



This presentation by Andrea Tarallo <https://orcid.org/0000-0002-2749-8588> is composed of slides and material created by the GO FAIR Foundation (<https://www.gofair.foundation>) ROR: <https://ror.org/056j50v04>. All the material is distributed under a CC BY-SA licence.

# FIP: FAIR Implementation Profiles

## Che cosa è un FAIR Implementation Profile (FIP)?

Un FIP è una **RACCOLTA** di **scelte** (tecnologiche)  
fatte da una **comunità** di pratica per **soddisfare**  
ognuno dei principi e sottoprincipi **FAIR**

## Box 2 | The FAIR Guiding Principles

### To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data it describes
- F4. (meta)data are registered or indexed in a searchable resource

### To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
  - A1.1 the protocol is open, free, and universally implementable
  - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

### To be Interoperable:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

### To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
  - R1.1. (meta)data are released with a clear and accessible data usage license
  - R1.2. (meta)data are associated with detailed provenance
  - R1.3. (meta)data meet domain-relevant community standards

- Nessuna soluzione di implementazione
- Non è possibile pianificare una strategia
- Nessuna possibilità di stimare costi

Wilkinson et al. 2016

# FAIR IMPLEMENTATION MATRIX

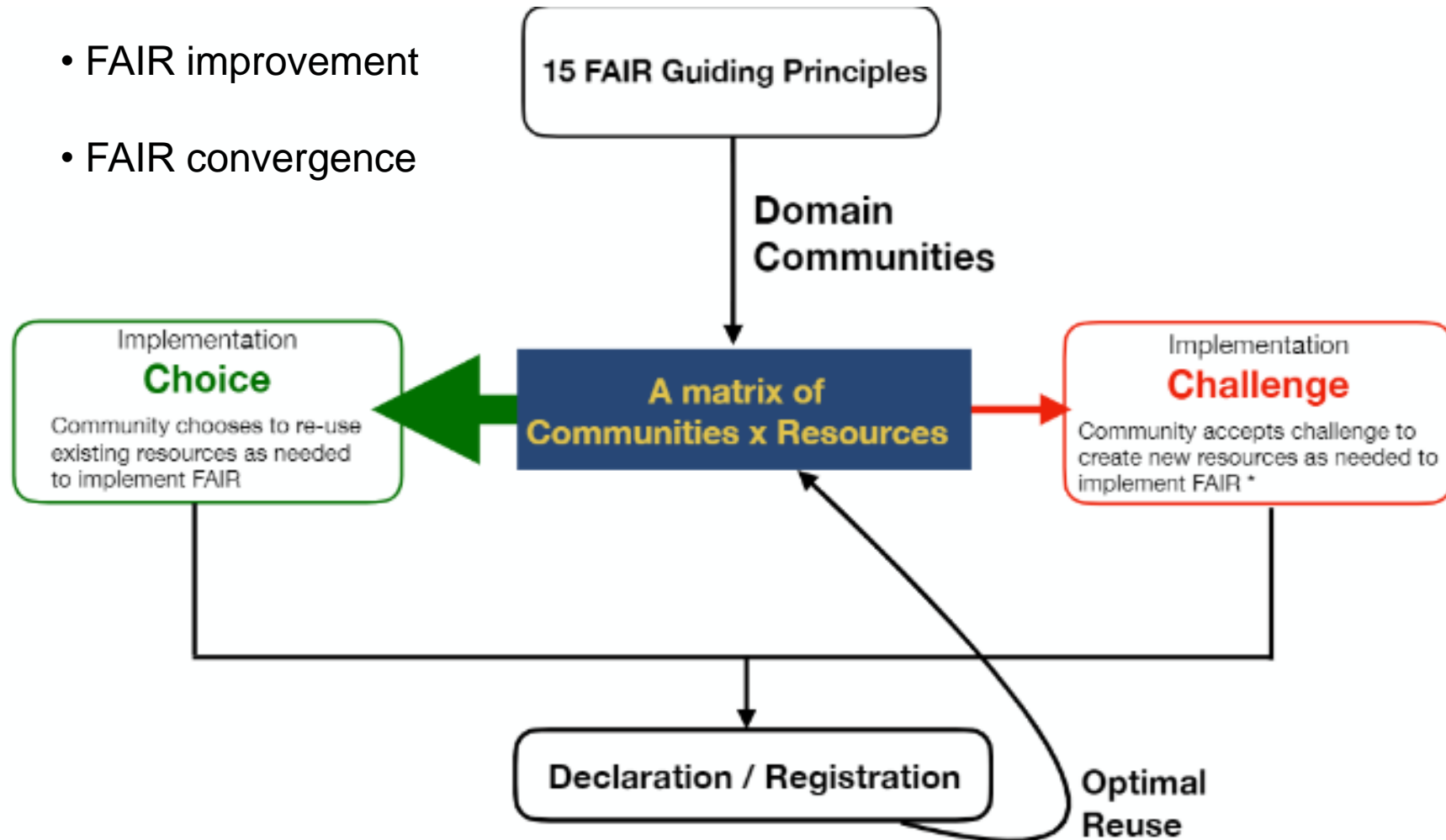


	A	B	C	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
9	FAIR Principle	Services	Digital Object	Chemistry (ChIN)	BiodiFAIRse	Biodiversities	ASTRON	CO-OPERAS	DS competence	FAIRwizard/metrics	Metabolomics	Metrology	Food Systems	SEADATANET	INOSIE	System Terre	Vaccine IS	EcoSoc	Annotation
18		Tooling(Repository)	<a href="https://www.dataone.org">https://www.dataone.org</a>		<a href="http://bioconductor.org">http://bioconductor.org</a> <a href="https://bioconda.github.io">https://bioconda.github.io</a>						<a href="https://bioconda.github.io">https://bioconda.github.io</a>		<a href="https://vest.agri.semantics.org/">https://vest.agri.semantics.org/</a>	<a href="https://www.seadatanet.org/Met">https://www.seadatanet.org/Met</a>			will consider		
19		Tooling	Registry Service	<a href="#">DOI/CrossRef</a> , <a href="#">ORCID</a> , <a href="#">Handle</a> , <a href="#">InChI resolver</a> , <a href="#">PubChem</a> , <a href="#">ChemSpider</a> , <a href="#">Chemical Identifier Resolver</a>	DOI ORCID			<a href="#">DOI/CrossRef</a> , <a href="#">Funding registry</a> , <a href="#">ORCID</a>			DOI		<a href="#">DOI/Datacite</a> , <a href="#">ORCID</a>	DOI for products, B2Handle for PID of dataset			for metadata, will use CEDAR <a href="https://metadatcenter.org">https://metadatcenter.org</a>	dalra	
20		tooling	Metadata forms/creators	<a href="#">PubChem</a> , <a href="#">ChemSpider</a>	<a href="#">IPT toolkit</a> (in production) <a href="#">Bexis</a> (testing) <a href="#">ISATools</a> (testing) <a href="#">Webforms</a>						<a href="#">ISATools</a>			<a href="#">Mikado software</a>			for metadata, will use CEDAR <a href="https://metadatcenter.org">https://metadatcenter.org</a>	dalra	
21		Tooling	Search capability	<a href="#">PubChem</a> , <a href="#">ChemSpider</a>				Each platform has its own search engine					<a href="#">eROSA Map of Data</a>	<a href="#">CDI search interface and</a>			<a href="#">Google</a> , <a href="#">Google dataset</a>	<a href="#">gesisDataSearch</a> , <a href="#">B2FIND</a>	
22																			
23		Policy	Persistence Policy	TBD	-Zenodo one ( <a href="http://about.zenodo.org/principles/">http://about.zenodo.org/principles/</a> ) -Data connected to GBIF will be retained for the lifetime of the repository (to be verified) -Or no persistence policy									tbd				decentral	
24		Technology	Computer-actionable policy description language		JSON or XML (for OAI-PMH & RESTful API)														
25		Tooling	License protocols	Open + Closed	CC0, CC-BY, CC-BY-NC Preferred: CC-BY			CC0, CC BY, CC BY-NC			CC, Apache		CC, Licence Ouverte	SDN vocab, SDN policy					
26		Tooling	Training Materials	TBD (registered via ELIXIR TeSS)	<a href="#">GBIF France elearning platform</a> ( <a href="http://formation.gbif.fr">http://formation.gbif.fr</a> ) <a href="#">Galaxy Training material Infrastructure</a> ( <a href="https://galaxyproject.github.io/training-material/">https://galaxyproject.github.io/training-material/</a> )						various		<a href="https://f1000research.com/gateways/godan/about-this-gateway">https://f1000research.com/gateways/godan/about-this-gateway</a>	<a href="https://www.seadatanet.org/Events/Training-courses">https://www.seadatanet.org/Events/Training-courses</a> (all recorded)			Research ethics		
27		Tooling	DS/DM tooling		<a href="#">DMP Opidor</a> <a href="https://opidor.fr/planifier/">https://opidor.fr/planifier/</a> (based on DMPOnline)			<a href="#">DMPOnline</a>		<a href="#">DS-Wizard</a>			<a href="#">DMP-online</a>	tbd			<a href="#">DS Wizard</a> <a href="https://ds-wizard.org">https://ds-wizard.org</a>		
28		Tooling	Workpace/labnote tooling	Many - ranging from Open Source to highly proprietary							W4M, MetaboAnalyst, XCMSOnline			<a href="#">Jupyterhub</a> (in dev in VRE)					
