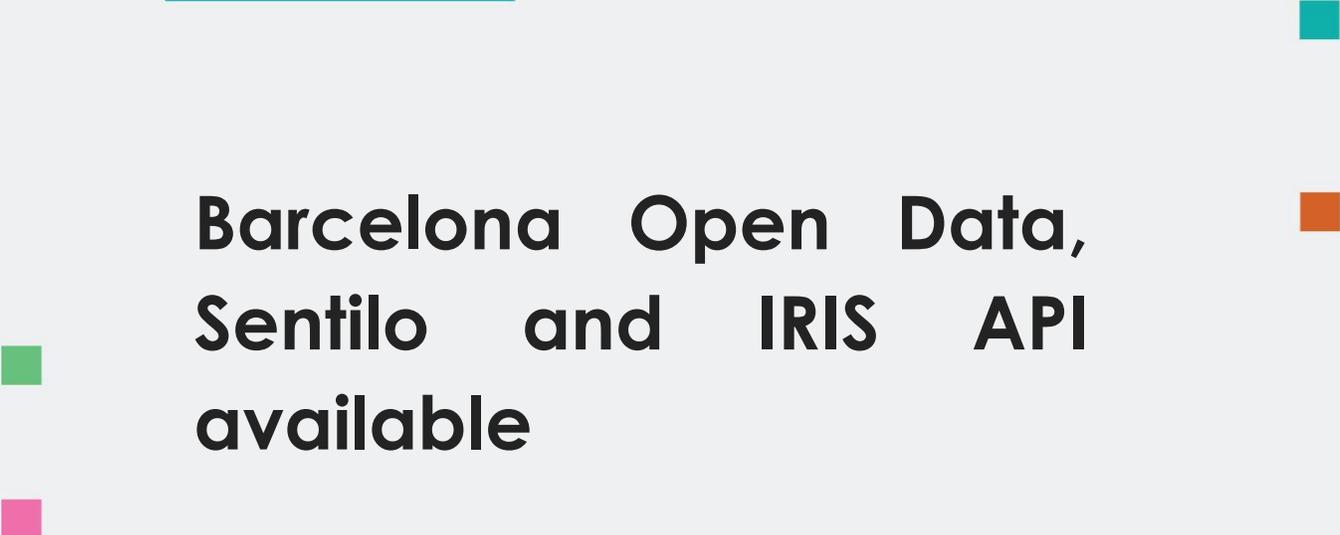
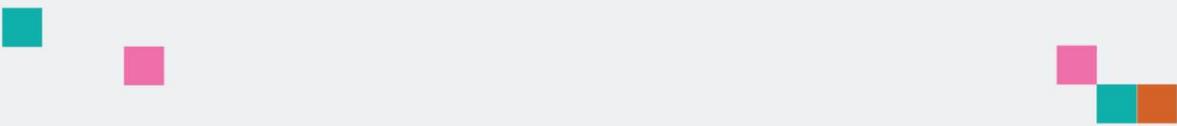




decode



Barcelona Open Data,
Sentilo and IRIS API
available



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Project no. 732546

DECODE

DEcentralised Citizens Owned Data Ecosystem

D5.1 Barcelona Open Data, Sentilo and IRIS API available- The existing data architecture from BCN will be connected through a public API to the DECODE platform

Version Number: V1.0

Lead beneficiary: IMI

Due Date: December 2017

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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Approved by: Francesca Bria, Chief Technology and Digital Innovation Officer, Barcelona City Council (IMI)

Date: 30/12/2017

This report is currently awaiting approval from the EC and cannot be not considered to be a final version.

Table of Contents

Abbreviations	3
1 Introduction	4
1.1 Scope of BCNNow	6
1.2 Barcelona's infrastructure short overview	7
2 BCNNow high level infrastructure plan	9
2.1 Platform sketch	9
□ 2.1.1 Data sources	10
□ 2.1.2 Components	10
2.2 Data Layer: Public data gathering module	10
3 Barcelona infrastructure connection details	12
3.1 IRIS	12
3.2 ASIA	12
3.3 CityOS	13
3.4 Sentilo	13
3.5 ODI	14
4. Technical connection details	15
4.1 IRIS Data Collector	16
4.2 ASIA Data Collector	17
4.3 BICING Data Collector	19
4.4 POINTS OF INTEREST Data Collector	20
4.5 Sentilo Data Collector	21
5 Conclusions	22

Abbreviations

BCN – Barcelona

ICT – Information and Communication Technology

IoT – Internet of Things

MVP – Minimum Viable Product

ODI – Open Data Infrastructure

WP – Work Package

CityOS – Operating System of the City

IRIS – Incidents, Claims and Suggestions / Incidencies Reclamacions i Suggeriments

ASIA – Application of Integrated Attention Systems / Aplicatiu de Sistemes Integrats d'Atenció

TW – ThoughWorks

IMI - Municipal Institute of Information Technology / Institut Municipal d'Informatica

HDFS - Hadoop Distributed File System

1. Introduction

Access to and control over data has become a strategic asset for Cities. While the data-driven platform economy has a clear potential to generate huge economic impact, there are several important issues that need to be resolved (first and foremost, around ownership, control and management of personal data).

DECODE – DEcentralised Citizens Owned Data Ecosystem – aims to develop decentralised and privacy-enhancing tools to protect people’s data and digital sovereignty. DECODE is experimented in two cities– Barcelona and Amsterdam– showing the key role of cities in resolve those dilemmas of the digital society that are not yet handled by nation states.

One key reason cities and municipalities have so far failed to foster local data-intensive services that can compete with Uber and Airbnb is missing access to raw data. Cities are well positioned to experiment with local open and decentralised data platforms, where people can use contextual data to guide meaningful decisions and actions.

