The Core Process of an healthcare organisation

Core Process characteristics:

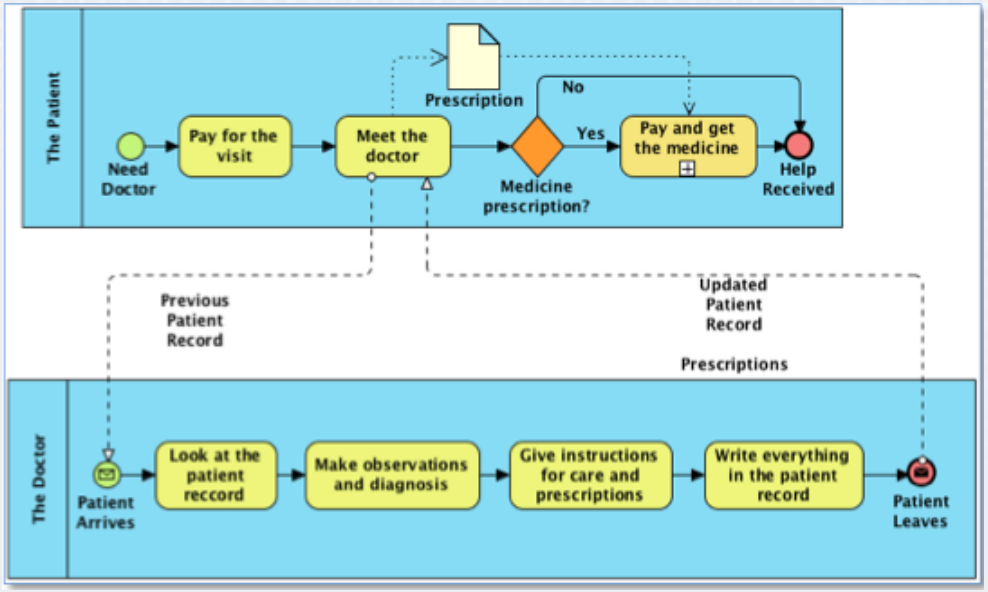
- The doctor´s process gives a service to the patient

- Volumes in “Happy Hospital”
  - 1000 visits/day
  - 600 beds
  - 10 000 employees

⇒ Thus, how to improve the existing AS-IS model??

⇒ There are several ways to improve the efficiencies of the above model?

⇒ Developed improved processes results into a TO-BE model



Business Process Modelling Method steps

1. Define Process Scope
2. Create the Top Level diagram for the Happy Path
3. Add top-level exception paths
4. Expand sub-processes to show detail at child level
5. Add intermediate message flows to external pools

Discovering the Processes

- Identify core processes
- Identify support processes?

- Then, in Service orientation
  - Consider possible Support Processes, by giving support services to the core processes, where possible

What to improve? Process Orientation

- Clinical Process?
- Scheduling Process?
- Financial Process?
- Pharmacy Process?
- Other Processes?
- Health Record Management Process?
  - As-Is: Health Records are written in the Medical Book owned by the patient.
  - To-Be: (vs Medical Record)?

What to improve? Process Orientation

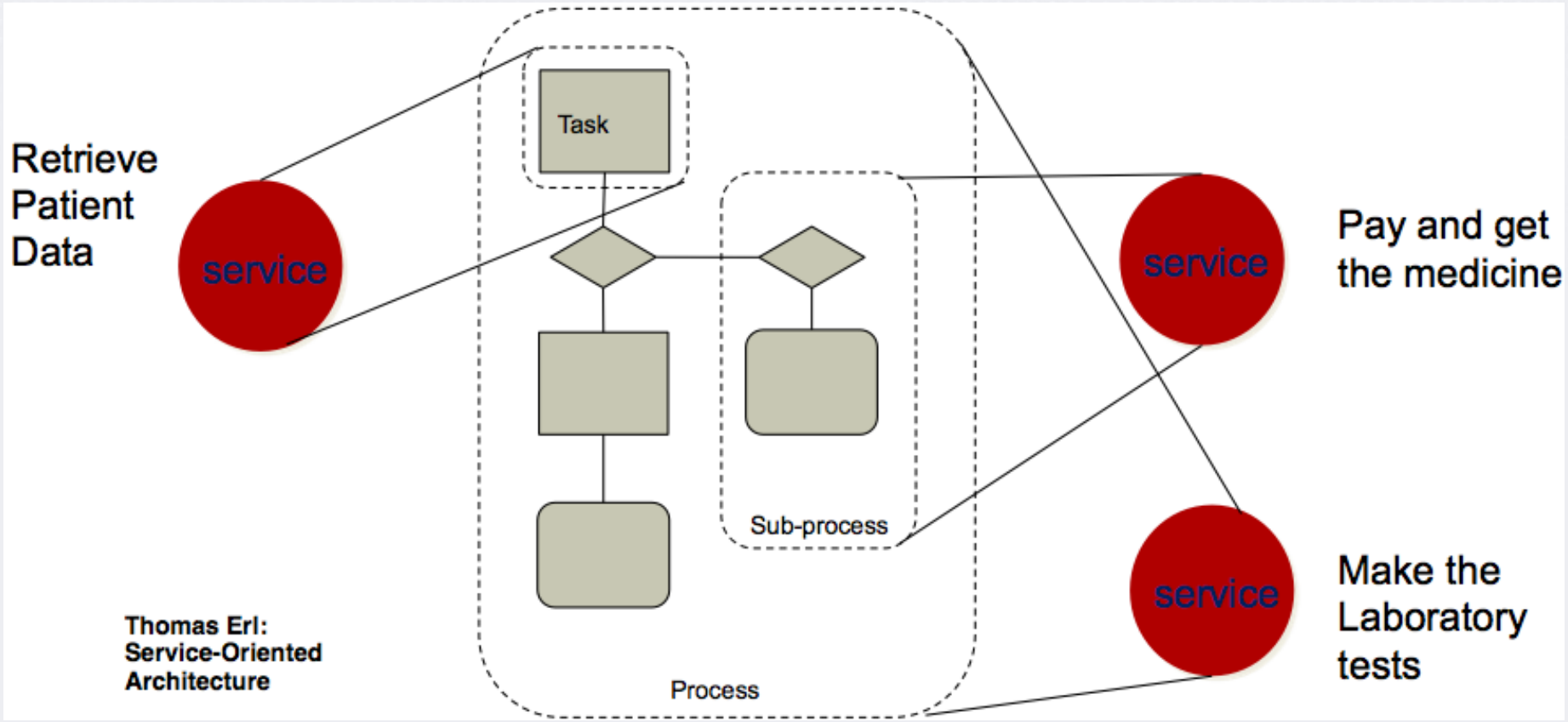
- Business Processes are composed of business services
  - Examples: Payment service, Patient record service

