



# Providing ART-DECOR ValueSets via FHIR Terminology Servers – A Technical Report

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  - IHE ValueSets for Sharing
  - provision in a local FHIR Terminology Server (Ontoserver)



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- CodeSystems not available from ART-DECOR currently, and not elsewhere available either
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- Lack of CodeSystems prohibits use of operations on FHIR TS
- Generate CodeSystems from the available ValueSet resources



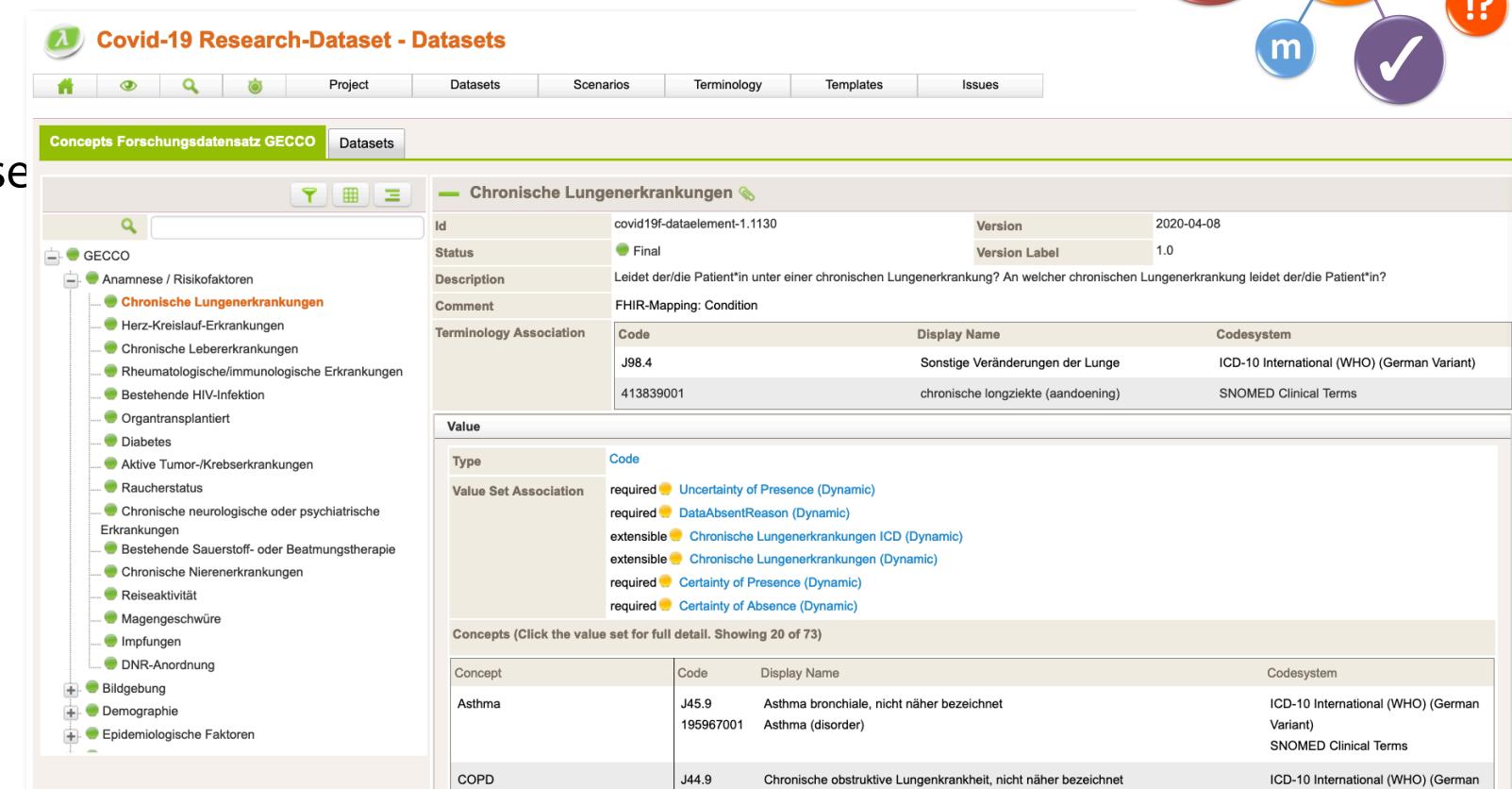
# Integrating the Healthcare Enterprise (IHE)

- IHE defines several integration profiles
  - e.g., XDS.b: Cross-Enterprise Document Sharing for exchange of documents (e.g. patient files)
- XDS.b requires use of coded information in the meta-model
  - “Container format” that can be used for exchange of machine-readable documents (e.g. HL7 CDA) alongside human-readable documents (e.g. scanned PDF documents)
  - Identification of metadata elements in container using standard terminology



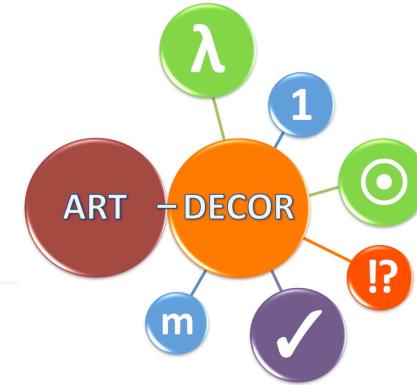
# ART-DECOR

- “Advanced Requirements Tooling using Data Elements, Codes, OIDs and Rules”
  - System for development of data set specifications
  - Used extensively for HL7 Clinical Document Architecture (CDA) profiling
- Implementation-independent logical models of the data sets
  - Transformation of models to e.g. FHIR, openEHR, CDA et al.

