



REDCap & FHIR

TMF REDCap Workshop
30.10.2019

Florian Seidel

Charité Universitätsmedizin Berlin

- **Fast Healthcare Interoperability Resources**
- Format zur strukturierten Ablage medizinischer Daten + REST API
 - modulare, erweiterbare Informationseinheiten (*Ressourcen*)
 - Informationsnetzwerk: Referenzen zwischen Ressourcen
 - Web-Technologien: XML/JSON, HTTP, SSL, ...
- Offene Spezifikation → <http://hl7.org/fhir/>
- Wird mit/durch die Community weiterentwickelt
→ z.B. <https://simplifier.net/Basisprofil-DE-R4>
- Kontakt zur der Community
→ <https://chat.fhir.org/>

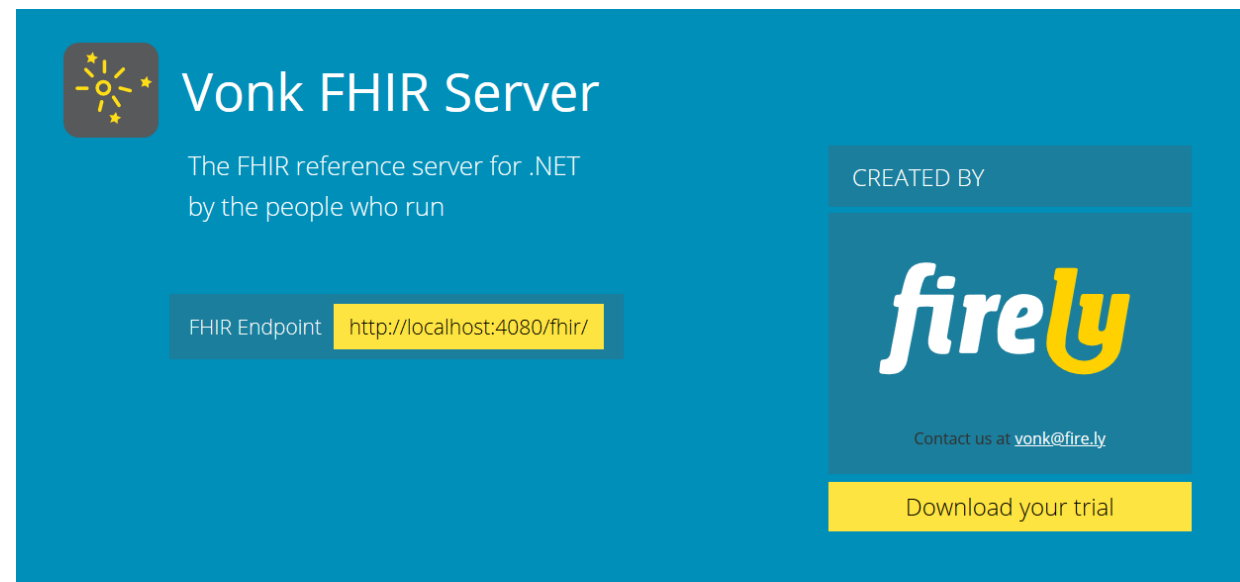


HL7[®] FHIR[®]

- SMART = **S**ubstitutable **M**edical **A**pplications, **R**eusable **T**echnologies
- Smart-on-FHIR = FHIR mit Security Layer
- Authentifizierung via OpenID Connect
- Scopes und Autorisierung via OAuth2.0



- Zahlreiche APIs in verschiedensten Sprachen verfügbar
- Zahlreiche Server Implementierungen + Integrationen in EHR-Systemen
- Charité: Vonk FHIR Server
(<https://fire.ly/products/vonk/>)
 - Performanter headless FHIR Server
 - Keine direkte SMART-on-FHIR Integration
(<https://github.com/FirelyTeam/Vonk.IdentityServer.Test>)



Vonk FHIR Server
The FHIR reference server for .NET
by the people who run

FHIR Endpoint `http://localhost:4080/fhir/`

CREATED BY
firely
Contact us at vonk@fire.ly
Download your trial

SERVER

VONK 3.0.0.0

This server implements FHIR STU3 and R4. It was built with SQL and ASP.NET Core.

license: Evaluation license
licensed to: florian.seidel@charite.de
until: 2019-11-18

