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# Profiling with clinFHIR

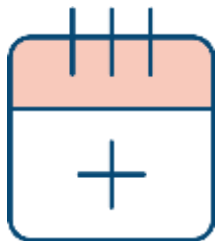
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Devdays | November 2017

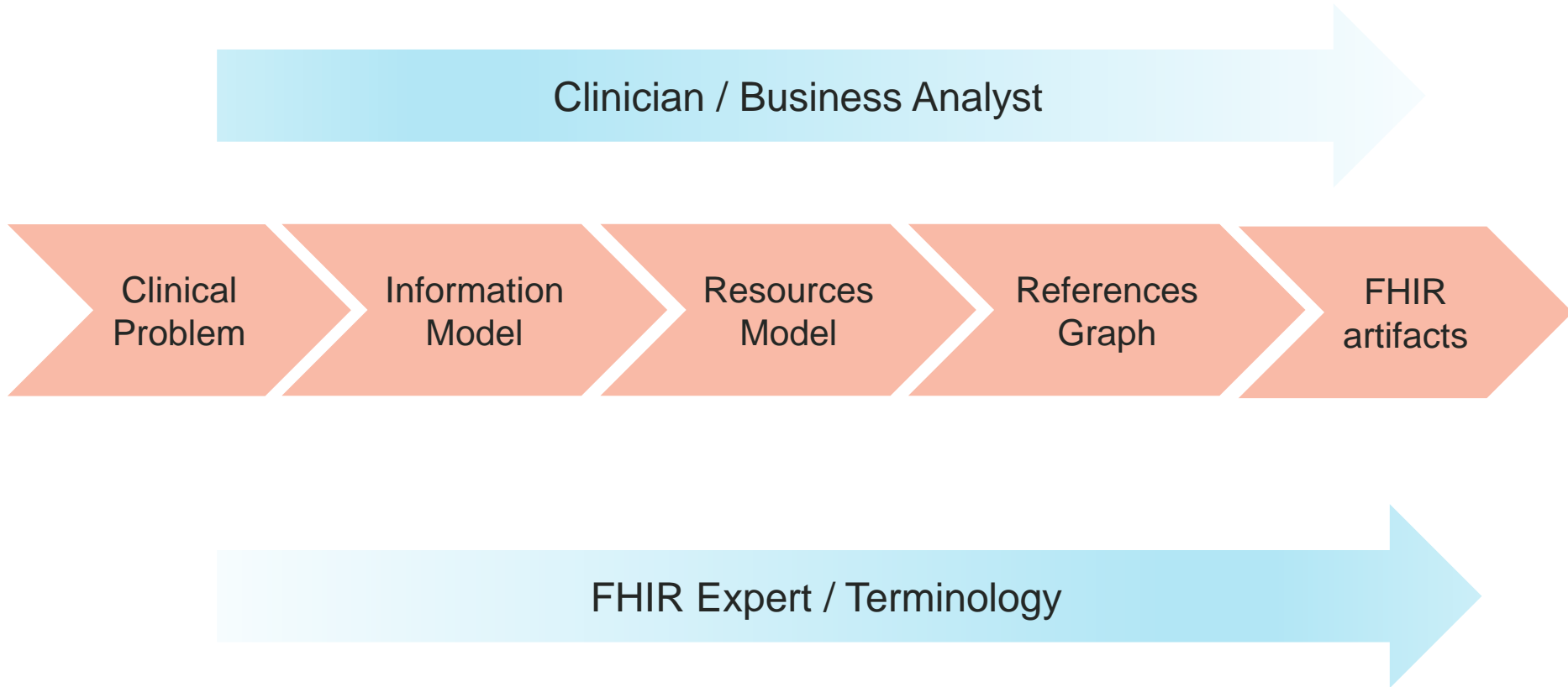
# Plan for the sessions

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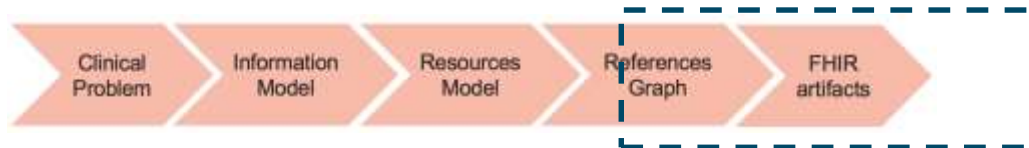


