

**Electronic Patient Record  
Systems Functional Model,**  
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# **Framework for an Electronic Patient Record Functionalities**

**Workgroup Action 2- Ehealth Roadmap – SPF SP/FOD VG**

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# Framework for an Electronic Patient Record

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## 1. Purpose of this document.

The objective of this document is to propose a minimal framework (or a functional model) listing the key capabilities expected in a hospital's electronic patient record (EPR). Functionality is listed from a high level perspective, without describing the processes in detail. The functionalities have been grouped into sections (some functions fit into different sections).

Immediate occasion for generating this document was the eHealth action plan 2013-2018 [Action2]. Motivations for this work:

1. To enable the Belgian government to assess the ICT status in a hospital and the degree to which meaningful use is made of ICT. This could be monitored almost in real time using, for example, the TTS facility provided by the e-Health platform.
2. To assist individual hospitals in acquiring or developing a full-blown EPR and in comparing systems on the market. Note, however, the important restrictions detailed further below.
3. To provide suggestions to suppliers of such systems about the functionality they may want to implement.
4. Because of the two previous motivations, to open the eyes for novel functionalities that are expected to become more widely available in future but that available at the current stage of progress have been realized only very partially-

This framework, is an ongoing work and should be adapted continuously to reflect advancements in health care technology and care delivery. It has used as inputs available previous national (e.g. BCD scheme ) and international available materials.

The financial means necessary to implement the functionalities described are not discussed here; the workgroup insists on the fact that the implementation of the listed functionalities is clearly related to the availability of sufficient financial resources via dedicated public financing/funding based on real cost estimates. Finally, the availability of functionalities does not mean that they are actually used. Organizational aspects need thus to be dealt with equal priority.

### 1.1 Timing, or requirements versus points of attention

Given the different goals of this document, each functionality has been attributed a priority (figure1):

- **Priority 1** designates a functionality that is currently considered essential for an electronic record. If this functionality is missing in a hospital, it is operating according to outdated standards. Therefore it reasonable for the government to demand the use of such functionality from hospitals, or to base financial incentives on this use.

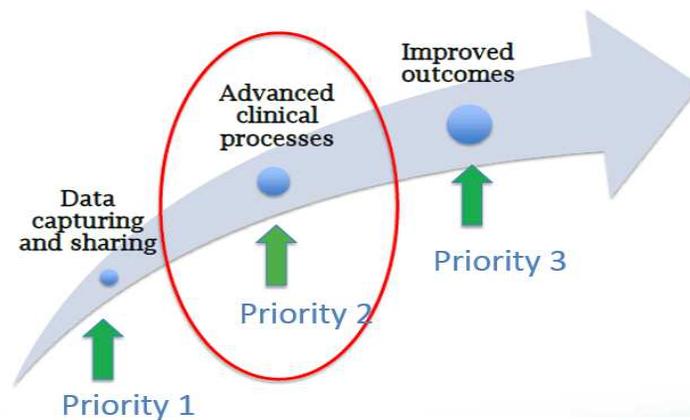
This does not imply that the use of such a functionality should become a hard requirement as of today. Hospitals will get some time to implement it. However, it is likely to become a requirement within the timeframe of the current eHealth action plan, so before the end of 2018. Each such priority 1 functionality comes with a proposed deadline and a method to measure compliance.

- **Priority 2** designates a functionality that is available today and that advanced hospitals should very seriously consider using. However, it is generally advisable to implement the priority 1 functionalities first.

If a hospital wants to procure an electronic record, functionalities with priority 2 should better be available already, even if not rolled out from the start.

The Belgian government is not expected to impose the use of a priority 2 functionality within the timeframe of the current eHealth action plan (up to 2018). However, it can be expected that a future action plan will include it.

- **Priority 3** designates a functionality that will become increasingly important but is not already fully available at the current state of the art. No timing is available either, and for some functions availability may evolve very gradually without realizing full potential even within a few decades. Moreover, new insights over the following years may invalidate the projections made in this document.



**Figure 1:** Given the different goals of this document, each functionality has been attributed a priority

### 1.2 This document does not imply a specific architecture

The integration between different functions and different modules of the electronic record is important. This, however, does not imply a particular system architecture. It remains important that the hospital creates a strategy for such an architecture. That is

not a purely technical issue. The most appropriate (or the best achievable) architecture also depends on the policy within each institution, primarily on the degree to which there is an integrated management that can ensure that benefits in interdepartmental cooperation are valued higher than advantages within each individual department.

It surely is not the intent that a hospital would, without further consideration, use the full list of functionalities in this document as a requirements document for a particular vendor - even not the ones with a particular priority. Whether these functionalities are obtained from a single vendor or from many different vendors, is part of the information strategy the institution must create.

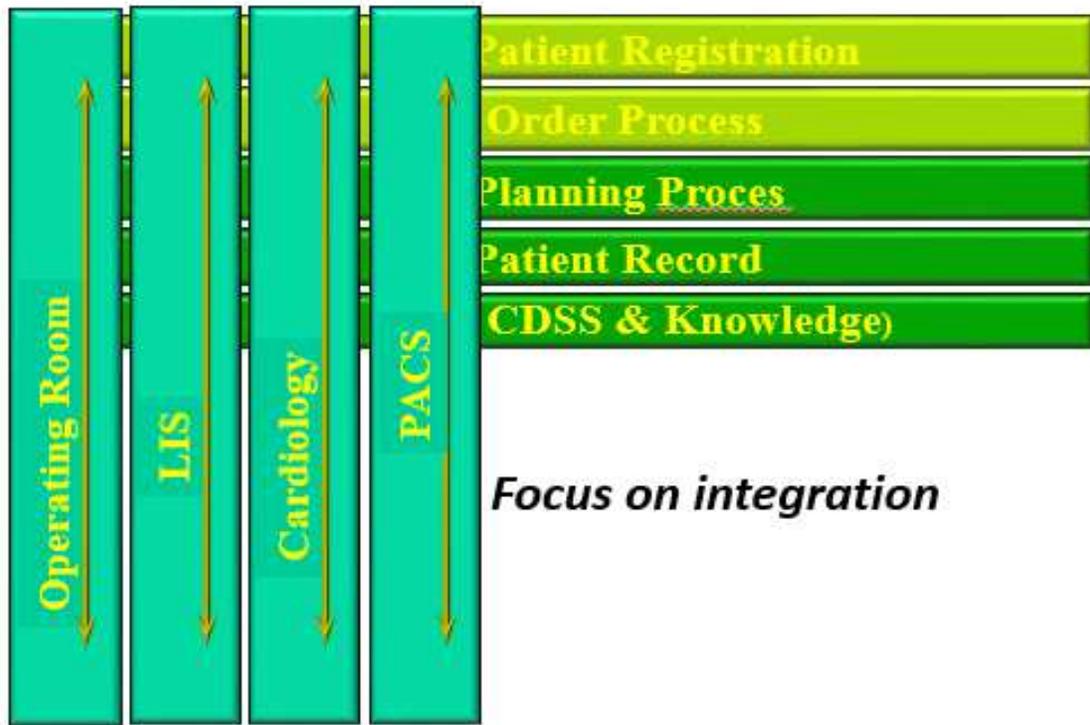
It is important in health care to stress the need for integration of systems. A single-vendor solution, often defined as a 'holistic system', offers the promise of integration but in practice this can be challenged by a missing or immature functionality in the product suite. The opposite strategy is the 'best of breed' approach, in which subsystems are selected from multiple vendors primarily on their performance for a particular functionality. But the best in functionality might not be the best in integration and often healthcare benefits more from integration than yet another extra feature. Anyway it has to be stressed that, most significantly, the industry pendulum has swung from best of breed/deep clinical functionality to the need for integration. It is still feasible to build an overall system out of modules from different vendors, but integration possibilities must be taken into account from the start and be made part of the requirements. Which choice is made is part of the information strategy of each hospital.

### 1.3 Some definitions

- Electronic Health Record (EHR) Represents the health care provider's view of the full patient's health history, spanning all involved health care organizations and including information by the patient. This clearly requires this EHR to adhere to standards selected by these organizations.
- Electronic Patient Record (EPR) – Includes information about the patient within one health care organization that can be created, managed, and consulted by authorized users within that organization. The EPR includes support for the process of care delivery by that organization (such as a hospital). It should be able to support clinical research and decision support.
- Personal Health Record (PHR) – Includes all information about one patient that can be drawn from multiple sources while being managed, shared and controlled by the patient.

### 1.4 Functionalities addressed in this document

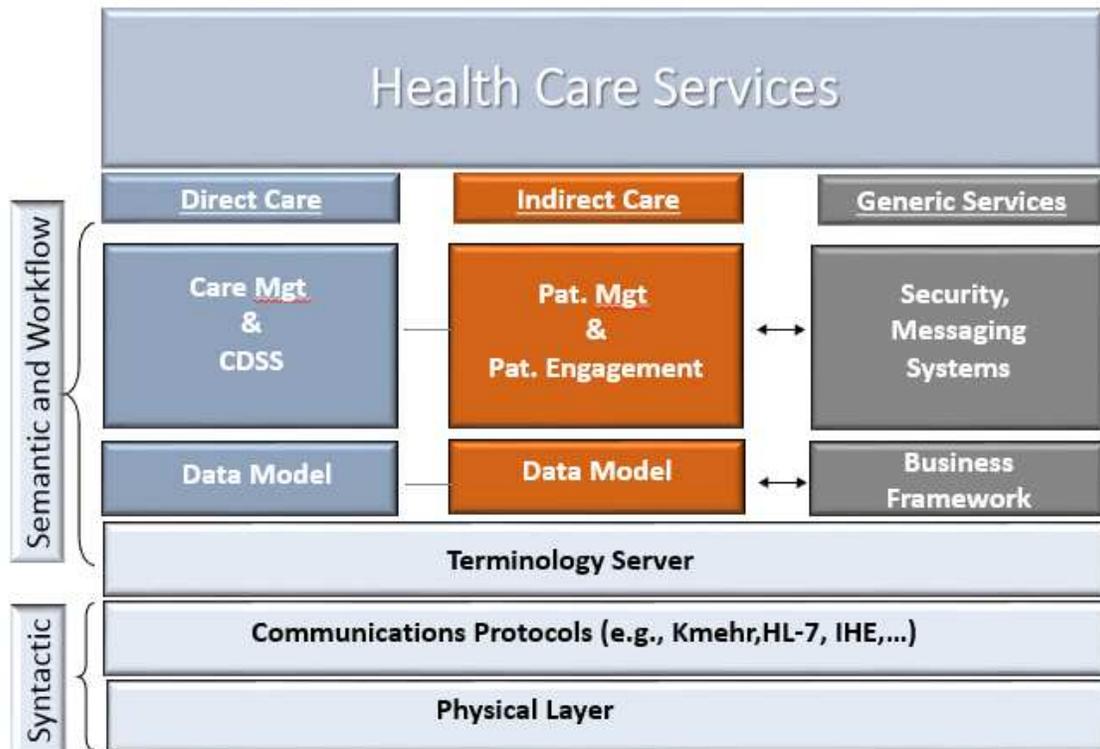
Figure 2 lists, from a high level, the functionalities addressed in this document. The figure also illustrates the difference between an approach that centers on those functionalities on the one hand, and a departmental focus on the other hand.



**Figure 2:** Functionalities and the need for integration. A modular, open EPR relies on a number of common (horizontal) functionalities to implement departmental (vertical), solutions. This in itself requires integration with common modules (detailed further in following sections). But the traditional focus on departmental solutions has been questioned as well: overall healthcare and even the individual departments probably benefit more from integration of common functionalities, workflows and policies than from dedicated niceties geared towards the specific department.

## 2. General Overview

In the next sections the proposed framework will be described in terms of Health care related common services and more generic services (figure3).



**Figure 3:** High level overview of the functionality framework as described hereafter

### Healthcare-related Common Services

Healthcare-related Common Services are components responsible for supporting the functionalities and information relevant to the healthcare business domain, including subject of care, activities, resources, authorization, health characteristics and concepts.

In considering the core functionalities of EPR systems for individual users (e.g., patients, clinicians, managers) and institutional users (e.g., hospitals, public health departments, accreditation organizations, educators, and research entities), it is important to recognize that EPR systems must support the delivery of:

#### Direct Care

Patient care provided personally by one or more healthcare (HC) workers. This includes:

- Care (delivery) management.
- Clinical decision support and knowledge management.
- Workflow management.

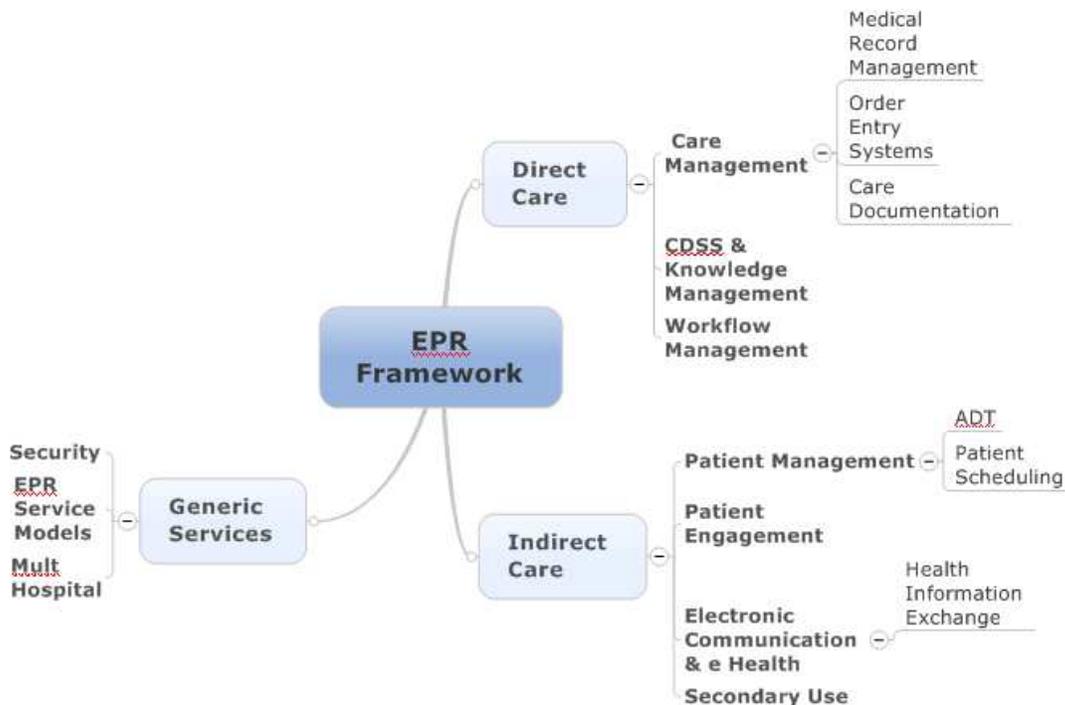
#### Indirect Care

Services concerned with patient care but without the need for direct contact with or interaction between the patient and the health care provider. This includes:

- Patient management (e.g., ADT, billing and reimbursement).
- Personal health care services & patient empowerment. Including all (information) services provided to patients to (proactively) optimize care.
- Communication (& e-Health). Including secure communications between HC professionals and patients
- Secondary Use of EPR Systems for:
  - Education.
  - Clinical and health services research.
  - Support policy development.

### Generic Common Services

Generic Common Services are those components responsible for supporting the generic functionality and information requirements that mostly are non-specific to the healthcare domain.



**Figure 4:** More detailed high level overview of the functionality framework.

### 3. Healthcare-related Common Services

EPR systems should be characterized by the following key functionalities for hospital, ambulatory care, nursing home, and care in the community (i.e., the personal health

record). Additional settings will need to be addressed in the future, such as home ehealth agencies, pharmacies, and dental care.

### 3.1. DIRECT CARE

#### CARE MANAGEMENT

Functions used by providers as they deliver and manage patient care and create an EMR.

