

# Interoperability, System Integration and Healthcare Information Standards

Lecture

**Health Information Systems, 21 June - 3 July, 2021**  
**Stockholm University**



# Interoperability in healthcare



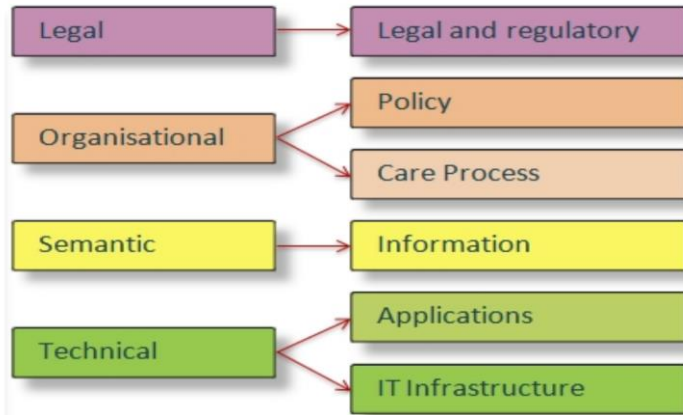
# Interoperability in healthcare

- “Interoperability is the ability of different **information systems, devices and applications (systems)** to access, exchange, integrate and cooperatively use data in a coordinated manner, **within and across organizational, regional and national boundaries**, to provide timely and seamless portability of information and optimize the health of individuals and populations globally”
- In healthcare, interoperability is a major issues since collaboration between healthcare providers are of major importance



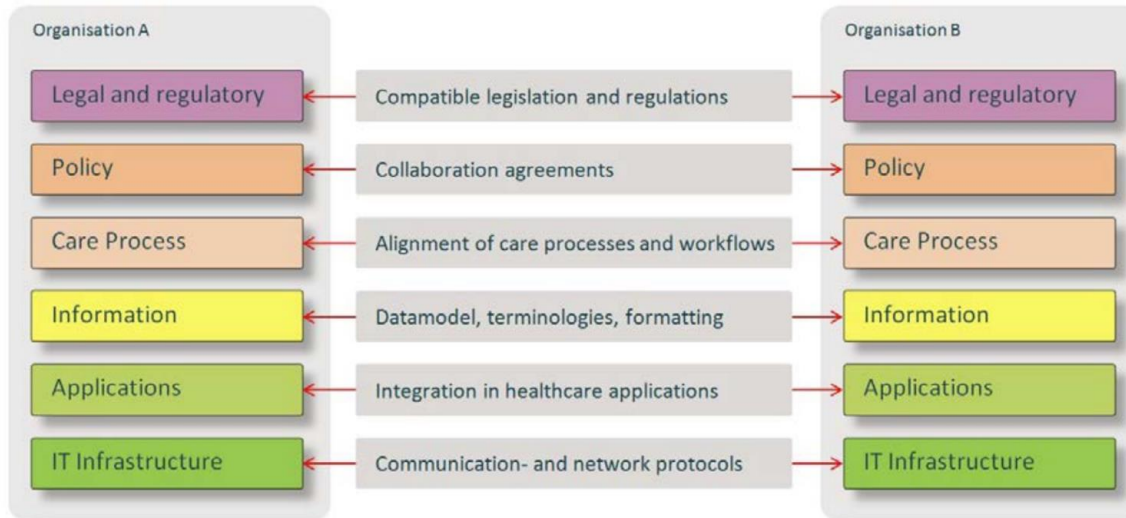
# Interoperability levels in healthcare

- Interoperability consider several levels, as suggested by the eHealth European Interoperability Framework



# Interoperability levels in eHealth

- More information about the different levels of interoperability



[[https://ec.europa.eu/health/sites/default/files/ehealth/docs/ev\\_20151123\\_co03\\_en.pdf](https://ec.europa.eu/health/sites/default/files/ehealth/docs/ev_20151123_co03_en.pdf)]



# Interoperability levels in eHealth

- Different roles related to different levels of interoperability

	Strategic	Tactical	Operational
Legal and regulatory	Regulators and advisors	Directors	Lawyers
Policy	Policy makers	Healthcare- Managers	Healthcare professionals
Care Process	Business- and information architects	Information analysts, terminologists	Patients
Information		Software engineers	
Applications	System architects		System managers
IT Infrastructure		System engineers	



