

Appendix A – Technical specifications required to meet functional requirements

1. Technical specifications required to meet general functional requirements

1.1. Proposed NBEPR Design and Capabilities

The proposed NBEPR design and capabilities is informed by the minimum user needs / functional specifications present in previous chapters. In addition, standard web design and development practices will guide the NBEPR design and development process.

1.2. Secure access, user authentication and rights

Services are only accessible to users with verified identities with access services matching their role and access rights. All transactions will be recorded and traced via user credentials. Data and information will be secure and cannot be intercepted by third parties or un-authorized users.

1.3. Search engine

- A search engine will enable users to search the site with the following capabilities:
- Normal text searches for the valid EPC
- Normal text search for EPC information
- Advanced searches by description, title, for accredited inspection bodies

1.4. User Management

- Admin users will have access to manage user profiles, approving user registration, adding new users and deleting users
- Admin users can disable inactive users

1.5. Content / Document Manager

- A secure web-based content management system will be built in as part of the platform. Logged-in admin users (government bodies) can edit and add content to the site using a web browser from anywhere in the world. Content can be added to the live site—no downtime during site updates.
- Metadata should be captured for each content item to define attributes such as title, description and categories to content items. This can then be used to create refined searches
- Flexible rights system for content, giving different users different roles on the site.
- Content management makes use of a submit, review and publish workflow. Users with content or manager roles must approve content generated by users with owner rights before it can be published as publicly visible content.
- Content can be created using HTML format

- All changes to documents can still be undone with an undo system.
- History is maintained of the user, time and comments of a resource for each action taken on it (submit, reject or publish). A complete editing history can be retrieved for each content item. This will be useful when teams co-edit resources that are not in the same physical location.

1.6. Solution Features

The features of the solution should include but not limited to the following features:

TERM	DESCRIPTION
ACCESS TO ONLINE PORTAL	The ability to access the EPC register through an openly accessible online portal
EPC/ADDRESS SEARCH	The ability to search for specific EPCs based on a buildings physical address
VALID EPC PUBLISHED HTML/PDF	Where the EPC register publishes valid EPCs either in Html or PDF format, with the former being an effective means of reducing EPC fraud
LIST OF QUALIFIED ASSESSORS	Where the EPC register makes a list of qualified assessors available to building owners
EPC STATISTICS	Where the EPC register provides consolidated statistics on EPCs issued, e.g. number of EPCs region, average EPC rating, number of EPCs issued in a period, etc.
DATA UPLOAD (MANUAL & AUTOMATIC)	Where the EPC register allows for assessors to either manually enter EPC data on a line by line basis into the register, or to automatically upload bulk EPC data (for one or more buildings) into the register through a populated file (e.g. MS Excel, or an .XML file)
ADDRESS SYSTEM INTEGRATION	Where the EPC register integrates with a live address database, so that buildings be easily and accurately identified when uploading EPC data
EXTERNAL CALCULATION	Where EPC ratings are calculated in a model that is housed on a government-controlled platform, from where adjustments to the model can be centrally made
VALIDATE LOGIC	Where the EPC register incorporates functions for automatically validating EPC data, and preventing data upload/raising flags where data might be invalid
EPC PUBLISHED SANAS AND COMPANY LOGO WITH RATING INFO	Where the EPC generated for print or download is standard with SANAS and company logo and rating information

USER MANAGEMENT	Where an administrator can manage various categories of EPC register users
CONTENT MANAGEMENT	Where an administrator can manage the content that is displayed on the EPC register
DATA MANAGEMENT	Where an administrator can manage EPC, databases contained on the backend of the EPC register
DATA EXTRACTION	Where an administrator/super user can extract EPC data from the EPC register, either in part. Data can be used to for monitoring and setting EE targets

1.7. User Classes and Characteristics

The following user classes are identified

Admin/Superusers

- SANEDI personnel / DMRE personnel

Registered Users

- SANAS accredited inspection bodies
- Building owners

Public Users / Building Owners

- Web-users

1.8. Operating Environment

The NBEPR platform should be developed to operate within an operating environment compatible with all web browsers and mobile responsiveness.

1.9. Design and Implementation Constraints

No design limitations have been identified thus far.

1.10. User Documentation

Detailed training documentation must be provided for all the functions of the solution.

1.11. Requirements: Assumptions and Dependencies

There are no requirement assumptions and dependencies currently.

1.12. Requirements: Constraints

Time constraints are critical as the solution needs to be implemented within the time frame specified in the project plan.

2. Technical specifications required to meet functional requirements related to user needs

The user requirements are formulated using the desktop analysis and key stakeholder interviews for a fully functioning NBEPR.

2.1. Functional Requirements

2.1.1. Functional Requirement 1

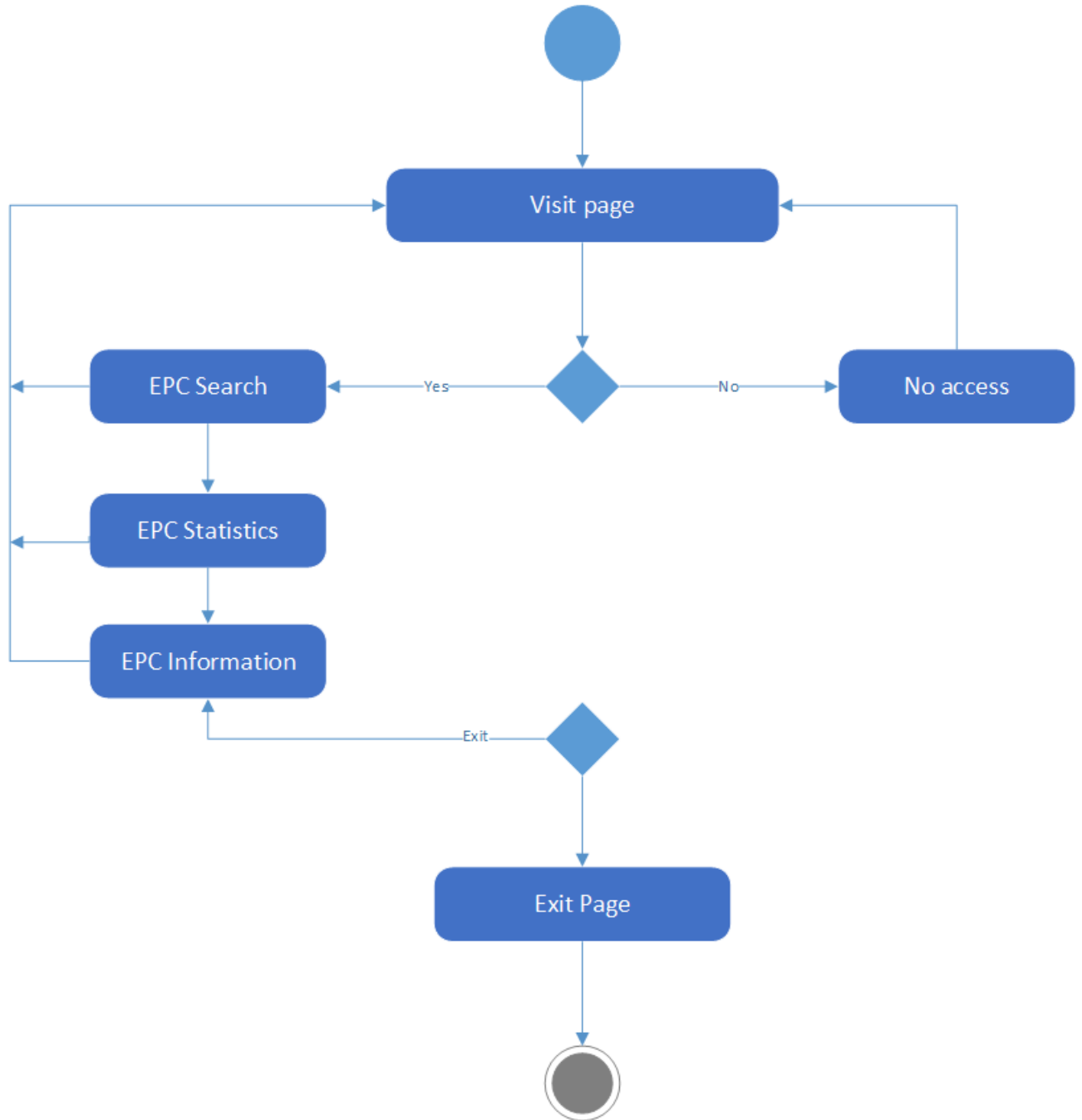
Workflow:

Public user can access the online web portal and is able to:

- EPC search,
- view consolidated EPC statistics and
- view EPC information

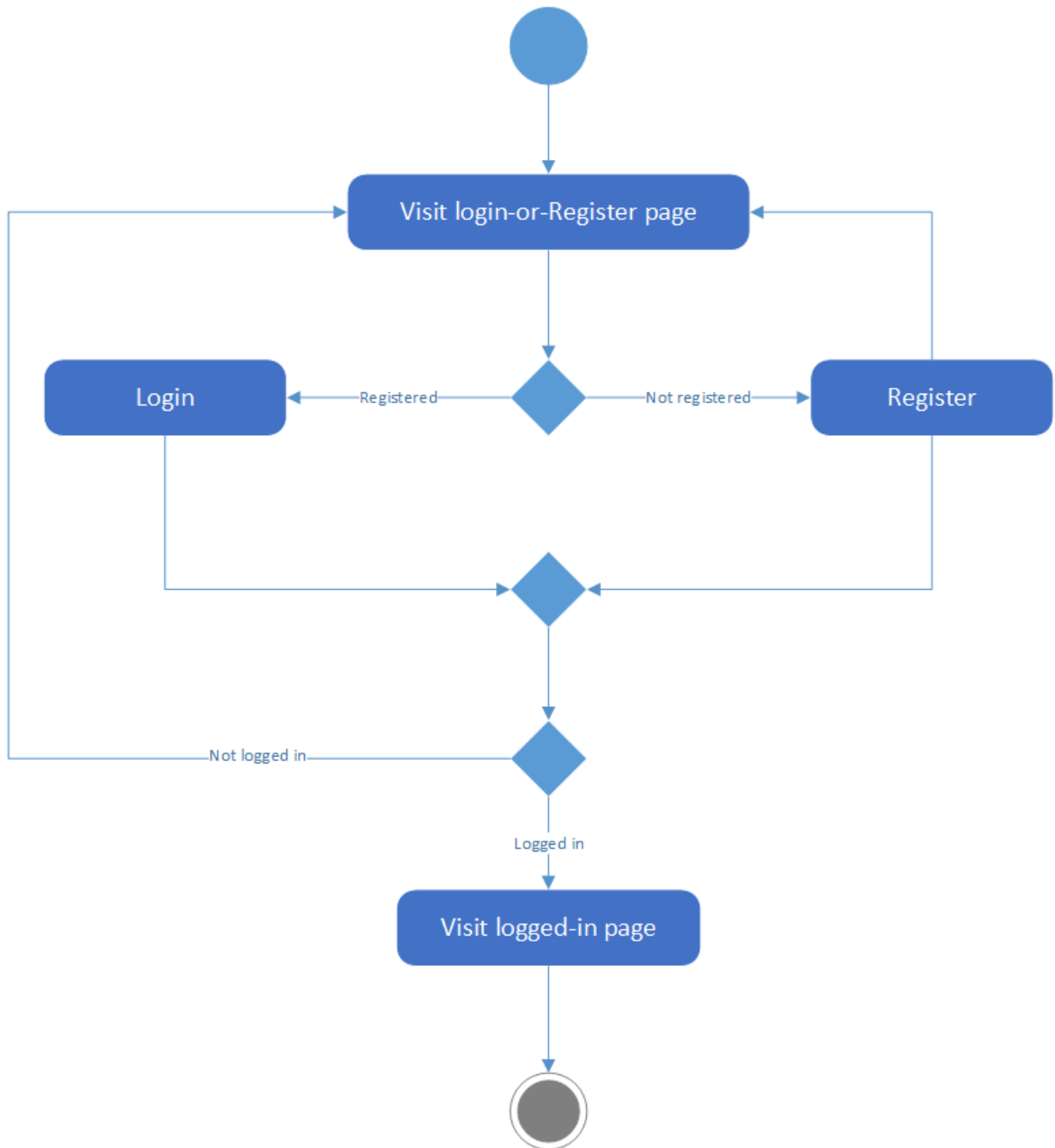
- If in line with the regulation: send a copy of the displayed EPC to SANEDI

Public User



Users are able to register and login based on access privileges. User roles are admin (SANEDI), super user (DMRE) and Registered user (SANAS accredited bodies).

Login/Register



The following fields will be required for registration by SANAS accredited bodies.

FIELD	DATATYPE
NAME	VARCHAR2
SURNAME	VARCHAR2
CONTACT NUMBER	NUMBER
ADDRESS	VARCHAR2
EMAIL	VARCHAR2
COMPANY NAME	VARCHAR2
SANAS ACCREDITATION NO	NUMBER

Technical specification:

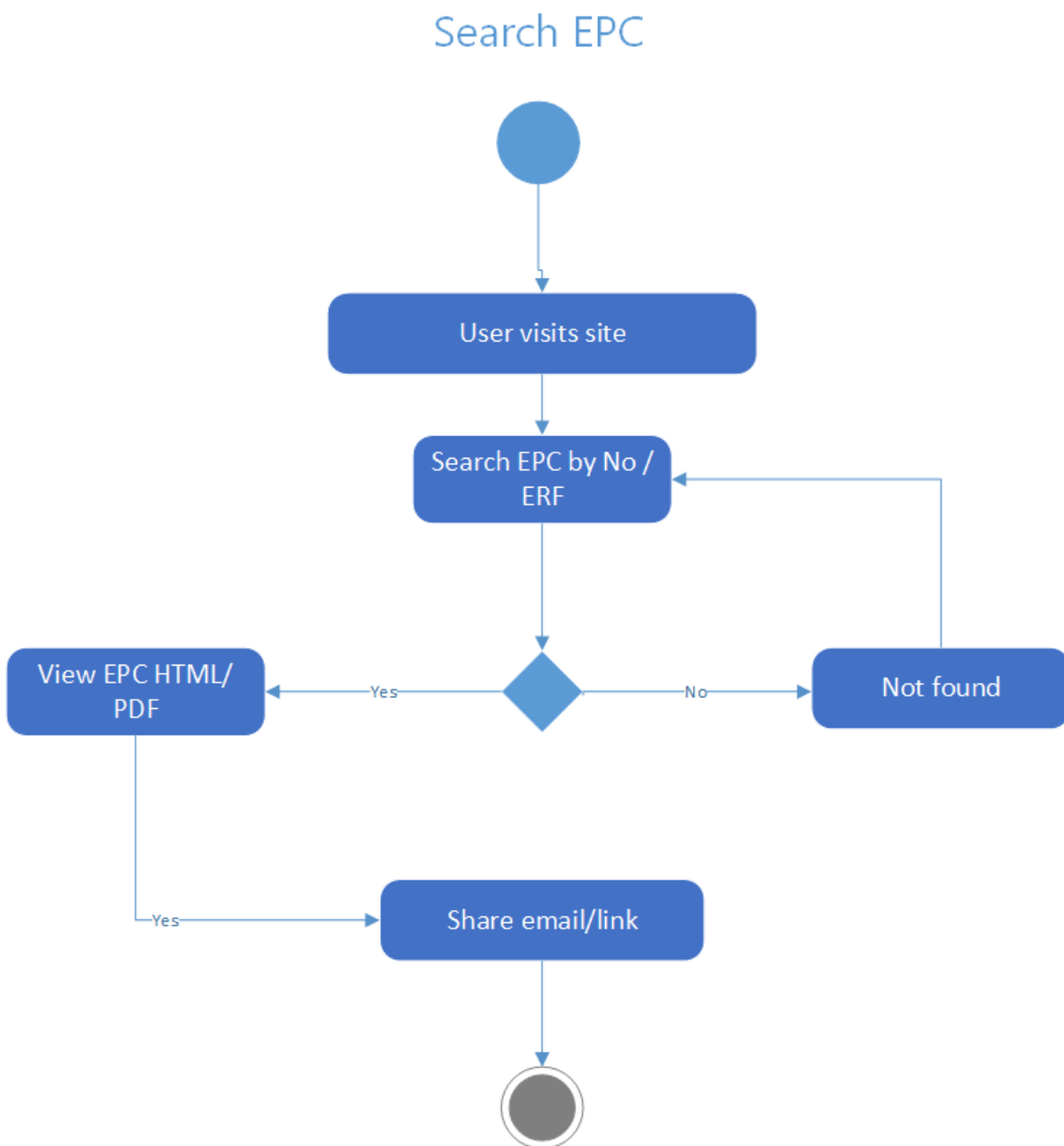
USE CASE NAME:	Browse, Register, Login	USE CASE TYPE
USE CASE ID:	001	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	All users	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where a user can browse any information posted on the Public view domain.	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user routes to the web address	Step 2: System loads the website landing page
	Step 3: The user browses the site for the target information site	Step 4: The System loads the user-selected pages
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User Registers	
	Alt step 3: User logs in to browse functionality as per user rights	
CONCLUSION:	Necessary information is obtained.	

POST-CONDITION:	The user has exited the site
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible
ASSUMPTIONS:	The user has basic computer skills to navigate a website
BUSINESS PROCESS	The following information must be captured and available: Browse, Register, Login

2.1.2. Functional Requirement 2

Workflow:

All users will be able to search for valid EPC and view it online.



Technical specification:

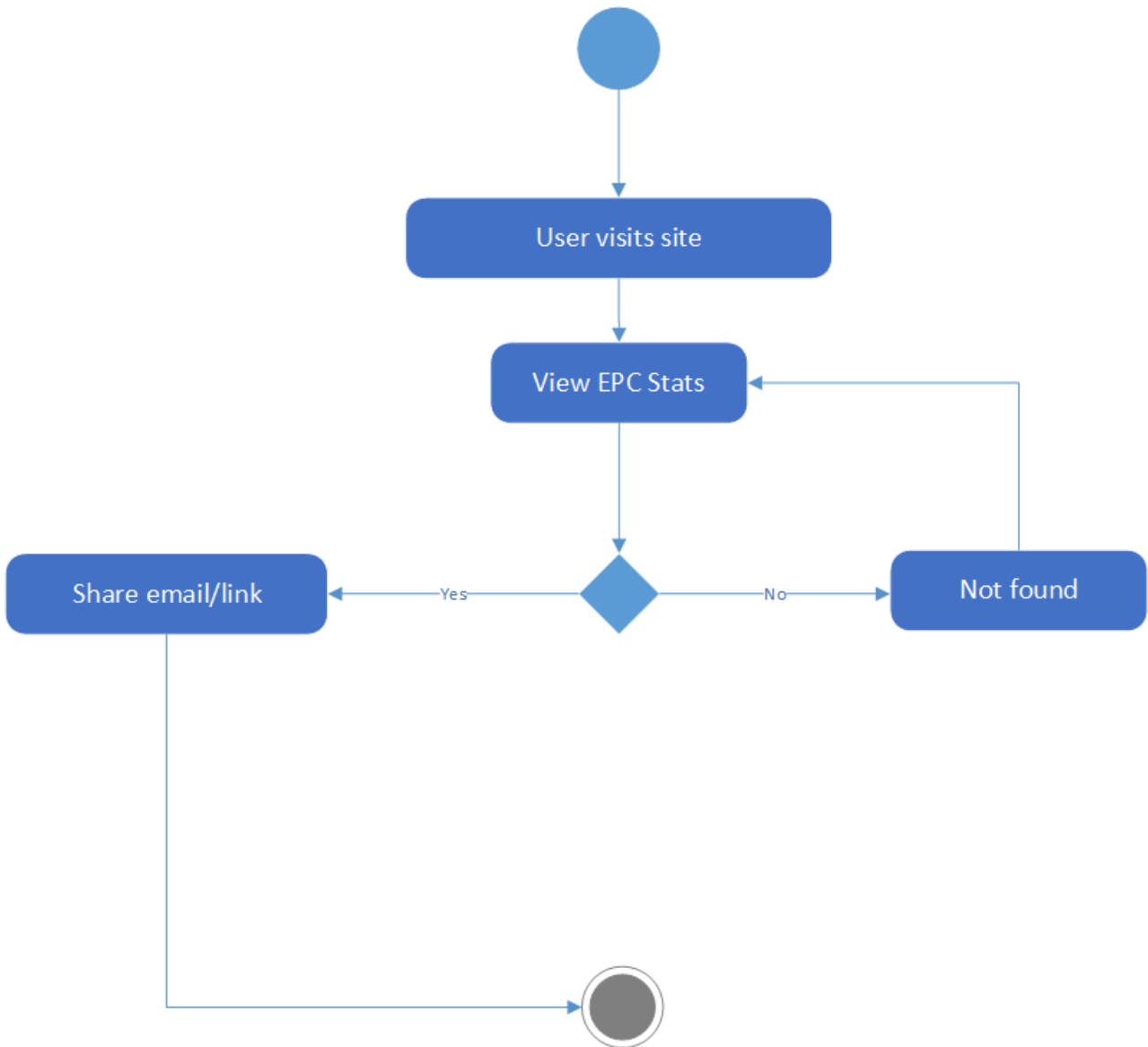
USE CASE NAME:	Search EPC	USE CASE TYPE
USE CASE ID:	002	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	All users	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where a user can browse any information posted on the Public view domain.	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user routes to the web address	Step 2: System loads the website landing page
	Step 3: The user searches for EPC	Step 4: The System loads the user-selected search
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browses other functionality on site	
	Alt step 3: User browses other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Search EPC	

2.1.3. Functional Requirement 3

Workflow:

All users will be able to view EPC statistics on the webpage:

View EPC Stats



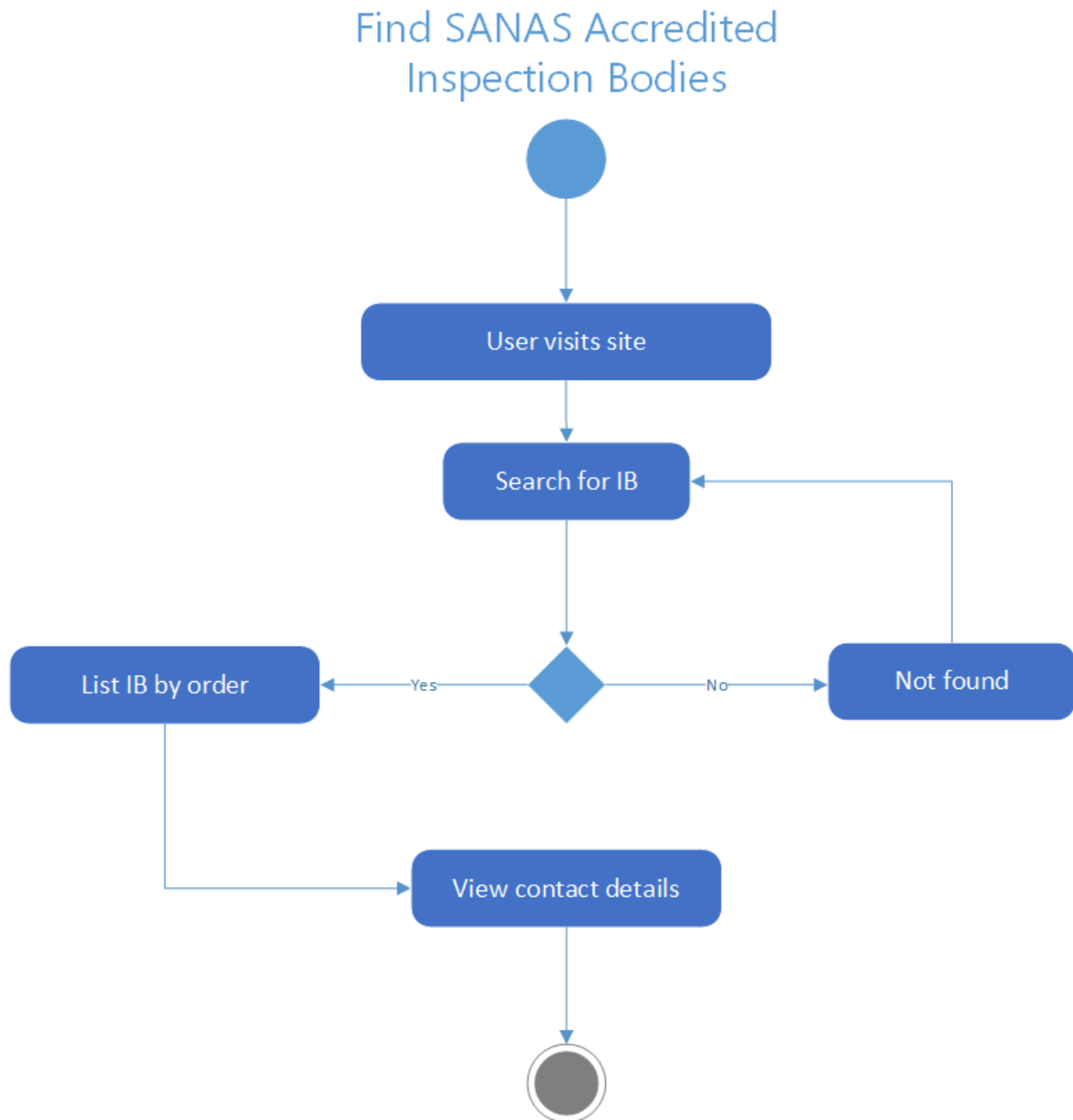
Technical specification:

USE CASE NAME:	View EPC Statistics	USE CASE TYPE
USE CASE ID:	003	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	All users	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where a user can view EPC statistics	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user routes to the web address	Step 2: System loads the website landing page
	Step 3: The user views EPC statistics	Step 4: The System loads the user-selected search
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: View EPC Statistics	

2.1.4. Functional Requirement 4

Workflow:

All users will be able to find SANAS accredited Inspection Bodies.



Technical specification:

USE CASE NAME:	Find accredited inspection bodies	USE CASE TYPE
USE CASE ID:	004	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	All users	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where a user can search for accredited inspection body	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user routes to the web address	Step 2: System loads the website landing page
	Step 3: The user searches for accredited inspection body	Step 4: The System loads the user-selected search
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Search for accredited inspection body	

2.1.5. Functional Requirement 5

Workflow:

Same as workflow shown in Functional Requirement 5

Technical specification:

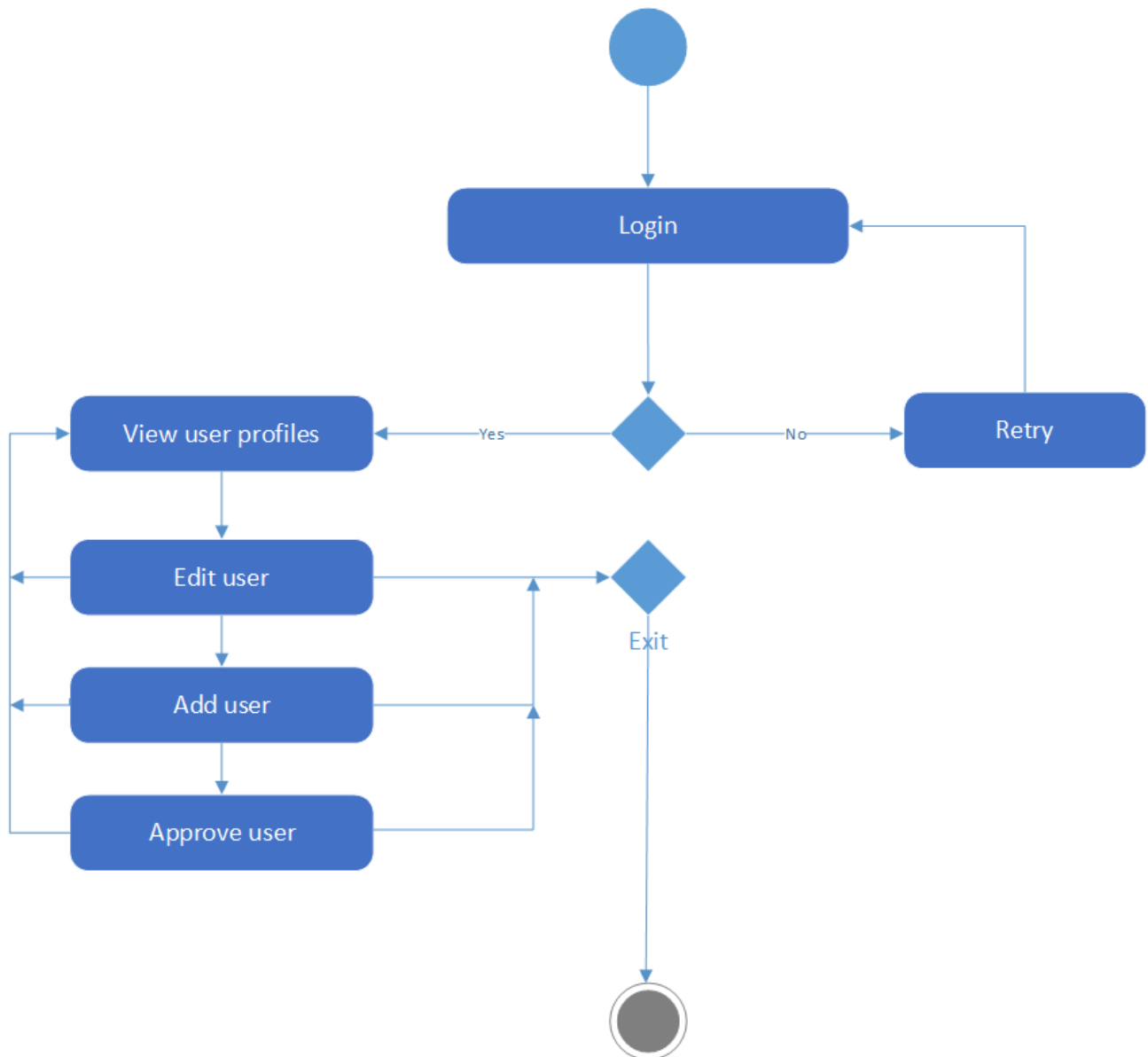
USE CASE NAME:	View valid EPC online	USE CASE TYPE
USE CASE ID:	005	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	All users	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where a user view valid EPC online	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user routes to the web address	Step 2: System loads the website landing page
	Step 3: The user searches for EPC and views EPC online	Step 4: The System loads the user-selected search
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: View valid EPC online	

