Interactive Systems in Cultural Heritage and Creative Industries

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NOVA-LINCS|| Computer Science Department
Faculdade de Ciências e Tecnologia
Universidade NOVA de Lisboa

ECSS 2017

Multimodal Systems

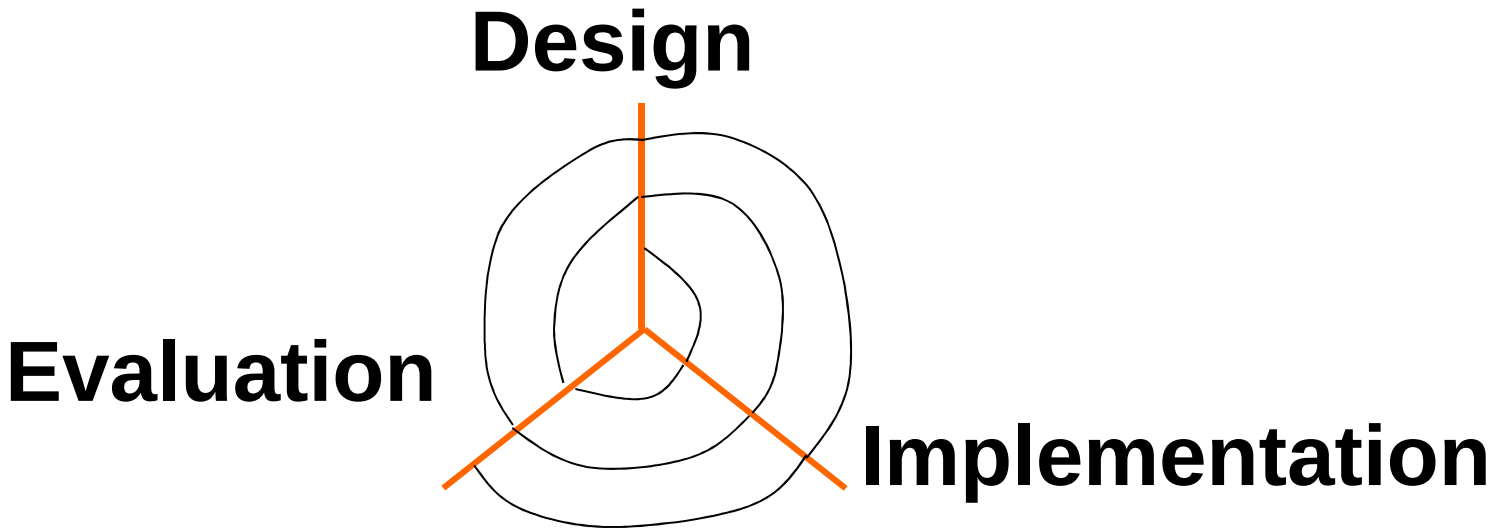
Part of **NOVA-LINCS** (NOVA Laboratory for Computer Science and Informatics)
Hosted by the Computer Science Department, FCT NOVA

Research in Interactive Multimedia
Research methods and tools to deal with the different aspects of **producing, describing, processing and presenting multimedia information**

Interactive systems, information processing, games, interactive art

NOVALINCS
LABORATORY FOR COMPUTER SCIENCE AND INFORMATICS

Iterative Design



Stories Everywhere

Narratives/Information Access

InStory supports a new form of narratives, that are navigable in space

Mobile storytelling, information access and gaming activities

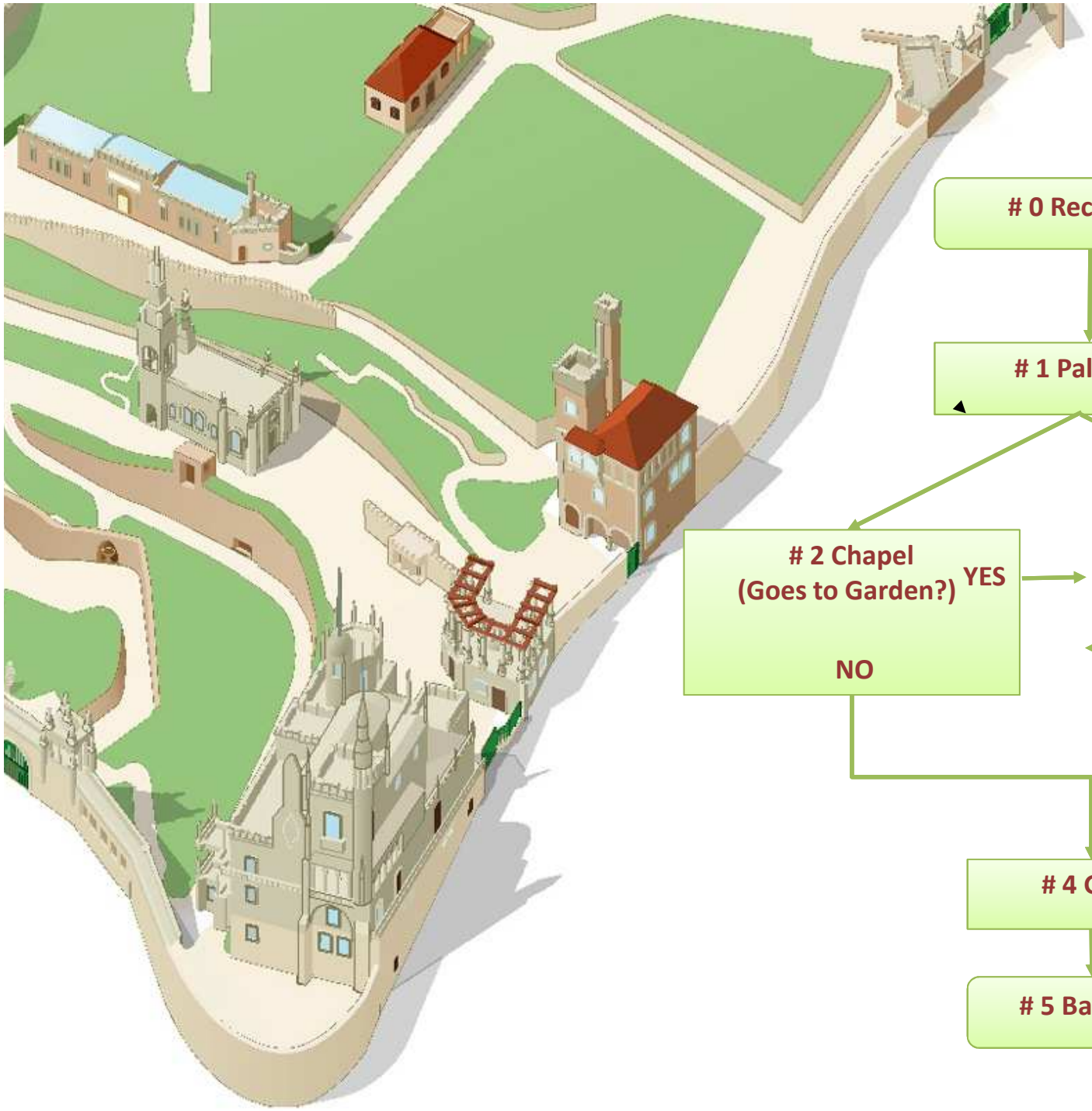
PDA, mobile phone, and Web interfaces

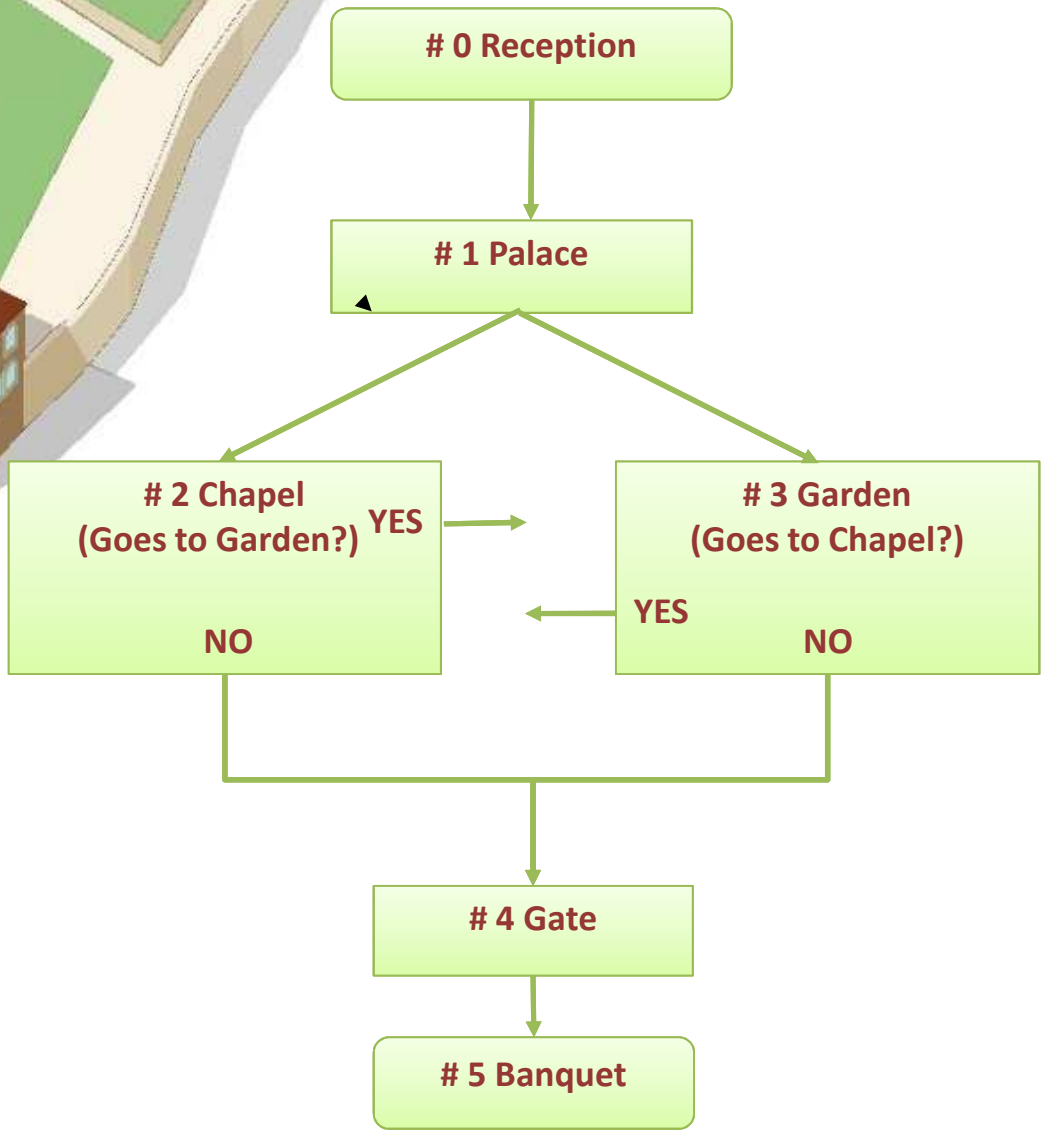
Interaction in the real world

Cultural heritage as an application area

MAPA
VOLTAR
Capela

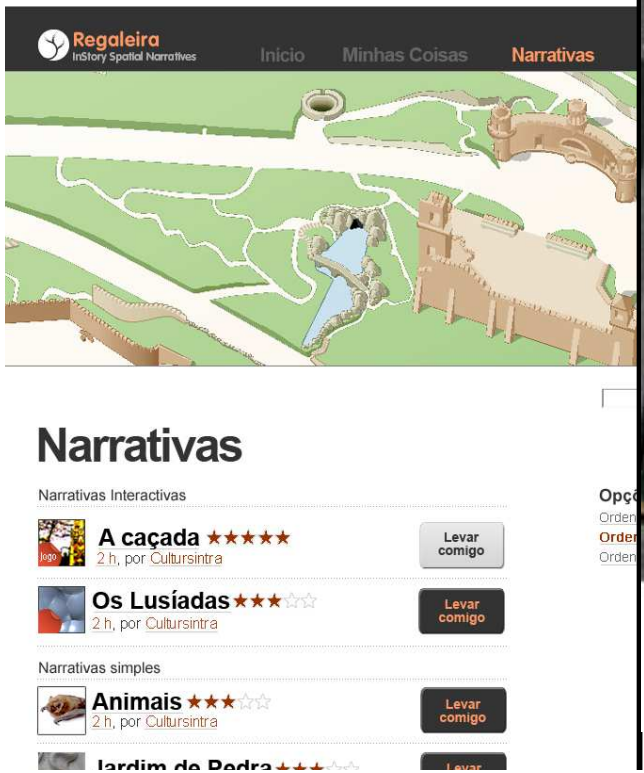
MAPA
VOLTAR




0 Reception
1 Palace
2 Chapel
(Goes to Garden?)
YES
NO
3 Garden
(Goes to Chapel?)
YES
NO
4 Gate
5 Banquet

Web

Retrieval, map, authoring, media sharing (community)



