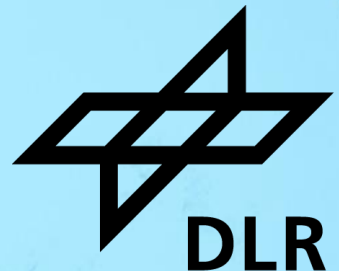


ANNOTATION VON FORSCHUNGSDATEN MIT ONTOLOGIEN IN SHEPARD

Dr. rer. nat. Roland Glück , 9.9.2026



Einheiten sind wichtig



- Mars Climate Orbiter
- Totalverlust 1999
- Impuls in N·s vs. $\text{lb}_f\cdot\text{s}$



- Gimli Glider (1983)
- Notlandung ohne Schwerverletzte nach Gleitflug
- Umrechnungsfaktor lb/l vs. Kg/l

Einheiten in Ontologien



- 500 → 500m
- Meter?
- Meile?
- Nautische Meile?



- **Ontologie:**
- Sammlung von Begriffen
- und wechselseitigen Beziehungen
- Inferenz- und Integritätsregeln
- Sprachlabels

Datenmanagement (oft) in der Realität



Bild1.jpg



Bild1.tif



Bild3Alt.jpg



Bild3Neu.jpg



Daten.zip



Daten1.csv



Daten2.csv



Daten2Final.xlsx

shepard unterstützt uns bei...

