TECHNICAL UNIVERSITY of MOLDOVA

DUCHENNE DATA FOUNDATION

Artificial intelligence as a tool for biomedical research, digital nutrition/fitness and smart e-commerce



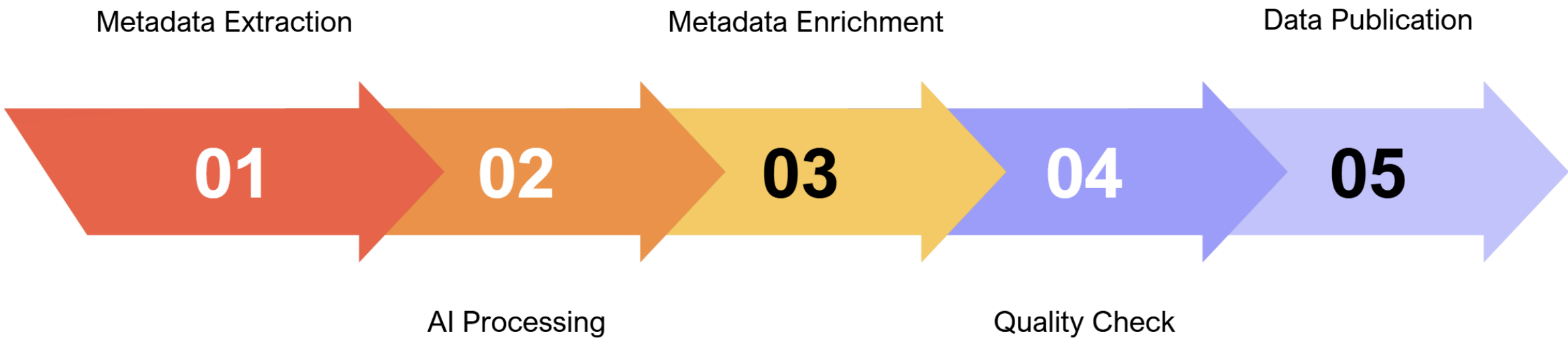
Sergiu SIMINIUC

Smart Diaspora 2025
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Cluj-Napoca | 4-7 noiembrie 2025

