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DOCUMENT PROCESSING

Domain Analysis

Software Architecture (H09B5a and H07Z9a) – Part 1

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Contents

1 Domain analysis

1.1 Domain models
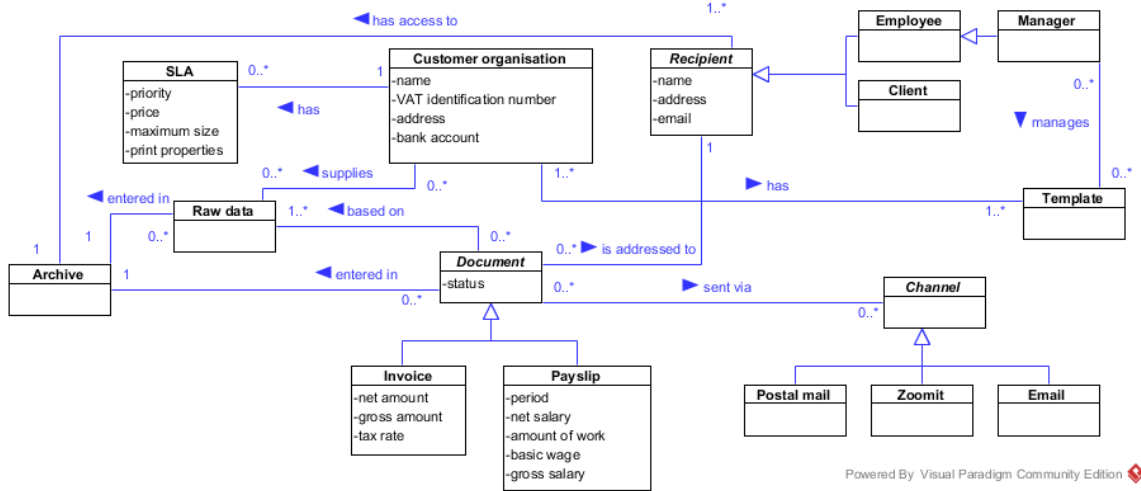
This section shows the domain model(s).

Figure 1: The domain model for the system.

1.2 Domain constraints

In this section we provide additional domain constraints.

- `Recipients` need to be registered and logged in to acquire access to the `archive`.

- `Templates` either correspond to a `payslip` or to an `invoice`.

- The basic `wage` and amount of `performed work` on a `payslip` are expressed in function of the same units.

- Columns in the `raw data` accord to fields in the corresponding `template`.

1.3 Glossary

In this section, we provide a glossary of the most important terminology used in this analysis.

- **Archive**: storage for both documents and raw data, which can be stored for several years.

- **Batch**: a number of raw data that needs to be processed at the same time.

- **Channel**: communication channel through which documents are sent to their receivers.

- **Customer organisation**: organisation that outsources its document processing for invoices and/or payslips to eDocs.

- **Document processing**: generating and sending the documents.

- **Document template**: file describing the format of documents, used to generate documents based on raw data.

- **eDocs administrator**: eDocs employee responsible for registering customer organisations.

- **Invoice**: commercial document issued for the sale of goods and/or services from a seller to a buyer.

- **Management dashboard**: interface for both sales and HR managers to access the state of their company's documents, create and consult document templates for their company and consult billing information.

- **Manager**: employee, either specialised in HR or sales, with the authority to access the management dashboard.

- **Payslip**: document sent out by companies to their employees that describes how their salary for a certain period is calculated.

- **Personal document store**: part of the archive that can be accessed by a registered user.

- **Raw data**: the unformatted information that is represented in a document.

- **Raw data packet**: subset of a batch of raw data, to enable parallel document generating.

- **Recipient**: a person or organisation that receives a document, e.g. an employee of a customer organisation or a client subscribed to the services of a customer organisation.

- **Registered user**: user that is either linked to a management dashboard, or a personal document store.