- **Medical Record Management.**

One of the earliest benefits of EPRs is to combine access to all patient data from various sources within the institution and present an integrated view to clinicians, nurses and other health actors whenever and wherever clinical decisions are made. Important for this core functionality is personalization by means of well-designed human-computer interfaces. Immediate access to key information - such as patients' diagnoses, allergies, lab test results, and medications - improves caregivers' ability to make sound clinical decisions in a timely manner. Ensuring that clinical data are entered and maintained by clinicians and nurses and other HC workers themselves, improves accuracy and hence quality.

- **Order Entry management.**

An order is a request for any kind service: clinical observations, tests, medication and even logistic. Orders initiate clinical interventions. The ability whether in the inpatient or outpatient setting to enter and store orders for prescriptions, tests, and other services in a computer-based system enhances legibility, enables resource management, planning and traceability, reduces duplication, and improves the speed with which orders can be executed. By integrating knowledge resources into the order entry process (which requires direct entry of orders by the clinician into the computer) it is possible in a proactive manner to improve the relevance of the clinicians' orders. This is probably the most efficient way to influence patient outcomes while reducing costs.

- **Care Documentation & Result management.**

The purpose is to facilitate the production of accurate, legal and legible documents (chart tracking, deficiency analysis, consents...) about the health care provided to a patient. A number of tools can assist in unstructured and/or full structured data registration.

## CLINICAL DECISION SUPPORT SYSTEMS & KNOWLEDGE MANAGEMENT

- **Clinical Decision support.**

Computerized decision support systems (CDSS) can actively provide options and explanations that improve the clinician's efficiency, minimize reliance on his memory and comply with accepted guidelines of practice. Using prompts and alerts, CDSS would help improve compliance with best clinical practices, ensure regular screenings and other preventive practices, identify possible drug interactions, and facilitate diagnoses and treatments.

Only few commercial systems provide a high level of proactive decision support. Drug interaction checking and simple abnormal laboratory-test result alerts are already widely available, but application of a broad range of knowledge to aid physicians' reasoning is still under development. Only when both patient data and clinical knowledge reside in the same system space in machine-understandable, interoperable format it is possible to provide additional support to the decision-making clinician. For example, encoded medical knowledge about the meaning and significance of abnormal laboratory-test results would allow a system to provide alerts, an active function, instead of mere passive data storage. Similarly, if the system could combine the patient context with relevant clinical guidelines, it could present ordering options consistent with the applicable guidelines.

- **Knowledge Management.**

The volume of data and medical knowledge is exceeding our human capacity. Therefore, care providers not only need access to patient data but also access to knowledge sources with general medical or administrative knowledge at the time decisions are made. In contrast to the previous section knowledge management refers to the transparent access from the EPR to non-institution specific medical knowledge sources and applications **such** as Up to date, Elsevier,... Nowadays a limited number of EPR systems provide methods to incorporate access to knowledge resources, but this knowledge access is passive: the user searches for the needed information electronically but this is not seamlessly integrated with the EPR system. Ideally, access to knowledge resources should be integrated with clinical decision support in ways that directly influence physicians' clinical decisions.

## WORKFLOW MANAGEMENT

The workflow management helps the clinicians and other health actors to organize their work by using clinicians work lists, reminders, notification of new incoming and past test results, orders to be verified

and signed, letters to create,... This increases patient safety and the effectiveness of care. Ideally the workflow management is dynamic. It will automatically also change and influence the user interface dynamically according to present and new information and actions already taken. A point of attention is also limiting information overload.

This functionality can be related to the knowledge management. Indeed, the guidelines can serve as a basis for the specification of high-level workflows.

### 3.2. INDIRECT CARE

#### PATIENT MANAGEMENT

- **ADT processes.**

This point concerns computerized administrative tools, such as ADT systems for inpatient, outpatient and, one-day clinics. ... This component is responsible for the correct and permanent identification of a patient in a health care organization, and the delivery of a number of services and functions to other components. It also is the basis for hospital billing and exchange with insurance companies.

- **Planning & scheduling.**

Concerns hospital wide computerized scheduling and planning systems that greatly improve hospitals' and clinics' efficiency and provide more timely service to patients. Scheduling is a constraint based decision making process in which resource demanding activities are assigned to resources over time taking into account predefined constraints.

#### PATIENT ENGAGEMENT

- **Patient Engagement.**

As individuals engage more actively in management of their own health, they become important users of electronic health information. The aim is to provide patients with access to their health records, interactive patient education, and the personal health record (PHR).

Various approaches may exist to “empower” the patient such as scheduling features, medication prescriptions, hospital originated PHR, portals, patient originated PHR and Shared PHR referring to the MetaHub / Hub project. Anyway, more is less and it is highly advisable to reduce the number of interfaces for the patient, and not to confront the patient with a plethora of different portals originating from various HC

institutions. In the long term some functionalities existing in secure hospital portals allow access to own their personal health record (PHR) and interactive patient education and communicate securely with doctors online. Patient appointment, communication... could also be standardized through the eHealth-platform.

Furthermore this functionality may assist to carry out home-monitoring and self-testing and is an enabler to improve control of chronic conditions, such as diabetes.

## ELECTRONIC COMMUNICATION & eHEALTH

- **Health Information Exchange.**

An EPR must have the ability to support the efficient and secure, communication among HC providers and between HC providers and patients, aimed at improving the continuity of care, increasing the timeliness of diagnoses and treatments, and reducing the frequency of adverse events. In this section we also refer to the initiatives dealing with sharing of data such as Vaccinet, the Sumehr,....

This also is about the exchange of demographic and clinical data based on uniform data exchange standards<sup>1</sup> for the federal government (RIZIV-INAMI; disease specific registries and other notifiable registries; see Action 18) for patient monitoring and subsequent epidemiological analysis. For sickness funds and insurers it enables the automated exchange of information needed for reimbursement.

- **Messaging standards**

Communication is based on interoperability. Interoperability is based on standards at the syntactical level and at the semantic level by based on terminology servers. The following national and international standards are prerequisite and are part of this section:

**HL7 version 2.x** messaging standard defines a series of electronic messages to support administrative, logistical, financial and clinical processes. Version 2.x is an *ad hoc* definition of a set of messages while version 3 is model-based.

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<sup>1</sup> We should strive for international standards. Each time a Belgian standard needs to be created there is an opportunity cost of not using and adapting an existing international standard.

**HL7 V3 Clinical Document Architecture (CDA)** is a common format for exchanging parts of a patient's medical record between different hospital systems or even different EPRs. It is an XML-based markup standard intended to specify the encoding, structure and semantics of clinical documents for exchange.

**KMEHR** (Kind Messages for Electronic Healthcare Record) is the current Belgian communication standard for exchanges between healthcare actors, with active use in e-prescription, summary healthcare documents (similar to CDA R2 CCD document), registry access, medication scheme, medico-administrative flows, vaccinations, etc. KMEHR was introduced in 2002 to enable the exchange of structured clinical information. This standard is XML-based and is encoding-agnostic, supporting multiple international coding standards such as ICD-9 and SNOMED CT. KMEHR will support Snomed compositional grammar in order to communicate complex concepts with detailed attributes.

**IHE** Integrating the Healthcare Enterprise (IHE) is an initiative between industry and health care actors' professional organizations to stimulate the integration of the information systems that support modern healthcare institutions. Often used workflows are analyzed and communication standards are proposed between the various actors in the different steps of the process. In addition, supportive standards such as for security are suggested. Such an IHE 'profile' typically does not introduce new standards (except for the workflow itself) but describes which existing standards should be used for the various aspects (e.g. DICOM and HL7), possibly decreasing a number of options in those standards.

**DICOM** facilitates interoperability of medical imaging equipment by specifying primarily:

- For network communications, a set of protocols to be followed by devices that exchange images or image related information (such as work lists for image generating equipment).
- For media communication, a file format and a medical directory structure to facilitate access to the images and related information stored on interchange media.
- Information that must be supplied with an implementation for which conformance to the standard is claimed.

## THE SECONDARY USE OF ELECTRONIC PATIENT RECORD SYSTEMS

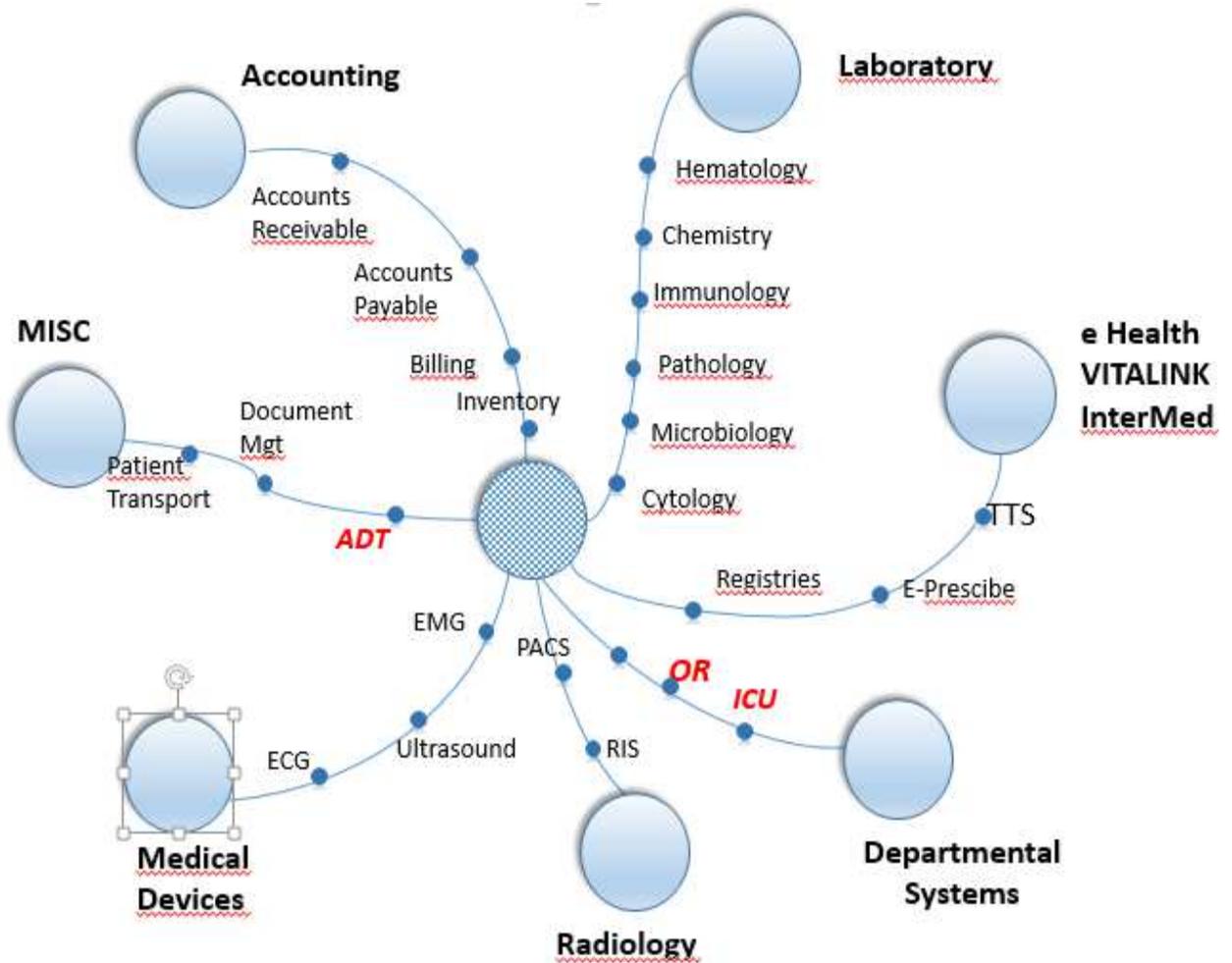
There is insufficient recognition in society of the benefit that we gain from (re)using data beyond immediate patient care delivery. But buried into those records is information that can help us to understand our bodies and empower us to be smarter about our own health.

There is the pressure both at the economical level but also at the society level to make better use of information and of knowledge to improve the quality of life of people. For the time being we don't have semantic interoperability to share data in a really efficient way. Important will be the availability of a terminology server (part of action13/FOD). This can be achieved by using data extraction and data mining functionalities giving birth to a data warehouse or/and by using a "semantic layer" on top of the EPR (data repository) that gives features to analyze and query data within the EPR.

We need to emphasize two types of data mining, on one hand the more administrative oriented data ware house systems (known as BI (business intelligence) - such systems provide current and predictive views of business operations by means of a BI portal, On the other hand the second scope concerns a really medical oriented medical data ware house functioning as a tool enabling the basics for clinical trials, specific medical searches,....

### 3.3. GENERIC SERVICES MANAGEMENT

Generic Common Services are those components responsible for supporting the generic functionality and information requirements that are non-specific to the healthcare domain, also found in to any information system in the business domain.



**Figure 4:** This EPR framework does not cover all hospital functionality as indicated on the figure above (which in itself only presents a limited number of satellite systems). Some systems (OR, ICU, ADT ...) may either belong to the core or regarded as satellite systems.

**Legend: Id#** -In the sections below nnn indicates a functionality ID that will defined after final approval.

**Seq** = Sequential number

**Prty** is a proposal (and to be discussed) of the phase when the corresponding functionality should be implemented an operational all over the hospital. This has also a financial impact. We refer hereby to the philosophy of the “meaningful use” adhered to in the USA.

## Functional Outline

### 4.1. Direct Care

#### 4.1.1 Care Management

Seq	Name	Description	Id-#	Prty	1	2	3
				→			
				Comment			
R	<b>Medical Record Management</b>	<p>A patient record is initiated for every patient (inpatients, outpatients, emergency patients, one-day clinic, etc.) assessed or treated by the organization.</p> <p>Patient are assigned a unique identifier that is used to refer to this patient across the HC organization. The objective is to ensure that each patient is represented only once across all the software systems used within the organization.</p> <p>Furthermore the EPR must be able to map local IDs into global IDs (national social security ID).</p>		Each HC organization may opt to use its own numbers. The enforcement to use a global ID may would needlessly constraint implementation and limit local flexibility			

		<p><i>The EPR must ensure ease, speed, and selectivity of information searches.</i></p> <p><i>Every data entry in the EPR must be identified by its author. In case a transcriptionist transcribes an author's notes or report, the responsible care provider must validate the note or report after transcription.</i></p>				
R01	<b>Problem list</b>	<p>A persistent and managed list of diagnoses identified or problems, or previous procedures performed, that may influence clinical decision-making and care provision. Problem lists are managed over time, hence giving an historical view of the patient's condition linked with goals and treatments/tasks and may include:</p> <ul style="list-style-type: none"> <li>• symptoms , diagnoses, allergies, devices in situ</li> <li>• family and genetic information</li> <li>• social problems, events</li> <li>• nursing problems &amp; risks</li> <li>• functional (dis)ability,</li> <li>• treatment and regimens</li> <li>• interventions (done &amp; planned)diagnostic procedures (done &amp; planned)</li> <li>• vaccinations (done &amp; planned)</li> </ul> <p>The source (e.g. the provider, the system id, or the patient, the location, time) of updates should always be documented for every item and version (unique Record ID with Timestamp).</p> <p>The start-stop dates should be known for every item.</p> <p>Filtering should be possible:</p> <ul style="list-style-type: none"> <li>• Global summary (important items for everybody at a certain point of</li> </ul>	nnn			*

