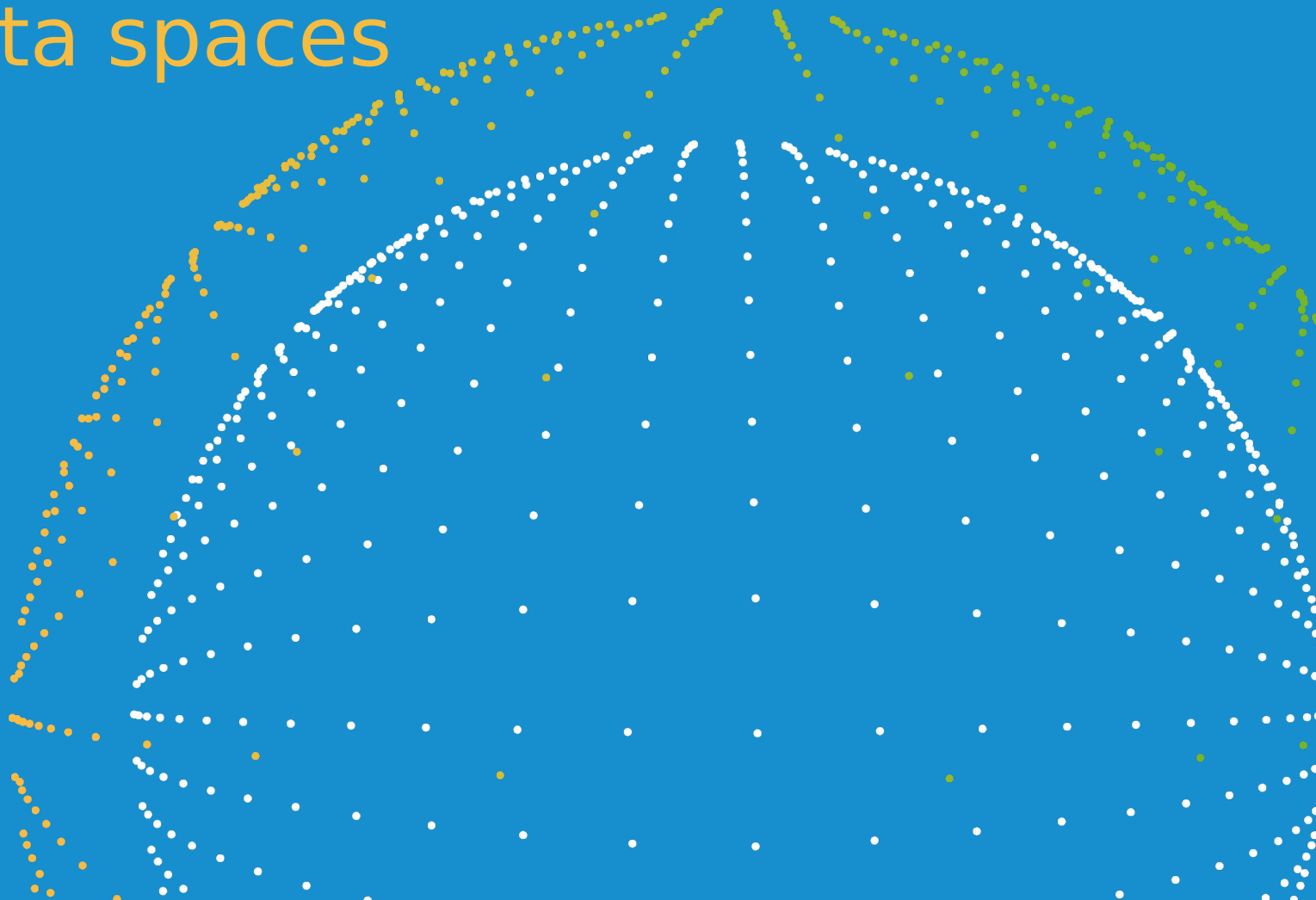
Data Spaces Symposium

Smart Data Models and exchange API in data spaces



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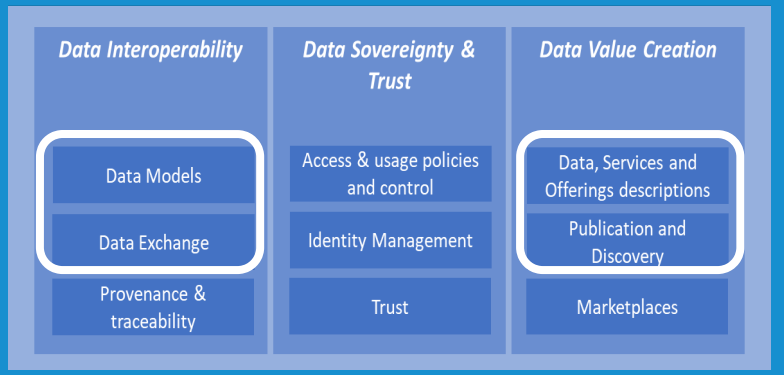
Smart Data Models and exchange API in data spaces