Cities are able to make citizen data, generated by the Internet of Things (IoT) and sensor networks available for broader communal use, with appropriate privacy protection, as *city data commons*. Cities could also design new legal, economical and governance schemes to foster collaborative behaviours by citizens to contribute to digital commons, including those involving personal data. In this way cities can become new custodians for citizens’ digital rights, enabling real data sovereignty.¹

DECODE considers three different practical use cases: collaborative economy/hospitality, participatory citizen sensing, and open democracy, with a specific focus on how this relates to user communities in two European cities - Amsterdam and Barcelona. These use cases are implemented in the form of four different pilot candidates, outlined in more detail in deliverable D1.1, Pilot Scenarios and Requirements² :

- iDigital / BCNow Platform in collaboration with [Decidim Barcelona](#) and the Barcelona City Council

¹ F. Bria (2017) “People should control their digital identity”:
<https://www.citymetric.com/horizons/people-should-control-their-digital-identity-barcelona-s-chief-technology-officer-decode>

² Irving, Jill, Barritt, James... "Pilot Scenarios and Requirements | DECODE." 27 Sep. 2017,
<https://www.decodeproject.eu/publications/pilot-scenarios-and-requirements>. Accessed 21 Nov. 2017.

- IoT Pilot with [Making Sense](#) (that uses [SmartCitizen](#) platform) in Barcelona
- Holiday Rental Register / FairBnB in Amsterdam
- [Gebiedonline](#) (Neighbourhood Online) in Amsterd

The DECODE Barcelona pilots include the interaction between the City Council data infrastructure and DECODE to leverage public and private data for the common good in a privacy aware and responsible way. Barcelona will be integrating DECODE decentralised data infrastructures and distributed ledger into the core city data architecture. The city will also propose, as part of their ethical and responsible data strategy and digital transformation framework³ new governance and data management models that considers collective rights to data, rewards and incentivise openness, enabling data discovery, transaction and secure data sharing.

BCNNow⁴ is the codename for one of the pilots in Barcelona that will use a combination of public data and citizens owned data enabled by the digital democracy platform Decidim Barcelona and the integration of the DECODE infrastructure to provide useful personalised insights to citizens.

To that end, BCNNow will be an example leveraging the existing BCN data infrastructure with the new decentralized technology provided by the DECODE platform to exemplify how data can be used for public good.

The DECODE project has very ambitious goals overall, and is highly experimental. Due to this fact, the project follows a lean & agile methodology⁵ and therefore, BCNNow and the contents of this document are to be considered part of an ongoing experiment, hence can change according to pilot development.

In the inception sessions⁶ for the Barcelona DECODE pilots, as well as the original documents of the proposal, the BCNNow pilot is described as a way to provide personalized recommendation and privacy aware data mining to citizens. Hence, given the final definition of pilots, it can act as a potential bridge between the two proposed implementations (Idigital-Decidim and BCN IoT-MakingSense), which are described in deliverable D1.1 of the project.

The present document defines the starting point for the process of creation of BCNNow. The main objective of this report is to describe how vital parts of the Barcelona City Council infrastructure are made available to the DECODE consortium, to be integrated with the DECODE platform via pilots. However, this deliverables goes one step further

³ <http://ajuntament.barcelona.cat/digital/en/digital-transformation/technology-for-a-better-government/transformation-with-agile-methodology>

and sketches the preliminary back-end parts that will be used as an engine for the BCNNow pilot.

It is organized as follows: The first section contains a description of the pilot and its relation to Barcelona's infrastructure. Section two provides a high level view of the development plan of the BCNNOW dashboard. Section three outlines the details of the connection of the public BCN infrastructure to the dashboard. Section four describes the technical connection details of the collector process used for each data source and finally Section five contains conclusions to the document.

1.1 Scope of BCNNow

The pilots of DECODE are aimed at demonstrating the use of technology to allow citizens to effectively control the use their data is given. In particular, they must serve to exemplify with real cases how data can be used in a different paradigm than the current one.

The scope of BCNNow is to contribute to the public good and public participation by leveraging public and open data, privately donated data via the DECODE platform and also using private data in a responsible and privacy-aware way.

The idea is to provide a dashboard, which allow citizens to visualize relevant information to issues that might interest them, and to put this information in contrast to their personal data. Such a dashboard emerged as an idea to leverage the data produced in the IDigital-Decidim pilot⁷, in particular, the data generated upon deciding on giving support to petitions in the platform. However, the fact that it uses public data, and its scope, make it susceptible to be connected to the IoT MakingSense use case (also happening in Barcelona), thus providing a unified picture. Nothing impedes the public data generated on the IoT case to be fed to the dashboard.

BCNNow will thus aggregate data from the BCN City infrastructure, optionally other public datasets and data produced by DECODE and willingly shared by their users (with its entitlements set appropriately).

The development of this dashboard will exemplify the legal recommendations provided in D1.8, the data management provisions of D1.2, the motivations shown in D1.7 and the execution of the design lead in D1.1. It will also exemplify with a real use case a

⁴ See D1.1 and D1.7 for more detailed information.

⁵ See D1.1 chapter 6.1. *Lean and Agile Methodology* for more detailed information.

⁶ Described in D1.1 *chapter 4.3.1.2 Pilot Inception Report*.

⁷ See D1.1 and other relevant documents for pilot definition details.

scenario mentioned in D1.4 (see section *Decode applications*). Finally, the BCNNow pilot impact is described in D6.1.

Concerning the project proposal, BCNNow is mentioned in several parts:

- Task T1.3 (D.1.1) and task T1.5 (D1.7).
- The task T2.3 (D2.3 and D2.5) has the aim to inform the BCNNow pilots, therefore, it is linked to the deliverables in T5.2 (D5.1, D5.2, D5.6 and D5.11).
- The task T3.3, which will inform the development of algorithms and metrics in T5.3.
- BCNNow will be also to merge and align the development of task T5.3 and deliverables D5.3, D5.4, D5.7 and D5.9.