- ▶ Yesterday
    - ▶ Review overall process
    - ▶ Review key FHIR elements
    - ▶ ‘Clinical’ Models
      - ▶ Information, Resources, References
  - ▶ Today
    - ▶ Structured and Coded data
    - ▶ Profiling: create/view FHIR artifacts
      - ▶ ValueSet
      - ▶ Extension Definition
      - ▶ Profile
      - ▶ Implementation Guide
-

# The road to FHIR (aka the process)



# Profiling



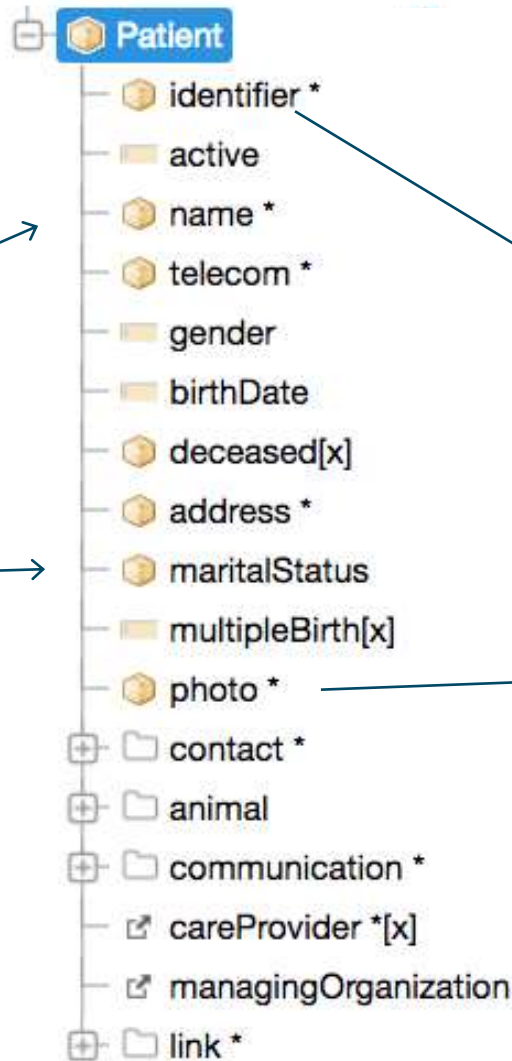
# Adapting FHIR to your needs: Profiling

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- ▶ Many different contexts in healthcare, but want a single set of Resources
  - ▶ Need to be able to describe 'usage of FHIR' based on context
  - ▶ Allow for these usage statements to:
    - Authored in a structured manner
    - Published in a registry & Discoverable
    - Used as the basis for validation, code, report and UI generation.
  - ▶ 3 main aspects:
    - Constraining a resource - remove element, change multiplicity fix values
    - Change coded element binding
    - Adding a new element (an extension)
  - ▶ Profiling adapts FHIR for specific scenarios
    - ▶ A statement of use
-

For example...



Limit names to just 1 (instead of 0..\*)

Change maritalStatus to another set of codes that extends the one from HL7 international

Require that the identifier uses the NHI number – and is required

Don't support photo

Add an extension to support ethnicity

# This talk:

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- ▶ 3 Main aspects
    - ▶ Coded data (and identifiers)
      - ▶ Binding to a ValueSet
    - ▶ Extensions
    - ▶ The Profile
  - ▶ Implementation Guide
-

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# Structured and coded data

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# Why have structured / coded data

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- ▶ Structured vs Coded
  - ▶ Coded:
    - ▶ Greatly improves quality of exchange
      - ▶ 'semantic' interoperability
    - ▶ Secondary uses
      - ▶ Decision Support
      - ▶ Analytics
      - ▶ Population Health
      - ▶ Reporting
-

