DSP831 Experience Design

How might we design a mobile app that utilises smart meter data to reduce the negative impact of domestic energy consumption and positively engage households with climate action?

Background

Climate change is real, the temperature of our world is increasing rapidly leading to extreme weather, melting ice, and rising sea levels. There are lots of interrelated factors that contribute to climate change, but scientists agree that human activity is leading to Global Warming. Climate change is a complex systemic problem and urgent action is needed; therefore, most nations of the world have committed to reducing carbon emissions by setting legal targets for radical reductions to be met by 2030 or 2050 at the latest.

The focus of this brief is upon reducing the carbon emissions caused by energy consumed in homes (which makes up around 27% of total UK carbon emissions).

This can be achieved by households:

- changing behaviours so that they use less energy in their homes,
- investing in their homes to make them more energy efficient,
- shifting when energy is used so peak time demand is reduced,
- generating, storing and trading solar generated energy.

Smart Meters securely transmit energy usage data to energy suppliers. The data from smart meters is also fed back to customers via an in-home display and /or mobile app to provide feedback on energy usage and cost. The UK government wants every home in the UK to have been offered a smart meter by 2025. Smart Meters enable timely and accurate billing, can increase understanding of energy use in the home, and support the transition to renewable energy and electric vehicles. When combined with Artificial Intelligence (AI), patterns in usage data can be interpreted to provide targeted advice on how to shift or reduce energy consumption. Data across households can be combined to predict peaks in demand which ultimately help maximise use of renewable energy from wind and solar.

Despite the on-going rollout of smart meters and the recent sharp increase in energy prices, most people remain unsure about how energy is being consumed in their home and how they can make significant changes. Generally, energy use is viewed as intangible and complex. Whilst awareness and concern about climate change is rising, most people remained confused by their smart meter data and have little idea about how they can make meaningful changes to their domestic energy use.

This brief has been set in partnership with Gengame Ltd. Gengame is a UK energy technology company that creates apps for businesses that supply gas and electricity to domestic homes (known as energy utility companies). Gengame's core modular app (IVIE) utilises novel behaviour change and gamification features, designed to encourage consumer engagement with sustainable energy technologies such as electric vehicles, solar energy systems, energy storage, and smart meters.

Students will retain the IP for their design work. A short list of the best projects may be submitted to Gengame for further feedback.

The Coursework – An Overview

This individual project runs in Semester One, it is 100% of this 15 credit module, and is formed of one coursework component.

*Your concept must be a native **mobile app** and address a **clearly defined need or opportunity** for a **specific group of users**.*

You can specify additional functionality or technology, e.g. Internet of Things (IOT) or smart home technology that interacts with the mobile app, as long as the role this plays in enabling the user experience (UX) is made clear in your presentation.

You will follow a UX design process that takes you through the stages outlined below. The lectures, supporting workshops, and studio sessions will take you through this process in relation to the brief. We are asking you to frame your design thinking and process using a hypothesis-based design approach. This is to help you understand and practice the lean and agile ways of working that are now common within digital experience design.

Stage 1: Product Discovery (discover and define)

In Stage 1 of this project, you will develop the *strategic UX vision* for your app. This stage of the design process is sometimes referred to as *product discovery*. It is about designing the '*right thing'* – a digital user experience that meets the brief and you are confident your target users will value. How will your app impact user behaviour in a way that reduces the negative impact of their domestic energy use and encourage positive engagement with climate action? What meaningful outcome are you seeking to create for your users? How does smart meter data, perhaps combined with AI, enable this?

You will need to work rapidly, and learn from existing research how the negative impact of domestic energy consumption can be reduced and make explicit your assumptions about what behaviours your target users are willing and able to change. You will identify appropriate goals for your users and identify the obstacles that currently prevent them from achieving these.

We have provided you with a design research pack that can be accessed via LEARN. It is based on over 10 years of research studying how UK families use energy in their homes. It includes an archive of ethnographic videos, family personas, information seeking behaviour archetypes, home life insights and speculative digital concepts. You should supplement this pack with well targeted secondary research of your own. The outcome from this stage of the project will be a vision statement and set of experience design principles that describe the design opportunity you intend to address.

Stage 2: Design

The focus is now on designing the '*thing right*'. In response to your vision statement and experience design principles you will rapidly explore a range of concept ideas and then choose one mobile app concept to develop further. You will develop a simple site map to provide an overview of the feature set for your application and further develop your concept through sketching low fidelity screens and one significant user flow through the app. You will evaluate your design through low-fidelity prototyping and in response to feedback refine your concept further.

