



Linked Data, Ontologies, Controlled Vocabularies and their usage in the Italian Public Administration sector

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Summary

- **Legal context**
- **OntoPiA – the Italian network of ontologies and controlled vocabularies**
- **The usage of OntoPiA's ontologies and controlled vocabularies in**
 - The Data and Analytics Framework DAF
 - The Italian DAF's (Open) Data Catalogue
 - The Italian Catalogue of Public Services



Legal context

PUBLIC ADMINISTRATION CODE (LEGISLATIVE DECREE NO 82/2005 AND SUBSEQUENT AMENDMENTS)



Legal context

PUBLIC ADMINISTRATION CODE (LEGISLATIVE DECREE NO 82/2005 AND SUBSEQUENT AMENDMENTS)

Article 71: National guidelines on PSI valorisation
“One of the purposes of these guidelines is to guide a progressive transition to the native production of Linked (Open) Data” [1]

[1] (ITA) <http://lg-patrimonio-pubblico.readthedocs.io/it/latest/aspettiorg.html#linea-3-linked-open-data>



Legal context

PUBLIC ADMINISTRATION CODE (LEGISLATIVE DECREE NO 82/2005 AND SUBSEQUENT AMENDMENTS)

Article 71: National guidelines on PSI valorisation

Article 50-ter: Italian National Digital Data Platform

“The Presidency of the Council of Ministers promotes the design, development and experimentation of a National Digital Data Platform aimed at facilitating the knowledge and use, for institutional purposes, of the information heritage”



Legal context

"Digital transformation is a priority of the Government.
The Three-Year Plan requires a team effort to simplify Public Administration and the life of citizens."

Paolo Gentiloni

President of the Council of Ministers

What is the Three-Year Plan?

It is a strategic and economic policy document for all Public Administrations that oversees the digital transformation of the country.

The Plan defines:

- the operational course of action in the development of public information technology;
- the strategic model of the evolution of the PA information system;
- ICT investments in the public sector according to the European and Governmental guidelines.

→ TO FIND OUT MORE

"Digital transformation continues with the Three-Year Plan, which will allow Public Administrations to become more efficient and put the citizen at the centre of their actions. Updating the Digital Administration Code will be an additional step towards freeing innovation from too many regulations and strengthen the rights of digital citizenship."

Marianna Madia

Minister for Public Administration and Simplification

<https://pianotriennale-ict.italia.it/en/index.html#> 



Italian Data Strategy

Base registers

Open Data

Ontologies/Controlled Vocabularies

"Digital transformation is a priority of the Government.
The Three-Year Plan requires a team effort to simplify Public
Administration and the life of citizens."

INTANGIBLE INFRASTRUCTURES

ENABLING PLATFORMS

CIE

SPID

PagoPA

FatturaPA

ANPR

NoiPA

PA DATA

Base
Registers

Open data

Controlled vocabulary



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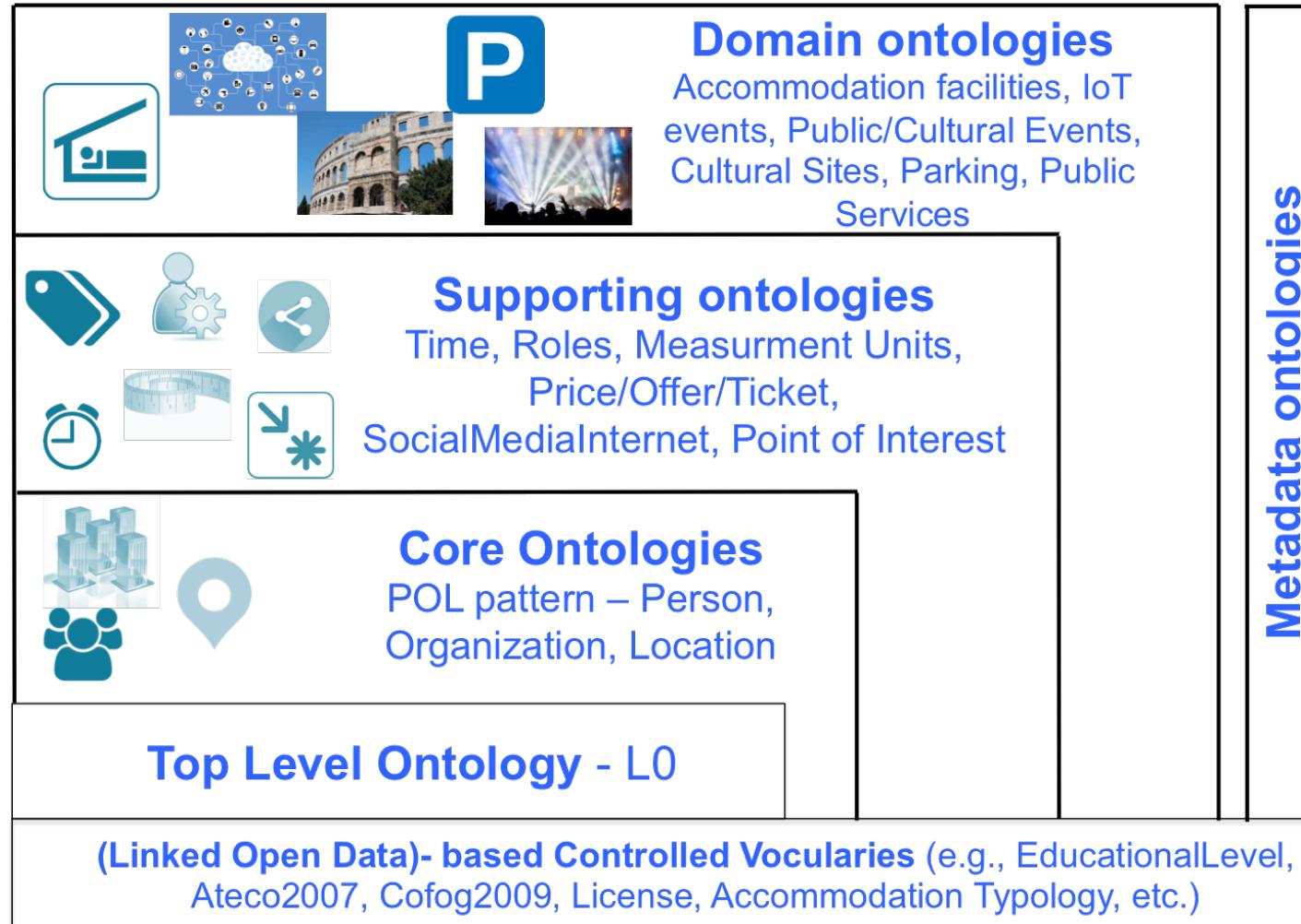
Open data