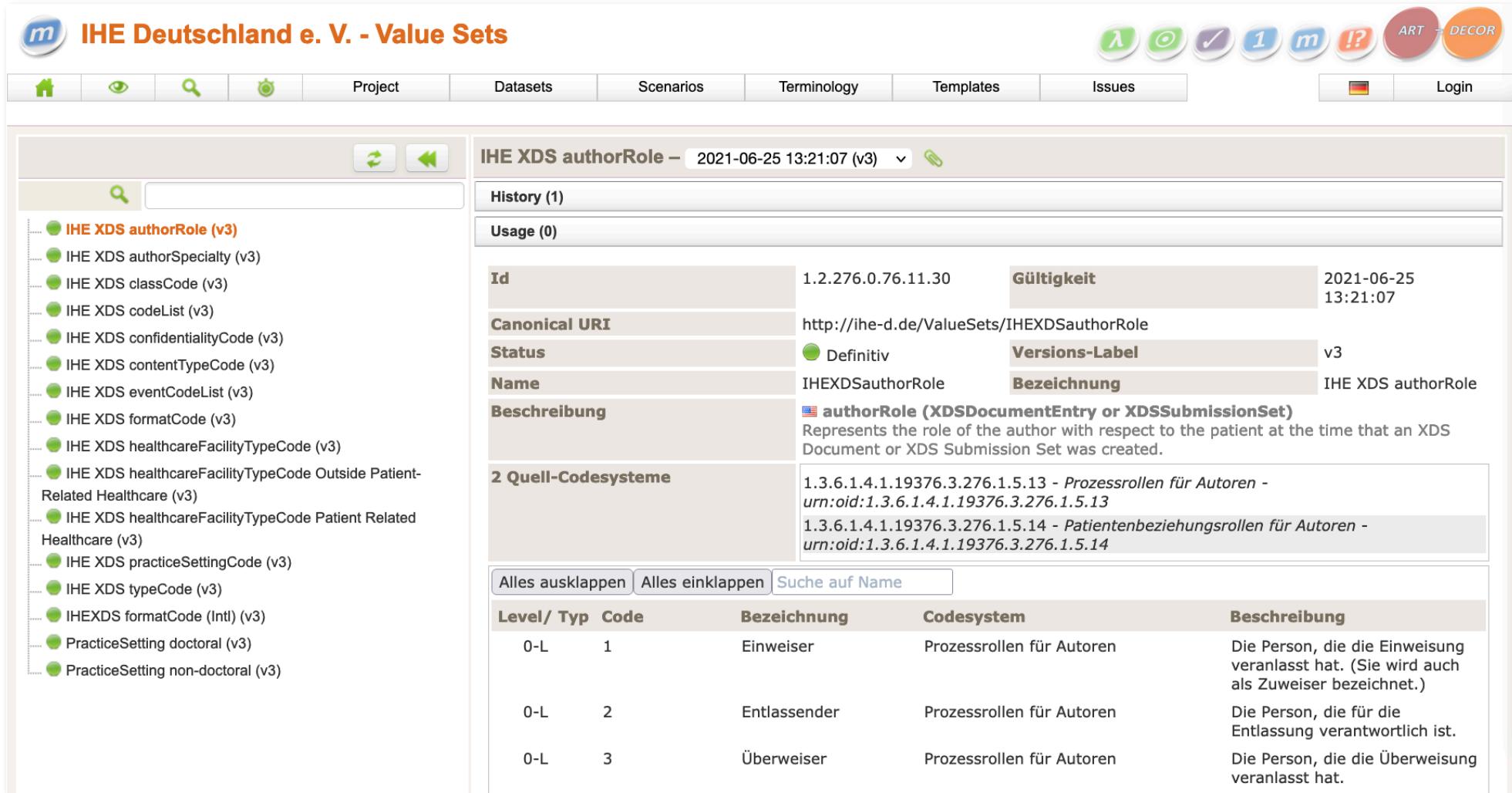


Id	covid19f-dataelement-1.1130	Version	2020-04-08									
Status	Final	Version Label	1.0									
Description	Leidet der/die Patient*in unter einer chronischen Lungenerkrankung? An welcher chronischen Lungenerkrankung leidet der/die Patient*in?											
Comment	FHIR-Mapping: Condition											
Terminology Association	<table border="1"><thead><tr><th>Code</th><th>Display Name</th><th>Codesystem</th></tr></thead><tbody><tr><td>J98.4</td><td>Sonstige Veränderungen der Lunge</td><td>ICD-10 International (WHO) (German Variant)</td></tr><tr><td>413839001</td><td>chronische longziekte (aandoening)</td><td>SNOMED Clinical Terms</td></tr></tbody></table>	Code	Display Name	Codesystem	J98.4	Sonstige Veränderungen der Lunge	ICD-10 International (WHO) (German Variant)	413839001	chronische longziekte (aandoening)	SNOMED Clinical Terms		
Code	Display Name	Codesystem										
J98.4	Sonstige Veränderungen der Lunge	ICD-10 International (WHO) (German Variant)										
413839001	chronische longziekte (aandoening)	SNOMED Clinical Terms										
<b>Value</b>												
Type	Code											
Value Set Association	<ul style="list-style-type: none"><li>required <span style="color: yellow;">Uncertainty of Presence (Dynamic)</span></li><li>required <span style="color: yellow;">DataAbsentReason (Dynamic)</span></li><li>extensible <span style="color: yellow;">Chronische Lungenerkrankungen ICD (Dynamic)</span></li><li>extensible <span style="color: yellow;">Chronische Lungenerkrankungen (Dynamic)</span></li><li>required <span style="color: yellow;">Certainty of Presence (Dynamic)</span></li><li>required <span style="color: yellow;">Certainty of Absence (Dynamic)</span></li></ul>											
Concepts (Click the value set for full detail. Showing 20 of 73)												
Concept	Code	Display Name	Codesystem									
Asthma	J45.9 195967001	Asthma bronchiale, nicht näher bezeichnet Asthma (disorder)	ICD-10 International (WHO) (German Variant) SNOMED Clinical Terms									
COPD	J44.9	Chronische obstruktive Lungenerkrankheit, nicht näher bezeichnet	ICD-10 International (WHO) (German Variant)									

Logo: <https://art-decor.org/>; Screenshot: GECCO valueset in ART-DECOR main server, <https://art-decor.org/art-decor/decor-datasets--covid19f?-id=2.16.840.1.113883.3.1937.777.53.1.1&effectiveDate=2020-04-08T13%3A04%3A13&language=de-DE> [accessed 2021-09-21]



