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THE SOFTWARE DEVELOPMENT LIFECYCLE: PERSONAS AND SCENARIOS

Last week we explored the analysis phase of the SDLC, this week we move onto design. Today's session will introduce you to techniques used to help understand a system's intended purpose and audience.

Designing Software Accurately

Although building software may be the most enjoyable part of software development for most people, a critical phase of the software development lifecycle is when the product is in design. Designing the structure of the software well from the beginning is imperative to help avoid encountering costly issues further into development and release. Software architecture can be considered at a number of different levels. For example, we can build models of the code base, the software composition, hardware or software interface, as well as the hardware or network level. Lethbridge et al. state, "Software architecture is the process of designing the global organisation of a software system, including dividing software into subsystems, deciding how these will interact and determining their interfaces."[1]

Figure 4: "Easy to Use" comic. Retrieved from
https://secandies.files.wordpress.com/2013/11/req-dis-funny.png

We design our software and systems to ensure:
- **Good scalability** so that the system can handle an increasing number of users.
- **Code reuse** so that we do not duplicate errors or add unnecessary complexity.
- **Ease of adding new features** to ensure that the system can expand as requirements change and update.

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[1] Lethbridge and Laganière, Object-Oriented Software Engineering

Good software architecture is the result of good design.

Obviously, it is very important that the end product is built correctly and functions as expected, however another important consideration is how the user will interact with the system. Understanding the users of a system and how to accommodate to them is the primary focus of the industry, User Experience (UX).

What is UX?

The term was first coined by Donald Norman in his book, *The Design of Everyday Things,* released in 1988. In an interview with Adaptive Path, Norman explained the reasoning behind inventing UX. He thought that already defined terms such as "human interface" and "usability" were too narrow to cover all aspects of a person's experience using a system and wanted a term that would encompass the user interface (UI), industrial design graphics, physical interaction and documentation (Lyonnais, 2017).

UX spans many disciplines from the technical (e.g. programming a UI) to the nontechnical (e.g. human behaviour) and is useful throughout the entire software development lifecycle process (see figure 5). For sake of brevity however, in this session we focus on applying UX techniques during the design stage.
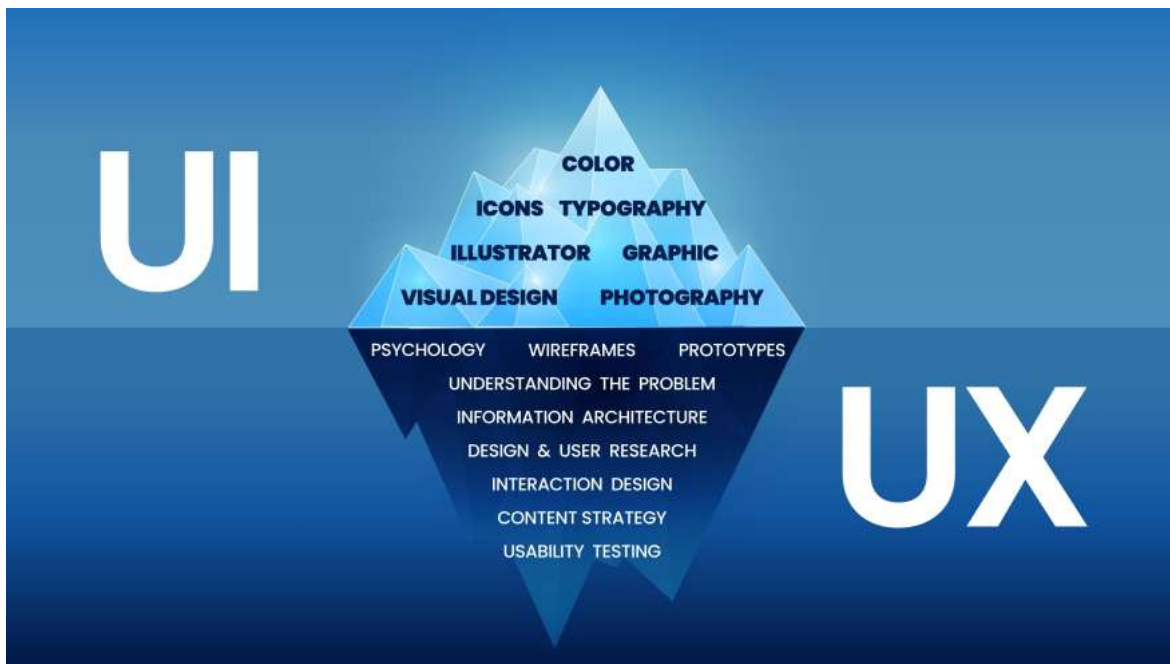

Figure 5: An illustration depicting the difference between UI and UX

Why UX?

