The Rosetta Wheel: a framework for designing behaviour change games

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THE KEY TO DECIPHERING

On the 15th July 1799, in the city of Rosetta, Egypt, a party of French soldiers were working to strengthen defences when they uncovered a very large dark grey slab of stone in the course of their duties. It was immediately recognised as potentially important, given the varied inscriptions on one side of the slab. The Officer in charge of the defence site, Lieutenant Pierre Francois Xavier Bouchard, identified three distinct scripts: one in Ancient Greek, one in Egyptian Hieroglyphics, and the third in Egyptian Demotic script.

It quickly became apparent that the three inscriptions represented the same text in three different languages. Following translation of the Greek text it was revealed that the stone was an ancient decree commemorating Egyptian King Ptolemy V and was inscribed in his honour on 27th March 196 BC. Up until 1799, scholars and savants of the time had been unable to translate Egyptian hieroglyphics. However, the discovery of what was quickly named the 'Rosetta Stone' *"provided the key to deciphering"* (Adkins & Adkins, 2000, p.35) this unknown scripted language.

Today, the Rosetta Stone is a world-famous monument and is located at the British Museum in London where it was taken in 1802. It remains

a symbol of translation, code deciphering, and as a key to learning new languages.

A TOOL FOR UNDERSTANDING

During the final game designer interview for this body of research, the conversation steered towards shared languages of design. It was the third section of the interview, where the framework was introduced, and the designer was explaining their design process, when they said this:

> *"I also had conversations with people who don't understand games at all, and so, you know, you almost need a Rosetta Stone to kind of say, you know, that the goals of psychologists and educators and games designers are very similar. There's a lot of overlap, it's just we all speak different languages, and so, you know, looking at this it's like, oh my gosh, it's the Rosetta Stone, you know?"*

– and thus, the name of the Rosetta Wheel was born.

The Rosetta Wheel is a language translation tool. It provides a basis for game designers to understand psychological principles and apply them in their work, and likewise, it provides an insight for health professionals and subject matter experts into game design processes, techniques, and terminology. It is a tool that has been developed with designing in mind, but it can equally be used as a foundation for analysis, or a guide for post-development evaluation. The Rosetta Wheel is not an all-encompassing framework that attempts to summarise and communicate every aspect of psychology and game design in a prescriptive, reductive, or conclusive way. Rather, it is a starting point – like the Rosetta Stone – to begin to understand some meaningful concepts in the psychology of behaviour change, and how these concepts can link to and be applied to game design processes. The goal is for this framework to be a useful guide for future collaborative work in the field of designing games for positive health change.

TOWARDS A FRAMEWORK

This article presents the Rosetta Wheel, the game design framework for games for health-behaviour change, developed iteratively through

research-led practice, and practice-led research (Smith & Dean, 2009). The Rosetta Wheel comprises 10 'Change Keys', as well as 19 'Key Considerations' supporting the development and design process.

This article starts by providing an explanation of how the Change Keys have been developed through Study 1 and Study 2 in this body of research. Definitions and explanations for all the components of change keys are provided in this section.

Included in this article is a single page visual representation of the Rosetta Wheel, visually designed to reflect the process of change through movement from one process to the next. This visual representation of the framework incorporates the psychological theoretical foundation as Wheel 1 and Wheel 2, with Wheel 3 representing the ten Rosetta Wheel Change Keys along with each design key. Following this visual representation of the Rosetta Wheel, each Change Key is outlined in detail.

Finally, the Key Considerations that designers should consider as part of their process when using the wheel are also outlined. These Key Considerations support the design and development processes involved in implementing the Rosetta Wheel for designing games for health-behaviour change.

CREATING CHANGE KEYS

Data Informed

The Rosetta Wheel has been informed by a research-led practice and practice-led research methodology (Smith & Dean, 2009). Study 1 is the research-led practice component. Study 2 is the practice-led research component.

