UNIVERSITY OF BIRMINGHAM | COLLEGE OF ENGINEERING AND PHYSICAL SCIENCES
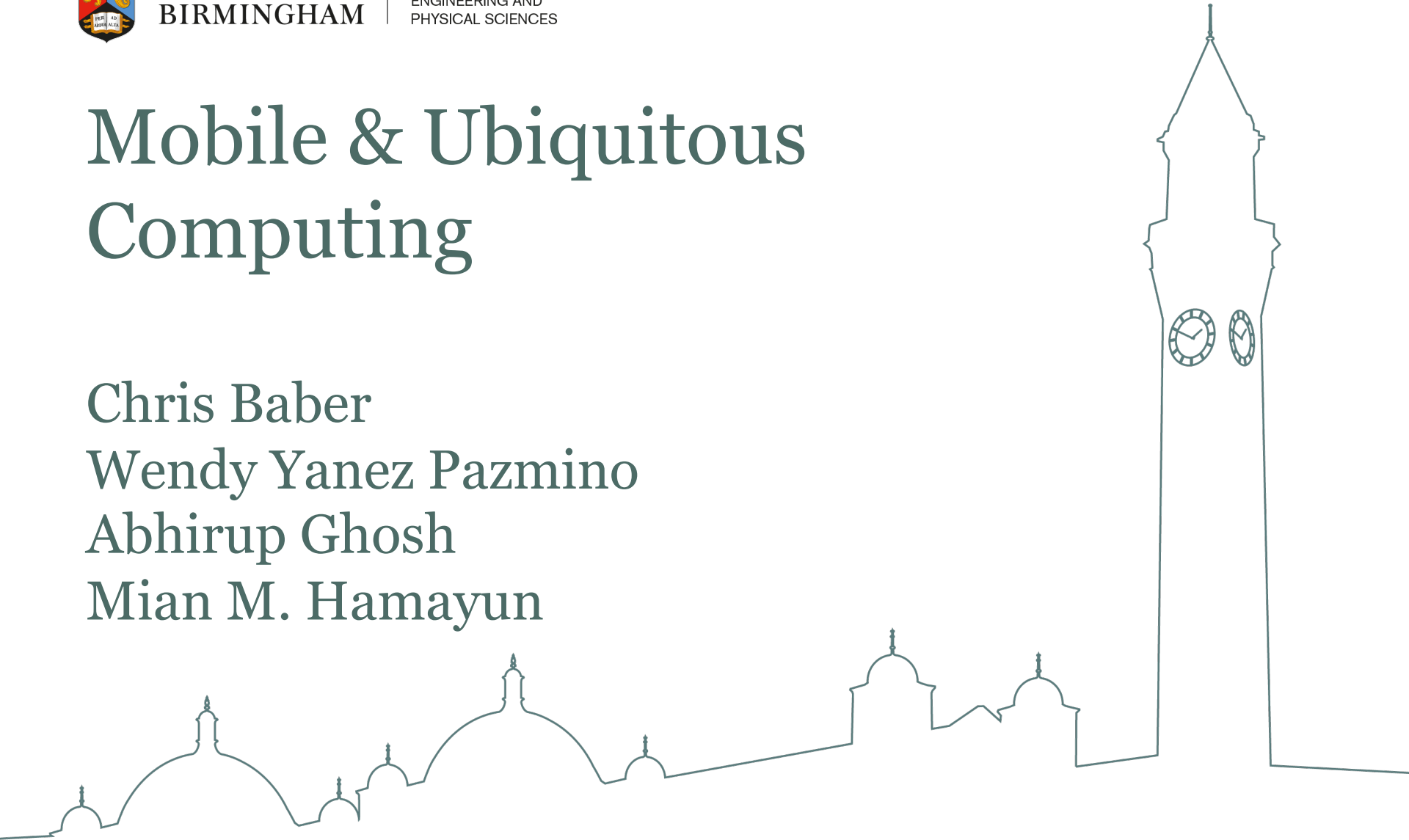
Mobile & Ubiquitous Computing
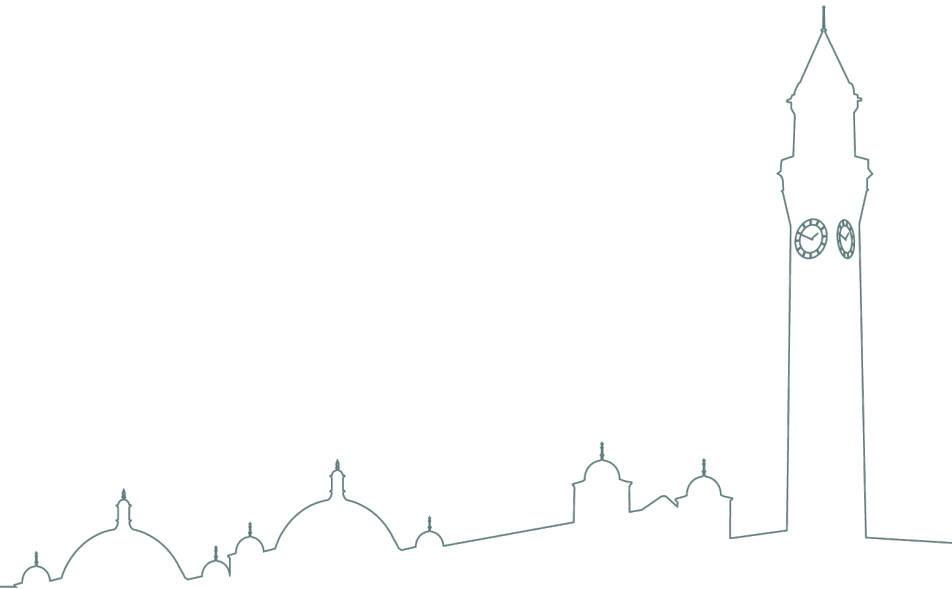
Chris Baber
Wendy Yanez Pazmino
Abhirup Ghosh
Mian M. Hamayun

# Week 6: Overview of Assignment 1

Assignment 1 marking scheme

Report Section	Marks	Suggested Minimum Word count	Guidance on Content
Abstract	4	400	An informative summary of the report which clearly explains how your design concept addresses a specific problem
Architecture	6	600	Clearly labelled diagrams and tables showing the elements on your design concept and how they connect to each other. An explanation of how the design concept operates.
Requirements	5	300	A table of usability, functional and non-functional requirements
Evaluation	5	200	A brief discussion on the criteria that you could apply in formative evaluation and testing of the concept
Total	20	1500	
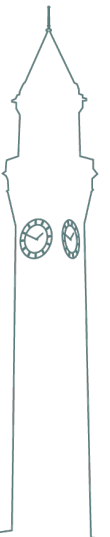
Abstract	An informative summary of the report which clearly explains how your design concept addresses a specific problem

