ADAPTIMES

Video games for education by ADAPTIMES (ADAPTIve player-centric serious video gaMES)

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RESEARCH & INNOVATION
MARIE CURIE ACTIONS

ADAPTIMES

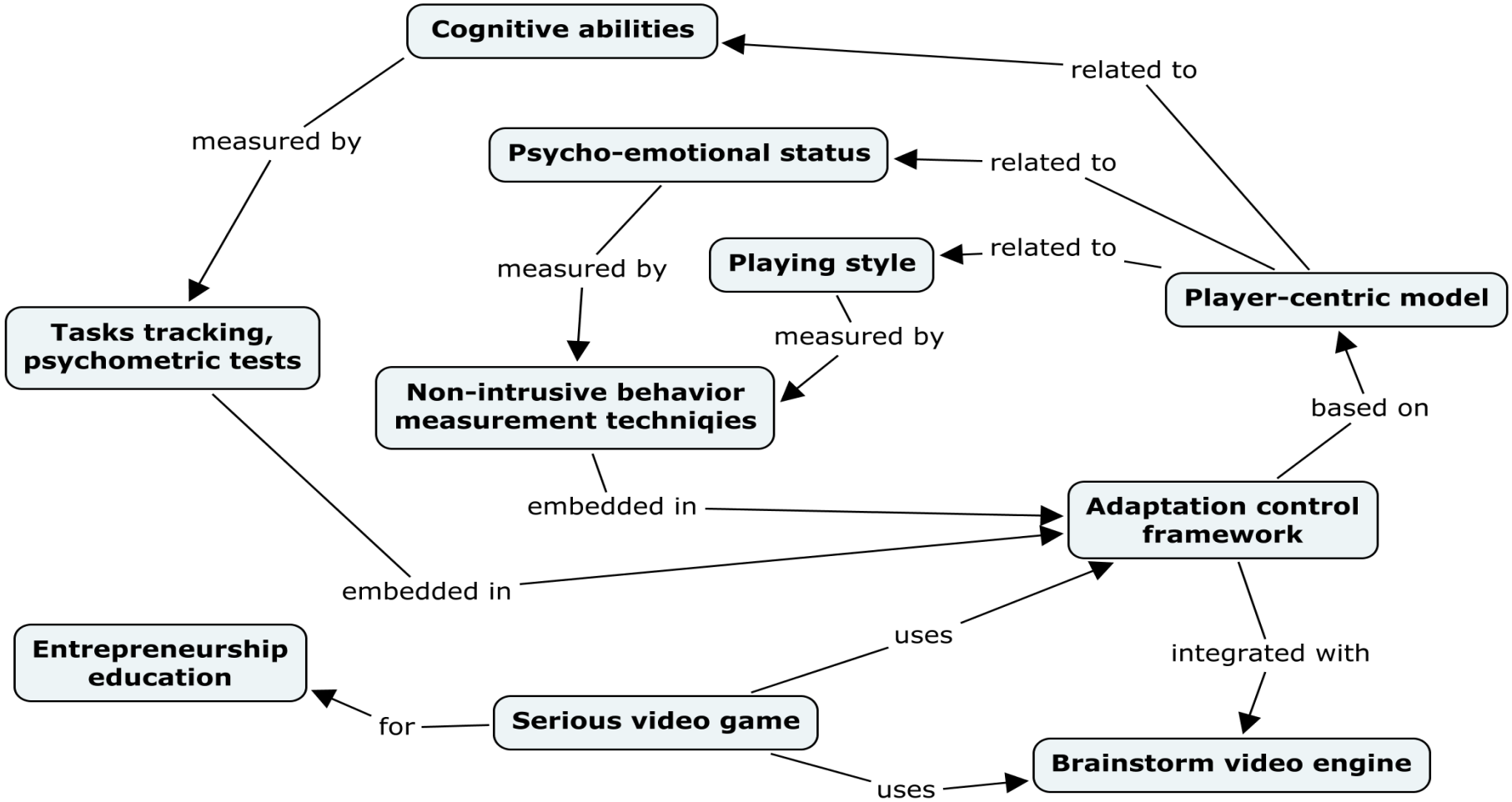
(ADAPTIve player-centric serious video gaMES)

- Funded under PEOPLE MARIE CURIE ACTIONS as an Intra-European Fellowship (IEF), Call: FP7-PEOPLE-2013-IEF
- Aims at investigating how
  - ❖cognitive abilities,
  - ❖psycho-emotional processes and
  - ❖playing styles

  can be used for realization of efficient player-centric adaptivity in serious games for entrepreneurship education
- Hosting organization: Brainstorm Multimedia S.L. , Spain
- Duration: August 2014 – July 2016

