Interactive Multimedia and Multimodal Systems

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http://img.di.fct.unl.pt

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IMG – Interactive Multimedia Group

Part of CITI (Center for Informatics and Information Technology) funded by FCT/MCTES
Hosted by the Computer Science Department, FCT/UNL
Multimodal Systems (other areas are Computer Systems and Software Principles and Methods)

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

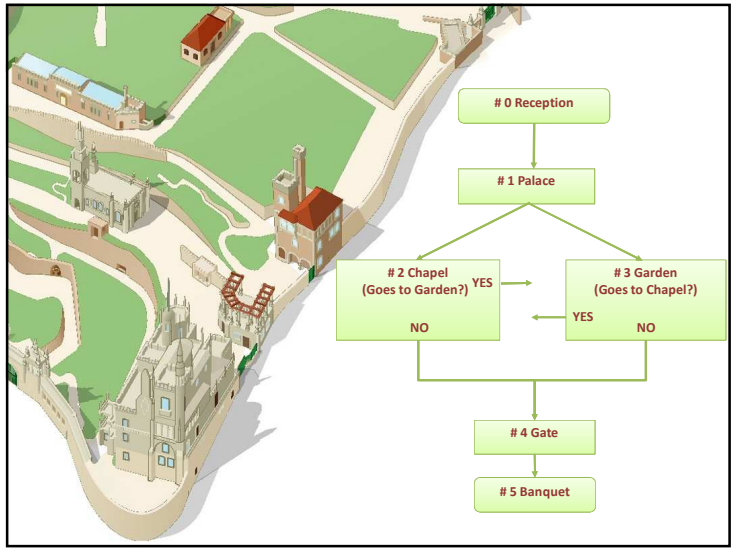
Stories Everywhere

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

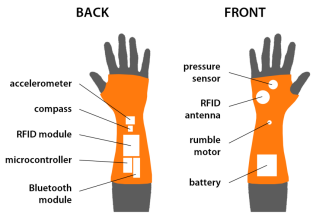
Mobile Phone
Location based information, map, media capture

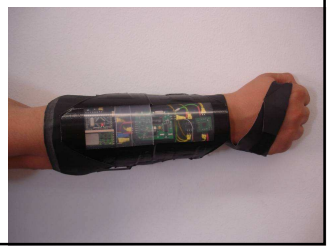
Wolves & Sheep

A GPS-driven location-based game
An experiment in: GPS accuracy, navigational constraints, sound-based gameplay, audience participation
Main author: Tiago Martins