- ☐ What is the problem that you are solving?
- ☐ Why is this a problem?
- ☐ What ways are currently used for this problem?
- ☐ In one or two sentences, what is your solution?
- ☐ Why is your solution preferable to the current ways of solving this problem?
- ☐ Who are the Stakeholders in your system?
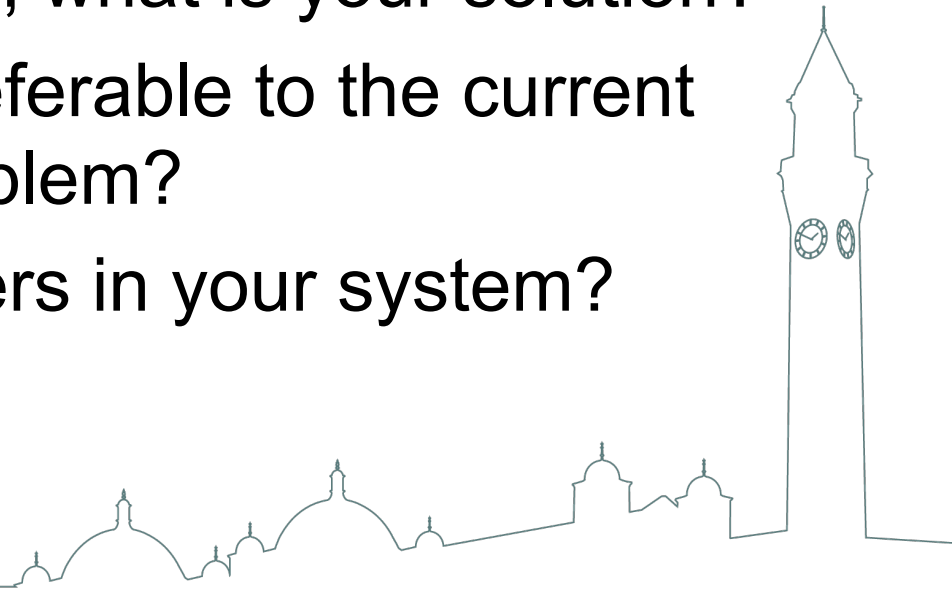
Defining Stakeholders

| Stakeholder	Role and how they might be affected by your system
User	What benefits will your system offer users? How might the system change their everyday activities (for better or worse)?
Other users affected by the system	Will other people have to change their everyday activities to support the user?
Suppliers (of infrastructure, devices, consumables)	Will manufacturers / suppliers need to change what devices or services they provide?
Regulators	Will your system be affected by regulation, e.g., security of personal data?