Last but not least, it is important to acknowledge in this document the work and collaboration that enables its execution. The great effort of the consortium is to be noted, with specific mention to its tech and lead partners (TW), as well as city council officials at IMI and local partners Eurecat.

1.2 Barcelona's infrastructure short overview

The intended dashboard will be fed with public data coming from the Barcelona city council public infrastructure. The functions of different data sources that will be used are shortly described below:

- ODI⁸: Open Data infrastructure, freely and openly accessible via the open data portal of the city, which contains information on several datasets related to public services. During the first year of the project, the City Council of Barcelona and Institut Municipal d'Informàtica (IMI) have extensively worked on the infrastructure, inaugurating a new portal with enhanced capabilities for developers.

- CityOS⁹: The "open operating system of the city". Internal data lake of the city council, currently under final stage of development, scheduled to start working by January 2018. At the present moment, initial use cases are being considered for the platform, but eventually the data from ODI, Sentilo, IRIS, ASIA (see below) and many other city council sources will be connected to the infrastructure. The projected architecture includes extensive computing and data analytics infrastructure.

- Sentilo¹⁰: The "IoT sensor platform" of the city. Currently a closed platform, accessible only to partners, which also has a public area. The platform allows partners to connect

⁸ See <http://opendata-ajuntament.barcelona.cat/en>

⁹ See <http://ajuntament.barcelona.cat/digital/en/digital-transformation/city-data-commons/cityos>

¹⁰ See www.sentilo.io and <http://connecta.bcn.cat/connecta-catalog-web/>

and consume sensors in a federated way. It contains mainly sensors from city council services, as well as pilot trials that have been connected as proof of concept.

- IRIS¹¹ : The “citizen relation system” of the city. An infrastructure that handles all the citizen interactions with the city via phone, person, email or other online means. It stores citizens demands and requirements, which are classified according to a predefined ontology and sent to its allocated supervisors. The city council has then roughly 30 days to attend to those petitions, some of which are also tagged with geolocated information.

- ASIA¹²: The system in charge of city equipment. This system fulfills two functions. One is to keep an up to date record of all city buildings and their usage, while the second is to keep a day to day agenda of all public activities held on public buildings.

In Section three the details on the data and API provided by each data source is given together with relevant references to extend its usage to other platforms. Deliverables D5.1 and D5.2 are devoted explicitly to this task.

¹¹ See <http://www.bcn.cat/iris/eng/index.html>

¹² See http://www.bcn.cat/publicacions/la_municipal/n_68/lm_33.htm

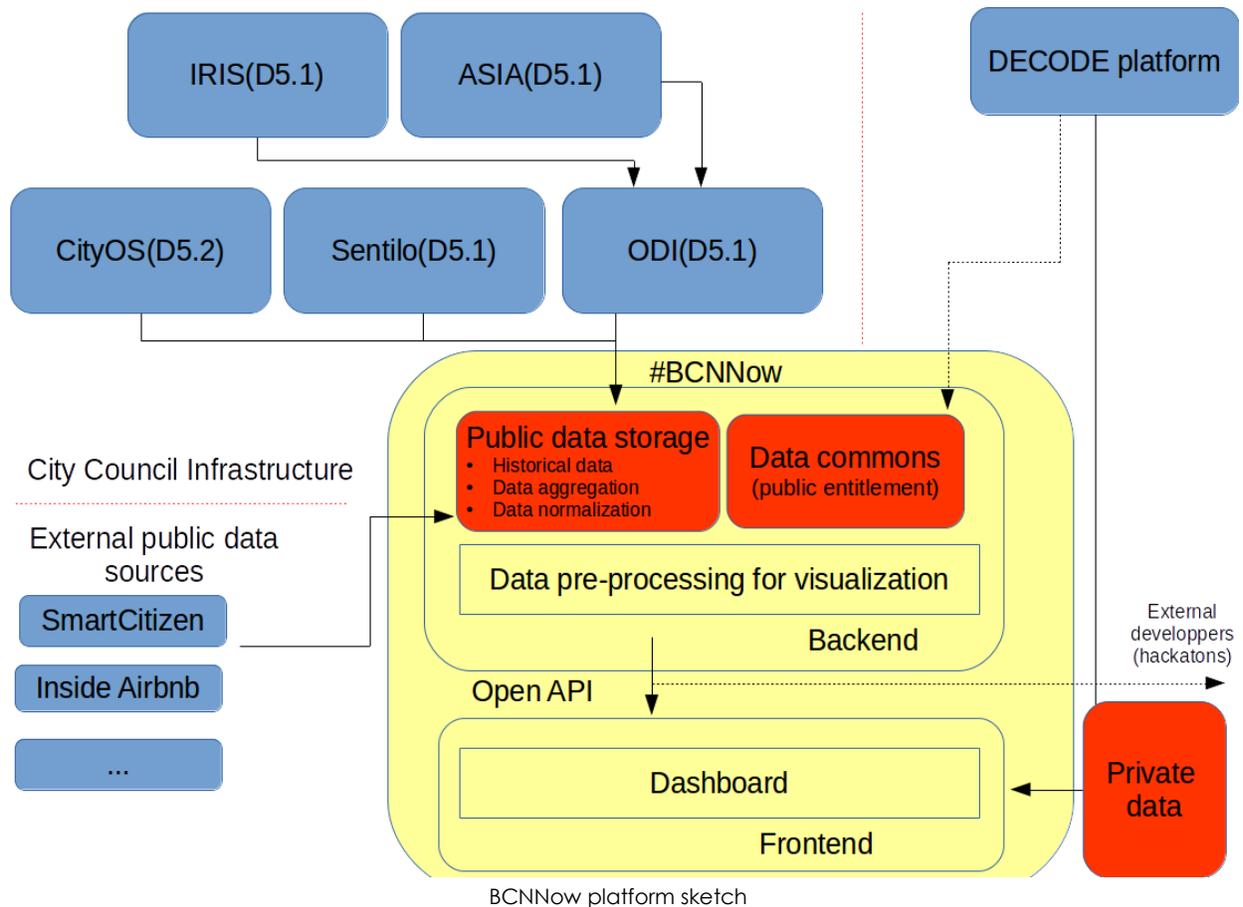
2. BCNNow high level infrastructure plan

The BCNNow module will be composed of a back-end that will act as data aggregator accompanied by visualizations of the data in the form of a front-end dashboard. The data aggregator will provide normalized access to the different datasets that will then be able to be consumed by the front-end module.

