Accelerated Knowledge Transfer to innovate (AKT2I)

Link to GitHub
An overview of the project topic is available in the following QR code and link.

PBLCare Project

Project ID: 1762

AKT with PblCare

June 2024

Introduction and Motivation

About PBLCare:

PBL Care is a leading home care provider, committed to delivering high-quality care services.

Focus on enhancing the well-being and satisfaction of service users.

Role of CQC:

Care Quality Commission (CQC):

- Regulatory body ensuring care services meet fundamental standards of quality and safety.
- PBLCare's operations must comply with CQC regulations to ensure the highest standards of care.

Current Challenges:

Manual Handling of Complaints:

- Existing complaint management relies on paper-based forms.
- Manual processing leads to delays, errors, and inefficiencies.
- Increased workload for staff and reduced service quality.

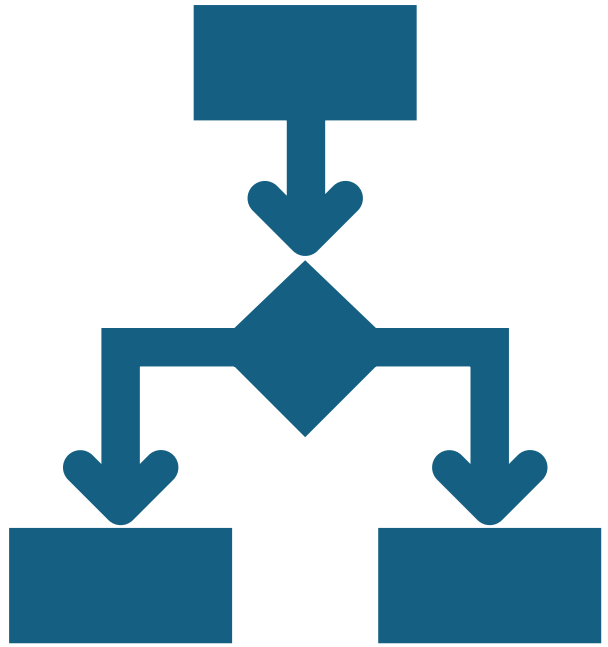
Need for Automation:

Digitalising the Complaint Process:

- Transition from manual to digital forms to streamline operations.
- Implementation of automation to improve response times and accuracy.
- Enhanced data analysis and visualisation for better decision-making.

Aim and Objectives

- **Aim:**
- To enhance the efficiency and effectiveness of complaints management through the implementation of advanced technological solutions.
- **Objectives:**
  - **Market Analysis**: Conducted thorough research on market solutions, identified gaps, and assessed the potential for implementing an off-the-shelf solution.
  - **Automated Smart Complaints Management Framework**: Proposed and developed an automated framework using NLP for the digitilisation and classifying of complaints, and LLM for report generation. We have ntegrated this framework with the developed scheduling system.
  - **Digitalised CQC Forms**: Designed and implemented digital CQC standard forms, ensuring they are linked with database access credentials for streamlined data handling and compliance.



Complaint Types and Access Levels

Data Source	Complaint Type(s)	Data Class	Frequency	Access Level
General Review	Staff Attitude, Inadequate Care, Missed Appointments	Service Quality Evaluation	Every 3 Months	Management, HR Department
Telephone Review	Scheduling Problems, Billing Issues, Paperwork Errors	Immediate Feedback	Monthly	Administrator, HR Department, Management
Medication Review	Medication Errors, Safety Hazards, Infection Control	Health and Safety	Monthly	Management, Administrator Department
Spot Check	Non-compliance with Regulations, Privacy Concerns	Operational Compliance	Every 45 Days	Administrator, HR, Management
Complaints Investigation	Feedback complains	All	Every 28 Days	Administrator, Management, HR
Annual Questionnaire	Cleanliness and Maintenance, Accessibility, Dignity and Respect, Cultural Sensitivity	Comprehensive Feedback	Annually	Management, HR
Supervision Meeting	Staff Shortages, Staff Competency	Performance and Development	Every 3 Months	HR, Management
Appraiser	Staff Attitude, Missed Appointments, Privacy Issue	Annual Performance Review	Annually	HR, Management
New Carer Review	Staff Competency	Initial Competency	Once After 1 Month	HR, Management
Probation Review	Staff Attitude, Inadequate Care, Missed Appointments, Lack of Communication	Performance Assessment	At 6 Months	HR, Management, Administrator