# Resource type structure in the spec



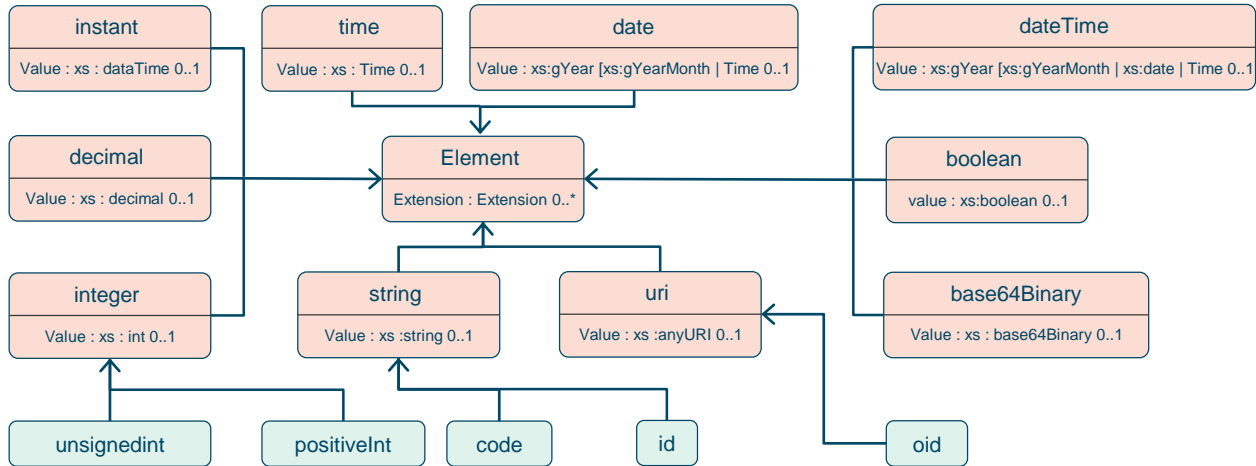
Name	Flags	Card.	Type	Description & Constraints
Patient			DomainResource	Information about an individual or animal receiving health care services Elements defined in Ancestors: <a href="#">Id</a> , <a href="#">meta</a> , <a href="#">implicitRules</a> , <a href="#">language</a> , <a href="#">text</a> , <a href="#">cont</a> An identifier for this patient
Identifier	Σ	0..*	Identifier	
active	?! Σ	0..1	boolean	Whether this patient's record is in active use
name	Σ	0..*	HumanName	A name associated with the patient
telecom	Σ	0..*	ContactPoint	A contact detail for the individual
gender	Σ	0..1	code	male   female   other   unknown <a href="#">AdministrativeGender</a> (Required)
birthDate	Σ	0..1	date	The date of birth for the individual
deceased[x]	?! Σ	0..1		Indicates if the individual is deceased or not
deceasedBoolean			boolean	
deceasedDateTime			dateTime	
address	Σ	0..*	Address	Addresses for the individual
maritalStatus		0..1	CodeableConcept	Marital (civil) status of a patient <a href="#">Marital Status Codes</a> (Extensible)
multipleBirth[x]		0..1		Whether patient is part of a multiple birth
multipleBirthBoolean			boolean	
multipleBirthInteger			integer	
photo		0..*	Attachment	Image of the patient
contact	1	0..*	BackboneElement	A contact party (e.g. guardian, partner, friend) for the patient + <i>SHALL at least contain a contact's details or a reference to an organizatio</i>
relationship		0..*	CodeableConcept	The kind of relationship v2 <a href="#">Contact Role</a> (Extensible)

# Datatypes



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- ▶ Datatypes in resource type definition
    - Backbone element
    - 'choice' data types
      - Eg deceased[x]
  - ▶ Identifiers
  - ▶ Review coded data
    - ValueSet binding
-

