Improving the University Library Experience

Service Design Portfolio

Introduction:

Students rely heavily on university libraries for focused study, collaboration, and resource access.

Laidlaw Library

Capacity of 720 and over 180 Computers available.

Edward Boyle Library

Open 24/7, 7 days a week with a capacity of over 1,800.

Identified Problem:

Students often struggle to **find available seating.** Especially during peak hours and assessment periods.

SST Anaysis (Current system):

1. Key Scenario

Student Searches for a Seat During Peak Hours

2. Main Actors

Actor	Role	Priority
Students	Trying to locate a seat	High
Library Staff	Manages complaints	High

3. Interaction Flows

1. Student checks capacity: “200 seats available”
2. Enters library, begins manual search
3. Encounters full or overcrowded zones
4. Reports frustration to library staff or leaves

Research Question:

How can we improve the current system to enable students to find available study spaces faster and more efficiently?

Research Insights:

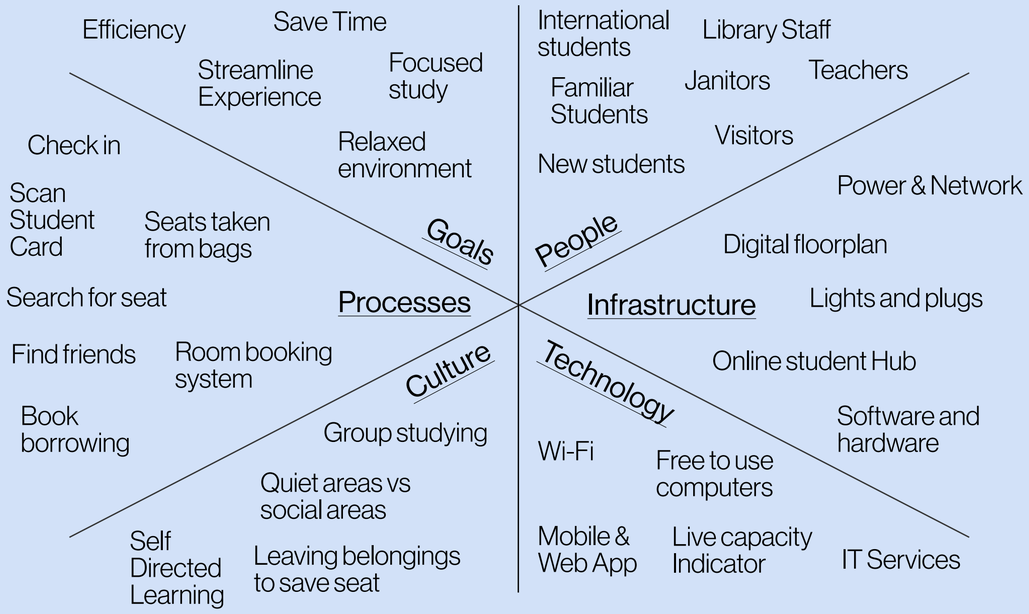
90% of survey respondents said they **visit more than one floor or walk around to find a seat** during peak hours.

60% Weren’t even aware of the live capacity system in place.

- Students prefer certain areas (e.g. quiet zones, window seats, plug socket areas)

  > location matters.

Socio-Technical Systems Hexagon Analysis:



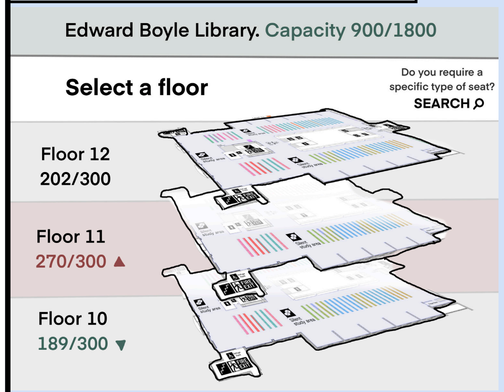
Requirements:

Requirement	Priority	Test Method	Evidence	Source
Spacial Data Visualisation	High	Use of physical references / points	Floor plan , maps, photos of the library..	Easy understanding[1]
Filters (Seat type / Accessibility)	High	Check seat types are diverse	Different seat types (quiet, group..)	Research Insights: location matters
Privacy-compliant tracking	High	Analise data over a period of time	No unique, identifi-able users	Free-use public space
Real-Time Up-dates	Med	Test update speed when leaving a seat	Time, seconds	Busy Periods, SST Analysis
User Involvement	Med	Check influence of user inputed data	Data impacts visuals and decisions	Inclusive Environment[2]

