



COMSATS University
Islamabad
Abbottabad Campus

ASSIGNMENT 2:

SUBMITTED BY:

MUHAMMAD UMAR JADOON

REGISTRATION NO:

SP22-BSE-160

SEMESTER:

BSE 8TH 'C'

COURSE:

BUSINESS PROCESS ENGINEERING

SUBMITTED TO:

SIR MUKHTAIR ZAMIN

DATE:

24TH Oct, 2025

QUESTION NO 1:

Do you think all the three business processes are correctly identified and modeled? Discuss at least one positive and negative point against each business process modelled?

ANSWER:**OUR FYP IS:****AI-BASED MEDICAL DECISION SUPPORT SYSTEM:**

“Our FYP is an AI-based medical decision support system. The user uploads a medical image, and the system first performs image quality validation. If the image is valid, it is sent to the AI model for disease classification. Along with the diagnosis, the system generates an explainable heatmap using Grad-CAM to visually show which region of the image contributed to the AI decision.

After diagnosis, the system retrieves the clinical guideline from the database according to the detected disease. These guidelines are pre-stored rule-based recommendations mapped disease-wise inside the system. Based on those guidelines, the system generates treatment recommendations for the user.

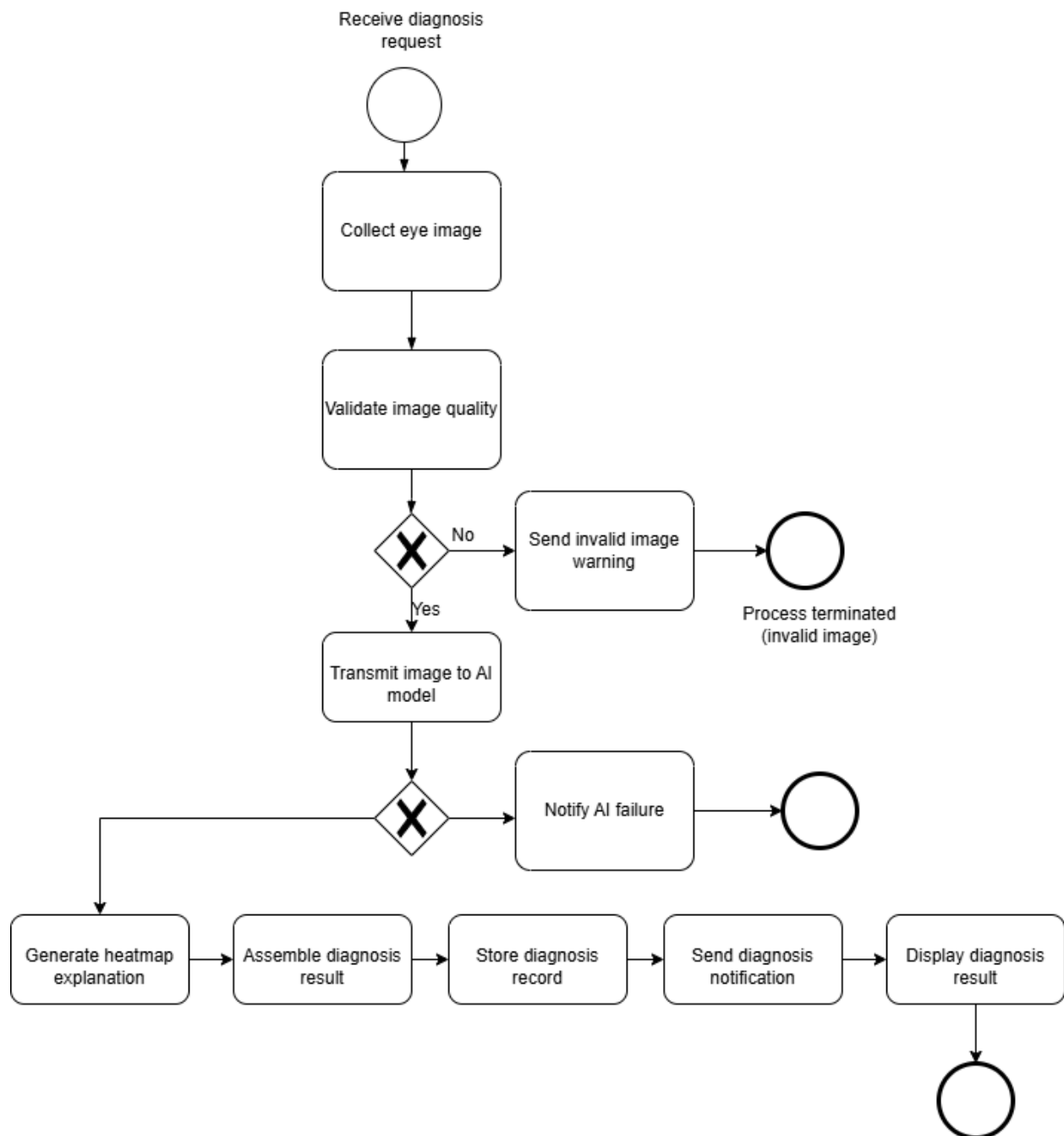
The final report including diagnosis, explanation heatmap, and guideline-based recommendation is displayed to the user and stored into the database for future history access. Doctors can also review and give feedback, which is logged for AI model improvement later. If a critical disease trend is detected, the system can generate public health alerts.