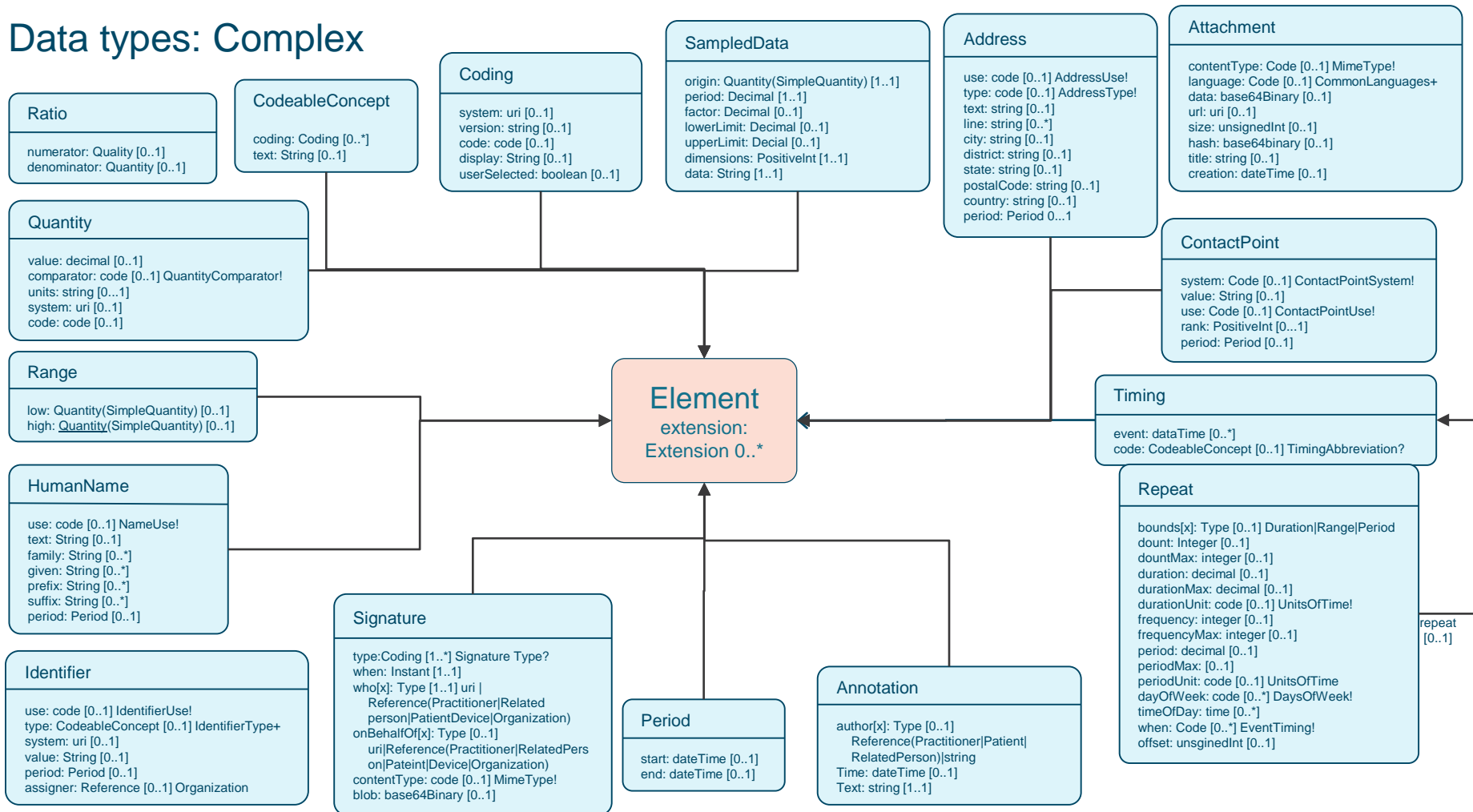
# Data types: Primitive



Based on w3c schema and ISO data types

- ▶ Stick to the “80% rule” – only expose what most will use
  - Simplified

# Data types: Complex



# Identifiers

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- ▶ Identifies an object (Person) within a given system
    - ▶ Eg National Identifier (NHI), Drivers License, HPI
  - ▶ Main sub components:
    - ▶ System – what ‘sort’ of identifier
    - ▶ Value – unique within the system
  - ▶ NamingSystem resource
-

# Coded datatypes



- `code: "status" : "confirmed"`
- **Coding:** {  
  `"system": "http://www.nlm.nih.gov/research/umls/rxnorm",`  
  `"code": "C3214954",`  
  `"display": "cashew nut allergenic extract Injectable"`  
}
- **CodeableConcept:** {  
  `"coding": [{`  
    `"system": "http://snomed.info/sct",`  
    `"code": "39579001",`  
    `"display": "Anaphylactic reaction"`  
  `}],`  
  `"text" : "Anaphylaxis"`  
}



# ValueSet



# ValueSet

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- ▶ A context specific subset of one or more Code Systems
  - ▶ Bound to an element
  - ▶ Promotes consistency between applications
  - ▶ Key component of Terminology
    - Also CodeSystem
  - ▶ Start thinking about in Information model
  - ▶ Used by a number of services
    - \$expand
- 

```
{
  "resourceType": "ValueSet",
  "compose": {
    "include": [
      {
        "system": "http://snomed.info/sct",
        "filter": [
          {
            "property": "concept",
            "op": "is-a",
            "value": "404684003"
          }
        ]
      }
    ]
  }
}
```