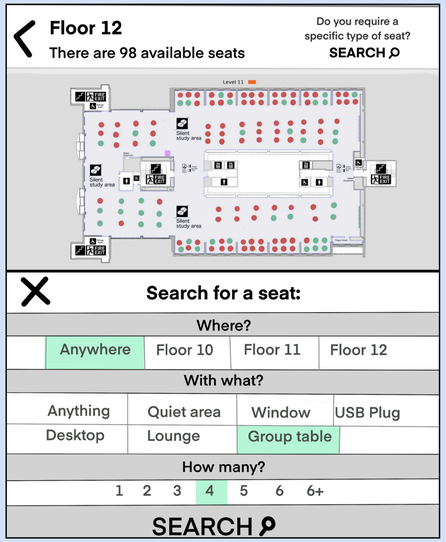
Concepts

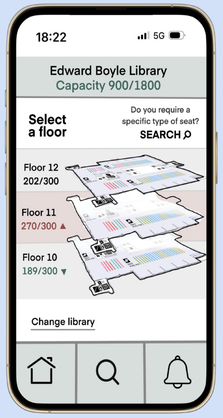
Displaying the data (UI)

Collecting the data



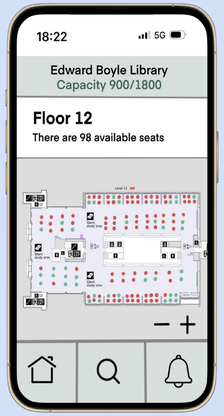
Kiosk at Library Entrance:
Large touchscreen floor map showing available seats

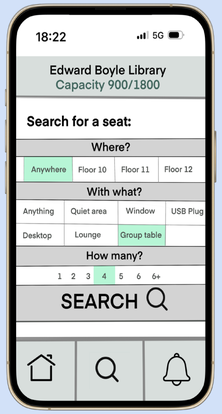




Choose a floor level

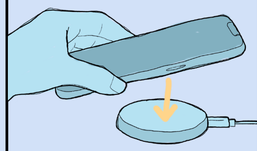
See free seats as green dots





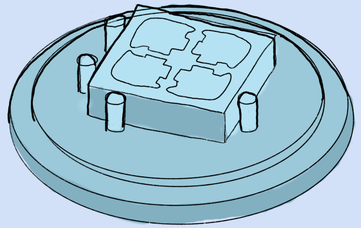
Mobile App / Website

Real-time map of available seats with potential notifications. Filter by zone/ seat type



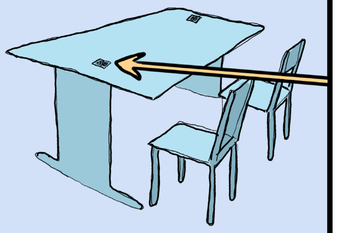
Sends data to a live database

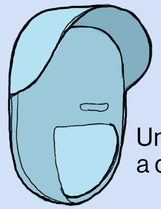
Pressure-based sensors on tables /desks (can double as wireless chargers or USB ports)



Each seat has a unique code

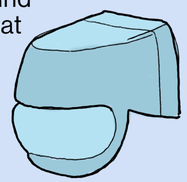
Crowd-sourced Feature: Students can scan a QR code and mark when they arrive at or leave a seat