The use of AI in researching rare neuromuscular diseases Duchenne and Becker

- Clinical Trials Metadata Enrichment
- FAIRification
- Exon Skipping

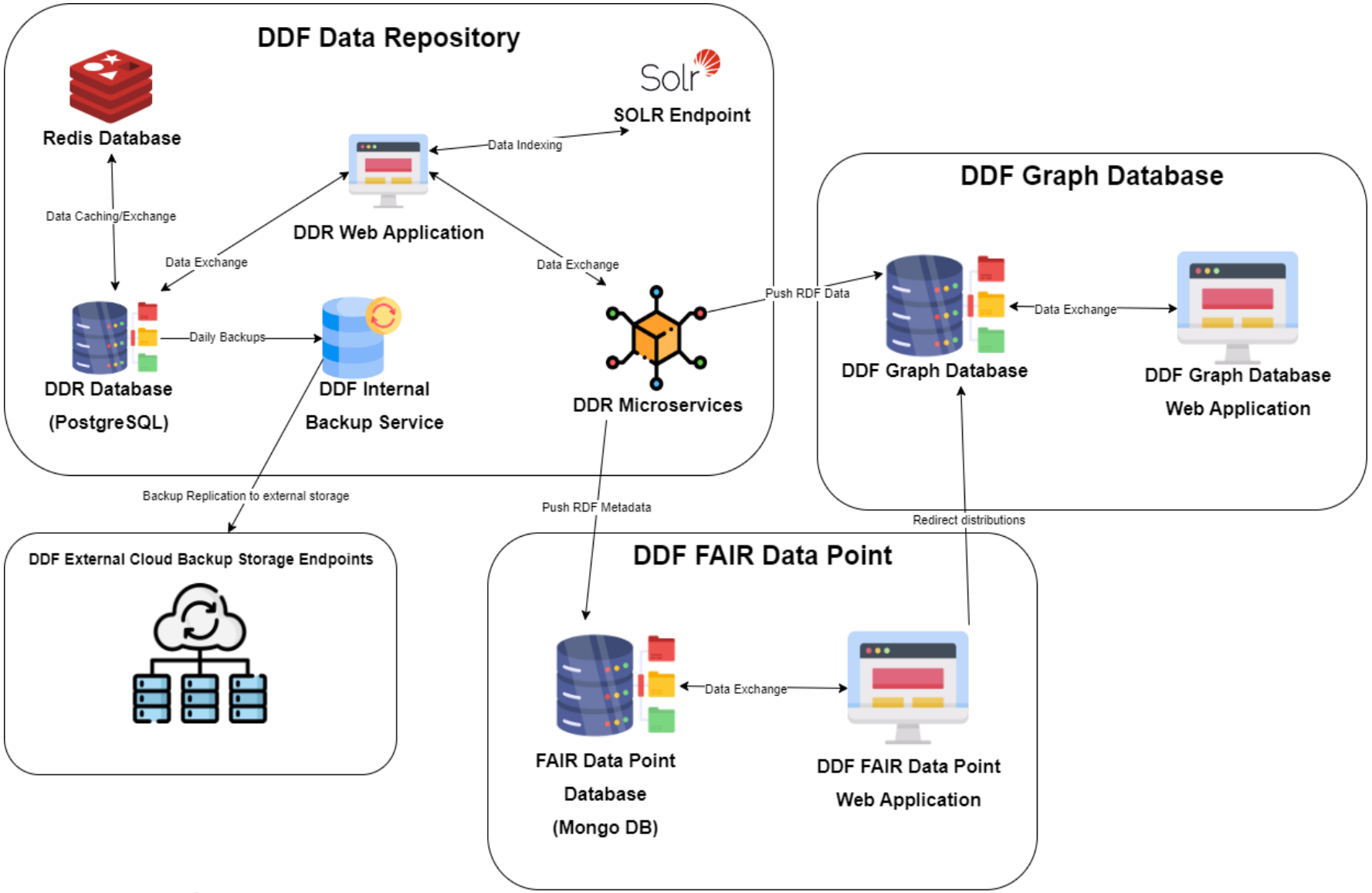
Clinical Trials Metadata Enrichment



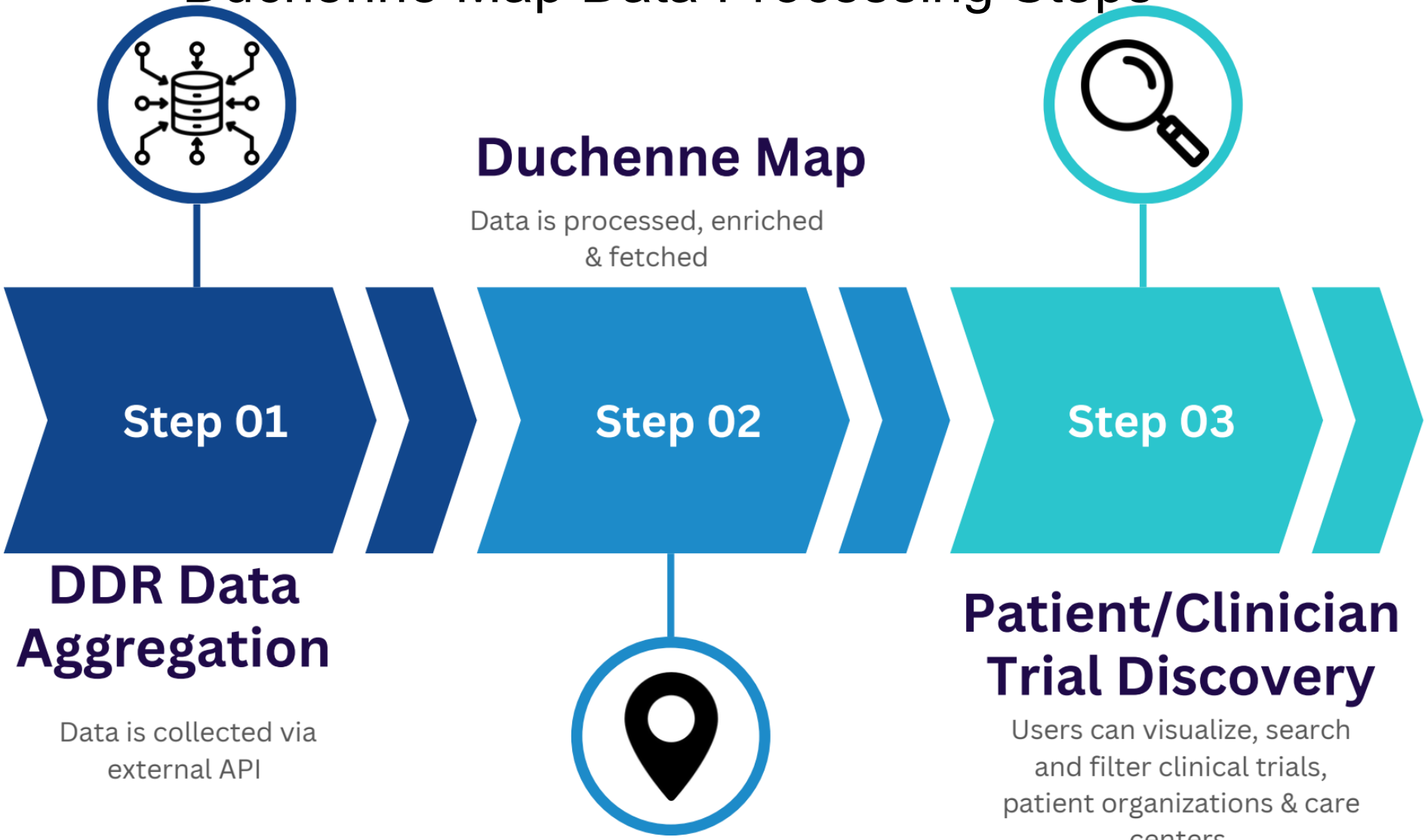
Duchenne Data Repository – Clinical Trials Dataset