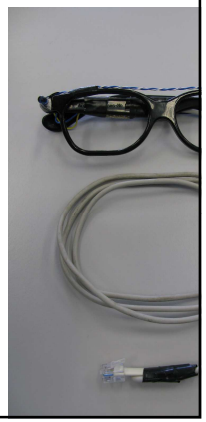
Interaction Devices

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

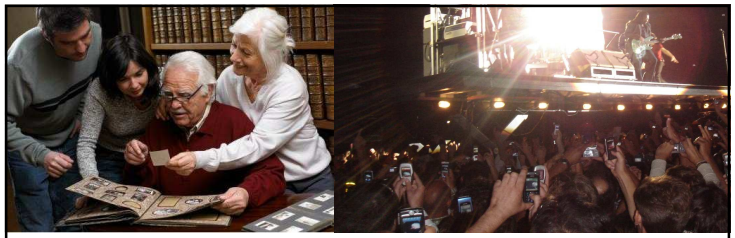


Noon

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

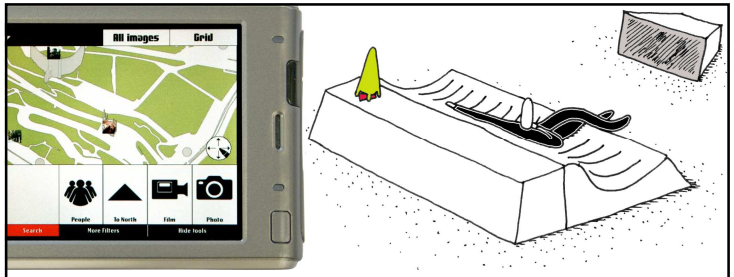
Noon

Memories and Recalling



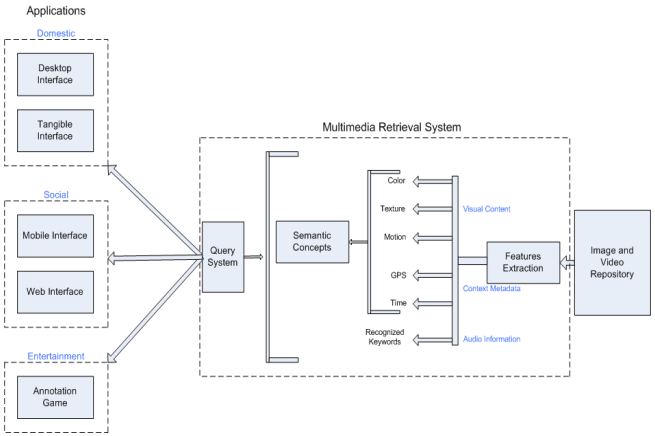
Personal and Shared Memories

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



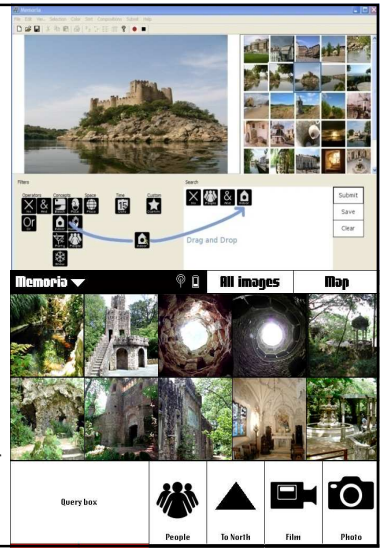
Interface Design

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

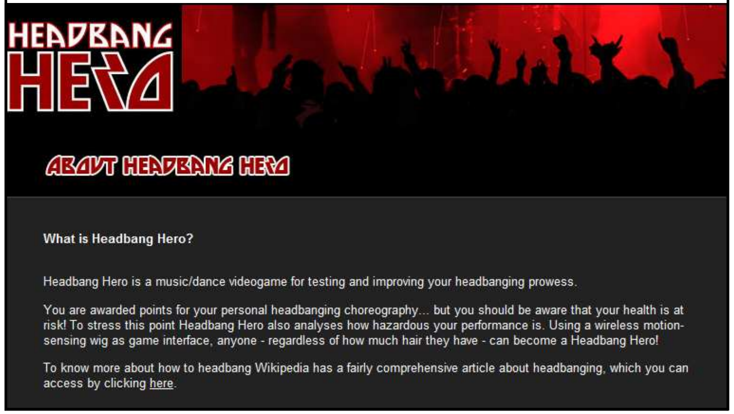
Mobile (PDA)
Uses content, location, and user annotations
Cultural heritage sites



The Art of Irony

with Tiago Martins // Kunstuniversität Linz, Austria (home of Ars Electronica)

HeadbangHero



Headbang Hero
a music/dance videogame

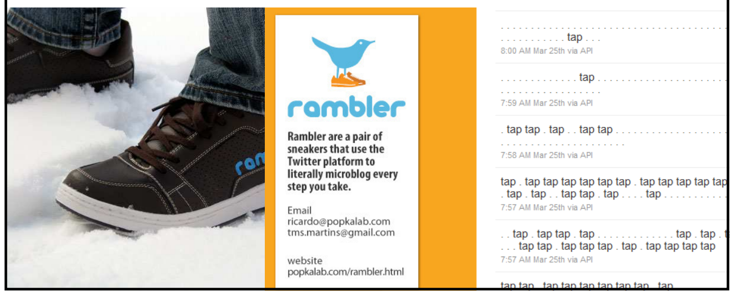
Demovideo 2009 by
Tiago Martins, Ricardo Nascimento, Andreas Zingerle.

www.headbanghero.com

Rambler

A pair of sneakers, by Ricardo Nascimento and Tiago Martins, that use Twitter to microblog every step you take

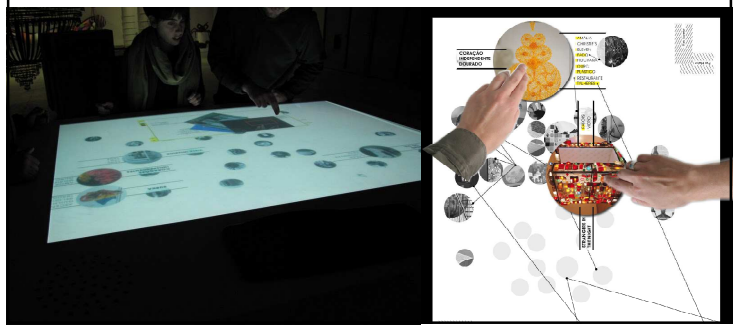
Rambler takes a critic/ironic view by posting literally every step you take in real life



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

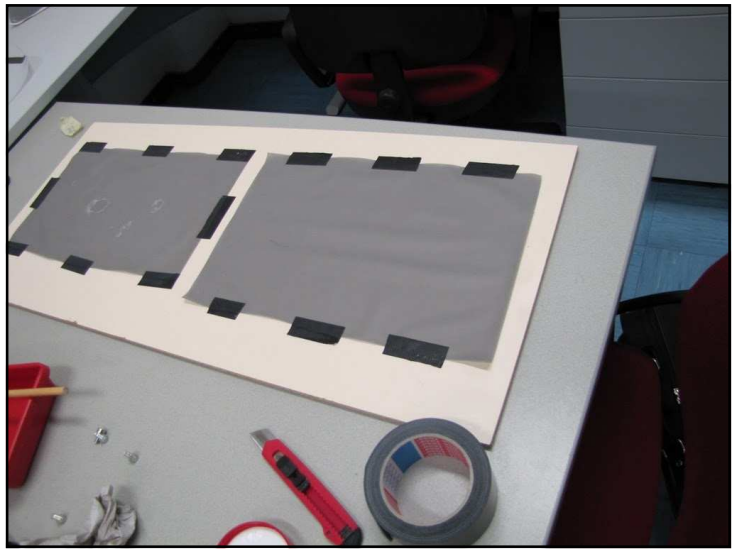
Design Principles and Requirements

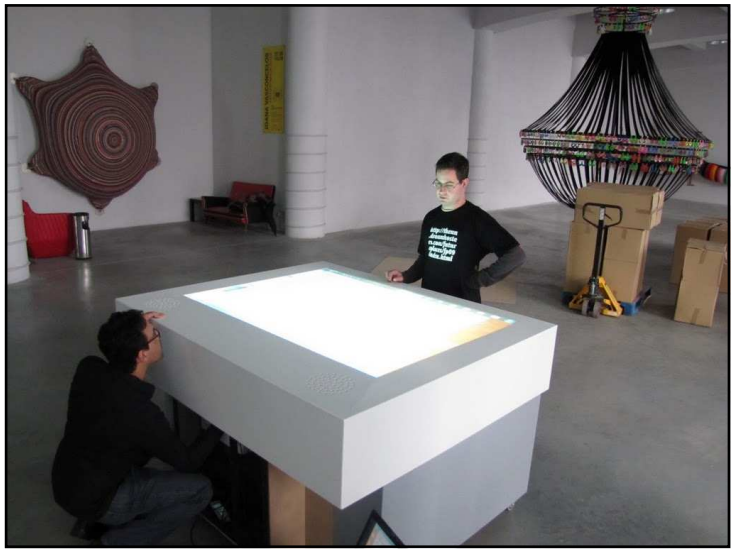
Many visitors, all with access to the interactive table
Available 9 hours a day, everyday (March 1 – May 18)
Thirty five artworks explored in a collaborative way
Provide feedback, entertaining experience, add user content (tags)