Stage 3: Deliver

Your individual design work will be presented as a mid-fidelity Figma prototype with supporting information containing your underlying design system.

You will demonstrate your knowledge and understanding of user experience (UX) and user interface (UI) design by presenting the key screens and interaction design for one significant flow that reflects your experience design principles. You must include the home page of your app as part of this user flow.

Deadlines

Please refer to LEARN for relevant deadlines and submission requirements.

Detailed Project Guide

Use this to guide to support you through the different stages of the project. Remember we are asking you to frame your design thinking and process using a hypothesis-based design approach. This is to help you understand and practice the lean and agile ways of working that are now common within digital experience design. The lectures, supporting workshops, and studio sessions will take you through this process in relation to the brief as well as introducing you to other core methods and approaches that will help you develop your Experience Design practice.

Stage 1: Product Discovery (discover and define)

1. Understand the brief and the problem space

Consider what you know and don't know about the brief, and the problem context. The lectures and workshops will help but you may need to do your own research to make sure you understand the brief and the problem space. Take time to reflect on your point of view regarding climate change and what you think needs to be done by governments and individuals to control it.

The Brief: What initial questions do you have about the brief, do you understand what you need to do and by when? Note down questions and bring to the workshop and studio support sessions or post in the *Coursework Questions* channel in the module page on TEAMS.

The Context: Do you know why a reduction in domestic energy consumption is needed and how it can be achieved? As we move towards a low carbon energy system, are you aware of key transitions in the energy system that are influencing how energy is generated and consumed? What is your own experience – is reducing or shifting your home energy use something you have thought about before? Is it exciting, frustrating, or boring; what do you believe needs to be done?

Technology: Do you know what a Smart Meter is, why they are needed, and what information they provide to users?

2. Refine the problem statement to define the broad focus for your project

Choose a target user group and context to focus on. Map your assumptions about this user group's attitudes towards energy saving in the home, their existing behaviours and how a mobile app could potentially help them reduce the negative impact of their energy consumption and engage them positively with climate action. Use these initial assumptions to create a refined problem statement in the form:

> How might we design a mobile app that utilises smart meter data to encourage *[target users and context]* to *[desired change in behaviour].*

For example:

> How might we design a mobile app that utilises smart meter data to encourage *time poor new parents* to *reduce their domestic energy consumption and engage positively with climate action?*

This high-level statement provides you with an initial direction for your project. Your next challenge is to understand user needs and pain points and how they are shaped by the context of use.

3. Discover

By the end of product discovery stage, you need to be clear about who your users are, the opportunity you have identified to make their lives better and what role your app will play in achieving that change. What *outcomes* are you are aiming to create for your target users by bringing your mobile app into their lives? What *benefits* will they gain from using it? What will have changed about their behaviours?

The purpose of the *discover* stage is to identify experience and end goals for your target users, the pain points they currently face which make it difficult for them to achieve these goals and *why* these pain points occur.

The *outcomes* you are seeking to achieve for your users must align with the desired *business outcome* for the project which is to use smart meter data to reduce the negative impact of domestic energy consumption. This is a key constraint within the brief so don't lose sight of it!

It’s important when working in UX and Service Design that you carry out user research in a targeted and purposeful way. We shouldn’t spend time carrying out user research to find out things we already know with some confidence to be true. Make good use of the user research materials provided and your own secondary research to understand the problem space, how energy is used in UK family homes and why families find it difficult to reduce the negative impact of their energy consumption and engage positively with climate action.

Re-visit your initial assumption mapping and make explicit what you are confident you already know and what you need to find out through carefully targeted research. Make full use of the research pack available.

Make sure, in relation to the brief and your chosen focus you:

- Understand *user goals* not just current behaviours – what are their *end goals*, what tasks do your users want to be able to do and what are their *experience goals,* how do they want to feel when they achieve these things?
- Uncover key emotional *pain points* and understand *why* these pain points are occurring. These are the obstacles or problems that hinder your target users from achieving their goals. Your *key insights* explain *why* they are experiencing these pain points.
- As you focus in on an opportunity to change user behaviour, make sure you understand how your target user’s experience unfolds overtime including the sequencing of key tasks and actions (the *user journey*).
- Uncover contextual and cultural factors that impact what your users believe and do.
- Empathise with the point of view of your target users. Don’t forget to consider their core emotional needs and cultural beliefs.