_id	NCTID	Title
41	NCT01954940	THE EFFECT OF WHOLE BODY VIBRATION THERAPY UPON MUSCLE STRENGTH & FUNCTION IN AMBULATORY BOYS WITH D…
42	NCT02354781	Phase I/II Clinical Intramuscular Gene Transfer of rAAV1.CMV.huFollistatin344 Trial to Patients With…
43	NCT03057002	Detection of Myocardial Metabolic Changes in Patients With Cardiomyopathy Using Hyperpolarized Carbo…
44	NCT04607824	Computational Task in Duchenne Muscular Dystrophy: Involvement of Cardiac Autonomic Regulation.
45	NCT06124196	Wearable Technology to Evaluate Hyperglycemia and Heart Rate Variability in Duchenne Muscular Dystro…
46	NCT06109103	Investigation of the Effects of Telerehabilitation-based Motor Imagery Training on Motor Imagery Ski…
47	NCT06114056	A Clinical Study Evaluating the Safety, Tolerability, and Initial Efficacy of Single Intravenous Inf…
48	NCT03236662	UCD0115B: An Open-label Extension Study of Purified Epicatechin to Improve Mitochondrial Function, S…
49	NCT04768062	A Phase 3, Multi-center, Open-label Extension Study to Assess the Safety and Efficacy of Viltolarsen…
50	NCT07058662	A Phase 1/2, Open-label Clinical Study to Evaluate the Safety, Tolerability and Efficacy of BBM-D101…
51	NCT05330195	The Effects of Bicycle Training on Gait and Balance in Children With Duchenne Muscular Dystrophy

