

CHAPTER

2

BLENDING USER EXPERIENCE INTO SOFTWARE DEVELOPMENT PRACTISE

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2.1 THE CHANGING LANDSCAPE OF SOFTWARE DEVELOPMENT

The Fourth Industrial Revolution (4IR) is frequently associated with advanced technologies such as Artificial Intelligence (AI), robotics, Virtual Reality (VR), and the Internet of Things (IoT). Yet, it is equally about the rise of creativity, emotional intelligence, and cognitive flexibility where skills that the World Economic Forum (2018) identified among the top ten requirements for future employment. These competencies highlight the human dimension of technology and emphasise that success in digital innovation now depends not only on technical mastery but also on sensitivity to User Experience (UX).

In conventional software development environments, the focus often remains on defining system requirements, modelling functionality, and ensuring technical accuracy. These aspects are essential, but they rarely capture the feelings, frustrations, and expectations of those who ultimately use the systems. Many projects succeed in meeting formal specifications while still failing to gain user satisfaction. Such gaps reveal an enduring tension between functional correctness and experiential quality.

Human-computer Interaction (HCI) and interaction design fields have long argued that a system can only be deemed successful when it satisfies both functional and emotional needs of users. Central to this perspective is the principle of User-centred Design (UCD), which places human goals, capabilities, and limitations at the forefront of the design process (Dix et al., 2004; Sharp et al., 2019). In industry, the practical expression of UCD has evolved into what is now known as UX research or UX study. Companies frequently use the combined term UI/UX, reflecting the integration of user interface design with broader experiential concerns.

The challenge, however, lies in how UX principles can be effectively embedded into the long-established processes of software engineering. Many teams continue to follow conventional lifecycles such as the waterfall model, where the emphasis on documentation and stage-based progress leaves limited space for iterative user engagement. This chapter explores how UX can be introduced and sustained within such contexts, showing how design thinking and agile practises help bridge the divide between technical precision and human experience.

2.1.1 From Conventional Engineering to Human-centred Thinking

The tension between engineering logic and human empathy is not new. Software development, as a discipline, emerged from engineering traditions that valued predictability, efficiency, and control. Conversely, design traditions celebrate ambiguity, creativity, and empathy (Schön, 1983). Integrating UX thus requires reconciling two epistemologies: One driven by problem-solving and optimisation, and the other by understanding and co-creation.

In practise, UX approaches enter conventional settings in incremental ways. Early efforts often start with minimal interventions, that is conducting short usability tests or developing personas, to familiarise technical teams with human-centred perspectives. Over time,

such activities can evolve into systematic UX programmes embedded within development cycles.

2.1.2 Understanding User Experience in Practise

User experience (UX) is often conflated with usability, yet the two differ in scope. Usability concerns the efficiency, effectiveness, and satisfaction with which users achieve specific goals; UX encompasses the holistic perception of interaction over time, including emotions, aesthetics, and meaning (Hassenzahl, 2010). A system can be usable but emotionally neutral, or even alienating. The ambition of UX is to create technology that not only functions well but also enrich people's lives.

The academic community has described this shift as a movement from user-centred to experience-centred design (Forlizzi & Battarbee, 2004). While UCD focuses on user needs and tasks, experience-centred approaches consider the broader social, cultural, and emotional contexts in which technology is used. This orientation is particularly relevant in Malaysia and other parts of Southeast Asia, where technology adoption is deeply influenced by communal values, institutional norms, and multilingual communication practises.

In these settings, UX cannot simply be imported as a Western design philosophy; it must be adapted to local cultures of collaboration and hierarchy. Designers must negotiate between formal authority structures and participatory ideals. As such, introducing UX into conventional software development in Malaysia represents not merely a methodological shift but also an organisational and cultural transformation.

2.1.3 The Malaysian Software Development Landscape

Although the value of user experience is now widely recognised across global technology sectors, UX adoption in Malaysia remains relatively uneven. Software development in many local organisations is still shaped by engineering priorities, like cost, timelines, and technical compliance, rather than user research or design thinking. Studies have

shown that Malaysian Information and Communication Technology (ICT) professionals tend to focus heavily on functionality, often neglecting usability and user studies (Hussein et al., 2010).