Obviously, such a back-end will provide an API that can potentially be used by other developers, in such a way that it can be used at DECODE community building events.

2.1 Platform sketch

A sketch of the intended platform is provided below. BCNNow will be composed of several parts:



2.1.1 Data sources

- Public sources: BCN city infrastructure
 - ASIA, IRIS will be connected via the ODI infrastructure
 - Barcelona ODI will be connected via public API
 - Sentilo will be connected via private access token
 - CityOS will be connected via private access token (TBD)
- Complementary sources: Other sources can be envisaged here, as for instance the SmartCitizen¹³ platform, which has an open API or InsideAirBnB¹⁴ data. At the moment this sources are not planned for an MVP.
- DECODE available data:
 - Data commons: Data available via the DECODE platform with appropriate public entitlements. This data would either be available in an anonymized way or via a DECODE app.
 - DECIDIM¹⁵ demographic data:
 - Aggregated demographic data on DECIDIM petitions obtained via the DECIDIM iDigital DECODE app.

2.1.2 Components

- BCNNow-Backend: The backend will aggregate and normalize available public data sources and will provide an API to serve them appropriately for visualizations.
- BCNNow-dashboard: The frontend will provide a dashboard for users.

2.2 Data Layer: Public data gathering module

The aim of this document is to describe the public data-gathering module of the BCNNow back-end. In further deliverables related to the BCNNow dashboard and its associated tasks, precise details of the implementation of the rest of modules and the overall infrastructure will be given.

¹³ See <http://www.smartcitizen.me>

¹⁴ See <http://insideairbnb.com/get-the-data.html>

¹⁵ See <https://www.decidim.barcelona>

The Data Layer is designed to collect data into BCNNow in a standard style. It is based on a set of Python Scripts, each one of them collects the data coming from one of the heterogenous data sources and pre-processes them, so that there is an agreement on data format standards. Each collector sends the standard records to an Apache Kafka¹⁶ (i.e. a framework for building real-time data pipelines and streaming apps), which collects them in a fault-tolerant way. The usage of Apache HBase¹⁷ (i.e. a Hadoop database, a distributed, scalable, big data store) will be considered to store the data.

¹⁶ See <https://kafka.apache.org/>

¹⁷ See <https://hbase.apache.org/>

3. Barcelona infrastructure connection details

This section contains details relevant to the main aim of this deliverable. It specifies how the connection of these data sources will be delivered to the intended back-end.

3.1 IRIS

- **What it is:** Registry of citizen interactions with the city council via email, Internet forms, telephone or in-person queries. It records citizens' requests to city council that is compelled by law to answer within a period of time not exceeding one month.
- **Data provision:** Some of the data included in the platform is sensitive and hence is normalized and aggregated. The normalization occurs by assigning each citizen query to a predefined thematic (out of 1000 approximately). The available data is further aggregated at increasing geographic levels (neighborhood) if it contains personal information in such a way that at least k-points are available k-anonymization strategy¹⁸. The k-level has been set to 10, according to meetings with city officials.
- **Infrastructure:** IRIS provides the data in static files via an automated batch process update that then is linked via a static URL to the ODI infrastructure.
- **Update rate:** The currently available data is released every three months, no historical data is currently available¹⁹. At the moment, IMI and city council is working on increasing the update rate of the platform to once a week.
- **API details:** IRIS can be freely and openly accessed via the ODI API.
- **Connection Status:** Available.

3.2 ASIA

- **What it is:** Registry of activities happening in the city council buildings (agenda) and also up-to-date registry of city council infrastructures.
- **Data provision:** City council equipment (RDF format) and agenda of activities (XML files) happening in the city council buildings (libraries, sports centers, civic centers...).
- **Infrastructure:** Batch automated process to the open data website repository (ODI infrastructure) in the form of static files.
- **Update rate:** Monthly (RDF overall data) and daily (XML cultural activities).

¹⁸ See <https://en.wikipedia.org/wiki/K-anonymity>

¹⁹ See <http://opendata-ajuntament.barcelona.cat/data/en/dataset/iris>

- **API details:** It provides data to the ODI via a public URL linked to the static documents, that is updated according to a Batch process. The URL is public.
- **Connection Status:** Available.

3.3 CityOS

* CityOS is still under development. Deliverable D5.2 contemplates its connection to BCNNow due for June 2018. Details will be then given on its connection.

3.4 Sentilo

- **What it is:** Barcelona's open source sensor and actuator platform designed to fit in the City architecture.
- **Data provision:** Variety of IoT sensor and actuator data collected from a variety of actors (cities, individuals and organizations) in the Sentilo community. It includes city council services such as atmospheric data, noise sensors, pollution sensors, mobility counters or energy consumption, and also industrial partners.

Sentilo through an universal viewer, provides a public demonstration that can be used as a start point for specific business visualizers²⁰. Each partner involved in the platform is responsible on the maintenance and data quality of their sensors, hence, some sensors work intermittently. The most relevant reasons is the lack of hardware and software maintenance and the end of the projects related to these sensors.

Most of the data is provided by partners, therefore it is private and needs explicit permission from their owners to be used. However, some of the data is public and available in their website²¹. IMI has requested access to the all datasets published in Sentilo platform, but this process requires the agreement of every partners in the platform, and hence until now the platforms of atmospheric data and energy consumption data has been acquired. The rest of datasets are in process of being added to BCNNow and will be added as the project advances.

