



A Personalised Integrated Care Platform
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D5.3 First Data Resource Browser

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1 Executive Summary

The PICASO Data Resource Browser is a web-based tool which allows clinicians to browse information stored in the PICASO shared memory. This tool follows the paradigm of a computer's file manager but restricted to read only features. Using this, the clinician can have an overall view of the data resources that are available in PICASO shared memory and is available to her. The data detailed view and their editing of the available resources is out of the scope of this tool. The browser offers a dynamic and interactive mind map, populated with the existing resources and focusing on the effective information design model, the data's physical location and last modified date. The data itself is being available through other PICASO and clinical tools. The dynamic map is being generated through the integration of different logical and physical data repositories which constitute the PICASO shared memory.

2 Introduction

2.1 Purpose, context and scope of this deliverable

This deliverable presents the outcome so far of Task 5.3 Data Resource Browser under WP5 Privacy Enhanced Integrated Data Management. This is the first iteration of the Data Resource Browser. The next iteration will be delivered / documented under D5.5 Second Data Resource Browser (M22). The final version of this tool will be delivered as part of the PICASO integrated care platform.

2.2 Content and structure of this deliverable

Section 3 presents the current requirements for the Data Resource Browser including technical aspects and information design approach. Section 4 presents the current User Interface and Section 5 provides information about the technical architecture and technologies.

3 Requirements

This section presents the user requirements directly or indirectly related to this tool and their first technical considerations for the Data Resource Browser.

3.1 PIC-72 Medical professionals are provided a graphical presentation of self-recordings from questionnaires FFbH/HAQ and RADAI as well as patient's pain ratings (only UDUS).

| | |
|---------------------------|--|
| Rational | It must be possible for medical professionals to easily browse patient's personal ratings on FFbH/HAQ and RADAI questionnaires and his/her pain ratings. Visualization of results in graphs supports the need of medical professionals to get a quick overview of a patient's current health status. |
| Fit Criterion | Graphical presentation of results from a patient's self-recordings on FFbH/HAQ, RADAI and pain status is provided and can be filtered by time slots (daily, weekly, monthly). Measurements below or above defined thresholds are indicated. Medical professionals can also have an integrated view on pain ratings and different types of measurements taken by the home monitoring platform (e.g., pain ratings combined with results from blood pressure and heart rate variability measurements). |
| Technical features | <ul style="list-style-type: none"> Show Questionnaires including date and location |
| Comments | |

3.2 PIC-74 Patient information should be presented to requesting medical professional according to relevance

| | |
|---------------------------|--|
| Rational | Patient records consist of many different pieces of information (e.g. results of physical exams, blood tests, scans, surgeries) not equally relevant for medical professionals. To support medical professionals in achieving their treatment goals, it is important to filter patient information according to relevance for the treating medical professional. Because information needs vary among medical professionals, this will need to be configurable by medical professionals. |
| Fit Criterion | Patient information is presented to medical professionals according to preconfigured relevance |
| Technical features | <ul style="list-style-type: none"> Group resources based on the professional carer's role Make configurable the list of relevant resources per professional carer's role |
| Comments | |

3.3 PIC -78 PICASO shall be able to show patient data as commonly included in a standard referral letter.

| | |
|-----------------|--|
| Rational | For UDUS trials patient information available from clinical systems is limited to information commonly provided in a standard referral letter to, e.g., a GP. This may include: patient's ID (trial ID), contact details, diagnoses, anamnesis, medication, lab test results, imaging results, examination results from different hospital departments (e.g., RA, CVD specialist), concluding comments, follow-up appointment. This information will be stored in Clinical ODS and shall be presentable to medical professionals on the Clinician Dashboard in a structured way. |
|-----------------|--|

| | |
|---------------------------|--|
| Fit Criterion | Patient information as commonly provided in a standard referral letter can be accessed through the Clinician Dashboard and shown to medical professionals in a structured way. |
| Technical features | <ul style="list-style-type: none"> Show Referral letter structure. This can be possible either as one resource per referral letter or as many (parts) to one. |
| Comments | |