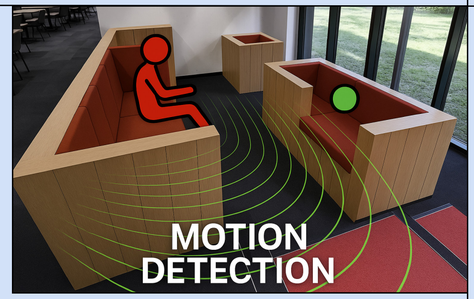




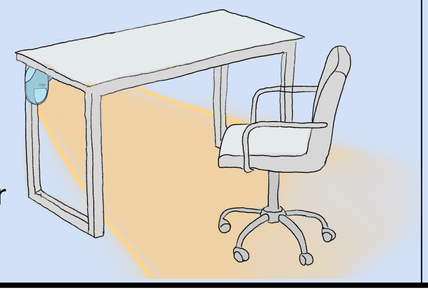
Under a desk

behind a seat

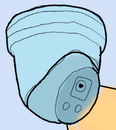


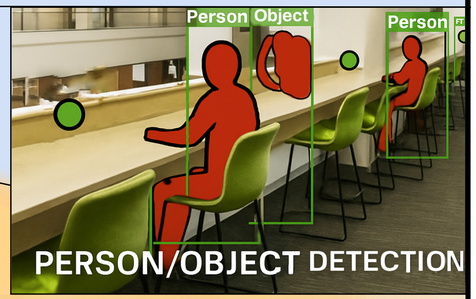


Motion or Proximity based sensors under and around seats

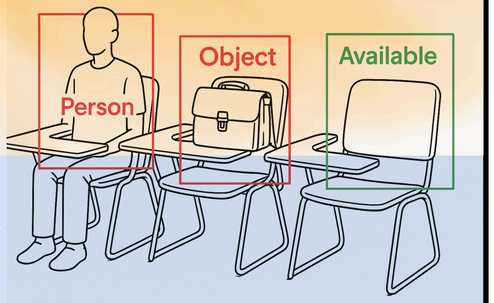


Using the already installed CCTV





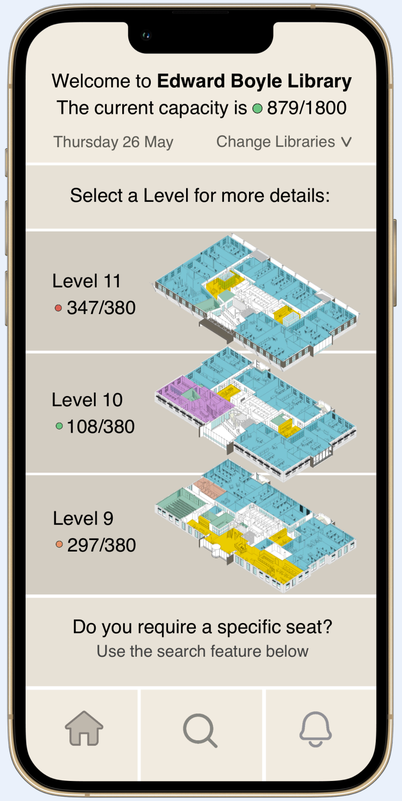
Overhead Cameras or sensors combined with AI to detect people and objects



Final Design

AI detection with a mobile app

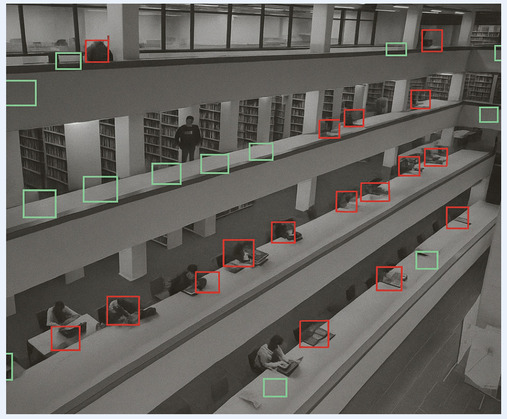
A mobile app that displays a live seat availability on top of a floor-plan of the library. With search and alerts features



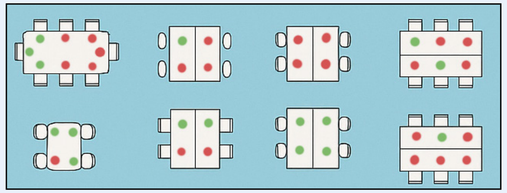
Mobile App Homepage

Service Blueprint

Time	Before visit	Searching seat	Selecting seat	Leaving seat
Physical Evidence	Library App	Seat map interface, filters (quiet, plug, group.)	Visual indicator of chosen seat	Prompt from app to leave a review
Customer Actions	Downloads/ opens library app	Applies filters and browses available seats →	Selects a seat and views more details (e.g. features, reviews)	Leaves a review about the seat (noise, comfort.. etc)
Onstage Contact	App homepage with seat map entry →	Map displays current availability	App shows expanded view with reviews and photos →	Review submission form visible in app ↓
Backstage Contact	CMS pushes updated UI and content to app ←	Pulls real-time data from AI		Review gets logged in database ↓
Support Process	IT team maintain app when needed	IoT updates seat status in database ←		Moderation tool may filter inappropriate content



The live CCTV footage is processed through a person & object detection AI which maps every seat in the library