29		Tooling	(distributed) analytics workflows		<a href="#">Galaxy-E</a>						W4M, Galaxy, Jupyter, KNIME		various	DIVA			<a href="http://www.researchobject.org">http://www.researchobject.org</a>		
		Tooling	visualisation applications	Many	<a href="#">Metadata portal integrated feature</a>						various		various	<a href="#">OpenLayers</a> and more					

# Dai FAIR Implementation Matrix ai FIP

Un approccio sistematico al:

- FAIR assessment
- FAIR improvement
- FAIR convergence



...every „choice“ was once a „challenge“

# The FIP approach

**Survey** with questions addressing each of the FAIR Principles

Survey	
F1	_____
F2	_____
F3	_____
F4	_____
A1	_____
A1.1	_____
A1.2	_____
A2	_____
I1	_____
I2	_____
I3	_____
R1	_____
R1.1	_____
R1.2	_____
R1.3	_____

Responses reflect technical community choices how to implement the FAIR Principles



In a FIP, these solutions are called **FAIR Enabling Resources (FERs)**

FIP	
F1	FAIR Enabling Resource (FER)
F2	FAIR Enabling Resource (FER)
F3	FAIR Enabling Resource (FER)
F4	FAIR Enabling Resource (FER)
A1	FAIR Enabling Resource (FER)
A1.1	FAIR Enabling Resource (FER)
A1.2	FAIR Enabling Resource (FER)
A2	FAIR Enabling Resource (FER)
I1	FAIR Enabling Resource (FER)
I2	FAIR Enabling Resource (FER)
I3	FAIR Enabling Resource (FER)
R1	FAIR Enabling Resource (FER)
R1.1	FAIR Enabling Resource (FER)
R1.2	FAIR Enabling Resource (FER)
R1.3	FAIR Enabling Resource (FER)

# What...

- A list of declared technology **choices** intended to implement each of the FAIR Principles
- Decided collectively by the members of a particular **community** of practice

## FAIR Implementation Community

- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource
- FAIR Enabling Resource

# How... a rigorous approach to FAIR implementation

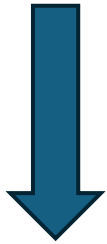
FAIR principle	FIP Question	FAIR Enabling Resource type	Your answers
F1	What globally unique, persistent, resolvable identifiers do you use for metadata records?	Identifier service	
F1	What globally unique, persistent, resolvable identifiers do you use for datasets?	Identifier service	
F2	Which metadata schemas do you use for findability?	Metadata schema	
F3	What is the technology that links the persistent identifiers of your data to the metadata description?	Metadata-Data linking schema	
F4	In which search engines are your metadata records indexed?	Registry	
F4	In which search engines are your datasets indexed?	Registry	
A1.1	Which standardized communication protocol do you use for metadata records?	Communication protocol	
A1.1	Which standardized communication protocol do you use for datasets?	Communication protocol	
A1.2	Which authentication & authorisation technique do you use for metadata records?	Authentication & authorisation service	
A1.2	Which authentication & authorisation technique do you use for datasets?	Authentication & authorisation service	
A2	Which metadata longevity plan do you use?	Metadata longevity	
I1	Which knowledge representation languages (allowing machine interoperation) do you use for metadata records?	Knowledge representation language	
I1	Which knowledge representation languages (allowing machine interoperation) do you use for datasets?	Knowledge representation language	
I2	Which structured vocabularies do you use to annotate your metadata records?	Structured vocabularies	
I2	Which structured vocabularies do you use to encode your datasets?	Structured vocabularies	
I3	Which models, schema(s) do you use for your metadata records?	Metadata schema	
I3	Which models, schema(s) do you use for your datasets?	Data schema	
R1.1	Which usage license do you use for your metadata records?	Data usage license	
R1.1	Which usage license do you use for your datasets?	Data usage license	
R1.2	Which metadata schemas do you use for describing the provenance of your metadata records?	Provenance model	
R1.2	Which metadata schemas do you use for describing the provenance of your datasets?	Provenance model	
R1.3	Who is the community, and what are their domain-relevant community standards?	The FAIR implementation Profile	<i>This FAIR implementation Profile</i>

Schultes, E., Magagna, B., & Schultes, J. (2023). FIP mini-questionnaire (2.0.0). Zenodo.  
<https://doi.org/10.5281/zenodo.10417536>





# Dal questionario excel alla machine actionability: humans VS machines



**III.6 Declaration F4 Datasets: Which service do you use to publish your datasets?**

Principle F4 states that digital resources must be registered or indexed in a searchable resource (e.g., a search engine). The searchable resource provides the infrastructure by which a metadata record (made accessible with a GUPRI, F1) can be discovered, using either the attributes in that metadata (F2) or via the identifier of the resource itself (F3) [T. Weigel , U. Schwardmann , J. Klump , S. Bendoukha & R. Quick . Making data and workflows findable for machines. Data Intelligence 2(2020), 40–46. 10.1162/dint\_a\_00026].

To summarize, this question requests a FAIR Enabling Resource of type "registry" which is a service that indexes metadata and data and provides search over that index.

Desirable: *Defining FAIR Implementation Profile*

a. Declaration: No implementation choice has been made by this community

b. Declaration: FAIR Enabling Resource(s)

Clear answer

Answered 5 months ago by Andrea Tarallo.