PDA

Location based narratives and information, map, media capture, annotation

Mobile Phone

Location based information, map, media capture

Interaction Devices

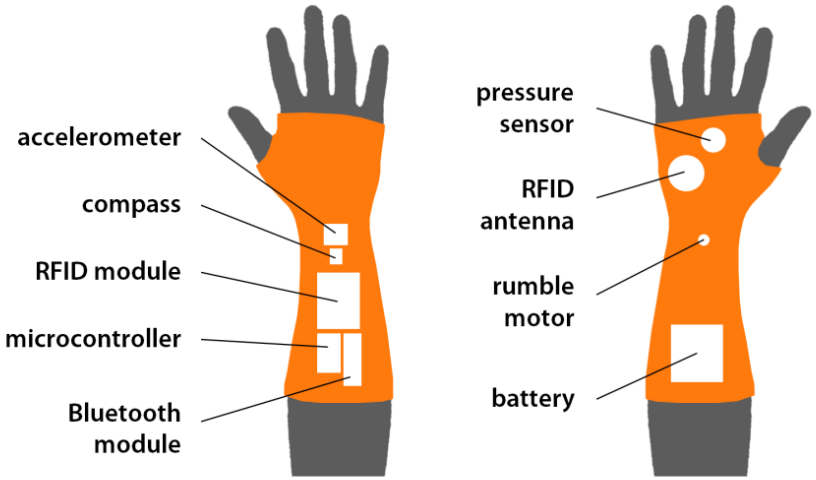
Gauntlet, a bracer embedded with sensors and actuators

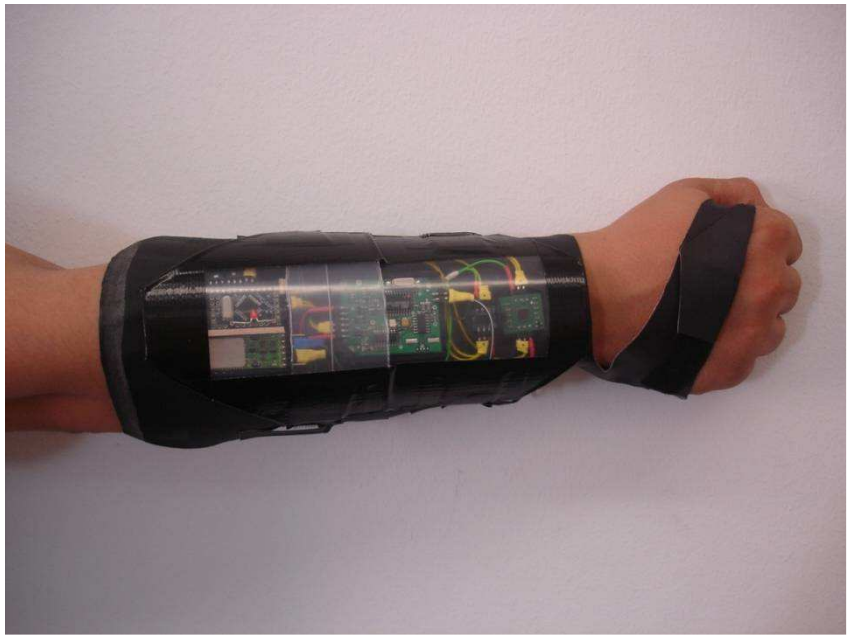
Object identification by RFID

Gesture recognition using accelerometer and compass

I/O device, Bluetooth serial port connection

Used in Noon, an interactive installation to explore object memories (sponsored by Nokia)



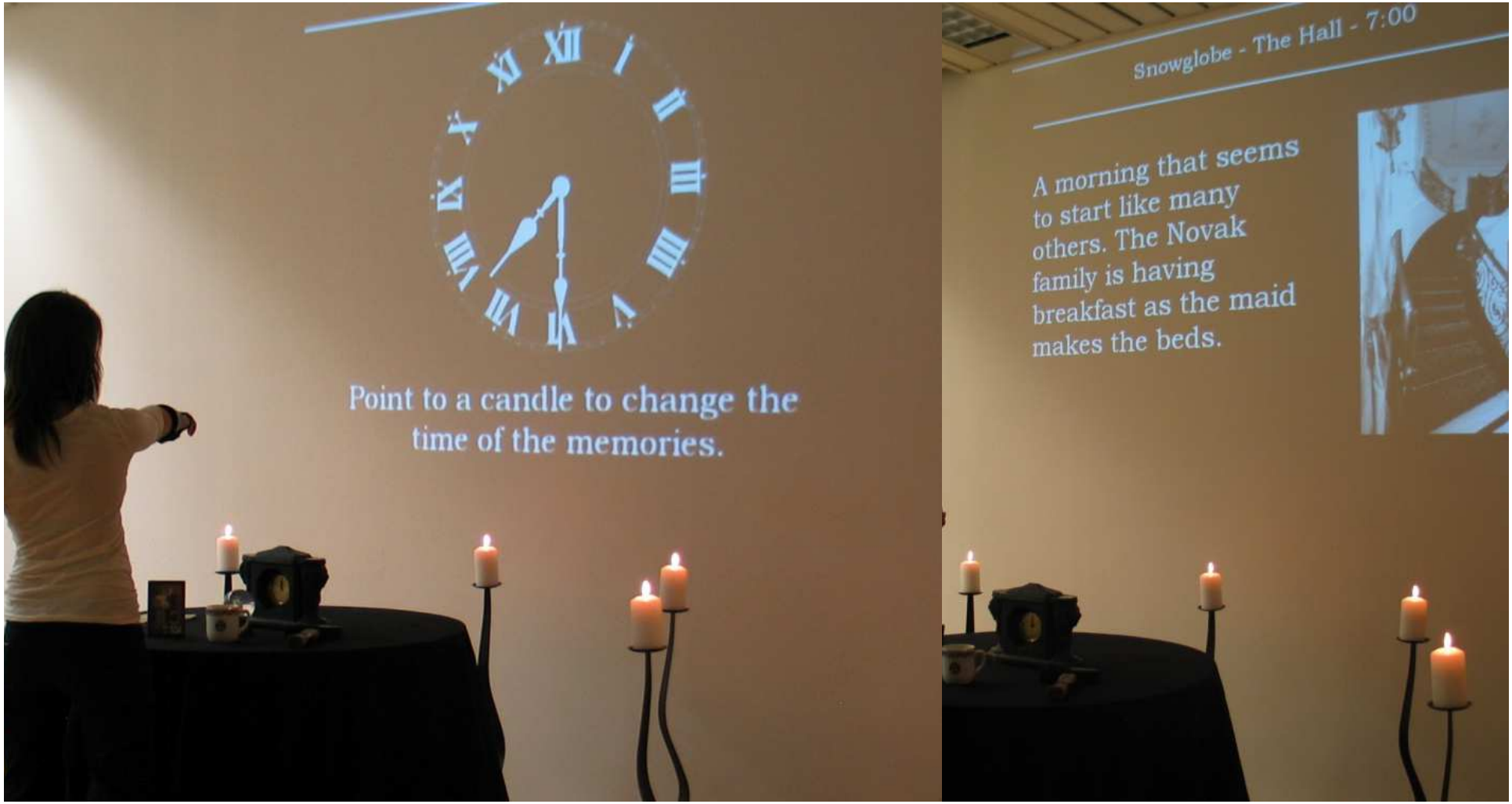


Interaction Devices

Noon

Noon – A Secret Told by Objects (Tiago Martins et al)
An investigation upon memories of old objects to uncover the answer to a mystery
Narrative-driven, exploratory, few gaming aspects

Noon


Point to a candle to change the time of the memories.
Snowglobe - The Hall - 7:00
A morning that seems to start like many others. The Novak family is having breakfast as the maid makes the beds.

Memories and Recalling

Personal and Shared Memories

Technological support for individual and collective memories

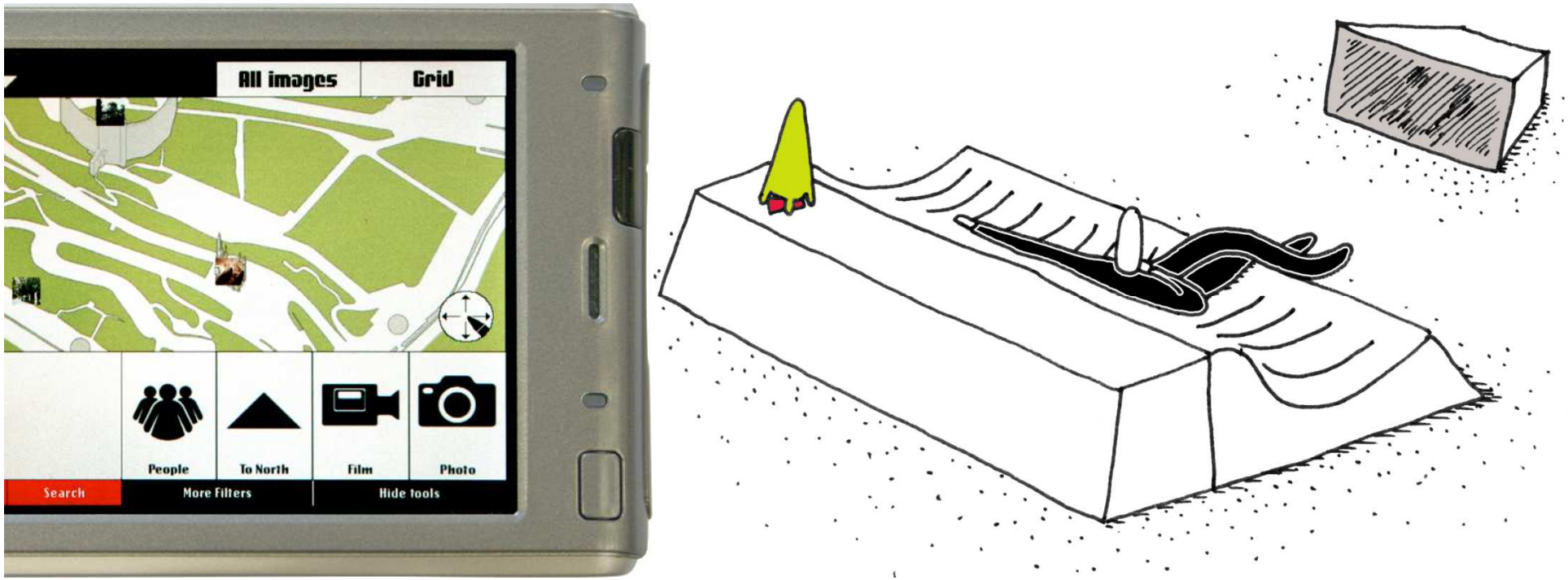
Annotation of multimedia information (authoring)

