

## Objective

This document introduces the **information model** for the project Patient Radar. The information model defines the information objects and their attributes in the customer's language. This ensures clients an understanding of the formulation of information models in the project. Hence, it provides the basis for the traceability of a proposed solution.

The information model describes all relevant information for the project. This information includes the “project patient radar” information of the patient, his treatment and the subsequent rehabilitation (rehab) in a clinic. This information refers to the “before” and “during” the treatment of patients in acute hospital. Some of the **relevant information** concerning the **treatment** of the patient need to be available at the rehab clinic, so that the process of the transfer runs smoothly.

The information model provides the terminology for an ongoing engagement between the involved departments and the project team. The information model is the basis to **define the requirements** for information. The needed information can be precisely identified. Hence, participants have a shared understanding of meaning of information.

Thus, **information documents** and the **time** to which information must be available, is fundamental to optimally support transferal process.

## Description of the process to derive the information model

The information model was derived by modeling a concrete process of the Hospital Walentstadt as a reference model.

Process steps were identified together with the information flow along them and their integration is presented. This gave the basis to derive the information model. The information model has been then specified and validated together with the Department (**which one?**)

Table 1 (in Annex 2) shows the approximate sequence of a patient's treatment in an acute hospital. The process diagram is used to derive the information model. This representation is an approximation of the process in the hospital (**Die Darstellung ist eine Annäherung an den Prozess im Spital**). Therefore, as such it does not embeds every detail of the process. The representation is intended to show the relevant activities, and the information they can be generated in, which are relevant to the rehabilitation clinic.

Table 1 shows the definition of the information objects and the information flows that were validated by the Transferal Manager Karin Zimmermann of the hospital Walenstadt on 08.07.15 / 22.07.15.

For the project it's important that specialists in the field validates the definition of the information objects. In order to provide the basis for the information model within a reasonable time, the terminology was validated only by one qualified person of one hospital (Walenstadt).

If other hospitals use different terminologies that are relevant for the project Patient-Radar, these will be transparently declared and insert in the knowledge base.

## 1. Information model

The information model structures information in a business perspective. Actors are included in the information model, and as table 1 shows each actor is introduced with its description aside. This association (actors and description) provides which actors is responsible for creating certain information as well as which actor should have access to what information. Such an identification ensures an optimal process support.

## Definition of Actors

Actors	Description
Care Giver (in Acute Hospital)	He/she is responsible for the health care of patients in Acute Hospitals
Rehabilitation Clinic	Rehabilitation Clinic is the generic term for all stakeholders/actors in rehabilitation clinics. In this early phase of the project the granularity of actors in reha. clinics is not specified. However, a detailed description will be given in a follow-up document, e.g. roles, data access authorizations). The Rehabilitation Clinic is the final user of radar system.
Surgeon (in Acute Hospital)	He/she performs the surgery in the acute hospital. The surgeon performs also the activity (Indikationssprechstunde) of consulting the patient before the surgery, in which the surgeon explains the procedure and suggests the surgery date (e.g. asap or next months) that is then defined. In this activity (i.e. Indikationssprechstunde) no decisions with respect to rehab. clinics are made.
Hospital Administrative Personnel (in Acute Hospital)	He/She is the responsible for the registration of the patient and opening the patient case. Hence, he/she ensures the correct acquisition of patients' data, e.g. check of the insurance card when patients are hospitalized; informing the health insurance about the patient hospitalization (in the hospital of Walenstadt: this role is covered by employees at the reception).
Transferral Manager (in Acute Hospital)	He/she is responsible for the registration and the transfer of patients from acute hospitals to rehab. clinics. The transferral manager is in charge also of discussing with the patient about his/her rehabilitation as well as selecting together with the patient a rehab. clinic. Additionally, he/she interacts with the health insurance for costs reimbursement submission (the KoGu form). Namely, the KoGu form is prepared by the physician, edited by the transferral manager, who then submits it to the health insurance. Hence, the transferral manager has to collect those information concerning patient treatments that are relevant for both the health insurance and the rehab. clinic. Transferral managers are entitled to deal with decisions regarding the cost reimbursement (KoGu). If necessary, the consultant or the case management expert contact the health insurance.
Patient	A patient is hospitalized in an acute hospital. After the patient completes the treatment in the acute hospital, he/she can be transferred to a rehab. Clinic to receive further rehabilitative treatment.
Bed scheduler	Bed scheduler arranges and provides the hospitalization date to the patient, opens the case and associates it with a DRG code.
Physician (Einweisender Arzt)	He/she is responsible for the patient treatment in the acute hospital and for the briefing prescriptions to send to the rehab. clinic. Contact information of the physician is included in the briefing prescription and it is available in case of questions/clarifications. He/she is responsible to ensure that information of the patient questionnaire is transmitted to the transferral manager. The physician does not have to be necessarily the surgeon.
Rapid assessment nurse	In emergency cases, she/he is the nurse who is in charge of the following tasks: Greet the patient as soon as he/she steps in the hospital, next she/he identifies the level of severity of the case and finally, she/he speaks with with a family member/person who waits in the waiting room.