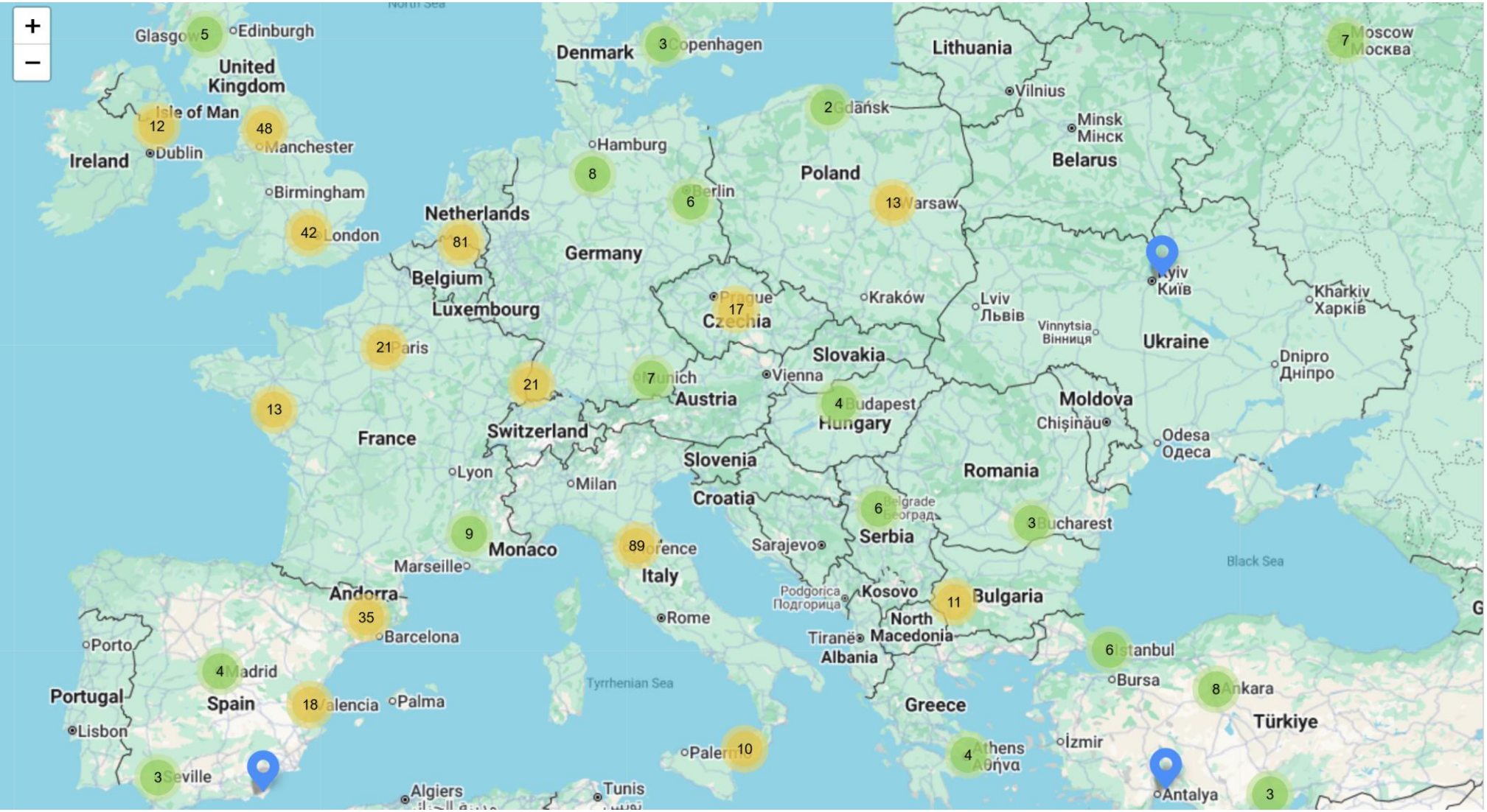
Tech Stack Overview



Duchenne Map Data Processing Steps



Duchenne Map



Clinical Trials Site

Last update: 11/1/2025, 1:00:01 AM

Clinical trial site information is sourced from ClinicalTrials.gov, a service of the U.S. National Institutes of Health.

- Show Clinical Trials Sites
- Enable Ambulation Filter
  - Ambulant
  - Non-Ambulant
- Using Corticosteroids
- Show Only Recruiting Trials
- Enable Age Participation Filter