Once the project requirements have been finalised, UX techniques can be employed to ensure understanding and clarity of the project. There are many techniques that can be used for this but the ones we are covering in this session are personas and scenarios.

Personas

Persona creation is a valuable method to express understanding of potential users of the system. They are fictitious people used to represent different groups of users that may use the system you're designing. A persona typically comprises of a name, picture, personal demographics (e.g. age, gender, occupation etc.) , quote, description about themselves, and goals (these are not centred around using the system but the system may help to achieve them). They should read like a description of a real person; try to avoid writing a job description or just listing the details (see figure 6).
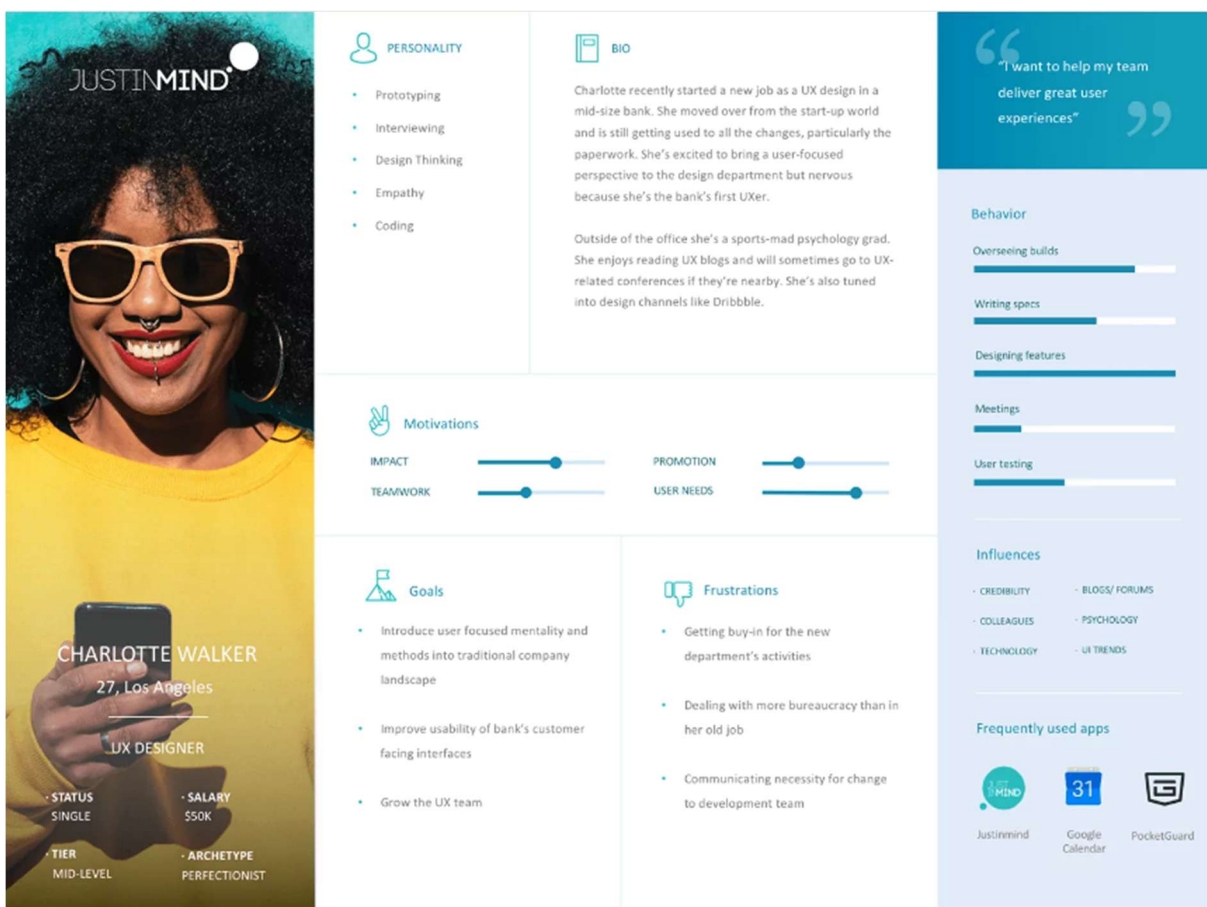

Figure 6: An example persona
Retrieved from: https://www.justinmind.com/blog/user-persona-templates/

Personas are grouped into three categories:

- **Primary** – Primary personas should represent the target audience. The target audience are the people you're designing the system for and are expecting to use the system once developed. It is important to resist the temptation to design for everyone because no system can perfectly match everyone's needs so the target users need to be representative of user groups that are likely to actually use your system as intended. For example, the TV show, Peppa Pig, is intended for children so the target audience could be children under the age of 10. This means the primary persona for Peppa Pig would have to be a child whose age is less than 10 (more information is required to create a persona but this is just for demonstration purposes).