The results of these two studies have directly informed the development of the third wheel of the framework – the Change Keys. These 10 Change Keys are tools for game designers to use in the design of games for health behaviour change. They are called 'keys' because they provide *"an aid to*

interpretation or identification" and *"a map legend"* ("Key", 2019) for design teams to work together, understand each other and map out a design.

The Change Keys are supported by Key Considerations. These are considerations, techniques, and processes that designers should consider as part of their process when using the Rosetta Wheel in the development and production cycle of games for behaviour change.

Study 1 resulted in a design analysis for each of the ten psychological processes of the Transtheoretical Model of Behaviour Change (TTM; Prochaska & DiClemente, 1982), based on the analysis of two existing games. The design analysis for each of these games focussed on '*what*' designing for each process involved, in terms of what game design patterns were used, and what their function for health behaviour change was within the game. These findings inform the ten Change Keys.

Study 2 represents an exploration of game design practice and has resulted in a practice analysis of game design decisions, processes, and techniques. This practice analysis focusses on '*how*' designing for each process takes place, and includes specific examples of links between design decisions, and the ten psychological processes of the TTM (Prochaska & DiClemente, 1982).

To show how the results of studies one and two directly inform the change keys of the framework, three examples from each study have been selected to demonstrate these links for the first psychological process, Consciousness Raising.

Change Key Structure and Definitions

Key Components

To provide a comprehensive framework for game design teams to work with, each Change Key provides definitions, context, explanation of what the key is, prompts for the designer, and an example from a game illustrating the Change Key. These are all represented by the following four components: Name of the key, Key Context, Design Key, and Designer

Prompt. These are each discussed and defined below. A detailed explanation of how these components have been developed is discussed in the next section 'Informing the Rosetta Wheel'.

Naming the Key

Each Change Key name is a distilled reflection of what the Design Key is about, and how it can be achieved. The name is not a comprehensive representation of each Change Key, rather it indicates its conceptual essence.

Key Context

Each Change Key is contextualised in relation to the TTM (Prochaska & DiClemente, 1982), and which stage of change, and process of change it relates to. The definition of the psychological process is also provided.

Design Key

The Design Key is the summary of what designing for each psychological process involves in terms of game design goals, as well as how these goals can be achieved through design.

Designer Prompt

The designer prompt is the summary of game design pattern categories that have been utilised for consciousness raising across both design analysis (study 1) and practice analysis (study 2). The prompt is framed as a question for design teams to facilitate an iterative creative process, and to question how design ideas and design patterns can give rise to the design goals of the key.

Informing the Rosetta Wheel

Study 1 – Game Analysis

Identifying Key Components

These two examples below show 'what' designing for consciousness raising involves. This includes identifying which design patterns and pattern categories were used (in brackets), and what function for health behaviour change they serve (underlined). These inform both the Design Key and the Designer Prompt in each Change Key.

Example 1

Re-Mission: The design patterns of resource locations (game elements > locations > resource locations) and power-ups (game elements > objects > power-ups) are reflected as Communication Taps within the game. In *Re-Mission*, Communication Taps are fixed location objects that when 'tapped' by the player character, provide information and resources. These features represent an important mode of information delivery relating to symptoms and the nature of specific cancer conditions, treatment information, important patient-doctor interactions, as well as self-management techniques. By providing didactic information, these Communication Taps heighten awareness and correct misconceptions about cancer condition, treatment, and self-management information. Interaction with the taps is a necessary requirement for completing each level and provides in-game rewards in the form of resources and information upon interaction.