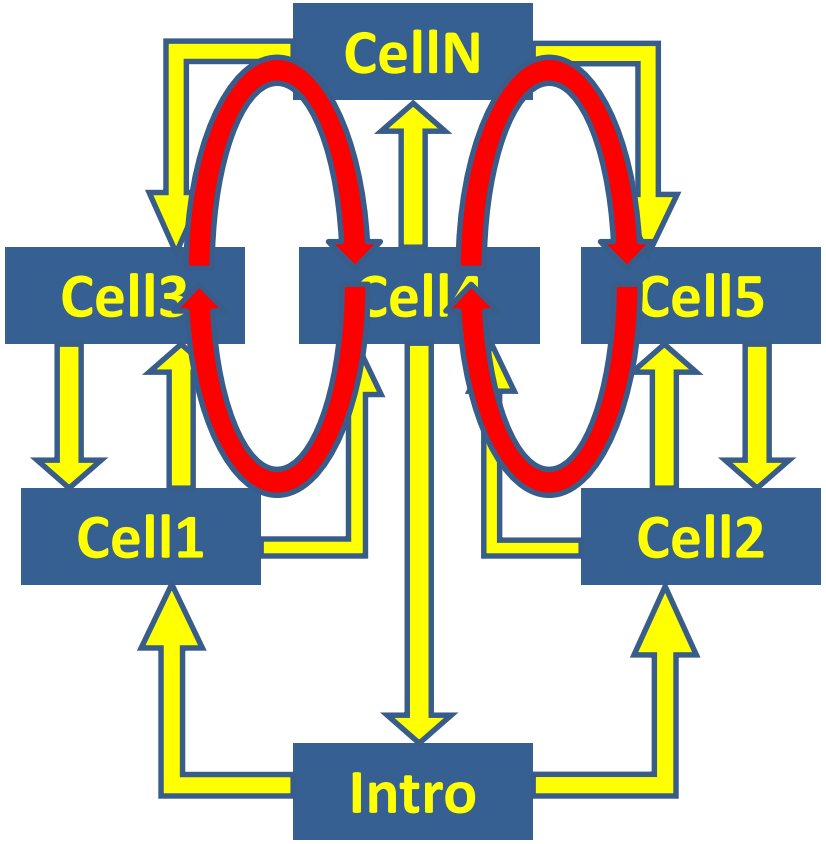
Research findings will address behavioral patterns,

ADAPTIMES conceptual mind map



Psycho-emotional status and playing style

Customizable video games for education



Imagine a maze as an educational game.