# Terminology Sub-system

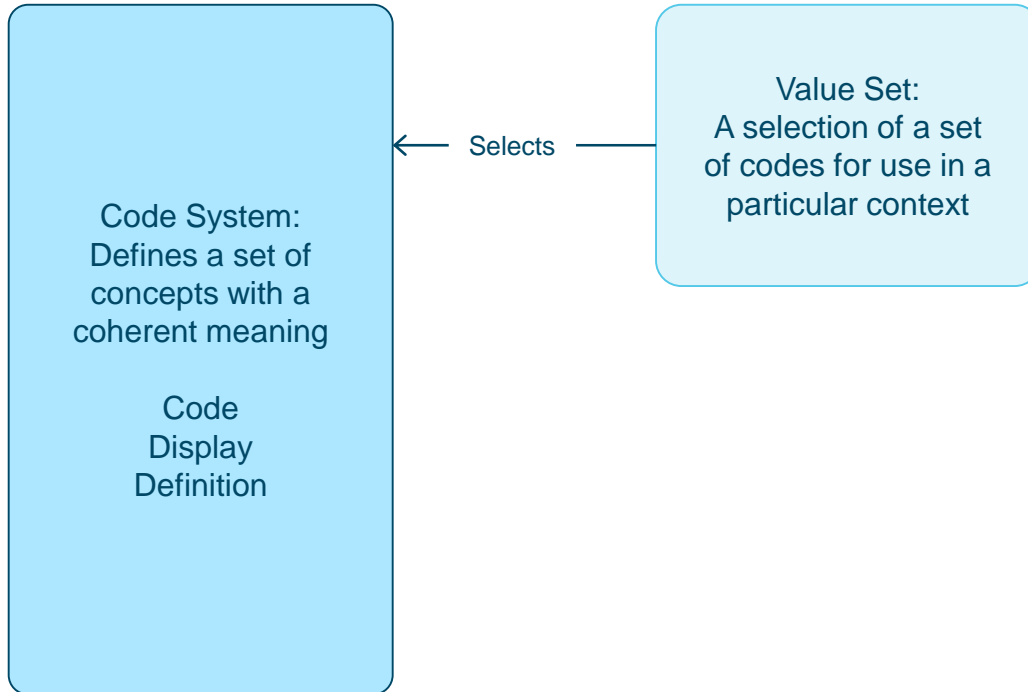


Code System:  
Defines a set of  
concepts with a  
coherent meaning

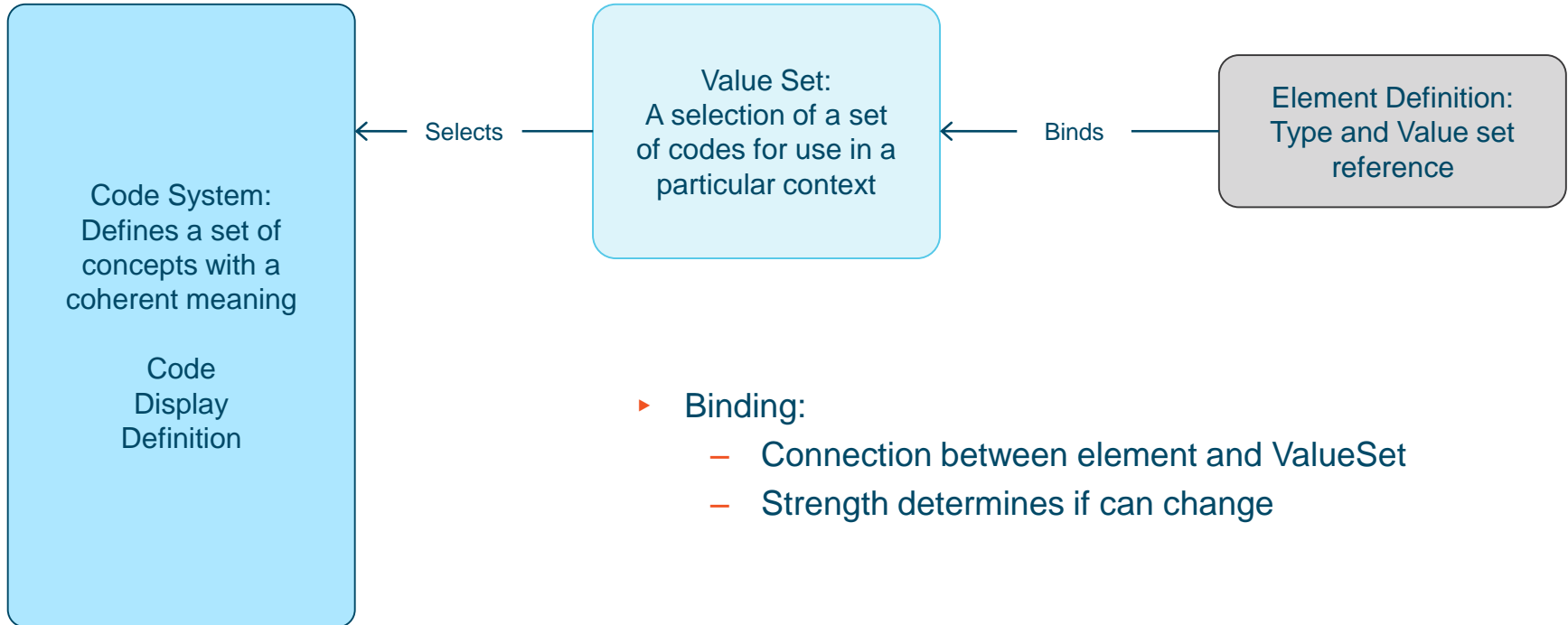
Code  
Display  
Definition

- 
- ▶ SNOMED CT / LOINC / RxNORM
  - ▶ ICPC, MIMS + 100s more
  - ▶ ICD-X+
  - ▶ A drug formulary
  - ▶ Custom
-