Market Research

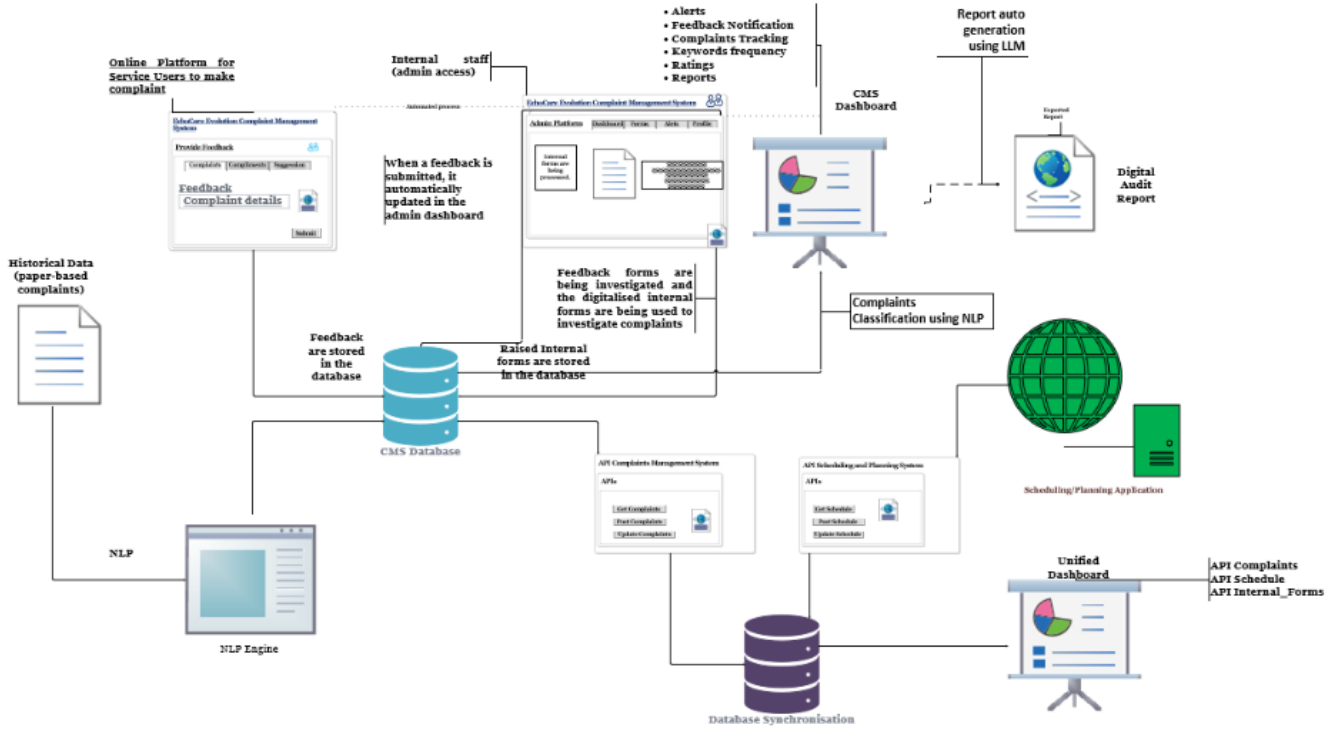
Research Gap:

- **Identified Gap:** The market lacks an integrated, automated complaints management system that combines NLP for digitalisation and classification with LLM for report generation.
- **Current Solutions:** Existing solutions do not fully address the need for seamless integration of digital forms, automated processing, and compliance with CQC standards.

Our Solution:

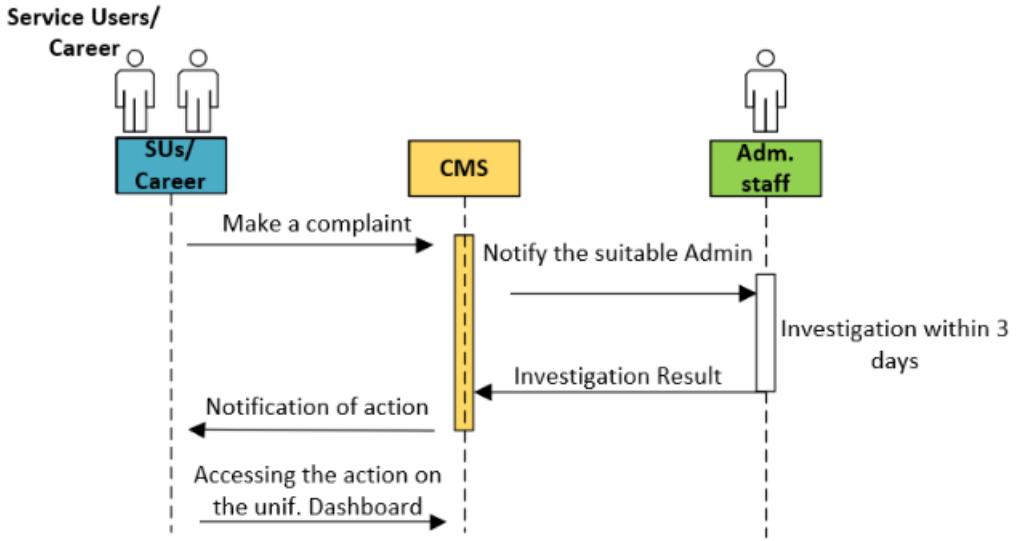
- **Automated Framework:** Our solution proposes an automated complaints management framework that uses NLP for complaint digitalisation and classification, and LLM for generating comprehensive reports.
- **Digitalised Forms:** We have designed and implemented digital CQC standard forms that are linked with database access credentials, ensuring compliance and streamlined data handling.

System Architecture



Architectural Framework

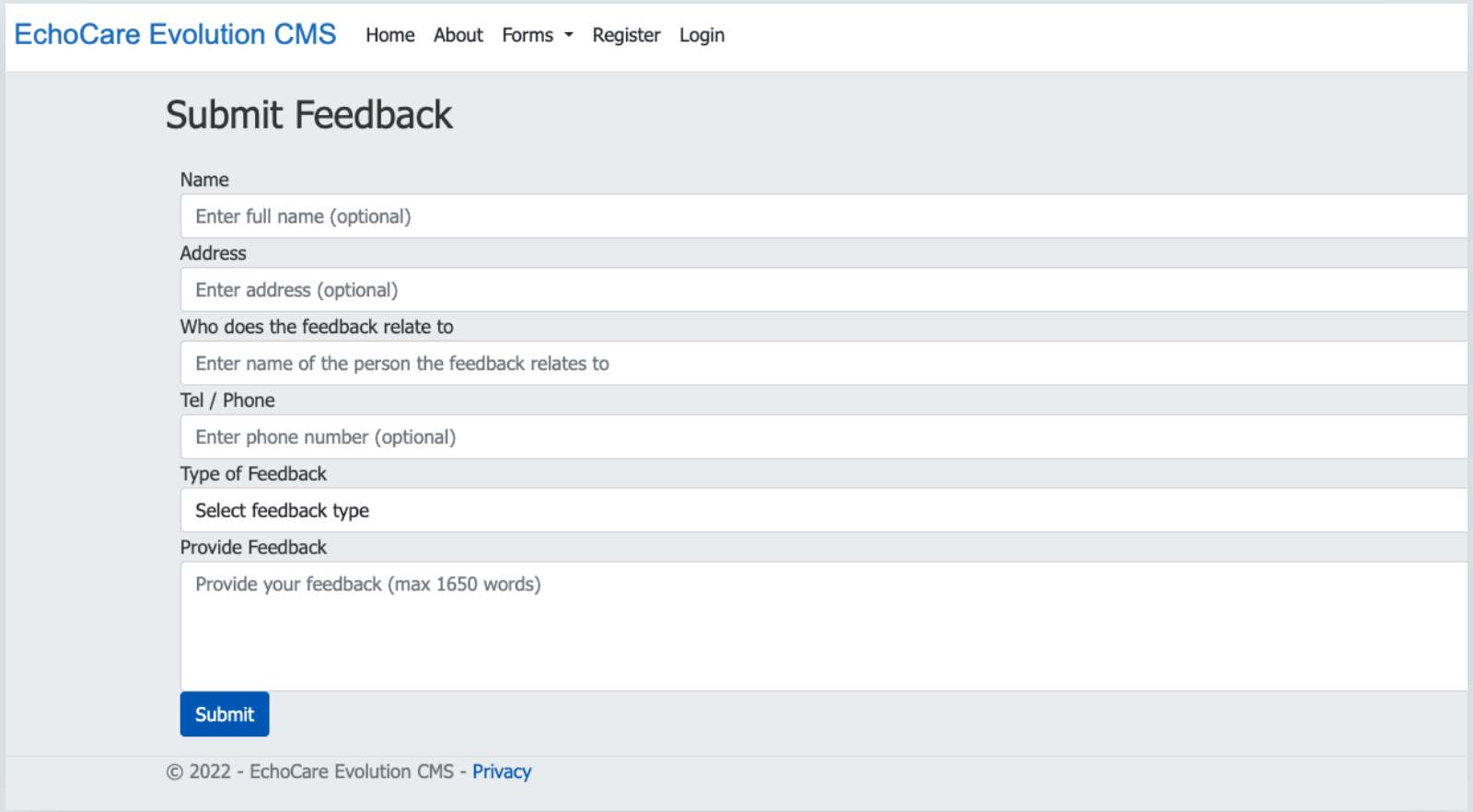
Service Users Submit Feedback	• Categorised as Complaints, Compliments, or Suggestions
Data Storage and Admin Dashboard	• Data stored in database • Updated in the admin dashboard for investigation • Processed via digilalised forms
Historical Data Processing	• Scanned using Natural Language Processing (NLP)
API Routines Integration	• Integrated from both the CMS and scheduling application • Stored in a synchronised database
Machine Learning Implementation	• Used for classifying and analysing complaints
Unified Dashboard	• Provides real-time analysis and insights • Aids in decision-making and operational oversight



