Màster Universitari en Neuroenginyeria i Rehabilitació

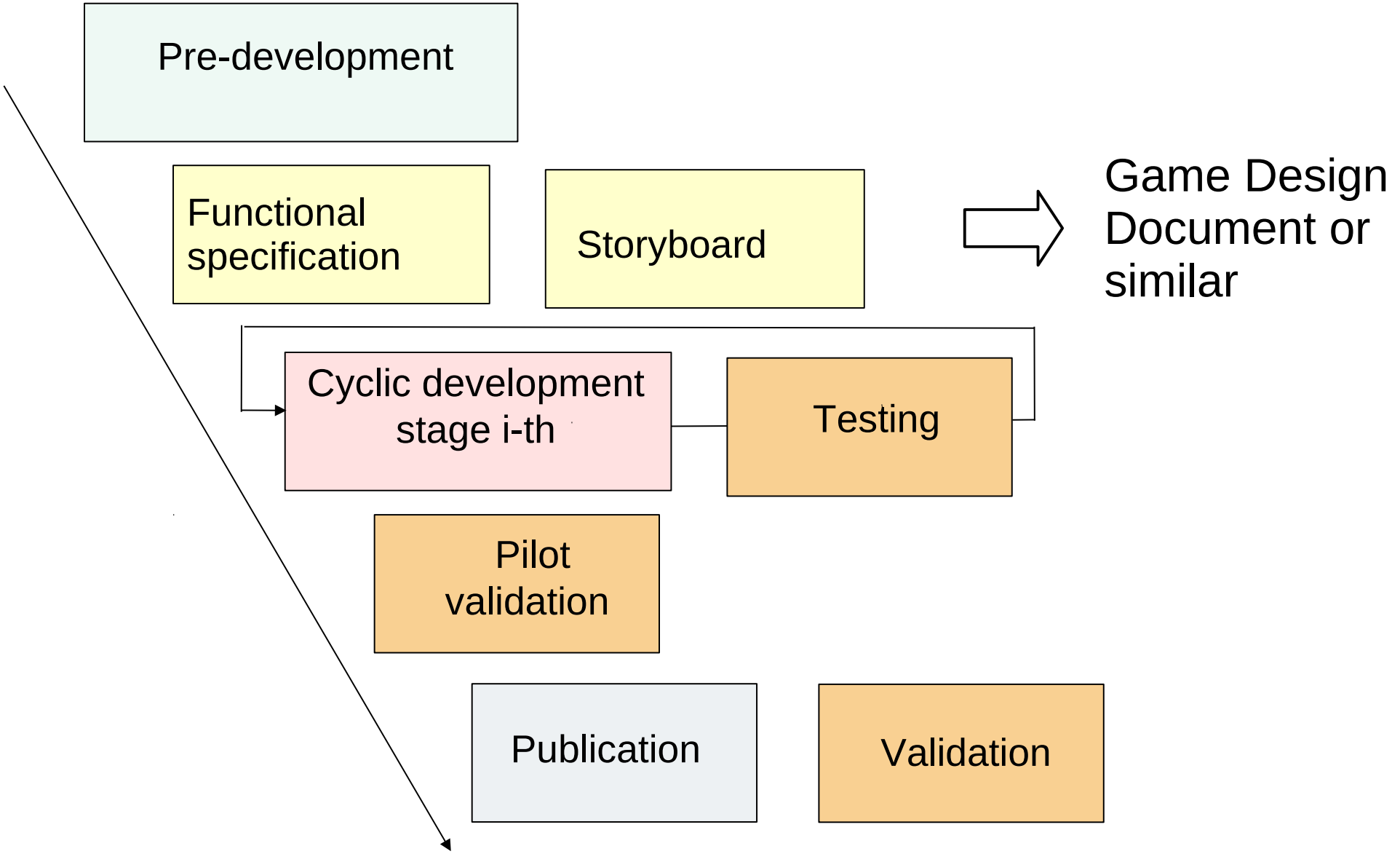
Course on Virtual Reality & Serious Games

Session 6

Game design
Gamification elements

Dani Tost

Steps



GDD – Game concept

The Game Design Document (GDD) is a live document written before the development of the game (Game concept) and extended later in *Game Functional Specification* and *Game Technical Specification documents*.

The Game concept expresses the core idea of the **leisure** game:

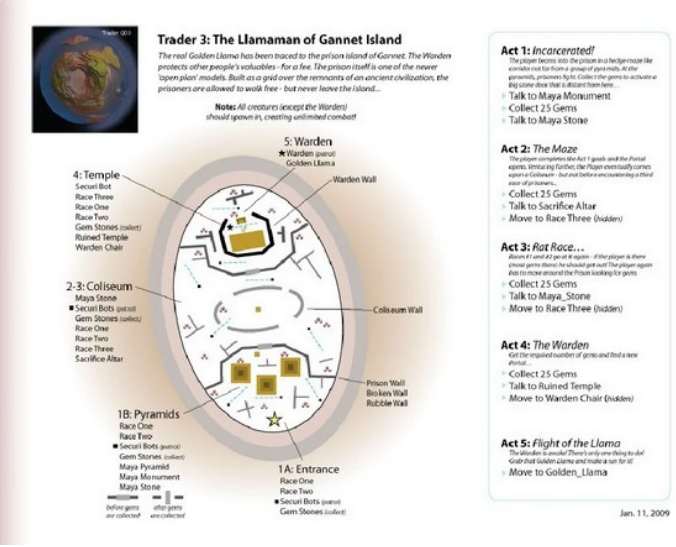
- Introduction: Brief appealing description of the game/app (**game genre**)
- Background/ Game Premise (see pre-development)
- Description of the game story and game play
- Key features: List of relevant items (selling points)
- Genre: Identify the genre you are using and identify why this genre is suitable
- Target Audience
- Technical: Platforms, game dimension, hardware, game engine
- Concept Art
- Accessibility:
  - How will the game be distributed? Free access, need of a password, private web?
  - How the game will be made usable to persons with functionality and/or intellectual diversity.
- Monetization: mechanisms to earn money directly or indirectly though the game/app