ADAPTIMES

forms & textures

forms & textures

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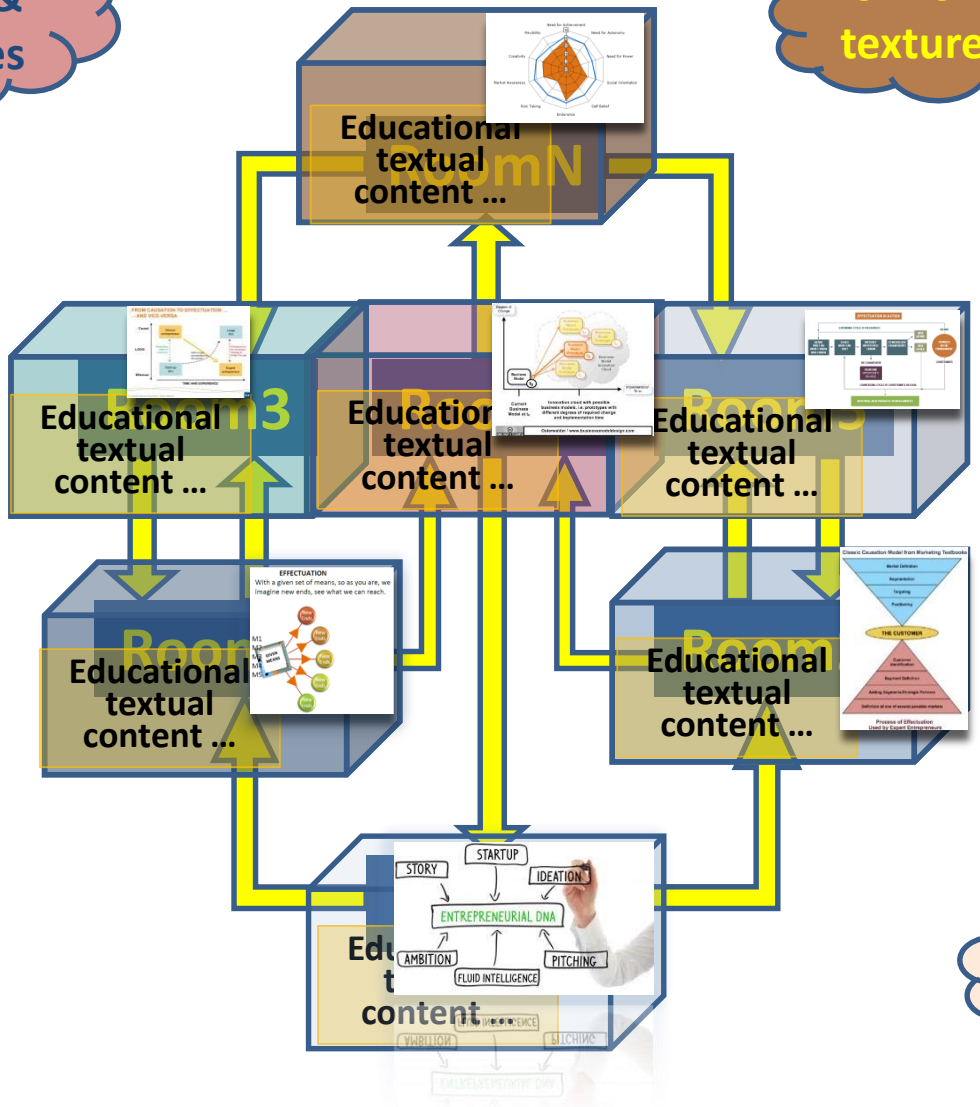
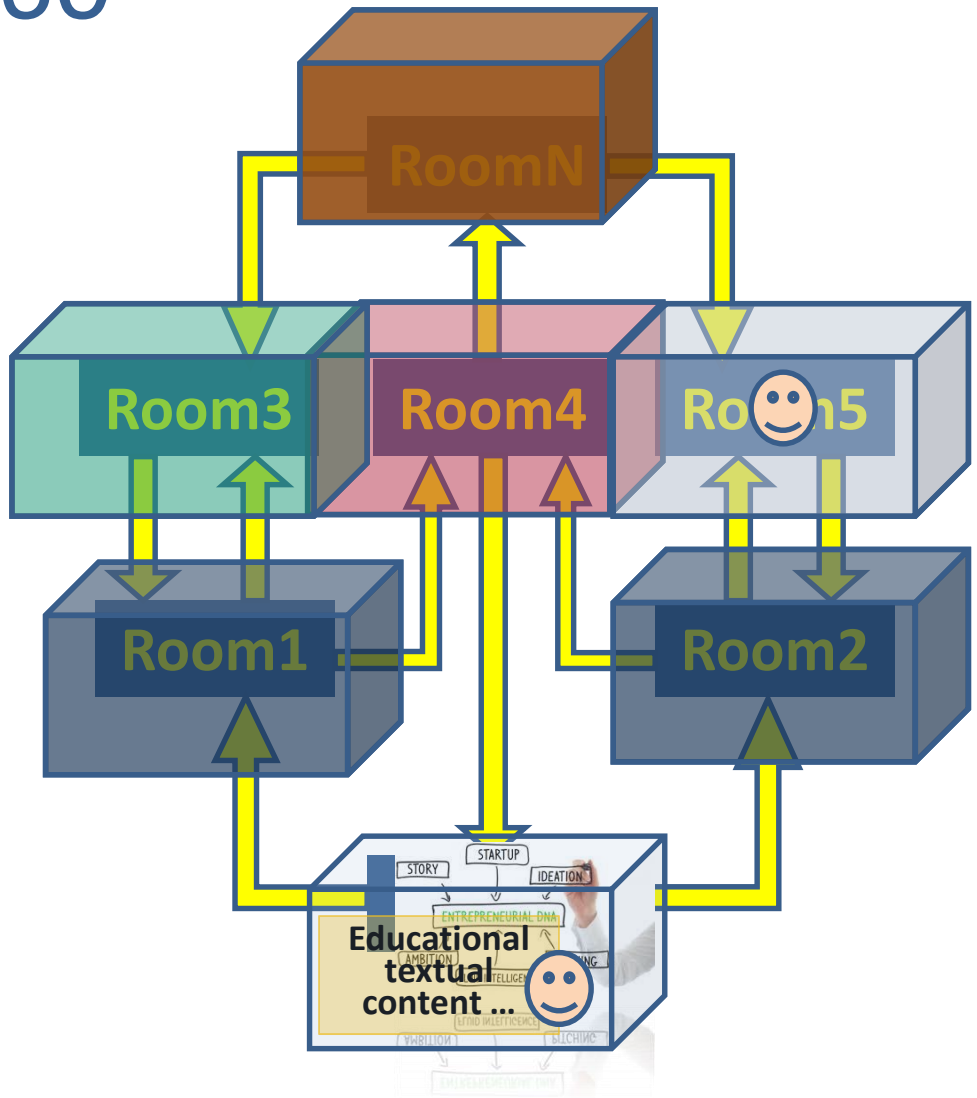