3.4 PIC-104 Patient needs to be able to decide with whom they want to share which information from their patient record.

| | |
|---------------------------|--|
| Rational | Patients needs to be able to decide with whom they want to share which information from their patient record. |
| Fit Criterion | Only information that the patient has allowed to share with a certain medical professional or an informal carer, can be accessed by him or her. Patients can decide upon this at any time. |
| Technical features | <ul style="list-style-type: none"> Show only data resources that the patient has shared |
| Comments | |

3.5 PIC-108 Physicians need to be able to decide with whom they want to share which medical information authored by them

| | |
|---------------------------|--|
| Rational | Physicians need to be able to decide with whom they want to share which medical information authored by them most of all to account for medical confidentiality. |
| Fit Criterion | Only information that the physician has allowed to share with a certain medical professional, can be accessed by him or her. |
| Technical features | <ul style="list-style-type: none"> Show only data resources that the physicians have shared |
| Comments | |

3.6 PIC-109 A medical professional needs to know about all professional roles involved in a patient's treatment.

| | |
|---------------------------|--|
| Rational | In order to get a quick overview on a patient's treatment situation, medical professionals should be visualised what kind of professional roles are involved in the treatment of this patient. |
| Fit Criterion | For every patient all involved professional roles are visualised. |
| Technical features | <ul style="list-style-type: none"> Visualize of involved professional roles |
| Comments | |

3.7 PIC-110 A medical professional needs to know about types of home monitoring measurements and recordings

| | |
|---------------------------|--|
| Rational | A medical professional should be able to get a quick overview on what type of sensors are actively used in a patient's home monitoring setting and what patient recordings are available (e.g., pain recordings) in order to know which results he/she can expect. For trial 2 types of sensors that have been used previously, but are not active at the moment, shall also be visualisable |
| Fit Criterion | For every patient all types of home monitoring measurements and recordings are visualised to medical professionals according to their access rights. |
| Technical features | <ul style="list-style-type: none"> Visualize all types of home monitoring and measurements according to the access rights |
| Comments | |

3.8 PIC-113 Patients are provided constantly available material with instructions on how to use sensors and the applications on the Patient Dashboard.

UDUS/UTV: Provide instructions on how to use sensors (handbook, videos etc.)..

| | |
|---------------------------|--|
| Rational | For the trials patients need to have information constantly available, e.g., in form of a 'handbook', video clip or the like, on how to use properly sensors of the home monitoring platform and applications of the Patient Dashboard, e.g., for self-recordings. |
| Fit Criterion | Patients are provided constantly available material such as a handbook with instructions on how to use sensors for home monitoring and applications on the Patient Dashboard properly. |
| Technical features | <ul style="list-style-type: none"> Show supporting material |
| Comments | |

4 Design

4.1 Information design - Data Requirements

Given the “browser” nature of this tool one of the most important aspects for its effective design is the design of the information model – the dynamic potential pathways of the clinicians aiming at having an overall picture of the patient from a more “data type” perspective. This is a complementary perspective to the “data” perspective which the Clinician Dashboard targets to offer.

From the user requirements, it comes out that clinicians want to initiate the browser by searching for a specific patient either using her name or ID. Having in the very centre the patient, different care professionals would need to follow different path ways in order to obtain a good overview of what data are available for a patient. Figure 1 presents a first attempt to model the information based on:

- The relevance to the parent node
- The distance of a potential target from the root node

The outcome takes the form of a graph as it seems that there is a need to reach the same nodes following different paths (e.g. observations can be reached either through Care Plans -> Observation or Home measurements and Recording -> Measurement / Recording). In principle, the most critical – usual nodes for a clinician should be nearer to the patient (shorter path – less hops).

