Deliverable

D2.2 Scenario specifications of the DUET solution

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Executive Summary

The goal of this deliverable is to describe what-if scenarios of how processes will look like when DUET is implemented. It describes the user stories for different domains in each pilot region and lists the key stakeholders and relevant datasets that affect data-driven policymaking in Athens, Pilsen and Flanders.

This is the second deliverable in WP2 and builds on D2.1 Policy Value Networks. This D2.2 provides the user stories each of the pilots want to apply during the DUET project. D2.1 and D2.2 go hand in hand and lay the basis for the DUET solution to be developed throughout the project.

This deliverable D2.2 is key to understanding the user stories that the DUET solution will need to support towards the end of the project. The user stories guide the application of Digital Twin in a real-life setting solving city challenges linked to the city strategy and digital policy. This deliverable uses the user story approach to begin identifying user requirements, which will be listed in more detail in D2.3 "Final list of user requirements for the DUET solution".

To that end, this deliverable starts by outlining the methodology that was used to gather the information from each pilot, followed by an overview of the domains, epics (see also D2.1) and user stories relevant to each DUET pilot region. The relevant stakeholders and datasets are listed, together with a feasibility table, indicating where challenges in data collection lie for each of the pilots.

The epics for each region are listed in this overview:

Athens
- How do city officials and citizens perceive that traffic issues affect both the quality of everyday life and the environment in the city center and how might they take up initiatives?
- How can city officials and citizens adopt measures that tackle pollution within the city by combining environmental and traffic data and promote a green city mobility.
- How can the city suggest and implement strategies focusing on pollution reduction, urban environment protection and how can citizens contribute to these strategic plans and adopt a greener way of life.
- How will the city redesign policies referring to traffic regulations in small areas of the city taking into account their local character, existing data and citizens' participation, in order to analyse the impact of several policies through a Digital Twin and adjust urban planning.

Pilsen
- How might we better understand the evolution of traffic-related noise and air quality in the city, with the goal of improving the living environment for citizens?
- How could we get a holistic digital overview of the city public space and of various city's digital resources for urban planning purposes?
- How might we create a techie community around the digital twin, with the goal to deliver new and innovative services to citizens

Flanders
- How might we better understand the mobility streams in Flanders, in Flemish cities and neighbourhoods to get a better view of the mobility impact on citizens' lives?
- How might we measure the impact of the implementation of mobility-related measures as low emission zones, parking schemes, and road closures/redirections on how citizens move in cities?

- How might we measure, simulate and understand the impact of noise and air pollution with the goal to improve the living environment of citizens?
- How might we influence the design of public space (for example more public green, less concrete) the local climate and well-being of citizens?
- How might we guide citizens, especially vulnerable road users, in an efficient way along the most environmentally friendly and safe routes to improve people's health?
- How might we measure, simulate and understand the impact of new city developments as new building developments and (attracting) new activities on citizens' life?
- How might we foresee appropriate safety measures on those places with a higher offence or crime rate to improve citizens' safety?
- How might we measure, simulate and understand the impact of road infrastructure measures and speed-reducing measures on traffic safety?

For each of the pilot regions, an assessment is made of the feasibility and the data opportunities that may arise during the course of the project. The main points of attention pertain to the availability of certain datasets. For the pilot regions and cities, it is difficult to assess whether or not some of these will become available in time, be of sufficient quality or detail to use in the project, but the overviews presented in this document, allow for the monitoring of the situation and highlighting these challenges early on.

1. Introduction

The goal of this deliverable is to describe what-if scenarios of the situation of how processes will look like when DUET is implemented. It describes the user stories for different domains in each pilot region and lists the key stakeholders and relevant datasets that affect data-driven policy making in Athens, Pilsen and Flanders.

This is the second deliverable in WP2 and builds on D2.1 Policy Value Networks. This D2.2 provides the user stories each of the pilots want to support using DUET. D2.1 and D2.2 go hand in hand and lay the basis for the DUET solution to be developed throughout the project.

This deliverable D2.2 is key to understanding the user stories that the DUET solution will need to support towards the end of the project. The user stories guide the application of Digital Twin in a real-life setting solving city challenges linked to the city strategy and digital policy. This deliverable uses the user story approach to begin identifying user requirements, which will be listed in more detail in D2.3 "Final list of user requirements for the DUET solution".

To that end, this deliverable starts by outlining the methodology that was used to gather the information from each pilot, followed by an overview of the domains, epics and user stories relevant to each DUET pilot region. The relevant stakeholders and datasets are listed, together with a feasibility table, indicating where challenges lie for the pilot.

2. Methodology

This section gives a brief overview of the methodology that was used to gather the required input from the different DUET pilot regions. A template was used to structure the input and several intake meetings (see below) took place to further detail and align the material provided in the template.

2.1. Template design

This chapter provides the template that was used to gather information from each DUET pilot region. Given the close link between D2.1 (M4) and this D2.2 (M5), one template was used to gather input towards both. In what follows, the template and its instructions are provided.

*To get to a better understanding of the current state of the art and policy goals in each pilot region, T2.1 will gather input from the partners by completing the following statements. While the statements may appear brief, they need to be **documented in a thorough way**.*

- **Domain**: *the specific domain the epic relates to.*
- **Epic**: *"How might we…"*
- **User story**: *"As a… , I want to… , with the goal of…"*
- **Stakeholders**: *"We need… to join because…"*
- **Data**: *Use [this template](#) to build the overview.* (See example in Annex)
- **Data opportunities**: *"…might be relevant because…"*
- **Feasibility**: *"This is (not) possible today because…"*

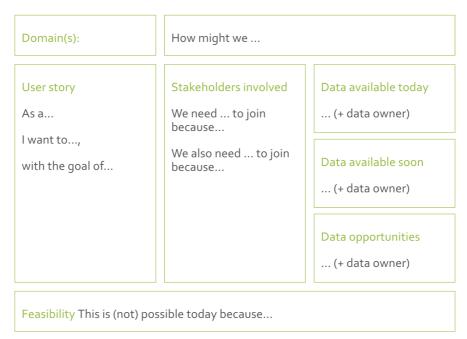| Domain(s):	How might we ...	
User story As a... I want to..., with the goal of...	**Stakeholders involved** We need ... to join because... We also need ... to join because...	**Data available today** ... (+ data owner)
		Data available soon ... (+ data owner)
		Data opportunities ... (+ data owner)
Feasibility This is (not) possible today because...		

Figure 1 Overview of the D2.1 and D2.2 template

This approach allows the input to be gathered in a structured way. Pilot regions are requested to fill out the template as a basis for an interview during which more details will be gathered or unclarities tackled. Fictional examples are given as inspiration.

Domain

Choose one or more of the DUET domains this specific epic (set of user stories) pertains to. Multiple options are of course possible and please add more details if relevant. The general domains are:
- Mobility
- Environment
- Health

Epic

The epic in this case is a statement that captures the overall goal of a pilot activity. The statement starts with "How might we…" and outlines the main goals of the pilot activity. The different pilot regions will each formulate their own epics.