| Architecture	Clearly labelled diagrams and tables showing the elements on your design concept and how they connect to each other. An explanation of how the design concept operates.
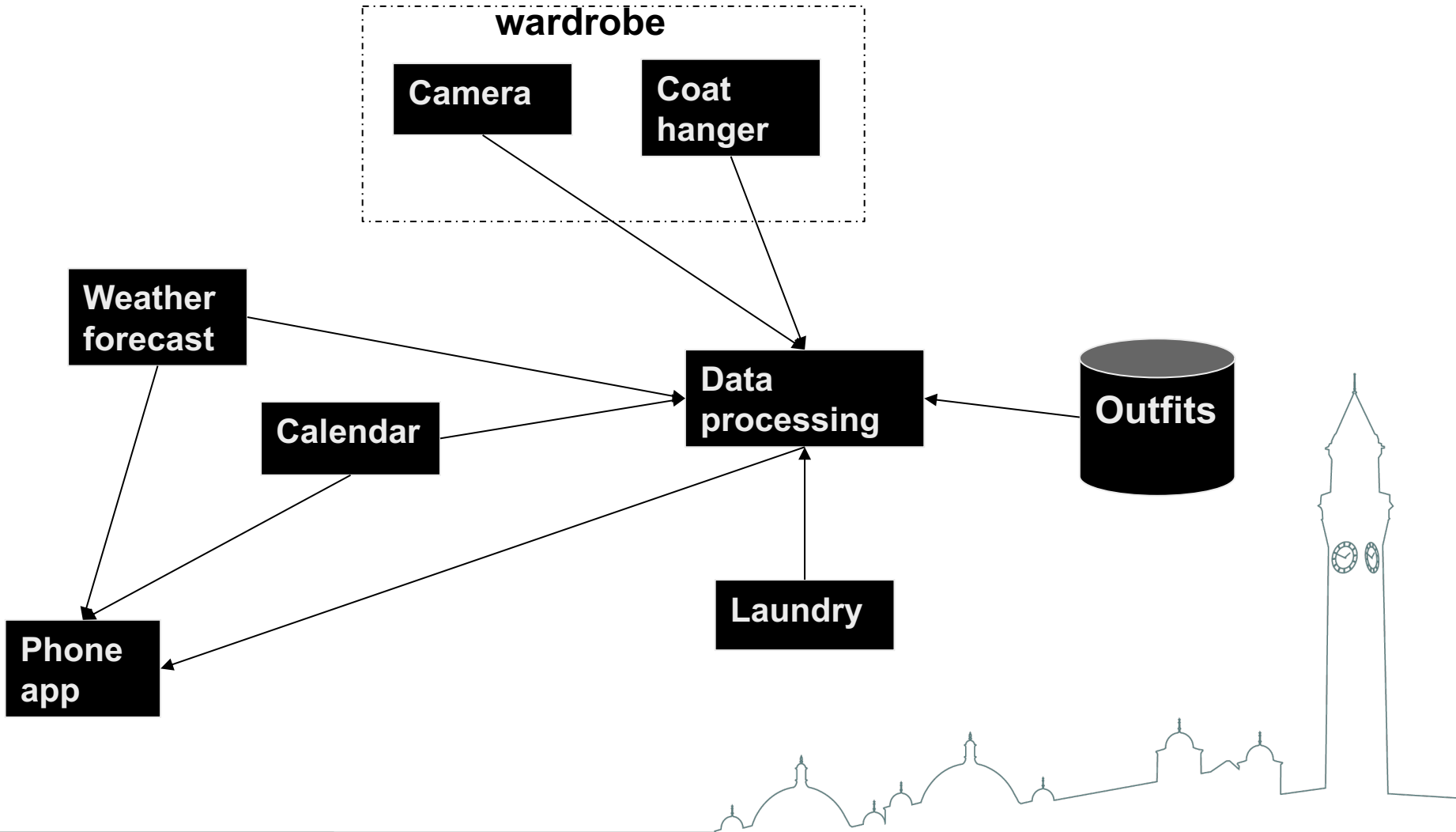
# Communications
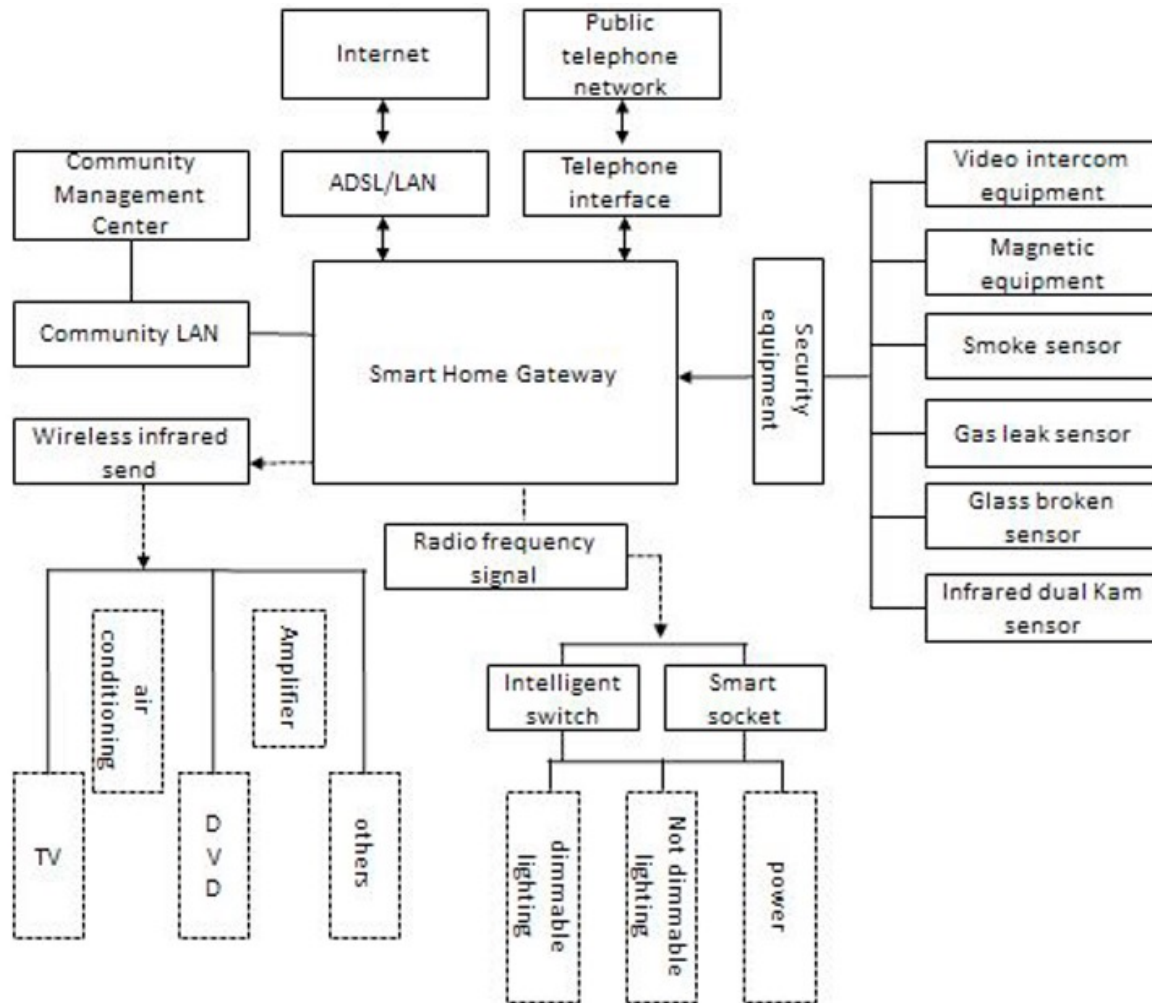
Li, M. et a., 2018, Smart Home: architecture, technologies and systems, ICIT-2018

