Software Requirements Specification, Software Design Document, Acceptance Testing Document and Data Collection Document

for

BD25 Crowd Engagement System (Software Design and Development Coursework 2)

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Software Requirement Specification (SRS)

1. Introduction

1.1 Purpose

This SRS (Software Requirement Specification) document describes the software requirements for the BD25 Crowd Engagement System. The software version is 1.0 and it is created by the University of Bradford BD25 Academic Evaluation Team for the BD25 event. The software will play the main role of managing and analyzing the users and the BD25 activities, creating a digital legacy for tourist, participants and even the local community. The main scope of this Software Requirement Specification is to cover the complete and full working BD25 Crowd Engagement System. The software should contain many functionalities, which will be discussed later on, in this document. Below are some of the functionalities, which the software will cover.

One of the functionality which the software should cover is the management of BD25`s activities as well as the management of the roles. Another functionality which the software should be including is to allow the relevant user, to upload the image (drone image, phone image, etc.), from file uploads of the device and add each activity images in that activity folder. Another important and critical functionality that the software should have, is the implementation of a Graphical User Interface (GUI) which should enable access to certain functionalities to users, according to their roles.

This Software Requirement Specification document intends to cover the whole software, while complying with the Legal, Social, Ethical and Professional Issues (LSEPI), and it includes all of the processes which the software will do.

1.2 Intended Audience and Reading Suggestions

There are many intended audiences for this document. One of the intended audience is the users (DIGM, AC and SM) and the reason why they are one of the intended audience is because they need to understand how the system works and how they can interact with it.

Another intended audience of the SRS (Software Requirement Specification) document are the developers of the system, since they need understand the system`s requirements in order to correctly implement the system.

Another intended audience for the SRS document are the project managers, as they will use the SRS document to analyze the purpose and impact of the software product and it will also assist them in creating project timelines and plan and manage the resource for the project.

Another intended audience of the SRS document are the testers, as the document will assist them to create appropriate test cases.

The last audience for the SRS document are the document writing staffs, as they will need to access this document, to create user guides about the system.

1.3 Product Scope

The software which is being specified is the BD25 Crowd Engagement System, which have the main purpose of assisting several users, such as senior staff members (SM), Data and Information Group Members (DIGM) and activity coordinators (AC), by tracking, managing and analyzing the users and activities data in the BD25 event. This data will be captured via drones, camera, and mobile devices and will only be uploaded to the BD25 Crowd Engagement System, via the device`s file upload, as well as, while taking into account the Legal, Social, Ethical and Professional Issues (LSEPI). The system will assist the users in user management and activity management, by storing all the activity and user`s data, in a memory, and it will store and show the data across the relevant interfaces, even when the "logout" button is pressed, allowing the SM (Senior Staff Member), to view the activity data with its relevant images, directly from the SM interface. The main benefit of the software is that the software will create a digital legacy of each activity, which will help the local community or the city council, to plan new activities, which are not been used before. The main objective is to keep track of which activity has been included in the BD25 event as well as, how many users were involved, in managing those activities, showing the crucial need for the system. The goal is to create a digital legacy system which contains all the activities that have been done in the event, with their images, sorted appropriately, in a folder system.

The relation of the system with the corporate goals and business strategies exists since it aligns with the University of Bradford commitment to academic excellence and community engagement, as well as, BD25 senior management`s objective to invest in the advanced technology aimed at creating a digital cultural legacy. It supports the business strategies of making the City of Bradford as a futuristic or forward thinking cultural hub, by supporting the businesses on planning activities, and enabling them to sell products and services, according to these activities, which can play a critical role in boosting Bradford`s economy.

2. Overall Description

2.1 Product Functions

- Data collection (assist the DIGM to capture and collect data)
- Data processing (enabling DIGM to label data)
- Reporting (enable to show evidence of storing and labelling the data)
- Activity management (allow the Activity Coordinators (AC) to create and delete an activity)
- User management (allow Senior Staff Member (SM), to add or remove users and provide each of them access across the system, according to their role)
- Navigation over all the other interfaces (for SM only, due to level of access)
- Login interface with role based interface redirection

- Logout feature, with memory retention feature

2.2 User Classes and Characteristics

There are many user classes which the system will use. Below is each of the user class, with their frequency of use, subset of functions used, technical expertise, privilege level, educational level, type of experience they have and why are they important to the system:

1. Senior Staff Member (SM):

- **Frequency of use:** High (since they will access the system frequently to add or remove staffs and overlook all the activities as well)
- **Subset of functions used:** User management, activity allocation and overlook of the activities
- **Technical expertise:** Medium (as normally a senior staff member is familiar with academic tools and not data processing)
- **Privilege level:** High (he should have admin access, in order to manage users, activity and overlook all the activities)
- **Educational level:** Advanced (should have postgraduate degree as minimum)
- **Type of experience:** Experienced in academic field and less likely in technical field
- **Importance:** SM (Senior Staff Members) manage the system`s strategic use, making sure that legacy is maintained and also ensuring that the crowd engagement targets are met.

2. Data and Information Group Members (DIGM):

- **Frequency of use:** High (they will use the system every time there is a need for data capture and data processing of an event)
- **Subset of functions used:** Data collection and data processing
- **Technical expertise:** High (must be skilled in various types of data tools)
- **Privilege level:** Medium (should have access to data tools and other resources related to his tasks, and should not have access to admin operations)
- **Educational level:** Advanced (should have postgraduate or undergraduate degree in any technology field)

- ***Type of experience:*** Likely experienced in technology
- **Importance:** DIGM are one of the key figure for data operations and they allow the production of better and precise crowd engagement analysis, via capturing and using accurate and detailed event images.

3. Activity Coordinators (AC):

- **Frequency of use:** High (since they will use the system daily to manage activities)
- **Subset of functions used:** Activity management
- **Technical expertise:** Basic (should be able to use the user interface but he is not expected to have knowledge on data processing)
- **Privilege level:** Medium (should have access to only add and delete activities)
- **Educational level:** Medium (should have an undergraduate degree or should have undertaken a training related to his task)
- **Type of experience:** should be proficient in event management
- **Importance:** Activity Coordinators are critical in keeping the activity data up to date and assisting data collection

Most important user classes: SM and DIGM are really important for the system because they begin and run legacy and external analysis tasks .

Less important user classes: AC are very important for activity management, however, they are less important to the analytical target. AC requirements are important but not as much important as the SM and the DIGM`s requirements.

3. External Interface Requirements

3.1 User Interfaces

The BD25 Crowd Engagement System contains a Graphical User Interface (GUI) to allow Senior Staff Members (SM), Data and Information Group Members (DIGM) and Activity Coordinators (AC) to complete their assigned tasks. Below are the important aspects and component which the BD25 Crowd Engagement System`s GUI will contain:

- **Access control:** the GUI must ensure that each user must access features based on their role, for example the SM (Senior Staff Member) should have admin access, the DIGM (Data and Information Group Members) must have data collection and data processing privilege and the AC (Activity Coordinator) must only have access to activity management features.

- **GUI standards:** The GUI must follow the required standards, including the University of Bradford branding standard (making sure correct University of Bradford colour schemes are being used) and also the GUI must adhere to LSEPI standard and accessibility standards

- **Button standards:** Depending on the screen, a screen should have at least one button (Logout button). Depending on the screen, a screen could have a “Save”, “Add” or “Cancel” button as well, in addition to the “Logout” button.

- **Screen layout:** The GUI should contain a navigation bar, which should display all the interfaces the system contains, however, restrict the access to some of the interfaces, based on the “logged in” user role

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- **Error message standard:** The GUI should be displaying 2 kind of messages, depending on the severity of the error. If the error is not critical (such as a DIGM forgetting to attach a data file), then a pop up message will appear alerting the user about the mistake, however, if the error is critical (such as entering incorrect login information), then the GUI will display another pop up message, informing the user about the error and the pop up won`t disappear, unless the user press the “OK” button.

Below are some of the likely software components, which the GUI will contain. These software components will give a brief idea on what to expect on each screen, however, the actual software may include less or more content on each screen:

- **Activity Management Interface:** This interface will be accessed by the SM and AC only and it will have the purpose of enabling activity management and also allowing the SM to assign DIGM. This interface will likely consist of:
    1. Form with fields like activity ID, activity name, location, status, etc.
    2. Table with existing activity data but no images (for GDPR purposes)
    3. Buttons such as “Add Activity” and “Delete Activity”

- **User Management Interface:** This interface should only be visible to the SM and it should allow the SM to add or remove AC or DIGM users. The interface should have:
    1. Form with fields like “Name”, “ID” and “Role”
    2. Buttons such as “Add User” and “Remove User”
    3. Table with all user`s data but with no user password showing in user table in SM interface (due to GDPR purposes)

- **Data Collection Interface:** This interface should be accessed by the SM and DIGM and it should allow the DIGM to select the activity images (captured from drone or mobile phones) from their device and upload them to the correct activity. The interface should consist of:
    1. Activity table with all the activity data filled from the AC
    2. Form with fields like “Record ID”, “Label Image”, etc.
    3. File upload button
    4. Dropdown for selecting image source (internal or external)

4. System Features

There are many features (functional requirements) which the BD25 Crowd Engagement System will contain. All of these features will be used by the users to facilitate their tasks and also it will be used by the users to view each activity with the activity images, to maintain digital legacy of BD25 event, effectively. Below are the functional requirements for the system:

4.1 Activity Management

4.1.1 Description and priority

Description: This feature will enable the SM (Senior Staff Members), DIGM (Data and Information Group Members) and the AC (Activity Coordinators) to add and even delete a BD25 activity, as well as, it will enable the SM (Senior Staff Member) to assign a DIGM (Data and Information Group Members) to each activity, which will assist in planning the activity.
Priority: High
Reason for priority: The feature has a high priority as, if this feature is not present, there won`t be any support available for the AC (Activity Coordinators), as well as, not implementing this feature would mean that all the BD25 events won`t be managed by the system, leading to confusion and unproductivity.

4.1.2 Stimulus / Response Sequences

- When the Activity Coordinator (AC) will press the “Add Activity” button, after filling all the required fields of the form, then the system will append the activity to the table where all the activities will be present.
- When the Activity Coordinator (AC) press the “Delete Activity” button then the system, will ask the AC user to enter the event ID of the event they wish to delete, and if the event ID is present in the table, then the system will remove the activity from the table and update the activity table in all the other interfaces.
- When a Senior Staff Member (SM) navigate to the AC interface, he will see a field “DIG ID”, where he will enter the ID of the DIGL for that activity.
- When an Activity Coordinator (AC) will miss a required field (such as activity location), when adding the new activity, the system will show an error pop up message informing the user about the error.

4.1.3 Functional Requirement

1. The system should allow the AC (Activity Coordinator) to add a new activity, by filling all the required fields and upon successfully filling all the required fields for the new activity, the system should include the activity details on the activity table
2. The system should allow the AC to delete an activity and after doing so, the system should update the activity table across the whole system.
3. The system should allow the SM (Senior Staff Member) to assign a Data and Information Group Leader (DIGL) to each activity, by typing the DIGL`s ID number
4. The system should display an error message if a mandatory field is empty

4.2 User Management

4.2.1 Description and priority

Description: The user management feature in the BD25 Crowd Engagement System should allow the Senior Staff Member (SM) to add and delete users (DIGM and AC) from the system.
Priority: High
Reason for priority: Without the user management feature, the SM won`t be able to add or delete a user from the system, meaning that if done so, not only the system will prevent access to the new user (infringing GDPR and accessibility law), but it will also pose a big security risk, as the staff who should be deleted from the system, can still access the system and potentially he can try to exploit the system vulnerability, for cyber attack purposes. By allowing the implementation of this feature and restricting its access to only the Senior Staff Member (SM), we are ensuring that not only this feature allow the SM to fully complete their jobs, but we are also ensuring that normal users, can`t add or delete other users.

4.2.2 Stimulus / Response Sequences

- When the SM fill the required fields and click on “Add User” button, then the system will register the user and add their records to the users table
- The SM must not be able to view the login password of each user in the user table, to comply with the GDPR law.
- When the SM will press “Delete User” button, then the system will ask the user ID of the user who will be dismissed from the system and as soon as the correct user ID is provided, the system will remove the user from the system and update the user table.