Example: How might we better understand the evolution of air pollution in our city, with the goal of improving the living environment of citizens?

User Stories

The basis definition of a user story is "an informal, natural language description of one or more features of a software system." User stories are written from the perspective of an end user of a system. We formulate these user stories according to a similar basic structure, starting from the perspective of that end user: the sentence "As a... , I want to… , with the goal of…". An epic can consist of multiple user stories, depending on the perspective taken. While user stories are short, it is important to formulate them in a correct manner, ensuring that the goals mentioned are really aligned with the perspective of the user. User stories could be discussed with actual stakeholders in order to ensure this.

Example: As a public servant of the mobility department of my city, I want to visualize the most congested areas in the city over the past 5 years, with the goal of planning efficient detours needed for upcoming works.

Stakeholders

List the concrete stakeholders that need to be involved and their level of commitment, **as concretely as possible**: list names of organisations, their type, competences, relevance to the pilot, contact details if known and so one. Different user stories will require different stakeholders, so specify to which user story they are linked.

Data

To build a structured overview of available (or soon to be available datasets), please use [this template](#).

Data opportunities

In this section, datasets that are not yet available but potentially of interest are listed. This could be the case for projects that have been announced or just started, and will start generating data during the course of DUET. Projects and initiatives that we are aware of, but have not yet reached out to regarding the availability of their data could also be listed here.

Example: data from the Belgian [Telraam](#) project in which passing vehicles, cyclists and pedestrians are counted using infrared sensors in a crowdsourced way could be highly relevant to DUET, but are not available as open data today.

Feasibility

This final section relates to the feasibility of the epic and which bottlenecks or challenges may exist. These factors could pertain to a lot of different things such as lack of interest from policy makers, no or limited data available, political motivations, technical challenges, lack of standardisation and so on.

Example: no (near) real-time data on air quality levels is available in a specific area of a city.

2.2. Intake meetings

Based on first input provided by the partners, several intake meetings took place with the key partners from every pilot region. Rather than providing a full report, this document gives a brief overview of the meetings that took place and their primary conclusions. The full minutes of the meetings are available to the consortium partners via the internal document sharing platform.

2.2.1. Athens

A first intake meeting with the Athens partners took place during the kick-off meeting in Antwerp on 10 December 2019. During this meeting, the first potential cases for the Athens region were explored, using a first inventory of Flemish datasets as inspiration. This led to the conclusion the Athens partners would first focus on finding available datasets, to then evaluate which cases would be most feasible in the context of DUET. After a first inventory of the available data, it was decided to also consider use cases for which data is not currently available and to more explicitly consider their feasibility throughout the project.

A second, virtual meeting was held on 13 March 2020 to further discuss the input, specifically related to the available datasets from Athens. This meeting kick-started the gathering of the relevant datasets from Athens and led to the further refinement of the user stories.

2.2.2. Pilsen

A physical meeting was held on 17 February 2020 with the partners from the Pilsen pilot and a number of officials (director-level) from the city administration across municipal departments (urban planners, innovation, IT, GIS). During this meeting, each epic and the diverse user stories already developed by the Pilsen partners were discussed in detail and further refined. The input from the meeting fed back into the user stories and led to identification of additional stakeholders and potentially relevant datasets. This input was processed by the WP2 lead in close collaboration with the Pilsen project partners.

2.2.3. Flanders

On 10 February 2020, a physical meeting was held with administration representatives of 5 of the 13 Flemish major cities (all of which were invited), organised by the Flemish pilot lead, AIV and imec. The cities of Leuven, Antwerp, Roeselare, Kortrijk and Ghent were present. During the meeting, the DUET project was explained to the city representatives, as well as a previous research trajectory led by imec, gathering use cases for digital twin solutions with various administrations of the Flemish Government. Next, the cities presented potential use cases and user stories relevant to challenges they face, as well as interesting related projects. These will be included in D2.2.

On 9 March 2020 a full-day event was organised by AIV and DUET was also presented to the organisation's wider community. During a specific session on digital twins, the concept of digital twins and DUET were presented. The initiative resulted in a discussion about the added value of Digital City Twins in Flanders and a better awareness of use cases with a mutual interest down the road.

On the 20th of March, a joint DUET and BuDI[1] advisory group was organised in Flanders with representatives of the major Flemish cities and the Flemish public administration departments. DUET and the BuDi initiative share the same goals and will use the same technology stack. The advisory board was the first of its kind and will be repeated 3 to 4 times a year. The first online workshop started with a presentation of the BuDi initiative and the DUET project followed by an interactive ideation workshop using the MIRO drawing board (a collaborative white board for digital meetings). During the workshop, different Digital City themes were covered regarding air quality, people flows, sound/noise and water. As a result of the workshop, five key takeaways were formulated:

1. Air quality, people flows & water emerged from the workshop as the most impactful domains;
2. The participants see an Urban Digital Twin that can be used for data monitoring, what-if simulations, but also as a tool for effect measurements;
3. The participants see the value of an Urban Digital Twin mainly in providing insight into data and cross-domain analysis of data;
4. Participants detected an opportunity for the Urban Digital Twin as a communication tool to citizens;
5. The participants see a series of challenges on the way to a workable and in practice brutal Urban Digital Twin.

The workshop leads to many interesting use cases integrated into this report. Based on the selected use cases and more in-depth analysis, a next advisory board meeting will look into more detail. Based on concrete interests and outcomes, one or more cities will be selected to realize the use cases as part of a Digital City Twin solution.

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[1] The BUild environment Digital Twin (BuDi) initiative of imec is a research program within imec on how digital twins can support evidence based decision making in the public and private environment. AIV and Imec have joined forces in order to enforce both projects by sharing lessons learned and shared initiatives like the advisory board.

3. Scenario specifications

3.1. Athens scenarios

In what follows, the scenarios for the region of Athens are described. The user stories fall under four epics related to urban mobility, healthy mobility, pollution reduction and city planning.

3.1.1. Urban transport and mobility

Epic 1

How do city officials and citizens perceive that traffic issues affect both the quality of everyday life and the environment in the city center and how might they take up initiatives.

User Stories

- As a **policy maker**, I would like to establish strategic plans to reduce traffic issues in the city by enhancing the already existing Controlled Parking System and promoting the use of public transport means. To that direction historical data of the city on mobility, parking and environmental measures will be exploited, as well as real-time datasets.
- As **a city official (e.g. Head of Department of Resilience and Sustainability)**, I would like to take initiatives and proceed with strategic activities to reduce traffic issues in the city-centre by promoting the use of public transport means instead of private vehicles, and/or other types of transportation. I would like to have access to historical data of the city on mobility, parking and environmental measures.
- As a **city employee** I will organize campaigns and events promotion through social media, printed informative material for the benefits of the use of public transport means and other types of transportation.
- As a **citizen** I would like to become familiarized with the use of public means of transport in everyday life, to use less my private vehicle, discover pedestrian areas in the city, adopt environmental consciousness and contribute to the air pollution reduction.