See Guidelines for the Game Concept, Tim Ryan, Gamasutra, 1999 for leisure games

GDD controversy

Writing down a GDD is time-consuming and difficult to maintain, and it does not foster team collaboration.

Stone Librande proposes a one-page document. Not a real recipe. At the end, try to representt different features of the game as much graphically as you can.



https://www.gdcvault.com/play/1012356/One-Page

Pre-development

Some questions to answer (you will practice them in lab 2)

- Motivation, origin of the game
- Who is your target users?
- Goals
- Advantage over other solutions
- Monetization: is it sustainable?
- Who is your team? How are you

Origin and goals

- What is the goal of the game /app:
  - to make a rehabilitation process more fun?
  - to increase patients' awareness of their health condition and management?
  - other ..

- Review current solutions (see paper review sessions)
  - Why are current solutions insufficient?
  - Can you give a better solution?
  - Can you demonstrate that it is better?

- Monetization and maintenance
  - Who will pay for the game/app?
  - Will it be used only in a scientific study?
  - Who will maintain it?

Team

Some questions to answer (you will practice them in lab 2)

- Define the team.
- Do you have in the team the expertise to design, implement and **validate** the game?

Keep in mind the different aspects you will have to define, design and implement

Game mechanics

User interface

Story

Art & Video

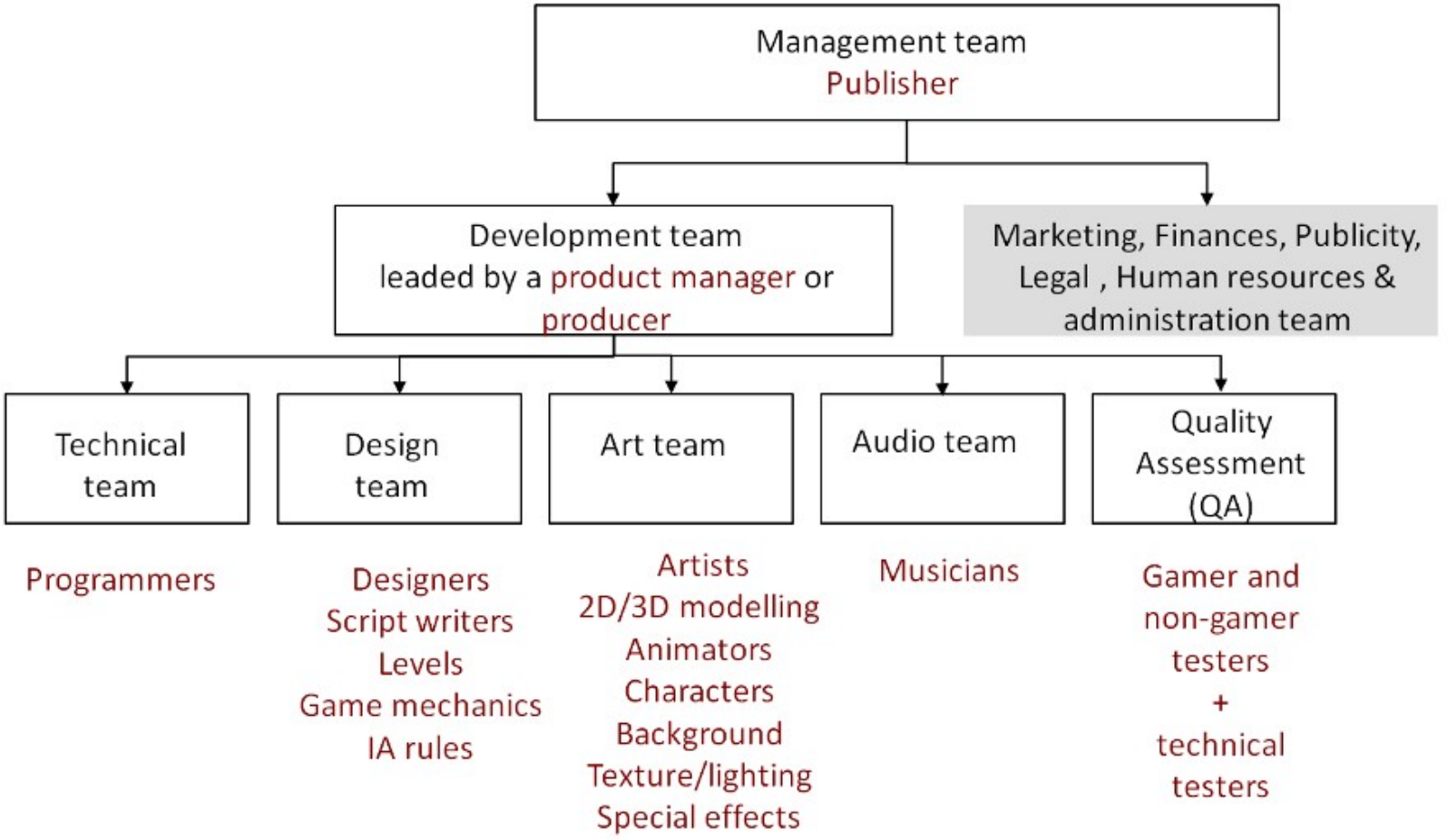
Sound & Music

Levels

Serious contents

Multidisciplinary teams

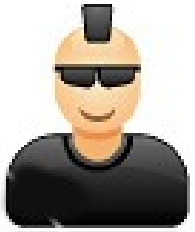
Regular “leisure” games. In indie teams, many persons assume many roles



