**User Groups**

1. **Requester/Data-to-whom** – Eternal user who request data by submitting request form
2. **Admin**
3. **OC/DOC** (team lead) – A user who is supervisor to IC
4. **IC** – A user who is supervisor to Users
5. **User/Operators** – User who can access the DBMS system to handle end-to-end requests process
6. **Service Providers/Telcos** – External party who provides data from requests send by users

**DBMS – User Stories**

1. **Account Management (Done by Keycloak)**

* **Create User & Roles**

As an admin, I want to create users and roles with specified access rights, so that each admin has appropriate permissions.

* **Delete User Accounts**

As an admin, I want to delete users, so that I can remove access for inactive or former admins.

* **Lock User Accounts**

As an OC/DOC, I want to lock user accounts that seem suspicious, so that I can prevent misuse of the system.

* **Unlock User Accounts**

As an OC/DOC, I want to unlock user accounts that have been locked, so that I can restore access as needed

1. **Password Change/Reset (Done by Keycloak, Admin Module)**

* **Reset/Change Own Password**

As an admin, designer, OC, DOC, IC, or user, I want to reset or change the password for my own account, so that I can regain access if I forget my password or want to update it for security reasons.

* **Reset/Change Group Password**

As an admin, OC/DOC, I want to reset or change the password for a group account,

so that the group can continue to access the account securely if the password needs to be updated or has been forgotten.

* **Reset/Change Password for All Accounts (Own & Group) [You cannot reset password for groups, only can do for individual]**

As an admin, I want to reset or change the password for my own account as well as a group account, so that my account and the group can continue to access the account securely if the password needs to be updated or has been forgotten.

* **Password Expiry Reminder**

As an admin, designer, OC/DOC, IC, User, I want the system to prompt me to change my account password every 3 months, so that my account is secured through regular password updates.

* + Length of 8, uppercase, lowercase, numeric & special character.
  + If user key in 5 times wrong, user will be locked. Will need to approach OC/DOC.

1. **Login (Done by Keycloak)**

* **Login Account**

As an admin, designer, OC/DOC, IC, User, I want to login my account with Single-Sign On (SSO) using OpendID Connect (OIDC), so that I can access the system.

1. **Dashboard**

* **View Dashboard [User should be able to save settings]**

As an OC/DOC, IC, or User, I want to view a dashboard that displays all the main menu options, so that I can easily navigate and access different features and modules from a single, centralized interface.

**A/C**

1. Dashboard is accessible immediately after user login
2. All main menu options are clearly displayed in Dashboard (e.g. Requests, Shift Reports, Settings etc.)
3. Summary graphs/charts displayed on Dashboard
4. **Request Creation – Routine CDR Request/Routine SS Request/CTC Request**
5. **Manual key in**

* **Create Manually Setup**

As an OC/DOC, IC, User, I want to access the New CDR Request/SS/CTC page and have certain fields auto-populated, so that I can begin filling in the request form quickly and accurately.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. System auto-generates unique “99 Reference” ID [this is the form id?]
3. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa (Refer to [Annex 6b](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206b_Field%20Lists%20for%20Drop-down%20box.xlsx?d=wbdb9498acfaa4be9b2f3237993e3bd7c&csf=1&web=1&e=7ELQr0&nav=MTVfezY0QTlERTA1LTU5N0QtNEI4RC1BMkRDLTg0RkQ3MjQxNUUwMX0))
4. User to manually input values into form fields or select from dropdown values ([Annex 6b\_Field Lists for Drop-down box.xlsx)](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206b_Field%20Lists%20for%20Drop-down%20box.xlsx?d=wbdb9498acfaa4be9b2f3237993e3bd7c&csf=1&web=1&e=1TYpci)
5. **Import form with structured data (Auto-populate)**
6. **Upload PDF Form**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from scanned Request Form (PDF) and using OCR to extract data, so that I can reduce manual input when working with scanned documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User uploads / drag and drop PDF form
3. System runs OCR to extract key fields from uploaded PDF and auto populates fields in Request.
4. Form fields remain editable after auto-mapping, allowing users to correct or modify the data.
5. System auto-generates unique “99 Reference” ID
6. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
7. **Upload Excel Form**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from Excel/Word format, so that I can reduce manual input when working with structured data documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User uploads / drag and drop form with Excel/Word format
3. System extracts key fields from uploaded form and auto populates fields in Request.
4. Form fields remain editable after auto-mapping, allowing users to correct or modify the data.
5. System auto-generates unique “99 Reference” ID
6. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
7. **Upload Email Content/Body**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from .MSG/PDF email format, so that I can reduce manual input when working with structured data documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User saves email as PDF/.MSG and uploads / drag and drop into system.
3. System extracts key fields from uploaded form and auto populates fields in Request.
4. Form fields remain editable after auto-mapping, allowing users to correct or modify the data.
5. System auto-generates unique “99 Reference” ID
6. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
7. **Import form with unstructured data (Email)**

* **Copy & Paste**

As an OC/DOC, IC, or User, I want to create a CDR Request/CTC/SS by manually copying and pasting content from a saved email body, so that I can easily copy the extracted content and use it to fill in a new request for ad-hoc tasks.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User saves email as PDF/.MSG and uploads / drag and drop into system.
3. System performs OCR on the uploaded email body, user can copy content directly from the extracted text and paste it into the Request form fields.
4. System auto-generates unique “99 Reference” ID
5. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
6. **Duplicate from existing requests**

* **By duplicate request**

As an OC/DOC, IC, or User, I want to create a CDR Request/CTC/SS by duplicating an existing one, then make necessary amendments and save it, so that it's quicker and easier for me to create similar requests without starting from scratch.

**A/C**

1. User views list of Requests and select a Request to duplicate.
2. Once duplicate:

* System will auto-generate a new unique “99 Reference” ID
* System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa

1. User edits the form fields accordingly.
2. **Save Request**

* **Validation Check**

As an OC/DOC, IC, User, I want the system to validate my inputs and detect duplicate requests/TOIs, so that I avoid creating invalid or duplicate requests.

**A/C**

1. On save, system validates:

* Required fields: Display error if required fields missing.
* Duplicate Request (Level 1): If TOI + Telco + Data-to-whom + Request Period Start + Request Period End already exists → show message “Duplicate request detected.”
* Duplicate TOI (Level 2): If multiple requests are found for the same TOI → system shows alert “Multiple requests found for same TOI” and displays a list of matching requests.
* **Saving Request**

As an OC/DOC, IC, or User, I want to save my request either as a draft or as a completed request, so that I can come back to finish later or confirm final submission.

**A/C**

1. If Level 2 validation check fails (duplicate TOIs): User can save the request as Draft.

* System stores request with status = “Draft”

1. If pass all validation checks:

* System saves the request with status = “New CDR Request Created” / “New SS Created” / “New CTC Created”
* User receives a confirmation message.
* System creates an audit log of the new request creation.

A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

1. **Urgent Request Creation – Urgent CDR Request, Urgent SS**
2. **Manual key in**

* **Create Manually**

As an OC/DOC, IC, User, I want to create an urgent CDR Request/SS Request by manually filling in request form fields, so that I can input request details when upload options are not suitable or available.

