Haute école d'ingénierie et d'architecture Fribourg
Hochschule für Technik und Architektur Freiburg

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Game Design & Development

Interaction + User Experience

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Interaction Design

- Interaction design is specifically a discipline which examines the interaction (via an interface) between a system and its user.
- It may also incorporate design focused on how information should be presented within such a system to enable the user to best understand that information.

User Experience Design

- User experience (UX) design focuses on the overall experience between a user and a product. It is not just concerned with the interactive elements but also the way that certain elements look, feel or contrive to deliver certain outputs (including dramatic elements).
- Interaction design can be considered a subset of UX design.

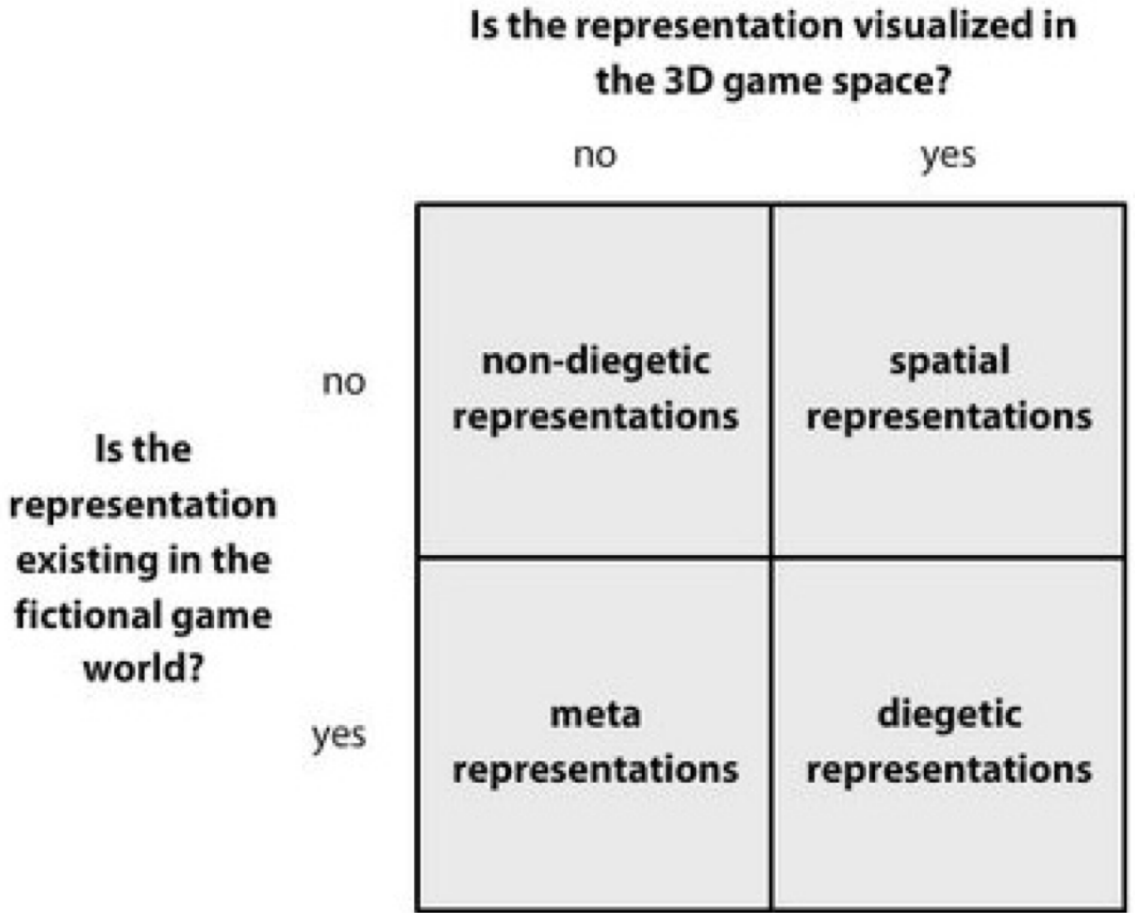
Interface

- User interface design in games differs from other UI design because it involves an additional element: fiction.
- This fiction can be directly linked to the UI, partly linked, or not at all.