- **Infrastructure:** The Sentilo infrastructure runs on an open-source implementation²² based on IoT subscription push-pull model.
- **Update rate:** Most of the data is served in almost real time (with maximum 30 min delay).

²⁰ See <http://connecta.bcn.cat/connecta-catalog-web/>

²¹ See <http://connecta.bcn.cat/connecta-catalog-web/component/map>

²² See <http://www.sentilo.io/xwiki/bin/view/Sentilo.Community.Documentation/Architecture>

- **API details:** The API allows to explore the database, subscribe to sensor data, register sensors and send orders to the sensor (in the case one has the appropriate permissions). It requires a private token. The API does not allow to access historical data²³.

- **Connection Status:** Available. Enabled connection via BCNNow port to the City Council infrastructure.

3.5 ODI

- **What it is:** Barcelona's open data infrastructure portal.

- **Data provision:** Open data sources from a variety of datasets. For an overview of activity, datasets, dataset quality (according to Tim Berner's Lee categorization²⁴) and demand/usage see <http://opendata-ajuntament.barcelona.cat/en/analytics>.

- **Infrastructure:** Website with different APIs for data consumption. Mainly displays static data under the form of CSV. The website is based on a CKAN²⁵ implementation.

- **Update rate:** Variable, depends on the dataset but is specified in the online documentation of each dataset.

- **API details:** Open API with no required authorization. It contains a catalog API (containing information on the contents of the catalog via CKAN), a CSV document API with enhanced SQL capabilities for some datasets and finally links to other external city council APIs (non maintained by the portal). Easily accessible via the instructions in the portal²⁶.

- **Connection Status:** Available.

²³ This functionality is planned to be available via the CityOS BCN module.

²⁴ See <http://5stardata.info/en/>

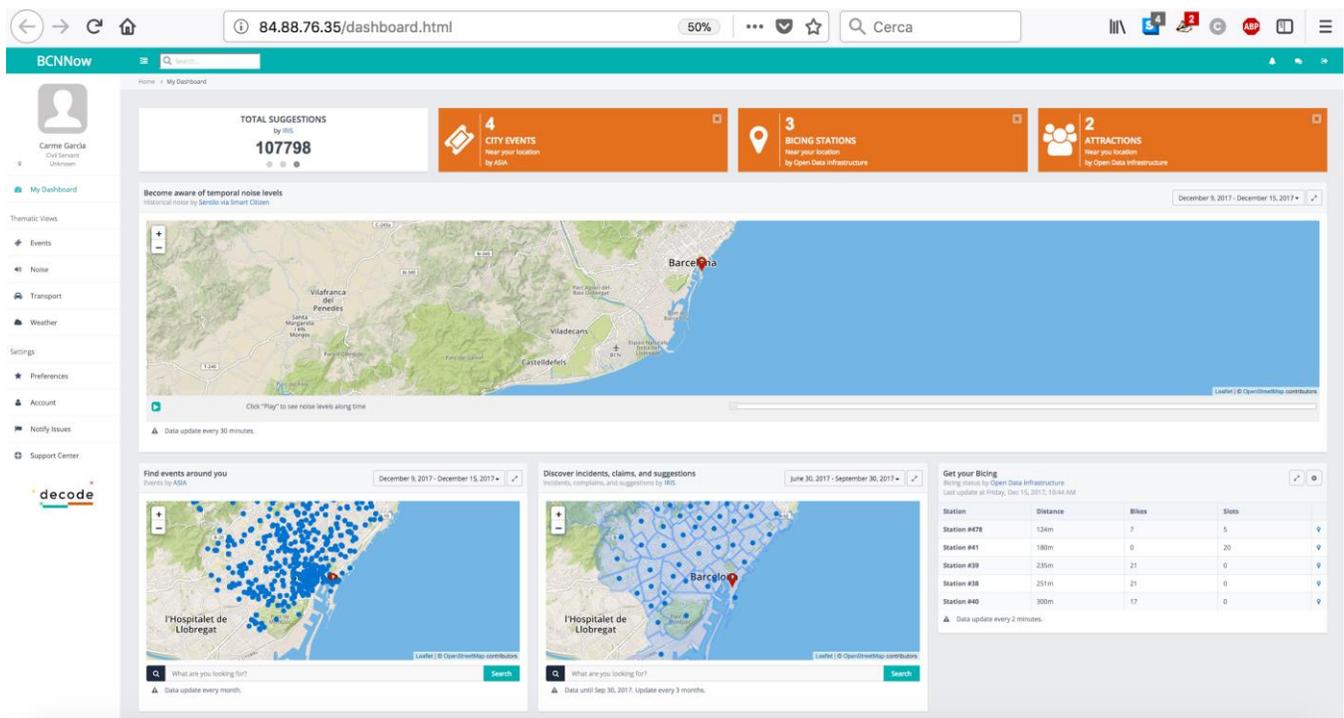
²⁵ See <https://ckan.org/>

²⁶ See <http://opendata-ajuntament.barcelona.cat/en/desenvolupadors>

4. Technical connection details

The following final section provides technical detail of the collector process used for each public data source mentioned in this deliverable.

Due to the flexible nature of the proposed implementation, other external data sources will be added during the development of the dashboard. All will be presented and documented in the project repository, which will be published once version 1.0 is production ready, coinciding with later deliverables. In the meantime, all the referenced data sources are freely open and a working alpha version of the dashboard can be accessed [here](#) (leaving the username and password empty). A snapshot of the current dashboard is shown below.