**A/C**

1. User navigate to “New Request” page to create a new request.
2. System to auto-generate “99 Reference”
3. System to auto populate “Data-to-whom" field based on the “Requesting Officer” and vice versa (Refer to [Annex 6b](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206b_Field%20Lists%20for%20Drop-down%20box.xlsx?d=wbdb9498acfaa4be9b2f3237993e3bd7c&csf=1&web=1&e=7ELQr0&nav=MTVfezY0QTlERTA1LTU5N0QtNEI4RC1BMkRDLTg0RkQ3MjQxNUUwMX0))
4. User manually input values into form fields or select from dropdown values.
5. To mark an urgent CDR/SS request:

* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
* User must select a value in the “Request via” dropdown field.

1. **Import form with structured data (Auto-populate)**
2. **Upload PDF Form**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from scanned Request Form (PDF) and using OCR to extract data, so that I can reduce manual input when working with scanned documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User uploads / drag and drop PDF form
3. System runs OCR to extract key fields from uploaded PDF and auto populates fields in Request.
4. Form fields remain editable after auto-mapping, allowing users to correct or modify the data.
5. To mark an urgent CDR/SS request:

* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
* User must select a value in the “Request via” dropdown field.

1. System auto-generates unique “99 Reference” ID
2. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
3. **Upload Excel Form**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from Excel/Word format, so that I can reduce manual input when working with structured data documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User uploads / drag and drop form with Excel/Word format
3. System extracts key fields from uploaded form and auto populates fields in Request.
4. Form fields remain editable after auto-mapping, allowing users to correct or modify the data.
5. To mark an urgent CDR/SS request:

* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
* User must select a value in the “Request via” dropdown field.

1. System auto-generates unique “99 Reference” ID
2. System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa.
3. **Upload Email Content/Body**

As an OC/DOC, IC, User, I want to upload a CDR Request/CTC/SS from .MSG/PDF email format, so that I can reduce manual input when working with structured data documents.

**A/C**

1. User navigates to “New Request” page to create a new request.
2. User saves email as PDF/.MSG and uploads / drag and drop into system.
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* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
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3. **Import form with unstructured data (Email)**

* **Copy & Paste**

As an OC/DOC, IC, or User, I want to create a CDR Request/CTC/SS by manually copying and pasting content from a saved email body, so that I can easily copy the extracted content and use it to fill in a new request for ad-hoc tasks.

**A/C**

1. User navigates to “New Request” page to create a new request.
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3. System performs OCR on the uploaded email body, user can copy content directly from the extracted text and paste it into the Request form fields.
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* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
* User must select a value in the “Request via” dropdown field.

1. System auto-generates unique “99 Reference” ID
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3. **Duplicate from existing requests**

* **By duplicate request**

As an OC/DOC, IC, or User, I want to create a CDR Request/CTC/SS by duplicating an existing one, then make necessary amendments and save it, so that it's quicker and easier for me to create similar requests without starting from scratch.

**A/C**

1. User views list of Requests and select a Request to duplicate.
2. Once duplicate:

* System will auto-generate a new unique “99 Reference” ID
* System auto-populates “Data-to-whom" field based on the “Requesting Officer” and vice versa

1. User edits the form fields accordingly.
2. To mark an urgent CDR/SS request:

* User can mark a request as urgent by checking the “Urgent (Routine)” checkbox.
* User must select a value in the “Request via” dropdown field.

1. **Save Urgent Request**

* **Validation Check**

As an OC/DOC, IC, User, I want the system to validate my inputs and detect duplicate requests/TOIs, so that I avoid creating invalid or duplicate requests.

**A/C**

1. On save, system validates:

* Required fields: Display error if required fields missing.
* Duplicate Request (Level 1): If TOI + Telco + Data-to-whom + Request Period Start + Request Period End already exists → show message “Duplicate request detected.”
* Duplicate TOI (Level 2): If multiple requests are found for the same TOI → system shows alert “Multiple requests found for same TOI” and displays a list of matching requests.
* **Saving Request**

As an OC/DOC, IC, or User, I want to save my urgent request, so that I can come back to finish later or confirm final submission.

**A/C**

1. If pass validation checks:

* System saves the request with status = “Urgent CDR Request Created” / “Urgent SS Created”
* User receives a confirmation message.
* System creates an audit log of the new urgent request creation.

1. **Create Routine – Urgent CDR Request**

* As an OC/DOC, IC, or User, I want to convert a routine CDR Request to an Urgent Request, so that I can retrieve this information from telco sooner when the request suddenly becomes urgent.

**A/C**

1. User views the list of routine requests and selects a request to convert.
2. User updates the request by checking the “Routine -> Urgent” checkbox.
3. System updates the request status to “Urgent” and creates audit log.
4. **System Prompts/Actions**

* **Prompt Save [Need Dirty bit detection]**

As an OC/DOC, IC, User, I want to be prompted to save my entry before exiting the system if I haven’t saved it, so that I don’t accidentally lose any unsaved work or data.

**A/C**

1. The prompt appears if user attempts to:

* Navigate away from the current page (e.g., via menu/sidebar)
* Close the browser tab or window
* Click “Back” in the browser
* Log out
* Refresh the page

1. If unsaved changes are detected, the system displays a confirmation message: “You have unsaved changed. Do you want to save before exiting?”

* “Save and Exit” option: saves the data and proceeds with the exit action.
* “Exit without Saving”: proceeds with the exit action and discards all unsaved changes.
* “Cancel”: closes the prompt and allows the user to continue editing.

1. If “Save and Exit” option is selected, system to perform validation checks:

* System to validate required fields: Display error if required fields are not filled.
* On successful save, system to create audit log
* **Auto-Save [Save as Draft, then UI must have a tab for drafts entries]**

As an OC/DOC, IC, User, I want the system to auto save my entry while I am creating a new request, so that I don’t accidentally lose any unsaved work or data.

* **Undo Action [Need 10 undo, redo steps]**

As an OC/DOC, IC, User, I want to undo my last action when editing a form, so that I can quickly revert mistakes or unintended changes without manually correcting them.

**A/C**

1. Undo button is only enabled when there are actions available to undo.
2. When user clicks Undo, the last change is reverted (e.g. input text is restored to the previous state).
3. System reverts only one action at a time.
4. System maintains a history of at least the last 10 actions.

* **Repeat Action [Need 10 undo, redo steps]**

As an OC/DOC, IC, User, I want to repeat or redo the last undone action, so that I can easily recover changes I previously reverted if needed.

**A/C**

1. Repeat button is only enabled when there are actions available to redo.
2. When user clicks Redo, the most recently undone action is reapplied.
3. **Request Management**

* **View Request List [What are the fields? How many records per page? Date Range?]**

As an OC/DOC, IC, User, I want to view and search for records within the DBMS, so that I can quickly find and reference the information I need for my tasks or investigations.