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**III.6.b.1 List the FAIR Enabling Resource(s)**

Desirable: *Defining FAIR Implementation Profile*

**III.6.b.1.a.1 Select the FAIR Enabling Resource**

Desirable: *Defining FAIR Implementation Profile*

**LifeWatchITAdatPortal | LifeWatch Italy Data Portal**  
The LifeWatch Italy Data Portal is a national data infrastructure facilitating data sharing for biological and environmental research and making it accessible and reusable.

- See more here

<https://w3id.org/np/RA5r5vJFLVberfcokXDO21Zjmx8Xishjfc950-fHykI50#LifeWatchITAdatPortal>

Clear answer

Answered 5 months ago by Andrea Tarallo.

**III.6.b.1.a.2 This implementation choice is:**

Desirable: *Defining FAIR Implementation Profile*

a. Currently in use by the community

b. Currently in use, but is planned to be replaced in the future

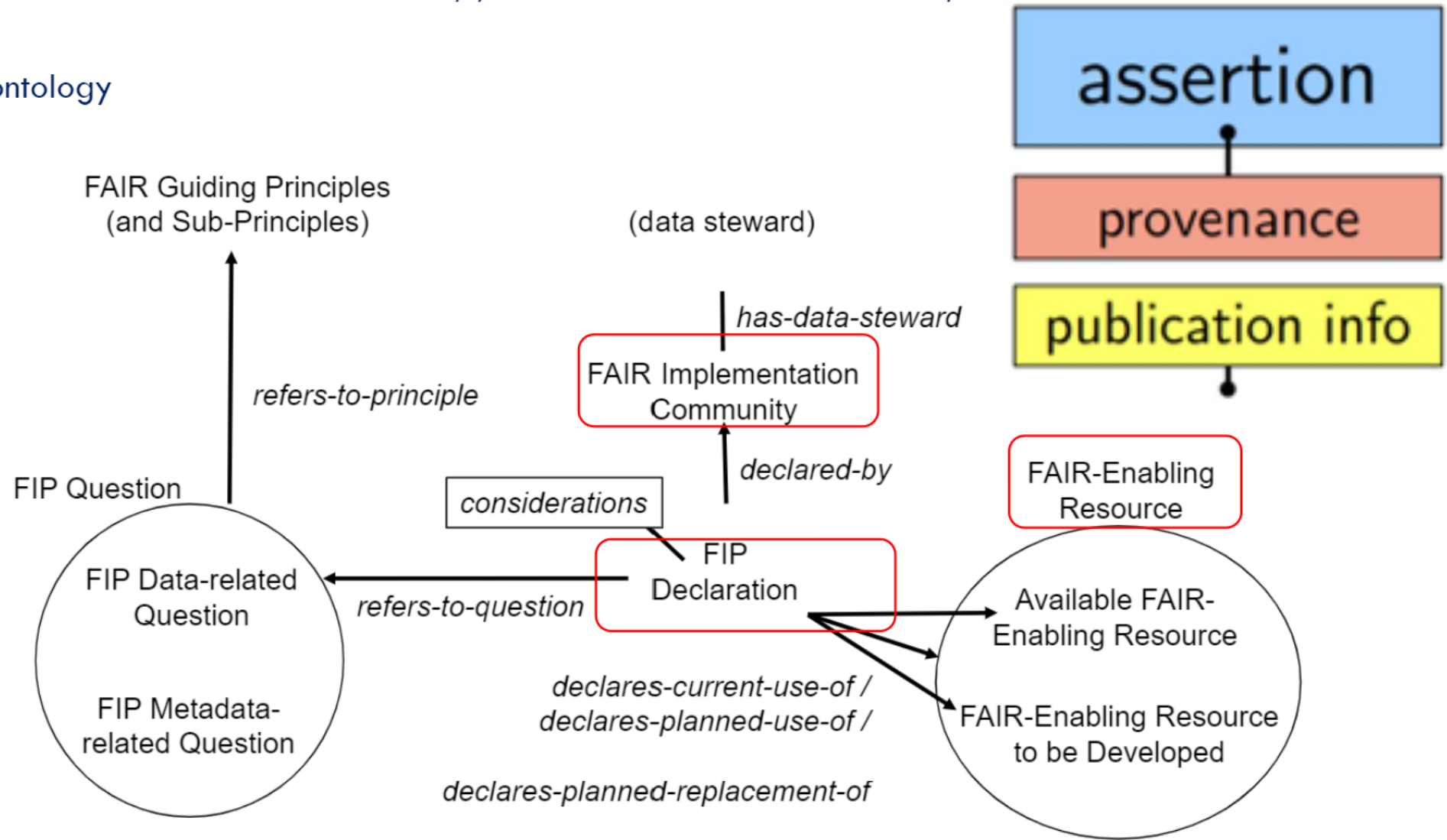
c. Is planned to be used in the future

<https://fip-wizard.ds-wizard.org/wizard/dashboard>

<https://gofair-foundation.github.io/fip/>

# FAIR Implementation Profiles (FIP) <https://fip-wizard.ds-wizard.org/>

[Link](#) to the FIP ontology

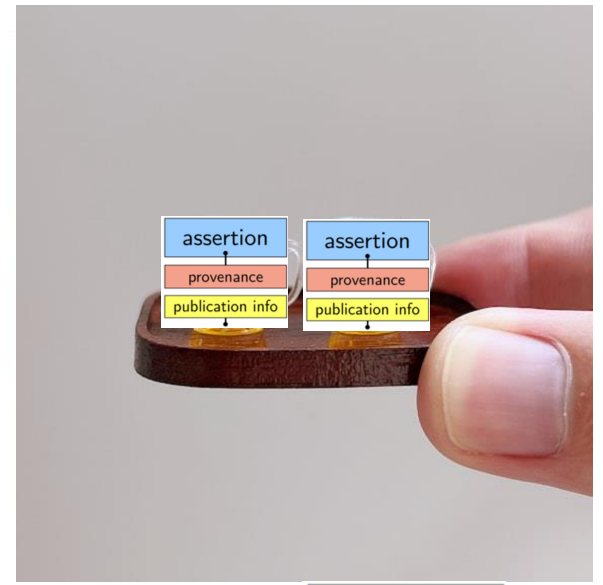
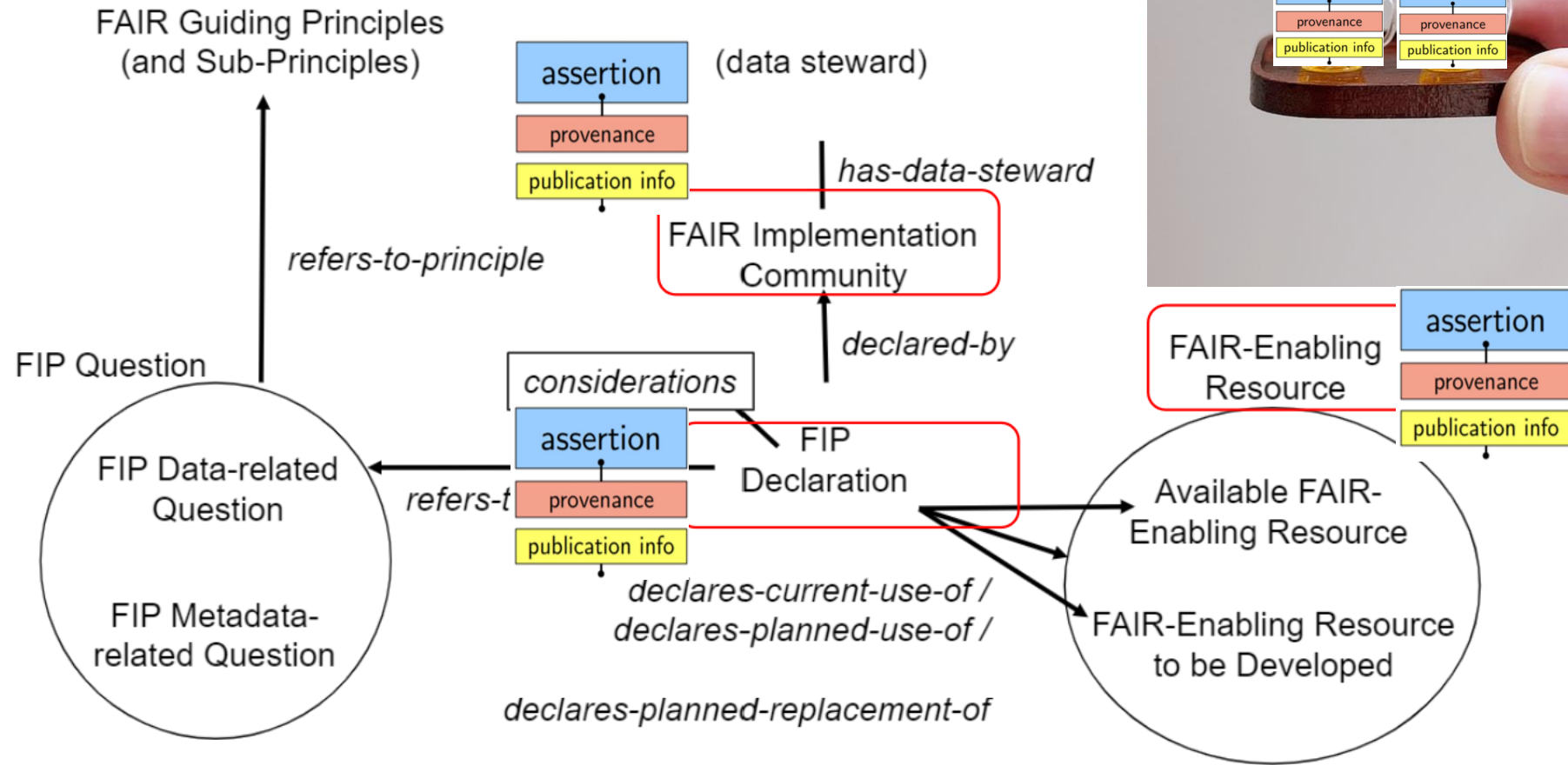