# Integration of systems in healthcare



# Integration of systems in healthcare

- Integration of systems focus on the application level of interoperability





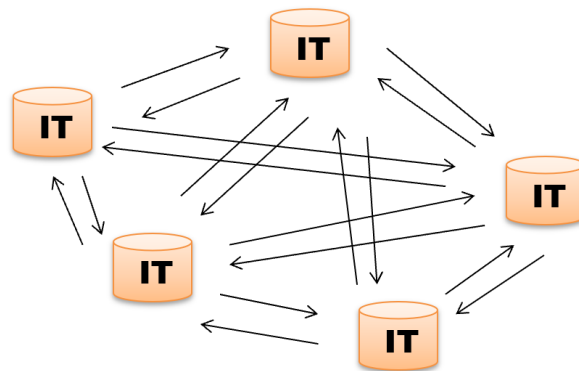
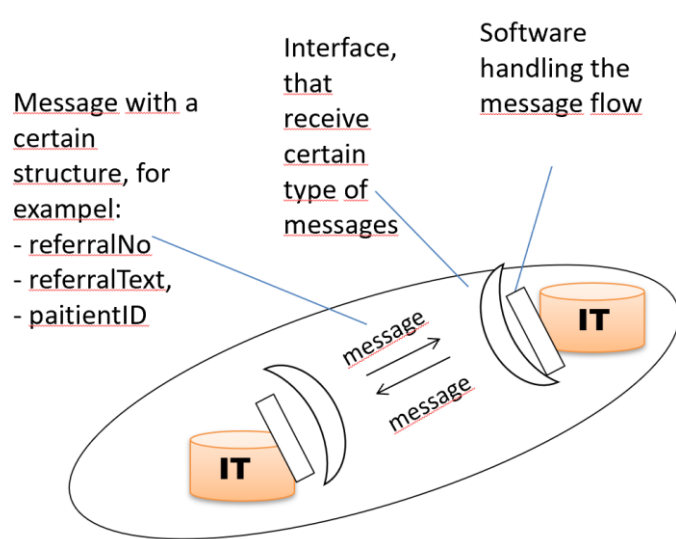
# Integration of systems in healthcare

- Systems can be integrated in different ways in healthcare
  - System integration using API
  - System integration using an EAI engine
  - National or regional service platform
  - Integration system for communication between organisations
  - Multifunctional singular EHR system
  - Data warehouse



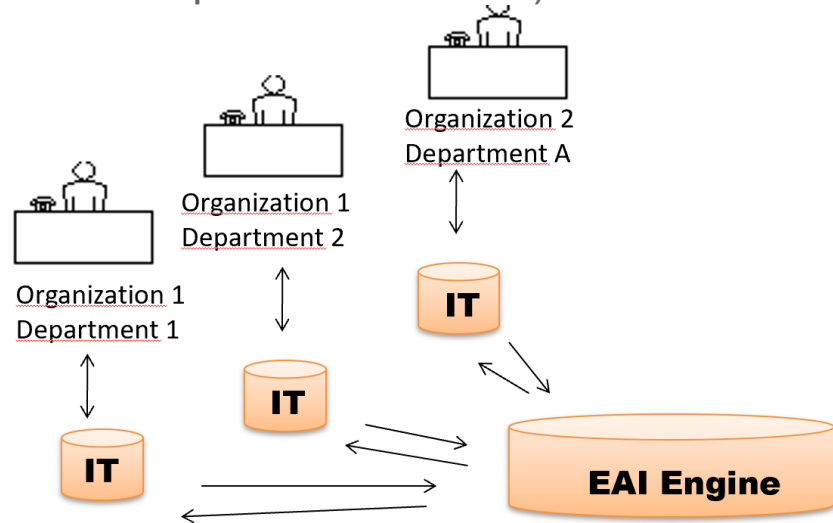
# System integration using APIs

- **System integration using API** – a connection of two or more systems using interfaces (APIs). This is a point-to-point solution.



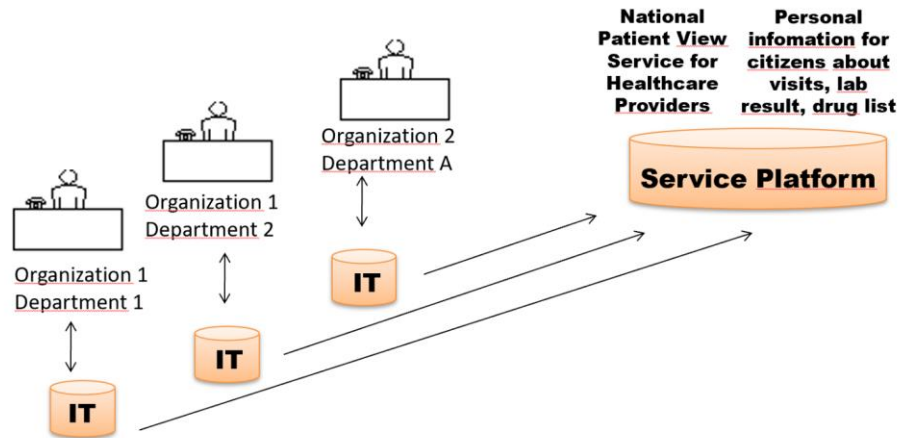
# System integration using an EAI engines