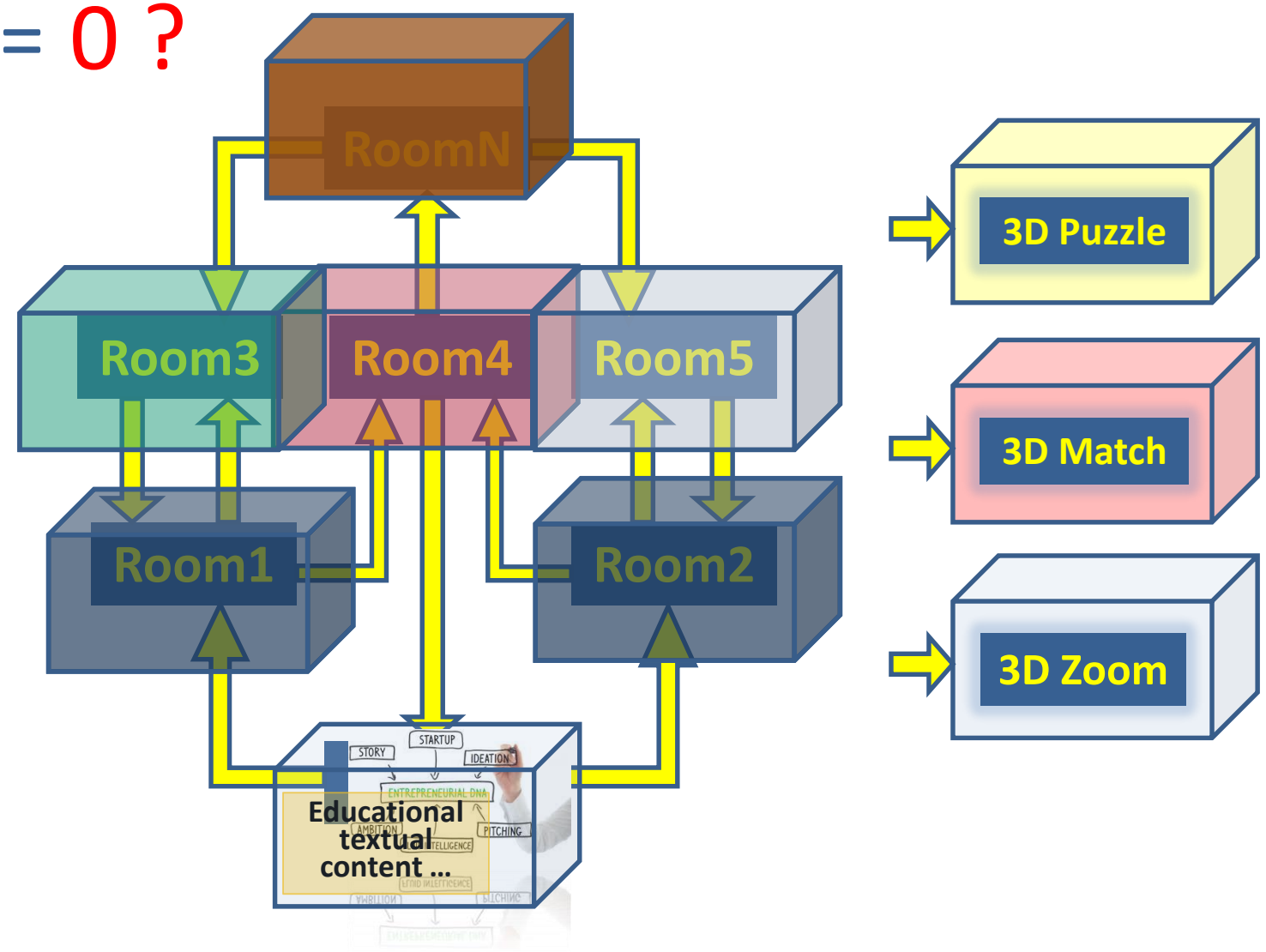
Now imagine 3D rooms instead 2D cells.

Points = 60



So player moves from room to room but not for free.

Points = 0 ?



When Points = 0, what next? Game over?

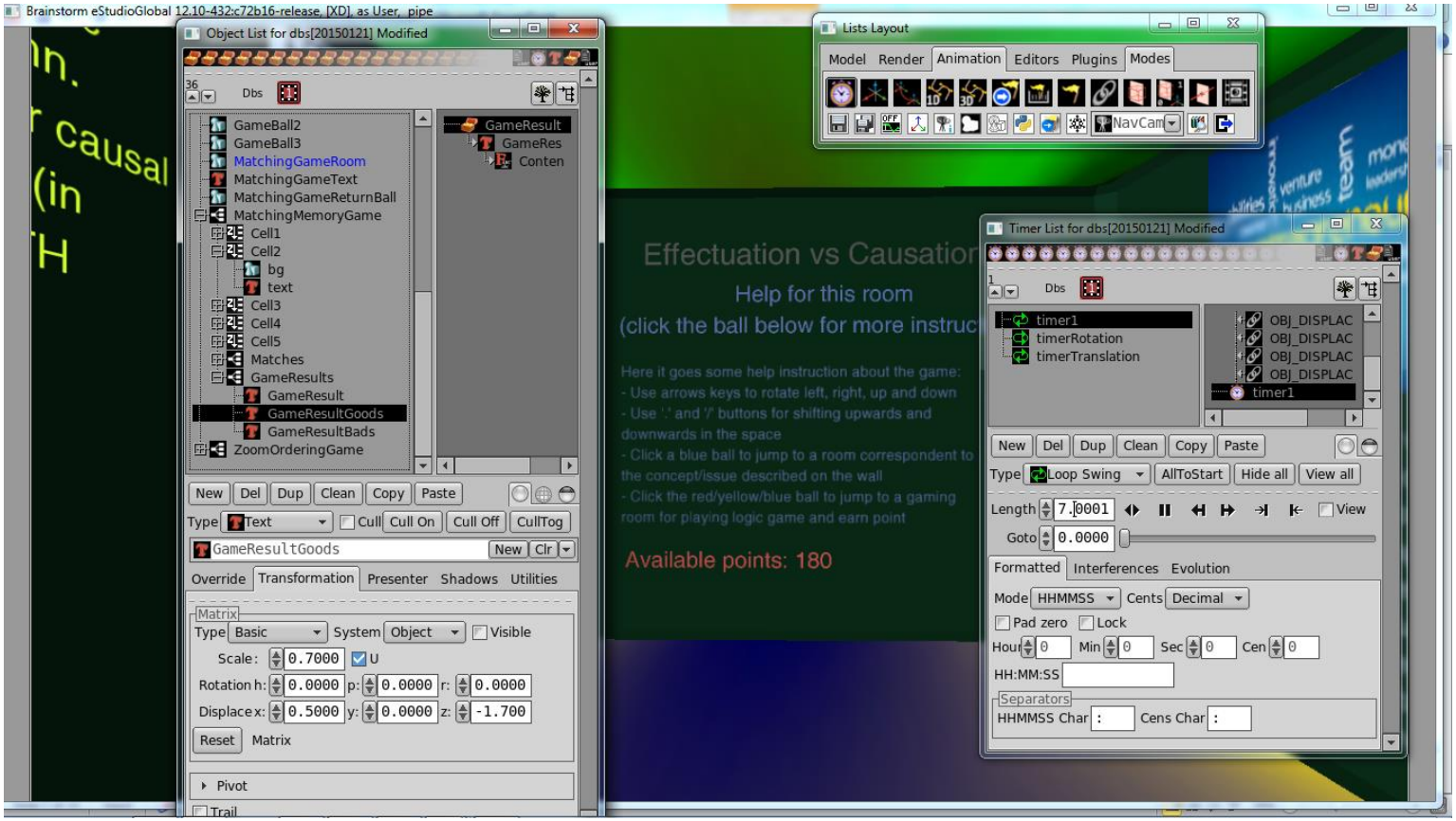
Pro-Effect - entrepreneurship education video game