- **Sales Manager**: registered user which is an employee for a customer organisation, responsible for sales.

- **Service Level Agreement (SLA)**: agreement between two parties, describing the services that are exchanged between them.

- **SLA Priority**: the maximum delivery time for documents, specified in a SLA. Can be silver (48 hours), gold (24 hours) or diamond (12 hours).

- **VAT identification number**: identifier used for value added tax purposes.

2 Functional requirements

2.1 *UC7*: Register customer organisation

- **Name:** Register customer organisation

- **Primary actor:** Customer organisation manager

- **Interested parties:**
  - *Customer organisation:* wants to become a registered user of the eDocs system so they can immediately start using it afterwards.
  - *eDocs:* wants to register as many new customers as possible.
  - *Sales and HR manager:* wants to be able to use management dashboard.

- **Preconditions:**
  - The customer organisation manager knows how to contact eDocs.

- **Postconditions:**
  - The customer organisation is registered with eDocs.
  - There is an SLA between eDocs and Customer Organisation.
  - Sales and HR managers have dashboard accounts.

- **Main scenario:**
  1. Customer organisation manager contacts eDocs and informs the organisation wants to process certain documents.
  2. eDocs system requests general information about the customer organisation.
  3. Customer organisation provides requested information.
  4. eDocs requests information about sales and HR responsible managers.
  5. Customer organisation provides requested information.
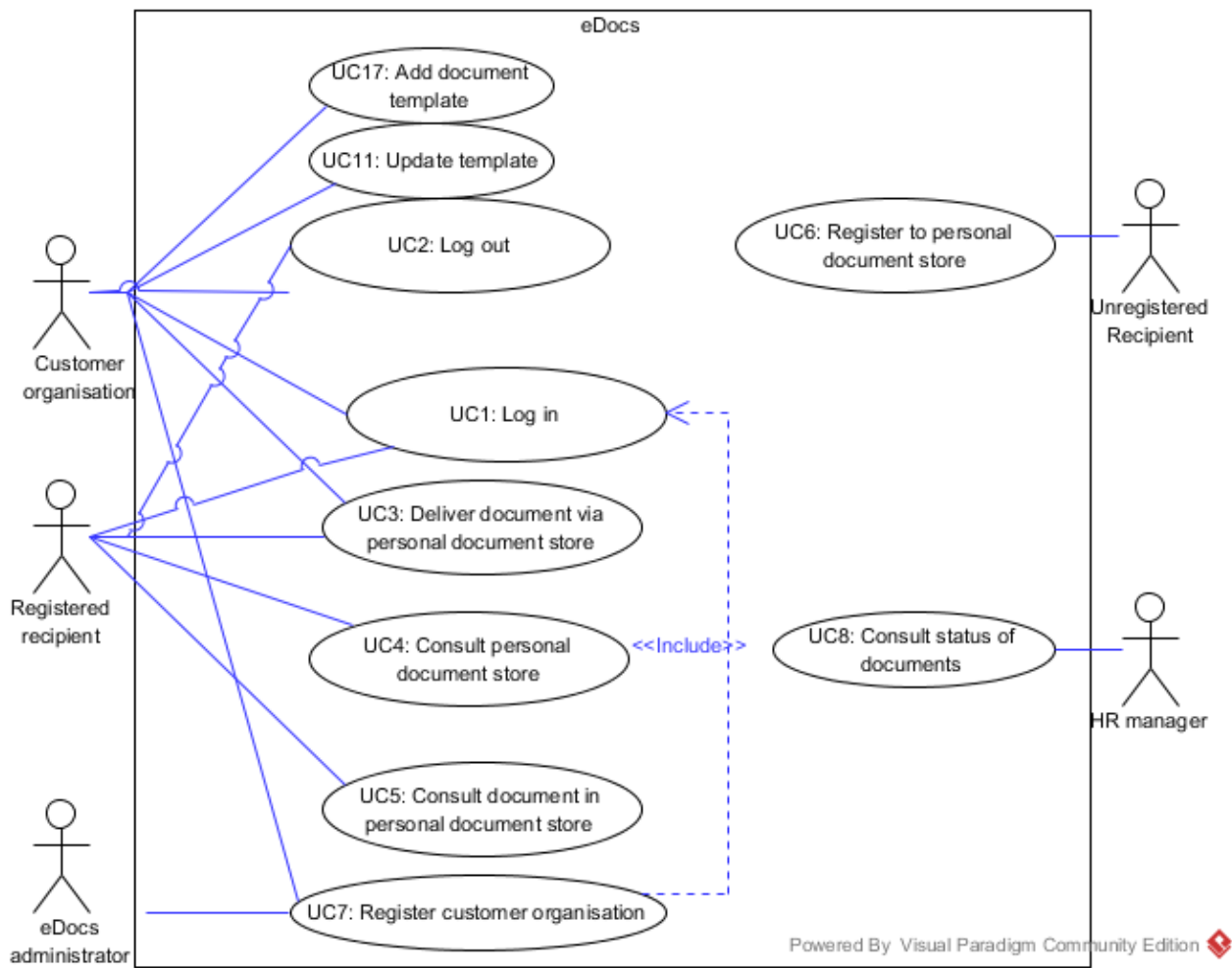 6. eDocs creates dashboard accounts for the given responsible managers.

