

Nantes | Hamburg | Helsinki

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Final Conference

14 - 15 September 2022
Hamburg (Germany)

SMART PEOPLE – SMART ECONOMY – SMART CITIES



Nantes demosite
Urban Platform

14/09/2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731297.

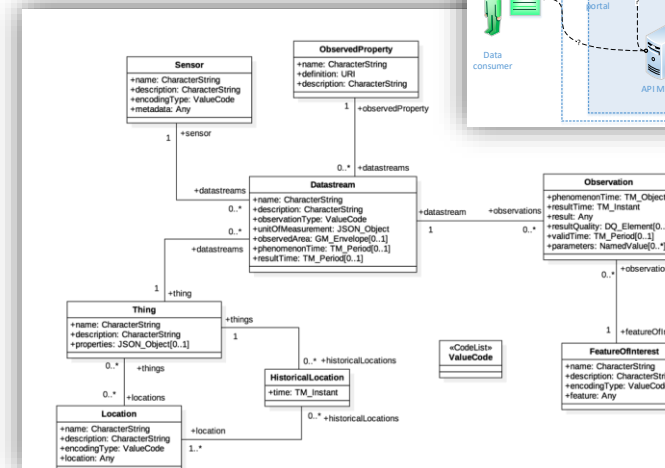
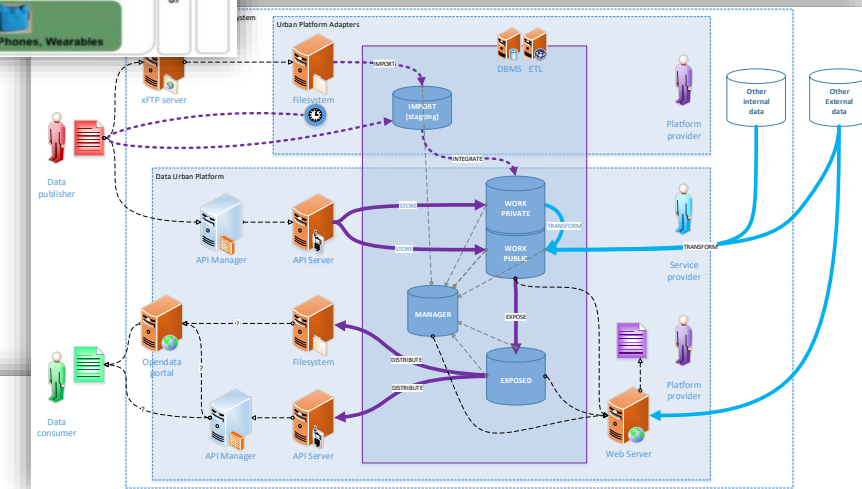


Nantes – Urban Platform

To collect data, give access, ensure interoperability through means of OpenAPI and OpenSource tech.

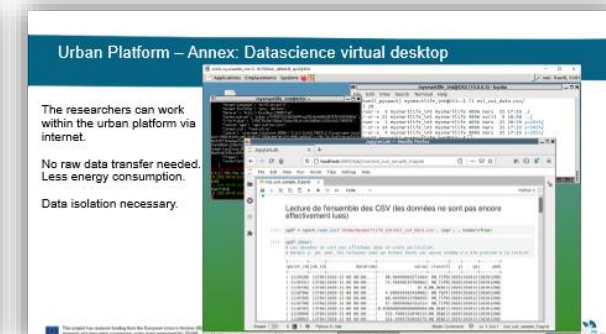
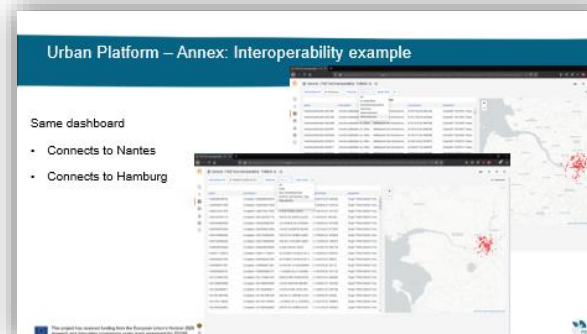
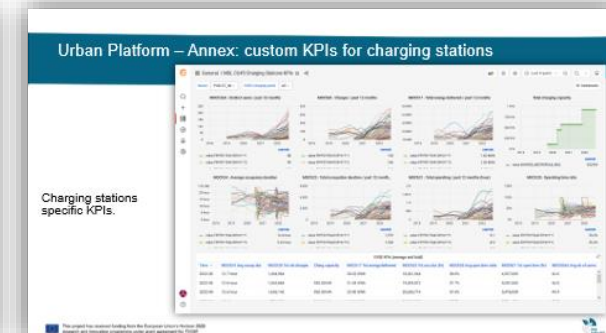
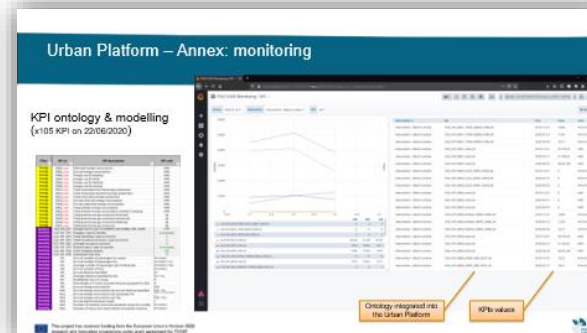
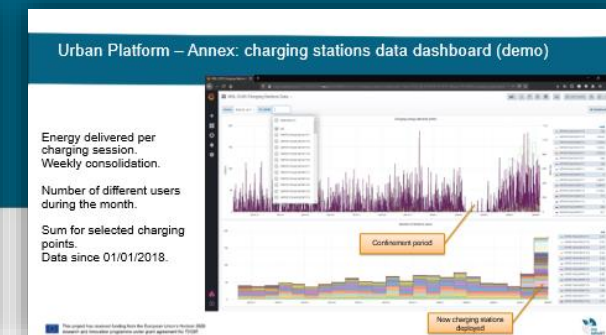
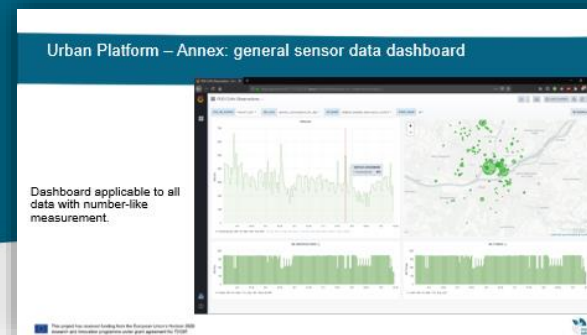
mySMARTLife's data:

- Assets owned by Nantes Métropole.
 - UC1. Pub.facilities electricity consumption
 - UC2. Smartlighting
 - UC3. Charging stations
 - UC4. Heating network
 - Nearly 100 KPIs on other actions



Nantes – Urban Platform

Data publishers / APIs :	5 / 9
Data types / KPI types :	17 / 57
Standardized datasets :	6
Data model exposed :	1 = Sensorthings
Observations points :	>800
Observations collected :	>33 millions (APIs) >280 millions (DS-lab)
Services :	12 dashboards 4 webapps
Direct users (closed data) :	Nantes Métropole IMT Atlantique



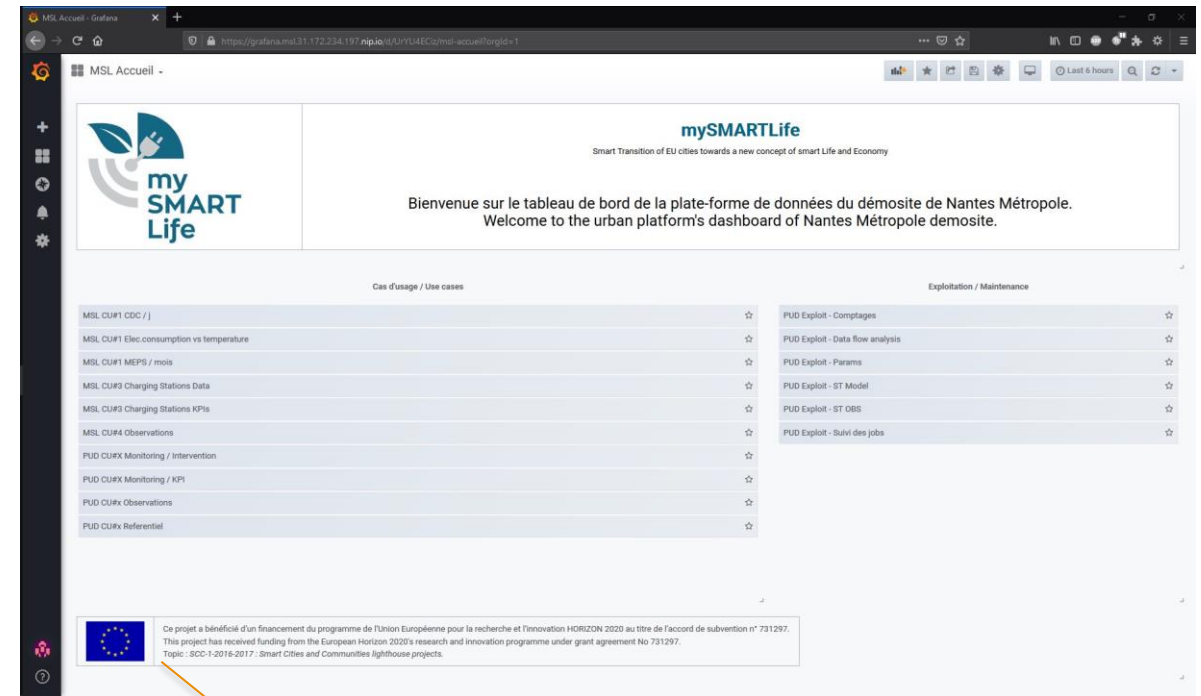
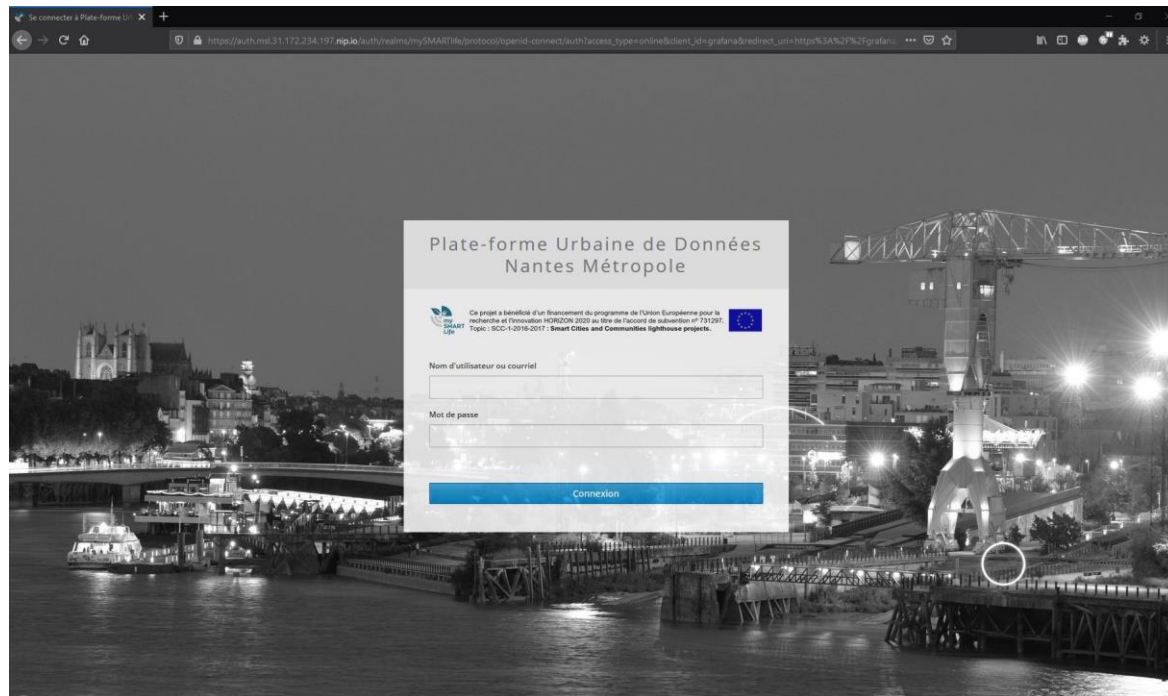
Nantes – Urban Platform

Return of experience

- Very few existing supervisors provide standardized APIs. Connectors are required. Graphical ETL: OK for transformation, KO for complex processing and checking.
- Data governance can be achieved before the actual business use cases are identify.
- Data volumetry should be defined as a requirement.
- Simple specific model VS complex all-purpose ontologic standard?
- Digital costs are not proportionate to the amount of IOT.