**A/C**

1. All users can access a “Requests” page from the main menu with list of requests with key summary fields.
2. All users can view requests created by other teams/users.
3. Clicking a request opens the full details of the request.
4. System logs viewed action.

* **Search Request**

As an OC/DOC, IC, or User, I want to search requests using keywords, so that I can quickly find the relevant records I need.

**A/C**

1. User can search using keywords
2. Search results update in real time
3. No result returns “No records found. Try adjusting your search filters.”

* **Filter/Sort Request**

As an OC/DOC, IC, or User, I want to use pre-set filters and/sort the request list, so that I can view relevant request data efficiently.

**A/C**

1. Users can filter using: [When is request generated in RL? Immediately safter save?]
2. ***“InstantAction”*** - Filters requests that have not been generated into routine lists before, and CDR Request Date End is at least one day earlier than today.
3. ***“RecurringAction”*** - Filters requests that are generated into routine list before, and CDR Request Date End later than today.
4. ***“FreshAction”*** - Filters requests that have not been generated into routine list before, and CDR Request Date End later than today.
5. Filters can be used independently or in combination.
6. Results update dynamically based on selected filters.
7. If no matching data is found: “No requests match your filter criteria”.
8. User can sort any column (ascending/descending)

* **Edit Request**

As an OC/DOC, IC, or User, I want to edit records created by other teams, so that collaboration is seamless.

**A/C**

1. All users can edit requests created by other teams/users.
2. System to log edit action.

* **Delete Record**

As an OC/DOC, IC, User, I want to delete a saved record, so that I can manage and clean up the data entries.

**A/C**

1. All users can delete a request created by themselves or others. [So confirm can delete others in same dept?]
2. System must maintain an audit log to track deleted request.
3. Bulk delete is not allowed – deletion must be done record by record.
4. **Request Extension Form**

* **Change Request Period [ Immediate applies to RL?]**

As an OC/DOC, IC, or User, I want to submit a request extension form to change the request period of an existing request, so that I can change the requests field without creating a new request.

**A/C**

1. To determine which Request(s) the Extension Form is trying to extend, the following fields are matched (because there is no primary key):

* Target number of the Request
* Request Period
* Requester (or Data-to-whom)
* Project Name

1. Users inputs new request start date and end date into Extension Form.
2. Upon uploading Extension Form, System to update the request period and its status:

* Status of original request (start date – date of change): “Ported”
* Status of new request (date of change – end date of original request): “Request Updated”

1. System creates an audit log.
2. Note that: Extension Form can contain extension for multiple Requests.

* **Change Service Provider**

As an OC/DOC, IC, or User, I want to submit a request extension form to change the service provider of an existing request, so that I can change the requests field without creating a new request.

**A/C**

1. To determine which Request(s) the Extension Form is trying to extend, the following fields are matched (because there is no primary key):

* Target number of the Request
* Request Period
* Requester (or Data-to-whom)
* Project Name

1. System to mark the original request to previous service providers as ‘Fulfilled’ or ‘Cancelled’ and continue to generate the routine list for new service providers.
2. System creates audit log.

* **Change Project Name**

As an OC/DOC, IC, or User, I want to submit a request extension form to change the Project Name of an existing request, so that I can change the requests field without creating a new request.

**A/C**

1. To determine which Request(s) the Extension Form is trying to extend, the following fields are matched (because there is no primary key):

* Target number of the Request
* Request Period
* Requester (or Data-to-whom)
* Project Name

1. In the case that Extension Form contains a change of “Project Name” filed, the “PID Job No” is used instead
2. System to maintain an audit log for changes in project names.
3. System shall maintain a history log for project names.
4. **Weekly Routine Query – For CDR Request only**

* **Generate Routine List**

1. **Filter Current Routine List (Export from DB)**

As an OC/DOC, IC, or User, I want to use predefined query criteria to filter for request to be included in Routine List, so that I can quickly retrieve and act on relevant records.

**A/C**

1. User can select the following criteria to generate the Routine Queries List:

* CDR-Action (Search criteria is “TRUE”)
* Telco
* Type
* Activate (To allow user to select the specific date or leave it blank)

1. Upon selection, the system displays current Weekly Routine List for the selected telco.
2. **Select Export Template and Generate [So exporting of excel is done here not after saving of request form?]**

As an OC/DOC, IC, or User, I want to select an export template for Routine List (Mobile/IMEI), so that I can send the consolidated routine requests to the telcos accordingly.

**A/C**

1. Template Selection

* System displays a list of Weekly Routine List template per telco. [Can we have all the telco templates, they shoudl be save as files and meta in db]
* User selects an export template from the list (Excel/Word/PDF) for data export.

1. Routine List Consolidation

* DBMS to consolidates a list of requests to include in Weekly Routine List. [Cron job weekly]

1. CDR Record Check

* The system performs CDR record checks based on TOI + Telco + Request Period:

1. Partial Match (same TOI, same telco, overlapping/partial request period):
   * System adjusts the request period to exclude the overlapping dates.
   * Remaining period is included in the current routine list.
2. Exact Match (same TOI, same telco, same request period):
   * System ignores the duplicate request (does not add it again).
3. No Match (new TOI or period):
   * System adds the request to the current routine list.
4. Generate List

* User clicks “Generate”:
  + System generates a Routine List file (Mobile/IMEI & ALL) based on template selected.
  + System updates CDR Request status updated to “In-Progress”
  + System creates audit log.
* **Normalise IMEI Field [Where to get the correct IMEI?]**

As an OC/DOC, IC, or User, I want the system to validate and auto-correct the IMEI field when generating a Routine List, so that I can ensure the correct IMEI format is sent to the telcos.

**A/C**

1. If TOI sent to telco includes IMEI number, the system should validate and check for IMEI number format when generating the Routine List file’s name:

* If IMEI is more than 15 digits, the system will correct the IMEI field by taking the first 14 digits and append a “0” at the last digit.
* If IMEI is 15 digits, the system will check if the last digit is “0”. If it is not “0”, the system will change the last digit to “0”.
* If IMEI has less than 15 digits, the system will flag an error as the IMEI is invalid.
* **Download to Local Drive**

As an OC/DOC, IC, or User, I want to download the Routine List to my device, so that I can send the file to the telcos for data request.

**A/C**

1. User downloads file to local device.
2. Upon successful download, system displays message “Download Success”.
3. **Data Import [After Telco comes back]**

* **Batch upload & decrypt CDR files [Should be a batch job, only password initial start is on the spot-> Finish Alert]**

As an OC/DOC, IC, or User, I want to batch upload CDR files (raw data file + summary table) from Telco, so that the system can match data to existing requests.

**A/C**

1. Select telco & upload

* User selects which telco the zip file is from.
* User uploads a zip file into system.

1. Import Processing

* System processes the uploaded file and generates an import status:
  + *Successful* → data is imported and linked to existing requests.
  + *Unsuccessful* → errors are detected.
* If unsuccessful, system:
  + Highlights errors on-screen for user.
  + Saves the failed files into an error log folder accessible to the Authority.

