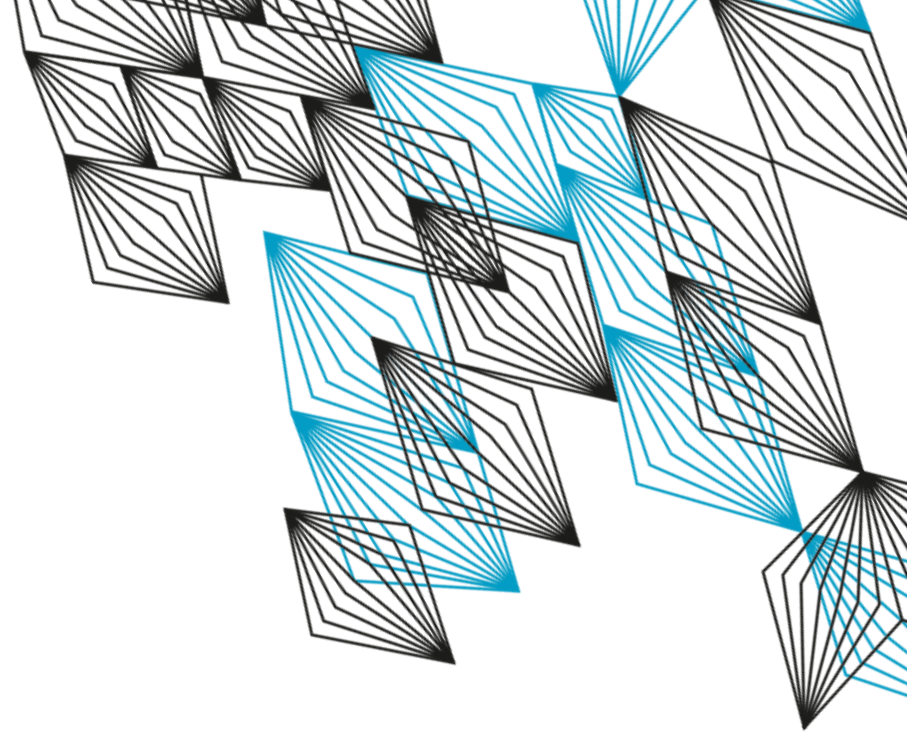


FACULTY OF COMPUTER SCIENCE
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VODAN IN A BOX

LUIZ BONINO



21 JULY 2020



VODAN IN A BOX



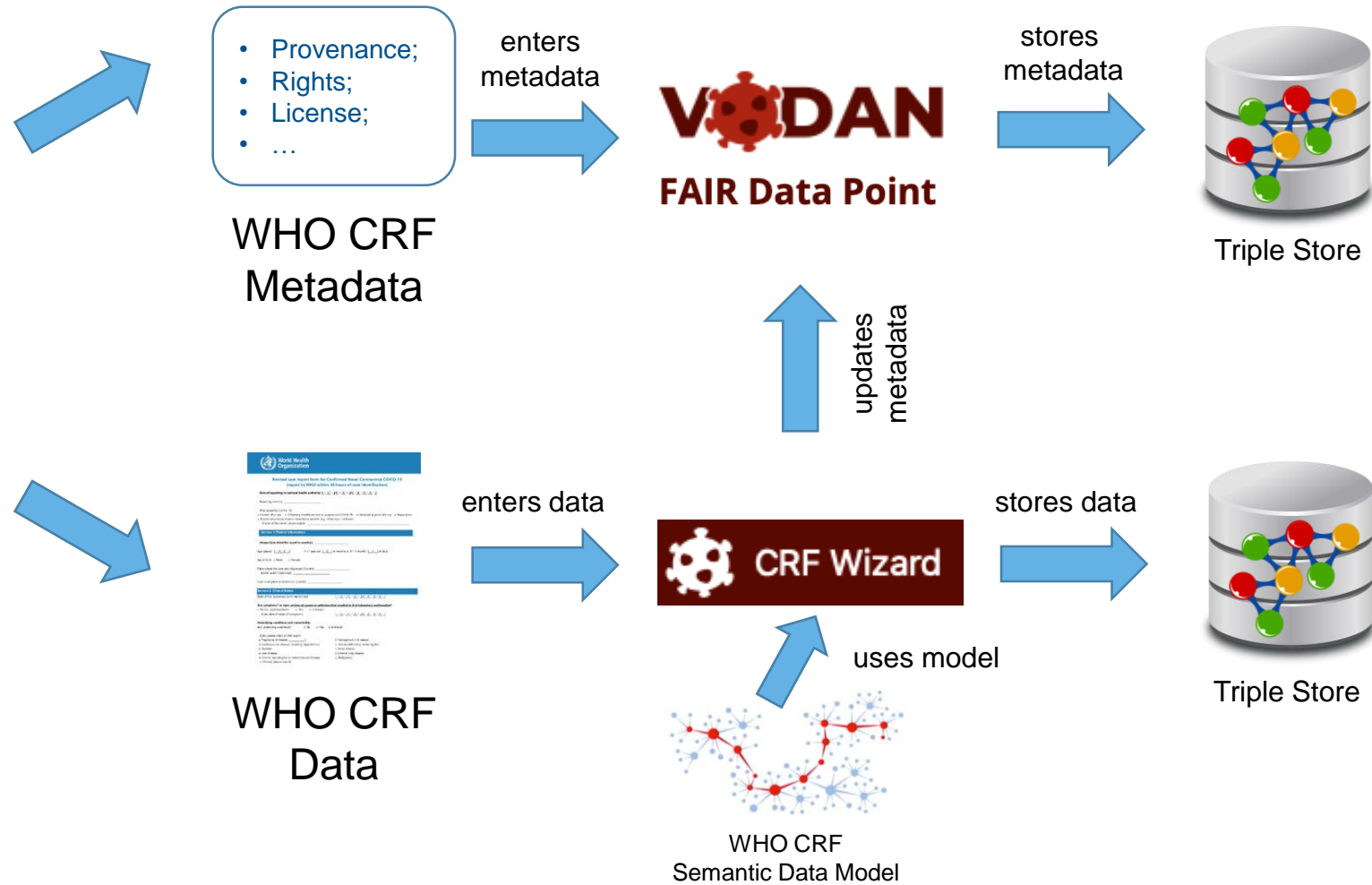
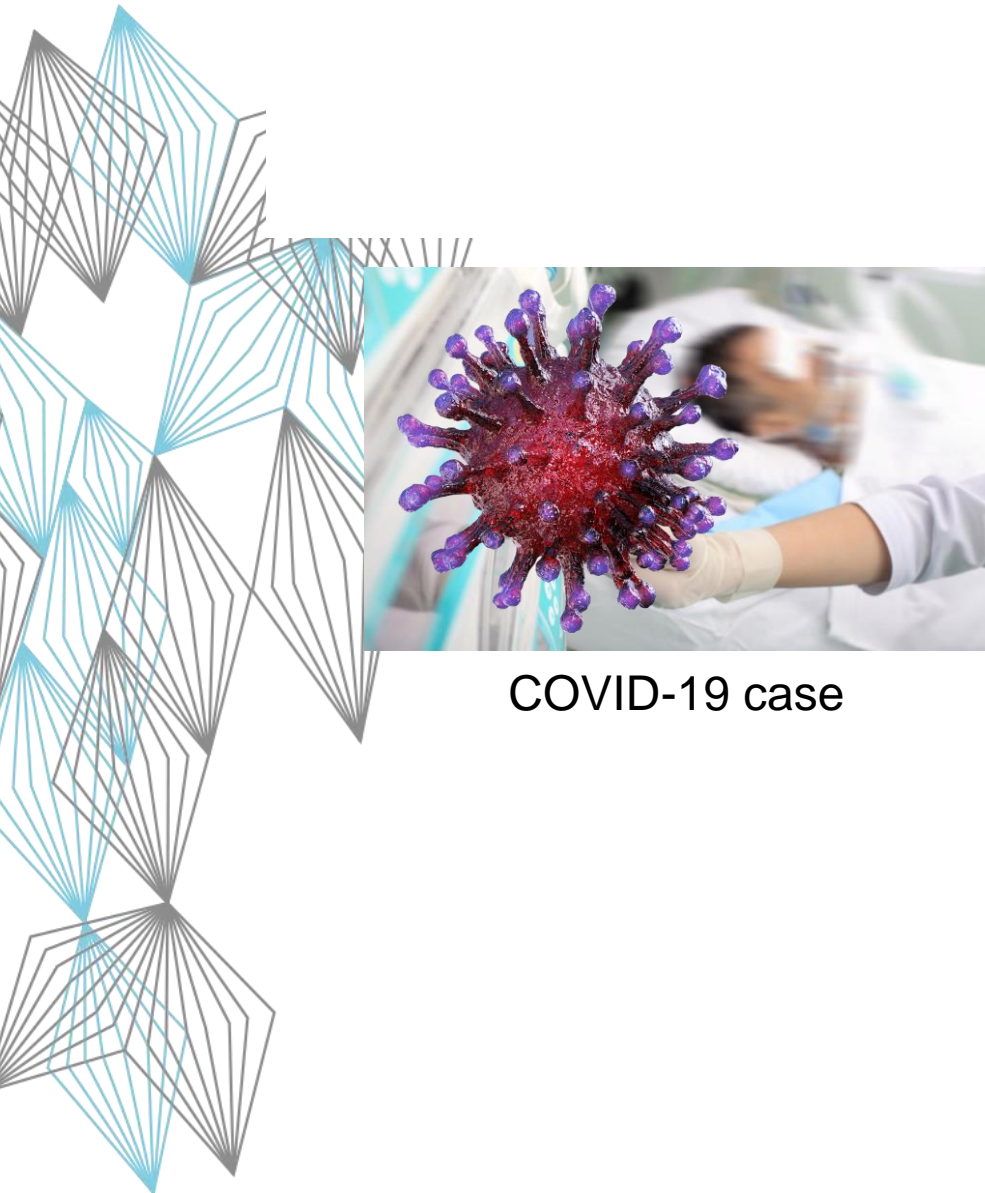
- **Goals:**

- Create an easy-to-deploy solution for capturing, storing and exposing data and metadata related to virus outbreaks.
- Support for local deployment of the complete solution → data and metadata stay on wherever their owners/creators decide;

- **Composed of:**

- Configurable and deployable data entry tool → CRF Wizard;
- Configurable and deployable FAIR metadata publication tool → FAIR Data Point;
- Semantic data model of the WHO COVID-19 CRF for reporting COVID-19 cases.