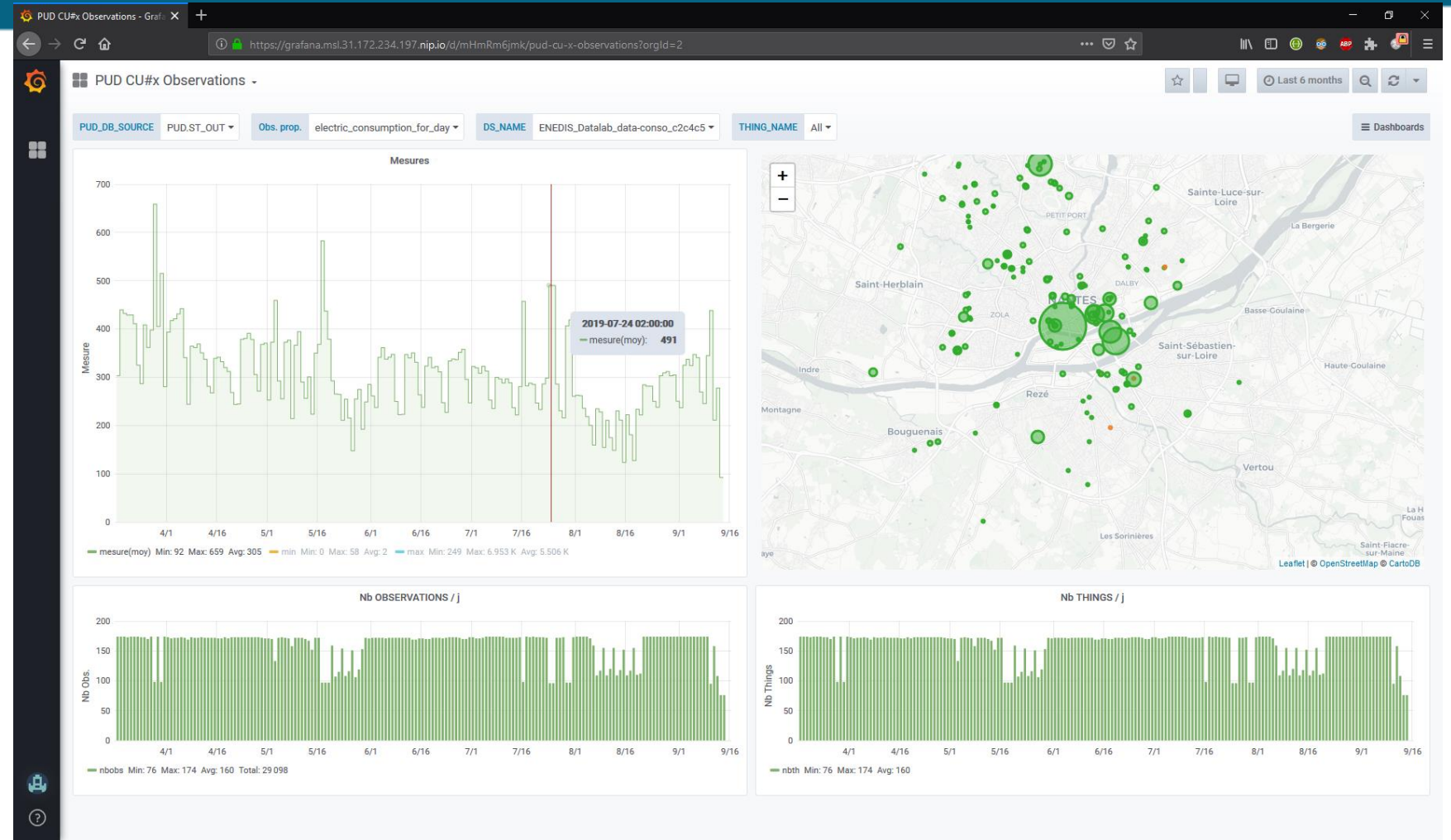
Urban Platform – Annex: login and home pages



Information on EU funding

Urban Platform – Annex: general sensor data dashboard

Dashboard applicable to all data with number-like measurement.