The goal is to take into consideration existing policies and upgrade them by exploiting the Digital Twin decision making outputs and predictive features. Namely by using "what-if" conditions the impact of potential policies will be analysed and their usefulness and effectiveness will be evaluated. Hence, DUET's Digital Twin technology will support the design of new policies for the city and provide recommendations.

3.1.2. Healthy mobility

Epic 2

How can city officials and citizens adopt measures that tackle pollution within the city by combining environmental and traffic data and promote a green city mobility.

User Stories

- As a **policy maker** I would like to adopt new strategies and policies in healthy mobility by promoting effective routing and focusing on tackling city pollution. To that direction I will leverage the existing initiatives in the city by introducing an environmental aspect to them and by exploiting real-time data on monitoring of environmental conditions within Athens
- As a **city official (e.g. Agency of Sustainable Mobility within the Department of Urban Planning),** I would analyse and suggest policies and initiatives for better mobility within the city by combining different ways of transport e.g. my private car, walking, shared bicycles or electric scouter and public transport (bus, metro, trolley) routes for the citizens. I will also take into consideration public feedback and suggestions from citizen groups promoting active participation.
- As a **city employee** I will promote initiatives and organize activities in order to highlight both the benefits of using different ways of transport in everyday life and the importance of a green mode of living and moving around the city.
- As **a citizen** I would like to follow all the initiatives and activities proposed in order to express my opinion, give my feedback for improvement and surely to adopt them in my everyday life. Hence, I will promote green mobility, I will contribute to become my city greener and to have, as a member of this city, a green consciousness.

The goal is to adopt measures that tackle pollution within the city by combining environmental and traffic data, promote a green city mobility and actively engage citizens. The Digital Twin will combine data sources in order to forecast reliable measures to be adopted by the city, and also it will test and replicate relative policies adopted by greener EU cities.

3.1.3. Pollution reduction and environment

Epic 3

How can the city suggest and implement strategies focusing on pollution reduction, urban environment protection and how can citizens contribute to these strategic plans and adopt a greener way of life.

User Stories

- As a **policy maker** I would like to enhance the strategies for pollution reduction, to promote the green spaces in the city and to transform Athens to a green, healthy and vibrant city.
- As a **city official**, I would like the city to achieve an environmental change, green spaces to be increased and promoted such as the National Garden of Athens and finally alternative ways of transport/mobility to connect the green spaces/areas.
- As a **city employee,** I will suggest green routes within the city in order to decrease the pollution level. Moreover, I will raise awareness through diverse environmental initiatives in order to incorporate new behavioural attitudes in our everyday life.
- As a **citizen** I would like to assist the city in promoting green routing within the city and to contribute to improvement of my city's environment. Finally, I would actively take part in initiatives that focus on my city, to express my opinion and to contribute to a greener Athens.

The goal is citizens to be actively engaged in the city's initiatives, to express their interest in a better and greener way of life and the citizens' voice to be an asset on policy making. In a wider scope, environmental change can be achieved only as a common goal by the whole community and individual and group interest is lately highly addressed. The Digital Twin will provide to the city a tool in order to visualize current pollution sources, green points of interest and routes and to test the environmental impact of different strategic plans.

3.1.4. City planning

Epic 4

How will the city redesign policies referring to traffic regulations in small areas of the city taking into account their local character, existing data and citizens' participation, in order to analyse the impact of several policies through a Digital Twin and adjust urban planning.

User Story

- As a **policy maker**, I would like to suggest, design and explore the potential of new policies from the Municipality of Athens regarding the traffic flow specified in different locations of the city to promote better mobility for citizens and visitors, to adopt a better administration for the city.
- As a **policy official (e.g. Head of Municipal Police),** I would like to proceed with the reduction of traffic issues in the city, by promoting and expanding the use of parking mobile application providing the service to find free parking spots. I would like to correlate available data on spots coverage, duration of coverage with the geospatial and socio-economic data of each area within Athens e.g. Parking data analysis in areas of commercial activity, in areas with business activities, in areas with leisure character, in areas with touristic activity, in green areas.
- As a **city employee (e.g. Municipal Policeman)**, I will correlate local environmental data (air-quality, emissions, PM particles, CO2, temperature, humidity etc) with data from the controlled parking system that provides the service of routing to the nearest free parking spot and the feature of pre-reserving a spot to reduce traffic flow. I will cooperate with policy officials in order to design the optimal strategy for the city in the field of urban planning.
- As a **citizen**, I am aware that a vast majority of private cars moving in the center is contributing to pollution since the difficulty in finding available parking spots is a current issue for Athens. I know that this challenge has already been addressed and the new services of pre-reserving and monitoring available spots are focused on having an environmental impact, since it will reduce the time of searching for a spot. Further on, I would like to be informed on several initiatives dedicated to this issue and take the opportunity to participate actively in policy making processes by suggesting solutions for the areas where I most frequently move (e.g. home neighbourhood, work location etc).

The goal is to correlate data analysis on parking spots coverage, duration of coverage with the geospatial and socio-economic data of each area within Athens e.g. Parking data analysis in order to design policies focusing on small areas of the city. The Digital Twin will contribute to foresee the impact of this city planning strategies to the actual city life at a neighbourhood level.

More specifically, indicative areas for analysis will be: areas of commercial activity (shops, malls etc), areas with business activities (e.g. where many offices and working spaces are located), areas with leisure character (e.g. neighbourhoods where many restaurants, bars, cafes are located), areas with touristic activity (museums, archaeological sites, art galleries etc), green areas (parks, gardens etc).

3.1.5. Athens Stakeholders

Given the strong overlap between the stakeholders involved in the Athens user stories, they are presented together in one overview in the following table.

Organisation name	Type	Relevance to DUET epic	Contact (e-mail, website)