Storage, indexing, and classification of multimedia information

Multimedia information retrieval system

Multiple contexts of use

Multiple access interfaces



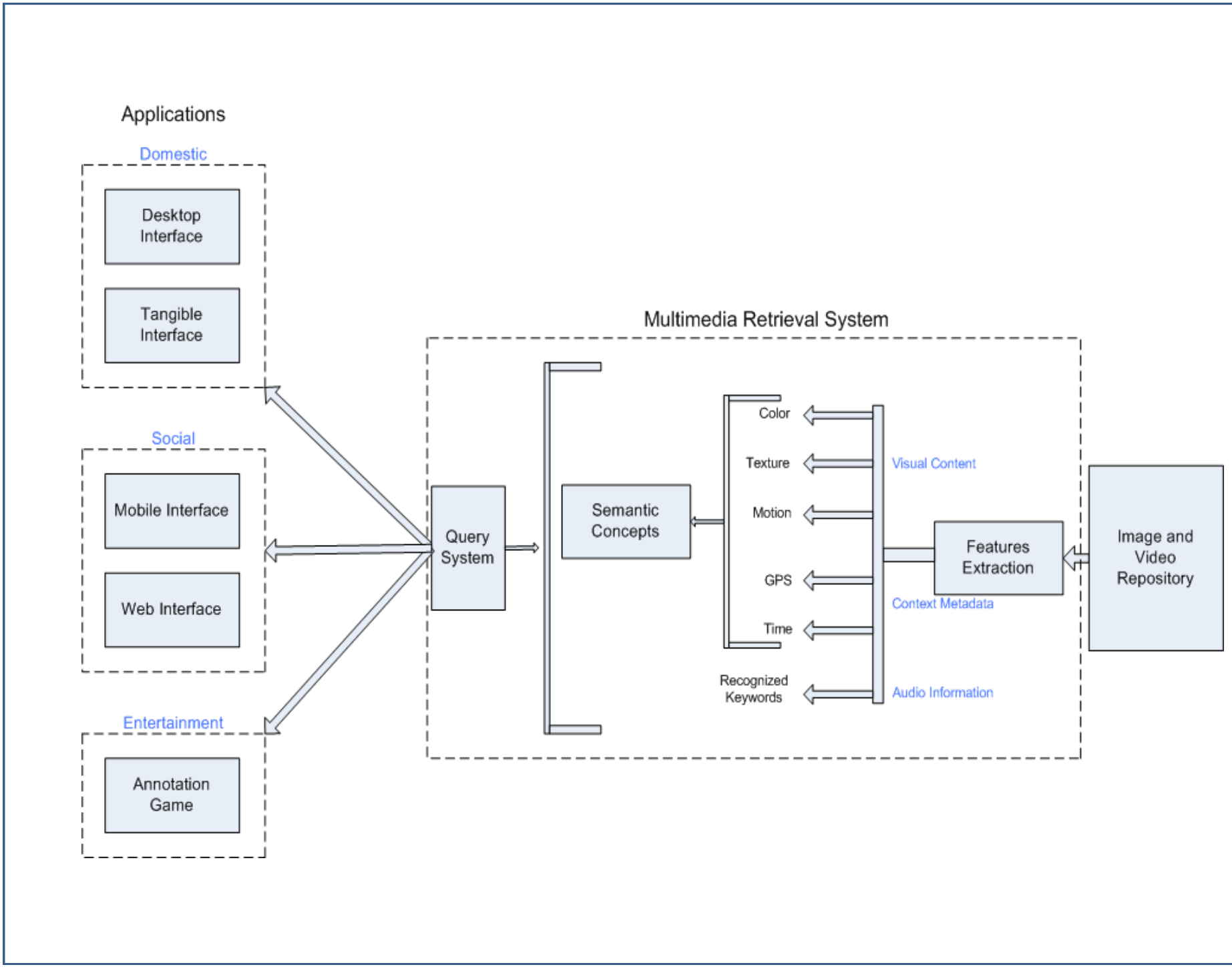
Project Memoria

Content based image and video search

Retrieval system using multimedia content and context features

Interfaces for multiple purposes (leisure, learning) and users

Annotation of the multimedia materials


Applications
Domestic
Desktop Interface
Tangible Interface
Social
Mobile Interface
Web Interface
Entertainment
Annotation Game
Multimedia Retrieval System
Query System
Semantic Concepts
Color
Texture
Motion
GPS
Time
Recognized Keywords
Visual Content
Context Metadata
Audio Information
Features Extraction
Image and Video Repository

Interface Design

User centered design
Participation of the potential users
Balance between technology and user expectations
Iterative process with multiple refinements
User evaluation

Interfaces

Desktop/PC

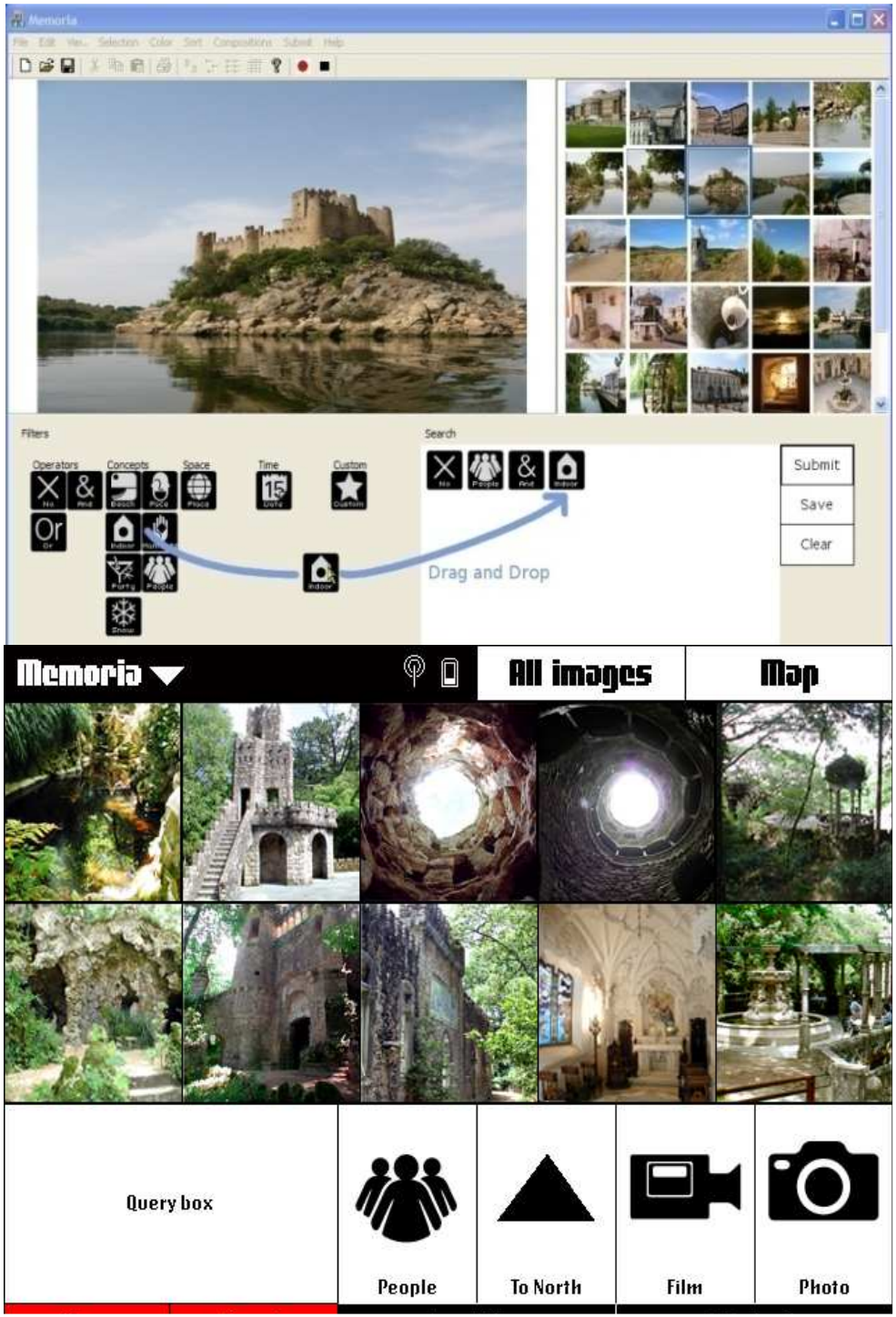
Powerful query language

Query by image (webcam) and parts of images

Mobile (PDA)