Controlled vocabulary



OntoPiA

Domain Level Supporting Level Core Level Foundational Level





Current OntoPiA in numbers

16 ONTOLOGIES

3 UNDER DEFINITION

2 METADATA ONTOLOGIES

373 CLASSES

15 CONTROLLED VOCABULARIES

5 READY BUT NOT YET PUBLISHED

1 MAPPING BETWEEN VOCABULARIES

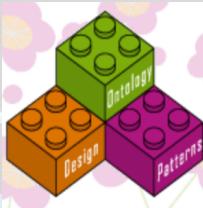
7937 AXIOMS

339 OBJECT PROPERTIES

189 DATA TYPE PROPERTIES



OntoPiA: Methodology



**AGILE EXTREME DESIGN
APPROACH, USE OF
ONTOLOGY DESIGN
PATTERNS, APPLICATION
PROFILES**



PERSISTENT URIs
w3id.org/italia/onto
w3id.org/italia/controlled-vocabulary
w3id.org/italia/data



MULTILINGUISM
Ontologies in ITA and ENG
Some Controlled Vocabs also in
DEU and FRA



**INDIRECT REUSE OF
EXISTING ONTOLOGIES**
External alignment files for each
ontology



MULTIPLE FORMATS
RDF/XML, RDF/Turtle
JSON-LD



**ONLINE BROWSING
AND DOCUMENTATION**
LODE, WebOWL, UML
diagrams



OntoPiA: User/PA Engagement

COLLABORATION WITH RESEARCH CENTRES

(STLab – Semantic Technologies Laboratory of CNR, Sapienza University of Rome)

COLLABORATION WITH PUBLIC ADMINISTRATIONS

(e.g., Italian National Institute of Statistics – ISTAT, Ministry of Cultural Heritage and Activities and Tourism)

