

# Human Computer Interaction

Dr. Ayman Ezzat

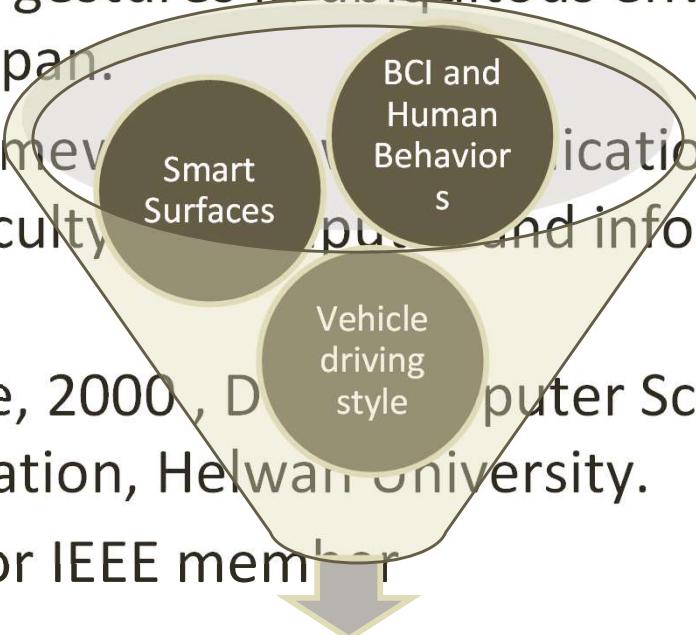
Spring 2024

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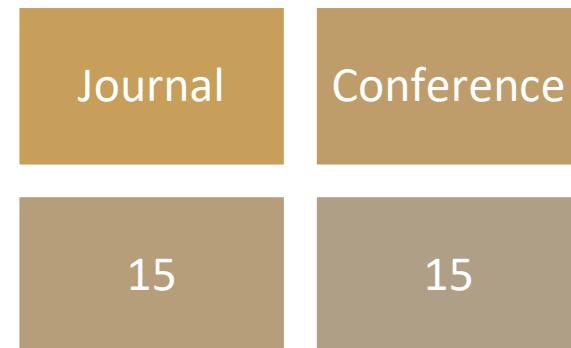
ayman@fcih.net

# Biography

- Phd, “Interaction with gestures in ubiquitous environments” ,2011, Tsukuba University, Japan.
- Msc.,”Building OO Framework for Smart Surfaces”, 2004, Dep. Computer Sceince, Faculty of Computer and information, Helwan University.
- Bsc. Computer Science, 2000 , Department of Computer Science, Faculty of Computer and information, Helwan University.
- ACM SIGCHI and Senior IEEE member



## Human Computer Interaction



Ayman Atia

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Ubiquitous computing Human Computer Interaction Smart Environments

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TITLE

CITED BY YEAR

- Brain computer interfacing: Applications and challenges SN Abdulkader, A Atia, MSM Mostafa Egyptian Informatics Journal 16 (2), 213-230 145 2013
- Interaction with tilting gestures in ubiquitous environments A Atia International Journal Of UbiComp 1 (3), 1-13 17 2010
- Recognizing driving behavior and road anomaly using smartphone sensors AH Ali, A Atia, MSM Mostafa International Journal of Ambient Computing and Intelligence (IJACI) 8 (3), 22-37 12 2017

2 ]

# Topics

- Overview of ID / HCI
- PACT Framework for Designing Interactive Systems
- Human Cognition
- Interaction Devices and Interaction Types
- Design Principles and the overall Design Process
- Conceptual and Physical Design
- Interaction paradigms
- Evaluating Interactive Systems

[ 3 ]

# Why Usability is Important

**UI**



**UX**



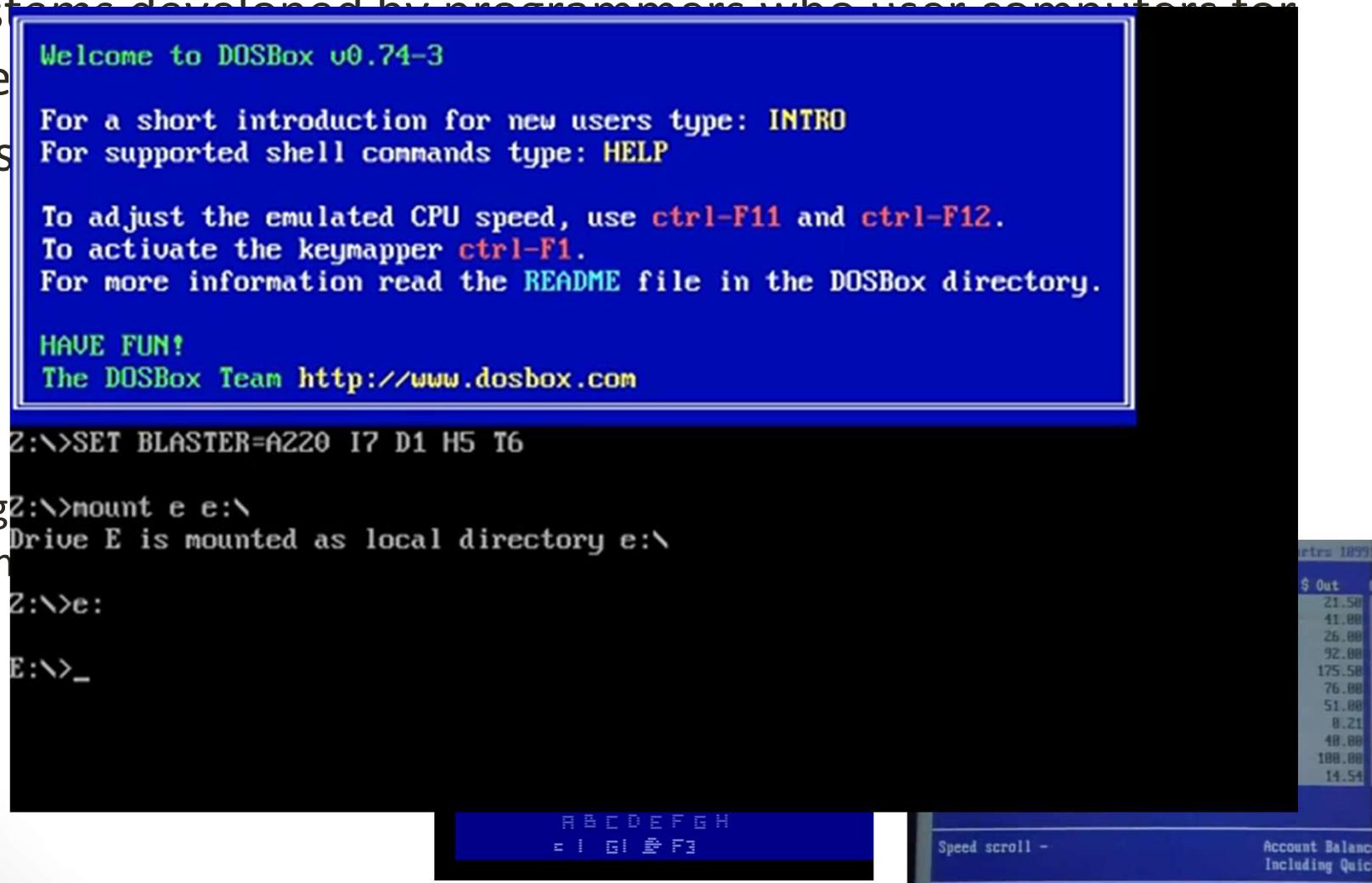
# Interactive Designers

- Their goal is to design interactive systems that are enjoyable to use, that do useful things and that enhance the lives of the people that use them.
- They want their interactive systems to be accessible, usable and engaging.
- In order to achieve this they believe that the design of such systems should be human-centred.
- That is, designers need to put people rather than technology at the center of their design process.

