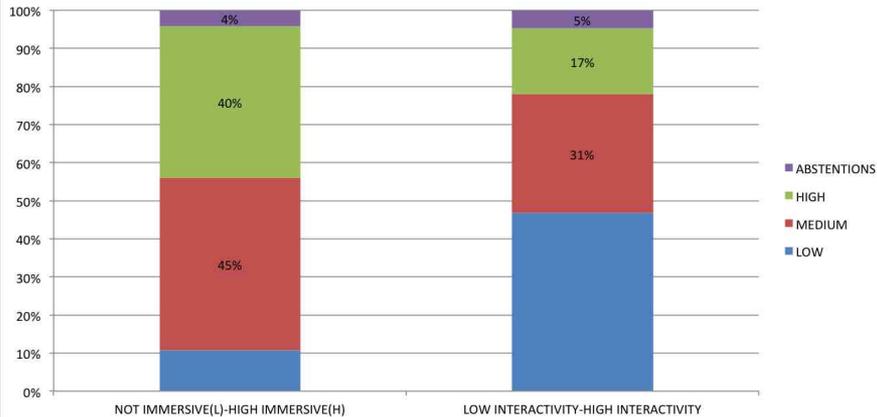
## USABILITY

A good average of testers considered the application easy to use and interact with.

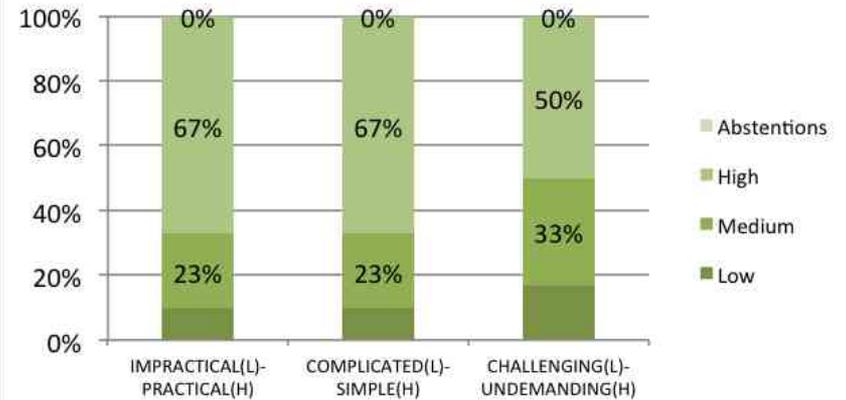


- ✧ 67% rating the usability as highly simple, and 50% also rating the usability as undemanding.
- ✧ 10% found it complicated
- ✧ 17% said it was challenging.

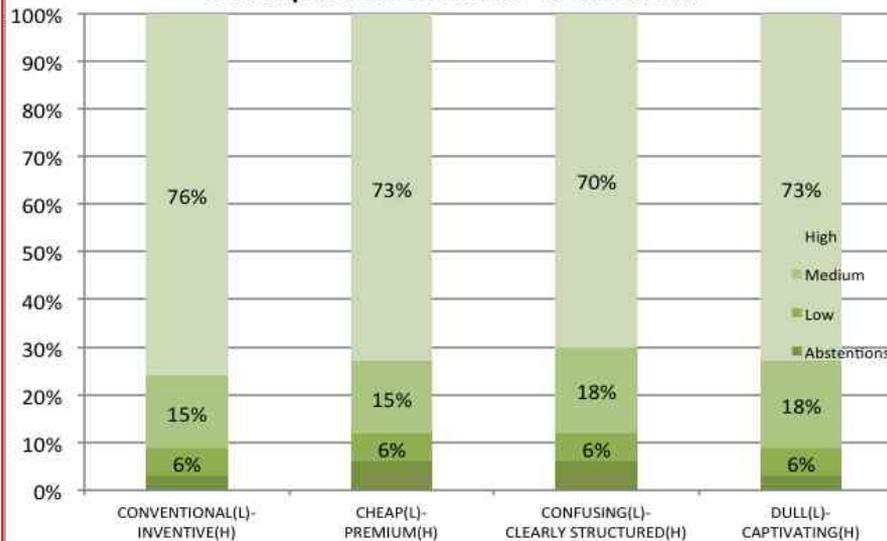
## YOUR EXPERIENCE ABOUT THE INVOLVEMENT OF THE APPLICATION