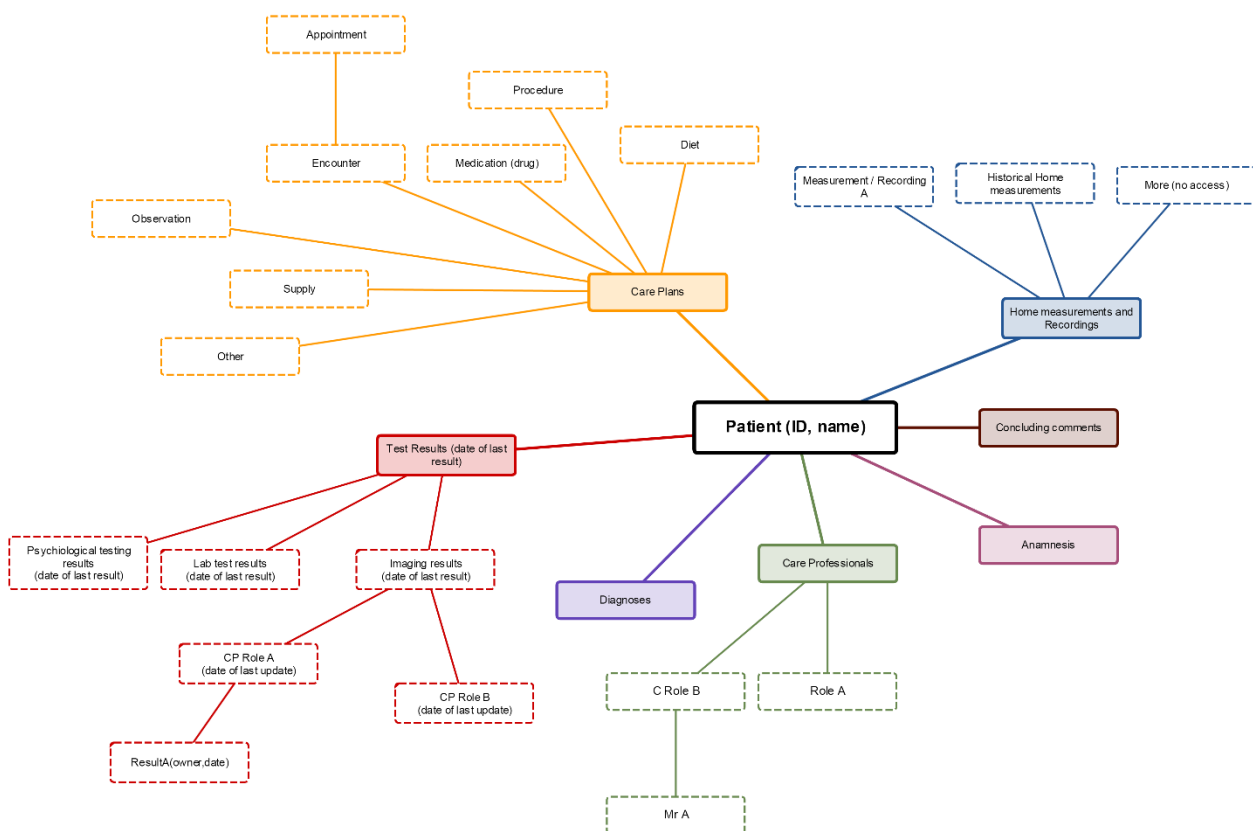


Figure 1: Data Browser Information Design Model

4.2 User Interface Design

The graph is “live” and is dynamically updated when the user clicks on the different nodes. If, for example, a general practitioner searches for data sent by her patient, the graph will show the actual patient as the centre node together with all the carers that have requested data from the doctor’s patient shown as the surrounding

nodes, provided that these carers have agreed to share this information with the doctor. By clicking on one of the carers, a new graph forms showing which data the carer has received from the patient (again provided that the doctor has been authorised to see this information). Finally, the doctor can click on a certain data type and see all the measurements performed (including contextual data and again, provided the proper authorisation is established). The doctor can click around the different branches and see other carers' interventions, the care plans executed, and dig further into the relevant data according to her access rights. The Data Browser is a read-only tool. It does not write any data within PICASO, other than to the Activity Log for logging access to data. Figure 2 presents the main use case activity diagram.