Validated by Karin Zimmermann, Hospital Walenstadt 22.07.2015

## Definition of Objects

Object	Description
Administrative Patient Data	Synonym for master data, it is used by the project team
Acute Hospital	It is a hospital for examination, treatment and care of patients with severe medical conditions. Following acute hospitals are more in detailed defined: <ul style="list-style-type: none"> <li>- Hospitals that provide basic care and centralized treatments</li> <li>- Specialized Clinics in surgery, gynaecology / neonatology and paediatrics.</li> </ul>

	Clinics specialized in psychiatry, treatments and other specialized clinics are not considered acute hospitals (source <a href="http://www.hplus.ch/de/zahlen_fakten/h_spital_und_klinik_monitor/begriffe/akutspital/">http://www.hplus.ch/de/zahlen_fakten/h_spital_und_klinik_monitor/begriffe/akutspital/</a> )
Historical Cases	In medicine, historical cases refers to the medical history and current condition of a patient. An historical case consists of information derived from questionnaires that a physician poses to a patient, and the physician who conducted the examination. (Source <a href="http://www.pflegewiki.de">www.pflegewiki.de</a> )
Reimbursement requests based on the medical prescription	The medical prescription is usually sent to the rehab. clinic. The calculation of reimbursement cost is initiated by the physician and then hand it over to the transferral manager who supplements the reimbursement request. This, is then sent to the health insurance, who decides whether to pay for the rehabilitation. The reimbursement request form (KoGu) consists of the following documents: <ul style="list-style-type: none"> <li>- Accompanying letter to the health insurance</li> <li>- Briefing of rehabilitation</li> </ul>
Transferral report	It is a detailed report on a patient treatment in the acute hospital. The report is available a few days after the patient is discharged.
Treatment	(From step 2 to 14) All values of measures carried out in the acute hospital should achieve a stable state of health (in German, it is compliant with WZW = wirksam, zweckmässig, wirtschaftlich) such as effective, functional, and efficient. A treatment includes medical treatment, care giving and nursing in various therapies (e.g. occupational therapy, physiotherapy)
Treatment data	It is a generic term for all information that are generated during the patient treatment in the acute hospital. The term is used by the project team rather than the hospital Walendstadt.
Comorbidity	When a patient that is treated in the Acute Hospital is affected by two diseases at the same time.
Complex Patients	Patients whose treatment and/or the follow-up rehabilitation are complex. Factors that lead to such a complexity are as follows: <ul style="list-style-type: none"> <li>- Medical (e.g. heart issues that imply additional examinations by the cardiologist before performing the surgery)</li> <li>- Social (e.g. alcohol diseases)</li> <li>- Psychological</li> </ul> <p>It may also occur that a patient turns to be a complex patient during his/her stay in the acute hospital as some complications arise.</p>
Diagnosis	Detection of physical or mental illness. Relevant cases for patient radar are as follows: Pertrochanteric femoral fracture femur fracture in between the greater trochanter and the smaller trochanter. Main diagnosis: basic entry Secondary diagnosis: comorbidities (e.g. stroke) Nursing diagnosis: delirium = risk of falling → increase of homecare / special requirements for treatments (derived from DRG code).
Hospitalization Reason	Reason why a patient is hospitalized in an acute hospital (e.g. fall).
Admission Criteria to Rehab. Clinic	Preconditions that should met for a patient to be admitted in a rehabilitation clinic. For example, Absolute criteria: rehab. clinics cannot admit patients with several demented diseases. " Relative criteria: a patient must achieve a health status (a target) such that can be transferred to a rehab. clinic.  <b>Possible Scenario:</b> A patient with a transtibial amputation. This patient has an infection and needs an infusion every 2 hour. Under these circumstances the patient cannot be transferred to a rehab. clinic.
Entry List	List with hospitalized patients in the acute hospital (only patients with an <b>elective treatment are entered in the list</b> ).
Rehab Briefing	It's a document/form, which contains all relevant aspects for a patient to be registered in a rehab. clinic.