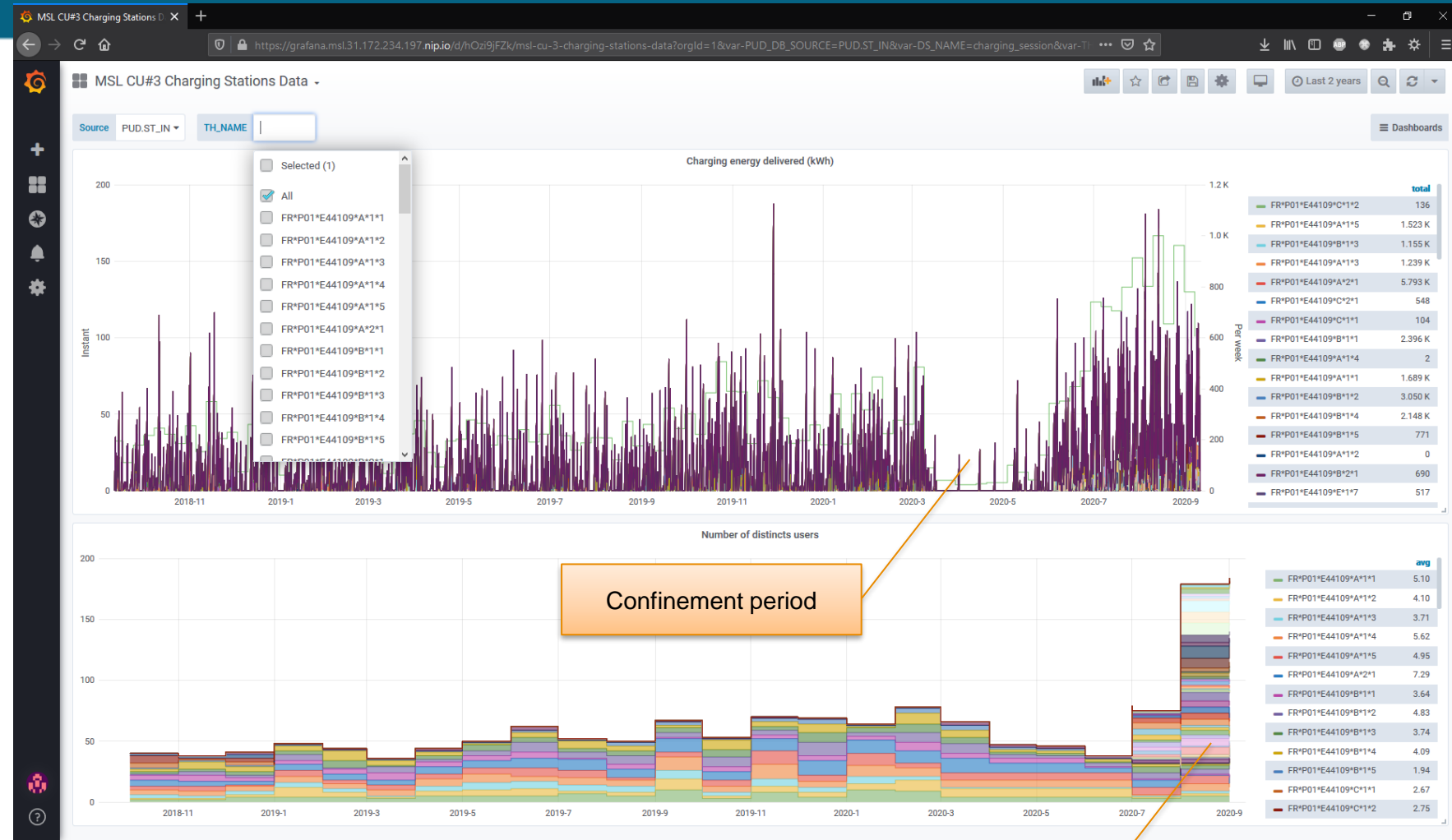


Urban Platform – Annex: charging stations data dashboard (demo)

Energy delivered per charging session.