ENGAGE WITH END-USERS

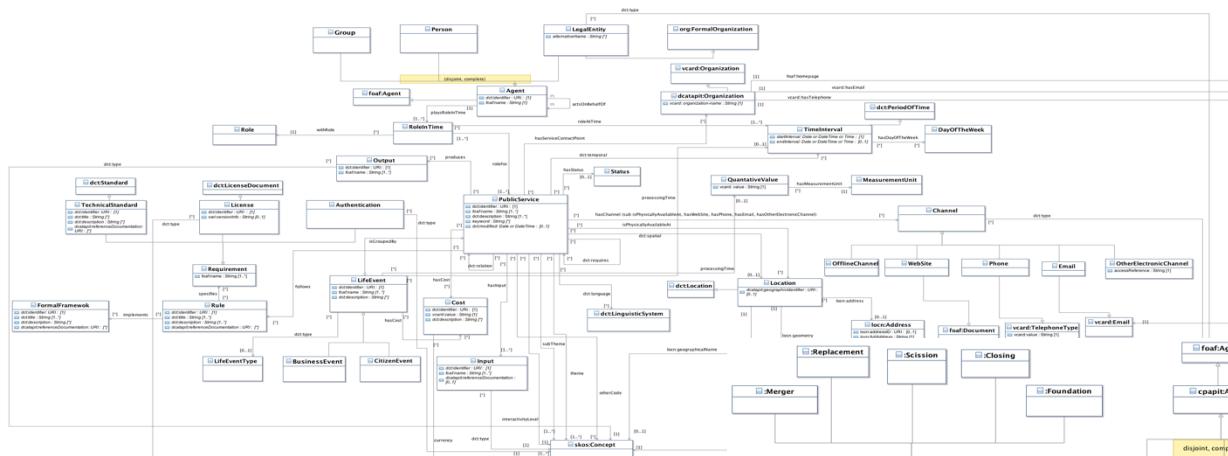
Available on Github so that users can

always raise issues or propose changes/bug fixes

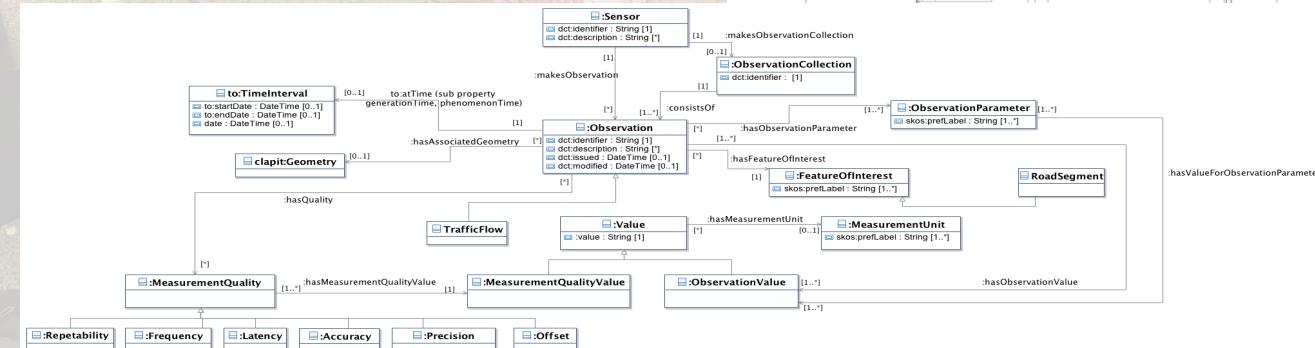
[https://github.com/italia/daf-ontologie-vocabolari-controllati/tree/master/
Ontologie](https://github.com/italia/daf-ontologie-vocabolari-controllati/tree/master/Ontologie)



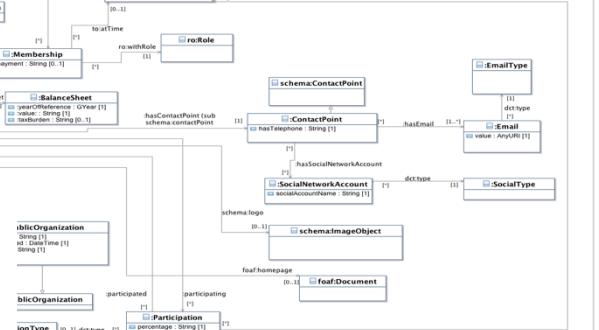
OntoPiA: Examples



COV-AP_IT



CPSV-AP_IT



IoT-AP_IT



- **Current development of three new ontologies (others in the upcoming months)**
 - Access conditions (temporary closures, opening hours, etc)
 - Ontology that supports GTFS specifications for public transportation
 - Public Contracts



- **Define a complete documentation** on ontologies, and techniques for Linked (Open) Data production aligned with ontologies



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The Italian Data & Analytics Framework (DAF)

Milano

Mef

Istat

Mit

Torino

...

Metabase Superset Jupyter

Strumenti di analisi



Open Data

Open Data in SaaS

Ingestion Form &
Meta Catalog

Ingestion &
Data Governance

Kylo

CLUSTER
BIG DATA

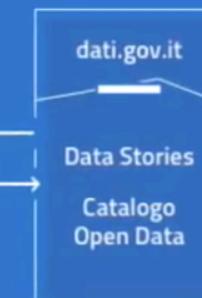


Application Programming Interfaces

Pubblica
Amministrazione
interoperabilità

Cittadini
semplificazione

Imprese
data applications



Digital Transformation
Team & AgID



What's DAF?

- **A Legal Component**; that is, article 50-ter of Legislative Decree no 82/2005 and subsequent amendments

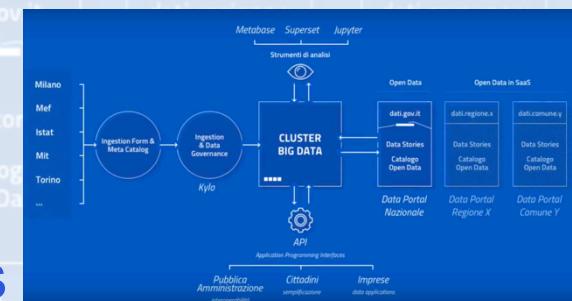
- **A Big Data Platform** to centralize and store (data lake), manipulate and standardize (data engine), re-distribute (API & Data Applications) data and insights

- **A Data Team** (data scientists + data engineers) who uses and evolves the Big Data Platform to analyze data, support PAs

Application Programming Interfaces

Pubblica Amministrazione Cittadini Imprese
Amministrazione semplificazione data applications
interoperabilità

The screenshot shows the homepage of the Gazzetta Ufficiale della Repubblica Italiana. At the top, there are links for "HOME", "GARANTIE", "TORNA ALL'INFORMAZIONE", and "TORNA ALL'ARCHIVIO". Below the header, a banner displays a decree from March 7, 2005, n. 82, titled "DECRETO LEGISLATIVO 7 marzo 2005, n. 82". The main content area shows the text of the decree, which includes sections like "ARTICOLO CAPITO I PRINCIPI GENERALI" and "ARTICOLO II (Carica della cittadinanza digitale)".





