



Programme: **BSc (Hons) Applied Computing, Level 6 Term 1 Group 1**
Module name and code: **Usability Engineering, ACCB6017**
Lecturer: **Koushik Modak**
Assignment: **2**

Full Interface and Testing

UWTSD CLUEDO Mobile Game

Student name: **Leonid Yanchev**
Student ID: **2215110**

Submission date: **December 21, 2025**

TABLE OF CONTENTS

Introduction	3
1. Full-Color Storyboards and Visual Design	4
1.1 Design Tools and Prototyping Approach	4
1.2. Color Scheme and Graphic Design Rationale	4
1.3. Iterations from Wireframes Based on Feedback	6
2. Prototype Testing and Feedback	7
2.1 Evaluation Method and Participant Selection	7
2.2 Usability Feedback	7
3. Data Collection in a Live Version	8
3.1 Collection of Emotional and Qualitative Feedback	8
3.3 Ethical and Practical Considerations	8
Reflective Summary and Conclusion	10
Appendix-1: Main Menu screens/wireframes	11
Appendix-2: Campus and Character selection screens	11
Appendix-3: Selection of player starting first and loading the Gameboard:	12
Appendix-4: Suggestion screen with confirmation	13
Appendix-5: Clue (Detective) sheet screen	14
References	15

Introduction

This report presents the second stage of the usability engineering process for the UWTSD Cluedo mobile game, building directly on the user research, personas, wireframe storyboards, and initial usability evaluation completed in Assessment-1. While the first assessment focused on low-fidelity design and early interaction concepts, this assessment advances the project by developing a complete set of high-fidelity, full-colour storyboards, conducting further usability evaluation, and critically reflecting on design decisions informed by both theory and user feedback.

The game reimagines the traditional Cluedo format within the context of the University of Wales Trinity Saint David (UWTSD), using real campus environments, including Carmarthen, Swansea, Cardiff, and London as investigative settings. Players attempt to solve the fictional murder of the Vice-Chancellor by navigating campus locations, collecting clues, and deducing the suspect, weapon, and room. The aim of this stage is to demonstrate how usability engineering principles, accessibility considerations, and user experience goals can be synthesised into a refined, mobile-appropriate interface design. [1],[2]

1. Full-Color Storyboards and Visual Design

1.1 Design Tools and Prototyping Approach

The full-color storyboards were created using a digital design tool suitable for mobile interface prototyping, allowing precise control over layout, color, typography, and visual hierarchy. Compared to the wireframe prototypes developed in Assessment-1, these high-fidelity storyboards provide a realistic representation of the final interface [2],[4], enabling evaluation of both functional usability and emotional response. This approach is consistent with HCI literature, which highlights the value of high-fidelity prototypes when assessing visual design, narrative engagement, and aesthetic coherence.

1.2. Color Scheme and Graphic Design Rationale

Across all screens, a dark, atmospheric color palette dominated by deep blues, charcoal greys, and muted teal tones is used to reinforce the mystery theme. This palette supports narrative immersion while also reducing visual strain during prolonged interaction. High-contrast white typography with dark outlines ensures legibility against complex photographic and illustrated backgrounds, supporting accessibility and readability on mobile devices. [1], [3]

The welcome and loading screens use a photographic image of a historic university building, visually anchoring the game within an authentic UWTSD campus environment. Subtle lightning and shadow effects introduce tension without overwhelming the interface. Interactive elements are intentionally absent from the loading screen, clearly signaling system status and preventing unnecessary user input. (see Appendix-1)

On the main menu, large semi-transparent buttons are layered over the campus imagery. This translucency preserves environmental context while clearly separating interactive elements from decorative content. Interactive elements on the main menu screen are presented as large, semi-transparent buttons layered over the background image. The use of translucency allows the campus imagery to remain visible while clearly separating actionable elements from decorative content. Button spacing and size are optimized for mobile touch interaction, supporting ease of use and reducing the likelihood of input errors. The consistent placement and styling of navigation options such as “New Game,” “Continue,” and “How to Play” support learnability and follow established usability principles of consistency and simplicity. (see Appendix-1)