Weekly consolidation.

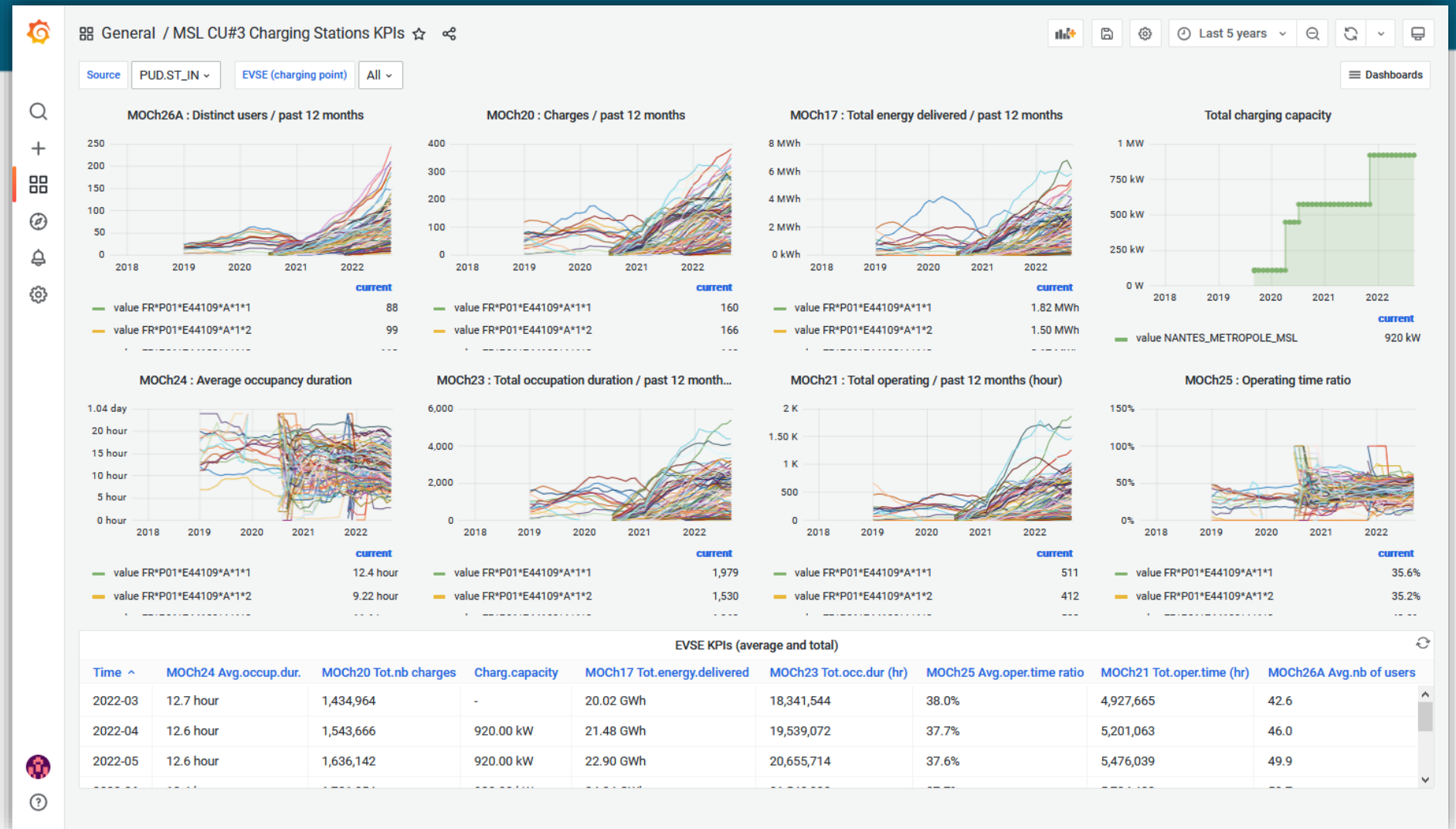
Number of different users during the month.

