EURECOM @ SemStats 2019 Challenge

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Sirene Track

- French directory managed by INSEE which assigns a SIREN number to French enterprises, and and a SIRET number to their establishments
- **Goal:** proposing a RDF model for Sirene data
- CSV dataset which includes:
  - All active and ceased companies
  - All open and closed establishments
  - Organizational changes between establishments

Modeling decisions

- Re-using existing ontologies
- Extending ontologies when necessary
- euBusinessGraph Ontology[1]
  - Organization (https://www.w3.org/TR/vocab-org/)
  - Registered Organization (https://www.w3.org/TR/vocab-regorg/)
  - FOAF (http://xmlns.com/foaf/spec/)
  - Schema.org (https://schema.org/)
  - ADMS (https://www.w3.org/TR/vocab-adms/)

[1] https://www.eubusinessgraph.eu/eubusinessgraph-ontology-for-company-data/

Controlled Vocabularies

- Legal Categories
  - SKOS-based scheme
  - 306 concepts
  - 3 levels of categories

```
<http://sirene.eurecom.fr/categorie-juridique/54>
  a skos:Concept ;
  skos:broader <http://sirene.eurecom.fr/categorie-juridique/5> ;
  skos:inScheme <http://sirene.eurecom.fr/categorie-juridique/> ;
  skos:prefLabel "Société à responsabilité limitée (SARL)"@fr .
```

- Employee Group (*“tranches d’effectifs”*)
  - Uses `schema:QuantitativeValue`
  - 16 levels defined by Sirene[1]

```
<http://sirene.eurecom.fr/tranche-effectif/11>
  a schema:QuantitativeValue ;
  schema:minValue "10"^^xsd:int ;
  schema:maxValue "19"^^xsd:int .
```

[1] https://www.sirene.fr/sirene/public/variable/tefen

Sirene Ontology (1)

- Legal Units
  - Mapped on `rov:RegisteredOrganization`
  - URI based on SIREN number
  - Legal category mapped to rov:orgType
  - Staffing level mapped to `schema:numberOfEmployees`

- Establishments
  - Mapped on `rov:RegisteredOrganization` and `org:Site`
  - URI based on SIRET number
  - Postal address mapped to `org:siteAddress`
  - Linked to legal unit via `org:hasSite` and `org:hasRegisteredSite`

- Organizational Changes
  - Mapped to `org:ChangeEvent`
  - Properties `org:originalOrganization` and `org:resultingOrganization` are set to the URIs of the establishments

Sirene Ontology (2)

- None of the existing ontologies covered the complete scope we needed

- We created an extension called **UniteJuridique**
  - Base URI: http://sirene.eurecom.fr/ontology#
  - Prefix: sirene
  - Github: https://github.com/D2KLab/insee/tree/master/sirene/ontology

- It is declared as an `owl:Class` and contains **37 properties** that are based on the name of the variables from the Sirene dataset
  - Examples:
    - sirene:identifiantAssociationUniteLegale
    - sirene:activitePrincipaleRegistreMetiersEtablissement
    - ...

Data Enrichment

- Linking legal units and establishments with other sources using **`owl:sameAs`**.

- Data from entreprise.data.gouv.fr.
  - `<http://sirene.eurecom.fr/siren/441639465>`
    `owl:sameAs <https://entreprise.data.gouv.fr/etablissement/441639465> .`

- Data from Wikidata
  - `<http://sirene.eurecom.fr/siren/441639465>`
    `owl:sameAs <https://www.wikidata.org/wiki/Q6686> .`

SIREN coverage in Wikidata

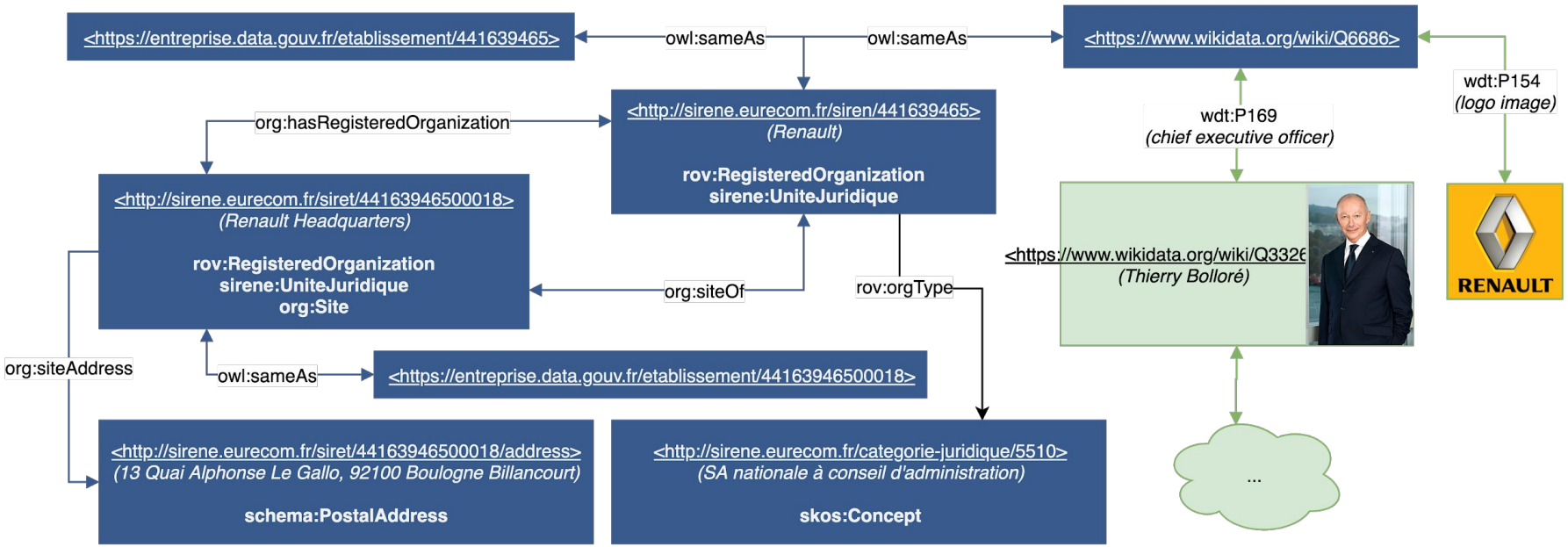
- We extracted the data from the Wikidata knowledge graph using a SPARQL query to retrieve the entities with properties `P1616` (SIREN number) and `P3215` (SIRET number)