| Physical Entities	Closet, Clothes, Hangers
Virtual Entities	User intent, Clothing recommendation engine, Clothing inventory database, Machine learning model.
Device	Temperature, Humidity, Weight sensors, Camera, Led lights
Resource	Previous clothing usage, User preferences, Weather information, Cloud storage, and Machine learning algorithms.
Service	Authentification, Clothing recommendation service, Clothing management service, Notifications and alerts service, and Data analysis service.
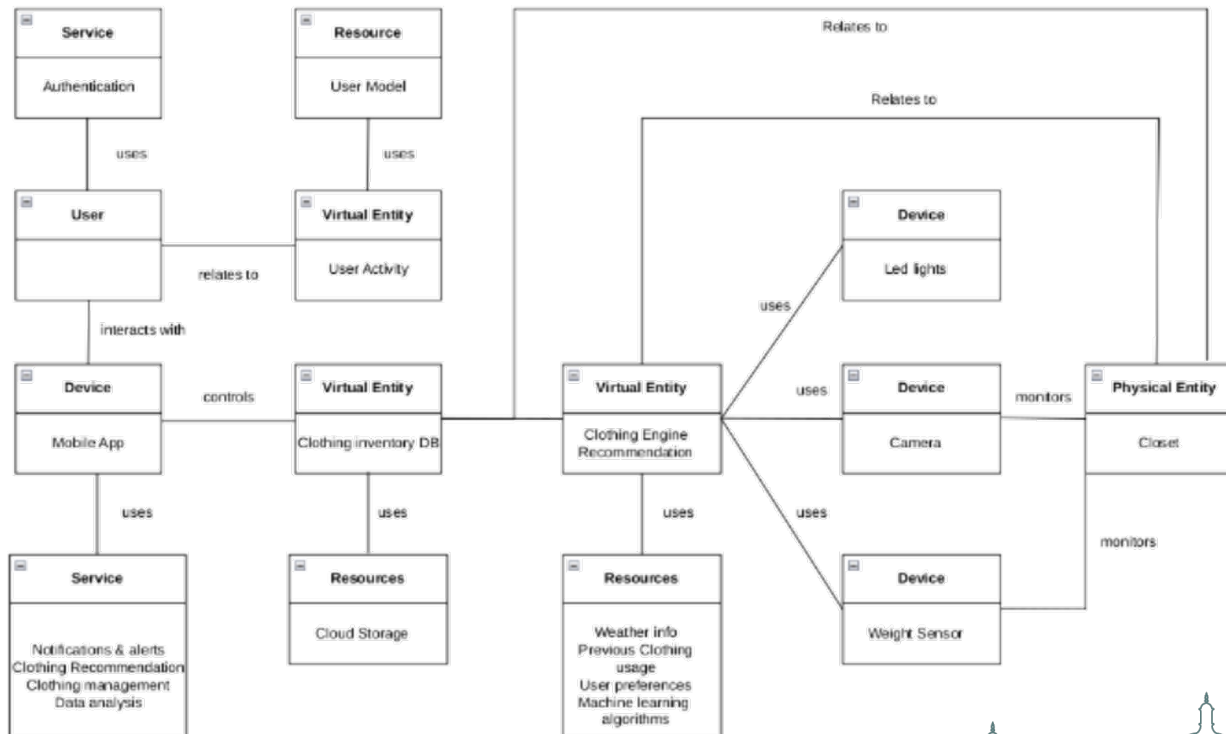
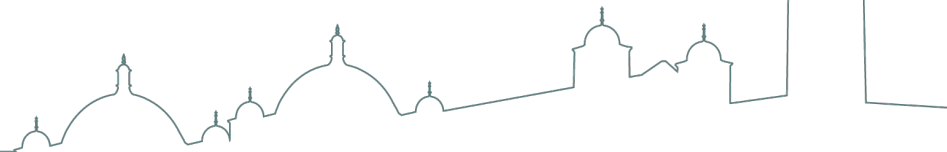2219814
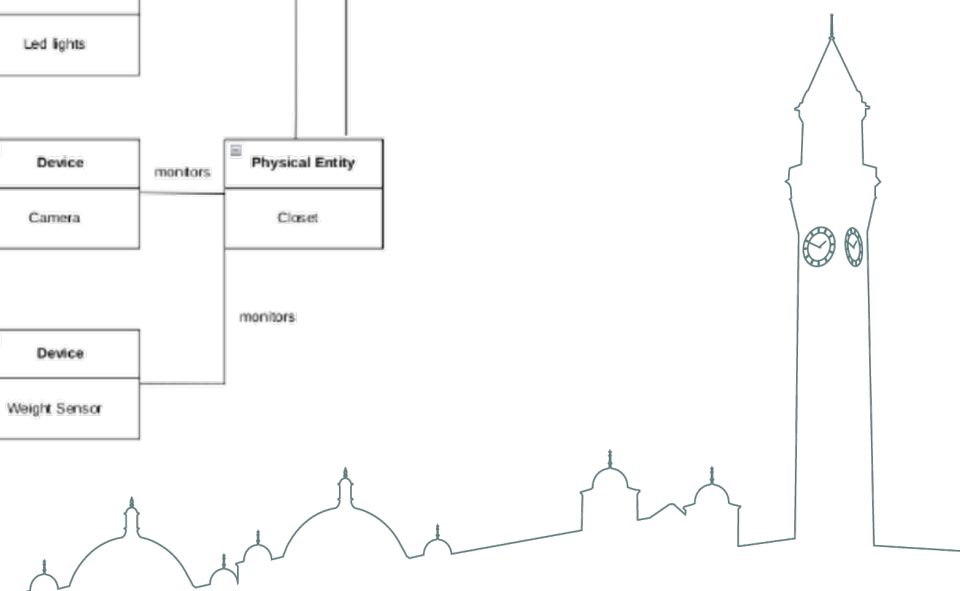
Example Class Diagram
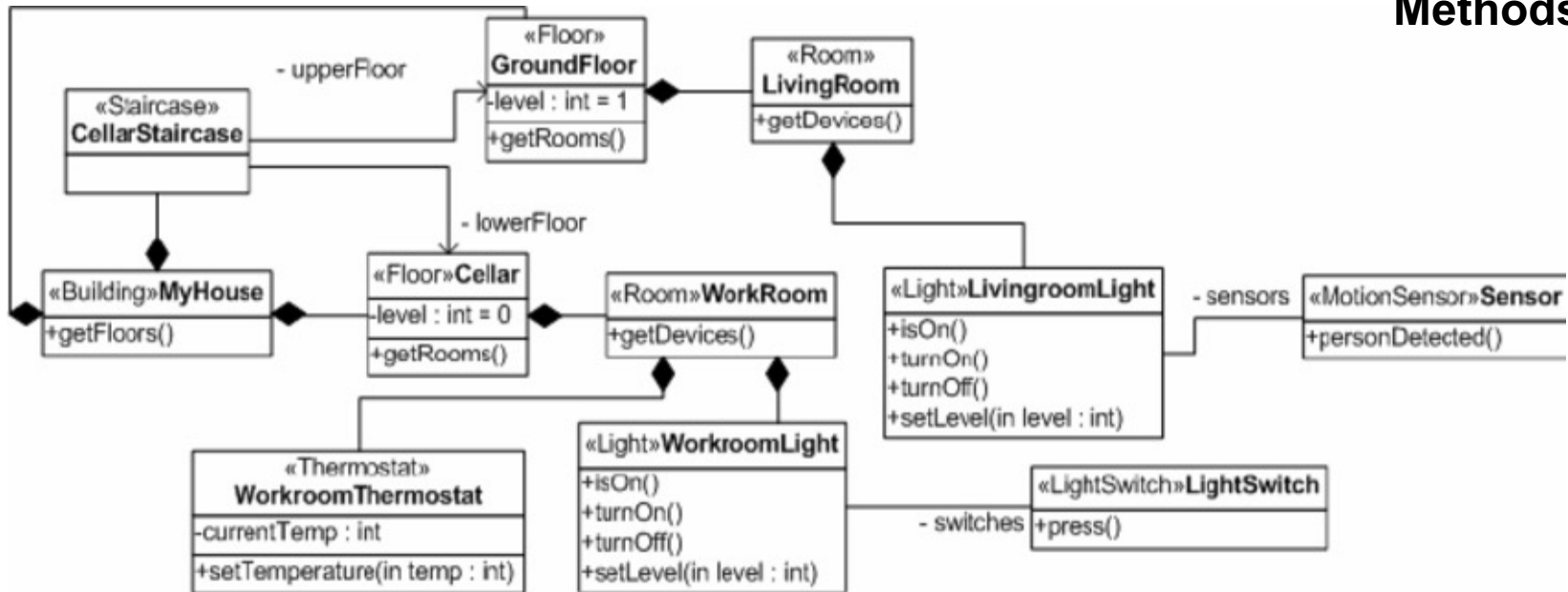
Narrative Description
"The MyHouse building consists of two floors, Cellar and GroundFloor. Two rooms, WorkRoom and LivingRoom, are located on the floors, each containing a light. The lights are connected to a light switch and to a motion sensor respectively."

