

The basic ICT components of the system include a data repository, the rules engine, several knowledge sources, some data mining tools and a human-computer interface, allowing remote access. The EHCR must be capable of integrating data across providers and from personal health records to form a longitudinal view of an individual's health status and healthcare.

**THE K4CARE DATABASE** consists of two parts: EHCR and support part. The **EHCR** describes patients and their documents, while the **support part** stores information about professional actors, their roles, groups of entities (e.g. evaluation units) or relations between entities (e.g. who is the family doctor for particular patient).

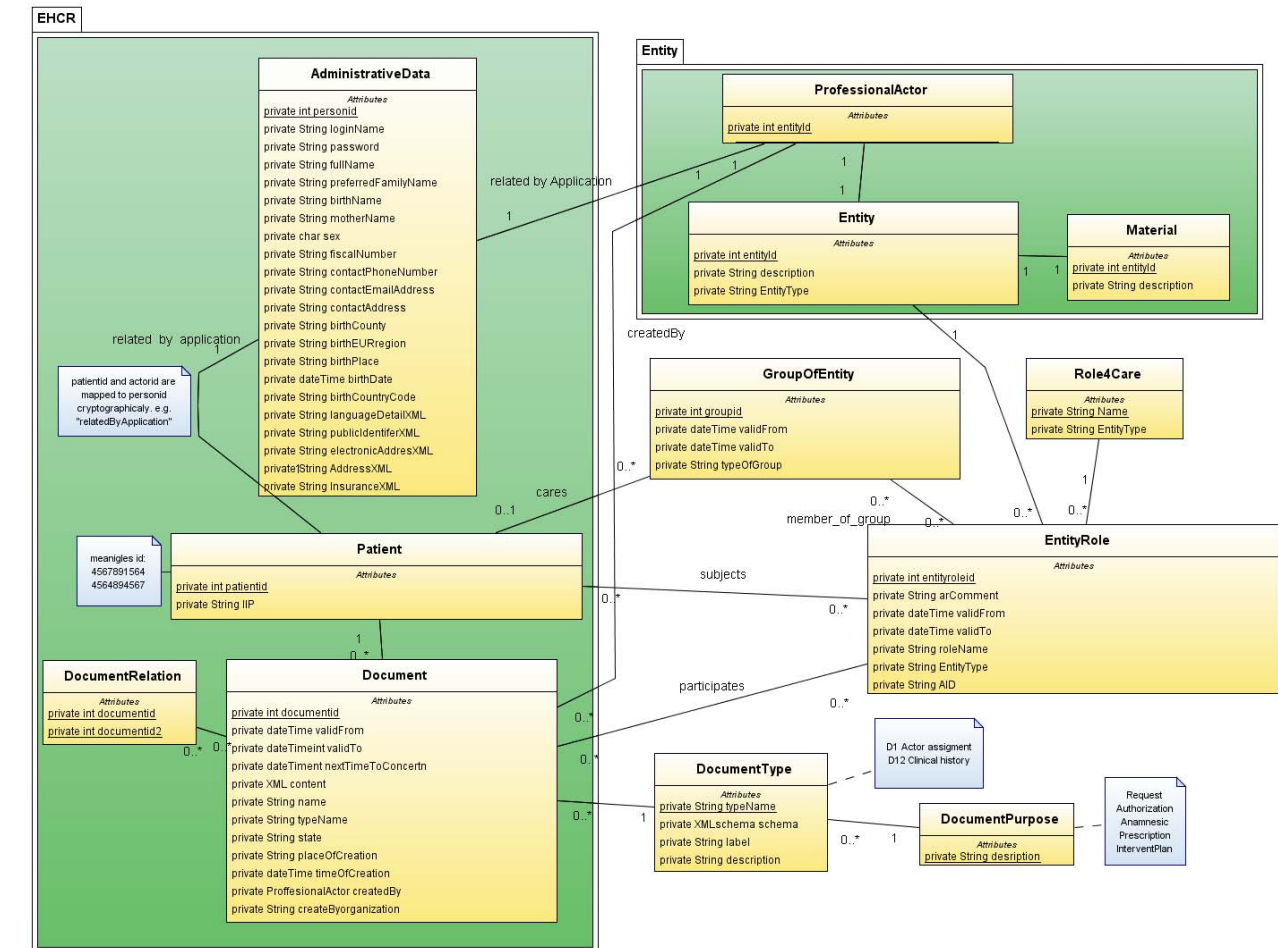
The master tables of the K4CARE Data Model are AdministrativeData, Patient, Document, ProfessionalActor, Entity, GroupOfEntity, and EntityRole.

Table **AdministrativeData** stores personal information like address, phone etc. of the K4CARE actors.

Table **Patient** identifies the K4CARE patients.

Table **Document** stores EHCR documents as XML strings. Some parts of these documents are extracted and can be used for fast searching:

- **validFrom** and **validTo** limit validity of the document;
- **nextTimeToConcern** is the time when the document has to be taken into account (e.g., invitation to some action, reminder, etc.);
- **state** of the document (e.g., open);
- **createdBy**, **createdByorganization**, **placeOfCreation** and **timeOfCreation** describe the origin of the document.



Documents are related to one patient (the *subject* of the document) and they can be also related to other documents. Each document is of a predefined type of table **DocumentType** (e.g., Actor assignment), which falls into one of the purposes of table **DocumentPurpose** (e.g., Request, Authorization).