Uses the [FIP Wizard](#) as entry tool

# FAIR Implementation Profiles (FIP) <https://fip-wizard.ds-wizard.org/>

[Link](#) to the FIP ontology

Una assertion è una tripla del tipo <Soggetto> Predicato <Oggetto>

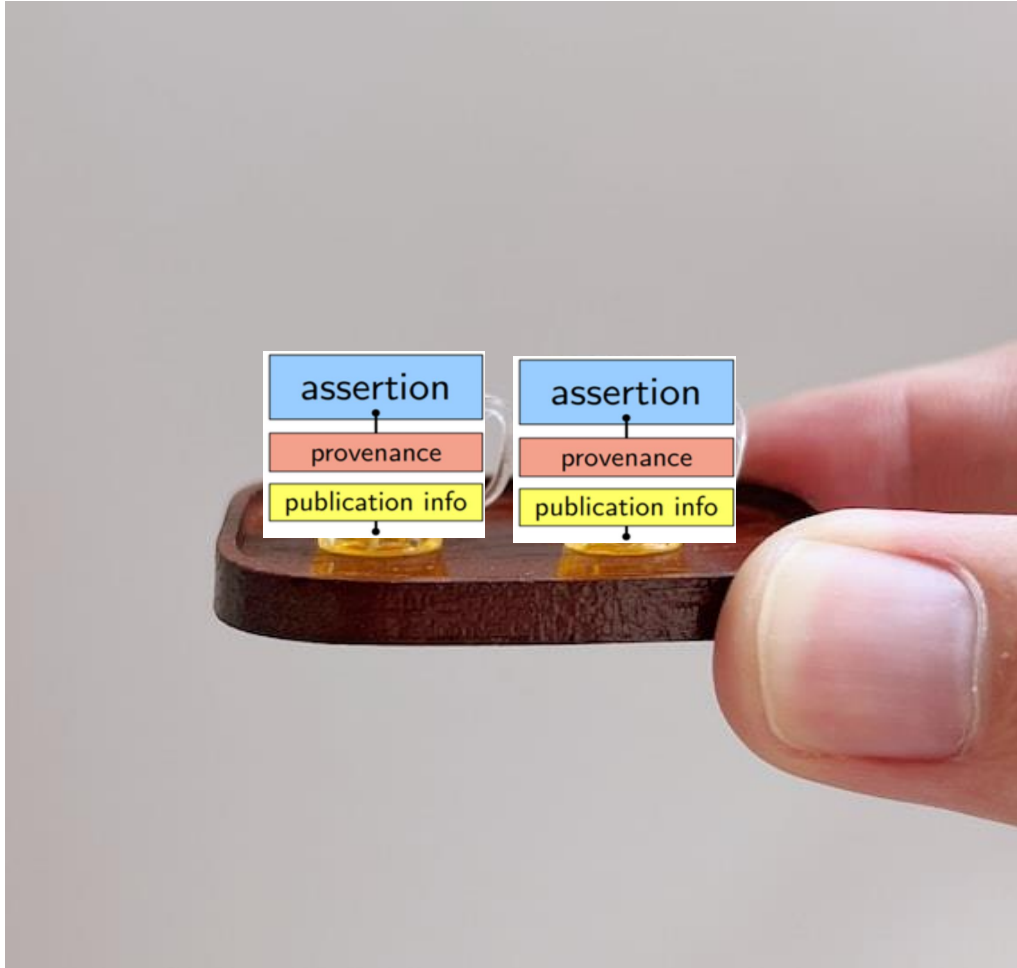


<LW ITA> è una <FIC>

<Andrea Tarallo> è un data steward di <LW ITA>

<LW ITA> dichiara l'uso di <HTTPS>

Uses the [FIP Wizard](#) as entry tool



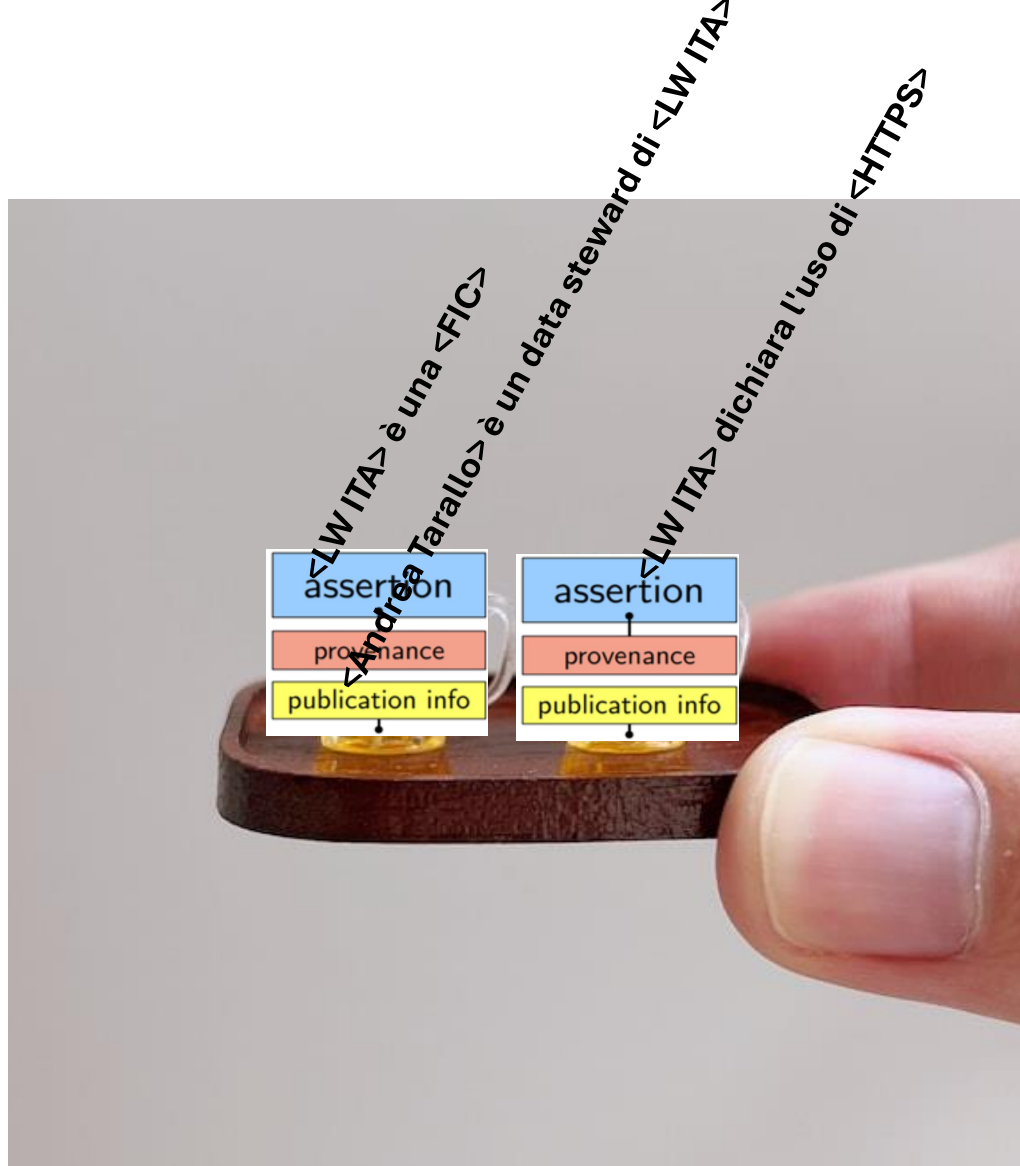
<LW ITA> è una <FIC>

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<LW ITA> dichiara l'uso di <HTTPS>

"The machine-actionability of nanopublications is a standard due to each **assertion comprising a subject, an object and a predicate** (type of relation between the subject and the object), **complemented by** provenance, authorship and publication information. A unique feature here is that each of the elements is linked to an online resource, such as a controlled vocabulary, ontology or standards."

<https://blog.pensoft.net/2023/09/12/nanopublications-tailored-to-biodiversity-data/>



PS: Le nanopublications hanno le caratteristiche di un FAIR Digital Object

Schultes EA, Magagna B, Kuhn T, Suchánek M, Bonino da Silva Santos LO, Mons B (2022) The Comparative Anatomy of Nanopublications and FAIR Digital Objects. Research Ideas and Outcomes 8:

e94150. <https://doi.org/10.3897/rio.8.e94150>

"The machine-actionability of nanopublications is a standard due to each **assertion comprising a subject, an object and a predicate** (type of relation between the subject and the object), **complemented by** provenance, authorship and publication information. A unique feature here is that each of the elements is linked to an online resource, such as a controlled vocabulary, ontology or standards."

<https://blog.pensoft.net/2023/09/12/nanopublications-tailored-to-biodiversity-data/>

# Le nanopubs sono Human-readable

RA1eHB-\_Fr

declaration type FIP-Declaration