VODAN IN A BOX



VODAN FAIR Data Point

Demonstration deployment

The screenshot shows the VODAN FAIR Data Point interface. At the top left is the VODAN logo and 'FAIR Data Point' text. At the top right is a 'Log in' link. The main heading is 'VODAN FAIR Data Point - Demonstration'. Below this is a paragraph describing the demonstration FDP. To the right is a metadata table. Below the table is a 'Catalogs' section with a 'Demonstration WHO COVID-19 CRF catalog' card. At the bottom right are links for 'Download RDF' in various formats. The footer contains 'FAIR Data Point · About'.

VODAN FAIR Data Point Log in

VODAN FAIR Data Point - Demonstration

This is the demonstration FAIR Data Point of the Virus Outbreak Data Network (VODAN) initiative. The content in this FDP is for demonstration purposes only and does not represent real cases. The VODAN FDP is part of the VODAN in a Box, a set of tools and models supporting quick deployment of solutions to allow recording reports of COVID-19 cases based on WHO's COVID-19 CRF (with the VODAN DSW), exposing the metadata of these gathered data (with the VODAN FDP) and improve the semantic interoperability by having the case reports semantically enriched (with the embedded WHO COVID-19 CRF Semantic Data Model).

Metadata Issued	Metadata Modified
08-07-2020	14-07-2020

Version
1.6.0

Language
en

License
cc-by-nc-nd4.0

Institution
gofairfoundation.org

Start date
01-07-2020

Institution country
Q29999

Download RDF
[ttl](#) [rdf+xml](#) [json-ld](#)

Catalogs

Demonstration WHO COVID-19 CRF catalog

A catalog containing a number of datasets created using the VODAN in a Box toolset. These datasets have mocked-up metadata for demonstration purposes only.

Issued 08-07-2020 Modified 14-07-2020

FAIR Data Point · [About](#)

KIU deployment

The screenshot shows the KIU FAIR Data Point interface. At the top left is the FAIR logo and 'FAIR Data Point' text. At the top right is a 'Log in' link. The main heading is 'KIU FAIR Data Point'. Below this is a paragraph describing the KIU FDP. To the right is a metadata table. Below the table is a 'Catalogs' section with two catalog cards: 'Covid-19 Case Report Form' and 'Migrant Media Reports'. At the bottom right are links for 'Download RDF' in various formats. The footer contains 'FAIR Data Point · About'.

FAIR FAIR Data Point Log in

KIU FAIR Data Point

This FAIR Data Point contains the metadata of datasets and other artefacts related to the COVID-19 pandemic and other health data in Kampala International University and the rest of Uganda.

Metadata Issued	Metadata Modified
01-07-2020	13-07-2020

Version
1.0

Language
en

License
cc-by-nc-nd3.0

Institution
kiu.ac.ug

Start date
03-06-2020

Last update
13-07-2020

Institution country
Q1036

Download RDF
[ttl](#) [rdf+xml](#) [json-ld](#)

Catalogs

Covid-19 Case Report Form

Covid-19 case report forms following WHO standard

Issued 13-07-2020 Modified 13-07-2020

Migrant Media Reports

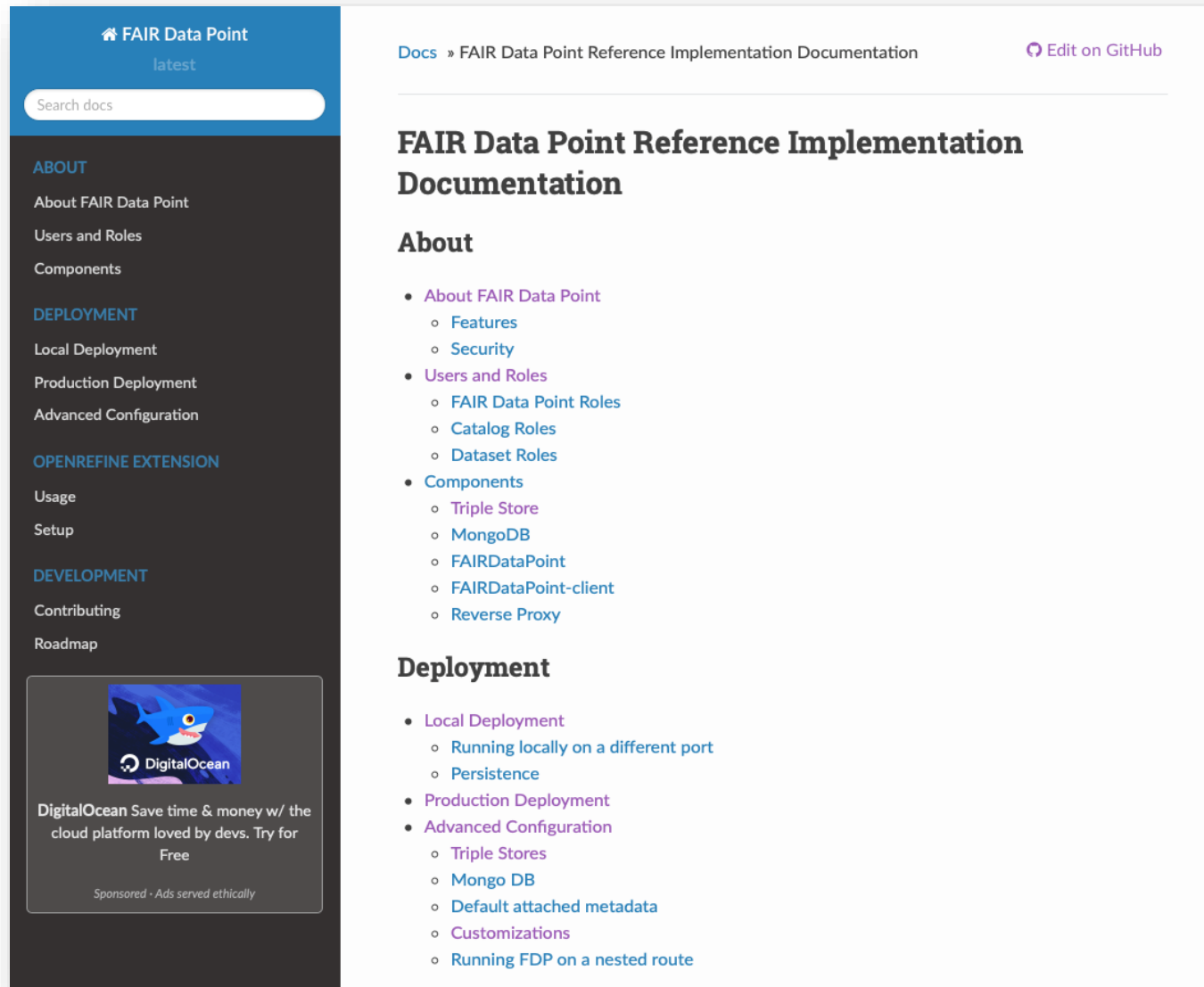
These are national and international media reports published during the covid-19 crisis.

Issued 13-07-2020 Modified 13-07-2020

FAIR Data Point · [About](#)

VODAN FAIR Data Point

FDP deployment documentation: <https://fairdatapoint.readthedocs.io/en/latest/>



FAIR Data Point
latest

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- Components

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- Advanced Configuration

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- Contributing
- Roadmap

Docs » FAIR Data Point Reference Implementation Documentation [Edit on GitHub](#)

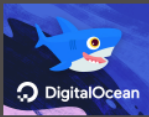
FAIR Data Point Reference Implementation Documentation

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VIDAN FAIR Data Point

Instructional videos



How to deploy a FAIR Data Point in your local computer

This video shows how to deploy an instance of the FAIR Data Point (FDP) in your computer. A local deployment of...