- **System integration using an EAI engine** – a connection of two or more systems using, for example, an integration solution such as EAI engine (also called message broker or enterprise service bus)



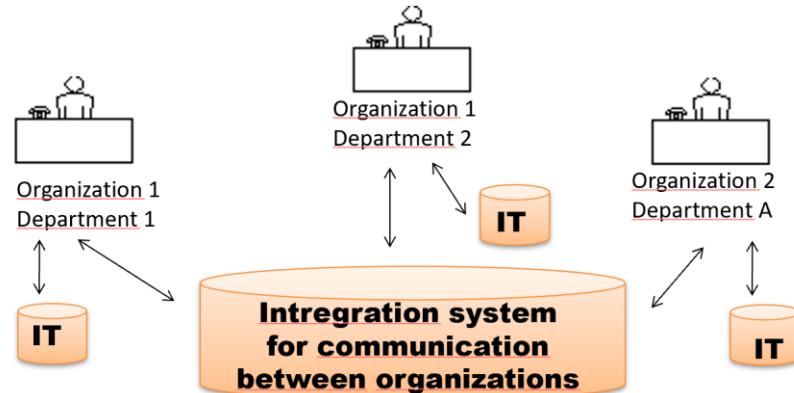
# System integration using a national service platform

- **National or regional service platform** – a system that extracts information from different EHRs and presents it in one shared platform. As well that sets the basis for linking and creating different information systems to facilitate information



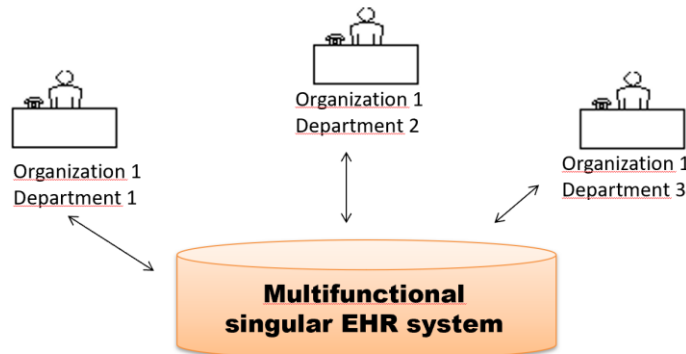
# System integration using an specific integration system

- **Integration system for communication between organisations** - is a single, specific, system which just focuses on communication between actors in different organizations, but not used for daily operations by each actor.



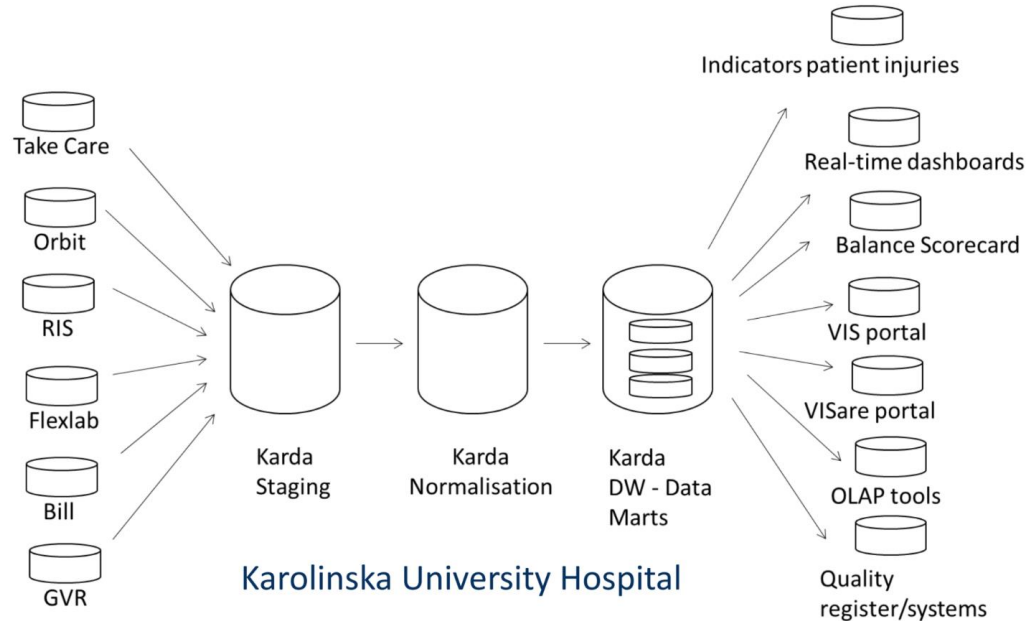
# System integration using a national service platform