	<p>The completed rehab briefing form is sent to the rehab. clinic, together with an accompanying letter for the rehab. clinic and an accompanying letter for the health insurance. However, both of these letters are not relevant for the information model.</p> <p>Rehab Briefing includes the following aspects:</p> <ul style="list-style-type: none"> <li>• Patient Name</li> <li>• Age, Gender</li> <li>• Rehab. Clinic</li> <li>• Family Doctor</li> <li>• Hospitalization reason (accident, disease) - (Einweisungsgrund (Unfall, Krankheit)</li> <li>• Rehabilitation type (musculoskeletal rehabilitation, neurorehabilitation, geriatric rehabilitation, pulmonary rehabilitation, psychosomatic rehabilitation, internal rehabilitation, cardiac, rehab, others)</li> <li>• Rehab. duration (in weeks)</li> <li>• Hospitalization date in acute hospital</li> <li>• Beginning of rehabilitation</li> <li>• OP-Date (optional)</li> <li>• <b>Diagnostics:</b> e.g. polyarthritis, often as part of a mischkristallarthropathie.</li> <li>• <b>Actual state:</b> e.g. generalized exacerbation of pain under Spiricort</li> <li>• <b>Comorbidities:</b> e.g. diabetes mellitus of type 2, insulin dependent, ED 1980 sequelae...(none, one or more comorbidities)</li> <li>• <b>Actual state comorbidities</b> e.g. Hyperglycemia blood glucose levels to 30 mmol/l under steroid medication... (none, one or more comorbidities)</li> <li>• <b>Course of therapy:</b> e.g. hospitalization for acute aggravation of a previously unclear etiology polyarthritis.</li> <li>• <b>Functional deficit:</b> limited features are described together with their daily basis impact on life and condition of the patient, e.g. high limited mobility.</li> <li>• <b>Treatment objective:</b> the objective is set with respect to the diagnosis and functional deficits, e.g. fullest restoration of general mobility and stamina. The goal is to go back home.</li> <li>• <b>Disability</b> (yes; no; if yes, since when, how much %)</li> <li>• <b>Medical confirmation of the hospitalization need (Ärztliche Bestätigung der Klinikbedürftigkeit):</b> (re-hospitalization into inpatient for further treatment(s); medical follow-up treatments, because daily medical and therapeutic measures are required; installation of early rehabilitation stationary from IMC / IPS; workplace clarification; high therapeutic density; outpatient treatment falls out of consideration, basic: Special living conditions, Comorbidities, outpatient therapies have been exhausted)</li> <li>• <b>Degree of disability</b> (patient is independent; needs assistance for eating, dressing, toilet, washing, walking; wheelchair; need an intensive assistance; bedridden)</li> <li>• <b>References Exhibitors (Austeller Referenzen)</b></li> <li>• <b>Concordat Number</b></li> <li>• <b>Physician (who deals with the rehab briefing) in acute hospital</b></li> <li>• <b>Tel. Physician</b></li> <li>• <b>Contact details acute hospital</b></li> </ul> <p><b>Block Pflegebedarf (geht nur an Reha) Information for Rehab. ?</b></p> <ul style="list-style-type: none"> <li>• <b>Nursing supplies nutrition:</b> (probe, parenteral nutrition, food enter, aspiration,.....)</li> <li>• <b>Nursing supplies excretion/toilet</b></li> <li>• <b>Nursing supplies personal hygiene</b></li> <li>• <b>Nursing supplies dressing and undressing</b></li> <li>• <b>Nursing supplies locomotion</b> (bedridden locomotion impossible ... ..)</li> <li>• <b>homecare transfer</b> (the transfer is not possible as it needs several assistants, Transfer with a lot of support of an auxiliary person, ....)</li> <li>• <b>Orientation</b> (strong disorientation, ...)</li> <li>• <b>Orientation Remarks</b> (free text)</li> <li>• <b>Understanding</b> (no possible communication ...)</li> <li>• <b>Understanding Remarks</b> (free text)</li> <li>• <b>Social interaction</b> (often distance / withdrawn, ...)</li> <li>• <b>Social interaction Remarks</b> (free text)</li> </ul>
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	<ul style="list-style-type: none"> <li>• <b>Psyche</b> (aggressiveness (easy, medium, hard), depression / apathy, ...)</li> <li>• <b>Psyche Comments</b> (free text)</li> <li>• <b>General comments</b> (wounds, injuries) (free text)</li> </ul>
Case	Specific container of treatment data. A treatment may consider several cases (ambulatory (outpatient) consultant treatment report = 1 case, inpatient intervention = 1 other cases). Both cases are part of the same treatment. One treatment in the acute hospital consists of minimum 1 or more cases. In the hospital Walenstadt, the transferral manager includes his/her actions in the appropriate case.
Indication or Cause Indication	<p>In medicine and nursing the indication is the justification/reason for a treatment, therapy or investigation.</p> <p>Source: <a href="http://www.merriam-webster.com/dictionary/indication#medicalDictionary">http://www.merriam-webster.com/dictionary/indication#medicalDictionary</a></p>
Consultation treatment report	<p>Surgeon examines patients. The treatment is determined according to the indication and it is discussed with the patient.</p> <p>The course of the consultation treatment report is transcribed in a consultation report.</p> <p>The <u>consultation report</u> is structured as follows:</p> <ol style="list-style-type: none"> <li>1. <b>Diagnoses</b> (HWS (cervical spine) whiplash accident, humeral side Partialruptur supraspinatus right shoulder right (i.e. rupture of the upper arm tendon)</li> <li>2. <b>History</b> (the actual suffers / medical history) interim medical history is current treatment.</li> <li>3. <b>Status</b> (short status) Description of the current status, ability to move the shoulder documented, recorded test results.</li> <li>4. <b>Assessment:</b> Description of the other treatment "surgical treatment of Partialruptur". Possible transferral for a second opinion.</li> </ol>
Cost Reimbursement (KoGu)	<p>Confirmation from health insurance whether rehabilitation is paid.</p> <p>Representation: actual state of information flow</p> <p style="text-align: center;"><b>Informationsfluss zwischen Akutspital und Krankenkasse</b></p> <p style="text-align: right;">www.websequencediagrams.com</p> <p>Action 3: the duration refers to the time to receive the grant (also to rehab.).</p>
Medical history	Synonymous of data treatment (the terminology is also used in the system PMS Nexus).
Quick Transferral Report	<p>This report is given to the patient during his/her hospitalization. It's a short discharging report containing the following information:</p> <ul style="list-style-type: none"> <li>• medicines list (treatment)</li> <li>• What was done to the patient (surgery, etc.)</li> <li>• What needs to be monitored</li> <li>• More procedures (Procedure)</li> </ul>
Drug History	It contains what medications the patient is taking or took in the past.
Medication list	It's a subset of medical documentation related to the patient medication (administered drugs). Drugs before entering → drug history
Surgery	The surgery is documented in a report, i.e. surgery report.
Nursing History (Pflegeanamnese)	<p>It is generated when the patient is admitted. Includes details concerning what activities the patient has carried out independently at home, e.g. where he/she and on what needed help.</p> <p>Examples of possible information of a maintenance history: He has his own business • What activities.</p>