In short, the system not only diagnoses using AI, but also explains the decision and supports treatment using database-stored clinical guidelines.”

BUSINESS PROCESSES:

PROCESS 1:

AI DIAGNOSIS:



AI DIAGNOSIS:

This process starts when the user uploads a medical image. The system first checks whether the image is usable (proper lighting, focus, and format). If valid, the image is forwarded to the trained AI model for disease detection. The AI classifies the image and generates a raw prediction. If either the image is invalid or the AI fails to return a result, the process ends with a failure message.

POSITIVE POINT:

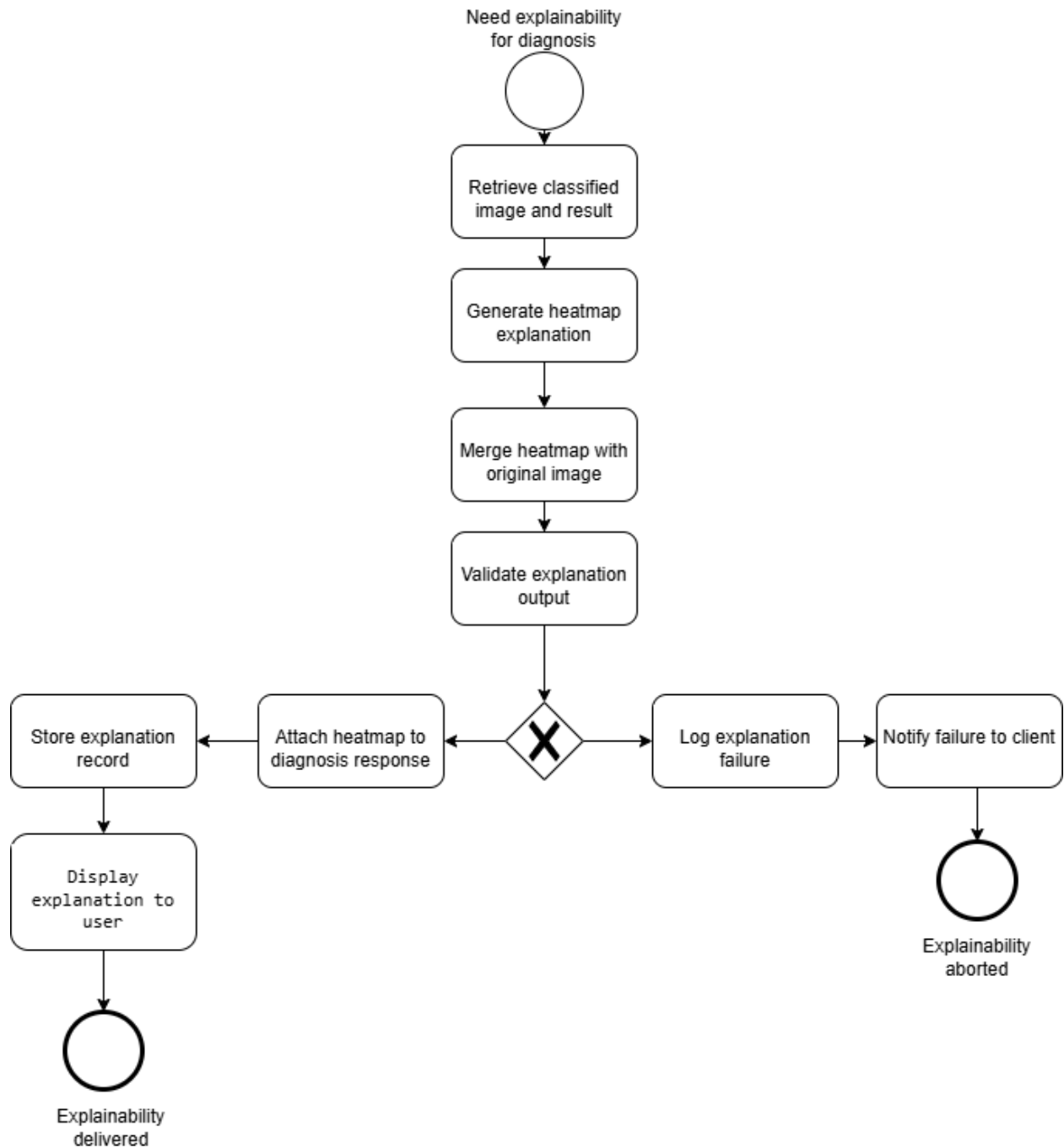
This process correctly captures the **core function of the system** image validation and disease classification using an AI model. It ensures that poor-quality images are filtered out before processing, improving diagnostic accuracy and reliability.