Patient Organizations

- Show Patient Organizations
- Enable Number of Patients Filter

Select Services ▼

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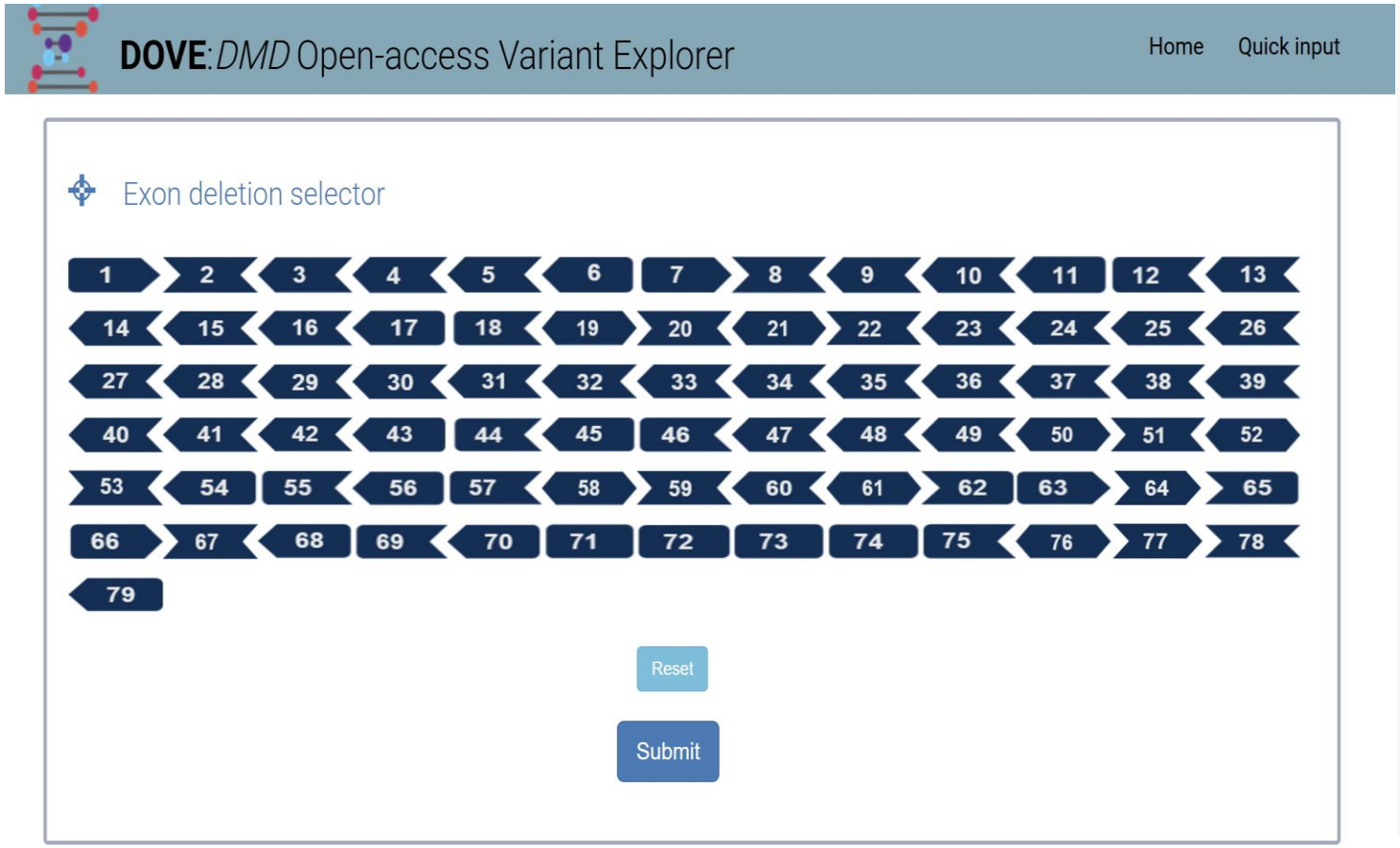
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USAMV

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Exon Skipping



Step 1

Find mentioned exons in Trial's Metadata using AI

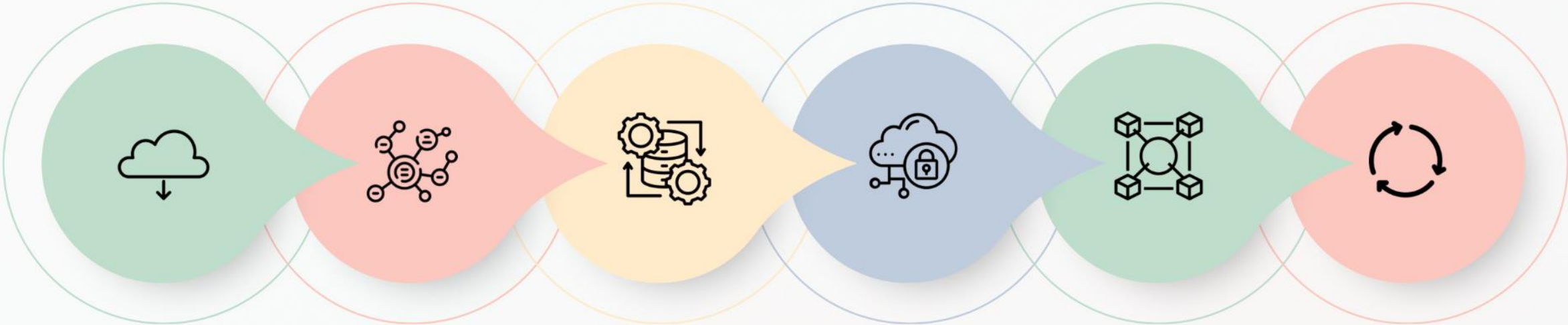
Step 2

Communicate with DOVE tool

Step 3

Filter the trials

From data ingestion to reuse



Data Ingestion

Collect heterogeneous data from registries, trials, biobanks etc..

Data Harmonization

Map incoming datasets to common data models and controlled vocabularies.

FAIRification

Apply FAIR principles through metadata enrichment and persistent identifiers.