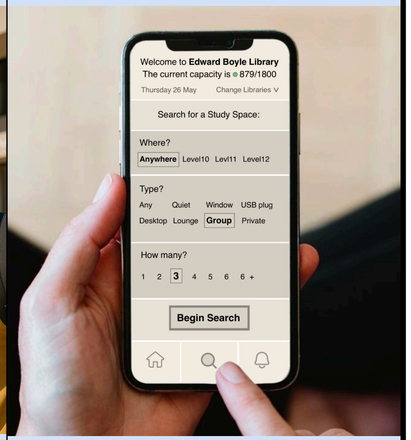


Storyboard (User Actions)

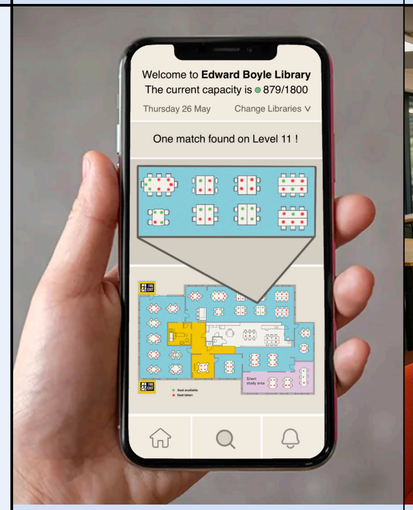
Three Classmates are hoping to work on a group assignment in the library

1. Student opens the App

They need a group table with three seats to work



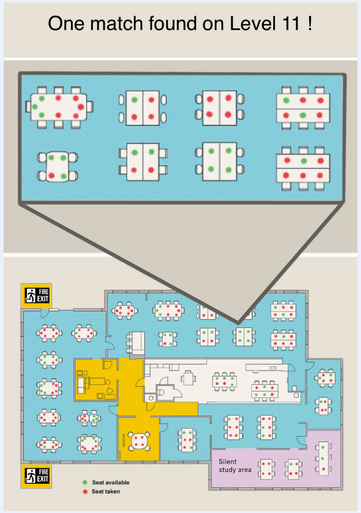
2. Begins a search with filters



3. App finds a suitable match

4. Students find their study space in minutes

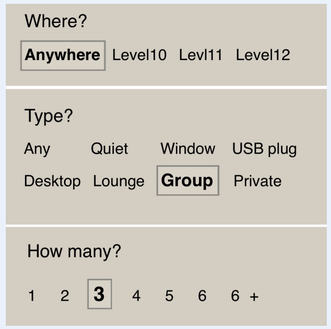
Evaluation



Search query results page

Spacial Data Visual-isation

Filters (Seat type / Accessibili-ty)



Number for groups searches

Implementation Cost:

The implementation will not disrupt any current library systems as it is independent of the current turnstile count. Initial cost may be high, but low maintenance.

SST Anaysis (Of the new design):

1. Key Scenario (stays the same)

Student Searches for a Seat During Peak Hours

2. Main Actors

Actor	Role	Priority
Students	Trying to locate a seat	High
Library Staff	Helps students use the app	High
IT Staff	Manages Data-base and app back-end	Med

3. Interaction Flows (See flowchart for more detail)

1. Student opens app
2. Either finds a seat from the map or uses the search feature to find a specific seat
3. Walks to seat that the app has located

Key Improvements:

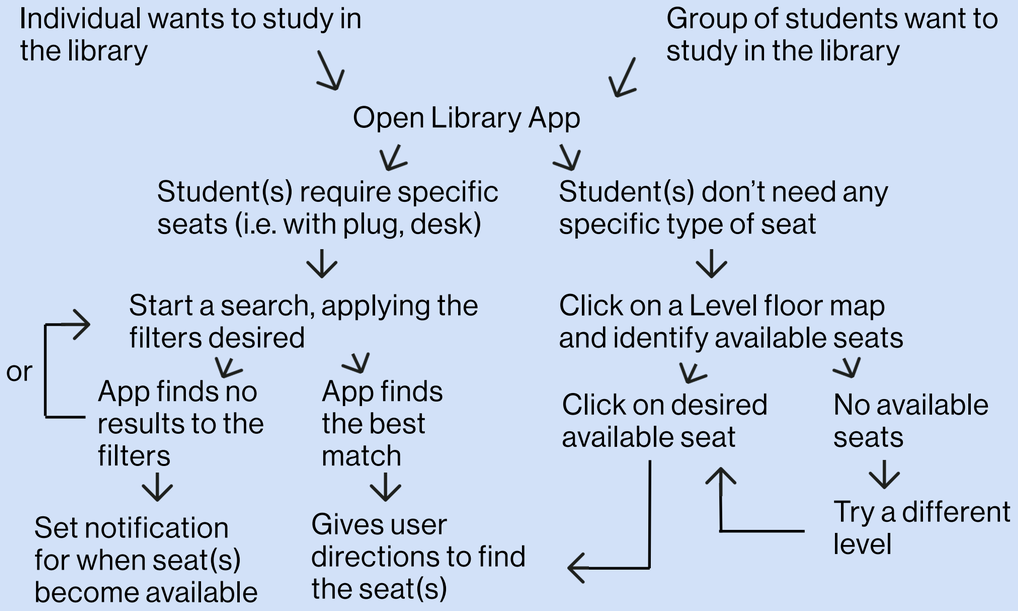
Generally:

- Removes uncertainty of finding a space
- Increases efficiency drastically
- Prevents areas from getting overcrowded
- Helps students unfamiliar with the space

For Groups:

- Ensures a group can be seated together with enough space
- Promotes the library as a collaborative space

Use Cases Flowchart:



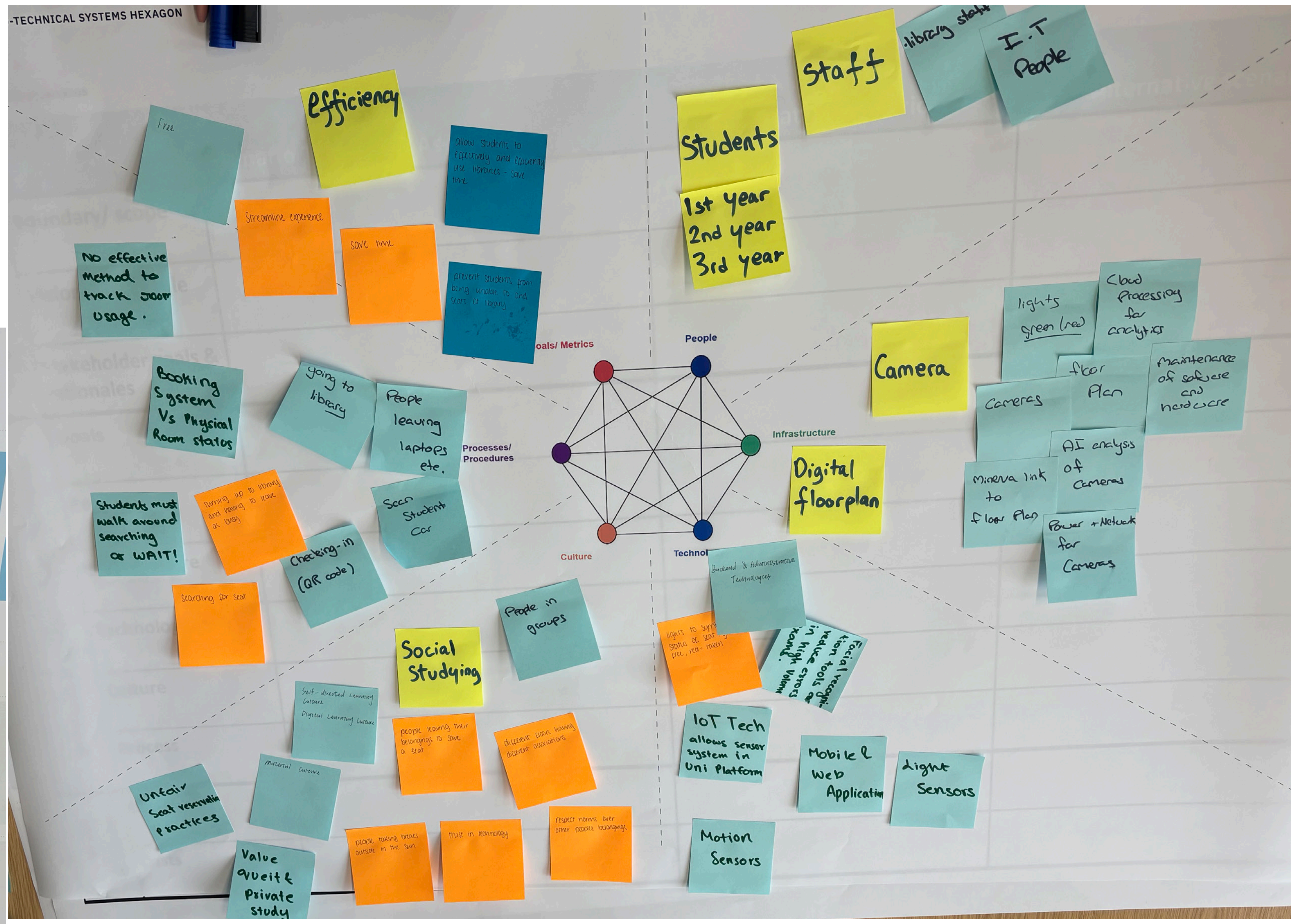
Analysis of the Requirements:

Requirement	Evidence	Score	Possible Improvement
Spacial Data Visualisation	Floor plan , maps, photos of the library..	8/10	3D render of space, maybe AR directions
Filters (Seat type / Accessibility)	Different seat types (quiet, group..)	9/10	User feedback to see if new filters are wanted
Privacy-compliant tracking	No unique, identifiable users	(7/10)	Use cameras that do not store footage
Real-Time Updates	Time, seconds	10/10	Add more possible settings for notifications
User Involvement	Data impacts visuals and decisions	7/10	More detailed rating system to make it more user-centric

Appendix

Challenge day Research:

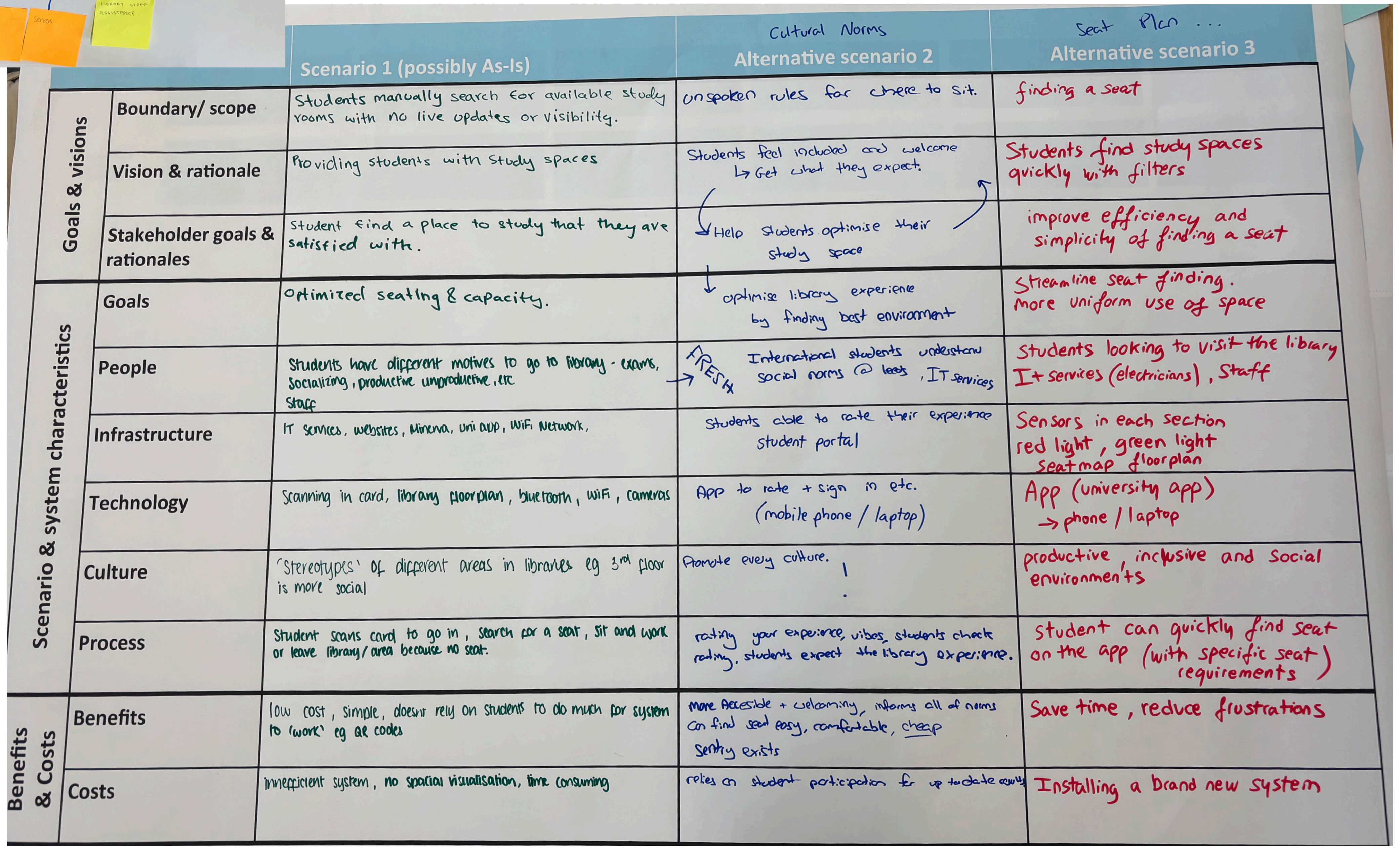
Service Blueprint



Efficiency
Staff
I.T People
Students
1st Year
2nd year
3rd year
No effective method to track room usage.
Booking System Vs Physical Room states
People leaving laptops etc.
Students must walk around searching or wait!
Camera
Digital floorplan
Social Studying
IoT Tech
Mobile & Web Application
Light Sensors
Motion Sensors
Unfair seat reserve practices
Value quiet & Private study

Socio-Technical System Hexagon

Systems Scenario



Scenario 1 (possibly As-Is)
Cultural Norms
Alternative scenario 2
Seat Plan ...
Alternative scenario 3
Goals & visions
Boundary/ scope
Students manually search for available study rooms with no live updates or visibility.
unspoken rules for where to sit.
finding a seat
Vision & rationale
Providing students with study spaces
Students feel included and welcome → Get what they expect.
Students find study spaces quickly with filters
Stakeholder goals & rationales
Student find a place to study that they are satisfied with.
Help students optimise their study space
improve efficiency and simplicity of finding a seat
Scenario & system characteristics
Goals
Optimized seating & capacity.
optimise library experience by finding best environment
Streamline seat finding. More uniform use of space
People
Students have different motives to go to library - exams, socialising, productive, unproductive, etc. Staff
International students understand social norms @ leeds, IT services
Students looking to visit the library, IT services (electricians), Staff
Infrastructure
IT services, websites, Minerva, uni app, WiFi Network,
Students able to rate their experience student portal
Sensors in each section red light, green light Seat map floorplan
Technology