UI & Narrative

- Types of interfaces depending on how linked to the narrative and game geometry they are:
  - Diegetic
  - Meta
  - Spatial
  - Non-diegetic

Fagerholt & Lorentzon's Model



Diegetic

- Diegetic user interface elements exist within the game world (fiction and geometry) so the player and avatar can interact with them through visual, audible or haptic means.
- Well executed diegetic UI elements enhance the narrative experience for the player, providing a more immersive and integrated experience.

Example of Diegetic UI

Metro 2033 uses a complete Diegetic UI with no HUD elements to help to support the game's narrative. It runs the risk of frustrating the player though slow response times but this forms part of the game mechanic.

The character's watch is used to measure how long the filter in the gas mask will last and how visible he is.

Meta

- Sometimes UI elements don't fit within the geometry of the game world.
- These UI elements can still maintain the game's narrative but sit on the 2D hub plane: these are called Meta elements.

Example of Meta UI

In Grand Theft Auto 4, interacting with the phone mimics the real world interaction but the actual UI element of the phone appears on the 2D hub plane, hence it is a meta element.

Spatial

- Spatial UI elements are used when there's a need to break the narrative in order to provide more information to the player than the character should be aware of. They still sit within the geometry of the game's environment to help immerse the player and prevent them from having to break the experience by jumping to menu screens. The closer these follow the rules of the game's fiction the more they can help immerse the player.

Example of Spatial UI

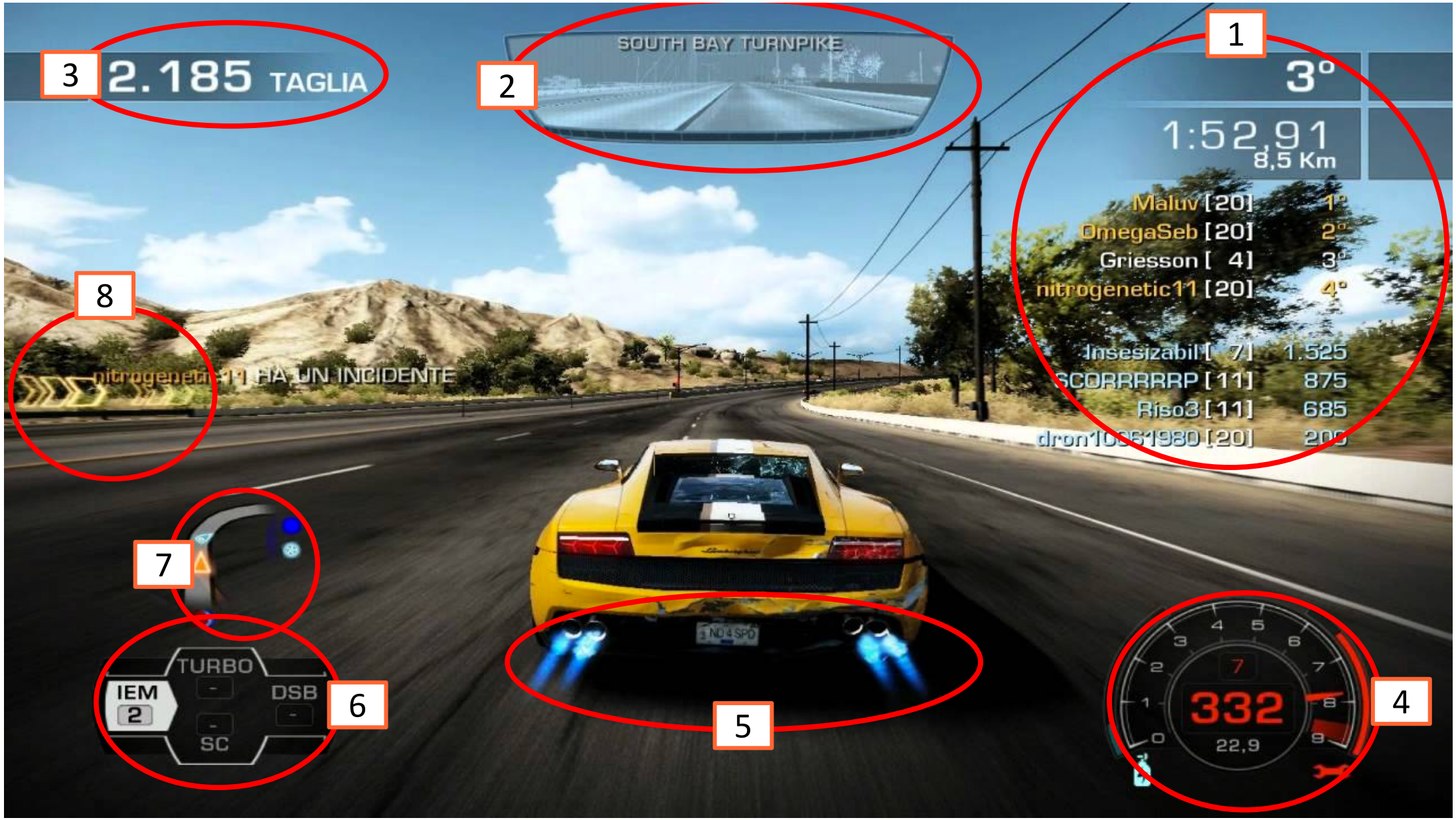
Splinter Cell Conviction also adopts Spatial elements in the form of projections that illustrate objectives within the game world. Their scale does seem to challenge the fiction slightly more than other examples. Writing is overlaid in to the environment to communicate messages to the player rather than the character.