Sum for selected charging points.
Data since 01/01/2018.



Urban Platform – Annex: custom KPIs for charging stations

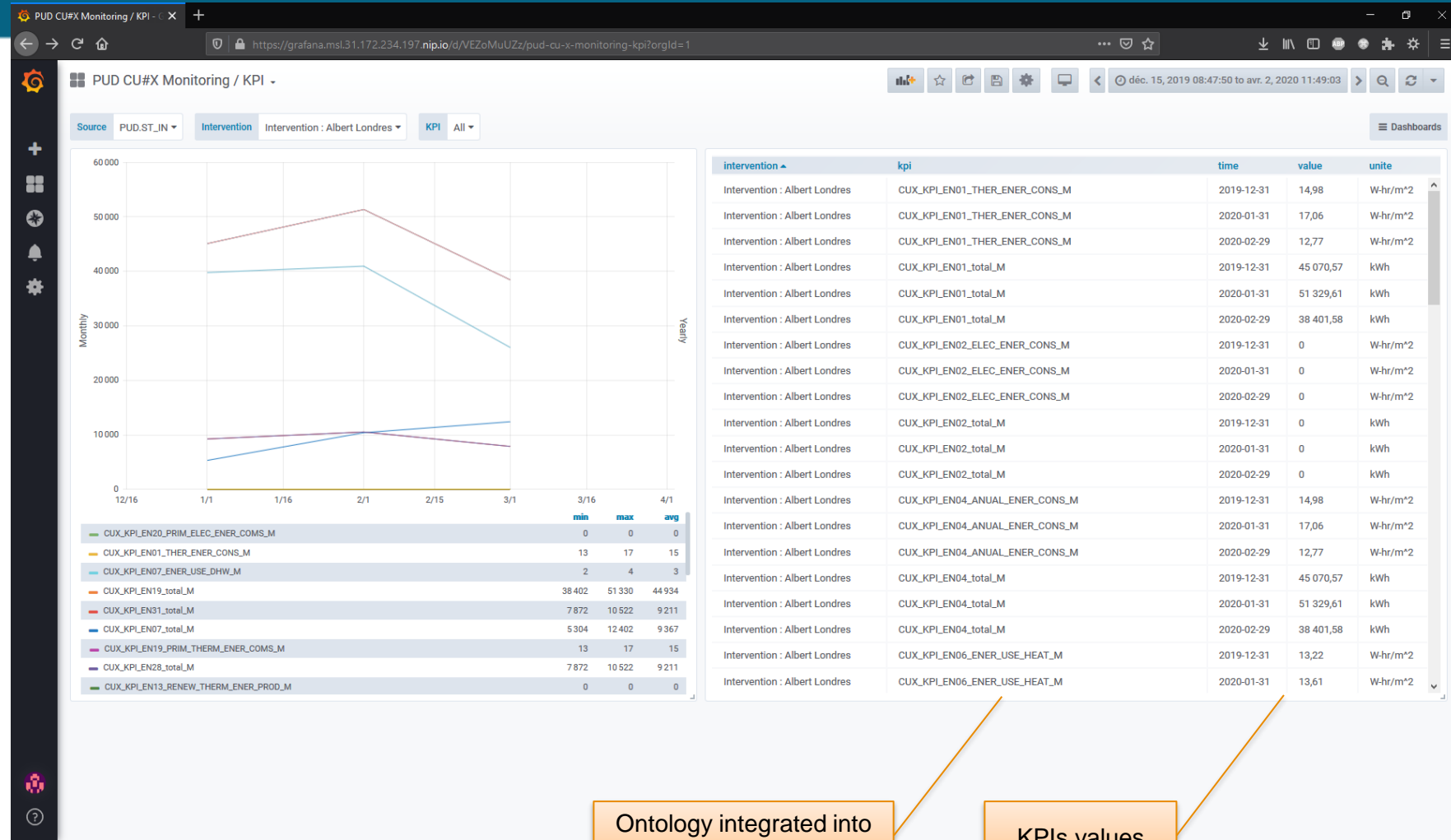
Charging stations specific KPIs.