		<p>time)</p> <ul style="list-style-type: none"> <li>• Filter Summary per User group (physician, nursing)</li> <li>• Department defined summary (relevant for department)</li> <li>• On the fly filtering</li> <li>• Problem related filter (all elements linked to a particular Problem)</li> <li>• No filter (chronological view of everything)</li> </ul> <p>It has to be stressed that the problem list can be represented (based on the time status of each item) as historical, or / and as an “active” problem list.</p>					
R02	<b>Patient History (H&amp;P)</b>	<p>History and Physical: Patient-reported or externally available patient clinical history. Covers the registration and maintenance of patient historical data communicated by the patient or external party including:</p> <ul style="list-style-type: none"> <li>• Medical diagnoses.</li> <li>• Surgical interventions.</li> <li>• Other procedures performed on the patient. <ul style="list-style-type: none"> <li>• Diagnostic procedures.</li> <li>• Therapeutic procedures.</li> </ul> </li> <li>• Relevant social and family history.</li> </ul>	nnn			*	
R03	<b>Immunization List</b>	<p>Create and maintain patient-specific immunization lists and history such as : type of immunization, allergic reactions. A bidirectional link with Vaccinet must be supported.</p>	nnn	We urge the fact that vaccinet must operate bidirectional in a real time fashion		*	
R04	<b>Patient-Specific Instructions</b>	<p>When an order is placed for:</p> <ul style="list-style-type: none"> <li>• a test,</li> <li>• procedure, or</li> <li>• patient discharge,...</li> </ul> <p>patient instructions (e.g. diet, medication, rehabilitation, care assistance, patient transportation, follow-up visit by the HC provider, etc., ) specific to</p>	nnn				*

		this event before or and after the performance of the corresponding procedures are generated and recorded in the EMR.				
R05	<b>Medical Results</b>	<p>The results of the physical examinations (vital signs), imaging, functional tests (e.g. fluid balance), laboratory tests, evaluation scales ... should be presented and customizable in the most appropriate method for the consulting user.</p> <p>Tests should be Snomed - annotated to communicate to other systems.</p> <p>The representation of data must be accessible in flexible, multiple views (e.g. Tabular and/or graphical representations) within the EPR with search, filtering, summarization by</p> <ul style="list-style-type: none"> <li>• medical specialty, physician, or</li> <li>• Problem Oriented</li> <li>• ...</li> </ul>	nnn	(Texts should be Snomed-annotated to communicate to other systems).	*	
R06	<b>Patient context-driven Assessment</b>	<p>Physicians or other qualified medical personnel can conduct a health assessment during an encounter, i.e. describe the general state of a patient's physical and mental health status. This assessment (also based on previous assessments and completed/updated) results in :</p> <ul style="list-style-type: none"> <li>– Understanding previous care and the care the patient is currently seeking.</li> <li>– Selecting the best setting for the care.</li> <li>– Identification of patient's medical needs that are identified based on the documented H&amp;P and other required hospital assessments</li> <li>– Identification of patient's nursing needs based on the nursing assessment, the medical assessment and other required hospital assessments.</li> </ul>			*	

		<p>Therefore It is advisable that the system provides tools to:</p> <ul style="list-style-type: none"> <li>Assure the completeness and accuracy of the assessment. Whenever possible the assessment process should follow a standard/template depending upon the type of specialty or patient. Standard assessment templates should be possible to be defined.</li> <li>Link with data from the problem list.</li> <li>Match the data entered by the care provider with other patient data found in the EPR to bring to the physicians attention e.g.: side effects of taken medication that could cause the symptoms...</li> </ul>	nnn				
R07	<b>Allergies and Adverse Reaction List</b>	<p>Manage patient allergies including reaction for any allergen, intolerance and adverse reaction lists (to drug, dietary).</p> <p>Trigger alarms when allergenic conditions are encountered (drug prescription,...)</p>	nnn			*	
R08	<b>Medication List</b>	<p>Create and maintain patient-specific medication lists (history, active not-active) recorded by providers, GP's and must also include patient-reported medications (home medication) .</p> <p>Provide medication convertor from home medication to formulary and vice versa (substitution).</p> <p>For medications, it should include the use of a reference database normalized to Snomed.</p>	nnn			*	*
R09	<b>Preventive Services</b>	<p>The clinician (or patient) is presented with due or overdue activities based on protocols for preventive care and wellness. Examples include (but not limited to)</p>	nnn	Maintain preventive Services, alerts for health maintenance			*

		<ul style="list-style-type: none"> <li>• routine immunizations,</li> <li>• adult and well child care,</li> <li>• age and gender appropriate screening exams, such as PAP smears.</li> </ul> <p>The provider may wish to provide reminders to the patient based on the alert.</p> <p>Alerts should be triggered preventively (before the deadline has passed)</p>					
R10	<b>External Data &amp; Documents</b>	<p>Tools for incorporating relevant clinical data and documentation from external sources based on well-defined and accepted standards eg. (Structured data, non-structured data, scanned documents, photos, other bitmaps...) with link to the procedures / problems of the Patient Summary.</p> <p>The origin or external source of the information including time of entering the data must be available in the system.</p>	nnn	See also Result Management	*		
R11	<b>Subjective Data</b>	<p>Register subjective (patient-originated) data provided by:</p> <ul style="list-style-type: none"> <li>• the patient himself,</li> <li>• a parent, spouse,</li> <li>• a third person,</li> <li>• POC devices used in homecare setting (e.g. glucometers, blood pressure...)</li> <li>• ...</li> </ul> <p>An electronic health record shall provide the ability for direct data entry by any of these third parties provided that this party is formally authenticated by a reference care provider.</p>	nnn	Result Management			*
R12	<b>Patient guidelines</b>	<p>Respect for autonomy. The patient has the right to refuse or choose his treatment. Patient guidelines (instructions) and provider DNR (Do Not Resuscitate) orders are registered with necessary corresponding data such</p>	nnn	DNR (Do Not Resuscitate). We propose that a number of "vital" codes (DNR,		*	

		as date and time, HC actor who registered this directive and possibly references to paper written documents		euthanasia, organ transplant,....should be stored in a central authorized accessible repository ( e-Health platform)			
R13	<b>Patient Consents</b>	The patient consent authorizes the collection, use and disclosure of health information for providers giving birth to the therapeutic relationship (patient – provider) in the context of the eHealth platform (see also the Health-MetaHub, Hub project).	nnn	Consider consent given by patient on personal eHealth portal		*	
R14	<b>Therapeutic relationship</b>	Identify in an automatic way (for example based on a patient-physician encounter or within the appointment and scheduling system) as much as possible the relation between care providers/services and or specialties and patients for a certain period of time starting at the time of encounter.	nnn			*	
R15	<b>Patient pseudo anonymized data</b>	With respect to patient privacy and confidentiality patient pseudo-anonymized data can be produced for internal or external requesters for a number of purposes: <ul style="list-style-type: none"> <li>• Clinical data ware houses</li> <li>• trials,</li> <li>• feeding national or other registries,</li> <li>• ...</li> </ul> Communication should be auditable and use the reversible anonymizing (coding) services of a recognized trusted third party like the eHealth-platform and compliant with the authorizations of the Belgian Privacy Commission sector Health.	nnn	Health data, anonymized and used in ways that fully protect individual privacy, will become an increasingly important source of information that will fuel our understanding of disease as a society.  See also secondary EPR use section			*
R16	<b>Clinical Research and outcome measures</b>	The system must have reporting and data exporting capabilities necessary to produce : <ul style="list-style-type: none"> <li>• Outcome indicators for specific patient diagnoses</li> <li>• Outcome indicators for specific patient treatments</li> <li>• Cost of care</li> </ul>	nnn	Diagnoses and treatments need to be coded (no free text).See also secondary EPR use section			*

		<ul style="list-style-type: none"> <li>• Adherence to best practices</li> <li>• ...</li> </ul> <p>This aspect is related to a more general functionality consisting into the possibility of definition and computation of indicators and goals (quality, performance,) for a patient or a defined population of patients.</p> <p>This also includes dashboards that - based on aggregation of data from the EPR -provides responsables within the hospital the information they need to evaluate costs (efficiency) and maintain high standards of quality of care.</p>				
R17	<b>Clinical Pathway</b>	<p>Clinical pathways are a standardized plan of care against which progress towards health is measured. Applied upon the results of a patient assessment. They show exact timing of all patient activities intended to achieve expected standard outcomes within designated time scale.</p> <p>Includes:</p> <ul style="list-style-type: none"> <li>• Documentation of problems</li> <li>• Expected outcomes and goals</li> <li>• Clinical interventions and orders (these may vary according to clinical state, available data and pathway progression)</li> <li>• Variances on the predefined pathway</li> </ul>	nnn	Workflow / Clinical pathways, also known as care pathways, critical pathways, integrated care pathways, or care maps, are one of the main tools used to manage the quality in healthcare concerning the standardization of care processes. It has been shown that their implementation reduces the variability in clinical practice and improves outcomes		*
R18	<b>OR Management</b>	<p>Operating room management system focuses on maximizing operational efficiency while minimizing the required resources and related costs. It covers the following functionality:</p> <ul style="list-style-type: none"> <li>• Surgery planning</li> <li>• Scheduling to improve resource utilization</li> <li>• Integration with OR logistics such as tracing implants, sterile sets,...</li> <li>• Medication tracing and capturing</li> <li>• Vitals registration</li> <li>• Integration with post-surgery services</li> </ul>		<p>In fact an OR system is mostly based on the existence of horizontal functions such as ADT, scheduling, CPOE, Medication...supplemented with OR specific functionality (device integration,...)</p> <p>Could be independently from the core system be implemented</p>		*
R19	<b>ICU Management</b>	<p>Provides capabilities to</p> <ul style="list-style-type: none"> <li>• Capture and display large amounts of data on a time scale highlighting patients with important data updates (critical lab</li> </ul>		Could be implemented independently from the core system.		*

		results...)				
		• Integration (interfacing) monitors, infusion pumps...				
R20	<b>Summary Record of Care</b>	<p>SumEHR or Summarized Electronic Health Record (a Summary Record of Care) is a <u>KMEHR</u> message, used for the exchange of medical information. It summarizes the minimal set of data (the most important and necessary items such as medications, procedures, problem list, etc...) that a physician assists to understand the medical status of the patient in a few minutes to ensure the continuity of care.</p> <p>The EPR software package should be capable to access the sumehr stored in Vitalink or Inter-Med, according to the principles of the hub-metahub project.</p> <p>The system provides facilities to import structured items from the sumehr (like allergies, medication scheme, antecedents, active problems ...) and integrate them within the local data of the EPR. In that case, the original attributes of those items (like author, datetime) must be recorded.</p> <p>The system enables to generate a new sumehr from local data. That sumehr can be exported in Vitalink or Inter-Med under the responsibility of a physician of the hospital.</p> <p>A link with Intermed/Vitalink is advisable.</p>	nnn	The SumEHR standard was introduced by the Belgian government in 2005.	*	

Seq	Name	Description	Id-	Prty →	1	2	3
				Comment			
0	<b>Order Entry Management</b>	<i>Orders initiate clinical interventions. The ability whether in the inpatient or outpatient setting to enter and store orders for prescriptions, tests, and other services in a computer-based system should enhance legibility, enables resource management, planning and traceability, reduce duplication, and improve the speed with which orders are executed.</i>		Order ID should be linked to result ID (one to many)			
01	<b>Medication orders</b>	<p>Manage medication prescriptions (including dispense, trace, discontinue, refill, and renew). These medication prescriptions may be compliant or not with the available hospital formulary. In case of non compliance other alternative drugs may be presented and ordered.</p> <p>Each order includes appropriate and detailed documentation such as patient clinical information preferably derived from the clinical information system necessary to perform. This information is communicated to the pharmacy for completion of the prescription.</p> <p>Patient instructions and prescription details are available by the ordering clinician, or the ordering clinician is facilitated in creating such instructions. Order screens are customizable to specific user groups or on an individualized basis.</p>	nnn	Medication prescriptions		*	
02	<b>Medication Recommendations</b>	<p>During the medication ordering process the system should provide access to drug monograph information and recommendations on the basis of patient diagnosis, cost, hospital formularies or therapeutic care plans. This may include following functionalities:</p> <ul style="list-style-type: none"> <li>Suggest alternative medications</li> </ul>	nnn			*	

		<ul style="list-style-type: none"> <li>• Suggest lab order as indicated by the medication or the medical condition to be affected by the medication.</li> <li>• In order to reduce cost medications may be presented in order of cost, displayed at the time of ordering.</li> </ul>	nnn nnn			
O3	<b>Orders for Medical Procedures</b>	<p>Manage orders for diagnostic and treatment procedures</p> <p>Functionalities: enter orders, trace, discontinue, and renew orders.</p> <p>Procedures performed are linked into the EPR.</p> <p>Each order will be completed with the necessary and appropriate patient information (such as instructions and patient clinical information preferably derived from the EPR or patient summary in an automatic way) necessary to perform the procedure.</p>	nnn			*
O4	<b>Orders for Lab Tests</b>	<p>Manage orders (immune) chemistry, microbiology, hematology, RIA... (Functionality: entry, tracing, discontinue, and renew). Each order includes appropriate and supporting detailed documentation (such as instructions and patient clinical information preferably derived from the patient summary) necessary to perform and communicated to the service provider for completion of the diagnostic test(s).</p> <p>In order to reduce lab costs, requests may be presented in order of cost, displayed at the time of order.</p> <p>Previous results, financial or administrative limitations and clinical data may influence available tests for ordering using a rules engine or may alert requesters at time of ordering.</p>	nnn	Probably less needed for lab tests compared to the diagnostic tests from the previous line		*

05	<b>Orders for Blood Products and Other products</b>	<p>Support orders for blood products (functionality includes: entry, tracing by means of barcode 2D/3D or other indirect technologies such as RfId, discontinue, and renew) or other products such as implants,... including traceability features. All contextual data such as request time, administration time, requesting actor, performing actor, location...must be captured.</p> <p>Interact with lab(result)system and blood bank system</p> <p>Functionalities:</p> <ol style="list-style-type: none"> <li>1. support for blood prescription; per unit for adults and per ml for children</li> <li>2. CDS with checks for blood groups and other transfusion restrictions</li> <li>3. Allow for confirmed registration of blood group</li> <li>4. Boundary with logistics; e.g. individual blood availability for a patient; preparation etc.</li> </ol>	nnn		*	
06	<b>Logistic orders</b>	<p>Support logistic orders such as :</p> <ul style="list-style-type: none"> <li>• Meal preferences, diets.</li> <li>• linen,</li> <li>• disposable materials (aseptic and non aseptic),</li> <li>• Patient transportation.</li> <li>• ....</li> </ul> <p>(functionalities: entry, tracing, discontinue, and renew).</p>	nnn		*	
07	<b>Order Sets</b>	<p>Order Sets are a pre-defined group of orders that a user may select or displayed automatically (cf. a corollary order) and performed in a linear way.</p>	nnn		*	

		<p>This request is based on a number of selection criteria</p> <ul style="list-style-type: none"> <li>• pathology,</li> <li>• procedure to be performed</li> <li>• ...</li> </ul> <p>Order sets cover all kinds of medical acts (medication and non-medication orders like physiotherapy, nursing) provided with tracing facilities and variance tracking.</p> <p>Order sets performed are linked into the EPR. Integration with patient data is required.</p> <p>These order sets are performed in a linear way or simultaneously but possibly with temporal constraints between them.</p> <p>This may be in some cases the basis for (simple) clinical pathways</p>					
08	<b>Structured Orders</b>	Concerns the availability of using templates for each ordered service that specifies data fields to be completed and guide choices with allowable values, defaults and required fields	nnn			*	
09	<b>Nursing Order Sets</b>	Nursing order set use standardized nursing terminology and are comprised of nursing interventions. These nursing order sets optimize patient safety by ensuring that patients receive the right care at the right time.	nnn	Standardized within the hospital. Possibly a standard may be defined on the national level.			*
010	<b>Complex orders sets</b>	Availability of templates and other tools to guide entry of orders with complex dosing (dose calculators) or administration requirements (e.g. alternate day dosing, custom TPN, chemotherapy). Other features: <ul style="list-style-type: none"> <li>• Support for 'special' groups of patients; e.g. NICU. Changing calculation weight; amount drug changes in function of</li> </ul>	nnn	This can be provided by an external expert system synchronized to the EPR.		*	