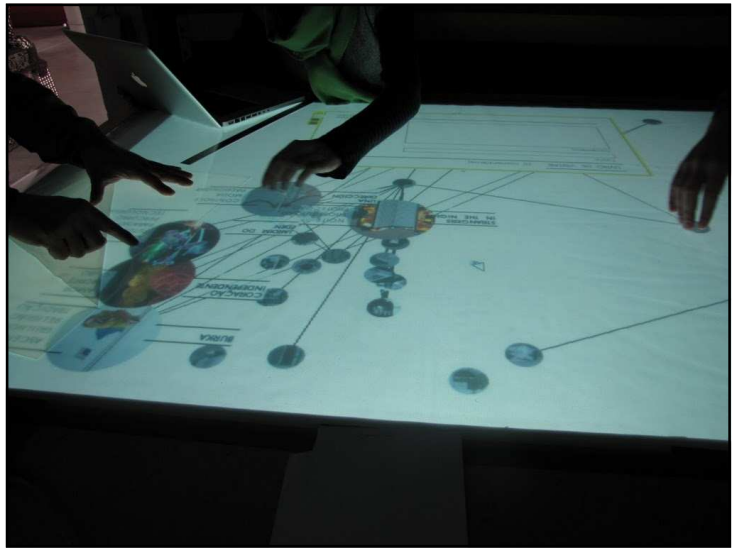
Hardware/Interactive Table

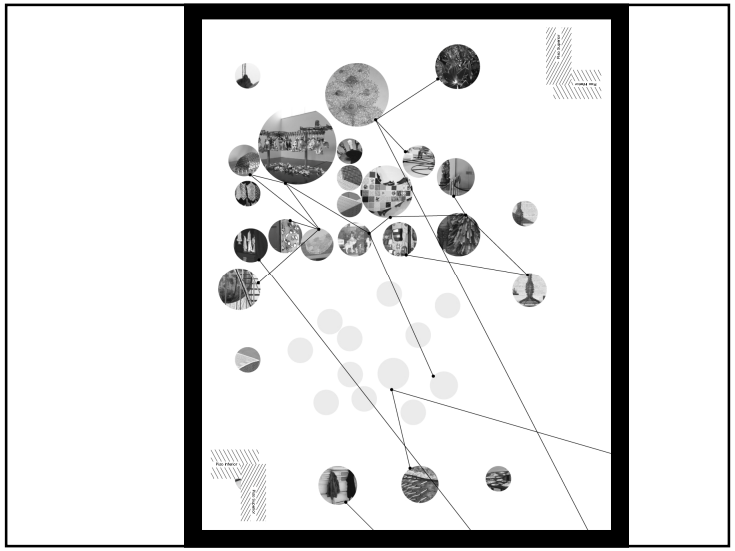
Large interactive area (**133x100**x80cm)
Tested with laser light plane, final setup is FTIR
Hard to get the surface right
- People compare with other multitouch devices
- PET + tracing paper + tracing paper with silicone + acrylic