	<p>He has availed • What aids.</p> <ul style="list-style-type: none"> <li>• patient has showered at home everyday. At the hospital, he will also want this → potential impact on care needs.</li> <li>• Wash only with cold water.</li> </ul> <p>The nursing history also provides information on the definition of objectives of the treatment, including rehabilitation. The aim of rehabilitation: same quality of life as before, the nursing history information includes what the patient was able to do on his/her own and where he/she is in need of help.</p>
Care needs (sheet)	<p>The care needs sheet is generated in the hospital (e.g. Walenstadt) for rehabilitative purposes. It describes needs for care of a patient, e.g. autonomous use of the WC, support while showering, adequate reactions of the patient.</p> <p>Source for the care needs is the nursing history (see above).</p>
Documentation Care (Hauptkurve der Pflegedokumentation)	<p>Generic term that contains the following information (in accordance to Kardex):</p> <ul style="list-style-type: none"> <li>• Main Diagnosis</li> <li>• Secondary diagnosis</li> <li>• Surgeries</li> <li>• Nursing diagnosis</li> <li>• Rea Status (yes, no, Date) → Reanimation</li> <li>• Rea Status new (yes, no, Date) → Reanimation, if some change takes place while treating the patient.</li> <li>• Nursing / Doctor: Questions/Average determination</li> <li>• BP (Blood Pressure)</li> <li>• Temperature</li> <li>• VAS (Visual Analog Scale, self-assessment of pain)/Pain protocol</li> <li>• Oxygen administration</li> <li>• Intake liquid</li> <li>• Infusion quantity</li> <li>• Urine quantity / indwelling catheter</li> <li>• Export/wound drains</li> <li>• Vomitus/Probe</li> <li>• Ostomy</li> <li>• Balance sheet (liquid absorption, excretion)</li> <li>• Enteral administration of medication (via gut) p.Os. (administered via mouth), suppositories, gtt(s) (drops)</li> <li>• Parenteral administration of medication, (e.g. i.v. (intravenous), i.m. (intramuscularly, in a skeletal muscle), s.c. (subcutaneously, under the skin))</li> <li>• Provisional medication (pain, sleep, nausea (feeling sick)) e.g. 2 Ponstan 500mg Tab max 3 times a day</li> <li>• Individual medication</li> <li>• Inhalations / drop (not p. Os.) / Other</li> <li>• Ointments / creams / gel</li> <li>• Associations / drains / pipes</li> <li>• Venflon control (intravenous cannula)</li> <li>• Wrapped / cold applications</li> <li>• Investigations / consultations / therapies</li> <li>• Laboratory</li> <li>• Blood sugar</li> <li>• Radiological examination</li> <li>• ECG (electrocardiogram)</li> <li>• Sonography (ultrasound)</li> <li>• Physiotherapy</li> <li>• Therapies (Logo, Ergo, diabetes, nutrition counseling, etc.)</li> </ul>
Nursing Documentation	<p>It is a general term for the following elements: Care planning, Social history, Main Documentation Care (Hauptkurve), Nursing History (see figure below)</p>