# ART-DECOR and IHE ValueSets



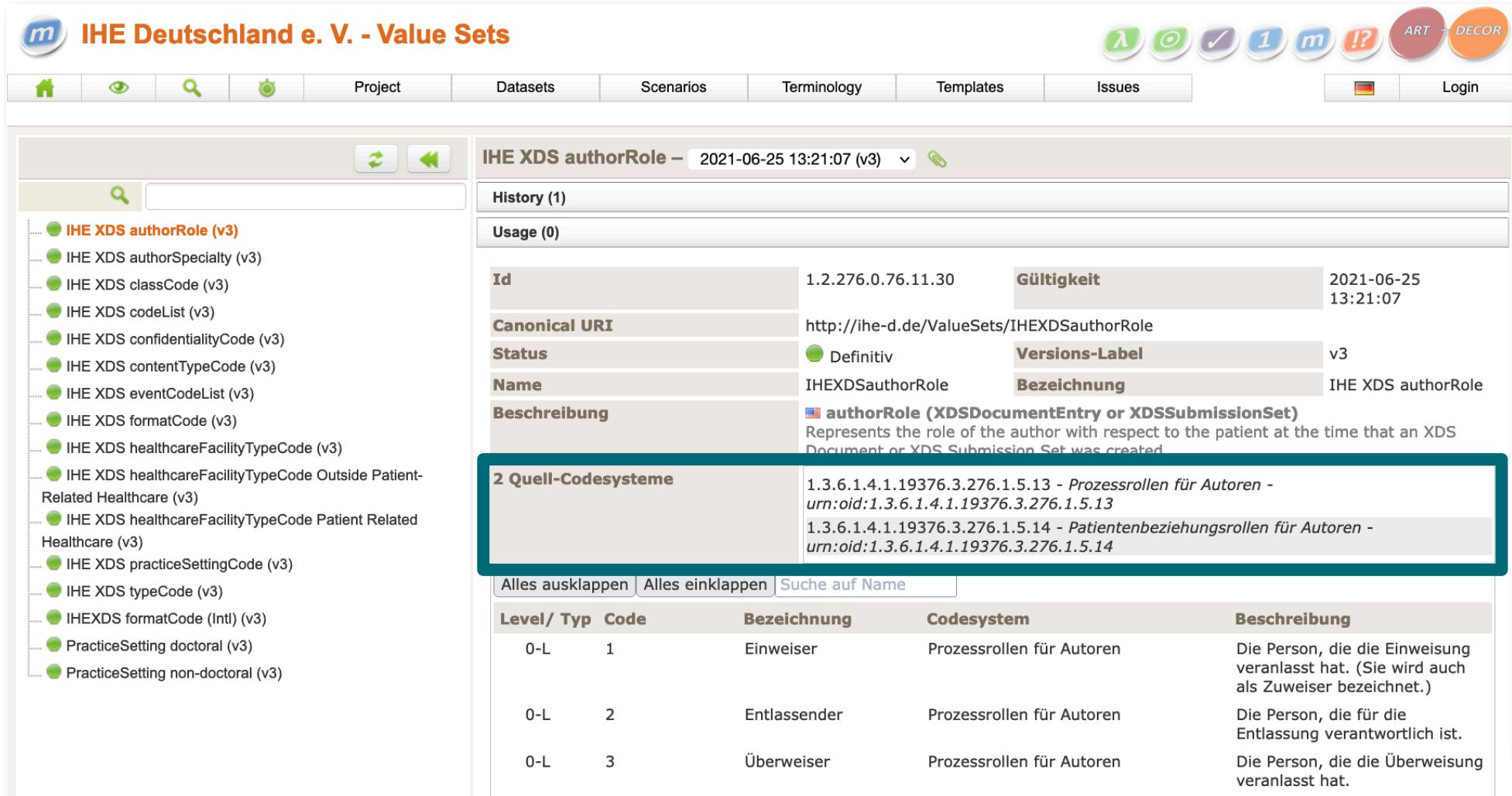
The screenshot shows the ART-DECOR web application interface. The top navigation bar includes the logo, the text "IHE Deutschland e. V. - Value Sets", and various menu items: Home, Project, Datasets, Scenarios, Terminology, Templates, Issues, a German flag, and a Login button. To the right of the menu is a toolbar with icons for search, refresh, and other functions, followed by a "ART → DECOR" button.

The main content area displays the "IHE XDS authorRole" ValueSet. The left sidebar lists other available ValueSets. The main panel shows the following details:

- History (1)**: Shows one entry from 2021-06-25 13:21:07 (v3).
- Usage (0)**: No usage information is present.
- Id**: 1.2.276.0.76.11.30
- Canonical URI**: <http://ihe-d.de/ValueSets/IHEXDSauthorRole>
- Status**: Definitiv
- Versions-Label**: v3
- Name**: IHEXDSauthorRole
- Bezeichnung**: IHE XDS authorRole
- Beschreibung**:  
**authorRole (XDSDocumentEntry or XDSSubmissionSet)**  
Represents the role of the author with respect to the patient at the time that an XDS Document or XDS Submission Set was created.
- 2 Quell-Codesysteme**:  
1.3.6.1.4.1.19376.3.276.1.5.13 - Prozessrollen für Autoren -  
urn:oid:1.3.6.1.4.1.19376.3.276.1.5.13  
1.3.6.1.4.1.19376.3.276.1.5.14 - Patientenbeziehungsrollen für Autoren -  
urn:oid:1.3.6.1.4.1.19376.3.276.1.5.14
- Level / Typ**: 0-L
- Code**: 1
- Bezeichnung**: Einweiser
- Codesystem**: Prozessrollen für Autoren
- Beschreibung**: Die Person, die die Einweisung veranlasst hat. (Sie wird auch als Zuweiser bezeichnet.)
- Level / Typ**: 0-L
- Code**: 2
- Bezeichnung**: Entlassender
- Codesystem**: Prozessrollen für Autoren
- Beschreibung**: Die Person, die für die Entlassung verantwortlich ist.
- Level / Typ**: 0-L
- Code**: 3
- Bezeichnung**: Überweiser
- Codesystem**: Prozessrollen für Autoren
- Beschreibung**: Die Person, die die Überweisung veranlasst hat.

Image: ART-DECOR ValueSet, Project IHE XDS ValueSets for Sharing, <https://art-decor.org/art-decor/decor-valuesets--ihede-> [accessed 2021-09-2021]