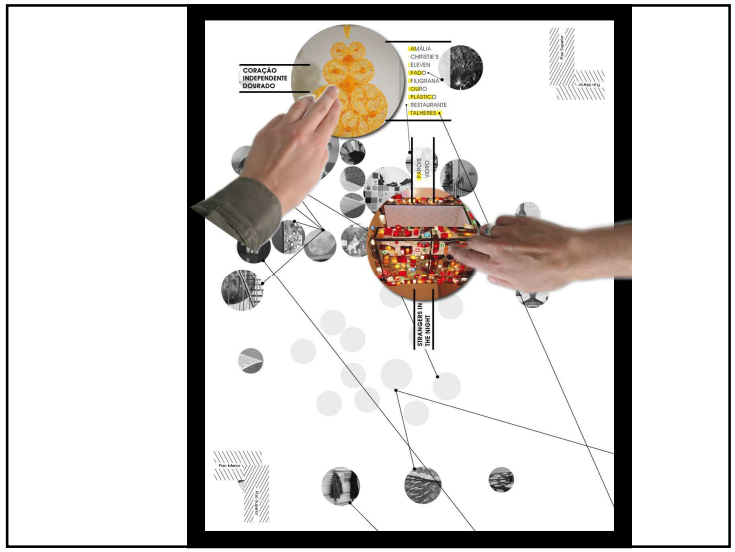
Three mirrors system
Speakers

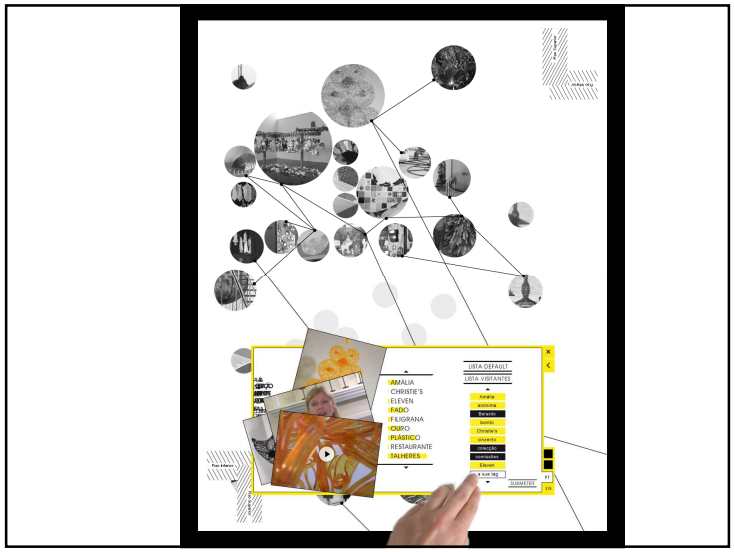


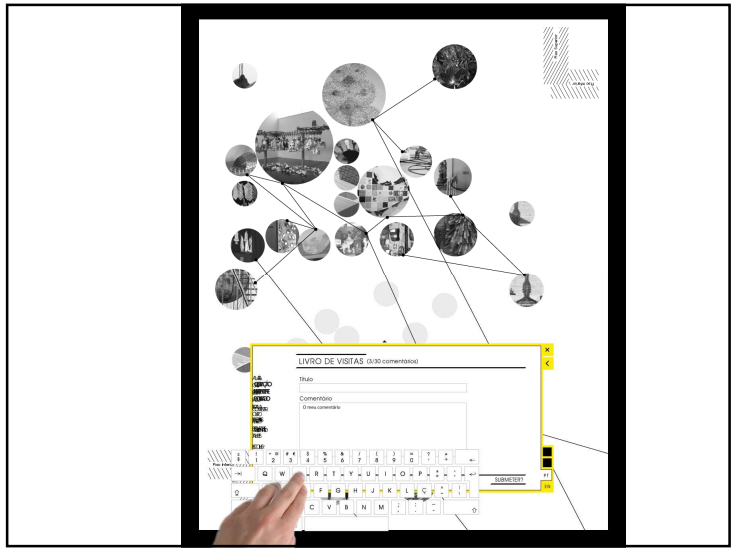


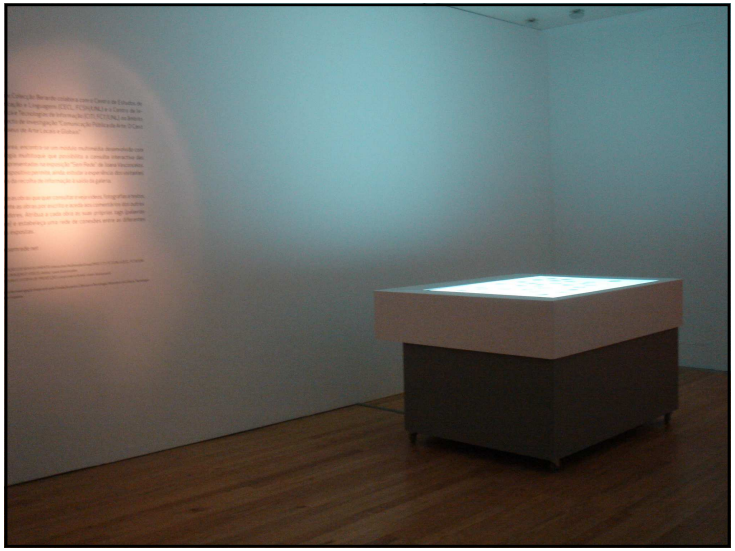





CORAÇÃO
INDEPENDENTE
DOURADO
AMÁLIA
CHRISTIE'S
ELEVEN
FADO
FILIGRANA
OURO
PLÁSTICO
RESTAURANTE
TALHERES


LISTA DEFAULT
LISTA VISITANTES
AMÁLIA
CHRISTIE'S
ELEVEN
FADO
FILIGRANA
OURO
PLÁSTICO
RESTAURANTE
TALHERES
SUBMETER


LIVRO DE VISITAS (3/30 comentários)
Título
Comentário
O meu comentário
SUBMETER?

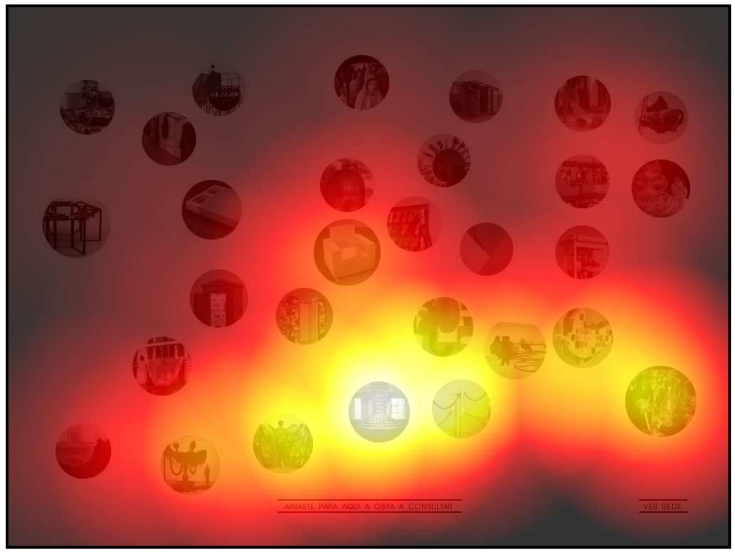


Results and Discussion

Logging: 47 days, 1.596.639 touches, average 33.971 touches a day

Features:

- Access artwork: 46%
- Tags navigation: 24,4%
- Access details (text): 12,6%
- Guestbook: 6,2%
- Casual game: 4,2%
- Assign tags: 3,3%
- Questionnaire: 3,2%



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

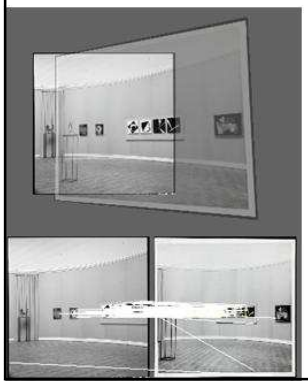
Virtual visit based on photos and video

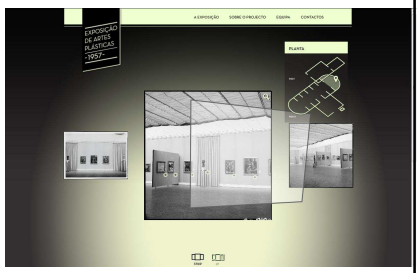
Space reconstruction through
photo-stitching and multi-view stereo

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

1957 Modern Art Exhibition

1957 Modern Art Exhibition





Illuminated Manuscripts

With DCR/FCT/UNL, PI: Maria João Melo

IMG contributes with an **interactive installation**

- Explore the intersection between physical elements and virtual representations
- Useful in educational settings

Three modules:

1. **Tablet based application** for drawing
2. **Real book** that controls a virtual representation
3. **Multitouch surface** to present context and historical overview

Why Using Technology?