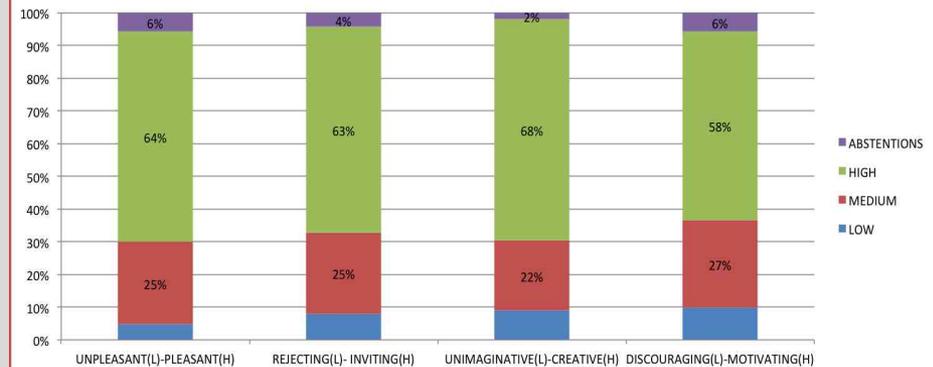
## Usability - Archeovirtual



## User Experience of Content - Archeovirtual



## YOUR EXPERIENCE ABOUT THE DESIGN OF THE APPLICATION-VISUAL/ AESTHETICAL EXPERIENCE





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## ARCHEOVIRTUAL 2012

- ✓ 24 written surveys
- ✓ 10 "scenario" interviews

### GOALS



Investigate specific aspects of the holistic term of UX:

- ✧ Utility
- ✧ Efficiency
- ✧ Learnability
- ✧ Stimulation

### TOOLS



- ✧ Direct interviews
- ✧ Questionnaires

Capture ground truth data on expectations in terms of

- Realization
- Interaction
- Graphic computer interface (GUI)

### METHOD



- ✧ Users
- ✧ Developers

Collect data and match the results in order to find out similarities and differences.



## UTILITY

.....rated as highly positive.....

In the written survey a majority of **92%** found all available functions useful. Similar reaction within the interviews.



- ✧ Relatively **long textual instructions** in the "Start" which lead to skip these.
- ✧ Functions desired: **direct investigation of objects** inside the tomb without switching to another mode; **more interaction opportunities** with the selected objects



## LEARNABILITY

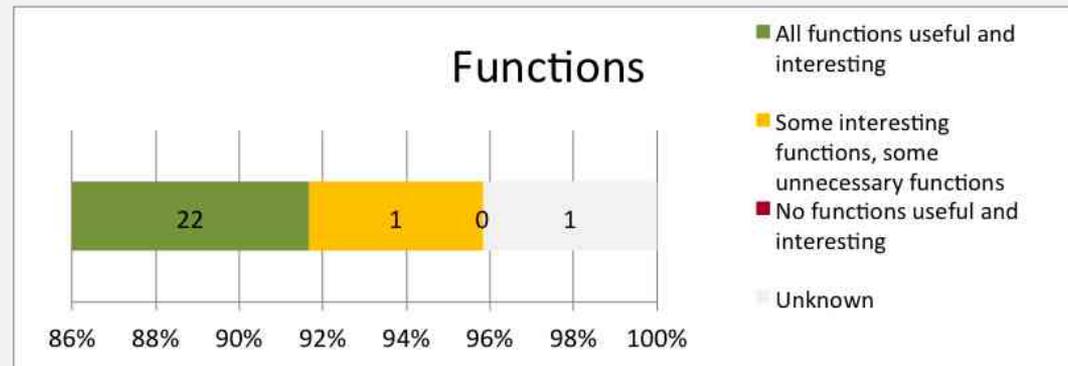
In the written survey **50%** of participants said it took some time to understand how to use the application. Within the interviews only **10%**.



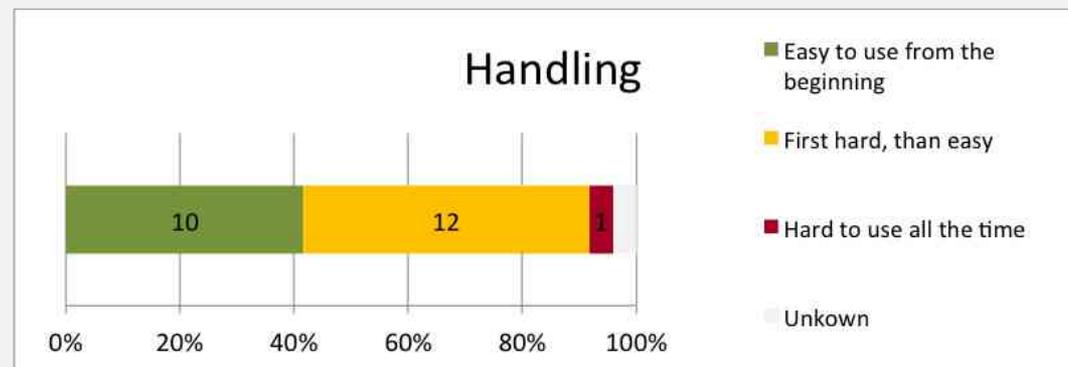
During the interviews it was observed that in the beginning many advices by the evaluators were required.. After a first learning phase, users could easily apply the gestures!