# Past PC

- Not considering users who used the PC

- Systems developed by programmers who used computers for everything
- Designers



Forgetting  
have not had

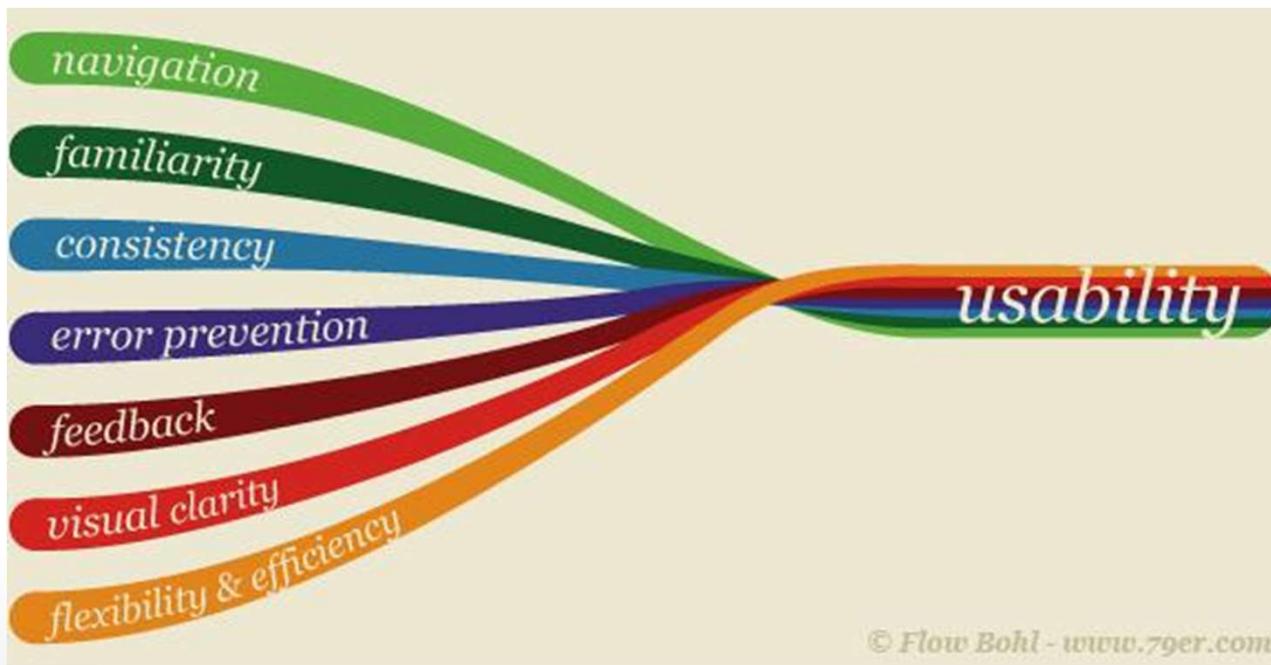
# Now PC

- Web and mobile dramatically changed the age of HCI
  - E-commerce
  - E-Guiding
  - E-Learning
  - E.....
- Before the immediacy of e-commerce, usability problems were only discovered after purchase.
- If you bought a nice looking MP3 player and brought it home only to find it was difficult to use, you could not take it back!
- The shop would say that it delivers its functions, all you had to do was to learn how to operate it properly. (read the manual)



# Web usability

- Customers look to **usability**
- If the system is hard to use, or if they do not understand it, they will go somewhere else to make their purchase.
- People are learning that systems do not have to be hard to use and are becoming more critical about the design of other products, such as their MP3 players too.



# Bad designs <http://www.baddesigns.com/>

The screenshot shows the homepage of www.ARNGREN.net. The top navigation bar includes links for Teknologi & Gadgets, Index, ei-retur, and a search bar. A banner at the top right displays a 4x4 vehicle and the text '2294854 Index (Fr 07.11.2004) < Frithjof i sin Fly-Bil'. The main content area is divided into several sections: 'Trådløs Video-Dørtelefon & Monitor kr. 1798,-' (with a small image of a video phone), 'Press Presse', 'Forbruker Elektronikk' (showing a mobile phone and a 40cm long device), 'Alle Produktene på denne siden lagerføres hos ARNGREN i Oslo. Se Lagerkoden etter Prisen (lev. 2-5 dager): er på Lager (green dot), kommer fra 3 uker (yellow dot), lengre enn 3 uker (red dot)'), 'RC Produkter' (listing various RC models like Helikopter, Biler, and Trukker), 'Elektronikk' (listing items like Oppladbar Lykt, Kamera sett, and Mikro Farge-Kamera sett), 'Bilde-Fliser' (listing various RC cameras and models like Jagerfly, Helikopter, and Avatar), and 'Teknologi & Gadgets' (listing items like RC Race-Hovercraft, RC Helikopter, RC Fiskebåt, Star Wars Sjakk, Hobby, and Elektronikk). Each product listing includes a price, a green dot for 'på Lager', and a yellow/red dot indicating delivery time.

**WELCOME**

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AUCTIONS	ART & COLLECTIBLES	ZSHOPS	TOOLS & HARDWARE	LAWN & PATIO	ART & COLLECTIBLES	ZSHOPS	TOOLS & HARDWARE	ART & COLLECTIBLES
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- by Nelson W. Aldrich

**Television's Greatest Hits, Vol. 2**

- ~ Television's Greatest Hits

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View a customer's Wish List—or

# Interactive systems

- Mac OS
- The iPod is an information appliance designed and optimized for a limited set of functions.
- The **AIBO** is a programmable product for fun and Companionship.
- Some interactive systems are concerned with helping people cooperate and create communities.

# Mac OS – Ubuntu and Win 10



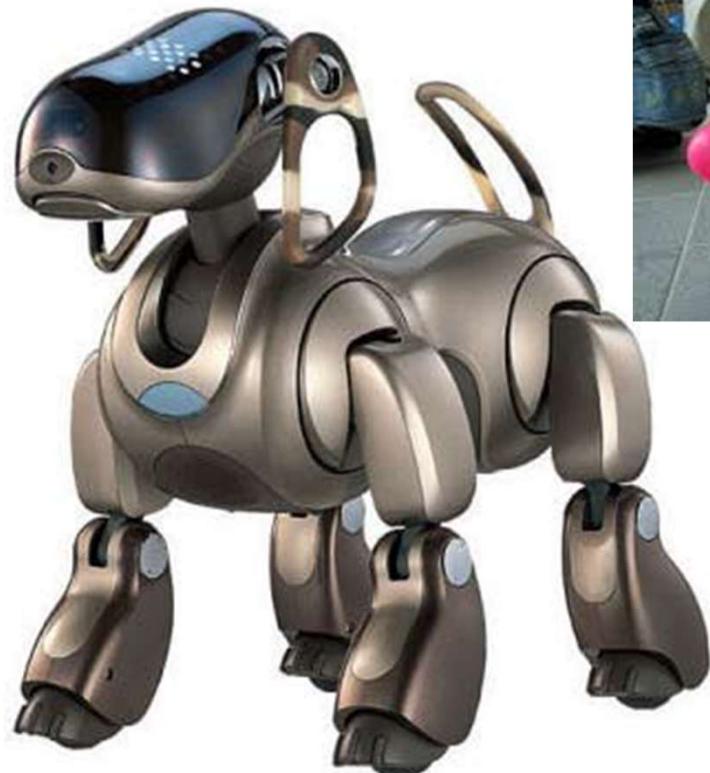
Dr Ayman Ezzat modified version  
of Dr, Frank Kriwaczek