- Business Services are **reusable components** which can be used in many business processes
- Business Services can be implemented using software components, often web services

- The **Benefits** of using **reusable** components or Services
  - Cost savings: Build once, use many times
  - Time savings: Use ready components instead of building from scratch
  - Risk management: Using ready components helps to control the risks

Discovering services

A service can be a task, a sub-process or a process



From As-Is to To-Be process

- Discussion about services
  - How to identify services
  - Service-Oriented-Architecture (SOA) Principles

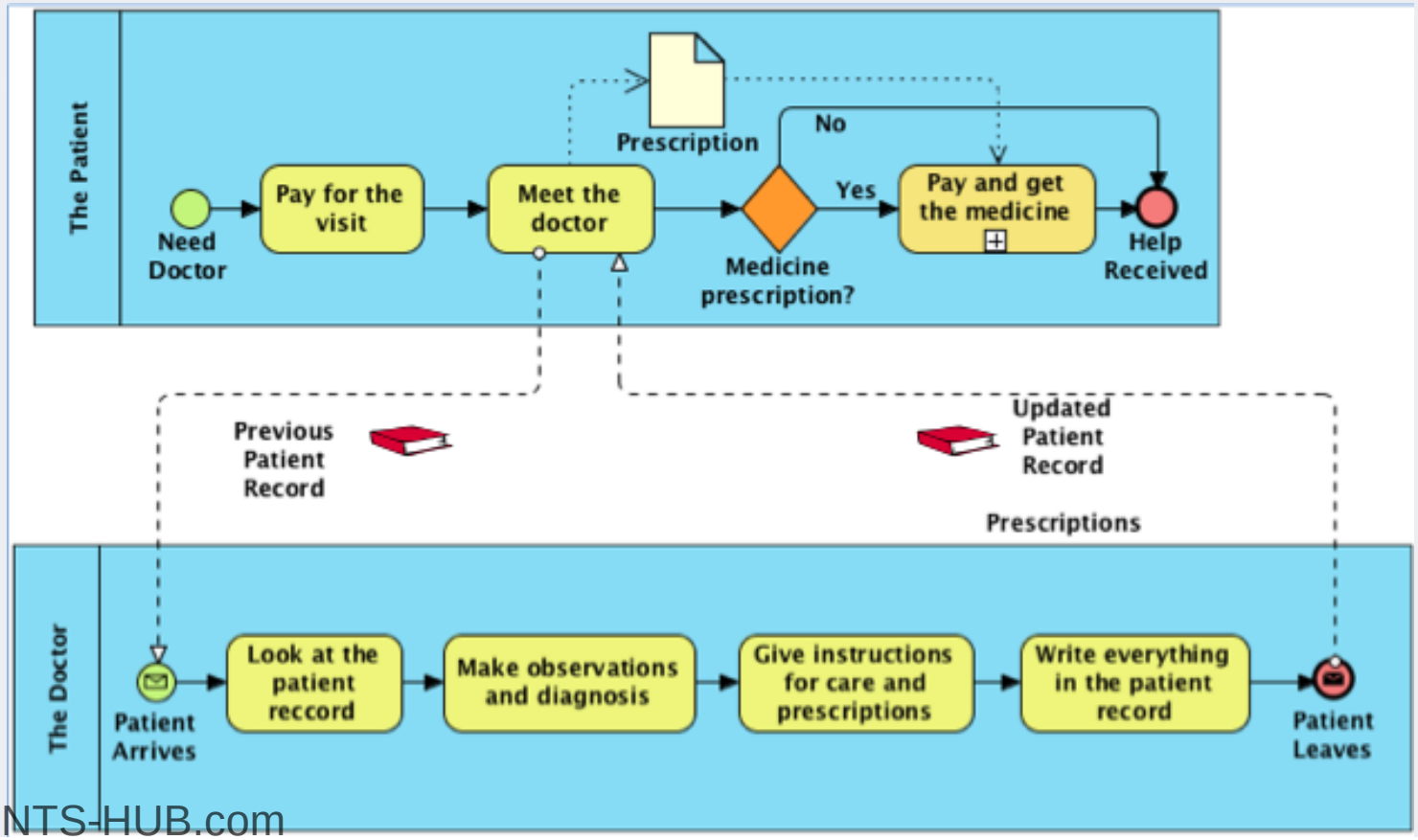
- How processes and services could be identified?
  - Data-oriented services (e.g. patient record)
  - Function-oriented services (e.g. laboratory)
  - Process-oriented services (e.g. the doctors workstation)
  - Notification-oriented services (if there are any?..)

Data-oriented: e.g. The Patient Record and the Doctor

As-Is: Health Records are written in the Medical Book (vs Medical Record) owned by the patient.

=> Patient-dependent solution

- Have a physical record/book- the patient owns and keeps the record
- Problems: A patient Medical book (or record) can be in one place only.
  - Other problems?