Uses content, location, and user annotations

Cultural heritage sites

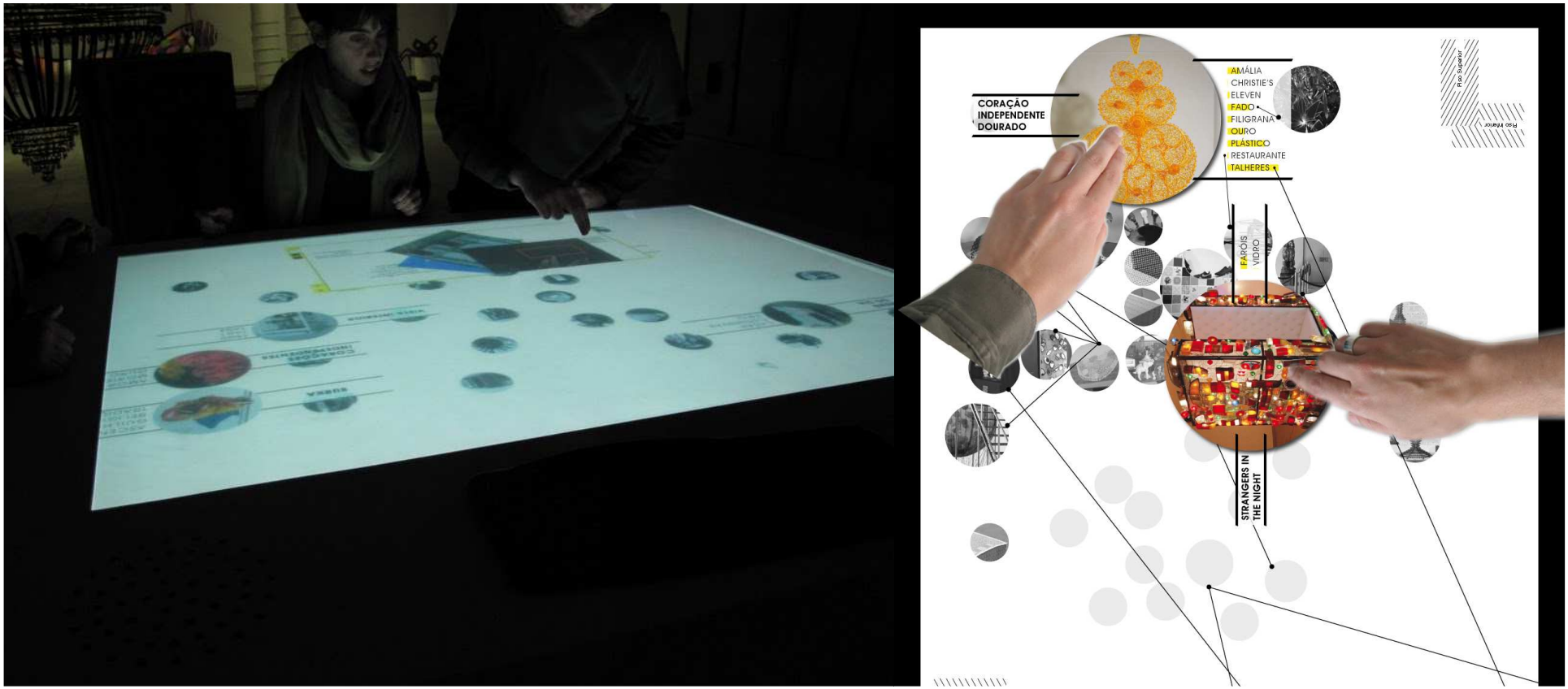


Touching Art

ArtTouch

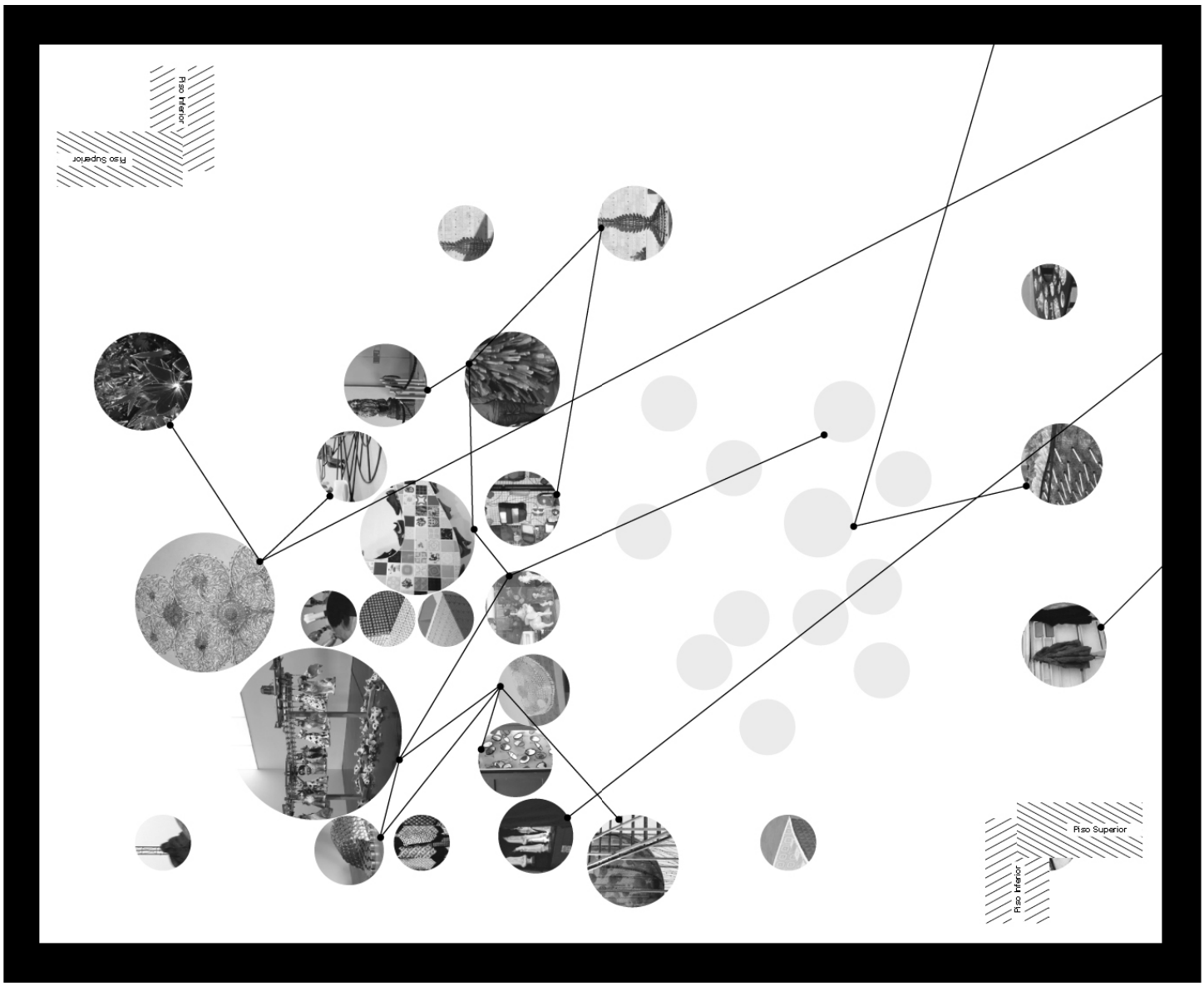
Multitouch interface to explore an art exhibition, collect data and foster public participation

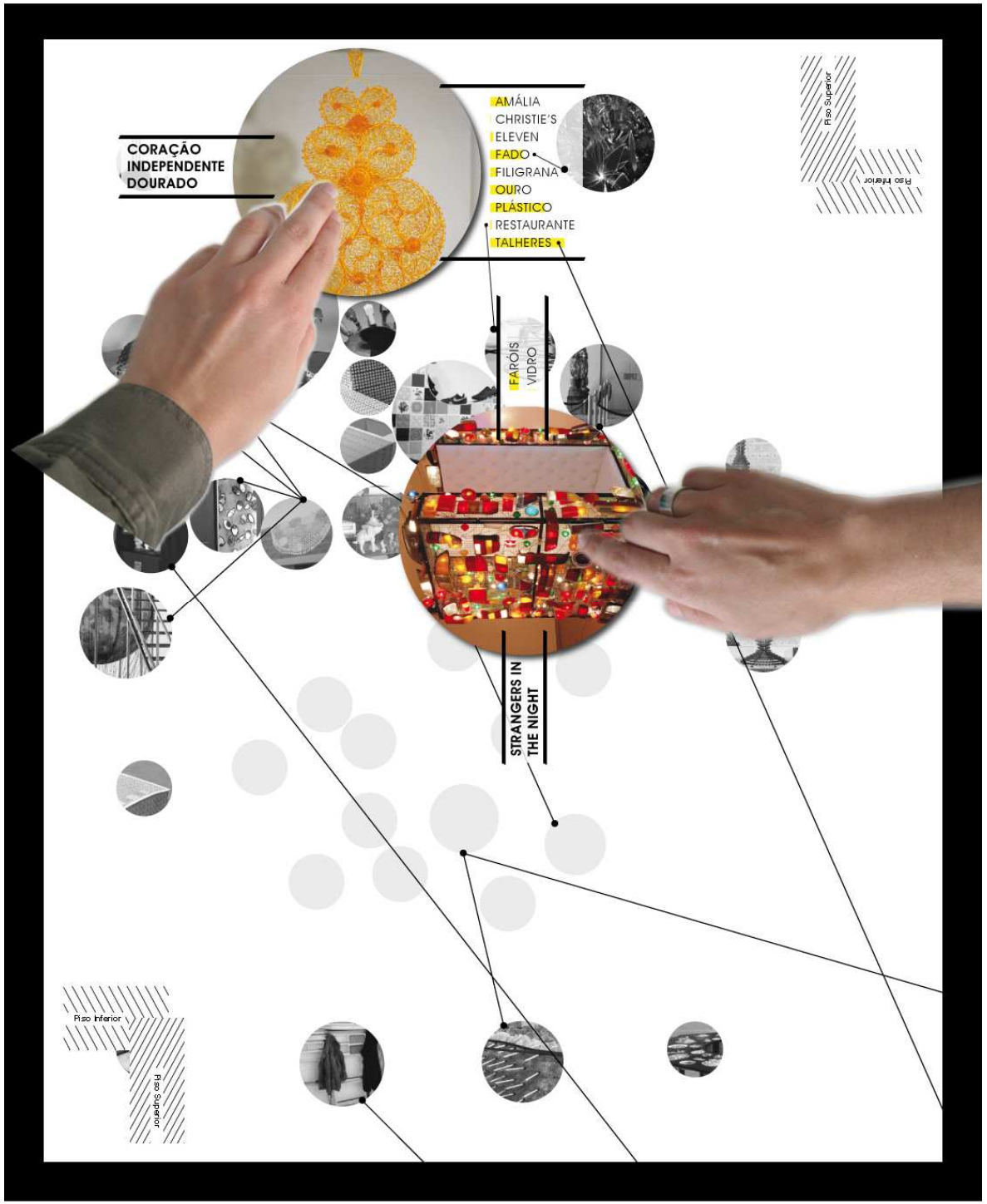
Berardo Museum – Joana Vasconcelos exhibition



Context

Large scale and high profile art exhibition
(>170000 visitors, about 1/3 used the table)
Artist Joana Vasconcelos (**joanavasconcelos.com**)
Museums as a natural laboratory
    Technology, interaction, social analysis
Technological artifact as a mediator
    Explore the collection
    Share and discuss
    Add meaning through tags


Piso Inferior
Piso Superior
Piso Superior
Piso Inferior


CORAÇÃO
INDEPENDENTE
DOURADO
AMÁLIA
CHRISTIE'S
ELEVEN
FADO
FILIGRANA
OURO
PLÁSTICO
RESTAURANTE
TALHERES
Piso Superior
Piso Inferior
FARÓIS
VIDRO
STRANGERS IN
THE NIGHT
Piso Inferior
Piso Superior

Revisiting the Past

1957 Modern Art Exhibition

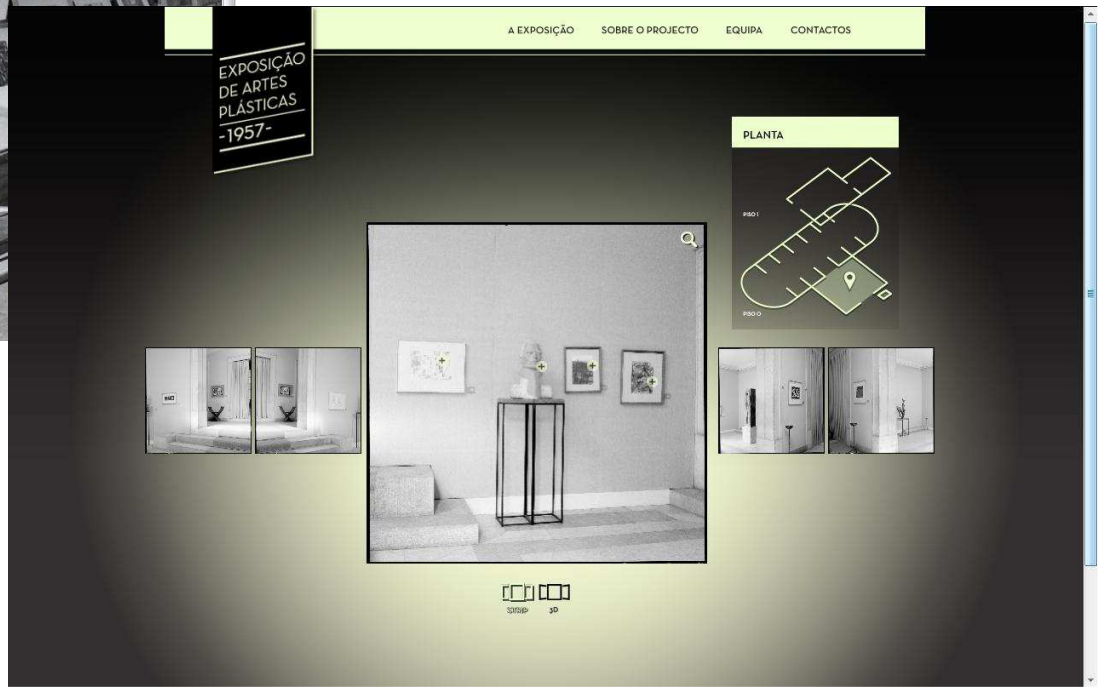
Recreate one of the first modern art exhibitions in Portugal
Uses the archive photos from Calouste Gulbenkian Foundation

Virtual visit based on photos and video

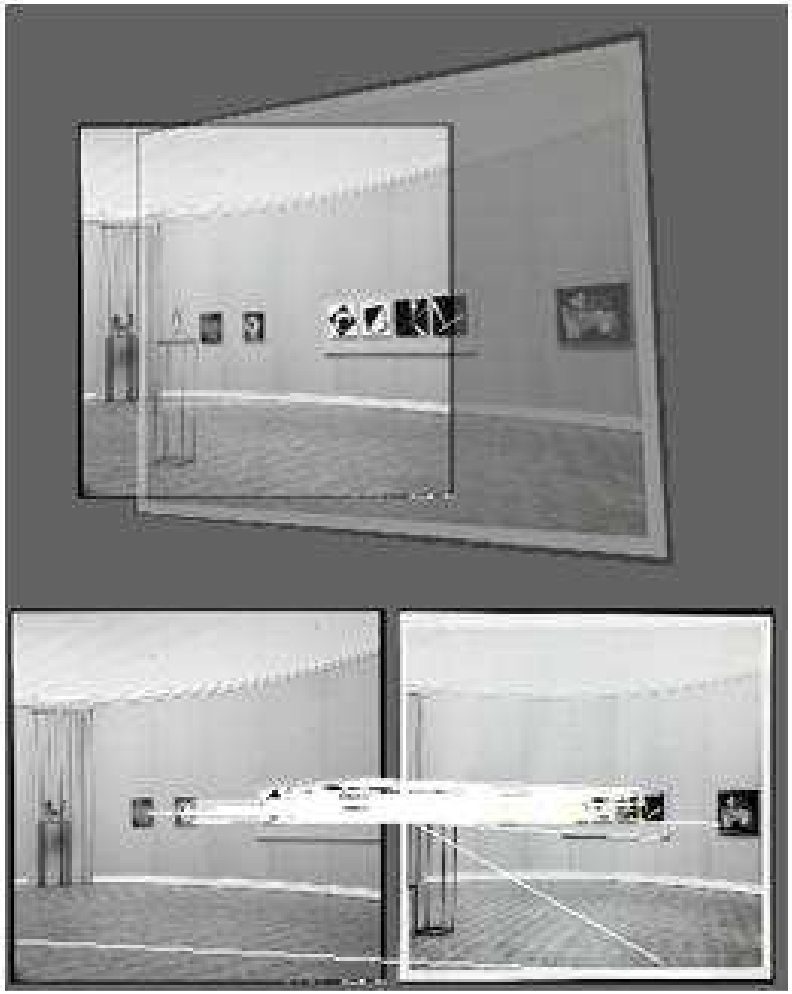
Space reconstruction through
photo-stitching and multi-view stereo