This emphasis reflects the historical roots of Malaysia's ICT sector, which grew rapidly in response to government initiatives promoting digitalisation. During the early 2000s, software projects were largely outsourced or developed internally under rigid hierarchical models. While these approaches delivered stable systems, they left little room for creative exploration or iterative testing. Consequently, usability and design research were often viewed as optional or secondary tasks.

Gradually, however, several factors have prompted change. The introduction of agile methodologies in the early 2000s (Sacolick, 2001) encouraged smaller, faster iterations, and closer collaboration between development teams and clients. At the same time, the rise of the 4IR discourse reframed UX as a competitive advantage. Organisations began to realise that appealing digital products depend not only on robust code but also on emotional resonance and simplicity.

Researchers such as Hussein et al. (2013) highlighted that Malaysian ICT organisations lagged behind in institutionalising UCD practises. Even when usability testing was conducted, it was often informal or ad hoc. The limited availability of trained UX professionals compounded the challenge. Nonetheless, as global companies set up design and innovation centres in Malaysia, exposure to UX principles began to increase.

2.2 CASE NARRATIVES FROM MALAYSIAN ORGANISATIONS

More recently, public universities have played a key role in modelling UX adoption. Through academic-industry collaborations and internal digital transformation initiatives, institutions like Universiti Teknologi Malaysia (UTM) have experimented with incorporating UX processes into their own development projects. The two case narratives presented in this chapter: UTMSmart and Monitoring Online Kids Activity

(MOOKA) applications, reflect this evolution from conventional engineering towards human-centred innovation.

2.2.1 User Experience with Agile Practise: The UTMSmart

UTMSmart is a flagship mobile application developed in-house by UTM. Initiated in 2019 as part of the university’s ambition to create a seamless digital campus experience, the application serves staff, students, parents, alumni, and visitors. The project was led by the university’s digital transformation unit, UTMDigital—the department in charge of UTM’s digital infrastructure. This team had deep technical expertise but limited prior exposure to UX methods.

Traditionally, the team followed a structured process: Requirement gathering from product owners, design and development, user training, and maintenance. This linear model delivered reliable systems but offered few mechanisms for capturing user emotion or context of use. In 2019, UTMDigital began adopting the agile methodology, forming a small, cross-functional team led by a Scrum Master. The inclusion of user stories within the Scrum framework represented the first step towards a more human-centred practise.

The team began by empathising with different categories of UTM community members and creating personas to represent them. These personas guided the identification of core features for the first release (see Figure 2.1). Through iterative cycles, the developers produced mock-ups and internal prototypes for evaluation. A formal usability test was conducted just before the application’s initial release on both the Apple App Store and Google Play, and feedback from this evaluation directly informed interface improvements.

As agile routines matured, UX activities became embedded in the team’s workflow. Workshops and ideation sessions (see Figure 2.2) allowed staff to revisit user journeys, especially during the COVID-19 pandemic when digital interactions increased dramatically.

Each sprint lasted two to four weeks, producing smaller, testable increments. user story design (USD) documents captured not only

functionality but also interface layouts and interaction diagrams (see Figure 2.3).