Groher, I., Reder, A. and Egyed, A., 2010, March. Incremental consistency checking of dynamic constraints. In *International Conference on Fundamental Approaches to Software Engineering* (pp. 203-217). Springer, Berlin, Heidelberg.
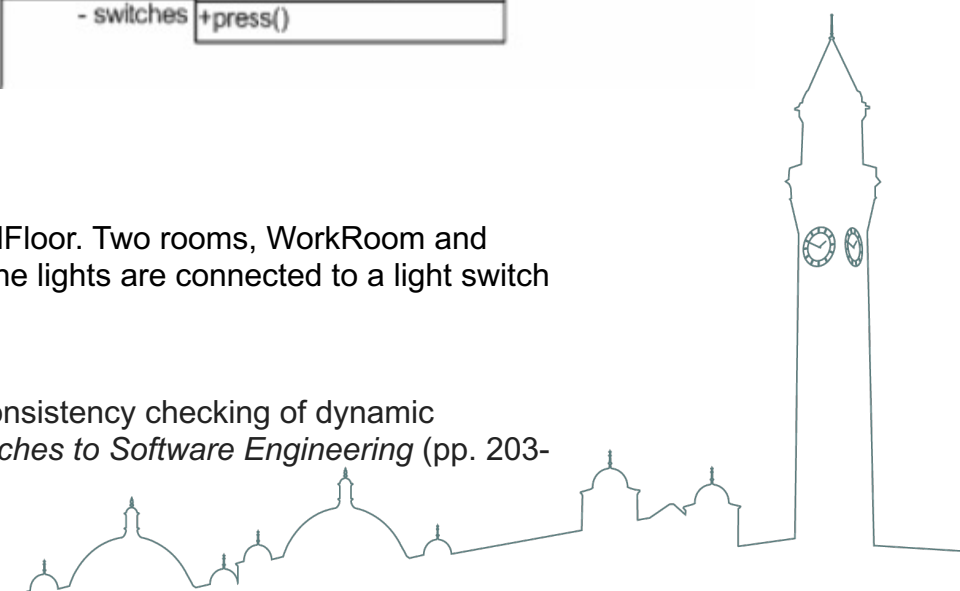
Requirements	A table of usability, functional and non-functional requirements

Functional Requirements	Non-functional Requirements	Usability Requirements
What will the system do?	How well will the system perform?	What goals will the user achieve (Effectiveness)?
What must the system do (or not do)?	How will you know that it has done this? How will you know that possible errors / risks are minimized?	How easy will it be for the user to achieve these goals (Efficiency)?
		How will you know user enjoys using the system (Attitude / Experience)?

Table 1 (2219814)

| Requirement Type	Requirement	Description
Usability	User-friendly interface	The system must have an easy-to-use interface that enables users to navigate and interact with it.
Usability	Personalization	Personalization of recommendations based on user preferences and previous clothing usage is required.
Usability	Smartphone app	The system must have a mobile app that allows users to interact with the closet remotely and provides clothing recommendations to users based on their preferences, and weather conditions.
Functional	Weather sensors	The system must have a humidity and a temperature sensors to detect weather conditions.
Functional	Weight sensor	The system must have a weight sensor to determine when an item has been added or removed from the wardrobe with the help of the integrated camera.
Functional	Camera	The system must have a camera to provide data if a new clothing item was added to the wardrobe. The camera also has the functionality to detect the removed items.
Functional	Data analysis	The system must be able to analyze the data gathered from the sensors and camera to provide personalized recommendations with the help of machine learning algorithms.
Non-functional	Security	The system must have secure user authentication and data encryption to protect users' privacy.
Non-functional	Scalability	The system must be scalable to handle a large number of users and clothing items.
Non-functional	Performance	Rapid response times are required for real-time adjustments based on weather information and user behaviour.

Table 2 (2513244)

Requirements	Description
Moisture level	Moisture sensor needs to provide accurate reading the moisture level of the soil at all times. Any toleran in the moisture reading should be kept very small.
Temperature level	Temperature sensor needs to send accurate reading the temperature of the room at all times. Any toleran in the temperature reading should be kept very small.
Water Pump (Turn ON/ OFF)	Water pump needs to start functioning immediately as the input from the moisture sensor signals moistu level below 30% or (2) 24 hours' time has elaps since the last water supply. Otherwise, the water pur remains OFF i.e moisture level > 30% or 24 hours' tir has not completed.
Heater (Turn ON/ OFF)	Heater needs to turn ON immediately as the input fro the temperature sensor signals temperature of t room below 20ºC. Otherwise, the heater remains Ol i.e temperature >20ºC
Controller	The controller needs to continuously monitor the inp from moisture and temperature sensors and also nee to keep record of the time since last water supply. If t moisture level falls below the set threshold or 24 hou are completed then water pump needs to be switch ON. Similarly, if the temperature falls below t threshold then heater needs to be switched ON.
Manual settings	The system should allow the user (farmer/ owner) set the threshold for moisture and temperature senso remotely through Mobile software app.
Over-ride mode	The system should allow the user (farmer/ owner) over-ride the system and control the functioning water pump and heater (locally as well as remote through Mobile software app regardless of the curre threshold level.
User authentication	Only the user (farmer/ owner) should be allowed adjust the threshold levels of sensors and over-ride t system (locally or remotely) through mobile app.

Table 3 (2102151)

Functional	Non-functional	Usability
The parking sensor should accurately detect and report available parking spaces in real-time.	The system should have a high level of accuracy and reliability.	The system should be easy to use and navigate for drivers with providing clear instruction on how to use it.
The camera sensor should be able to capture and read the license plates of cars who enters and exits.	The system should be able to handle a large number of users and parking spaces.	The system shall have a reliable and fast payment process.
The system should calculate parking fees based on the duration of the parking stay automatically.	The system should be secure, with extreme measures to prevent unauthorized access and protect user data.	The system should have a user-friendly interface for payment processing, with concise and easy-to-follow steps.
The system should allow drivers to pay for parking using their mobile phones with providing a record of the parking transaction to the user.	The system should be able to operate under different weather conditions (if the parking space is outdoor).	The system should provide user feedback, including confirmation of payment and parking spot availability.