Urban Platform – Annex: monitoring

KPI ontology & modelling (x105 KPI on 22/06/2020)

Pillar	KPI id	KPI description	KPI unit
Energy	EN02_total	Electrical energy consumption	kWh
Energy	EN04_total	Annual energy consumption	kWh
Energy	EN06_total	Energy use for heating	kWh
Energy	EN07_total	Energy use for DHW	kWh
Energy	EN08_total	Energy use for lighting	kWh
Energy	EN09_total	Energy use for cooling	kWh
Energy	EN13_total	Total renewable thermal energy production	kWh
Energy	EN14_total	Total renewable electrical energy production	kWh
Energy	EN15_total	Total renewable energy production	kWh
Energy	EN19_total	Primary thermal energy consumption	kWh
Energy	EN20_total	Primary electrical energy consumption	kWh
Energy	EN21_total	Total primary energy consumption	kWh
Energy	EN23_total	Total primary energy consumption related to heating	kWh
Energy	EN28_total	Total greenhouse gas emissions (thermal)	kg
Energy	EN29_total	Total greenhouse gas emissions (electrical)	kg
Energy	EN30_total	Total greenhouse gas emissions (lighting)	kg
Energy	EN31_total	Total greenhouse gas emissions	kg
Mobility	CUX_KPI_EPY	Énergie fournie par an (ENERGY_DELIVERED_PER_YEAR)	kWh
Mobility	CUX KPI CPY	Charges / past 12 months	# (number)
Mobility	CUX KPI OPY	Total operating / past 12 months	h
Mobility	CUX KPI OPY	Total occupancy duration / past 12 months	h
Mobility	CUX KPI AOC	Average occupancy duration	h
Mobility	CUX KPI UPY	Distinct users / past 12 months	# (number)
Mobility	CUX KPI CCA	Total charging capacity	kW
Mobility	CUX KPI OTR	Operating time ratio	%
Mobility	M1	Annual number of passengers (or users)	# (number)
Mobility	M2	Annual number of passengers.km	# (number) / km
Mobility	M3	Average number of passengers per working day	# (number) / day
Mobility	M4	Annual number of trips	# (number)
Mobility	M5	Annual distance travelled	km
Mobility	M6	Average distance travelled by trip	km / trip
Mobility	M7	Availability rate of e-buses	%
Mobility	M8	Percentage of e-buses acquired that are equipped for data	%
Mobility	M9	Annual energy consumption	kWh
Mobility	M10	Annual energy consumption per annual distance travelled	kWh / km
Mobility	M11	Annual energy consumption per passenger.km	kWh / # (number) / km
Mobility	M12	Annual energy consumption per trip	kWh / trip
Mobility	M13	Annual eqCO2 emissions saved	t
Mobility	M14	Number of incidents and traffic accidents where the shuttle	# (number)
Mobility	M15	Number of heavy-duty (HD) vehicle compatible charging	# (number)