4.2.3 Functional Requirements

1. The system should enable the SM to add a new user, if the SM have filled all the fields correctly
2. The system should provide role based access to each user (AC accessing Activity Management interface, SM accessing all the features, etc.)
3. The system should never show the login password of a user, in the user table in the SM interface, to ensure compliance with data protection law.
4. The system should allow the SM to delete a user by entering the ID of the user who will be deleted and then the system should update the users table and prevent the deleted user from logging in.

4.3 Data Collection

4.3.1 Description and priority

Description: The data collection feature in the BD25 Crowd Engagement System will enable the Data and Information Group Members (DIGM) to collect live event image data from physical devices (drones, etc.), then upload it to the system, via the file uploading feature in the system, to link the event to that image and to allow to store all of the images of an event, in a system generated folder, for that specific event.
Priority: High
Reason for priority: This feature is critical for the BD25 Crowd Engagement System, as since one of the main purpose of the system is to maintain digital legacy, implementation of this feature will allow the DIGM to upload the captured image data into the system and then the system will organize each event`s image to the relevant event`s folder, ensuring organized digital legacy is maintained.

4.3.2 Stimulus / Response Sequences

- When the DIGM uploads an image file, select the source (Internal or External) from the dropdown menu, add an image label, record ID, event ID and click on “Upload Image” button, then the system should show a pop up message asking if the user wants the image to be only uploaded to the activity tables, or if the user wants the image to be uploaded only on the folder of that activity or if the user wishes to upload the image to both, the correct folder of that activity and the activity table as well.
- When a field is left blank or incorrect event ID is entered and the user attempts to upload the image, the system will display a pop up message, alerting the user of his mistake.

4.3.3 Functional Requirements

1. The system should enable the DIGM to upload the image file from the device, running the system
2. The system should allow the DIGM to select the data source from the dropdown menu and add an image label, before uploading the data (image)
3. When the user have selected the image and filled the form correctly, the system should ask the user if he wants to upload the image to the activity table only, in the system, or if he wants to add the image to the folder of that activity or if he wants to achieve both.
4. Upon entering invalid activity ID or leaving a form field blank, the system should display an error message.

4.4 Reporting

4.4.1 Description and priority

Description: Like other features in the BD25 Crowd Engagement System, this feature is also very important for the BD25 Crowd Engagement System, as it allows the Senior Staff Members (SM) to store each activity data in a separate system (folder system), so that in case he wishes to prove to someone that BD25 event actually occurred in Bradford, he can do so easily, by showing the activity data allocated in the BD25 Crowd Engagement System and he can also show the images of each activity, by opening the folder of a specific activity.
Priority: High
Reason for priority: The main reason why I believe that the reporting feature is really important for the BD25 Crowd Engagement System is because it will enable the SM, to create digital legacy and it can be helpful to the City of Bradford council, to prove to the Government and to other councils, that BD25 event actually took place in Bradford.

4.4.2 Stimulus / Response Sequences

- When SM opens his interface, he should be able to view all the activities that have been added by the AC (Activity Coordinator) with the images uploaded by the DIGM (Data and Information Group Members), of each activity.

4.4.3 Functional Requirements

1. The system should allow the SM to view all the BD25 activities data including images of the activity as well.
2. The system should allow the SM to view all the user`s data as well, in his interface

5. UML Use Case Diagram

5.1 Use Case Diagram

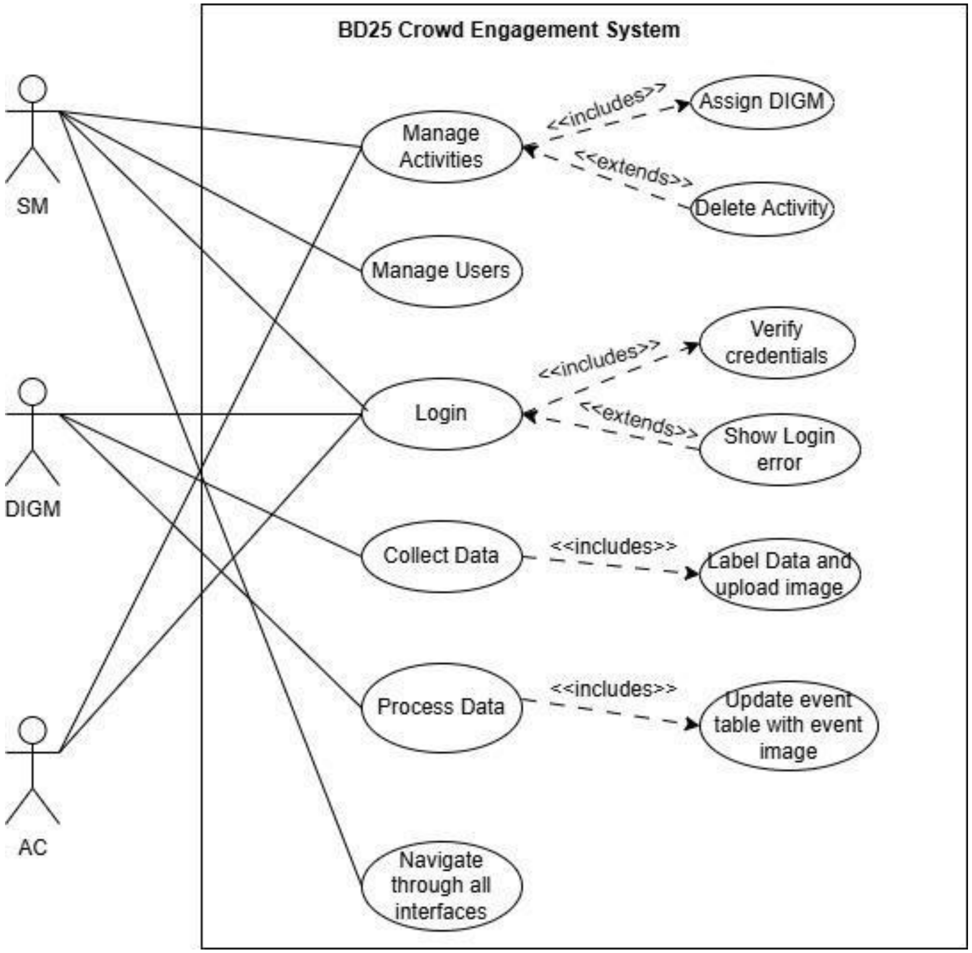


Figure 1 UML Use Case Diagram for BD25 Crowd Engagement System

Explanation of UML Use Case Diagram

The SM (Senior Staff Member) is linked with the "Manage Activities" use case, in the UML use case diagram above since the SM need to assign DIGM (Data and Information Group Members) to each activity. The "Manage Activities" use case have an include relationship with the "Assign DIGM" use case, as each activity should have a DIGM assigned to them. The "Manage Activities" use case have an extend relationship with the "Delete Activity" use case, as sometimes, an activity need to be deleted, but not all the time

The SM is interacting with the "Manage Users" use case, as only the SM, has the ability to add or remove users

The SM will need to interact with the "Login" as well, in order for the SM to log inside the system as SM (Senior Staff Member). The SM will need to enter the correct login credentials, which will be validated and if the login credentials are wrong, then login error will appear. The "Login" use case have an include type relationship with the "Verify credentials" use case, as every time the SM or any other user will log to the system, their login credentials will be checked. The "Login" use case have an extend relationship with the "Show Login error" use case, as not all the time the user will enter the incorrect login credentials.

The SM will be interacting with the "Navigate through all interfaces" use case, as he is the only user who is allowed to access all the interfaces in the system, without any restriction.

The DIGM (Data and Information Group Member) will interact with the "Collect Data" and "Process Data" use case, in order for him to complete his task. Additionally he will need to interact with the "Login" use case as well, where his credentials will be validated and an error message will show if the login credentials are incorrect. Both "Collect Data" and "Process Data" use cases have an include relationship, as every time we are collecting data, we must make sure the data (image) is labelled and uploaded to the system and as soon as the "Upload Event Image" button is pressed, the system will update the event table, by adding, additional to the event information, the event image.

The AC (Activity Coordinator) will interact with "Manage Activities" use case in order to complete his task as well as he will need to interact with the "Login" use case, for authentication purposes.

6. Other Nonfunctional Requirements

6.1 Performance Requirements

6.1.1 Data Collection Performance

Requirements: The system should process and store the uploaded image within 10 seconds
Rationale: DIGM requires quicker data uploading skill
Circumstances: During a normal BD25 event

6.1.2 Data Processing Performance

Requirements: The system should save the image label within 2 seconds
Rationale: Faster labelling make DIGM work more efficient
Circumstances: During peak hours the DIGM will have more tasks to deal with, making fast data processing, very useful for DIGM.

6.1.3 Activity Management Performance

Requirements: The system should save or update activity records within 5 seconds
Rationale: Responsive activity management interface required for better activity management
Circumstances: Before the event

6.1.4 Reporting Performance

Requirements: As soon as the activity table is modified from the AC interface, the system will immediately update the activity table across all the other interfaces
Rationale: Faster internet connection will help to achieve the requirement
Circumstances: During or after the event

6.1.5 Overall System performance

Requirements: The system should be able to handle up to 50 users
Rationale: It ensures scalability during big events
Circumstances: Peak event time

6.2 Data Risk / LSEPI

The BD25 Crowd Engagement System must ensure that it complies with the Legal, Social, Ethical and Professional Issues (LSEPI). This section discusses the LSEPI risks, their impact and it also provide some strategy to mitigate these risks.

6.2.1 Legal Issues

Risk:

- GDPR non-compliance (while capturing live data a person`s face maybe included, which if captured without consent, could lead to GDPR infringement)
- Drone regulation (flying a drone over a public place without consent would lead to infringement of UK CAA regulations)

Impact: Hefty fine or imprisonment or both and project suspension

Solution to the risks:

- Request permission from every event attendee
- Request permission from UK CAA

6.2.2 Social Issues

Risk:

- Privacy (visitors may view live footage (images) as intrusion to their privacy)
- Digital barrier (event attendees or community members who don`t have internet access, may not be included in the digital legacy)

Impact: Less attendees and community criticism

Solution to the risks:

- Make the crowd data anonymous
- Try to provide offline legacy system

6.2.3 Ethical Issues

Risk:

- No consent (attendees may not consent for their data to be stored in the system for digital legacy purposes)

Impact: Criticism from the attendees

Solution to the risks:

- Use an opt-out method (allowing attendees to opt out from data storing process via filling a physical form)

6.2.4 Professional issues

Risk:

- Incompetence from DIGM (for example incorrect image labelling)

Impact: Loss of academic integrity

Solution to the risks:

- Training the DIGM

6.3 Security Requirements

6.3.1 Data Privacy Requirements

Requirements: The system should make the individual data anonymous
Rationale: It protects attendee privacy

6.3.2 User Identity Authentication

Requirements: All the users must authenticate with the system by entering their login credentials in the login area
Rationale: It make sure that only authorized users can access the system

6.3.3 External Policies and Regulations

Requirements: It must ensure it complies with the UK CAA, GDPR and all other applicable regulations
Rationale: Ensure legal trouble is avoided

6.3.4 Security certifications

Requirements: It should ensure it follows and adhere to ISO/IEC 27001 certification
Rationale: Make sure that basic security is implemented

6.4 Data and Information Description

6.4.1 Data Entities and Attributes

Activity

- Description: BD25 event activity (e.g., RISE).
- Attributes:
  - Event ID (text, 10 chars, e.g. ACT-001)
  - Name (text, 50 chars, e.g. “RISE”)
  - Format (dropdown: Workshop, Performance, Other)
  - Location (text, 100 chars, e.g. “Centenary Square”)
  - Status (dropdown: Active or Cancelled)
  - DIG ID (text, links to DIG)

User

- Description: System user (SM, AC, DIGM).
- Attributes:
  - User ID (text, 10 chars, e.g., USR-001)
  - Name (text, 50 chars, e.g., “Roger Blue”)
  - Role (dropdown: SM, AC, DIGM)
  - ID Number (text, 8 digits, e.g. “12345678”)
  - Password (text, 255 digits, e.g. "ac1234”)
  - Status (dropdown: Active, Inactive)

Data Record

- Description: Captured event image data
- Attributes:
  - Record ID (text, 10 chars, e.g., REC-001)
  - Image Label (text, 200 chars, e.g., “Crowd at the Giraffes”)

    - Event ID (text, links to Activity)
    - Source (dropdown: Internal, External)

6.4.2 Relationships

- Activity and Data Record: 1-to-Many (via Activity ID)
- User and Activity: Many-to-1 (via Assigned DIG ID)
- Data Record: Many-to-Many

6.4.3 Data Management

- Storage: folder based storage (each activity image stored on the correct activity folder)
- Access: Role-based
- Image source, image label and folder based image sorting are added in the system for easier data management.