declaration considerations "It represents the standard de facto as secure communication protocol."

declaration declared-by LWERIC\_Ecosystem

declaration declares-current-use-of HTTPS

declaration refers-to-question FIP-Question-A1.1-D

declaration endDate "2022-12-31"

declaration startDate "2022-01-01"

The assertion above creator 0000-0002-5935-6074

This nanopublication was created on "2024-01-22T19:11:39Z"

sig has as target this nanopublication

sig has the algorithm "RSA"

sig has the public key

"MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCofb7LKIXyBB7BUvjFF9bDJNk0WxH3Xerr4H3v/VCiRVshEDI3BZVekbMMmdRe+TOPyc8AOLd9IAL2VfVVD/T0rmCHK7Pw7DQJl96mwyXhE7f4g0WG5UT5Pxxm0Rzy7IrYnEaaVDs7dkZUt952M6qWIHfTwCQDcXJhZfLiXoMwIDAQAB"

sig has the signature

"KeEWoUuv/3zxwWMGJIB2XqfJUivfpNugf6hrBS4GQDQsy/byCw8kJO3Ukg/CKXxlwwpJWuMyA6zHVR2rLncvH1xpiCnggFF+FE/rcGEJwF/1ULCCBtxB0pd1TiUWIMKFG5RVp0Vfz8guvb3AM0aFhlwrysAdraqVIMt9+NdLkGE="

this nanopublication creator wizard

this nanopublication license 1.0

this nanopublication wasDerivedFrom 15acf2a5-8a1f-42e5-b6b6-bebae9e9fd83

<https://fip-wizard.ds-wizard.org/wizard> 22 Jan 2024, 19:11:39 UTC

PREFIX  
HEADER

```
@prefix this: <https://w3id.org/np/RA1eHB-_Frc00rE7Ar1_ljYjyWBQgr0ttrLJm16xEQV9o> .  
@prefix sub: <https://w3id.org/np/RA1eHB-_Frc00rE7Ar1_ljYjyWBQgr0ttrLJm16xEQV9o#> .  
@prefix np: <http://www.nanopub.org/nschema#> .  
@prefix dct: <http://purl.org/dc/terms/> .  
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .  
@prefix orcid: <https://orcid.org/> .  
@prefix dcat: <https://www.w3.org/ns/dcat#> .  
@prefix fip: <https://w3id.org/fair/fip/terms/> .  
@prefix prov: <http://www.w3.org/ns/prov#> .  
@prefix npx: <http://purl.org/nanopub/x/> .
```

URI

vocabolari/schemi

```
sub:Head {  
  this: np:hasAssertion sub:assertion ;  
  np:hasProvenance sub:provenance ;  
  np:hasPublicationInfo sub:pubinfo ;  
  a np:Nanopublication .  
}
```