DAF functionalities

- **Interoperability (aka Get out of the Silos!)**
 - Public data is public and all PAs should have access to it
 - **Democratizing Data (aka Open Data, API & Data Viz)**
 - Data should be open (when possible), accessible by anyone for any purpose
 - **Data Products (aka deliver value & insights)**
 - Machine Learning in interconnected software applications
 - **Crowdsourcing (aka data is everywhere, give it to me)**
 - Citizens (esp. civic hackers) contribute to the surfacing of knowledge
-
- The diagram illustrates the DAF (Digital Administration Framework) architecture. At the top, a central cluster labeled 'CLUSTER BIG DATA' is connected to various components: 'Ingestion Form & Meta Catalog' (with arrows pointing to 'Milano', 'Mef', 'Istat', 'Mit', 'Torino', and '...'), 'Data Stories' (with arrows pointing to 'Open Data' and 'Open Data in SaaS' boxes), and a 'Data Portal' (with arrows pointing to 'Nazionale', 'Regione X', and 'Comune Y'). Below the cluster, three horizontal bars represent user groups: 'Pubblica Amministrazione' (interoperabilità), 'Cittadini' (simplificazione), and 'Imprese' (data applications). Above the cluster, a large eye icon is positioned above the text 'Database', 'Superset', and 'Jupyter'. The bottom of the diagram features the text 'API' and 'Application Programming Interfaces'.



DAF: public data portal

AgID + Team Digitale

Piano Triennale

Developers

DAF

Designers

Forum

Docs

Github



/daf alpha

Il framework dei dati pubblici del Paese

Il Progetto ▾

Community ▾

Data Application

Partecipa

Accedi

A public dataportal & national (Open)
Data Catalogue

Seguici su



Scopri la bellezza e la ricchezza dei dati

Cerca nei 14946 dataset

community di esperti: partendo dai dati, interpretiamo il mondo e aiutiamo la
a prendere decisioni basate sui fatti

STORIE

ESPLORA

Registro Nazionale degli Aiuti di
Stato

Analisi esplorativa sulla distribuzione dei
aiuti allo Stato.