CAPABILITIES

Find out what Vonk can do by viewing the CapabilityStatement

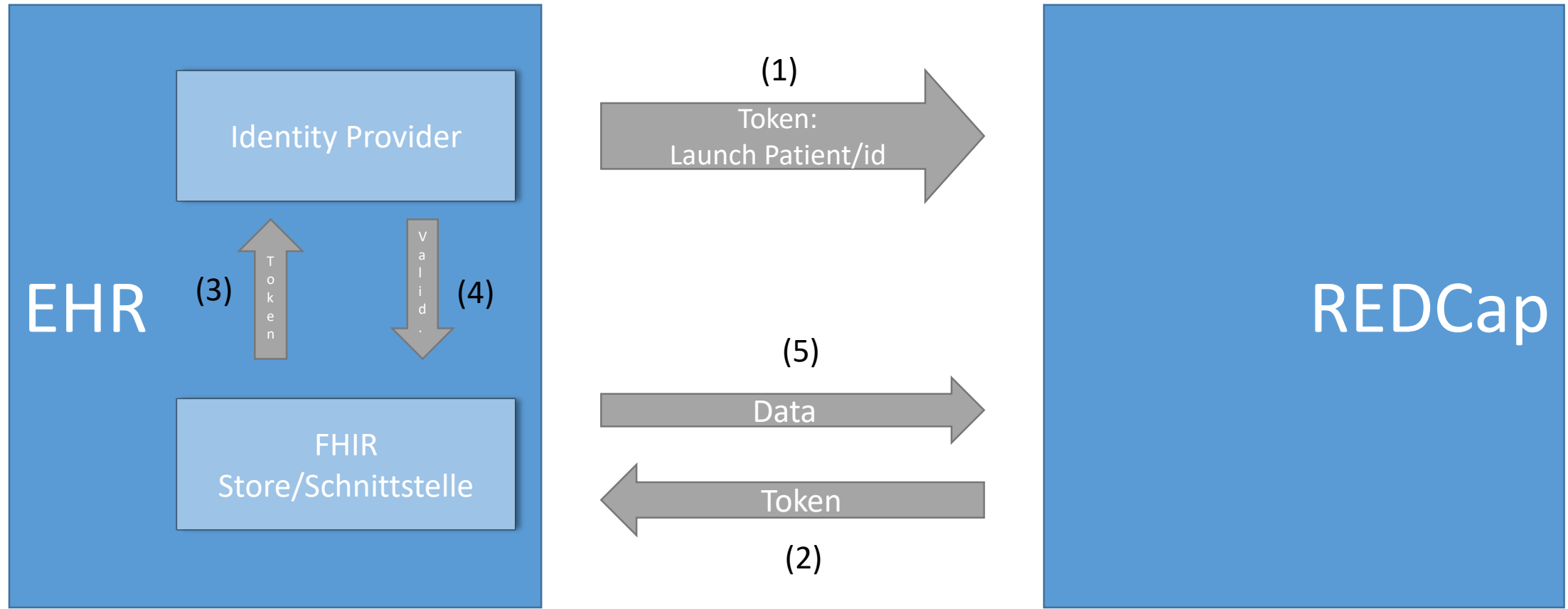
[View](#)

MORE INFO

[Vonk product page](#)
[Getting started](#)

- Input (Clinical Data Interoperability Services)
 - CDP - Clinical Data Pull (DDP - Dynamic Data Pull)
 - CDM - Clinical Data Mart
- Output
 - FHIRCap
- Ontologien
 - FHIR Ontology Autocomplete Module

- CDP - Clinical Data Pull (fr. DDP - Dynamic Data Pull)
 - Erlaubt das Importieren von Daten einzelner Patienten
- CDM Clinical Data Mart
 - Erlaubt das Importieren von Daten mehrerer Patienten
- Festintegrierte Bestandteile REDCaps
- Integration in ein EHR notwendig



MAP SOURCE FIELDS TO REDCAP FIELDS			
External Source Field (StarPanel)	Map to REDCap Field	Map to REDCap date/time field (Date/time value is used with day offset to construct window of time when searching for source data)	Remove mapping?
mrn "Medical Record Number" ★ Source Identifier Field	<input medical="" number"="" record="" type="text" value="mrn "/>		
Demographics			
dob "Date of Birth"	<input birth"="" date="" of="" type="text" value="dob "/>		✗
ethnicity "Ethnicity"	<input ethnicity"="" type="text" value="ethnicity "/>		✗
firstName "First Name"	<input first="" name"="" type="text" value="first_name "/>		✗
gender "Gender"	<input gender"="" type="text" value="sex "/>		✗
lastName "Last Name"	<input last="" name"="" type="text" value="last_name "/>		✗
race "Race"	<input race"="" type="text" value="race "/>		✗

REDCap

– Input CDP

Demography

Editing existing Study ID 2

12 new items from source system [View](#)

Study ID 2
(To rename this record, modify the value immediately below.)