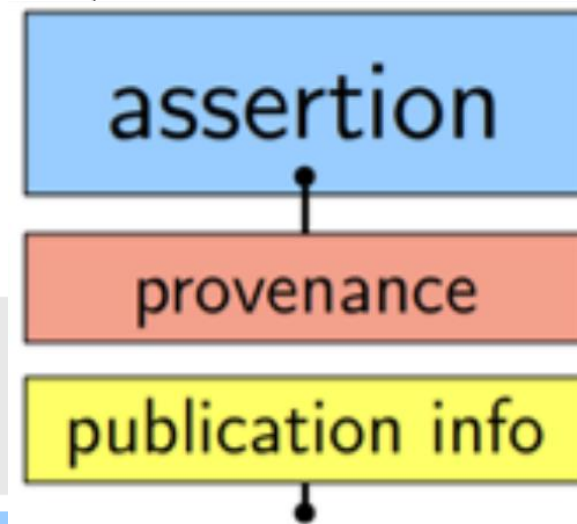
Struttura della nanopub

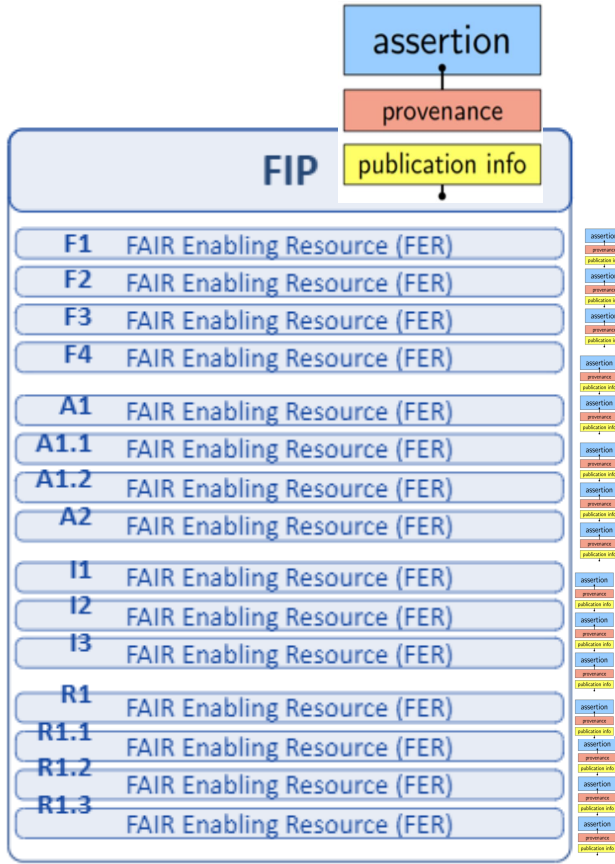
```
sub:assertion {  
  sub:declaration a fip:FIP-Declaration ;  
  fip:considerations "It represents the standard de facto as secure communication protocol." ;  
  fip:declared-by <http://purl.org/np/RA39vQmcuWBPUjH06TsvTZYPvj3KImUVGVc2HQ2xwQML8#LWERIC_Ecosystem> ;  
  fip:declares-current-use-of <http://purl.org/np/RAF1ANn-BCFop00BMOC7S8NtG0y_xYhRX4tAu37XZVCo0#HTTPS> ;  
  fip:refers-to-question fip:FIP-Question-A1.1-D ;  
  dcat:endDate "2022-12-31"^^xsd:date ;  
  dcat:startDate "2022-01-01"^^xsd:date .  
}
```

```
sub:provenance {  
  sub:assertion dct:creator orcid:0000-0002-5935-6074 .  
}
```

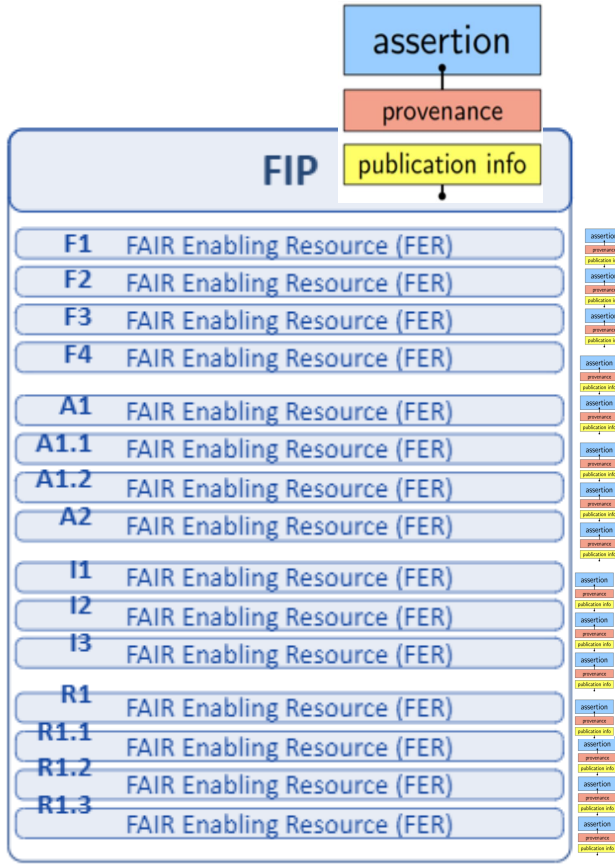
```
sub:pubinfo {  
  sub:sig npx:hasAlgorithm "RSA" ;  
  npx:hasPublicKey  
"MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCoKfB7Lk1Xy8B7BUvjfF9bDJNk0WxH3Xerr4H3v/VCiRVshED13BZVekbMMmdRe+TOPyc8AOLd9IAL2VfVVD/T0rmCHK7Pw7DQjI95mw  
;  
  npx:hasSignature  
"KeEwoUuv/3zxwWIMGJlB2XqfJULVfpNugf6hrBS4GQDQsy/byCw8k03Ukg/CKXxIwwpJWuMyA6zHVR2rLncvH1xpiCnggFF+FE/rcGEJwF/1ULCCBtxB0pd1TiUwIMKFG5RVp0Vfz8guyvb  
;  
  npx:hasSignatureTarget this: .  
  this: dct:created "2024-01-22T19:11:39Z"^^xsd:dateTime ;  
  dct:creator <https://fip-wizard.ds-wizard.org/wizard> ;  
  dct:license <https://creativecommons.org/publicdomain/zero/1.0/> ;  
  prov:wasDerivedFrom <https://w3id.org/fip/wizard/15acf2a5-8a1f-42e5-b6b6-bebae9e9fd83> .  
}
```

Metadati: chi ha creato la nanopub, quando è stata creata, licenza, versione, etc.