DAF: private access through login

DAF

Cerca

Nome File: sinistri_firenze

AZIONI

Dataset

Carica

I Miei Dataset

STANDARDS

Standards

Ontologie

Vocabolari

STRUMENTI

Grafici

Business Intelligence

Data Science

DASHBOARDS

Nome File: sinistri_firenze

Privato: Si

Metadata INDIRIZZO

Nome Campo: INDIRIZZO

Tipo: string

Concetto Semanticoo

Descrizione: Descrizione

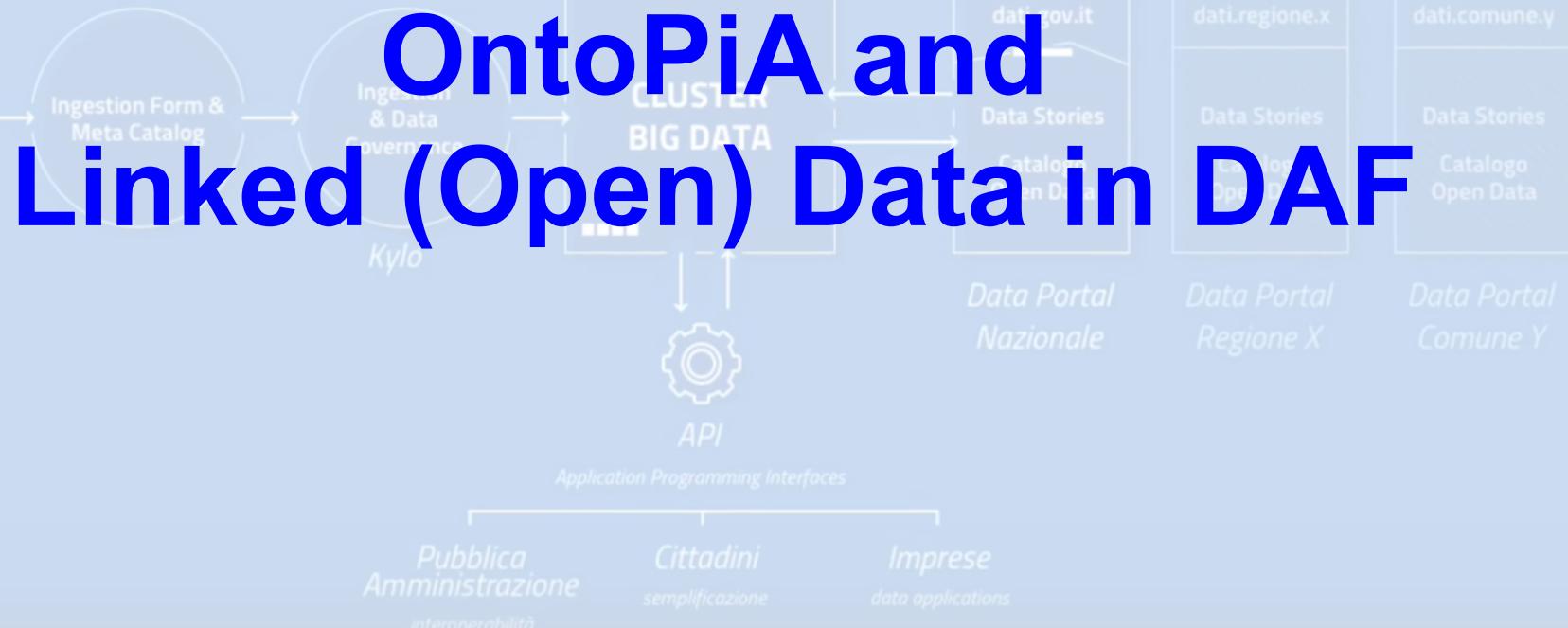
Tags: Aggiungi nuovo tag

Obbligatorio: No

Tipo Colonna

Dati colonna INDIRIZZO

- Via Pistoiese
- Via Francesco Baracca
- Via di Novoli
- Viale Alessandro Guidoni
- Viale Filippo Strozzi
- Viale Francesco Redi
- Viale dei Mille
- Via Baccio da Montelupo
- Viale Fratelli Rosselli





DAF: semantic tagging

The screenshot shows the DAF interface for managing datasets. On the left, a sidebar lists various menu items: Home, AZIONI (Dataset, Carica, I Miei Dataset), STANDARDS (Standards, Ontologie, Vocabolari), STRUMENTI (Grafici, Business Intelligence, Data Science), and DASHBOARDS. The main area displays a dataset named "sinistri_firenze". The "Nome File" field contains "sinistri_firenze". The "Privato" field has "Si". Below this, a section titled "Metadata INDIRIZZO" is shown. It includes fields for "Nome Campo" (set to "INDIRIZZO"), "Tipo" (set to "string"), "Concetto Semanticco" (with "Indirizi" selected, and "indirizzo completo [Indirizzi(Luoghi)]" highlighted in blue), "Descrizione" (listing "indirizzo email [Ontologia per i social media]", "ha componente indirizzo [Indirizzi(Luoghi)]", "Componente Indirizzo [Indirizzi(Luoghi)]", and "Area dell'Indirizzo [Indirizzi(Luoghi)]"), "Tags" (set to "No"), and "Tipo Colonna" (empty). To the right, a large blue arrow points from the highlighted semantic concept back to a list of street names: "Via di Novoli", "Viale Alessandro C", "Viale Francesco Redi", "Viale dei Mille", "Via Baccio da Montelupo", and "Viale Fratelli Rosselli".

Semantic tagging based on OntoPiA



Home

AZIONI

Dataset

Carica

I Miei Dataset

STANDARDS

Standards

Ontologie

Vocabolari

STRUMENTI

Grafici

Business Intelligence

Data Science

DASHBOARDS

Titolo i
sinistri_fin

Nome
sinistri_fin

Descrizione
sinistri_fin

Categoria
TRASPORTO

Licenza

Creative Commons CC0 1.0 Universale - Public Domain Dedication (CC0 1.0)

ODC Public Domain Dedication and License (PDDL)

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Creative Commons Attribuzione 1.0 Generica (CC BY 1.0)

Italian Open Data License 2.0 (IODL 2.0)