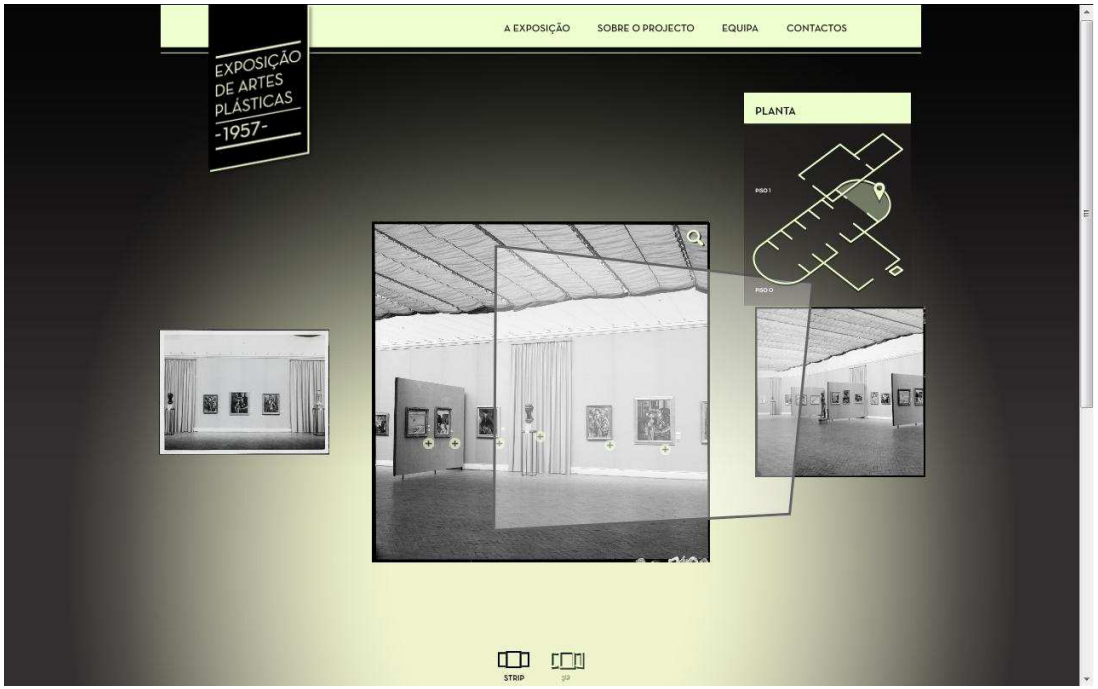
Partnerships:
Art History Institute (FCSH/UNL)
Calouste Gulbenkian Foundation

1957 Modern Art Exhibition



1957 Modern Art Exhibition





LX Conventos

LXConventos

Funded project on urban space
With Instituto de História da Arte, FCSH NOVA and CML

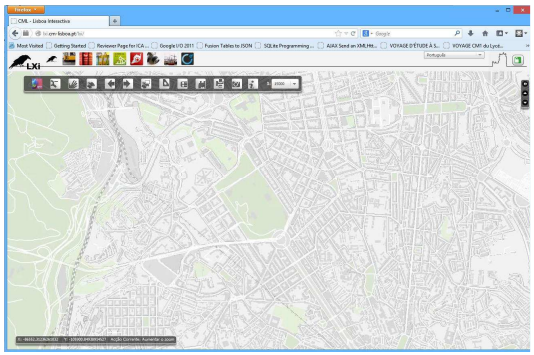
Tool for establishing relations among images (Evolapse)

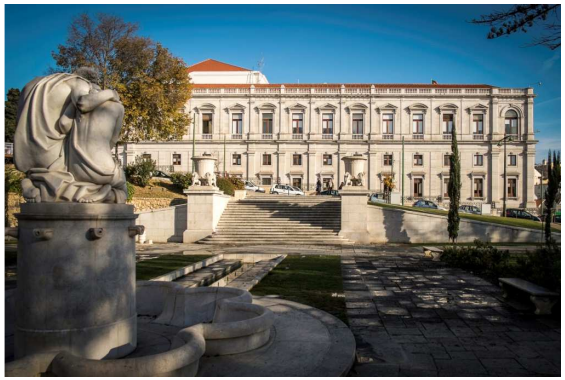
Resources

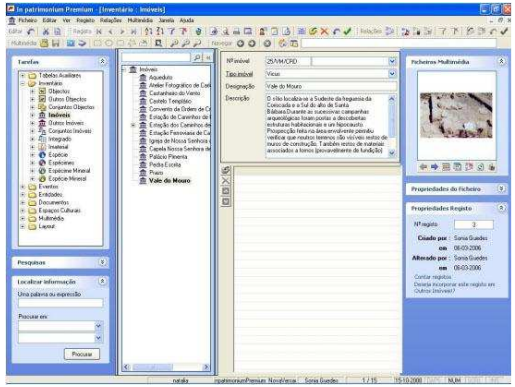
Historical cartography (1650-1950)

Photos (past and current)

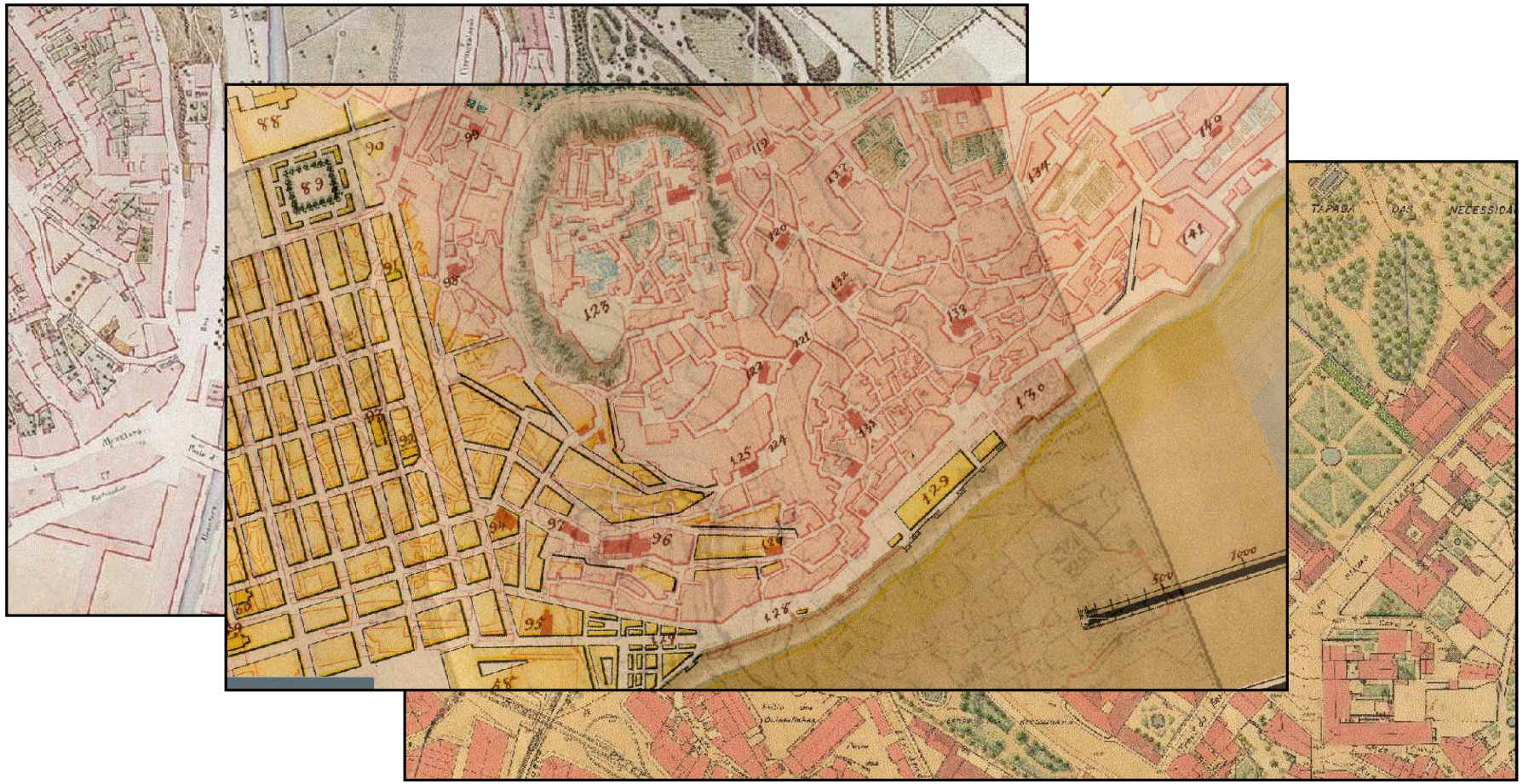
Existing databases (In patrimonium and LXi)







