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FHIR

The healthcare interoperability standard for the future

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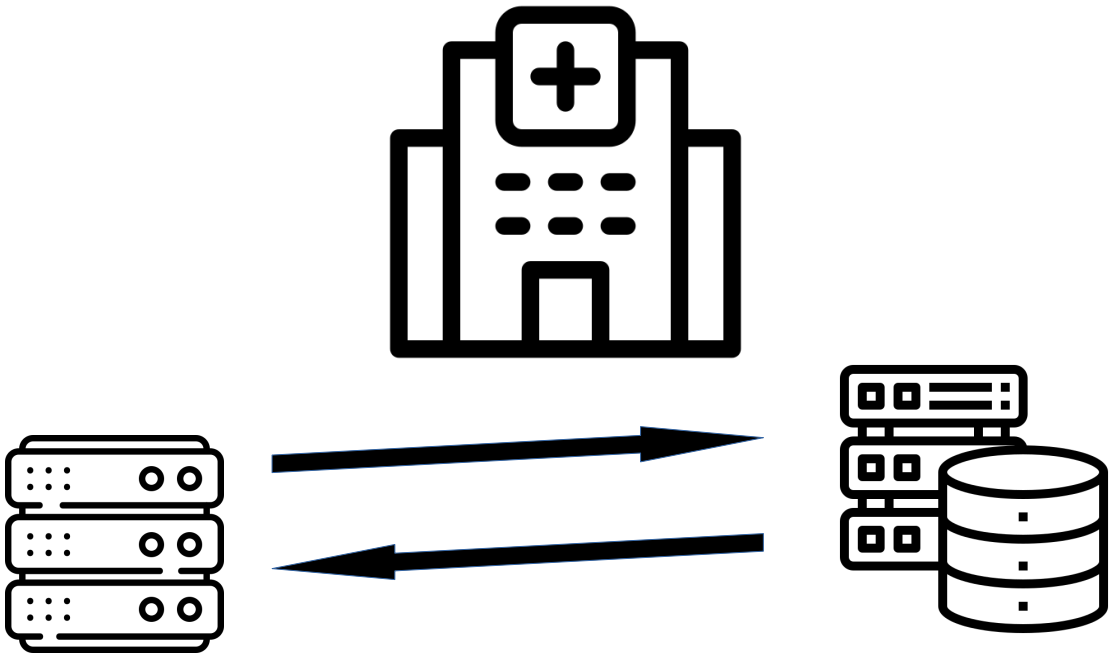
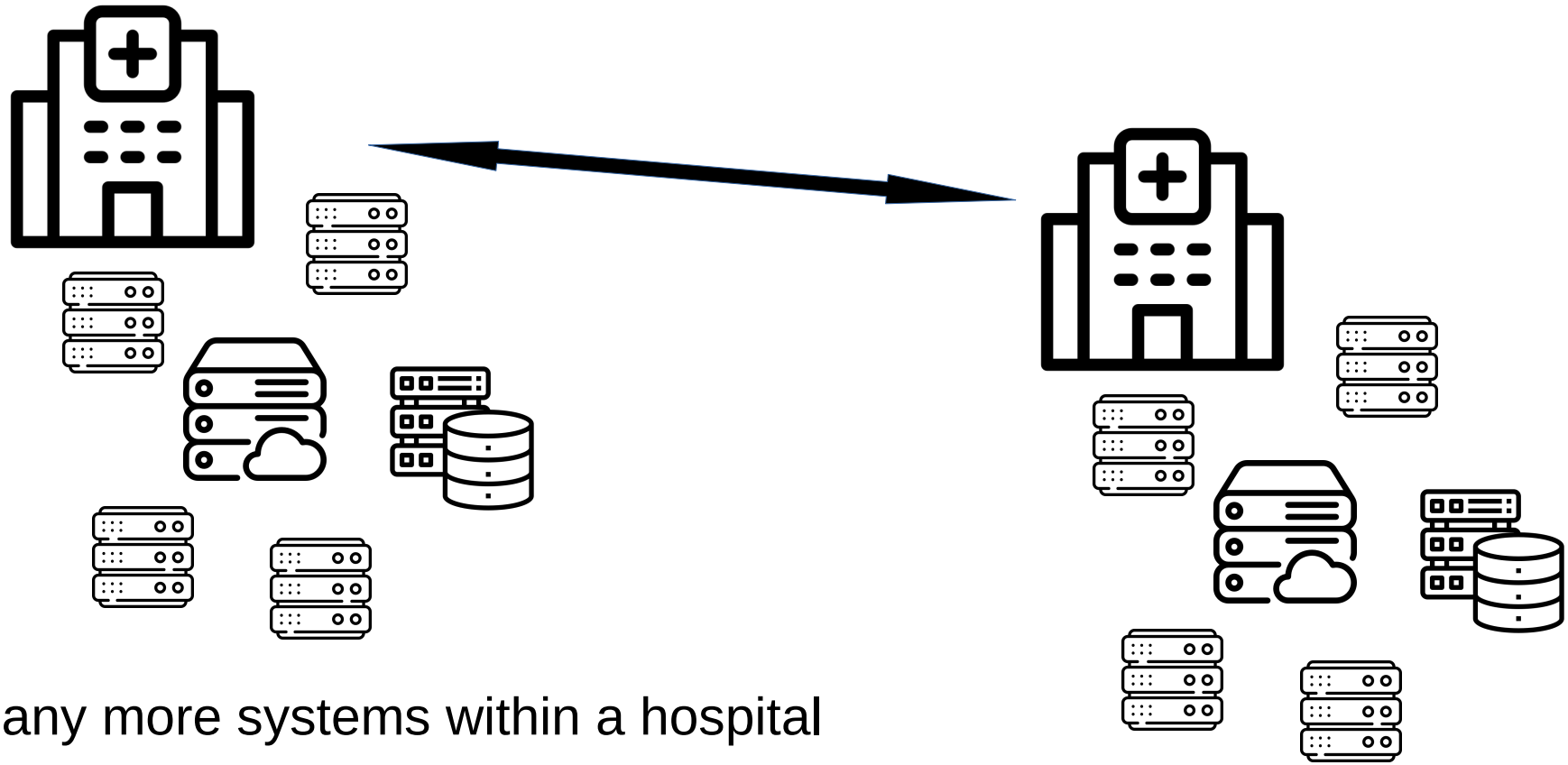
The 80s: interoperability begins