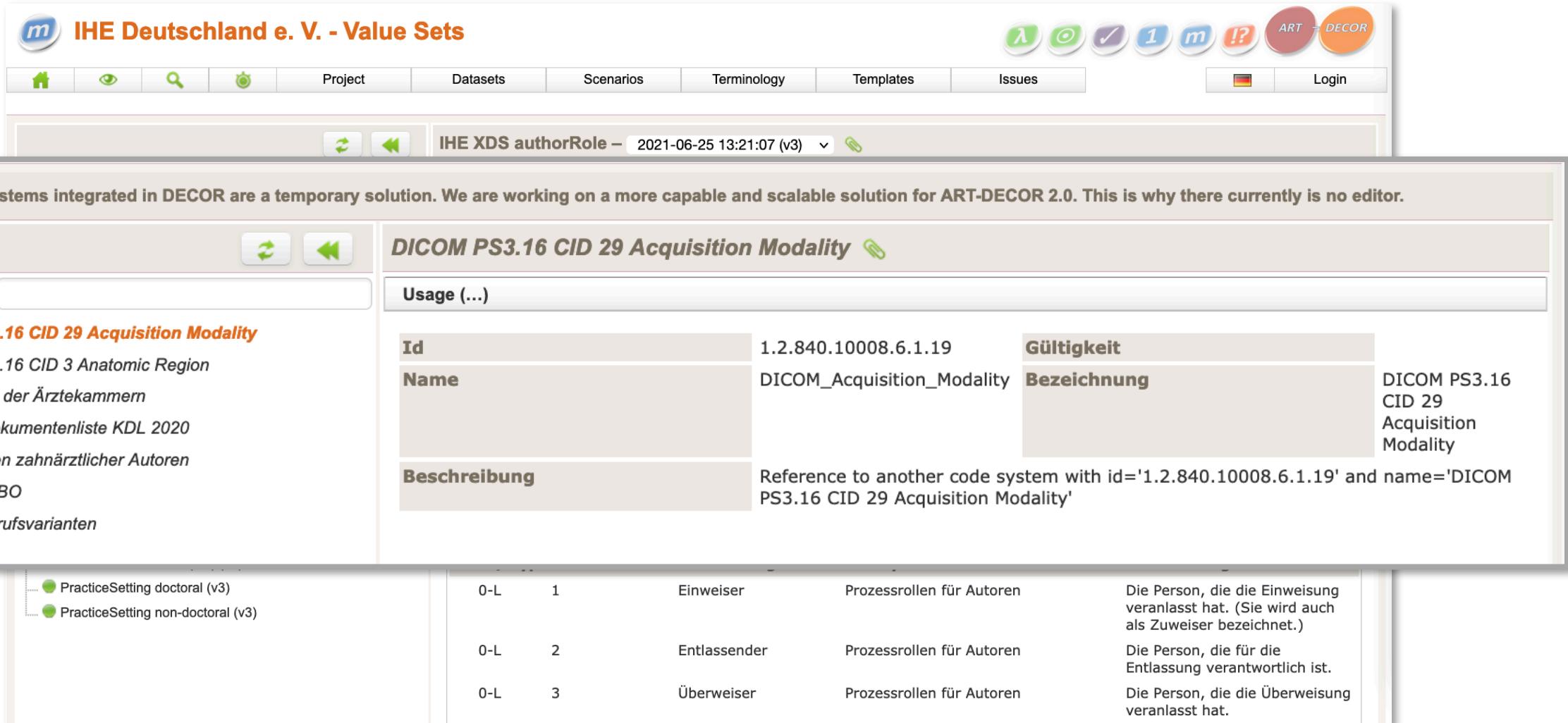
# ART-DECOR and IHE ValueSets



The screenshot shows the IHE Deutschland e. V. - Value Sets interface. The left sidebar lists various IHE XDS ValueSets, including the selected "IHE XDS authorRole (v3)". The main content area displays the "IHE XDS authorRole" ValueSet details. It includes sections for History (1), Usage (0), and a detailed view of the ValueSet itself. The "Beschreibung" section defines the "authorRole" as a role related to the patient at the time of document creation. Below this, a section titled "2 Quell-Codesysteme" lists two source code systems: "1.3.6.1.4.1.19376.3.276.1.5.13 - Prozessrollen für Autoren" and "1.3.6.1.4.1.19376.3.276.1.5.14 - Patientenbeziehungsrollen für Autoren". The bottom part of the screen shows a table mapping levels (0-L) to codes (1, 2, 3) and their descriptions.

Level / Typ	Code	Bezeichnung	Codesystem	Beschreibung
0-L	1	Einweiser	Prozessrollen für Autoren	Die Person, die die Einweisung veranlasst hat. (Sie wird auch als Zuweiser bezeichnet.)
0-L	2	Entlassender	Prozessrollen für Autoren	Die Person, die für die Entlassung verantwortlich ist.
0-L	3	Überweiser	Prozessrollen für Autoren	Die Person, die die Überweisung veranlasst hat.

# ART-DECOR and IHE ValueSets



The screenshot shows the IHE Deutschland e. V. - Value Sets web application. At the top, there is a navigation bar with icons for Home, Search, Project, Datasets, Scenarios, Terminology, Templates, and Issues. On the right side of the header are language selection (German) and a Login button. Below the header, a toolbar includes icons for refresh, back, forward, and search. The main content area displays a message: "Warning! Code systems integrated in DECOR are a temporary solution. We are working on a more capable and scalable solution for ART-DECOR 2.0. This is why there currently is no editor." Below this, a specific value set is shown: "DICOM PS3.16 CID 29 Acquisition Modality". The details for this code system are listed in a table:

<b>Id</b>	1.2.840.10008.6.1.19	<b>Gültigkeit</b>
<b>Name</b>	DICOM_Acquisition_Modality	<b>Bezeichnung</b>
<b>Beschreibung</b>	Reference to another code system with id='1.2.840.10008.6.1.19' and name='DICOM PS3.16 CID 29 Acquisition Modality'	

On the left side of the main content area, there is a sidebar with a search icon and a list of integrated code systems:

- DICOM PS3.16 CID 29 Acquisition Modality** (selected)
- DICOM PS3.16 CID 3 Anatomic Region
- Facharzttitle der Ärztekammern
- Klinische Dokumentenliste KDL 2020
- Qualifikatoren zahnärztlicher Autoren
- S\_BAR2\_WBO
- Ärztliche Berufsvarianten

At the bottom of the page, there is a table showing the usage of the selected code system:

	0-L	1	Einweiser	Prozessrollen für Autoren	Die Person, die die Einweisung veranlasst hat. (Sie wird auch als Zuweiser bezeichnet.)
PracticeSetting doctoral (v3)	0-L	2	Entlassender	Prozessrollen für Autoren	Die Person, die für die Entlassung verantwortlich ist.
PracticeSetting non-doctoral (v3)	0-L	3	Überweiser	Prozessrollen für Autoren	Die Person, die die Überweisung veranlasst hat.



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  - Specifications for the representation and exchange of terminological artefacts needed



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- Separation of concerns: code system vs. value sets!