2.1.6. Functional Requirement 6

Workflow:

Admin user will be able to manage users, approve registration.

Admin User Management



Technical specification:

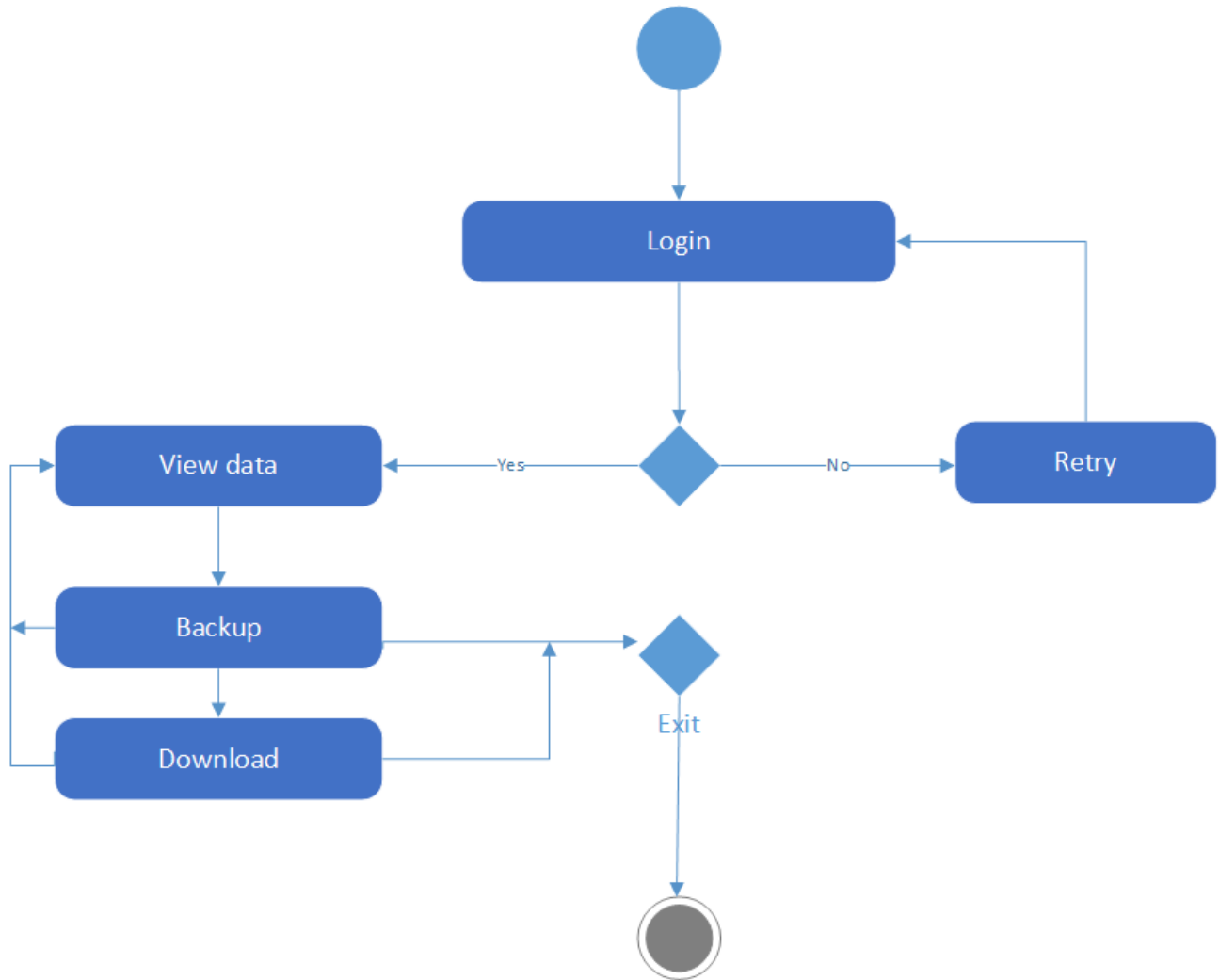
USE CASE NAME:	User Management	USE CASE TYPE
USE CASE ID:	006	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	Government Bodies (SANEDI)	
OTHER PARTICIPATING ACTORS:	DMRE	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where an admin user can manage users	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user logs in	Step 2: System loads the website admin panel
	Step 3: The user views user management menu	Step 4: The System loads the user-selected function
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: User management	

2.1.7. Functional Requirement 7

Workflow:

Admin User will be able to manage data, backups and maintenance.

Data Management



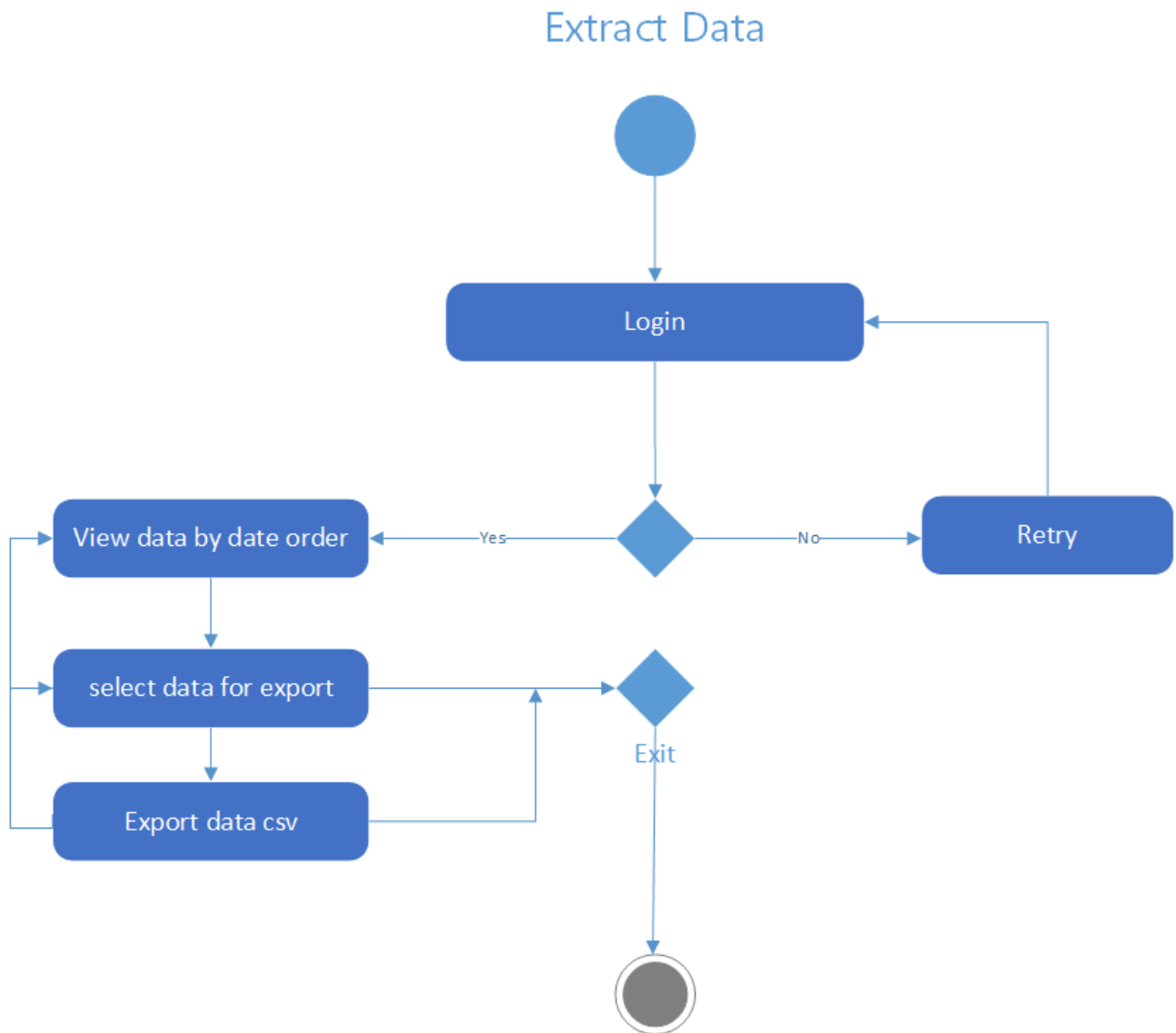
Technical specification:

USE CASE NAME:	Data Management	USE CASE TYPE
USE CASE ID:	007	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	Government Bodies (SANEDI)	
OTHER PARTICIPATING ACTORS:	DMRE	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where an admin user can manage data	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user logs in	Step 2: System loads the website admin panel
	Step 3: The user views data management menu	Step 4: The System loads the user-selected function
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Data management	

2.1.8. Functional Requirement 8

Workflow:

Admin User will be able to extract data for monitoring and modelling.



