Policy Cloud

Cloud for Data-Driven Policy Management

CLOUD FOR DATA-DRIVEN POLICY MANAGEMENT

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D6.4 USE CASES IMPLEMENTATION & EXPERIMENTATION

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Abstract: This document contains details of the first set of End to End scenarios, with focus on users' requirements, that will be used in the implantation and experimentation process for PolicyCLOUD platform.

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Abbreviations and Acronyms

Abbreviation/Acronym	Definition
EC	European Commission
PDT	Policy Development Toolkit
PME	Policy Modelling Editor
KPI	Key Performance Indicator
E2E	End to End

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Executive Summary

The purpose of this deliverable is to describe the end to end (E2E) scenarios that will explore how users will effectively use the PolicyCLOUD platform. The given scenarios will describe the different steps required in order to perform the modelling of the policy. The scenarios will also include details of the necessary configurations and settings needed to determine the output of the visualization module.

This document is the first of a series of deliverables that will detail the implementation and experimentation process. The E2E scenarios will be used to experiment the adaptability of the Policy Development Toolkit (PDT) in conjunction with several use case-based scenarios. This document will include a single scenario from each respective pilot and further details on alternative scenarios will be included in the upcoming D6.10 Use Case Scenarios Definition & Design M16 in deliverable in April 2021.

The experimentation process for software usually consists of four phases: definition, planning, operation and interpretation. This approach was adopted for the design of the E2E scenarios. Taking the four phases into consideration the E2E scenarios descriptions can be used to achieve the definition and planning stages. The E2E helps explore how well the PDT can be adapted for various situations.

At the current stage of the project there needs to be a clear definition of the end users experience and expected results. In order to achieve this, the visualizations and analytical tools will help create the full E2E scenario. The contents within deliverable D2.2 Conceptual Model & Reference Architecture and D2.4 State of the Art & Requirements Analysis was used to specify the available analytical tools that were available for the user stories. This approach was necessary to avoid the E2E scenarios becoming unattainable in terms of implementation to the PDT. There was also input provided from D6.3 Use Case Scenarios Definition & Design as well in relation to the use case scenarios.

The final result of these series of deliverables will be the implementation and experimentation of the use cases based on the E2E scenarios detailed within this report.

1 Introduction

1.1 Purpose and Scope

Initially intended to describe the implementation and experimentation of the PolicyCLOUD platform for the use cases prototypes, and given that in this first iteration the whole platform is not yet ready to be exploited and experimented by the pilots, the current version of this deliverable is focused on providing the End to End description of user scenarios.

The purpose of this document is to display an overview of the implementation and experimentation methodology used for the PolicyCLOUD platform. The deliverable provides details on the full E2E user scenarios including the structure for the upcoming scenarios, to be described in D6.10. Regarding the scope, this document will be used to identify the requirements from each use case scenario and the necessary configuration settings. The deliverable will focus on providing the end to end user scenarios, a practical description from the point of view of the policy makers, on how the platform will be effectively used. This includes, how the modelling of the policies will be performed through the Policy Model Editor (PME), what needs to be configured in the Policy Development Toolkit (PDT) (which datasets, analytical tools and KPIs shall be used), which at the end will provide the desired output in the visualization module.

1.2 Structure of the document

This document starts with an introduction. The bulk of document are the sections devoted to PolicyCLOUD pilot use cases. The contents for each pilot section consist of the following structure: overview, description of scenario, policy modelling editor and policy development toolkit. The document ends with a conclusion.

For each pilot use case, the overview and description of the scenario sub-sections describe the related use case scenario, as well as details of the initial problem or subject matter that will be addressed. The Policy modelling sub-section includes details of the necessary parameters that will be required for the analytical tool from the PDT in relation to specified use case. Finally, the policy development toolkit sub-section includes details about the KPI properties.

2 MAGGIOLI - Use Case 1

The overall goal of the Use Case 1 (UC1) is to develop a collaborative data-driven analysis for the creation, modelling and validation of policies against radicalization based on a participatory review of data coming from social media and open datasets. In addition, it will provide useful insights and valuable information to policy makers at any level (local, regional, national, and international) to update existing policies and/or create new ones. It will allow policy makes to interact with other relevant stakeholders during the creation and modelling of new policies, ranging from early detection methodologies to measures for the monitoring and management of domestic radicalization.

The main objective of this Use Case is to improve operational efficiency, transparency and decision making using PolicyCLOUD big data analytics and visualization technologies.