# Modern mp3 players



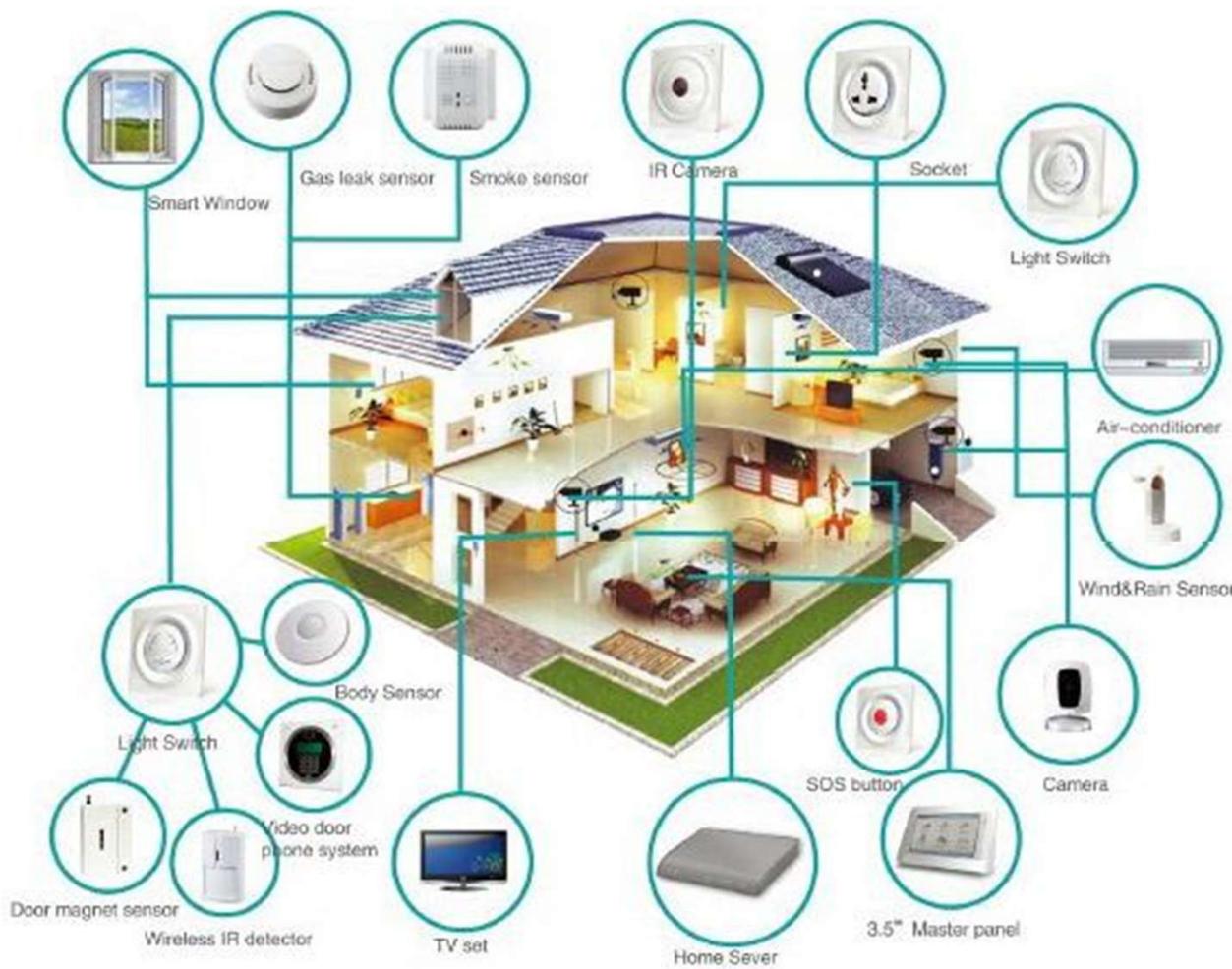
Dr Ayman Ezzat modified version  
of Dr. Frank Kriwaczek

# Sony AIBO





# Smart Home



# Elements of Interactive Systems

- **Technologies** - what can technology do? What content does something have?
- **People** - who will use it, who will be affected by it?
- **Activities** and **contexts** - what will people have to do in what circumstances?



# Design

- The creative process of specifying something new and
- The representations that are produced along the way
- – e.g site map, blueprints, sketches, etc.
- It typically involves much iteration –
- both problem and solution evolve during design
- Our materials are **interactive systems**... we work within and shape this medium
- – Such as cameras, phones, web sites, DVDs, computer applications... any device or system that is *interactive*

# Interactive Systems

- The concept of interaction
- interactive systems
- The components of an interactive system
- The process of creating an interactive system
- The design of an interactive system
- The implementation of an interactive system



# User Interface

- All those parts of the system we come into contact with...
- **Physically** we might interact with a device by pressing buttons or moving levers and the interactive device might respond by providing feedback through the pressure of the button or lever.
- **Perceptually** the device displays things on a screen, or makes noises which we can see and hear.
- **Conceptually** we interact with a device by trying to work out what it does and what we should be doing. The device provides messages and other displays which are designed to help us do this.

# Input / Output

- • Input
  - some methods are needed to enter commands (tell the system what we want it to do)
  - We also need to be able to navigate through the commands and the content of the system
  - We need to enter data or other content into the system
- • Output
  - So the system can tell us what is happening - provide feedback
  - So the system can display the content to us.

# Designing interactive system

- .... is more than just designing the user interface .... is more than designing the input, output and content
- It is about designing the whole human-computer interaction
- It is about designing the human-human interaction that is often enabled *through* devices
- It is about designing whole **environments** of interlinked **devices** and **objects**
- – Think of designing museum exhibits, or an amusement park
- – Or an airport, a hotel lobby or a shopping mall