Ontology integrated into
the Urban Platform

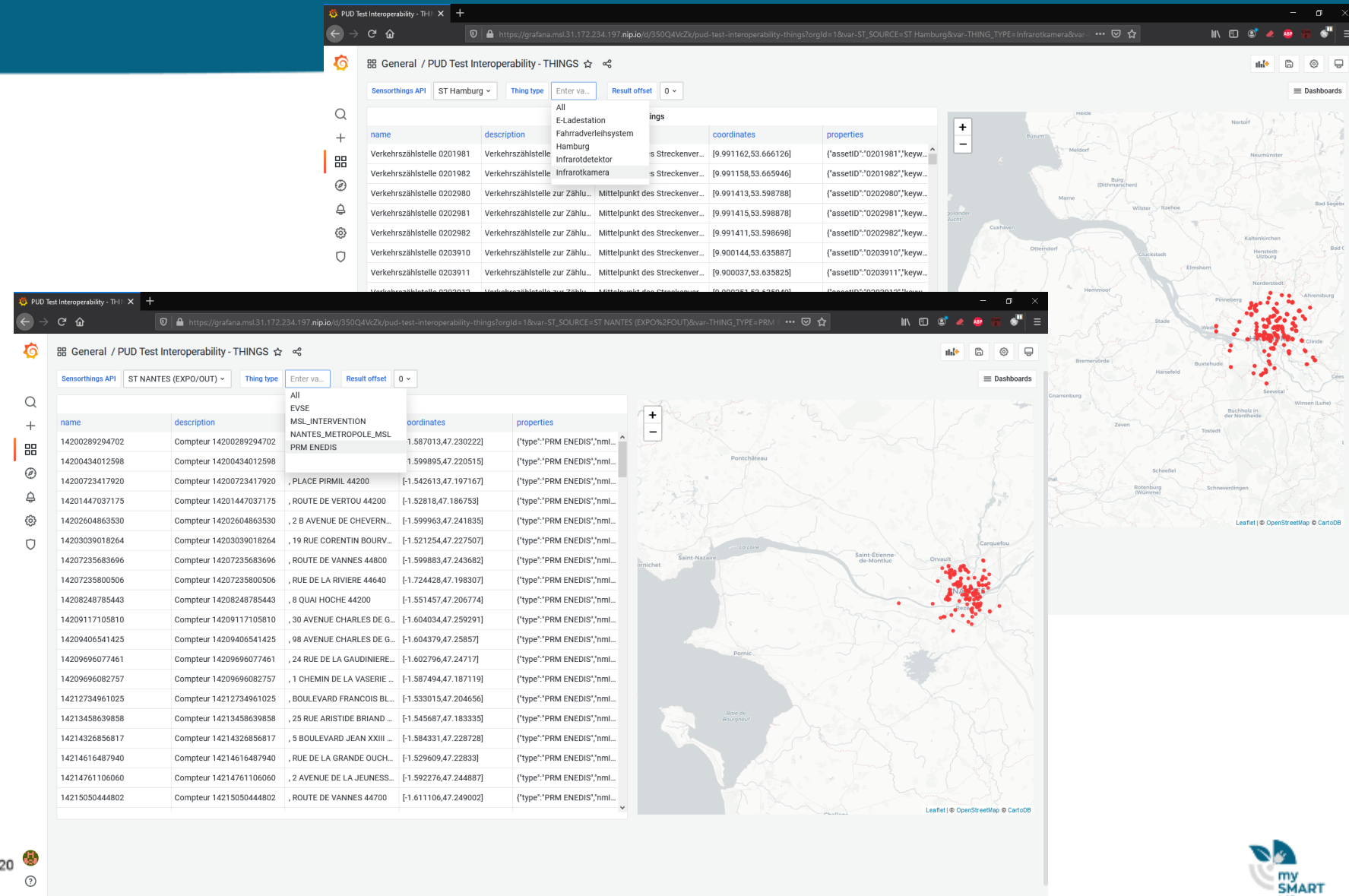
KPIs values



Urban Platform – Annex: Interoperability example

Same dashboard

- Connects to Nantes
- Connects to Hamburg



Urban Platform – Annex: Data science virtual desktop

The researchers can work within the urban platform via internet.

No raw data transfer needed.
Less energy consumption.

Data isolation necessary.

The screenshot displays a virtual desktop environment. At the top, a terminal window titled 'mysmartlife_int@DS3' shows a list of files and directories. Below it, a file explorer window titled 'mysmartlife_int@DS3 (10.0.0.3) - byobu' shows the contents of a directory. In the foreground, a JupyterLab notebook titled 'mysmartlife_int@DS3' is open, displaying a Python script that reads a CSV file and shows its contents. The notebook output shows a table of data with columns: point_id, job_id, datetime, value, classif, y, ym, and ymd. The table contains 10 rows of data.

```
hon37_pyspark) mysmartlife_int@DS3:~$ ll msl_cu4_data.csv/
l 20
-rwxr-x 5 mysmartlife_int mysmartlife 4096 mars 31 17:33 ./
-r-xr-x 22 mysmartlife_int mysmartlife 4096 avril 9 10:58 ../
-rwxr-x 3 mysmartlife_int mysmartlife 4096 mars 25 20:59 y=2019/
-r-xr-x 14 mysmartlife_int mysmartlife 4096 mars 31 17:33 y=2020/
-r-xr-x 4 mysmartlife_int mysmartlife 4096 mars 31 17:33 y=2021/
```

Lecture de l'ensemble des CSV (les données ne sont pas encore effectivement lues)

```
[26]: spdf = spark.read.csv('/home/mysmartlife_int/msl_cu4_data.csv', sep=';', header=True)
[27]: spdf.show()
# Les données ne sont pas affichées dans un ordre particulier.
# Hormis y, ym, ymd, les colonnes sont au format texte car aucun schéma n'a été précisé à la lecture
```

point_id	job_id	datetime	value	classif	y	ym	ymd
1119330	13784	2020-12-08 00:00:...	98.90999603271484	HN_TCPD	2020	202012	20201208
1119331	13784	2020-12-08 00:00:...	74.58999633789062	HN_TCPR	2020	202012	20201208
1119336	13784	2020-12-08 00:00:...	15.9	HN_DEBI2	2020	202012	20201208
1119786	13784	2020-12-08 00:00:...	4.900029182434082	HN_TEXT	2020	202012	20201208
1119789	13784	2020-12-08 00:00:...	60.04999923706055	HN_TCPD	2020	202012	20201208
1119790	13784	2020-12-08 00:00:...	57.90999984741211	HN_TCPR	2020	202012	20201208
1119795	13784	2020-12-08 00:00:...	0.036000000000000004	HN_DEBI2	2020	202012	20201208
1119999	13784	2020-12-08 00:00:...	533.7000122070312	HN_DEBI2	2020	202012	20201208
1120003	13784	2020-12-08 00:00:...	516.5999755859375	HN_DEBI2	2020	202012	20201208

Thank you for your attention!

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