Non-diegetic

- Non-diegetic elements have the freedom to be completely removed from the game's fiction and geometry and can adopt their own visual treatment, though often influenced by the game's art direction. These elements are best used when the diegetic, meta and spatial forms provide restrictions that break the seamlessness, consistency or legibly of the UI element.

Example of Non-diegetic UI

Mass Effect 3 uses many Non-diegetic UI elements in order to inform the player of the character's selected weapon and power. These elements still inherit the visual style associated with the game world.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Game User Interface

- There are many kinds of UI for games:
  - 2D
  - 3D
  - First Person
  - Third Person
  - Et cetera
- Designers and developers have a vast freedom but it is important to create usable and consistent interfaces.

Usability

- Software for Work versus Software for Fun
- Work is less productive if the software is unnecessarily hard to use.
- Games are not fun unless some difficulty is involved.
- Example: “Solve Problem” Button.

Wrong Ideas on Game Usability 1

- “Usability is not an issue because games are supposed to be challenging”: the game has to respect the designed challenge not the difficulty of controlling it, this could make the user go out of the Flow zone.
- “User tasks are indeterminate, after all, people can and should do anything they want in a game!”: Concept of the game implies that player will do certain activities, Need to make sure required interactions do not impair fun.

Wrong Ideas on Game Usability 2

- “We like it, so what's the problem?”: Developer's intuitions about usability are usually wrong. If you built it, you can't see it from point of view of actual user (user-centered design and playtesting).
- “Sales are good, so we must be doing OK.”: Effects of poor usability happen after the sale, not before - what do former purchasers think? If nobody complained it is because people do not bother to complain.

Usability is a Scientific and Technical Issue

- Focus on:
  - **Ease of learning** (Can the system be learned quickly and easily, either for the long term, or for immediate, "walk up and use," purposes?)
  - **Ease of use** (Can the system be used to accomplish work rapidly, accurately, and without undue effort?)
- If a system is difficult to learn or to use, customers are likely to be dissatisfied eventually, even if it is a market success at first.

Dev Approach for Usable Games

- Write out the Entertainment Goal.
- Identify what is actually difficult about the game (user-centered design and Apply standard usability techniques).
- Identify the difficulties that are not part of the Entertainment Goal.
- Fix the instrumental difficulties with standard usability design concepts.