		<p>calculation method, MD prescribes in mg/kg but nurse must see total amounts to deliver</p> <ul style="list-style-type: none"> <li>• Prescription on age category (pediatrics)</li> <li>• Co-signing and double-signing</li> </ul>				
O11	<b>Order-relevant patient data visualisation</b>	<p>When preparing an order the required medical data relevant to the corresponding procedure and or intervention within the order (e.g. : laboratory data to be reviewed before ordering a medication) are automatically displayed</p>	nnn	Not as ambitious but check lists linked to orders can offer a first line of safety		*
O12	<b>Order-relevant patient data registration</b>	<p>Provide the ability in the order process (e.g. wizard) to capture additional patient-specific information relevant to the interventions or procedures being ordered but needed for:</p> <ul style="list-style-type: none"> <li>• Possible contraindications (e.g. allergy) or to</li> <li>• Perform necessary calculations (patient weight, body surface area...)</li> <li>• Optimize the scheduled examination/procedure</li> <li>• .....</li> </ul>	nnn	Example: Patient information needed for a CT brain scan is different compared with an order for an angiography		*
O13	<b>Referrals</b>	<p>Provide the ability to manage the registration of referrals between HC Providers (in the broadest sense including HC organizations, physicians...) including all necessary data.</p>	nnn			*
O14	<b>Data completeness &amp; integrability</b>	<p>Interoperability mechanisms must enable the EPR to maintain and visualize all relevant information: starting with a patient order and all subsequent data: the order, the corresponding result(s), the derived codes, administrative billing items (RIZIV-INAMI), MZG scores .... can</p>	nnn	Integrability & operability, some data items (billing) are not required for quality/efficiency of care. We must not impose an organization in which the physician needs to be aware of		*

		<p>be displayed.</p> <p>Example: in the cardiology domain, if an order for an observational act (e.g. heart catheterization) was placed the order information with corresponding set of diagnostic images together with the cardiology report associated with the study, including the patient demographics, including billing nomenclature, including eventually MZG codes must all be synchronized and accessible in order for the clinicians to view the complete record.</p>		<p>billing-related information. Apart from the legal requirements, it may be a strategic choice of the hospital not to have the physicians primarily concerned about ways the cost of medical procedures but instead let them focus on quality and efficiency of care</p>			
	<b>NURSING</b>						
015	<b>Nursing History and Assessment</b>	<p>The nursing assessment summary contains the patient's biographical details (e.g. name and age), the reason for admission, the nursing needs and problems identified for the care plan, medication, allergies and medical history.</p>	nnn		*		
016	<b>(Nursing) Care Plan</b>	<p>Document the identified nursing care problems with goals derived from the problems, nursing assessment and discharge considerations including patient and family educational needs and social considerations.</p>	nnn		*		
017	<b>Nursing Notes</b>	<p>Nursing notes provide a chronological record of the nursing care provided, the patient's status, and/or responses to nursing interventions.</p> <p>The documentation should reflect any change in condition and results of treatment.</p> <p>Nursing notes may be captured in various ways:</p> <ul style="list-style-type: none"> <li>○ unstructured in a narrative form or,</li> <li>○ unstructured based on a template or,</li> <li>○ (semi)structured by means of coded data by means of:</li> </ul>	nnn		*		

		<ul style="list-style-type: none"> <li>○ templates,</li> <li>○ forms,</li> <li>○ pick lists or</li> <li>○ Dictation with subsequent transcription of voice to text, either manually or via voice recognition system.</li> <li>○ Text generation based on mnemonic codes</li> </ul>				
O18	<b>Fluid balance chart</b>	<p>Fluid balance is the concept of human homeostasis that the amount of fluid lost from the body is equal to the amount of fluid taken in. Defined as a 'fluid intake and output chart' or sometimes just 'fluid chart' is used to record all fluid intake and fluid output over a 24-hour period. The amounts may be summarized and the balance calculated at different time periods: 24.00 hours (midnight), or at 06.00 or 08.00 hours.</p> <p>Fluid intake includes oral, nasogastric, via a gastrostomy feeding tube, and infusions given intravenously, subcutaneously and rectally. Fluid output from urine, vomit, aspirate from a nasogastric tube, diarrhea, fluid from a stoma or wound drain are all recorded</p>	nnn	Intake & Output	*	
O19	<b>Basic Vital signs</b>	<p>Vital signs are measures of various physiological data, often taken by health professionals, in order to assess the most basic body functions. The act of taking vital signs normally entails recording body temperature, pulse rate (or heart rate), blood pressure, and respiratory rate, but may also include other measurements. Vital signs often vary by age.</p> <p>Capture and manage the following basic vital signs:</p> <p>- Temperature,</p>	nnn	Basic chart	*	

		<ul style="list-style-type: none"> <li>- Blood pressure</li> <li>- Pulse rate,</li> <li>- Respiratory rate</li> <li>- Height</li> <li>- Weight</li> </ul> <p>Other measurements</p> <ul style="list-style-type: none"> <li>-Expiratory flow</li> <li>- O2 saturation</li> <li>-...</li> <li>....</li> </ul>					
<b>O20</b>	<b>Incident/ accident form</b>	<p>Any non-routine incident or accident involving a patient, must be recorded by an HC actor who witnesses (sees) the incident or finds the patient after the incident happened. Incidents include falls, drug errors, a visitor or a patient attacking a member of staff in any way.</p> <p>These data can be exported to a separate general quality control system.</p>	nnn	Is a declaration record referring to an error which <u>could be</u> recorded in the patient record most of the time and fed to an appropriate incident/reporting system.	*		*

Seq	Name	Description	Id-#	Prty → Comment	1	2	3
D	<b>Documentation of Care (Measurements Management)</b>	<i>Concerns the capturing of accurate, legal, and legible results that serves as a comprehensive account of healthcare services provide to a patient. This includes electronic routing to appropriate other care providers, or ensuring that such providers can access the information when needed.</i>					
D1	<b>Manage Medication Administration</b>	<p>Medication (and Immunization) administration is part of the medication administration workflow and is supported by a system of task reminders and visual overview/summary displays for timely and accurate administration of medications.</p> <p>Medication orders administered to a patient by a care provider must capture (eg. Supportive technology: barcode registration) the necessary details: patient-ID, medication, time (medication planned vs given) , dose and route, user identification when a medication is administered with options to continue, discontinue or modify.</p> <p>Additional checks for possible drug-drug or other interactions can be performed.</p>	nnn	See below for more detail CDSS		*	

D2	<b>Results Notification</b>	<p>Notification of test results are presented in a user friendly way to the requesting providers, that new patient results have been sent/received. These notifications informing that new patient results have been sent/received are all directed by the workflow system.</p> <p>The system must have the ability to filter results (indicate normal and abnormal / pathological results), or possibly to route these results to other health care actors.</p>	nnn	See Medical Organizer	*	
D3	<b>Complex vital signs</b>	<p>More complex charts are provided to inform about:</p> <ul style="list-style-type: none"> <li>- Neurological observation charts,</li> <li>- Glasgow Coma Scale score for level of consciousness,</li> <li>- Pupil size and reaction to light, and limb movement</li> <li>- Body mass index (BMI)</li> <li>- Growth curves for children 2-20 years also prenatal, including BMI</li> <li>- Etc....</li> </ul>	nnn			*
D4	<b>Progress Notes</b>	<p>Progress (Medical) notes provide a chronological record of the medical care provided, the patient's status, and/or responses to medical interventions.</p> <p>The documentation should reflect any change in condition and results of treatment.</p> <p>Depending upon the context and the clinical domain, clinical notes (graphical, audio, etc... ) may be captured:</p> <ul style="list-style-type: none"> <li>o unstructured in a narrative form or,</li> <li>o unstructured based on a template or,</li> <li>o (semi)structured by means of coded data by means of: <ul style="list-style-type: none"> <li>o templates,</li> <li>o forms,</li> <li>o pick lists or</li> <li>o Dictation with subsequent transcription of voice to text, either manually or via voice recognition system.</li> </ul> </li> </ul>	nnn		*	

		o Generating text based on mnemonic codes....				
D5	<b>Automatically track medications from order to administration</b>	<p>In order to reduce medication errors at the time of administration of a medication, the patient must be positively identified: check on the right patient, the right drug, dose, the route and the time are necessary (by means of RFID, bar code label printing and reading...), i.e. Closed-loop registration.</p> <p>In combination with supportive technologies (e.g. 1D/2D barcode scanning, RFID scanning, electronic dispenser...) enable a user to electronically verify the following before administering medication(s):</p> <ul style="list-style-type: none"> <li>• Right patient. The patient to whom the medication is to be administered matches the medication to be administered.</li> <li>• Right medication. The medication to be administered matches the medication ordered for the patient.</li> <li>• Right dose. The dose of the medication to be administered matches the dose of the medication ordered for the patient.</li> <li>• Right route. The route of medication delivery matches the route specified in the medication order.</li> <li>• Right time. The time that the medication was ordered to be administered compared to the current time.</li> </ul>	nnn	<p>Focus here is on the technology used (Rfid, barcode) and the fact that unit dose medications are equipped with tracing labels.</p> <p>Additional :</p> <ol style="list-style-type: none"> <li>1. support link with electronic dispenser</li> <li>2. block order while in preparation</li> <li>3. label/barcode printing at the ward for preparations outside the pharmacy</li> </ol>		*
D6	<b>Discharge summary</b>	<p>Prepared at discharge, documented in the patient's record and contains:</p> <ul style="list-style-type: none"> <li>– Reason for admission</li> <li>– Significant physical and other findings</li> <li>– Significant diagnoses and co-morbidities</li> <li>– Diagnostic and therapeutic procedures</li> <li>– Significant medication and treatments</li> </ul>	nnn	<ol style="list-style-type: none"> <li>1. not only discharge from the hospital but also discharge from an internal ward; e.g. ticket to ride</li> <li>2. medication reconciliation (separate functionality) but must be included in discharge summary/ticked to ride</li> <li>3. A link with Intermed/Vitalink is necessary to allow e.g. direct updates and modifications for</li> </ol>	*	

		<ul style="list-style-type: none"> <li>– Condition at discharge</li> <li>– Discharge medications and all medications to be taken at home</li> <li>– Follow up instructions</li> </ul>		patient home medication.			
D7	<b>Report Generation</b>	<p>The system must provide facilities to generate reports based on data extracted from the EPR in order to respond quickly to new demands for deeper analysis on medical, administrative and or financial level.</p> <p>This is a more BI-oriented system, merely not comparable with a medical driven data warehouse.</p> <p>.A user - on basis of a number of parameters to define their reports - to select, sort, access, and create patient lists based on a combination of e.g. the following data elements: Problems; Medications; Medication allergies; Demographics; orders &amp; procedures, type of encounter.</p>	nnn	Generate lists of patients That could as well be considered an implementation detail or a choice by the institution		*	
D8	<b>Coding Assistance</b>	<p>The user is assisted in the medical coding process by means of a syntactical and semantical search linked with a terminology server. Descriptions of medical diagnoses and procedures are transformed into universal medical codes (ICD 10, Snomed, Loinc...) . The diagnoses and procedures are usually taken from a variety of sources (within the patient record, such as the transcription of the physician's notes, laboratory results, radiologic results, and other sources.</p>	nnn	Cf. terminology server (see Action 13)		*	
D9	<b>Acuity /severity of illness</b>	<p>Acuity management corresponds to define the level of severity of an illness. This is one of the parameters considered in patient classification systems that are designed to serve as guidelines for allocation of nursing staff, to justify staffing decisions, and to aid in long-range projection of staffing and budget.</p>	nn n	Patient acuity is a concept commonly referenced by caregivers but without a concrete definition or measurement.		*	

		The EPR has to provide the data necessary to support and manage patient acuity/severity.				
D10	<b>Unstructured data</b>	<p>Functionality to manage (capture and store) EPR record information as unstructured data. Unstructured data (or unstructured information) refers to information that either does not have a pre-defined data model or is not organized in a pre-defined manner. Unstructured information is typically text-heavy, but may contain data such as dates, numbers, and facts as well. Multimedia data can also be seen as part of unstructured data (see further).</p> <p>Using predefined templates, headings may organize / categorize more or less unstructured data. Semi-structured data is a form of <u>structured data</u></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>- Text (progress notes...)</li> <li>- unstructured data commonly occurs in electronic documents (word documents)</li> <li>- (scanned) images</li> <li>- dictated report transcribed into text (e.g. by means of voice recording)</li> <li>-email</li> </ul>	nnn	Also graphical representations e.g. surgical report with locations of the drains, bypasses in CABG .... Or in the wound record	*	
D11	<b>Structured data</b>	<p>Functionality to manage (capture and store) EPR record information as structured data items (fields) referring to a data model.</p> <p>Structured data must have the facility to be captured by using predefined templates, code lists, using well known and available</p>	nnn	Therefore anational thesaurus (terminology server) is indispensable and must needless be integrated	*	*

		<p>terminologies SNOMED CT,.</p> <p>Examples of structured health information:</p> <ul style="list-style-type: none"> <li>- patient demographics- diastolic blood pressure (numeric+ Snomed annotated for communication)</li> <li>- coded result observation</li> <li>-Lab results</li> <li>-coded interventions</li> <li>- coded diagnosis</li> </ul>				
<b>D12</b>	<b>Multimedia support</b>	<p>The system must facilitate features to capture, view and manage various types of multimedia data such as</p> <ul style="list-style-type: none"> <li>• Images (PACS...)</li> <li>• Waveforms (ECG, ...)</li> <li>• Scanned documents (Patients consent...)</li> <li>• Pictures (JPEG,...)</li> <li>• Sound (spoken text)</li> <li>• Video/film</li> </ul>	nnn	<p>See also DICOM standard</p> <p>Most current EPRs do not provide this functionality directly but rely on ancillary systems for that.</p>		*

## 4.1.2. CLINICAL DECISION SUPPORT SYSTEMS & KNOWLEDGE MANAGEMENT

Seq	Name	Description	Id-#	Prty → Comment	1	2	3
K	<b>Clinical Decision Support &amp; Knowledge mgmt.</b>	<p><i>CDSS can actively influence decisions, provide options, suggest diagnoses on the basis of assessment information, explanations that improve the clinician's efficiency and compliance with accepted guidelines of practice. Using prompts and alerts, computerized decision-support systems would help improve compliance with best clinical practices.</i></p> <p><i>Ideally, access to knowledge resources should be integrated with clinical decision support in ways that directly influence physicians' ordering behavior.</i></p> <p><i>The holy grail would be to provide instant access to knowledge resources over the internet, by means of context-specific "info buttons" triggered by keywords in notes that link user to relevant textbooks and guidelines.</i></p>					
K1	<b>Domain knowledge for providers</b>	<p>The clinician should be able (from entries in the patient record, or through other means such as key word search) to access and guided in a wide variety of context-specific available evidence-based knowledge, at the point of care, for healthcare decisions and care planning.</p> <p>The information request should be feasible from a single problem or medication or from the Sumehr as a whole. Examples of knowledge</p>	nnn	<p>We refer here to well know sources such as (Action 18)</p> <p>-CEBAM Digital Library for Health</p> <p>-Up to Date</p>			*

		<p>resources include but not limited to are:</p> <ul style="list-style-type: none"> <li>• evidence on treatment of specific medical conditions, maintenance of wellness,</li> <li>• drug or device trials,</li> <li>• special medical techniques</li> <li>• clinical research</li> <li>• information available through <ul style="list-style-type: none"> <li>• online journals,</li> <li>• Printed resources such as books and specialty organizations resources.</li> </ul> </li> </ul>		--On-line Journals (NejM, JAMA,...)			
K2	<b>Knowledge sources for patients</b>	<p>It is a well-known fact that after a visit to a health care provider, most patients do not understand at the time of the visit the full medical explanation provided.</p> <p>After a medical encounter, a patient must be able to find an answer to his questions and must have access to reliable information relevant for his medical problem...This information accessible for the patient may be linked directly from entries in the patient record.</p>	nnn	See Patient empowerment			*
K3	<b>Medication Order checking</b>	<p>Before a medication order is completed and acted upon during computerized provider order entry (CPOE), interventions must automatically and electronically indicate to the user (real-time prompting and alerting at the time of order entry) drug interactions and contraindications based on explicit rules and a range of patient-specific electronic information with respect to severity/grading and relevance (cfr alert fatigue) and with respect to specific medication classes.</p> <p>Those alerts are customized (even personalized) to specific medical specialties. Moreover the user must have the possibility to overrule</p>					