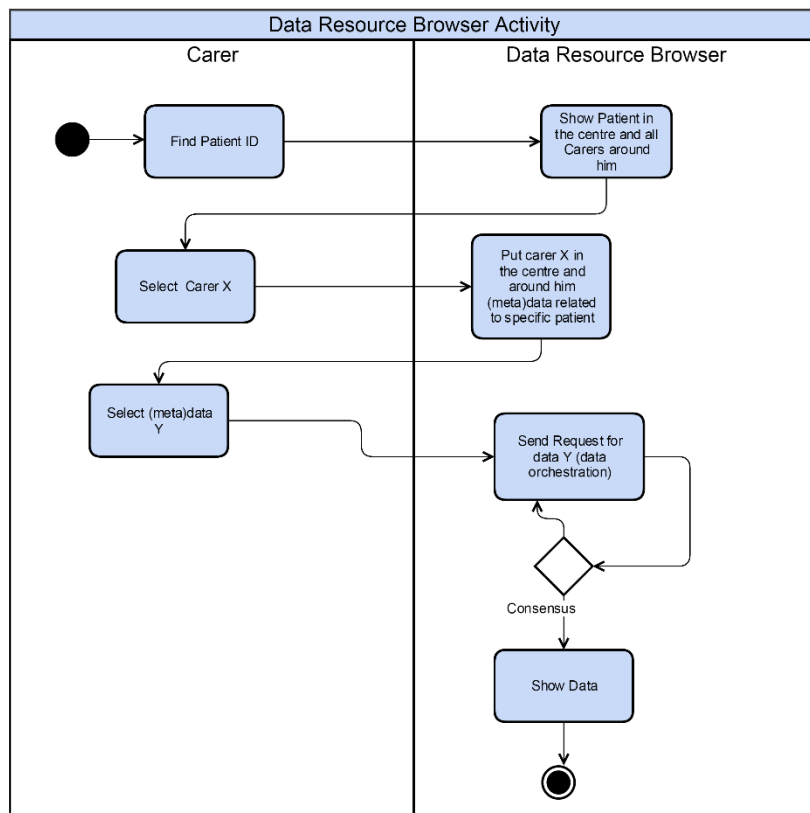


Figure 2: Main activity diagram

Figure 3 presents the very first wireframe iteration of the Data Resource Browser tool.