- 3D maze created and customized only by editing text files (no programming experience needed)
- Customizable player help for each room
- Educational texts and graphics from papers about Effectuation theory (http://effectuation.org/)
- 3D mini-games for earning points
  - 3D matching game with entrepreneurial concepts
  - 3D ordering zoom game (pictures by *Istvan Banyai*)

The 3D maze alternates light and dark rooms, where

The Pro-Effect Game

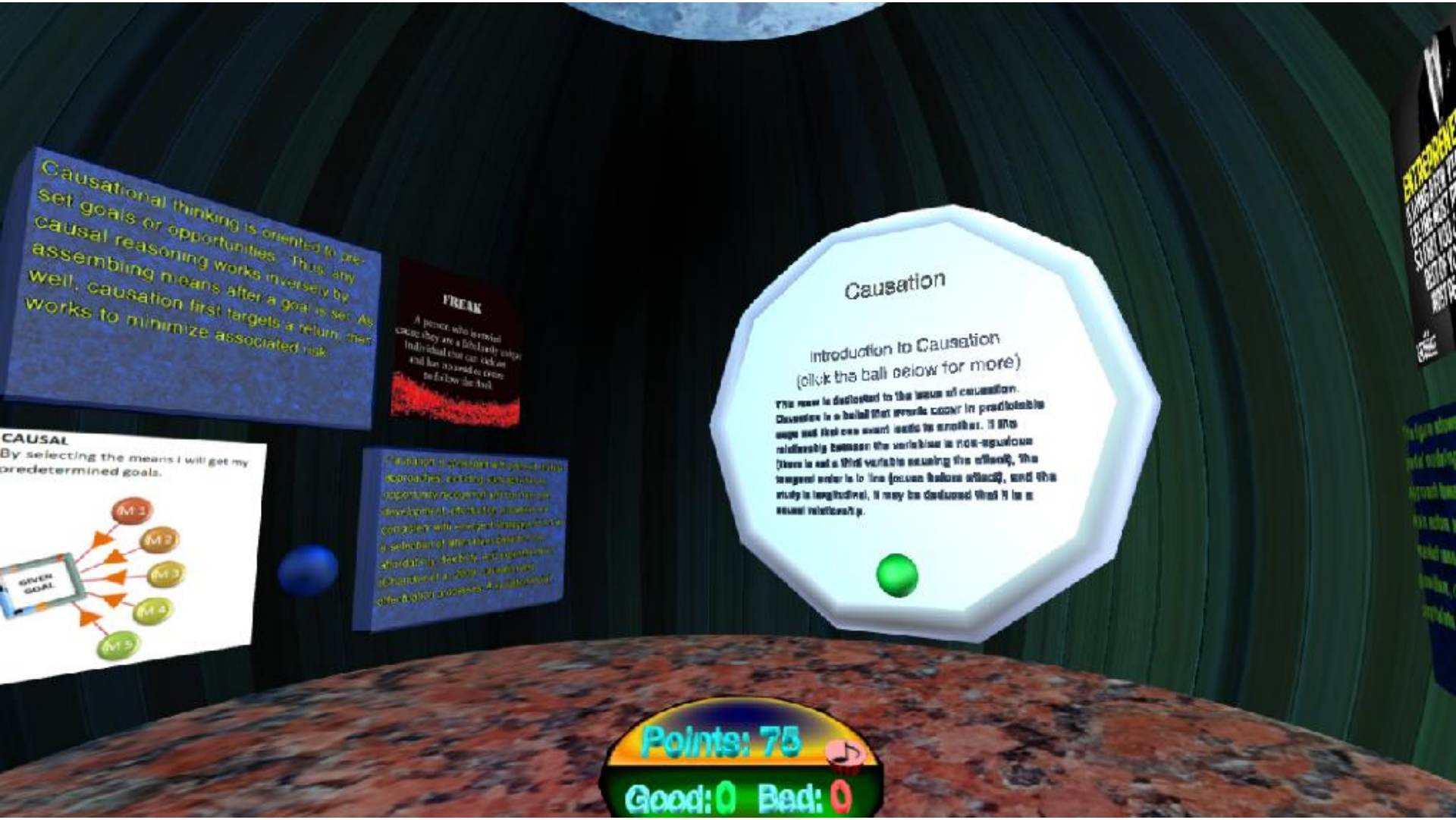
- Developed by the Brainstorm eStudio - http://www.brainstorm.es/