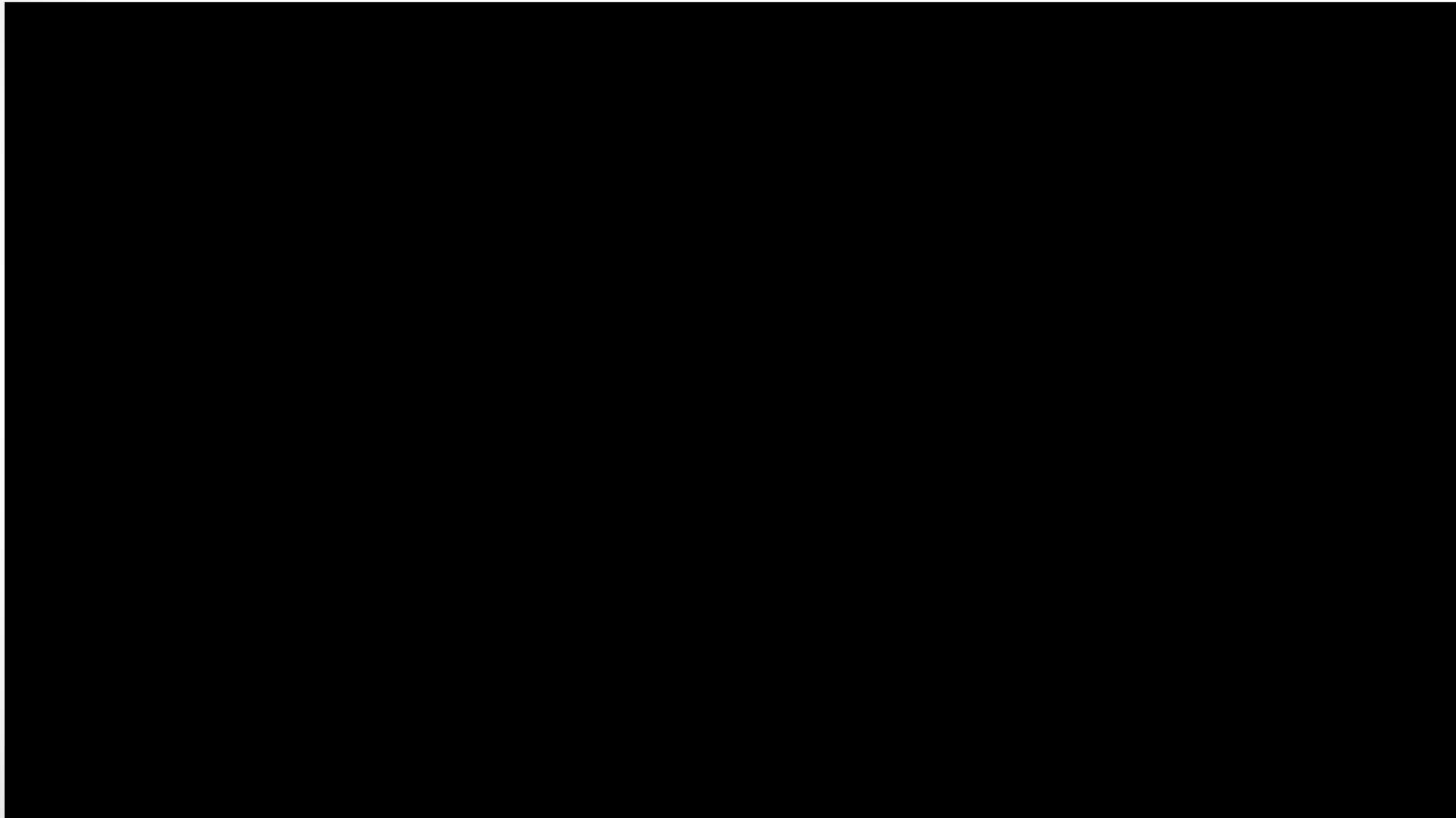




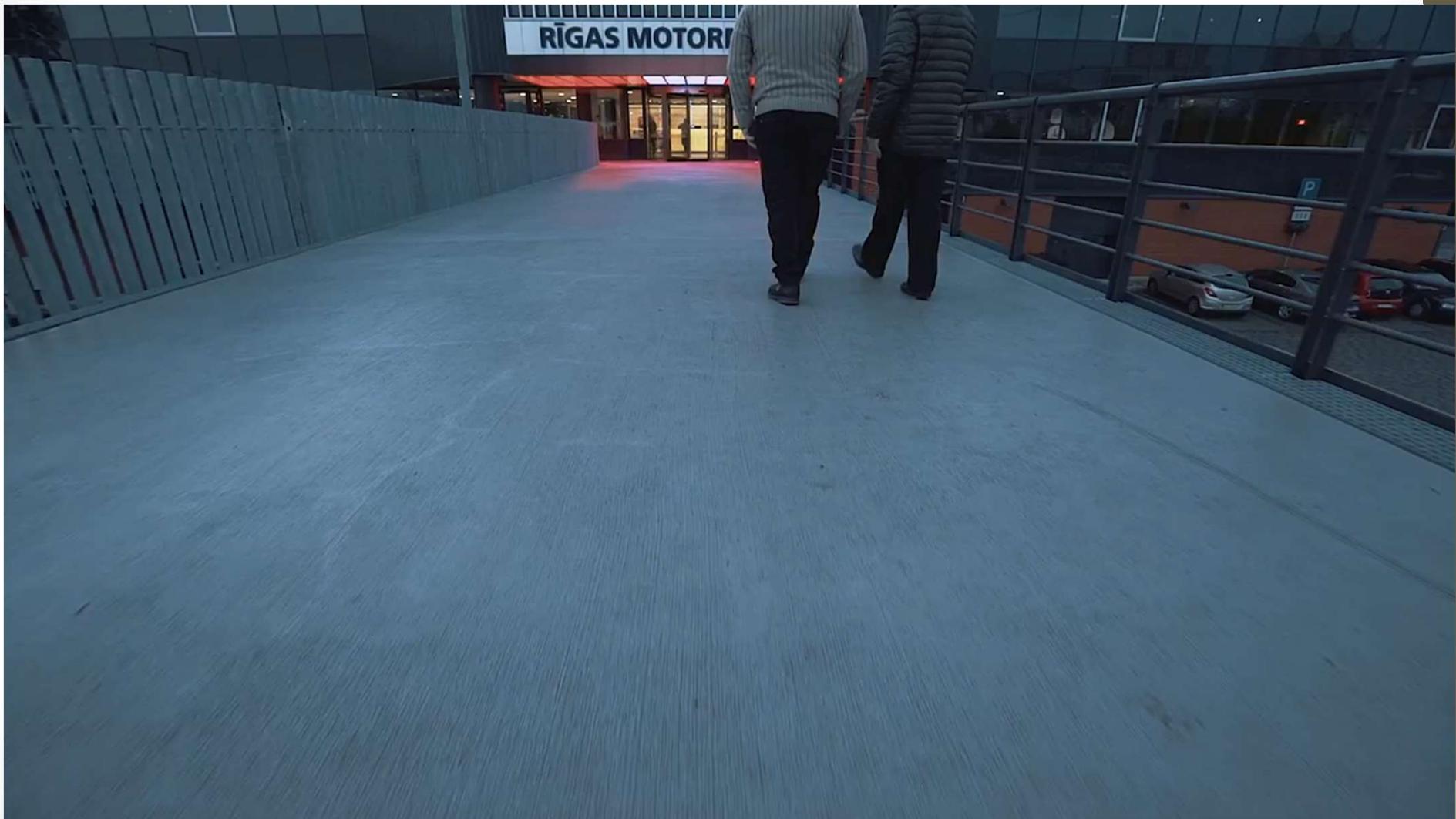
# Exercise

- Divide into groups of .....
- Each group select (Museum, Airport, Restaurant)
- Please answer the following questions
  - What is the problem faced for each system
  - What idea can help to solve the problems mentioned
  - What technologies you will use
  - Do you think these parameters will be included
    - Time to do activity
    - Personality of the one using your system
    - Emotions of the person
    - Education level