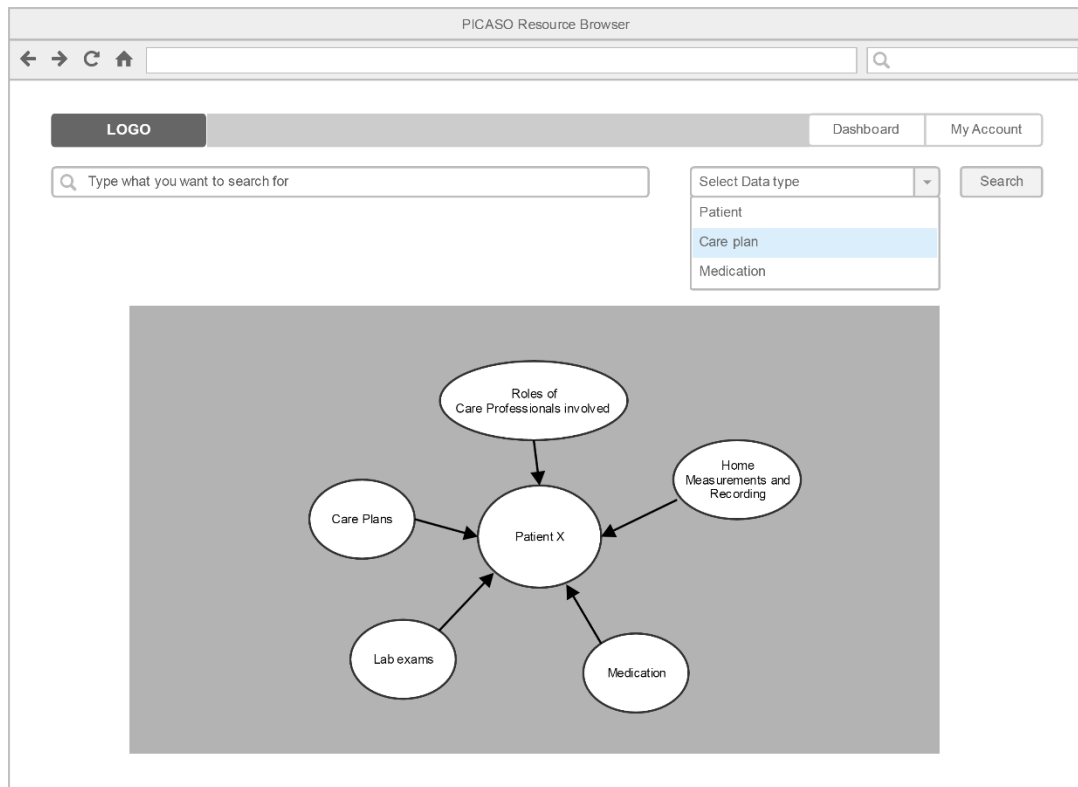


Figure 3: Data Resource Browser UI – 1st Iteration drawing

Figure 4 presents the first prototype of the Data Resource Browser tool

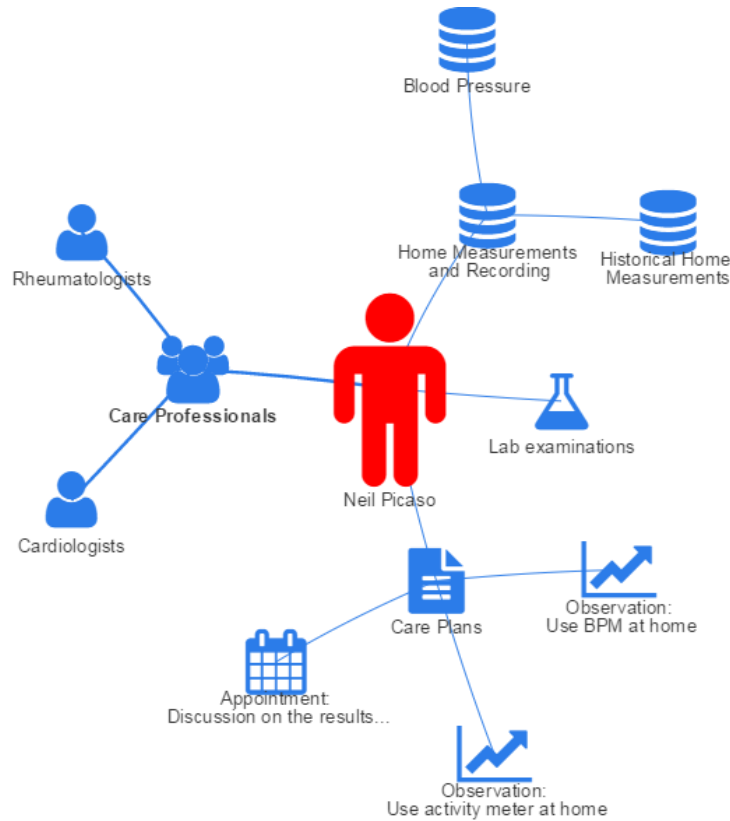


Figure 4 Data Resource Browser UI – 2nd Iteration mock-up

4.3 Architecture

Figure 5 provides an architecture zoom to the PICASO Architecture as described in D2.3. The Data Resource Browser depends closely on the following components:

- the Data Orchestration which is responsible for preparing the data model that will be visualized by the Data Resource Browser
- the Activity Log which is responsible of inserting log entries on every data access
- the Clinician Dashboard which will be a complementary view of the patient – from a “significant data” perspective
- the Risk Manager which will complement the above mentioned views in order to provide decision support