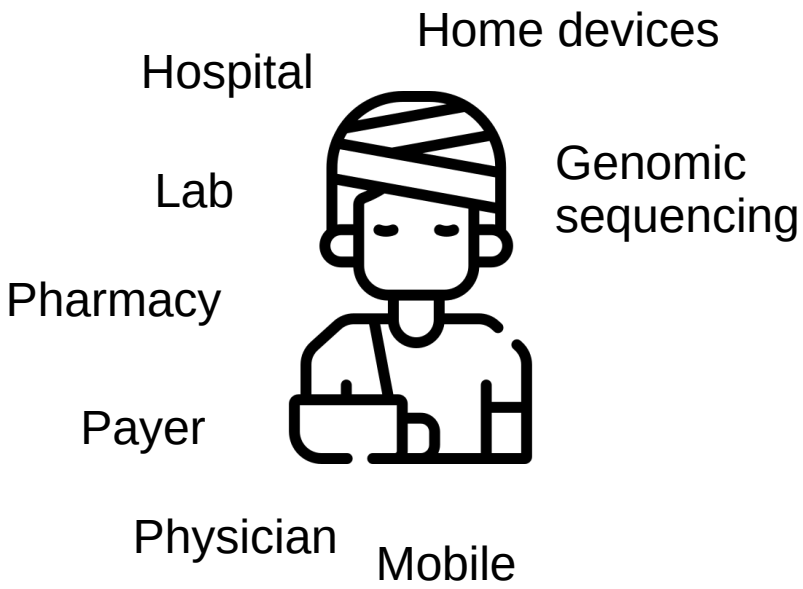
- Hospitals begin to have more than 1 computer system
  - These systems need to be connected and share data

Interoperability today



- Many more systems within a hospital
- Data exchange beyond the the walls of a hospital

Much more distributed data



Interoperability is about

All data

Real time

All systems

HL7 “Fresh Look Task Force”

- 2011: What if we created a new standard from scratch?
- HL7 v2 **Almost 30 years old. Too old!**
- HL7 CDA **10 years old, but not appropriate!**
- HL7 v3 **Too complex, almost no adoption!**

Changes in the data landscape

- Offline to online
- Data transparency initiatives
- Mix of narrative and codes

Fast Healthcare Interoperability Resources (FHIR)

- A **RE**presentational **S**tate **T**ranfer API
- Specification of how to request data and what data is returned

- Widely used on the internet
  - Web services and Websites
  - Cloud services
  - Social media integration
  - Payment gateways
  - Authentication services
  - Geolocation services
  - Third-party API integration
  - ...