3 ideas

1. FIWARE has software for interchanging data and semantic management across a data space
2. Reusing (selling) data needs some pre-conditions
3. Smart Data Models initiative and pysmartdatamodels package extends your semantic description within your data space



Data Exchange Building block (DSSC)

Smart Data Models

Data Models become Smart

Stay up-to-date on **smartdatamodels.org**

A GLOBAL PROGRAM LED BY FIWARE IUDX OPEN & AGILE SMART CITIES tmforum

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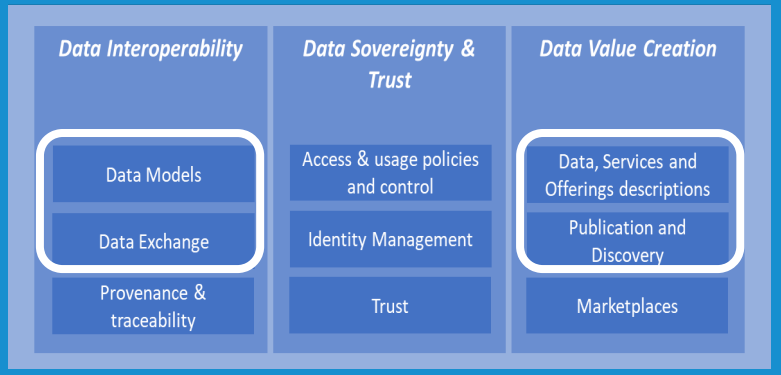
Smart Data Models and exchange API in data spaces

Context in Data Spaces:

- Identity is trusted
- Authorization to access the data resources and services
- Trusting that economic transactions will be fulfilled



Data Exchange Building block (DSSC)

A data space is a technical resource where participants interchange data and data services

- **Users, don't know each other**
- **Users don't know the details of what is available**

Frankfurt stock Exchange

Summary could be also applicable to oher value added services

Smart Data Models and exchange API in data spaces

How can we ensure that all potential users / buyers will access to / purchase our data services?

Open data dealt with this issue for a decade

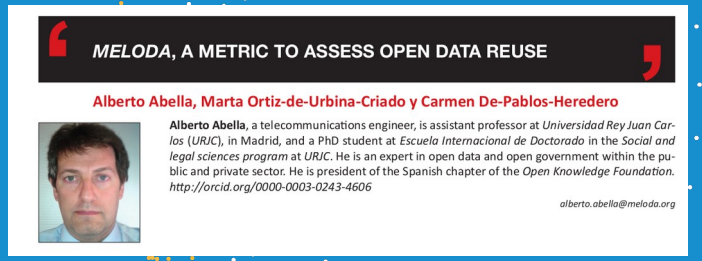
Some lessons learnt would be useful

Summary: **You cannot take for granted that just offering data services will make successful sales**

MELODA metric assess how reusable are the data released for sharing

Academic Details

- Started 2011
- Abella, A.; Ortiz-de-Urbina-Criado, M.; De-Pablos-Heredero, C. **(2014)**: Meloda, a metric to assess open data reuse, El profesional de la información, 23/6, noviembre-diciembre, 582-588.
- Abella, A., Ortiz-de-Urbina-Criado, M., & De-Pablos-Heredero, C. **(2019)**. Meloda 5: A metric to assess open data reusability. *Profesional de la información*, *28*(6).
- **4 reports on the situation of open data in Spain**
- **Assessed more than 1200 datasets in more than 300 data portals**
- **More than 50 scientific references**