	<pre> graph TD     A[Pflegedokumentation] -- beinhaltet --&gt; B[Pflegeplanung]     A -- beinhaltet --&gt; C[Soziale Anamnese]     A -- beinhaltet --&gt; D[Hauptkurve]     A -- beinhaltet --&gt; E[Pflege Anamnese] </pre>
Care Planning	Internal hospital planning, what care activities are carried, e.g. Patient A can wash himself except for his back.
Rehabilitation	Measures and actions that aim at gaining back capabilities and functions. Additionally, measures and actions that at best maintain autonomous conditions.
Rehab. Clinic	Clinic where the rehabilitation is performed.
Social History	<p>Social history includes information about the social position and social environment of the patient.</p> <p>Information concerning the housing situation are also reported, e.g. patient A lives <i>alone</i> on the 7<sup>th</sup> floor <i>without elevator</i>.</p> <p>Furthermore, what kind of support the patient already needs.</p>
Hospital List (Spitalliste)	Relevance for the choice of the Rehab. Clinic (Relevanz für die Auswahl der Reha-Klinik.)
Master Data / Administrative Information	<p>Generic term that includes all information of the patient which are not relevant for treatments, such as the following:</p> <ul style="list-style-type: none"> <li>• Surname and Name</li> <li>• Residential Address</li> <li>• Telephone number(s)</li> <li>• Date of birth/Age</li> <li>• Gender</li> <li>• Insurance number</li> <li>• Insurance type (private, semi private, general)</li> <li>• Family Doctor</li> <li>• Contact person in case of emergency</li> <li>• Referring Physician*</li> <li>• Accidents/Diseases*</li> </ul> <p>* may change according to the entry type</p>
Appointment to begin rehabilitation	Estimated transfer of a patient from an acute hospital to a rehab. clinic, which implies that the proceeding of the treatment goes smooth (no compliances)
Appointment	Admission, surgery date, estimated transfer date to a rehab. clinic
Progress/Therapy	<p>(post surgery) Treatment progress.</p> <p>A therapy is a treatment of a disease with the aim to heal the disease and to achieve stable general conditions. It includes: regular patient status assessment from the medical assistant in the hospital. In the hospital Walenstadt the assessment is performed <b>in PMS Nexus</b>.</p>
Verordnungsblatt Law and ordinance gazette	Hospital internal documents which includes care actions that are documented by doctors, e.g. increase of painkillers dose. Assessments conducted in Progress/Therapy (see above) provide the basis for actions.
Wound Documentation	<p>In the wound documentation, text and images concerning the healing of wound is documented. The wound documentation is kept in the hospital Walenstadt only when a standard deviation is conducted.</p> <p><b>Wunddokumentation wird im Spital Walenstadt nur bei einer Abweichung vom Standard geführt.</b></p>
Patient ID	This code is assigned only once to the patient and it doesn't change also for future hospitalizations