		<p>these warnings specifying the reason for overruling.</p> <p>Local drug databases / formularies should be Snomed-annotated in order to be compliant between institutions and professionals. The use of subsets of the national reference drug databases will guarantee interoperability.</p> <p>Interaction checking includes :</p> <ul style="list-style-type: none"> <li>• <i>Drug-allergy checking</i> : Medication for which patient allergy has been documented or allergy to other drug in same category has been documented</li> <li>• <i>Drug-Lab interaction</i> checking: Medication either contraindicated for this patient based on laboratory studies or for which relevant laboratory results must be considered in appropriate dosing</li> <li>• <i>Drug-Therapy</i> checking</li> <li>• <i>Drug-Radiology</i>: Medication contraindicated for this patient based on interaction with <b>contrast medium</b> in recent or ordered radiology study</li> <li>• <i>Drug-disease</i> interaction checking : Medication either contraindicated based on patient diagnosis or diagnosis affects appropriate dosing</li> <li>• <i>Drug-pregnancy</i> : Medication either contraindicated based on patient pregnancy</li> <li>• <i>Therapeutic duplication</i>: Medication with therapeutic overlap with another new or active order; may be same drug, within drug class, or involve components of combination products</li> <li>• <i>Corollary</i>: Intervention that requires an associated or secondary order to meet the standard of care. (e.g. a medication order that should be accompanied by an order to test blood levels of the medication to titrate dosing-adjustment of the dose until the medication has achieved the desired effect)</li> </ul>	<p>nnn</p>		<p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p>	
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		<ul style="list-style-type: none"> <li>• <i>Min-max dose ranges</i> : Medication with a specified dose that exceeds recommended dose ranges or that will result in a cumulative dose that exceeds recommended ranges</li> <li>• <i>Check dose against age, weight or BSA</i>: Medication either contraindicated for this patient based on age and weight or for which age and weight must be considered in appropriate dosing. (calculator, suggested dose, and/or dosage checking)</li> <li>• <i>Against renal function</i></li> <li>• <i>Duplicate and Therapeutic overlap checking.</i></li> <li>• <i>Cost of care</i></li> <li>• ...</li> </ul>	nnn			*
			nnn			*
			nnn			*
			nnn			*
			nnn			*
K4	<b>Non-Medication Order checking</b>	<p>Checking of non-medication orders for</p> <p>-duplicates within specified timeframes</p> <p>-maximum number of acts that may be performed within a specific time frame</p> <p>-other parameters such as gender, age...</p>	nnn			*
K5	<b>Surveillance outside of order entry</b>	New medical of information regarding patient medical status may have an influence on previously ordered interventions, warns/alert and notifies the requesting health care actor to reconsider these previous orders. (e.g.: Antibiotic stewardship and link with microbiology results),	nnn			*
K6	<b>Surveillance of expired alerts</b>	<p>A Rules-based engine continuously analyzes alerts in the notification engine and keeps all sort of alerts under close surveillance including:</p> <ul style="list-style-type: none"> <li>• Expired orders alerts</li> </ul>	nnn			*

		<ul style="list-style-type: none"> <li>• A history of all Pending/outstanding order alerts</li> <li>• Exception documentation for alert overrides</li> </ul>				
K7	<b>Access to Guidelines and care Pathways</b>	Guidelines, and care pathways (Care plan) for care planning must be accessible for health care providers and may be site specific, community or industry-wide standards. Pathways may be started at any point in time and will feed automatically the nurse work list.		<u>See also further</u> GL & CP		

### 4.1.3. CARE SUPPORT & WORKFLOW MANAGEMENT

Seq	Name	Description	Id-	Prty	1	2	3
				→			
				Comment			
W	<b>Workflow</b>	<i>An electronic patient record is composed of a static part (viewing results...) and a dynamic part that corresponds to the execution of medical procedures carried out on behalf of health care providers. The latter supports the clinical workflow.</i>					
W1	<b>Clinical task tracking</b>	<p>An electronic patient record is composed of a static part (viewing results...) and a dynamic part that corresponds to the “dynamics” of medical procedures carried out on behalf of health care providers. Therefore functions must exist in the EPR that support the flow of tasks i.e. the workflow that previously existed in a paper based system (such as the paper chart, a phone call, a message) that tracks the status of the various tasks.</p> <p>The workflow management will automatically change and influence the user interface dynamically according to present and new information and actions already taken and limit information overload.</p> <p>Task management is the process of managing tasks through its life cycle. Tasks are time-limited (or finite). The status of tasks can be described by the following states:</p> <p>Ready, (un) assigned, Terminated, Expired, Waiting, Forwarded, Finished, Failed</p> <p>In order to reduce the risk of errors during the care process (e.g. due to missed tasks), the care provider must be able to view and track the status of each task (either by explicit inspection or by automatically having drawn</p>	nnn nnn nnn	See also further note on Medical Organizer		*	*

		<p>the attention to):</p> <ul style="list-style-type: none"> <li>• (Un)resolved tasks,</li> <li>• Tasks on hold and waiting for a call to action: <ul style="list-style-type: none"> <li>• Provide feedback,</li> <li>• Patient phone call to do</li> <li>• Test results that have (not) been reviewed by the ordering provider based on an interval appropriate to the care setting.</li> </ul> </li> <li>• Unproven orders to be (counter)signed</li> <li>• Unassigned tasks or</li> <li>• ....</li> </ul>				
W2	<b>Care pathways</b>	<p>Create, maintain care pathways in a user friendly modelling (processes, tasks, roles, rule definitions...) environment and a language (possibly graphical) for pathway description. This language shall be able to express numerous concepts like: activities, decision, roles, and indicators... useful to describe clinical pathways</p> <p>for an individual specialty or multidisciplinary. In the latter case we talk about Integrated Care Pathway (ICP).</p> <p>A Clinical Pathway derived from a guideline, is a road map for a patient and for the treatment team in which the different tasks (interventions) by professionals involved in the patient care are defined, optimized and sequenced either chronologically, or by attending service/provider of all care activities intended to achieve expected standard outcomes within predefined time frames. It may encompass only part of the total treatment plan and the time span they cover can vary considerably.</p> <p>Adaptability to changing conditions is an important requirement for making clinical recommendations. These changes can be the consequence of a changing patient's medical condition progressing in potentially</p>	See also Belgian initiative BELRAI : Belgium Resident Assessment Instrument (RAI)		*	



W5	Multidisciplinary team alert	<p>The tool shall alert responsible people in case of failure or variation from expected course of a pathway. It shall compare continuously the real route of the patient with the ideal route defined by the pathway. In case of variance, the system shall automatically alert the involved caregivers.</p> <p>Caregivers have the possibility to justify and document variances. This information will be useable during retrospective analysis of the pathway.</p>	nnn				*
W6	Pathway variance tracing	<p>Variances from standard care pathways must be traced. Tool to evaluate the use of care pathways by continuously assessing practices and giving feedback to multidisciplinary team members.</p> <p>The goals of the pathway will be evaluated. Goals are related to target values of transversal indicators within a pathway, like for example pain management, patient comfort and wellness, ...</p>	nnn				*

## 4.2. INDIRECT CARE

### 4.2.1. PATIENT MANAGEMENT

Seq	Name	Description	Id-#	Prty → Comment	1	2	3
P	<b>ADT</b>	<i>Concerns all computerized functionality to support the registration and management of administrative patient data independent of the type of encounter (e.g.: inpatient, outpatient, one day clinics, emergency...) and to provide timely service to patients. Key feature is the unique patient identification including more than one identifiers as there are the NISS/INSZ, the sickness fund nr. Ids of foreigners.</i>		This function does not necessarily belong to the core of an EPR system and could be obtained from another vendor.			
P1	<b>Patient Demographics</b>	Capture and maintain patient (verified) demographic information (addresses, phone numbers, date of birth, gender, insurance information, etc...) for unique patient identification within and outside (National ID) the organization, reporting purposes and for the provision of care. This patient information is therefore on-line accessible anywhere in the institution and are the basis for improved claims handling for reimbursement.	nnn		*		
P2	<b>Patient Admission</b>	The admission, discharge and transfer (ADT) module must be integrated with all other components such as CPOE, Planning, EPR and hospital billing (RIZIV/INAMI nomenclature)...	nnn		*		

	<p>It has the following basic functionality:</p> <ul style="list-style-type: none"> <li>-Master Patient Index (MPI)</li> <li>- Barcoded armband printing (1D,2D for positive patient identification)</li> <li>-Emergency admission with (nurse) triage functionality</li> <li>- Swap Patients</li> <li>- Pre-Admission</li> <li>-Re-Admission</li> <li>- One day clinic admission</li> <li>- Patient Waiting list,</li> <li>- Discharge</li> <li>- Patient transfers to another ward, to another provider and planned transfer by adding a future date to the transfer transaction</li> <li>- Ability to use and hold beds for short periods: home leave (WE) or ICU stay</li> <li>- Short admission</li> <li>- Multiple views of current and historical patient censuses</li> <li>- Patients are attached to specialties and ward units temporary (in case of emergency) or fixed</li> </ul>		<p>It should be the choice of the hospital which identification method is preferred</p> <p>Swap patients means to swap patient A into bed B and patient B into bed A</p> <p>Patient waiting list is part of bed management</p>		
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P3	<b>Ward management</b>	Ward management - allows patients to be admitted, transferred (to a ward) on a ward unit itself , and bed swap,... without or with specification of the projected bed category or the actual bed category for the patient	nnn		*		
P4	<b>Bed planning</b>	<p>Bed planning corresponds with the allocation and provision of beds. The "bed" in this context represents not only a place for the patient to sleep, but the services that go with being cared for by the medical facility: admission processing, physician time, nursing care, necessary diagnostic work, appropriate treatment, and so forth. Bed planning is usually performed by a dedicated team.</p> <p>This planning (assignment) functionality integrated and based the generic scheduling system allows the hospital to define and visualize the actual number of:</p> <ul style="list-style-type: none"> <li>• occupied beds,</li> <li>• free beds, and</li> <li>• beds scheduled for the (near) future</li> </ul> <p>The bed assignment functionality tries to minimize risks (e.g. exposure to contagious patients).</p>	nnn			*	
P5	<b>Manage person-patient ID</b>	In case a “mistake” has been discovered during the registration process of the patient Id (Id contains no patient related content) this functionality enables to change the wrong patient Id to the exact one and (by selection by an authorized user ) to transfer the corresponding medical data to the right patient Id	nnn		*		

P6	<b>Patient retrieval</b>	Searching facilities by Individual: <ul style="list-style-type: none"> <li>• Name (phonetic),</li> <li>• National ID-#</li> <li>• Medical record-#,</li> <li>• Admission-#</li> </ul> By Group / Work list: <ul style="list-style-type: none"> <li>• Nursing Unit</li> <li>• Provider (nurse, physician)</li> <li>• Agenda (e.g. consultation)</li> <li>• Medical Service</li> <li>• Patient type</li> <li>• Status -             <ul style="list-style-type: none"> <li>• pre/admit / date</li> <li>• discharged / date</li> <li>• pending</li> </ul> </li> </ul>	nnn		*		
P7	<b>Certifications</b>	Manage patient health-related certifications <ul style="list-style-type: none"> <li>• Certify sick leaves</li> <li>• Certify disabilities</li> <li>• Certify ...</li> </ul>	nnn		*		
P8	<b>Patient relations</b>	Functionality that enables to depict patient relations: mother-child (fetus and fetal record), patient- parents, sister, brother...important in the era of genograms and genomics.	nnn			*	
P9	<b>Self-service Patient Kiosks</b>	As patients become more and more familiar with self-service (welcome) kiosks (see also airports) kiosks let patients inform institutions of their arrival in the hospital, update if necessary the demographics, respond questionnaires, consents,..., Configurable, multi-language patient kiosks which enable outpatients to quickly and efficiently check into the	nnn	The "kiosk" function could also be part of the patient portal (see also flight confirmation by air companies through portals).			*

		outpatient clinic, may improve the patient's hospital experience.					
P10	<b>Patient Insurability</b>	<p>The ADT system is the basis in addition with demographic and insurance data linked with other data arriving from the EPR system and other departmental and satellite systems for the Belgian e Care message system for</p> <ul style="list-style-type: none"> <li>• Patient insurability and</li> <li>• Patient billing</li> </ul> <p>Following the social legislative rules of the federal government.</p>	nnn		*		
P11	<b>Payment Handling</b>	Most of the times direct patient payments are dedicated for outpatient clinics and may use third payer payment (direct billing) integrated with the ADT system and the scheduling system and the ERP-application.	nnn		*		
P12	<b>Automatic Generation of Administrat. and Financial Data from the EPR</b>	<p>Physician and clinical teams do not have to perform additional data entry / tasks exclusively to support administrative or financial processes. The data needed for billing is derived from the data in the EPR system.</p> <p>Clinical information needed for billing is available on the date of the performance of the corresponding medical act. Administrative and financial data can be derived from clinical data to complete administrative and financial processes by mapping of clinical terminologies in use to administrative (RIZIV/INAMI) and financial terminologies for generating patient bills.</p>	nnn			*	
P13	<b>Claim Manage-</b>	Part of the billing system, linked with the ADT component to manage	nnn	EMR should record all billable	*		

	<b>ment</b>	patient claims. Patients financial status can be viewed during a patient encounter.		acts/materials/... and reports them to a billing system. The billing system uses its set of rules to handle the data. Whether or not that a physician treating the patient needs to be able to see that patient's financial status, is debatable.			
<b>P14</b>	<b>MZG Management</b>	Physicians, nurses and administrative personnel do not perform additional data entry / tasks exclusively to support the MZG (MKG/ MVG) registration/ mapping.  Clinical information needed for those registries is available on the date of procedure performed and can be transparently (mostly) derived from clinical data and other data sources (HR...) by mapping to MZG (MKG, MVG) terminologies.	nnn	See also :Automatic Generation of  Administrative and Financial Data from the EMR		*	
<b>P15</b>	<b>Generate DRG</b>	Concerns an automatic link from the EPR system with the Diagnosis-related group (DRG), a system to classify hospital admissions into homogeneous units of hospital activity to which binding prices could be attached. DRGs may be further grouped into major diagnostic categories (MDCs).Today, there are several different DRG systems in the US and in the different EU countries. The one used in Belgium today is the 3M APR-DRG v15 grouper.	nnn	For the time being the one used in Belgium is the 3M DRG grouper.	*	*	

Seq	Name	Description	Id-#	Prty → Comment	1	2	3
S	<b>Planning &amp; Scheduling</b>	<i>Concerns enterprise wide computerized scheduling systems that improve hospitals' and clinics' efficiency and provide timely service to patients.</i>					
S1	<b>Basic features appointment planning</b>	<p>Hospital wide scheduling options to assist staff in booking a range of appointments types including:</p> <ul style="list-style-type: none"> <li>• <i>single appointment</i> - a one off outpatient attendance</li> <li>• <i>linked appointment</i> (serial appointments) - the booking of multiple appointments on one day for different clinics/caregivers/specialties from a single point saving the hospital and the patient time and effort</li> <li>• <i>Multiple appointments</i> - allows the booking of regular appointments over a specified period of time from a single point.</li> <li>• <i>Multiple resource</i> scheduling (patient, provider, staff, rooms &amp; equipment), resource pools</li> <li>• <i>Cyclical &amp; Group Scheduling</i></li> </ul> <p>The scheduling system is a holistic setup where centralized and decentralized scheduling enables cross-departmental bookings (e.g. :by means of drag and drop facilities).</p> <p>Trigger mechanism:</p> <ul style="list-style-type: none"> <li>• Appointments can be triggered by other processes or</li> <li>• Appointments can trigger in their turn other appointments (patient</li> </ul>	nnn	The patient scheduling system must be needless integrated on the syntactical and semantical level with other feeding systems such as CPOE, ADT, ...	*		