1. Decryption

* If the uploaded zip file is AES-encrypted, system prompts user to enter a password.
* If password is correct → system decrypts and reads the file.
* If password is incorrect → system displays message *“Incorrect Password”* and allows retry.
* After 3 failed attempts, system blocks further attempts and displays an error message.

1. Find Matching Requests

* Once file is decrypted, system reads the file and searches for matching Requests based on target number and request period (e.g. 98765432\_1Mar2023\_31Mar2023.xlxs)
* System associates the data files to the matching Request.
* If no /multiple request(s), system alerts user.

1. Data Storage

* System saves original CDR files into system. {File system]
* System creates audit log of import action.
* **Single File Upload & Decryption – SS/CTC Requests**

As an OC/DOC, IC, or User, I want to upload a CDR file (raw data file + summary table) from Telco, so that the system can match data to existing requests.

**A/C**

1. Select telco & upload

* User selects which telco the file is from.
* User uploads CDR file into system.

1. Import Processing

* System processes the uploaded file and generates an import status:
  + *Successful* → data is imported and linked to existing requests.
  + *Unsuccessful* → errors are detected.
* If unsuccessful, system:
  + Highlights errors on-screen for user.
  + Saves the failed files into an error log folder accessible to the Authority.

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* If the uploaded file is AES-encrypted, system prompts user to enter a password.
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* If password is incorrect → system displays message *“Incorrect Password”* and allows retry.
* After 3 failed attempts, system blocks further attempts and displays an error message.

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* System associates the data file to the matching Request.
* If no /multiple request(s), system alerts user.

1. Data Storage

* System saves original CDR files into system.
* System creates audit log of import action.
* **No Data Files [Alert via the processing log and alerts]**

As an OC/DOC, IC, or User, I want to be alerted if a CDR file imported has no data, so that I know that there were no call logs during the request period.

**A/C**

1. Upon matching the CDR file and requests, the summary file will state if the requested TOI has no results.
2. If there is no data within the CDR file, the system displays an alert to the user indicating that there are no results during the requesting period.

* **Export Table [What is verification table?]**

As an OC/DOC, IC, or User, I want to export the verification table, so that I can use it for reporting purposes.

**A/C**

1. Once the system reads the CDR file, it will populate the verification table.
2. The verification table includes at least the following columns:

* TOI
* Request Start Date
* Request End Date
* Duplicate Result
  + ✅ tick = CDR file already exists in DBMS
  + ❌ cross = data does not exist in DBMS
* CDR File Exists
  + ✅ tick = CDR file exists in DBMS
  + ❌ cross = no record found for that request
* New/Missing Fields
  + ✅ tick = CDR file contains new or missing fields compared to telco template
  + ❌ cross = all columns headers in CDR file and telco template matches
* Unrecognised Header
  + ✅ tick = column header(s) detected but unrecognised (e.g., spelling error)
  + ❌ cross = all column header detected are recognised
* User can click an “Export Table” button to download the table.
* Export should support at least Excel (.xlsx) and CSV formats.
* Exported file must include all populated rows and columns as seen in the verification table.
* System creates audit log for export action.
* **Verify CDR files**

1. **Status Update [State machine]**

As an OC/DOC, IC, or User, I want the system to validate and assign statuses to uploaded CDR requests, so that I can know whether each request is ready for processing or requires attention.

**A/C**

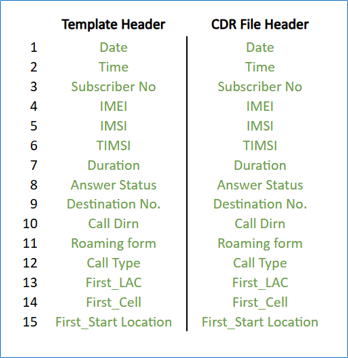
* Upon decryption of the zip file, system reads all TOI requests included.
* System updates each request with one of the following statuses:
  + Uploaded → No CDR files exist in the zip file.
  + Error → No matched request found.
  + Pending → Matched request found
  + Ignore → Duplicate detected (same CDR file already exists in the system).

1. **Verify CDR file with Matched Column Headers**

As an OC/DOC, IC, or User, I want to verify if the column headers of the CDR file and telco template match, so that I can proceed with the data processing.

**A/C**

* System updates Status column to “Pending”.
* System enables “Proceed” button in Action column.
* User can click “Proceed” to continue with data processing.

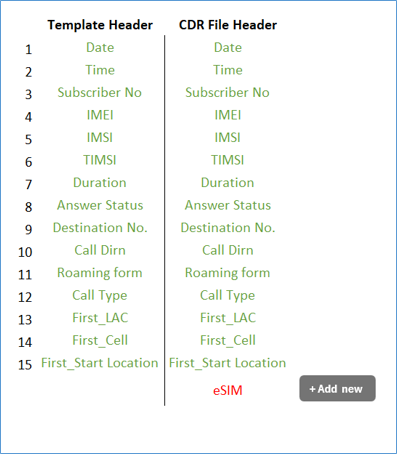


1. **Verify CDR file with extra column header**

I want the system to verify when an extra column header(s) is detected in a CDR file compared against the telco template and allow me to update the telco template if needed, so that I can ensure the uploaded data matches the requirements before processing.

**A/C**

* When extra column(s) is detected, System updates Status column to “Pending”
* System enables “Review” button in Action column for the TOI request.
* When user clicks “Review” button:
  + The system displays a pop-up to show discrepancies in column headers
  + The extra column(s) detected from the CDR file are highlighted.
* User can click on “Add New” button to be redirected to the Template Editor page where they can add another field into the telco template. [User can add to Template? I would think is Designer?]



1. **Verify CDR file with extra column header**

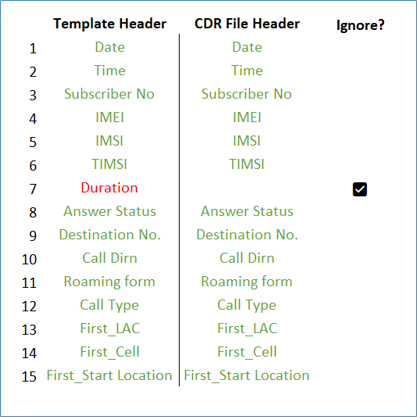
I want the system to verify when missing column header(s) is detected in a CDR file compared against the telco template, so that I can ensure the uploaded data matches the requirements before processing.

**A/C**

1. When missing column(s) is detected, System updates Status column to “Pending”
2. System enables “Review” button in Action column for the TOI request.
3. When user clicks “Review” button:

* The system displays a pop-up to show discrepancies in column headers
* The missing column(s) detected from the CDR file are highlighted.

1. User can select the checkbox within the “Ignore?” columns to proceed with data processing with missing column.



1. **Verify undetected column headers**

I want the system to verify when there are undetected column header(s) in a CDR file compared against the telco template, so that I can ensure the uploaded data matches the requirements before processing.