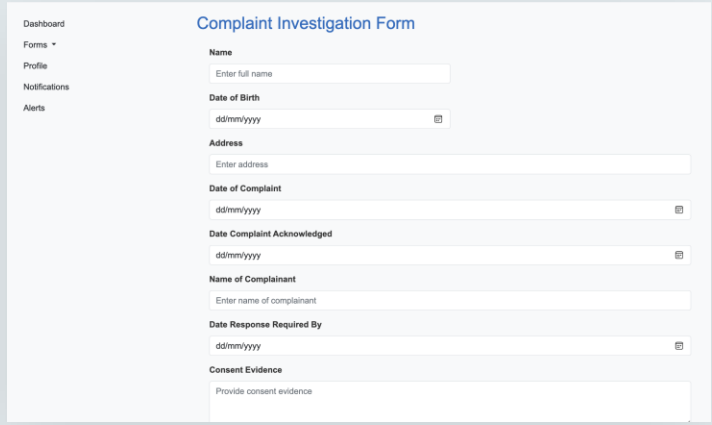
Sequence Process of Complaints Submission

Digitalised Forms

Feedback Form



Complaint Investigation Form

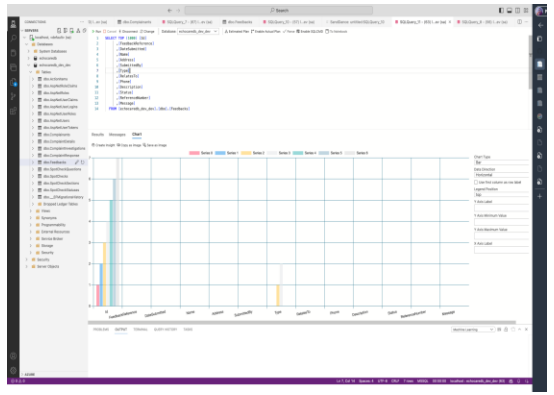


Spot-Check Form

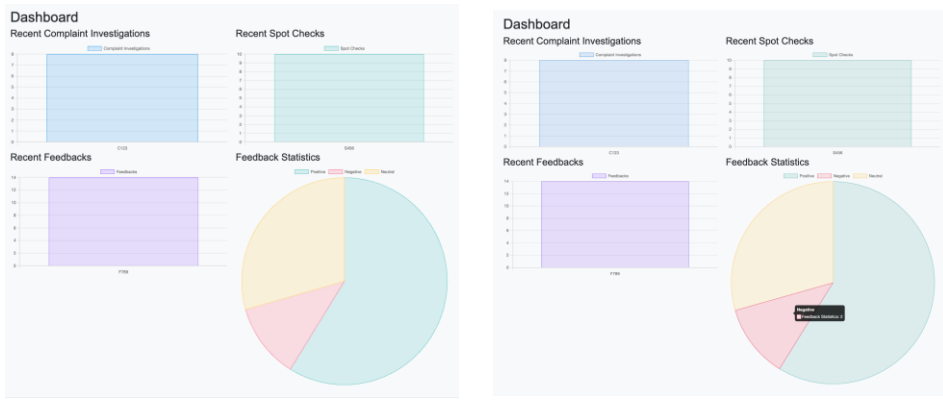
Database and Dashboard

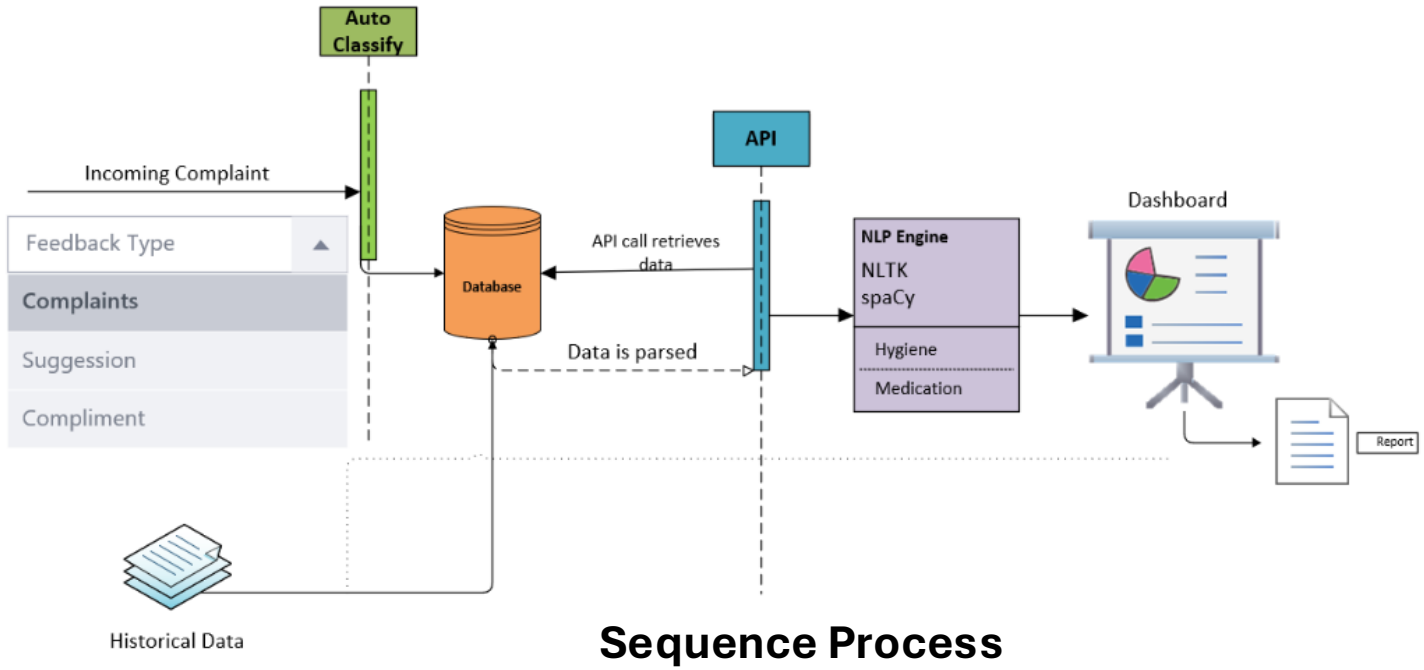
- **DB Components**
  - Digital Forms (.NET Core)
  - Database (MySQL Server)
  - APIs
  - NLP (python)
  - Dashboard (Chart.js)
  - Report