Table **ProfessionalActor** identifies the K4CARE actors. Through table **Entity**, professional actors may participate on the documents in various roles. The fact that "one particular actor participates on one particular document in one particular role" is captured in table **EntityRole**.

The database also stores **information about the activity in the K4CARE home-care centers.**

Table **GroupOfEntity** stores the actors that are part of the K4CARE professional groups, as for example an Evaluation Unit. In the same way, it stores the links between all the professionals (family doctor, nurse, etc.) that are treating each patient at a certain period of time. This feature is expressed by the relationship *subjects* between **EntityRole** and **Patient**.

In the K4Care project, the EHCR of one patient consists of the set of all the EHCR documents that are related to that home care patient.

Only one of these documents contains the administrative information of the patient. The rest of the documents contain no personal identification information about the patient. Therefore, an EHCR without the administrative document contains all the available medical information of an unknown patient and can be used for statistical purposes.

**THE XML EHCR DOCUMENTS:** The development of

**A. Documents in Access Services**

1. Home Care Request Document
2. Home Care Patient Admission Document
3. Home Care Patient Discharge Document

**B. Documents in Patient Care Services**

1. Actor Assignment
  2. Actor Confirmation
  3. Patient Consent
  4. Family Doctor Authorization
- Service Specific Documents*
1. Multi Dimensional Evaluation Scales
  2. External Clinical History
  3. Physical Examination Report
  4. Request of Diagnostic Examination
  5. Request of Laboratory Analysis
  6. Request of Consultation
  7. Consultation Report
  8. Social Report
  9. Continuous Care Provider Report
  10. Social Operator Report
  11. Informal Care Giver Report
  12. Home Care Patient Report
  13. Request of Extra Comprehensive Assessment
  14. Prescription of Non-Pharmacological Treatment
  15. Prescription of Nursing Care
  16. Prescription of Assistive Devices
  17. Request of Blood Gas Analysis
  18. Request of Blood Transfusion
  19. Transfusion Report
  20. Request of Certification
  21. Certification
  22. Request of INR (International Normalized Ratio)
  23. Social Support Request
  24. Information Sheet
  25. Result of Laboratory Analysis
  26. Pharmacological Treatment
  27. Administrative Information Document
  28. Result of Blood Gas Analysis
  29. Anamnesis
  30. Diagnoses
  31. General Action Report
  32. Medical Diary
  33. Nursing Diary
  34. Social Worker Diary
  35. Blood Sugar Measurement
  36. Diagnostic Examination Report

**C. Documents in Rehabilitation**

1. Physiatrist Examination
2. Physical Therapist Report
3. Occupational Therapist Report
4. Speech and Language Therapist Report
5. PT Diary
6. OT Diary
7. SLT Diary

the document-oriented EHCR in K4CARE is divided into two major parts:

- Developing the common data structure for each document (i.e., header and footer).
- Developing the document specific data structure for each document (i.e., body).

The *header* and the *footer* of all the K4CARE documents have a common structure, while the *body* is different in case of different type of EHCR documents. The body can be restructured into *sections* (an identifiable part of the document).

We have chosen the **XML Schema language** to formalize our EHCR model. XML is a modern and widely used platform independent language. According to this schema the **instances of our EHCR model are XML documents**. These documents are stored in the **PostgreSQL relational database**.

**THE TECHNOLOGICAL CONTEXT:** On the level of business logic, Java Beans are generated to be used by Java applications. These Java Beans can be easily stored into and retrieved from our database using Hibernate.

**K4CARE PROJECT LIST OF MEMBERS**

- Universitat Rovira i Virgili, ES
- Centro Assistenza Domiciliare Azienda Sanitaria Locale RM B, IT
- Czech Technical University in Prague, CZ
- Università degli Studi di Perugia, IT
- Telecom Italia, IT
- European Research and Project Office GmbH, GE
- 'Ana Aslan' International Academy of Ageing, RO
- Fondazione Santa Lucia, IT
- Computer and Automation Research Institute of the Hungarian Academy of Sciences, HU
- The Research Institute for the Care of Older People, UK
- Amministrazione Comunale di Pollenza, IT
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**The K4CARE Data Model**

[www.k4care.net](http://www.k4care.net)

The K4CARE project (IST-2004-026968) is an EC 6FP project aiming at the development, the integration and the use of several Information and Communication Technologies (ICT) and intelligent Computer Science (CS) technologies in the framework of Home Care (HC). K4CARE is based on:

- a model for HC service which can be shared by the EU countries;
- an Electronic Home Care Record;
- a telematic and knowledge-based CS platform;
- an Actor Profile Ontology for representing the profiles of the subjects involved in the K4CARE model;
- a Case Profile Ontology for representing symptoms, diseases, syndromes;
- Computer-Based Formal Intervention Plans.

The K4CARE project is developed by thirteen EU partners: eight centres with geriatric, medical and healthcare competencies and five ICT and CS centres.

The K4CARE Data Model comprises data structures that are underlying the services performed in home care (HC). The data model reflects all entities in HC, namely actors (patient, family doctor, nurse, and other care givers), services, procedures, and documents. An important part of the model is an EHCR, Electronic Health Care Record. The EHCR must: integrate data from multiple sources; capture data at the point of care; and support caregiver decision making.