https://youtu.be/rN_IVwppL_E

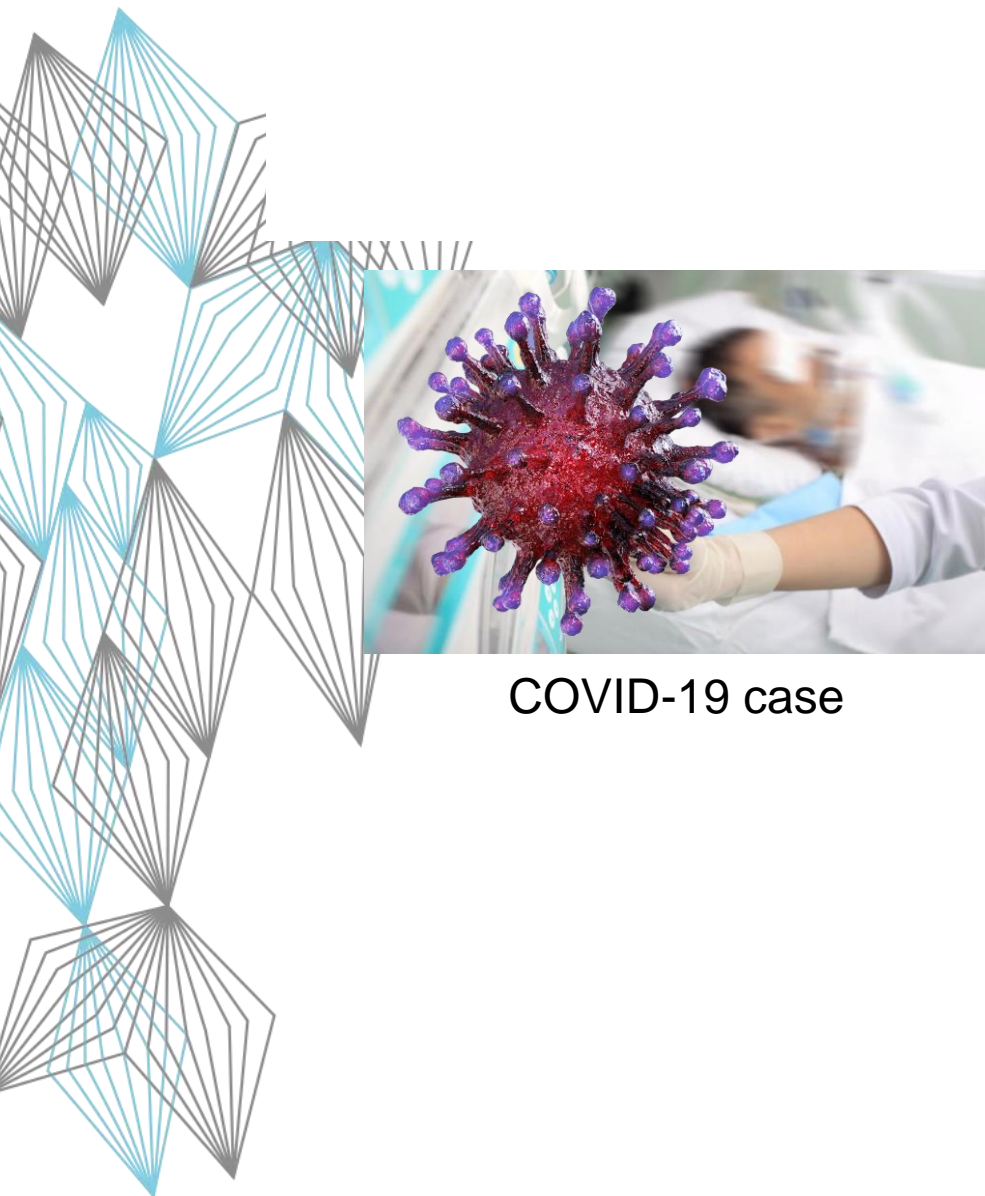


Introduction to the FAIR Data Point

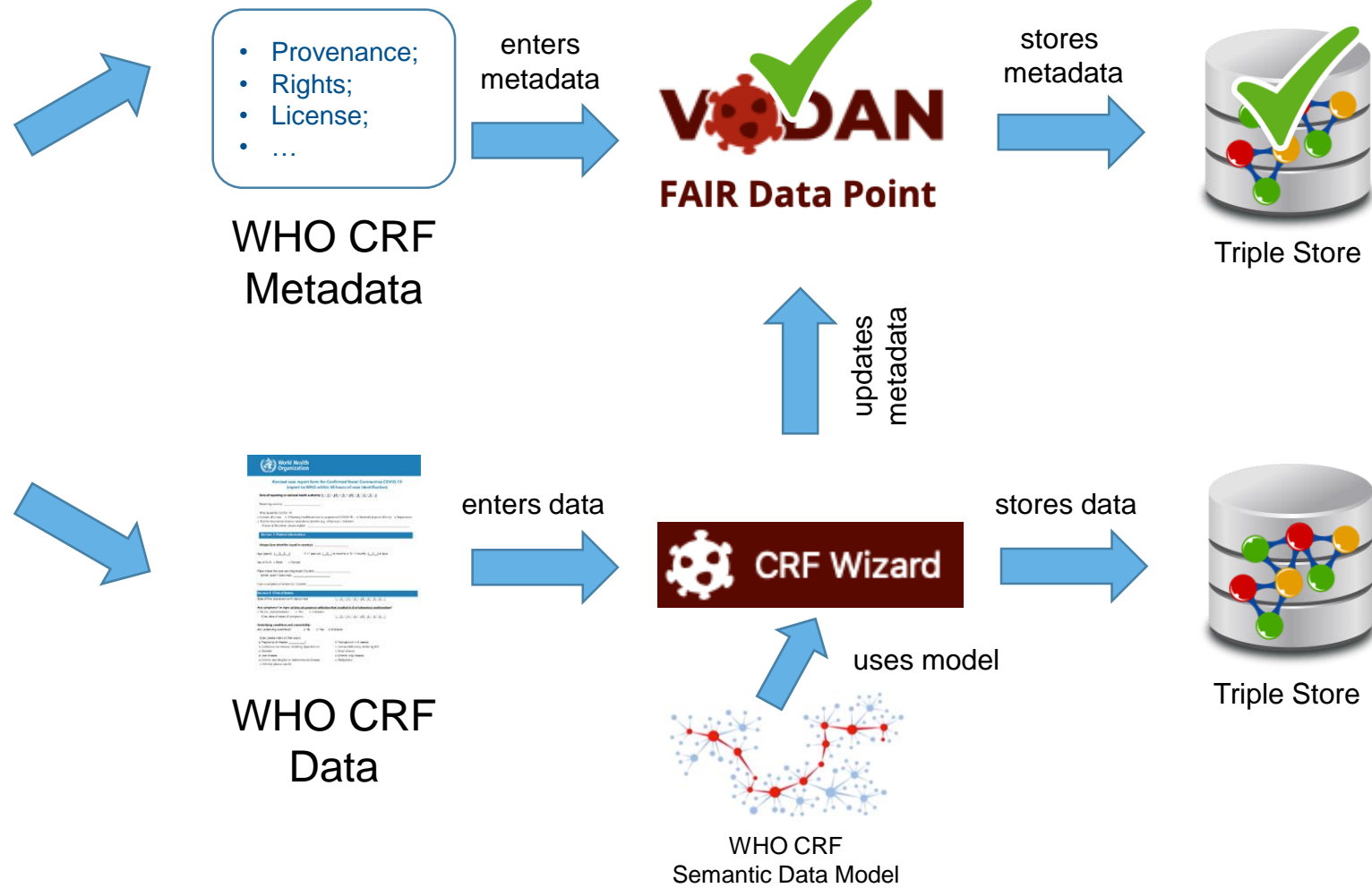
This video provides an introduction to the FAIR Data Point, explaining what it is and how metadata providers can use...

https://youtu.be/PtS_ek7BXSA

VODAN IN A BOX



COVID-19 case



FDP INDEX

- Registers deployed FDPs;
- Verifies if FDPs are reachable and active;
- First step for searching content over distributed FDPs;

FAIR FAIR Data Point index

Filter: All 38 Active 9 Inactive 0 Unreachable 22 Invalid 5 Unknown 0

Endpoint ▲ ▼	Registration ▲ ▼	Modification ▲ ▼	Status
https://fdp.test.fairdatapoint.org	16/07/2020, 13:47:48	16/07/2020, 16:43:50	Active
http://localhost:8081	12/05/2020, 11:37:12	16/07/2020, 15:49:15	Unreachable
https://fdp.sdsc.edu	01/05/2020, 23:44:58	15/07/2020, 21:08:44	Active
https://fdp.kiu.ac.ug	28/05/2020, 14:51:06	15/07/2020, 20:10:43	Active
http://localhost:8080	29/04/2020, 15:14:44	15/07/2020, 16:26:21	Invalid
http://localhost	29/04/2020, 15:48:01	14/07/2020, 21:54:06	Unreachable
https://app.fairdatapoint.org	29/04/2020, 16:37:21	14/07/2020, 16:00:52	Active
https://staging.fairdatapoint.org/nested-fdp	11/05/2020, 13:44:30	14/07/2020, 15:59:05	Active
https://staging.fairdatapoint.org	29/04/2020, 15:23:20	14/07/2020, 15:58:36	Active
https://fdp.vodan.fairdatapoint.org	12/06/2020, 13:06:57	14/07/2020, 11:29:04	Active
http://lumc-beat-covid.fair-dtfs.surf-hosted.nl	03/06/2020, 16:33:03	13/07/2020, 09:36:56	Active
https://fdp.casehospital.org	15/06/2020, 12:38:42	09/07/2020, 08:44:45	Unreachable
https://localhost:8081	07/07/2020, 13:01:09	08/07/2020, 20:20:27	Unreachable
http://localhost:8084	29/04/2020, 15:19:41	23/06/2020, 15:56:55	Unreachable
http://197.156.104.225:81	13/06/2020, 10:07:50	17/06/2020, 08:04:17	Unreachable
https://demo.fair-dtfs.surf-hosted.nl	02/06/2020, 17:41:37	15/06/2020, 10:40:04	Unreachable
http://197.156.104.225	13/06/2020, 09:51:42	13/06/2020, 10:02:19	Unreachable
http://fdp.uc.nu.tn	01/06/2020, 12:07:04	12/06/2020, 20:45:40	Unreachable

WHO COVID-19 RAPID VERSION CRF SEMANTIC DATA MODEL (



- Published on:

- GitHub: <https://github.com/FAIRDataTeam/WHO-COVID-CRF>

- BioPortal:

- <https://bioportal.bioontology.org/ontologies/COVIDCRFRAPID>

- On BioPortal the semantic model has received over 1400 visits since the publication of the first version in April 2020.