- We then link the entities together using their registration number.

- In the end, we obtain a list of links to the Wikidata pages of **40,984 companies** and **374 establishments**, which are materialized thanks to the `owl:sameAs` property.

- Dump: 76GB 

Example


<https://entreprise.data.gouv.fr/etablissement/441639465>
owl:sameAs
owl:sameAs
<https://www.wikidata.org/wiki/Q6686>
wdt:P154
(logo image)
org:hasRegisteredOrganization
<http://sirene.eurecom.fr/siren/441639465>
(Renault)
rov:RegisteredOrganization
sirene:UniteJuridique
wdt:P169
(chief executive officer)
<http://sirene.eurecom.fr/siret/44163946500018>
(Renault Headquarters)
rov:RegisteredOrganization
sirene:UniteJuridique
org:Site
org:siteOf
rov:orgType
<https://www.wikidata.org/wiki/Q3326
(Thierry Bolloré)
RENAULT
org:siteAddress
owl:sameAs
<https://entreprise.data.gouv.fr/etablissement/44163946500018>
<http://sirene.eurecom.fr/siret/44163946500018/address>
(13 Quai Alphonse Le Gallo, 92100 Boulogne Billancourt)
schema:PostalAddress
<http://sirene.eurecom.fr/categorie-juridique/5510>
(SA nationale à conseil d'administration)
skos:Concept
...

BPE Track

- The permanent facilities database (or BPE for "Base de données Permanente des Installations") provides information on the level of **facilities** and services provided by a territory to its population
- It lists over **2.5 million installations** of a wide range of different types with their main features, most of which are geolocated
- 3 datasets:
  - bpe2018-facilities: contains data for each facility, in RDF format.
  - bpe2018-codelists: the code lists used, expressed in SKOS.
  - bpe2018-geo-quality: metadata on geolocation quality.
- **Goal:** enriching BPE data with other sources

Knowledge Base: City Moove

- Knowledge base specialized in the domain of tourism and city exploration
- Contains descriptions of events, activities, POIs, transportation facilities and social activities, collected from numerous local and global data providers (tourism offices, social medias, etc.)
- Entities are deduplicated, interlinked and enriched using semantic technologies
- Contains a vocabulary for categories of places, with over **480 categories**
- Largest area covered: French Riviera (Côte d'Azur), with nearly **339k locations** collected in 2019

Enriching BPE data using social media

- We created a mapping between the 501 categories from BPE and those from the City Moove knowledge base
  - 59 BPE categories were mapped with at least one category from City Moove
  - Relation materialized using the `owl:sameAs` property
- Entity linking based on properties common to both sets of data.
  - Using: the geographical position, and the categories mapping
  - Goal: calculate a similarity score between each entity, by minimizing the score obtained

BPE Entities Linking

Similarity score formula:

score = (distanceInMeters * geoWeight) + (catMatch * catWeight)

- **score** is the similarity score desired
- **distanceInMeters** is the distance (in meters) between the two geographic positions
- **geoWeight** is the weight of the geographic quality
- **catMatch** is equal to 0.0 when the categories match, or 1.0 otherwise
- **catWeight** is the weight of categories matching (0.1)

Note: scores are normalized to be contained between 0 (worst) and 1 (best)

BPE Alignments Generation

Finally, the results are converted into RDF using the Expressive Declarative Ontology Alignment Language (EDOAL), which makes it possible to represent the relations between two entities in the form of RDF triples:

```
<http://bpe.eurecom.fr/alignment/967>
  a align:Alignment;
  align:map [
    a align:Cell;
    align:entity1 <http://beta.id.insee.fr/territoire/equipement/14729731>;
    align:entity2 <http://data.linkedevents.org/location/86688656-84d6-3971-8467-5f78b6cfb7ab>;
    align:measure "1"^^xsd:float;
    align:relation "="
].
```

Visualizer

- Showcase: we developed a web app allowing the user to explore the data on a map with each BPE installation being represented as a marker.

Quality of the alignment is BAD!

http://sirene.eurecom.fr/bpe/

- When moving the mouse over a marker, a popup appears with the label, category and photo of the reconciled place, as well as the similarity score.

- The data is queried directly from the City Moove knowledge base in real time using a Federated SPARQL Query, which allows for executing queries distributed over different SPARQL endpoints.

Conclusion

- We created a model of the Sirene database by reusing existing ontologies from W3C and euBusinessGraph
- We linked Wikidata pages with Sirene entities, using the technologies associated with Linked Data. This could also help enriching Wikidata by filling up existing pages that don't have the SIREN number yet
- We showed how existing RDF data could be interlinked with other data sources, by using entity matching techniques and alignment ontologies.
- The source code to the Sirene track and BPE track challenges are available on GitHub: https://github.com/D2KLab/insee/.