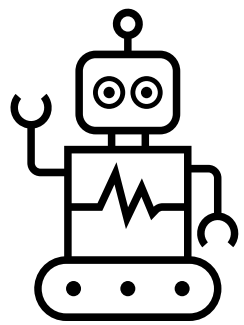


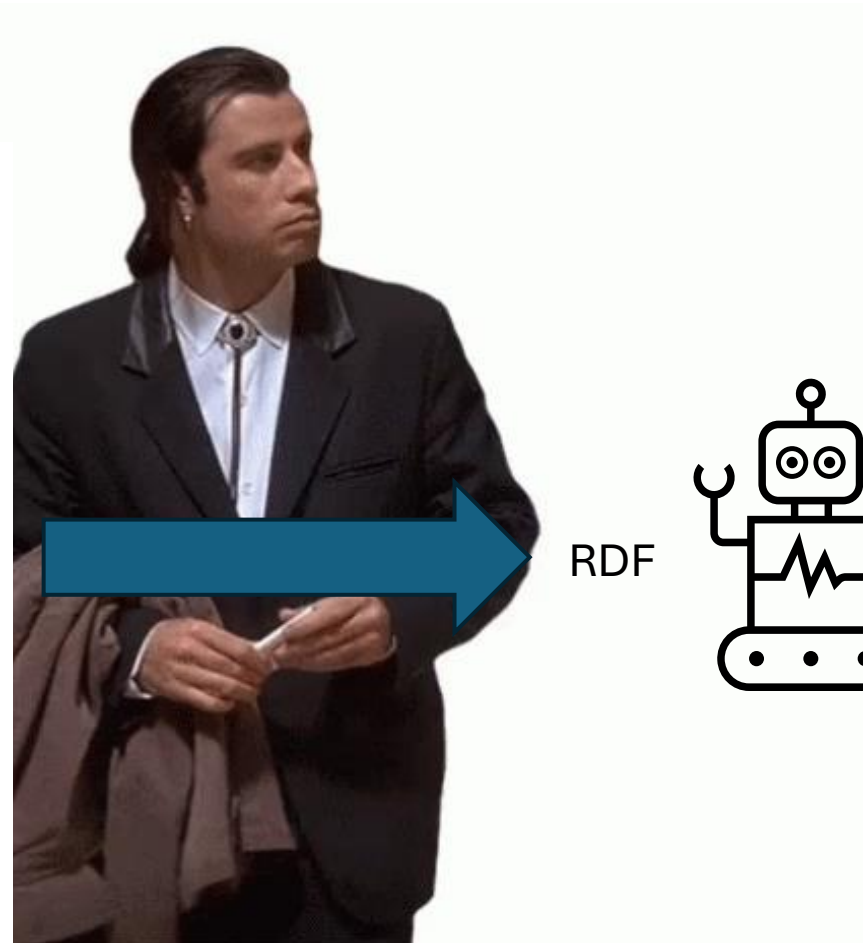
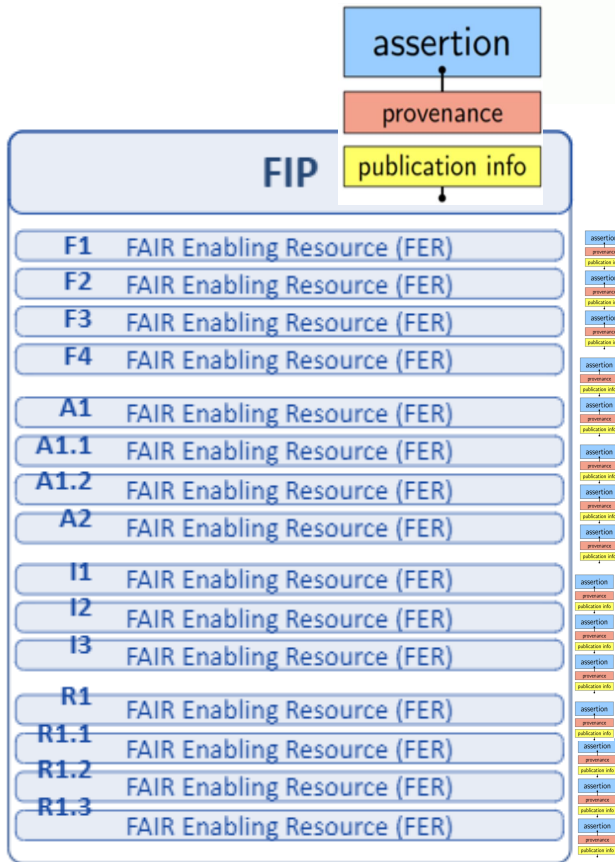






RDF

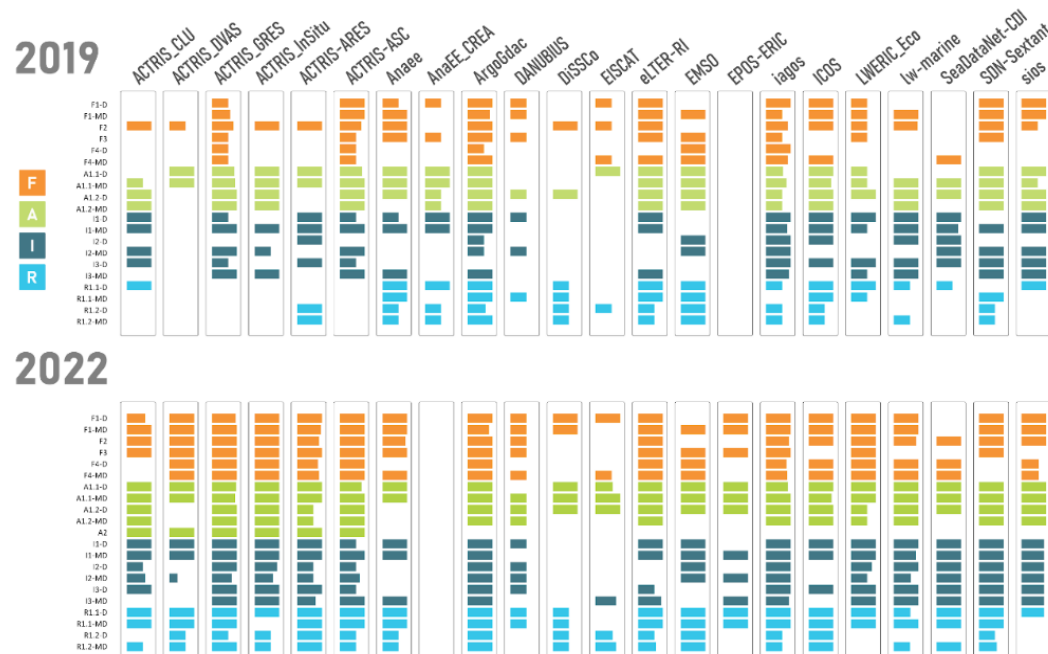




Query customizzata per scaricare tutti i FIP come csv

[https://github.com/peta-pico/dsw-nanopub-api/blob/main/tables/new\\_matrix.csv](https://github.com/peta-pico/dsw-nanopub-api/blob/main/tables/new_matrix.csv)

## Evoluzione del livello di FAIRness



ENVRI-FAIR D5.6: Synthesis and future strategy

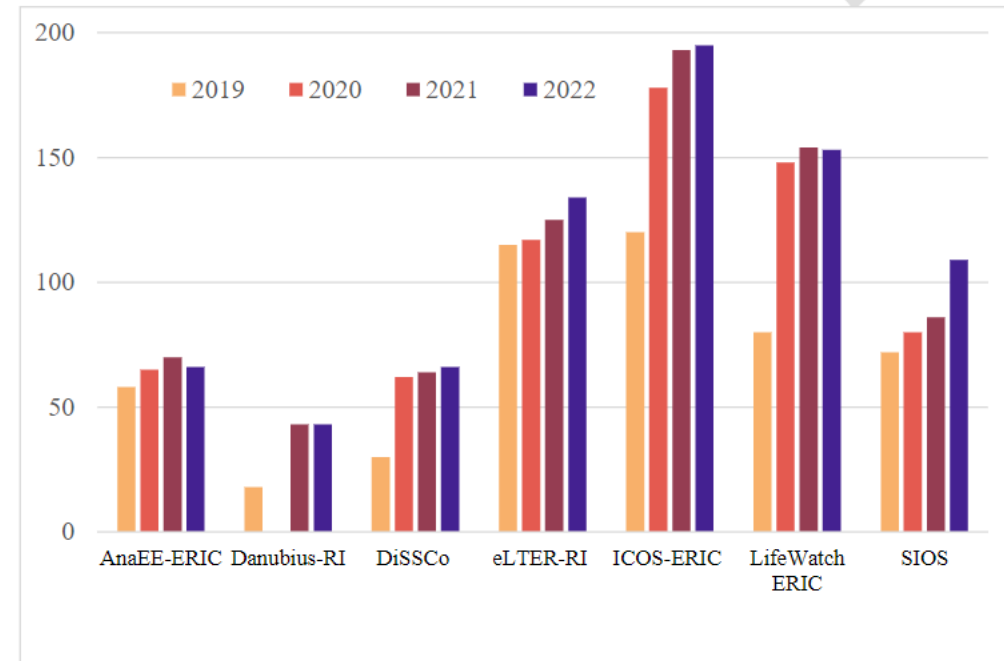
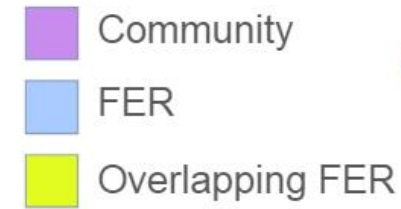
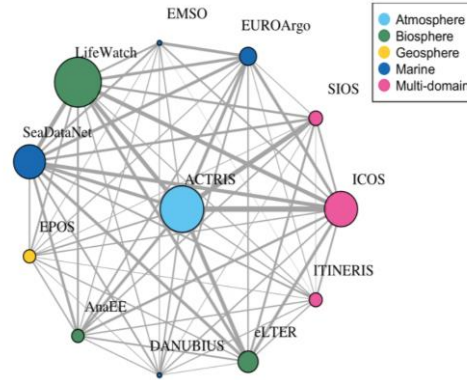
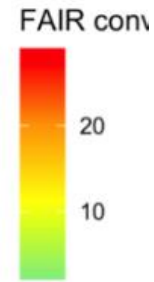