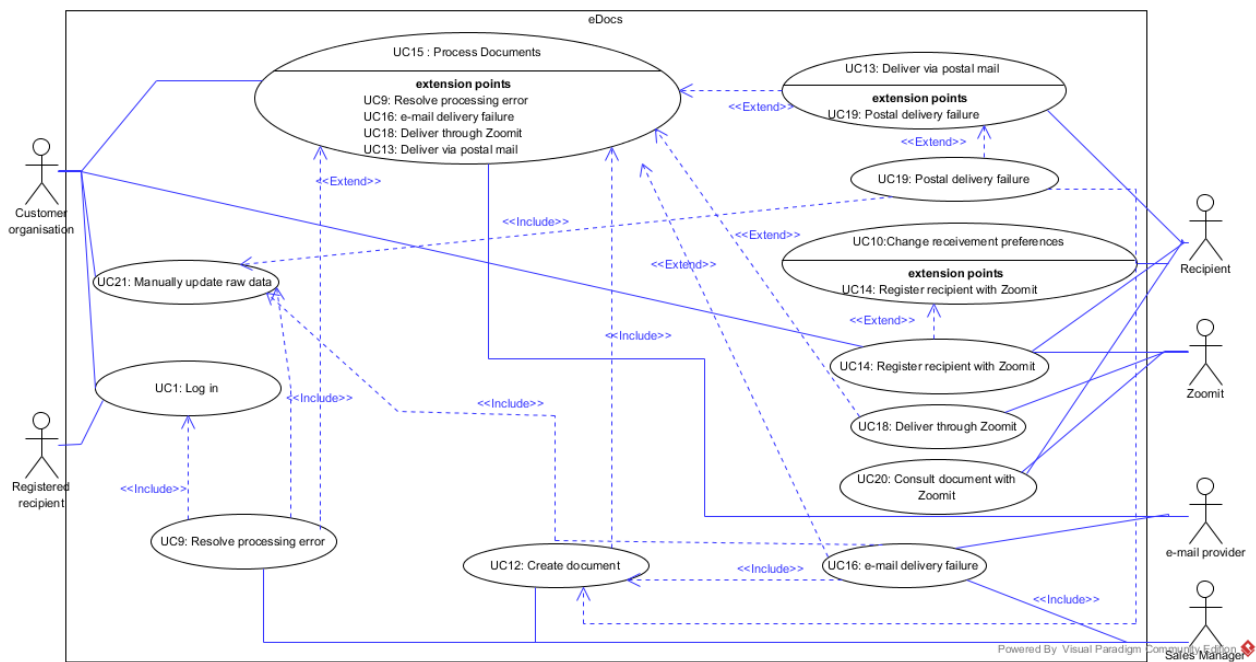Figure 2: Use cases not related to document processing