Multidisciplinary teams

Simplified vision of a leisure game team

Writers



Artists

Programmers

Target user:
- player

Narrative
Rules

Music and
Visuals

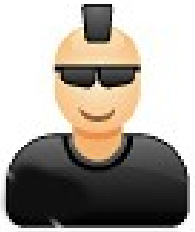
Programming

Game

Multidisciplinary team

Serious games/gamified application teams: we have a new role, the **domain specialist**

Writers



Artists

Programmer

Domain experts/
Specialists

Target user:
- Trainee
- Student
- Patient

Narrative
Rules

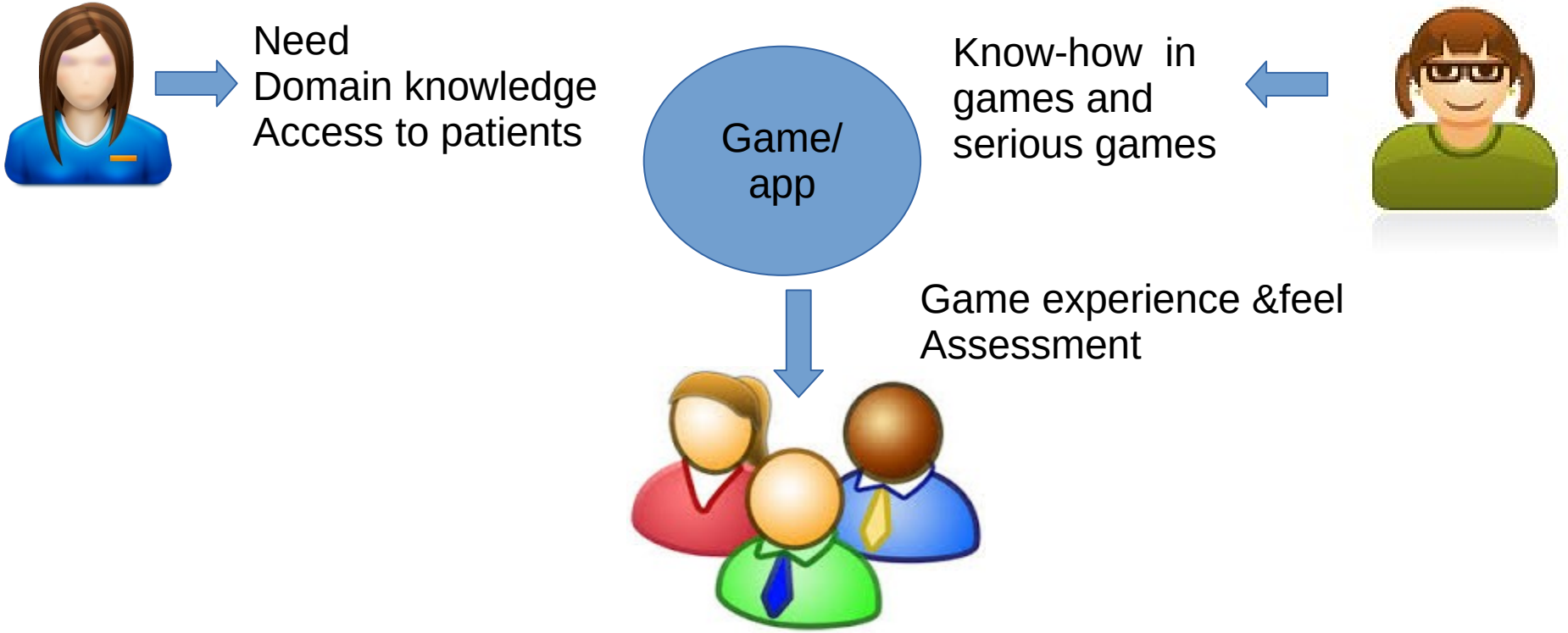
Music and
Visuals

Programming

Serious
contents

Multidisciplinary team

The **domain specialist** often proposes the seminal idea, the original domain motivation. E.g: Need of an app for taking care of mental health, for testing memory, new instrument to assess orientation impairment of aging patients after stroke …
Game developers have the experience and skills in games
Patients have diverse background, skills and interests. They are the game/app users who validate the usability and interest of the technology