Municipality of Athens	Public organisation	*Epic 1,2, 3, 4* elected representatives or high-level managers of the city who decide on policies: - Mayor - Deputy mayor - Director of city organisation - Director of city department	https://www.cityofathens.gr/
City of Athens - Municipal Police	Public organisation	*Epic 1, 2, 4* Police force working for the city of Athens on regulations that refer to traffic management.	d.dim.astynomias@athens.gr
City of Athens - Department of Resilience and Sustainability	Public organisation	*Epic 1, 2, 3* Agency of the city including officials and public employees focusing on the definition and execution of the Athens Resilient Strategy framed by 4 pillars, 65 actions and 53 supporting actions. The pillars refer to transforming Athens in an open, green, vibrant and proactive city.	http://www.100resilientcities.org/strategies/athens/
City of Athens - Social Solidarity Agency	Public organisation	*Epic 1, 2, 3* Agency of the city including officials and public employees focusing on the services that target diverse social groups (vulnerable population, homeless, women, migrants, seniors etc)	https://www.cityofathens.gr/ypiresies/dioikitikes-koinonikes-ypiresies/dieythynsi-koinonikis-alilegiis-ygeias
City of Athens - Urban Planning Agency	Public organisation	*Epic 1, 2, 4* Agency of the city focusing on urban planning of the city, on planning regulations and sustainable mobility	https://www.cityofathens.gr/ypiresies/texnikes-ypiresies/dieythynsi-sxedioy-poleos-kai-astikou-perivallontos
Athens Digital Lab	Private Organization	*Epic 1, 2, 3* Athens Digital Lab is a venture aiming at introducing innovation into the municipality of Athens structures and supports youth entrepreneurship.	https://www.athensdigitallab.gr/en
Bike Associations, Shared vehicles associations (Lime, Uber etc)	Private Organizations, NGOs	*Epic 1, 2, 3* Profit or nonprofit organizations focusing on proposing alternative means of transport and moving within the city.	https://www.filoi-podilatou.gr/ http://www.podilates.gr/links https://www.grcycling.com/cycling-athens/

			https://www.podilattiki.gr/ https://www.li.me/electric-scooter https://www.uber.com/global/en/cities/athens-gr/
Public Transport Means Associations (OASA, STASY, Athens Metro)	Private Organizations	*Epic 1, 2, 3* OASA is responsible for the public buses and trolleys in Athens, STASY for the urban rails, the metro and tramway	http://www.oasa.gr/?id=ind3ex&lang=en http://www.stasy.gr/index.php?id=1&no_cache=1&L=1
Citizens groups (Atenistas etc)	NGOs, unofficial initiatives	*Epic 1, 2, 3, 4* Citizens communities, groups, associations and other initiatives that focus on the improvement of Athens in several domains	https://atenistas.org/poioi/ https://www.synathina.gr/en/

Table 1 Athens stakeholders

3.1.6. Athens Data

The following table summarizes potential data sources for the aforementioned user stories and estimates their availability. For a more detailed and structured overview of available (or soon to be available datasets), see DUET's online dataset inventory.

Dataset Title + description	Comment	Availability estimate
Municipality of Athens environmental data	Antennas in the city centre measuring temperature, PMI, humidity, air pollution	
Municipality of Athens stores licence	Data from licence issuance on commercial stores provided by the City of Athens	
DAEM Controlled Parking System	Controlled Parking System for Athens: location of parking spots, duration of coverage, data of pre-reservation, economic data, spots reserved for residents, spots reserved for citizens with disabilities	
OASA – Urban Transport	Public Buses Transport data: routes, number of passengers using public transportation	
Ministry of Transportation	Traffic data, data of accidents, traffic lights data, bicycle routes	
Region of Attica	Traffic data	
Copernicus pollution measurement	Atmospheric measurements	

Air quality measurements PANACEA	Particulate concentration monitoring network by placing measurement stations in the major Greek urban centers	
Air-quality map DRAXIS	Air pollution data	
Ministry of Environment and Energy: Measurements of air pollution	YPEKA historical data on air quality (1984-2018)	
Ministry of Environment and Energy: Air Pollution Levels	YPEKA near real time Daily Report of Air Pollution Levels	
Air Visual: Air quality	Hourly update on air quality and air-pollution in Athens	
OASA – Urban Transport	Public Buses Transport data: Locations of stations of Athens urban transport and timetables	
Social Media Data	e.g. Twitter	

Table 2 Athens data

3.1.7. Athens feasibility table

This table gives an indication of the overall feasibility of the epics for Athens.

Epic	Feasibility	Score
Urban Transport and Mobility	It is not currently feasible since not all data are available yet. Datasets on environmental conditions are available in Athens but traffic data and real time data from public transport are not yet available.	
Healthy Mobility	As above, traffic and transport real-time data are not available	
Pollution Reduction and Environment	Datasets on environmental conditions are available in Athens but their applicability must be checked. The parking data are an ongoing project managed by DAEM on behalf of the city. Currently, sensors are being installed and it is expected to have data on parking in the next years.	
City Planning	The parking data are an ongoing project managed by DAEM on behalf of the city. Currently, sensors are being installed and it is expected to have data on parking in the next years. The exploitation of the controlled parking service, as soon as it will be installed and active in the city, is an ongoing issue for the Municipality. New regulations, adjustment of existing regulations and policies might be designed for Athens.	

Table 3 Athens feasibility

3.2.   Pilsen scenarios

In this section, the Pilsen epics and user stories are detailed. Given the strong divergence in stakeholders involved, these are listed per epic for the Pilsen region.

3.2.1. Health and environment

Epic 1

How might we better understand the evolution of traffic-related noise and air quality in the city, with the goal of improving the living environment for citizens?

User Stories

1. As a **policy maker**, I want to have access to historical and real-time information as well as to predictive models related to air pollution and traffic-related noise levels in the city, with the goal to drive an era of informed, intelligent policy making towards citizens. In the long term, such policies can increasingly be co-created with citizens.
2. As an **urban planner**, I want to understand trends in the historical **noise** levels (at various spatiotemporal resolutions) and **predict/model** future scenarios, with the goal to take measures to reduce noise levels (such as sound walls, rerouting traffic, green space, physical interventions, noise absorption materials).
3. As an **urban planner**, I want to understand trends in the historical **air pollution** levels (at various spatiotemporal resolutions) and **predict/model** future scenarios, with the goal to take measures to improve air quality.
4. As a **citizen**, I want to have access to historical and real-time information as well as to predicted levels regarding noise and air pollution, with the goal to avoid areas risky for my health both in daily commutes and my housing/workplace choice. Cities should provide the needed data to enable this in multiple apps (however, route planning is not a specific goal within DUET).

Stakeholders

Organisation name	Type	Relevance to DUET user story	Contact (e-mail, website)
City of Pilsen - policy makers	Public organisation	*US 1* elected representatives or high-level managers of the city who decide on policies: ● Mayor ● Deputy mayor ● Director of city organisation ● Director of city department	https://telefony.plzen.eu/struktura/
City of Pilsen - urban planning unit (ÚKRMP)	Public organisation	*US 2, 3* urban planners who work primarily with, city basic structure, i.e. buildings and public space,with purpose of spatial	https://ukr.plzen.eu/

		analysis and regulation (parameters such as area of built space, area of public space, green areas, roads and traffic areas, building height). Other requirements include land use and function analysis (Proximity, space syntax, accessibility of public services, etc.) and mobility. Environmental parameters such as air pollution and noise levels are also within the urban planning competence of ÚKRMP	
City of Pilsen - unit responsible for energetics & heating	Public organisation	*US 3* to provide data on air pollution generators	
Citizens	the people	*US 1, 4* to be informed about the health-related risks in different areas of the city. Specific target groups could be: children, elderly people. *Note: a positive PR narrative could be that these parks/parts of the city are the ones where you should be for your walks/sport activities etc.*	

Table 4 Pilsen stakeholders epic 1

3.2.2. Urban planning

Epic 2

How could we get a holistic digital overview of the city public space and of various city's digital resources for urban planning purposes?