MELODA, A METRIC TO ASSESS OPEN DATA REUSE

Alberto Abella, Marta Ortiz-de-Urbina-Criado y Carmen De-Pablos-Heredero

Alberto Abella, a telecommunications engineer, is assistant professor at *Universidad Rey Juan Carlos* (*URJC*), in Madrid, and a PhD student at *Escuela Internacional de Doctorado* in the *Social and legal sciences program* at *URJC*. He is an expert in open data and open government within the public and private sector. He is president of the Spanish chapter of the *Open Knowledge Foundation*.
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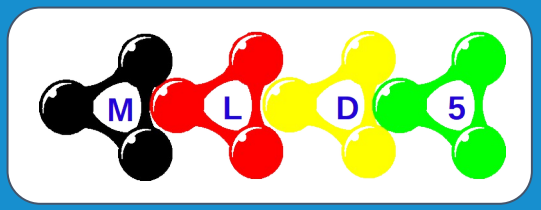
alberto.abella@meloda.org

Smart Data Models and exchange API in data spaces

MELODA 5 provides 8 questions to answer to allow data reuse.



Q1: What are legal rights to use the data?

Q2: What is the access mechanism?

Q3: What is the technical format?

Q4: What is the structure of the data?

Q5: Is the information geolocated?

Q6: Is the information updated?

Q7: Are you aware that this data exists?

Q8: Do you trust on the entity providing the data?

Assess data reusability

Overall figure assess reusability

Dimensions (maximum 61 points)	Levels
Legal licensing (max. 6 points)	1. Private use 2. Non-commercial reuse 3. Commercial reuse or no restrictions
Access to information (max. 6 points)	1. Web access or unique URL parameters to dataset 2. Web Access unique with parameters to single data 3. API or query language
Technical standard (max. 6 points)	1. Closed standard reusable and open non reusable 2. Open standard reusable 3. Open standard, individual metadata
Standardization (max. 10 points)	1. Own data model standardization 2. Own ad hoc data model standardization published (harmonization) 3. Local standardization 4. Global standardization
Geolocation content (max. 6 points)	1. No geographic information 2. Simple or complex text field 3. Coordinates or full geographical information
Updating frequency of data (max. 15 points)	1. Longer than 1 month 2. Monthly. Updating period ranges from 1 month to 1 day 3. Daily. Updating period ranges from 1 day to 1 hour 4. Hour. Updating period ranges from 1 hour to 1 minute 5. Seconds. Updating period is lower than 1 minute
Dissemination (max. 6 points)	1. Communication / dissemination not systematic 2. Available resources on updates (i.e., RSS feed) 3. Proactive dissemination / push dissemination (information automatic and timely)
Reputation (max. 6 points)	1. No information about the reputation of the data source 2. Statistics or reports published on user's opinions 3. Indicators or rankings on reputation of the data source

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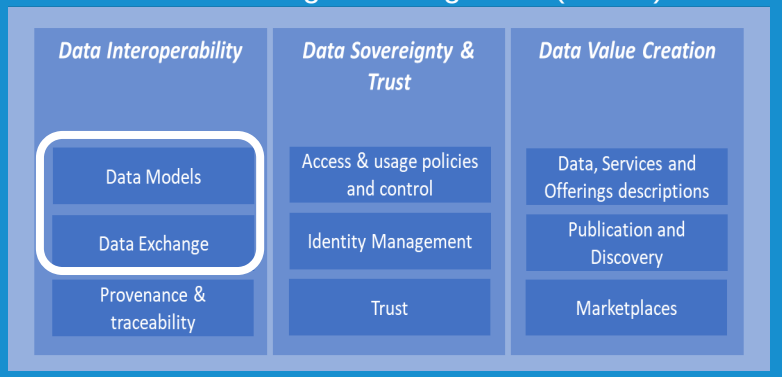
Smart Data Models and exchange API in data spaces

Data Exchange Building block (DSSC)



8 questions to answer to allow data reuse.

Data space catalog is based on DCAT.

Q1: What are legal rights to use the data? → Distribution.accessRights

Q2: What is the access mechanism? → Common API. BB data exchange 1

Q3: What is the technical format? → Distribution.format, distribution.mediaType

Q4: What is the structure of the data? → Distribution.conformsTo 2

Q5: Is the information geolocated? → Dataset.spatial

Q6: Is the information updated? → Dataset.frequency

Q7: Are you aware that this data exists? → Hopefully the BB of publication & discovery will deal with it

Q8: Do you trust on the entity providing the data? → Reputation (comments and stars systems)?