WHO COVID-19 Rapid Version CRF semantic data model

Last updated: June 24, 2020



- Summary
- Classes**
- Properties
- Notes
- Mappings
- Widgets

Details

Acronym	COVIDCRFRAPID
Visibility	Public
Description	This is a semantic data model for the WHO's COVID-19 case record form RAPID version from April 8 2020. It aims at providing semantic references to the questions and answers of the form. Changes in the version 1.1.4: - Corrected: Urea_(BUN) to remove the "()", which may cause resolution and validation issues; Changes in the version 1.1.3: - Corrected: Chloroquine/hydroxychloroquine to remove the "/", which may cause resolution issues; Changes in version 1.1.2: - Corrected: Cough with haemoptysis because the IRI was misspelled; - Corrected: CPAP/NIV Mask to remove the "/", which may cause resolution issues; - Added: missing "part of" property for section 1g. - Added: "has other measurement unit label" property for the laboratory results that may use a different unit than specified in the CRF; - Added: missing "has value" for the Which coronavirus question; - Added: missing possibility to enter the name of a specific antibiotic in section 3c of the CRF; - Added: missing question on testing the presence of other pathogenic of public health interest from section 3a of the CRF. Changes in version 1.1.1: - Added: Facility Name to identify the care facility in which the case is reported from. Changes in version 1.1.0: - This version covers the modifications introduced by the WHO COVID-19 Rapid CRF from April 8, 2020. The model maintains backward compatibility with the WHO COVID-19 Rapid CRF from March 23, 2020.
Status	Production
Format	OWL
Contact	Luiz Bonino, luiz.bonino@go-fair.org
Categories	Health

Metrics ?

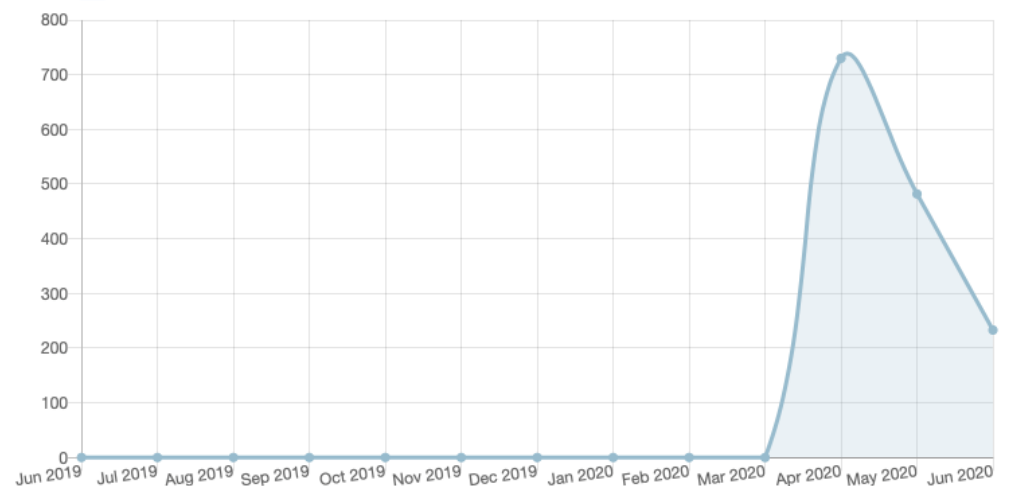
Classes	398
Individuals	333
Properties	13
Maximum depth	6
Maximum number of children	91
Average number of children	7
Classes with a single child	4
Classes with more than 25 children	2
Classes with no definition	352

Submissions

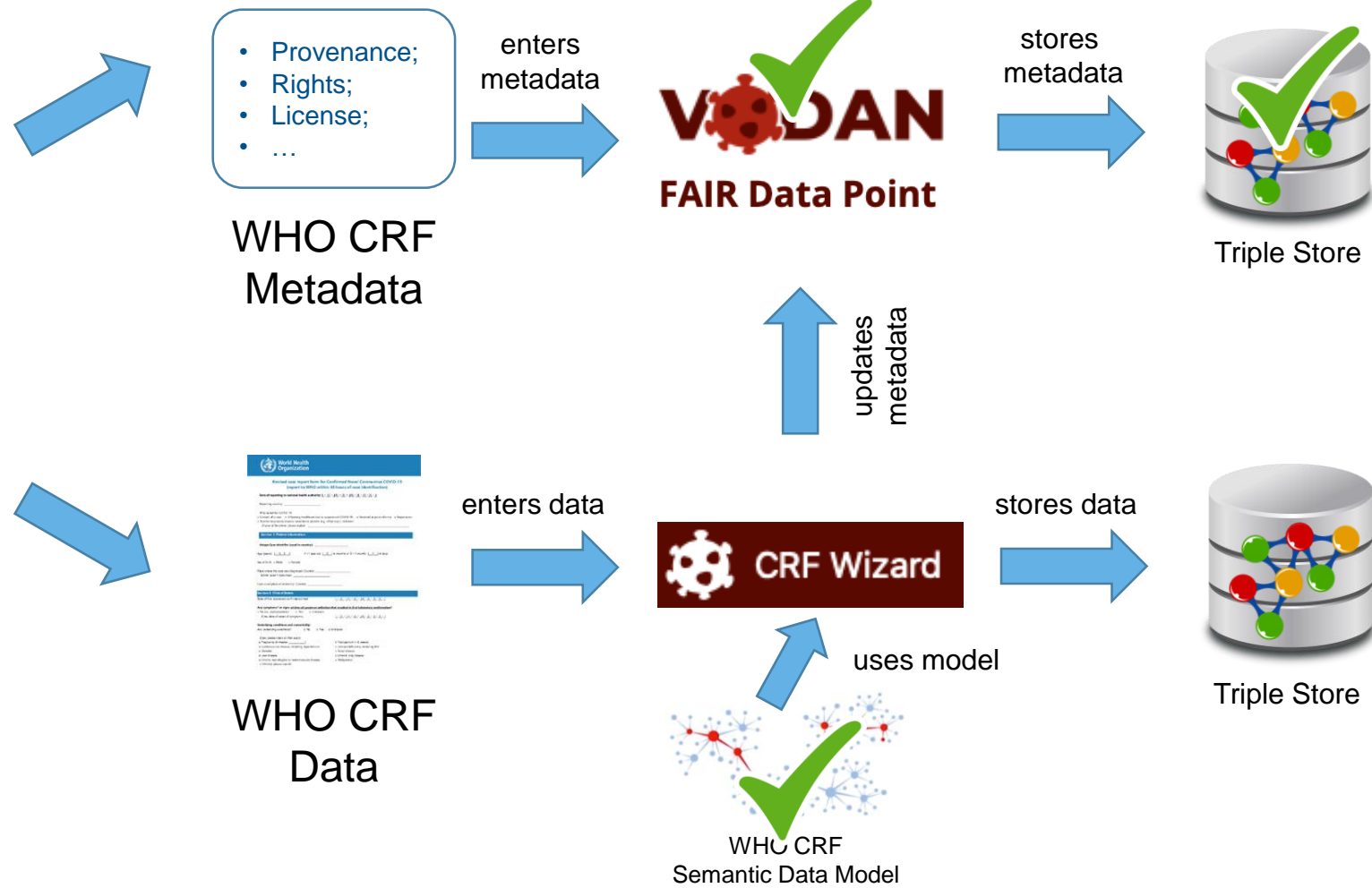
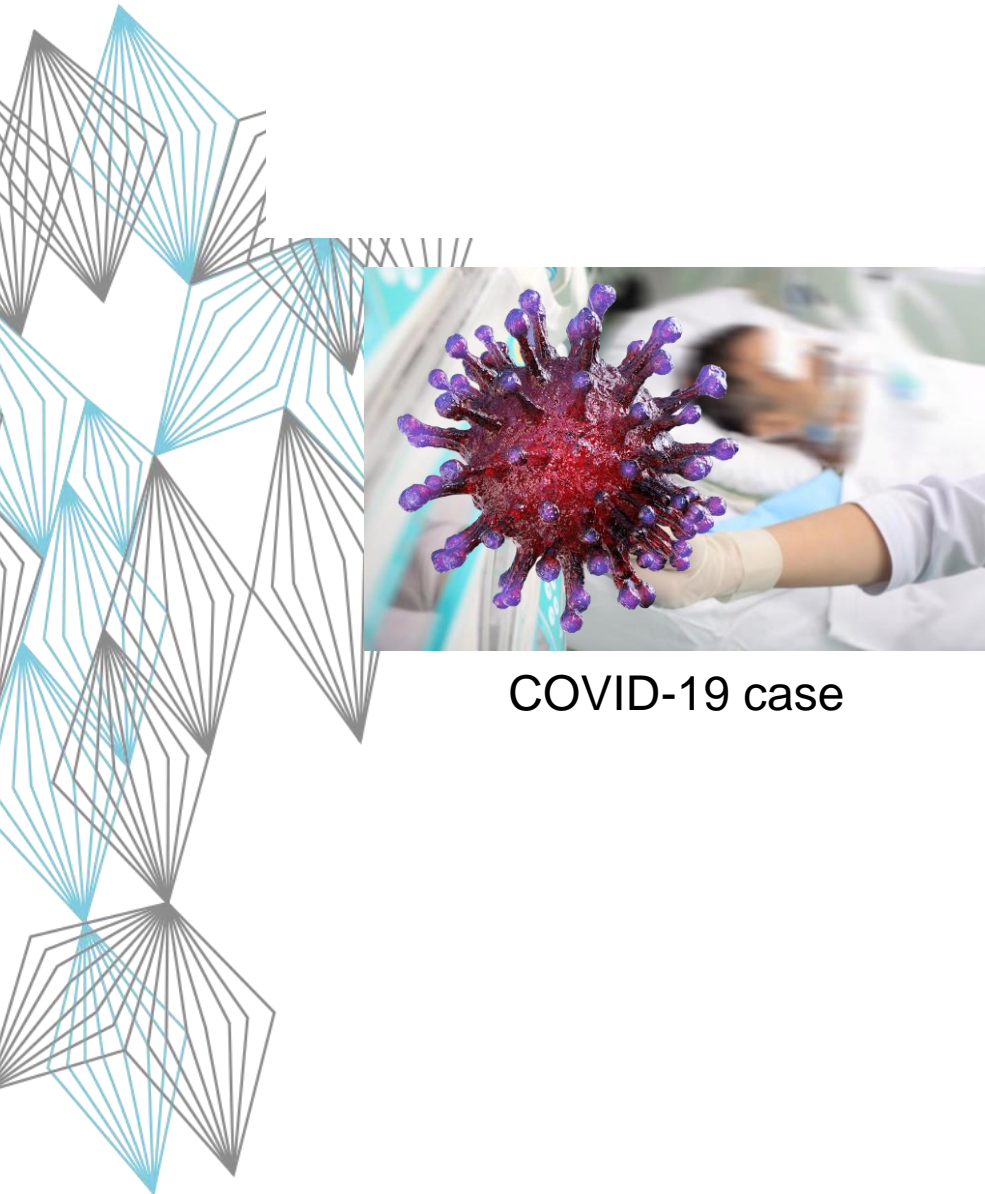
Version	Released	Uploaded	Downloads
1.1.4 (Parsed, Indexed, Metrics, Annotator)	06/24/2020	06/24/2020	OWL CSV RDF/XML Diff
1.1.3 (Archived)	06/12/2020	06/22/2020	OWL Diff
1.1.2 (Archived)	06/12/2020	06/18/2020	OWL Diff
1.1.1 (Archived)	06/12/2020	06/17/2020	OWL Diff
1.1.0 (Archived)	06/12/2020	06/12/2020	OWL Diff