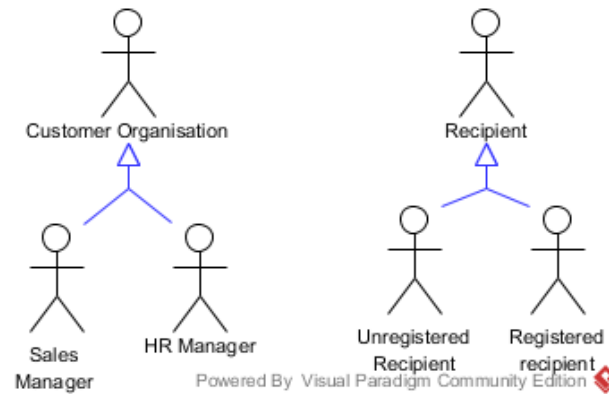Figure 3: Use cases related to document processing

Figure 4: Actor hierarchies

7. eDocs request information on the number and priority of the batches, the send date, the used protocols, tracking, printing policy and authentication methods.
8. Customer organisation provides requested information.
9. eDocs confirms registration to the customer organisation.

- **Alternative scenarios:**

  3b. Customer organisation enters invalid information
      (a) eDocs shows why given information is invalid. Go to step 2.
  5b. Customer organisation enters invalid information
      (a) eDocs shows why given information is invalid. Go to step 4.
  8b. Customer organisation enters invalid information
      (a) eDocs shows why given information is invalid. Go to step 7.

2.2 *UC8*: Consult status of documents

- **Name:** Consult status of documents

- **Primary actor:** HR manager

- **Interested parties:**

  - *HR manager:* Wants to be able to check the status of a certain document.
  - *eDocs:* Wants to be able to give an overview of documents and their individual status.
  - *Customer organisation:* Wants their responsible employees (HR managers) to be able to check the status of relevant documents.

- **Preconditions:**

  - The HR manager has logged on to the manager dashboard.

- **Postconditions:**

  - The HR manager is aware of the status of the requested document.

- **Main scenario:**

  1. The dashboard provides a way to lookup a document in a certain batch.
  2. HR manager specifies document and batch and requests status.
  3. The dashboard looks up the document.
  4. The dashboard presents the requested information.

- **Alternative scenarios:**

  3b. The requested document cannot be found.
      (a) The dashboard shows that the document was not found.

2.3 *UC9*: Resolve processing error

- **Name:** Resolve processing error
- **Primary actor:** Sales manager
- **Interested parties :**
  - *Sales manager:* wants to resolve the missing information problem.
  - *eDocs:* misses information needed to process documents.
  - *Customer organisation:* Wants that all documents can be processed on time without errors.
- **Preconditions:**
  - A number of files could not be generated because of missing information.
- **Postconditions:**
  - The missing information is added.
  - The affected files will be processed further according to the SLA.
- **Main scenario:**
  1. eDocs system notifies a responsible sales manager that some files could not be generated.
  2. Sales manager logs in to the dashboard (UC1).
  3. Dashboard provides a way for the manager to see the affected files.
  4. Sales manager inspects the files and finds out some information for the files is missing.
  5. Manager can update information by changing the raw data. (UC21).