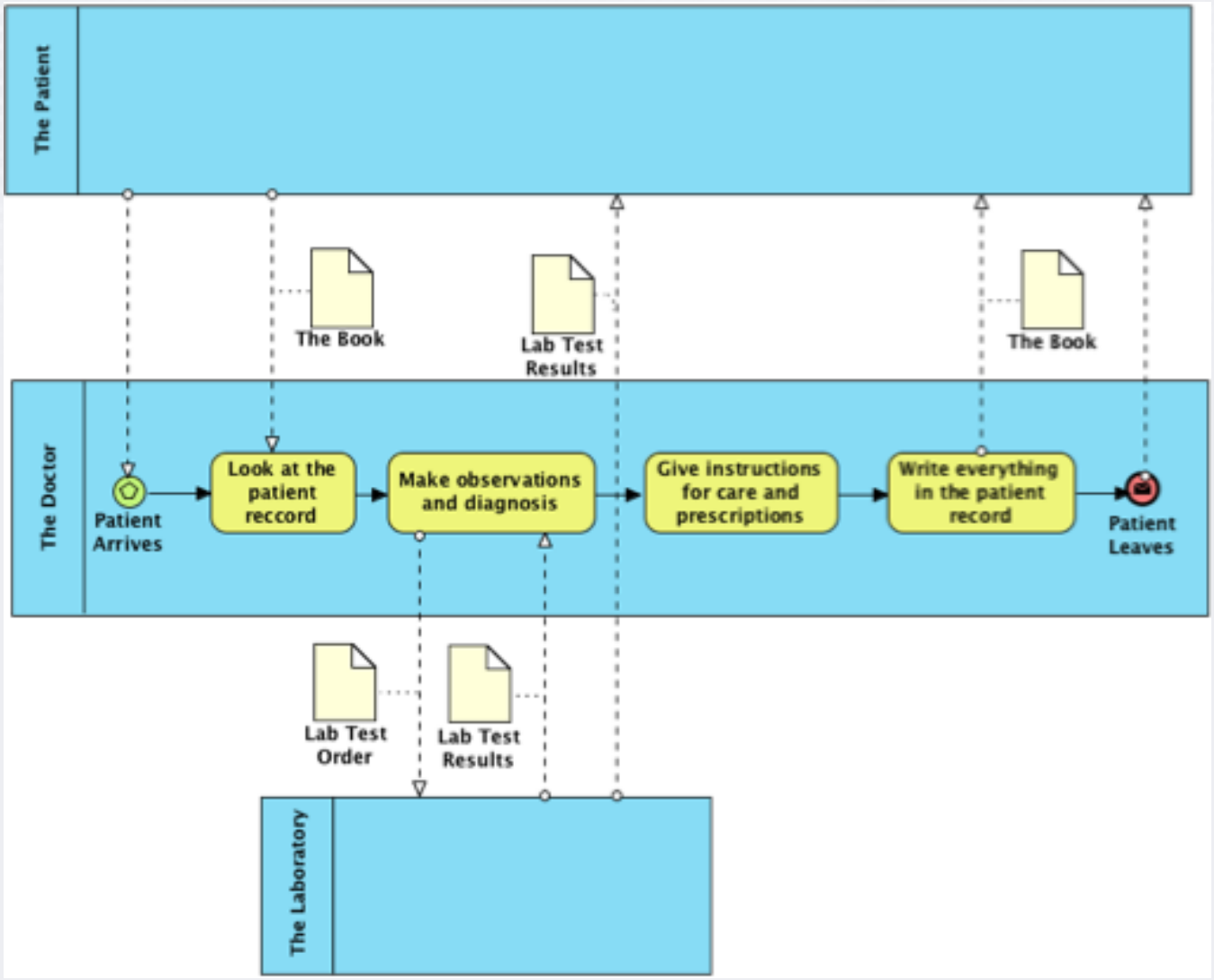


Ideas for improvement regarding Patient Health Record

- Electronic Health Record?
- Discussion and collection of improvement ideas
  - What problems could it solve?
    - The patient could forget the paper book at home or lose it
    - The doctor has a bad handwriting
    - The laboratory results and other documents are on separate papers
  - What other opportunities EHR would give
    - The hospitals could share the patient records
- Other requirements
  - Privacy, Confidentiality, Authenticity and other security aspects
  - Support to other processes: Scheduling, Financial, etc...
  - Availability, Usability, Performance

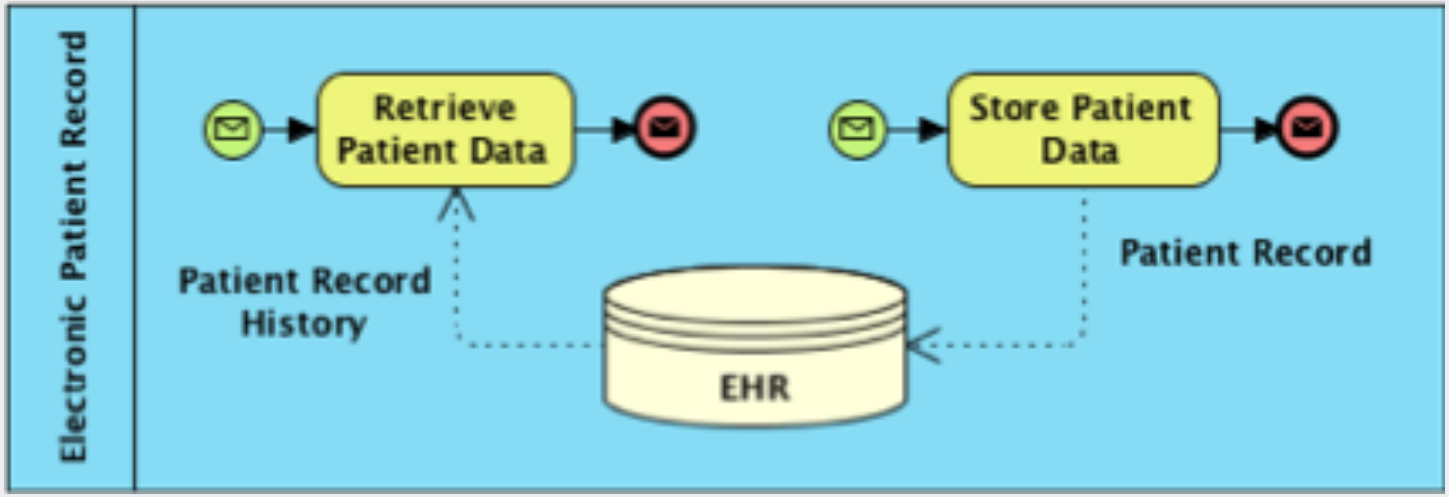
Function-oriented: e.g. Laboratory included as a business service

- The Laboratory orders and results are on a separate paper form
- The doctor receives the results
- The patient pays for the laboratory and receives the results