Example 2

Nevermind: The design pattern of clues (game elements > objects > clues) is reflected in the presence of signposts throughout the game. At the beginning of the game, the player is guided by several signposts to 'notice everything', 'interact with the world', 'collect memory photos', and introduces the idea that the game will prompt change with a signpost to a

new area labelled 'shifting mind'. Following through this gate, the tutorial, now set in a darker game world environment, goes on to provide basic real-world advice using signposts, such as 'still yourself', 'take a moment', and 'stay calm even in the face of danger'. These signposts represent non-narrative based information for the player which signals firstly how to engage with the game world, in addition to prompting emotion regulation strategies. These signposts are didactic in nature, and they raise awareness and provide information about concrete strategies to use in the moment during play. The strategies assist with recognition and improvement of interoceptive awareness and emotional regulation.

Study 2 – Design Analysis

Identifying Key Considerations

These two examples below show 'how' designers approach designing for health behaviour change. The first example shows 'how' design decisions link to the psychological process of consciousness raising and what function for health behaviour change they serve (underlined), which informs both the 'Design Key' and the 'Designer Prompt'. The second example shows 'how' a design process informs a Key Consideration through design processes (underlined).

Example 1

Participant Quote: *"Then bumping into asthma triggers because you didn't notice them or didn't care. Then realising that [character] peak flow goes down every time you do it. Then you start paying attention to, "Oh, so that furry animal, I have to stay away from."*

Practice Analysis: The designer indicated that information was communicated through role-play of other non-playable characters within the game to demonstrate the negative impact of asthma triggers on peak flow functioning. Interacting with these triggers raises awareness about triggers to avoid and may also correct misconceptions about the presence and impact of triggers. In this way, information was provided by way of

social learning theory (Bandura, 1977). Bandura asserts that *"in the social learning system, new patterns of behaviour can be acquired through direct experience or by observing the behaviour of others"* (Bandura, 1977, p. 3). By providing these experiential and observational moments, players can engage with the 'social learning system'.

Example 2

Participant Quotes: *"We start with exploring the problem space. Understanding what – sort of what I mentioned before. What is the unwanted effect in the real world, and who is at risk or affected by this thing? Is it a health condition? Is it injustice to a particular group or sub-population? Is it poor financial outcomes or opportunities? Where are we trying to head, right? What is the long-term positive gain in the world that we're trying to affect?"*

"I say start – knowing what your goal is, knowing the research, and also understanding the audience and the context that you're trying to reach, and what it means to reach them and what's authentic to them, especially for the topics we were talking about."

Practice Analysis: These quotes represent the Key Consideration "identify change outcome goal", which follows the Change Keys. In this theme, participants explained their first step of the design process is to clearly identify the optimal change outcome goal. This process can be achieved through multiple means including engaging with client / stakeholder to understand needs, understanding the target audience, and exploring ideal outcomes.

THE ROSETTA WHEEL

Image 1: The Rosetta Wheel incorporating the five stages of change (wheel 1), the ten processes of change (wheel 2), and the ten Change Keys (wheel 3)

CHANGE KEYS

Change Key 1: Informative Experiences

Key Context

This change key context is in the pre-contemplation stage of change, and involves the psychological process Consciousness Raising, which involves *"Increasing awareness about the problem and improving the accuracy of information processing about the problem and about the self (e.g., seeking information, observations, interpretations)"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves increasing awareness, providing information, and correcting misperceptions through communication, experiences, feedback, outcomes, and engagement with the target topic.

Designer Prompt

How can the game elements, resource & resource management, game actions & events, game goals, or information provided during game roll-out, communicate or raise awareness of the issues or correct misperceptions relating to target topic and change goal through in-game experiences? How can you utilise relevant theories, such as social learning theory, to show the player an outcome rather than tell them information?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the consciousness raising process, there were five game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Actions and Events

- Narrative Structures, Predictability, and Immersion Patterns
- Resource & Resource Management
- Goals

Change Key 2: Emotion Engagement

Key Context

This change key context is in the pre-contemplation stage of change, and involves the psychological process Dramatic Relief, which involves "*Experiencing and releasing feelings about the problem and the solution (e.g., expressing and feeling upset at risk information)*" (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves engaging emotions, challenging assumptions, shifting perspective, and providing insight through in game experiences, narrative, modelling, and the embodiment of diverse perspectives. It can also involve creating discomfort, challenge, prompt heightened/decreased arousal levels, and emotional relief, through the presence or absence of tension, predictability, and stimulating audiovisual and environmental design.