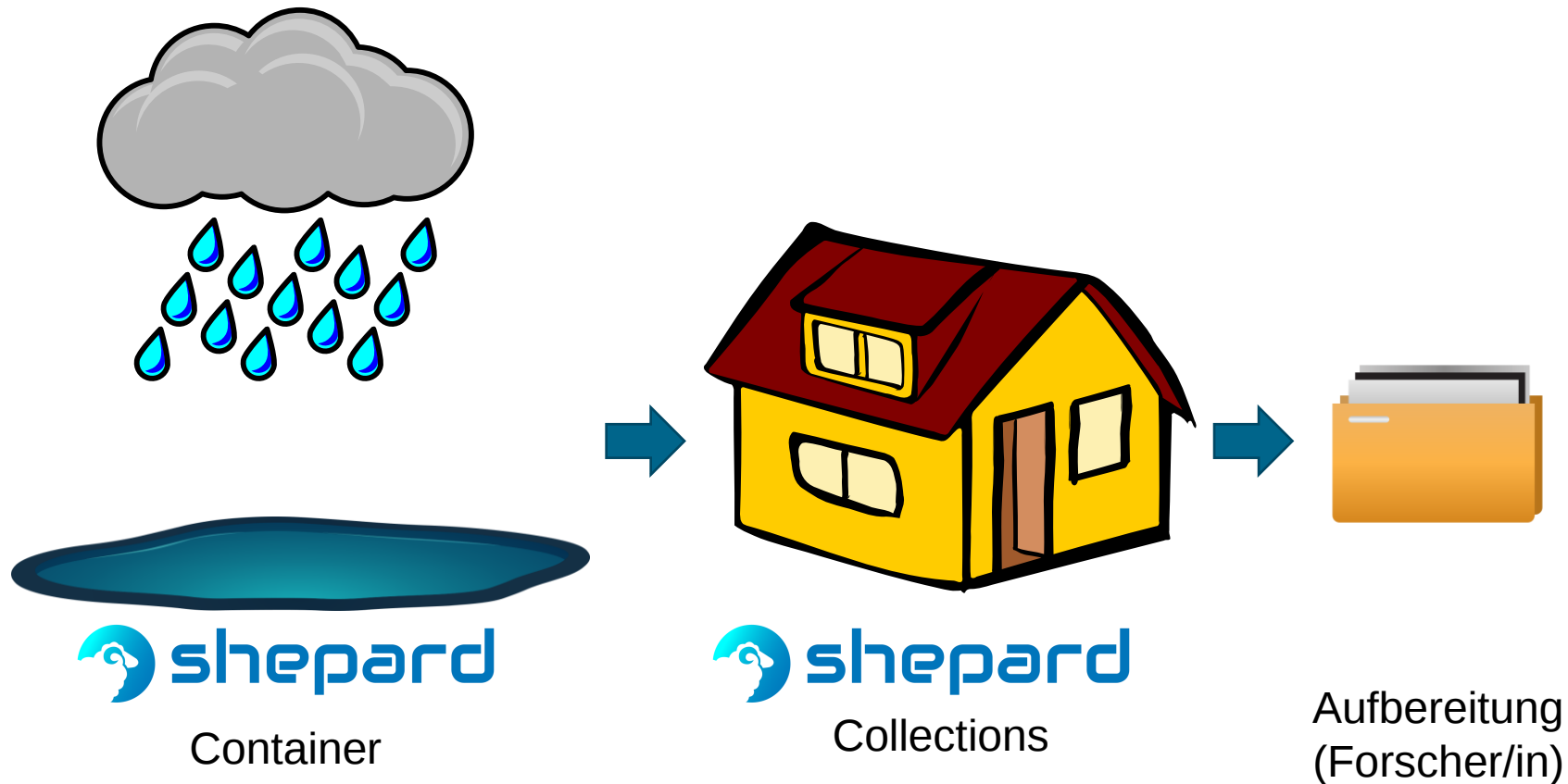


- storage for **heterogeneous production and research data**
- entwickelt am ZLP des Instituts BT in Augsburg
- in Zusammenarbeit mit XITASO
- [shepard · GitLab](#)

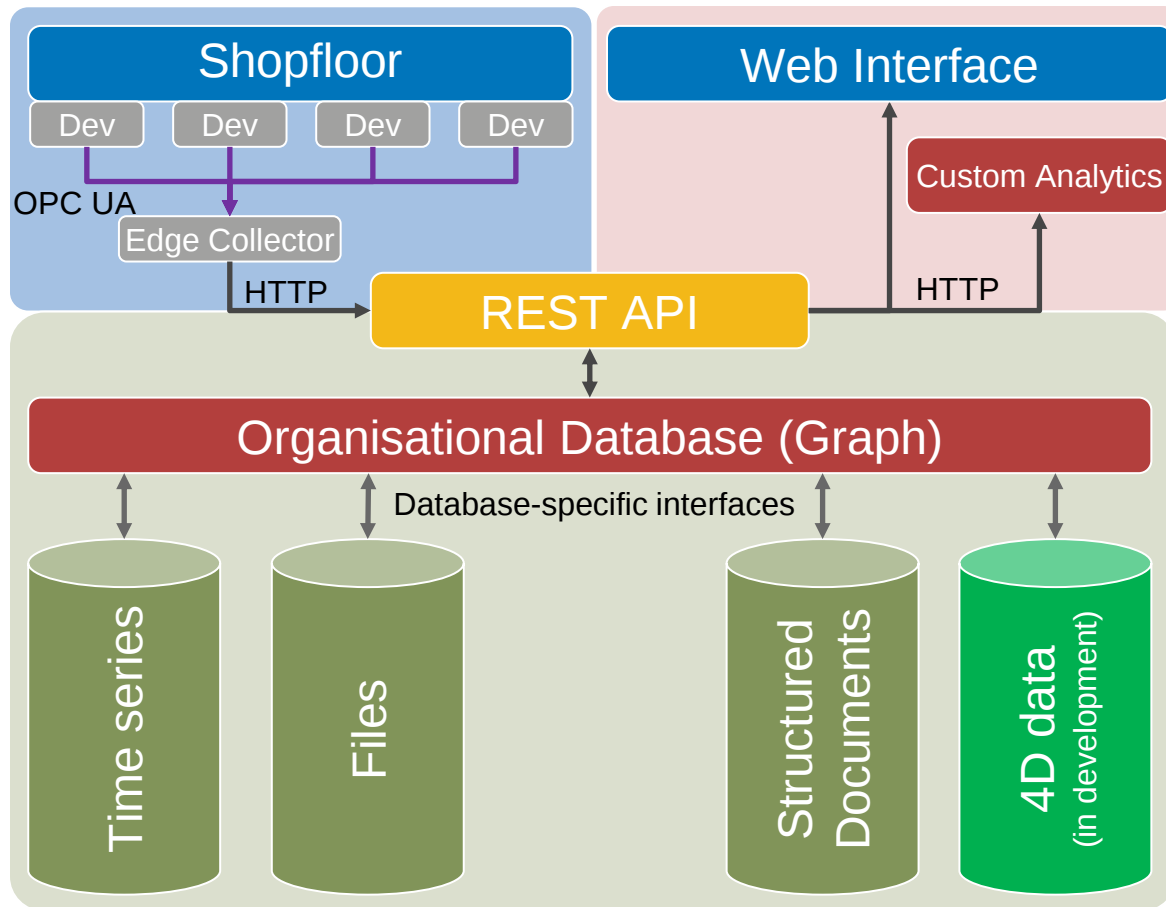


... der Speicherung und Kontextualisierung der Daten

Datengenerierung



Auf technischer Ebene heißt das...