2219814 **2513244** **2102151**
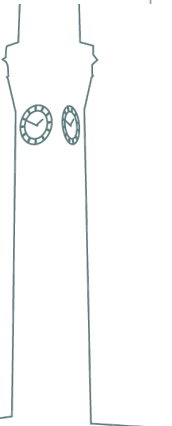
| Evaluation	A brief discussion on the criteria that you could apply in formative evaluation and testing of the concept

Criteria	How to evaluate it
Regulatory/ Compliance	Make sure that IPS system complies with all the rules, regulations, standards and compliance checkpoints set up by the industry by consulting risk quality assurance expert who specialised on medical solutions.
Security	Check whether IPS is free from any threats, vulnerabilities or risks.by running a penetrating test to find any venerability.
Usability	Makes sure that IPS is easy to use and provides the user with an optimal experience by asking multiple users to use the system to complete some tasks and after their attempt they immediately will be given a questionnaire to measure how difficult that task was.Another way is to count the number of errors the participant makes when attempting to complete a task and calculate the effectiveness by the following formula. **Effectiveness = (number of tasks completed successfully / Total number of tasks undertaken) X 100**
Availability	Run the system for 24/7 with downtown for two hour every month for maintenance, and collect any failure events and repair times then compare the availability percentage to the required availability percentage which is 99.9%

Table: Evaluation criteria for the proposed system (Grida et al., 2020)

Functionality	Operational feasibility of the sensors
	Technical compliance with the hardware
	Real time tracking
	Pulse sensor range
	Real time data processing
	Intelligent decision making
	IMU sensor range
	Thermometer range
	Touch sensor range
	Wireless range
	Access and privileges
	Data logging and storage
Quality	System reliability
	Accessibility
	Usability
	Network distribution quality
	Response rate
	Hardware quality
	Data verification
	Data privacy and encryption
	System validation

2263077   2315601
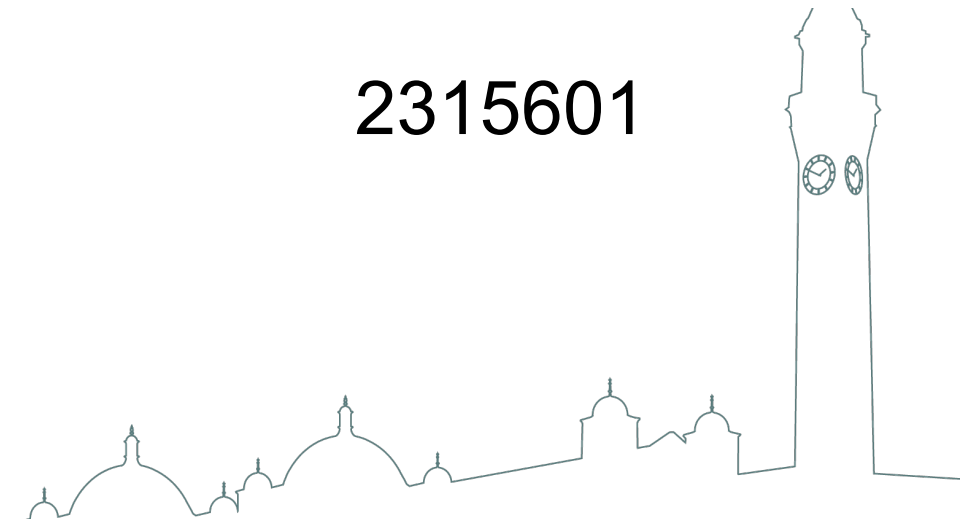
User Experience Questionnaire (Laugwitz et al., 2008)
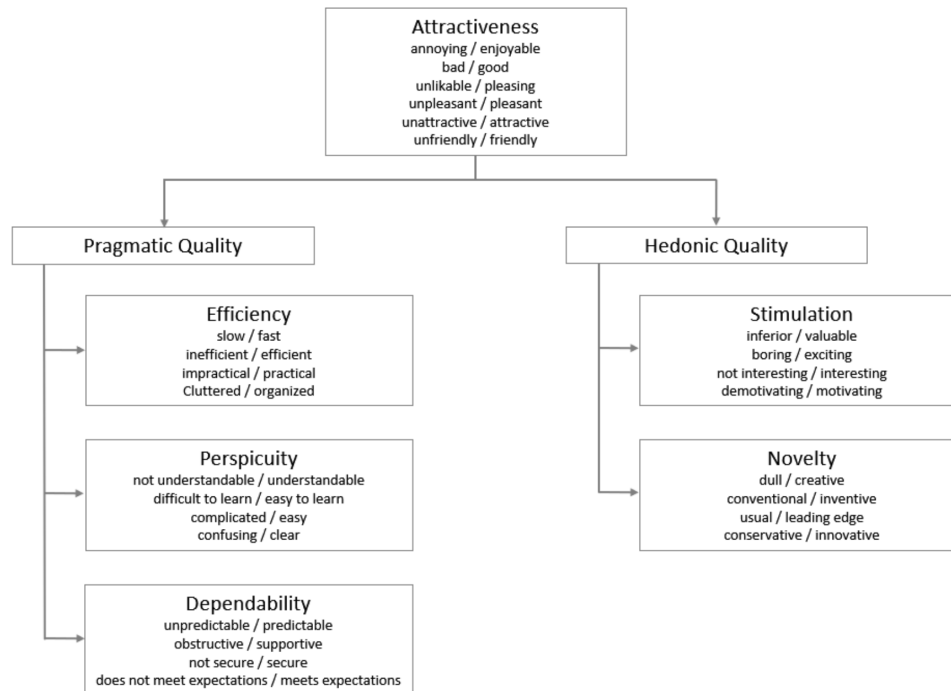
Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	○	○	enjoyable	1
not understandable	○	○	○	○	○	○	○	understandable	2
creative	○	○	○	○	○	○	○	dull	3
easy to learn	○	○	○	○	○	○	○	difficult to learn	4
valuable	○	○	○	○	○	○	○	inferior	5
boring	○	○	○	○	○	○	○	exciting	6
not interesting	○	○	○	○	○	○	○	interesting	7
unpredictable	○	○	○	○	○	○	○	predictable	8
fast	○	○	○	○	○	○	○	slow	9
inventive	○	○	○	○	○	○	○	conventional	10
obstructive	○	○	○	○	○	○	○	supportive	11
good	○	○	○	○	○	○	○	bad	12
complicated	○	○	○	○	○	○	○	easy	13
unlikable	○	○	○	○	○	○	○	pleasing	14
usual	○	○	○	○	○	○	○	leading edge	15
unpleasant	○	○	○	○	○	○	○	pleasant	16
secure	○	○	○	○	○	○	○	not secure	17
motivating	○	○	○	○	○	○	○	demotivating	18
meets expectations	○	○	○	○	○	○	○	does not meet expectations	19
inefficient	○	○	○	○	○	○	○	efficient	20
clear	○	○	○	○	○	○	○	confusing	21
impractical	○	○	○	○	○	○	○	practical	22
organized	○	○	○	○	○	○	○	cluttered	23
attractive	○	○	○	○	○	○	○	unattractive	24
friendly	○	○	○	○	○	○	○	unfriendly	25
conservative	○	○	○	○	○	○	○	innovative	26