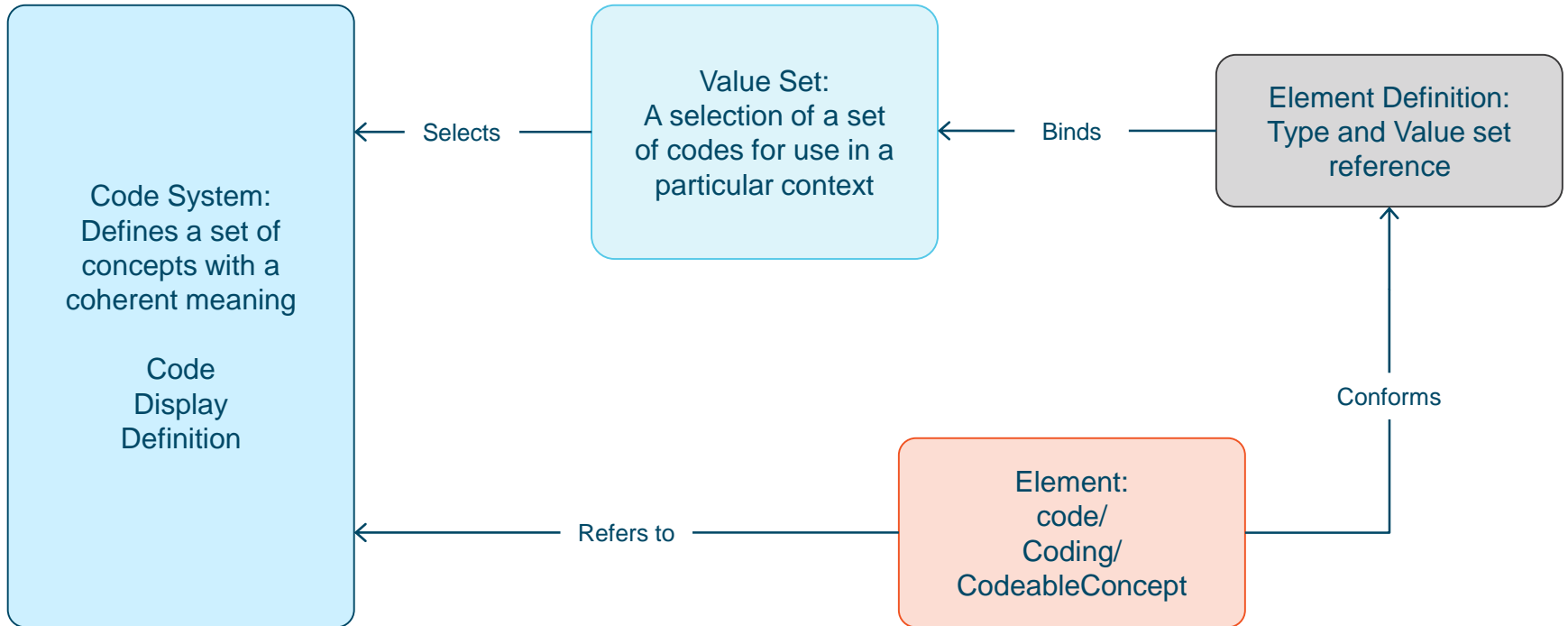
# Terminology Sub-system



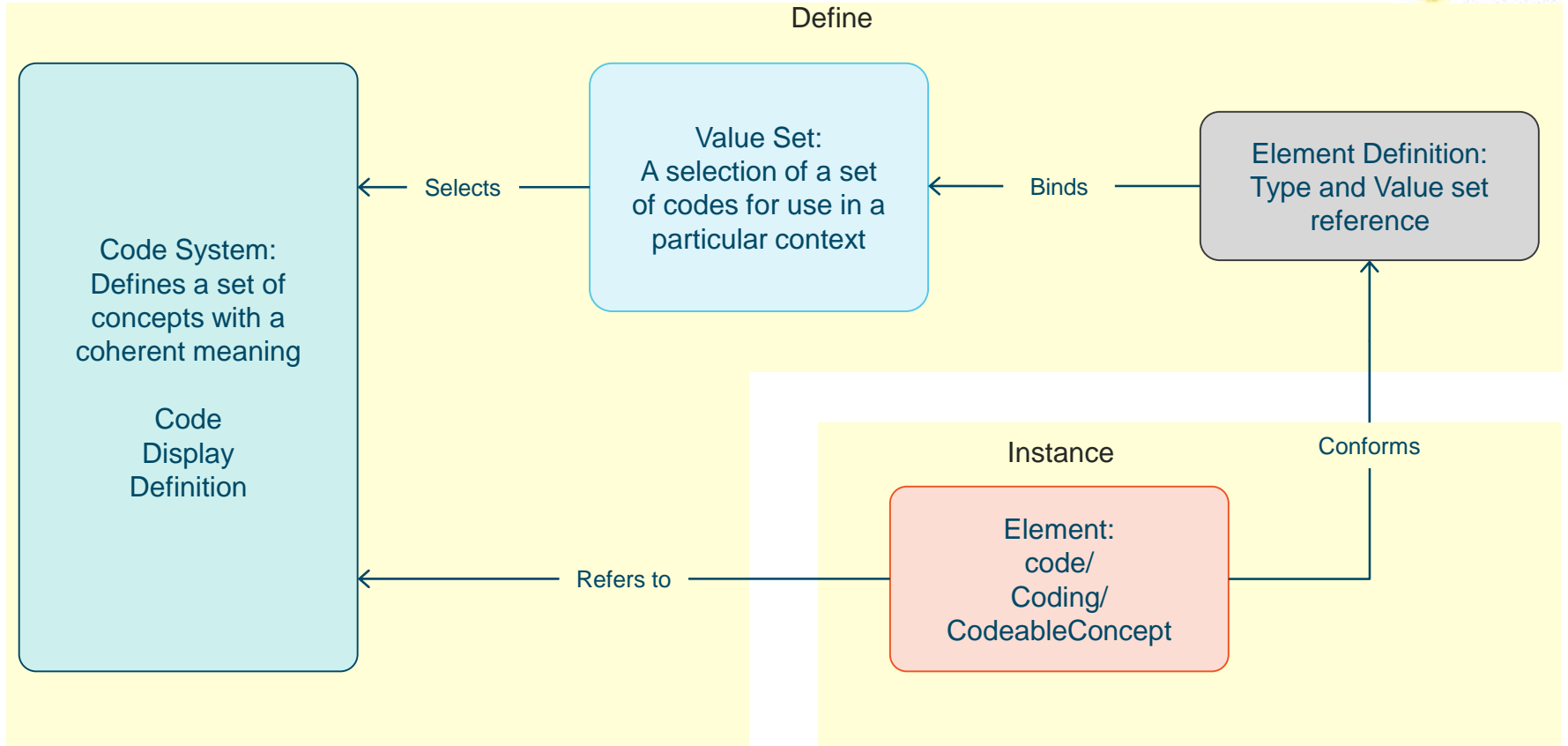
# Terminology Sub-system



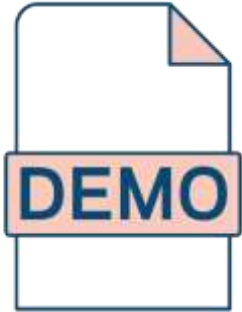
# Terminology Sub-system



# Terminology Sub-system

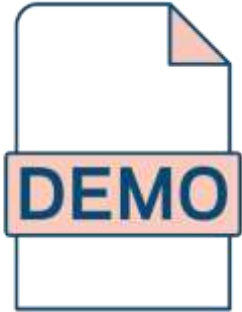


# Demo



- 
- ▶ Adding structures and coded data to the scenario
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# Demo