- **Secondary** – Secondary personas should represent a person who may still use the system but not to the same extent or capacity as the main audience. For example, continuing on with the previous example involving Peppa Pig, a secondary persona could be a parent who has a young child. Although the TV show is not intended for them, as they have a young child, they may watch the show from time to time.

- **Negative** – Negative personas should represent the people that will not (or are not willing to) use the system. These are the people that the system does not cater to nor expects their use/participation. For example, a negative persona for Peppa Pig could be someone who does not watch children's programs or cartoons.

Generally speaking, the more believable a persona is, the "better" it is. Therefore when creating personas it is important to consider the impact of more minor, easier to complete details (such as name or picture) just as much as the major details (such as description or goals).

Let's try an example. Imagine you are a part of a software development company contracted to develop software for keeping track of a student's NCEA achievements and school reports. Your team is tasked with identifying the target users and creating primary, secondary and negative personas. You have been provided with a set of requirements and the work you do will be passed on to the development teams building the prototype.

Functional Requirements:
R.1. Login using the student's National Student Number (NSN) and password.
R.2. The portal will display the student's NCEA credits, reports and any other notes added by the school.
R.3. The NCEA credits data can be filtered by subject, year and level.

Hopefully, it is easy to see that a valid primary persona could be a high school student currently completing NCEA level three who wants to be able to review their progress. Using this, we can now create the primary persona (see below).

Name: Olivia Lane **Age:** 17 **Gender:** Female **Occupation:** High school student **Family:** Mum, dad, brother and a dog **Traits:** Positive, driven, friendly **Interests:** Animals, Rom-Com movies, hanging out with friends	
	"It's heartbreaking to see so many pets come to the shelter but it's so heartwarming when they get adopted"
Description: Olivia is currently in her last year of high-school and is considering a career as a vet because of her love for animals. Each Sunday for a couple of hours Olivia volunteers at her local SPCA and although it's not the easiest work, she enjoys the hands-on and rewarding nature of the job. The shelter has software which tracks various statistics such as adoptions and arrivals and Olivia uses it frequently to keep track of the shelter's progress. In her spare time, Olivia likes hang out with her dog, Millie and watch rom-com movies from the early 2000s, her favourite is Mean Girls.	

Goals:
   1) To be able to check her academic progress regularly like she does while working at the shelter.
   2) She would like to watch the movie, Mean Girls, with her friends for the 11th time.	

There is no "right" answer regarding persona creation as long as it is plausible. By that we mean, provided the primary persona was a secondary student (as the software requires an NSN) that would want to know about their NCEA progress, they could have had other traits, interests, a different description and goals (etc). However, as mentioned earlier, the persona needs to be believable so adding something like "Olivia is allergic to dogs" would clash with the description and thus, make the persona less believable.

To obtain images for personas, use an AI art generator like This Person Does Not Exist (https://this-person-does-not-exist.com/en) – it is important not to use images of real people as a persona is supposed to be a fake character.

Now onto the secondary persona, can you think of a person who may wish to use the system but is not represented by the primary persona (i.e. is not a student)? A valid secondary persona could

be a parent of a student as although the software may not be designed specifically for them or their use, they are likely to want to check up on their child's progress. Keeping this in mind, let's create a secondary persona.

Name: Richard Granger **Age:** 45 **Gender:** Male **Occupation:** IT Support **Family:** Wife, 16yr old daughter, 10yr old son **Traits:** Analytical, trustworthy, enthusiastic **Interests:** Technology, cycling, Sci-Fi movies	 *"First things first, have you tried turning the computer off and on?"*
Description: Richard's currently in charge of a small team of IT specialists for a logistics company he's worked at for 7 years. He enjoys helping people and solving the many problems that continuously crop up day to day. Part of his job is to monitor systems' statistics, such as up time, internet usage and temperature (etc) which he likes because he enjoys analysis and finding patterns in data. In his spare time, Richard enjoys spending time with his family, watching movies (Sci-Fi in particular) and cycling. Every year for the past 10 years Richard has watched the Tour De France, and although he does not wish to participate, he finds it inspiring for his own cycling journey.	

Goals:
  1) To be able to check on his daughter's academic progress throughout the year.
  2) To provide excellent IT support to his colleagues.	

Lastly, to create a negative persona, it needs to represent people who are not a student and not a parent of a student aged 15+. A person that fits these criteria is someone who does not have any children so let's craft a persona based on this (see below).