Web Interface: Vue 3

Rest API: Quarkus

Main database: neo4j

Time Series: TimescaleDB

(Structured) Files: MongoDB

Spatial data: Postgis

Beispiel einer Metadatenstruktur



- Inner Solar System
 - Mercury
 - Venus
 - Earth
 - Moon

- Earth
 - temperature measurements
 - Image
 - Diary

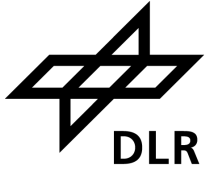
Beispiel einer Metadatenstruktur



- Inner Solar System (Collection)
 - Mercury (Data Object)
 - Venus (Data Object) -> predecessor: Mercury, successor: Earth
 - Earth (Data Object)
 - Moon (Data Object)
- Earth
 - temperature measurements (reference to a timeseries)
 - semantically annotated by unit::celsius based on ontology
 - Image (reference to a file)
 - Diary (Lab journal)

- Paar von Eigenschaft und Wert
- `hasUnit::Kelvin`, `hasUnit::Meter`, `isMadeOf::Carbon`, ...
- beide Werte per IRI (Internationalized Resource Identifier) aus Ontologie übernommen
- Zusätzlich wird default-Sprachlabel des Eintrags übernommen
- Semantische Tripel in SPO-Struktur (analog RDF)

Wir starten eine Reise ...



Collections

Containers

Configuration

Advanced Search

COLLECTION

Inner Solar System

CONTENTS



- Mercury
- Venus
- ▼ Earth
 - Moon
- Mars

 [ADD NEW DATA OBJECT](#)

[Collections](#) / [Inner Solar System](#)

Inner Solar System

ID: 5164

Created: 21 Apr 2026
by lett_fe

› Description

▼ Semantic Annotations

contains

Earth (Planet) 

› Attributes (0)

› Lab Journal

[Containers](#) / [Solar System Timeseries](#)

Solar System Timeseries

Container Type:
Timeseries Container**Container ID:**
3624**Number of items:**
17[UPLOAD CSV](#)

	ID	Measurement	Device	Location	Symbolic Name	Field
^	1310	Climate	Thermometer	Baden-Wuerttemberg	Jesstherm	Temperature
Semantic Annotations: temperature unit degree celsius ×						+ ADD
▼	1311	Climate	Thermometer	Bayern	Jesstherm	Temperature
▼	1309	Climate	Thermometer	Brandenburg	Jesstherm	Temperature
▼	1308	Climate	Thermometer	Brandenburg_Berlin	Jesstherm	Temperature
▼	1324	Climate	Thermometer	Deutschland	Jesstherm	Temperature
▼	1312	Climate	Thermometer	Hessen	Jesstherm	Temperature

... legen Zugriffsrechte fest ...



Manage Permissions



General Permissions ⓘ

Permission Type

Private ▲

Owner

Felix Jakob Lettowsky ▼

Public

PublicReadable

Private

user or group role ▼

+ ADD

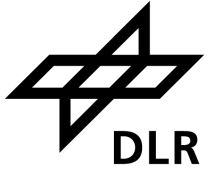
List of Additional Permissions

Name ▲		Roles
	Roland Glück	Reader (x) Writer (x)

CANCEL

SAVE CHANGES

... erstellen eine Referenz ...

[Collections](#)[Containers](#)[Configuration](#)[Advanced Search](#)[About](#)[SIGN OUT](#)

COLLECTION

Inner Solar System

CONTENTS



- Mercury

- Venus

- Earth

- Moon

[+ ADD NEW DATA OBJECT](#)

Timeseries Reference “Climate since 1980”

Type: Timeseries
ID: 3630

Created: 27 May 2025
by lett_fe

Container: [Solar System Timeseries](#)
(ID: 3624)



Interval: 1 Jan 1980, 00:00 - 1 Jan 2025, 00:00

Selected items: 0 / 7

[METRICS AND PLOTTER](#)

Select	Measurement	Device	Location	Symbolic Name	Field
☐	Climate	Thermometer	Sachsen	Jesstherm	Temperature
☐	Climate	Thermometer	Bayern	Jesstherm	Temperature
☐	Climate	Thermometer	Niedersachsen	Jesstherm	Temperature
☐	Climate	Thermometer	Mecklenburg-Vorpommern	Jesstherm	Temperature

... laden weitere Daten hoch und referenzieren sie ...