Given the tight time constraints of the project, plan your research carefully.

3. Define

The *define* stage is about focussing in on identifying desirable outcomes to achieve for your users. To help do this create one or more *proto-personas* – sketchy characters that represent the target users for your app, their relevant goals and behaviours.

A key milestone at the end of this stage will be one or more clear *user need statements* written in the following format:

> As a *[who is the user + context]* I need to… *[what does the user need?]* so that… *[what outcome does the user want to achieve?]*

For example:

> As a *new parent lacking confidence in childcare,* I need to *know that the temperature of my house is optimal for my baby's health* so that *I am reassured that I am properly caring for my child.*
>
> As a *time poor new parent,* I need to *understand the long term impact of small changes I make to my energy consumption*, so that *I am reassured that I am creating a better future for my child*.

Remember to stay focussed on the brief: Which pain points could be overcome by a mobile app that helps your target users better understand, control or shift their domestic energy use? How could your app be aligned with their core *motivations* – the things your users really value and identify with? How will you positively engage your users with climate action?

4. Create an initial UX Vision Statement and experience design principles

After you have generated key insights from your research findings and identified key user needs, decide on the opportunity you plan to address. Write this in the form of a *UX Vision Statement.* As the purpose of your app will be to encourage behaviour change try to frame the opportunity in this form:

> There is an opportunity for a mobile app for *[target users and context]* who want to *[goals]* but *[key pain points*] so that [*desired outcome*].

For example:

> There is an opportunity for a mobile app for *new parents lacking confidence in childcare* who want to *optimise the indoor climate of their home* but *struggle to do this in line with the changing needs of their child.*

You must also communicate your experience design principles as keywords and short supporting statements. For example:

> The experience of using the app will be: *Reassuring – it will gently inform but not alarm unless it is critical to do* so.

Stage 2: Design

You are now moving from defining the *problem space* to defining the *solution space* for your project. Be prepared however to go backwards and forwards to revisit your research and refine your focus. This is an iterative and messy process!

5. Ideation of key features

Now you have established the broad solution space for your app you need to hypothesize how the app will deliver the desired outcome. Ideate the *key feature set* for the app and how smart meter data will be used to create a useful, desirable, and meaningful outcome for your users *and* encourage behaviour change in line with the brief. Don't forget to positively engage your target users with climate action.

You can propose features that do not directly lead to reduced energy consumption in the home but make sure at least one of your features makes use of smart meter data. Reflect on the role smart meter data can play within the user experience and make sure you make good use of it. What other data can you combine with smart meter data to create a personalised experience for your users? Is there a role for AI?

Use your *user need statements* and *insights* to drive your ideation process. The app features you propose should meet one or more key user needs. Be clear

where additional technology is needed in the home and the role it will play in enabling the user experience.

6. Storyboard

Storyboard, from the point of view of your proto persona, a *context scenario* showing how you expect the persona to use one or more key features of the app to achieve a significant outcome for your users. If you cannot describe a believable scenario then it is likely the feature set of the app needs amending!

Where does the user experience begin – what will be the '*call to action'* that triggers the user to engage with your app? What steps will the user need to go through when interacting with the app to achieve their goal?

7. Initial Site Map

Based on your feature set, develop a simple hierarchical site map to represent the structure of the app.

8. Choose one significant flow to prototype

Choose one significant user flow through the app to prototype. Communicate its purpose using the user story format often used within agile software design:

As a [type of user] – who are you designing this user journey for?
I [want to] – Describe *the task* the user wants to complete— not the feature they use. What is it they're trying to achieve? [so that] –What's the outcome they're trying to achieve?

This statement should be implementation free, do not describe any part of the user interface (UI) in this statement.

For example:
As a *[parent]*, I want to *[be alerted if my child is too hot or too cold]*, so that *[I am confident that the room temperature remains optimal for my baby's health]*.

As a *[householder]*, I want to *[choose how I allocate my reward points]* so that *[I am reassured that my energy saving efforts make a tangible difference to the lives of others].*

Note this is much more concise than a user needs statement but is still written from the point of view of the user.

You will need to re-visit your discovery research and consider from the *point of view* of the user, the context within which they are likely to complete this task. How will use of your app, fit into the routine of their everyday life? What are they thinking, feeling and doing? What is the *Call To Action* that triggers interaction? How will you prompt engagement with your app?