Illuminated manuscripts are frail and cannot be easily manipulated
The workshop using pigments and other materials is hard to setup and requires more preparation

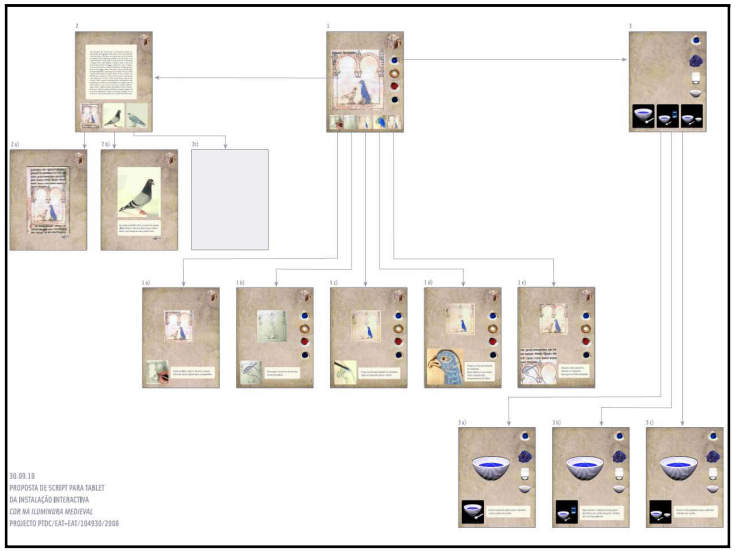
Interactive technology has the potential of attracting new audiences to explore the wonders of medieval manuscripts

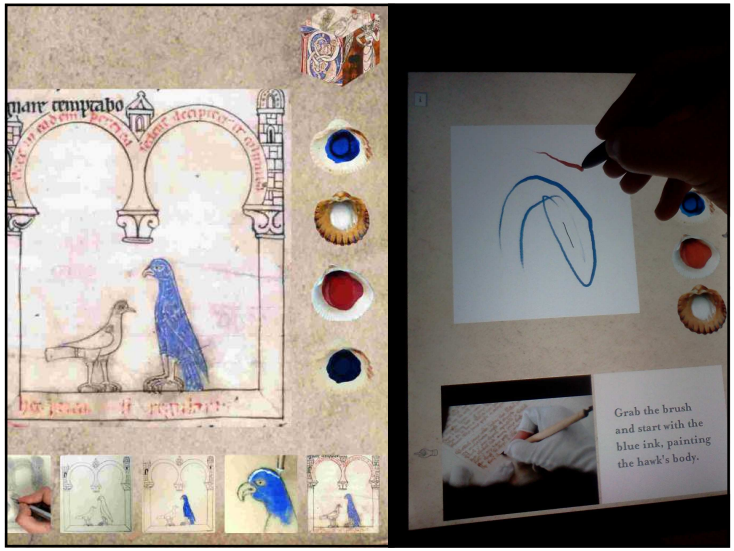
Simulation and game like interfaces enable risk free exploration and a first level of contact

Virtual Scriptorium

Tablet PC Application

Tablet PC based application for drawing
"Reproduce" the physical process with digital elements
Pen based interface
Multiple drawing steps with
physical constraints