2.4 *UC10*: Change receivement preferences

- **Name:** Change receivement preferences
- **Primary actor:** Recipient
- **Interested parties:**
  - *Recipient:* wants to receive documents through Zoomit
  - *eDocs:* enables recipients to change their preferred way of receiving documents.
  - *HR manager:* makes sure the recipients preferences are communicated to the system.
- **Preconditions:**
  - The customer organisation is registered with eDocs.
  - The recipient and its preferences are known by the eDocs system.
  - The recipient wants to change his preferred way of receiving documents.
- **Postconditions:**
  - Recipient's preference of receiving is changed to the preferred setting.
- **Main scenario:**
  1. Recipient contacts HR to inform he wants to change his preference.
  2. HR manager changes the raw data concerning the new preference (UC 21).
  3. HR manager notifies the user of the changed preference.
- **Alternative scenarios:**

  1b. User wants to change to Zoomit
  - (a) HR notifies user that this should happen through Zoomit.
  - (b) Go to UC 14

2.5 *UC11*: Update document template

- **Name:** Update document template

- **Primary actor:** Manager from customer organisation (HR or sales)

- **Interested parties:**
    - *manager:* wants to update a document template.
    - *eDocs:* wants to provide a way for the customer organisation to modify their templates.
    - *customer organisation:* wants it to be possible to change the templates used for their documents.

- **Preconditions:**
    - Manager is logged on to the management dashboard.
    - There already is at least one template for the client company.

- **Postconditions:**
    - The template is modified.

- **Main scenario:**
    1. Management Dashboard provides an overview of all the templates from the customer organisation.
    2. The manager indicates he wants to modify a certain template.
    3. The management dashboard provides a way to upload a template file.
    4. The manager uploads a template file.
    5. The management dashboard replaces the previous selected template file with the given one.

- **Alternative scenarios:**

    5b. An error occurred uploading the template file.
    - (a) Management Dashboard shows that an error occurred.
    - (b) Go to step 4

2.6 *UC12*: Create document

- **Name:** Create document

- **Primary actor:** Sales manager

- **Interested parties:**
    - *Manager:* wants to be able to create documents.
    - *eDocs:* provides a way to create documents.
    - *Customer organisation:* wants to send a document.
    - *Recipient:* wants to receive the document.

- **Preconditions:**
    - Customer organisation wants to send a document.
    - Responsible manager is logged in.

- **Postconditions:**
    - A document is sent to the recipient.

- **Main scenario:**
    1. The dashboard presents a way to manually create a document from raw data.
    2. The manager shows he wants to create a document and uploads the raw data.

3. The system creates a document from the data.

4. eDocs sends the document according to the SLA to the recipient (Go to UC15 step 3).

- **Alternative scenarios:**

  2b. The managers shows he wants to create a critical document and uploads the raw data.

    (a) The system creates a critical document from the data and charges the customer organisation.

    (b) eDocs sends the document according to the critical document policy.

2.7 *UC13*: Deliver via postal mail

- **Name:** Deliver via postal mail

- **Primary actor:** Recipient

- **Interested parties:**

  - *Recipient:* wants to receive files that are addressed to him by snail mail.
  - *eDocs:* generates files for the recipient and passes them to the postal service.
  - *Postal service:* Wants to print, package and send as many files as possible to the right recipient.
  - *Customer Organisation:* Wants to send generated file to the recipient by postal mail.

- **Preconditions:**

  - The customer organisation is registered with eDocs.
  - The document for the recipient has already been generated.
  - The recipient and its preferences are known by the eDocs system.
  - The recipient prefers to receive files by postal mail.
  - The postal service is known by the eDocs system.

- **Postconditions:**

  - Recipient receives a printed version of the document generated by the eDocs system by postal mail.

- **Main scenario:**

  1. The system sends the document to the postal service together with the address of the recipient.
  2. The postal service prints, packages and sends the file to the given address.
  3. Recipient receives the document.

- **Alternative scenarios:**

  1b. The document cannot be delivered by the postal service.

    (a) Go to UC19.