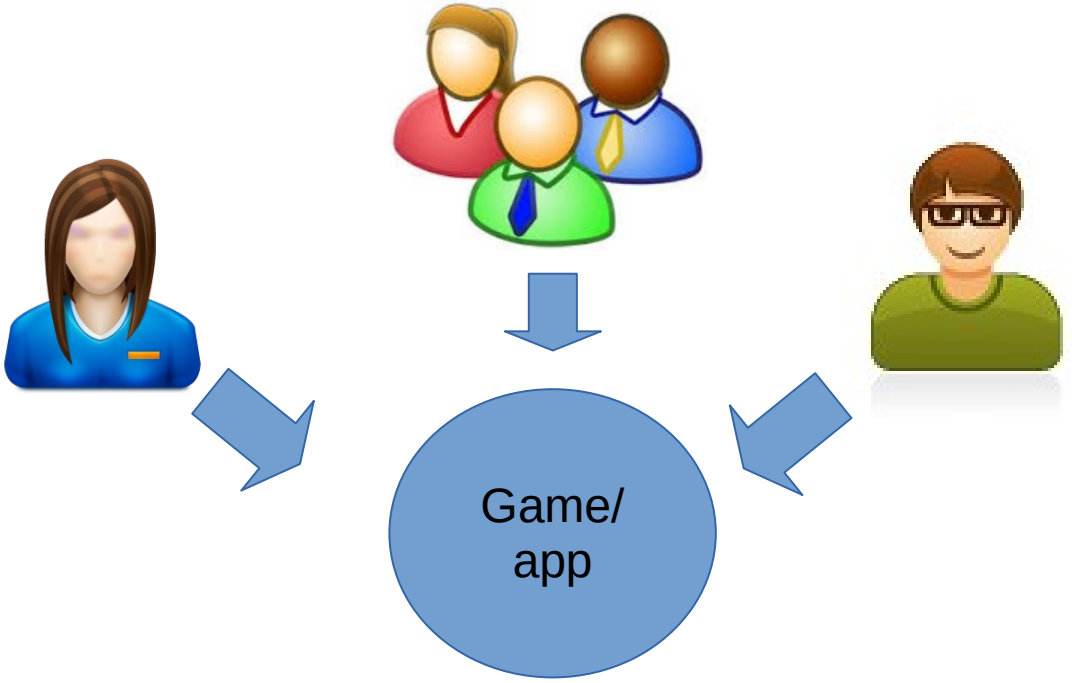


Multidisciplinar teams

The team collaboration is essential for the success of the game.
Often domain experts have their own non-professional idea of the game. They want to protect patients and have high administrative complications to test on patients. Often game designers have unrealistic vision of patients skills and a bad understanding of the neurorehabilitation problem. Patients get often forgotten...

Challenges

- Find a common vocabulary
- Respect each other expertise and perspective
- **Do not delay the involvement of users to the last stage of the design**



Multidisciplinar teams

Some efforts have been put in providing domain experts with **authoring tools** to sketch games using visual editors, specially in the educational context (not so much in the health field).

See for instance:

- https://itystudio.com/
- *Nadolski, R. J., Hummel, H. G. K., van den Brink, H. J., Hoefakker, R. E., Slootmaker, A., Kurvers, H. J., & Storm, J. (2008). EMERGO: A methodology and toolkit for developing serious games in higher education. Simulation & Gaming, 39(3), 338–352*
- *Slootmaker, A., Hummel, H., & Koper, R. (2017). Evaluating the Usability of Authoring Environments for Serious Games. Simulation & Gaming, 48(4), 553–578*
- *Moya, S., Tost, D., Barnekow, A. von, Félix, E. SKETCH'NDO: A framework for the creation of task-based serious games. "Journal of visual languages and computing", 1 Juny 2016, vol. 34-35, p. 1-10.*

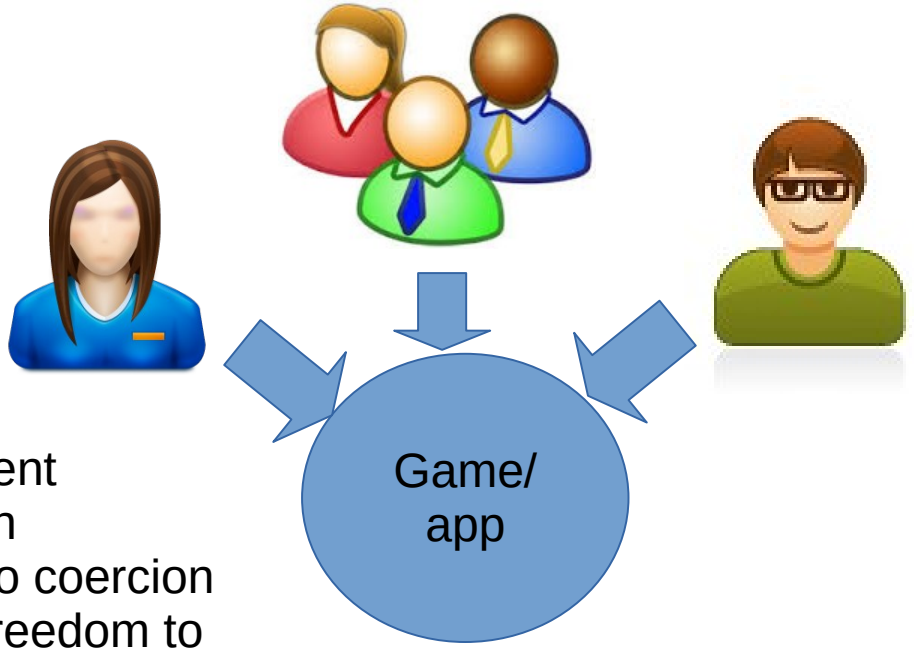
Multidisciplinar teams

Do not delay the involvement of users to the last stage of the design ….