[more...](#)

Visits ↓

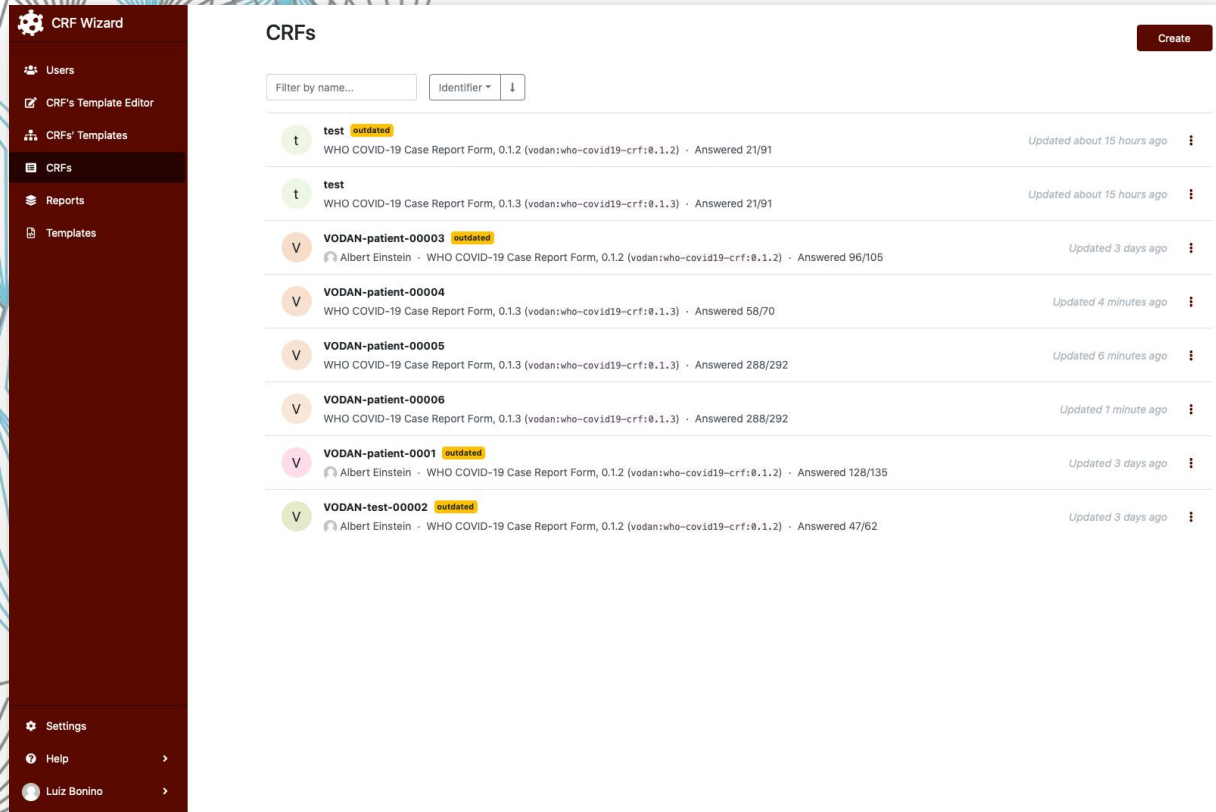


VODAN IN A BOX



- 
- Adapted from the Data Stewardship Wizard (DSW);
 - Web form based on WHO RAPID COVID-19 CRF;
 - Exports data in RDF based on the WHO COVID-19 semantic data model. The RDF data can be exported as a downloadable file or submitted directly to attached triple store;
 - Attached triple store supports distributed querying;

Existing cases (CRFs)

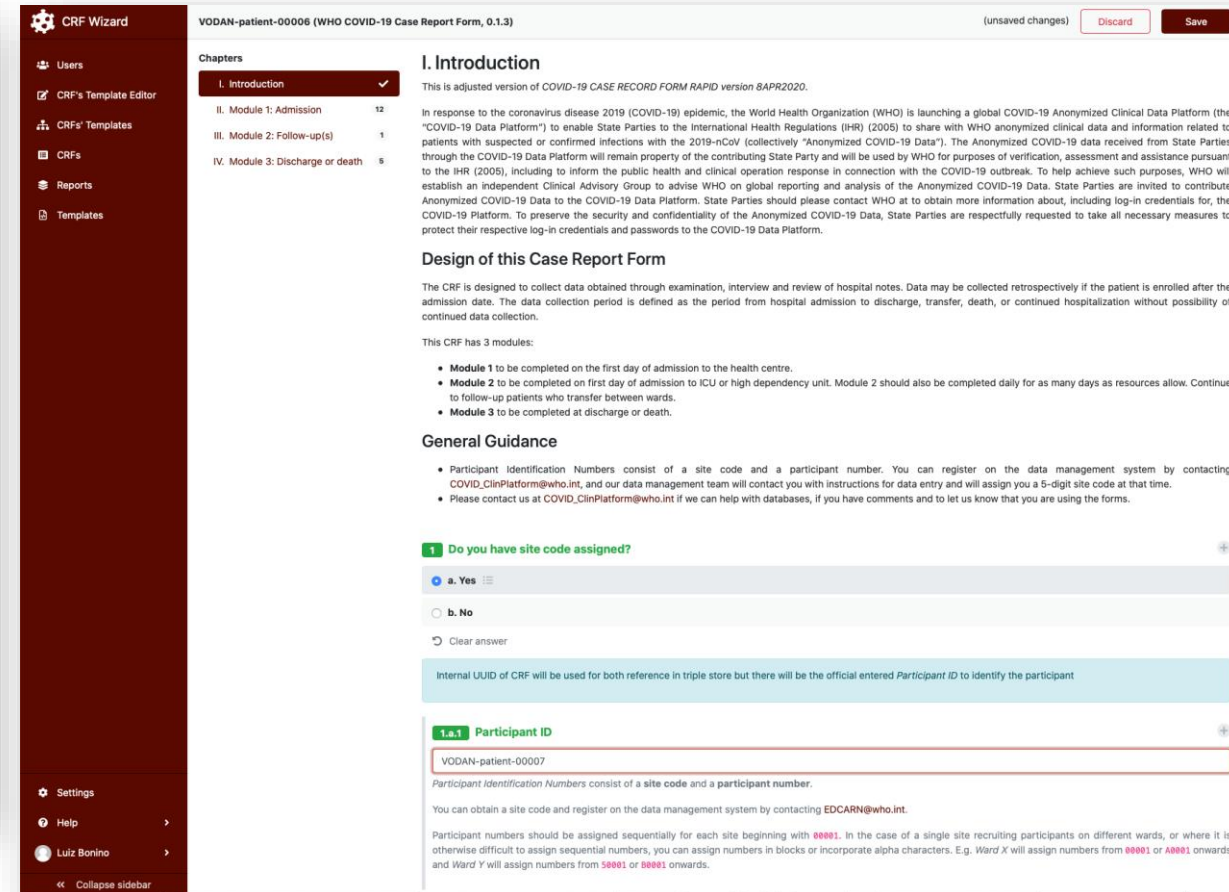


CRFs Create

Filter by name... Identifier ▾ ↓

Status	Name	Identifier	Answered	Updated
test outdated	WHO COVID-19 Case Report Form, 0.1.2	(vodan:who-covid19-crf:0.1.2)	21/91	Updated about 15 hours ago
test	WHO COVID-19 Case Report Form, 0.1.3	(vodan:who-covid19-crf:0.1.3)	21/91	Updated about 15 hours ago
VODAN-patient-00003 outdated	Albert Einstein · WHO COVID-19 Case Report Form, 0.1.2	(vodan:who-covid19-crf:0.1.2)	96/105	Updated 3 days ago
VODAN-patient-00004	WHO COVID-19 Case Report Form, 0.1.3	(vodan:who-covid19-crf:0.1.3)	58/70	Updated 4 minutes ago
VODAN-patient-00005	WHO COVID-19 Case Report Form, 0.1.3	(vodan:who-covid19-crf:0.1.3)	288/292	Updated 6 minutes ago
VODAN-patient-00006	WHO COVID-19 Case Report Form, 0.1.3	(vodan:who-covid19-crf:0.1.3)	288/292	Updated 1 minute ago
VODAN-patient-0001 outdated	Albert Einstein · WHO COVID-19 Case Report Form, 0.1.2	(vodan:who-covid19-crf:0.1.2)	128/135	Updated 3 days ago
VODAN-test-00002 outdated	Albert Einstein · WHO COVID-19 Case Report Form, 0.1.2	(vodan:who-covid19-crf:0.1.2)	47/62	Updated 3 days ago

New case (CRFs)



CRF Wizard (unsaved changes) Discard Save

VODAN-patient-00006 (WHO COVID-19 Case Report Form, 0.1.3)

Chapters

- I. Introduction
- II. Module 1: Admission
- III. Module 2: Follow-up(s)
- IV. Module 3: Discharge or death

I. Introduction

This is adjusted version of COVID-19 CASE RECORD FORM RAPID version 8APR2020.