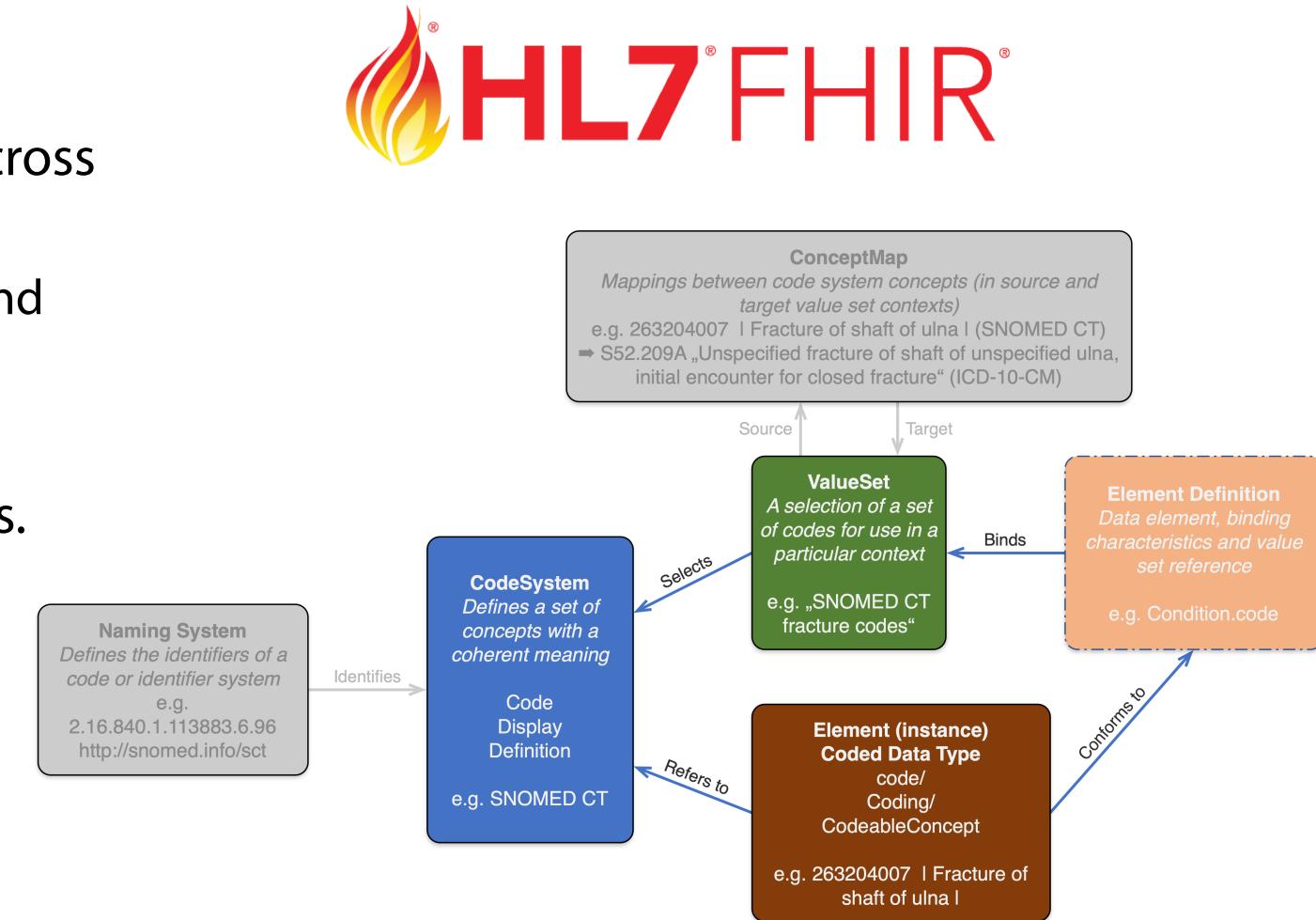


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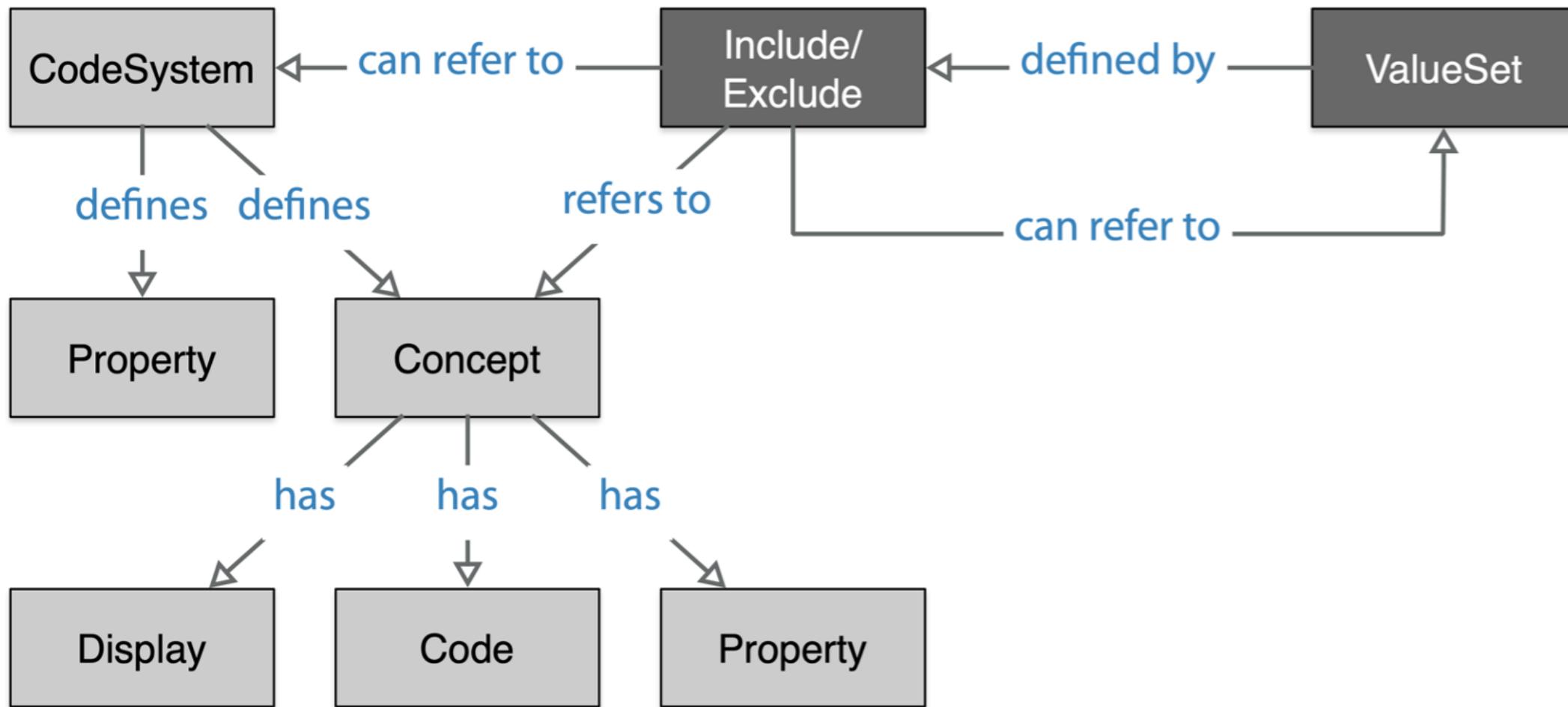
- Terminology must be exchangeable across institutions
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- Utilization of terminology servers (TS) and standard-compliant resources
  - HL7 FHIR R4 Terminology Package
    - Resources
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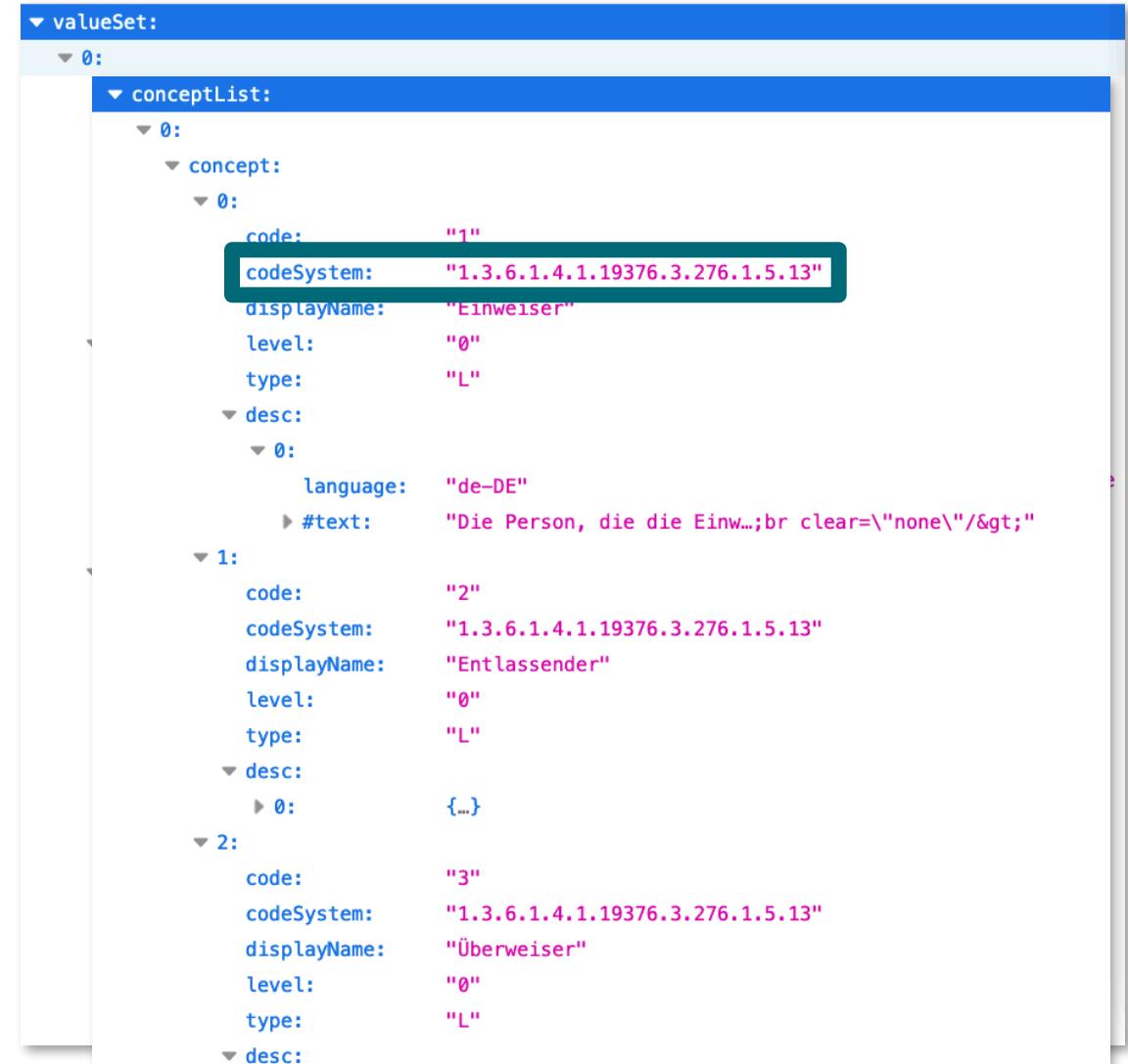


# CodeSystem/ValueSet Dichotomy in HL7 FHIR



# Conversion Process

- Input: native ART-DECOR JSON

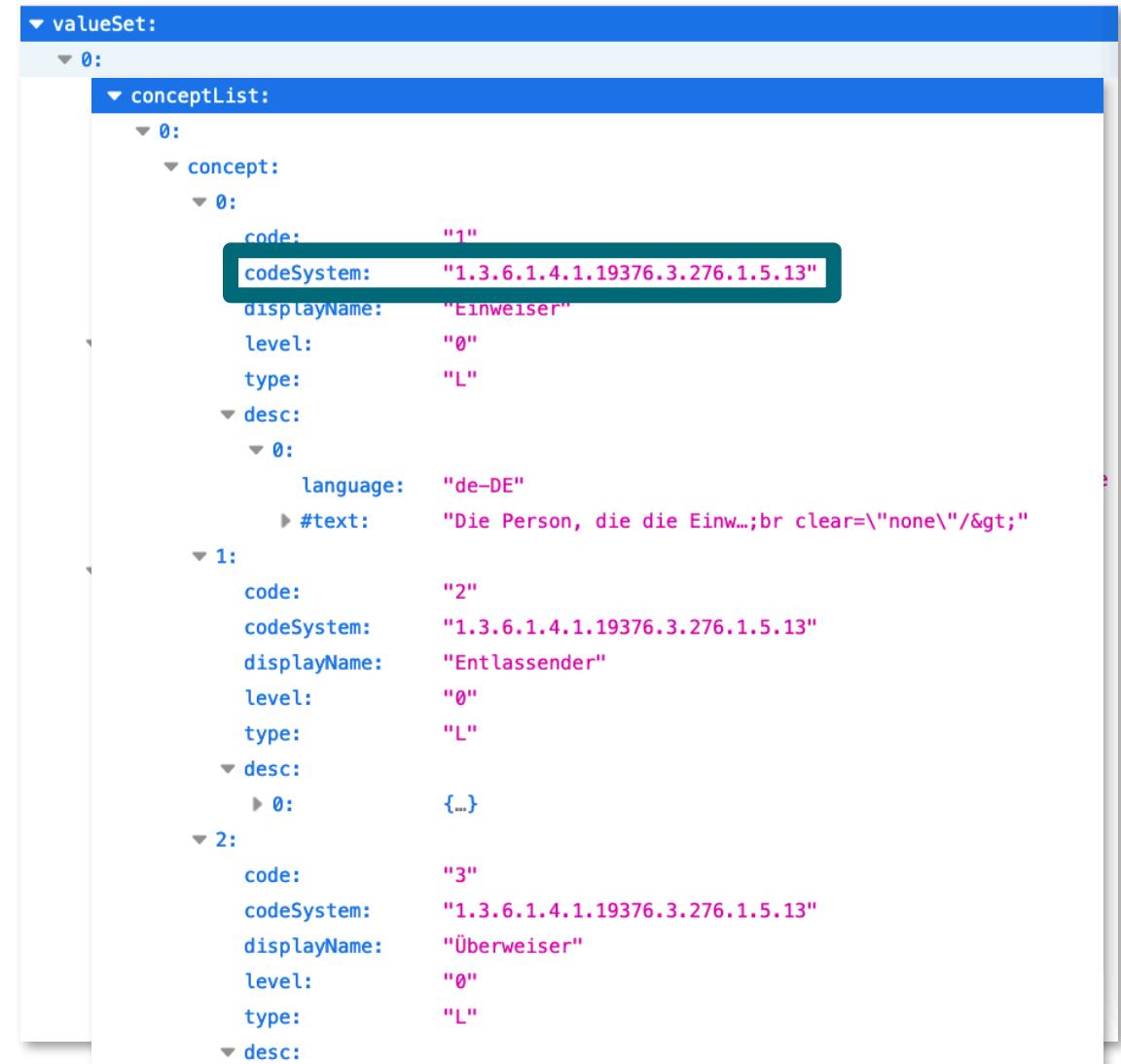


```
valueSet:  
  0:  
    conceptList:  
      0:  
        concept:  
          0:  
            code: "1"  
            codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
            displayName: "Einweiser"  
            level: "0"  
            type: "L"  
            desc:  
              0:  
                language: "de-DE"  
                #text: "Die Person, die die Einweiser; br clear='none'"/>"  
      1:  
        code: "2"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Entlassender"  
        level: "0"  
        type: "L"  
        desc:  
          0:  
            {...}  
      2:  
        code: "3"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Überweiser"  
        level: "0"  
        type: "L"  
        desc:
```

