1

REQUIREMENTS ANALYSIS AND SPECIFICATION

SYSTEM DOMAIN

The CuraGP web and mobile applications provide an interactive interface hat alllows patients to describe the symptomos they are experiencing for a quick consultation session with Cura's interactive general practitioner bot. The patient can choose to view a detailed report of the GP's diagnosis, which is to be sent to the patient's preferred oncologist for diagnosis confirmation, further diagnosis and treatment follow-up through Cura CBR. The patient does not have a prescribed method of question asking, the bot is programmed in such a way as to answer all questions, no matter how they are written, the only requirement is that they are written in English. In order for any user to be able to use any of the cCura products, they have to be registered on the main Cura portal. Patients can register through a specific website that grants them access to CuraGP, CuraCBR and CuraTherapy. Patients should provide their names, date of birth, country, city of residence, address, email, phone(s) for contact, and a password. Doctors/Oncologists have to request membership through the same portal. Specialized moderators handle registrations and confirm oncologist registration.

CLASS DIAGRAM

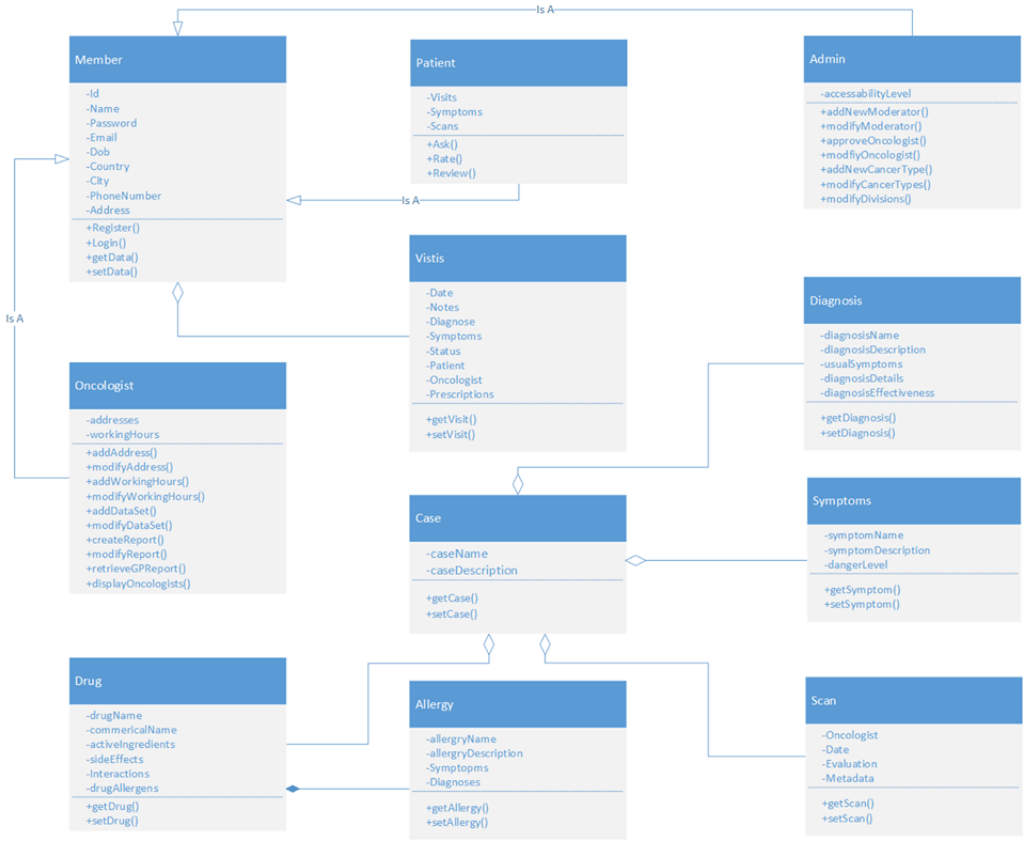


Figure 1.1: Class diagram

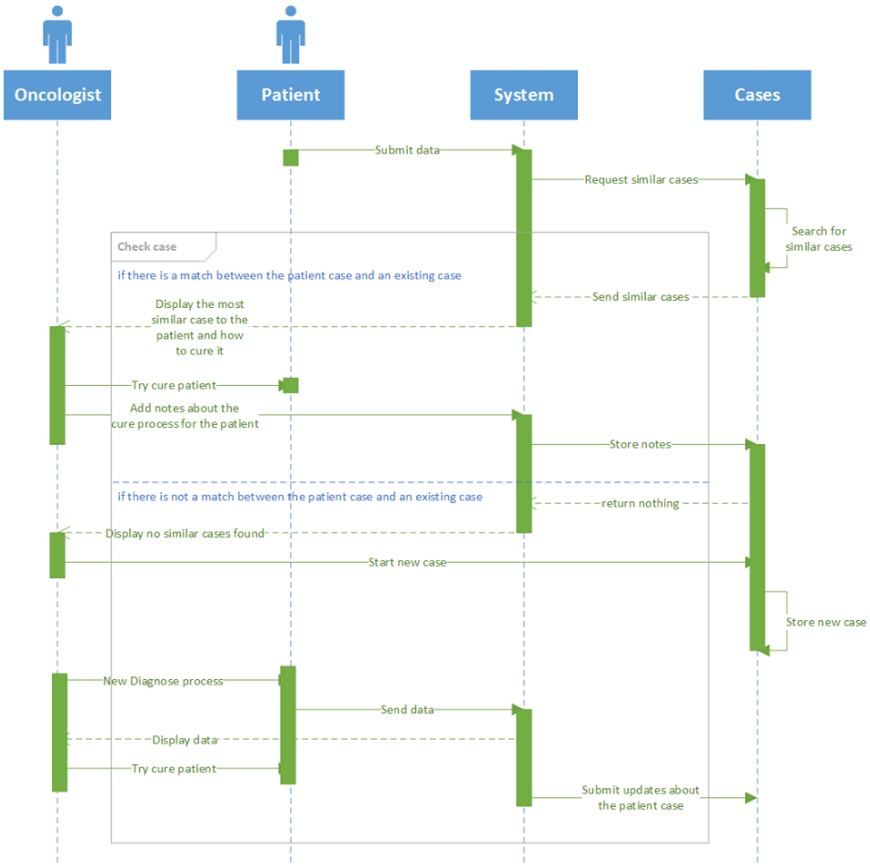


Figure 1.2: Use case diagram 1

USE CASE DIAGRAMS

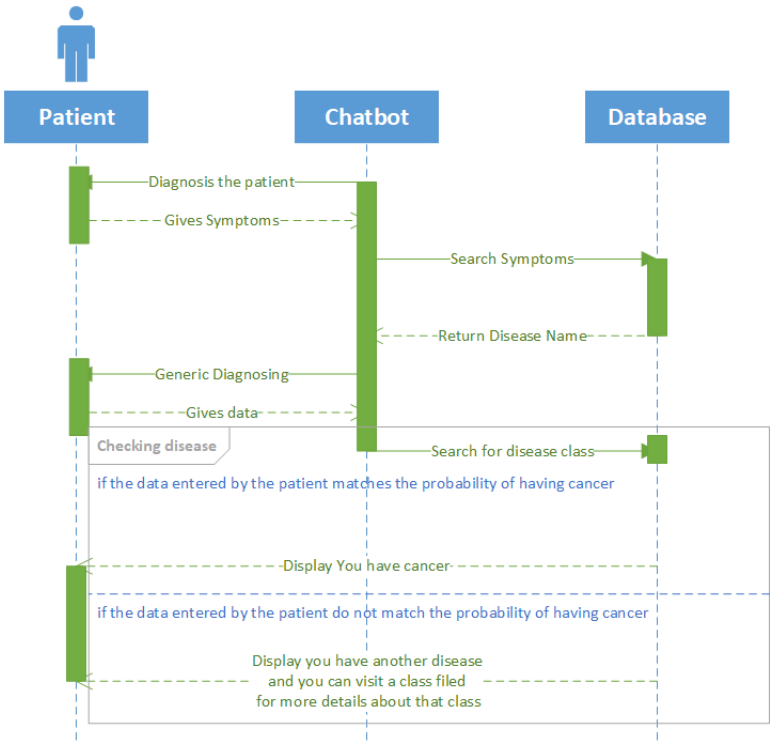