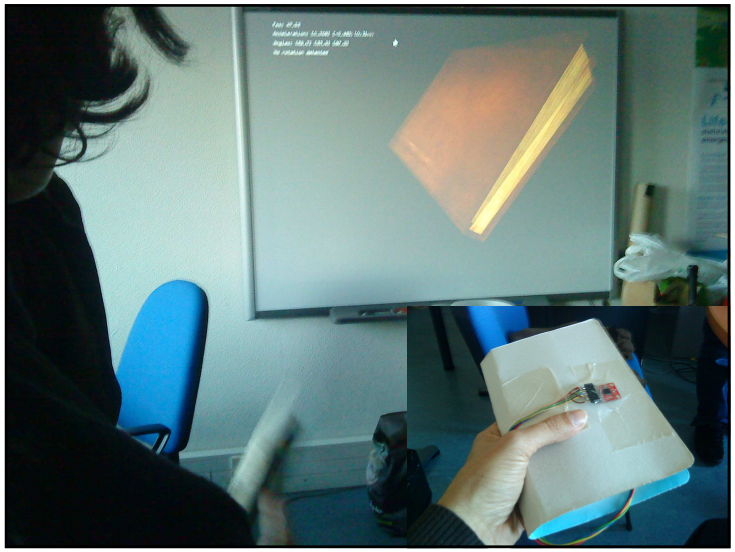


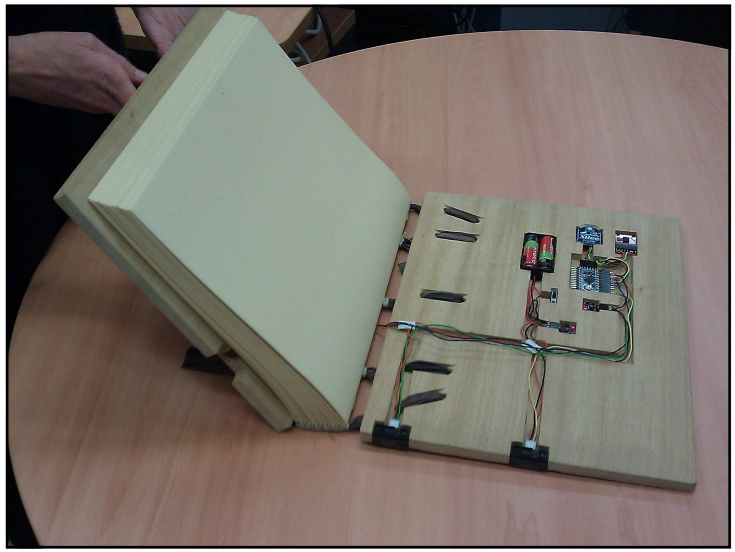


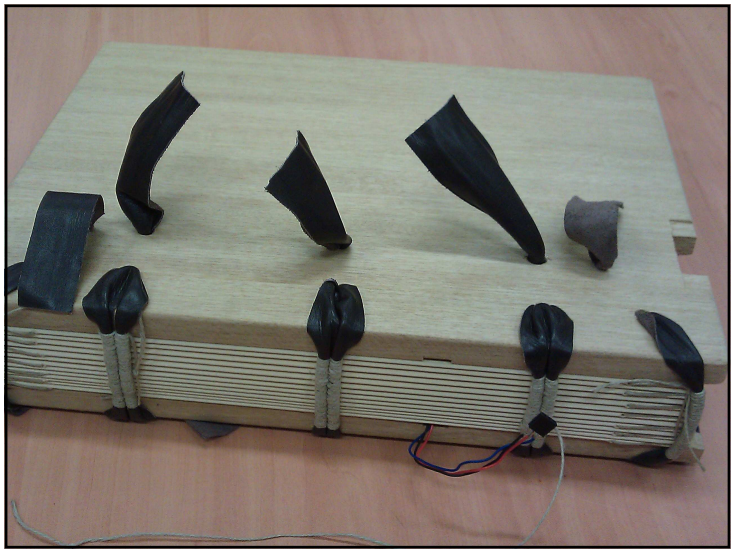
Magic Book

Real Book, Virtual Content

Real book that controls a virtual representation
Tangible interface
Explore the book as an object
Sensor rich interface
Gameplay

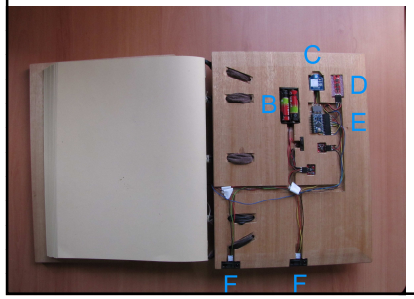






Sensors

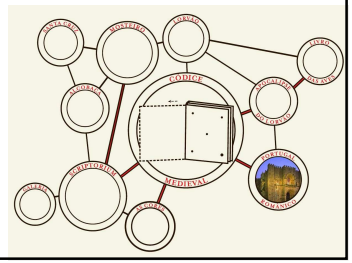
A - Capacitive sensors (page detection)
B - Battery
C - Wireless communication module
D - Inertial Measurement Unit (position and motion)
E - Microcontroller
F - Distance sensors

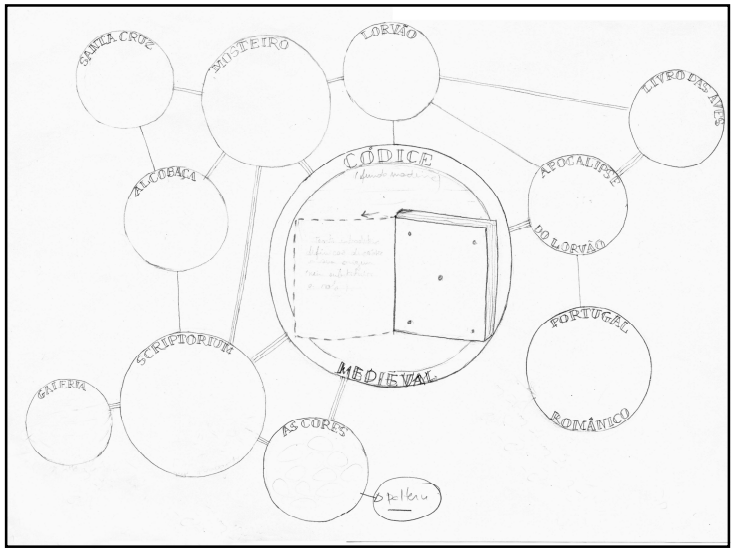


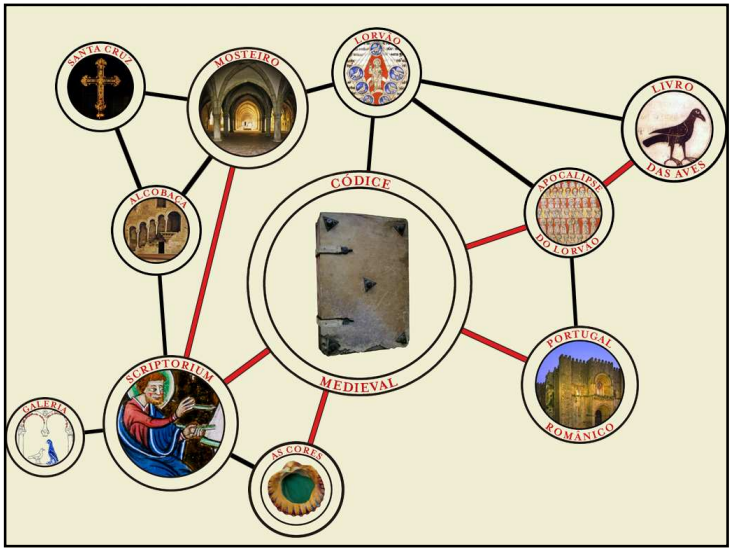
Touch Panel

Touch Panel

Multitouch surface to present historical context
Image gallery (results from the Tablet PC)
Useful in museums/libraries or learning situations







Contemporary Dance

TKB – Video Annotation

Funded project on video annotation
Contemporary dance
With FCSH/UNL (PI: Carla Fernandes), Rui Horta