You can immerse yourself in the context of use in a number of ways. You might choose to quickly storyboard, bodystorm or journey map the user experience. The choice is yours! The key is to *empathise* with the user's point of view and critically consider how and why they would bother to interact with your app. Use this empathy to help you sketch the screens and interactions for your app and keep this perspective as you iteratively refine your concept.

9. Sketch the home page of your app.

Like any well-designed app, the home page must communicate to the user the purpose of the app (through its layout, structure, navigation style, branding and content) and reflect the experience design principles that underpin it.

Begin by considering the structure of the app. How will the home page make the user aware of the app's key features? What navigation style are you using? Make sure this fits with the navigation principles used by the Operating System (OS) you are designing for. Is your app for Apple, Android or is it cross platform?

10. Sketch how the user interacts with the app screen by screen.

Now sketch how the user interacts with the app screen by screen to complete the task represented by your user story. Based on your feature set, sketch the interactions and screen layouts for your chosen user flow. Sketch the ideal or 'red route' through the app as a set of low fidelity hand drawn wireframes to communicate clearly how the user interacts with the app to complete the task and achieve their goal.

As a guide, you should include approximately 9 screens within your design work. These should begin from the home page and can represent one user flow through the app or a number of shorter flows if that is more appropriate. Make sure you choose meaningful and interesting user flow(s) to develop and prototype.

Keep 'walking through the journey' of using the app step by step from the point of view of your user and rapidly iterate and improve the user flow. Refine your initial site map if needed. Remember this is a messy and iterative process! Capture your process, the questions that arise and the changes you decide to make.

11. Carry out a lo-fi prototyping session to refine your design

Choose one or more design issues to explore further. Carry out a lo-fi prototyping session with a representative target user in order to resolve interaction design issues and improve your design based on user feedback. You may choose to use a software package such as POP/Marvel, or you can create a prototype entirely using paper, but remember, this is a low-fidelity prototype and must be designed appropriately (i.e. not under or over worked).

Remember to use the Question Plan Test Reflect framework to plan your evaluation session. Document with photos the prototyping session taking place and clearly and succinctly describe your evaluation process: what design issues were you seeking to resolve and how did you go about resolving them? Consider sketching a number of alternative designs for key screens and discussing these with your participant.

If you do not have access to a household that represents your target users, it is acceptable to use an alternative household or fellow student. Reflect on the limitations of your evaluation. In what ways was your participant similar or different to your target user group? How did these differences influence what you learnt from the evaluation session? Your participant(s) must be provided with an information sheet and sign an informed consent form.

Stage 3 Deliver

Represent, as a mid-fidelity Figma prototype, the final screen layouts, and interaction design from the start to the end of your refined user flow. This mock-up should communicate your final user interface (UI) and interaction design including where appropriate example content. Make sure you include the home page of the app within your prototype even if the initial Call To Action in your journey is a notification received on the home screen of the user's phone.

Use your knowledge of UX laws and heuristics, and apply tools such as grids, colour palette generators and libraries, to support decisions over spacing, alignment, navigation, usability, and accessibility, in a way that visually directs and motivates the user towards the intended outcome.

An intuitive navigation depends on good design as much as it does on familiarity; in other words, users like things to be where they expect them to be (see Jakob's Law). As such, your design should reflect the distinct characteristics expected in iOS, Android, or cross-platform design.

For example, for:

- Visual metaphors
- Navigation
- Visual hierarchy
- Typography
- Icons, glyphs and buttons
- Use of colour and animations

Design Systems, even basic ones, allow UI designers to rapidly change any aspect of a design, including adapting a UI to different contexts of use, all the while collaborating with others. Employ this skill by:

- Creating and using a Figma component library
- Documenting your design elements ready for handoff (to developers)
- Including signposting where necessary (for interactions)
- Designing for responsive and adaptive (breakpoints)

Handoff (to developers) is the last step in the design stage, and the first in a period of back-and-forth communication with the developers' team. While you are **not expected to produce a handoff file or documentation**, it is important to work within that mindset, i.e., making sure that your prototype is as close to finished as possible.

This means that:

- It follows relevant Web Content Accessibility Guidelines (WCAG 2.0)
- It has been checked against Nielsen's heuristic checklist for usability
- Sizes and proportions have been checked (no blurred pixels)
- Expected interactions are clear
- The device frame used matches the chosen OS

Submission Requirements

Please refer to LEARN for relevant deadlines and submission requirements.