Maggioli Use Case consists of three scenarios: A, B and C. We are going to look into the details of Scenario A. The following sub-sections describe "A" end to end (E2E) scenario from the point of view of a policy maker.

2.1 Scenario A. Incidents heatmap

2.1.1 Overview

This scenario will use the PolicyCLOUD platform to explore the occurrence of radicalization incidents in the geographic proximity of a town/region. The purpose is to produce useful insights that will help policy makers to understand what is the impact of radicalization in the territory and evaluate whether there is a need to create new policies and/or update the existing ones.

2.1.2 Description of Scenario

The main objective of this scenario is to validate existing policies to counter radicalization and violent extremisms and to investigate if there is a need to update them or create new ones based on the information extracted from open data. Specifically, the Global Terrorism Database (GTD) will be used for this purpose.

The results will be presented to the policy maker using a heatmap that illustrates the occurrence of radicalization incidents in a given area. The policy maker will have the possibility to filter the extrapolated data based on time and location, in order to identify possible trends.

2.1.3 Policy Modelling Editor

For this scenario, the following parameters will be used:

KPIs:

- **MAG-KPI#9**: Number of identified occurrences of radicalization incidents in a given area

Analytical tools:
The available visualization tools should be intuitive and at the same time informative. It is important that policy makers are able to efficiently assess data queries outcomes and impact, and to be able to connect deviation in results with alterations in inputs

- Data Visualization
    - Type: Heatmap

Additional parameters to be specified:

- "iyear", the year when the incident occurred. The policy maker can select a unique value (type:EQUAL): 2017, or a set of values (type:GREATER_OR_EQUAL): 2017 [2017, 2018, 2019, 2020]
- "region", the geographic area where the incident occurred. It can have a unique value (type:EQUAL): Lombardy, or a set of values (type:IN): [Milan, Bergamo, Brescia]

Once the policy maker has reviewed and submitted the Policy Model, he/she will be redirected to the PDT in order to evaluate the submitted model.

2.1.4 Policy Development Toolkit

For scenario A of UC1, the policy maker will need to select the Policy Model defined previously and specify the relevant KPIs for its evaluation, which again will be MAG-KPI#9.

In the properties of the KPI, the policy maker needs to specify the data source which in this case is the GTD.

3 SARGA - Use Case 2

The overall goal of the Use Case 2 (UC2) is to support the wine sector of Aragón through a series of scenarios which could contribute in the definition of what is the impact of the wines and Denomination of Origins, what trends are present in the world of wine, how to direct marketing efforts and campaigns in different countries, and how to control the distribution channel so that prices are within established limits.

To achieve these objectives, it is necessary to adequately identify the sources of information, to collect the data and extract its value so PolicyCLOUD could contribute to the development of tools that bring knowledge and *intelligence* to the wine industry. This is one of the priorities of the Agri-Food Promotion and Innovation Department of the Government of Aragón, to design and implement intelligent policies for the development of agri-food industry.

SARGA Use Case consists of three scenarios: A, B and C. We are going to look into the details of Scenario A. The following sections describe "A" end to end (E2E) scenario from the point of view of a policy maker.

3.1 Scenario A. Opinion on wine

3.1.1 Overview

To understand this scenario, it is important to realize that wineries devote a lot of effort to analysing and understanding the key factors influencing consumers purchasing decision. One of these key factors is the influence of the opinion or recommendations that are made about wine brands. This fact is especially significant since the boom experienced by social networks.

3.1.2 Description of Scenario

Due to the rise of social networks, consumers who interact with brands and give their opinions on different types of wines can have a great level of influence on potential consumers.

In this context it is important to know the perception of the wines produced in Aragón, and have a tool that monitors opinions about the wines in our region could be very useful. And not only to know how Aragonese wineries are perceived and therefore be able to devise marketing campaigns to deepen or modify this perception, but also to monitor and mitigate the effects of negative opinions about the brands.

To face this scenario, it is necessary to have an information hierarchy that allows incorporating the Denomination of Origin and expanding it through the wineries, different brands and wines to be able to cover from a more sector-wide vision to a more specific one.

To collect this information, datasets fed by the various social networks, for example: Twitter, will be stored with the corresponding tweets labelling and tagging Denomination of Origins, wineries, brands, etc.

Once the process of data capture has been explained, we will proceed to explain how to use the policy modelling editor and the development toolkit in this scenario.