User Stories

1. As a **city urban planning expert**, I need to work with the 3D representation of the city (which for my work is sufficient in a lower level of texture detail), with the goal to achieve a higher quality of the public space, by using tools that allow to better simulate, plan in scenarios (e.g. related to the urban planning,), and regulate the future development of the city.
2. As a **city urban planning expert**, I want to connect existing data resources of the city to the digital twin and make sure they are up-to-date, interoperable, and include all available attributes, with the goal to make my daily work more efficient thanks to **working with different data sources in a single environment**, especially by
   a. including attributes for all **buildings** and **objects** (as we do not want to build another Google maps)

      i.   having the 'object composition' (objektovou skladbu) and attributes of the 3D buildings

  b. including not only data on buildings but also other data on **public space** (and public infrastructure) such as

      i.   surfaces (plochy), bridges, walls and earth banks, public green (veřejná zeleň)

      ii.   e.g. include data layer with trees containing attributes such as tree type, height, diameter of trunk, diameter of treetop

  c. including the 'z' dimension for all objects and surfaces (e.g. streets/pavements etc.) which is an attribute currently not supported by the GIS solution of the city (Marushka), and allowing its import to ESRI ArcGIS used by the Urban Planning Unit (UKR)

  d. styling objects based on available attributes,

  e. making the digital twin data compatible[2] with ESRI GIS Environment, i.e. ArcGIS Desktop, ArcGIS Pro, ArcGIS Online, and also with AutoCAD and Google Sketchup,

  f. allowing import/export of the 3D data (i) from investors and (ii) 3D data created by UKR

  g. and to make the points above possible, by setting up data management processes in the city that will define ownership and data update responsibilities.

3. As a **policy maker,** I would like to motivate investors of major development projects to provide 3D data during the building planning and permission process, with the goals (i) to inform citizens of future evolution of the city and (ii) to achieve a higher architectural quality of the urban space.

4. As an **investor**, I'm interested to provide 3D data (as well as BIM data) of my envisaged major construction project to the city, thus allowing the city administration to assess my project in 3D, with the goal to inform citizens about my project in the official digital twin of the city (under the 'future' view).

5. As a **citizen**, I want to consult a visually appealing and realistic digital twin of the city, with the goal to be informed about considered variants of the city's future development.

Stakeholders

Organisation name	Type	Relevance to DUET user story	Contact (e-mail, website)
City of Pilsen - policy makers	Public organisation	*US 3* elected representatives or high-level managers of the city who decide on policies: - Mayor - Deputy mayor - Director of city organisation - Director of city department	https://telefony.plzen.eu/struktura/
City of Pilsen - Urban Planning Unit (UKR)	Public organisation	*US 1, 2, 4* urban planners who work with 3D model of the city within their urban planning competence	https://ukr.plzen.eu/

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2 - viewing/browsing; importing; editing; exporting data from/into 3D model

Organisation name	Type	Relevance to DUET user story	Contact (e-mail, website)
City of Pilsen - Public Property Management unit (SVS)	Public organisation	*US 1, 2* city managers who maintain public infrastructure of the city and use the related data management and visualisation tools	https://telefony.plzen.eu/struktura/detail/16?typ=1
Investors	private businesses	*US 4* investors of major development projects that could be motivated to provide the 3D data of their projects	
Citizens	the people	*US 3, 5* to be <u>informed</u> about the public space planning (e.g. also in scenarios) in existing participation and information rounds	

Table 5 Pilsen stakeholders epic 2

3.2.3. Public engagement and co-creation through open data

Epic 3

How might we create a dedicated tech community around the digital twin, with the goal to deliver new and innovative services to citizens.

User Stories

1. As a **policy maker**, I want to make the 3D data of the city available as open data (see data section for already opened data), with the goal of engaging the techie community and students to enrich the data and develop new services with the data. The city balances the relevance of opening the data with policy objectives, the price, the relevant level of granularity and so on.
2. As a **city 3D expert**, I want to create high-res 3D models of selected public buildings or areas (e.g. the cathedral or football stadium) with the goal to stimulate the further use of the 3D data (both commercial and non-commercial) by the data enthusiasts, students and professionals.
3. As a **3D data enthusiast**, I want to be able to access the 3D data of the city (open data, web service, API), with the goal to import it into other applications, play with the data, enrich it, create own 3D visualizations of selected areas/buildings and share my work with the community.
    -   Nice to have: interoperability/import back to the city 3D model, in which case agreements need to be made on how detailed or heavy the imported models can be, so they do not impede the user experience.
4. As an **entrepreneur**, I want to use the city's 3D data for my business (and I could even be ready to pay for using it under the right conditions), with the goal to deliver better services to my customers.

Stakeholders

Organisation name	Type	Relevance to DUET user story	Contact (e-mail, website)

City of Pilsen - policy makers	Public organisation	*US 1* elected representatives or high-level managers of the city who decide on policies: • Mayor • Deputy mayor • Director of city organisation • Director of city department	https://telefony.plzen.eu/struktura/
City of Pilsen - 3D Experts (GIS unit)	Public organisation	*US 2* 3D expert creating 3D models of selected public building in high resolution	Zdeněk Malík malikz@plzen.eu
Techies, 3D data enthusiasts, students	Public or private, community	*US 1, 2, 3* e.g. Techmania, ZČU university students - community of 3D enthusiasts	
Technical education financed or supported by the city (technical elementary schools, tech high schools, Centrum Robotiky etc.) + city organised/supported hackathons	public	*US 1, 2, 3* Schools or Centrum Robotiky together with the City could create courses on working with 3D data Use of augmented reality technology	https://smartcity.plzen.eu/projekty/lide/
nVias	non-profit	*US 1, 2, 3* technical education of children, free-time activities, tech competitions for kids	https://www.nvias.org/
Experts and entrepreneurs	private and public sector	*US 1, 4* experts and businesses using 3D to provide their services	
BIM Experts	private sector	*US 3, 4* Unicorn - extended reality glasses, BIM focused. May be willing to have a showcase in Pilsen (fed by 3D buildings from the City?)	
Citizens	the people	*US 1, 4* people will be the final beneficiaries of better private and public services created on top of 3D data	

Table 6 Pilsen stakeholders epic 3

3.2.4. Pilsen data

The table below provides a basic overview of the available data, datasets that are not yet available but potentially of interest, as well as data opportunities.

For a more detailed and structured overview of available (or soon to be available datasets), see DUET's online dataset inventory.