- **Multifunctional singular EHR system** – a single EHR system used by all in an organization, also for daily operations by each actor, achieving integration of the healthcare organization that use the system, like an ERP system in business



# System integration using a data warehouse

- **A data warehouse** – is a business intelligence system supporting decision makers. It aggregate information in order to provide statistics, trends etc. Mostly for strategic and tactical decision, but could be used for operational decision as well.



# Why information standards in healthcare?





# Why information standards?

New EHR with  
supplier specific  
concepts

*Care plan*  *Patient*  *Healthcare activity*

*Drug prescription*  *Referral* 



# Why information standards?



# Why information standards?

New EHR with  
supplier specific  
concepts

Existing and future  
information systems,  
such as RIS

Existing and future  
information systems,  
such as Analytix

Existing and future  
information systems,  
such as PACS



*Care plan*

*Patient*

*Healthcare activity*

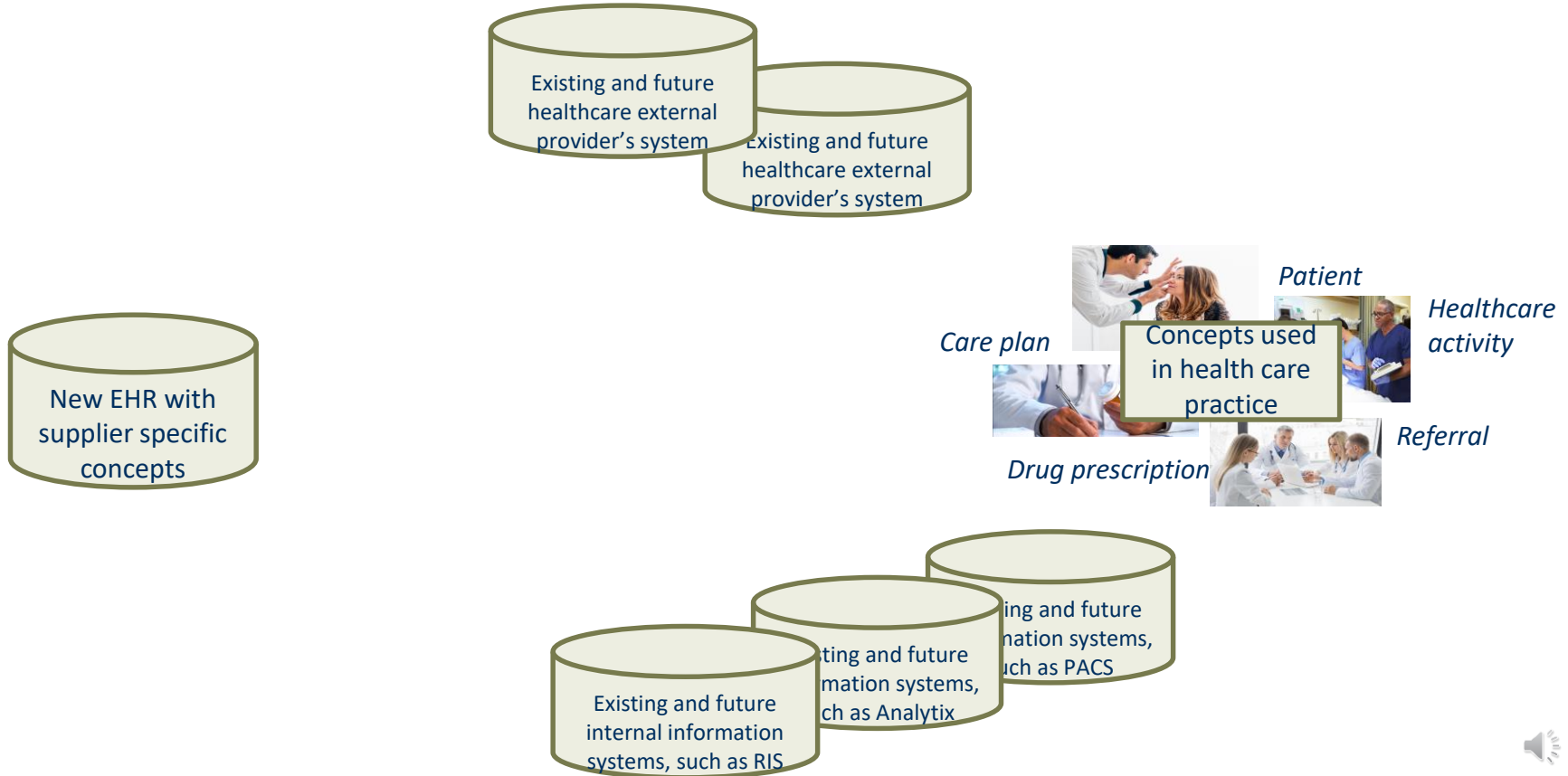
*Referral*

Concepts used  
in health care  
practice

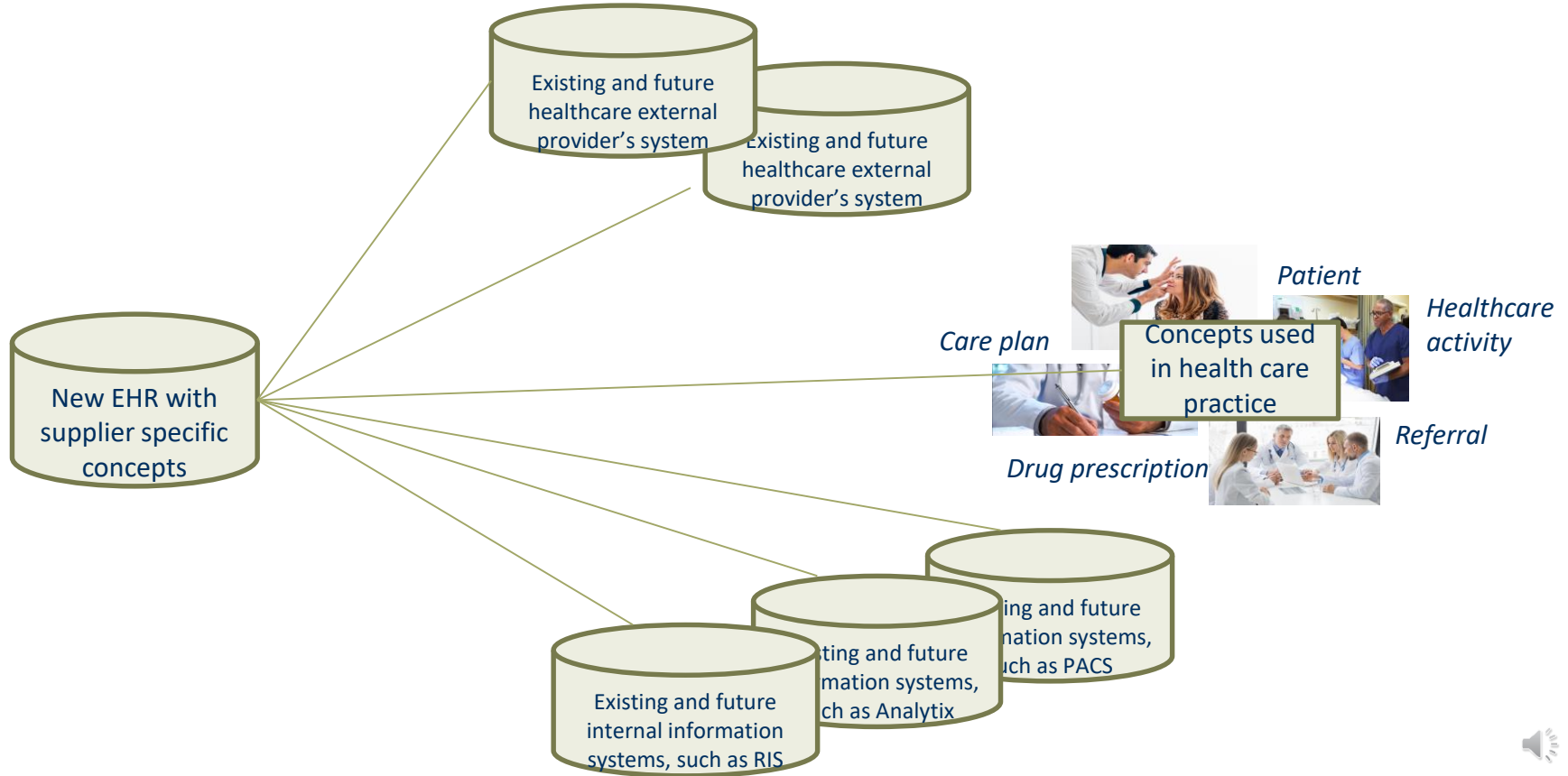
*Drug prescription*



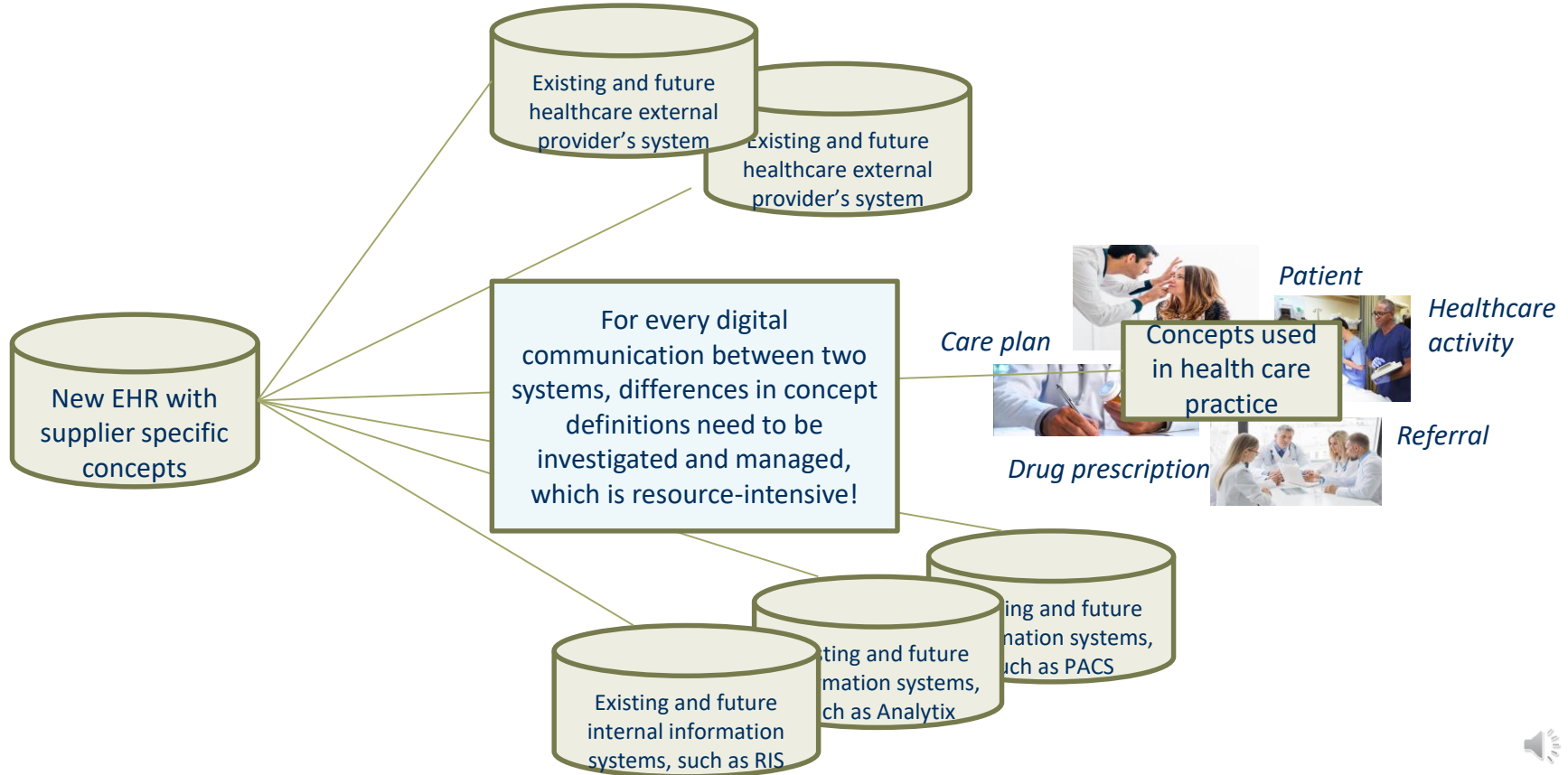
# Why information standards?



