



Re-deployment and availability of current KDS resources

Workshop Central Terminology Server for MII & NUM: Actual state in 2024

Joshua Wiedekopf, M.Sc., University of Lübeck

Status quo ante

- Deployment used server established within the HiGHmed project
- “That server in Cologne” - <https://terminology-highmed.medic.medfak.uni-koeln.de/fhir>
- Resources on the server have evolved organically over time in response to ad-hoc requests
- Little to no insight to customers about resources available on the server
- Little to no insight to us about who is responsible for resources, where do they come from, ...
- Re-deployment necessary

CodeSystemde.dktk-FMLokalisationCS-1.2.0	FMLokalisationCS	http://dktk.dkfz.de/fhir/onco/core/CodeSystem/FMLokalisationCS	0.9.0
CodeSystemops2014	OPS	http://fhir.de/CodeSystem/dimdi/ops	2014
CodeSystemops2021	OPS	http://fhir.de/CodeSystem/dimdi/ops	2021
CodeSystemv3-Race	v3 Code System Race	http://terminology.hl7.org/CodeSystem/v3-Race	2018-08-12
CodeSystemHiGHmedBildgebendesVerfahren01	HiGHmed Bildgebendes Verfahren	http://highmed.org/fhir/CodeSystem/bildgebendes-verfahren	1.0
CodeSystemHiGHmedRadiomicsGesamtstatusdesErgebnissesErgebnisses	HiGHmed Radiomics Gesamtstatus des Ergebnisses	http://highmed.org/fhir/CodeSystem/onko/radiomics-gesamtstatus-des-ergebnisses	1.0
CodeSystemlist-status	ListStatus	http://hl7.org/fhir/list-status	4.0.1
CodeSystemcondition-clinical	Condition Clinical Status Codes	http://terminology.hl7.org/CodeSystem/condition-clinical	4.0.1
CodeSystemde.dktk-TNMcpuPraefixNCS-1.2.0	TNMcpuPraefixNCS	http://dktk.dkfz.de/fhir/onco/core/CodeSystem/TNMcpuPraefixNCS	0.9.0
CodeSystemgecco-codesystem-frailty-score	Frailty Score	https://www.netzwerk-universitaetsmedizin.de/fhir/CodeSystem/frailty-score	1.0
CodeSystemICD10GM2022	ICD-10	http://fhir.de/CodeSystem/bfarm/icd-10-gm	2022
CodeSystemCodeSystemWirkstofftyp	CodeSystem - Wirkstofftypen	https://www.medizinformatik-initiative.de/fhir/core/modul-medikation/CodeSystem/wirkstofftyp	1.0
CodeSystemicd10gm2017	ICD-10	http://fhir.de/CodeSystem/dimdi/icd-10-gm	2017
CodeSystemHiGHmedRadiomicsStatusdesErgebnisses	HiGHmed Radiomics Status des Ergebnisses	http://highmed.org/fhir/CodeSystem/onko/radiomics-status-des-ergebnisses	1.0
CodeSystemATC2021	Anatomisch-therapeutisch chemische Klassifikation (ATC) Amtliche deutsche Fassung 2021	http://fhir.de/CodeSystem/bfarm/atc	2021
CodeSystemmil-cs-medikation-ask-20240418	MII CS Medikation ASK 2024-04-18	http://fhir.de/CodeSystem/ask	2024-04-18
CodeSystemicd10who2019	ICD-10	http://fhir.de/CodeSystem/dimdi/icd-10-who	2019
CodeSystemgecco-codesystem-sofa-score	SOFA Score	https://www.netzwerk-universitaetsmedizin.de/fhir/CodeSystem/sofa-score	1.0.4
CodeSystemspecimen-status	SpecimenStatus	http://hl7.org/fhir/specimen-status	4.0.1

New deployment concept

- Deployment of a new server at <https://ontoserver.mii-term serv.de/fhir>
- Management of resources no longer using ad-hoc requests
- Consistent use of FHIR NPM Packages for resource management
- Rigid QA/QC processes for deployment of new packages
 - Availability of all dependencies of the contained terminologies
 - Availability of dependent resources coming from profiles in the managed resources
- Scope not limited to KDS packages and dependencies, [other customers can request resources by providing packages they'll be responsible for](#)
- Package-based deployment enables deterministic setup of mirrored servers
- Transparency by design