"Researchers mentioned end users' involvement in the development of **less than half of the identified SGs**, and this involvement was also poorly described. " [1].

Ethical issues:

- reticence from clinicians
- need to ask for authorization of an ethical committee
- respect patients autonomy



- provide research participants with sufficient information to make an informed decision
- ensure that participants are not subject to coercion
- ensure participants' awareness of their freedom to withdraw
- protect confidentiality and anonymisation.
- do not generate false expectations

[1] *Maheu-Cahotte et al., 2021, Involvement of End Users in the Development of Serious Games for Health Care Professions Education: Systematic Descriptive Review, JMIR, Vol 9, No 3 (2021): Jul-Sep.*

Player profiling & modelling

Player profiling is about defining the basic characteristics of the players. The goal is to determine the players intrinsic and extrinsic motivations and their skills.

Player modelling is the process of creating a model of players' behaviour in a specific game context. The goal is to adjust the level of difficulties and the games mechanics to the player's answer capability.

Both activities are done on the basis of gathered data.

Player profiling & modelling

- Age range (profile)

- Genre (profile)

- Health problem/pathology: (profile)
  - Does he/she have a physical disability?
  - Does he/she have an intelectual disability?
  - What is her/his level of digital litteracy?
  - Are they gamers? When do they play? How often? For how long? To what game genres?

- What is the intrinsic motivation of patients. How long in time is their goal achievable? Are the progresses visible? At what speed? (profile)

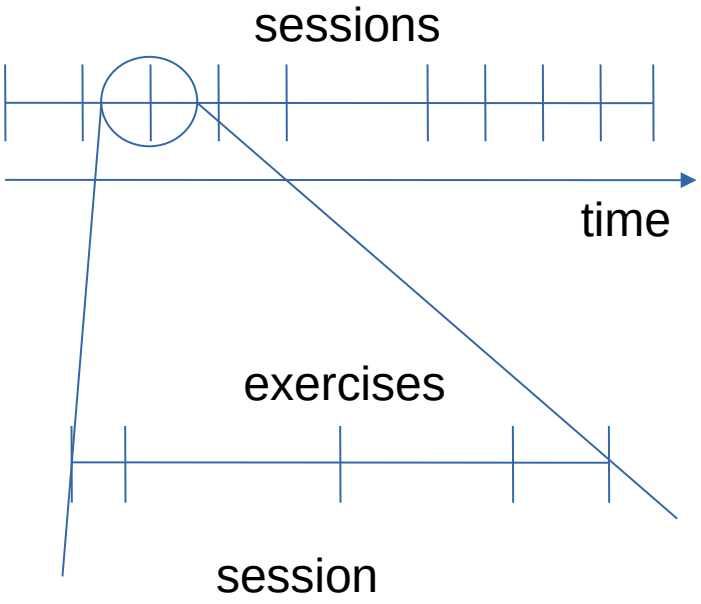
- What are the patients' other interests? (profile)
  Do they read? What kind of litterature?
  Do they watch movies or series? What kind?
  Do they play non-digital games? What kind?

Player profiling & modelling

- Do they understand the interface, how quickly? (modelling)
- What is their interaction speed? (modelling)
- Do they understand the goals of the game? (modelling)
- How long would it take to them to finish a game? (modelling)
- For how long can they play, how often? (modelling)

E.g.: gamification of a rehabilitation session

- How many sessions? For how long? What frequency?
- Are the sessions the same?
- How long does a session last?
- Are the patients able to start/choose a game with a conventional interface?
- How many exercises per session?
- How long last every exercise
- Does it have repetitions?