Your work should be presented as an individual A3 landscape illustrated report with a maximum length of 20 pages comprised of *at least* 50% illustrations and *no more* than 50% text. Keep text to a minimum. The content should equate to an illustrated and informative portfolio piece rather than an academic essay!

Your illustrated report should include:

- Title page (not included in page count). Include on the title page a clickable weblink to your Figma prototype. Check before submitting that the link is clickable and works (Do not password protect the file, if you do it may not be marked).
- Introduce the climate change problem and your target users. Succinctly reflect your understanding of the climate change problem including the role played by smart metering in combatting climate change. Include a high-level description of who you decided to design for and why – your target user group and initial problem statement.
- Present your discovery process, what you did and why to unpack your assumptions and make use of existing research. Present how and why you carried out further secondary research and how you used this to further refine your assumptions. Present the key insights and user need statements that emerged.
- Present your UX vision statement and experience design principles to communicate the opportunity your app is addressing. Be clear about your target users and the pain points you are seeking to overcome.
- Communicate the design process you followed to create the feature set for the app and the final feature set.
- Present a significant and believable context scenario – an end to end story which describes your proto-persona character achieving a well-defined and meaningful outcome through step by step interaction with your product. Put the user at the centre of the story and communicate how your product will enable your user to achieve their desired outcome.

- Communicate, using the user story format used within agile software design, the significant user flow through the app that you decided to prototype.
- Present the structure of your app as a simple site map, the home page of the app and a significant user flow as a series of low fidelity sketchy wireframes. Communicate where you had unresolved design issues (e.g., relating to screen layout, screen content, navigation etc).
- Document with photos your prototyping session taking place and clearly and succinctly describe your evaluation process: what design issues were you seeking to resolve and how did you go about resolving them?
- Present your final concept. Why is it an innovative and appropriate response to the brief? Why do you believe your app will be useful, desirable and meaningful to your target users? Why do you believe the features proposed will address their identified pain points and how will it reduce the negative impact of domestic energy use in the home? How will your app encourage your target users to positively engage with climate action? What role does smart meter data and if appropriate artificial intelligence (AI) play in delivering this experience? Communicate succinctly how your final design meets the experience design principles you presented earlier. You may choose to use screen grabs from your Figma board to do this.
- Reflect on your underlying assumptions. Which are the riskiest? In other words, will cause your entire idea to fail if you are wrong? How could you go on to test these assumptions through further prototyping and user research?
- References - Harvard style (not included in page count)
- Appendices (not included in page count)

Appendices must include Participant Information Sheets and BLANK Consent Forms.

Any content over the 20 page limit – not including the sections noted above as being exempt – will not be marked.

Ethics

An ethical checklist and risk assessment have been completed for the module by the module leader. Any user research (including prototype evaluations) you choose to conduct must adhere to this and you will need to tailor the consent and information sheet to your own project. Upload a blank version of your informed consent paperwork as an Appendix to your design book.
Use the forms shared on LEARN for DSP851 Design Research Methods.

SDCA policy on the use of Generative AI tools

Failure to disclose the use of Generative AI in submissions will be treated as academic misconduct. If you choose to use Generative AI tools in your submission then follow the guidance below. Use an Appendix to present this information if needed.

To ensure clarity, all AI usage requires a citation. Students are advised to follow the cite them right conventions.

Where generative AI is used in a practical submission output, we expect more detailed information to be provided, with specific information on the tools used, what prompts and seeds were inputted, what output was obtained and details of how the output was adapted.

Where a complex generative AI process was used, for example with iterative cycles seeing imagery evolving from an initial prompt through multiple stages, students should endeavour to be clear about the full process, adding extra information, as necessary. The priority is transparency.

Students are reminded to keep a paper trail for all coursework submissions, whether AI has been used or not, in case they are asked to speak to the school academic misconduct team.

Loughborough University

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This coursework will be assessed using the standard assessment criteria available on LEARN. We will be specifically looking for evidence of the following within your submission:

Knowledge & Understanding	• A comprehensive understanding of the experience design process and how it is used to understand user needs and context, identify design opportunities and propose design concepts.
Application	• Critical assessment and development of your design concept using appropriate experience design methods and tools, including low-fidelity prototyping and refining of your assumptions.
Design Outcome	• In response to your UX vision statement and design principles, demonstrate a novel, useful, usable and satisfying user experience that meets the requirements of the brief.
Communication	• Professional communication of your design process and outcomes in a persuasive and engaging manner.
Professionalism	• Evidence of tackling complex issues systematically, creatively and ethically.