FHIR NPM Packages

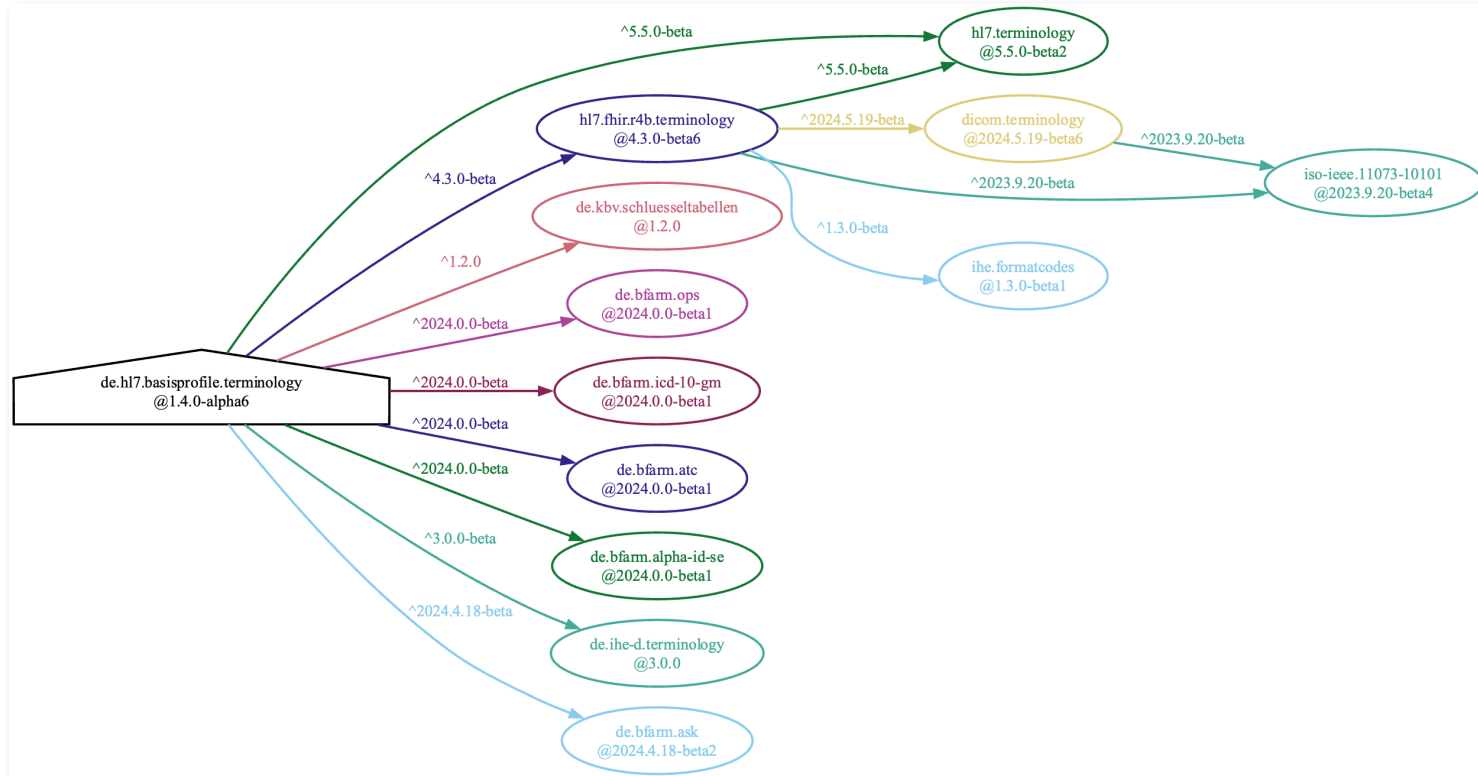
- Part of the FHIR specification as of R5
- Adapted from internet-specific specifications for distribution of JavaScript code
- Already in broad use in the FHIR community, including the MII
- Packages distributed via registry, most commonly registry.fhir.org (c/o simplifier.net)
 - e.g. <https://simplifier.net/packages/de.medizininformatikinitiative.kerndatensatz.person>

```
.└─ package
  ├── .index.json
  ├── CapabilityStatement-mii-cps-person-cap-stat.json
  ├── CodeSystem-mii-cs-person-vitalstatus.json
  ├── MII_IG_Person_DE_v2024.json
  ├── SearchParameter-mii-sp-person-adresszusatz.json
  ├── SearchParameter-mii-sp-person-assignerpid.json
  ├── StructureDefinition-mii-lm-person.json
  ├── StructureDefinition-mii-pr-person-patient-pseudo.json
  ├── StructureDefinition-mii-pr-person-patient.json
  ├── StructureDefinition-mii-pr-person-proband.json
  ├── StructureDefinition-mii-pr-person-todesursache.json
  ├── StructureDefinition-mii-pr-person-vitalstatus.json
  ├── ValueSet-mii-vs-person-vitalstatus.json
  └─ examples
     ├── Condition-mii-exa-person-condition-todesursache.json
     ├── Observation-mii-exa-person-observation-vital.json
     ├── Patient-mii-exa-person-patient-full.json
     ├── Patient-mii-exa-person-patient-minimal.json
     ├── Patient-mii-exa-person-patient-pseudonymisiert.json
     └── ResearchSubject-mii-exa-person-researchsubject.json
  ├── icd10who2016.json
  ├── icd10who2019.json
  └── package.json
```