Player profiling and modeling

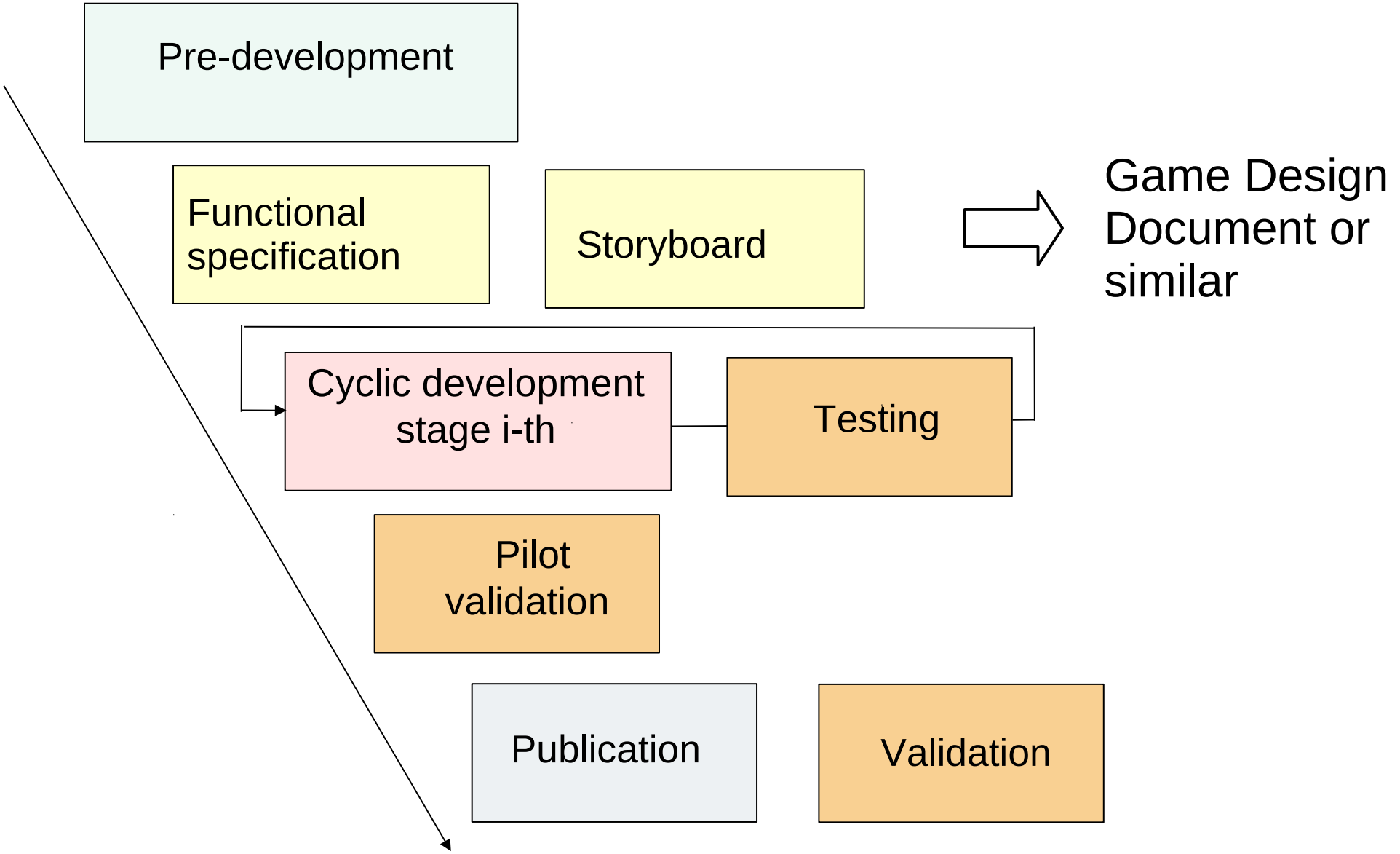
How?

- Talk to clinicians (see next)
- Try to talk with patients (see next)
- Focus group sessions
- Informal interviews
- Structured interviews e.g. the Big Five quest or Bartle test (see next week)
- Observe them play (gather data from play) *

I get stressed out easily.	○	○	◉	○	○
I have a rich vocabulary.	○	○	○	◉	○
I don't talk a lot.	◉	○	○	○	○
I am interested in people.	○	○	○	○	◉
I leave my belongings around.	○	○	○	◉	○
I am relaxed most of the time.	○	◉	○	○	○
I have difficulty understanding abstract ideas.	◉	○	○	○	○
I feel comfortable around people.	○	○	◉	○	○
I insult people.	◉	○	○	○	○
I pay attention to details.	○	○	○	◉	○
I worry about things.	○	○	○	◉	○
I have a vivid imagination.	○	○	○	○	◉
I keep in the background.	○	◉	○	○	○
I sympathize with others' feelings.	○	○	○	○	◉
I make a mess of things.	○	○	○	○	◉
I seldom feel blue.	○	○	○	◉	○
I am not interested in abstract ideas.	◉	○	○	○	○
I start conversations.	○	○	○	◉	○
I am not interested in other people's problems.	◉	○	○	○	○
I get chores done right away.	○	○	○	◉	○
I am easily disturbed.	○	◉	○	○	○
I have excellent ideas.	○	◉	○	○	○
I have little to say.	○	○	◉	○	○

** Games as personality profiling tools,*
G. van Lankveld et al., 2011, 2011 IEEE Conference on Computational Intelligence and Games (CIG'11)

Steps



Functional specification

It defines how the game/app will work:

- Synopsis: game genre, main goal
- Game Mechanics: rules, elements, interaction mechanisms, characters and objects
- Interface
- Art and Video
- Sound and Music
- Story
- Level Requirements

Functional requirements can be written in a document (Game Design Document), a mockup or a one-page design (see next). This design document is shown to clients and investors, ideally also to target users.

Game mechanics

- Game concept summary
- Game flow: detailed description of player activity
- Characters types, role and behavior
  - Driven by users
  - NPC= Non-playable-characters,
- Gameplay elements: objects/goods (“passive” characters) users can interact with, or acquire
- Game Physics related to motion, collisions and others. (e.g. gravity?)
- Artificial Intelligence (AI): data-driven levels of difficulty, NPC and others
- Multiplayer (if applicable): how players interact.

Game mechanics

- Game rules (game mechanics) define the conditions of play
- There are many different typologies of games in which different kinds of rues apply
    - Turn games versus free play
    - Board
    - Card or dice
    - Bidding
    - Problem solving/Puzzles
    - Tile
    - Role play
- Some elements of these games can be used in the rules of others, for instance:
    - Cards or dices can be used in any game to influence in a random way the movements of a player (allowed actions, mission, progress on a board…)
    - **Catch-up** consists of increasing the level of difficulty the closer a player gets to victory
    - **Bidding** can be used as a **Risk** and **Reward**. They allow users to take risks at a given moment of the game to progress or loose

Interface

Synopsis
Game Mechanics
Interface
Art and Video
Sound and Music
Story
Level Requirements

- Flowchart /Game flow[1]: navigation through screens & windows
- Interface functional requirement: for every interface element (menus, buttons..etc): input and expected result
- Mockups: of all the screens, windows and menus.
- GUI Objects: buttons and so shared by screens