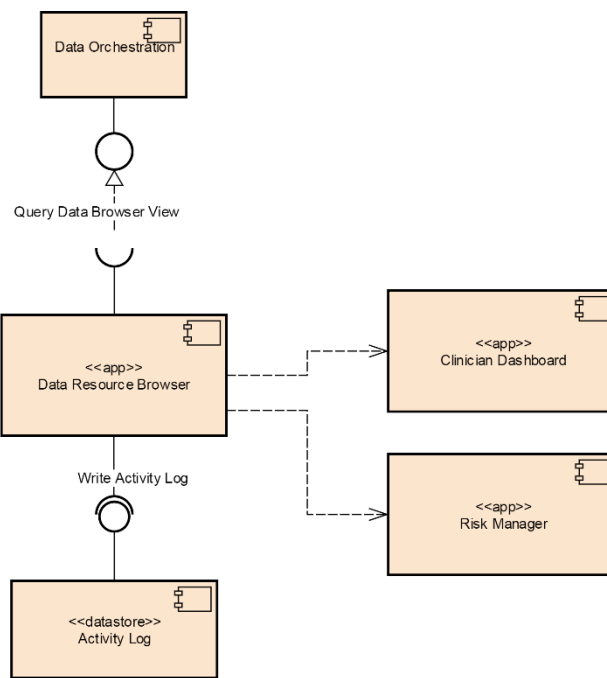


Figure 5: Data Resource Browser Architecture – Dependencies

Regarding the Activity Log, it is foreseen that the logging could be done more centrally through the data orchestration component. However, for the moment it is not clear if this can be done for all components so for this first iteration the functionality is kept on the application layer components.

The Clinical Dashboard and the Risk Manager components have indirect dependency to the Data Resource Browser as there will be no data exchange between these components. However, these applications will need to have some dependencies on the user interface level (e.g. link from the home care measurements to the clinical dashboard).

5 Implementation

5.1 Data model

The Data Resource Browser will need data coming from the following data sources:

- Clinical ODS
- Metadata Registry

For the implementation of the Data Resource Browser the developed information design model needs to be mapped to the data models of the different data sources. The Data Orchestration component is responsible for delivering such a unified model and transform it to the data browser exchange model as illustrating in Figure 6 .

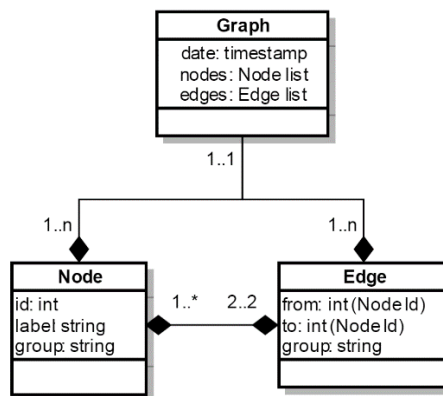


Figure 6: Data exchange model for Data Resource Browser

JSON representation format will be used. Follows a simple example:

5.1.1 Clinical ODS

```

{
  "nodes": [
    {"id": 1, "label": "Neil Picasso", "group": "patient"},
    {"id": 2, "label": "Care Professionals", "group": "usergroups"},
    {"id": 3, "label": "Home Measurements\n and Recording", "group": "data" }
  ],
  "edges": [
    { "from": 1, "to": 2, "label": "" },
    { "from": 1, "to": 3, "label": "" }
  ]
}
    
```

Figure 7 illustrates the current design of Clinical ODS which will be used as one of the data sources for building the Data Resource Browser outcome through the Orchestration component.