In response to the coronavirus disease 2019 (COVID-19) epidemic, the World Health Organization (WHO) is launching a global COVID-19 Anonymized Clinical Data Platform (the "COVID-19 Data Platform") to enable State Parties to the International Health Regulations (IHR) (2005) to share with WHO anonymized clinical data and information related to patients with suspected or confirmed infections with the 2019-nCoV (collectively "Anonymized COVID-19 Data"). The Anonymized COVID-19 data received from State Parties through the COVID-19 Data Platform will remain property of the contributing State Party and will be used by WHO for purposes of verification, assessment and assistance pursuant to the IHR (2005), including to inform the public health and clinical operation response in connection with the COVID-19 outbreak. To help achieve such purposes, WHO will establish an independent Clinical Advisory Group to advise WHO on global reporting and analysis of the Anonymized COVID-19 Data. State Parties are invited to contribute Anonymized COVID-19 Data to the COVID-19 Data Platform. State Parties should please contact WHO at to obtain more information about, including log-in credentials for, the COVID-19 Platform. To preserve the security and confidentiality of the Anonymized COVID-19 Data, State Parties are respectfully requested to take all necessary measures to protect their respective log-in credentials and passwords to the COVID-19 Data Platform.

Design of this Case Report Form

The CRF is designed to collect data obtained through examination, interview and review of hospital notes. Data may be collected retrospectively if the patient is enrolled after the admission date. The data collection period is defined as the period from hospital admission to discharge, transfer, death, or continued hospitalization without possibility of continued data collection.

This CRF has 3 modules:

- Module 1 to be completed on the first day of admission to the health centre.
- Module 2 to be completed on first day of admission to ICU or high dependency unit. Module 2 should also be completed daily for as many days as resources allow. Continue to follow-up patients who transfer between wards.
- Module 3 to be completed at discharge or death.

General Guidance

- Participant Identification Numbers consist of a site code and a participant number. You can register on the data management system by contacting COVID_ClinPlatform@who.int, and our data management team will contact you with instructions for data entry and will assign you a 5-digit site code at that time.
- Please contact us at COVID_ClinPlatform@who.int if we can help with databases, if you have comments and to let us know that you are using the forms.

1 Do you have site code assigned?

a. Yes

b. No

Clear answer

Internal UUID of CRF will be used for both reference in triple store but there will be the official entered Participant ID to identify the participant

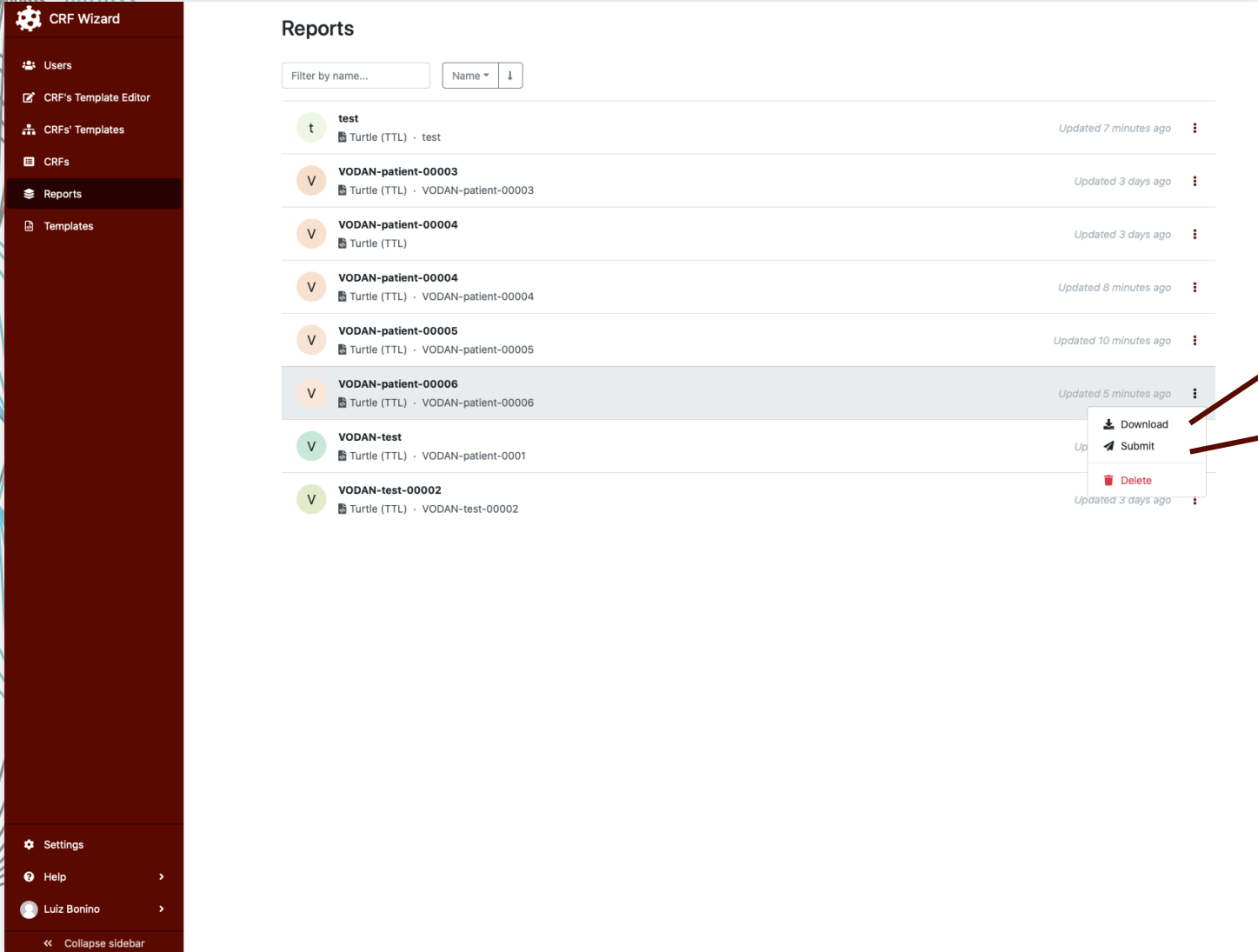
1.a.1 Participant ID

VODAN-patient-00007

Participant Identification Numbers consist of a site code and a participant number.

You can obtain a site code and register on the data management system by contacting EDCARN@who.int.

Participant numbers should be assigned sequentially for each site beginning with 00001. In the case of a single site recruiting participants on different wards, or where it is otherwise difficult to assign sequential numbers, you can assign numbers in blocks or incorporate alpha characters. E.g. Ward X will assign numbers from 00001 or A0001 onwards and Ward Y will assign numbers from 00001 or B0001 onwards.



CRF Wizard

- Users
- CRF's Template Editor
- CRFs' Templates
- CRFs
- Reports
- Templates

Settings

Help

Luiz Bonino

<< Collapse sidebar

Reports

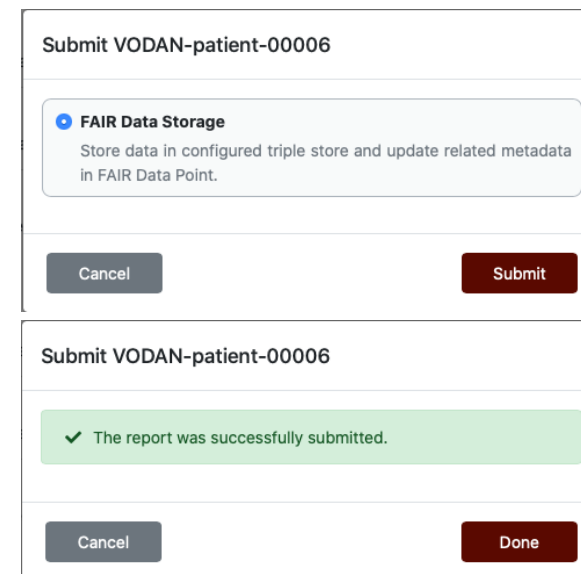
Filter by name... Name ▾ ↓

t	test	Turtle (TTL) · test	Updated 7 minutes ago
V	VODAN-patient-00003	Turtle (TTL) · VODAN-patient-00003	Updated 3 days ago
V	VODAN-patient-00004	Turtle (TTL)	Updated 3 days ago
V	VODAN-patient-00004	Turtle (TTL) · VODAN-patient-00004	Updated 8 minutes ago
V	VODAN-patient-00005	Turtle (TTL) · VODAN-patient-00005	Updated 10 minutes ago
V	VODAN-patient-00006	Turtle (TTL) · VODAN-patient-00006	Updated 5 minutes ago
V	VODAN-test	Turtle (TTL) · VODAN-patient-0001	Up
V	VODAN-test-00002	Turtle (TTL) · VODAN-test-00002	Updated 3 days ago

- Download
- Submit
- Delete

Download the CRF RDF

Submit the CRF RDF to the triple store



Submit VODAN-patient-00006

FAIR Data Storage

Store data in configured triple store and update related metadata in FAIR Data Point.