Software Design Document (SDD)

1 Introduction

1.1 Purpose:

The purpose of this Software Design Documentation is to describe the architecture and system design of a software which will manage and analyse the engagement level of the crowd for each BD25 activity while creating a digital legacy for tourists and participants.

1.2 Scope:

The main scope of the software is to manage information related to BD25 activities, support the DIG in data capture through drones and cameras, provide user-specific access, maintain secure and accurate storage of data, and ensure compliance of LSEPI guidelines. The goals consist of providing a user interface to manage the BD25 activities and participant records, a collection of data workflow. Enable the DIG members to label data, include machine learning models which would be used for crowd engagement metrics, and ensure secure data storage and retrieval.

1.3 Overview:

The document will present the development of an information system which will be used to manage crowd engagement and activities for BD25 as mentioned previously. The document will include which design the system will use, how the design will work, and the functionality of it. In addition to this the documentation will consist of a system overview, system architecture, data design, component design, and human interface design.

Roles and responsibilities amongst the organisation:
The management of the crowd engagement is carried out by the Senior staff members (SM) as well as the activity coordinators (AC). The role of the AC is to manage a list of activities which can be updated for example a new activity can be added to the list, or an activity can be removed. Each activity is provided a Data and information group (DIG) which is led by an academic leader (DIGL). The role of the DIGL is to collect data and store it. The DIG has access to drones and cameras which enables them to capture the required information.

2 System Overview:

The system will provide several functionalities such as:

- User interface access: This will enable only role-based access to the system for example, it will only enable the SM, AC, DIGL, and possibly stakeholders to access the system and view it. However, the DIGL will be restricted access to the AC's interface similarly the AC will be restricted access to the DIGLs interface.
- Activity management: This will enable the Activity Coordinators (AC) to add new, update, remove, or cancel the activities at BD25.
- Data collection and storage: This will support the procedure of data capture through drones, cameras, etc and store them in an organised/categorised method.
- Data labelling and processing: This will enable the Data and Information group (DIG) to label and process the data they have collected.
- User enrolment and management: This will enable users to register for activities, resulting in more data for the DIGM.
- LSEPI: A functionality of the system will be to ensure that Legal, Social, Ethical, and Professional issues are complied with. Such as the correct handling, usage, and protection of data.

Context:

BD25 is an initiative focused on increasing participation in different cultures and communities. The functionalities above briefly describe a system which will be used for BD25 with the purpose of tracking and evaluating activities while managing crowd engagement analysis through data collection. The proposed system above aligns with the BD25 standards and criteria.

Design:

The design of the system goes as briefly described below:

User roles and accessibility:

- Senior Management: The SM role is to oversee all activity and ensure that the compliance with LSEPI is consistent throughout the event.
- Activity Coordinators: The AC's role is to manage activities and add or remove participants to the activities.
- Data and Information Group Leaders: The DIGLs role is to oversee the collection of data and its processing.
- Data and Information Group Members: The DIGMs role is to collect data, label/organise the data, and then to process it.

Data Management and processing:

1. The AC's add activities and then assign available DIGs to them.
2. The data is collected and captured live through videos, audios, and images.
3. The data collected is then securely and safely stored in organised folders.
4. The members of the DIG then label and pre-process the data.

3 System Architecture:

3.1 Architectural design: - Provide a diagram showing the major subsystems and data repositories and their interconnections

The java program will consist of a three layer/tier architecture design. These layers are, the GUI layer, the Logic and manipulation layer, and the Database layer.

GUI layer:

The GUI layer is the user interface of the system and acts as a point of interaction for its various users such as the AC, DIGL, and SM.

Functions & responsibilities:

- Display the system outputs (available activities for BD25)
- Collect and label data through user input, such as registration
- Allow members to manage assigned activities
- Useability and accessibility

How it works:

1. The user can interact with the system by logging in
2. The input and requests are sent to the Logic and manipulation layer
3. The results are then provided to the user
4. GUI layer → Logic and Manipulation Layer → Database Layer

Business and logic layer:

The business layer is essentially the processing unit for the system and acts as a bridge between the GUI and the database layers. It simply enforces rules and manages the interactions between the GUI and database.

Functions & responsibilities:

- Implement LSEPI checks during data collection and storage to enforce correct guidelines
- Coordinate the GUI and database layers
- Manage workflow of data collection
- Manage activity records

How it works:

1. Layer receives the requests & inputs from GUI
2. Processes the requests & inputs via validation and business rule checks

3. Interacts with the database layer to store or retrieve any data
4. Returns the data to the GUI layer and presents it

Database layer:

The database layer's role is simply to store any data collected safely so that it can be managed, manipulated, and retrieved at any moment. The database layer must always stay secure as it will contain valuable information. The data collected and stored in the database can consist of user information, client information, activity information, machine learning outputs, and a lot more. Therefore, it is arguably one of the more important layers in the 3-tier architecture system.

Functions & responsibilities:

- Store data securely and accurately
- Retrieve data
- Ensure and preserve the data's integrity and consistency
- Manage user records, captured data (crowd engagement), and information on various activities

How it works:

1. Accepts incoming commands from the logic and manipulation layer
2. Stores data in appropriate ways, providing organisation, simplicity, and ease
3. Provide results to the command received

Relationship between 3-teir architecture system:

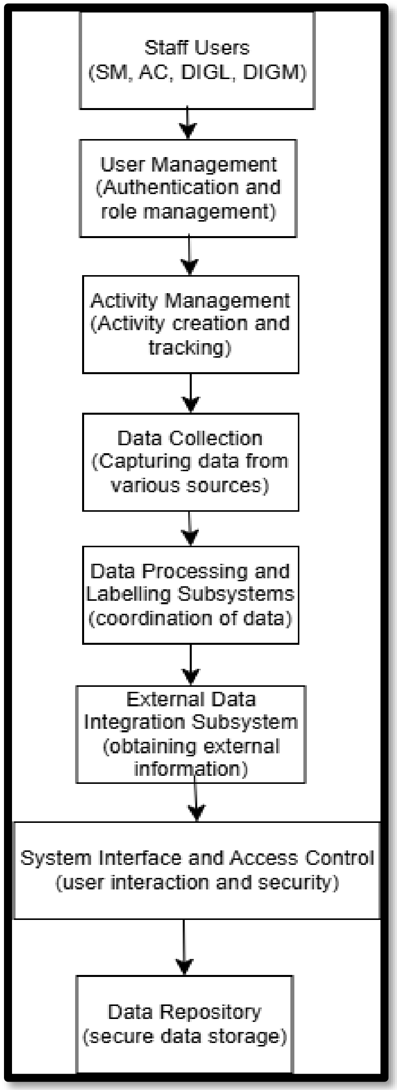
The system works by initially sending user requests from the GUI layer to the business layer. The logic layer receives the request and processes it. From here the layer queries the database layer for stored data. This is then recorded as new data. The database responds by providing the requested data in the command/queries. From here the logic/business layer delivers the information to the GUI layer and it is then displayed to the user.

For example, when the Activity Coordinator creates an activity. Once this is acknowledged by the system, the status of the activity is updated. The business layer communicates with the database and the activity is recorded appropriately to allow DIGM assignment.

The GUI layer only consists of handling the interaction from users and does not have access to the database outside the use of the business layer. This layer only processes the information/data it has received from the GUI and passes it to the database (acting as a bridge). The database only provides secure storage or retrieval of data to the business layer after receiving its command. The modularity of each layer in the 3-tier architecture provides security as well as maintenance, thus enhancing the system.

3.2 Decomposition description:

Top level data flow diagram:


Staff Users (SM, AC, DIGL, DIGM)
User Management (Authentication and role management)
Activity Management (Activity creation and tracking)
Data Collection (Capturing data from various sources)
Data Processing and Labelling Subsystems (coordination of data)
External Data Integration Subsystem (obtaining external information)
System Interface and Access Control (user interaction and security)
Data Repository (secure data storage)

Top Level Data Flow Diagram

Structural decomposition of subsystems:

User Management Subsystem: Handles user authentication and authorization, manages the user roles and rights of access/restriction, stores credentials securely.

Activity Management Subsystem: Enables the AC to create, edit, or cancel activities, assigns DIGM to activities.

Data Collection Subsystems: Captures data using various sources for example, cameras, drones, audios, phones. Ensures data is stored securely and organised via folders.

Data Processing & Labelling Subsystem: Labelling of collected data, ensures correct compliance of LSEPI.

System Interface: User-friendly interface for different role, role-based access control.

Data Repository: Stores collected data securely, data retrieval, backup mechanisms for the maintenance of data.

3.3 Design Rationale:

The 3-tier architecture was chosen because of its ability to provide a scalable, modular, structured framework which enables us to meet the BD25 Information Systems requirements.

One key reason for using this design was because it enables each layer to have a distinct role in the system, ultimately making it less complex and easier to manage, maintain, and develop. In addition to this the separation of each layer enables easier debugging and better performance. Another reason as to why this design was used was because it does not enable a direct passage to the database. This protects valuable information such as user information and member details from unofficial and prohibited users. Another security benefit that is provided through this design is the constant processing and regular check of data. These checks ensure that the LSEPI guidelines are followed effectively.

Alternative designs were initially considered, such as monolithic architecture and client-server architecture, however, they weren't finalised due to certain reasons. For example, the issue with the monolithic architecture design is that it is harder to maintain over time making it more difficult and complex. The reason as to why the client-server architecture design isn't used is because it made processing the data a little more difficult which made it challenging to perform LSEPI compliance checks.

In conclusion, the 3-tier architecture was more appropriate and well rounded than the others as it presented a more stabilized approach in terms of simplicity, complexity, security, maintenance, and future extensions all while staying in check with the needs of the client and BD25 stakeholders.

4 Data Design

4.1 How data is stored

Image data storage

When using the system software, the data and information group members (DIGM) can store an uploaded image using their interface, when uploading the image, it will only be stored as "temporary memory" as it will be lost when the system closes. However, if they want to permanently store the file image somewhere, the DIGM can choose the "Activity" folder which will allow the image to be stored permanently without any risk of it being wiped from the data. The "activity folder" when selected, contains a images folder with sub-folders named after each activity, this allows the DIGM to easily navigate through all images organised by event making it easy to find the correct images.

User data storage

The system software already contains four coded users which will always be available. Any new users which are added to the system software will only be stored temporarily and will be removed once the system software closes. The four roles can only be seen if the person is using the SM interface which is the admin interface.

Activity storage data

Activities added to the system are temporary which means that once the system closes the data with the activities will also be lost. User's can create how many activities they wish using the "AC interface" (activity coordinator) however once the system closes they will need to re-enter the activities details in order for them to be seen in the system software.