Historical Cartography

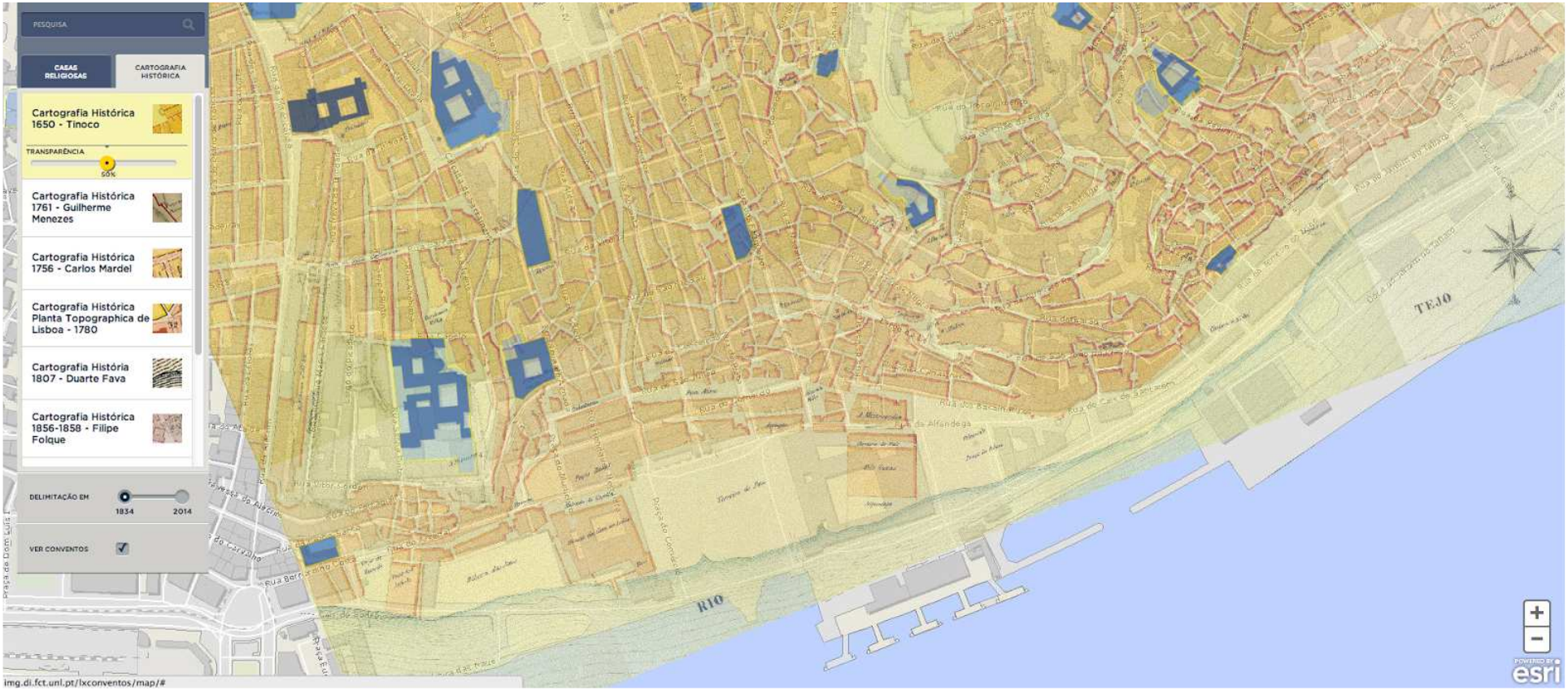


Images

S. Bento

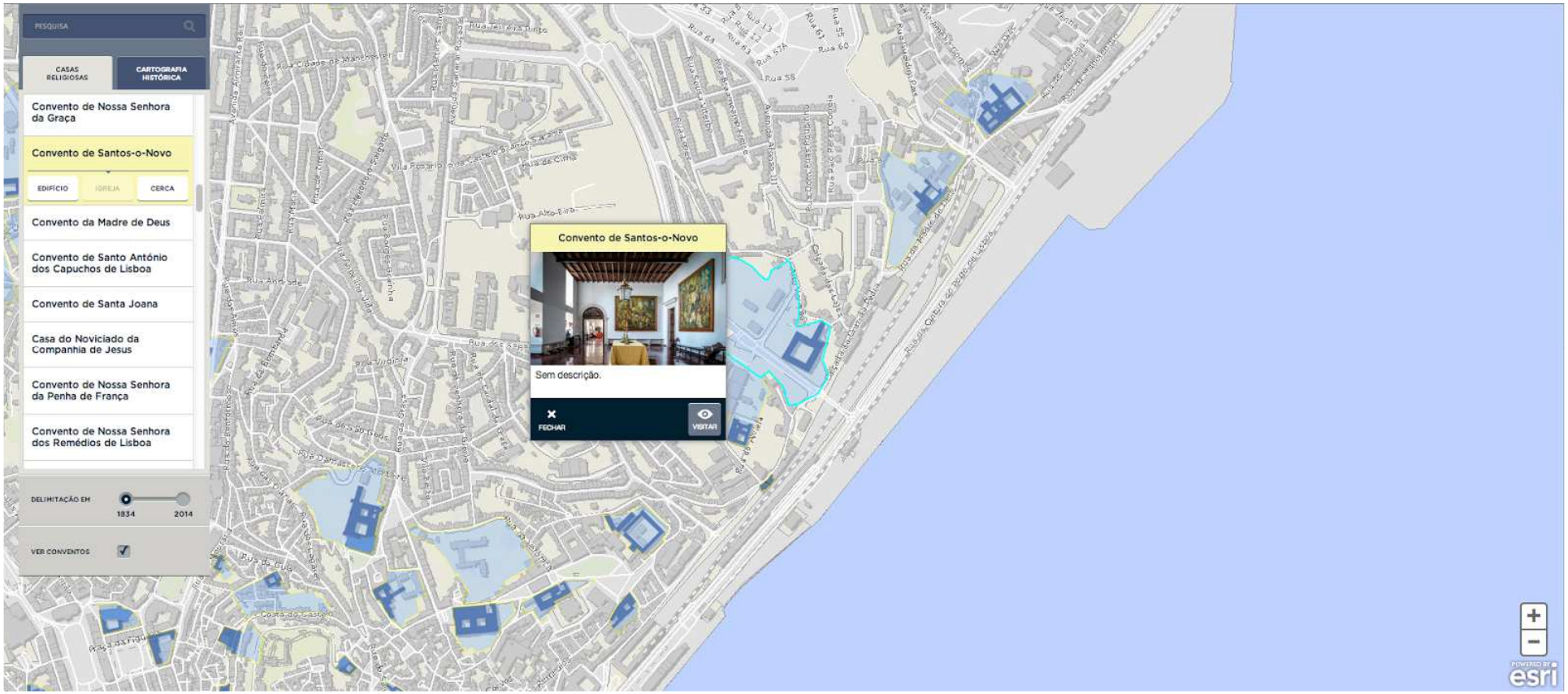
Platform

Cartography from 1650 over current map



Platform

Religious houses

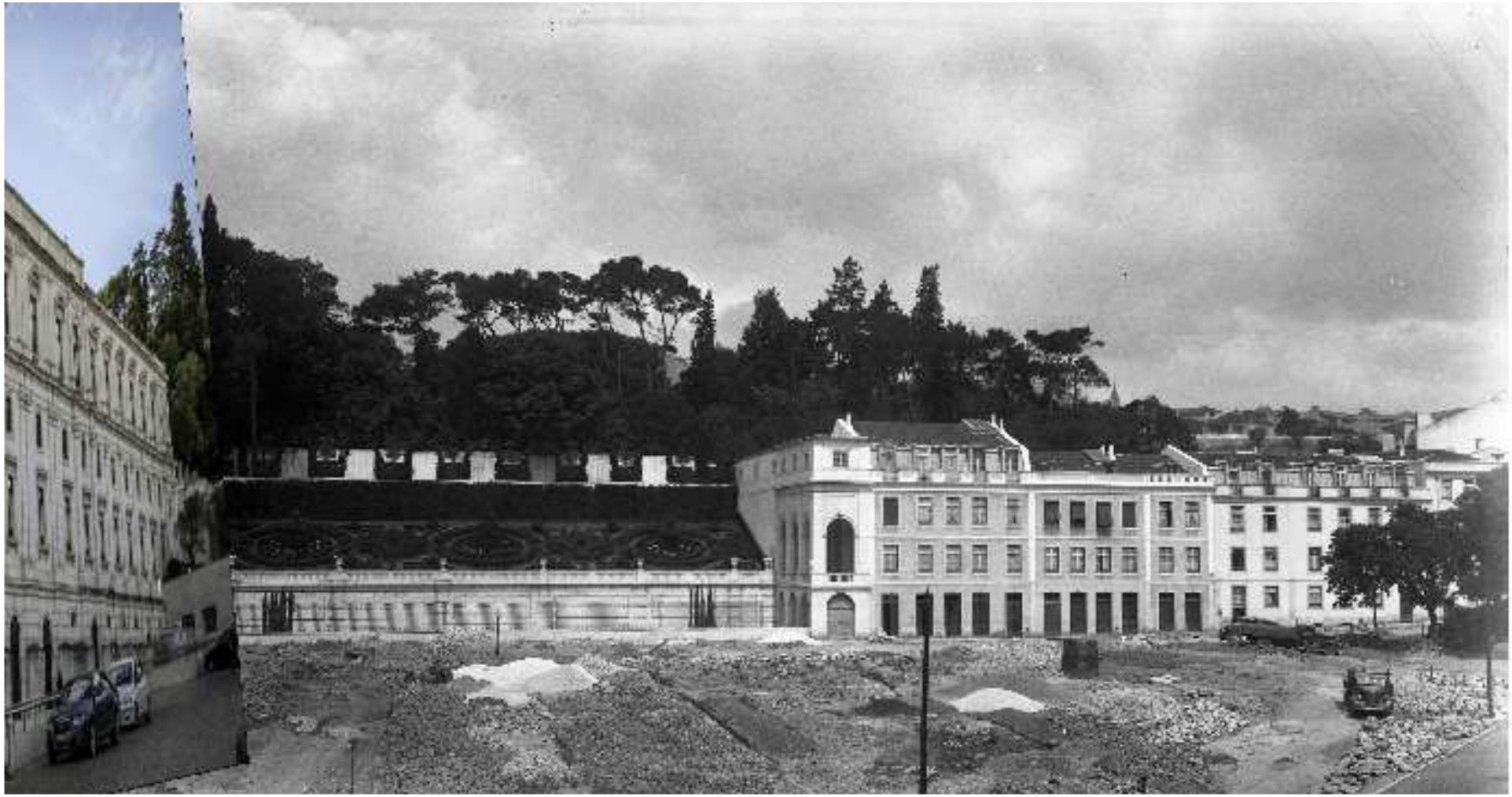


Evolapse

Establish and edit relations amog images of diferent periods
Generate external representations (2D-3D, video) that can be used in other contexts such as websites

Evolapse

Results (1943 + 2013 images)



Contemporary Dance

TKB – Video Annotation

Funded project on video annotation

Contemporary dance

With FCSH NOVA (PI: Carla Fernandes

Contributed to an **ERC grant - BlackBox**

Several tools:

- Motion analysis
- **Video annotation**
- **Sketching over live video**
- Web archive

TKB Project

Creation Tool: Video Annotation

- Text, Images
- Pre-defined marks (e.g, sound, light)
- Pen based annotation on video
- Motion tracking

Web Archive for Contemporary Dance

- Video based
- Uses annotations to organize materials

Research Goals

Explore possibilities of live video for **interaction**, learning and content augmentation

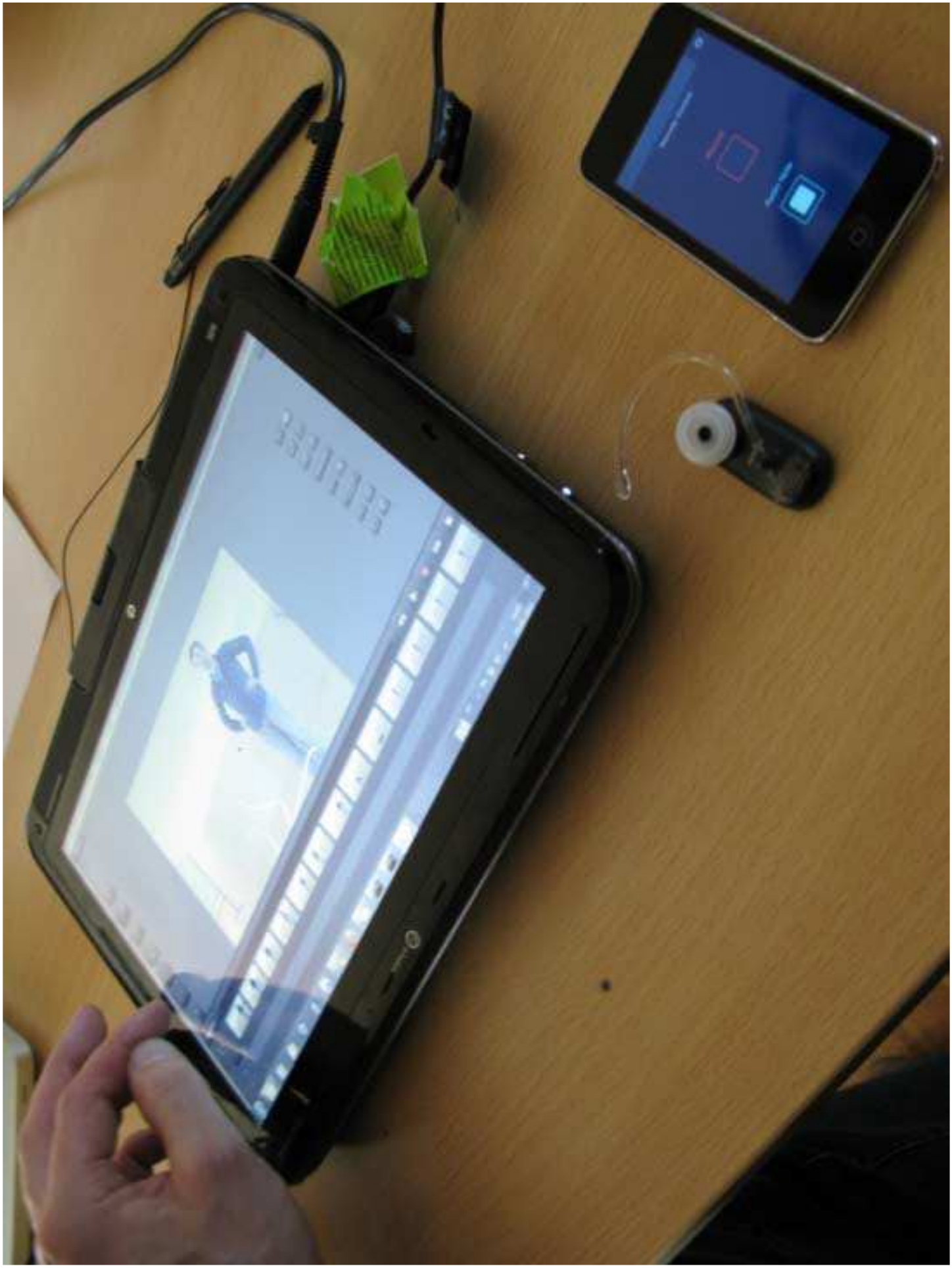
Research on **natural pen based interaction** for temporal media