Fast Healthcare Interoperability Resources (FHIR)

- A **RE**presentational **S**tate **T**ranfer API
- Specification of how to request data and what data is returned

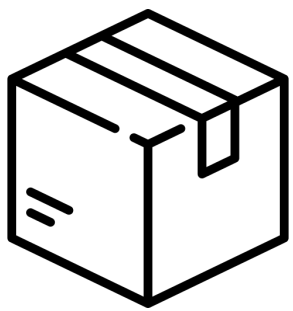
- Technology

  +

- Agreement on the meaning of the data

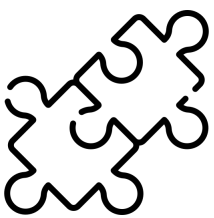
FHIR Resources

- Resources as in URL (Universal Resource Locator)
- Known location on a server
  - My local server
  - A server on the internet
- Defined meaning: the FHIR specification
- Discrete data concepts
  - Patient
  - Medication
  - List
  - Care plan
  - ...



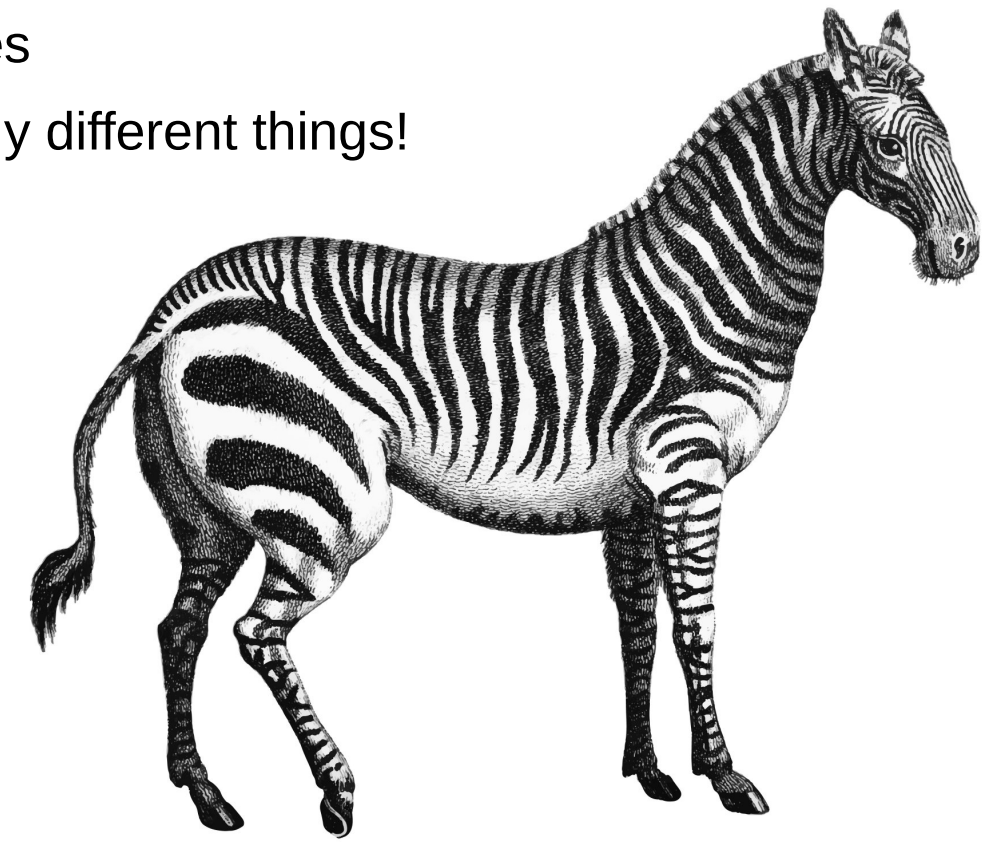
FHIR Interoperability Paradigms

- Data expressed as FHIR can be used in
  - Messages
  - Documents
  - REST API
  - Services
- Example scenario: Lab result represented as FHIR data
  - http://hl7.org/fhir/observation.html
  - Obtain the result from the lab system using a REST API
  - Put the FHIR data (the result) in a message or document
  - Send it to a Decision support system
  - **No data transformation required!**