4.2 Data Dictionary and Class Diagram

Main Class

Attributes:

- users: ArrayList (static, private)
- activities: ArrayList (static, private)
- dataRecords: ArrayList (static, private)
- frame: JFrame (static, private).
- currentUser: User (static, private)

- DARK_GREEN: Color (static, private, final)

Methods:

- main(String[] args): void (static)
- showLoginInterface(): void (static, private)
- authenticate(String idNumber, String password): User (static, private)
- createNavigationMenu(): JMenuBar (static, private)
- showACInterface(): void (static, private)
- showDIGMInterface(): void (static, private)
- showSMInterface(): void (static, private)
- findActivity(String activityID): Activity (static, private)

User Class

Attributes:

- userID: String (private)
- name: String (private)
- role: String (private)
- idNumber: String (private)
- password: String (private)
- status: String (private)

Methods:

- User(String userID, String name, String role, String idNumber, String password, String status)
- getUserID(): String

- getName(): String
- getRole(): String
- getIDNumber(): String
- getPassword(): String
- getStatus(): String

Activity Class

Attributes:

- activityID: String (private)
- name: String (private)
- format: String (private)
- location: String (private)
- status: String (private)
- assignedDIGID: String (private)
- imagePath: String (private)
- source: String (private)

Methods:

- Activity(String activityID, String name, String format, String location, String status, String assignedDIGID, String imagePath)
- getActivityID(): String
- getName(): String
- getFormat(): String

- getLocation(): String
- getStatus(): String
- getAssignedDIGID(): String
- getImagePath(): String
- getSource(): String
- setImagePath(String path): void
- setSource(String source): void

DataRecord Class:

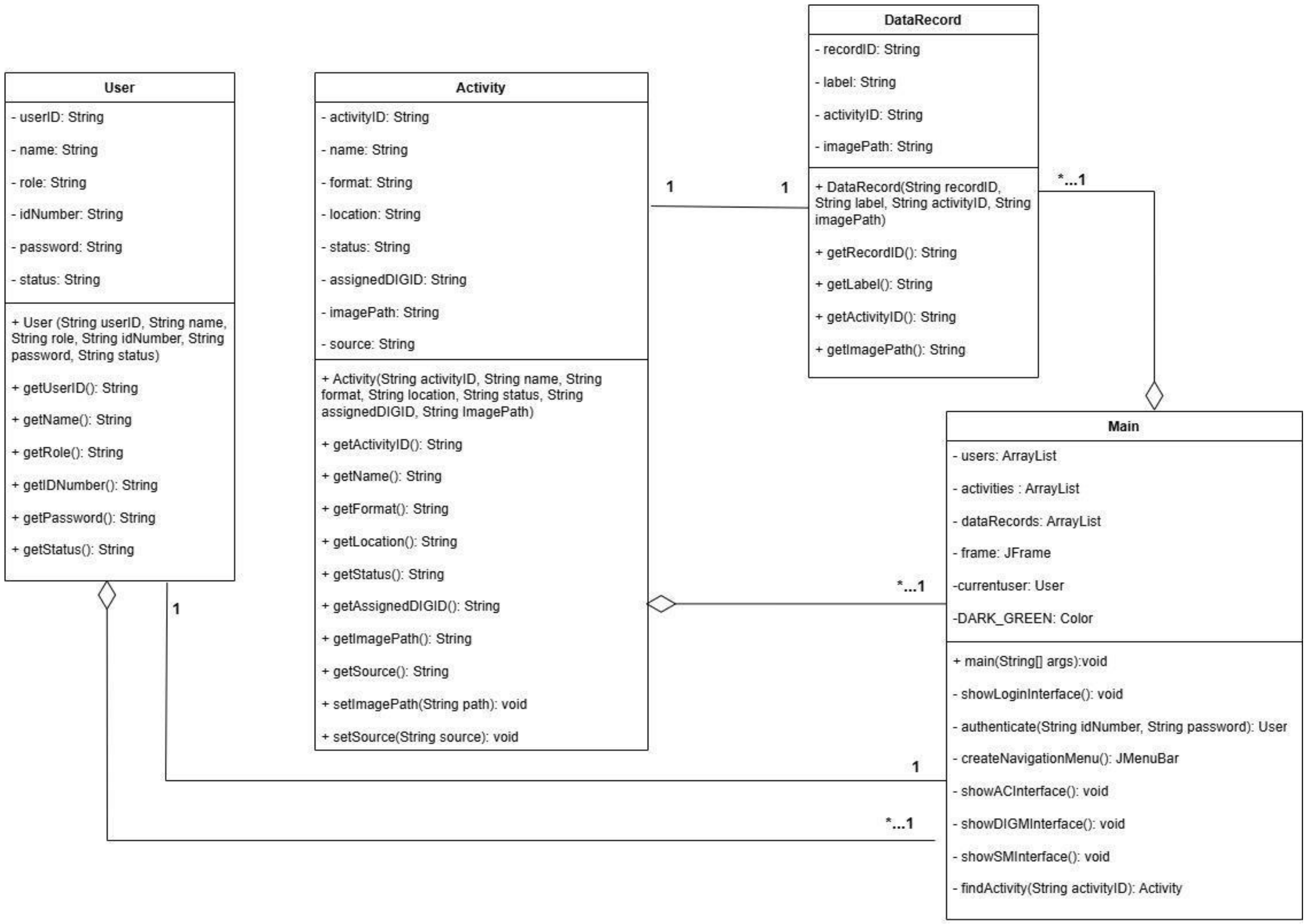
Attributes:

- recordID: String (private)
- label: String (private)
- activityID: String (private)
- imagePath: String (private)

Methods:

- DataRecord(String recordID, String label, String activityID, String imagePath)
- getRecordID(): String
- getLabel(): String
- getActivityID(): String
- getImagePath(): String

Class Diagram:



Class Diagram for BD25 Crowd Engagement System

5.0 Component Design

PsuedoCode for the user class

Get user ID

```
-FUNCTION getUserID()
RETURN userID()
END FUNCTION
```

getName()

```
-FUNCTION setName()
RETURN name
END FUNCTION
```

setName(name)

```
FUNCTION setName(name)
SET this.name = name
END FUNCTION
```

getRole()

```
FUNCTION getRole()
RETURN role
END FUNCTION
```

getIDNumber()

```
FUNCTION getIDNumber()
RETURN IDnumber
END FUNCTION
```

getStatus()

```
FUNCTION getStatus()
RETURN status
END FUNCTION
```

SetStatus(status)

```
FUNCTION setStatus(status)
SET this.status = status
END FUNCTION
```

Activity class Psuedocode

```
GetActivityID()
FUNCTION getActivityID()
RETURN activityID
END FUNCTION

GetName()
FUNCTION getname()
RETURN name
END FUNCTION

GetFormatID()
FUNCTION getformat()
RETURN format
END FUNCTION

Getlocation()
FUNCTION getlocation()
RETURN location
END FUNCTION

getstatus()
FUNCTION getstatus()
RETURN status
END FUNCTION

GetAssignedDIGI()
FUNCTION getAssignedDIGIID()
RETURN assignedDIG
END FUNCTION

getImagePath()
FUNCTION getImagePath()
END FUNCTION

setImagePath(imagepath)
FUNCTION setImagePath(imagepath)
SET this.imagepath = imagepath
END FUNCTION
```

DataRecord class Pseudocode

```
GetRecordID()
FUNCTION getrecordID()
RETURN recordID
END FUNCTION

getLabel()
FUNCTION getLabel()
RETURN label
END FUNCTION

getactivityID()
FUNCTION getActivityID()
RETURN activityID
END FUNCTION

getImagepath()
FUNCTION getImagepath()
RETURN Imagepath
END FUNCTION

getTimestamp()
FUNCTION getTimestamp()
RETURN timestamp
END FUNCTION
```

Main class pseudo-Code

```
Main()
Function main(args)
CALL showloginInterface()
END FUNCTION

-showloginInterface()
FUNCTION showLoginInterface()
DISPLAY login form
IF user submits credentials THEN
CALL authenticate (idnumber, password)
END IF
END FUNCTION

-Authenticate (ID number, password)
FUNCTION authenticate (idnumber, password)
SEARCH for user in system
IF user exists AND password matches THEN
RETURN user object
ELSE
DISPLAY “Invalid credentials”
RETURN NULL
END IF
END FUNCTION

createNavigationMenu()
FUNCTION createnavigationMenu()
CREATE menu for different user roles
RETURN MenuBar object
END FUNCTION

showAcinterface()
FUNCTION showinterface()
DISPLAY interface for Activity coordinator (AC)
ALLOW managing activities
END FUNCTION

ShowDIGMinterface()
FUNCTION showDIGMInterface()
DISPLAY the interface for the data information group members
END FUNCTION

showSMinterface()
FUNCTION showSMinterface()
DISPLAY interface for senior management (SM)
ALLOW reviewing activites and engagement reports
END FUNCTION

findActivity(activityID)
FUNCTION findActivity(activityID)
SEARCH activity list for matching activityID
IF found THEN
```

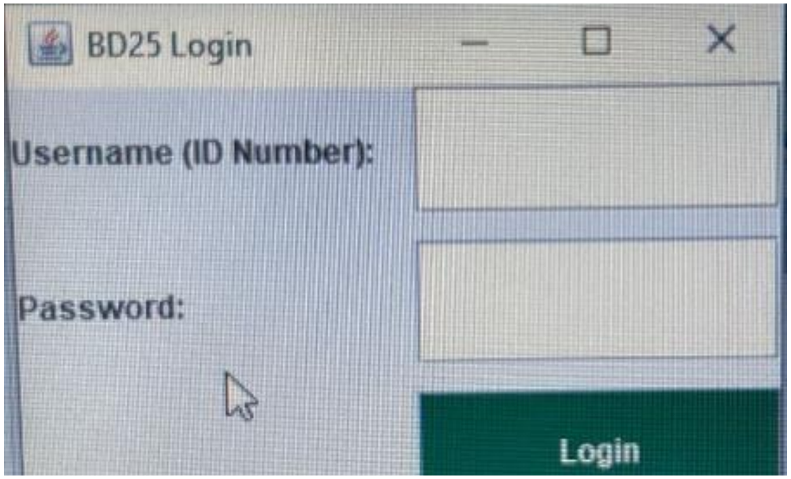
```
RETURN Activity object
ELSE
RETURN NULL
END IF
END FUNCTION
```

6 Human Interface Design

6.1 Overview of User Interface, 6.2 Screen Images and 6.3 Screen Objects and Action

Login interface

The **BD25 Login System** is a simple authentication interface that allows users to securely log in using their **Username (ID Number)** and **Password**. To use the system, the user first launches the **BD25 Login** application on their computer, which opens a small login window with two input fields: **Username (ID Number)** and **Password**. The user then enters their **Username (ID Number)** in the first text box and their **Password** in the second text box. After filling in both fields, they click the **"Login"** button, prompting the system to process the login request by verifying the provided credentials. If the credentials are correct, the system grants access and redirects the user to the main system or dashboard. However, if the credentials are incorrect, an error message may be displayed, such as **"Invalid Username or Password," "User not found,"** or **"Incorrect Password. Try again."** In such cases, the user must re-enter the correct details to attempt logging in again.



Login Interface from BD25 Crowd Engagement System

Navigation bar

The navigation bar consists of four interfaces which are

- Senior Staff interface
- DIGM interface
- Activity coordinator interface

Senior Staff Member Interface

The **Senior Staff Member Interface** is responsible for **adding and removing members** within a system. This interface provides administrators with the ability to manage user accounts by assigning roles, setting statuses, and maintaining user records.