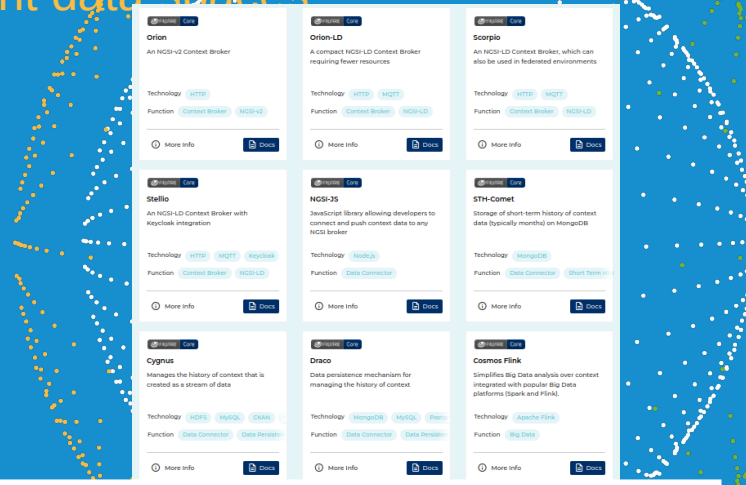
Smart Data Models and exchange API in data spaces

Common API. Building Block data exchange 1

- Efficient transmission of data
- Querying capabilities diverse data with complex needs and varying data structures geoquerying
- Data streaming endpoints to receive real-time continuous streams of data
- Data retrieval endpoints to request datasets such as historical data stored in a database
- Mechanisms that enable alerts for updates or modifications of the data sources
- Information retrieval in federation scenarios, particularly across different data spaces
- Publication of the API specification in the data space
- *Allow the retrieval of information on federation scenarios, i.e. across different data spaces

One solution: Data exchange API

- **General purpose API: NGSI-LD**
- **Standardized by ETSI (9th version)**
- **Proved implementations (3 context broker implementations and >60 components)**
- **Marketplace of solutions (>100 solutions)**



https://www.fiware.org/catalogue/#components

Smart Data Models and exchange API in data spaces

2

Distribution.conformsTo

- **One link to point to the standard**
- **What if you need to know the technical structure?**

One solution: Smart Data Models semantic resources

- Active initiative led by FIWARE, TMForum, OASC, IUDX
- 1000 open-licensed data models. 156.000 terms
- Open to contribution (Agile standardization) new DM in 1 week
- 70 subjects available in github
- 23 functions including update from central repository and update a context broker
- URI for use in linked data resources and mapping to external ontologies/vocabularies
- Single-source-of-truth json schema. Exports in yaml, sql and examples csv, json, jsonld

Smart Data Models

https://smartdatamodels.org

pysmartdatamodels 0.7.0

```
pip install pysmartdatamodels
```

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Smart Data Models and exchange API in data spaces

2

Distribution.conformsTo

Soon:

- Manage your local models without sharing
- Validation against models
- Contribute your data models to central repository

Smart Data Models

https://smartdatamodels.org

pysmartdatamodels 0.7.0

```
pip install pysmartdatamodels
```

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Smart Data Models and exchange API in data spaces

Demo

Inserting a value compliant with an official data model

```python
from pysmartdatamodels import pysmartdatamodels as sdm

# Update a broker compliant with a specific data model, inspired by Antonio Jara
subject = "dataModel.Weather"
dataModel = "WeatherForecast"
attribute = "precipitation"
serverUrl = "http://localhost:1026"
value = 0.5

print(sdm.update_broker(dataModel, subject, attribute, value, serverUrl=serverUrl))
```

demo_insert_NGSI-LD

```
/usr/bin/python3.8 /home/aabella/PycharmProjects/scaleup/PoC/insert_function/demo_insert_NGSI-LD.py
Variable matches the specified data type.
[True, "Successfully inserted in server http://localhost:1026 the entity {'id': 'urn:ngsi-ldRkh3:xWCQ', 'type': 'WeatherForecast', 'precipitation': {'type': 'Property', 'value': 0.5}, '@context': 'https://raw
  .githubusercontent.com/smart-data-models/dataModel.Weather/master/context.jsonld'}"]

Process finished with exit code 0
```

Smart Data Models and exchange API in data spaces

Demo

Retrieving the data with the URI as field names

```python
from pysmartdatamodels import pysmartdatamodels as sdm

# Update a broker compliant with a specific data model, inspired by Antonio Jara
subject = "dataModel.Weather"
dataModel = "WeatherForecast"
attribute = "precipitation"
serverUrl = "http://localhost:1026"
value = 0.5

print(sdm.update_broker(dataModel, subject, attribute, value, serverUrl=serverUrl))