Database



Dashboard



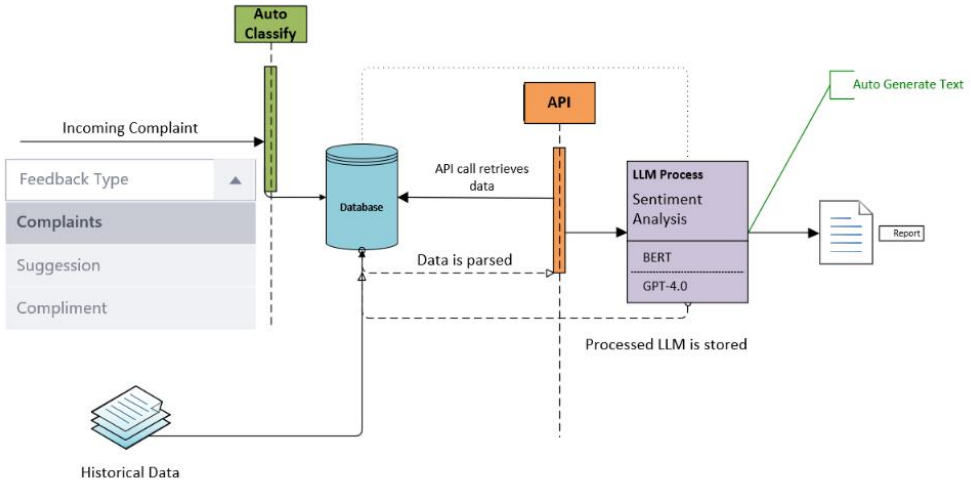


Sequence Process

Complaints Classification and Auto generation

Complaints Visits Report Classification

Word	Count
scheduling	0
timetabling	0
cleaning	18
planning	0
spot-check	0
company uniform	0
key safe	399
id badge	0
late	22
delayed	0
not on time	0
care plan	0
disqualified	0
disappointed	0
PPE	1196
hazard	0
hygiene	12
medication	886
drugs	0
breakfast	2040
aggressive	12
fall	48
massage	107
key	908
safe	1863
danger	0
dinner	211
lunch	322

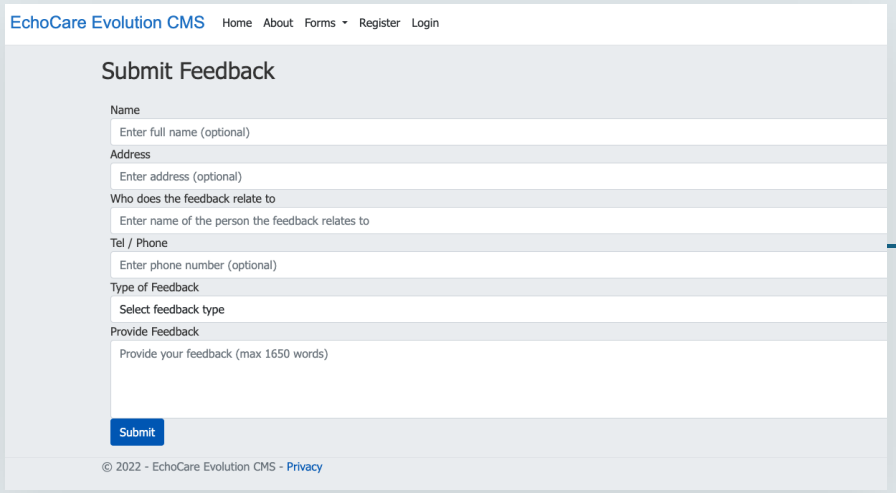


LLM/NLP Sequence Process

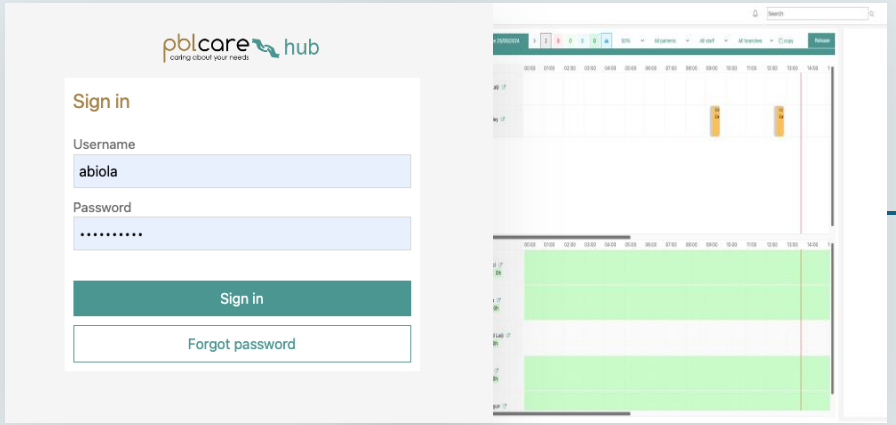
- **Keywords Frequency**
- **Reporting auto-generation**