Laugwitz, B., Held, T., & Schrepp, M. (2008). Construction and Evaluation of a User Experience Questionnaire. 4th Symposium of the Workgroup Human-Computer Interaction and Usability Engineering of the Austrian Computer Society, Austria.

UNIVERSITY OF BIRMINGHAM

Preparation for Flutter Lab
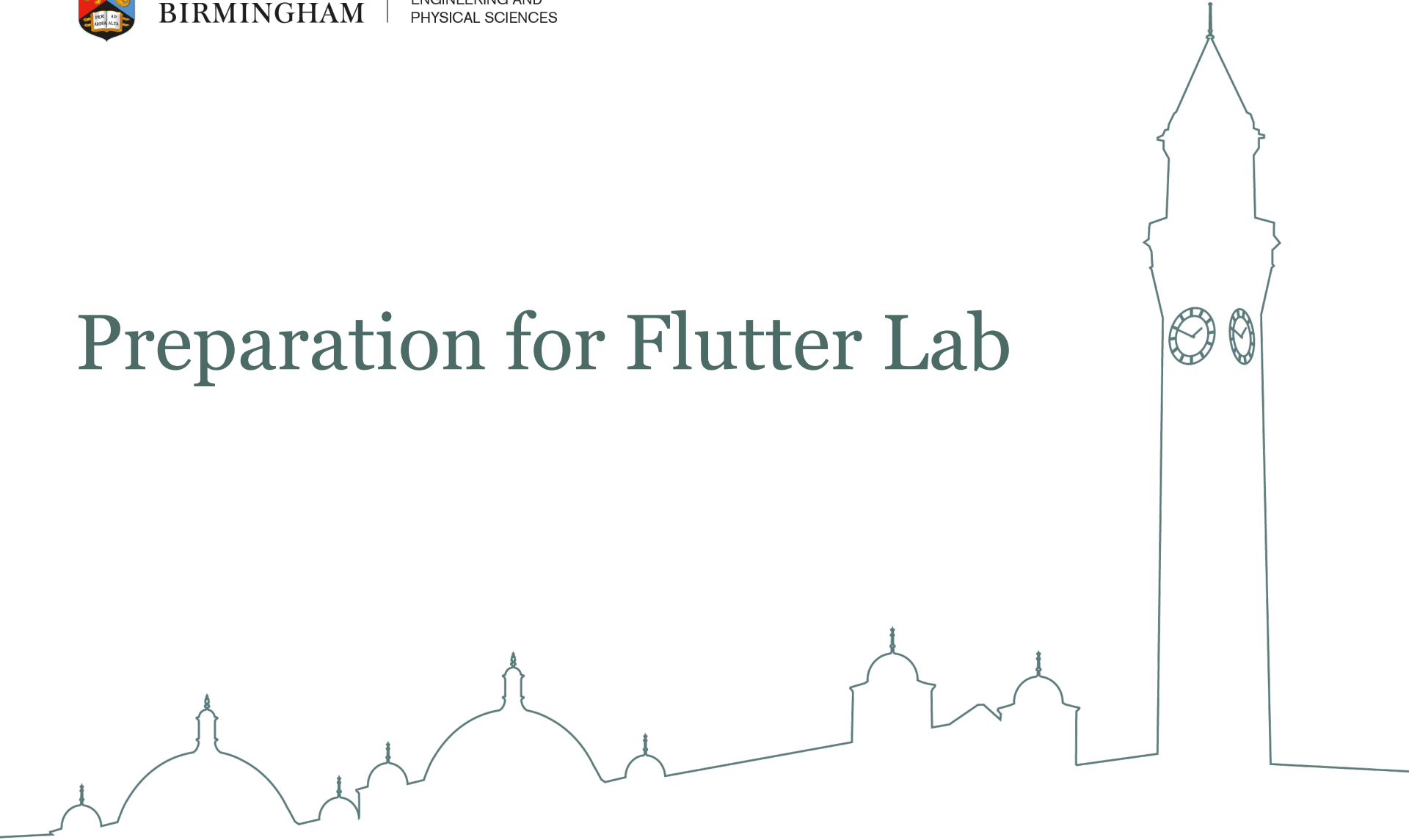
Install Flutter

- Flutter is an open-source framework that Google have developed to allow you to compile apps to different platforms from a single code.

- Install Flutter from here: https://docs.flutter.dev/get-started/install.

- This will save to your Downloads folder. It is a good idea to move this into another folder (but not the Desktop), so I suggest putting this into your Documents folder (unless you want to create a new folder for it).

- When you create your first Flutter app, you will define the path to the Flutter SDK (which will point to this location)
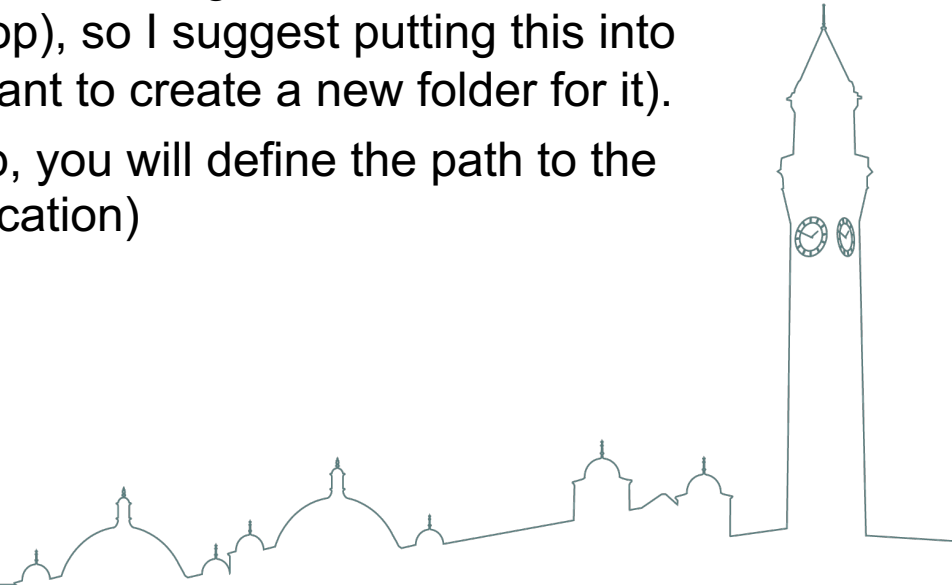
Install IntelliJ Community Edition