Development Technique

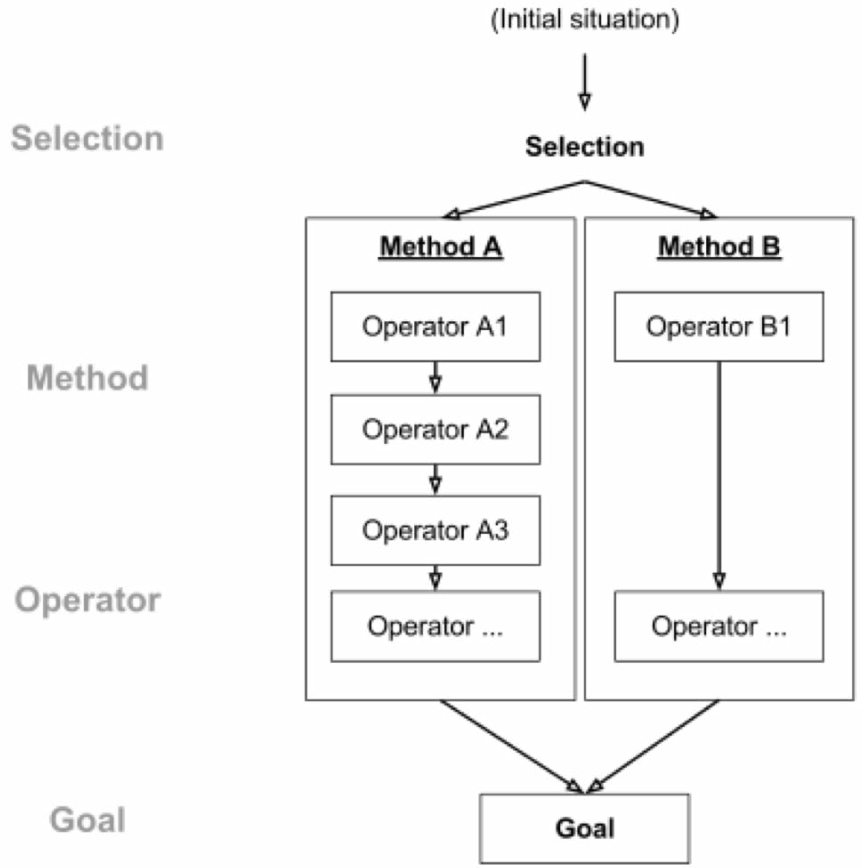
- Perform a task analysis.
- Choose system functions that will support the task.
- Choose and adopt some usability specifications.
- Choose initial interface design for chosen functionality.
- Evaluate the usability of the design.
- Correct identified problems.
- **Iterate**.

GOMS Model

- GOMS is a specialized human information processor model for human-computer interaction observation that describes a user's cognitive structure on four components.
- A set of **Goals**, a set of **Operators**, a set of **Methods** for achieving the goals, and a set of **Selections** rules for choosing among competing methods for goals.

GOMS Model Structure

- A GOMS model is composed of methods that are used to achieve specific goals.



GOMS Model Elements

- Goals are symbolic structures that define a state of affairs to be achieved and determinate a set of possible methods by which it may be accomplished.
- Operators are elementary perceptual, motor or cognitive acts, whose execution is necessary to change any aspect of the user's mental state or to affect the task environment.
- Methods describe a procedure for accomplishing a goal.
- Control Structure: Selection Rules are needed when a goal is attempted, there may be more than one method available to the user to accomplish it.