**A/C**

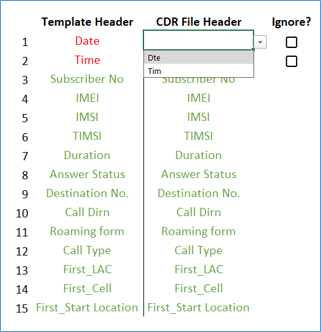
1. When missing column(s) is detected, System updates Status column to “Pending”
2. System enables “Review” button in Action column for the TOI request.
3. When user clicks “Review” button:

* The system displays a pop-up to show discrepancies in column headers
* The undetected column(s) from the CDR file are highlighted.

1. User can either:

* select the misspelled header names from the dropdown list or;
* select the checkbox within the “Ignore?” columns to proceed with data processing with misspelled column headers.

*Note that once a template header has been selected, it is removed from the dropdown list (cannot be reused).*



* **Proceed All**

As an OC/DOC, IC, or User, I want to proceed with data processing for all CDR files with no errors, so that I can update all matched TOI requests at once.

**A/C**

1. When user clicks the “Proceed All” button, the system processes all CDR files with no error.

[Can we have the RL and Return Data to test?]

1. **Data Processing**

* **Update Requests**

As an OC/DOC, IC, or User, I want the system to update existing requests in the DBMS, so that I am updated on the project/request status.

**A/C**

* System to check for “MOBILE” or “IMEI or ALL” type
* If request with “MOBILE” type, system shall auto populate fields in Database:
  + “Period Collected till” date from CDR
  + “Request Period End”:
    - If “Period Collected till” and “Request Period End” tally: “CDR-Action” = FALSE
    - If “Period Collected till” and “Request Period End” do not tally: “CDR-Action” = TRUE
  + “1st Delivery Date”:
    - If “1st Delivery Date” field in DB is empty, populate date as reflected in CDR
    - If field is already filled in DB, ignore
* If request with “IMEI” or “ALL” type, system shall auto populate fields:
  + “Period Collected till”, “IMEI/ALL (ST)”, “IMEI/ALL (SH)”, “IMEI/ALL (M1)” field from CDR
  + Ensure “CDR – Action” = TRUE, as the remaining field “IMEI/ALL(SIMBA)” will not return fast
  + “1st Delivery Date”:
    - If “1st Delivery Date” field in DB is empty, auto populate date as reflected in imported template
    - If field is already filled in DB, ignore
* **No Results**

As an OC/DOC, IC, or User, I want the system to update the request status for requests that have no data from the CDR file, so that I know that there were no call logs made by the TOI during that request period.

**A/C**

1. Even when there is no data, System updates the fields:

* “MOBILE”: Update fields “Period Collected Till”, “CDR-Action”, “1st Delivery Date”
* “IMEI & ALL”: Update fields “Period Collected till”, “IMEI/ALL (ST)”, “IMEI/ALL (SH)”, “IMEI/ALL (M1)”, “CDR – Action”, “1st Delivery Date”

1. **Data Normalisation (For internal Use)**

* **Standardised CDR Template**

As an OC/DOC, IC, or User, I want the imported CDR data to be mapped into a standardised template, so that I can easily read, interpret data consistently across all Service Providers.

**A/C**

1. CDR imported shall be normalised – map by column e.g. Raw CDR column A to Standard column C (in case column name is spelled wrongly)
2. Columns will be standardised for all CDR across all Service Providers:
   * Sub No
   * Sub Country
   * Date of Call
   * Day of Call
   * Ans Time
   * Hour of Call
   * IMSI
   * IMEI
   * Duration of Call
   * Destination No.
   * Call Direction
   * Start Cell
   * Start Loc
   * End Cell
   * End Loc
   * Remarks
   * Forwarded/Roaming No.
   * Sub Telco
   * Start Lat
   * Start Long
   * End Lat
   * End Long
3. Data values will be standardised based on individual data type:

* Standardised Date to dd/mm/yyyy format
* Standardised Time to hh:mm:ss format
* Standardised the Location field (street name, blk/no)
* Standardised Telephone number by removing prefix. E.g.
* 65 (for local number if more than 8 digits)
* 1800 (toll-free services access code)
* 1900 (premium rate services access code)
* 1410, 1411, 1412, 1413, 1414, B484, B485, B486 and B487 (prefix that appear in M1 CDR)
* Transform cell ID and/or locations description to geo-position – use one map?
* Auto fill empty fields for location description

1. Mapping Rules: [Annex B - Mapping Rules for CDR (updated 16 Sep 22).xlsx](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%20B%20-%20Mapping%20Rules%20for%20CDR%20(updated%2016%20Sep%2022).xlsx?d=w2898c5231bb04364b9efc25644d072fc&csf=1&web=1&e=QvvdaW)
2. New columns received from telco raw data will be added from the last column e.g. eSIM field

* **Verify Auto-mapping**

As an OC/DOC, IC, or User, I want to review and confirm the auto-mapped fields, so that I can ensure the data is correctly mapped. [Is is the CDR Data?]

**A/C**

1. System to log the user who confirmed the mapping, timestamp, and any changes made to the original mapping.

* **Edit Certain Fields**

As an OC/DOC, I want to edit CDR records from telcos, so that I can update information as needed for operational tasks or investigations. [IN Zipped File or when prcessing?]

**A/C**

1. Only able to edit fields such as “Period Collected Till”, “CDR-Action” fields
2. System must validate input e.g. required field
3. System to log edit action.
4. **Request Delivery**

* **Export Data [Need to select requests first?]**

As an OC/DOC, IC, or User, I want to export data to send back to the requester, so that I can fulfil their requests.

**A/C**

1. System references the export configuration defined per Requester:

* Selected columns
* Formatting preferences
* File type preferences (Excel, Word, PDF)

1. When user selects “Export”, system exports the data in the configured formats
2. DBMS to create a zip folder based on Requestor department/telco/ project name – Exported files are grouped by into folders by Requester and Service Provider/Telco (many files in one zip folder)
3. All grouped folders and files are compressed into a .zip file
4. Once user has exported, system auto updates the status to “Delivered”
5. System to log export action.

* **Export NR File**

As an OC/DOC, IC, or User, I want to export a .TXT file for CDR with no data, so that I can deliver it to the requestors to indicate that no data is available for the specified request period.

**A/C**

1. When user selects “Export”, the system generates a blank .TXT file when there is no data within the CDR file matched with the request.
2. The file shall follow the naming convention:

* <TOI>\_<Request Start Date>\_<Request End Date>.txt
* e.g. 98765432\_1Mar2023\_31Mar2023.txt

1. System creates audit log for file generation.
2. Once file is exported, system updates request status as “Completed”
3. **Report Management**

* **Generate CDR Request into Shift Return Report**

As an OC/DOC, IC, User, I want to select the query criteria of CDR Requests and export the results into a Shift Return Report, so that I can generate a filtered report and download it [have UI design?]

**A/C**

1. User can define filtering criteria:

* Activate (To allow Authority to select the specific date Start & End)
* Urgent (Requested via) [Search criteria for records Urgent (Requested via) “TRUE”]

1. User to click on “Export” button to export and download file (Excel/PDF/Word)

* Template: [Annex 6h\_Shift Return CDR Template.xlsx](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206h_Shift%20Return%20CDR%20Template.xlsx?d=w445b1b01b6fe472588a18330cec66678&csf=1&web=1&e=0spZ5a)

1. System to log creation of report and export action.

* **Generate SS into Shift Return Report**

As an OC/DOC, IC, User, I want to select the query criteria of the SS and export the results into a Shift Return Report, so that I can generate a filtered report and download it.