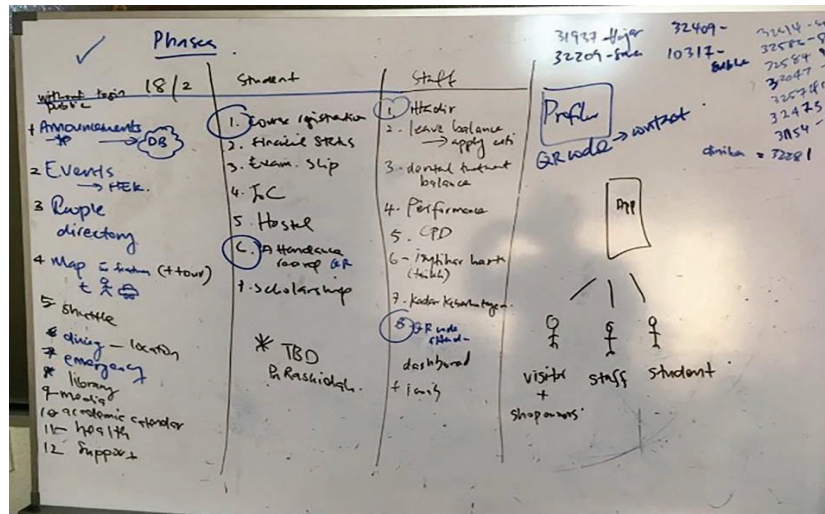


Figure 2.1 The identified features for UTMSmart version 1.0 based on the profiling of personas



Figure 2.2 Revisiting the user journey in the preparation of the new version in the time of pandemic

User Story (As a <type of persona>, I want <goal> so that <value achieve>)

As a UTMSmart user, I would like to find UTM staff and display detailed information

Figure 2.3 Excerpt from a user story design document containing user stories and user interface design

By the end of 2019, 50 modules were planned, and the team successfully delivered 53 (see Figure 2.4). Regular agile rituals like daily stand-ups, sprint reviews, and retrospectives, ensured transparency and collective ownership.

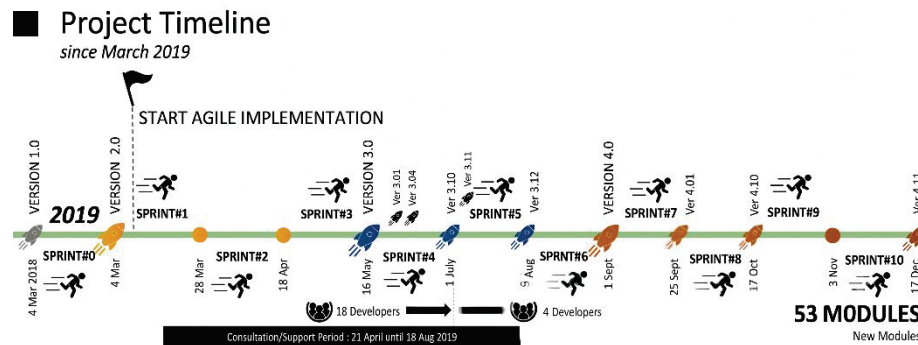


Figure 2.4 UTMSmart Project Timeline in 2019

Initially, developers were sceptical about the value of agile and UX, viewing them as managerial overheads. However, as iterations continued, the benefits became visible: Communication improved, rework decreased, and user satisfaction increased. The shift was not merely procedural but cultural; developers began to see themselves as co-designers of user experience rather than solely as coders.

2.2.2 Rethinking Requirements through User Experience: The MOOKA

While the UTMSmart project integrated UX within an existing agile framework, the MOOKA project demonstrated how UX can help re-evaluate traditional requirement-driven projects. Implemented in

collaboration with a Malaysian secondary school, MOOKA aimed to help teachers and parents monitor students' attendance, behaviour, and learning outcomes.

Initially, requirements were gathered using conventional methods, resulting in a specification that met technical criteria but failed to address user realities. Teachers and parents struggled to imagine how the system would fit into their daily routines. To address this gap, the development team applied a design thinking approach, emphasising empathy, ideation, and prototyping.

A participatory design session was held at the school, involving ten teachers and five parents (see Figure 2.5). Participants were invited to express their “pain points” regarding current monitoring practises. This exercise surfaced emotional frustrations, such as difficulty in communicating with students' guardians or delays in disciplinary reporting.



Figure 2.5 Exploring teachers' and parents' pain points

Next, an information-visualisation exercise encouraged participants to map relationships and workflows on large boards using sticky notes. The “How Might We” (HMW) technique helped frame opportunities for improvement (see Figure 2.6).