# Interactive Museum



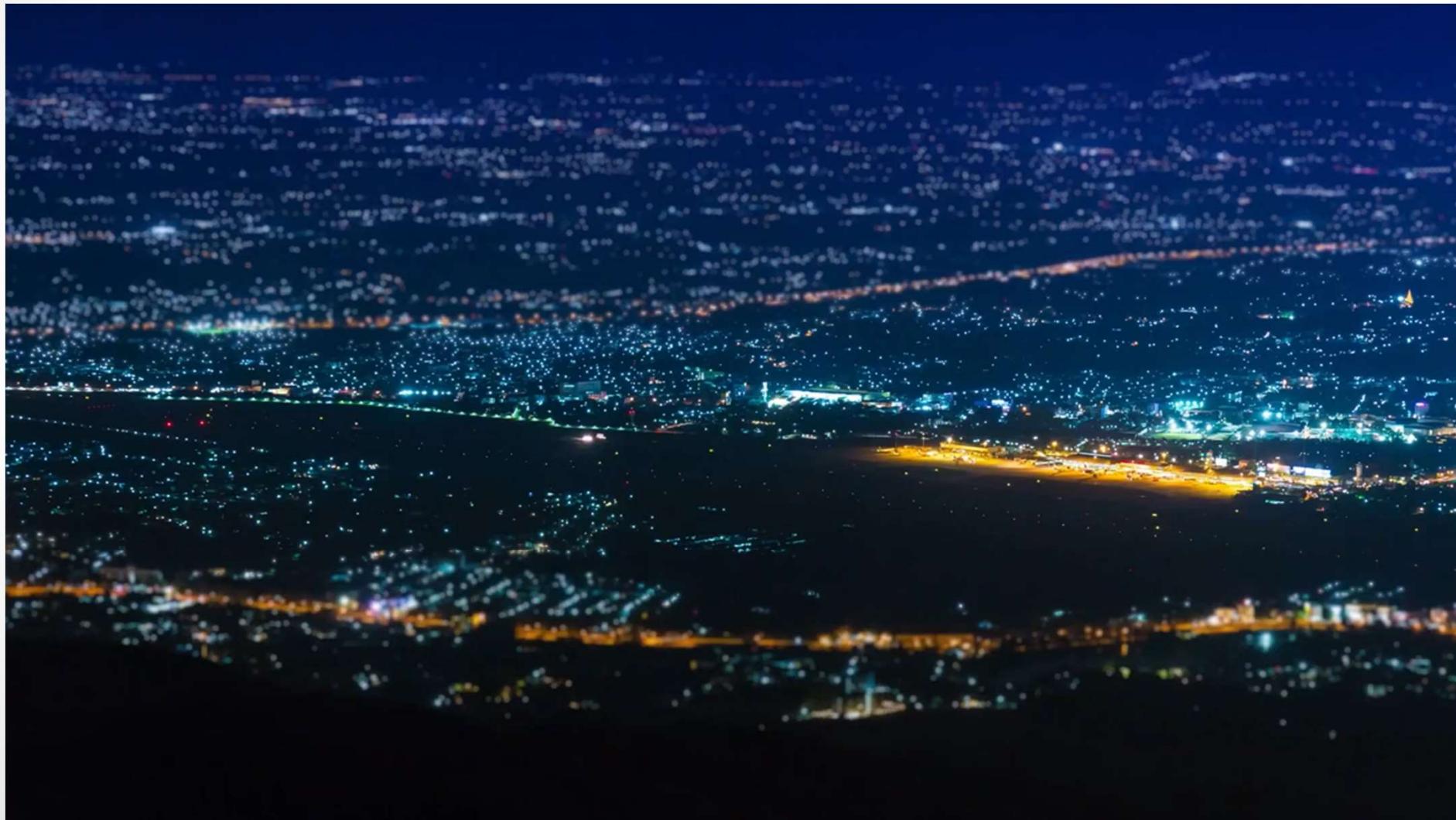
# Interactive Museum 2



# Inamo Restaurant



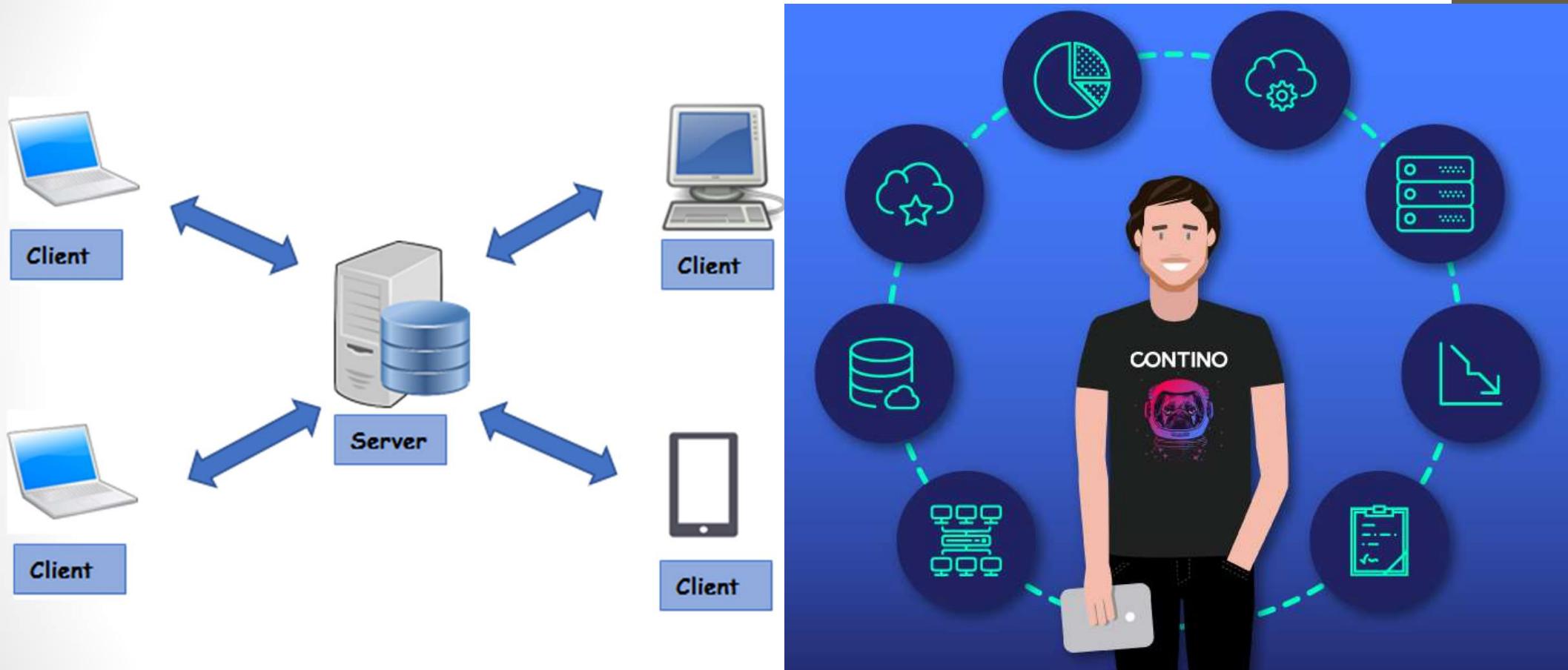
# Smart Air-Port



# Being Human Centered

- We take a human-centred approach to designing interactive systems. That means...
- thinking about what people want to do rather than just what the technology can do
- designing new ways to connect people with people
- involving people in the design process
- designing for diversity

# Moving from computer center arch. To human center arch.



# Some History for HCI

- 1950s - computers invented
- 1960s - first screen and mouse developed
- 1970s - business start to take up computers seriously.

First internet created

- 1980s - Arrival of microchip and micro-computers
- 1984 - Apple Macintosh (Xerox Star). Games

consoles arrive. First conferences on HCI

- 1990s - World Wide Web arrives
- ... and so on to Ubiquitous Computing



Mark Weiser 1999

# What is Ubiquitous Computing (ubicomp)

- **Ubicomp** is a post-desktop model of human computer interaction in which information processing has been thoroughly integrated into everyday objects and activities.
- Integrate computers seamlessly into the world
  - invisible, everywhere computing.
  - Often called **pervasive/invisible computing**.
- Computers are mostly not invisible , they dominate interaction with them.
- *Ubicomp* is about making computers invisible.

<http://cs.calstatela.edu/wiki/images/c/c8/Ubiquitouscomputing.ppt>

Ubiquitous computing = mobile computing + intelligent environment.

### **Technology View**

- Computers everywhere – embedded into fridges, washing machines, door locks, cars, furniture.
- Intelligent environment.
- Mobile portable computing devices
- Wireless communication – seamless mobile/fixed.

### **User View**

- Invisible – implicit interaction with your environment.
- Augmenting human abilities in context of tasks

# Early work

Tabs:

- very small – smart badge with user info, calendar, diary, etc.
- allow personalized settings to follow a user
- Carried around by a person
- Hundreds in a room
  - Remote controllers
  - Badges
  - Tags / Labels (RFID)
  - Locating system (tags as library catalogs)
  - Animate static physical objects (active calendar, a



105mm X 73mm X 24mm  
215g

# PADs

- Foot-scale Ubicomp devices
  - A sheet of paper / tablet PC.
  - Portable computers but not laptop metaphor
- Tens in a room
  - Like scrap papers that can be grabbed unique ID.

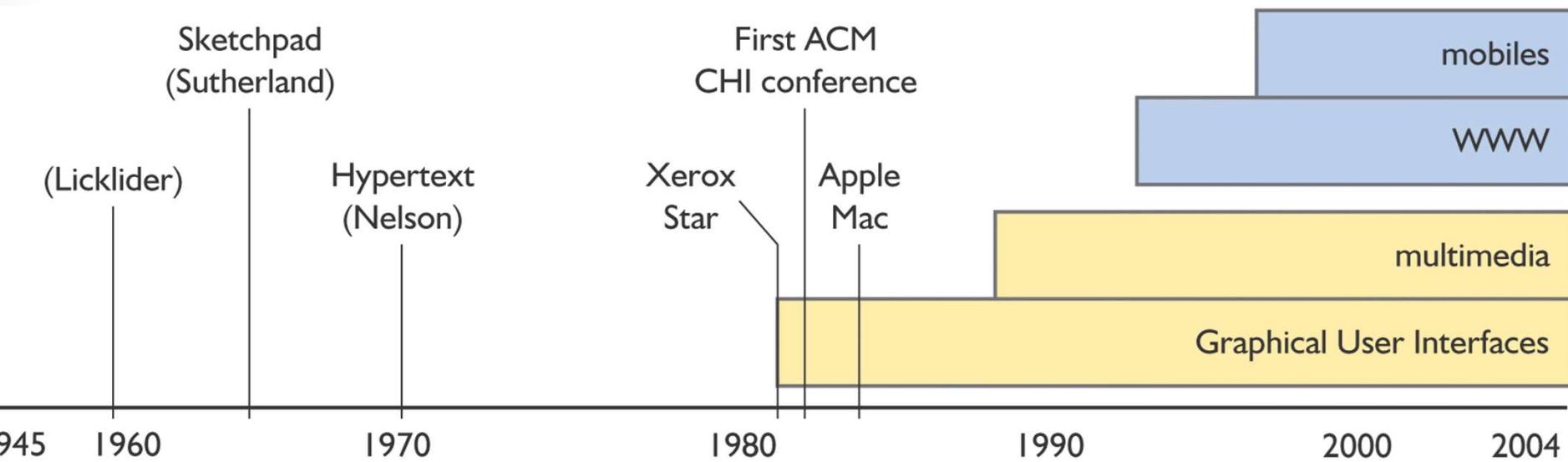


# Boards and large display

- larger display – whiteboard size.
- Personalized electronic bulletin boards.
- Multiple pens.
- Meeting capture.
- Lots of bandwidth available because they're plugged into the wall
- White board with e-chalk  
Shared white board with remote participants.
- Video screen.
- Electronic Bookcases