		<p>transportation, supply chain...)</p> <p>Scheduling calendar based on predefined time parameters and templates.</p> <p>Handles scheduling exceptions :</p> <ul style="list-style-type: none"> <li>• week end,</li> <li>• maintenance (slots), ...</li> </ul> <p>Appointment related data must be available in other systems: Tight Integration with: ADT, (C)POE, EPR</p> <p>Templates: Adjustable resource pattern scheduling</p> <ul style="list-style-type: none"> <li>• One patient at a time <ul style="list-style-type: none"> <li>• Fixed slots</li> <li>• Variable length slots</li> </ul> </li> <li>• Block schedules</li> </ul>		influence status in other systems			
S2	<b>Appointment follow up features</b>	<p>The following control features must be embedded:</p> <ul style="list-style-type: none"> <li>• track patients;</li> <li>• cancelations;</li> <li>• register no-Shows;</li> <li>• perform reschedules,</li> <li>• waitlist Functions (e.g.: for patients who don't obtain an immediate appointment).</li> </ul>	nnn		*		
S3	<b>Overbooking Management</b>	<p>In real life a number of appointment slots have to be reserved in case of emergency and unattended patients who need to be seen immediately.</p>	nnn		*		

S4	<b>Access to the planning system</b>	<p>Who is entitled (defined by department or use profiles) to:</p> <ul style="list-style-type: none"> <li>• book an appointment with what resources,</li> <li>• define an appointment calendar ,</li> <li>• define Resources or Resource pools needed by appointment type</li> <li>• to grant access</li> </ul> <p>Access to the planning (view):</p> <p>by patient :</p> <ul style="list-style-type: none"> <li>• chronologic order (previous visits)</li> <li>• date</li> </ul> <p>by service : monthly / weekly / daily overview</p> <p>by resource : monthly / weekly / daily overview</p> <p>by day</p>	nnn		*		
S5	<b>Rule driven scheduling management</b>	<p>Clinical &amp; Business Rules based scheduling is embedded</p> <ul style="list-style-type: none"> <li>• <i>Resource conflict</i> checking: tracing appointment incompatibilities between certain procedures to be scheduled.</li> <li>• <i>Triggers</i> – conditions which will initiate a task</li> <li>• <i>Pre-conditions</i> –specific conditions to be fulfilled before a task may be started</li> <li>• <i>Wait conditions</i> – conditions (in addition to pre-conditions) necessary for a task to execute</li> <li>• Automatic, manual or repeating execution for a number of repeats or until a goal is reached</li> </ul>	nnn		*		

		<ul style="list-style-type: none"><li>• <i>Post-conditions</i> – conditions true on task completion after the performance of a scheduled activity</li></ul> <p>These facilities provide useful clinical decision support in the background without being obtrusive.</p>					

## 4.2.2. Patient Engagement

Seq	Name	Description	Id-	Prty	1	2	3
				→			
				Comment			
E	<b>Patient Engagement</b>	<p>Concerns tools that provide patients controlled access to their medical records, interactive patient education, access to scheduling, access to personal record (letters, results, allergies, vaccinations...),direct communication with health worker, self-monitoring (BP, glycaemia...),source of health information , online questionnaires.</p> <p>Furthermore it may assist to carry out home-monitoring and self-testing and is an enabler to improve control of chronic conditions, such as diabetes.</p> <p>Four questions every patient should /may ask :</p> <ul style="list-style-type: none"> <li>• Can I have my results</li> <li>• What does it mean?</li> <li>• What are my options</li> <li>• What Next?</li> </ul>					
E1	<b>Electronic Copy of Health Information</b>	<p>Provide patients on their request an electronic copy of their health information (including diagnostic test results, problem list, medication lists, and medication allergies)</p> <p>A hardcopy or electronic output may be desired.</p>	nnn	<p>On CD, DVD, or by secure mail exchange.</p> <p>This may not cover the complete electronic record, especially if the institution goes far in collecting structured or multimedia information. e of</p>	*		

				communication. Some patients may request this type			
E2	<b>Patient clinical summaries</b>	<p>Provide clinical summaries for patients after each visit/encounter. These summaries contain the following:</p> <ul style="list-style-type: none"> <li>• reason(s) for visit,</li> <li>• updated medication list,</li> <li>• updated vitals,</li> <li>• procedures and</li> <li>• instructions based on clinical discussions that took place during the contact,</li> <li>• updates to a problem list,</li> <li>• immunizations or</li> <li>• medications administered during visit, and</li> <li>• next appointment if scheduled, or a</li> <li>• Recommended additional appointments and / or tests that the patient needs to schedule.</li> </ul>	nnn			*	
E3	<b>Personal Health Record</b>	<p>EPR technology must provide patient engagement tools to foster the patient – HC provider communication at remote locations. Patients (and their authorized representatives) –will have the ability to access online validated parts of the EPR to view, download, (and transmit to a 3rd party) validated medical data.</p> <p>A personal health record, or PHR, is an electronic application used by patients to maintain and manage their own health information (or that of others for whom they are authorized to do so). A PHR differs from an EPR in that patients themselves usually set up and access the PHR. Patients can use a PHR to keep track of information from doctor visits, record other health-related information, and link to health-related resources.</p> <ul style="list-style-type: none"> <li>• <b>Standalone PHRs</b>, patients fill in the information from their own</li> </ul>		<p>This can be part of the PHR functionality PHR and the EPR do not necessarily overlap. Some result are sensitive/difficult to interpret and should first be explained by the responsible physician.</p> <p><i>Recommendation.</i> This is still a political discussion. More so, this view is not shared by a majority of physicians, at least not at the “Orde van Geneesheren” who recently advised against giving the patient access to his file.</p>			

		<p><i>records and memories, and the information is stored on patients' computers or the Internet.</i></p> <ul style="list-style-type: none"> <li>• <b>Shared Electronic Health Record</b> Represents the full patient's view of his health history, which conforms to national standards across more than one health care organization, including the patient. This refers to the Hub/MetaHUB e Health project</li> <li>• <b>Connected PHRs</b> are linked to a specific health care organization's EPR system. The patient accesses the information through a secure portal. The following features could be available: Fill in (encounter) questionnaires, schedule some appointments, view billing status, get automated health reminders, secure messaging between HC providers and patients, e-visits (future),</li> </ul> <p>Access to these capabilities must be through a secure channel that ensures all content is encrypted and integrity-protected in accordance with the standard for encryption and hashing algorithms.</p>	<p>nnn</p> <p>nnn</p>	<p>Could be provided by external vendors</p> <p>A trusted authority needs to guarantee the safety and usage of data patients put in their PHR.</p> <p>Not part of a hospital related EMR</p>			*
E4	<b>Support self-care</b>	<p>Self-care refers to actions and attitudes which contribute to the maintenance of well-being and personal health. It is any activity of an individual, with the intention of improving or restoring health, or treating or preventing disease.</p> <p>For a group of patients (e.g. chronic diseases, revalidation,...) provide the patient (or others directly involved in the patient's self-care) with instructions and documentation for self-management that may include:</p> <ul style="list-style-type: none"> <li>• recommendations about nutrition,</li> <li>• physical activity,</li> </ul>	nnn				*

		<ul style="list-style-type: none"> <li>• tobacco use,</li> <li>• Medications.</li> <li>• Etc. ...,</li> </ul> <p>Also guidance or reminders are generated about:</p> <ul style="list-style-type: none"> <li>• schedules for other appointments</li> <li>• lab tests</li> <li>• clinical checkups;</li> <li>• Etc. ...</li> </ul>					
E5	<b>Access to patient educational information</b>	<p>While busy clinicians cannot fill all the educational needs. Patient education is the process by which patients are provided access to educational information or a library of educational resources usable by the patient or representative in the language or dialect they understand.</p> <p>This information shall be easily accessible through the internet, or available by print out (by the physician) during his visit</p>	nnn				*

### 4.2.3. Electronic Communication (e Health)

Seq	Name	Description	Id-#	Prty → Comment	1	2	3
H	<b>Health Information Exchange</b>	<p><i>Health Information Exchange (HIE) concerns the efficient and secure communication among care providers (possibly including the patient) to improve the continuity of care and increase the timeliness of care.</i></p> <p><i>In this section we refer to initiatives dealing with sharing of data which will be based always on the same National or international (Khmer / HL7 syntax) transactions (vaccination, medication scheme, Sumehr, prescription)</i></p>		Hub/metahub project			
H1	<b>Notifications</b>	<p>Automatic generation and electronic communication of various notifications towards appropriate destinations (insurance companies, GP, federal bodies...):</p> <ul style="list-style-type: none"> <li>• Admission notification (e.g. carenet 721 message)</li> <li>• Hospitalisation Prolongation (Caretnet message 723)</li> <li>• Emergency Admission notification</li> <li>• Death notification          Discharge notification (e.g. carenet 727 message)</li> </ul>	 nnn  nnn  nnn  nnn		 *  *  *  *		
H2	<b>Medical letters</b>	Automatic generation and electronic communication of various letters towards GP, referring physicians by means of the eHealthBox (see eHealth platform)...					

		<ul style="list-style-type: none"> <li>Discharge letter &amp; Discharge Sumehr</li> <li>Referral letter &amp; Kmehr prescription / transfer</li> </ul>	nnn nnn		*	*	
H3	<b>Specialized disease registries</b>	<p>Regarding all electronic communications with external entities, some may be considered as “a” report</p> <ul style="list-style-type: none"> <li>eCare-SAFE consultation</li> <li>eCare -Orthoprider</li> <li>Qermid <ul style="list-style-type: none"> <li>Coronary Stenting</li> <li>Pace maker</li> <li>Endoprotheses</li> <li>Hart defibrillators</li> </ul> </li> <li>e-Birth <ul style="list-style-type: none"> <li>E-Birth medical form- baby part.</li> <li>E-Birth notification- baby part.</li> <li>E-Birth medical form - mother part.</li> <li>E-Birth notification- mother part.</li> </ul> </li> <li>Medical Advisor Agreement (Ch. IV)</li> <li>Vaccinet</li> <li>...</li> <li>Trusted Time Stamp TTS (digital signature)</li> </ul>	nnn nnn nnn nnn			*	*
H4	<b>Generate and transmit medication prescriptions</b>	<p>Generate and transmit permissible encrypted discharge prescriptions electronically to pharmacists. Referring to the e-Prescribe project of FOD : Recipe-e, en Recipe-e patient portal.</p>	nnn			*	

	<b>electronically</b>					
H5	<b>Transmit electronic medical reports,</b>	<p>This includes all the necessary reports from various parties such as</p> <ul style="list-style-type: none"> <li>• Laboratory results,</li> <li>• radiology</li> <li>• cardiology</li> <li>• ...</li> </ul>	nnn			*
H6	<b>Patient/(hosp) - Insurance communication</b>	<p>Manage (My)Caret messages</p>	nnn		*	
H7	<b>Remote health care services</b>	<p>Telehealth: In order to promote patient empowerment and wellness support remote health care services such as</p> <ul style="list-style-type: none"> <li>• <i>home monitoring</i> remote treatment of patients using monitoring devices</li> <li>• <i>Video conferencing</i> and two way communications between provider and patients.</li> </ul>	nnn nnn	<p>For the time being we are not in a position to already specify what concepts and technology will make sense and what is required in an EMR.</p>		* *
H8	<b>Patient-Provider Communication</b>	<p>Facilitate secure communications between providers and patients (originated by patients). Examples:</p> <p>Medication Prescription (refill).</p> <ul style="list-style-type: none"> <li>• Patients suffering from chronic diseases may wish to communicate their daily measured vitals, or other data (glucose...) .</li> <li>• ...</li> </ul>	nnn			*
H9	<b>Provider - Patient</b>	<p>Patients will become more involved in the care process by direct electronic communication (reminders) with their treating physicians</p>				

	<b>communication</b>	<p>related to their care.</p> <p>Examples of patient related communications include</p> <ul style="list-style-type: none"> <li>• The clinician may wish to inform the patient by email of receipt of a medical ((ab) normal) result.</li> <li>• Reminders</li> <li>• Hospital may wish to establish an electronic communication with a selected group of patients about a new care program /facilities</li> <li>• Request to schedule an appointment (based on age and frequency criteria) generated automatically by the EPR on behalf of the provider.</li> </ul>	<p>nnn</p> <p>nnn</p> <p>nnn</p>	<p>Some caution is needed as many results may still require a word of explanation. We need guidelines (or common principles) for when to use this communication.</p>				<p>*</p> <p>*</p> <p>*</p>
<b>H10</b>	<b>Provider - Provider communication</b>	<p>Enables communication between providers:</p> <ul style="list-style-type: none"> <li>• Physician –physician</li> <li>• Physician-pharmacy : e-prescribe project for transmission of prescriptions to pharmacies</li> <li>•</li> </ul>						*
<b>H11</b>	<b>Team coordination.</b>	<p>On line (multidisciplinary) team coordination/ collaboration that uses data, audio and video telecommunications to bring HC actors at different sites together to share documents and display medical information on whiteboards. They work with each other to achieve shared goals. One example is the MOC is requested by the treating physician (general practitioner or specialist) and organized within or outside the hospital by a (medical) coordinator with participation of different medical specialists (e.g. radiotherapy, surgery, organ specialism, pathology).</p> <p>The participation of the general practitioner is recommended and also external medical consultants can assist as non-hospital physician</p>	<p>nnn</p>	<p>Multidisciplinary. oncology consultation (MOC) Specifically for “video conferencing” technology only limited support from within the EMR is needed. Specifications for such real-time interaction is not standard.</p>				*

		because of their special expertise.				
H12	<b>External validated registries</b>	<p>All components of an EPR must provide the ability to interact with external registries of providers, services...</p> <p>Support interactions and communication with external directories/registries (VAS -Validated Authentic Source cfr e Health) to have access to the following registries:</p> <ul style="list-style-type: none"> <li>• <b>National Register:</b> Database containing identification and location data of Belgian citizens registered in one of the following directories:- the population registers held by the Belgian municipalities, or the consular registers containing Belgian citizens registered at a consular post or a Belgian diplomatic embassy abroad.</li> <li>• <b>Bis Register:</b> Database containing the information on physical persons for whom a file is managed by the Social Security, but who are not registered in the National Register and as such do not have a National Register Number. This concerns mainly those people who do not or no longer live in Belgium.</li> <li>• <b>CoBRHA :</b> data file containing basic identification data of health care providers and organizations,</li> <li>• <b>SAM/CIVICS:</b> CIVICS - Chapter IV Information Consultation System) Authentic source of drugs for use by healthcare professionals in Belgium. This model will describe a national therapeutic arsenal with 6 basic concepts (3 universal and 3 with country and brand specification). Moreover the reimbursement is also taken into account referring to the Belgian system for sickness and invalidity insurance. (Chapter IV describes the conditions for reimbursement of specialties which are refundable through a medical advisor's agreement. In order to obtain reimbursement of these specialties, specific criteria have to be met and filled in on application forms). These forms should be</li> </ul>	nnn	Cf. eHealth  platform Directory linkage part of the project 18 of the FOD	*	

		<p>replaced by an automatic rule based check of the coded Patient Summary.</p> <ul style="list-style-type: none"> <li>• NIHII: Number assigned by the National Institute for Health and Invalidity Insurance identifying an organization in the health care sector (e.g. hospital). NIHII number can also be assigned to certain professionals in the health care sector (e.g. doctors). These numbers consist of 8 digits, to which 3 digits are added depending on the specialization in a medical domain.. ,</li> <li>• Medical Devices cfr other FOD project</li> <li>• Mandates</li> <li>• Nomenclatures (RIZIV/INAMI)</li> <li>• Terminology servers: see further other FOD project</li> <li>• ...</li> </ul>				
H13	<b>Terminology servers</b>	<p>Use the standard terminologies labeled as VAS - Validated Authentic Sources cfr eHealth - as to ensure data correctness and to enable semantic interoperability for communication (continuity of care), decision and administrative support systems (Chapter IV), secondary coding.</p> <p>Examples of VAS terminologies that an EPR may support:</p> <ul style="list-style-type: none"> <li>• CD-Kmehr, Snomed CT, LOINC, SAM CIVICS for medication, Cobrha for health care professionals and institutions</li> </ul> <p>Examples of secondary coding systems or classifications are RIZIV/INAMI, ICD-9-CM, ICD-10-WHO, ICD-O, ICD-10-CM/PCS, ICPC</p> <p>Employ standard terminologies (as VAS -Validated Authentic Source cfr e Health) as to ensure data correctness and to enable semantic interoperability (both within a hospital and externally as well and support decision support logic.</p> <ul style="list-style-type: none"> <li>•</li> </ul>	nnn	This requirement will be difficult to check as long as it is not decided which terminology server will be selected(FOD project); See Action 13 of the roadmap		*
H14	<b>Message Standards</b>	Internally as well as externally various standards may be supported in order to ensure maximum interoperability between various satellite		The most commonly used HL7		