Cancel Submit

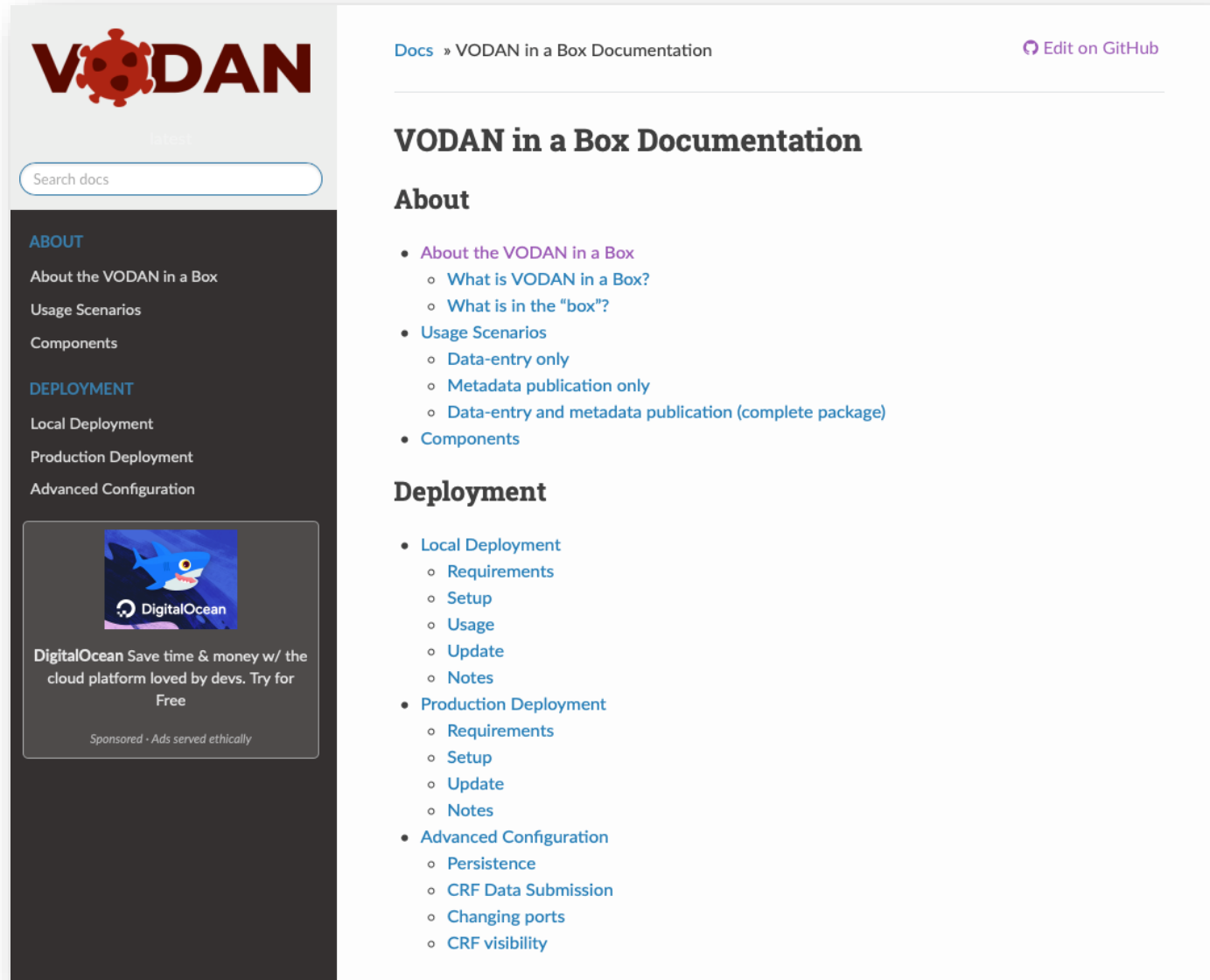
Submit VODAN-patient-00006

✓ The report was successfully submitted.

Cancel Done

VODAN IN A BOX

Documentation: <https://docs.vodan.fairdatapoint.org>



VODAN latest

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Docs » VODAN in a Box Documentation [Edit on GitHub](#)

VODAN in a Box Documentation

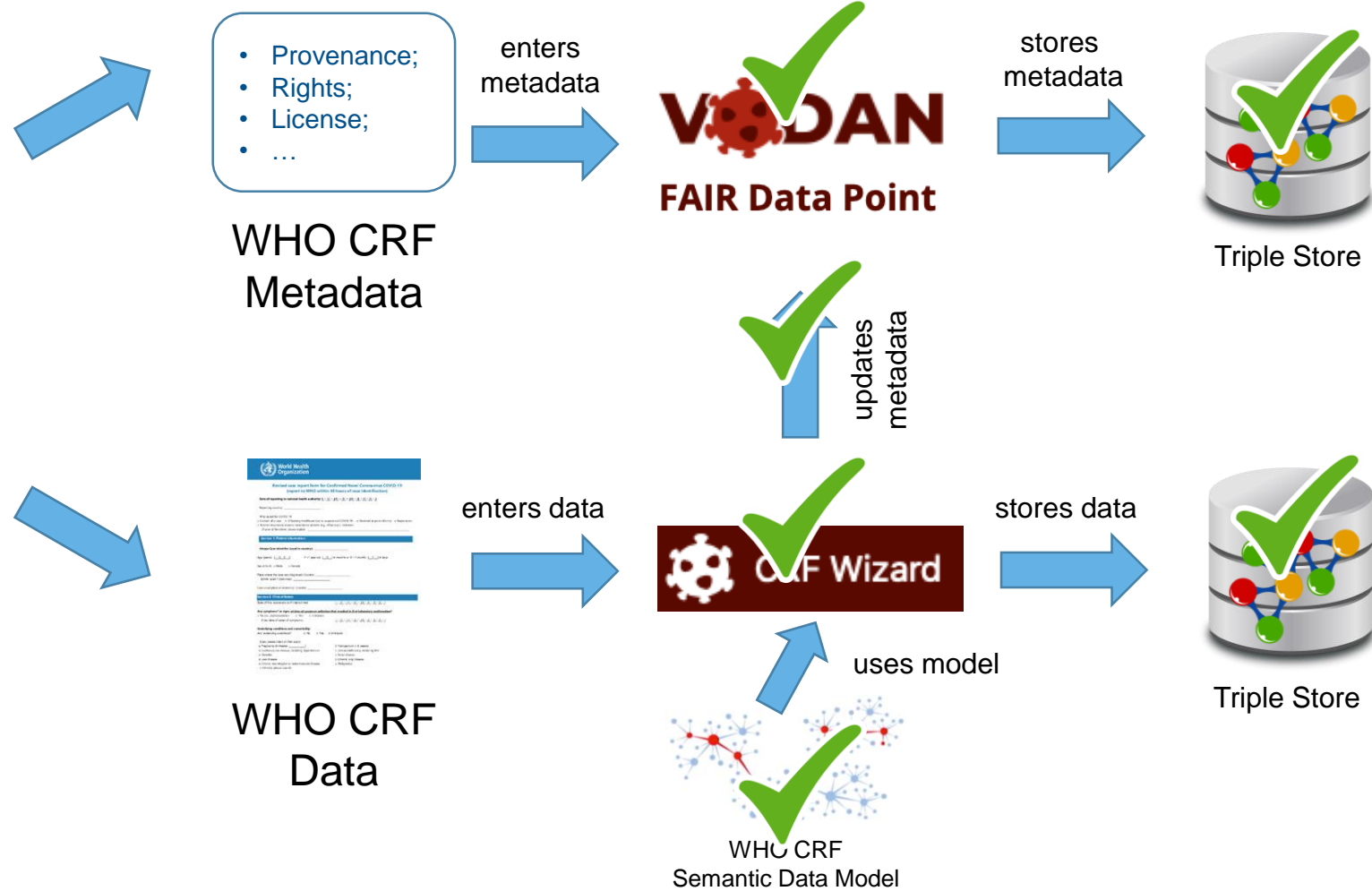
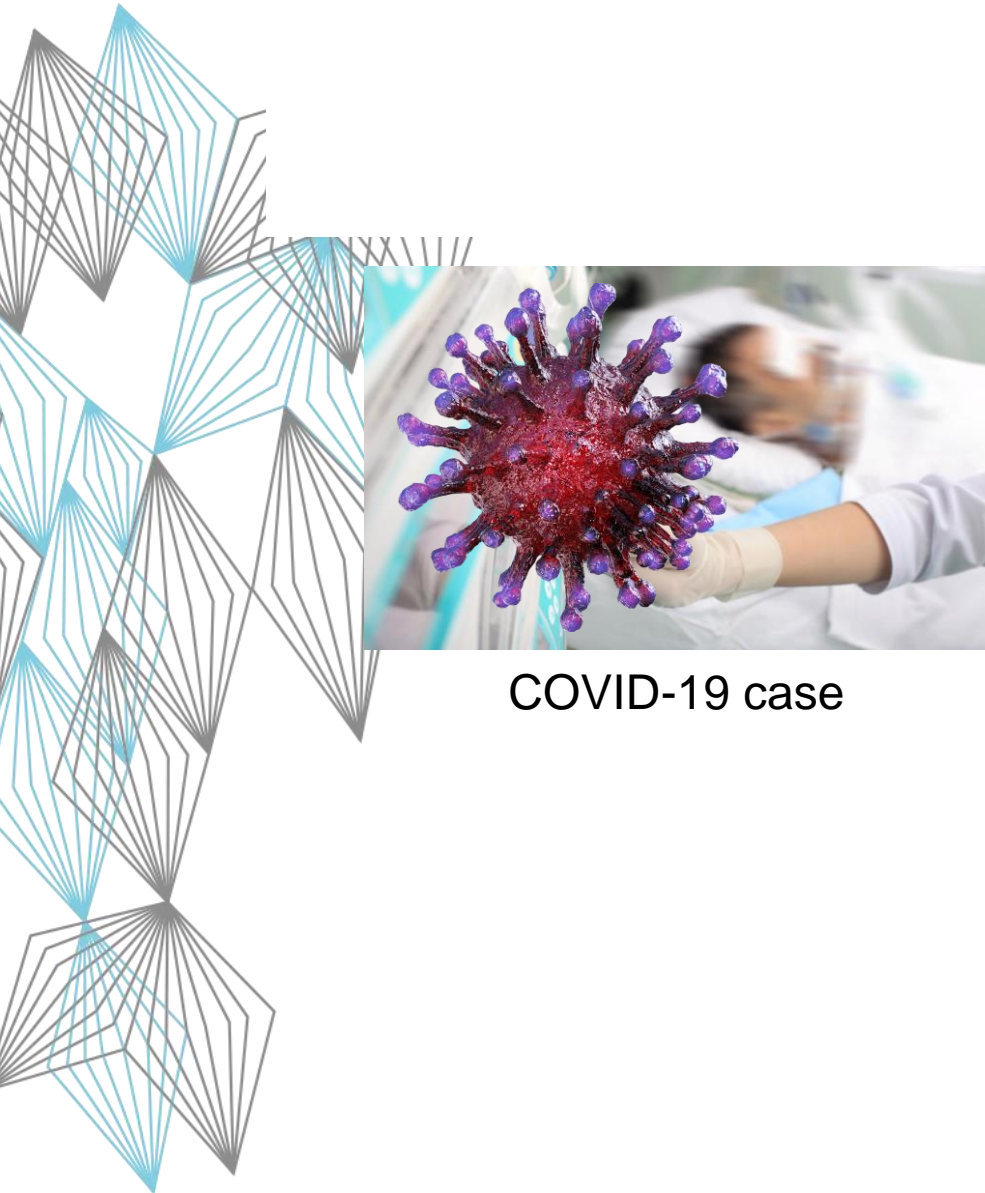
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 - [CRF visibility](#)