Designer Prompt

How can your game elements, player actions, and goals provide emotional context and meaning relating to the target topic? How can player activity, narrative design, and diversity of perspectives involve the player emotionally, provide meaning, challenge assumptions, and create shifts in perspective relating to the target topic and change goal? Consider how your game world's believability, predictability, presence/absence of tension, and varied environmental and audiovisual design, can provide emotional provocation to heighten player engagement.

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the dramatic relief process, there were six game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Actions and Events
- Narrative Structures, Predictability, and Immersion Patterns
- Goals
- Game Sessions
- Game Masters and Balancing

Change Key 3: Social Reflection

Key Context

This change key context is in the pre-contemplation stage of change, and involves the psychological process Environmental Reevaluation, which involves *"Cognitive and affective assessments of how a personal behaviour might have an impact on the social environment (e.g., thinking the world would be a better place if everyone stopped smoking)"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves fostering player reflection on actions and outcomes in relation to the target topic, through providing feedback on player actions, providing repeated opportunities to develop and demonstrate capacity, to increasingly improve the frequency and accuracy of player reflection of how their actions impact in relation to the target topic.

Designer Prompt

How can your game narrative, extent of player influence, and opportunities to succeed foster player reflection, encourage repetition and mastery of skills, and provide accurate feedback to the player to develop the accuracy of their self-reflection? How can increasing the degree of player influence of game session outcome, and heightening player perceptions of ability to succeed and overcome (when applicable), and empower the player to build competence and mastery, and reflect on that accurately?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the environmental reevaluation process, there were three game design pattern categories identified as relevant for the process, as follows:

- Narrative Structures, Predictability, and Immersion Patterns
- Goals
- Game Masters and Balancing

Change Key 4: Observing Support

Key Context

This change key context is in the pre-contemplation stage of change, and involves the psychological process Social Liberation, which involves *"Noticing social, policy or environmental changes that facilitate health behaviour change (e.g., noticing that society has changed in ways that make smoking cessation easier)"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves providing the player with prompts to pay attention, notice external supportive factors, and provide incentive in

relation to the target topic through both in-game and extra-game information, clues, feedback, and consequences.

Designer Prompt

How can your game elements, such as clues, and learning curves, including consequences prompt your player to pay attention and notice information, strategies, and support in relation to the target topic? How can consequences, in-game and/or outside of the game, provide feedback and incentive to the player to observe external factors that may assist them with understanding in relation to the target topic?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the social liberation process, there were two game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Meta Games, Replayability, and Learning Curves

Change Key 5: Introspective Shift

Key Context

This change key context is in the contemplation stage of change, and involves the psychological process Self Reevaluation, which involves *"A person's cognitive and affective assessments of their self-image in relation to the problem behaviour (e.g., thinking that stopping smoking is part of being a responsible person)"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves providing the experience of a different

perspective, embodiment of different behaviour, and the feedback to reflect on current self.

Designer Prompt

How can you design your game's world, player actions, and game narrative to enhance character and story embodiment, challenge perspectives and attitudes, and give players the opportunity to see themselves through new experiences relating to the target topic and change goal? How can you use the player's belief that games are designed for (eventual) player success to challenge the player's perspective regarding their potential success relating to the target topic and change goal?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the self reevaluation process, there were four game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Actions and Events
- Narrative Structures, Predictability, and Immersion Patterns
- Game Masters and Balancing

Change Key 6: Transforming Belief

Key Context

This change key context is in the preparation stage of change, and involves the psychological process Self Liberation, which involves *"A person's belief in their ability to change a particular behaviour and their commitment to act on that belief"* (Prochaska & DiClemente, 1982).