Study ID

Medical record number
* must provide value

First Name

Last Name

Gender

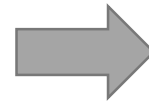
Ethnicity

Race

Date of birth Y-M-D

Age (years)
[View equation](#) [Disclaimer](#)

General Comments



Demography

Editing existing Study ID 2

0 new items from source system [View](#)

Study ID 2
(To rename this record, modify the value immediately below.)

Study ID

Medical record number
* must provide value

First Name

Last Name

Gender

Ethnicity

Race

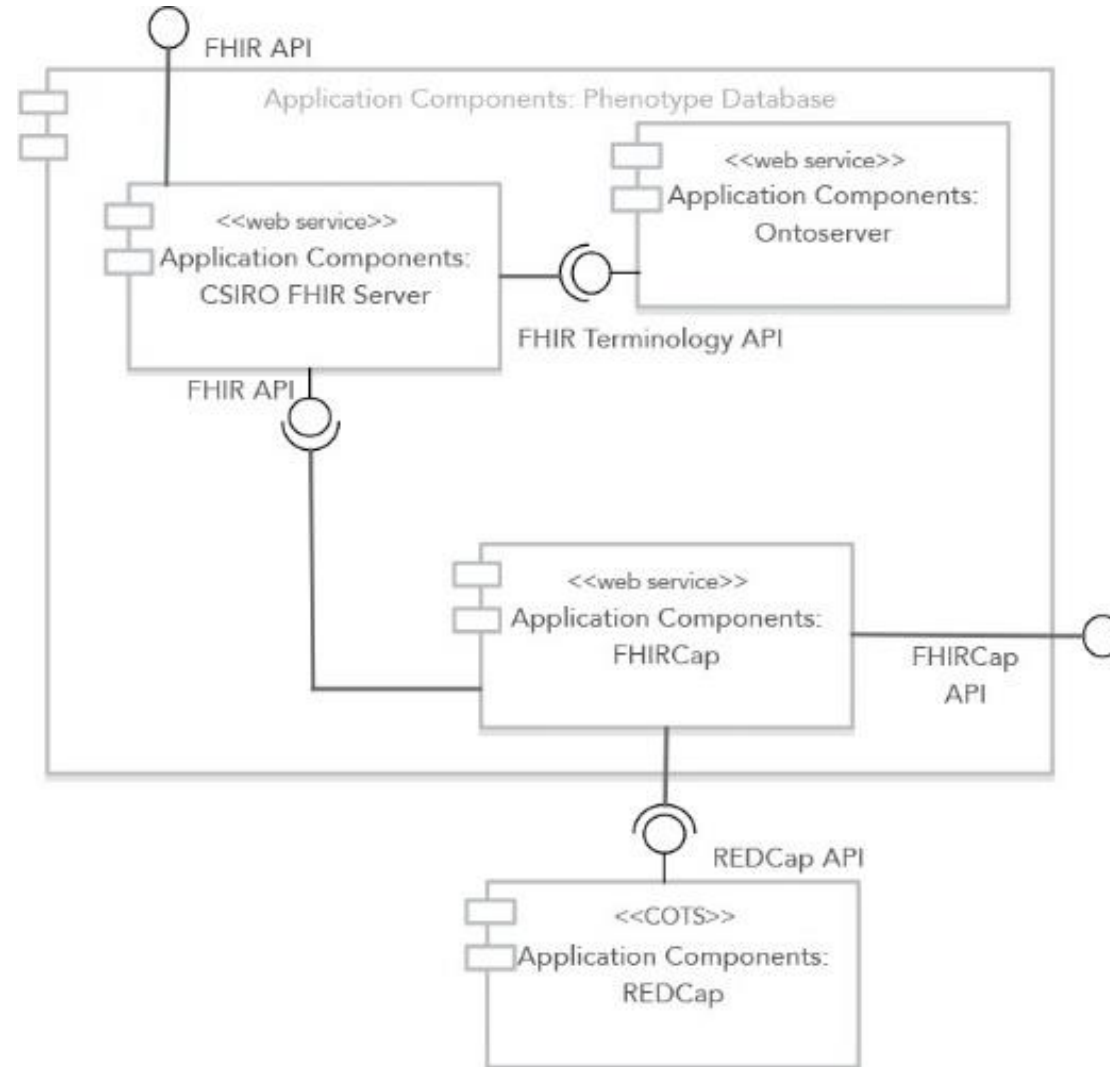
Date of birth Y-M-D

Age (years)
[View equation](#) [Disclaimer](#)