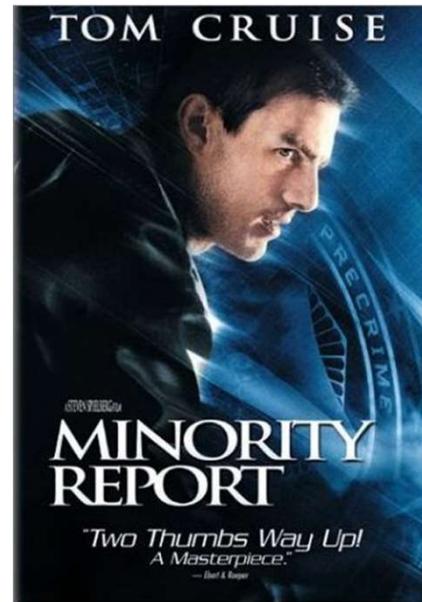


# Interactive system time line



# Where are we headed 1/2?

- Science and Drama

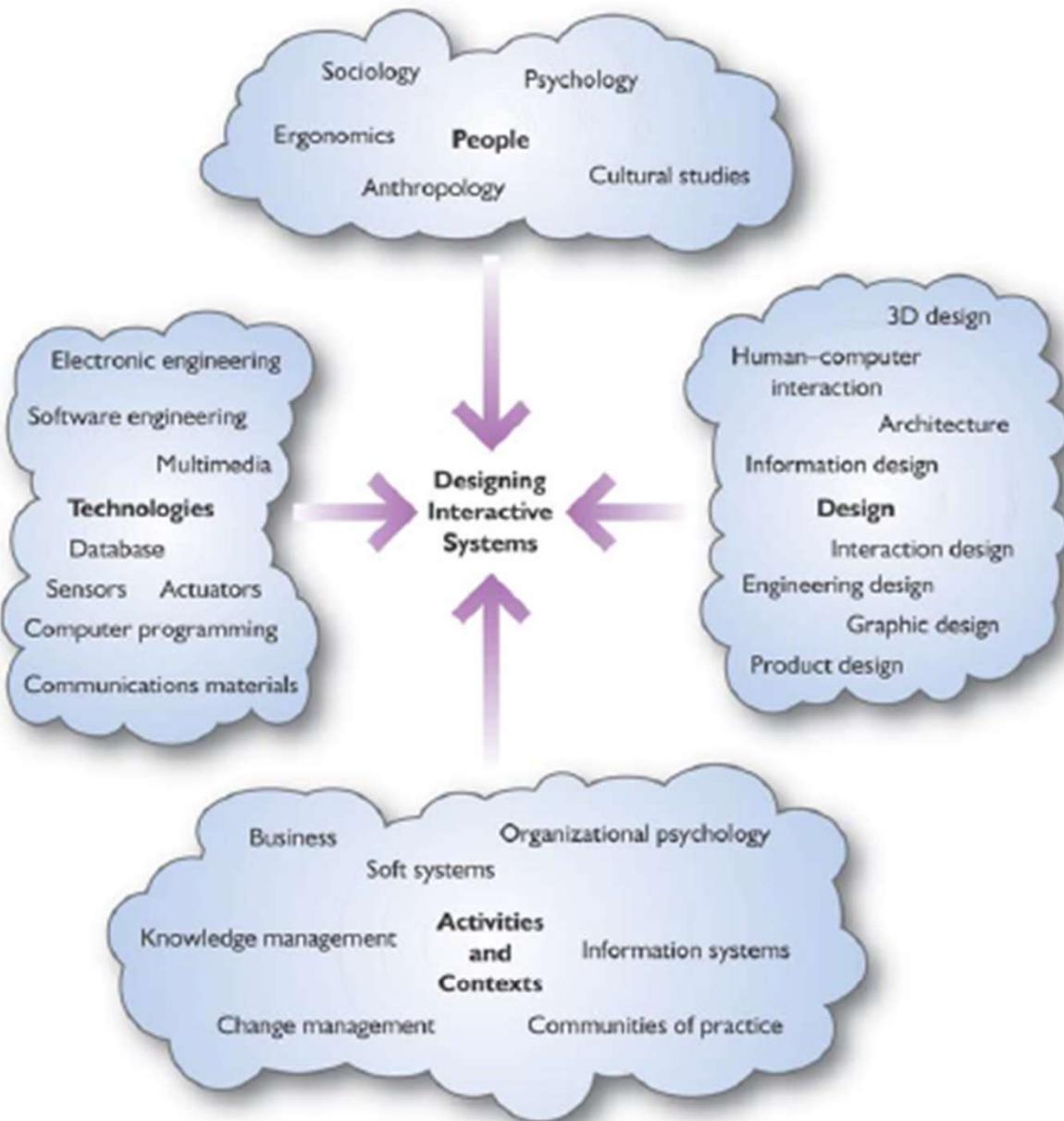


# Where are we headed 2/2

- Everyday things requiring everyday skills to use
- With a clear, focused function
- Provide peer-to-peer interaction
- And have a direct user interface - physical interaction
- Support the idea of 'closure' - completing a task
- Allow you to do things on impulse
- Are personalizable and portable

# The Skills of the Interactive Systems Designer

- **Knowing about people**
  - Sociology, anthropology, psychology, culture
- **Knowing about technologies**
  - Software, communications, materials, database, etc.
- **Knowing about activities and contexts**
  - Communities of practice, information systems, organizations, knowledge management
- **Knowing about design**
  - Fashion, interior, information design, architecture,
  - product design