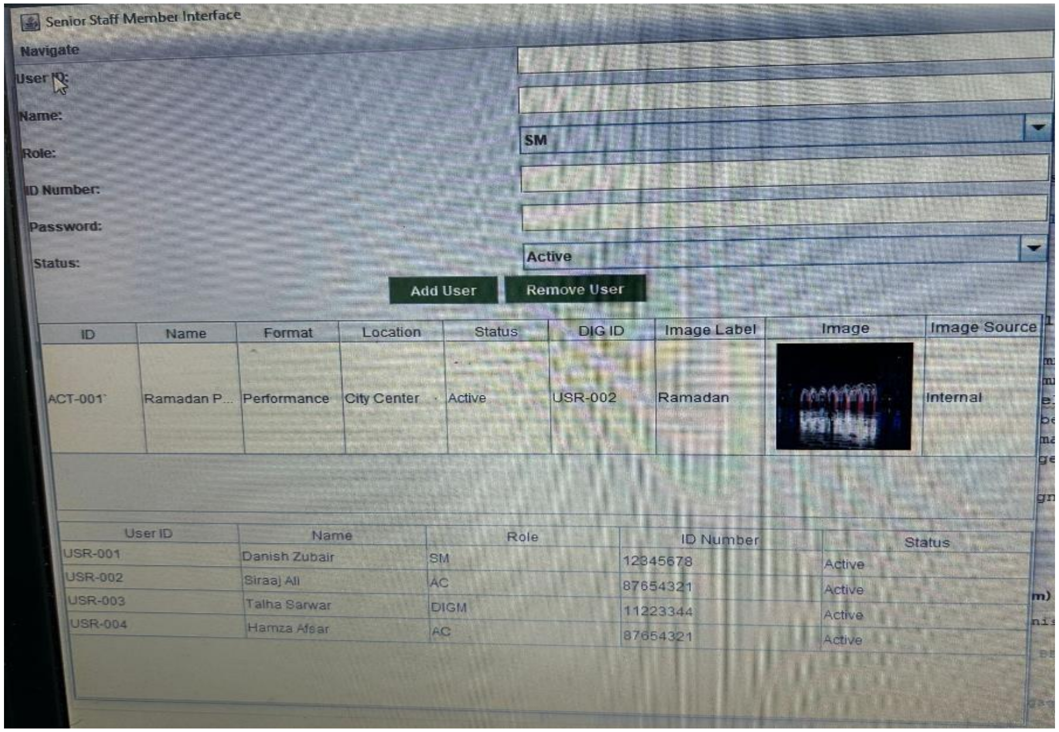
At the top, there is a **user management form** with labeled fields for entering a **User ID, Name, Role, ID Number, Password,** and **Status**.

- **User ID:** A unique identifier for each user.
- **User ID:** A unique identifier for each user.
- **Role:** A dropdown menu with predefined roles (e.g., "SM" for Senior Member).
- **ID Number:** A field for entering the user’s identification number.
- **Password:** Likely used for setting or updating a user’s password.
- **Status:** A dropdown menu with options like **"Active"** to define the user’s account status.

Below these fields, there are two main buttons: **"Add User"** to register a new member and **"Remove User"** to delete an existing one.

The lower section contains a **user table**, which displays a list of registered members with columns for **User ID, Name, Role, ID Number,** and **Status**. The table currently lists four users, all marked as **Active**, with roles such as **SM (Senior Member), AC,** and **DIGM**.

This interface is designed for efficient **user account management**, enabling administrators to keep records up to date by adding new members and removing those who are no longer needed.



User ID:	
Name:	
Role:	SM
ID Number:	
Password:	
Status:	Active

ID	Name	Format	Location	Status	DIG ID	Image Label	Image	Image Source
ACT-001`	Ramadan P...	Performance	City Center	Active	USR-002	Ramadan		Internal

User ID	Name	Role	ID Number	Status
USR-001	Danish Zubair	SM	12345678	Active
USR-002	Siraaj Ali	AC	87654321	Active
USR-003	Talha Sarwar	DIGM	11223344	Active
USR-004	Hamza Afsar	AC	87654321	Active

Senior Staff Member (SM) Interface in BD25 Crowd Engagement System

DIGM (Data and Information Group Member) Interface

The **DIGM Interface** is designed to allows the DIGM users to **upload images related to an event** . It provides fields for entering **Record ID, Image Label,** and **Event ID**, ensuring that each uploaded image is properly categorized and linked to the correct event. The **"Upload Event Image"** button enables users to select and upload an image to the system. After pressing this button, the DIGM user will receive a pop-up message, asking if you want to upload the image to the table within the system or to the folder of that event, stored in the same folder as the system. The last options given in the pop-up is the "BOTH" which simply uploads the image to the table and inside the folder of that event

Below this, a **data table** is present with columns such as **ID, Name, Format, Location, Status, DIG ID,** and **Image**, which likely displays a list of previously uploaded images along with their details.

This interface serves as a **digital image management tool**, helping users efficiently store and track event-related images within the system.

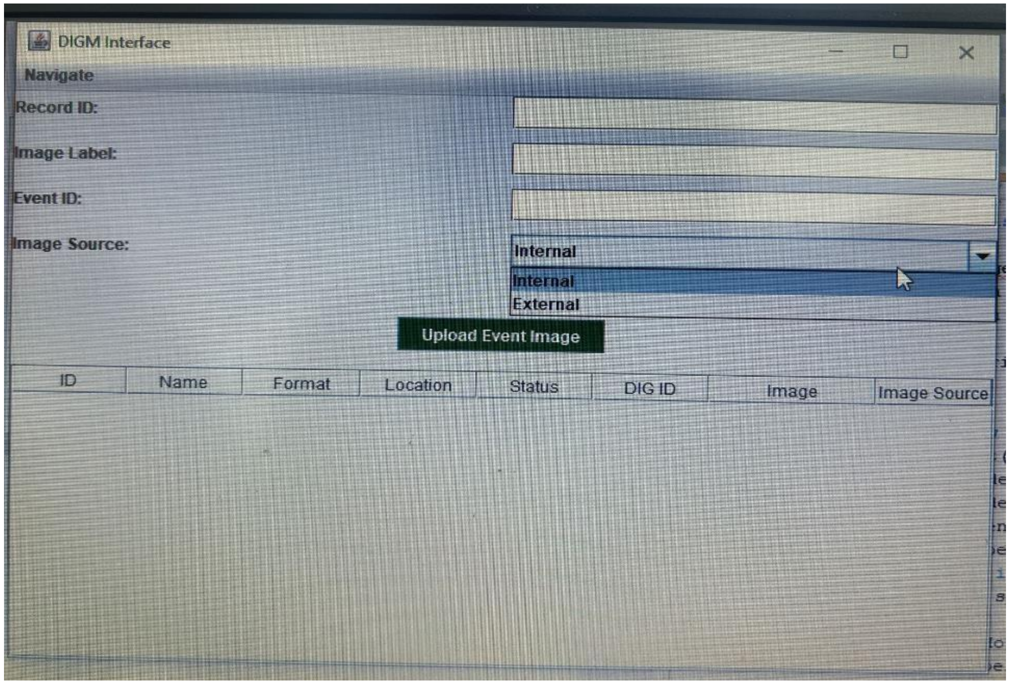


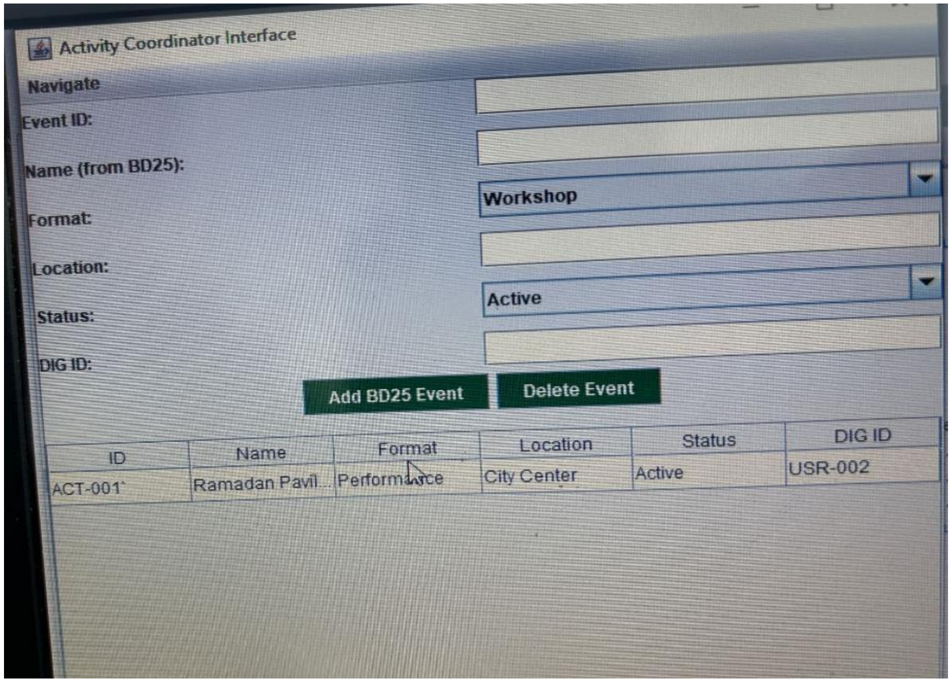
Image Source: Internal

Data and Information Group Member (DIGM) Interface from BD25 Crowd Engagement System

Activity Coordinator Interface

The **Activity Coordinator Interface** is designed to allow users to **manage BD25 events** by adding or deleting them. It includes fields for entering **Event ID, Name (from BD25), Format, Location, Status,** and **DIG ID**, ensuring that each event is properly categorized and stored in the system.

Users can select the **event format** from a dropdown menu, such as "Workshop," and set the **status** (e.g., Active). The interface provides two primary functions: **"Add BD25 Event"** to register a new event and **"Delete Event"** to remove an existing one. Below these buttons, a **data table** displays event details, including **ID, Name, Format, Location, Status,** and **DIG ID**, likely showing a list of previously added events.



Event ID:

Name (from BD25):

Format: Workshop

Location:

Status: Active

DIG ID:

ID	Name	Format	Location	Status	DIG ID
ACT-001	Ramadan Pavil...	Performance	City Center	Active	USR-002

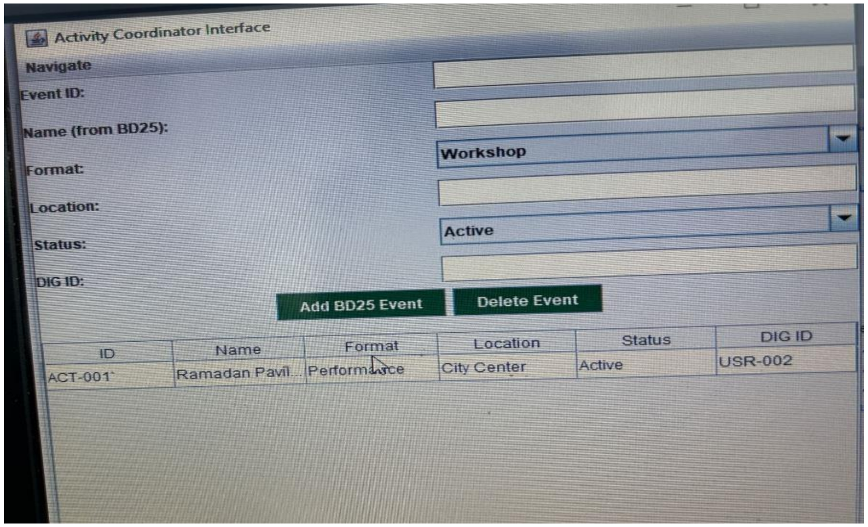
Activity Coordinator Interface in BD25 Crowd Engagement System

7. Requirement Matrix:

Activity Manager

Functional Requirement

1. The system should allow the AC (Activity Coordinator) to add a new activity, by filling all the required fields and upon successfully filling all the required fields for the new activity, the system should include the activity details on the activity table.



Event ID:

Name (from BD25):

Format: Workshop

Location:

Status: Active

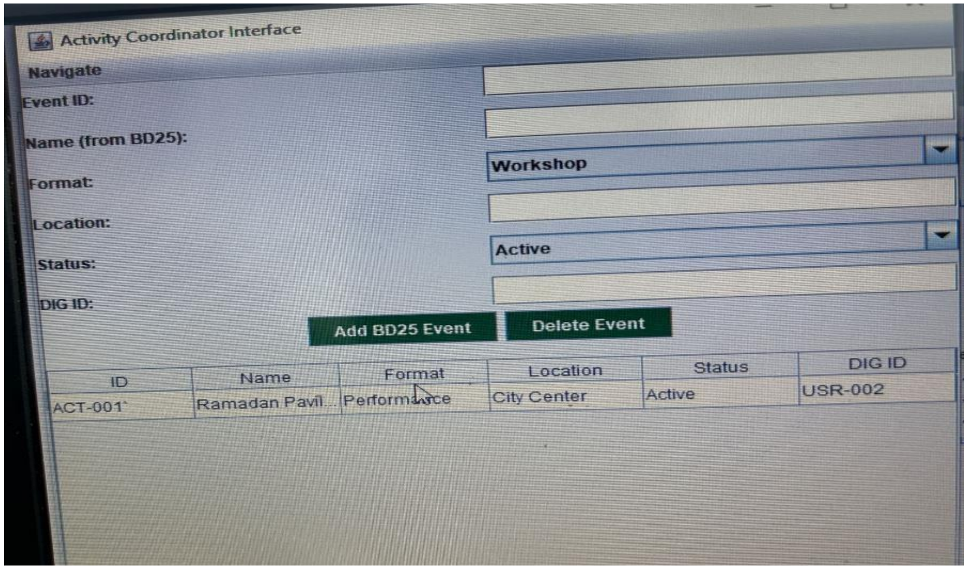
DIG ID:

ID	Name	Format	Location	Status	DIG ID
ACT-001`	Ramadan Pavil...	Performance	City Center	Active	USR-002

Activity Coordinator Interface in BD25 Crowd Engagement System

As seen above the AC(Activity Coordinator) is able to add new BD25 event when all fields has been filled up. For this case the event Ramadan pavillion was added by the activity coordinator.