True interoperability

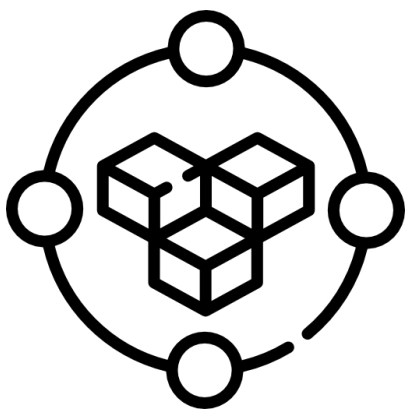
- Exchange information and **mean** the same thing!
  - Black horse with white stripes
  - White horse with black stripes
  - To a computer two completely different things!



Clinical Information model

- Computer systems need a very specific definition of a data concept
  - Exchange it
  - Mean the same

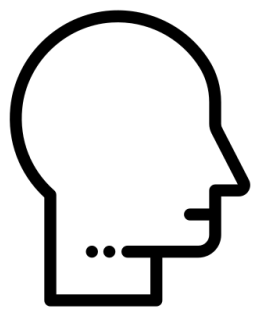
- Clinical Information Models: definitions of data concepts
  - Rules that apply
  - Relationships between the data elements
  - Terminology bindings



FHIR Profiles

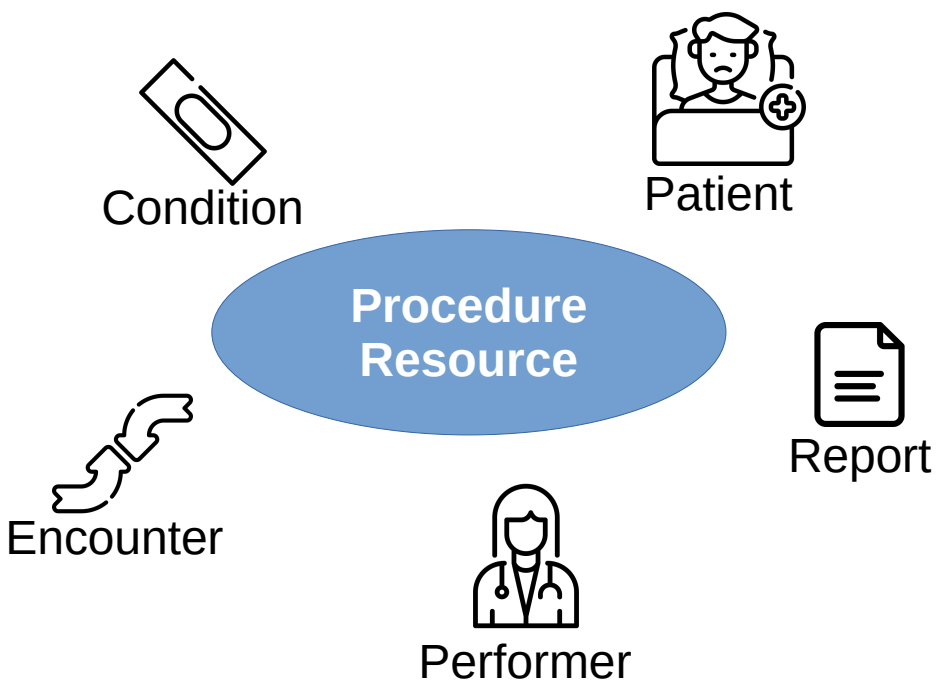
- Define how individual data elements and structures should be used and constrained for a specific use case
  - Restrict and extend
  - Cardinality
  - Value sets
  - Extensions