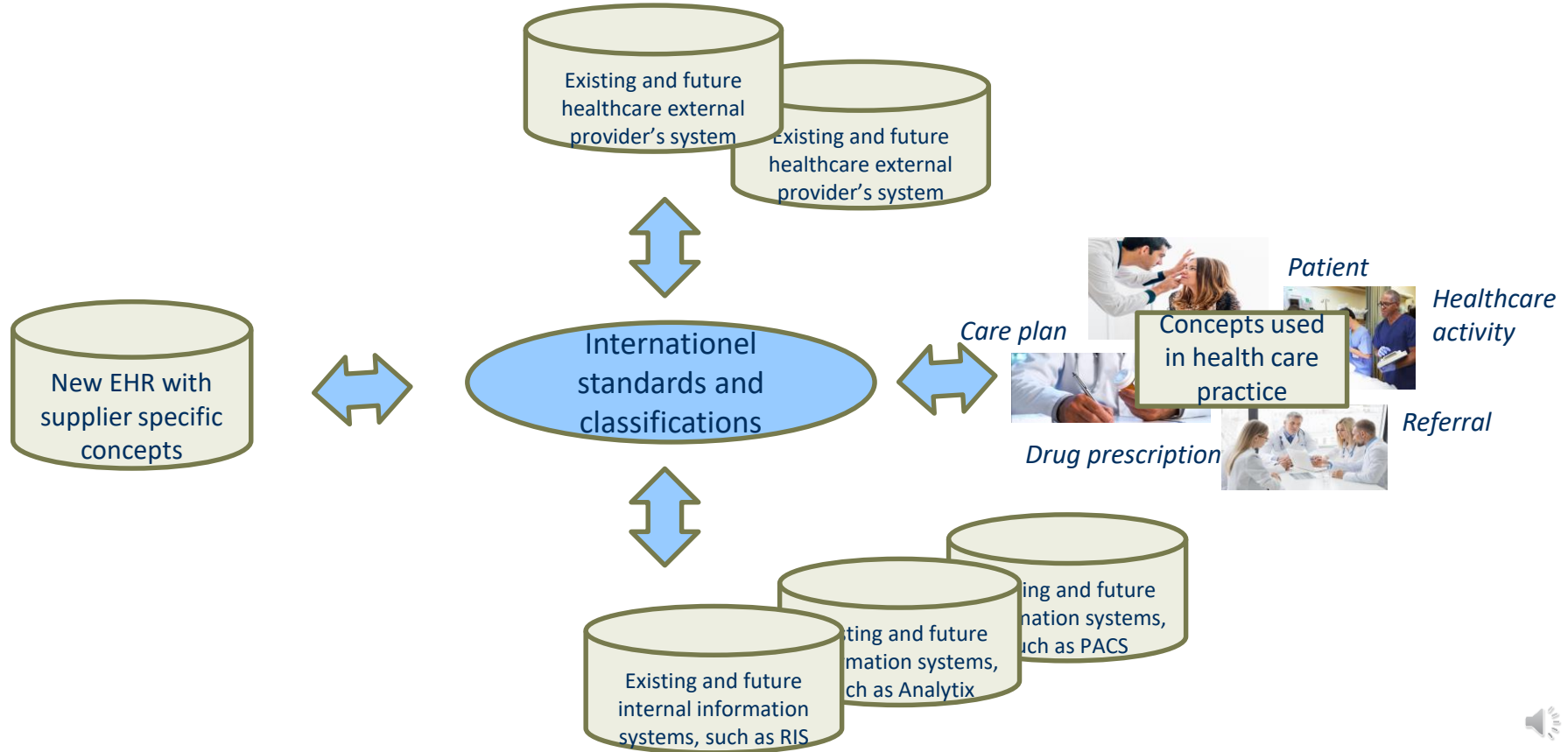
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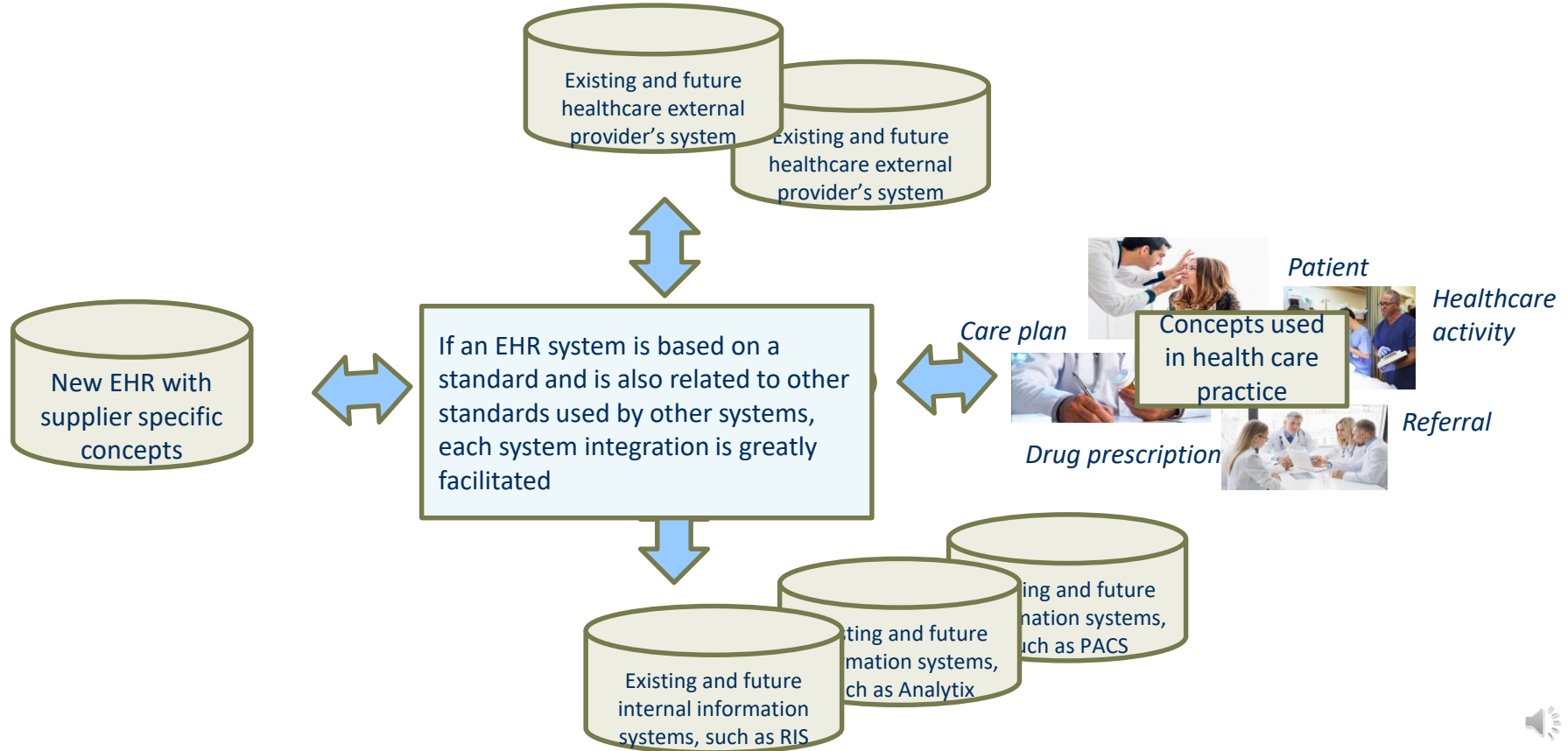
# Why information standards?