Design Key

Designing for Self Liberation involves building capacity and heightening self-efficacy by providing repeated opportunities for success in relation to the target topic and change goal.

Designer Prompt

How can you design your game world, player experience, and mastery opportunities to promote capacity building, and confidence / belief in capacity, through both challenge, and opportunity for success relating to the target topic and change goal?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the self liberation process, there were four game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Goals
- Game Sessions
- Game Masters and Balancing

Change Key 7: Developing Substitution

Key Context

This change key context is in the action stage of change, and involves the psychological process Counter Conditioning, which involves *"The adoption of healthier behaviours as substitutes for problem behaviours"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves providing challenge, incentive, and prompting mastery through providing repeated opportunities for development, experimentation, and player choice in relation to the target topic and change goal.

Designer Prompt

How can your narrative structures, predictability, tension, and challenge provide opportunities for players to experiment, develop and adopt skills and behaviours in relation to the target topic and change goal? How can player goals, resource management, and the development of mastery inside the game relate to the target topic and change goal?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the counter conditioning process, there were six game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Actions and Events
- Narrative Structures, Predictability, and Immersion Patterns
- Resource & Resource Management
- Game Masters and Balancing
- Goals

Change Key 8: Supportive Communication

Key Context

This change key context is in the action stage of change, and involves the psychological process Helping Relationships, which involves "*Relationships*

characterised by openness, trust and empathy, which are supportive in regard to the problem behaviour and health behaviour change" (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves providing prompts, communication, and cues which support the awareness and development of skills relating to the target topic and change goal through in-game elements such as audiovisual clues, and extra-game information and consequences.

Designer Prompt

How can your game elements, such as in game objects and clues, provide supportive prompts for the player relating to the target topic and change goal? How can you utilise meta-game information and consequences to provide trusted and supportive prompts for the player relating to the change goal?

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the helping relationships process, there were two game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Meta Games, Replayability, and Learning Curves

Change Key 9: Rewarding Choices

Key Context

This change key context is in the action stage of change, and involves the psychological process Reinforcement Management, which involves *"This occurs when a person is rewarded (by themselves or by others) for engaging in*

healthy behaviours, or conversely when they are punished for not engaging in healthy behaviours" (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves providing encouragement (or discouragement), incentive (or disincentive), and rewards (or punishment) for the specific target behaviour or skill through repeated opportunities to practice and experiment, providing feedback, and changes in capacity, resources, and level of challenge.

Designer Prompt

How can your game elements, actions and events, and narrative design provide rewards, incentive and feedback for the player relating to the target topic and change goal? How can you utilise resources and design game sessions to provide information and encouragement to the player about success and failure relating to the change goal?

Game Design Patterns Categories

Across all mechanisms of action that fostered the reinforcement management process, there were seven game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Narrative Structures, Predictability, and Immersion Patterns
- Game Masters and Balancing
- Actions and Events
- Resource & Resource Management
- Game Sessions
- Meta Games, Replayability, and Learning Curves

Change Key 10: Intentional Integration

Key Context

This change key context is in the maintenance stage of change, and involves the psychological process Stimulus Control, which involves *"When a person makes changes to their environment so that cues for problem behaviours are reduced and cues for healthier behaviours increased"* (Prochaska & DiClemente, 1982).

Design Key

Designing for this key involves giving players control of their environment, providing opportunities to disengage with cues for non-target behaviour, experiment with different actions and paths throughout the game, through providing repeated opportunities to master making changes to their place in the environment to control their exposure.

Designer Prompt

Question prompt for designer including key design patterns

Relevant Game Design Patterns Categories

Across all mechanisms of action that fostered the stimulus control process, there were six game design pattern categories identified as relevant for the process, as follows:

- Game Elements
- Actions and Events
- Narrative Structures, Predictability, and Immersion Patterns
- Resource & Resource Management
- Goals
- Game Masters and Balancing

KEY CONSIDERATIONS

Broader Context

The Rosetta Wheel is a design tool for designing games for health behaviour change and is suggested to be used throughout the design phase of a game development process. Design teams can choose to focus on one or more parts of the Rosetta Wheel Framework, depending on what their design goals are.