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

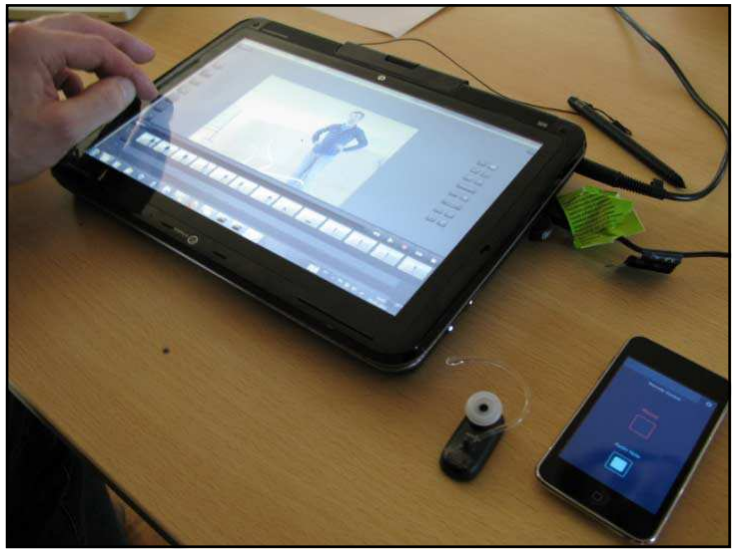
Research Goals

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 → **Creation Tool**
Motion analysis

Web archive



Annotation Modalities

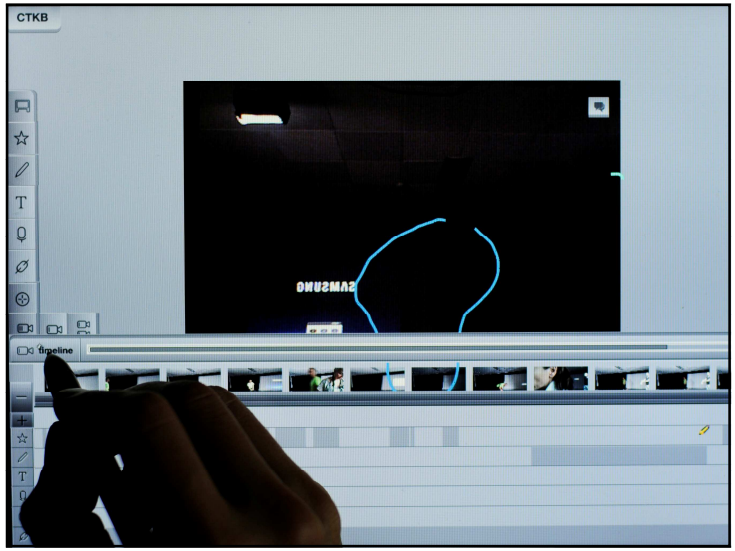
Annotation marks: concepts defined by the user and represented by a keyword and an icon.

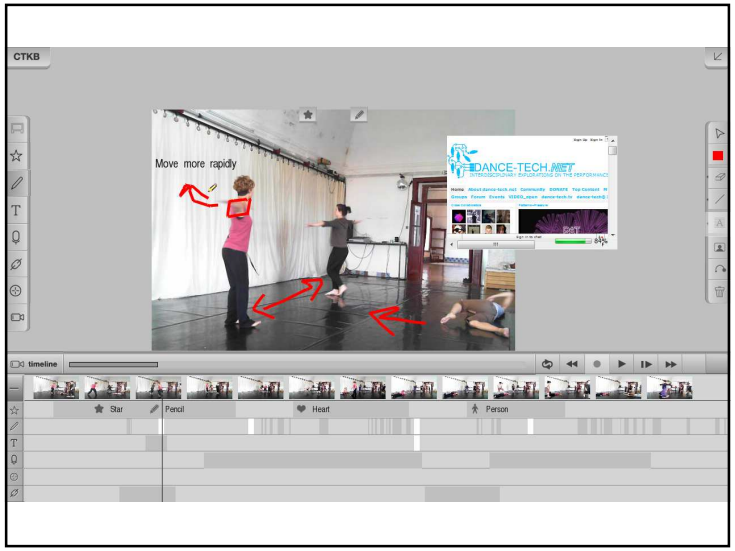
Audio: microphone records voice annotations.

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.





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.

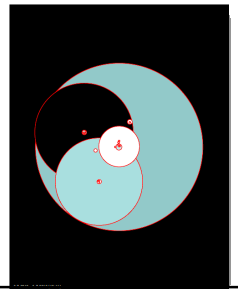
Usability, user-friendly design and the ability to categorize the information into a coherent structure were main concerns.

TIME MACHINE

with CADA, Lisboa

Time Machine

FCT funded project, with CADA (Lisbon based artists)
A machine that shows how you spend your time and predicts your (personal) future
Data mining and visualization in mobile phones



Time Machine

The Time Machine project explores personal location data with artistic purposes.

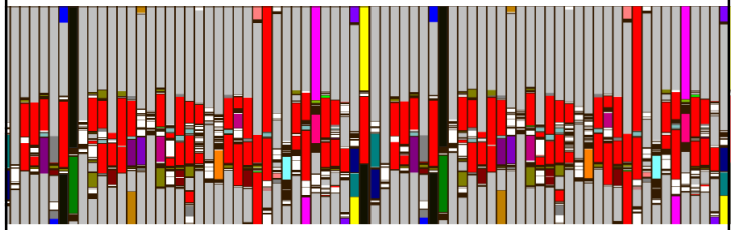
An ambient intelligence proposal, an application which runs on mobile phones, presenting **individual users with an overview of their time usage patterns.**

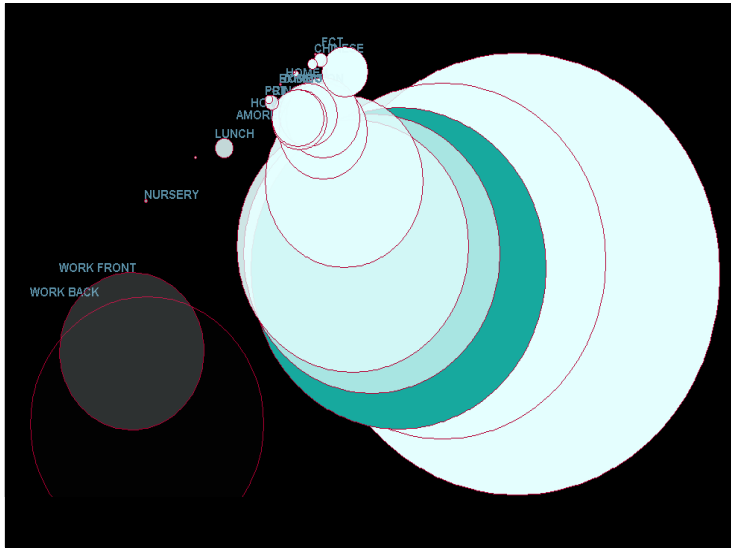
It provides means for reflection upon habits and lifestyle.