Disciplines contributing to interactive systems design

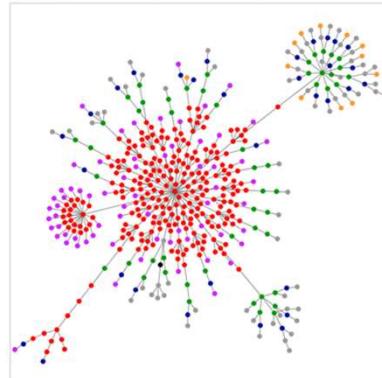
# Human Computer Interaction



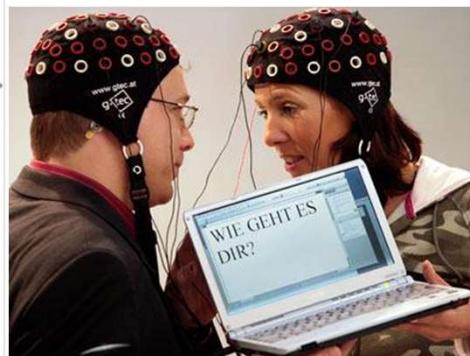
Large display screen



Smart surfaces



Visualization



BCI



Intuitive interfaces



Head mounted/small displays



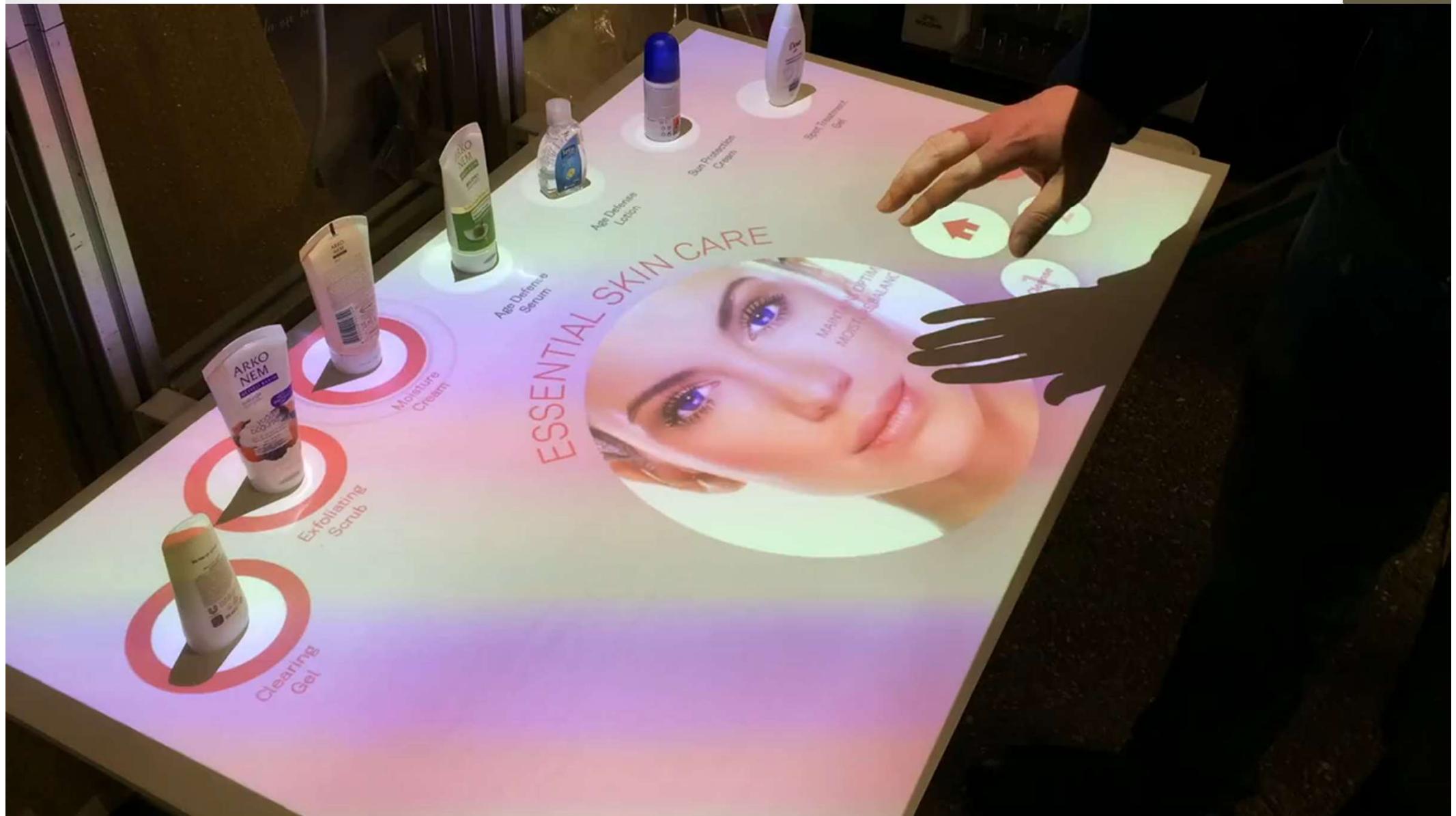
Augmented reality



TUI

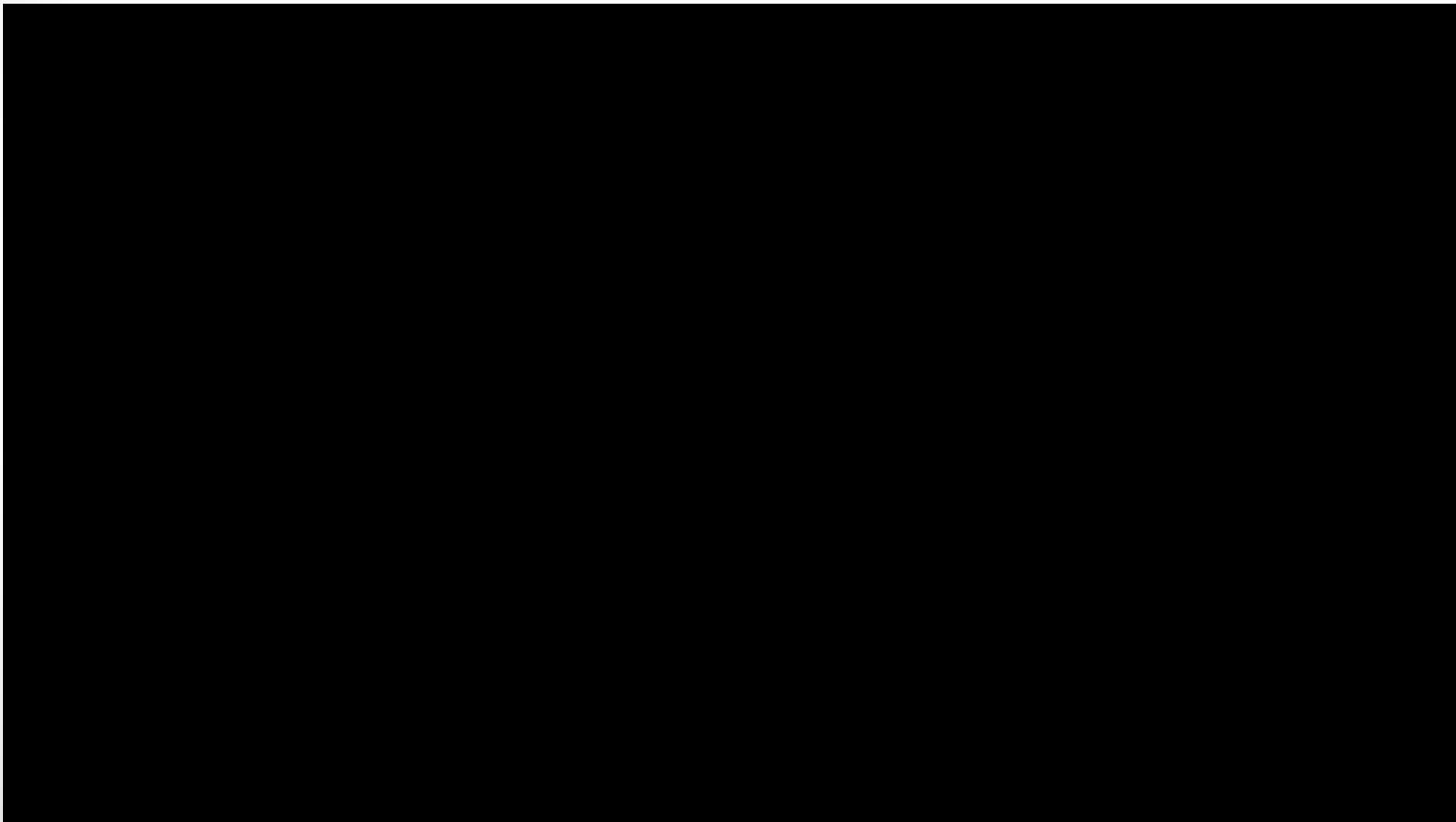
# Die display

# Smart Surfaces

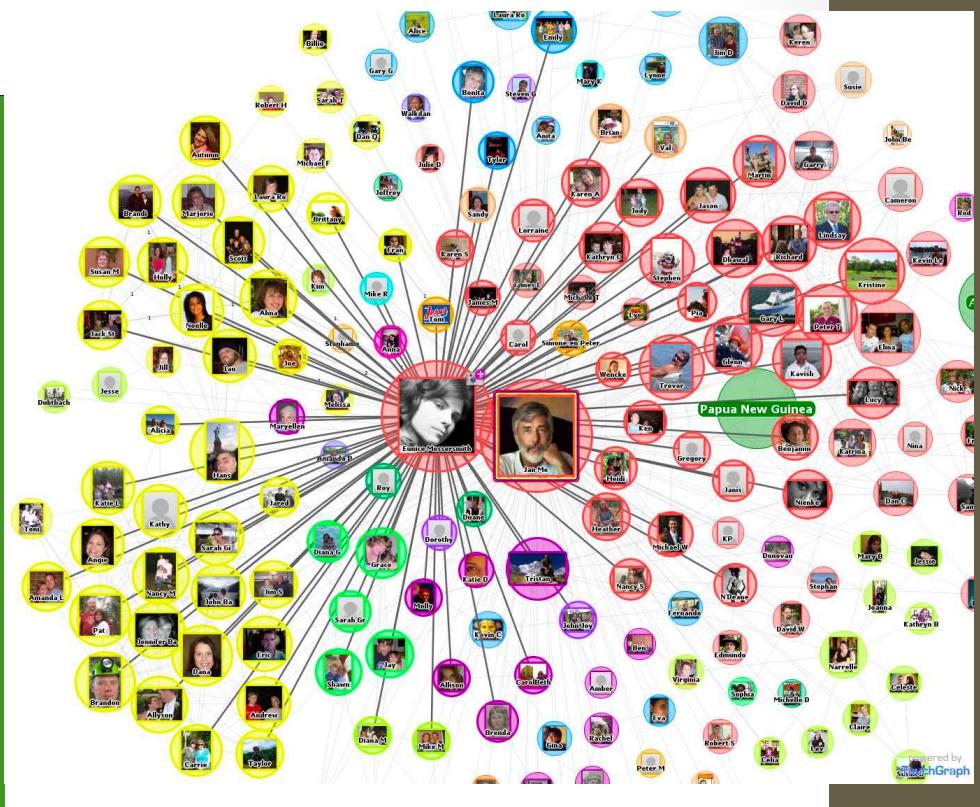
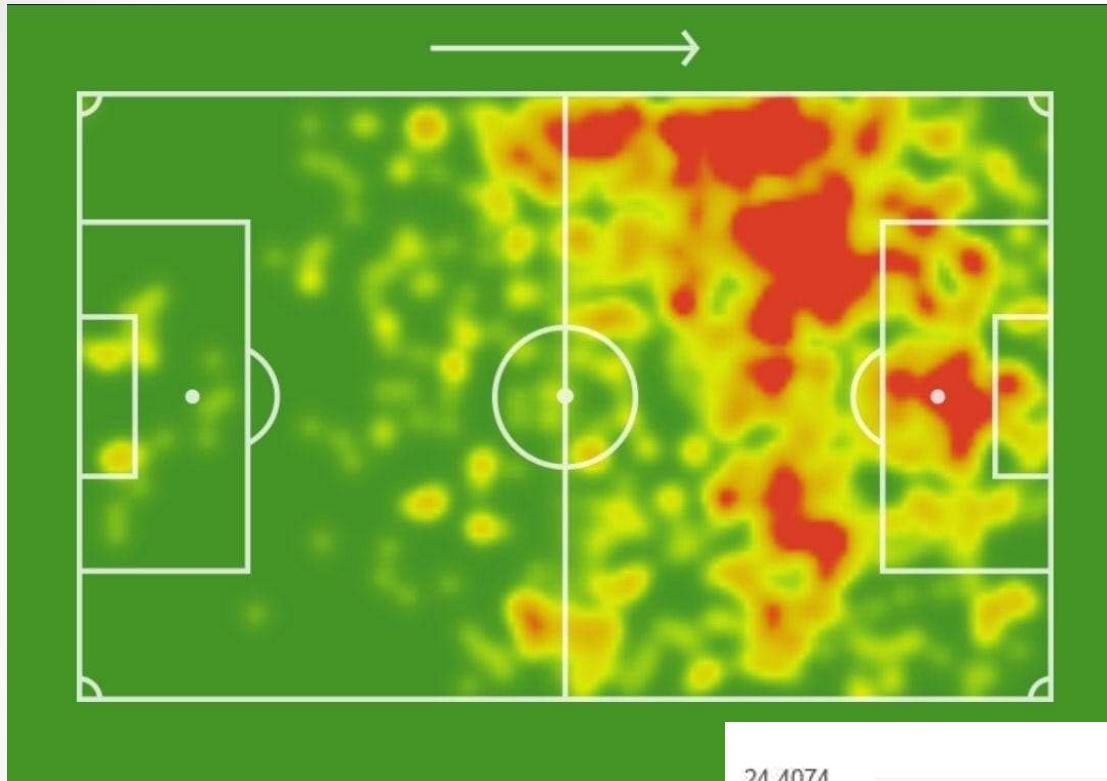