Several techniques developed in the TKB Project:

Video annotation
Sketching over live video
Motion analysis

Creation Tool

Web archive



Annotation Modalities

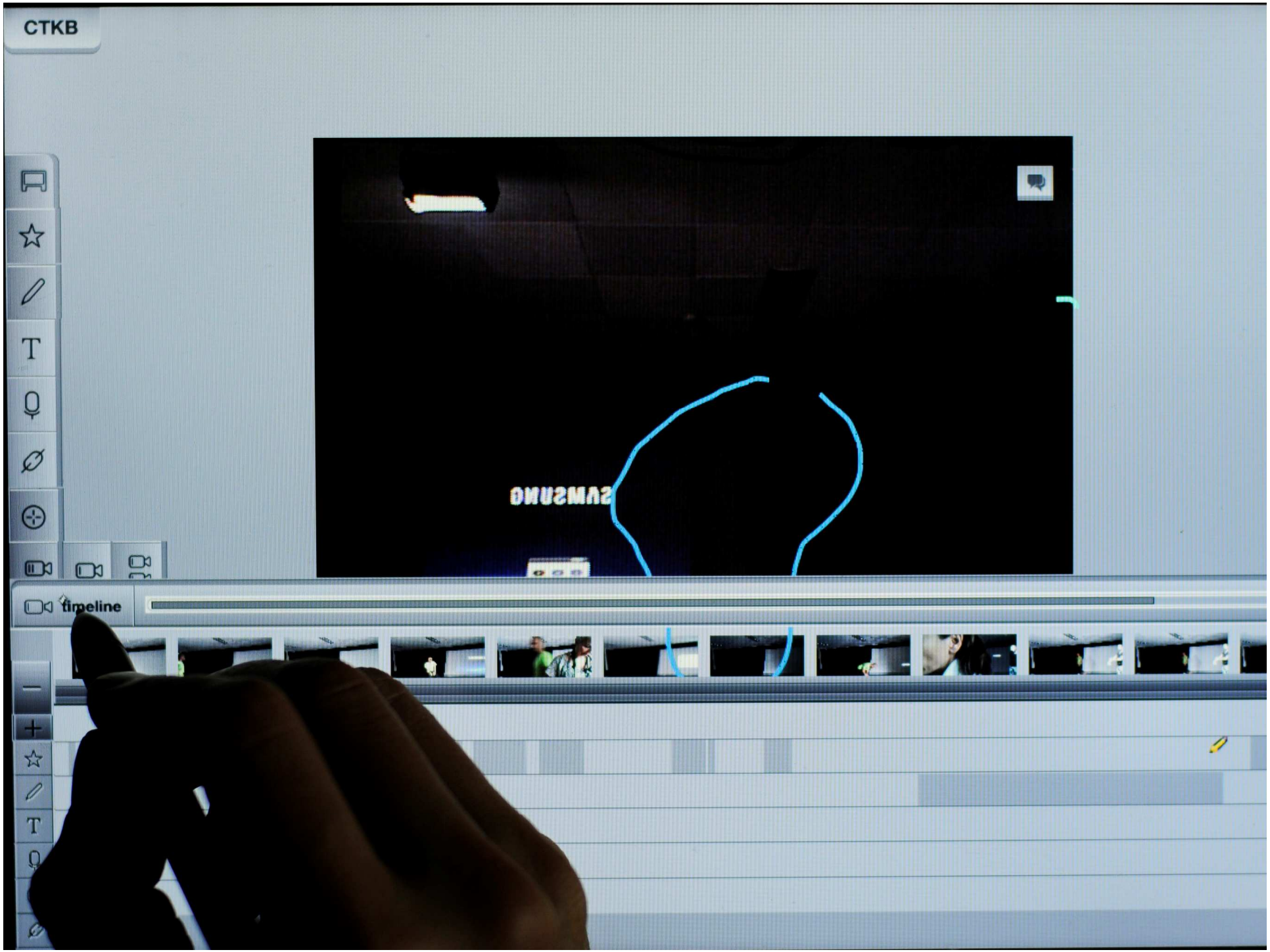
Annotation marks: concepts defined by the user and represented by a keyword and an icon.

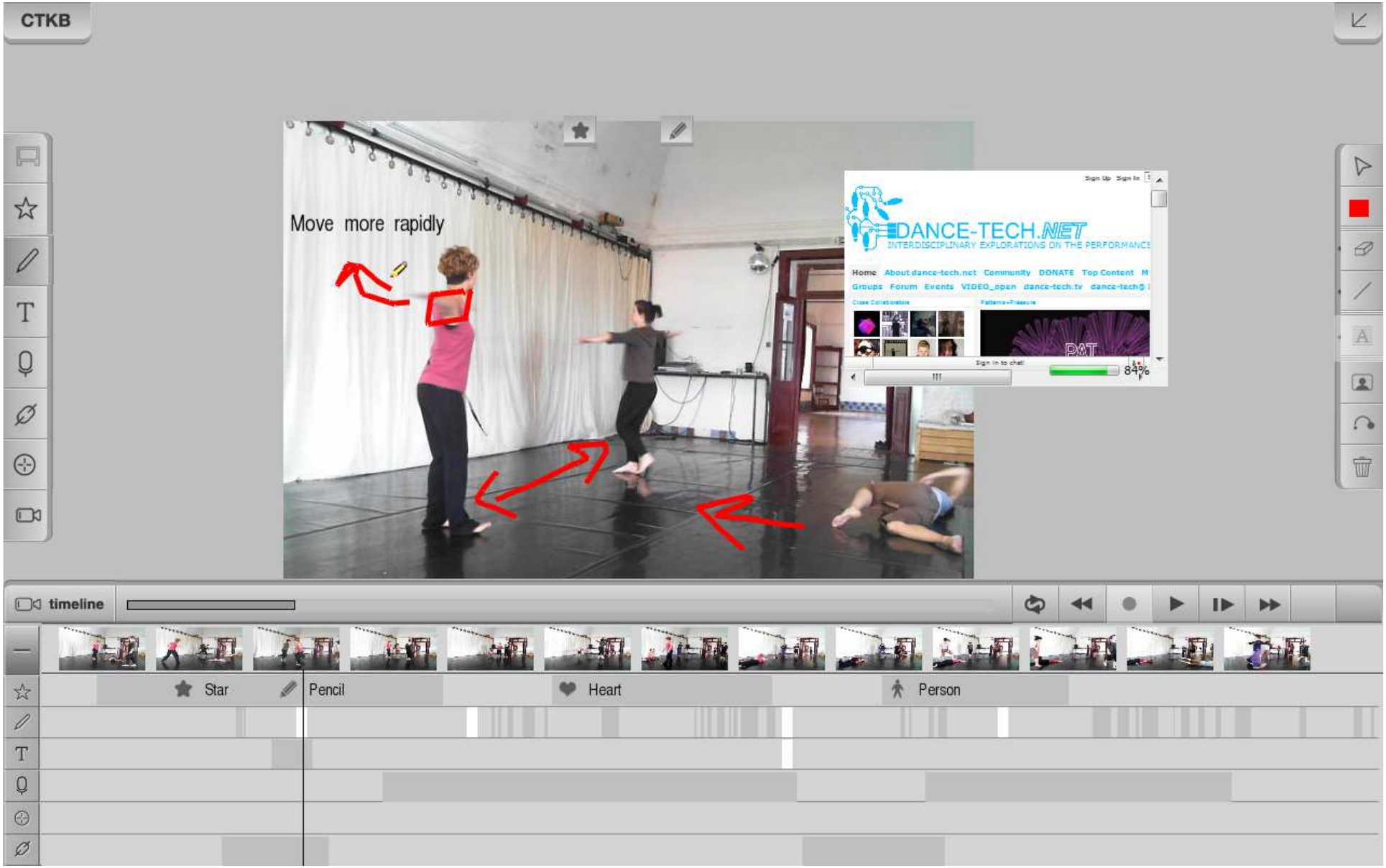
Audio: microphone records voice annotations.

Text: using a physical keyboard or a virtual keyboard.

Ink strokes: sketching over a video stream.

Hyperlinks: local and external. The local links are other documents owned by the user. The external links are Web sites defined by a URL.


CTKB
timeline


CTKB
Move more rapidly
DANCE-TECH.NET
INTERDISCIPLINARY EXPLORATIONS ON THE PERFORMANCE
Home
About dance-tech.net
Community
DONATE
Top Content
Groups
Forum
Events
VIDEO_open
dance-tech.tv
84%
timeline
Star
Pencil
Heart
Person

Design Process

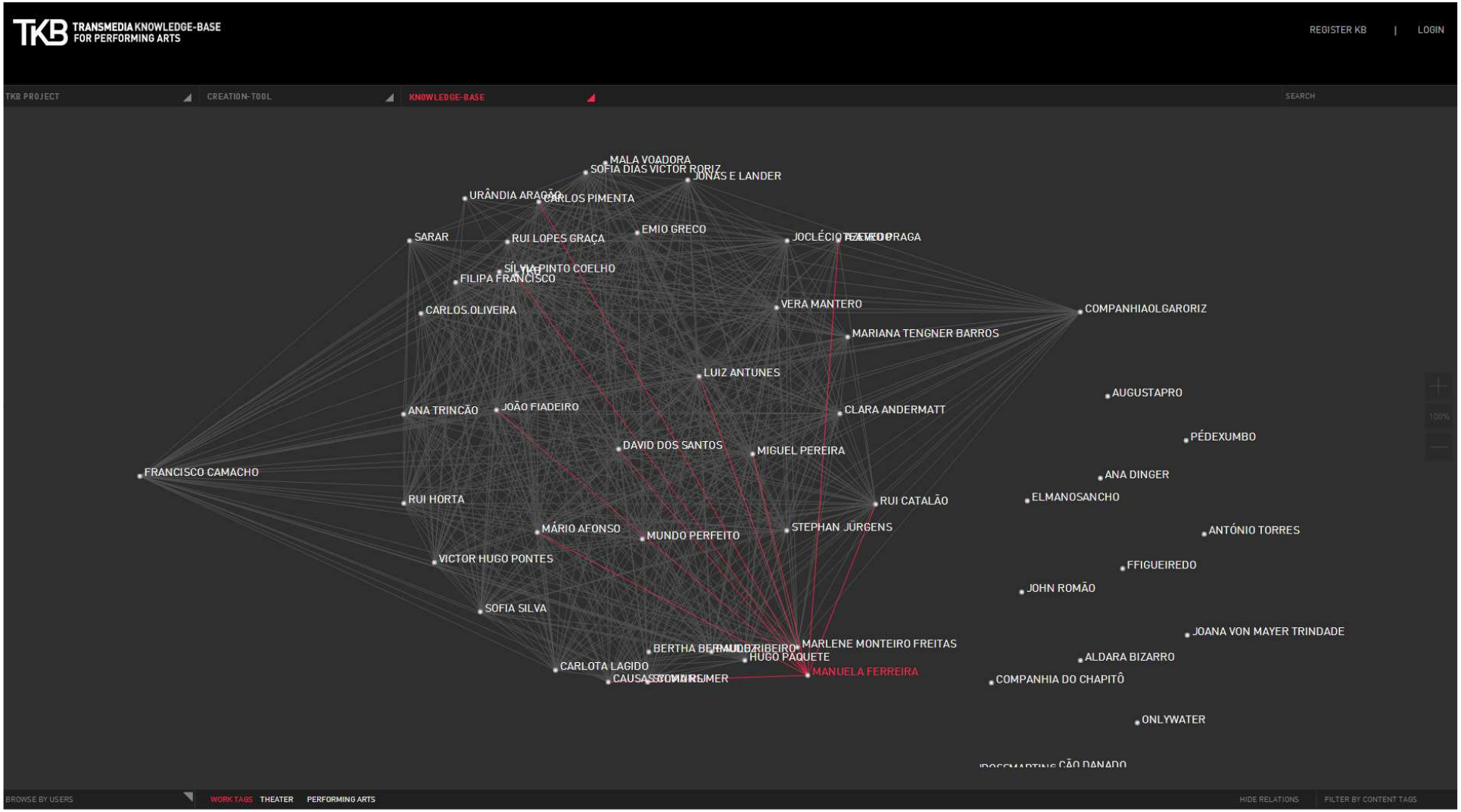
An iterative process: two choreographers were involved from the beginning.

