

Addendum VII: Final extraction form and additional instructions for extraction by Dr Woolner

First some clarifications...

For the purpose of this study, a successful serious game is one that has a positive impact on cognition, behaviour and/or motor skill acquisition. This review will collect a number of studies on successful serious games to extract and analyse the traits/factors of these games—these traits will later be called success factors of serious games. The qualitative analysis process will provide an underlying structure/grouping of common factors (or show that no such structure is possible).

Every primary study must have its own data extraction form. Also note that not every study will have answers to every question asked in this data extraction form.

Data extraction form for collecting data from primary studies

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
Reviewer name			
Date of extraction			
Study identifier			
Categorisation of serious games			
What is the application of the serious game?	<i>Taxonomy of Sawyer and Smith (2008):</i> Games for health, advergaming, games for training, games for education, games for science and research, production or games as work		This may include games that are based on game shows (e.g. Jeopardy, Who Wants to be a Millionaire, Family Feud)
For what sector is the serious game intended?	<i>Taxonomy of Sawyer and Smith (2008):</i> Government & NGO, defence, healthcare, marketing and communication, education, corporate or industry		
What subject or discipline does the serious game cover?			
On what platform is the game delivered?	PC, mobile, console, VR mask, VR cave or augmented reality		The researcher will also note if any haptic or kinaesthetic devices were employed

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
What genre is the game?	<i>Classification of Herz (1997):</i> Action, adventure, fighting, puzzle, role-playing, simulation, sport or strategy		
Player/user profile			
Age?	Either given as a numerical range or category		
Gender?			
Socio-economic status?	<i>Kuppuswamy socio-economic status scale:</i> Lower, upper lower, lower middle, upper middle or upper		
Geographic region?	Country of study		
What is the player language proficiency?			
What is the player technology exposure?			
What are the player disabilities?			
What types of learners (if discussed) are subjected to the game?	<i>Four-dimensional model of Felder and Silverman (1988:675):</i> Sensing-intuitive, visual-verbal, active-reflective, sequential-global		
What are the subjects' perceptions regarding the use of games for learning?			
Design aspects of the game (i.e. possible success factors)			
How did the game come about?	User need, commissioned by government, commercial brief, seemed like a good idea or other		
How is the design of the game established?	End-user involvement, desktop research, collaborative design, commercial or other		
What underlying theory, model or framework was used in designing the game?	Just give the name of the theory, model or framework and page number where it is described		
What roles are explicitly mentioned/present in the game's production?	Designer, developer, content expert, pedagogical expert, artist, storyboard writer and sound engineer		

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
Who fulfils the roles?	Designer (users themselves), developer (student team), content expert (university professor), pedagogical expert (not mentioned), artist (not mentioned), storyboard writer (freelance journalist), sound engineer (industry professional)		
Is it a single- or multi-player game?			
Are gender preferences considered?	Yes/No		If yes, then the rest of the design aspects should be distinguished “male” or “female”
What are the core and secondary mechanics of the game (or what does the player do over and over in the game—most often and second most often)?	This does not have a clear-cut set of answers, but may include: Run, jump, shoot, press buttons, move tokens around, roll dice, drive a car (or other type of vehicle)		
What controls are used for these core mechanics?	Keyboard and mouse, Wii-type controller, gesturing or posture, joystick, racing wheel and pedals, thermal mouse, controller with haptic feedback, bespoke controller (provide description) and possible others.		
What game objects does the player interact with (give the top 3 most occurring)?	Once again, there is no clear-cut set of answers. Make use of the game descriptions to determine these.		
What does the player do with the game objects?	Shift them, collect them, blow them up, rescue them, speak to them, solve a problem...		
How is this accomplished?	Click to select, run over them, click and drag, typing, speaking (i.e. voice recognition is used)...		
What reward mechanics are present?	Points (can include game specific score, health bar, hit points), levels, challenge, virtual goods, leader board, gifting, charity and/or sound.		
What victory mechanic is in place?	Game specific goals (describe briefly), loss avoidance, elimination, puzzle-solving, racing, structure building or territory control (there may be others).		