Example: PEGASO project

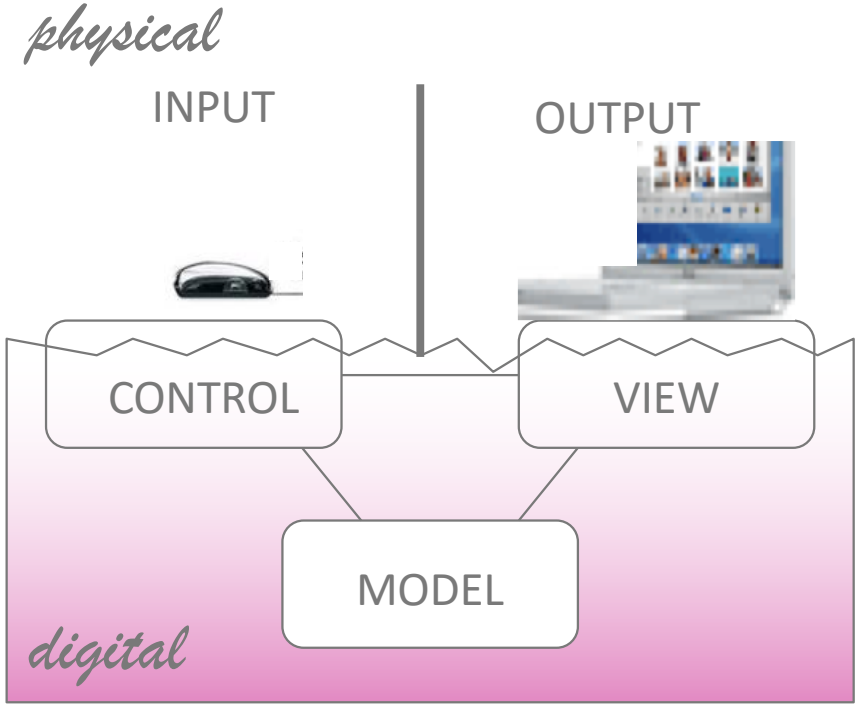
Gesture

Button

Thumbstick

Interaction Model: MVC

- MVC (Model-View-Controller): a technical model for GUI software design
- Provides a tool for studying the conceptual architecture of graphical interfaces.