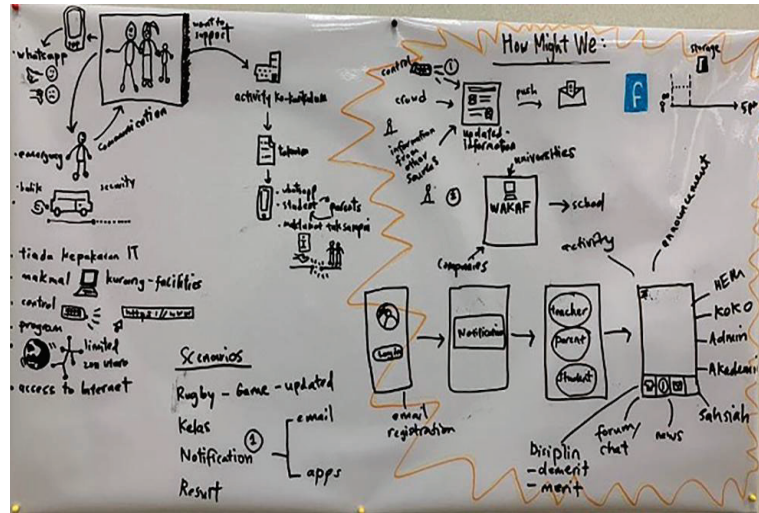


Figure 2.6 Applying the information visualisation using “How Might We” technique

A low-fidelity paper prototype was then created to capture the user flow and interface elements (see Figure 2.7). Labels, copywriting, and navigation structures were refined collaboratively with participants. Because of its simplicity, the paper prototype enabled rapid testing and iteration (see Figure 2.8). The prototype evolved into a functional digital version, eventually supporting the system's commercialisation (see Figure 2.9).

Through this process, stakeholders gained a sense of ownership and clearer understanding of how their feedback shaped the design. The exercise also demonstrated that UX need not be expensive; relatively small investments in participatory sessions and quick prototypes can yield substantial returns in usability and stakeholder satisfaction.

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Figure 2.8 The paper prototyping enable quick test for improvement

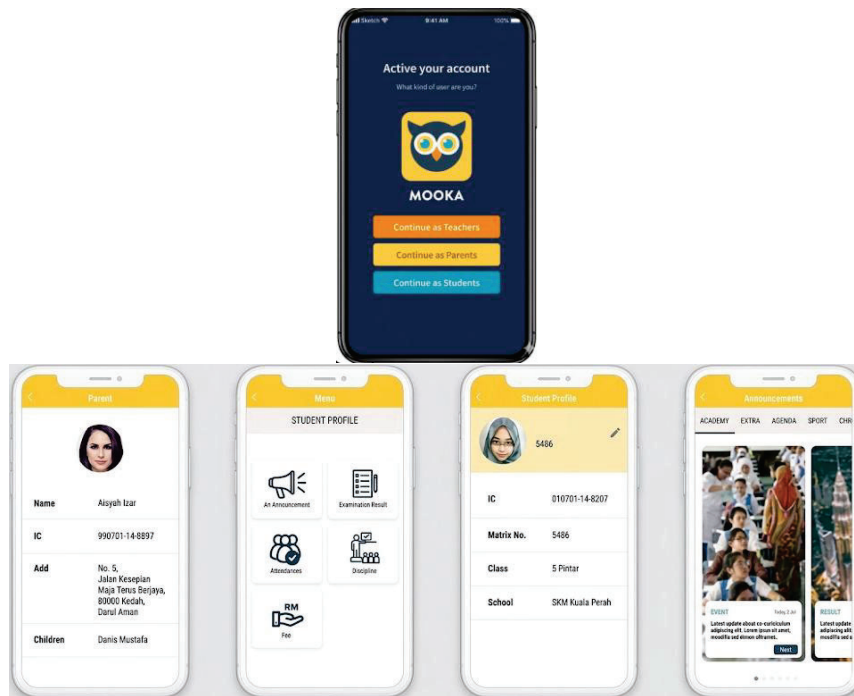


Figure 2.9 Interfaces for MOOKA

2.3 REFLECTION, INSIGHTS, AND LOOKING AHEAD

The two case narratives together illustrate the gradual but powerful integration of UX into conventional software development. In both contexts, UX was introduced incrementally rather than through radical overhaul. At UTM, agile practices created a natural entry point for user stories and iterative evaluation. In MOOKA, design thinking provided a framework for revisiting and validating user requirements.