2.8 *UC14*: Register recipient with Zoomit

- **Name:** Register recipient with Zoomit

- **Primary actor:** Recipient

- **Interested parties:**

  - *Recipient:* wants to receive documents on Zoomit.
  - *Zoomit:* gets a new customer.
  - *eDocs:* wants to generate documents for the recipient and pass them to the service provider the recipient wants (here Zoomit). Wants to be notified if the document has been received.
  - *Customer Organisation:* wants to send generated file to the recipient with its chosen provider. Wants to be notified when a recipient wants to start using Zoomit.

- **Preconditions:**
  - Recipient is not using Zoomit.

- **Postconditions:**
  - Customer organisation knows the changed preferences of the recipient.
  - Recipient will receive future documents through Zoomit.

- **Main scenario:**
  1. Zoomit presents a way for the recipient to subscribe through pc banking application.
  2. Recipient subscribes to Zoomit and specifies from which customer organisations he wants to receive documents through Zoomit.
  3. Zoomit informs customer organisations.
  4. Customer organisation update their information on the preferences of the recipient.

2.9 *UC15*: Process documents

- **Name:** Process documents

- **Primary actor:** Customer organisation

- **Interested parties:**
  - *Recipient:* wants to receive documents.
  - *eDocs:* generates documents for the recipient and sends them.
  - *Customer organisation:* Wants to send generated document to the recipient in the way he prefers it.

- **Preconditions:**
  - The customer organisation is registered with eDocs.
  - The recipient and its preferences are known by the eDocs system.

- **Postconditions:**
  - The documents are created according to the organisation's template and the provided raw data.
  - Recipient receives a version of the document generated by the eDocs system.

- **Main scenario:**
  1. Customer organisation wants to generate documents.
  2. eDocs generates documents from raw data according to the template and the SLA.
  3. eDocs sends the documents by mail to the known e-mail address of the recipient.
  4. Recipient receives the document.

- **Alternative scenarios:**
  2b. The file could not be generated.
    (a) Go to UC9.
  3b. The recipient wants to receive his documents through postal mail.
    (a) Go to UC13.
  3c. The recipient wants to receive his documents through Zoomit.
    (a) Go to UC18.
  3d. The recipient wants to receive his documents through his personal document store.
    (a) Go to UC3.
  4b. E-mail delivery failure.
    (a) Go to UC16.

2.10 *UC16*: E-mail delivery failure

- **Name:** E-mail delivery failure

- **Primary actor:** Sales manager

- **Interested parties:**
  - *E-mail provider:* wants to notify users when a mail was not sent.
  - *eDocs:*   wants to successfully send e-mail to the recipient.
  - *Recipient:*   wants to receive e-mails with documents.
  - *Sales Manager:*   wants to successfully send the e-mail to the recipient.

- **Preconditions:**
  - Recipient wants to receive documents by e-mail.
  - Recipient provided wrong e-mail address.
  - Some e-mail is sent and could not be delivered.

- **Postconditions:**
  - E-mail address is corrected.
  - E-mail is correctly sent to recipient.

- **Main scenario:**
  1. E-mail provider notifies eDocs that a certain e-mail is not sent because the address does not exist.
  2. eDocs notifies sales manager of the customer organisation that the address is incorrect through the management dashboard.
  3. Sales manager contacts recipient to whom the e-mail address belongs and requests an updated version.
  4. Recipient provides new e-mail address.
  5. Manager updates email address (UC21).
  6. Manager generates new document. (UC12)

2.11 *UC17*: Add document template

- **Name:** Add document template

- **Primary actor:** Manager (HR or sales)

- **Interested parties:**
  - *Manager:* wants to add a document template.
  - *eDocs:* wants their users to be able to add document templates.

- **Preconditions:**
  - The manager is logged in on the management dashboard.

- **Postconditions:**
  - A template is added to the system.

- **Main scenario:**
  1. The dashboard provides a way for the manager to upload a new template.
  2. The manager uploads the template file.
  3. The dashboard confirms the upload and adds the template to the system.