RULE: Consistent design

[1] Be careful with the different meanings of game flow

Interface

Sketch

Storyboard

Synopsis
Game Mechanics
Interface
Art and Video
Sound and Music
Story
Level Requirements

- Create a paper storyboard of your game or a mockup of your gamified app with the main screen and the flow mechanisms in the game
- Discuss the concept with domain experts. Remember: they are the domain experts, and you are the game expert!
- Discuss the concept with potential users
- Refine the idea

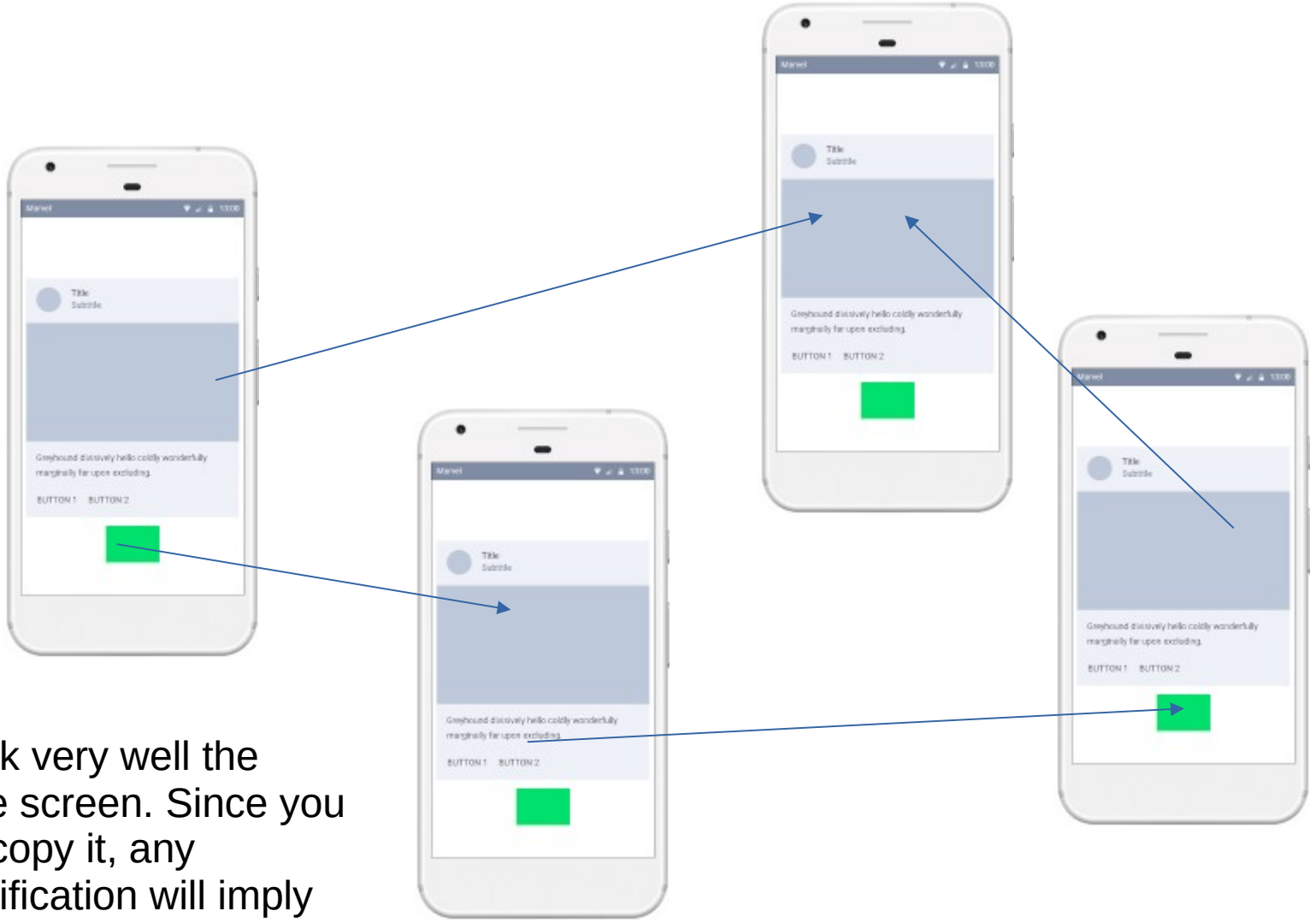
Some mockup tools

https://moqups.com/
https://www.mockplus.com/
https://mockflow.com/
https://marvelapp.com/

Golden rules

Clear goals
Clear rules
Suitable difficulty level
Continuous feedback
Attractive story

Mockups



Think very well the base screen. Since you will copy it, any modification will imply modifications in all screens.

https://marvelapp.com/

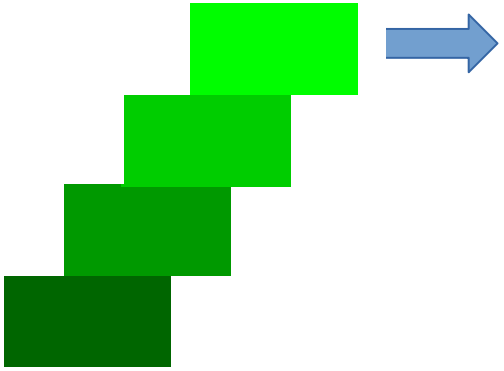
Game/app specification

Synopsis
Game Mechanics
Interface
Art and Video
Sound and Music
Story
Level Requirements

- **Art and Video**
  - Description: motivated description of the style of the arts (style, color, typography, ambient..)
  - List of all elements needed graphics, terrain, characters, objects, animations, special effects, videos and interface elements
- **Sound and Music**
  - Description: motivated description of the music and sound style
  - List of all sound resources (interface and objects, and logics)
  - List of character voices and dialogues
  - Soundtrack
- **Story**
  - List of embedded text of the narrative thread. Think about translations!