Structured Data Payload

```
{
  "_id": {
    "$oid": "68c2b98cf0670558006d30ad"
  },
  "planet": "earth",
  "parent_star": {
    "name": "sun",
    "main_element": "hydrogen"
  },
  "continents": [
    "Africa",
    "Europe",
    "Asia",
    "America",
    "Australia"
  ],
  "_meta": {
    "createdAt": {
      "$date": "2025-09-11T11:59:08.611Z"
    },
    "name": "earth_desc.json"
  }
}
```

Container Type: File Container

Container ID: 4564

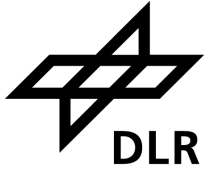
Number of items: 3

UPLOAD FILES

Name	Oid	Created at
mercury.jpg	68c2b988f0670558006d30a6	11 Sept 2025
venus.jpg	68c2b988f0670558006d30a9	11 Sept 2025
earth.jpg	68c2b988f0670558006d30ac	11 Sept 2025

Type	Name	Meta	Created
TimeSeries	Climate since 1980	ID: 4562 Container: Solar System Timeseries (ID: 4560) Interval: 1 Jan 1980, 00:00 - 1 Jan 2025, 00:00 temperature unit degree celsius	11 Sept 2025 by lett_fe
TimeSeries	Climate in the 90s	ID: 4563 Container: Solar System Timeseries (ID: 4560) Interval: 1 Jan 1990, 00:00 - 1 Jan 2000, 00:00 temperature unit degree celsius	11 Sept 2025 by lett_fe
File	sattelite image	ID: 4571 Container: Planet images (ID: 4564) Files: 1	11 Sept 2025 by lett_fe
Structured Data	Structured description of earth	ID: 4579 Container: JSON Descriptions (ID: 4576) Payloads: 1	11 Sept 2025 by lett_fe

... und suchen in den Daten.



Query

Query Type*
References & Relationships

Search Query*
{ "AND": [{ "property": "hasAnnotation",

☒ Use Code view

```
1 {  
2   "AND": [  
3     { "property": "hasAnnotation",  
4       "operator": "contains",  
5       "value": "unit::celsius" },  
6     { "property": "createdAt",  
7       "operator": "gt",  
8       "value": 12444 }  
9   ]  
10 }
```

Line: 10 Column: 1

Results

ID	Name
5177	Climate in southern Germany since 1980
5176	Climate in northern Germany since 1980

< 1 >

Additional Search Criteria:

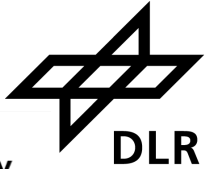
Collection Name or ID...
Inner Solar System (ID: 5164)

Data Object Name or ID...

RESET

SEARCH

Verwendung eigener CFK-Ontologie (Mathieu Vinot)



Add geometrical data

Select the part geometry

Extruded profile Plate **Tube**

1. Selection of an ontology class → SPARQL query of class restrictions in ontology

2. Automatic generation of user input fields

Diameter (Number of measurement: 1)

hasNumericalValue

0.00 - +

hasUnit

nm

+ Add measurement - Remove measurement

Length (Number of measurement: 1)

hasNumericalValue

0.00 - +

hasUnit

nm

+ Add measurement - Remove measurement

Thickness (Number of measurement: 1)

hasNumericalValue

0.00 - +

hasUnit

nm

+ Add measurement - Remove measurement

- shepard bringt Meta zu den Daten
- unterstützt FAIR-Prinzipien
- Suchfunktionalität für Findability
- Nutzerverwaltung für Accessibility
- Ontologien für Interoperability
- ontologiebasierte AI-Verarbeitung weist den Weg Richtung Reusability

FRAGEN?

Gitlab: <https://gitlab.com/dlr-shepard/shepard>