- **Alternative scenarios:**

  3b. An error occurred uploading the document template.
    (a) Management Dashboard shows that an error occurred.
    (b) Go to step 2

2.12 *UC18*: Deliver documents to Zoomit

- **Name:** Deliver documents to Zoomit

- **Primary actor:** eDocs

- **Interested parties:**

  - *Recipient:* wants to receive documents through Zoomit
  - *eDocs:* generates documents for the recipient and sends them to Zoomit.
  - *Customer organisation:* wants to send generated document to the recipient in the way he prefers it.
  - *Zoomit:* receives documents.

- **Preconditions:**

  - The customer organisation is registered with eDocs.
  - The recipient and its preferences are known by the eDocs system.
  - The recipient prefers to receive files through Zoomit.
  - The document is created according to SLA and template.

- **Postconditions:**

  - Recipient receives an electronic version of the document generated by the eDocs system.

- **Main scenario:**

  1. eDocs sends the created document to Zoomit.
  2. Zoomit confirms reception of the documents.
  3. Zoomit notifies recipient that there are new documents.

2.13 *UC19*: Postal Delivery failure

- **Name:** Postal Delivery failure

- **Primary actor:** Sales manager

- **Interested parties:**

  - *Postal mail service:* wants to notify users when a letter was not sent.
  - *eDocs:* wants to successfully send letters to the recipient.
  - *Recipient:* wants to receive his document letters
  - *Sales Manager:* wants to successfully resend the letters to the recipient.

- **Preconditions:**

  - Recipient wants to receive documents by postal mail.
  - Recipient provided wrong address.
  - A mail is sent and could not be delivered.

- **Postconditions:**

  - Postal address is corrected.
  - Letter is resent to recipient.

- **Main scenario:**

  1. Postal mail service notifies eDocs that a certain letter is not sent because the address does not exist or was wrong.

2. eDocs notifies sales manager of the customer organisation that the address is incorrect through the management dashboard.

3. Sales manager contacts recipient to whom the address belongs and requests an updated version.

4. Recipient provides correct address.

5. Sales manager enters correct address through management dashboard (UC21).

6. Manager creates new document (UC12).

2.14 *UC20*: Consult document with Zoomit

- **Name:** Consult document with Zoomit

- **Primary actor:** Recipient

- **Interested parties:**

  - *Recipient:* wants to open a document with Zoomit.
  - *Zoomit:* wants the recipient to open his documents.

- **Preconditions:**

  - Zoomit has notified recipient that there are unopened documents.
  - Recipient has a Zoomit account.
  - Recipient is logged on to Zoomit.

- **Postconditions:**

  - If receipt tracking is active, eDocs is notified.
  - Recipient has opened his Zoomit documents.

- **Main scenario:**

  1. Zoomit provides a way to open unread documents.
  2. Recipients reads documents.
  3. Zoomit notifies eDocs that the documents are received.

- **Alternative scenarios:**

  3b. Receipt tracking is not enabled.
      (a) End use case.

2.15 *UC21*: Update raw data

- **Name:** Update raw data

- **Primary actor:** manager

- **Interested parties:**

  - *Managers:* wants to change the raw data.
  - *eDocs:* wants to give the possibility for a customer organisation to change the raw data manually.

- **Preconditions:**

  - The manager is logged in.

- **Postconditions:**

  - The raw data has been changed to the new provided data.

- **Main scenario:**

1. Management dashboard provides a possibility for the manager to view and select the raw data he wants to change.

2. The manager selects the raw data he wants to update.

3. The management dashboard provides a way for the manager to upload new data to replace the selected data.

4. Manager uploads the new raw data.

5. The dashboard provides a possibility to enable receipt tracking

6. The magager chooses not to enable receipt tracking.

7. System confirms the success of the upload.

- **Alternative scenarios:**

  5b. An error occurred uploading the raw data.

    (a) Management dashboard shows that an error occurred.
    (b) Go to step 3

  6b. The manager chooses to enable receipt tracking.