Dataset Title + description	Comment	Availability estimate
Health and environment data		
Air quality sensor data	6 air quality sensors installed in the city, data owned by the city	available
Air Quality report	Aggregated air quality measurements for 2000-2014 available in a report, data from the Czech Hydrometeorological Institute	available
Traffic detectors	Data from 1000 magnetic loop detectors available through API and visualised in an analytical Map of Traffic (created in PoliVisu), owned by the city	available
Traffic model	Traffic model data + traffic modeller backend and web application for real-time traffic modelling, owned by the city	available
Strategic Plan of Pilsen - Environment	Environmental conception as a part of the Strategic plan of Pilsen	available
Noise map (model) 2017	Noise model data owned by a 3rd party (Ministry of Health). It needs to be investigated whether it can be used in the project.	license to investigate
Noise Action plan for main transit roads in Pilsen	Noise Action plan for main transit roads in Pilsen, created by the Ministry of Transport	available
3D noise data	3D noise visualization in Pilsen, a result of a diploma thesis at UWB	available
Heating source of buildings	Heating type/source for all buildings in Pilsen	available
Pollution generators	Factories, waste incinerator, heat plant etc. (owned by Czech Hydrometeorological Institute, access to the data needs to be negotiated- Tomáš Fory, Marek Hladík)	to negotiate
Energy policy	Information on heating energy sources, data owned by the city	available
Sustainability plan for Pilsen mobility	Long term investment strategy for urban mobility, with more than 80 measures	available
Real-time position of public transport vehicles	Availability not clear at the moment, needs to be discussed with the Pilsen Public Transport Company (PMDP)	to negotiate
Public transport routes	Vector data layer with public transport routes mapped to the street network of the city	available
Amounts of public transport passengers	Availability not clear at the moment, needs to be discussed with the Pilsen Public Transport Company	to negotiate

Public transport stops	Point data layer with public transport stops	available
Crowdsourcing data on air quality/noise	Mobile apps, citizen science sensors at home etc. Pilsen has a need for best practices in this kind of crowdsourced data collection (see e.g. Telraam in Belgium for crowdsourced data on traffic intensity). The city has its own LoRa network for IoT devices and will also be covered by 5G as one of the first cities in CZ, estimated in 2021.	potentially interesting opportunity
Urban planning **data**		
Digital technical map	Technical infrastructure, pipes, energy and water networks etc., managed by the Pilsen Region, available to the city	available
Cadastre (national register)	Ownership of land and buildings, managed by the Czech Cadastre	available
RUIAN (national register)	Information on buildings - no. of floors, heating, energy sources etc., managed by the Czech Cadastre	available
Pilsen GIS data	All GIS datasets managed by the city	available
Pilsen Urban Plan (land use)	Land use regulation for the whole city, created and owned by the city	available
3D model of the buildings	The new 3D data of the city shall be available late 2020 or in the first half of 2021. The public procurement is currently being prepared by the city	expected 2021
Digital surface model	The new 3D data of the city shall be available late 2020 or in the first half of 2021. The public procurement is currently being prepared by the city	expected 2021
Digital terrain model	The new 3D data of the city shall be available late 2020 or in the first half of 2021. The public procurement is currently being prepared by the city	expected 2021
3D City centre and ZOO	3D datasets of the City centre and ZOO	available
BIM data	Shall become available in the coming years under the current legislation	expected, timing unclear
Public engagement & co-creation **data**		
3D data of the city	See above, shall be available late 2020 or 2021	expected 2021
Pilsen Open data	All open data of the city available on the open data portal	available

Table 7 Pilsen data

3.2.5. Pilsen feasibility table

This table gives an indication of the overall feasibility of the epics for Pilsen.

Epic	Feasibility	Score
Health and environment epics:		
How might we better understand the evolution of traffic-related noise and air quality in the city, with the goal of improving the living environment for citizens?		
a) Visualisation of air pollution data	Feasible in the project. ● Historical data from 6 air quality stations available. ● Data needs to be analysed to assess the feasibility of the digital twin integration.	
b) Visualisation of noise data	Feasibility not clear at the moment. ● No measured (real) noise data identified for the moment. ● Only noise model data owned by a 3rd party (Ministry of Health) was identified. It needs to be investigated whether it can be used in the project. ● noise sensors installation might be considered by the city, depending on the resources availability	
c) Traffic-related noise modelling	Feasible in the project. ● 3D data of the city shall be available at the end of 2020 or 2021 ● Noise modelling plugin to TrafficModeller will be developed (task of P4All in DUET)	
d) Air pollution modelling	Probably feasible. ● 3D data of the city shall be available at the end of 2020 or 2021 ● Currently no online tools for air pollution modelling. DUET shall investigate what tool could be used (either DUET internal or 3rd party's).	
Urban planning epics:		
How could we get a holistic digital overview of the city public space and of various city's digital resources for urban planning purposes?		
a) digital twin of the city for both urban planners and citizens	Feasible in the project. ● 3D data of the city shall be available at the end of 2020 or 2021 ● Analysis necessary to assess BIM (Building Information Modeling) related obligations, how public administration	

		processes should be changed to implement BIM and how this data can be integrated in the city digital twin	
b)	existing data integrated seamlessly in the digital twin, incl. data ownership and management processes	Partly feasible. Various legacy softwares, multiple data warehouses, missing attributes, no clear ownership and responsibility for data accuracy, and issues with software tools/formats compatibility are some of the issues faced by the city GIS and urban planners that need to be tackled. They can be resolved technically, however city-internal process constraints as well as budget issues might complicate the solution.	
c)	investors providing 3D data of major development projects to the city	Feasible in the project. ● 3D data of the city shall be available at the end of 2020 or 2021 ● Investors currently not obliged to provide 3D data for the construction permit ● Initial legal analysis to assess whether it's possible under current legislation to request the 3D data for major construction projects shows that it is not feasible to do this. ● Rather, a win-win for both the city and investors is pursued. 'Soft measures' / incentives needs to be proposed to motivate investors to provide the data	
Public engagement & co-creation epics:			
How might we create a tech community around the digital twin, with the goal to deliver new and innovative services to citizens.			
a)	making the 3D data open data	Partly feasible. ● Currently a public procurement for the new 3D data of the city is being prepared. The price for the data also depends on the subsequent licence to use the data by the 3rd parties, i.e. if the city would like to make all the data open also for commercial purposes, the cost for the data could be significantly higher. ● the balance needs to be found between the cost of the data and the rights to use it by the 3rd parties afterwards. ● Some 3D data might be available as open data, some only for non-commercial purposes	

b) engaging the tech community	Feasible. ● 3D data will be made available to 3D data enthusiasts, example 3D visualisation will be developed by the city experts. ● Hackathons, technical education and a city-nurtured startup community will be the target audience.	
c) engaging businesses	Partly feasible. ● Depends on the open data availability / or the price of the data. See the point a) above.	

Table 8 Pilsen feasibility

3.3. Flanders scenarios

The user stories for the Flanders region are detailed in what follows. Like in the previous cases, these are structured per domain, for which a number of specific challenges identified by a number of large Flemish cities are included.

3.3.1. Mobility

From discussions with the centre cities of Flanders (approximately the largest cities in the region), as well as departments of the Flemish government, the following specific challenges have surfaced. These are brought together in epics and subsequently user stories.