Figure 14: Evolution of the total number of FERs

Basset, A., et al. (2023). ENVRI-FAIR D11.6: Assessment of FAIRness in the Biodiversity and Ecosystem subdomain (1.1). Zenodo. <https://doi.org/10.5281/zenodo.10363537>

# Convergenza

ITINERIS	8	8	6	7	3	5	11	7	11	8	4	
SIOS	25	9	6	5	2	5	12	13	14	13		4
eLTER	22	10	9	5	2	8	17	17	17		13	8
SeaDataNet	18	15	17	11	12	9	20	23		17	14	11
LifeWatch_ERIC	23	12	16	8	11	11	22		23	17	13	7
ICOS_ERIC	29	14	17	9	10	8		22	20	17	12	11
EPOS_ERIC	10	9	7	5	5		8	11	9	8	5	5
EMSO_ERIC	8	7	16	6		5	10	11	12	2	2	3
DANUBIUS	10	7	11		6	5	9	8	11	5	5	7
EUROArgo_ERIC	18	11		11	16	7	17	16	17	9	6	6
AnaEE	16		11	7	7	9	14	12	15	10	9	8
ACTRIS_ERIC		16	18	10	8	10	29	23	18	22	25	8
	ACTRIS_ERIC	AnaEE	EUROArgo_ERIC	DANUBIUS	EMSO_ERIC	EPOS_ERIC	ICOS_ERIC	LifeWatch_ERIC	SeaDataNet	eLTER	SIOS	ITINERIS



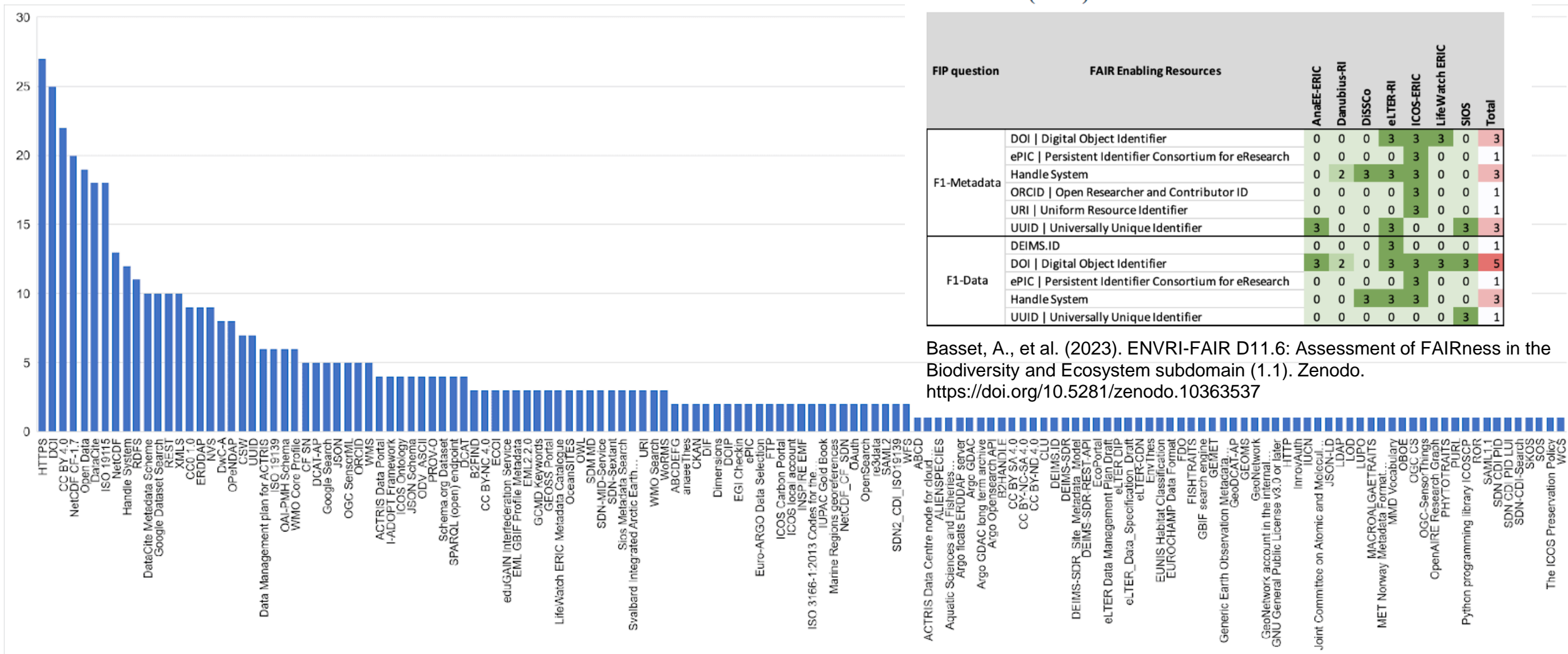
Kristina Hettne, CDS University Library

# Pianificazione

## 2.1 F1. What globally unique, persistent, resolvable identifiers do you use for (meta-)data records?

FIP question	FAIR Enabling Resources	FAIR Enabling Resources						Total
		AnaEE-ERIC	Danubius-RI	DJSSCo	eLTER-RI	ICOS-ERIC	LifeWatch ERIC	
F1-Metadatas	DOI   Digital Object Identifier	0	0	0	3	3	3	3
	ePIC   Persistent Identifier Consortium for eResearch	0	0	0	0	3	0	1
	Handle System	0	2	3	3	3	0	3
	ORCID   Open Researcher and Contributor ID	0	0	0	0	3	0	1
	URI   Uniform Resource Identifier	0	0	0	0	3	0	1
	UUID   Universally Unique Identifier	3	0	0	3	0	0	3
F1-Data	DEIMS.ID	0	0	0	3	0	0	1
	DOI   Digital Object Identifier	3	2	0	3	3	3	5
	ePIC   Persistent Identifier Consortium for eResearch	0	0	0	0	3	0	1
	Handle System	0	0	3	3	3	0	3
	UUID   Universally Unique Identifier	0	0	0	0	0	3	1

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Fair Implementation Profiles (FIPs): Report on the first release. (ITINERIS)

# Grazie per l'attenzione :)

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