Scanning in card, library floorplan, bluetooth, WiFi, cameras
App to rate + sign in etc. (mobile phone / laptop)
App (university app) → phone / laptop
Culture
'Stereotypes' of different areas in libraries eg 3rd floor is more social
Promote every culture.
productive, inclusive and social environments
Process
Student scans card to go in, search for a seat, sit and work or leave library/area because no seat.
rating your experience, vibes, students check rating, students expect the library experience.
student can quickly find seat on the app (with specific seat requirements)
Benefits & Costs
Benefits
low cost, simple, doesn't rely on students to do much for system to 'work' eg QR codes
more accessible + welcoming, informs all of norms, can find seat easy, comfortable, cheap, safety exists
Save time, reduce frustrations
Costs
Inefficient system, no spatial visualisation, time consuming
relies on student participation & up to date
Installing a brand new system

Research Paper References:

1. Harrison, S., & Dourish, P. (1996). Re-Place-ing space: The roles of place and space in collaborative systems.
Proceedings of the 1996 ACM Conference on Computer Supported Cooperative Work (CSCW), 67–76
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Link: https://doi.org/10.1080/15710880701875068

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Link: https://www.thisisservicedesigndoing.com/ (official site)

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Sciences (2nd ed., pp. 769–774). Elsevier.
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5. Forlizzi, J., & Battarbee, K. (2004). Understanding experience in interactive sys-tems. Proceedings of the 5th Conference on Designing Interactive Systems (DIS '04), 261–268.
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6. Yang, L., Yang, S., & Zhao, L. (2017). A smart parking system based on wireless sen-sor networks. Sensors, 15(8), 2112–2137.
Link: https://ieeexplore.ieee.org/document/6389096

Final Design Storyboard AI Generated Classmates:

ChatGPT 12/05/25 13/03 Prompts:

"Using this image to generate an image of three classmates. One is showing something on her mobile phone to the other two. Make the image photorealistic and high quality."

"Using the same three classmates, generate an image of them arriving a available table , one is pointing at it and the other two are walking behind her."