- Visualizing city flow data - travel behaviour (data about the displacement of pedestrians, cyclists, cars and lorries) measured via all different kinds of sensors. (Antwerp, Kortrijk, Ghent, Roeselare)
- Traffic prediction (region-wide, city-wide and on neighbourhood level) - Dynamic versus static modelling (Kortrijk, Leuven)
- Effects of the implementation of a Low Emission Zone (LEZ) (Antwerp, Ghent and probably Mechelen)
- Parking guidance (visualizing parking sensors, parking policy impact monitoring) (Kortrijk)
- Impact of mobility measures

Epic 1

1. How might we better understand the mobility streams in Flanders, in Flemish cities and neighbourhoods to get a better view of the mobility impact on citizens' lives? (Mobility 1 and 2)
2. How might we measure the impact of the implementation of mobility-related measures as low emission zones, parking schemes, and road closures/redirections on how citizens move in cities? (Mobility 3, 4 and 5)

User Stories

1. As a public servant of the mobility department and spatial planning department, I want to have insights in the mobility flows and on how changes in the traffic flows influence mobility. (Mobility epic 1)
2. As a citizen, I want to have an idea about the mobility flows in my city and neighbourhood. (Mobility epic 1)

3. As a public servant of the mobility and the environment protection department, I want to know the impact of the implementation of a low emission zone on mobility and air quality. (Mobility epic 2; health and environment epic 1)
4. As a public servant of the mobility department and economic department, I want to know the impact of a new parking policy on the cities' mobility and economy. (Mobility epic 2)
5. As a public servant of the mobility department, spatial planning department and environmental department, I want to know the impact of road closures, road redirections in the city and more specifically in neighbourhoods. (Mobility epic 2)
6. As a citizen I want to know the impact of mobility-related measures in my city and neighbourhood. (Mobility epic 2)

3.3.2. Health and environment

From discussions with the centre cities of Flanders, as well as departments of the Flemish government, the following specific challenges related to health and environment were also identified. These are brought together in epics and subsequently user stories.

● Monitoring noise pollution (data about noise sensors) (Leuven, Ghent, Kortrijk)
● Monitoring air pollution (integrating data on a map), modelling air pollution based on a combination of local measurements and region-wide air pollution models
● Impact of green spaces on the local climate impact (Kortrijk, Ghent)
● How can we walk, cycle, drive with a minimum of air pollution (Flanders region)
● Water management (Roeselare)

Epic 2

1. How might we measure, simulate and understand the impact of noise and air pollution with the goal to improve the living environment of citizens? (Health and environment 1 and 2)
2. How might we influence the design of public space (for example more public green, less concrete) the local climate and well-being of citizens? (Health and environment 3)
3. How might we guide citizens, especially vulnerable road users, in an efficient way along the most environmentally friendly and safe routes to improve people's health (Health and environment 4)

User Stories

1. As a public servant of the mobility and environment protection department, I want to know the level and impact of air and noise pollution, the reasons and the impact on citizens well-being in the city. (Health and environment epic 1)
2. As a citizen, I want to know the level and impact of air and noise pollution, the reasons and the impact. (Health and environment epic 1)
3. As a public servant from the spatial planning department and environment protection department, I want to create green spaces that create a healthy climate and better well-being for citizens. (Health and environment epic 2)
4. As a citizen, I want to have qualitative and healthy public spaces in my city and neighbourhood. I also want to support co-creating those spaces. (Health and environment epic 2)
5. As a public servant from the mobility, spatial planning, safety and environment protection department, I want to provide routes that citizens and especially vulnerable road users can use to travel in a healthy and safe way. (Health and environment epic 3)
6. As a citizen, I want cyclists and pedestrians to travel through the city in a healthy and safe way. (Health and environment epic 3)

3.3.3. Spatial planning

A few challenges related to spatial planning were also brought to table. These are brought together in epics and subsequently user stories.

- Impact of new buildings in the city (spatial effects, mobility, economy etc) (Kortrijk)
- Optimizing care facilities (Flanders region)
- Matchmaking empty locations (Kortrijk)

Epic 3

1. How might we measure, simulate and understand the impact of new city developments as new building developments and (attracting) new activities on citizens' lives? (Spatial planning 1, 2 and 3)

User Stories

1. As a public servant of the planning department, mobility and environment protection department, I want to have insight into the impact of new city developments for the region, city and neighbourhood from different perspectives. (spatial impact, environmental impact, mobility impact) (Spatial Planning user story 1)
2. As a public servant from the spatial planning and economic department, I want to match the demand and supply for (public) space and organize match making to counter vacancy and impoverishment. (Spatial Planning user story 1)
3. As a citizen, I want to know the impact of new city developments, and I want to participate and co-create to mitigate the impact. (Spatial Planning user story 1)

3.3.4. Public safety

Finally, discussions on public safety led to the following ideas.

- Crime monitoring including the planning of new security measures (Kortrijk)
- Impact of road infrastructure and speed-reducing measures on traffic accidents (Flanders region)

Epic 4

1. How might we foresee appropriate safety measures on those places with a higher offence or crime rate to improve citizens' safety? (Public safety 1)
2. How might we measure, simulate and understand the impact of road infrastructure measures and speed-reducing measures on traffic safety? (Public safety 2)

User Stories

1. As a public servant from the safety department, I want to know if the safety measures in my city are in line with those places with the highest chance for certain offences/crimes (Public safety epic 1).
2. As a policeman, I will be able to improve safety in the city on an efficient basis with respect to the law and with respect for the people's privacy. (Public safety epic 1)
3. As a public servant of the mobility and public works department, I want to know how we can improve traffic safety in the most efficient way. (Public safety epic 2)
4. As a citizen, I want to know what are the safest routes especially for vulnerable road users and what measures are planned to improve safety. (Public safety epic 2)
5. As a policeman, I will have better insights into roads and crossings with potential safety issues caused by inappropriate driving behavior to prevent infringements. (Public safety epic 2)

3.3.5. Flanders stakeholders

MR = Mobility Related; HE = Health and Environment; SP = Spatial Planning; PS = Public Safety

Organisation name	Type	Relevance to DUET user stories	Contact (e-mail, website)
Information Flanders	Public organisation	Owner of the PoliVisu pilot, driving force after the realisation of the Flanders Digital Twin in cooperation with IMEC.	
IMEC	Public organisation	Co-owner of the PoliVisu pilot, driving force as a research institute and a digital innovation hub behind the Digital City Twin concept in Flanders.	imec.be
Flemish 13 major cities	Public organisation	Main customer of the Polivisu Digital Twin concept. These cities are: Aalst, Antwerpen, Brugge, Genk,Gent, Hasselt, Kortrijk, Leuven, Mechelen, Oostende, Roeselare, Sint-Niklaas and Turnhout	-
VMM - Flemish environmental agency	Public organisation	Flanders Environment Agency (abbreviated VMM) is an agency of the Flemish government working towards a better environment in Flanders. Water, air and the environment. These are the three domains in which VMM is active.	info@vmm.be
MOW/AWV - Flemish public works agency	Public organisation	The mobility and public works department aims at policy making, both for mobility and road safety and for investment, management and operation of the transport and port infrastructure.	https://mow-contact.be/ http://mow.vlaanderen.be
OMG - Flemish land-use agency	Public organisation	"Omgeving - Environment" aims at the realisation of a qualitative environment and integrated spatial policy in close cooperation with local communities and provinces.	omgeving@vlaanderen.be
VITO - Flemish institute for technology research	Public organisation	VITO's aim is a society where sustainability is the norm. They are working on global projects to promote the transition to sustainability. They create innovative technological solutions and actively share knowledge with businesses and government bodies.	https://vito.be/en/contact