Technical specification:

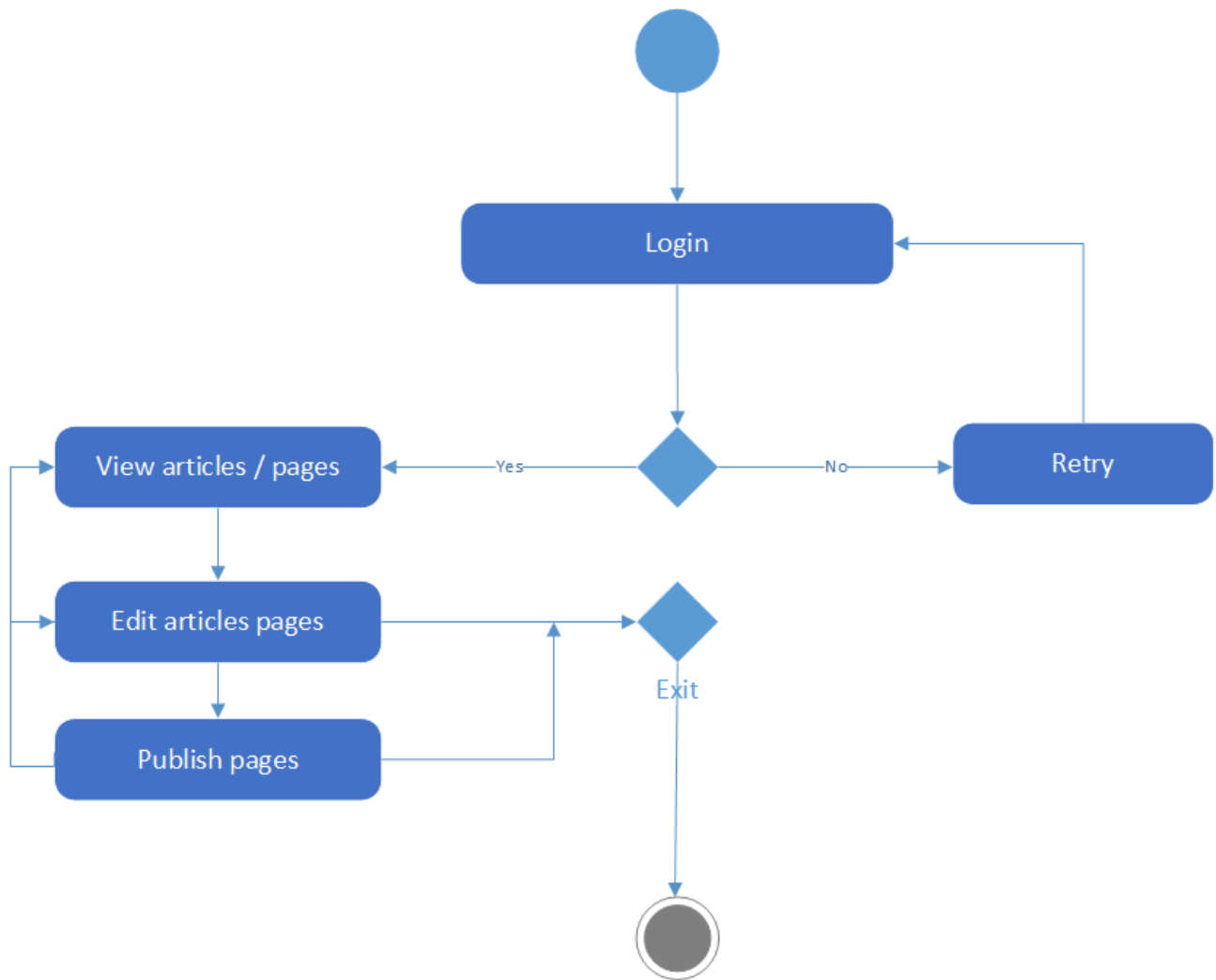
USE CASE NAME:	Data Extraction	USE CASE TYPE
USE CASE ID:	008	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	Government Bodies (SANEDI)	
OTHER PARTICIPATING ACTORS:	DMRE	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where an admin user can extract data	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user logs in	Step 2: System loads the website admin panel
	Step 3: The user views data extraction menu	Step 4: The System loads the user-selected function
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browses other functionality on site	
	Alt step 3: User browses other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Data extraction	

2.1.9. Functional Requirement 9

Workflow:

Admin user will be able to manage content and maintenance.

Content Management



Technical specification:

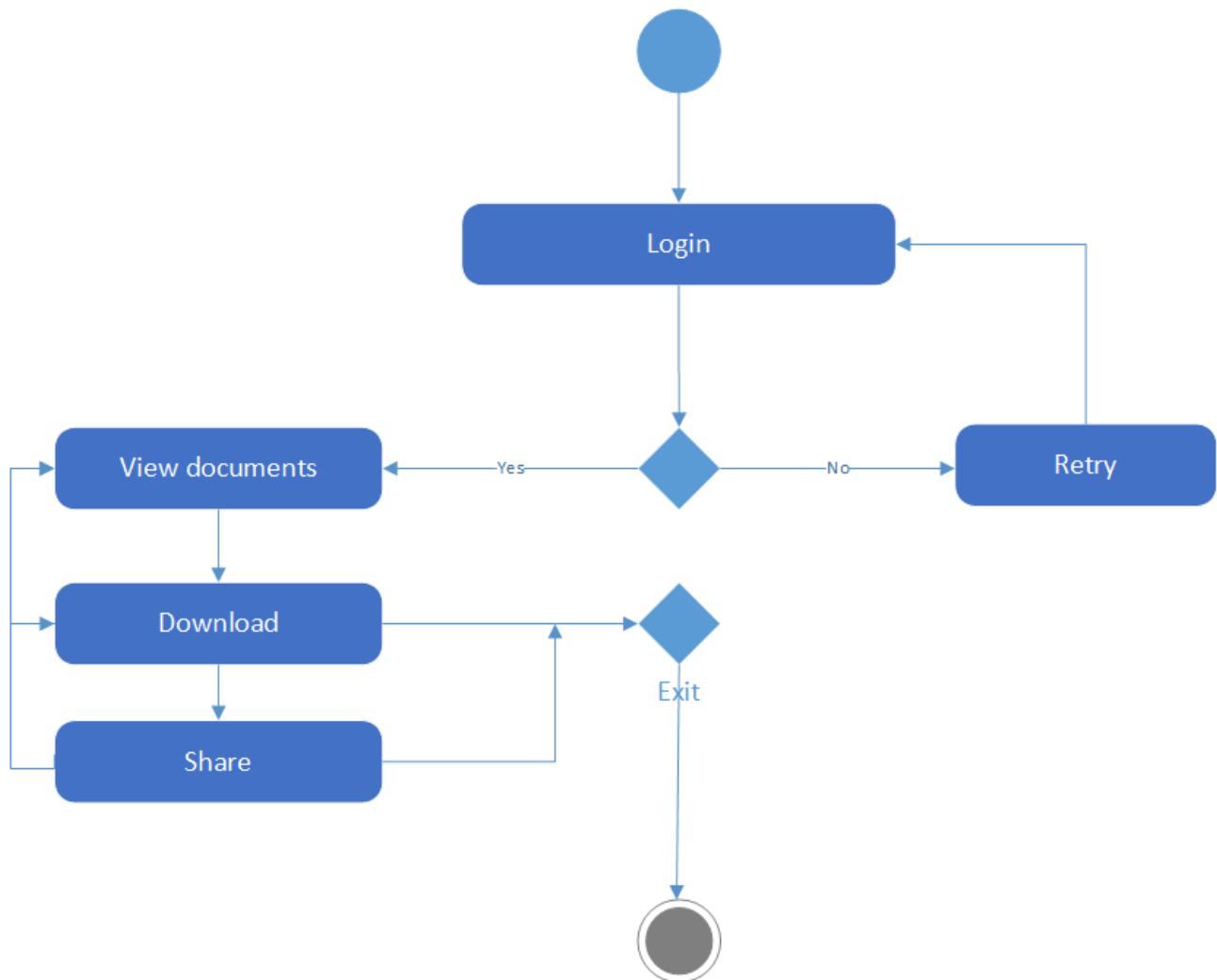
USE CASE NAME:	Content Management	USE CASE TYPE
USE CASE ID:	009	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	Government Bodies (SANEDI)	
OTHER PARTICIPATING ACTORS:	DMRE	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where an admin user can manage content	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user logs in	Step 2: System loads the website admin panel
	Step 3: The user views content management menu	Step 4: The System loads the user-selected function
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browsers other functionality on site	
	Alt step 3: User browsers other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Content management	

Functional Requirement 10

Workflow:

Admin User will be able to manage documents, backups and maintenance.