# Why information standards?



# Why information standards?





# Introducing and comparing healthcare information standards



# Healthcare information standards

- There are a number of international healthcare information standards for semantic interoperability
  - ISO 13940 - ContSys
  - HL7 (Health level 7)
  - FHIR (Fast Healthcare Interoperability Resources) - also by HL7
  - HISA (Health informatics Service Architecture)
  - openEHR
  - Snomed CT (global standard for medical terms)
- Different countries also have developed their own national healthcare standards (but often inspired by the international standards)



# How to use healthcare information standards?

- Adapt the standard in full - and use the concepts presented by the standard, and stop using the concepts used among the practitioner
- Adapt the standard in part - use some concepts presented by the standard, but use some concepts used among the practitioner
- Continue to use the concept among practitioners but map/relate the concept to an international standard
- Combine different standards, that is used different standards and also some of the concept used used among the practitioner



# In this course - focus on ContSys and FHIR

## ContSys (ISO 13940)

- Has the ambition to support continuity in care
- Concept models with a focus on coordination / collaboration
- Covers a larger area
- Provide detailed models

## FHIR - Fast Healthcare Interoperability Resources)

- Describe data formats and elements for exchange
- Provide an application programming interface (API) for exchanging electronic health records (EHR).



# Your task (task 5)

- This task is to relate/map concepts from an organization to different healthcare information standards, and to relate/map concepts between different healthcare information standards.



# Your task (task 5)

To do the task you need to:

- a) Select four (4) of the concept from the conceptual model in task 2 and their definition in task 3. Add them to a table shown below.
- b) Find the four most similar concepts from the information standard CONTSYS and add them to the table with their definitions. Use the following link to find the concepts in CONTSYS:  
<https://contsys.org/page/default>
- c) Find the four most similar concepts from the information standard FHIR and add them to the table with their definitions. Use the following link to find the concepts in FHIR: <https://hl7.org/FHIR/>
- d) Add a comment about the relating/mapping for each mapping. The comment could be something interesting or some issue found



# Your task (task 5)

Concept task 2	Definition concept task 2	Concept CONTSYS	Definition concept CONTSYS	Concept FHIR	Definition concept FHIR	Comment about mapping
patient		Subject of care	healthcare actor with a person role; who seeks to receive, is receiving, or has received healthcare	Patient	Information about an individual or animal receiving health care services	



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