Secure Storage & Governance

Store datasets in compliant infrastructure with role-based access, ISO & GDPR safeguards, and audit trails.

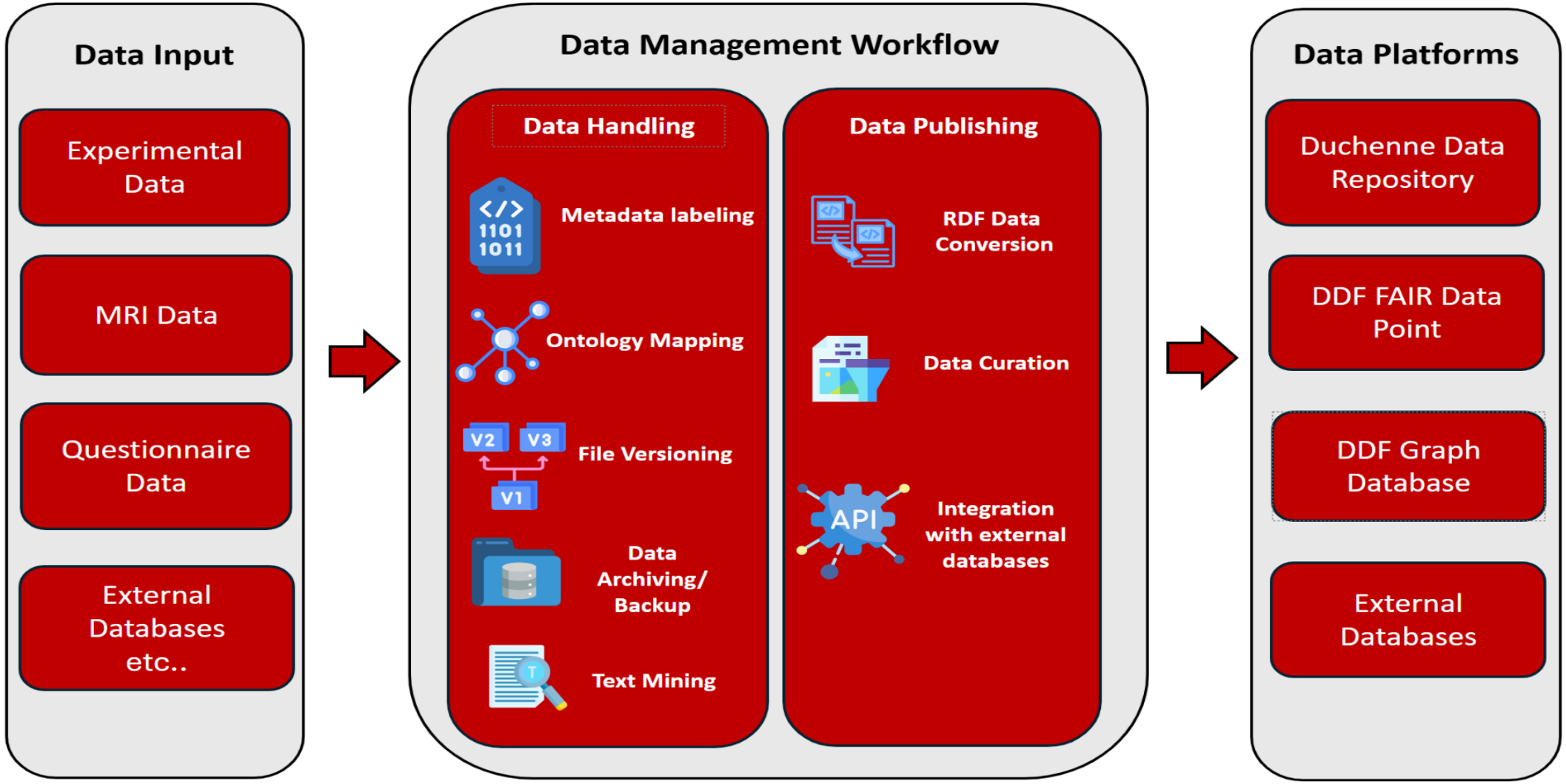
Integration & Interoperability

Link to external FAIR Data Points, ontologies, and federated learning environments.

Access & Reuse

Enable discovery via dashboards, APIs, and maps for researchers, clinicians, and patient communities.