<b>Case number</b>	This code is generated for the current case, in contrast to the patient ID, each case is assigned to a different case number
<b>Tessiner code<sup>1</sup></b>	It is a Swiss national code assigned to patients to identify the main disease. A predefined long of stay is associated with each Tessiner code;
<b>ICD-10 code<sup>2</sup></b>	It is an international code used to classify both the main and the secondary diseases - these codes are provided by the physician. They provide the estimation of the patient's long of stay (LOS) and derive costs reimbursement in both hospitals and rehabilitation clinics .
<b>Functional Deficit Diseases</b>	See object "Rehab Briefing" (above)
<b>Kardex</b>	A Kardex is a medical information system used by nursing staff as a way to communicate important information on their patients. It is a quick summary of individual patient needs that is updated at every shift change
<b>Reconsideration</b>	In case the KoGu is rejected, the main physician has to reconsider the case
<b>Rapid Assessment Nurse</b>	
<b>Emergency room (ER)</b>	An emergency room (ER) is the area of a hospital where patients are brought or are going first when they have accidents or emergency.
<b>Operating room</b>	
<b>Intensive Care Unit (ICU)</b>	
<b>Non-Intensive Care Unit</b>	
<b>DefReha Interface Criteria</b>	
<b>SwissDRG code</b>	
<b>CHOP code</b>	

Validated by Karin Zimmermann, Hospital Walenstadt 22.7.15.

## Appendix

### Detailed Process Description

Die "high-density"-Darstellung (Abbildung 1) ist zur besseren Verständlichkeit in drei Darstellungen abgebildet

Figure 1 shows the "high-density" task? Split into three representations for a better readability.