BCNNow dashboard alpha version screenshot

4.1 IRIS Data Collector

	HEADER	CONTENT
GENERAL INFORMATION	URLs	http://www.bcn.cat/iris/eng/index.html (IRIS Blog). http://opendata-ajuntament.barcelona.cat/data/ca/dataset/iris (IRIS in Open Data BCN).
	Short Description	It is a multi-channel program for managing service requests, incidents reports and complaints of the citizens; it stores citizens demands and requirements classified in a pre-defined ontology. Then, they are sent to its allocated responsible who has roughly 30 days to attend to those petitions.
	Provision Constraint	Aggregation by thematic area and neighborhood.
	Provision Method	Batch process update to the Open Data BCN infrastructure.
	Update Rate	Every three months.
	Historical Data?	Yes. From January 2014.
	Connection Type	Batch Open Data BCN API http://opendata-ajuntament.barcelona.cat/en/desenvolupadors .
	Access Permission	Public.
	Data Format	CSV.
	Status	Available.
	Current Size	TBD
	Original Record Structure	ID (Integer) · FITXA_ID (Integer) · TIPUS (Enum String) · AREA (Enum String) · ELEMENT (Enum String) · DETALL (String) · CODI_DISTRICTE (Integer) · DISTRICTE (String) · CODI_BARRI (Integer) · BARRI (String) · SECCIO_CENSAL (Integer) · TIPUS_VIA (String) · CARRER (String) · NUMERO (Integer) · COORDENADA_X (Integer) · COORDENADA_Y (Integer) · LONGITUD (Integer) · LATITUD (Integer) · SUPORT (Enum String) · CANALS_RESPOSTA (String) · DIA_DATA_ALTA (Day) · MES_DATA_ALTA (Month) · ANY_DATA_ALTA (Year) · DIA_DATA_TANCAMENT (Day) · MES_DATA_TANCAMENT (Month) · ANY_DATA_TANCAMENT.
	Data Collection Type	Cron-Based: Every three months from 1 st January.
	DATA LAYER INFORMATION	Source Data Preprocessing
Source Structure Adaption		"ID": <AUTO-INCREMENT> (e.g. "16373"), "SOURCE": "iris", "PROVIDER": None, "PUBLISHER": None, "TYPE": Tipus, "LOCATION": { "LONGITUDE": C(Coordenada_X), "LATITUDE": C(Coordenada_Y), "ALTITUDE": None, "DISTRICT": DISTRICTE, "BARRI": BARRI, "STREET_TYPE": TIPUS_VIA, "STREET_NAME": CARRER, "STREET_NUMBER": NUMERO, "CITY_NAME": "Barcelona" } "TIMESTAMP": C(DIA_DATA_ALTA, MES_DATA_ALTA, ANY_DATA_ALTA), "PAYLOAD": { "IRIS_ID": FITXA_ID, "AREA": AREA, "ELEMENT": ELEMENT, "DETAIL": DETALL, "SUPPORT": SUPORT, "CHANNEL": CANALS_RESPOSTA, "START": C(DIA_DATA_ALTA, MES_DATA_ALTA, ANY_DATA_ALTA), "END": C(DIA_DATA_TANCAMENT, MES_DATA_TANCAMENT, ANY_DATA_TANCAMENT) }
	Source Duplicates Checking	FIXTA_ID does not exist in ALL(PAYLOAD.IRIS_ID).

4.2 ASIA Data Collector

	HEADER	CONTENT	
G E N E R A L	URLs	http://opendata-ajuntament.barcelona.cat/data/ca/dataset/agenda-diaria (Daily ASIA). http://opendata-ajuntament.barcelona.cat/data/ca/dataset/agenda-mensual (Monthly ASIA). http://opendata-ajuntament.barcelona.cat/data/ca/dataset?q=equipments (Equipment).	
	Short Description	It is the system in charge of the city equipment management whose purpose is to keep an up-to-date record of all city buildings and maintain an agenda of all public activities held on them.	
	Provision Constraint	No.	
	Provision Method	Batch process update to the Open Data BCN infrastructure.	
	Update Rate	Every month.	
	Historical Data?	No. Only from October 2017.	
	Connection Type	Batch Parser from Open Data BCN.	
	Access Permission	Public.	
	Data Format	XML (Events). RDF (Equipment).	
	Status	Available.	
I N F O R M A T I O N	Current Size	TBD	
	Original Record Structure	Events: ID (Integer) · Nom (String) · Lloc_Simple: ID (Integer) · Nom (String) · Seccio (Integer) · Adreca_Simple: Carrer@codi (String) · Numero (Integer) · Districte@codi (String) · Codi_Postal (Integer) · Municipi@codi (Integer) · Coordenades: Geocodificacio@X@Y (Integer) · Data: Data_Inici (Date) · Hora_Inici (Time) · Data_Fi (Date) · Data_Proper_Acte (Date) · Typus_Acte (Enum Char) · Estat (Enum Char) · Estat_Cycle (Enum Char) · Classifications: Nivell1@codi (String) · Nivell2@codi (String) · Nivell3@codi (String). Equipment: Identifier (Integer), Fn (String), Address: Street_Address: Street_Name (String), Street_Number (Integer), District (String), Neighborhood (String), Postal_Code (Integer), Locality (String), Country_Name (String), Location: Latitude (Float), Longitude (Float), Tel (String), Fax (String), Agent: Given_Name (String), Family_Name (String), Honorific_Prefix (String), Role (String), Dies_Open (String), E-Mail (String), Fundacia (Integer), Notes (String). Relationship: FOREIGN KEY Lloc_Simple_ID REFERENCES Equipment(Identifier).	
	Data Collection Type	Cron-Based: Every month from 1 st January.	
	Source Data Preprocessing	<i>Timestamp conversion:</i> Before: DATA_FI After: (DATA_FI + "00:00:00") Before: DATA_INICI, HORA_INICI After: (DATA_INICI + HORA_INICI) <i>Coordinates conversion Custom ED50 to WGS84:</i> Before: ED50(long_asia / 1000 + 400000, lat_asia / 1000 + 4500000) After: WGS84(X, Y)	
	Source Structure Adaption	"ID": <AUTO-INCREMENT> (e.g. "16373"). "SOURCE": "asia", "PROVIDER": None, "PUBLISHER": None, "TYPE": "event", "LOCATION": { "LONGITUDE": C(GEOCODIFICACIO@X), "LATITUDE": C(GEOCODIFICACIO@Y), "ALTITUDE": None, "DISTRICT": LLOC_SIMPLE.DISTRICTE, "BARRI": None, "STREET_TYPE": None, "STREET_NAME": LLOC_SIMPLE.CARRER, "STREET_NUMBER": LLOC_SIMPLE.NUMERO, "CITY_NAME": "Barcelona" } "TIMESTAMP": C(DATA_INICI, HORA_INICI) "PAYLOAD": { "ASIA_ID": ID, "NAME": NOM, "EQUIPMENT_ID": LLOC_SIMPLE.LOCATION_ID,	
	D A T A		
L A Y E R			
I N F O R M A T I O N			

```

"START_DATE": C(DATA_INICI, HORA_INICI),
"END_DATE": C(DATA_FIN),
"EVENT_TYPE": TIPUS_ACTE,
"STATE": ESTAT,
"CATEGORIES": List(NIVELL1, NIVELL2, NIVELL3)
}