VODAN IN A BOX



VODAN IN A BOX – USAGE WORKFLOW

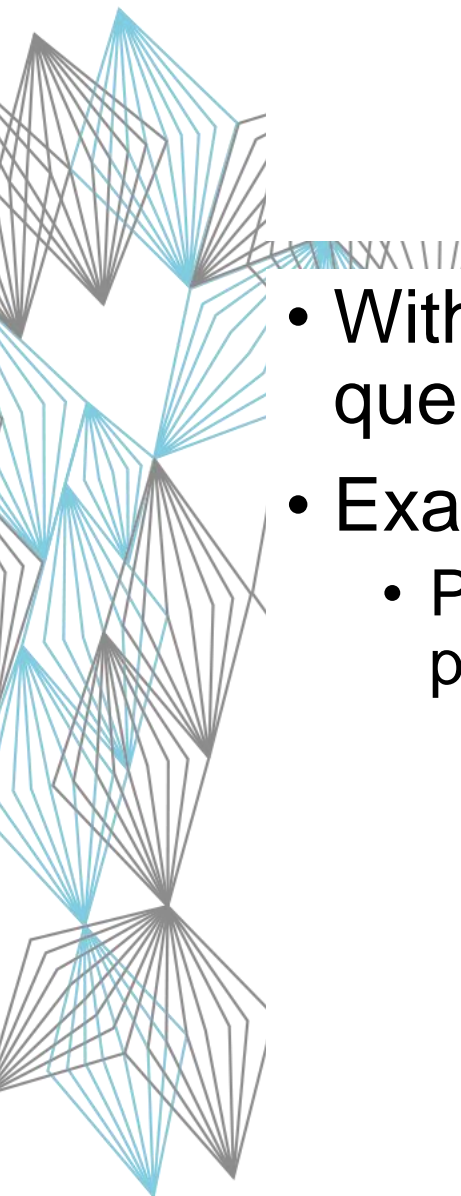
Preparation

Step	Description	Application	Role
1	Create and publish metadata for catalog, dataset and distribution;	FAIR Data Point	Data steward
2	Configure CRF Wizard with the URI of the target dataset's distribution;	CRF Wizard	System administrator

Daily operation

Step	Description	Application	Role
1	Enter CRF data (fill CRF Wizard's form);	CRF Wizard	Data entry user
2	Generate CRF report;	CRF Wizard	Data entry user/data steward
3	Submit CRF report to triple store	CRF Wizard	Data steward/data entry user

EXAMPLE QUERY

- 
- With some mocked-up data in the triple store we can start querying.
 - Example query:
 - Present the names of the health care facilities that have had male patients that we admitted with fever (temperature => 38)

EXAMPLE SPARQL QUERY

```
# View triples

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX crfsm: <http://purl.org/vodan/whocovid19crfsemdatamodel/>
PREFIX crfsmi: <http://purl.org/vodan/whocovid19crfsemdatamodel/instances/>
PREFIX obo: <http://purl.obolibrary.org/obo/>

SELECT ?facilityName ?participantID

WHERE
{
  # Selects entities that are of type WHO COVID-19 RAPID CRF
  ?case rdf:type crfsm:who-covid-19-rapid-crf .

  # Retrieves the participant ID (patientID) of the case report
  ?case crfsm:participant_id ?participantID .

  # Selects the case reports having a module1 as one of its parts (BFO_0000051 =
  hasPart)
  ?case obo:BFO_0000051 ?module1 .
```

```
?module1 rdf:type crfsm:Module_1 .

# Selects the case reports having as one of its parts an element of type
Facility_name
?module1 obo:BFO_0000051 ?facility .
?facility rdf:type crfsm:Facility_name .

# Retrieves the facility name
?facility crfsm:has_literal_value ?facilityName .

# Selects the case reports with a module1 subsection of type Demographics
?module1 obo:BFO_0000051 ?demographics.
?demographics rdf:type crfsm:Demographics .

# Selects the case reports whose patients are males (C46109). For females,
use C46110
?demographics obo:BFO_0000051 ?genderQuestion .
?genderQuestion rdf:type crfsm:Sex .
?genderQuestion crfsm:has_value crfsmi:C46109 .
```

```
# Selects the case reports with a module1 subsection of type Vital Signs
?module1 obo:BFO_0000051 ?vitalSigns .
?vitalSigns rdf:type crfsm:Vital_signs .

# Selects the case reports with a Vital Signs subsections with the question
temperature on admission filled
?vitalSigns obo:BFO_0000051 ?temperatureAtAdmission .
?temperatureAtAdmission rdf:type crfsm:Temperature_admission .

# Retrieves the temperature at admission
?temperatureAtAdmission crfsm:has_literal_value ?temperatureValue .

#Filters the case reports whose patients had fever (temperature => 38) at
admission
FILTER (?temperatureValue >= 38) .
}
```

EXAMPLE SPARQL QUERY RESULTS

Edit query

```
30
31 # Selects the case reports whose patients are males (C46109). For females, use C46110
32 ?demographics obo:BFO_0000051 ?genderQuestion .
33 ?genderQuestion rdf:type crfsm:Sex .
34 ?genderQuestion crfsm:has_value crfsmi:C46109 .
35
36 # Selects the case reports with a module1 subsection of type Vital Signs
37 ?module1 obo:BFO_0000051 ?vitalSigns .
38 ?vitalSigns rdf:type crfsm:Vital_signs .
39
40 # Selects the case reports with a Vital Signs subsections with the question temperature on admission filled
41 ?vitalSigns obo:BFO_0000051 ?temperatureAtAdmission .
42 ?temperatureAtAdmission rdf:type crfsm:Temperature_admission .
43
44 # Retrieves the temperature at admission
45 ?temperatureAtAdmission crfsm:has_literal_value ?temperatureValue .
46
47 #Filters the case reports whose patients had fever (temperature => 38) at admission
48 FILTER (?temperatureValue > 38) .
49 }
```

Language: SPARQL

Limit to 1000 results

Reasoning

Long parts

Cancel on warnings

Show namespaces

Add a namespace

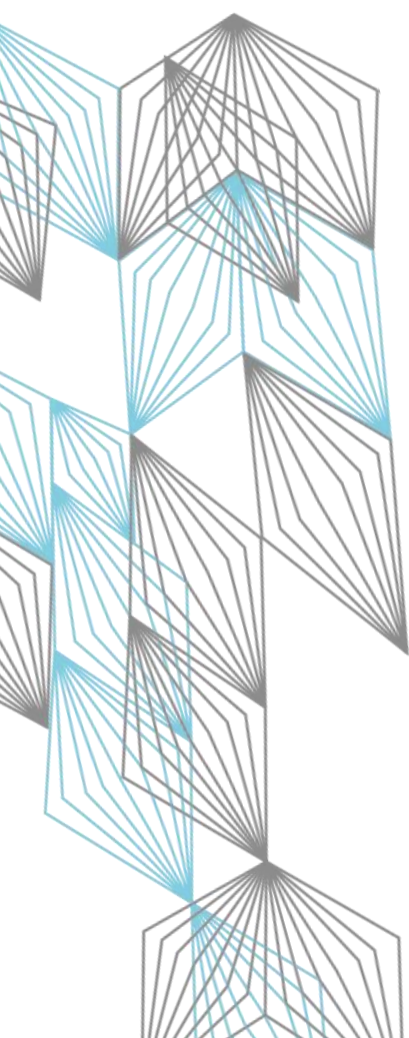
Edit initfile

[Permalink to query](#)

Execute Log Query Show Plan Save as Add to repository

2 results in 55.062 ms Information

facilityName	participantID
"Neverland Hospital"	"VODAN-patient-00006"
"ACME Hospital"	"VODAN-patient-00004"
"ACME Hospital"	"VODAN-patient-00003"



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