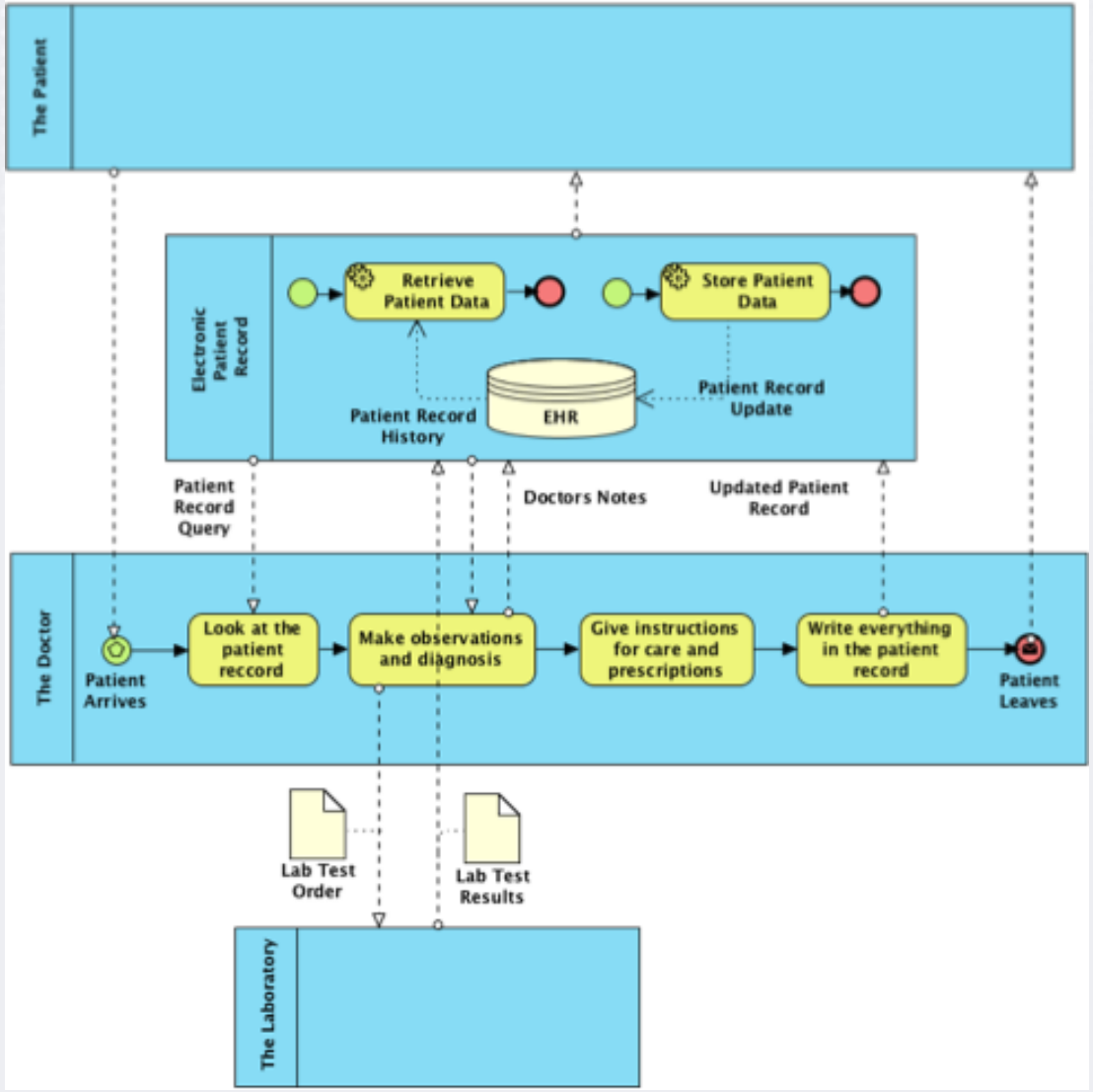
Function-oriented: e.g. Electronic Health Record as a service

- EHR could store all the doctors notes in a similar way as the patient record book
- It could store also the lab results and other information
- It could be accessible for the doctor and other professionals when needed
- It could also be accessible within the hospital and also outside the hospital at regional level
- It must guarantee the privacy, confidentiality and authenticity of the notes



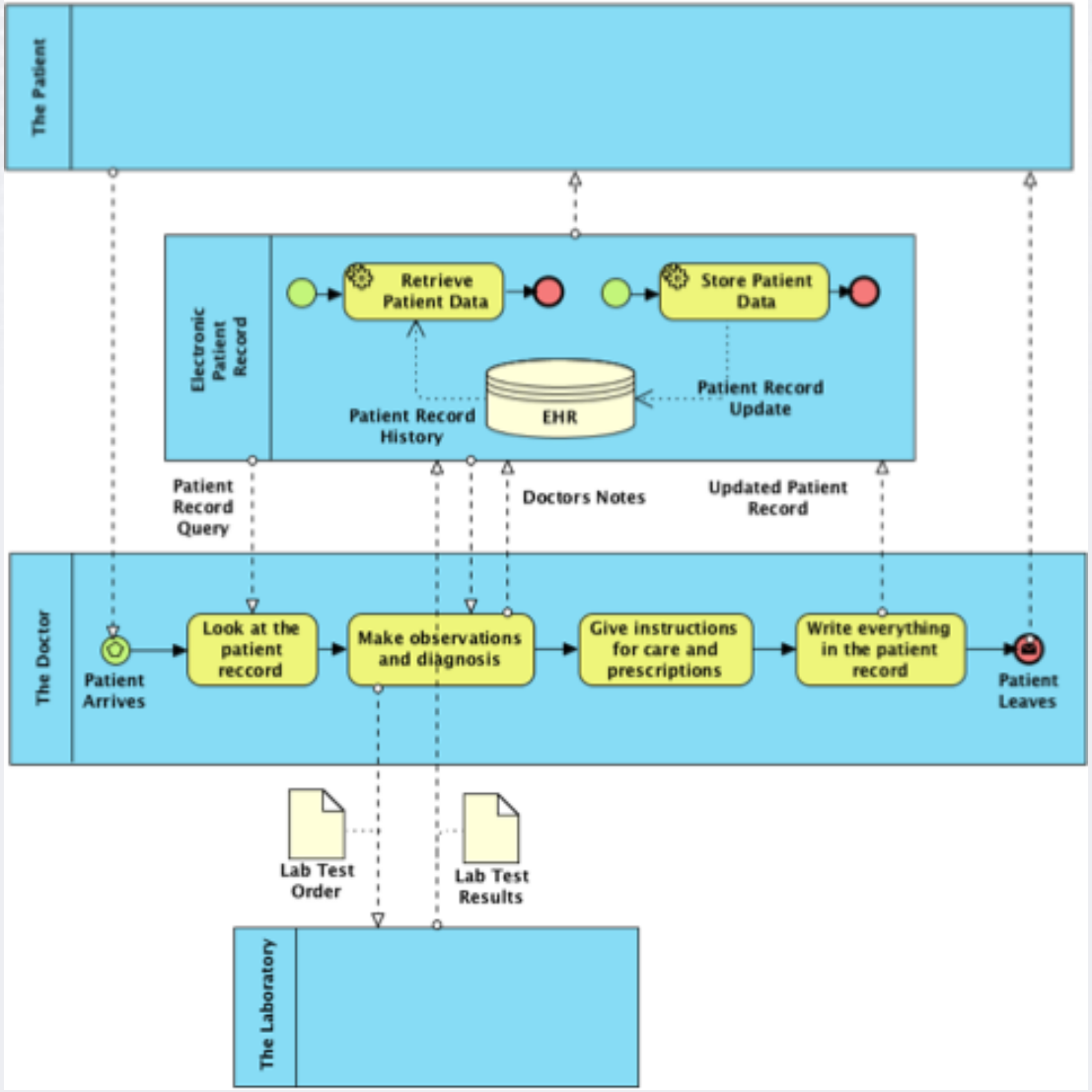
How EHR service could be used?