Additional input from dancers and dance technology experts: in a one-week residence-lab workshop and during the development process.

Usability, user-friendly design and the ability to categorize the information into a coherent structure were main concerns.

With Prof. Carla Fernandes,
FCSH/UNL

Dance Knowledge Base



Video Quality Assessment

COGNITUS

Converging Broadcast and User Generated Content for Interactive Ultra-High Definition Services

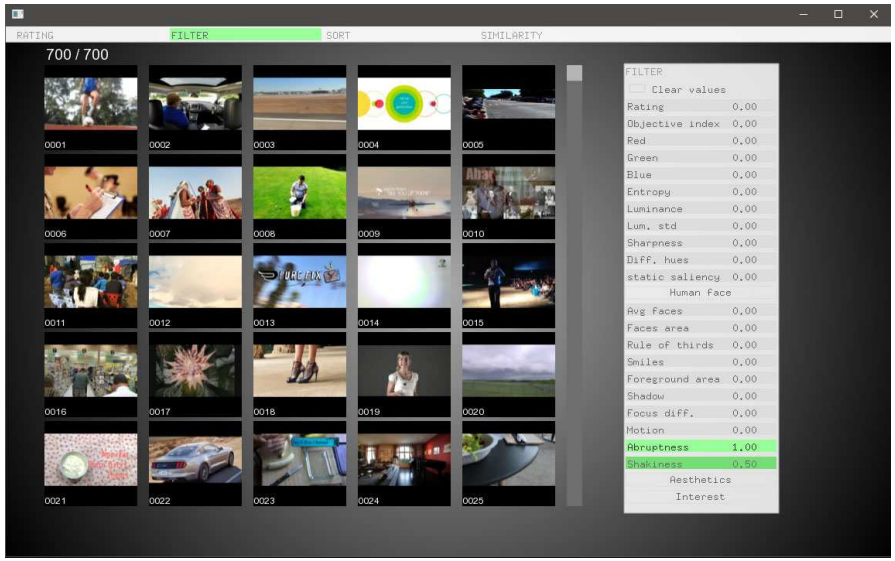
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687605.

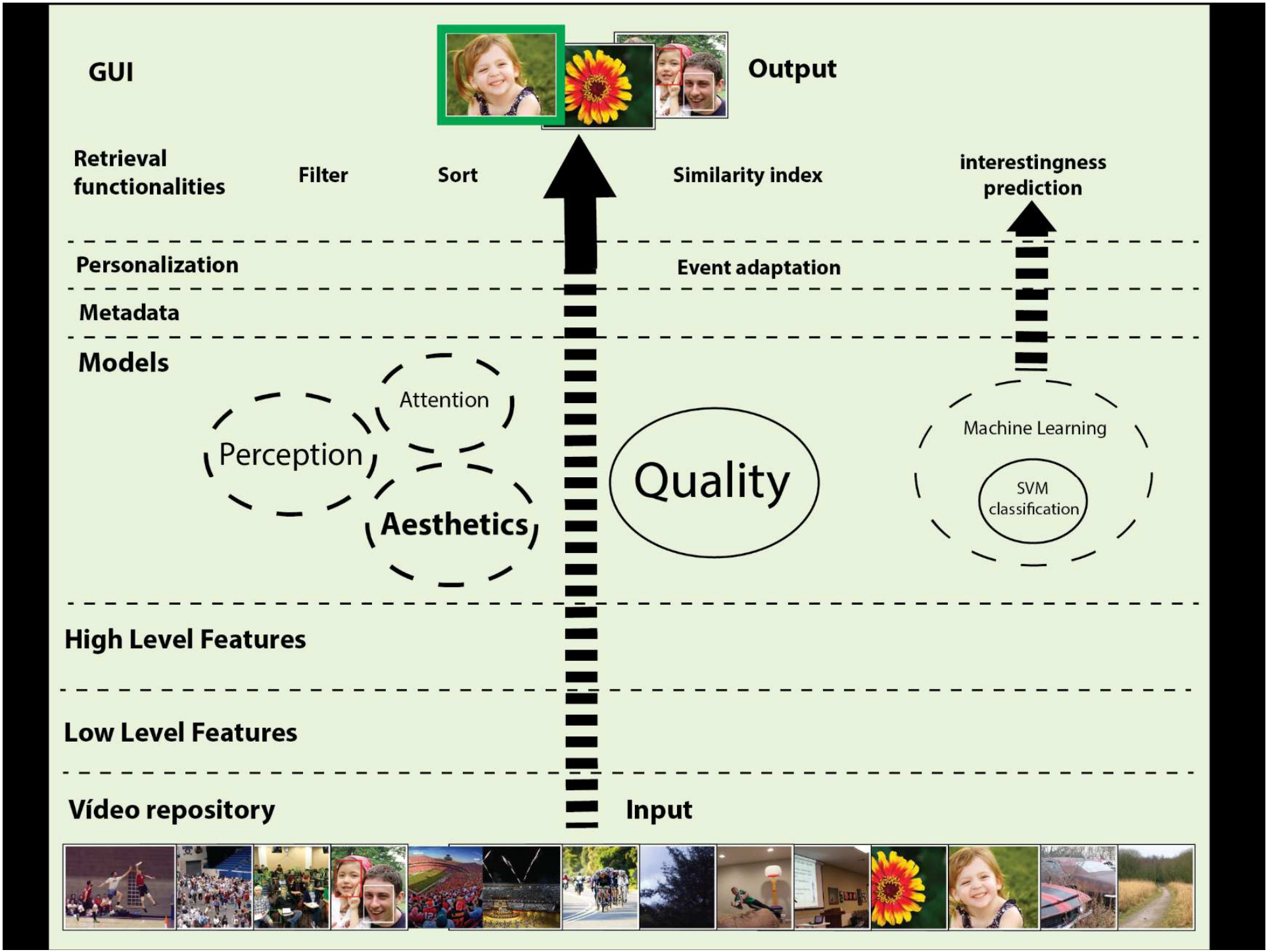
Semi Automatic Video Assessment

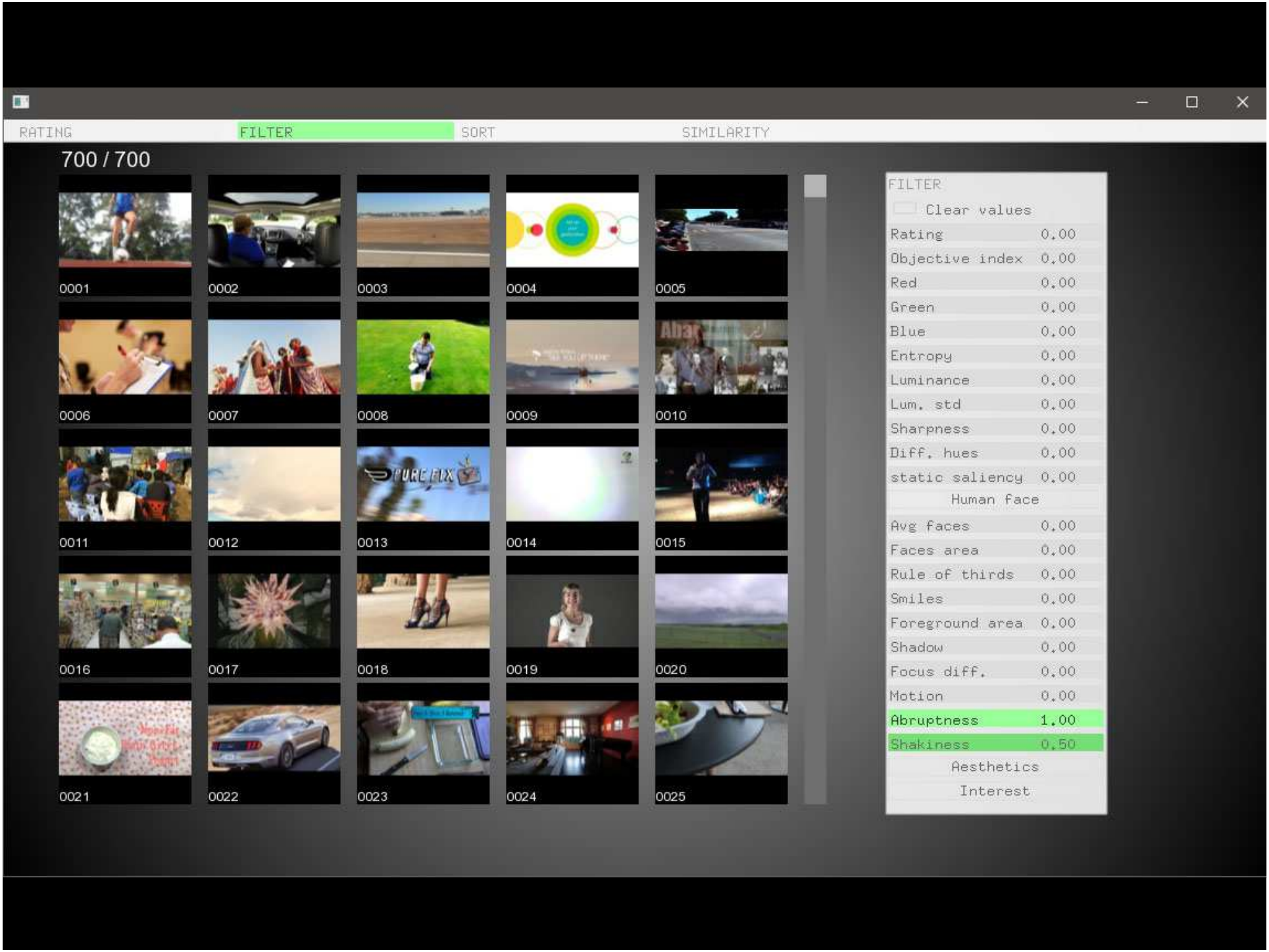
User generated content (e.g., music festivals)

Content filtering based on perception and attention

Human in the loop approach




GUI
Output
Retrieval functionalities
Filter
Sort
Similarity index
interestingness prediction
Personalization
Event adaptation
Metadata
Models
Attention
Perception
Aesthetics
Quality
Machine Learning
SVM classification
High Level Features
Low Level Features
Vídeo repository
Input


RATING
FILTER
SORT
SIMILARITY
700 / 700
0001
0002
0003
0004
0005
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0011
0012
0013
0014
0015
0016
0017
0018
0019
0020
0021
0022
0023
0024
0025
FILTER
Clear values
Rating 0.00
Objective index 0.00
Red 0.00
Green 0.00
Blue 0.00
Entropy 0.00
Luminance 0.00
Lum. std 0.00
Sharpness 0.00
Diff. hues 0.00
static saliency 0.00
Human face
Avg faces 0.00
Faces area 0.00
Rule of thirds 0.00
Smiles 0.00
Foreground area 0.00
Shadow 0.00
Focus diff. 0.00
Motion 0.00
Abruptness 1.00
Shakiness 0.50
Aesthetics
Interest

Contributions

André Sabino, Armanda Rodrigues, Diogo Cabral, João Magalhães, Nuno Correia, Ricardo Dias, Ricardo Noguês, Rossana Santos, Rui Jesus, Rui Madeira, Rui Nóbrega, Rute Frias, Sofia Cavaco, Sofia Reis, Tarquínio Mota, Teresa Romão, Tiago Amorim, Tiago Martins, …

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