**A/C**

1. User can define filtering criteria:

* Activate (To allow Authority to select the specific date Start & End)
* Urgent (Requested via) [Search criteria for records Urgent (Requested via) “TRUE”]

1. User to click on “Export” button to export and download file( Excel/PDF/Word)

* Template: [Annex 6h\_Shift Return Subscriber Template.docx](https://easaipl.sharepoint.com/:w:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206h_Shift%20Return%20Subscriber%20Template.docx?d=w2bb5e45d5f3a4f7db230866bd7155c05&csf=1&web=1&e=5wvdyS)

1. System to log creation of report and export action.

* **Generate Monthly Return Template**

As an OC/DOC, IC, User, I want to generate and export CDR Requests/CTC/SS into Monthly Return Template, so that I can generate standardized reports efficiently for monthly review, submission, or compliance purposes.

**A/C**

1. System to display a list of pre-defined report types: [What are the reports types?]

* User to select the report type to generate.

1. For SS, system shall allow user to select specific start and end date.

* These dates determine the data range included in the report.

1. After selecting report type, user can:

* View available pre-defined fields
* Select pre-set calculations/formulas should be applied (e.g. highest, lowest, average values, percentage increase/decrease of request comparison between months etc.)
* System applies selected calculations and auto-populates the report.

1. User to click on “Export” button to export and download file
2. Example:

* Export Word template: [Annex 6h\_Monthly Return Template.docx](https://easaipl.sharepoint.com/:w:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206h_Monthly%20Return%20Template.docx?d=w7e84614e0e5f4926a2cca22576282a6d&csf=1&web=1&e=d1dWAp)
* Export Excel template: [Annex 6h\_Monthly Return Template.xlsx](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206h_Monthly%20Return%20Template.xlsx?d=w706476cbf193412f85b4a44f6436359b&csf=1&web=1&e=n5xmBR&nav=MTVfezAwMDAwMDAwLTAwMDEtMDAwMC0wMDAwLTAwMDAwMDAwMDAwMH0)

1. System to log creation of report and export action.

* **Generate Ad-hoc Statistic Reports**

As an OC/DOC, IC, or User, I want to generate an ad-hoc statistics report, so that I can generate and customize data outputs based on selected parameters for analysis or sharing.

**A/C**

1. Ad-hoc Statistic Reports for telco, requesters, project, yearly, monthly, type etc.
2. User to select request template from pre-defined list (estimate 25 report templates)
3. User can select pre-set formulas/calculations based on template to apply to export e.g. pivot table, total, highest, lowest, median, average, ratio etc. (estimate 15 formulas)
4. User can click on “Export” button to export and download file (Excel/PDF/Word)
5. System to log creation of report and export action.

* **Generate Comparison Report**

As a user, I want to generate a comparison report with graphs/charts representation, so that I can easily compare data trends and make informed decisions based on visual insights.

**A/C**

1. User can select datasets to compare
2. User can choose chart types from pre-defined list (e.g. bar charts, line graphs, pie charts etc.) to visualise data comparison
3. User to select request template from pre-defined list (estimate 25 report templates) Where?
4. User can select pre-set formulas/calculations based on template to apply to export e.g. pivot table, total, highest, lowest, median, average, ratio etc. (estimate 15 formulas)
5. User can click on “Export” button to export and download file (Excel/PDF/Word)
6. System to log creation of report and export action.
7. **Designer Role – Data Management**

* **Manage Dropdown List Values**

As a Designer, I want to manage the dropdown values used in forms across the system, so that data entry is consistent.

**A/C**

1. Designer can add, edit, delete dropdown fields
2. Deleted dropdown values are soft-deleted (i.e. marked as "Deleted") and will no longer be shown in dropdown fields throughout the DBMS.

* There is no physical deletion of values from the database.

1. Edited dropdown values will be updated globally across the DBMS.

* Existing forms or records using the old value will display the newly updated value.

1. System to log all add/edit/delete actions.
2. [Annex 6b\_Field Lists for Drop-down box.xlsx](https://easaipl.sharepoint.com/:x:/r/sites/STEHawkeye/Shared%20Documents/Project%20Management/Requirements/DBMS/Annexes/Annex%206b_Field%20Lists%20for%20Drop-down%20box.xlsx?d=wbdb9498acfaa4be9b2f3237993e3bd7c&csf=1&web=1&e=m19CFj)

* **Manage Data Fields in Request data**

As a designer, I want to manage data fields in certain modules, so that I can customize, standardize, and maintain the data structure across the DBMS.

**A/C**

1. Designer can add, edit, delete data fields used in:
2. Requests Forms
3. CDR fields from Service Providers
4. Deleted data fields are soft-deleted (i.e. marked as "Deleted") and will no longer be shown in data throughout the DBMS.

* There is no physical deletion of data fields from the database.
* Data fields that have dependencies on others cannot be deleted.

1. Edited data fields only pertain to display labels.
2. Added new data fields are displayed as the last entry field of form or reports.
3. System to log add/edit/delete actions.
4. **Configuration**

* **Edit Data Backup Schedule**

As an OC/DOC, I want to edit the data backup schedule, so that can ensure backups are performed at appropriate times to reduce system load and meet operational or compliance requirements.

**A/C**

1. OC/DOC can view current backup schedule frequency (e.g. daily/weekly) and time.
2. OC/DOC can modify data backup schedule (e.g. daily/weekly/monthly)
3. System logs the update.

* **Edit Data Retention Period**

As an OC/DOC, I want to edit the data retention period, so that I can ensure data is retained in compliance with policy, legal, or operational requirements.

**A/C**

1. OC/DOC can view current data retention period (e.g. every 3 years) and time.
2. OC/DOC can modify data retention period and time.
3. System logs the update.

* **Template Editor**

As an OC/DOC, IC, or User, I want to use the Template Edit to edit templates used in the DBMS, so that data can be aligned consistently.

**A/C**

1. Template Editor allows user to configure fields to be shown in reports or exported CDR files to the requestors.
2. Templates that can be configured:
3. Weekly Routine templates (although seldom)
4. Requestor Export Templates
5. Telco CDR Import Templates

* Configure fields to be imported to the Database
* Configure mapping of Telco CDR fields to Standard CDR template (applies to new Telco CDR fields)

1. Monthly Return Report Template
2. Shift Return Report Template
3. System logs the update.
4. **Archived Data**

* **Archive/Unarchive Data**

As an OC/DOC, I want to archive or unarchive an entire database, so that old data can be excluded from active search results without being deleted.