Avanti

Use of controlled vocabularies of OntoPiA

Powered by Team Digitale



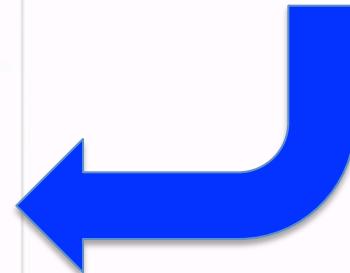
DAF: accessing OntoPiA's ontologies

DAF

Cerca

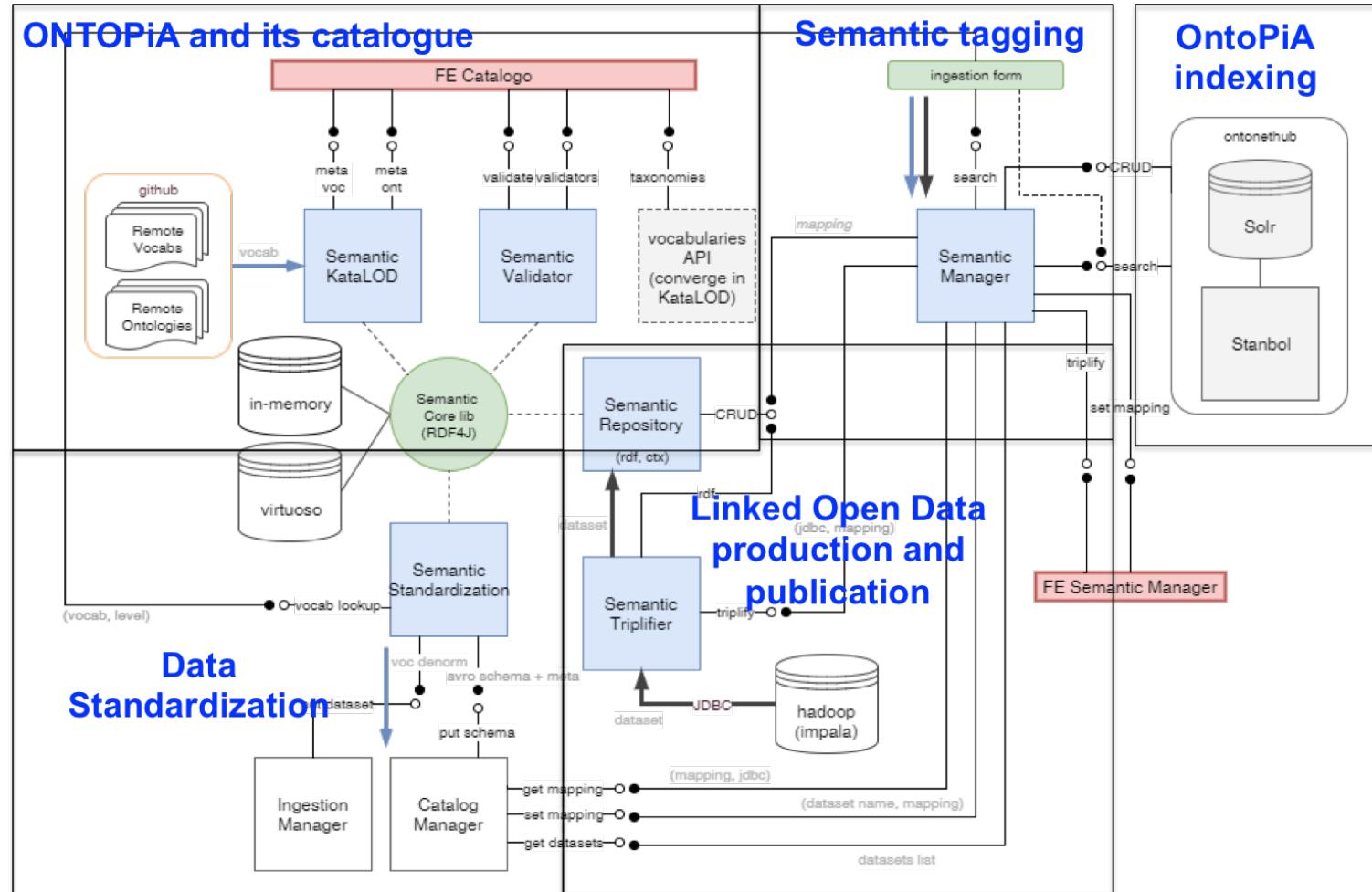
Acronimo	Nome	Risorsa
CLV-AP_IT	Core Location Vocabulary-Italian Application Profile	</>
COV-AP_IT	Core Organization Vocabulary-Italian Application Profile	</>
CPV-AP_IT	Core Person Vocabulary-Italian Application Profile	</>
CPSV-AP_IT	Core Public Service Vocabulary-Italian Application Profile	</>
DCAT-AP_IT	Data Catalogue - Italian Application Profile	</>
IoT-AP_IT	Internet of Things-Italian Application Profile	I </>
SM-AP_IT	Social Media-Italian Application Profile	</>
TI-AP_IT	Time- Italian Application Profile	</>
Level0	Top ontology - Livello 0	</>
Cultural-ON	Cultural ONtology - Ontologia dei Luoghi e degli Eventi Culturali	</>