APIs Integration

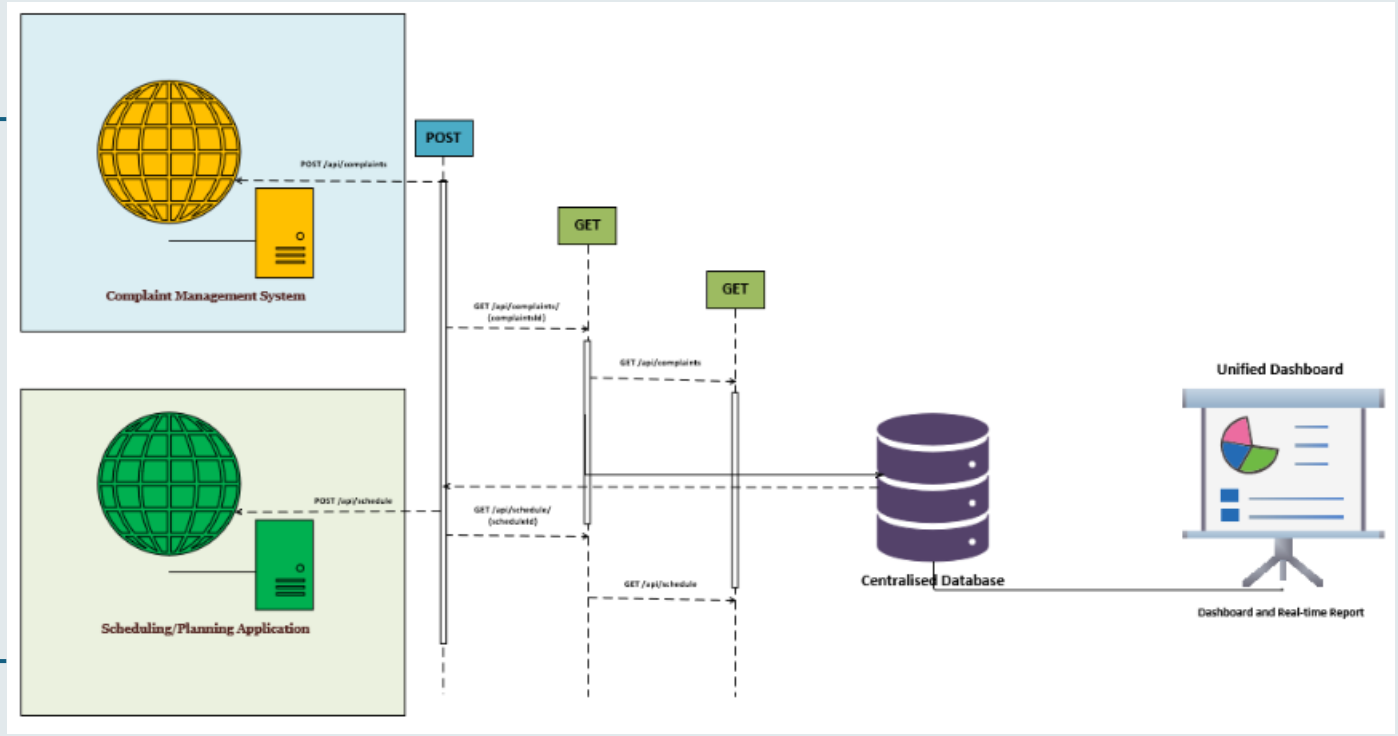
Complaints Management System



Scheduling and Planning System



API Sequence Process



Conclusion

- Extensive market research to identify Off-shelf software solution.
  - Proof-of-concept of developed automated complaint management system
  - CQC Standard Digital Forms connected to MySQL database and visualised dashboard
  - NLP in identifying the frequency of the keywords for visualization of the key complaints and feedback as well as used in the classification.
  - Integrating this system with other developed scheduling through API.
  - The complete software with the documentation of the work is open-source.
- A Framework of the proposed system integrating digital forms, NLP and LLM for intelligent complaints handling and reporting auto-generation.
- Outcomes:

  Automated complaint handling

  Enhanced service quality

  Compliant with CQC regulation

  Visualised dashboard with data analytics

  A user-friendly digital interface for both service users and staff.

Potential proposal of off-the-shelf software solution

Future Collaboration

- This projects leads into a KTP or UK innovative Project for implementation of one of the two ideas:

a) fully implementation and integration of the system,

b) develop an intelligent system to understand the patterns in those complaints to provide insights to mitigate further complaints based on the extracted frequency of keywords in the complaints.

- This system opens the door for further industries-led student project at UG and PG level for decision-making parts based on raising the complaints.

QR Code to access complete Documentation and software.