The character selection screen uses illustrated avatars placed against a dark storm-themed background. Bright, friendly character illustrations contrast strongly with the background, ensuring easy recognition and supporting quick decision-making. Consistent framing and spacing reinforce visual order and predictability. (see Appendix-2)

On the “Which player is going first?” screen, the stormy background and lightning imagery create a sense of anticipation while remaining visually subdued enough to avoid distracting from the primary interaction. The spinner uses soft, light-colored segments that contrast clearly against the darker background, ensuring that each player avatar is easily distinguishable. This contrast supports visibility and reduces cognitive effort when tracking the spinner’s movement. The pointer is centrally positioned and clearly defined, providing immediate visual feedback when the spinner stops. The result text (“It is Mrs. Alison Carter’s turn”) is displayed in high-contrast typography, ensuring clarity and reinforcing system status without requiring further user input. (see Appendix-3)

The Gameboard screen adopts a more structured visual layout while maintaining the same color palette to ensure continuity. Each room is represented as a clearly bound rectangular space with subtle outlines and semi-transparent fills, allowing room labels to remain legible against the textured background.

Character avatars are consistently positioned at the top of both screens, providing a persistent reminder of participating players and supporting social awareness within the game. The signed-in player indicator at the bottom of the screen reinforces identity and turn ownership, reducing ambiguity during turn-based interaction. Iconography, including the settings icon, follows a simple, recognizable design and is placed away from core gameplay elements to minimize accidental activation.(see Appendix-3)

The room interaction and suggestion screen continues this visual language while shifting the focus toward functional clarity. The library background is rendered in muted tones to avoid visual clutter, allowing interactive elements such as suspect, weapon, and room selection panels to stand out clearly. Accent colors, particularly soft cyan highlights and white text overlays, are used to indicate selectable components and active states. This selective use of color supports visibility of system status and reduces the likelihood of user error. The semi-transparent overlays used for text and selection areas ensure legibility without completely obscuring the environmental context, preserving both usability and immersion.

Graphic elements across both screens follow a clean, illustrative style rather than photorealism. This approach ensures visual consistency across devices and screen sizes, supports faster visual processing, and avoids unnecessary details that could distract from gameplay. Character designs are friendly and recognizable, helping users emotionally connect with the game while maintaining a professional, academic tone appropriate for a university setting. (see Appendix-4)

The Clue Sheet screen is designed as a functional, information-dense interface that supports logical deduction while minimizing cognitive load. Visually, it adopts a restrained and neutral color scheme that complements the overall dark, atmospheric aesthetic of the game without competing with the core task of information tracking. Muted greys and soft blue tones dominate the interface, creating a calm visual environment that encourages focus and analytical thinking rather than emotional immersion.

To ensure clarity, the clue grid is presented as a semi-transparent overlay placed above the library background. This approach allows the environmental context to remain visible while clearly separating interactive and informational elements from decorative content. The transparency level is carefully balanced to maintain readability of text and symbols, ensuring that users can quickly scan the grid without visual interference. This design choice supports usability principles related to visibility and readability, particularly on smaller mobile screens.

The grid layout itself is highly structured, with suspects, weapons, and rooms grouped into clearly labelled sections. Consistent spacing, alignment, and typography are used throughout the table to reinforce predictability and support rapid visual scanning. Checkmarks and subtle icon indicators are used to confirm eliminated or confirmed clues, reducing reliance on memory and supporting recognition over recall. This is especially beneficial for users who may struggle with complex information processing or who prefer a more relaxed, low-pressure gameplay experience. (see Appendix-5)

1.3. Iterations from Wireframes Based on Feedback

Several design changes were implemented in direct response to feedback gathered during Assessment-1. Participants previously reported that some icons were unclear when presented without text, in the revised design, icons are consistently paired with labels or contextual cues. The wireframe game board was also perceived as visually crowded. In response, the full-color game board introduces increased spacing between rooms, clearer boundaries, and improved visual grouping. [2],[4]

Another significant change involved strengthening narrative flow. Feedback indicated that the wireframe version felt abrupt and lacked atmosphere. The revised design introduces automated transitions, including a campus loading sequence and cinematic introduction, to establish narrative context before gameplay begins. These changes enhance emotional engagement while maintaining usability.