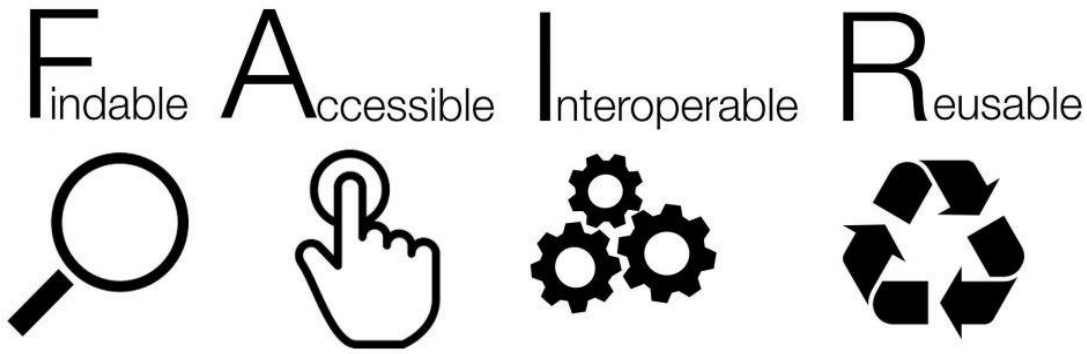
FAIRification workflow



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Variable Name	Ontology	Variable Description
Subject ID	http://purl.obolibrary.org/obo/NCIT_C83083	Subject Identifier
Biological sex	http://purl.obolibrary.org/obo/NCIT_C205472	biological sex
Recruitment Site	dcterms:spatial	Recruitment Site
Age Group	http://purl.obolibrary.org/obo/NCIT_C20587	Age Related Group
Diagnosis	http://purl.obolibrary.org/obo/NCIT_C2991 http://purl.obolibrary.org/obo/NCIT_C75482 for DMD http://purl.obolibrary.org/obo/NCIT_C84587 for BMD	Diagnosis
Age at assessment (in years)	http://purl.obolibrary.org/obo/NCIT_C213227	Age at assessment (in years)
Age at MRI	http://purl.obolibrary.org/obo/NCIT_C217261	Age at MRI
Data Custodian	http://purl.obolibrary.org/obo/NCIT_C165210	Data Custodian
Protocol	http://purl.obolibrary.org/obo/NCIT_C164368	Protocol

FAIRification workflow



	subject	predicate	object	context
1	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	dcterms:alternative	"3xICM PBS"	http://bind_wp4_subject_metadata/
2	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	dcterms:identifier	"3xICM PBS01"	http://bind_wp4_subject_metadata/
3	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	sio:SIO_000008	http://bind_wp4_subject_metadata/individual/3xICM_PBS01/ageCategory	http://bind_wp4_subject_metadata/
4	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	sio:SIO_000008	http://bind_wp4_subject_metadata/individual/3xICM_PBS01/ageExperiment	http://bind_wp4_subject_metadata/
5	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	sio:SIO_000008	http://bind_wp4_subject_metadata/individual/3xICM_PBS01/agentValue	http://bind_wp4_subject_metadata/
6	http://bind_wp4_subject_metadata/individual/3xICM_PBS01	sio:SIO_000008	http://bind_wp4_subject_metadata/individual/3xICM_PBS01/genotype	http://bind_wp4_subject_metadata/

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Visit Duchenne Map

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Use of AI in ecommerce market intelligence & analytics



54%
Compliance score

100%
Completeness score

SKU #	EAN	BRAND	CATEGORY
01745-20	4078500174503	Gardena	Other

GROUP	TAGS	PRODUCT NUMBER	MANUFACTURER NUMBER
–	–	–	–

Monitor your product content automatically across all e-commerce channels.