- The doctor would start looking at the patient´s EHR
- The lab results would be collected into the EHR
- The doctor would write all notes into the EHR
- The patient would get a paper copy or could also look at the EHR



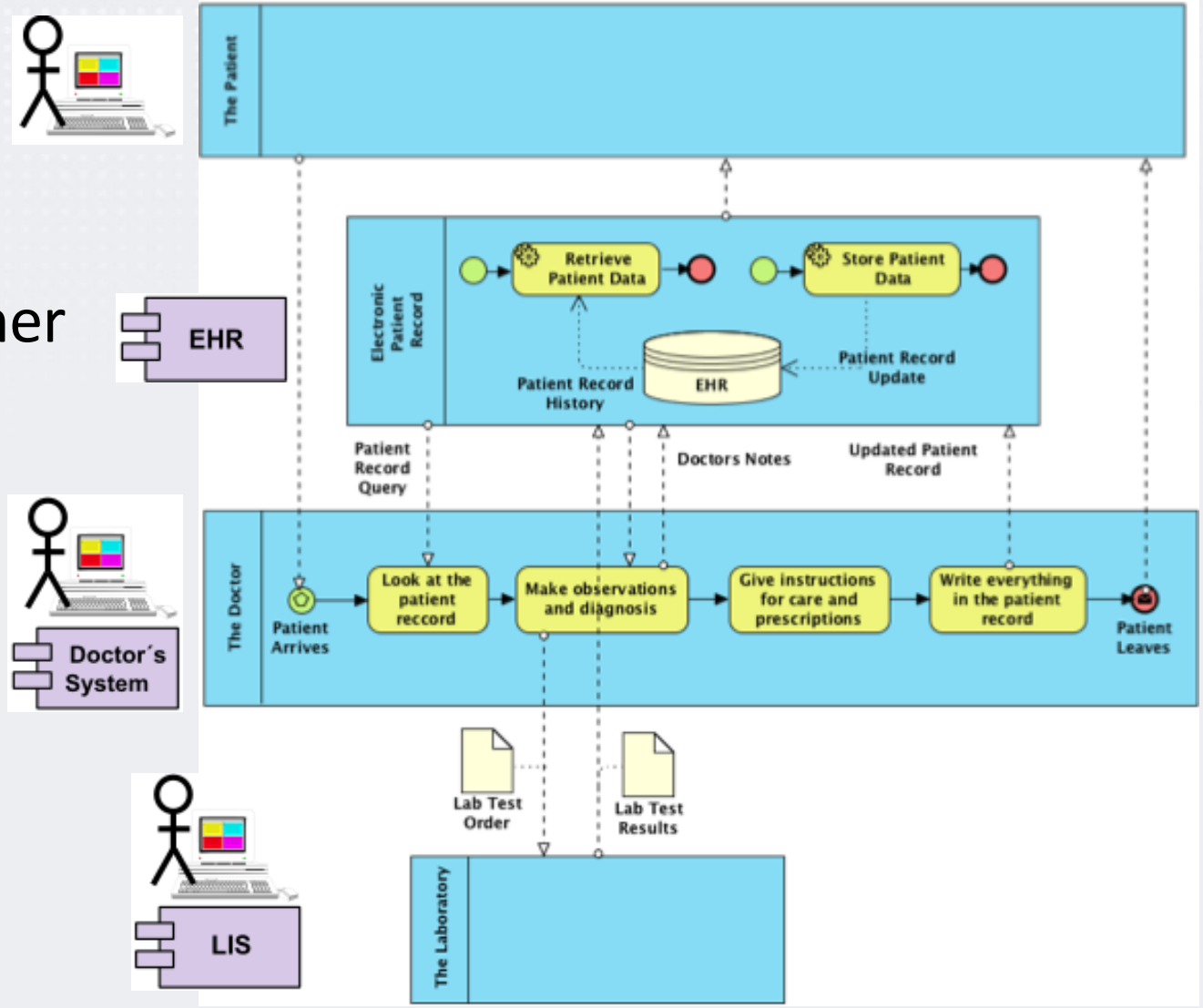
How EHR could be implemented?