Figure 1.3: Use case diagram 2

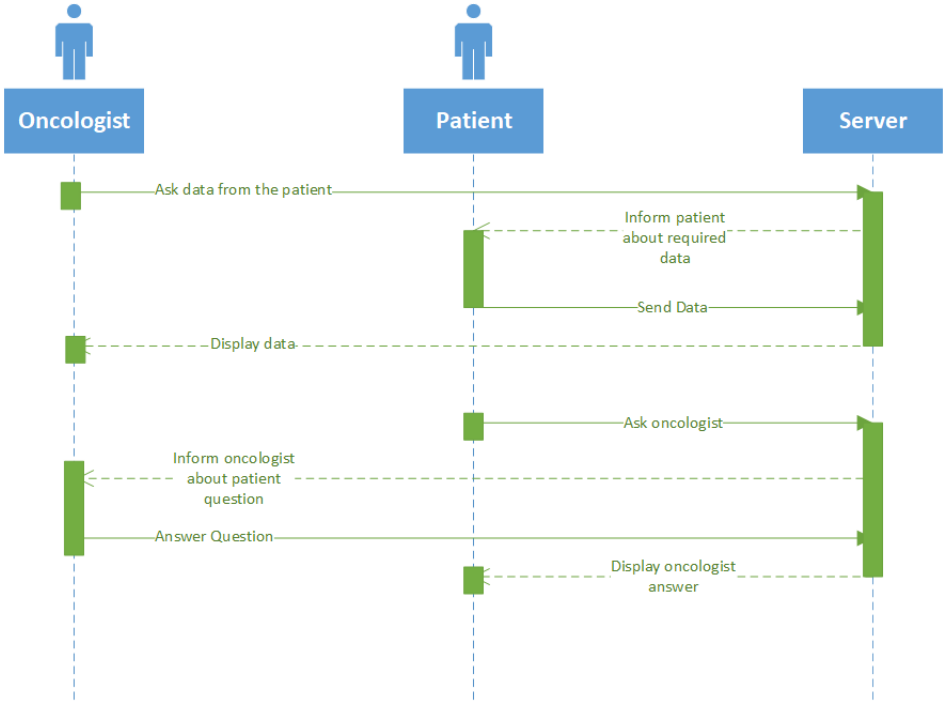


Figure 1.4: Use case diagram 3

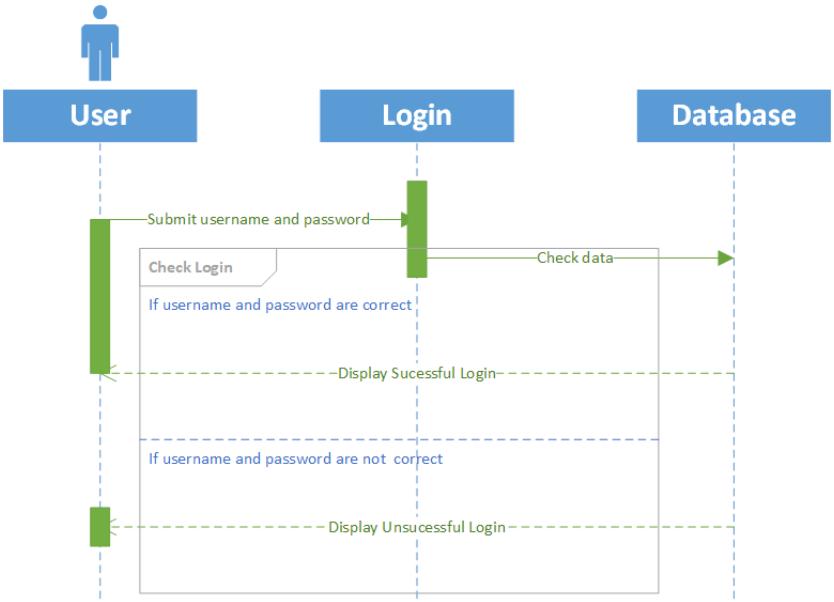


Figure 1.5: Use case diagram 4

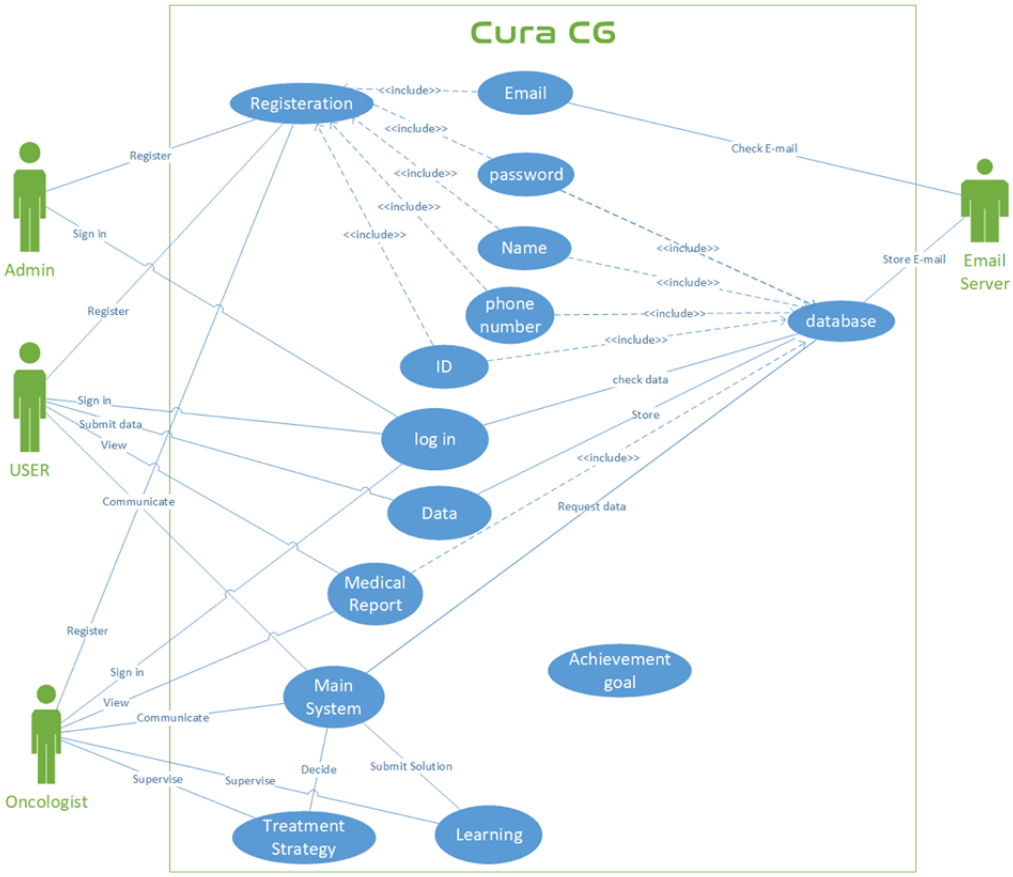


Figure 1.6: Use case diagram 5

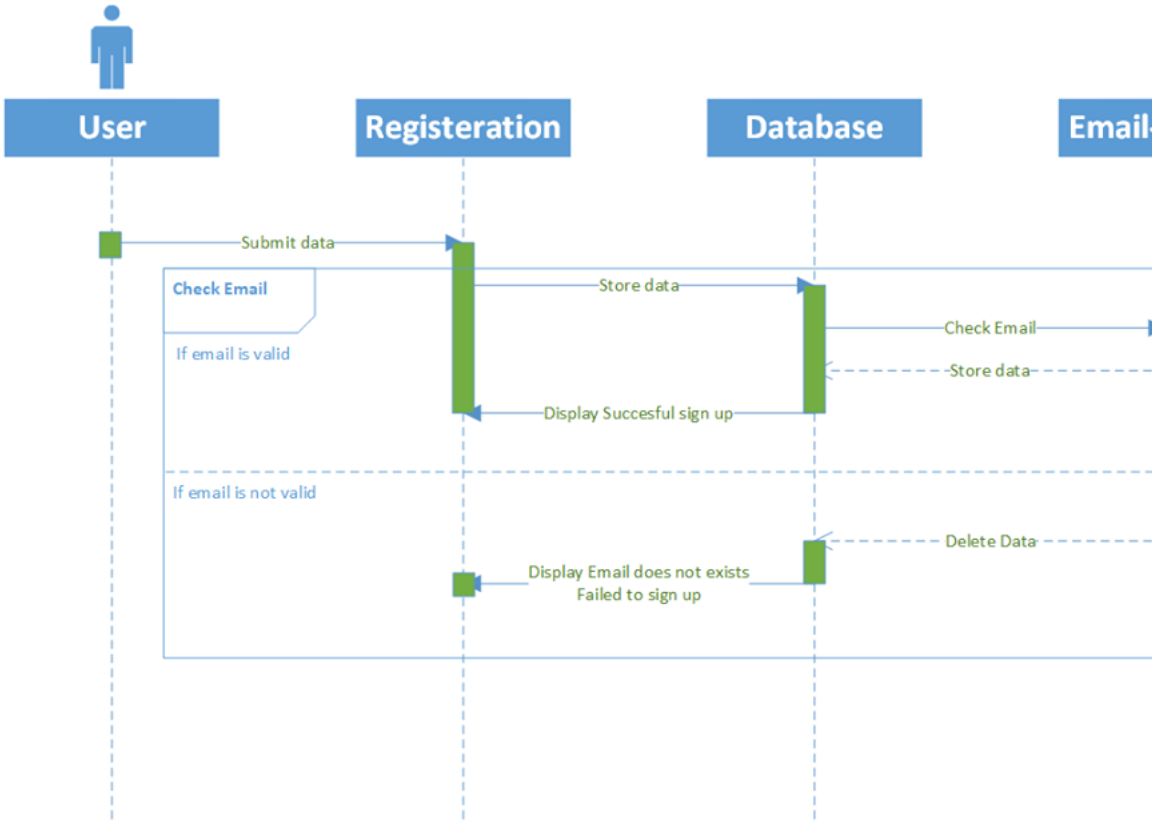
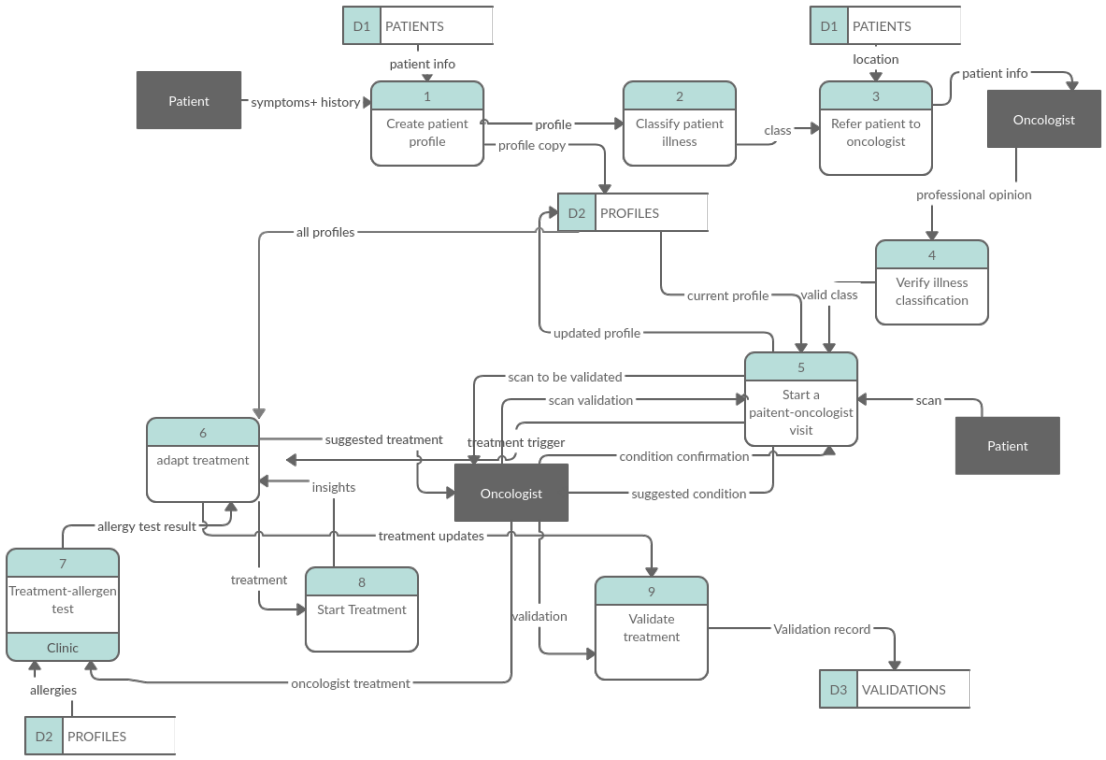