☐ If you prefer to use Xcode, Vscode, Android Studio… or any other IDE that is OK

☐ I am assuming that IntelliJ might have been used in other modules

☐ IntelliJ IDEA Community edition is free from www.jetbrains.com

☐ Load the Flutter Libraries

– Open IntelliJ IDEA and, on the left panel, select 'Plugins'.

– Open 'Marketplace' and type flutter into the search bar.

– Select the Flutter plugin and click install.

– Click Yes when prompted to begin install and then restart (if required). This installation should also include the Dart language that flutter uses.
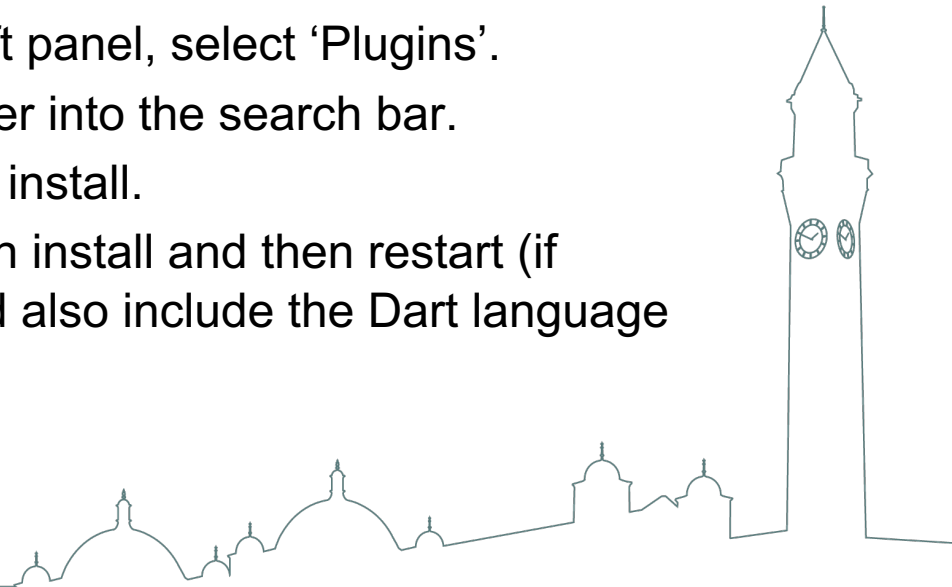
phone in Developer Mode (iOS)

- ☐ Connect your iOS device to your machine via USB cable.
- ☐ On your device, open the **Settings** app. Select **Safari**, scroll down to the bottom of the page and open the **Advanced** menu. Enable the **Web Inspector** option Still on your device, open the **Safari** app and browse to any web page.
- ☐ On your Mac, launch **Safari**, open the **Preferences** (**Safari > Preferences**), and navigate to the **Advanced** section. Enable the **Show Develop menu in the menu bar** option
- ☐ Open the **Develop** menu. You will see your iOS device listed. When you mouse over your device name, you will see the URL to the site you've browsed to on your device displayed.
- ☐ Select the URL and a **Web Inspector** window will open, allowing you to preview, inspect, and debug content on your mobile browser from your
- ☐ desktop
- ☐ In the **Resources** section, you can preview and inspect the web page. Hovering over elements in the **Web Inspector** will highlight the corresponding elements in the browser on your iOS device
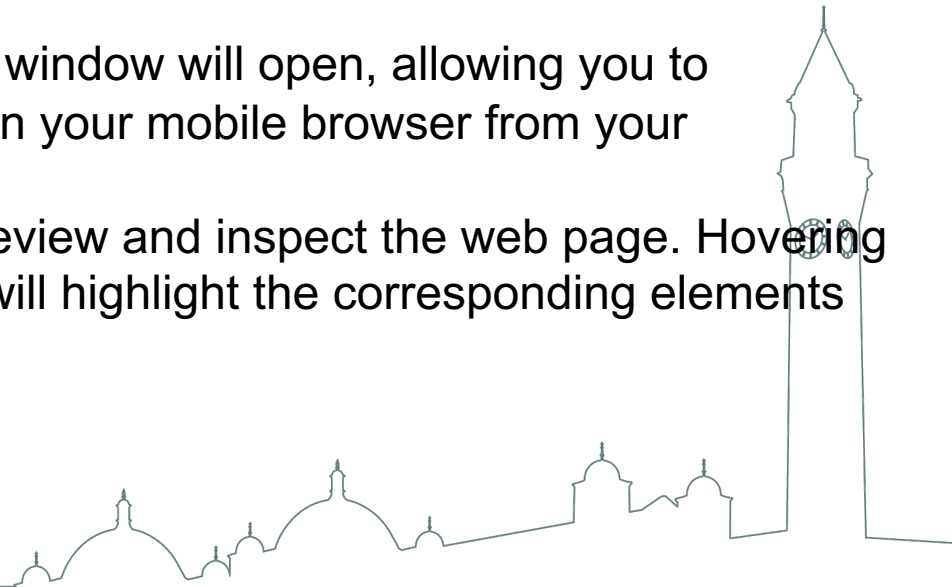
Phone in Developer Mode (Android)

- ☐ If you are a running Android 4.2+, you will need to enable your device's **Developer options** before you can turn on USB debugging. On your device, open the **Settings** app and select the **About phone** menu.
- ☐ Locate your device's **Build number** and tap it <u>seven times</u>. If you are running an older version of Android, you can enable USB debugging by going directly to Settings > Developer options.
- ☐ Enter your device password. You should now see a message that states, **You are now a developer!**.
- ☐ To access your **Developer options** in Android 11, return to **Settings** and select **System**.
- ☐ Expand **Advanced**, and tap **Developer options**
- ☐ Scroll down to **USB debugging** and turn on the toggle