2.3.1 Lessons from Practise

Here, we list the prominent lessons we gained from these experiences.

- (1) Small, early steps matter UX adoption succeeds when teams begin with manageable activities—such as persona creation or quick user tests—that demonstrate immediate value.

- (2) User experience complements agile rather than competes with it when embedded into sprints, UX activities improve clarity and reduce wasted effort.
- (3) Stakeholder empathy improves outcomes. Engaging teachers, parents, or students directly in design not only enhances usability but also builds trust.
- (4) Institutional support is essential. Leadership commitment to training, recognition, and time allocation ensures that UX practises are sustained.

Both projects reveal that UX acts as a catalyst for organisational learning. Developers and users alike become more reflective about design choices, leading to more thoughtful systems. Table 2.1 illustrates the cross comparison of the two projects.

Table 2.1 Cross case comparison

Aspect	UTMSmart	MOOKA
Project Type	Internal mobile app for a university community	School-level monitoring system
UX Methodology	Agile UX with user stories and personas	Design thinking with participatory design
Primary Stakeholders	Developers, staff, students	Teachers, parents
Outcome	Continuous agile improvement and cultural shift	Revised requirements and higher engagement

2.4 CONCLUSION

As Malaysia advances its digital transformation agenda, UX will increasingly determine the success of public and private sector applications. Emerging technologies such as AI and machine learning introduce new ethical and experiential questions: How do algorithms shape perception? How can designers preserve transparency and agency? Integrating human-

in-the-loop principles into UX processes may help ensure that technological progress remains aligned with social values.

Future work should also focus on capacity-building, like training software engineers in qualitative research, ethnography, and participatory facilitation. Cross-disciplinary collaboration between computer science, design, and social science programmes can produce graduates capable of balancing technical and human concerns.

Blending UX into conventional software development is both a methodological and cultural transformation. The cases of UTMSmart and MOOKA demonstrate that even within structured, engineering-oriented environments, UX can take root through empathy, iteration, and collaboration. Over time, these practises lead to systems that not only work efficiently but also resonate emotionally with users. As digital transformation continues, Malaysian organisations stand to benefit from embedding UX as a core competency rather than an optional enhancement. Ultimately, good user experience is not an indulgence but a prerequisite for sustainable innovation.

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REFERENCES

- Dix, A., Finlay, J., Abowd, G., & Beale, R. (2004). *Human-computer interaction* (3rd ed.). Prentice Hall.
- Forlizzi, J., & Battarbee, K. (2004). *Understanding experience in interactive systems* [Conference session]. Proceedings of the 5th Conference on Designing Interactive Systems (pp. 261–268). ACM.

- Hassenzahl, M. (2010). *Experience design: Technology for all the right reasons*. Morgan and Claypool.
- Hussein, I., Mahmud, M., & Yeo, A. (2010). *HCI practises in Malaysia: A reflection of ICT professionals' perspectives* [Conference session]. Proceedings of the International Symposium on Information Technology (ITSim), 3, 1549–1554. <https://doi.org/10.1109/ITSIM.2010.5561621>
- Hussein, I., Mahmud, M., Md Tap, O., & Jack, L. (2013). Does user-centred design (UCD) matter? Perspective of Malaysian IT organisations. *International Journal of Interactive Digital Media*, 1(1), 71–78.
- Sacolick, I. (2001). *What is agile methodology? Modern software development explained*. InfoWorld. <https://www.infoworld.com/article/3237508/what-is-agile-methodology-modern-software-development-explained.html>
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Sharp, H., Rogers, Y., & Preece, J. (2019). *Interaction design: Beyond human–computer interaction* (5th ed.). John Wiley & Sons.
- World Economic Forum. (2018). *The future of jobs report 2018*. World Economic Forum.