- Standalone System



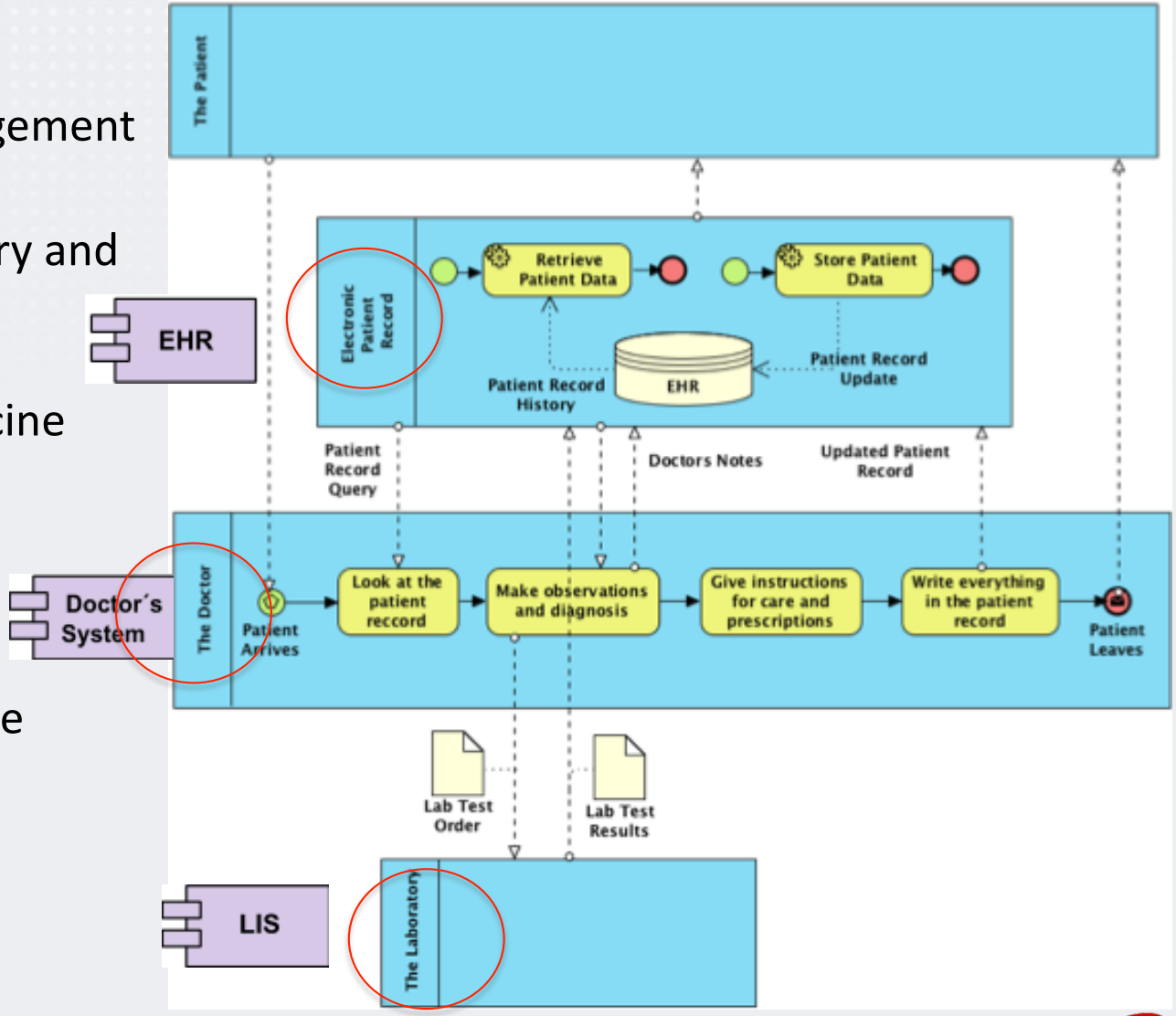
How EHR could be implemented?

- An application service which would offer services to other applications



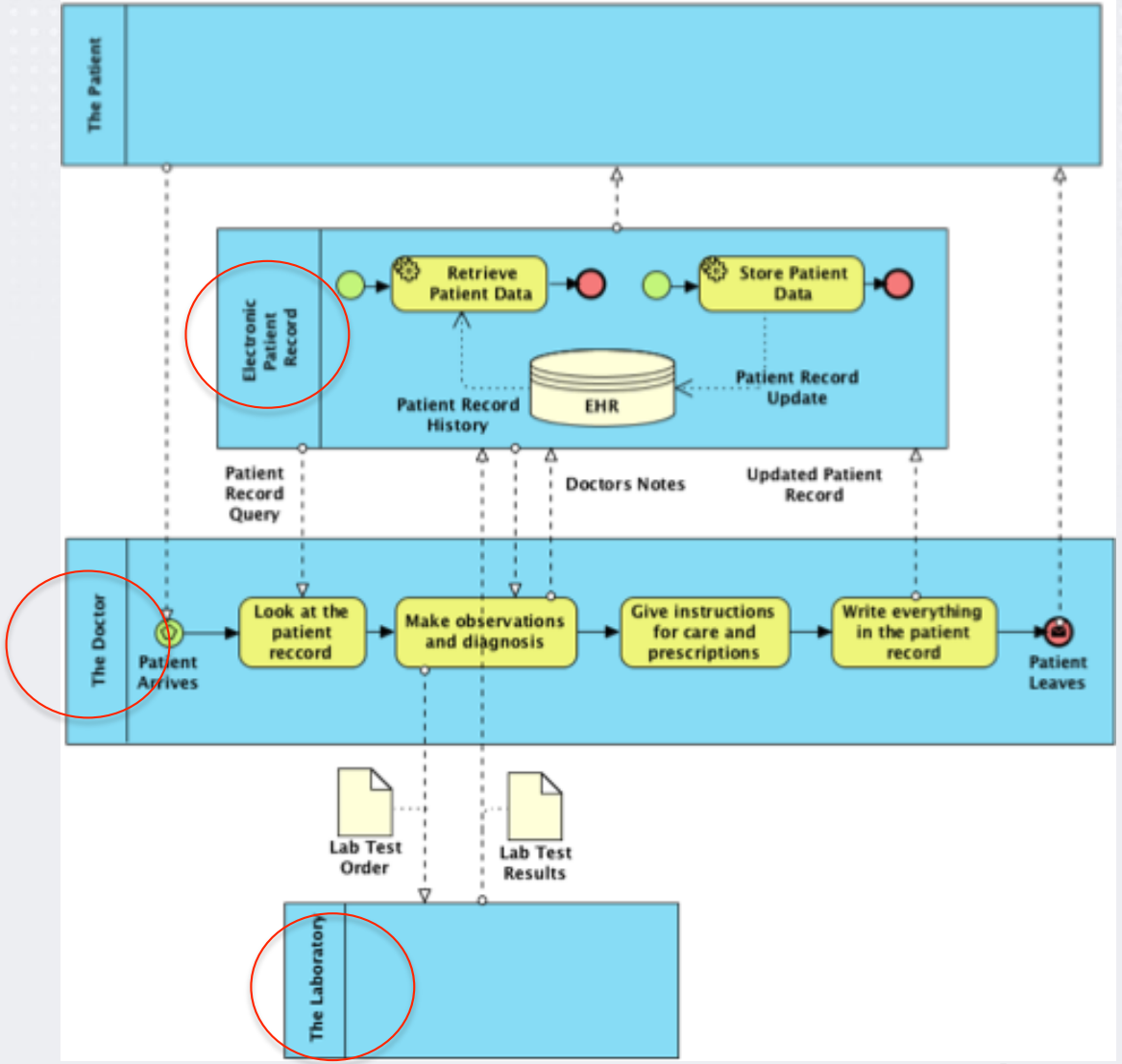
Identifying Application Services

- EHR
  - Patient record management
- LIS
  - Laboratory order entry and results delivery
- Pharmacy system
  - Delivery of the medicine
- Doctor´s system
  - Coordination of the collaboration
- The Patient
  - Collaboration with the professionals