See http://www.brainstorm.es/products/estudio/

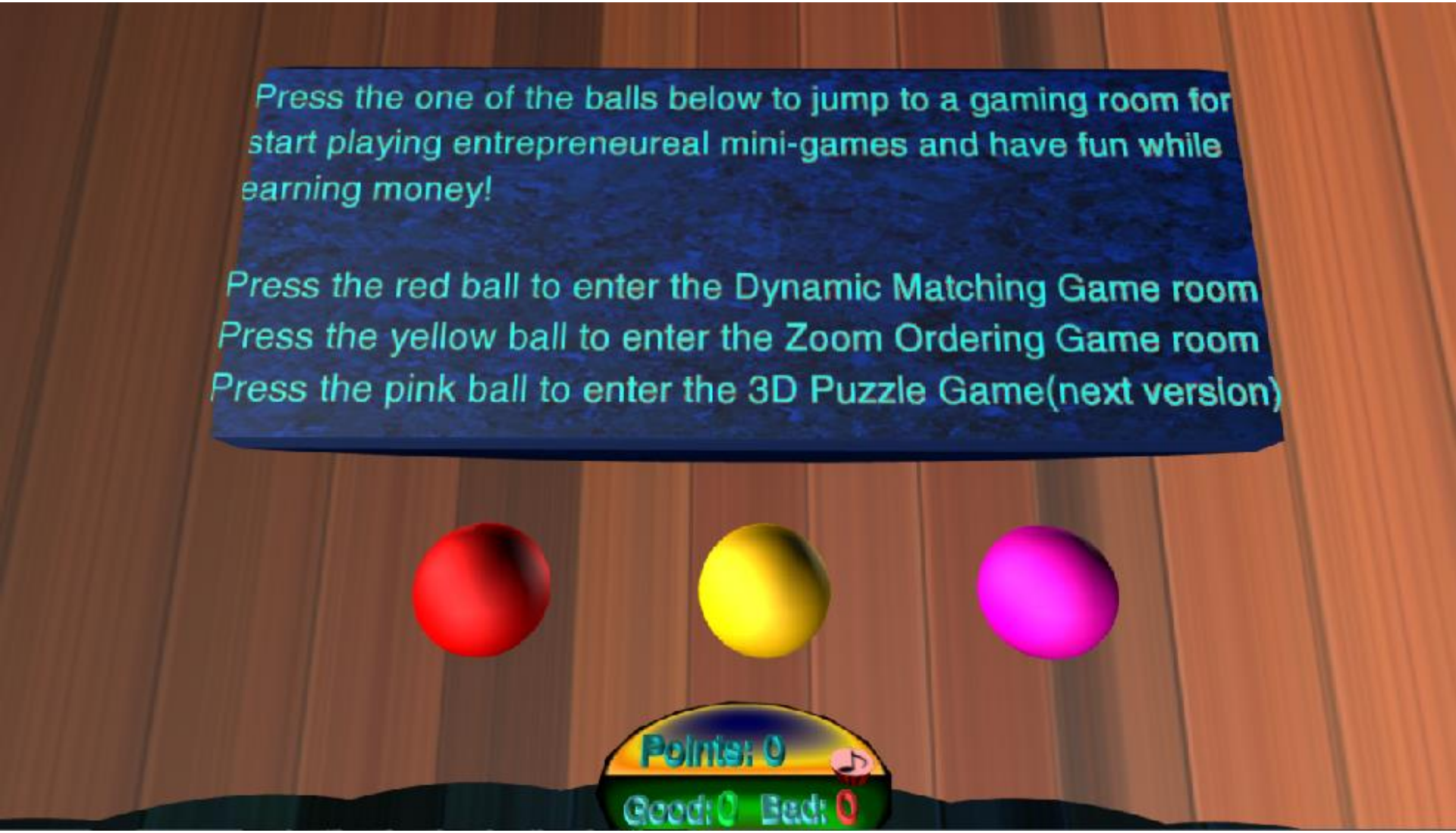
In the entrance room player starts with 100 points

For passing to the next room, player pays by points.



Next room is about Causation.