Document Management



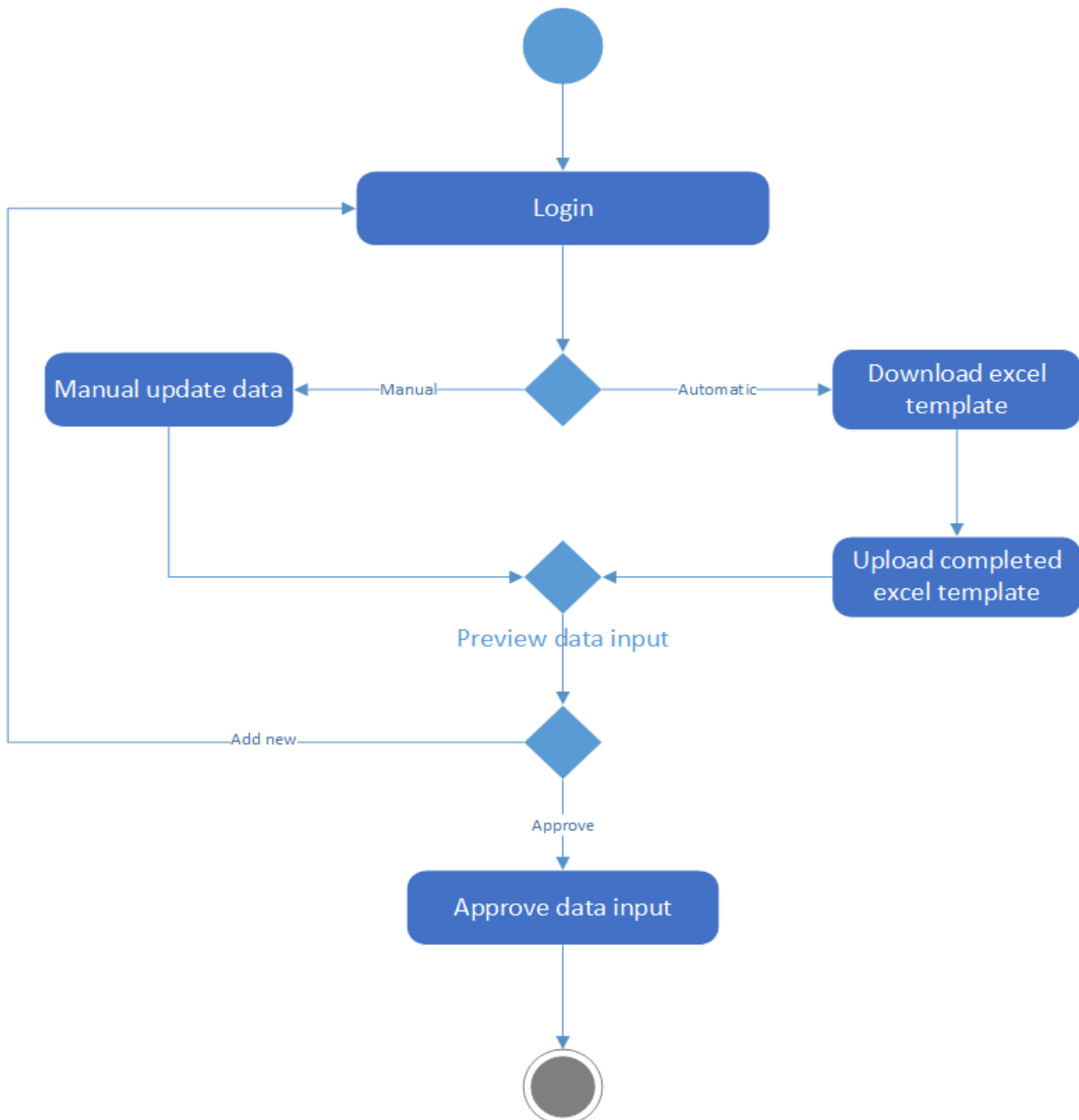
Technical specification:

USE CASE NAME:	Document Management	USE CASE TYPE
USE CASE ID:	010	
PRIORITY:	High	Business Requirements
SOURCE:	Requirement analysis	
PRIMARY BUSINESS ACTOR:	Government Bodies (SANEDI)	
OTHER PARTICIPATING ACTORS:	DMRE	
OTHER INTERESTED STAKEHOLDERS:	Project Management Team	
DESCRIPTION:	This use case describes an event where an admin user can manage documents	
PRE-CONDITION:	The System must be available. The user must have a compatible web browser installed. The information must be ready & available for consumption.	
TRIGGER:	User needs to browse the site	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user logs in	Step 2: System loads the website admin panel
	Step 3: The user views document management menu	Step 4: The System loads the user-selected function
	Step 5: User selects to exit	Step 6: The System will close the site
ALTERNATE COURSES:	Alt step 3: User browses other functionality on site	
	Alt step 3: User browses other functionality on site	
CONCLUSION:	Necessary information is obtained.	
POST-CONDITION:	The user has exited the site	
BUSINESS RULES	The information must be displayed appropriately & be accurate and as current as possible	
ASSUMPTIONS:	The user has basic computer skills to navigate a website	
BUSINESS PROCESS	The following information must be captured and available: Document management	

2.1.10. Functional Requirement 11

Workflow:

Add building information



Registered User will be able to upload data into the NBEPR manually or automatically using an excel template (refer to section 7 for the minimum list of data fields that this excel template must contain).

Technical specification:

USE CASE NAME:	Data Input and Upload	USE CASE TYPE
USE CASE ID:	011	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the registered user can upload data manually or via excel template	
PRE-CONDITION:	A user must be registered in order to be able upload data User must be logged in to be able to input or upload data	
TRIGGER:	The user wants to input or upload data	
BUSINESS PROCESS	User inputs data manually or via an excel template for multiple buildings	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user opens manual data input menu	Step 2: The System displays a form for data input
	Step 3: The user inputs data manually and submits	Step 4: The System provides a time stamp and commits the form entry
	Step 5: The System will display a page showing all recorded inputs	Step 6: The use case ends
ALTERNATE COURSES:	Alt step 3: The user selects excel template data upload for multiple buildings	
CONCLUSION:	Data inputs are captured and displayed appropriately.	
POST-CONDITION:	The user can preview data inputs	
BUSINESS RULES	Data inputs are done manually or via excel template upload	
ASSUMPTIONS:	None	
BUSINESS PROCESS	Manual data input or excel template upload	
DATA CATEGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until	

2.1.11. Functional Requirement 12

Workflow:

Same as workflow shown in Functional Requirement 11

Technical specification:

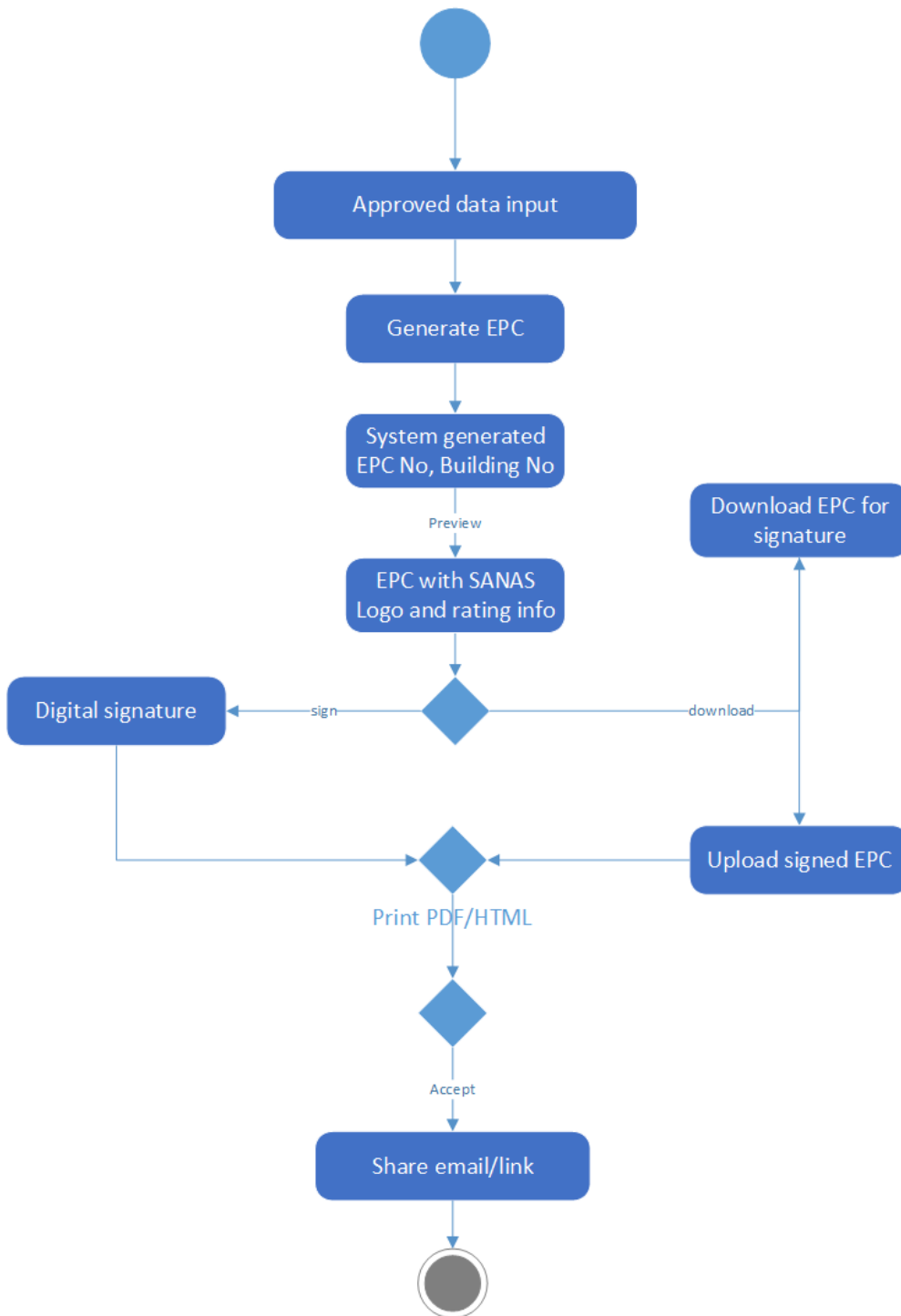
USE CASE NAME:	Data Variables Validation	USE CASE TYPE
USE CASE ID:	005	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the registered users input, or upload data and the System validate the data variables and calculation	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data	
TRIGGER:	The user submits data entry to System	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user will submit data entry in the System	Step 2: The System opens a window that allows validation of variables and calculation
	Step 3: The System displays an approved message	Step 4: The user accepts the approval
	Step 5: The user can preview validated data inputs	Step 6: The use case ends
ALTERNATE COURSES	Alt step 3: The System displays error message that data input is not valid	
	Alt step 4a: The user can make changes and re-submit	
CONCLUSION:	Transactions are recorded	
POST-CONDITION:	Users can preview validated data inputs	
BUSINESS RULES	Data input or upload is validated based on variables and calculations	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User submits data input or upload; Data variables and calculation is validated	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until	
OPEN ISSUES:	External calculation engine is used by SANS accredited inspection bodies. The System will use a built-in calculation engine to validate calculations submitted	