Figure 1.7: Use case diagram 6

DFD LEVEL 0



This diagram can be summarized as follows:

The patient submits their symptoms while chatting with the Cura General Pracititioner along with their medical history which is requested when finalizing the general practitioner's session if the GP suspects the patient has one of the cancers the system is concerned with. The system then classifies the patient's symptoms along with their entire profile, which includes their medical history, according to previous cases stored in the Cura Case Based Reasoning system to confirm whether or not they have the suspected cancer. Only then the system refers the patient to a nearby oncologist specialized in that illness and uses Cura CBR to continue the diagnosis and then treatment. The oncologist has to verify the CuraGP classification of the illness as a final confirmation before the patient is admitted to the system.

Once the patient is confirmed, a series of visits with the oncologist commences in which each time the oncologist asks the patient to submit scans prior to the physical session, which the system classifies according to a data set including the profiles of other patients along with their scans, this is more detailed in child diagram 5. At the end of each session there are conclusion arrived at by the system and by the oncologist, the oncologist has to verify the system's conclusion.

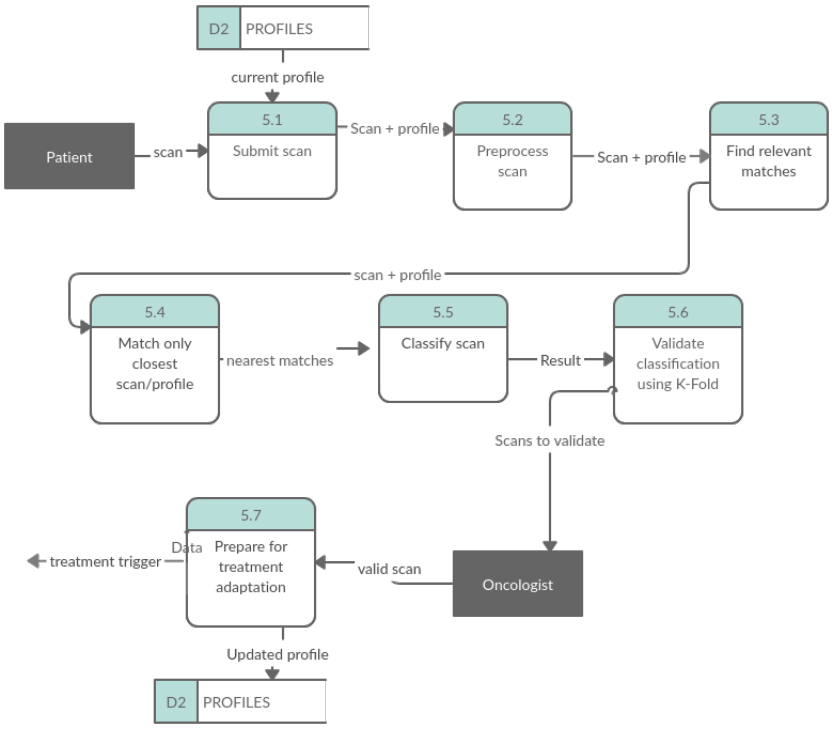
Once a treatment trigger is found, the adaptation subsystem is fired which uses a connectionist neural network to derive discriminating

features to find the most appropriate treatment for the current patient, more details of this process is in child diagram 6. The system triggers the oncologist to ensure no allergic reactions to the treatment will ensue by requiring the oncologist to perform an alllergy test on the patient.