    (a) Management dashboard adds the needed information to the raw data.
    (b) Go to step 7.

3 Non-functional requirements

In this section, we model the non-functional requirements for the system in the form of *quality attribute scenarios*. We provide for each type (availability, performance and modifiability) one requirement.

3.1 Availability

3.1.1 *Av1*: Document generation failure

Part of the subsystem responsible for generating a batch of documents fails or crashes

- **Source:** Internal

- **Stimulus:**

  – Part of the internal subsystem responsible for generating documents fails or crashes.

- **Artifact:** Part of internal subsystem

- **Environment:** Normal execution

- **Response:**

  – The other non-crashed parts of the subsystem keep on generating documents for their own assigned raw data packets and are not affected by the crash.
  – This does not lead to a loss of documents.
  – Generated documents are not placed in the storage system until the whole raw data packet assigned to a processing unit is processed.
  – Prevention:
    * Each raw data packet is kept in a secure storage until it is totally processed.
  – Detection:
    * The system is able to detect this problem in time.
    * The eDocs operators are notified of the problem.
  – Resolution:
    * If the system detects a crashed processing unit, the raw data packet running on the crashed unit is assigned to an equivalent processing unit.

* Notified eDocs operators address the problem by replacing hardware, restarting software, . . .
* The raw data packet running on the crashed part is restarted in a timely manner.

- **Response measure:**
  - Detection:
    * A crashed processing unit is detected within one minute of the crash.
    * eDocs operators are notified within one minute of the crash detection.
  - Resolution:
    * The processing of a raw data packet being processed on the crashed unit is restarted within 30 minutes.
    * After three failures concerning the same raw data packet, the packet gains higher priority and is restarted within 5 minutes.

3.2 Performance

3.2.1 *P1*: Document generation

Documents should be generated in a timely manner, according to the SLA, even in case of extremely large amounts of raw data that needs to be processed.

- **Source:** Customer organisation
- **Stimulus:**
  - Customer organisation uploads a batch of raw data and wants it to be processed.
- **Artifact:** Part of the subsystem responsible for generating documents.
- **Environment:** Normal modus
- **Response:**
  - If the batch is large enough, it is split into raw data packets.
  - Additional processing units are started when the usage of the current units reaches a certain threshold. When it goes below a certain threshold, a unit will be stopped.
  - Each raw data packet is processed individually, according to the SLA.
- **Response measure:**
  - If the total usage of the processing units reaches 80 percent, an additional unit is started.
  - If the total usage of the processing units is below 30 percent, a unit is selected to be stopped. This means it will still process its assigned packets but no new packets will be assigned to it.
  - A raw data packet with a Silver SLA is always processed within 48 hours.
  - A raw data packet with a Golden SLA is always processed within 24 hours.
  - A raw data packet with a Diamond SLA is always processed within 12 hours.
  - A critical raw data packet is always processed within 5 hours.

3.3 Modifiability

3.3.1 *M1*: Additional document types

eDocs is currently only able to create and deliver invoices and payslips based on raw data. Some clients may prefer to send their own special documents for example non-standard correspondence. They also want to be able to generate other types of documents than invoices and payslips. Therefore eDocs wants to be able to support these requests.

- **Source:** Customer organisation
- **Stimulus:**

– Wishes to be able to upload documents without the need to process raw data.

– Wishes to be able to generate documents which are not invoices or payslips.

- **Artifact:** This modification affects the way a customer organisation can present data to eDocs.

- **Environment:** At design time.

- **Response:**

    – Incorporating a possibility to upload e.g. PDF-files without the need of raw data. These documents skip the document generating step when documents need to be processed and are treated like generated documents further on.

    – Incorporating the ability to create other types of documents based on raw data does not require changes since this comes down to uploading another template. The fields that need to be filled in in the document correspond to columns in the raw data.

- **Response measure:**

    – Incorporating this new possibility takes less than 2 man weeks to implement.