Browsing OntoPiA's ontologies



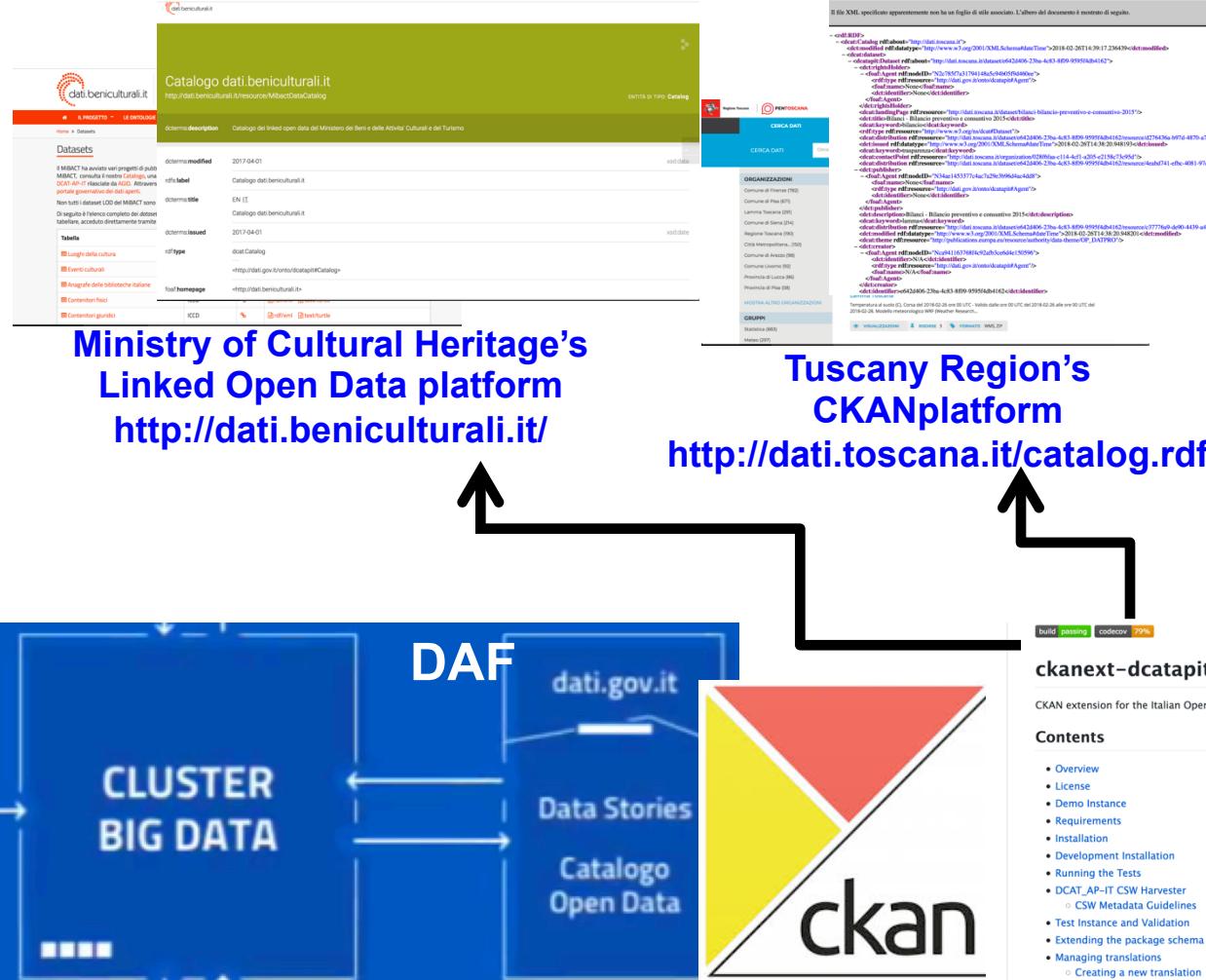


DAF: semantic microservices





DAF: Linked Data for (Open) Data catalogues federation



**DCAT-AP_IT extension
based on the DCAT one.
It also uses OntoPiA's
controlId vocabularies**



Login Servizi.gov.it

Nome utente (Codice Fiscale)