It tracks user movements in space using GPS technology and displays this information, aiming to highlight **changes to the normal routine.**

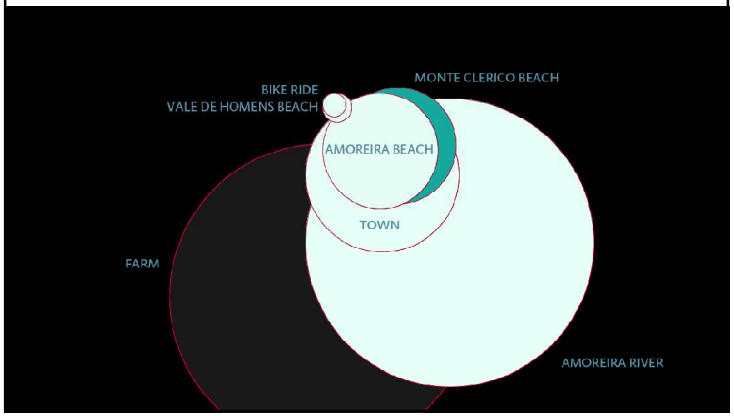
Data Processing Tools

To find the meaningful places for the user, the stay points are clustered using a variant of the density-based algorithm, DJ-Cluster.



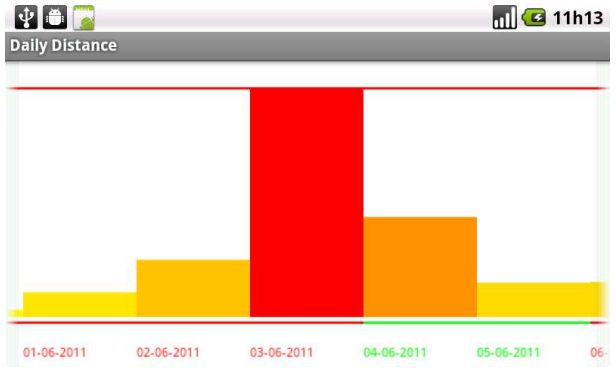


Distances Based on Frequency

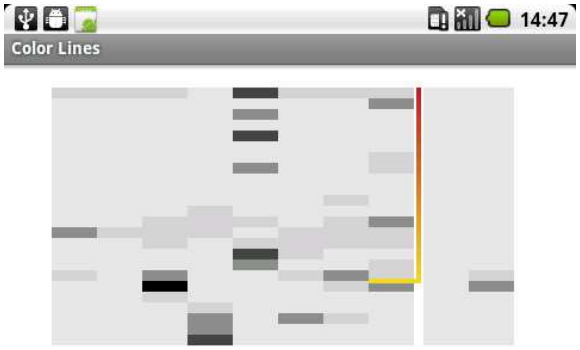


Distances Based on Frequency

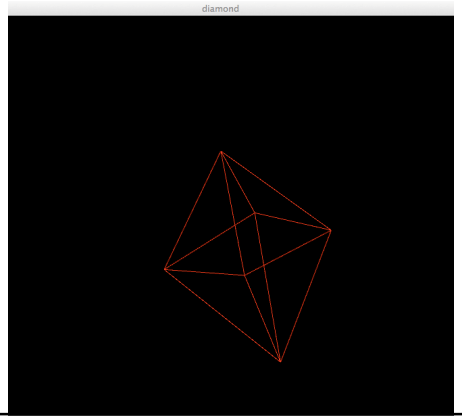
Visualization Sketches



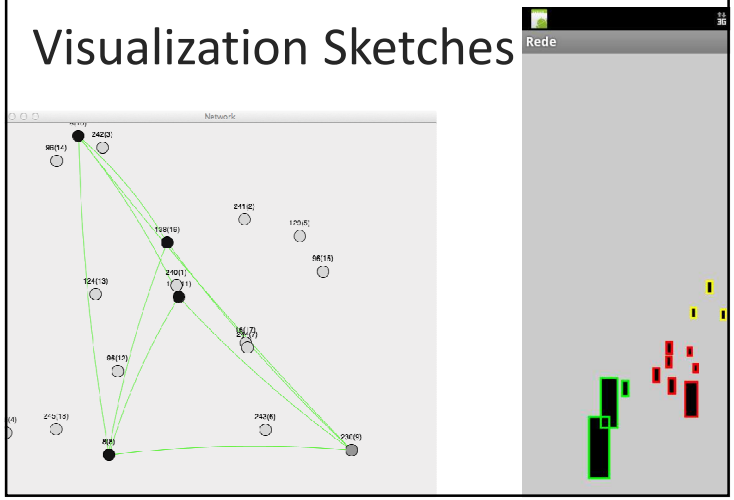
Visualization Sketches



Visualization Sketches

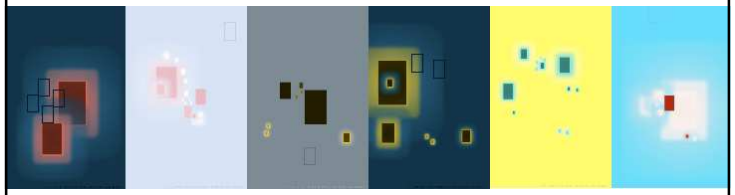


Visualization Sketches



Time Machine

First integrated version, data mining + visualizations.
Take full advantage of predictive model.
Currently three users continuously for more than one year.
Experiment with many users.



IMG

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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