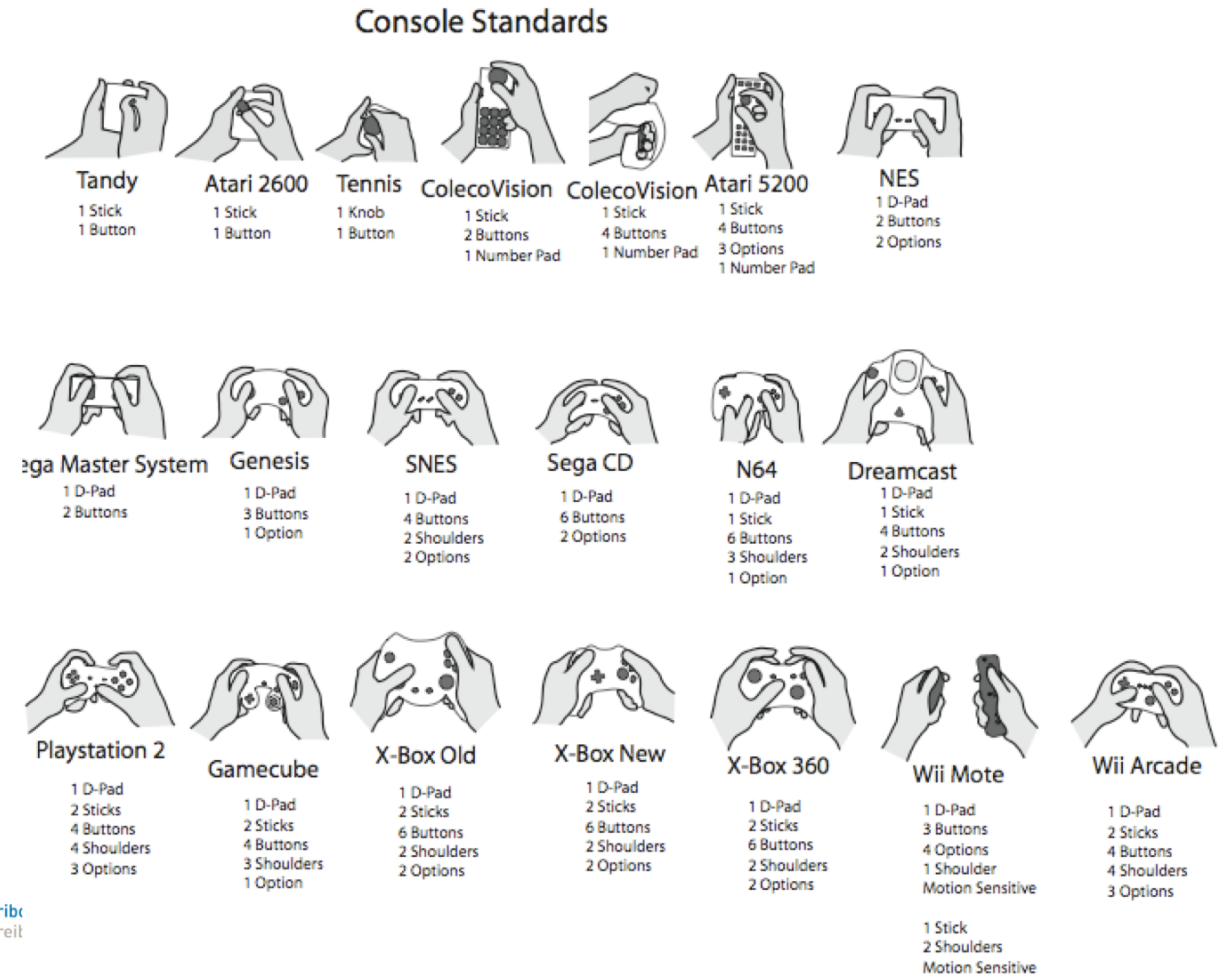
View / Control

- Highlights the separation of the GUI between the visual representation (or view) provided by the graphical display and the control capacity mediated by the input device of the GUI.

Input

- Joypad
- Touchscreen
- Cockpit
- Gestures
- Body Motion

Example: Joypad



Example: Playstation Joypad

Example: Cockpit

Example: Gestures

Example: Body Motion

Output

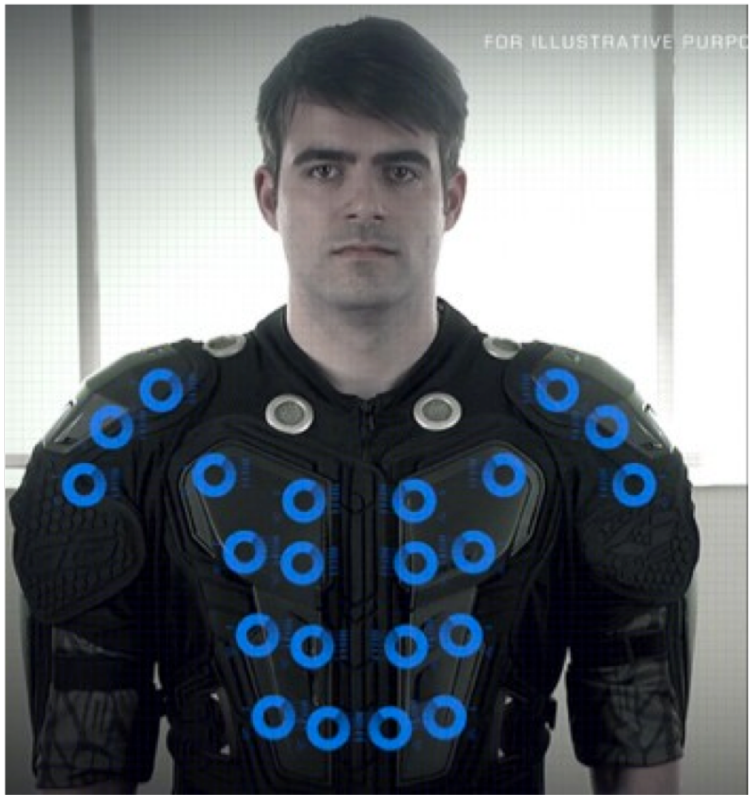
- Display
- Audio
- Vibration
- Movement
- Functional electrical stimulation

Example: Motion Simulator

Example: Araig

Vest providing multiple forms of feedback:

- Vibration
- Electrical muscle stimulation
- Sound (on the collar)