	<p>systems or medical devices.</p> <p>For alphanumeric messages:</p> <p><b>-HL7</b> (version 2.0; 3.0) on an international level</p> <p><b>-HL7 CDA</b> Document Architecture</p> <p><b>-Kmehr</b> for exchange on a national level</p> <p><b>-IHE</b> as framework,</p> <p>IHE- XDS will use the concepts of document repositories and document registries. Distinct entities with separate responsibilities:</p> <p>The repository is responsible for storing documents in a transparent and persistent manner and responding to document retrieval requests.</p> <ul style="list-style-type: none"> <li>• The registry is responsible for storing information about the documents so that documents of interest for the care of a patient may be easily found, selected and retrieved irrespective of the repository where they are actually stored.</li> </ul>		<p>message types include:</p> <p>ACK – General acknowledgement</p> <p>ADT – Admit discharge transfer *</p> <p>BAR – Add/change billing account</p> <p>DFT – Detailed financial transaction *</p> <p>MDM – Medical document management</p> <p>MFN – Master files notification</p> <p>ORM – Order (Pharmacy/treatment)</p> <p>ORU – Observation result (Unsolicited)</p> <p>QRY – Query, original mode</p> <p>RAS – Pharmacy/treatment administration</p> <p>RDE – Pharmacy/treatment encoded order</p> <p>RGV – Pharmacy/treatment give</p> <p>SIU – Scheduling information unsolicited</p>		
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#### 4.2.4. Secondary Use of EPR (Clinical data warehouse)

Seq	Name	Description	Id-	Prty → Comment	1	2	3
M	<b>Clinical Data Warehouse</b>	<p><i>Clinical Data Warehouse (DW).</i></p> <p><i>To make a better use of information, better use of knowledge we need a clinical data warehouse. The aim is enterprise-wide repurposing and distribution of patient record data for research embracing the semantic interoperability gap to share data.</i></p>		Although the fact that a clinical data warehouse is not strictly a part of the EPR at least export facilities of clinical data should be possible to be used in a clinical data warehouse. The DW might be provided by a totally different vendor. Again, it has to be stressed that this secondary use of EPR will increase in importance the coming years to measure outcome and value (KPI).			
M1	<b>Clinical Data warehouse</b>	<p>We need to define two types of data mining, on one hand</p> <ul style="list-style-type: none"> <li>The more administrative oriented data ware house systems (known as BI business intelligence). Such systems provide current and predictive views (KPI) of business operations by means of a BI portal.</li> <li>On the other hand the second scope concerns a really medical oriented medical data ware house functioning as a tool enabling the basics for clinical trials, specific medical searches,</li> </ul> <p>The aim of a clinical data warehouse must respond to a number of</p>	<p>nnn</p> <p>nnn</p>			*	*

		<p>issues:</p> <ul style="list-style-type: none"> <li>• Integration of data from distributed and differently structured databases in order to perform comprehensive analyses.</li> <li>• Extraction of data from daily operational or transactional data needed for research.</li> <li>• Standardization of a model across systems. Codes must be the same as the codes used in the EPR (VAS -Validated Authentic Sources) and must be backwards compatible with ICD-9-CM (historical data on TCT).</li> <li>• Ease of use by end-users.</li> <li>• Reversible (pseudo)-anonymization with eHealth coding as Trusted Third Party</li> </ul>					*
M2	<b>Clinical Trials</b>	<p>Concerns the support of data capturing for Clinical trials, tests in medical research and drug development that generate safety and efficacy data (or more specifically, information about adverse drug reactions and adverse effects of other treatments) for health interventions (e.g., drugs, diagnostics, devices, therapy protocols).</p>	nnn				*
M3	<b>Clinical dashboards</b>	<p>Traditionally, dashboards present aggregated data to evaluate efficiency, quality, and cost of operations and are based on aggregation of data from the EPR and provides responsables within the hospital the information they need to evaluate costs (efficiency) and maintain high standards of quality of care.</p> <p>A Clinical Dashboard is a toolset developed to provide clinicians with the relevant and timely information (KPI) they need to inform daily decisions that improve quality of patient care.</p> <p>The toolset gives clinicians easy but controlled access to the wealth of data that is being stored in the clinical data warehouse. Data querying</p>	nnn				*

		should be done in the same coding system as used in the EMR and should be governed by the authorizations of the Privacy Commission.				
<b>M4</b>	<b>Policy issues</b>	<p>In order to insure the proper and correct use of data within the clinical data warehouse, one should embed the following features:</p> <ul style="list-style-type: none"> <li>• review requests for “ethical” appropriateness before allowing access;</li> <li>• archive and review all queries (generate audit trail);</li> <li>• define penalties for violating hospital established rules and ensure that sanctions are effectively executed;</li> <li>• anonymization of patient data;</li> <li>• Provide reporting facilities about data access.</li> </ul>	nnn			*
<b>M5</b>	<b>DW Query Tools</b>	<p>Selecting and reviewing patients for studies according to the authorizations of the Belgian Privacy Commission sector Health. Queries are population based, which means that the number returned from the initial query is the <i>number of patients</i> that fulfill the criteria you assigned.</p> <p>Integration of several data export and analysis tools</p>	nnn	DW=Data Warehouse		*
<b>M6</b>	<b>Accreditation</b>	<p>Hospitals should be places of safety, not only for patients but also for the staff and for the general public. Quality of hospitals and healthcare services is also of great interest to many other bodies, including governments.</p> <p>Many hospitals reported that they began preparations in relation to an accreditation process. Accreditation will definitely have an impact on the quality of EMR’s. Therefore it is desirable to know if EMR’s are used in accredited hospitals and support these accreditation processes. We need</p>		<p>e.g. in JCI : MCI (4<sup>th</sup> Edition)Chapter Addresses how well the hospital obtains, manages and uses information to provide, coordinate and integrate services. Principles of good information mgt apply to all methods.</p> <p>Other chapters AOP Assessment; ACC Discharge; COP Procedures;</p>		

	<p>to explore JCI's/NIAZ hospital standards for medical records, including intent and how they are evaluated on survey</p> <p>Accreditation schemes recognized as providers of national healthcare accreditation services used in Belgium include:</p> <ul style="list-style-type: none"> <li>• NIAZ–Qmentum (NIAZ) Netherlands Institute for Accreditation in Healthcare ) based in the Netherlands in combination with Canadian organization (Qmentum)</li> <li>• Joint Commission (JC) - based in the USA</li> <li>• Accréditation française (<i>Dr Thierry Klein</i>): <ul style="list-style-type: none"> <li>○ Développement de l'évaluation des pratiques professionnelles</li> <li>○ Programme d'amélioration de la qualité et de la sécurité des soins</li> <li>○ Déclaration des événements indésirables</li> <li>○ Maîtrise du risque infectieux</li> <li>○ Gestion des plaintes et des réclamations</li> <li>○ Prise en charge de la douleur</li> <li>○ Prise en charge et droits des patients en fin de vie</li> <li>○ Gestion du dossier du patient</li> <li>○ Accès du patient à son dossier</li> <li>○ Identification du patient à toutes les étapes de sa prise en charge</li> <li>○ Management de la qualité de la prise en charge médicamenteuse</li> <li>○ Prise en charge médicamenteuse</li> <li>○ Prise en charge des urgences et des soins non programmés</li> <li>○ Organisation du bloc opératoire</li> </ul> </li> </ul>		ASC Anesthesia			
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### 4.3. Generic Common Services

Seq	Name	Description	Id-#	Prty			
				1	2	3	
				→			
				Comment			
G	<b>Generic Common Services</b>	<i>Generic Common Services are components responsible for supporting the generic functionality and information requirements that are non-specific to the healthcare domain, and may be broadly relevant to any information system</i>					
G1	<b>Multihospital EPR feature</b>	<p>Concerns possibilities to connect different hospitals to one physical EPR system having in mind that the data and functionalities may include different models.</p> <p>For each participating hospital :</p> <ul style="list-style-type: none"> <li>- Data and functionality are completely (on a logical level) isolated from another, or</li> <li>- Data and functionality may be shared.</li> </ul> <p>This can be implemented by a combination of SaaS, Paas, IaaS</p> <p>See hereafter</p>	nnn	<p>Small hospitals organized in a multihospital systems will have a significantly higher EPR level compared with independent hospitals.</p> <p>They have an advantage over small independent hospitals in HIT capacity possibly because of the greater availability of capital, access to shared HIT capacity, and other resources including technical expertise.</p> <p>Small and independent hospitals (even bigger in size) are often struggling to improve their HIT capacity. In addition, this makes it easier to really share medical data.</p>			

<b>G2</b>	<b>EPR Service models</b>	<p>Concerns the features that a hospital's EPR software and corresponding data can be hosted elsewhere outside on a server by an EPR company or another hospital.</p> <p>According to the NIST, this may include three fundamental service models :</p> <p><b>(1) Software as a Service (SaaS)</b></p> <p>The applications (e.g. EMR) are hosted by a cloud service provider and made available to users over the Internet. The user does not control either the underlying infrastructure or platform.</p> <p><b>(2) Platform as a Service (PaaS)</b></p> <p>The application development resources (hardware, operation system, programming languages, toolkits) are hosted in the Cloud. The PaaS user can use the services to develop higher- level applications and host them on the platform to serve its end-users.</p> <p><b>(3) Infrastructure as a Service (IaaS)</b></p> <p>The capability provided to the IaaS user is storage, networks, and other fundamental computing resources where the user can run and execute an operation system (OS), applications, or any software that they choose. However, the user is not able to manage or control the cloud infrastructure but has control over OS, applications, storage, and selected networking components (e.g. firewalls)</p>	nnn	See also above multi-hospital			
<b>G3</b>	<b>Communication with Medical</b>	Support communication (and presentation) of data captured from medical devices and other software artefacts with the EPR system.	nnn			*	

	<b>Devices</b>	A communication server is deployed to control the intense data traffic (. If device-related software is used in combination with the EPR, (there must be provisions to check that the device software is open on the right patient)..					
<b>G4</b>	<b>Manage user accounts &amp; information</b>	<p>Use information from the user access management of eHealth ( Cobrah) (the authentic source for user and provider information including).</p> <ul style="list-style-type: none"> <li>o demographic data,</li> <li>o credentials,</li> <li>o certifications, (RIZIV/INAMI Id) -OG-#</li> <li>o Any other information that to be used to verify the levels of access in accordance with the relevant medico-legal laws.</li> </ul> <p>Essential to guarantee the interoperability and consistency within the EPR and across external systems (locations).</p>	nnn	Cfr. AD Registry		*	
<b>G5</b>	<b>Protect and safeguard electronic health information created</b>	EMR technology designed to locally store electronic health information on end-user devices must encrypt the electronic health information stored on such devices after of EPR software on those devices is not used anymore.	nnn			*	
<b>G6</b>	<b>Secure electronic messaging</b>	<p>Usage of secure electronic messaging to communicate with patients on relevant health information</p> <p><i>eHbox</i>: The system must be able to communicate over the ehealthBox The eHealthBox Consultation Web Service allows an authenticated user to consult information about the content associated with his eHealthBox. A user can get general information on his eHealthBox, a list of messages for a specific folder and the content of a specific message. He can also move a message to his inbox.</p> <p>It has to be stressed that the EH-box functionality could be used by the</p>	nnn			*	

		patient for a safe communication with HC providers for specific sensitive messages				
G7	<b>Workflow Management Defining workflows</b>	<p>Workflow systems are being installed in EPR systems to give clients more-explicit control over medical processes when compared to the current practice of EMR' s mostly embedding those processes in application code.</p> <p>The ability to provide "generic" workflow management functions using workflow-related rules to support:</p> <ul style="list-style-type: none"> <li>• the flow of work assignments parallel and serial task distribution</li> <li>• the management and set up of work queues,</li> <li>• distribution of information to and from internal and external parties;</li> <li>• notification and task routing based on system triggers; and</li> <li>• initiating corresponding order sets and input screens depending on the patients pathology</li> <li>• Support for escalations and redirection</li> </ul> <p>All this gives more flexibility and efficiency by means of reusability.</p>	nnn			*
G8	<b>Hospital-wide Authentication</b>	<p>Enterprise-wide authentication, wherein users may authenticate once and subsequently have access to all relevant systems in an enterprise. The EPR must authenticate users and/or other software artifacts before allowing access to an EMR.</p> <p>Examples of authentication include:</p> <ul style="list-style-type: none"> <li>- username &amp; password</li> <li>- digital certificate</li> <li>- Strong authentication in the form of "hardware tokens."</li> <li>- biometrics</li> </ul>	nnn	It belongs to the autonomy of every hospital to decide what technology is most appropriate.		*

G9	<b>Authorization</b>	<p>Authorization defines the access policy to the EPR .The system uses access control rules to decide whether access requests from (authenticated) users shall be approved (granted) or disapproved (rejected). Access validation, where both transactions and content detail are controlled according to their :</p> <ul style="list-style-type: none"> <li>• role</li> <li>• identity,</li> <li>• work-assignment,</li> <li>• location and/or the</li> <li>• patient’s present condition and the</li> <li>• EPR user’s scope of practice within a legal jurisdiction.</li> </ul> <p>There are 3 types of authorization available:</p> <p>- <b>User based authorization</b> refers to the permissions granted or denied based on the identity of an individual.</p> <p>- <b>Role based authorization</b> refers to the responsibility or function performed in a particular operation or process.</p> <p>- <b>Context-based Authorization</b> like defined by ISO 10181-3 Technical Framework for Access Control Standard as security-relevant properties of the context in which an access request occurs, explicitly time, location, route of access, and quality of authentication.</p>	nnn		*	
G10	<b>Patient access management</b>	<p>Enable the enforcement of patients’ privacy and confidentiality of their EPR, by giving them the right to control access of providers to their medical data</p> <p>A patient has the right to view his or her EPR validated data and the right to place restrictions (by means of the “therapeutic relationship”</p>	nnn	Patient privacy & confidentiality	*	

		mechanism) on who can view parts or the whole of his EMR					
G11	<b>Nonrepudiation</b>	<p>Non-repudiation refers to the inability to deny participation in information processing.</p> <p>More concretely, a user must not be able to deny (repudiate) sending or receiving of information, or authorization of an act using the EPR.</p> <p>Nonrepudiation can be achieved through the use of a:</p> <ul style="list-style-type: none"> <li>- Digital signature.</li> <li>- Timestamp, which proves that a document existed at a certain date and time.</li> </ul>	nnn			*	
G12	<b>Audit trail management</b>	The EPR must provide audit trail functionality indicating the origin, the author, and the date and time at which a record was created, modified, viewed, extracted, or deleted. Furthermore, it provides the opportunity to verify that data integrity, security, and access-control rules were not violated.	nnn			*	
G13	<b>Electronic signature</b>	<p>Only specific parts or acts within the electronic medical record can be signed.</p> <p>Therefore, integration with electronic TTS service of the e health platform to legally sign every version of a particular document may be desirable.</p> <p>Every data entry in the EPR must be identified by his author. In case a transcriptionist transcribe an author's notes a physician must attest to the accuracy of another's statement of events.</p>	nnn			*	

G14	<b>Trusted Time Stamping</b>	<p>Trusted time stamping is the process of securely keeping track of the creation and modification time of a whole record or parts of a record. Security here means that no one — not even the owner of the record — is able to change the data without this being detected by checking with the original timestamp.</p> <p>Therefore, integration with electronic TTS service of the e health platform to trace every version of a particular document is desirable.</p>	nnn		*	
G15	<b>Traceability in healthcare</b>	<p>In the health it is necessary to trace objects for patient safety and as a mean to improve efficiency of the logistics of care and a way to better understand costs and usage of resources. The challenge for this Process is to agree on generic healthcare requirements and on a common way to describe the traceability process irrespective of these differences. The GS1 Global Traceability Standard for Healthcare remains a high level description of the process enabling and promoting supply chain collaboration but allowing each organization to design its traceability system in terms of breadth, depth and precision to support its own business objective(s). This process standard is applicable to all types and sizes of organizations in any part of the extended healthcare supply chain. The GS1 Global Traceability Standard for Healthcare includes:</p> <ul style="list-style-type: none"> <li>• Identification of parties, items and events</li> <li>• Labeling and/or marking and/or tagging of Traceable Items</li> <li>• The nature and type of data to be captured and collected</li> <li>• Record keeping including archiving / data storage</li> </ul> <p>Communication and sharing of information (Information can be shown at the physical level of packaging labels and printed bar-codes or captured</p>	nnn		*	

and recorded at a data management level and communicated using e-business messaging, e.g. EDI.)