  - https://www.hl7.org/fhir/profilelist.html



FHIR Profiles: Resources and data elements

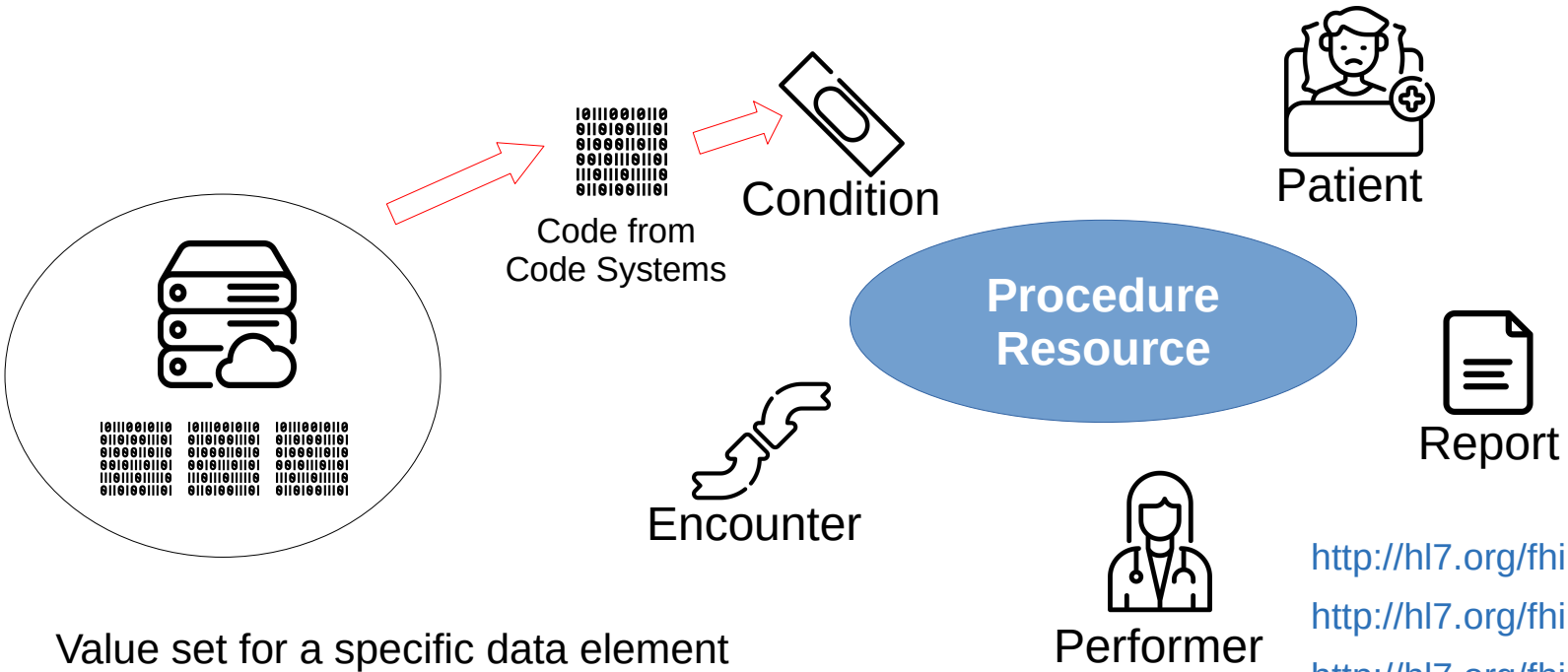
- What resources are needed to implement a use case?
- What data elements are needed to implement a use case?



http://hl7.org/fhir/procedure.html
http://hl7.org/fhir/patient.html
http://hl7.org/fhir/condition.html
http://hl7.org/fhir/encounter.html
http://hl7.org/fhir/practitioner.html
http://hl7.org/fhir/diagnosticreport.html

FHIR Profiles: Terminology bindings

- What values to use for the data elements



Value set for a specific data element

- From code systems
- Referenced as URL of a terminology server
- Part of the FHIR architecture
- Implementations don't need to store this information

http://hl7.org/fhir/procedure.html
http://hl7.org/fhir/patient.html
http://hl7.org/fhir/condition.html
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FHIR Extensions

- The 80/20 rule
  - The FHIR specification contains that what is in *most* systems
  - Makes the standard less complex and
  - easier to implement
  - It’s a rule of thumb
- For some uses cases more is needed
  - Extensions **extend** a specific resource
  - Example *Health tourism*
  - Profile would include the extension Nationality for the resource *Patient*
  - Extensions are often country or region specific.
    - https://ig.fhir.de/basisprofile-de/1.5.0-ballot/ig-markdown-Home.html

FHIR Implementation guides (IG)

- Set of rules and instructions about how FHIR resources should be used to solve a particular problem
  - Includes associated documentation to support and clarify the usage
  - FHIR implementation guides are published on the web
  - They are a FHIR resource
  - They are machine readable
  - Possible to validate an implementation using the published IG