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
Are any game mechanics evaluated or commented on (by the author or users)? If so, provide the details.	Do this verbatim: The researcher is particularly interested if the impact of the game or game-play experience is affected		
What fidelity is discussed, mentioned or apparent?	See fidelity hierarchy below		
How is the level of fidelity described?	Only report this if the author explicitly gives a level (even though it will likely be an opinion).		
Are any aspects of fidelity evaluated or commented on (by the author or users)? If so, provide the details.	Do this verbatim: The researcher is particularly interested if the impact of the game or game-play experience is affected		
Which game aesthetic(s) is/are discussed (or why do the players want to play the game)?	<i>Eight player goals and emotional states Hunicke et al (2005:2):</i> Sensation (games as sense pleasure) Fantasy (game as make-believe) Narrative (game as drama) Challenge (game as obstacle course) Fellowship (game as social framework) Discovery (game as uncharted territory) Expression (game as self-discovery) Submission (game as pastime)		Some authors use the term aesthetics when referring to fidelity. Make sure to record this correctly in the form
Are any aspects of aesthetics evaluated or commented on (by the author or users)? If so, provide the details.	Do this verbatim: The researcher is particularly interested if the study shows how these emotional states are heightened		
What game narrative if any is presented?	Give a concise rendition of the narrative (this may be verbatim if the author already shortens it)		
Are any aspects of narrative evaluated or commented on (by the author or users)? If so, provide the details.	Do this verbatim: The researcher is particularly interested if the impact of the game or game-play experience is affected		
What AI if any is used? Give a brief description?	Only report on this if the author explicitly mentions the AI that is added to the game as a feature.		There is no need to go into an algorithmic level of discussion.

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
Are any aspects of AI evaluated or commented on (by the author or users)? If so, provide the details.	Do this verbatim: The researcher is particularly interested if the impact of the game or game-play experience is affected		Same as above; no need to discuss computational details of evaluating the AI that is used
Describe the feedback the game presents to the player?	What feedback is given? How is the feedback presented? When is the feedback given?		
What other feedback mechanisms are in place?	For example, post-game debriefing/summarising by a subject-matter expert or psychological counselling		
Implementation and environment for the study/game			
What instructional support is present?	Facilitator, supplementary material and/or others		
What motivational factors (reward) for playing the game are cited?	Name the intrinsic or extrinsic rewards that the author cites		
Where is the game intervention administered?	Laboratory, classroom, web, sports field, LMS, in-your-pocket and/or others		
What perceptions regarding the use of games for learning does the facilitator/mediator have?			
Impacts and effects of the study/game			
How are the intended outcomes of the game (if at all) presented?			
What behavioural impact(s) does the study discuss?			
What learning or cognitive effect does the study discuss?			
What motor skill does the study impart or aim to improve?			
Is the impact or effect intentional or unintentional?			
Game as assessment tool			
Is the game used as an assessment tool, or is the impact of the game assessed?			

Data item	Options and source of extraction options	Detail (data extracted)	Additional notes
When does the assessment take place?			
Where does the assessment happen?			
Who/what performs the assessment?			
What is the assessment format?			
What is the assessment based on (i.e. what is measured)?			
How is the assessment outcome (if at all) communicated to the player?			
Additional comments			
<p>If there is any further pertinent detail in the study that can add value to the review it should be captured here. Possible examples include: What are the perceptions regarding the use of games for learning?</p> <p>Capture limitations if mentioned.</p>			

Fidelity

This review will only identify and describe the fidelity (if discussed or mentioned)* in the primary study; the level and any other details of the fidelity in question will only be given if the author(s) of that study provide these. The fidelity hierarchy (Figure 1) should be used in a top-down fashion and use the deepest level that is apparent (or given) in the primary study—if the author goes to a deeper level than presented below, use the deepest label in the hierarchy and use the additional notes column to mention the exact fidelity given by the author.