2. The system should allow the AC to delete an activity and after doing so, the system should update the activity table across the whole system. The AC (Activity Coordinator) is also able to delete an event using the "Delete Event button" when it no longer needed in the system or when the activity has passed



Event ID:

Name (from BD25):

Format: Workshop

Location:

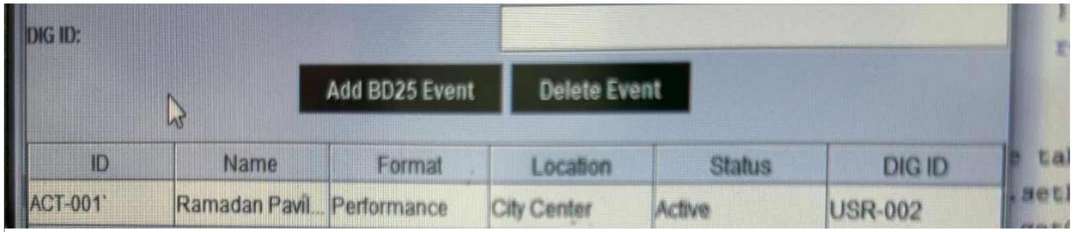
Status: Active

DIG ID:

ID	Name	Format	Location	Status	DIG ID
ACT-001`	Ramadan Pavil...	Performance	City Center	Active	USR-002

Activity Coordinator Interface in BD25 Crowd Engagement System

3. The system should allow the SM (Senior Staff Member) to assign a Data and Information Group Member (DIGM) to each activity, by selecting the DIGM`s ID number



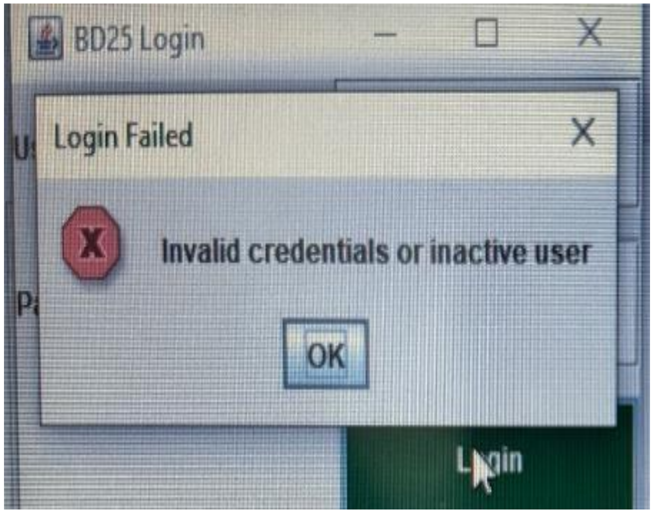
DIG ID:

ID	Name	Format	Location	Status	DIG ID
ACT-001`	Ramadan Pavil...	Performance	City Center	Active	USR-002

Activity Coordinator Interface in BD25 Crowd Engagement System

4. The system should display an error message if a mandatory field is empty

   The system displays the error pop-up message shown below, when an incorrect username or password is entered, which has not been registered by the senior staff member.



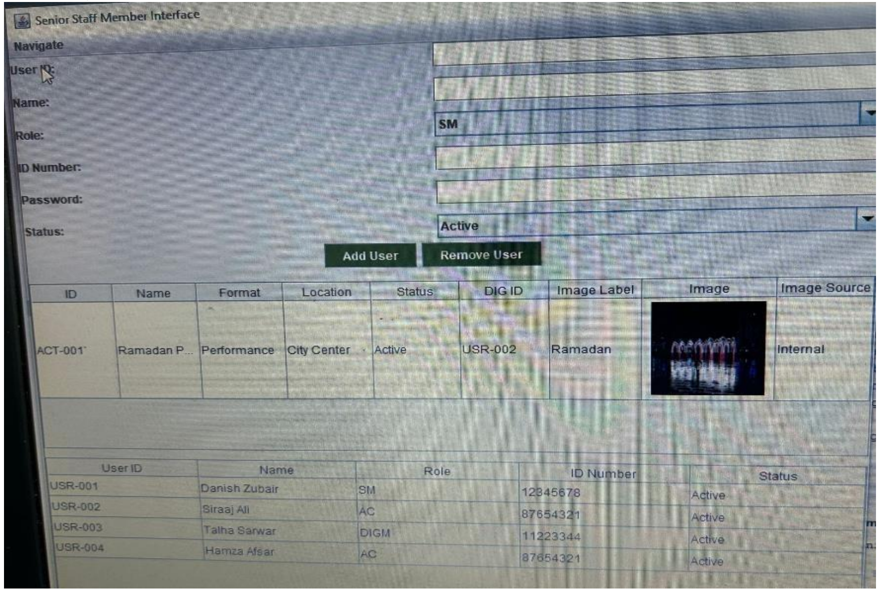
Invalid credentials or inactive user

Login Interface in BD25 Crowd Engagement System

USER MANAGEMENT

Functional Requirements

1. The system should enable the SM to add a new user, if the SM have filled all the fields correctly.
   This field enables the staff member to add new users, using their details, the SM interface is the only field where new users can be added to the system



User ID:

Name:

Role: SM

ID Number:

Password:

Status: Active

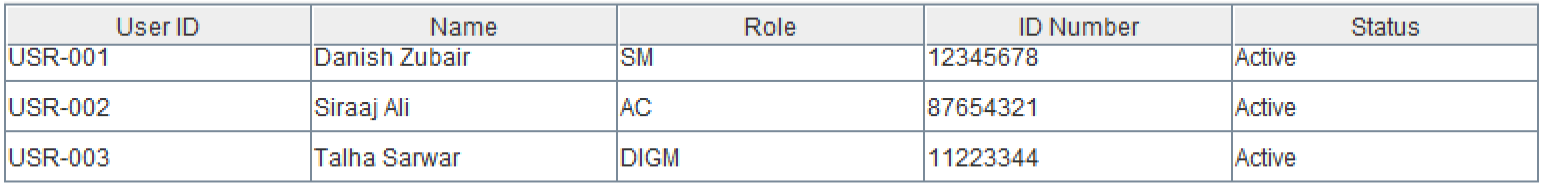
ID	Name	Format	Location	Status	DIG ID	Image Label	Image	Image Source
ACT-001	Ramadan P...	Performance	City Center	Active	USR-002	Ramadan		Internal

User ID	Name	Role	ID Number	Status
USR-001	Danish Zubair	SM	12345678	Active
USR-002	Siraaj Ali	AC	87654321	Active
USR-003	Talha Sarwar	DIGM	11223344	Active
USR-004	Hamza Afsar	AC	87654321	Active

Senior Staff Member Interface in BD25 Crowd Engagement System

2. The system should provide role based access to each user (AC accessing Activity Management interface, SM accessing all the features, etc.)

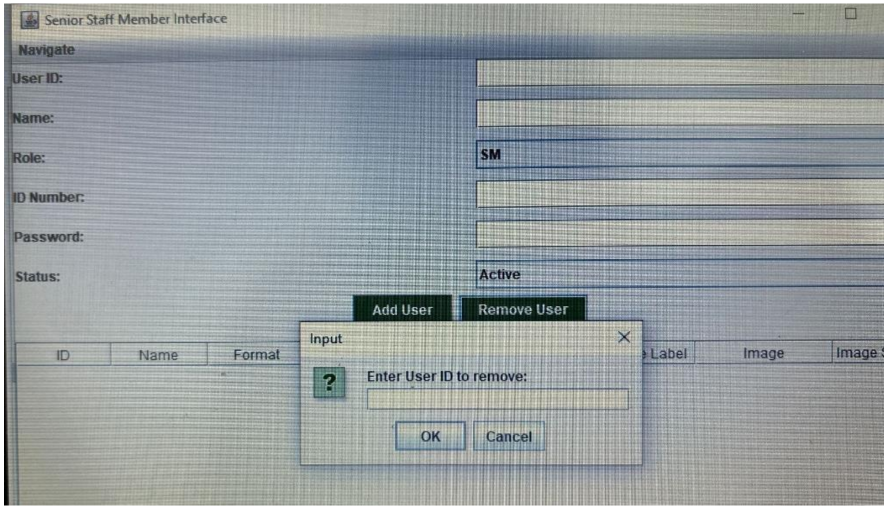
3. The system should never show the login username, in the user table in the SM interface,and the password is not showed for security reason to ensure compliance with data protection law.



User ID	Name	Role	ID Number	Status
USR-001	Danish Zubair	SM	12345678	Active
USR-002	Siraaj Ali	AC	87654321	Active
USR-003	Talha Sarwar	DIGM	11223344	Active

User table in Senior Staff Member Interface in BD25 Crowd Engagement System

4. The system should allow the SM to delete a user by entering the ID of the user who will be deleted and then the system should update the users table and prevent the deleted user from logging in.



User ID:
Name:
Role: SM
ID Number:
Password:
Status: Active

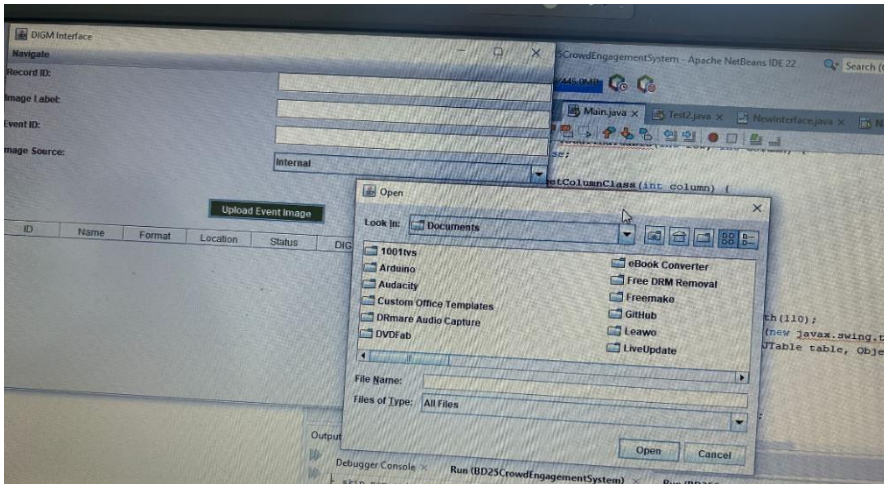
Enter User ID to remove:

Senior Staff Member Interface in BD25 Crowd Engagement System

DATA COLLECTION:

Functional Requirements

1. The system should enable the DIGM to upload the image file from the device, running the system



Record ID:
Image Label:
Event ID:
Image Source: Internal

Look In: Documents

1001tvs
Arduino
Audacity
Custom Office Templates
DRmare Audio Capture
DVDFab
eBook Converter
Free DRM Removal
Freemake
GitHub
Leawo
LiveUpdate

File Name:
Files of Type: All Files

```
etColumnClass(int column) {
th(110);
(new javax.swing.t
JTable table, Obje
```

Data and Information Group Member (DIGM) Interface in BD25 Crowd Engagement System