2. Prototype Testing and Feedback

2.1 Evaluation Method and Participant Selection

Usability testing of the full-color prototypes was conducted through face-to-face walkthrough sessions with the same four individuals who previously informed the persona development and wireframe evaluation. This deliberate reuse of participants ensured that feedback covered the full range of personas defined earlier, namely an international undergraduate, a strategic thinker, a casual relaxed gamer, and a narrative-focused player. By maintaining consistency in test subjects, it was possible to directly assess whether the design changes implemented after Assessment-1 effectively addressed the previously identified usability issues. [4], [6], [8]

Each participant was shown the high-fidelity storyboards on a mobile-sized display and asked to complete a series of representative tasks. These tasks included starting a new game, viewing the campus introduction sequence, navigating the game board, moving between rooms, suggesting, and reviewing the clue sheet. Participants were encouraged to verbalize their thoughts during the walkthrough, allowing insight into both cognitive processing and emotional reactions.

2.2 Usability Feedback

Overall usability feedback was positive and indicated clear improvement compared to the wireframe prototypes. Participants reported that navigation felt more intuitive due to clearer visual hierarchy, improved spacing, and the use of color-coded highlights to indicate valid movement options. The redesigned icons, now paired with text labels, significantly reduced confusion and supported faster decision-making, particularly for the international student persona who had previously struggled with ambiguous symbols.

Participants also reported improved clarity, better navigation, and greater confidence when interacting with the interface compared to the wireframe version. The replacement of dice with spinner was consistently praised as fair, modern, and easier to understand. The clue (detective) sheet was described as clear and satisfying to use, supporting logical reasoning without excessive mental effort.

However, some minor usability issues were identified, including requests for stronger confirmation feedback when submitting suggestions and slightly increased contrast in certain text areas. This confirmed that the narrative elements and visual polish increased immersion, particularly for story-driven users. Overall, the feedback aligned closely with expectations derived from the personas.

3. Data Collection in a Live Version

If the game were developed into a fully functional application, both automatic usage data and user-reported feedback would be collected to support iterative improvement. Automatic analytics could track metrics such as session length, room visitation frequency, number of suggestions made, and game completion rates. This data would provide insight into cognitive workload, engagement, and potential usability bottlenecks. [9], [10]

3.1 Collection of Emotional and Qualitative Feedback

While usage analytics provide insight into what users do, they do not fully explain why users behave in certain ways or how they feel during interaction. For this reason, emotional and qualitative data would also need to be collected. This could be achieved through optional in-app feedback mechanisms, such as short post-game surveys, star ratings, or brief open-ended questions asking users to describe their experience. Emotional response data might focus on enjoyment, frustration, tension, or immersion, key aspects of a mystery-based game.

Unlike automatic usage data, emotional feedback typically requires explicit user participation and therefore must be carefully designed to minimize disruption. For example, feedback prompts could be presented after a game session rather than during gameplay, preserving immersion. This distinction highlights an important difference between collecting behavioral data, which can be largely automated, and emotional response data, which often relies on direct user communication and subjective reporting.

3.3 Ethical and Practical Considerations

All data collection would need to comply with ethical standards and data protection regulations, including GDPR. Users would be informed about what data is collected, how it is used, and given the option to opt out of non-essential data tracking. Personally identifiable information would not be required for usability analysis, ensuring that data remains anonymized and focused solely on improving the application.[11]

From a practical perspective, combining automatic analytics with selective qualitative feedback offers a balanced and sustainable approach. Automated data supports large-scale pattern recognition, while targeted user feedback provides context and depth. Together, these data sources would inform future iterations of the game, guiding decisions related to difficulty balancing, interface refinement, narrative pacing, and accessibility enhancements.