Images: ART-DECOR native JSON for IHEDSauthorRole ValueSet, <http://art-decor.org/decor/services/RetrieveValueSet?prefix=ihede-&language=de-DE&version=&id=1.2.276.0.76.11.30&effectiveDate=2021-06-25T13%3A21%3A07&format=json> [accessed: 2021-09-21]

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- Assumption: all codes of CodeSystems are enumerated within the project
  - not necessarily within one resource
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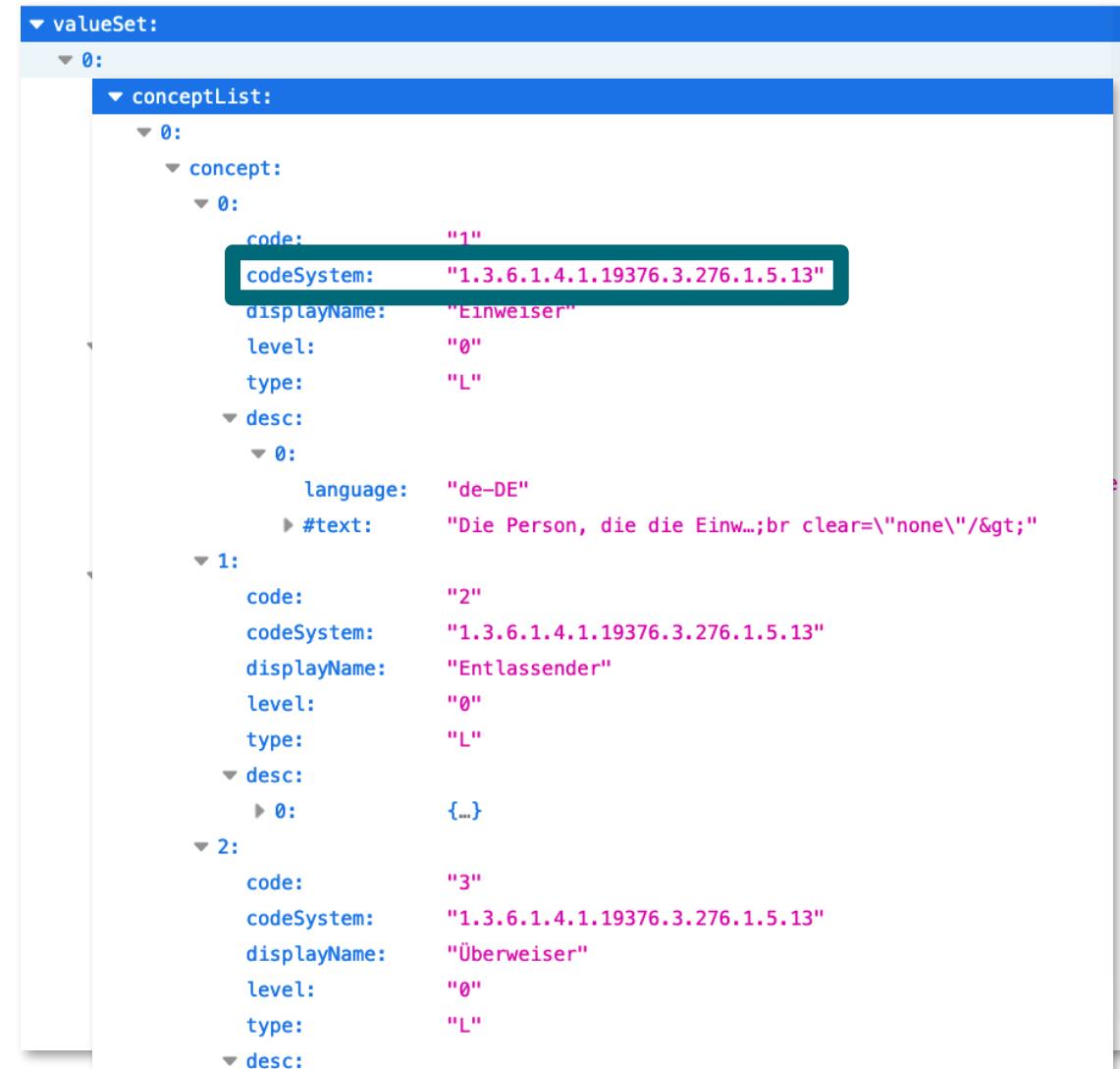


```
valueSet:  
  0:  
    conceptList:  
      0:  
        concept:  
          0:  
            code: "1"  
            codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
            displayName: "Einweiser"  
            level: "0"  
            type: "L"  
            desc:  
              0:  
                language: "de-DE"  
                #text: "Die Person, die die Einw...;br clear=\"none\"/>"  
      1:  
        code: "2"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Entlassender"  
        level: "0"  
        type: "L"  
        desc:  
          0:  
            ...  
      2:  
        code: "3"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Überweiser"  
        level: "0"  
        type: "L"  
        desc:
```