2. The system should allow the DIGM to select the data source from the dropdown menu and add an image label, before uploading the data (image)

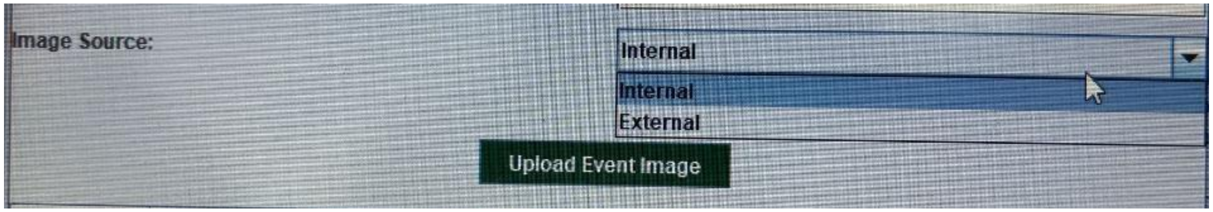
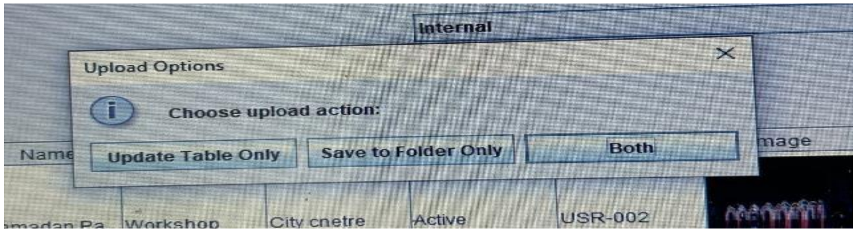


Image Source: Internal

DIGM Interface in BD25 Crowd Engagement System

3) When the user have selected the image and filed the form correctly, the system should ask the user if he wants to upload the image to the activity table only, in the system, or if he wants to add the image to the folder of that activity or if he wants to achieve both.



Upload Options

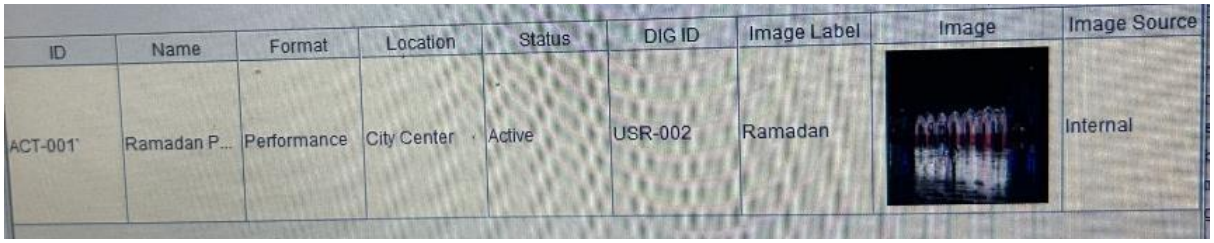
Choose upload action:

DIGM Interface in BD25 Crowd Engagement System

REPORTING

Functional Requirements

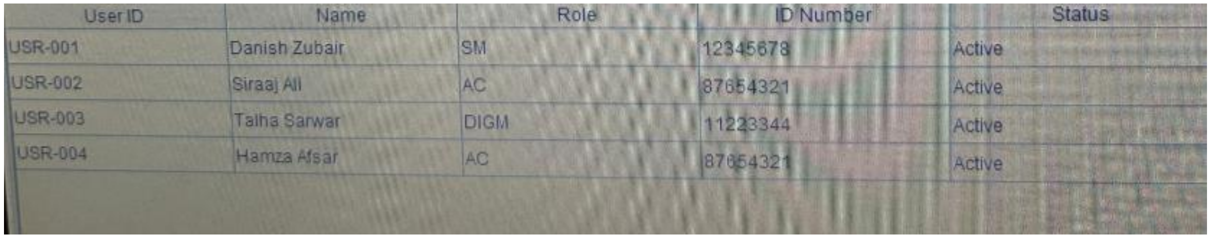
1. The system should allow the SM to view all the BD25 activities data including images of the activity as well.



ID	Name	Format	Location	Status	DIG ID	Image Label	Image	Image Source
ACT-001	Ramadan P...	Performance	City Center	Active	USR-002	Ramadan		Internal

Senior Staff Member (SM) Interface in BD25 Crowd Engagement System

2. The system should allow the SM to view all the user`s data as well, in his interface



User ID	Name	Role	ID Number	Status
USR-001	Danish Zubair	SM	12345678	Active
USR-002	Siraaj Ali	AC	87654321	Active
USR-003	Talha Sarwar	DIGM	11223344	Active
USR-004	Hamza Afsar	AC	87654321	Active

Senior Staff Member (SM) Interface in BD25 Crowd Engagement System

Acceptance Testing Document for BD25 Crowd Engagement System

Acronyms used:
AC: Activity Coordinator
DIGM: Data and Information Group Member
SM: Senior Staff Member

Test Number	Test name	Expected output	Actual output	Action needed
1	Check if the login interface appear as soon as the program is executed	When running the program, the login interface should appear first	The login interface is appearing when the project is executed, as expected.	None
2	Check if SM can log inside the system using correct SM credentials	When entering the correct SM username and password, the software should redirect to the SM interface	The software correctly redirects to the SM interface, when correct SM login credentials are typed.	None
3	Check if AC can access the system, once correct AC login credentials are entered	When the AC enters the correct AC credentials, he should be redirected to the AC interface	The software is actually redirecting to the AC interface, when the AC type his correct credentials	None
4	Check if the DIGM can login, when he enters his correct DIGM login credentials	When the DIGM type his correct login details, he should be shown the DIGM interface	The software is correctly displaying the DIGM, when the DIGM login credentials are entered in the login interface	None
5	Check if the system displays an error message when invalid user login credentials are entered	When any user enters wrong login credentials, a pop up message should be shown saying that the credentials are incorrect	The software displays the error message in a pop up, if any user types incorrect username and/or password	None

6	Check if the inactive users or users who were never users, can access the system	When any user, who is not in the users list in the software or is inactive, tries to access the system, by entering his past login details, he should be shown a pop up message saying that the login credentials are invalid or the user is inactive	The software displays an error message, when any username or password is entered, which is not present in the users table in the software. When an inactive user tries to access the system with his old login credentials, he will be denied access and the software will display a pop up message, saying he is inactive	None
7	Check if AC can add a BD25 event	The software should allow the AC user to fill the activity form, and when the “Add BD25 Event” button is pressed, the software should add the event, in the event table in the AC interface and across the whole software as well	The software enable the AC user to add a new activity, by filling the form in the AC interface and when the “Add BD25 Event” button is pressed, the software append the event with its details to the event table, both in the AC interface and across the whole software as well.	None
8	Check if the AC can remove a BD25 event	When the AC press “Delete Event” button in the AC interface, the software should ask the ID of the event which should be removed, and when that is entered, the software should remove the event and update the event table across the whole software	When the AC press “Delete Event” button, he is asked to enter the ID of the event he wishes to be removed, and when he enters the ID of that event, that event is deleted from the event table and the event table is updated across the whole software, as expected.	None
9	Check if AC user can navigate to DIGM or SM interface	The AC should not be able to access any other interfaces except his own	The software shows a pop up message saying “Access denied” if he attempts to navigate to SM or DIGM interfaces, meaning that the AC is restricted from accessing other interfaces	None
10	Check if AC can view event images, on the activity table, once it is uploaded from DIGM	The AC should not be able to view the activity image on the event table in his interface	The AC is not viewing the activity image in the activity table, in the AC interface, as expected.	None

11	Check if DIGM can upload an event image, when entering the wrong event ID, in the form	The software should show an error pop up message saying that the “Event is not found”, preventing DIGM, to upload the image of that event	The software shows the pop up message alerting that the event is not found, and doesn’t allow him to upload the image of that specific event	None
12	Check if the JFileChooser correctly works and enable the DIGM to choose file from his system	When the DIGM click on “Upload Event Image” button, he should see JFileChooser, displaying all the files of the system, running the software	The DIGM correctly views all of the files of the system running the code, when the “Upload Event Image” button is pressed, allowing him to upload the image of the event from the device.	None
13	Check if the pop up message appear asking the user if he wants the image to be uploaded to the activity table in the software, or in that activity folder or both	The software should show a pop up message asking if the DIGM wants the image to be updated in the event table in the software, or if he wants the image to be copied to the folder of that activity or if he wants to achieve both and the software should upload the image wherever it is specified	The software is correctly showing the pop up message as soon as the image is selected and the software correctly copies the image to either, the event table, folder of that event or both, depending on what the user wants.	None
14	Check if the software is actually creating automatically event folders, with the event name and storing each image of an event, to the correct event folder	The software should create folders, naming the folders specific event name, as soon as the event is created in the AC interface. Then the software should upload the photo of a specific event, to the correct event folder, when the image is uploaded from DIGM interface	The software is correctly creating each folders with the correct event names, as soon as the AC creates an event. Then as soon as the DIGM upload the photo to the software, the system quickly find the event ID, check if the there is any folder of that event in the “images” folder, and if it is, it simply uploads the image to that folder	None
15	Check if the error pop up message appear if incorrect event ID is entered	The software should display an error pop up message saying “Event not found”, if the DIGM enters	The software displays the error pop up message saying “Event not found”, when the DIGM enters incorrect event ID and attempts to upload the image of the incorrect event	None

		incorrect event ID, when uploading the images of the event.		
16	Check if the DIGM can navigate to AC or SM interface	The software should show a pop up message rejecting the access to those interfaces	The software show a pop up message saying “Access Denied” and doesn`t allow the DIGM to navigate to AC or SM interface, as expected	None
17	Check if the SM can view the user table with all of the users with their details	The software should display in the SM interface a list of active users with their details	The software correctly shows a list of active users, in the SM interface	None
18	Check if the activity table can be viewed with the event image, in the SM interface	The SM should be able to view all the event data and with the event image, from his interface	The software shows an event table, with all the event details filled by the AC and the event image, uploaded by the DIGM	None
19	Check if the SM can add a new user by filling the form	The SM should be able to fill the form and when he press on “Add User” button, the system should add the user in the user list and the software should allow the new user to login as well	When the SM fills the form correctly and press on “Add User” button, he is shown a pop up message saying that the user is added to the system and the user table is immediately updated and the new user is also able to login to the system	None
20	Check if the SM can remove a user	The software should allow the SM to delete a user from SM interface by pressing the “Delete User” button	When the SM press the “Delete User” button in the SM interface, the software ask for the User ID of the user which will be removed, and as soon as a valid user ID is provided, the software remove the user from the user list and take away login privileges	None
21	Check if SM is able to navigate through all the interfaces, without any restrictions	The software should enable the SM to navigate through AC and DIGM interface, without any restrictions	The software is allowing the SM to navigate to the AC and DIGM interface and even interact with the interface, without any restrictions	None
22	Check if the navigate menu is present in AC, DIGM and SM interface	The software should have a “Navigate” menu button, in all user`s interfaces	The software correctly have the “Navigate” menu button, in all the user`s interfaces	None

23	Check if the logout button works and redirects to the login interface	The logout button should redirect to the login interface, as soon as it is pressed, logging out the user	The logout button correctly redirects to the login interface, once it is pressed, logging out the user, as expected.	None
24	Check if the table correctly updates, when a form is filled and check if that table is updated throughout the whole software	The software should update both the activity table and the user table, as soon as a new activity or user is added/removed from the system	The software updates immediately the activity table as soon as the activity is added/removed from the AC interface and it also updates the activity table for the DIGM and SM interface, as soon as the DIGM uploads the event image. The user table is also updated immediately in the SM interface, as soon as the SM adds a new user or removes a user.	None

Data Collection Document

This document aims to provide a detailed overview of the user roles, activity types and record types as well as a collection of images from the Bradford 2025 events.

User Roles:

The Senior Manager (SM) looks over all the activities which are uploaded to the software as well as ensuring all the data and images are associated with one another and are up to date.