2.1.12. Functional Requirement 13

Workflow:

Registered User - system generated unique EPC No, Unique building No. Registered User - system generated preview of EPC for approval. Registered User - system generated EPC in PDF/Html file with SANAS Logo, company logo & rating information. Registered User will be able to sign digitally or download to manually sign. Registered User will be able to print signed EPC or download for manual signature. Registered User will be able to upload manually signed EPC

Generate EPC



Technical specification:

USE CASE NAME:	System generated EPC No	USE CASE TYPE
USE CASE ID:	006	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the System generates a unique EPC No	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated	
TRIGGER:	The user submits previewed validated data entry	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user will submit validated data entry in the System	Step 2: The System generates a unique EPC No
	Step 3: The System displays a success message with unique EPC No	Step 4: The user accepts the approval
	Step 5: The user can preview Unique EPC No	Step 6: The use case ends
CONCLUSION:	Transactions are recorded	
POST-CONDITION:	Users can preview Unique EPC No	
BUSINESS RULES	System generated Unique EPC No	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User submits validated data input, System generates Unique EPC No	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until	

2.1.13. Functional Requirement 14

Workflow:

Same as workflow shown in Functional Requirement 13

Technical specification:

USE CASE NAME:	Preview	USE CASE TYPE
USE CASE ID:	007	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the System generates a unique EPC, that includes SANAS Logo and company logo, sows rating from A-G preview	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated System generated Unique EPC No	
TRIGGER:	System generated Unique EPC No	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user accepts the Unique EPC No generated by the System	Step 2: The System generates a unique EPC
	Step 3: The System displays a success message with unique EPC with data categories, that includes SANAS Logo and company logo, sows rating from A-G as per SANS 1544/10400	Step 4: The user accepts the system message
	Step 5: The user can preview Unique EPC	Step 6: The use case ends
CONCLUSION:	Transactions are recorded	
POST-CONDITION:	Users can preview Unique EPC	
BUSINESS RULES	System generated Unique EPC	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User accepts Unique EPC No; system generates Unique EPC	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic	

zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until

2.1.14. Functional Requirement 15

Workflow:

Same as workflow shown in Functional Requirement 13

Technical specification:

USE CASE NAME:	Issue EPC PDF/Html	USE CASE TYPE
USE CASE ID:	015	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the System generates a unique EPC, that includes SANAS Logo and company logo, sows rating from A-G	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated System generated Unique EPC No	
TRIGGER:	System generated Unique EPC No	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user accepts the Unique EPC No generated by the System	Step 2: The System generates a unique EPC
	Step 3: The System displays a success message with unique EPC with data categories, that includes SANAS Logo and company logo, sows rating from A-G	Step 4: The user accepts the system message
	Step 5: The user can preview Unique EPC	Step 6: The use case ends
CONCLUSION:	Transactions are recorded	
POST-CONDITION:	Users can preview Unique EPC	
BUSINESS RULES	System generated Unique EPC	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User accepts Unique EPC No; system generates Unique EPC	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End	

(date), Energy used [KWh], Energy Source: Gas, From (date),
End (date), Energy used [KWh], Energy Source: Other, From
(date), End (date), Energy used [KWh], Energy used outside net
floor area, Benchmark [kWh/(m2.a)], Performance
[kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference
value, Performance scale, Accredited body, Accreditation
number, Assessor name, Date of issue, Valid until

2.1.15. Functional Requirement 16

Workflow:

Same as workflow shown in Functional Requirement 13

Technical specification:

USE CASE NAME:	Download for signature or digital signature	USE CASE TYPE Business Requirements
USE CASE ID:	016	
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the System generates a unique EPC that can be signed digitally or manually and uploaded	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated System generated Unique EPC No System generated Unique EPC	
TRIGGER:	System generated Unique EPC Preview	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user digitally signs Unique EPC	Step 2: The System generates a unique EPC digitally signed
	Step 3: The System displays a success message with unique EPC with data categories, that includes SANAS Logo and company logo, sows rating from A-G as per SANS 1544	Step 4: The user accepts the system message
	Step 5: The user can preview Unique EPC that is digitally signed	Step 6: The use case ends
ALTERNATE COURSES:	Alt step 1: The user downloads Unique EPC for manual signature Alt step 1a: User manually signs downloaded Unique EPC Alt step 2a: User uploads manually signed Unique EPC	
CONCLUSION:	Transactions are recorded, Unique EPC is stored in document manager	
POST-CONDITION:	Users can preview Unique EPC; public users can search Unique EPC	
BUSINESS RULES	System generated Unique EPC digitally signed	
ASSUMPTIONS:	None	

BUSINESS PROCESS

User accepts Unique EPC No; system generates Unique EPC

DATA CATEGORIES

Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until

2.1.16. Functional Requirement 17

Workflow:

Same as workflow shown in Functional Requirement 13

Technical specification:

USE CASE NAME:	Export / Print signed or digital signature	USE CASE TYPE
		Business Requirements
USE CASE ID:	017	
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the System generates a unique EPC that can be printed or exported in to Pdf/Html	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated System generated Unique EPC No System generated Unique EPC	
TRIGGER:	System generated Unique EPC Preview	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user preview signed EPC	Step 2: The System generates provides option to print or export into PDF/Html
	Step 3: User selects option to print or export	Step 4: The System displays a success message
	Step 5: The user can download valid EPC	Step 6: The use case ends
ALTERNATE COURSES:	Alt step 1: The user downloads Unique EPC for manual signature Alt step 1a: User manually signs downloaded Unique EPC Alt step 2a: User uploads manually signed Unique EPC	
CONCLUSION:	Transactions are recorded, Unique EPC is stored in document manager	
POST-CONDITION:	Users can preview Unique EPC; public users can search Unique EPC	
BUSINESS RULES	System generated Unique EPC digitally signed	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User accepts Unique EPC No; system generates Unique EPC	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval,	

Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From (date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until

2.1.17. Functional Requirement 18

Workflow:

Same as workflow shown in Functional Requirement 13

Technical specification:

USE CASE NAME:	Upload manually signed EPC	USE CASE TYPE
USE CASE ID:	018	Business Requirements
PRIORITY:	High	
SOURCE:	Requirement Analysis	
PRIMARY BUSINESS ACTOR:	Registered User (SANAS Accredited Inspection Body)	
OTHER PARTICIPATING ACTORS:	SANEDI Staff	
OTHER INTERESTED STAKEHOLDERS:	Project Team	
DESCRIPTION:	This use case describes an event where the user is able to upload manually signed EPC	
PRE-CONDITION:	The System is available, The user is logged in The user inputs or uploads data The data is validated System generated Unique EPC No System generated Unique EPC	
TRIGGER:	System generated Unique EPC Preview	
TYPICAL COURSE OF EVENTS:	Actor Action	System Response
	Step 1: The user has option to upload in menu	Step 2: User uploads
	Step 3: The System displays a success message	Step 4: The use case ends
ALTERNATE COURSES:	Alt step 1: The user downloads Unique EPC for manual signature Alt step 1a: User manually signs downloaded Unique EPC Alt step 2a: User uploads manually signed Unique EPC	
CONCLUSION:	Transactions are recorded, Unique EPC is stored in document manager	
POST-CONDITION:	Users can preview Unique EPC; public users can search Unique EPC	
BUSINESS RULES	System generated Unique EPC digitally signed	
ASSUMPTIONS:	None	
BUSINESS PROCESS	User accepts Unique EPC No; system generates Unique EPC	
DATA CATAGORIES	Certificate number, Name, Address line 1, Address line 2, Address line 3, Address line 4, Owner, Occupancy Class/es, Number of floors, Year of construction, Building plan approval, Occupancy certificate, Year of last major renovation, Climatic zone, Cadastral information, Net floor area, Occupancy rate (in net floor area), Energy Source: Electricity , From (date), End (date), Energy used [KWh], Energy Source: Gas, From (date), End (date), Energy used [KWh], Energy Source: Other, From	

(date), End (date), Energy used [KWh], Energy used outside net floor area, Benchmark [kWh/(m2.a)], Performance [kWh/(m2.a)], Variance [kWh/(m2.a)], Multiple of reference value, Performance scale, Accredited body, Accreditation number, Assessor name, Date of issue, Valid until

Appendix B – Technical specifications required to meet non-functional requirements

1. Design overview

The NBEPR design follows standard web design and development practices.