Just then the treatment starts, and along the road the treatment is adapted by the patient's progress, similar profiles and the oncologist's opinion until the treatment is complete. When the treatment is complete, the oncologist validates the treatment progress by completing a survey. This is done to ensure better performances in the future.

DFD CHILD DIAGRAMS

Child Diagram 5



DATA DICTIONARY

Description:	Create Patient Profile Gather all necessary data about patient from medical history to symptoms	Process ref.: 1
Inputs	Logic Summary	Outputs
P-1 symptoms + history D1-1 patient info	Once the Cura general practitioner collects all the necessary information needed to classify the patient, it immediately sends them to the classifier	1-2: profile
Physical ref.: Full description of this logic can be found in:	Part of online form through CuraGP Functional spec. section 3.7.1	

Description:	Classify Patient Illness Classify illness using training set of other patient profiles	Process ref.: 2
Inputs	Logic Summary	Outputs
1-2 profile	Required preprocessing is performed then using a connectionist neural network similar profiles are fetched and matched with the current patient's profile	2-3: class
Physical ref.: Full description of this logic can be found in:	Functional spec. section 3.7.2	

Description:	Refer Patient to Oncologist Send the patient to a preferred oncologist	Process ref.: 3
Inputs	Logic Summary	Outputs
2-3: class D1-3: patient location	After the general practioner classifies the patient's probable illness, using the class, the patient's info and preferences he is referred to an oncologist.	3-O patient info
Physical ref.: Full description of this logic can be found in:	Functional spec. section 3.7.3	

Description:	Verify illness classification Check whether the general practitioner classification is valid	Process ref.: 4
Inputs	Logic Summary	Outputs
O-4: professional opinion	Prior to starting the treatment history on the system, the doctor has to verify whether or not the patient has the cancer suggested by the GP	4-5: valid class
Physical ref.: Full description of this logic can be found in:	Functional spec. section 3.7.4	

Description:	Start a patient-oncologist visits This process handles all patient visits to the oncologist	Process ref.: 5
Inputs	Logic Summary	Outputs
4-5: valid class, D2-5: current profile, P-5: scan,O-5: scan validation,O-5: condition confirmation	The patient submits a scan required by the oncologist in each visit, the system classifies the scan before the oncologist's confirmation before the system classifies the patient's condition for the oncologist's confirmation until they find a treatment trigger. More details are in child diagram #5	5-O: scan to validate , 5-O: suggested condition , 5-D2: updated profile , 5-6: treatmetn trigger
Physical ref.:	Part of online form through CuraCBR	
Full description of this logic can be found in:	Functional spec. section 3.7.5	

	Adapt treatment	Process ref.: 6
Description:	Use previous experience to figure out treatment	
Inputs	Logic Summary	Outputs
D2-6: all profiles , 5-6: treatment trigger , O-6: treatment trigger, 8-6: insight, 7-6: allergy test result	This process handles almost all parts of the treatment; a machine learning algorithm adapts treatment and solutions throughout the patient's journey to recovery. Full operation is in child diagram 6.	6-O: suggested treatment , 6-8: treatment, 6-9: treatment updates
Physical ref.: Full description of this logic can be found in:	Adaptation subsystem in CuraCBR Functional spec. section 3.7.6	

	Treatment-allergen test	Process ref.: 7
Description:	Test the patient's allergies before starting a treatment	
Inputs	Logic Summary	Outputs
D2-7: allergies , O-7: oncologist treatment	Prior to starting a treatment, this process ensure no allergic reaction will ensue.	7-6: allergy test result
Physical ref.: Full description of this logic can be found in:	Allergy test in clinic Functional spec. section 3.7.7	

Description:	Start treatment Start the treatment for a patient	Process ref.: 8
Inputs	Logic Summary	Outputs
6-8: treatment	This process follows the patient's progress throughout their treatment and logs statistics, information and insights about their progress.	8-6: insights
Physical ref.: Full description of this logic can be found in:		

Description:	Validate Treatment Check the treatment as a success or not for future reference	Process ref.: 9
Inputs	Logic Summary	Outputs
6-8: treatment	This process follows the patient's progress throughout their treatment and logs statistics, information and insights about their progress.	9-D3: validation record
Physical ref.: Full description of this logic can be found in:		