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  0:  
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      0:  
        concept:  
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            code: "1"  
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            desc:  
              0:  
                language: "de-DE"  
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        code: "2"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Entlassender"  
        level: "0"  
        type: "L"  
        desc:  
          0:  
            ...  
      2:  
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        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
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        level: "0"  
        type: "L"  
        desc:
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- Assumption: all codes of CodeSystems are enumerated within the project
  - not necessarily within one resource
  - merging of resources during processing
- Hierarchy of codes (level, type) to be mirrored
- Only render resources that are not elsewhere defined
  - OID matcher: ignore entire OID subtrees
  - e.g. HL7 Terminology 2.16.840.1.113883.5



```
valueSet:  
  0:  
    conceptList:  
      0:  
        concept:  
          0:  
            code: "1"  
            codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
            displayName: "Einweiser"  
            level: "0"  
            type: "L"  
            desc:  
              0:  
                language: "de-DE"  
                #text: "Die Person, die die Einw...;br clear=\"none\"/>"  
      1:  
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        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Entlassender"  
        level: "0"  
        type: "L"  
        desc:  
          0:  
            ...  
      2:  
        code: "3"  
        codeSystem: "1.3.6.1.4.1.19376.3.276.1.5.13"  
        displayName: "Überweiser"  
        level: "0"  
        type: "L"  
        desc:
```

Images: ART-DECOR native JSON for IHEDSAuthorRole ValueSet, <http://art-decor.org/decor/services/RetrieveValueSet?prefix=ihede-&language=de-DE&version=&id=1.2.276.0.76.11.30&effectiveDate=2021-06-25T13%3A21%3A07&format=json> [accessed: 2021-09-21]

## Lessons Learned



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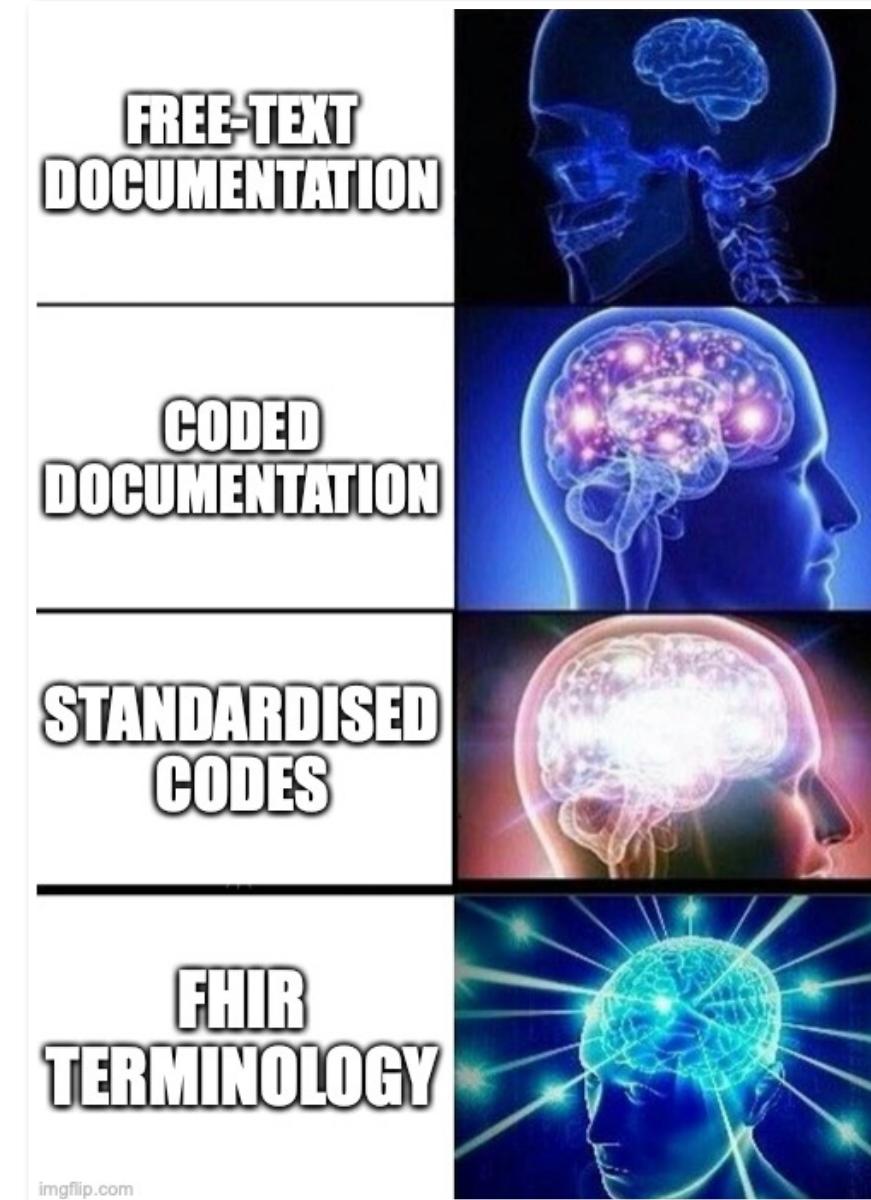
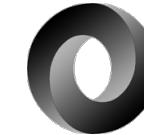
## Lessons Learned



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- One resource converted manually using GUI tooling → tools exist!

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- FHIR JSON is easier than XML
- One resource converted manually using GUI tooling → tools exist!
- Go FHIR, it's not that hard!



## Discussion

- In a FHIR-based world, terminology should be FHIR also
- Need for terminology servers to distribute resources across the ecosystem

## Workshop „Terminologie-Management für nationale E-Health-Infrastrukturen“

[zurück](#)



30.09.2021 10:00 – 15:30



Satelliten Event

Zum Event: <https://www.gmds.de/de/aktivitaeten/medizinische-informatik/arbeitsgruppenseiten/medizinische-terminologien-und-klassifikationen-mtk/>

Ansprechpartner: Prof. Dr. Josef Ingenerf, GMDS-AG „Medizinische Terminologien und Klassifikationen“ ([MTK](#))  
Ansprechpartnerin: Prof. Dr. Sylvia Thun, GMDS-AG „Standards für Interoperabilität und elektronische Gesundheitsakten“ ([SIE](#))



## Contact

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- [@jpwiedekopf](https://twitter.com/jpwiedekopf)
- [www.linkedin.com/in/jpwiedekopf](https://www.linkedin.com/in/jpwiedekopf)