4. Usability vs User Experience Conflicts

Throughout the design process, several tensions emerged between strict usability optimization and broader user experience goals. For example, narrative animations and atmospheric effects slightly delay access to gameplay but significantly enhance immersion. Similarly, maintaining high contrast for accessibility constrained certain aesthetic choices but ensured inclusivity.

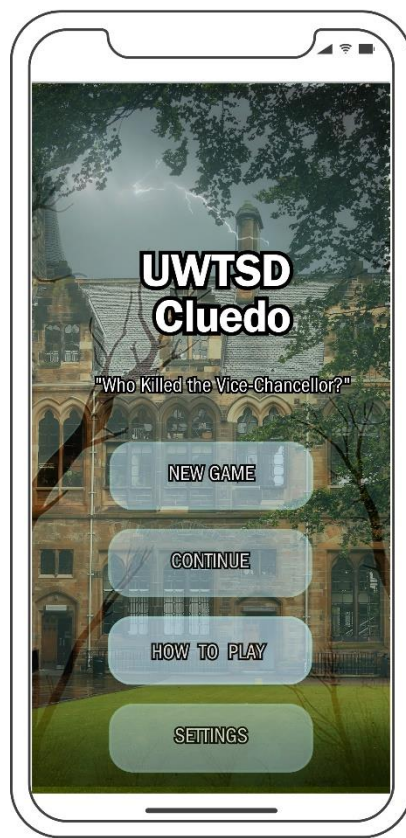
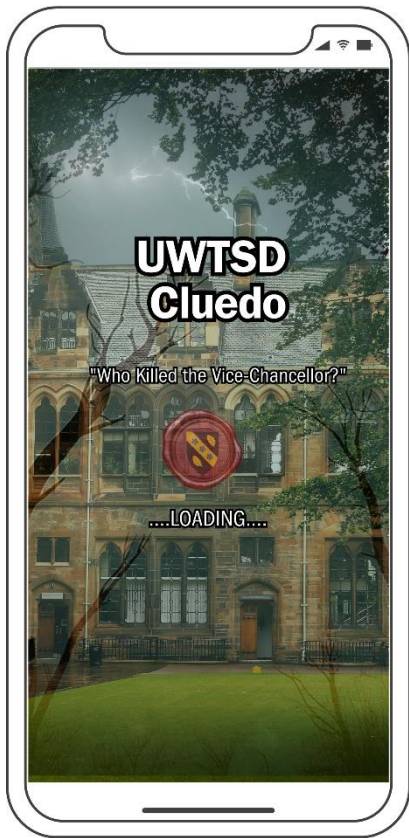
Another trade-off involved information density. Presenting all deducted information at once could improve efficiency but risk overwhelming users. The layered design of the clue sheet resolves this by supporting recognition without clutter. These decisions reflect a deliberate balance between efficiency and engagement, demonstrating synthesis of usability engineering principles and experiential design. [5]

Reflective Summary and Conclusion

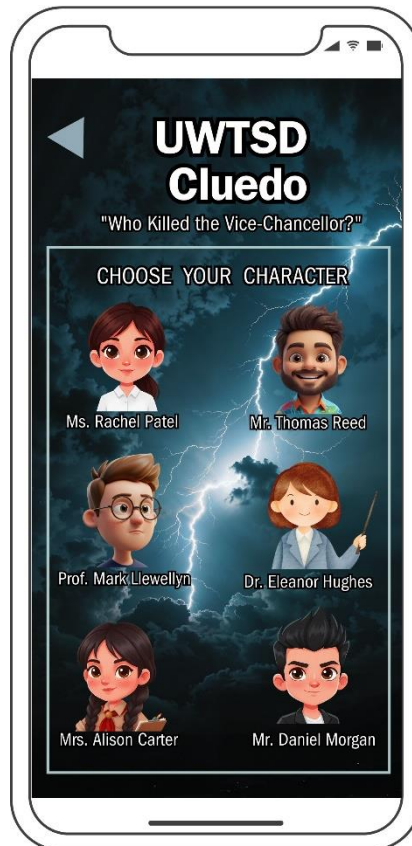
This report demonstrates the value of iterative, user-centered design informed by usability engineering theory and real user involvement. Transitioning from wireframes to full-color storyboards revealed how visual design, narrative elements, and interaction feedback can significantly influence both usability and emotional response. User testing validated many design decisions while highlighting areas for refinement, reinforcing the importance of evaluation at multiple stages. [7]