Implementing services as web services

- A **service** consists of one or multiple **operations**
  - A Message Exchange Pattern (MEP) is related to an operation
  - **Request-Response** operation
    - A service receives a request message and sends a reply message
  - **Solicit-Response** operation
    - A service sends a request message and waits for a reply message
  - **One-way** operation
    - A service receives a message
  - **Notification** operation
    - A service sends a message
  - A fault message can be replied (Fault)
- Applies to any programming language
- Services are **synchronous** or **asynchronous**

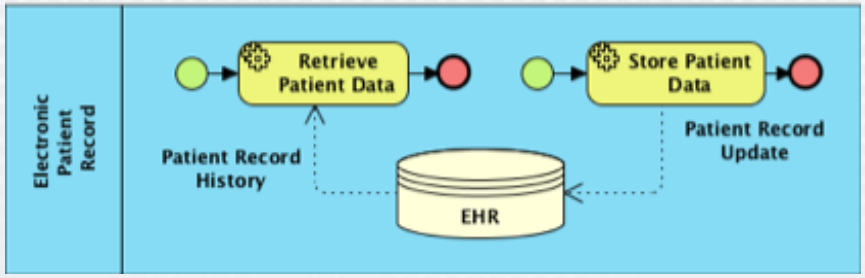


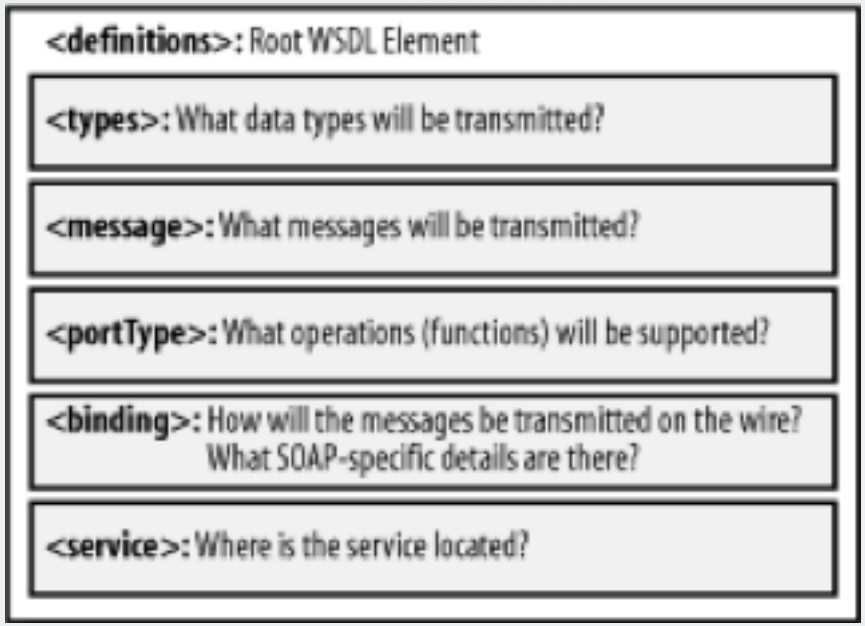
Implementing services as web services

Service: Electronic Patient Record

- Operations and messages
  - EPRQuery
    - In: EPR-QueryMessage
    - Out: EPR-ReplyMessage
  - EPRStore
    - In: EPR-StoreMessage

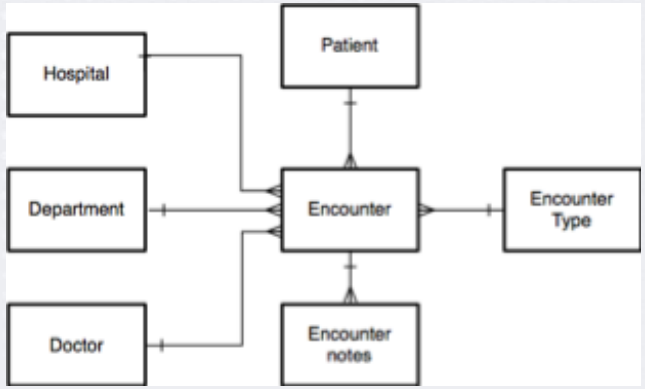
- Web services are defined using web services definition language (WSDL)