3.1.3 Policy Modelling Editor

In this scenario, the following parameters will be used:

KPIs:

- **KPI**: percentage of positive opinions versus negative ones in a time interval

Analytical tools:

- Data Visualization- Visualization tools should be intuitive and at the same time informative. It is important that policy makers are able to efficiently assess data queries outcomes and impact, and to be able to connect deviation in results with alterations in inputs
    - Type: Line Chart for the evolution opinion for the selected concept: Denomination of Origin, specific winery, specific brand, etc.

Additional parameters to be specified:

- "idate", period of time to be evaluated.
- "region", the geographic area of interest.

Once the policy maker has reviewed and submitted the Policy Model, he/she will be redirected to the PDT in order to evaluate the submitted model.

3.1.4 Policy Development Toolkit

For this scenario, the policy maker will need to select the Policy Model defined previously and specify the relevant KPI for its evaluation and the terms and concepts to be monitored.

In the properties of the KPI, the policy maker needs to specify the data source, Twitter. The toolkit will perform the analysis and will show the results for the specific Denomination of Origin, winery or brand and will also analyze how the opinion varies over time as it is shown in the following picture.

In the picture, the x-axis represents time in days and the y-axis represents clients/users opinions, ranging from -1 (very negative) to +1 (very positive)

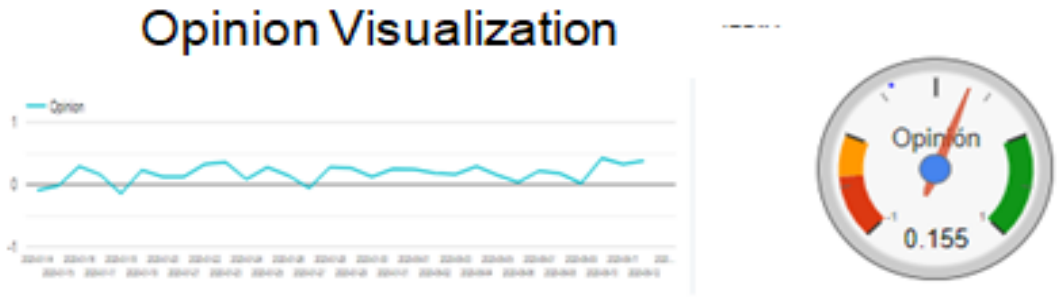

FIGURE 1 – OPINION VISUALIZATION

4 SOFIA - Use case 3

The aim of this use case is to support Sofia Municipality's policy making in important areas of citizen's everyday life. Sofia municipality is constantly working to improve the urban environment and meet the challenges that the city is facing. Evidence-based policy making is crucial for addressing urban challenges in a cost-efficient way. The PolicyCLOUD project will support Sofia municipality to address this challenge by adapting the design of its policies, considering analytics' results that combine information of sectors, related to a) transport, parking and road infrastructure; b) waste collection and waste disposal; c) cleanliness of public spaces; d) ecology, air quality; and e) violation of public order.

4.1 Scenario SC3. Road infrastructure

4.1.1 Overview

Road infrastructure, together with adjacent urban environment (such as pavement, fences etc.) is one of the most important and budget consuming elements, that affects citizens' everyday life.

4.1.2 Description of Scenario

Sofia Municipality will be able to carry out a detailed analysis of the territorial distribution of the signals by categories / types, areas, districts, major transport roads, etc. The results of the analysis will allow the municipal and district administrations to identify the problems in the road infrastructure and adjacent urban environment and to adopt or modify adequate policy making decisions, including budget planning and effective use of budget and public resources. It will also help Sofia Municipality to better control and monitor, as well as can serve as early warning to prevent issues.
The PolicyCLOUD visualization technologies will enable policy makers to identify tendencies.

4.1.3 Policy Modelling Editor

The Policy Model Editor (PME) is the core component which supports and guides the end-user to effectively create a Policy Model safely. More specifically, the PME is a Single Page Application that relays on the PDT backend REST API to fetch or store related entities of the Policy Model.
For this scenario the following parameters can be defined:
KPIs:

- # of incidents
- # of incidents per year
- # of incidents per geographical location
- # of incidents per category per location
- % per type of incident
- % per month
- % per year

- change in frequency over the years

Analytical tools:

Data Visualization: Visualization tools should be intuitive and at the same time informative. It is important that policy makers are able to efficiently assess data queries outcomes and impact, and to be able to connect deviation in results with alterations in inputs. The results will be presented to the policy maker using:

- **Type: Heatmap**, that illustrates:
  - **the occurrence of incidents or issues, leading to citizen signals in a given area,**
  - **geographical distribution,**
  - **areas with repeating incidents over given time**
- **Type: Pie Chart**, that illustrates major categories of incidents
- **Type: Line graphs**, that illustrates frequency of issues per area over time, etc.