- Links identification and management
- Retrieval / search of information (The ability to track and trace a traceable item from creation to the point of sale (POS), dispensing, use or destruction, e.g. using EPCIS)

For example the following products must be within the scope of a traceability system:

- drugs , pharmaceutical product, e.g. an Active Pharmaceutical Ingredient (API)
- human surgical implantation, e.g. a pacemaker
- blood derivatives
- prosthesis (such as mammary implants) ,
- Medical instruments (endoscope...),
- disposables,
- nutrition DB
- bio bank
- tissue-bank
- ...

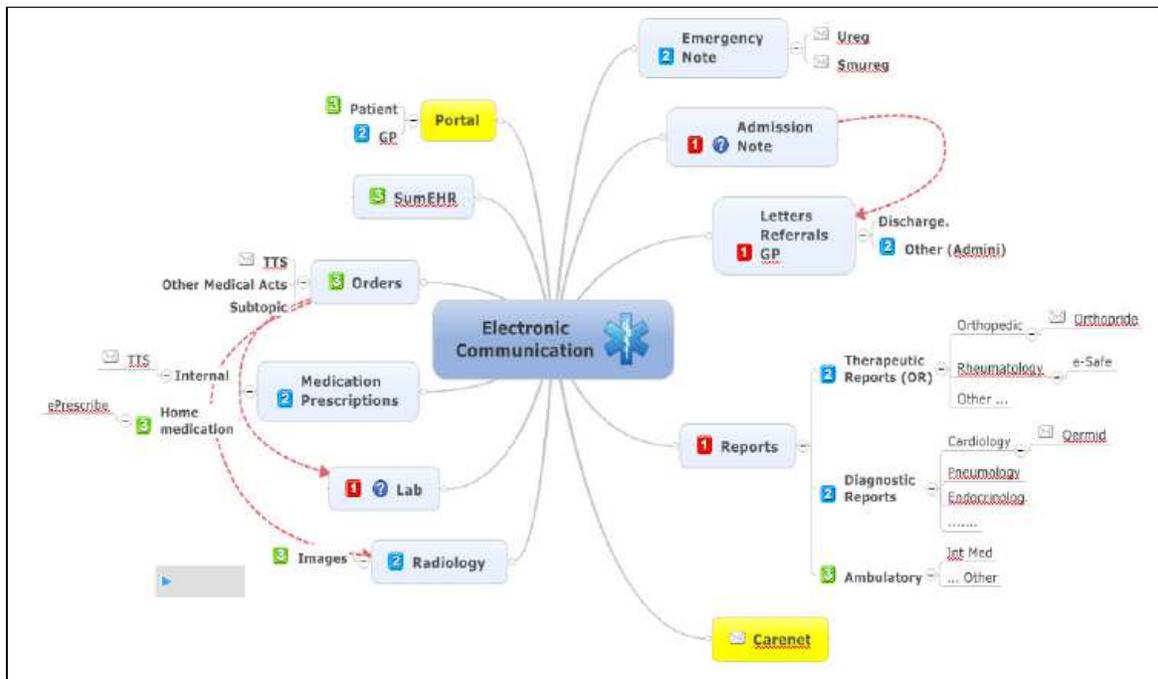
Any trade item and logistic unit, e.g., an infusion pump

Traceability data includes information about :

- Who? Party [Identification + data elements]
- Where? Location [Identification + data elements]
- When? Date / Time
- What? Traceable item [Identification + data elements]
- What happened? Process or event [Identification + data elements]

		The unique Id of the device (UDI or EAN) should be scanned and linked to the high level definition of the object (eg Snomed-code for procedure or device) in the EPR of the patient.				
G16	<b>HIMSS Analytics Staging</b>	<p>OPTIONAL INDICATOR. The EPR <b>Adoption Mode</b> (EMRAM) identifies and scores hospitals using an 8 steps scale that charts the path to a fully paperless environment.</p> <p><b>Stage 7:</b> patient record fully electronic:. CDO able to contribute to EHR as byproduct of EPR.</p> <p><b>Stage 6:</b> Physician documentation (structured templates),full CDSS (variance &amp; compliance), full R-PACS</p> <p><b>Stage 5 :</b>Closed loop medication administration,</p> <p><b>Stage 4 :</b>CPOE, CDSS (clinical protocols)</p>		<p>HIIMSS Analytics created the Electronic patient record Adoption Model (EMRAM) to provide a methodology for evaluating the progress and impact of electronic patient record(EMR) systems for acute care delivery environments. The introduction of the EMRAM by white paper in 2005 and the subsequent research update in 2006, has led HIMSS Analytics to extend the EMRAM research to correlations with quality of care. Continuing research will evaluate the impact of the EMRAM on financial components of acute care</p>		<p>*</p> <p>*</p> <p>*</p> <p>*</p>

		<p><b>Stage 3:</b> Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</p> <p><b>Stage 2 :</b>CDR, CMV, CDSS inference engine, may have Document Imagine</p> <p><b>Stage 1:</b> Ancillaries: Lab, Radiology, Pharmacy</p> <p><b>Stage 0 :</b> None of the three ancillaries installed</p>		delivery environments.	*		
G17	E-learning	E-learning module within the EPR includes numerous types of media that deliver text, audio, images, animation, and streaming video, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. Information and communication systems.			*		



**Figure 5:** High Level View of EPR related communication entities, following priorities of implementation.

### 5. High Level View of EPR Related Information Concepts. (Exemplary)

Based on the CENTC251/HISAS standard a high level information model is enclosed (Figure 6) hereafter that provides a guideline how various high level objects are interlinked and could be interrelated with each other. This is not mandatory but can serve as a guideline to align ideas.

It identifies the most generic components of a clinical information /EMR system:

- Activities
- Orders (demands for care)
- Patients (generic subject of care)
- Resources
- Planning Agenda
- Contact/encounter
- Clinical Information
- Type of Plan (Protocol, Care Plan)
- Agents (Health Care providers)
- Patient Care Plan



## **Annexe 1: Acronyms**

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<b>ADT</b>	<b>Admission, discharge and transfer system</b>
<b>ADE</b>	<b>Adverse Drug Event</b>
<b>CDA</b>	<b>Clinical Document Architecture</b>
<b>CDO</b>	<b>Care delivery organization</b>
<b>CDR</b>	<b>Clinical Data Repository</b>
<b>CDSS</b>	<b>Clinical Decision Support System</b>
<b>CIO</b>	<b>Chief Information Officer</b>
<b>CIS</b>	<b>Clinical Information System</b>
<b>CMV</b>	<b>Controlled Medical Vocabulary</b>
<b>CPOE</b>	<b>Computerized Physician Order Entry</b>
<b>CSO</b>	<b>Chief security officer</b>
<b>DICOM</b>	<b>Digital Image Communication Standard</b>
<b>DNR</b>	<b>Do Not Resuscitate</b>
<b>DW</b>	<b>Data Warehouse</b>
<b>EHR</b>	<b>Electronic Health Record</b>
<b>EMPI</b>	<b>Enterprise master person index</b>
<b>EMR</b>	<b>Electronic Medical Record</b>
<b>EMRAM</b>	<b>Electronic Medical Record Adoption Model</b>
<b>EPR</b>	<b>Electronic Patient Record</b>
<b>e-Health</b>	<b>e-Health</b>
<b>HIE</b>	<b>Health Information Exchange</b>
<b>HIPAA</b>	<b>Health Insurance Portability and Accountability Act</b>
<b>HIS</b>	<b>Hospital Information System</b>
<b>HL7</b>	<b>Health Level 7</b>
<b>H&amp;P</b>	<b>Historical and Physical Integrated delivery system</b>
<b>ICU</b>	<b>Intensive Care Unit</b>
<b>IHE</b>	<b>Integrating the Healthcare Enterprise</b>
<b>KPI</b>	<b>Key Performance Indicator</b>
<b>LIS</b>	<b>Laboratory Information System</b>
<b>OR</b>	<b>Operating Room</b>
<b>PACS</b>	<b>Picture Archiving and Communication System</b>
<b>PDA</b>	<b>Personal digital assistant</b>
<b>PHR</b>	<b>Personal health record</b>
<b>POE</b>	<b>Physician Order Entry</b>
<b>RHIO</b>	<b>Regional Health Information</b>
<b>ROS</b>	<b>Review of Systems</b>
<b>RIS</b>	<b>Radiological Information System</b>
<b>SOAP</b>	<b>Subjective Objective Assessment</b>



## ***Annex 2: List of Specialized Disease Registries.***

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1. Ambulatory Care Health Information Lab (RIZIV-INAMI)
2. Annual Hospital Statistics (FOD-SPF)
3. Antwerpen registry of congenital anomalies (EUROCAT)
4. Belgian Abortion Registry (FOD-SPF)
5. Belgian AIDS-reference centres (WIV-ISP)
6. Belgian AIDS-reference laboratories (WIV-ISP)
7. Belgian alpha-1 antitrypsin deficiency registry (Alpha One International Registry (AIR))
8. Belgian Association for Cardio-Thoracic Surgery Database
9. Belgian Cancer Register: Standard version (Belgian Cancer Registry)
10. Belgian Cystic Fibrosis registry (WIV-ISP)
11. Belgian Early Warning System for Drugs (WIV-ISP)
12. Belgian familial adenomatous polyposis registry
13. Belgian Langerhans cell histiocytosis registry (LCH)
14. Belgian Neuromuscular Disease Registry (WIV-ISP)
15. Belgian patient database for Wilson disease (EuroWilson registry)
16. Belgian Patient registry for rare bleeding disorders
17. Belgian Pediatricians Nephrology Registry (BPNR)
18. Belgian Register for Assisted Procreation (National College of Physicians in Reproductive Medicine)
19. Belgian Register Substitution Treatment (FAGG-AFMPS)
20. Belgian registry of primary immunodeficiencies (ESID European registry)
21. Belgian registry on acromegaly, epidemiology and quality of care (ACROBEL)
22. Belgian severe chronic neutropenia patient registry (SCN international registry (SCNIR))
23. Belgian sickle cell anemia registry
24. Belgian Systemic Sclerosis Cohort
25. Belgian Virtual Tumourbank (Belgian Cancer Registry)
26. Belgian Treatment Demand Indicator Register (WIV-ISP)
27. BINC: Begeleiding in cijfers
28. Biobank of the pediatric granulomatous arthritis international registry (University Hospitals Leuven)
29. Birth Register (VAZG, Observatbru, DGOPLASS, ADSEI)
30. Central Register of Rare Diseases (WIV-ISP)
31. Database Farmanet (IMA-AIM)
32. Database Health Care (IMA-AIM)
33. Database Population (IMA-AIM)
34. Database Palliative care (Federation Palliative Care Flanders)
35. Declaration of Infectious Diseases (MATRA, WIV-ISP)
36. Drug Related Infectious Diseases (WIV-ISP)
37. EFFectiveness of Endometrial Cancer Treatment (EFFECT) (Belgian Cancer Registry)
38. End of career measures (FOD-SPF)
39. Electronic Patient Registration Centers Mental Health Care Flanders
40. European alternating hemiplegia and rare epilepsies registry in childhood (ENRAH)
41. European Antimicrobial Resistance Surveillance Network (WIV-ISP)
42. European network for the study of orphan nephropathies registry (EUNEFRON)
43. European patient registry and cohort for congenital disorders of glycosylation (EUROGLYCANET)
44. European Point Prevalence Survey (PPS AB & HAI; WIV-ISP)
45. European registry of human alveolar echinococcosis: Belgium (EURECHINOREG)

46. European Surveillance of Antimicrobial Consumption (ESAC-Net; WIV-ISP)
47. Flemish Renal Registry (NBVN)
48. Haemoglobinopathies - database
49. Hand hygiene (WIV-ISP)
50. Head and Neck: orofarynxcarcinomen Project (Belgian Cancer Registry)
51. Healthcare Associated Infections & Antimicrobial Use in European Long Term Care Facilities(WIV-ISP)
52. Hospital Financing (FINHOSTA, FOD-SPF)
53. Infectious diseases (sentinel laboratories) (WIV-ISP)
54. Informatiestroom tussen de ziekenhuizen en de administratie gezondheidszorg (VAZG)
55. Initiative for Quality improvement and Epidemiology in Diabetic Foot clinics (WIV-ISP)
56. Initiative for Quality promotion and Epidemiology in Diabetes care (WIV-ISP)
57. Initiative for Quality promotion and Epidemiology in Diabetes care for children and adolescents (WIV-ISP)
58. Integrated Computerized Network, INTEGO
59. Medical Emergency Services: MUGREG (FOD-SPF)
60. Minimum Hospital Data (FOD-SPF)
61. Minimum Psychiatric Data (FOD-SPF)
62. MIRAGE database (IKAROS; Kind & Gezin)
63. Mortality Register (VAZG, Observatbru, DGOPLASS, ADSEI)
64. National Surveillance of Antimicrobial Use in Belgian Hospitals (WIV-ISP)
65. National Surveillance of Healthcare Associated Infections in Intensive Care Units (WIV-ISP)
66. National Surveillance of Influenza (WIV-ISP)
67. National Surveillance of Meticillin resistant Staphylococcus aureus (MRSA) in Belgian hospitals(WIV-ISP)
68. National surveillance of multi-resistant micro-organisms in Belgian hospitals (WIV-ISP)
69. National Surveillance of Septicemia in the Hospital (WIV-ISP)
70. National Surveillance of Surgical Site Infections (WIV-ISP)
71. Netoverschrijdend ICT-project van de CLB's in samenwerking met het departement Onderwijs(VAZG)
72. Newborn college Register
73. ORTHOpedic Prosthesis Identification Data (RIZIV-INAMI)
74. Pediatric granulomatous arthritis international registry
75. Permanent Sample (IMA-AIM)
76. PROCARE (Belgian Cancer Registry)
77. Prospective collection of tissue, ascites and plasma samples from patients with ovarian cancer(University Hospitals Leuven)
78. Qermid©Coronaire stents (RIZIV-INAMI)
79. Qermid©Endoprothesen (RIZIV-INAMI)
80. Qermid©Hartdefibrillatoren (RIZIV-INAMI)
81. Qermid©Pacemakers (RIZIV-INAMI)
82. Quality Indicators Healthcare Associated Infections (WIV-ISP)
83. Register POMALYST (Celgene)
84. Register REVLIMID (Celgene)
85. Register THALOMID (Celgene)
86. Rest/care homes (FOD-SPF)
87. Robot Assisted Laparoscopic Prostatectomie (RALP) (Belgian Cancer Registry)
88. Sentinel General Practitioners (WIV-ISP)
89. Sexually transmitted infection (sentinel surveillance) (WIV-ISP)
90. Shared Arthritis File for Electronic use (RIZIV-INAMI)

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