There is a broader context in which the Rosetta Wheel, which only focusses on game design techniques that foster psychological processes, is situated. There are three additional broad themes which can support designing games for health behaviour change, which were informed by Study 2. These three broad themes are Development Considerations, Design Processes, and the Design Toolkit. These are each defined below and include the key considerations for each context.

Design teams can use the Rosetta Wheel Framework in multiple ways, from early in development as a guidance tool to inform theoretical foundations, incorporation of expertise, and ethical considerations; or as a more specific design tool when they are designing for a specific outcome and would like to focus on one or two change keys. Here is an example of how two design teams can utilise the Rosetta Wheel Framework in two different ways:

1. Design Team A is from a large game development studio. They have a very refined workflow and game development cycle. They do not need any input into their processes of development. They are utilising the Change Keys in the Rosetta Wheel only, as prompts for behaviour change design in their early design ideation sessions.
2. Design Team B is a small independent development studio creating a serious game for health-related change for the first time. They have not approached a serious game before. They will read through the whole Rosetta Wheel Framework comprised of the Change Keys and the Key Considerations and will use these as prompts to inform behaviour change design as well as the overall

game development cycle.

There are a multitude of ways the Rosetta Wheel Framework can be utilised, from minimally informing early ideation, to providing a checklist for the overall development cycle. The next section will outline the Development Considerations, Design Processes, and the Design Toolkit, which make up the Key Considerations of the Rosetta Wheel Framework.

Development Considerations

This context details broad processes and considerations that are important across the overall project development stages, including e.g., research, stakeholder engagement, business models, scoping, documentation, and collaborative processes. The Development Process is the overall context in which game design practice is situated and will provide key considerations in support of the Rosetta Wheel. All development considerations reflect findings from Study 2. Condensed summaries are presented here.

Identify business model

Identify the business model, stakeholders, monetisation considerations, and client motivations. This process typically precedes but influences game design processes and techniques, dependent on these contingent business model factors.

Conduct cycle of discovery

Immerse into the subject matter to increase familiarity and knowledge of the problem space. This process precedes formal design processes and has the function of increasing familiarity and knowledge of the subject matter. This phase influences game design processes.

Consider ethics and do no harm

Consider the ethics of the game design and player involvement as a priority throughout all stages of design, playtesting, and development to eliminate

potential harm. Ethical considerations must be given at the beginning of the design cycle. When dealing with ethically challenging subjects, designers can adapt topic material and present it as an analogy. Given there may be varying ethical codes depending on target areas, design teams should consult with subject matter experts in the target topic area and discuss ethical considerations during early phases of design.

Consider using frameworks

Using frameworks, whether formalised theoretical frameworks, or in-house design/process frameworks, is an important step in the preliminary stages of the development process.

Useful frameworks that expert designers recommend exploring:

- Mechanics, Dynamics, Aesthetics framework (Hunicke, LeBlanc, & Zubek, 2004)
- Social Cognitive Theory (Bandura, 1989)
- Extended Parallel Process Model (Witte, 1992)
- Intrinsic / Extrinsic Motivation theory (Ryan & Deci, 2000)
- Transtheoretical Model (Prochaska & DiClemente, 1982)
- Behaviour Change Wheel (Michie, Atkins, & West, 2015)
- Self Determination Theory (Ryan & Deci, 1985)
- Human Centered Design (Cooley, 2000)

Collaborate with subject matter experts and diverse perspectives

Incorporate diverse voices from the target population, people with lived experience, subject matter experts, psychologists, social workers; through a variety of methods including interviews, observations, participatory design, and collaboration. Incorporating diverse perspectives and disciplines will provide increased insight into both the problem space, and the potential solution. This development process informs design processes

and, as such, it forms part of the overall development process to consider prior to direct design work.