**A/C**

1. Archive database to store archived data.
2. Archived records are not searchable or visible in regular record searches.
3. Audit log must track all archive/unarchive actions.
4. Archive Data:

* Request List
* Routine List
* CDR Data
* **View Archive List**

As an OC/DOC, I want to view a list of archived data, so that I can monitor and retrieve past records. [Another menu]

**A/C**

1. DBMS displays a list/table of all archived records

* View archived Request List
* View archived Routine List
* View archived CDR data

1. OC/DOC can filter archived table by data fields

* **Delete Whole Database**

As an OC/DOC, I want to delete archived records, so that I can permanently remove outdated data if necessary. [Meaning Purge]

**A/C**

1. Deletion must not be allowed if the record is not archived.
2. System must confirm deletion with a warning.
3. All deletions are tracked in the audit log with record ID, user, and timestamp.
4. OC/DOC can configure rules such as: “Data cannot be deleted if less than 3 years old”. Prompt user if deletion violates retention rules.
5. All rule changes must be logged in the audit log with timestamps and user IDs.
6. **Notifications (SMS/Email) [Pleae give SMA API or Email API?]**

* **Change in IMEI (Routine)**

As an OC/DOC, IC, or User, I want to be notified by SMS and Email if there is a change in IMEI (Routine) if it is linked, so that I can be promptly aware of changes.

**A/C**

1. Alert when: Same subscriber number but change in IMEI e.g. switched or replaced the device
2. User to receive notification by SMS and Email

* **Change in IMSI (Routine)**

As an OC/DOC, IC, or User, I want to be notified by SMS and Email if there is a change in IMSI (Routine) if it is linked, so that I can be promptly aware of changes.

**A/C**

1. Alert when: Same subscriber number but change in IMSI e.g. change SIM card
2. User to receive notification by SMS and Email
3. **Audit Log**

* **View Audit Logs**

As an OC/DOC, IC, or User, I want to view audit logs made in the DBMS, so that I can track changes, monitor activities, and ensure accountability for actions performed within the system.

**A/C**

1. Each audit log entry must display the following:

* Timestamp of action
* User who performed action
* Action performed (e.g. created, edited, deleted, exported)

1. OC/DOC cannot edit or delete audit logs.
2. OC/DODC can filter by fields and only filtered results are displayed.

* **Export Audit Log File**

As an OC/DOC, I want to export the audit logs file, so that I can save a copy for investigation purposes.

**A/C**

1. OC/DOC can export audit logs to Excel/Word/PDF format

**LINK ANALYSIS**

**(Dr Lius – Algo and Processing)**

**(Infra and Frontend]**

**Link Analysis – User Stories**

**\*Link Analysis module will be web-based**

1. **Import Dataset**

* **Perform Analysis on DB**

As an OC/DOC, IC, or User, I want to perform link analysis using data from various sources (e.g. DBMS, STE, ad-hoc data), so that I can include all relevant datasets in my analysis. [We will start with DBMS]

**A/C**

1. User can select from multiple data sources: DBMS, STE, ad-hoc datasets: [How to select? I thot already configure to pull data from DBMS soources?]

* Excel
* Word
* PowerPoint
* Access file types
* CSV
* PDF
* HTM/HTML
* Videos and photos (e.g. JPEG, PNG) - media files/ embedded media (audio, video, image) will not be part of data analytics

1. **Link Analysis Tools**

* **Plot Link Chart [Front End – Judy, Backend – Dr LJ]**

As an OC/DOC, IC, or User, I want to import data and plot a network graph showing its relationships between nodes, so that I can visually understand their connections. [Centrality,Betweenness, CLoseness or Clsutering?]

**A/C**

1. System generates network graph based on relational data
2. System to provide standard template for mapping of imported data to create link relationship. [User can Import Manually?]
3. Upon import of dataset, the system will be mapped via the standard template, so as to reduce processing time [What templates? Is it Dataset to be stored?]
4. System to data clean or format all fields prior to importing into the analysis visualization tool e.g. the field for input of date should be date format and not a text or general format.
5. System to update the process status for: [We will have a UI to track progress of s=cron jobs]
6. Processing Data – In progress, completion, error
7. Time taken – total time taken to process the request
8. Amount of data being process – e.g. number of rows of data are mapped (for user to countercheck for missing data – to check against imported data)

* **Search & Insert into Graph [UI]**

As a user, I want to search for entities/nodes from the database and insert it into the graph, so that I can visualize all the connections.

**A/C**

1. System should be able to extract both entities and relationships from tables and databases
2. Some tables in database could be interpreted as both an entity and relationship: System should be able to extract relationships from tables that contain multiple relationships e.g. An entity (X) on the graph could be related to another entity (Y) multiple times by the same relationship (R)

* John called Jane 20 times.
* Users should be able to visualise such relationships in one of the following two ways:

1. As individual edges on the graph
2. As single combines edge on the graph, with appropriate text label (e.g. called [20])

* **Expand/Collapse Links on Graph**

As a user, I want to expand and collapse links/edges of connected nodes, so that I can explore the network step-by-step.

**A/C**

1. User can expand/collapse for all link/edges
2. User can expand/collapse for links/edges of specific relationship type

* **Toggle Weighted Edges**

As a user, I want to toggle between enabling and disabling weighted edges when edges are combined, so that I can choose whether or not to visualize the number of original connections through edge thickness.

**A/C**

1. User can enable/disable: When weighted edge is enabled, the thickness of the edge is determined by the number of edges that the combined edges were combined from.
2. **Graph Display Customization**

* **Edit Label of Node**

As a user, I want to customise the label of a node by selecting from the list of its properties, so that the graph reflects meaningful identifiers for each node.

**A/C**

1. User selects node label from its properties.
2. Label update reflects immediately on the graph.

* **Edit Label of Edge**

As a user, I want to customise the label of an edge by selecting from the properties of the connected nodes or using a custom text, so that the relationship is clearly described.

**A/C**

1. User selects edge label from properties of edge or its connected nodes.
2. Custom text input option is available.

* **Edit Shape of Nodes**

As a user, I want to choose the shape of the node from a list of pre-defined shapes, so that I can visually differentiate between entity types.

**A/C**

1. User selects from predefined shapes (circle, rectangle, hexagon etc.)

* **Edit Node Background (i.e. the inside of the shape)**

As a user, I want to set the background of the node, so that visual styling aligns with entity characteristics.

**A/C**

1. User can select from the following options:
2. Static Image (user to upload image during configuration)
3. Dynamic Image (select from list of the node’s properties)
4. System pre-defined icons
5. Background colour

* **Customise Graph Display- JD**

As a user, I want to customise the graph’s aesthetic such as line width, colour, and size, so that I can better visualise and differentiate relationships and nodes.

**A/C**

1. Line color, thickness, and node size adjustable via settings.
2. Changes apply immediately to the active graph view.

* **Set Global Display**

As a user, I want to set these customisation preferences globally in a settings page, so that my default styling is applied consistently.

**A/C**

1. Global styling preferences are saved in user profile.
2. **Information Display on Selected Node/Edge**

* **Information Panel Display**

As a user, I want to view an information panel on one side of the page (left or right), so that selected data does not obstruct the main graph view.

* **View Information**

As a user, I want to view information only when I explicitly ask it to be shown (e.g. double-clicking, context menu), so that information is only shown when I request it.