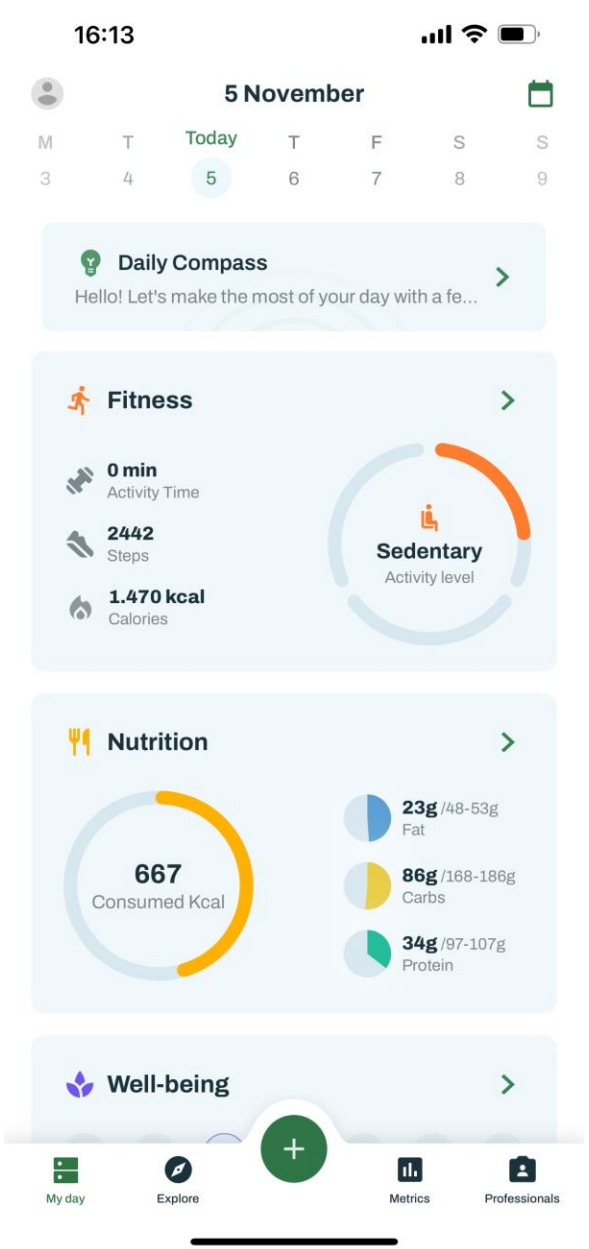
Ensure quality product presentation

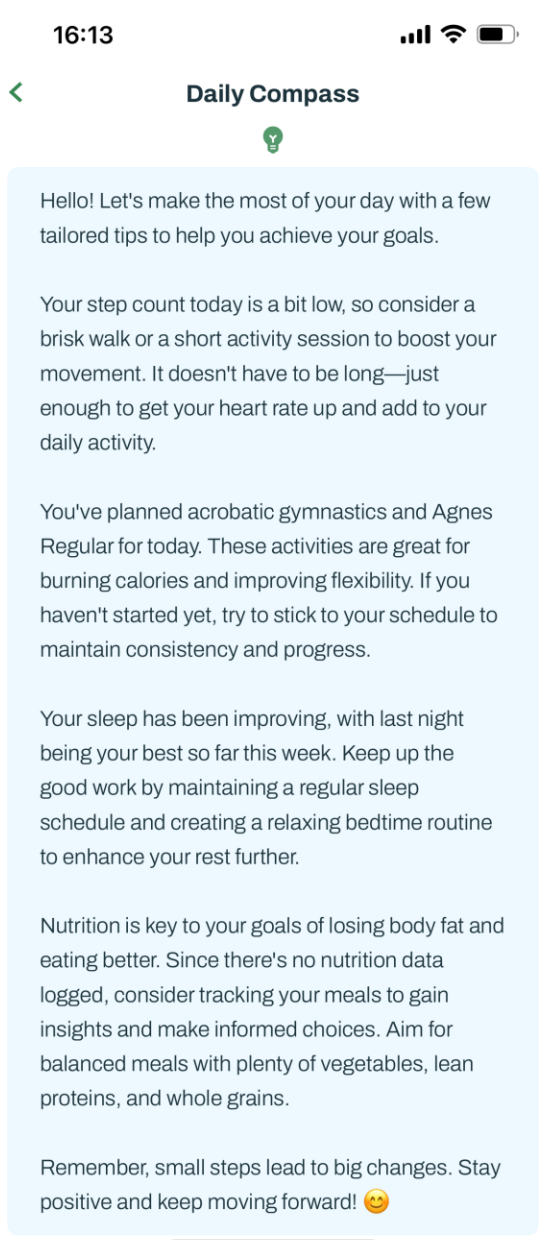
Protect brand image

Identify errors and optimization potential

Use of AI in ecommerce market intelligence & analytics

Title	GARDENA Pumpen-Anschlussstück, zum Anschluss von Pumpen an Wasserschlauch-Stecksystem	Gardena Pumpen-Anschlussstück 33,3 mm (G 1)	Exist	✓	✓
			Character Count	50-77	43
			Similarity	42	42
Image	 1	 1 2	Exist	✓	✓
			Quantity	3-12	2
			Similarity	99.55	99.55





Use of AI in fitness, nutrition and wellbeing

- Increase of ~ 30% in application user interactions
- Continuous insights improvement

Thank You