Example: Muscle Stimulation

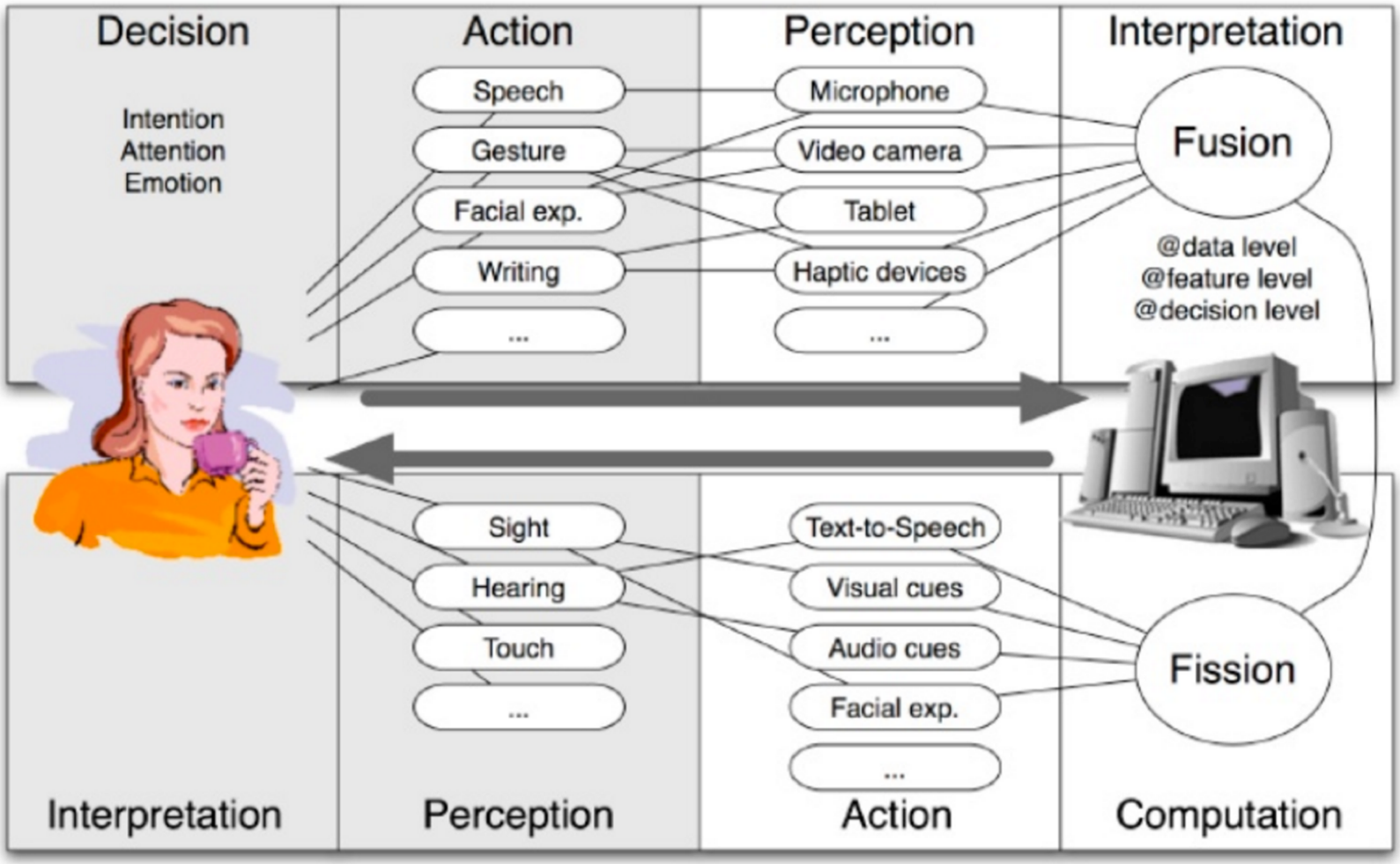
Multimodality

- Multimodality describes communication practices in terms of the textual, aural, linguistic, spatial, and visual resources - or modes - used to compose messages.

Multimodal Interaction

- Multimodal interaction: the situation where the user is provided with multiple modes for interacting with the system.
- Multimodal interfaces process two or more combined user input modes (such as speech, pen, touch, manual gesture, gaze, and body movements) in a coordinated manner with multimedia system output.

Multimodal Interaction Model



Example: Birdly

Virtual Reality

- Virtual reality (VR) is a computer technology that replicates an environment, real or imagined, and simulates a user's physical presence and environment in a way that allows the user to interact with it. Virtual realities artificially create sensory experience, which can include sight, touch, hearing, and smell.

