Activity 1: Problem Definition and Conceptualization:

1.1 Problem Definition:

The Lumis student residence faces recurring challenges in three essential operational areas those are facility booking, door access, and rent payment. These issues create confusion and dissatisfaction among residents, particularly students balancing academic and personal commitments.

1. **Unorganized Booking Arrangements:**
   Shared facilities such as the cinema, gaming, events lounge and study rooms are booked informally through a residents' group chat. This method lacks fairness and structure, often leading to disputes and frustration. For instance, residents may post vague messages like "I'm booking the cinema room from afternoon till late night", blocking the space for hours without proper scheduling. Others may think they have booked the room when an earlier message already claimed it. Without a centralized and schedule system, double bookings and unfair use occur frequently, creating tension among residents.

2. **Inflexible Door Unlocking System:**
   Access to rooms relies solely on physical key cards, which are often lost, damaged, or locked inside rooms. Each replacement costs around €100, and residents must rely on reception staff to regain entry — a process that causes stress, delays, and inconvenience, especially during weekends or late nights.

3. **Confusing and Restrictive Rent and Payment Process:**
   Rent payments are made via manual IBAN bank transfers, which many residents find complex. Additionally, Lumis sends emails and letters written in German, causing confusion for residents who do not understand the language. Payments must reach the account on the exact due date, and even when a resident sends money on time, delays caused by bank holidays in their country or international transaction delay often result in unfair fines. The system's lack of flexibility and automation leads to frequent errors and financial stress.

These issues clearly demonstrate the need for a centralized, user-friendly, and automated solution that enhances convenience and minimizes errors in residents' daily interactions.

1.2 Conceptualization: How Design Solves the Problems:

The MyLumis App is a smart housing management platform designed using user-centred design principles. It combines all three essential functions (booking, door access, and rent payments) into one intuitive digital interface. Each feature directly resolves the operational challenges identified above.

Feature 1: Smart Booking System:

The Smart Booking System intends to replace the chaotic group chat system with a real-time digital interface for all residents. Moreover, it lets them reserve temporary shared rooms in a convenient and equitable manner. System shows all rooms and time slots available between 12:00 p.m. The bookings screen displays current bookings to residents from 6:00 a.m. Every booking slot is divided into 2 hours and users can select a maximum of 2 consecutive slots, meaning a maximum of 4 hours. This design makes sure that everyone has equal access and prevents individuals from being in shared rooms for another unreasonable number of hours. The system automatically blocks overlapping bookings making availability clear to all residents. When a user books, they instantly receive confirmation and reminder notifications. Thus, it improves reliability and fairness during the entire process.

Feature 2: Dual Door Access (Key Card + Mobile NFC):

The Door Unlocking System utilizes Near Field Communication (NFC) technology to ensure that access requests generated using the resident's mobile phone or smart watch are authorized and valid. This is achieved by generating a door unlock signal that enables the authorised access if everything checks out. To make the system more reliable you can use a mobile device or a card to enter the system. When a resident requires replacement of card, they are to submit the request to manage in a standard format. A resident can submit an online request in a format already designed by the manager. By implementing a two-front this approach, both requests for replacement of cards is reduced as well as the overall management and residents' cost incurred to replace the cards. The system will work offline and will always be accessible at any time. There are higher protection encryptions as well security authentication protocols to protect all residents information as well as ensure the smooth and efficient functioning.

Feature 3: Integrated Rent and Payment System:

With the Rent and Payment System residents can make their rent payments directly through the app. The app supports modern and secure payment methods like Apple Pay, Google Pay, and debit or credit cards. To ensure residents pay before the due date, the system sends automated reminders a few days before the due date. All payment emails, invoices and receipts are in English and German so as not to cause any confusion from German-only emails before. The app also shows you complete payment history and instant digital receipts for transparency and record keeping. Also, using the system for real time digital payments and timely alarms avoids fines for residents.

By integrating these features, the MyLumis app transforms resident operations from manual and confusing to automated, transparent, and efficient. It promotes independence, reduces stress, and ensures a consistent, fair experience for all users.