In one of the next room (about effectuation principles)



Let choose the first option -

In this game, player has to match some

Next, in Zoom ordering game, players have to

Benefits of mini-games

- Develop 3D spatial thinking and skills
- Enhance context-dependent thinking
- Provides additional learning content
- Can be used for self-testing
- Have dynamic game play and make fun
- Can be used as a base for ADAPTATION

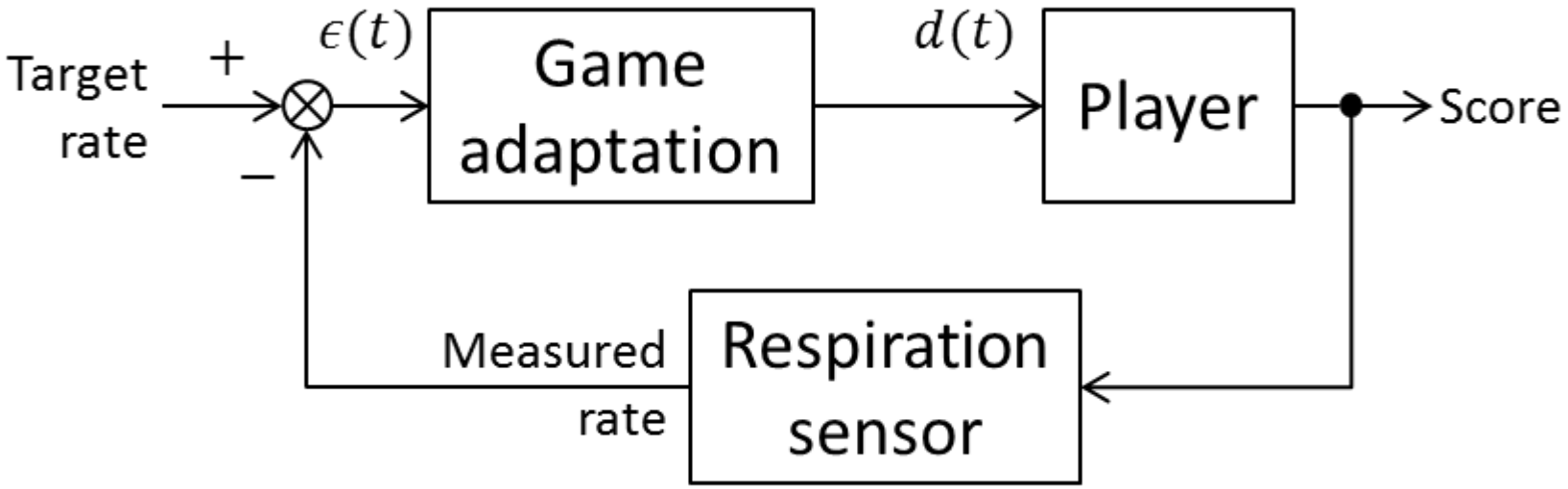
In both the mini-games, players have to explore

Possible enhancements

- 3D graphics
  - Rooms/flats/caves/…
  - Small interior objects
  - Gateways
- Graphic tool for:
  - Maze construction
  - Maze customization
  - (Game rules)
- N-to-1 matching games
- Mini-games customization
- 3D puzzle as a creation mini-game
- **Adaptation**

All the game enhancements

Next step – ***player-centric adaptation***



Source: http://psi.cse.tamu.edu/portfolio_item/biofeedback-games-2/

Adaptive video games – **goal of player-based adaptation**?

Why player-based adapted?

- Use of unobtrusive, accurate and robust HW devices for measuring physiological signals
- Immersive games
- Affective gaming
- Player's boredom detection
- Greater player's satisfaction
- Efficient game-based learning
- …

To be challenged as a next step in ADAPTIMES.

Adaptive video games – **subjects of player-based adaptation**?

What can be adapted?

- Game mechanics (rules, actions, data structures…)
- Game dynamics (run-time behavior of the mechanics)
- Game aesthetics (emotional responses evoked in the player)
- Game content (texts & graphics)

This is an educational game with simple mechanics,

Adaptive video games – **base of player-based adaptation**? 1/2

What can be used as a base for player-centric adaptation?

- Player performance
  - Assessment of tests, choices, quest and tasks
  - Quizzes
- Playing styles
- Player's behavior - actions and motor skills
  - Mouse, keyboard or joystick input (clicks)
  - Eye tracking
  - Biofeedback - gestures & postures tracking, temperature, …..

In last decades, player's behavior is a proven base

Adaptive video games – **base of player-based adaptation**? 2/2

What can be used as a base for player-centric adaptation?

- Player physiological bio-signals & parameters/affective state (to differentiate discrete emotions, e.g. anger, joy, sadness, etc.):
  - Electro-Dermal Activity (EDA) – referred as Galvanic Skin Response (GSR), Skin Conductance Response (SCR) or Psycho Galvanic Reflex (PGR)
  - Heart Rate (HR), Heart Sound (HS), Heart Rate Variability (HRV) and Blood Volume Pulse (BVP)
  - Electrocardiogram (ECG)
  - Electromyography (EMG), electroencephalography (EEG), functional magnetic resonance imaging (fMRI), … - much more expensive

Most probably, two or three bio-signals will be enough

Adaptive video games – **ways for player-based adaptation**?

How to?