Package distribution for SU-TermServ

- Re-packaging of resources necessary to:
 - Add provenance information using meta.tag
 - Ensure that resource IDs do not clash across resources and are human-understandable
 - Detect and fix issues in the original distributions that prevent e.g. ValueSet expansion
 - Identify and distribute dependencies of all packages
- Distribution only of terminological content in our redistribution (no profiles etc.)
 - Some resources are pulled out from the “original” packages (e.g., ICD-10-WHO from KDS-Person or ATC from DE-Basis) and replaced with comprehensive packages used as dependencies
 - E.g. ICD-10-GM package distributes all versions starting 2010 and will be updated yearly when new versions become available from BfArM
 - Upstream resources becoming available as FHIR (NTS@BfArM) can be distributed independently of KDS release
- Use of most-current balloted versions of the packages; concurrent package distribution of in-ballot packages is also possible
- Some resources generated from authoritative sources using our own [open-source BabelFSH tool](#)

Package Dependencies



Distribution architecture

- Use of the GitLab Package Registry allows automatic publishing of packages based on Git repositories
 - Simple tooling for us allows high flexibility independent of other actors
 - Git-based workflow also allows collaborative efforts
- <https://gitlab.com/mii-termserve/fhir-resources>
- Versions track those of upstream packages

The screenshot shows the 'fhir-resources' GitLab Package Registry page. It features a search bar and a list of subgroups and projects. The subgroups listed are 'bfarm', 'highmed', 'mii-kerndatensatz', and 'scripts'. Each subgroup has a star icon and a '1' icon. Below the subgroups, there is a list of packages with their names, star icons, and '2 months ago' or '1 month ago' timestamps. The packages listed are 'de.bbmf.fhir.terminology', 'de.dtk.terminology', 'de.gecco.terminology', 'HL7.de.hl7.basisprofile.terminology', 'IHE.de.ihe-d.terminology', 'de.kbv.schlussettellen', and 'de.sutermserve.governance.terminology'.

The screenshot shows the 'Package Registry' page with 41 packages. The packages are listed with their names, versions, and publication dates. The packages listed are:

- @mii-termserve/de.sutermserve.governance.terminology 2.0.0-alpha2 - rpm Published to de.sutermserve.governance.terminology by Joshua Wiedekopf, 8 days ago
- @mii-termserve/de.kbv.schlussettellen 1.2.0-rc1 - rpm Published to de.kbv.schlussettellen by Joshua Wiedekopf, 6 days ago
- @mii-termserve/de.sutermserve.governance.terminology 2.0.0-alpha1 - rpm Published to de.sutermserve.governance.terminology by Joshua Wiedekopf, 6 days ago
- @mii-termserve/org.unitsformasures 2024.71-rc1 - rpm Published to org.unitsformasures by Joshua Wiedekopf, 8 days ago
- @mii-termserve/de.sutermserve.governance.terminology 2.0.0-alpha0 - rpm Published to de.sutermserve.governance.terminology by Joshua Wiedekopf, 1 week ago
- @mii-termserve/h7.uv.ipa.terminology 1.1.0-alpha5 - rpm Published to h7.uv.ipa.terminology by Joshua Wiedekopf, 1 week ago
- @mii-termserve/h7.uv.ipa.terminology 1.1.0-alpha4 - rpm Published to h7.uv.ipa.terminology by Joshua Wiedekopf, 1 week ago
- @mii-termserve/h7.uv.ipa.terminology 1.1.0-alpha3 - rpm Published to h7.uv.ipa.terminology by Joshua Wiedekopf, 1 week ago
- @mii-termserve/de.medizinformatikinitiative.kerndatensatz.terminology.fat 2024.01-beta0 - rpm Published to de.medizinformatikinitiative.kerndatensatz.terminology.fat by Joshua Wiedekopf, 1 week ago
- @mii-termserve/de.medizinformatikinitiative.kerndatensatz.terminology.person 2024.0.0-beta4 - rpm Published to de.medizinformatikinitiative.kerndatensatz.terminology.person by Joshua Wiedekopf, 1 week ago
- @mii-termserve/de.medizinformatikinitiative.kerndatensatz.terminology.diag 2024.0.0-beta1 - rpm Published to de.medizinformatikinitiative.kerndatensatz.terminology.diag by Joshua Wiedekopf, 1 week ago