Table 9 Flanders stakeholders

3.3.6. Flanders data opportunities

The full overview of datasets can be found in the online living inventory. The datasets below are not yet available, but represent significant opportunities for DUET:

Dataset Title + description	Comment	Availability estimate
Mobility data + safety		

Anonymized/pseudonymized ANPR data - Federal police platform	Not specified yet - Belgian Federal police law didn't allow access from the central police platform.	
Anonymized/pseudonymized ANPR data - Local sources (non police)	Allowed, if conform GDPR - Extensive dataset (resource intensive)	
Road accident data	Today, there is an agreement with the Federal police (DRI) to use the data for the PoliVisu project. An extension of the contract for Duet is the easiest way to still get access to the data. Contact with the Federale police is there.	
Mobility data		
Kortrijk - Parking data (on street and public parking spaces)	Agreement with the City of Kortrijk needed. Interest and contacts are there.	
Safety data		
Geospatial referenced register of installed cameras on public domain	Not sure if there will be a willingness to open the data. Probably an agreement with a local police zone/city is possible. A Flanders wide dataset is considered as difficult	
Crime and infringements geospatial register	Not sure if there will be a willingness to open the data. Probably an agreement with a local police zone/city is possible. A Flanders wide dataset is considered as difficult. Question is, if opening this data (anonymized) will be in line with the Federal Police law.	

Table 10 Flanders data

3.3.7. Flanders feasibility table

This table gives an indication of the overall feasibility of the epics for Flanders.

Epic	Feasibility	Score
Mobility related epics:		
How might we better understand the mobility streams in Flanders, in Flemish cities and neighbourhoods to get a better view of the mobility impact on citizens' lives? (Mobility UC 1 and 2)	Feasible, but some important datasets are private and expensive (Floating car data) or difficult to get access to (ANPR).	
How might we measure the impact of the implementation of mobility-related measures as low emission zones, parking schemes, and road closures/redirections on how citizens move in cities? (Mobility UC 3, 4 and 5)	Datasets are available to realize a proof of concept in some of the Flemish cities.	
Health and environment epics:		
How might we measure, simulate and understand the impact of noise and air pollution with the goal to improve the living environment of citizens? (Health and environment UC 1 and 2)	A lot of air pollution data is available and also high quality models can be used. Noise is easy and cheap to measure and a POC is possible without big investments.	

How might we influence the design of public space (for example more public green, less concrete) the local climate and well-being of citizens? (Health and environment UC 3)	A 3D detailed model of the city and an easy to use tool is needed to let citizens co-create. Only the city of Ghent has the tools to realize this use case at this moment.	
How might we guide citizens, especially vulnerable road users, in an efficient way along the most environmentally friendly and safe routes to improve people's health (Health and environment UC 4)	With GIPOD, The Flanders planned road works service,, we have a data source about the planned road works. Other more accurate information is needed from citizens (via intermediate apps like waze). Healthy routes can be derived from models based on traffic history and the environment along the road (GRB, Ortho photo etc) and air quality models.	
Spatial planning epics:		
How might we measure, simulate and understand the impact of new city developments as new building developments and (attracting) new activities on citizens' lives? (Spatial planning UC 1, 2 and 3)	A LOD 2 or LOD 3 model is needed to have a detailed view on the impact of new models in terms of spatial impact on the direct neighbourhood. Data about activities is available about empty buildings and sites. The cross-road bank of companies contains information about the activity of companies according to NACE.	
Public safety epics:		
How might we foresee appropriate safety measures on those places with a higher offence or crime rate to improve citizens' safety? (Public safety UC 1)	Access to anonymized crime data is privacy sensitive and falls probably under the Federal Police law data regulation. Also the register of installed cameras and other means, can cause privacy of access problems.	
How might we measure, simulate and understand the impact of road infrastructure measures and speed-reducing measures on traffic safety? (Public safety UC 2)	The GRB allows us to have a detailed view on the road infrastructure. For the PoliVisu project, we have access to the Flemish accident data. The traffic road sign database gives us information about the applied speed regimes, even if the quality is disputable).	

Table 11 Flanders feasibility

4. Conclusion and next steps

The goal of this deliverable was to describe what-if scenarios of how processes will look like when DUET is implemented. It describes the user stories for different domains in each pilot region and lists the key stakeholders and relevant datasets that affect data-driven policymaking in Athens, Pilsen and Flanders.

This deliverable D2.2 is key to understanding the user stories that the DUET solution will need to apply towards the end of the project. This deliverable helps the pilot regions to internally discuss potential use cases of a digital twin and at the same time serves as input towards the technical team to prepare relevant cases, discuss and develop the appropriate technical solutions to meet these cases and indicate to which extent this is possible or not.

To that end, this deliverable gives an overview of the domains, epics and user stories relevant to each DUET pilot region. The relevant stakeholders and datasets are listed, together with a feasibility table, indicating where challenges lie for the pilot. The next step is to begin identifying user requirements, which will be listed in more detail in D2.3 "Final list of user requirements for the DUET solution". To make this transition, the user stories will need to be further detailed and a selection will need to be made of user stories to pursue in the first instance. The actual selection will be done in D2.3, based on a number of criteria and discussion among and in the pilot sites. Initial criteria that will be considered are:

- The level of feasibility, with a sufficient level of ambition (e.g. the stories labelled green & orange)
- Availability of the required data, or clear time horizon for availability of certain sets
- Potential legal hurdles
- Support from local policy makers / decision makers (high-level officials)
- Technical complexity and feasibility
- Alignment with the project ambitions (assess the similarities and differences between the cases)

Towards D2.3 a template will be created that the pilot sites can use to both select the most suitable user stories and distil user requirements from them.

A main point of attention pertains to the availability of certain datasets. In many cases, governments do not own the data pertaining to significant aspects of the public domain. It is difficult to assess whether or not some of these will become available in time, be of sufficient quality or detail to use in the project, but the overviews presented in this document, allow for the monitoring of the situation and highlighting these challenges early on. Collaboration in complex multi-stakeholder settings remains key in this regard, but is highly challenging. This will be one of the critical success factors of the user stories presented here and the DUET consortium strives to achieve these to the highest degree possible.