In conclusion, the final high-fidelity storyboards represent a coherent, accessible, and engaging solution to a complex interaction design problem. The project shows how usability principles, accessibility standards, and user experience considerations can be effectively integrated within a realistic university-based application context. Further development would benefit from live deployment and data-driven iteration, but even at the storyboard stage, the design provides strong evidence of sound usability engineering practice.

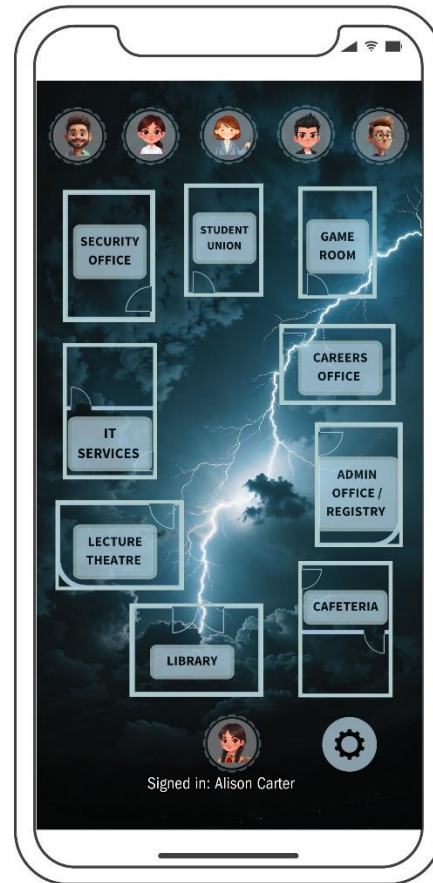
Appendix-1: Main Menu screens/wireframes



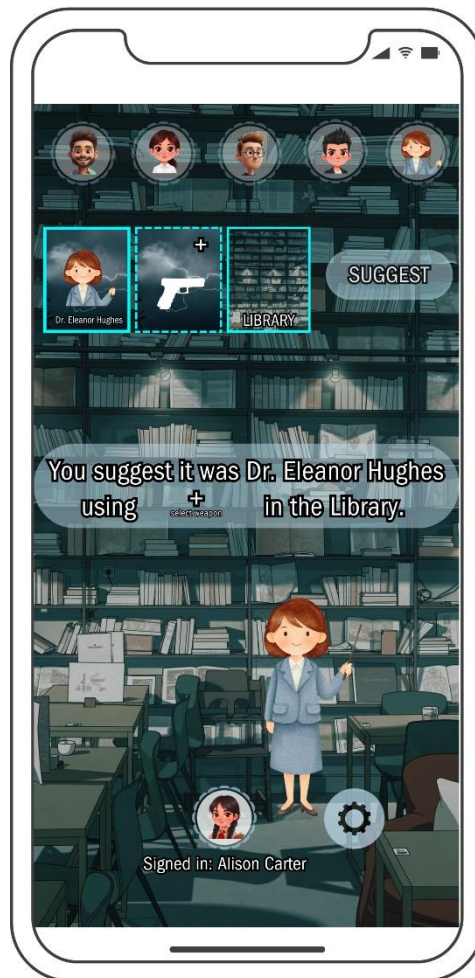
Appendix-2: Campus and Character selection screens