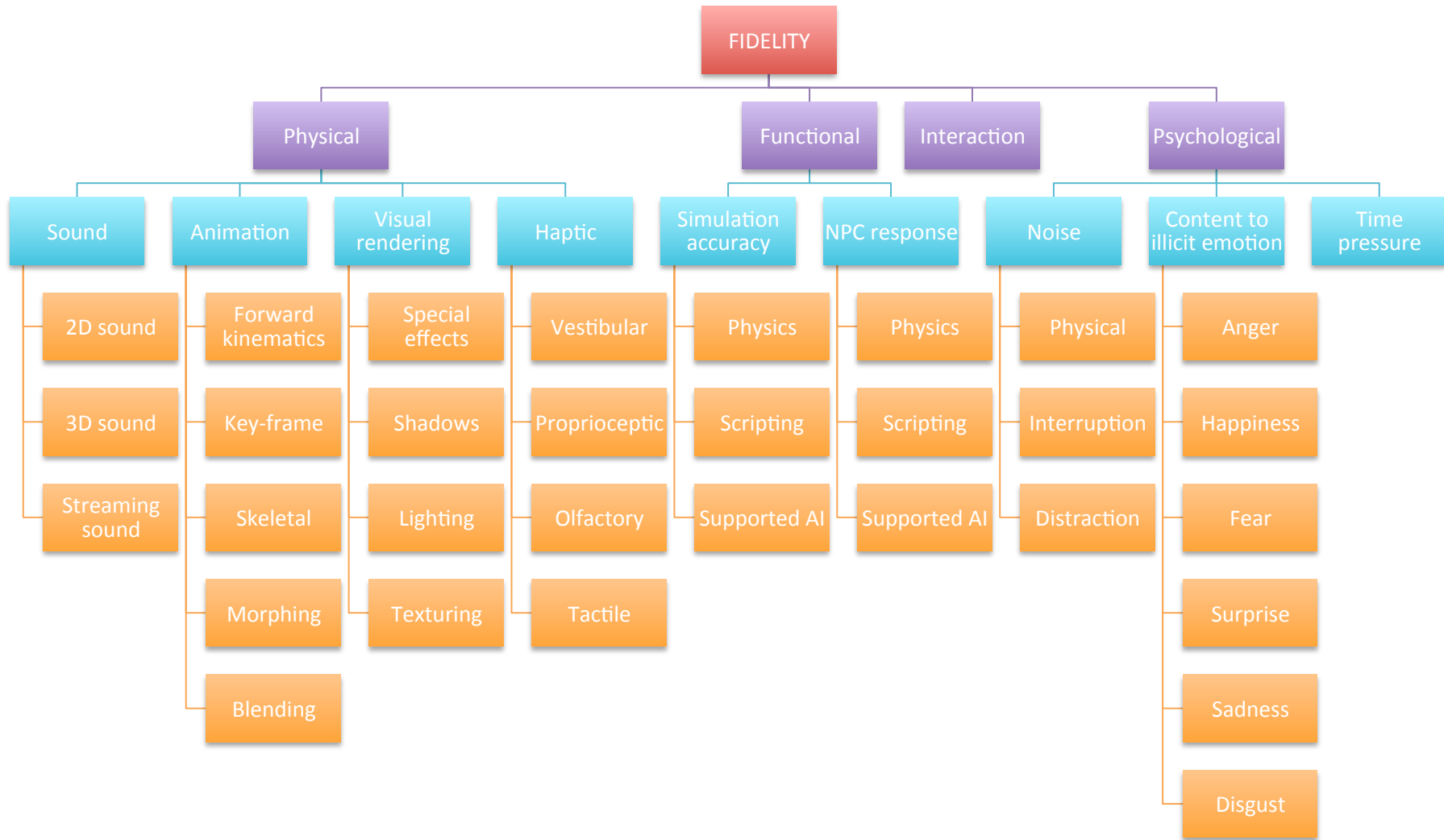


Figure 1: Fidelity hierarchy

Mechanics

As with fidelity, this review only wishes to identify the game mechanics (if discussed or mentioned)* that are present in the primary studies and aims to answer questions (Table 1) about the actions the player can exercise on the game tokens to elicit a state change and how the game communicates this state change to the player**. The researcher has decided, for practical reasons, to not report the rules of each of the games; the “black box” (algorithms and code structures) details are also not brought into consideration—there is a separate categorisation that captures the salient AI details. In other words, this review will only report on the interaction mechanics (or feedback loop).

Table 1: Game mechanics questions and possible answers for data extraction

	Question	Possible answers
ACTIONS	What are the core and secondary mechanics of the game (or what does the player do over and over in the game—most often and second most often)?	This does not have a clear-cut set of answers, but may include: Run, jump, shoot, press buttons, move tokens around, roll dice, drive a car
	What controls are used for these core mechanics?	Keyboard and mouse, Wii-type controller, gesturing or posture, joystick, racing wheel and pedals, thermal mouse, controller with haptic feedback, bespoke controller (provide description) and possible others.
TOKENS	What game objects does the player interact with (give the top three most occurring)?	Once again, there is no clear-cut set of answers. Make use of the game descriptions to determine these.
	What does the player do with the game objects?	Shift them, collect them, blow them up, rescue them, speak to them, ...
	How is this accomplished?	Click to select, run over them, click and drag, typing, speaking (i.e. voice recognition is used), ...
STATE CHANGE	What reward mechanics are present?	Points (can include game specific score, health bar, hit points), levels, challenge, virtual goods, leader board, gifting & charity.
	What victory mechanic is in place?	Game specific goals (describe briefly), loss avoidance, elimination, puzzle-solving, racing, structure building or territory control (there may be others).

* The mechanics or fidelity might not be explicitly named in the primary studies, but in most cases there is a game description and we should try to answer the questions pertaining to game mechanics and fidelity from that description.

** If the author(s) of the primary studies give further detail about these mechanics, please put them in the additional notes column.