<sup>1</sup> <http://www.marcuret.ch/tessinercode2.pdf>

<sup>2</sup> <http://apps.who.int/classifications/icd10/browse/2016/en>



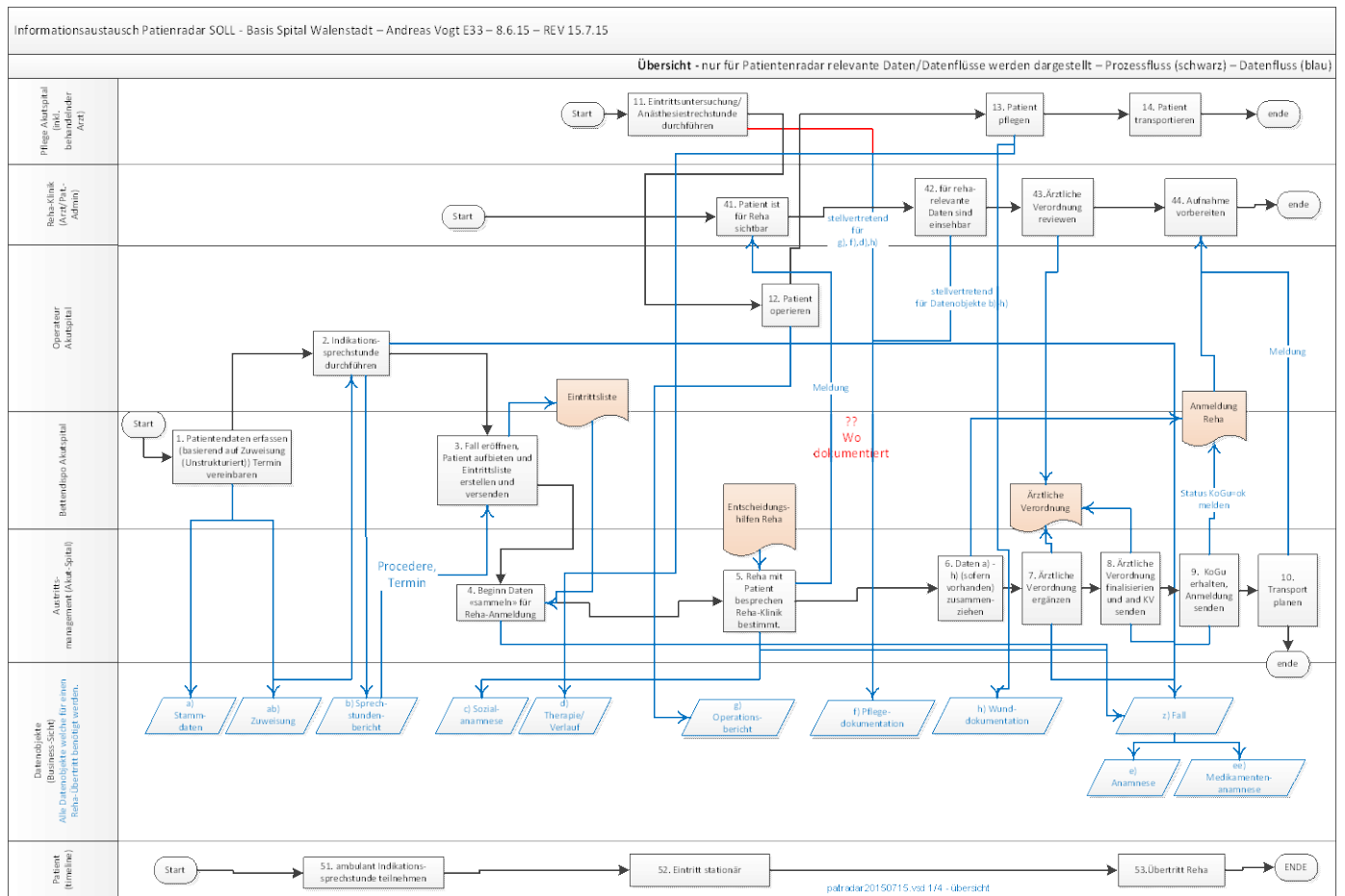


Figure 1 High-Density overview to determine the information model