## UTILITY



## LEARNABILITY





## EFFICIENCY

...relatively large consent...

Within the written survey **79%** rated the time to reach their goals as adequate, but still **13%** criticized slow system reactions. Within the interview a similar result emerged. For **20%** it took either too much time or always.



A natural interaction interface that requires too much time to understand which gestures adopt for navigating is frustrating by some participants!



## STIMULATION

...rated as positive on average...

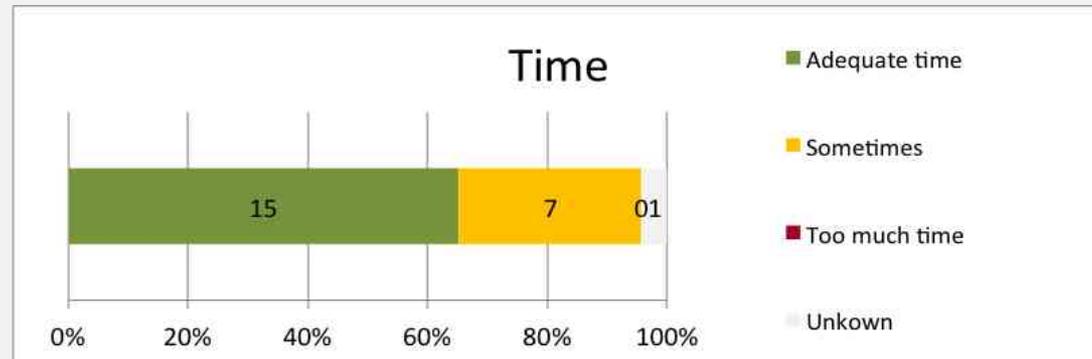
For **60%** of participants the natural interaction represented a totally new experience within the written survey. Within the interviews **80%** pointed out that it was a new experience for them to interact with such a "surrounding" installation.



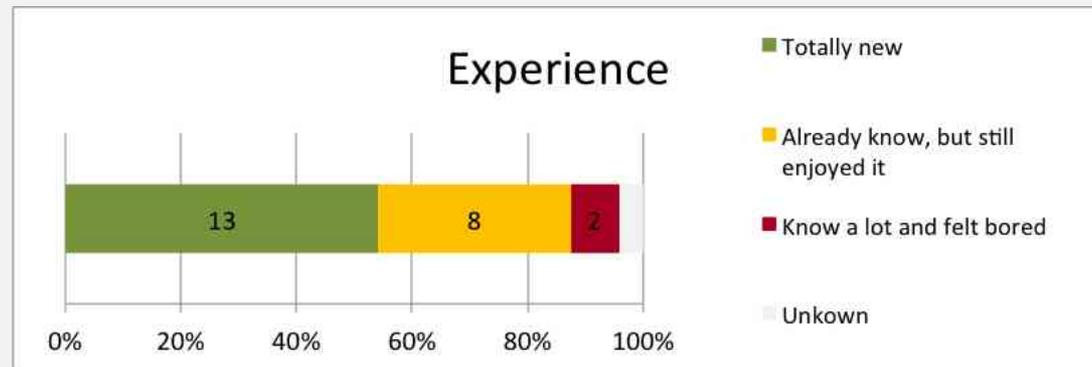
- ✧ The **type of interaction** was special
- ✧ The **immersive and natural** atmosphere was appreciated



EFFICIENCY



STIMULATION



# IMPROVEMENTS

## GESTURES

The intuitiveness of the gestures needs further investigations.

↳ It could be interesting to develop different sets of gestures for navigating and compare their intuitiveness within a usability test.

## TIPS FOR USER

The instructive part at the start hotspot of the application is welcomed by the users but contains too much text.

↳ It might be interesting to integrate demonstration videos instead of text.

## SELECTION MODE

The selection mode needs improvements as the users do not understand immediately what to do and it takes too much time for some persons to access an object.

- ↳
- When the menu is not available during walk mode, it might be good to blend it out or grey it out.
  - Another interesting option might be to remove the menu and let the user select an object by directly pointing at it inside the tomb.

# CONCLUSION



Etruscanning project supports a relatively high level of stimulation with its immersive environment and new way of interaction.



Gesture based interaction can be improved, also in accordance with the technological advancement of the sensors.



Etruscanning project won the First Award in the Natural Interaction category and the First Public Appreciation Award at Archeovirtual 2012.