- 
- ▶ Viewing/Building a ValueSet in clinFHIR
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# Extension Definition

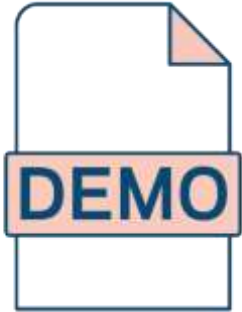
# Extension Definitions

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- ▶ Also a StructureDefinition
    - Defines the content of a single extension
  - ▶ Simple or Complex
    - ▶ Complex has children
  - ▶ Definition:
    - Available on the web
    - Canonical Url – Globally unique identifier
      - Resolvable or Registry
  - ▶ In resource instance:
    - Reference to Canonical Url
      - Recipient can always find out definition
    - Extension or ModifierExtension
-

# Demo



- 
- ▶ Create an Extension Definition
-



# The 'Profile'

# The 'profile'

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- ▶ On a single resource type
  - ▶ Defined by StructureDefinition resource
    - Same as used for core resources
  - ▶ Defines each element
    - Path, name, dataType, binding, multiplicity, mapping & much more
    - Including allowable extension points
  - ▶ Can use Forge tooling to build
    - clinFHIR (and others) for learning/viewing
  - ▶ US Core (was DAF)
    - <http://hl7.org/fhir/us/core/index.html>
-

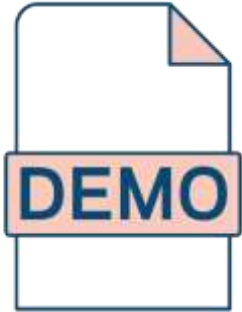
# clinFHIR: Profiling support

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- ▶ Build from Logical Model
    - ▶ On single resource
  - ▶ Main options
    - ▶ Remove elements
    - ▶ Add extensions
    - ▶ Change Bindings
  - ▶ This is not Forge!
-

# Demo



- 
- ▶ Build a profile
-



# Implementation Guide



# Implementation Guide

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- ▶ Brings all the artifacts together
    - ▶ Clinical & FHIR
  - ▶ Demo of guide
    - ▶ CareConnect (UK)
-

# Main Conformance artifacts

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- ▶ StructureDefinition
    - ▶ Profile and Extension Definitions
    - ▶ In resources model
  - ▶ ValueSet
    - ▶ From Information model
  - ▶ CodeSystem
  - ▶ ConceptMap
  - ▶ NamingSystem
  - ▶ ImplementationGuide
-

# Exercises



## Notes

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- Getting started
    - Set servers (hapi-3)
    - Create user account
  - Use initials for model name
  - Remember to save models
- 

## Process

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1. Choose resource to profile
  2. Build Logical model (single resource)
  3. Edit model
    1. Constrain
    2. Extend
    3. Re-bind
  4. Create profile
-



# clinFHIR help on the FHIR Chat

<https://chat.fhir.org/#narrow/stream/clinFHIR>

# More information

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## From HL7

- ▶ <http://hl7.org/fhir/index.html>
- ▶ [wiki.hl7.org/index.php?title=FHIR](http://wiki.hl7.org/index.php?title=FHIR)
- ▶ <http://www.fhir.org/>

## Community

- ▶ <https://chat.fhir.org/>
- ▶ List server (fhir@lists.hl7.org )
- ▶ Stack Overflow (tag FHIR)

## Blogs

- ▶ [www.healthintersections.com.au/](http://www.healthintersections.com.au/)
- ▶ <https://fhirblog.com/>
- ▶ <https://thefhirplace.com/>
- ▶ <https://brianpos.com>

## Libraries

- ▶ Java (<http://hapifhir.io/>)
- ▶ C# (NuGet HL7.FHIR)Tooling
- ▶ Forge (<http://fhir.furore.com/Forge>)
- ▶ <http://clinfhir.com/>

## Tooling

- ▶ Forge (<http://fhir.furore.com/Forge>)
- ▶ <http://clinfhir.com/>

## Test servers

- ▶ [http://wiki.hl7.org/index.php?title=Publicly\\_Available\\_FHIR\\_Servers\\_for\\_testing](http://wiki.hl7.org/index.php?title=Publicly_Available_FHIR_Servers_for_testing)
- ▶ <https://fhirblog.com/2016/10/19/setting-up-your-own-fhir-server-for-profiling/>



All done!