2. Architectural Goals and Constraints

The overall architecture goals of the System are to provide a highly available and user-friendly web portal for NBEPR users, to understand what programs and services are available.

A key architectural goal is to leverage industry open source best practices for designing and developing a Web Portal that has a Content Management System (CMS). To meet this goal, the design of the NBEPR will be based on industry-standard development guidelines.

3. Guiding Principles

Guiding principles provide a foundation upon which to develop the target architecture for NBEPR in part by setting the standards and measures that the System must satisfy. These, in turn drive design principles that can be used to validate the design and ensure that it is aligned with ITIL's overall Architecture, Design Principles and Standards.

Some of the guiding principles that should be followed during the NBEPR design and development are outlined below.

Scalable:

Scalability is the ability of the platform to scale both up and down to support varying numbers of users or transaction volumes. The application should be able to scale horizontally (by adding more servers) or vertically (by increasing hardware capacity or software efficiency).

Flexible:

Flexibility is the application's ability to adapt and evolve to accommodate new requirements without affecting the existing operations. This relies on a modular architecture, which isolates the complexity of integration, presentation, and business logic from each other in order to allow for the easy integration of new technologies and processes within the application.

Standards-Based:

The NBEPR should comply with established industry standards. The standards compliance will apply to application development and design, platform/infrastructure, and other parts of the NBEPR application. W3C standards should be used to build rich interactive experiences with capable data stores accessible to any device. The NBEPR should use best W3C best practices in HTML, CSS, SVG, WOFF, the Semantic Web stack, XML, and various APIs.

4. UX/UI Design Patterns

Design patterns are elements of any web portal. Existing design pattern catalogues can be used for the design of the NBEPR.

User experience focuses on having a deep understanding of the users, what the users need, their abilities and limitations. The following are for design consideration:

- **Consistency:** In its broadest sense, means that the designs and functionality are consistent throughout all of the pages and products.
- **Accessibility:** Make your designs easy for everyone to use, including people with disabilities, this will allow users to have a great experience.
- **Usability testing:** Implement a user-centric design strategy, this means that designers must consult users at the beginning of the design process.
- **Usable:** The web portal or the system must be easy to use.
- **Desirable:** Pictures, brand and other design elements are utilized to inspire feeling
- **Findable:** Content should be navigable online
- **Useful:** Content should be unique.
- **Accessible:** Content should be available to everyone
- **Credible:** Clients must believe and accept what you tell them

User interface design centres on foreseeing what clients might need to do and guaranteeing that the interface has components that are simple to access, understand and utilize to facilitate those actions.

User interface brings together concepts from interaction design, visual design, and information architecture. Interface elements needed are:

- **Input controls:** Text fields, radio buttons, dropdown lists, buttons, checkboxes, date fields, toggles, etc.
- **Checkboxes-** Checkboxes allow the user to select one or more options from a set. It is usually best to present checkboxes in a vertical list. More than one column is acceptable as well if the list is long enough that it might require scrolling or if comparison of terms might be necessary.
- **Radio buttons -** Radio buttons are used to allow users to select one item at a time.
- **Dropdown lists -** Dropdown lists allow users to select one item at a time, similarly to radio buttons, but are more compact allowing you to save space. Consider adding text to the field, such as 'Select one' to help the user recognize the necessary action.
- **List boxes -**List boxes, like checkboxes, allow users to select multiple items at a time but are more compact and can support a longer list of options if needed.
- **Buttons -** A button indicates an action upon touch and is typically labelled using text, an icon, or both.
- **Toggles -** A toggle button allows the user to change a setting between two states. They are most effective when the on/off states are visually distinct.
- **Text fields -** Text fields allow users to enter text. It can allow either a single line or multiple lines of text.

- Dropdown button - The dropdown button consists of a button that when clicked displays a drop-down list of mutually exclusive items.
- Date and time pickers - A date picker allows users to select a date and/or time. By using the picker, the information is consistently formatted and input into the system.
- Navigation components: Search field, slider, tags, icons, etc.
- Breadcrumb - Breadcrumbs allow users to identify their current location within the system by providing a clickable trail of proceeding pages to navigate by.
- Search Field - A search box allows users to enter a keyword or phrase(query) and submit it to search the index with the intention of getting back the most relevant results. Typically search fields are single-line text boxes and are often accompanied by a search button.
- Tags - Tags allow users to find content in the same category. Some tagging systems allow users to apply their own tags to content by entering them into the system.
- Pagination - Pagination divides content up between pages and allows users to skip between pages or go in order through the content.
- Sliders - A slider, also known as a track bar, allows users to set or adjust a value. When the user changes the value, it does not change the format of the interface or other info on the screen.
- Icons - An icon is a simplified image serving as an intuitive symbol that is used to help users to navigate the system. Typically, icons are hyperlinked.
- Image Carousel - Image carousels allow users to browse through a set of items and make a selection of one if they so choose. Typically, the images are hyperlinked.
- Information components: Progress bar, notifications, message boxes, tooltips, etc.
- Progress Bars - A progress bar indicates where a user is as they advance through a series of steps in a process. Typically, progress bars are not clickable.
- Notifications - A notification is an update message that announces something new for the user to see. Notifications are typically used to indicate items such as, the successful completion of a task, or an error or warning message.
- Tool Tips - A tooltip allows a user to see hints when they hover over an item indicating the name or purpose of the item.
- Message Boxes - A message box is a small window that provides information to users and requires them to take an action before they can move forward.
- Modal Window (pop-up) - A modal window requires users to interact with it in some way before they can return to the system.
- Containers: accordion
- Accordion - An accordion is a vertically stacked list of items that utilizes show/ hide functionality. When a label is clicked, it expands the section showing the content within. There can be one or more items showing at a time and may have default states that reveal one or more sections without the user clicking.
- A generic user interface for building operating systems should meet the following requirements:
- Responsiveness: The generic user interface should be responsive. The responsiveness should be able to work in different types of devices and provide consistent experience to users.

- **Role Management:** The user interface should be able to accommodate different users that use the software system. An admin user interface design should be different from a building owner user interface and so on. It is important to be able to identify the users' roles on the system, hence this will give each type of user different permissions to access the system. Public users or general users should be identified to be able to restrict access to some information belonging to the building owner.
- **Configurability:** Displayed content, layouts and appearance features of the user interface can be custom-made according to their preferences.

Considerations for good interface design:

- **User control and freedom:** Provide users with a digital area where they can take backward movements, such as undoing and redoing earlier actions.
- **Error prevention:** Design systems in such a way that potential errors are minimized to a minimum whenever possible. Users dislike being asked to identify problems that are sometimes beyond their scope of knowledge. Error prevention can be accomplished by either eliminating or flagging actions that may result in errors.
- **Flexibility and efficiency of use:** These are two important factors to consider. As the number of users grows, so does the demand for fewer interactions and faster navigation. Abbreviations, function keys, hidden commands, and macro facilities can all be used to accomplish this. Users should be able to adjust or tailor the interface to their specific needs, allowing them to do routine tasks in a more convenient manner.
- **Help users recognize, diagnose and recover from errors:** Designers should presume that users are unable to comprehend technical jargon, thus error messages should almost always be written in plain English to ensure that nothing is lost in translation.
- **Visibility of system status:** Within a fair length of time, users should be informed of system operations with easy-to-understand and highly visible status presented on the screen.
- **Aesthetic and minimalist design:** clean uncluttered homepage
- **Help and documentation:** User guide documentation is required

5. Design principles

Best practices and design principles should be applied in two main areas: -

- 1) A range of modern browsers that support HTML, DHTML, CSS, JavaScript, and XML is required.
 - Look and feel for NBEPR will be based on the SANEDI website, corporate identity and branding. It will also consider a colour palette that is accessible to people with disabilities.
 - Client-side JavaScript should validate user input and prevent round trips between the browser and the server.
 - The NBEPR user interface will be designed so that standard user interface functionality will be implemented similarly across the board. Examples of this include: –

- A consistent way of capturing date inputs
 - A uniform way of displaying informational and error messages to the users
 - A uniform way of displaying required and optional fields on the screens.
- 2) Business Rules should be encoded within the application development framework: -
- Business rules will need to be separated from the presentation and database frameworks
 - Server applications are based on event-based systems. Complex server-side event cascades will need to be supported.
 - Standard frameworks for encoding business rules and events will need to be used.
 - Adoption of a component-based framework needs to be considered to promote reuse of information object

6. Accessibility for people with disabilities

- The design and function of the NBEPR should include principles that allow people with disability access. User testing should also be conducted with people with disabilities to ensure a smooth and accessible design approach. This will identify any existing gaps that were missed during the design phase.
- The design should include compatibility with various device types using large text size and fonts that are inclusive of the needs of people with disabilities. The choice of colour palette with accessible colour combinations should be considered.
- The consideration for keyboard accessibility should be integrated into the interface design that works consistently with mouse operation.
- The building of text alternatives into the design that allows for options for text transcripts or an accessible text version of large infographics should be included throughout the design phase. Heading structures should be identified from the start so that heading elements are clearly labelled.
- Clear visible labels should be integrated into the design so that it is an accessibility compliant and have labels to assistive technology like voice over. The design should be compatible with voicing web browsers that cater for blind individuals.