```

```
Terminal:  Local  +
aabella@fiware-aabella:~/PycharmProjects/scaleup/PYTHON_PACKAGE/pysmartdatamodels$ curl -X GET http://localhost:1026/ngsi-ld/v1/entities/urn:ngsi-ldRkh3:xWCQ
{"id":"urn:ngsi-ldRkh3:xWCQ","type":"https://smartdatamodels.org/dataModel.Weather/WeatherForecast","https://smartdatamodels.org/dataModel.Weather/precipitation":{"type":"Property","value":0.5}}
```

Smart Data Models and exchange API in data spaces

Demo

Listing the attribute names, data type and description

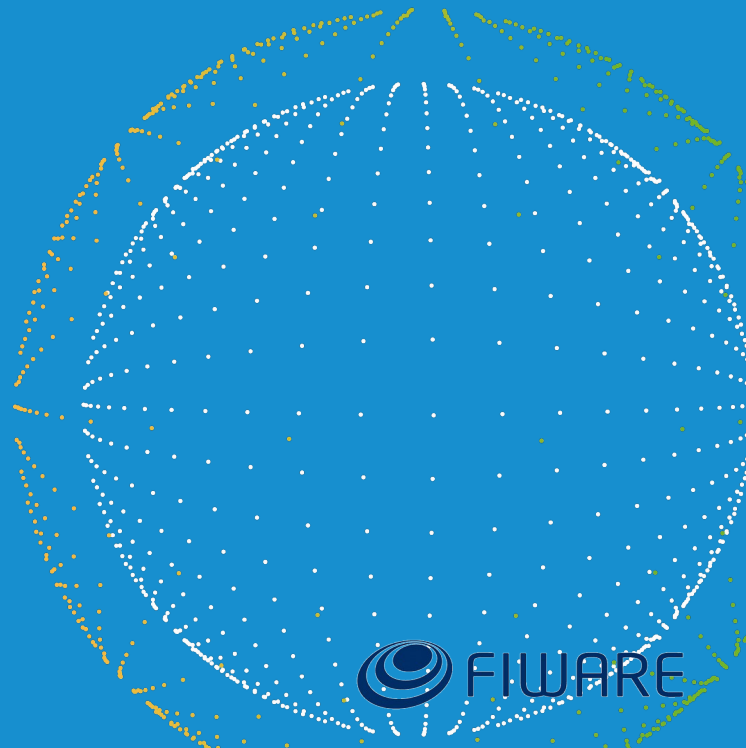
```python
from pysmartdatamodels import pysmartdatamodels as sdm

# Update a broker compliant with a specific data model, inspired by Antonio Jara
subject = "dataModel.Weather"
dataModel = "WeatherForecast"

print(sdm.print_datamodel(subject, dataModel, ",", [
        "property",
        "type",
        "description"
    ]))
```

demo_list_NGSI-LD

```
property,type,description
address,object,The mailing address
addressCountry,string,The country. For example, Spain
addressLocality,string,The locality in which the street address is, and which is in the region
addressRegion,string,The region in which the locality is, and which is in the country
district,string,A district is a type of administrative division that, in some countries, is managed by the local government
postOfficeBoxNumber,string,The post office box number for PO box addresses. For example, 03578
postalCode,string,The postal code. For example, 24004
streetAddress,string,The street address
streetNr,string,Number identifying a specific property on a public street
feelLikesTemperature,number,Temperature appreciation of the item
relativeHumidity,number,Humidity in the Air. Observed instantaneous relative humidity (water vapour in air)
temperature,number,Temperature of the item
atmosphericPressure,number,The atmospheric pressure observed measured in Hecto Pascals
gustSpeed,number,A sudden burst of high-speed wind over the observed average wind speed lasting only for a few seconds
illuminance,number,(https://en.wikipedia.org/wiki/Illuminance) observed measured in lux (lx) or lumens per square metre (cd·sr·m-2)
refPointOfInterest,string,Point of interest related to the item
visibility,string,Categories of visibility
weatherType,string,Text description of the weather
windDirection,number,Direction of the wind bet
windSpeed,number,Intensity of the wind
```



Summary

1. FIWARE has software for interchanging data (Building Block of Data Exchange) and semantic management (building Block of Data Models) across a data space