Name: Brett Harrison **Age:** 44 **Gender:** Male **Occupation:** Military Soldier **Family:** partner, no children **Traits:** Physically fit, disciplined, dedicated **Interests:** Fitness, spending time with family, rugby	 *"The time spent with loved ones is precious so appreciate all that you have with them"*
Description: Brett joined the military straight out of school when he was 18. Since then he has been stationed all over the world, often serving on the front line. Unfortunately, due to the nature of his job, Brett does not get much time to be with family and friends but the time he does get is treasured greatly. When off duty, he enjoys exercising and playing in the base's weekly rugby game, where he usually plays as number 11, flying down the left wing.	

Goals:
   1) To spend more time with family and friends.
   2) To break the record for most tries scored in the base's season.	

A negative persona does not have to be "negative" about the system to qualify as one, they just represent the people that are unlikely to use your system and thus the people who you are not considering when making design choices. Our example here, Brett, is a negative persona because he has no children and there is no mention of any expected in the future so based off of these details, we have concluded that he will not be using the system (as it requires a NSN).

Now that we have worked through examples, it is your turn to create some personas for the project with Parkway Commute. Using the example proposal document on the Slack channel, create three personas (one primary, one secondary and one negative) for the Parkway Commute project. Feel free to use the previous examples as templates or ask for help if you get stuck. Once you're finished, show staff the personas you have created. Remember, creating personas are like crafting characters for a story so experiment and try to have fun with the characters but just make sure they are believable!

Scenarios

Now that you have created the three characters (personas) it is time to create a story for them. Scenarios are narratives that describe the activities of a persona, they include a goal (what the persona is trying to achieve) and the actions taken by the persona to achieve that goal. The

scenario is centred around the system under development but the interface details of the system are not included in the description. This is because the focus is on the persona and completing the task from their perspective. An analogy being, if you saw a flower that resembled a daisy, you're likely to call it a daisy rather than its proper, scientific name of bellis perennis (unless you're a botanist of course!). Scenarios are similar in that the level of detail should be reflective of the protagonist (i.e. the persona).

Let's have a go at writing a scenario for the primary persona we created earlier (Olivia Lane).

Goal: To be able to check her academic progress regularly like she does while working at the shelter.

Approaching the end of her shift at the local SPCA shelter, Olivia was finishing cleaning out the last few kennels she had been assigned to do. It had been a beautiful, sunny Sunday, lovely enough to take her mind off the exams she would sit next week. While on the last kennel, a coworker asked about arrivals and adoptions so they decided to review the shelter's progress before Olivia went home.

As Olivia lives close to the shelter, she opted to walk home, with the bright sunshine and cool breeze making a nice walk. Once home and away from the animals that she adores, the exams on Tuesday and Wednesday the following week began to play on her mind. She had already looked at her progress throughout the term but wanted to check again to remind herself of how many credits she had and how many she would need for an excellence endorsement. She opened the app on her phone and identified herself. Once loaded, she was greeted with a menu of options. She wanted to see an overview of all of the credits she had earned so far so she navigated to the screen and viewed the credits breakdown. Due to her hard work this year, she realised she only needed 6 credits with excellence to achieve the endorsement, which filled her with confidence and spurred her on to continue preparing for them. As she was content with what she had done, Olivia logged off the app and started studying for her biology exam.

As said earlier, scenarios are stories where the protagonist is the persona who is attempting to achieve a certain goal. They are meant to be creative and believable but without the technical details. In the example above we first stated the goal of the scenario and then provided some background detail before introducing the purpose of the scenario (achieving the goal). Notice how we wrote "...identified herself" instead of something like "...logged on using NSN '123' and password 'abc'". We did this because the detail is unnecessary and does not contribute anything to the narrative.

Now that you have created three personas, and learnt about writing scenarios, it is your turn to create two scenarios for the Parkway Commute project (we do not write scenarios for negative

personas as they are not expected to interact with the system). See the exercises below. Again, once complete, ask staff to read the scenarios you have written.

Exercises:
1) Create a scenario for your primary persona.
2) Create a scenario for your secondary persona.

Summary

In this session we introduced UX and techniques to understand people (personas) and tasks (scenarios) which is vital as part of the design phase of the SDLC. Next week we will be exploring human-robot interaction with our robot, Cruz. Following that session, we will use these software development artefacts to begin building a prototype of the user interface which will guide the implementation process.

Useful Resources

- Where Did the Term "User Experience" Come From?: https://blog.adobe.com/en/publish/2017/08/28/where-did-the-term-user-experience-come-from
- Personas from Usability.gov: https://www.usability.gov/how-to-and-tools/methods/personas.html
- What are personas and what are they used for?: https://www.uxdesigninstitute.com/blog/what-are-ux-personas/
- What are User Scenarios?: https://www.interaction-design.org/literature/topics/user-scenarios
- Scenario Mapping: Design Ideation Using Personas: https://www.nngroup.com/articles/scenario-mapping-personas/