Quality Assurance & Quality Control

- Set of ([public, open-source](#)) Python scripts ensure integrity of our distribution
- Dependency tracing: *are all resources (e.g. ValueSets) that are referenced in the original package available in the infrastructure?*
- Validations:
 - *Are there conflicts between packages?*
 - *Do all ValueSets \$expand, can we \$lookup codes from the CodeSystems, ...*
- Deployment to an internal test server of all packages
- Provenance
 - Application of tags to make project and dataset context(-s) transparent on the resource level
 - Application of license tag linking to a section on our website, giving brief descriptions of relevant license terms and usage restriction
- Scripts found relevant bugs in core specifications and MII packages that have been reported and discussed

CRMI Package Feed

- [Canonical Resource Management Infrastructure Implementation Guide](#)
 - Development and deployment lifecycle for resources with canonical URLs
 - Including terminological resources
- Publishing and distribution covers packaging of resources and syndication feeds
 - [Extension for scope of resources](#) (which NPM package are they from) – extension applied to our resources
 - [Syndication](#) similar to Ontoserver feeds
 - API we developed implements this Atom profile and will be deployed next to Ontoserver to make uploaded packages transparent
 - Upload script updates CRMI feed automatically

```
<feed>
  <id>urn:uuid:64b60fc5-aec2-4d43-8b86-4f92d2369fa3</id>
  <title>SU-TermServ Package Feed</title>
  <updated>2024-07-02T16:52:54.028239+00:00</updated>
  <author>
    <name>SU-TermServ</name>
    <email>team@mail.mii-termse.de</email>
  </author>
  <link href="https://internal-test-server.mii-termse.de/crmi/syndication.xml"
    rel="self" />
  <generator uri="https://gitlab.com/mii-termse/crmi-syndication.git"
    version="0.9.7">CRMI Syndication Tool for MII SU-TermServ</generator>
  <entry>
    <id>mii-termse://de.bfarm.alpha-id-se/2024.0.0-beta1</id>
    <title>de.bfarm.alpha-id-se</title>
    <updated>2024-06-25T02:09:50.325247+00:00</updated>
    <link
      href="https://gitlab.com/mii-termse/fhir-resources/bfarm/
      de.bfarm.alpha-id-se/-/package_files/133726754/download" />
    <h17:fhirVersion>4.3.0</h17:fhirVersion>
    <h17:artifactType>resource</h17:artifactType>
    <h17:publishAction>publish</h17:publishAction>
    <h17:artifactVersion>2024.0.0-beta1</h17:artifactVersion>
  </entry>
  <entry>
    <id>mii-termse://de.bfarm.ask/2024.4.18-beta2</id>
    <title>de.bfarm.ask</title>
    <updated>2024-06-25T02:09:50.325247+00:00</updated>
    <link
      href="https://gitlab.com/mii-termse/fhir-resources/bfarm/de.bfarm.ask/-
      /package_files/134782852/download" />
    <h17:fhirVersion>4.3.0</h17:fhirVersion>
    <h17:artifactType>resource</h17:artifactType>
    <h17:publishAction>publish</h17:publishAction>
    <h17:artifactVersion>2024.4.18-beta2</h17:artifactVersion>
  </entry>
</feed>
```

Status and outlook

- Currently, work on KDS packages is ongoing
 - Some issues still need to be resolved
 - Some dependencies are WIP
 - Some resources will not be available until a MII-wide decision has been reached, e.g. PZN
- Server deployment with KDS resources and dependencies expected during July '24
- Updates pushed as new KDS releases become available
 - New infrastructure allows agile reaction to new releases and timely updates
 - SU-TermServ involved in further development of KDS and German dependencies
- UI/introspection for available resources will be developed after server goes live
- Coordination between SU-TermServ and FDPG+ to ensure process compatibility
- Distribution scheme for local terminology servers is WIP – see next talk!