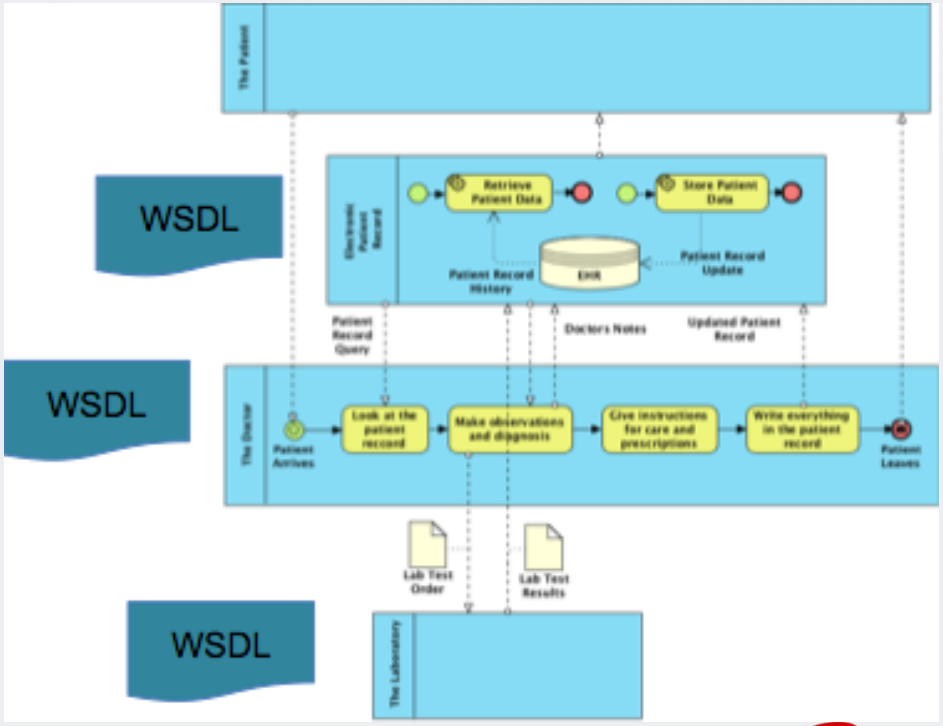




The data model for the messages

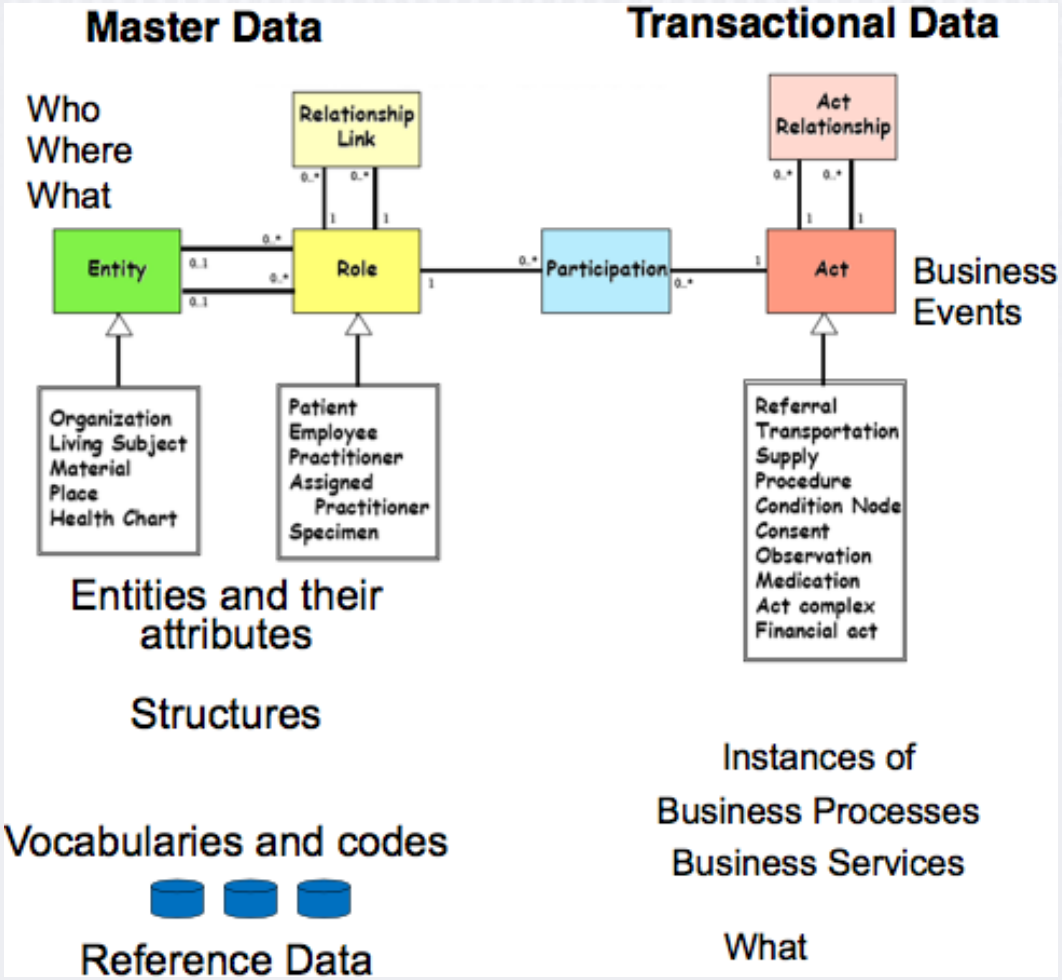
- How do we define the messages in WSDL documents?
- A data model must be defined, to include:
  - Transactional data
    - That describes business events, e.g.
      - What happened
      - Encounter and Notes...
  - Master Data
    - The “static data” that describes who, where, what
    - It is referenced from the transactional data with every business event
    - e.g. Hospital, Department, Doctor, Patient, Encounter Type...





Healthcare Information Model HL7 RIM

- HL7: clinical data/records exchange standard
  - RIM (Reference Information Model) is a generic health care data model
- HL7 CDA (Clinical Document Architecture) is a RIM based standard



References

- M. Weske. *Business Process Management: Concepts, Languages, Architectures*. Springer-Verlag (2012). ISBN: 978-3-642-28615-5
- E. Rolón, F. García, F. Ruiz, M. Piattini, L. Calahorra, M. García, R. Martin, Process modeling of the health sector using BPMN: a case study, Proceedings of HEALTHINF 2 (2008), 173-178.
- Francisco RUIZ a,1, Felix GARCIA a,, Luis CALAHORRA a and César LLORENTE , Business Process Modeling in Healthcare, Studies in health technology and informatics · August 2012 .
- R. Müller, A. Rogge-Solti, BPMN for Healthcare Processes. Services und ihre Komposition Proceedings of the 3rd Central-European Workshop on Services and their Composition. ZEUS, CEUR Workshop Proceedings 705 (2011), 65-72.
- S.W. Tu, P.D. Johnson, M.A. Musen, A Typology for Modeling Processes in Clinical Guidelines and Protocols. SMI Report 2002-0911, Stanford, CA 2002. Available at http://www.smi.stanford.edu/pubs/SMI_Reports/SMI- 2002-0911.pdf
- S. Kay, N.R. Hardiker, S. Aldridge, B.C. Warboys, I. Robertson, A. Martinez-Garcia, et al., Process modelling and simulation for managing clinical care in the community. Proc AMIA Symposium (1998), 270–274.
- White, S.A., Miers, D.: BPMN Modeling and Reference Guide: Understanding and Using BPMN. Future Strategies Inc. (2008)

Thanks!

Any questions?

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