The Activity Coordinator (AC) is responsible for adding the activity information to the database this could include information such as the activity name, activity location, the type of the activity whether it is a workshop, performance or stall etc and also the current status of the activity for example if it has been cancelled or completed.

The Data and Information Group Member (DIGM) is responsible for uploading the images into the software and organising them into the correct folder generated by the system as well as correctly linking each image to the correct activity. This will ensure that all the media and data is easily accessible.

Activity Types and Record Types:

The system we have created allows users to be able to organise and categorise various activities and records to ensure that the events are managed correctly. This section of the document breaks down the multiple different types of activities and record types of our software is compatible with as well as the types which the users can select when they are either uploading or accessing data or activity information.

Activity Types:

The activity types function is used to be able to differentiate the different activities which are being held as well as to be able to filter and organise based on the different activity types.

The available activity types in our system are:

- Performances: Events such as concerts, theatre plays or musical performances.
- Workshops: Events which are hands-on and allow people to learn skills through different activities.
- Outdoor activities: Art installations, Cultural displays, cultural events, etc.
- Gathering: Indoor or outdoor community gathering
- Cinema Movie: Indoor cinema in the city centre`s massive cinema
- Other: Any other types of activities

How activity types are selected:
When a user is creating a new event, they will be able to select the correct type of activity which is best suited for the event they are creating in the system. This helps to organise and streamline the process of adding and finding an event also helps to filter search for specific types of activities.

Record Types:

In our document the record types will indicate the type of media which is associated with each specific activity.

The record types in our system will include:

- Images: Pictures of the various events being held.

How record types are selected:
When adding a new file into the system to link with an activity they will be able to select the record type which is accepted by our system during the upload process, ensuring that all media files are correctly organised and categorised depending on their file type.

Image Labels:

A correct and detailed layout of the steps to label images will ensure that all uploaded data follows a uniformed procedure ensuring a smooth process. All the media files which will be uploaded by the DIGM members will be labelled with the activity name of which they belong to.

Guidelines for uploading images:

- No use of special characters within the media file names.
- Prefixing the file names, this will allow for more easier association to the corresponding folders ensuring an optimized folder.

Example:
Activity: ClayTime
Image Label: Claytime event BD25

Activity Images:

Ramadan Pavillion (Outdoor activity)

The Ramadan Pavillion is an outdoor architectural installation which celebrates the holy month of Ramadan.

Bradford Performance Showcase 2025 (Performance)

This highlights the talent which is found within Bradford by featuring various performances from a wide range of popular performers varying from music and dance to art and culture.

Digital Marketing (Gathering)

A group of experienced digital marketer, aimed at increasing digital marketing knowledge of Bradford people

Cultural Dance Performance 2025 (Performance)

Multiple dance performances which showcase the traditional dance forms within various different cultures from Bradford.

Zindagi Na Milegi Dobara (Cinema movie)

A famous Bollywood movie with English captions, aimed at providing knowledge of Indian/Pakistani culture

Heritage Walking Tours 2025 (Outdoor Activity)

A collection of guided walking tours which takes you and allows you to explore the vast and deep history of Bradford heritage and culture, visiting landmarks and architectural buildings which have moulded the city over time.

Food and Drink Festival 2025 (Outdoor Activity)

Celebrating Bradford's diversity in culinary experience and expertise, offering food and live cooking demonstrations from various cultures and backgrounds.

Craft and Handmade Market 2025 (Workshop)

A market featuring handmade goods and crafts from local craftsmen whilst also offering live demonstrations on the traditional techniques of wood carving.

Multicultural Parade 2025 (Outdoor Activity)

A parade which celebrates the diverse cultures Bradford has to offer, this parade features traditional music, dances and floats.

Clean North (Performance)

Clean North is a performance by Bradford's breakdance crew who showcase their acrobatics combined with intricate dance moves resulting in a truly captivating display of talent.

The Great Adventure Build (Workshop)

This is an innovative construction project which allows children to be able to get hands on in building their own spaces. This will allow young people to be able to use their creativity to be able to accomplish great achievements through teamwork.

Claytime (Workshop)

This workshop allows children to turn imaginative shapes into a story, where children use clay to create unique characters as well as some based-on characters from famous plays and stories allowing for a hands-on storytelling experience.

Loves Brass (Performance)

A renowned brass band showcases the rich and deep heritage of bass music, creating an exhilarating musical experience for the audience.

Brass Oranje (Performance)

A showcase which features dynamic acts from the Netherlands allowing for a musical experience from Dutch to be in Bradford.

Curius Investigators (Workshop)

A theatrical experience designed for the ages of 3-10, it allows children to fully indulge themselves into the theme by creating characters to follow the story with and encourage children to think creatively.

Team Statement

Danish Zubair (Team leader): Danish Zubair have contributed in the assignment, as he have completed all of his assigned tasks on time and have actively and frequently offered help to all of the team members. Danish Zubair have completed the Software Requirement Specification (SRS) document, managed the project across the team, ensuring that each team member know exactly what is expected from their end and he have also created internal deadline, by which he expects each team member to complete their tasks by that time. Danish Zubair contributed massively in writing the code and have assisted the testing phase as well. He used Microsoft Outlook and WhatsApp group, as a communication channel with the team and he was the one who carried out the interview.

Siraaj Ali: Siraaj Ali have contributed to the assignment. He produced good quality of work and always completed his tasks on time. Siraaj Ali requested help from Danish Zubair (team leader) few times, just to ensure that he doesn`t do his task incorrectly. Danish Zubair grouped Siraaj Ali with Talha Sarwar and Victor Nwagu, to work on the Software Design Document, and he have actively contributed in this task and completed his tasks on time and with good quality. Siraaj Ali contributed in writing the code as well, helping many times, the team leader and other team members, in debugging bugs.

Talha Sarwar: Talha Sarwar contributed to this assignment, as he have completed all of his assigned tasks, within the internal deadline. Talha Sarwar was grouped with Siraaj Ali and Victor Nwagu, by the team leader (Danish Zubair), to work on the Software Design Document. Talha Sarwar, Siraaj Ali and Victor Nwagu told the team leader that they have split the Software Design Document in fair sections, and assigned those sections to each team leader. Talha Sarwar have also, contributed in writing the code and helped various team members, in debugging the code as well.

Victor Nwagu: Victor Nwagu contributed to the assignment, as he have also completed all of his assigned tasks on time. Victor Nwagu worked with Siraaj Ali and Talha Sarwar, in completing the Software Design Document, and he have always completed all of his assigned tasks on time. There were many cases where Victor asked the team leader to further explain his task, and the team leader ensured that Victor fully understood his task. He have contributed in writing and debugging the code as well as, he offered help and support to other team members.

Hamza Afsar: Hamza Afsar contributed in this assignment, as he completed all of his tasks on time. Hamza Afsar worked with Lazhary Elazhari in the Data Collection task, and he have completed his part of the task on time. Like other team members, Hamza asked many times the team leader about his task and how he should complete it, as well as he gave some useful advices to the team leader as well. Hamza Afsar contributed in writing the code and he have also helped many times in researching on how we should code a certain feature.

Lazhary Elazhari: Lazhary Elazhari contributed in this assignment, since he completed all of his tasks on time. Lazhary Elazhary was grouped with Hamza Afsar, by Danish Zubair (team leader), to complete the Data Collection task. Both Hamza Afsar and Lazhary Elazhari told the team leader that they split the Data Collection task in 2, and assigned those, to each of them. Lazhary Elazhari helped in writing and debugging the code as well, since he have many times, corrected the programming bugs of the team leader and other team members.

Aremu Muritadoh: Aremu Muritadoh have contributed in the assignment, since he have also been completing all of his tasks on time. Aremu Muritadoh, have asked many times help from the team leader and all the time the team leader helped him, or anyone asking for help from team leader. Aremu Muritadoh completed the acceptance testing of the code, with the help of the team leader, and he have ensured that the acceptance testing task is completed on time. Aremu Muritadoh have also contributed in writing the code and he have also contributed in constantly researching on how we should implement a feature in the software

Meeting Minutes

Meeting minutes
Date: 18/03/2025 from 2:30PM to 4PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: We have discussed the assignment, broken down the assignment and decided that Danish Zubair will be leading the team. Danish Zubair have split the team into many parts, where Siraaj Ali, Talha Sarwar and Victor Nwagu will be all working on the Software Design Document, Hamza Afsar and Lazhary Elazhari will be doing data collection task, Aremu Muritadoh will be doing research on acceptance testing and how it should be done and Danish Zubair will be doing Software Requirement Specification document. The team leader have given the team 3 days to complete the tasks and informed them that they will be moving towards the coding part, in the next meeting

Date: 20/03/2025 from 2PM to 5PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar and Lazhary Elazhari have all showed each other their task being done and the team leader informed them that we will be starting the code now. Aremu Muritadoh have shown some example of acceptance testing, just to tell the team how acceptance testing will be done. Danish Zubair (team leader) have decided that everyone will be working together on the code, so he have informed the team that the code for each class that will be done after each ending day, will be added in a word document, which is shared with all the team members, so that they can all have a look at the code and improve each other`s code, if required. Danish Zubair (team leader) have informed the team that there will be approximately 3 to 4 classes, and he informed the team that we should all start working on the "User" class, followed by "Activity" class, and get it finished by 25/03/2025. All the team members agreed on the deadline and started working together.

Date: 24/03/2025 from 12:15PM to 2PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together and they have provided feedback to each other on the code present on the shared word document. We have also discussed about the importance of each method and attribute and discussed again what the final software will look like. The team have prepared the interview notes and they will be asking them to the PAT tutor.

Date: 25/03/2025 from 3PM to 8PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together and they have provided feedback to each other on the code present on the shared word document. All of the team members decided to physically sit together and code. All of the team members have helped each other in writing the code by using their own knowledge and using YouTube tutorials as well, when it was needed. The Data Record class was completed and the development of the main class was started, where the login and AC (Activity Coordinator) interface was completed thanks to the contribution of all of the team members. At the end of the meeting, the team leader (Danish Zubair) have discussed the interview notes and the answers we have received from the PAT and decided to make the software, taking in consideration those interview notes.

Date: 27/03/2025 from 2PM to 7PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together and they have continued to work on improving the AC and login interface. The meeting was spent in fixing bugs, adding some required functionalities and researching about how to implement a feature or how to fix a bug, using Google search engine and YouTube.

Date: 01/04/2025 from 3PM to 9PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together and the team leader (Danish Zubair) told the team that they will be all working on the DIGM and SM interfaces. We all had a break down of what each interface should look like and what each interface should contain (thanks to the SRS and SDD document). After this all of the team members have decided to start writing the code for the DIGM interface. During the meeting all of the team members were stuck in several bugs and they were unsure on what to do next, so they all decided to research how to implement the feature and they also found solutions to the bugs.

Date: 03/04/2025 from 2PM to 9PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together and they continued working on the DIGM (Data and Information Group Members) interfaces. All of the team members helped each other in writing the code, during the meeting and the whole team constantly researched about how to implement a specific feature, by using YouTube tutorials. At the end of the meeting the team leader told the team that the DIGM interface is completed and informed the team that they will be now working on the SM (Senior Staff Member) interface.

Date: 04/04/2025 from 7:30AM to 2PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have gathered together (online) and they have collaborated together in writing the code for the SM interfaces. The team faced a lot of bugs, which took most of the time, in the meeting. The team leader have asked all of the team members to research about the bug during the weekend and propose any solutions, on the next meeting.

Date: 08/04/2025 from 10AM to 1PM and from 3PM to 10PM
People attended: Siraaj Ali, Talha Sarwar, Victor Nwagu, Danish Zubair, Hamza Afsar, Lazhary Elazhari and Aremu Muritadoh
People absent: None
Content: All of the team members have physically gathered together and they have all proposed similar solutions to the bugs that we were facing, while developing the SM interface. The team leader have taken in considerations all of the solutions and fixed the bugs (with the help of all of the other team members). The team then continued the development of the SM interface and at the end of the meeting, the team leader have informed the team that finally the SM interface is completed and have assigned Aremu Muritadoh, to do the testing for the system.