Define game scope

In the context of the business model, consider the scope of possibility in your games design in relation to the client goals, included theories, allocated budget, development time. Identify the boundaries of what is expected and what is possible within the scope of resources. This development process is dependent on business model, and influences design processes and direction.

Playtest and iterate

Playtest and iterate on your game design by play testing it with the target population or audience. Where appropriate, determine playtesting outcomes using objective indicators (such as in-game analytics) as they may be more reliable than direct feedback from play testers. This development process is involved in and informs the iterative design process.

Document your process and design

Develop documentation of your design processes. This development process took place both prior to, and during the design phase for all participants.

Useful documentation that expert designers recommend including are:

- Agreed messaging
- Flowchart of narrative design
- Mapping outcome goals to game mechanics
- Game blueprint / vision
- Metric / goal sheet to assist workflow and completion

Design Processes

This context represents game design processes that take place over time and relates to how and by which processes the game is designed, including e.g., the process for mapping outcome goals to design, designing for user experience, creating "juicy" fun, and identifying barriers to change. The design process context operates within the scope of, and is influenced by, key considerations specified in the development process, and provides key considerations in support of the Rosetta Wheel. All design process considerations reflect findings from Study 2. Condensed summaries are presented here.

Identify change outcome goal

Identify and define the optimal change outcome goal as a first step in your design process. To achieve this, game design teams need to engage with client / stakeholder to fully understand needs, understand the target audience and explore ideal outcomes. This key consideration is of high importance, takes place as a first step in the design process, and informs all following aspects of the design process.

Design Team Reflection Prompts to identify change outcome goal:

- What function does the game serve?
- Do we need to educate?
- Do we need to motivate?
- Do we need to persuade?
- Do we need to provide feedback?

Discover change techniques

Once the outcome goal is known, commence a discovery phase exploring effective techniques for the change outcome goal. This process is achieved through reviews of research, guidelines, consulting with subject matter experts and engaging in participatory design. This key consideration is high

in importance and takes place following the identification of the outcome goal, and further informs all following aspects of the design process.

Map techniques to design

Map the identified change goal along with established techniques for change, to game design elements. This process is achieved through brainstorming, iterating, and exploring potential game design elements that engage the player in the change technique which then leads to the outcome goal. This key consideration relies on the identification of the outcome goal, and the identification of established techniques for change. Detailed design prompts to foster brainstorming at this stage can be found for each Change Key in the designer prompt section.

Consider player perspective & user experience

Consider the players perspective and user experience when designing the game. This process includes considering all aspects of the experience, from aesthetics, the messaging, the difficulty, the 'feeling', and whether it is a positive / negative / enjoyable experience. Considering player perspective and user experience throughout your design process will assist with designing a game that 'feels' right and creates the intended experience.

Design "juicy" fun

Design for the engaging, entertaining, 'juicy' fun aspect of gameplay. The fun design element is important as players may not begin or continue engaging with the game unless it provides them with an enjoyable experience. This key consideration involves considering 'juicy' fun during the design process, through to iterative playtesting and feedback.

Be flexible in design direction

Remain flexible and avoid having fixed ideas with regards to design direction during the design process. Design teams should be willing to iterate on initial design ideas in accordance with feedback. This design

process involves seeking peer and player feedback throughout the design process to test design elements and user experience.

Design narrative intentionally

Utilise narrative in an intentional way to communicate the target topic and change goal. Narrative design refers to the environmental design of the game, including everything that players experience holistically, from text, story and characters to environmental contexts, objects, cues, and audiovisual effects. This design process involves considering target psychological processes when designing narrative and worldbuilding in the game.