- Visual and audible effects introduced to the game when particular EDA and HR signal threshold combinations are met (like in modified Half Life 2, by Dekker & Champion)
- Adaptation of player dynamic – speed (linear & radial), acceleration, show time, focus (based on eye tracking)
- Pattern recognition and machine learning methodologies for reliable emotion recognition – after analysis of adaptation's effects
- …

We could start first by signals' threshold adaptation

Problems of biofeedback adaptation

- Lack of cheep integrated devices
- Data synchronization

Image: http://www.cooking-hacks.com/

Other problems and needs

- Data processing – signal/noise, curation
- Psychological interpretation – how to react/adapt?
- Adaptation analysis
- Machine learning
- Re-develop the game by Unity 3D
- NPC's and agents

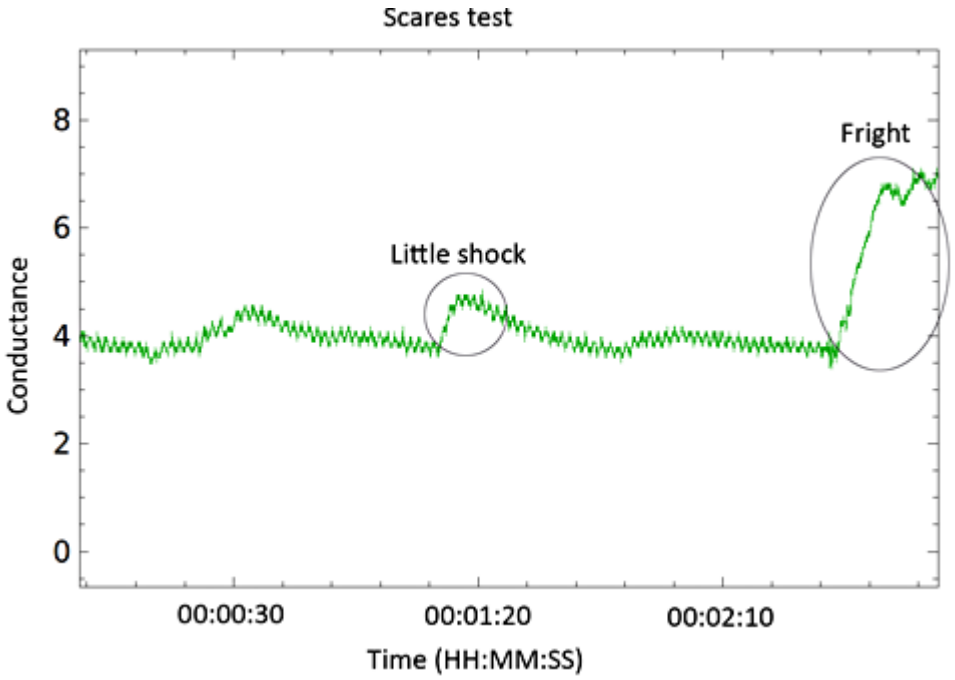


Image: http://www.cooking-hacks.com/

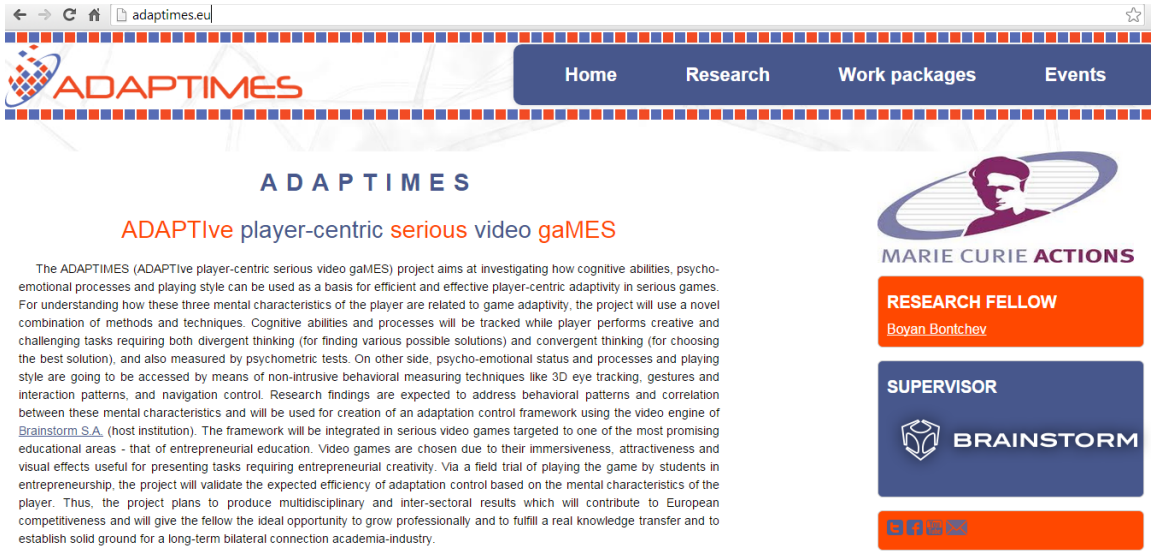
YouTube video

- https://www.youtube.com/watch?v=jdbKhRDwXWo

Video track of game play with the Pro-Effect game

Thank you for your attention!

- Questions and
- Proposals?



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SEVENTH FRAMEWORK PROGRAMME

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