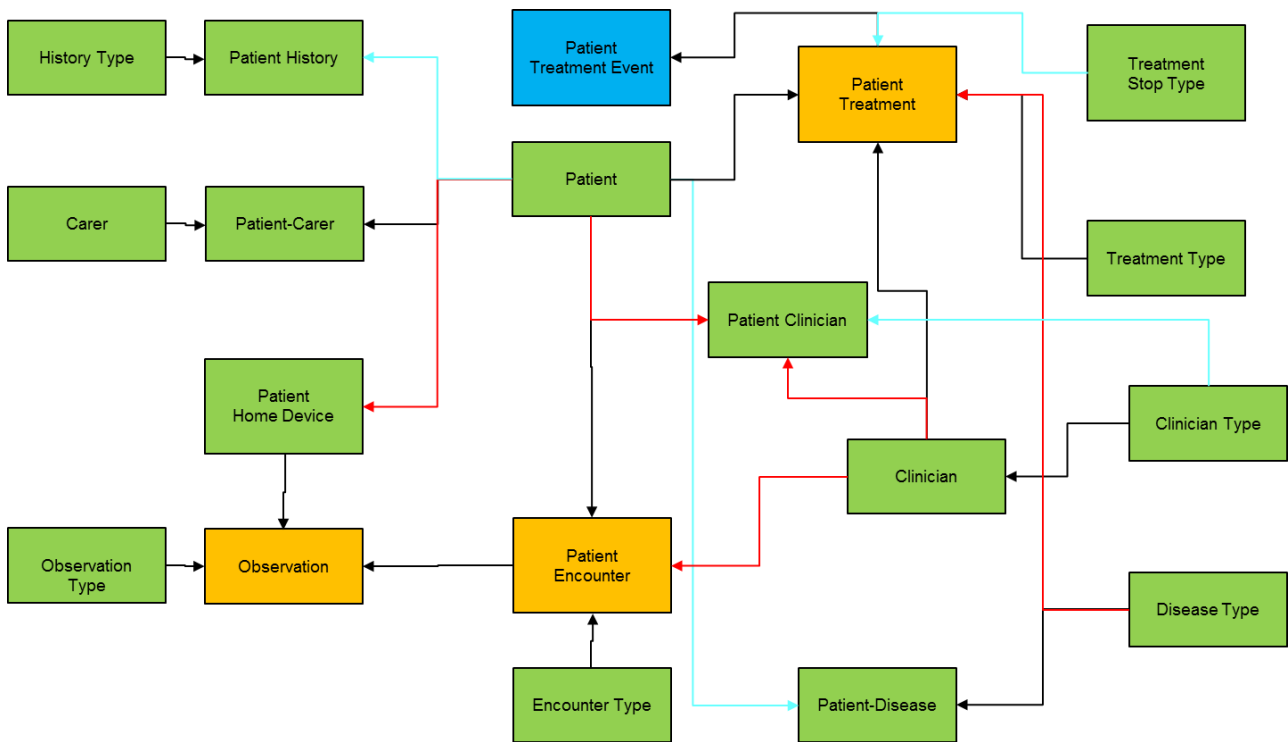


Figure 7: Current ODS Design Model

5.1.2 Metadata Registry

From the Metadata registry, the Data Resource Browser will retrieve information about:

- Location (entity owner)
- Time Stamp (last modified)

5.2 APIs

The Data Resource Browser is a front end tool that needs to read data from the Data Orchestrator Component and write data to the Activity Log. It follows the APIs for such a communication.

5.2.1 Data Orchestration API

| Description | path | method | parameters | response success | response success |
|-------------------------------|------------------------------------|--------|------------|------------------|-----------------------------------|
| Get All Browser Data | /browser/all/:patientId/ | GET | userToken | 200 OK | 401 Unauthorized 404 Not Found |
| Get Data for node type | /browser/part/:patientId/:nodeType | GET | userToken | 200 OK | 401 Unauthorized 404 Not Found |

5.2.2 Activity log API

| Description | path | method | parameters | response success | response success |
|-------------|------|--------|------------|------------------|------------------|
|-------------|------|--------|------------|------------------|------------------|

| | | | | | |
|-----------------------|-------|------|---|-------------|--------------------------------------|
| Insert log row | /log/ | POST | userToken timestamp transactionType LogData (JSON): <ul style="list-style-type: none">• clinician token• source token• Data type token | 201 Created | 401 Unauthorized 304 Not Modified |
|-----------------------|-------|------|---|-------------|--------------------------------------|

5.3 Protocols

- HTTPS/REST

5.4 Technological landscape

- Web technologies
- visjs visualization library¹
- AngularJS version 1²
- NodeJS³

¹ <http://visjs.org/>

² <https://angularjs.org/>

³ <https://nodejs.org/>

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