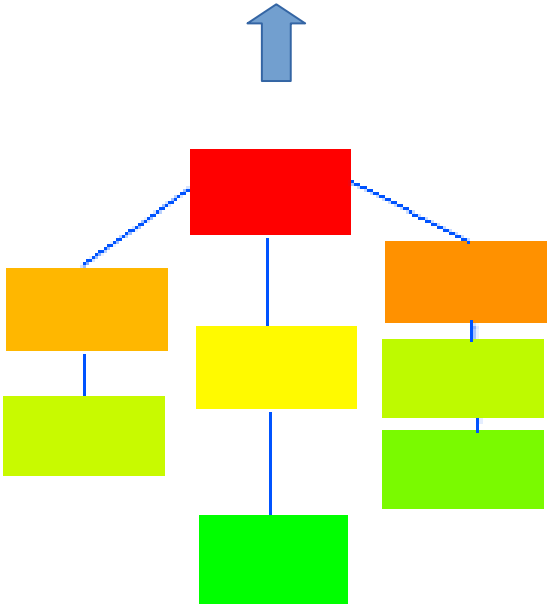
Game/app specification

- **Level Requirements**
  - Level diagram
  - Asset revelation schedule
  - Preliminary level description



Synopsis
Game Mechanics
Interface
Art and Video
Sound and Music
Story
Level Requirements

Note that level design is an important part of the design that will be modified after user testing



Levels

- Game progression is structured by levels
- Levels in a game keep players motivated to continue playing

- New levels bring changes:
  - new elements or characters
  - new scenarios
  - new challenges
  - new rules

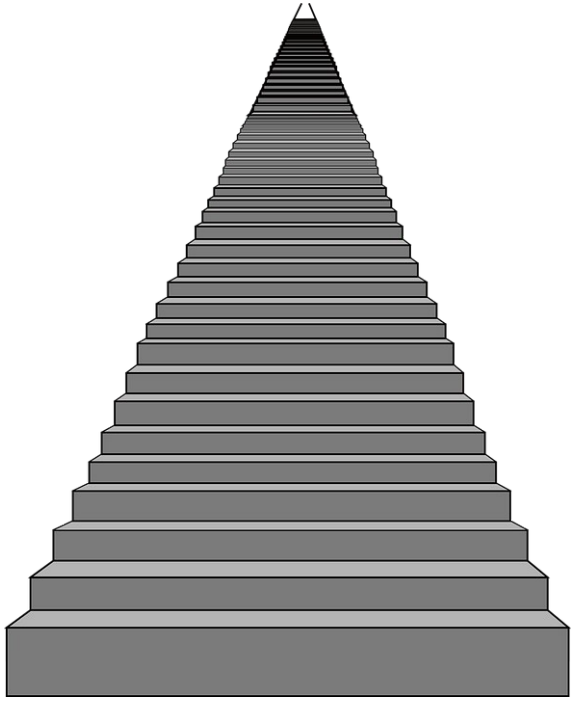
- The level of difficulty of the game increases at each level
- The value of the rewards and penalties (?) increases at each level

- Players should be aware of the existence of levels
- Motivation comes from the desire to jump to the next step
  - To be at a higher more prestigious level
  - To break monotony (novelty of the level)

Levels

- Goal: make reaching the next step challenging but not too difficult
- Constraints to keep in mind:
  - The amount of time available to play and the frequency of play, which determines the duration of a level
  - The current skill level of the players and its learning curve

“ When a player feels empowered, achieves some level of competence that was formerly beyond him, that’s when he starts having fun.”
Feil J and Scattergood, M. Beginning Game Level Design, Thompson, 2005



Accessibility

By opposite to leisure games, serious games users are often not gamers, not even computer literate.
Some users need assisted technology: eye gaze tracking, one handed controller, BCI ...
Some serious game target at users with cognitive or intellectual disabilities. Can they read? At which rate?

Accessibility options may need to be put in place

Rules

- Ease user interaction, specially selection and navigation
- Use simple to understand metaphors
- Provide assistance mechanisms
- Limit the number of visual and auditory stimuli when needed

Accessibility

Text-to-speech and text-to-speech

Large cursors

Reduced number of visual and auditori stimuli

Subtitles

Repetition of instructions

Error-free game play

Auditory alerts

Smart cursors

Automatic navigation

- *Balakrishnan, R. (2004)Beating fitts's law: virtual enhancements for pointing facilitation. Int. J. Hum.-Comput. Stud. 61, 857–874*
- *Moya at al. (2013) The wise cursor: assisted selection in 3D serious games, pp 795–804|*
- *Johanson,C. et al. (2017). The Effects of Navigation Assistance on Spatial Learning and Performance in a 3D Game. 341-353*
- *Aguado-Delagdo J. at al. Accessibility in video games: a Systematic Review International Journal of Universal Access in the Information Society. Springer. 2018*

More next session

Thank you