Design Toolkit

This context represents a specific game design decision, technique, tool, or resource that can be utilised in a games' design, including e.g., incorporating narrative for a specific purpose, ethical considerations, and providing opportunities for failure. The design toolkit context is situated within the design process context and will provide key considerations in support of the Rosetta Wheel. All design toolkit considerations reflect findings from Study 2. Condensed summaries are presented here.

Consider purpose-driven narrative

Utilise narrative to achieve a specific aim for the players, from prompting an emotion, to providing learning or perspective shifting cues.

Emotion & Empathy

Create stories that players can relate to, either through characters or contexts. This heightens player character/context empathy and can shift perspective when placed in new contexts/characters.

Feedback

Narrative can be a vehicle for feedback through providing dynamics of story change following choices or actions.

Learning & Memory

Information presented within a story format is learned faster and remembered more readily than information presented as disconnected facts which requires higher cognitive load. When learning and remembering are required for the target topic and change goal, design teams should consider linking information within a narrative.

Representation & Identification

Characters or contexts that players can identify with heighten emotional engagement. This can foster a sense of connection and emotional responsiveness.

Meaning

Incorporating deeper meanings and belief systems through in-game story and lore allows players to experience something new, shift perspectives, and provide transcendental experiences for the player. It can also provide heightened understanding of known concepts.

Reframe / Subvert

Incorporating reframing or subversions of common tropes and stereotypes through narrative can impact the player emotionally, enhance self-efficacy, and provide increased motivation around the target topic and change goal.

Provide opportunities for failure

Provide time and choices for players to fail, make mistakes, and

experiment with different game progress and action options. Furthermore, this design strategy involves giving the player the capacity to make further attempts to approach different choices. Providing opportunities to make wrong choices allows players to engage their curiosity and learn through failure.

Allow space for reflection and ambiguity for interpretation

Provide enough ambiguity and 'gaps' that players are prompted to reflect on meaning and develop their own interpretations. By providing cues, ambiguous choices, and room for interpretation rather than concrete indications, player engagement can be heightened, and space is created for reflection both within and outside the game.

Layer aesthetics for emphasis and priming

This key consideration involves considering the use of aesthetic layering to amplify or emphasise particular points or prime players for an upcoming moment. This technique can involve utilising music, sound design, dialog/text effects, audiovisual effects, layering and repetition of visual motifs, can all enhance player curiosity, stimulate a feeling, heighten engagement, lead players in a specific direction, and just be 'part of their journey'.

CONCLUSION

The Rosetta Wheel Framework is a starting point – hopefully a useful one – for design teams of games for behaviour change. It is a living framework in the sense that it is not meant to be a finite piece of unchanging work. This body of research began as it means to continue; continually informed by research and practice and contributing to the body of literature around designing games for positive change in individuals and society in the context of health behaviour.

In concluding this body of work, the future directions are clear. The practice-led research and research-led practice that led to this first Rosetta

Wheel Framework should continue. Furthermore, it should continue beyond the scope of one individual's contributions.

I would like to make a call for game design teams to implement the framework, add to it, revise approaches and develop it based on continued scholarship and practice.

Implementing this framework could cover a variety of approaches, such as:

- Does the Rosetta Wheel Framework facilitate communication between multidisciplinary teams through a shared understanding of game design and psychology?
- Which Key Considerations are most useful in development, and at which stage?
- How can the Rosetta Wheel Framework be used to redesign games to be more effective at health behaviour change?
- Are games designed with the Rosetta Wheel Framework effective with the change goal?
- Can the Rosetta Wheel Framework be used to analyse existing games to predict efficacy?

I invite researchers, designers, players, subject matter experts, and all the other multidisciplinary game design team members to test this framework and report on its suitability. I invite them to provide valuable critique. I invite revisions, inclusions, experiments. I invite them to keep building it with me. The Rosetta Wheel Framework is just the beginning of a practical and comprehensive shared language of psychology and game design for the purpose of designing behaviour change games. By continuing as it was started, this field of endeavour will be in an increasingly fertile ground for creating experiences that make a positive impact on people and the world.

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