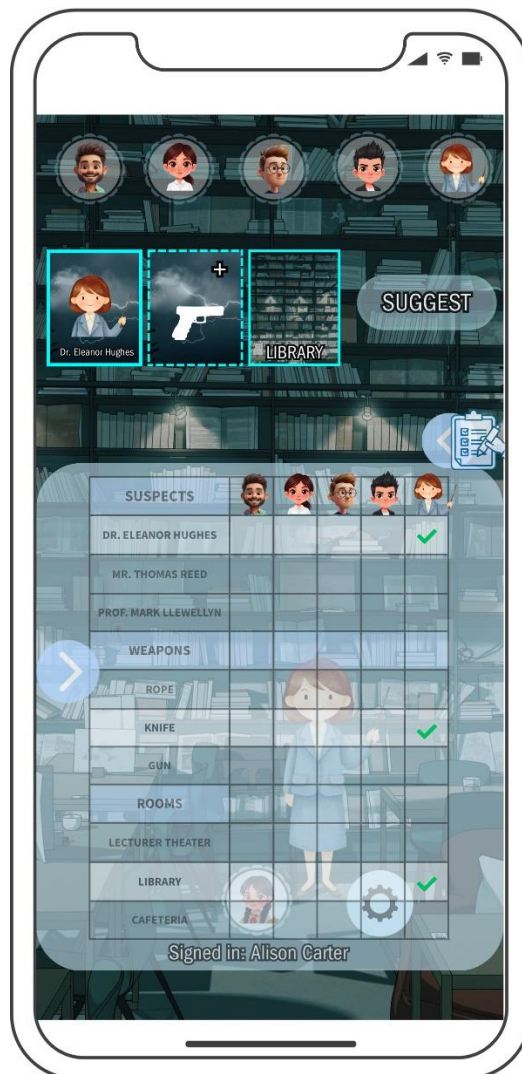
Appendix-3: Selection of player starting first and loading the Gameboard:



Appendix-4: Suggestion screen with confirmation



Appendix-5: Clue (Detective) sheet screen



References

- [1] B. Schneiderman, C. Plaisant, M. Cohen, S. Jacobs, N. Elmqvist, and N. Diakopoulos, *Designing the User Interface: Strategies for Effective Human–Computer Interaction*, 6th ed. Boston, MA, USA: Pearson/Addison-Wesley, 2017.
- [2] Y. Rogers, H. Sharp, and J. Preece, *Interaction Design: Beyond Human–Computer Interaction*, 4th ed. Chichester, U.K.: John Wiley & Sons, 2015.
- [3] World Wide Web Consortium (W3C), *Web Content Accessibility Guidelines (WCAG) 2.1*, 2018.
- [4] J. Lazar, J. H. Feng, and H. Hochheiser, *Research Methods in Human–Computer Interaction*, 2nd ed. San Francisco, CA, USA: Morgan Kaufmann, 2017.
- [5] D. A. Norman, *The Design of Everyday Things*, Rev. ed. New York, NY, USA: Basic Books, 2013.
- [6] S. A. MacKenzie, *Human–Computer Interaction: An Empirical Research Perspective*. Waltham, MA, USA: Morgan Kaufmann, 2014.
- [7] A. Dix, J. Finlay, G. D. Abowd, and R. Beale, *Human–Computer Interaction*, 3rd ed. Harlow, U.K.: Pearson, 2004.
- [8] J. Nielsen, “*Why You Only Need to Test with 5 Users*,” Nielsen Norman Group, 2000.
- [9] J. Sauro and J. R. Lewis, *Quantifying the User Experience: Practical Statistics for User Research*, 2nd ed. Cambridge, MA, USA: Morgan Kaufmann, 2016.
- [10] B. Buxton, *Sketching User Experiences: Getting the Design Right and the Right Design*. San Francisco, CA, USA: Morgan Kaufmann, 2007.
- [11] European Union, *Regulation (EU) 2016/679 (General Data Protection Regulation)*, Official Journal of the European Union, 2016.