# Head mounted displays

- Video Microsoft Holo Lens



# Visualization

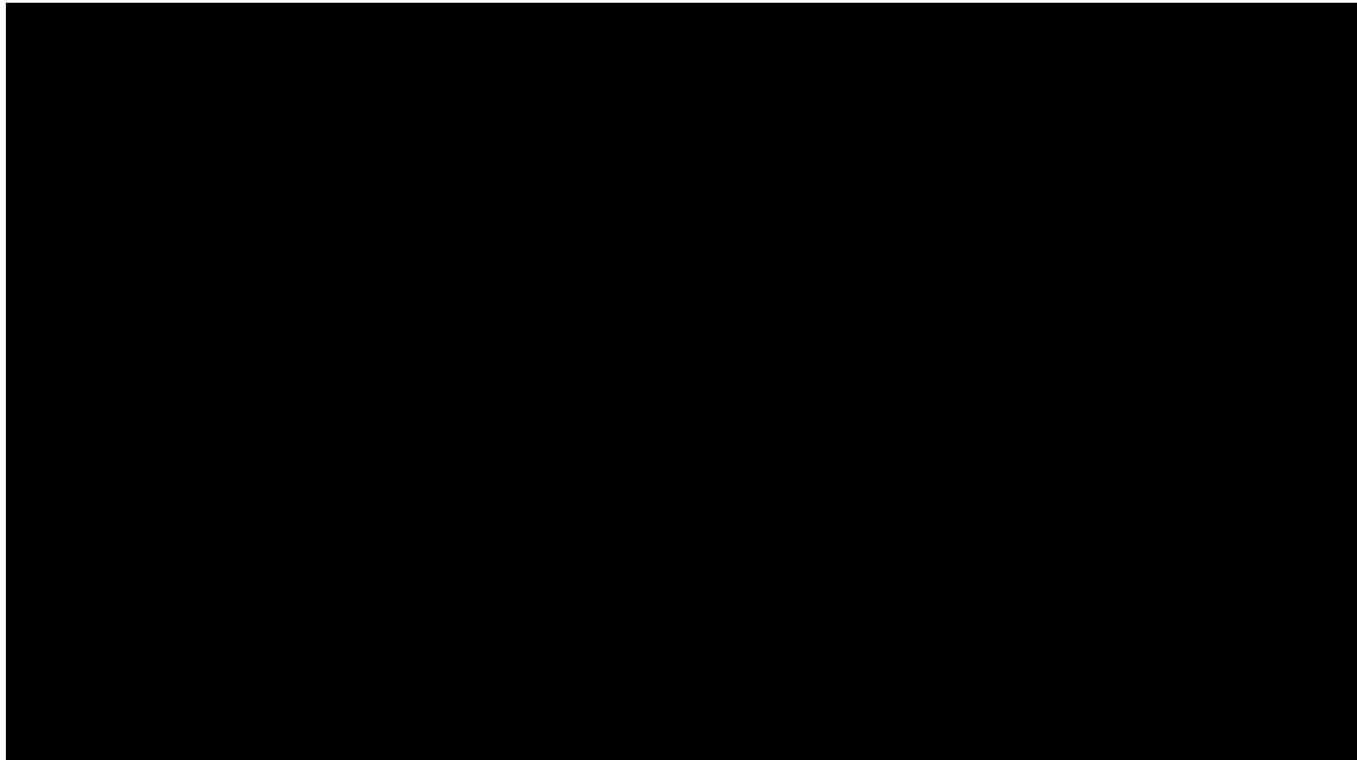


# Brain computer interfaces

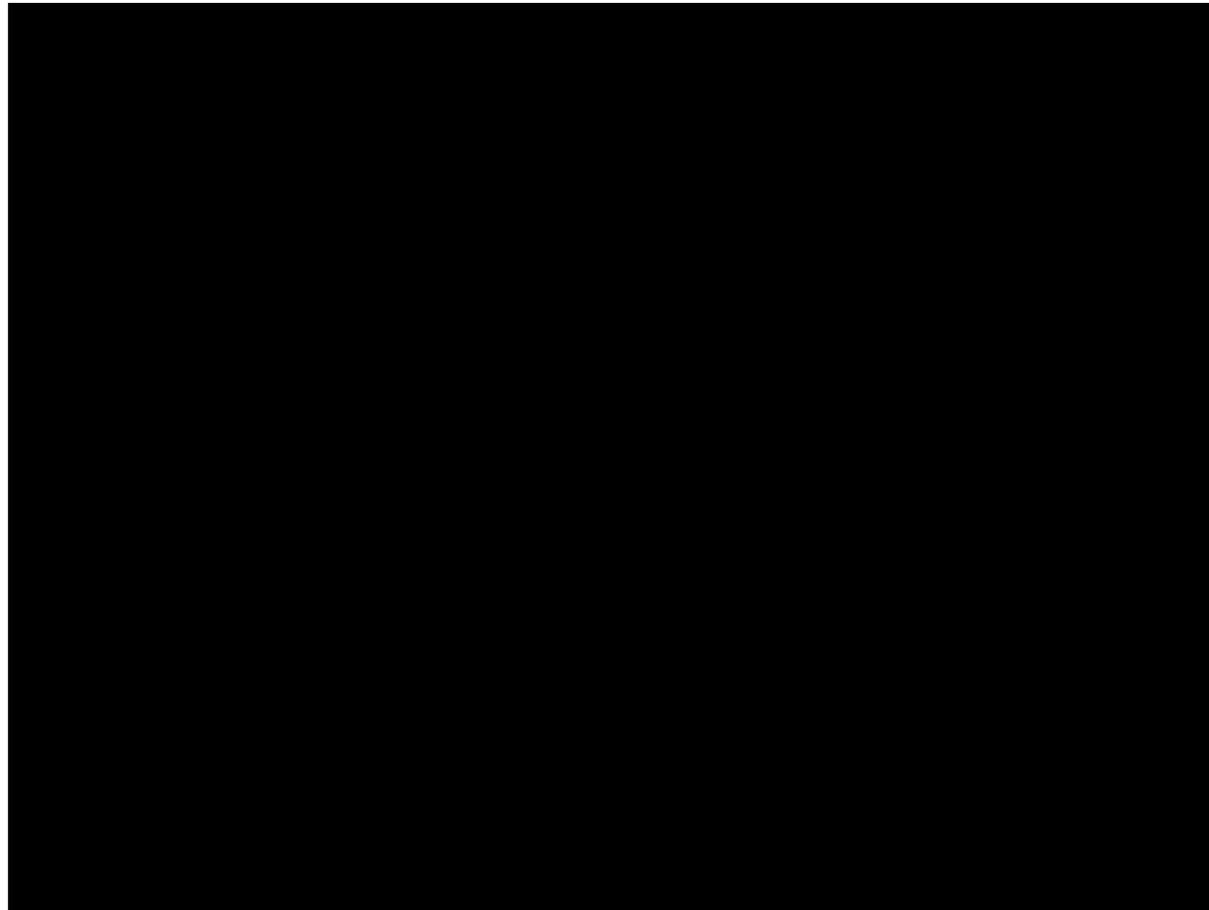
# Intuitive Interfaces



# Augmented Reality



# Tangible User Interface



# Assignment 1

- Write 1 paragraph for the future of any of the above technologies in 2035

# Test your self

- **www.kahoot.it**