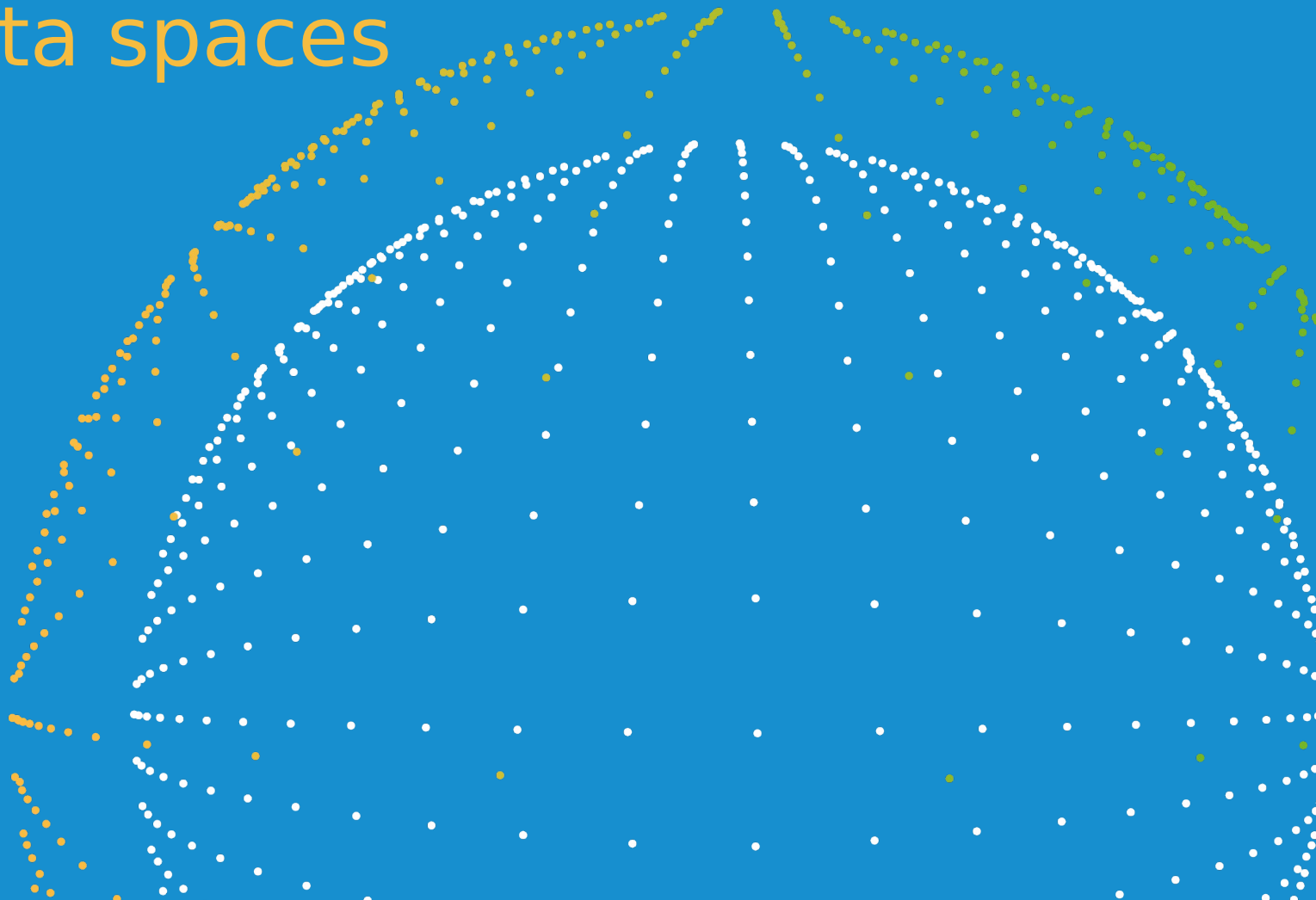
2. Reusing (selling) data needs some pre-conditions.
    a. MELODA 5 reassess this reusability

3. Smart Data Models initiative and pysmartdatamodels package extends your semantic description within your data space
    a. Provides a large database of data models
    b. Integrate locally in your Data Space
    c. Create new data models ‘on the fly’
    d. Soon: manage locally without sharing

Data Spaces Symposium

Smart Data Models and exchange API in data spaces

Thanks



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