```

```

"ID": <AUTO-INCREMENT> (e.g. "16373"),
"SOURCE": "asia",
"PROVIDER": None,
"PUBLISHER": None,
"TYPE": "equipment",
"LOCATION": {
  "LONGITUDE": C(LOCATION.LONGITUDE),
  "LATITUDE": C(LOCATION.LATITUDE),
  "ALTITUDE": None,
  "DISTRICT": DISTRICT,
  "BARRI": None,
  "STREET_TYPE": FROM(STREET_NAME),
  "STREET_NAME": STREET_NAME,
  "STREET_NUMBER": STREET_NUMBER,
  "CITY_NAME": "Barcelona"
}
"TIMESTAMP": None,
"PAYLOAD": {
  "EQUIPMENT_ID": IDENTIFIER,
  "NAME": FN,
  "NOTES": NOTES
  "FOUNDATION_YEAR": FUNDACIA
  "TELEPHONE": TELEFON,
  "FAX": FAX,
  "AGENT_NAME": AGENT.GIVEN_NAME,
  "AGENT_SURNAME": AGENT.FAMILY_NAME,
  "AGENT_ROLE": AGENT.ROLE,
  "AGENT_MAIL": E-MAIL
}

```

EVENT(PAYLOAD.EQUIPMENT_ID) REFERENCES EQUIPMENT(EQUIPMENT.ASIA_ID).

**Source Duplicates
Checking**

Events: ID does not exist in ALL(EVENT.PAYLOAD.ASIA_ID).
Equipment: IDENTIFIER does not exist in ALL(EQUIPMENT.PAYLOAD.EQUIPMENT_ID).

4.3 BICING Data Collector

	HEADER	CONTENT
G E N E R A L I N F O R M A T I O N	URLs	http://opendata-ajuntament.barcelona.cat/data/ca/dataset/bicing (BICING in OPEN DATA BCN)
	Short Description	Bicing is a bicycle sharing system in Barcelona inaugurated on March 22, 2007. It is similar to the Vélo'v service in Lyon or Vélib' in Paris, and using the same bicycles and stations as used in Stockholm, Oslo, and Zaragoza. Its purpose is to cover the small and medium daily routes within the city in a climate-friendly way, eliminating the pollution, roadway noise, and traffic congestion that motor vehicles create.
	Provision Constraint	No.
	Provision Method	Batch process update to the Open Data BCN infrastructure.
	Update Rate	Immediate.
	Historical Data?	No.
	Connection Type	Batch Parser from Open Data BCN.
	Access Permission	Public.
	Data Format	JSON.
	Status	Available.
	Current Size	Not available.
	Original Record Structure	Stations: ID (Integer), Type (Enum String), Latitude (Float), Longitude (Float), Street_Name (String), Street_Number (String), Altitude (Float), Slots (Integer), Bikes (Integer), Nearby_Stations_IDs (List), Status (Boolean).
	Management	Direcció Serveis Informació Atenció Ciutadana. Departament Avaluació d'Incidències Qualitat.
	D A T A L A Y E R I N F O R M A T I O N	Data Collection Type
Source Data Preprocessing		Not required.
Source Structure Adaption		<pre> "ID": <AUTO-INCREMENT> (e.g. "16373"), "SOURCE": "opendatabcn", "PROVIDER": None, "PUBLISHER": None, "TYPE": "bicing", "LOCATION": { "LONGITUDE": LONGITUDE, "LATITUDE": LATITUDE, "ALTITUDE": ALTITUDE, "DISTRICT": None, "BARRI": None, "STREET_TYPE": FROM(STREET_NAME), "STREET_NAME": STREET_NAME, "STREET_NUMBER": STREET_NUMBER, "CITY_NAME": "Barcelona" } "TIMESTAMP": The current timestamp. "PAYLOAD": { "ID": ID, "TYPE": TYPE, "TOTAL_SLOTS": SLOTS, "NBIKES": BIKES, "NEARBY_STATIONS_IDS": List(PAYLOAD.ID) } </pre>
Source Duplicates Checking		Current (ID, TIMESTAMP) does not exist in ALL(PAYLOAD.BICING_ID, TIMESTAMP).