* **View Information Details Based on Node/Edge Selected**

As a user, I want to see detailed information relevant to the type of selected node or edge selected, so that I understand the context.

The information shown is dependent on the item being selected:

* + Node: Show the node’s properties (based on the columns of the corresponding table in the database)
  + Single edge: Show the edge’s properties (based on the columns of the corresponding table in the database)
  + Combined edge: Show combined information (e.g. duration:20 seconds – 5 min 15 sec)
* **Filter Criteria**

As a user, I want to filter out nodes and edges based on criteria so that I can focus on specific data segments.

**A/C**

1. System to grey-out filtered-out nodes/edges. Optionally, if a portion of the graph has been isolated from the main tree, the whole portion shall be greyed out too.
2. System to remove filtered-out nodes/edges from the graph view. Optionally, if a portion of the graph has been disconnected from the main tree, the whole portion shall be removed too.
3. **Machine Learning/ AI Enhancement – Dr Liu**

* **Detect Equivalent Data**

As a user, I want the system to automatically detect equivalent data with different formats (e.g., phone numbers, addresses, dates), so that links can be established more accurately.

* + e.g. formatting issues:
    - 1/1/2023 = 01 Jan 2023
    - Jurong East Street 21 = Jurong Eas St 21
    - +6512345678 = 12345678
* **Detect Hidden Relationships**

As a user, I want the system to detect hidden relationships, so that I can uncover indirect connections.

* + Relationships should be established for values that are deemed to be equivalent
    - John owns 12345678
    - +6512345678 calls 98765432
    - Peter owns +6598765432
    - Relationship between John and Peter established
* **Analyse Data**

As a user, I want the system to perform analysis using ML/AI to detect potential criminal activity or suspicious clusters, so that I can proactively identify important findings.

1. Shortest Path Analysis
2. Centrality Analysis
3. Geographical Analysis
   * + Call Location
     + Residential Address
4. Temporal Analysis (usually done in conjunction with link analysis or geographical analysis)
   * + Date
     + Time
     + Date & Time
     + Day of the week
     + Hour
     + Etc.

Application of Temporal Analysis:

* + Used as a filter (e.g. Link analysis filter)
  + Used for visualizing data
  + To group data in day of week and visualise data based on days

1. **Data Analysis**

As an OC/DOC, IC, or User, I want to perform certain analysis for the dataset, so that I can obtain clearer insights to support my decision-making.

**A/C**

1. User can choose MSISDN (either one or multiple) and period of data for analysis.
2. User can find locations frequented by TOI and display by location, Cell ID, MAC address, day and hour.

* To collate the top cellsite (Cell IDs and locations) and to filter by critieria (e.g. MAC address, certain hours of the day / certain weekdays)

1. User can identify travel matters or mode of travel

* To calculate the routes that TOI was detected on according to time slots and geolocation of the phone.
* The travel patterns to be plotted on map and can be used to enrich the phone details and the person that is related to this phone.

1. User can find meeting places – defined TOIs, date and time range and location (geo-location parameters set above and show it on the map as meeting Icon and/or in a table format.)

* System to identify common travel patterns across two or more lines – to be able to pick up users who converge into a same point i.e. meeting place

1. User can list common contacts amongst two or more phone numbers – to find POI (associates) through defined TOIs, date/time range and location (geo-location parameters of the phone call)
2. System to highlight change of IMEI – to be performed on single MSISDN entity and show all linked IMEI entities of telephone number and time frames that this number was related to each IMEI.
3. System to highlight IMEI links – to be performed on multiple MSISDNs, extending the search to multiple data sources.
4. System to associate contact or ‘Unknown’ – to list common IMSI or IMEI found across 2 or more locations.
5. User can conduct search for data from different data sources and display the entities and links.
6. **Special Queries**

* **Expand Graph**

As a user, I want to expand the graph to show entities/nodes and relationships/edges that are relevant to the analysis or investigation, so that I can focus better without being distracted by irrelevant data.

* **Run Query**

As a user, I want to perform special queries between nodes, so that I can explore specific graph insights.

* + If the Special Query requires additional information, the operator shall provide the additional information in order to run the query.
* **Configure New Special Query**

As a user, I want to configure a new special query, so that I can tailor the query to extract insights relevant to my specific use case or investigation.

* **Edit an existing Special Query**

As a user, I want to edit an existing Special Query, so that I can refine or update the query conditions without creating a new one from scratch.

* **Delete an existing Special Query**

As a user, I want to delete a special query that I no longer need, so that I can keep the query list organized and relevant.

* Note that it will affect the existing links
* **Use Pre-configured Queries**

As a user, I want to use pre-configured queries, so that I can quickly answer complex questions.

1. **Alerts [User must have an alert box]**

* **Configure Alert Template**

As a privileged user, I want to create a new alert template with specific triggers by specifying entities/relationships related to the alert, so that I can proactively monitor key events.

* + e.g. When Person {X} makes more than {Y} number of bank transactions between {StartDate} to {EndDate}.
  + e.g. phone number making more than 50 calls during a time range
* **Edit Alert Template**

As a privileged user, I want to edit an existing template with specific triggers, so that I can keep it up to date.

* **Delete Alert Template**

As a privileged user, I want to delete an existing template with specific triggers, so that I can remove those that are not in use.

* **View Alert Templates**

As a privileged user, I want to view all pre-defined templates, so that I review them.

* **Create Alert Template by Duplicate**

As a privileged user, I want to create alerts by duplicating pre-defined templates, so that I can quickly set up new alerts with consistent settings while saving time on manual configuration.

* + User should specify all variable values that are present in the template
  + e.g. when Mary makes more than 10 bank transactions between 1 Jan 2025 to 31 Jan 2025.
  + Set period, frequency, trigger
* **View List of Alert Events**

As a user, I want to view a list of triggered alerts (alert events), so that I can keep track of system activities and monitor incidents.

* + Each alert should contain the following information:
    - The trigger date/time
    - The alert that raised the event
    - The rules (conditions) that triggered the alert
    - Alert specific properties (properties defined during alert creation)
* **Receive Alert Notification**

As a user, I want to receive notifications when alerts are triggered, along with the relevant data, so that I can respond immediately.

* + Visually marked in the GUI (e.g. exclamation mark)
* **View Alert Notification Details**

As a user, I want to view detailed information of the alert when clicked, so that I can understand the severity and take appropriate action.

* + The information should include the following:
    - Alert trigger date/time
    - Name of the alert
    - Entities/relationships related to the alert (configured in the template creation)
* **View List of Alerted Notifications**

As a user, I want to view a list of notifications of alerts, so that I can stay informed about system events or issues that require my attention.

* **View Entities/Relationships of Alert Notification**

As a user, I want to view the entities/relationships of an alert notification in a suitable tool (e.g. Link Analysis Tool, Geographical Tool), so that I can better understand the context and connections involved for more effective investigation and decision-making.

1. **Analytic Views**

* **View Use Cases**

As a user, I want to define up to 8 analytic views based on different use cases, so that I can tailor the analysis dashboard to different investigation needs. (e.g. link chart, map view)