NEGATIVE POINT:

The process focuses mainly on technical validation and classification but **lacks user feedback or retry handling** for failed uploads. In real healthcare scenarios, error recovery and user guidance are crucial for usability and completeness.

PROCESS 2:

EXPLAINABLE AI (GRAD-CAM):



EXPLAINABLE AI (GRAD-CAM):

After receiving the AI prediction, this process generates a visual explanation. Grad-CAM highlights the exact region of the image where the AI focused to make the decision. The heatmap is merged with the original image to create an interpretable output. If explanation generation fails, the system logs the issue and informs the user; otherwise, the explained image is attached to the final report.

POSITIVE POINT:

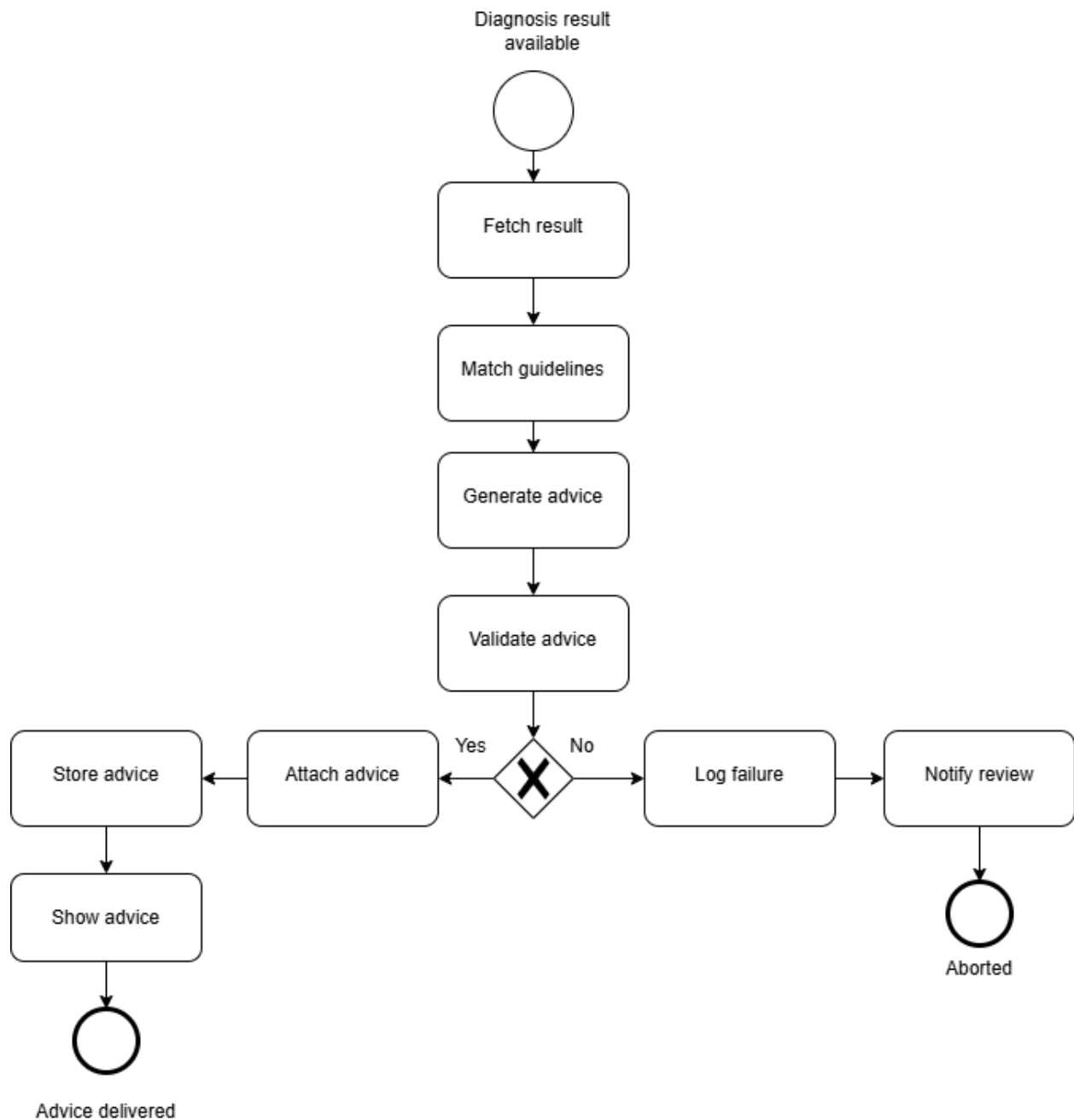
The inclusion of Grad-CAM makes the process **transparent and trustworthy**, as it provides a visual explanation of how the AI reached its decision. This feature helps doctors and patients better understand and trust AI results.