4.4 POINTS OF INTEREST Data Collector

	HEADER	CONTENT
GENERAL INFORMATION	URLs	http://opendata-ajuntament.barcelona.cat/data/ca/dataset/punts-informacio-turistica (POI in OPEN DATA)
	Short Description	It lists our choice of best Barcelona's tourist attractions and sights of interest. You will find a brief description of each Barcelona sight of interest
	Provision Constraint	No.
	Provision Method	Batch process update to the Open Data BCN infrastructure.
	Update Rate	Weekly.
	Historical Data?	No.
	Connection Type	Batch Parser from Open Data BCN API.
	Access Permission	Public.
	Data Format	XML.
	Status	Available.
DATA LAYER INFORMATION	Current Size	Not available.
	Original Record Structure	Address (String), City (String), Relative_Items (List), Code_URL (URL), Districte (String), Barri (String), GmapX (Float), GmapY (Float), Interest_Info_URLs (List), Telefon (String), Type (Enum String), Title (String), Description (String).
	Management	Direcció Serveis Informació Atenció Ciutadana. Departament Avaluació d'Incidències Qualitat.
	Data Collection Type	Cron-Based: Every week from 1 st January 00:00:00.
	Source Data Preprocessing	Not required.
	Source Structure Adaption	<pre> "ID": <AUTO-INCREMENT> (e.g. "16373"), "SOURCE": "opendatabcn", "PROVIDER": None, "PUBLISHER": None, "TYPE": "poi", "LOCATION": { "LONGITUDE": GMAPX, "LATITUDE": GMAPY, "ALTITUDE": None, "DISTRICT": DISTRICT, "BARRI": BARRI, "STREET_TYPE": FROM(ADDRESS), "STREET_NAME": ADDRESS, "STREET_NUMBER": FROM(ADDRESS), "CITY_NAME": "Barcelona" } TIMESTAMP: None. PAYLOAD: { "ID": ROW@NUM, "NAME": TITLE, "TYPE": TYPE, "URL": CODE_URL, "SHORT_DESCRIPTION": META_DESCRIPTION_INTERNACIONAL, "LONG_DESCRIPTION": OG_DESCRIPTION_INTERNACIONAL, "NOTES": CONTENT, "ASSOCIATIONS": List(CODE2), "CONTACTS": List(INTERESTINFO + PHONENUMBER), } </pre>
	Source Duplicates Checking	Current (ID) does not exist in ALL(PAYLOAD.ID).

4.5 Sentilo Data Collector

	HEADER	CONTENT
GENERAL INFORMATION	URLs	http://www.sentilo.io/wordpress/ (Sentilo Home Page). http://www.sentilo.io/xwiki/bin/view/APIDocs/Overview (Sentilo Documentation). http://sentilo.bcn.cat/connecta-catalog-web/ (Sentilo Catalog).
	Short Description	It is the IoT sensor platform of the city. Currently, it is a closed platform, accessible only to partners, which also has a public area. The platform allows partners to connect and consume sensors in a federated way. It contains a variety of IoT sensor data collected from a variety of actors in the Sentilo community. It includes city council services (atmospheric data, noise sensors, pollution sensors) and industrial partners. Each partner provides maintenance and data quality of their sensors; hence, some sensors do not work.
	Provision Constraint	Limited number of online working sensors.
	Provision Method	Push model.
	Update Rate	Every Half-Hour
	Historical Data?	No. From October 2017.
	Connection Type	Push model to #BCNNOW public endpoint.
	Access Permission	Private by token.
	Data Format	JSON.
	Status	Available for Meteorological sensor by SMC.
	Current Size	Not available.
	Original Record Structure	Meteorological Sensors: Message (Float), Timestamp (Datetime), Topic (String), Type(String), Sensor (String), Provider (String), Location (String), Publisher (String), PublisherAt (Datetime).
	Management	Barcelona City Council.
DATA LAYER INFORMATION	Data Collection Type	Push-Based: Our endpoint for Sentilo's push notifications is set to http://84.88.76.35:81 .
	Source Data Preprocessing	For each provider for which we have access permission, the component sends a request to Sentilo in order to receive push notification from all the sensors that given provider includes.
	Source Structure Adaption	<pre> "ID": <AUTO-INCREMENT> (e.g. "16373"). "SOURCE": "sentilo". "PROVIDER": PROVIDER (e.g. "smc"). "PUBLISHER": PUBLISHER (e.g. "wt-0129"). "TYPE": PROVIDER.TYPE (e.g. "meteo"). "LOCATION": { "LONGITUDE": PROVIDER.SENSOR.LOCATION.X (e.g. "2.13"), "LATITUDE": PROVIDER.SENSOR.LOCATION.Y (e.g. "41.132"), "ALTITUDE": None, "DISTRICT": None, "BARRI": None, "STREET_TYPE": None, "STREET_NAME": None, "STREET_NUMBER": None, "CITY_NAME": "Barcelona" } "TIMESTAMP": TIMESTAMP (e.g. "2017-01-01 10:14:43"). "PAYLOAD": { "VALUE": MESSAGE } </pre>
	Source Duplicates Checking	Current (PUBLISHER, TIMESTAMP) does not exist in ALL(PUBLISHER, TIMESTAMP).

5. Conclusions

This deliverable is the first outcome of the process of imagining, conceptualizing and deploying the BCNNow dashboard, as part of the DECODE BCN pilots. It has presented the BCNNow pilot, the Barcelona City Council data infrastructures that will be connected to it, an initial technical plan of deployment, an initial prototype, and the connection technical details of each of the mentioned data sources.

The dashboard plan and execution will allow subsequent Tasks in WP5, data analysis coverage and exemplify the use of data for public good (data commons). This document sets the basis for the work to be developed in this field and aligns the different Deliverables and Tasks planned.

The immediate future steps of development will be related to deliverable D5.3 (Data analysis methods and first results from pilots) as well as deliverable D5.2 (CityOS connection) and also with deliverable D5.4 (Prototype Data Visualization Tool).

Last but not least, it is important to note that the development of this dashboard will also help in other dissemination activities of the project and in its community building, described in the WP6. This deliverable works closely with task T6.1 in order to maximize the engagement of developers and the promotion of the pilots, for that reason it will allow collaboration from communities and developers wishing to generate their own visualizations and contributions via the planned OpenAPI that will allow, for the very first time, to access many Barcelona data sources in a unified and structured way. All these activities are planned for the upcoming second and third year of project and will contribute to spread the vision of the DECODE project for fair data ownership through tangible examples.