General Comments

- Berechtigung verläuft vergleichbar zu CDP
- Kein Mapping nötig!
 - Forms werden automatisch je nach ausgewählten Daten generiert
- Auswahl von Records, Datumsbereichen und Feldern
- Retrospektive Studien, Suchen von Kohorten

- FHIRCap: Transforming REDCap forms into FHIR resources
Alejandro Metke-Jimenez, PhD und David Hansen, PhD (AMIA Jt Summits Transl Sci Proc. 2019)
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6568121/>
- Sprache zur Übersetzung in **interoperable** FHIR Ressourcen
- (techn.) Datenverfügbarkeit für weitere Studien oder Routine
- Synchronisierung der Ressourcen nach Änderung in REDCap Daten, Metadaten, Regeln, Mappings
- Weniger proprietäre Datenstrukturen zur Weiterverarbeitung
- OpenSource?
<https://github.com/aeherc/fhircap>



- **FHIR Ontology Autocomplete Module**
- Externes Modul (öffentliche Module Registry)
- OpenSource: https://github.com/aeherc/redcap_fhir_ontology_provider
- Erhobenen Daten international standardisiert
- Form Elemente verknüpfen mit:
 - FHIR ValueSet
 - FHIR CodeSystem
 - SNOMED CT Refset (implicit ValueSet)
 - SNOMED CT Hierarchy (implicit isaValueSet)
 - LOINC answer list
- Standardeinstellung zeigt auf einen Server mit australischer SNOMED CT Version
 - Nationale SNOMED CT Lizenz?

REDCap

– Ontologieunterstützung

Field Label

medications

Action Tags / Field Annotation (optional)

Learn about [@ Action Tags](#) or [using Field Annotation](#)

Variable Name

(utilized in logic, calcs, and exports)

medicine Enable auto naming of variable based upon its Field Label?

ONLY letters, numbers, and underscores

How to use [Smart Variables](#) [Piping](#)

Validation? (optional)

---- None ----

– or –

FHIR Ontologies

Search For valuset using:

SnomedCT Refset

Medicinal product reference set

http://snomed.info/sct?fhir_vs:

Required?*

No Yes

* Prompt if field is blank

Identifier?

No Yes

Does the field contain identifying information (e.g., name, SSN, address)?

REDCap

– Ontologieunterstützung

Variable: snomed_sex
SexSnomed Intersex 325706910000

Variable: medicine
Medications insul Type to begin searching

- [21699011000036100] **insulin** aspart | http://snomed.info/sct] insulin aspart
- [21764011000036105] **insulin** detemir | http://snomed.info/sct] insulin detemir
- [21815011000036108] **insulin** glargine | http://snomed.info/sct] insulin glargine
- [21731011000036104] **insulin** glulisine | http://snomed.info/sct] insulin glulisine
- [21851011000036103] **insulin** lispro | http://snomed.info/sct] insulin lispro
- [1363711000168101] **insulin** glargine + lixisenatide | http://snomed.info/sct] insulin glargine + lixisenatide
- [33636011000036107] **insulin** isophane bovine | http://snomed.info/sct] insulin isophane bovine
- [33643011000036100] **insulin** isophane human | http://snomed.info/sct] insulin isophane human
- [33621011000036104] **insulin** neutral bovine | http://snomed.info/sct] insulin neutral bovine
- [33644011000036103] **insulin** neutral human | http://snomed.info/sct] insulin neutral human
- [1171101000168101] **insulin** degludec + insulin aspart | http://snomed.info/sct] insulin degludec + insulin aspart
- [21276011000036104] **insulin** aspart + insulin aspart protamine | http://snomed.info/sct] insulin aspart + insulin aspart protamine

Variable: height
Height (cm)

Variable: weight
Weight (kilograms)

Variable: bmi
BMI

- Probleme
 - Fehlende FHIR Schnittstelle in der Charité
 - Kleine FHIR Server ohne vollen SMART-Stack sind nicht kompatibel
 - FHIRCap Release
 - SNOMED CT in Deutschland

→ Vor uns liegt Arbeit aber auch viele Möglichkeiten und Chancen!

Vielen Dank für Ihre
Aufmerksamkeit

florian.seidel@charite.de