NEGATIVE POINT:

The model assumes that Grad-CAM generation will always work correctly. However, **no fallback mechanism** is modeled if visualization fails repeatedly, which could leave users without any explanation for critical diagnoses.

PROCESS 3:

CLINICAL RECOMMENDATION:



CLINICAL RECOMMENDATION:

In this process, the system retrieves disease-specific clinical guidelines stored in the database. Using these guidelines, it automatically generates treatment recommendations or next-step instructions for

the patient or doctor. The recommendations are validated for correctness and safety before being included in the final report. If guidelines cannot be validated, the process stops and sends it for review.

POSITIVE POINT:

This process effectively extends diagnosis into **actionable medical support** by mapping results to pre-stored clinical guidelines. It ensures that users receive medically relevant next steps, making the system more valuable for real-world healthcare use.

NEGATIVE POINT:

The process relies heavily on pre-defined rule-based recommendations. If these guidelines are **not regularly updated or validated by medical experts**, outdated advice could reduce system credibility or even pose clinical risks.

QUESTION NO 2:

Provide information artifacts with their types (Data Object, Data Storage etc.) from each business process modelled. Also mentioned the ones he missed or linked it to any activity?

ANSWER:

1. PROCESS 1: AI DIAGNOSIS:

Information Artifact	Type	Linked Activity / Description
Uploaded Medical Image	Data Object	Input provided by the user at the start of the process. It is validated for quality, focus, and format.
Validation Result	Data Object	Outcome of image quality checking — determines if the image can proceed to AI classification.
AI Model (Trained Weights)	Data Storage	Stored model file used by the system to perform disease classification.
Diagnosis Result (Raw Prediction)	Data Object	Output generated by the AI model after processing the image.
Error Log / Failure Message	Data Object	Created when image validation or AI processing fails, then shown to the user.

MISSED ARTIFACT:

- *User Profile / Login Information* was not explicitly linked, but it should be associated with the upload activity to identify which user the diagnosis belongs to.

PROCESS 2: EXPLAINABLE AI (GRAD-CAM):

Information Artifact	Type	Linked Activity / Description
AI Prediction (Diagnosis Result)	Data Object	Input from the previous process used to generate Grad-CAM visualization.
Grad-CAM Heatmap Data	Data Object	Visual explanation highlighting the important region in the image.
Original Image	Data Object	Used as a base layer to merge with the heatmap for visualization.
Explained Image (Final Output)	Data Object	Combined image (original + heatmap) displayed to the user.
Grad-CAM Log / Error Report	Data Object	Stored when Grad-CAM fails to generate explanation.

MISSED ARTIFACT:

- *Explainability Configuration File* (layer names, model settings) should be linked to the Grad-CAM generation activity this artifact defines which model layer Grad-CAM targets.

3. PROCESS 3: CLINICAL RECOMMENDATION:

Information Artifact	Type	Linked Activity / Description
Diagnosis Result	Data Object	Input from AI Diagnosis process used to find matching clinical guideline.
Clinical Guidelines Database	Data Storage	Repository containing disease-specific, rule-based treatment information.
Recommendation Rule (Mapping Table)	Data Object	Rule that maps a disease label to its clinical advice.
Generated Treatment Recommendation	Data Object	Output generated by the system for the patient or doctor.
Final Report (Diagnosis + Explanation + Recommendation)	Data Object	Combined output shown to user and saved in the system database.
Validation Log	Data Object	Records if recommendation validation passed or failed.

MISSED ARTIFACT:

- *Approval Log or Review Record* from medical experts validating clinical rules is missing; it should link to the validation activity for safety assurance.