Example: Oculus Rift + Leap Motion

Augmented Reality

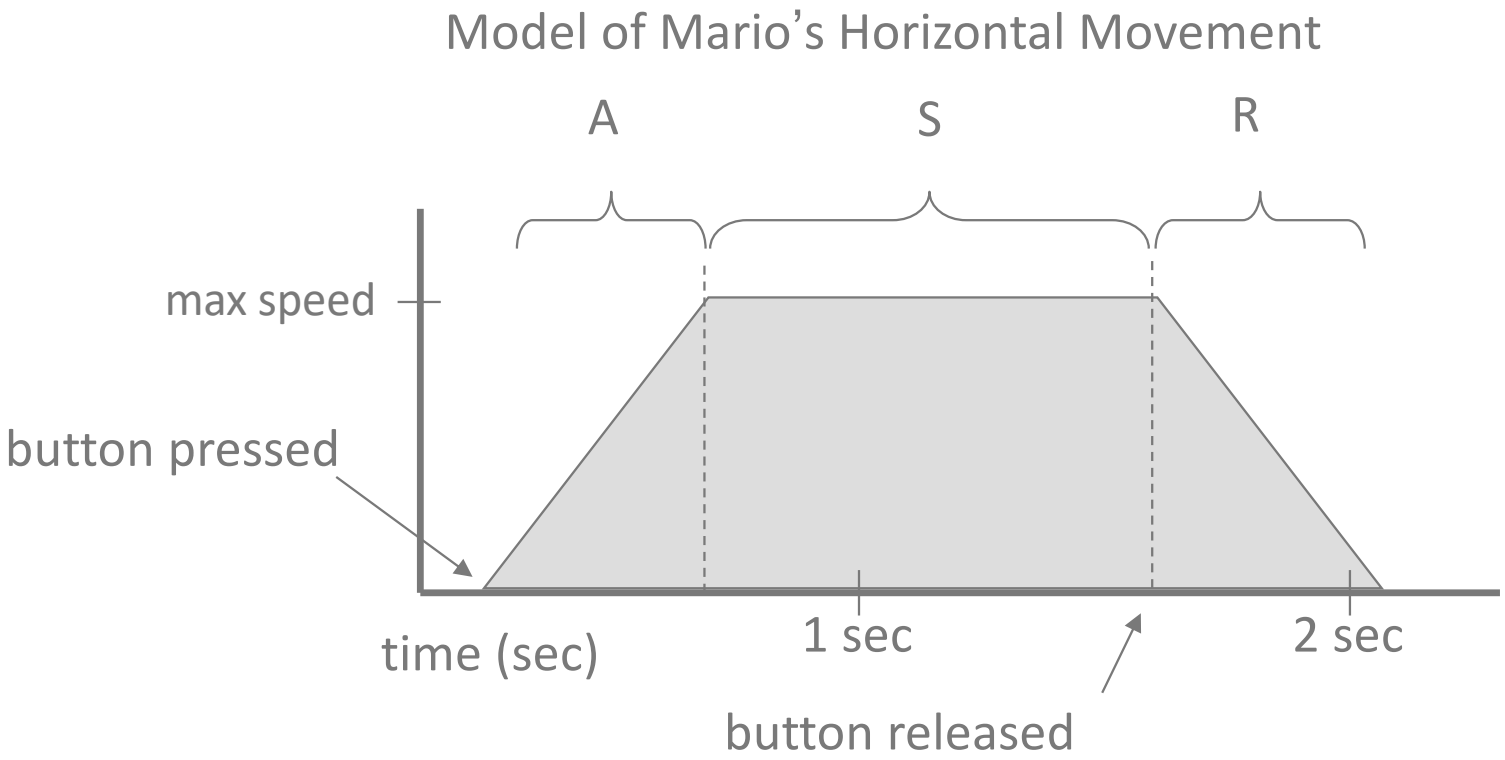
- Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data.
- It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. As a result, the technology functions by enhancing one's current perception of reality.

Example: Microsoft HoloLens

Attack, Decay, Sustain, Release

- Controller inputs are mapped to in-game parameters
  - Example: right D-Pad arrow mapped to forward motion in Super Mario Bros.
- The magnitude of the response of a parameter to a control over time is critical to the “feel” of that control
- A framework for thinking about this time response is:
  - Attack
  - Decay
  - Sustain
  - Release

Example: ADSR for Super Mario



Aesthetics of Interaction

Wrap-up

- Types of interfaces, usability and development techniques.
- Interaction model and modes of input/output, multimodality.
- Virtual reality and augmented reality.
- ADSR model.

Questions?