Indicare il nome utente che equivale al codice fiscale

Password

Indicare la password di accesso

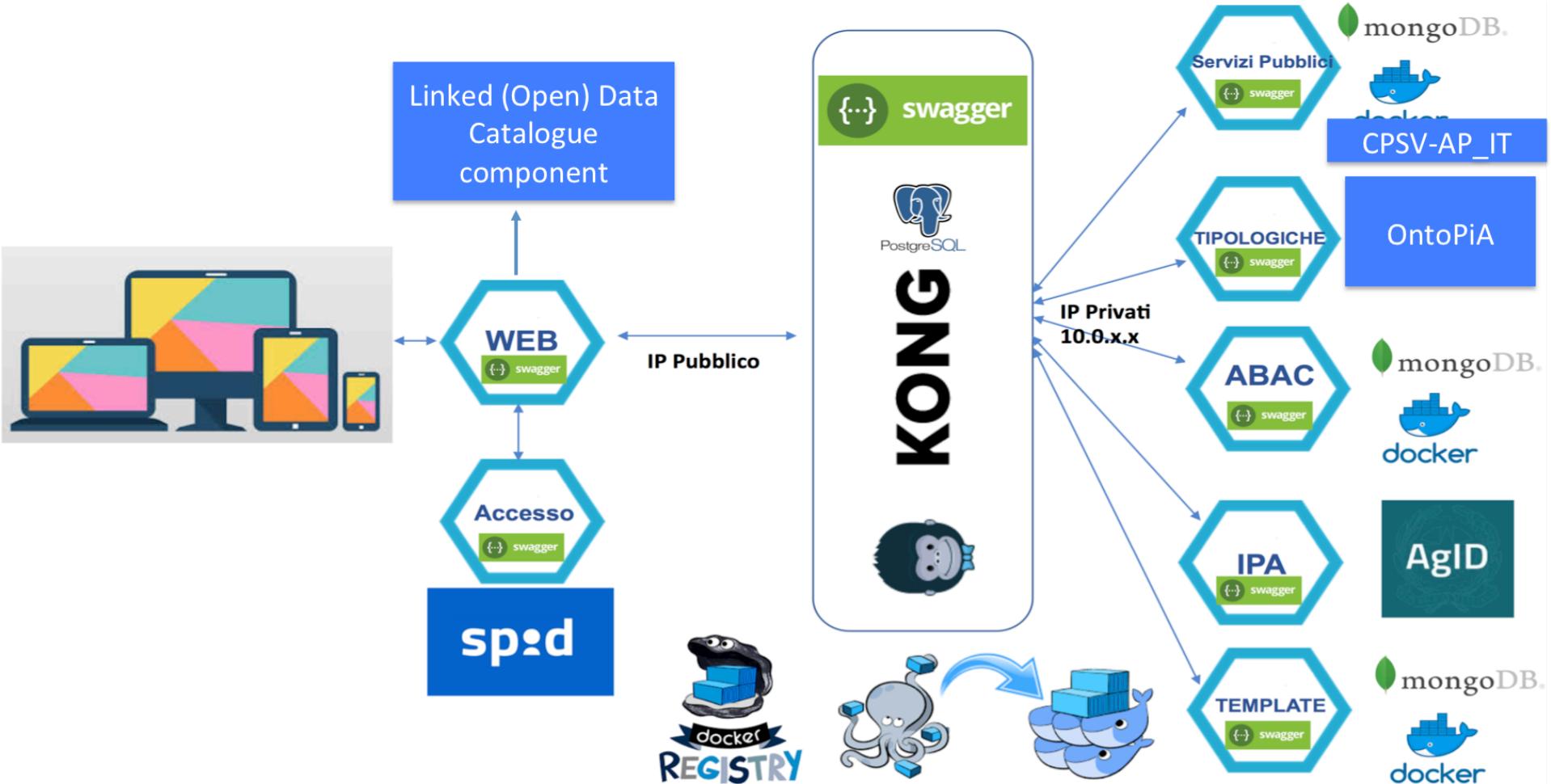
Accedi

Italian Catalogue of Public Services





Microservices-based infrastructure





Inserimento

Macro concepts of CPSV-AP_IT ontology



1 Informazioni

2 Classificazioni

3 Organizzazioni

4 Contatti

5 Accesso

6 FAQ

7 Fine

INDIETRO

AVANTI

Informazioni di base

Nome del servizio *

Prenotare un appuntamento on line con l'Agenzia delle Entrate

Indicare il nome del servizio evitando acronimi, riferimenti normativi o codici non esaustivi, es. "Dichiarazione precompilata"

Nome alternativo

È possibile indicare un nome alternativo del servizio. Se questo campo è compilato verrà visualizzato al posto del "nome del servizio" indicato nel campo precedente

Descrizione *

Prenotare un appuntamento on line con l'Agenzia delle Entrate



Using OntoPiA for web form creation

Connection to OntoPiA's controlled vocabularies



Input e output

Input richiesti Indicare uno o più input richiesti dal servizio. L'input può essere qualsiasi risorsa (documenti, moduli, codici, ecc...) necessaria affinché il servizio sia espletato. Es.: "numero di targa", "codice fiscale"

Aggiungi input richiesti

Output prodotti Indicare uno o più output prodotti dal servizio. Es: "certificato di residenza"

Servizi beta.gov.it

Aggiungi input

Nome dell'input

Indicare il nome per esteso dell'input richiesto dal servizio. Es.: codice fiscale

Tipo di input Seleziona un campo
Attestazione di pagamento
Codice
Altra documentazione
Attestazione di identità
Istanza/Richiesta
Documentazione Amministrativa
Certificazione
Atto autorizzativo

Documentazione di riferimento

Indicazioni sugli input richiesti per poter usufruire del servizio.

Aggiungi **Annulla**

Copertura temporale e geografica

Copertura temporale Indicare uno o più periodi temporali associati al servizio. Se esiste una copertura temporale specificare almeno la data di inizio dei periodi temporali. es. Dal 22 gennaio al 22 febbraio 2017 si aprono le Iscrizioni alle scuole online.

User Regione Emilia



Conclusions

FUTURE WORK

- Next important step is to create a central Linked Open Data hub within DAF that can be used to
 - Discover potential new knowledge paths
 - Enable analyses in order to discover potential data inconsistencies
 - Enable the development of innovative applications
- Complete the Italian Public Service Catalogue that can be ingested in the DAF in order to produce its Linked Open Data version

ADDITIONAL REFERENCES

- DAF public data portal (ITA) → <https://dataportal.daf.teamdigitale.it/>
- DAF Documentation in ENG → <http://daf-docs.readthedocs.io/en/latest/>
- DAF on Github → <https://github.com/italia/daf>
- DAF semantics → <https://github.com/italia/daf-semantics>,
<https://github.com/teamdigitale/ontonethub>



Thank
You!