4.1.4 Policy Development Toolkit

For the road infostructure scenario for UC3, the policy maker will need to select the Policy Model defined previously and specify the relevant KPIs for its evaluation.

In the properties of the KPI, the policy maker needs to specify the necessary tools and parameters, so the toolkit can perform the analysis and show the corresponding visualization results for the Sofia Municipality.

Analytical tools parameters:

- The analytical tool should be able produce calculations based on sum totals, including per type, per year, per district
- The analytical tool should be able to process fields with numerical values
- The analytical tool should be able to process fields with time values
- The analytical tool should be able to process field with geographical location values
- The tool should be able to adjust KPI calculations based on
  - Field: geographical location of incidents
  - Field: district
  - Field: time stamp of incidents
  - Field: Type of incident
  - Field: Incident

KPI visualization parameters

- KPI figures should include figures for different months of the calendar year
- KPI figures should include figures from different years
- KPI figures should include figures from different locations (field geographical location), visualized on a heatmap
- KPI figures should include figures from different years

- KPI figures should include figures from different types
- KPI figures should display either colour change or arrows to show percentage increase/decreases

Configurable parameters related to the selected KPIs

- Dependant on choice - users should see either an Annual percentage increase/decrease in #
- Combined analysis including cross analysis of several criteria should be possible – e.g. per type and district and year
- Increase / decrease per type/ year/ district/ month
- Geographical spread per district/ per geo location
- share of incidents per type / per month / per year

5 LONDON - Use Case 4

The aim of this use case is to support Camden's policy making in the matter of tackling unemployment. Camden has dedicated strategic plan to tackle issues such as anti-social behavior and crime. Evidence-based policy making is necessary for reducing the level of negative affects cause by high unemployment rates. The PolicyCLOUD project will support the London borough of Camden in addressing the series of negative issues caused by unemployment.

5.1 Scenario A. Unemployment Analysis

5.1.1 Overview

The following E2E scenario will be based on using the PolicyCLOUD platform to explore analytics based on gender, age etc. in relation to unemployment. The purpose of this scenario is to produce useful outputs that will help policy makers create a policy based on statistics.

5.1.2 Description of Scenario

The main objective of this scenario is to enhance and revise existing policies to counter unemployment based on the outcomes produced from the PDT.

The results will be presented to the policy maker using a heatmap that will highlight parts of the borough of Camden that are most affected. The visualizations produce from the PDT will also highlight which demographics of citizens are most effected based on factors such as age and gender.

5.1.3 Policy Modelling Editor

The Policy Model Editor (PME) is the core component which supports and guides the end-user to effectively create a Policy Model safely. More specifically, the PME is a Single Page Application that relays on the PDT backend REST API for fetch or store related entities of the Policy Model.

The following list contains the KPIs required for the unemployment analysis;

KPIs:

- % of Males receiving benefits within specified month
- % of Females receiving benefits within specified month
- # of Men claiming per month
- # of Females claiming per month
- % Annual & percentage of males claiming benefits
- % Monthly percentage of females claiming benefits
- % Annual percentage increase/decrease of males claiming benefits
- % Annual percentage increase/decrease of females claiming benefits

Analytical tools:

The necessary visualizations for the unemployment analysis scenario:

- Pie Chart – Displaying the overall share of a gender based on the claimant count in each specified period.
- Line graphs – The line graphs should highlight trends/correlations based on the selected parameters. The graph can be used to highlight external factors that might be affecting a specific gender.
- Heat map – The claimant can be displayed on a map using their location coordinates field in the dataset. This heat map can help with showing places with the highest rates of unemployment.

5.1.4 Policy Development Toolkit

For the unemployment analysis scenario for UC4, the policy maker will need to select the Policy Model defined previously and specify the relevant KPIs for its evaluation.

In the properties of the KPI, the policy maker needs to specify the necessary tools and parameters, so the toolkit can perform the analysis and show the corresponding visualization results for the London borough of Camden.

Analytical tools parameters:

- The analytical tool should be able produce calculations based on sum totals
- The analytical tool should be able to process fields with numerical values
- The tool should be able to adjust KPI calculations based on the following fields:
    - Field: Gender
    - Field: Month
    - Field: Year
    - Field: Age

KPI visualization parameters:

- KPI figures should include figures for different months of the calendar year
- KPI figures should include figures from different years
- KPI figures should display either colour change or arrows to show percentage increase/decreases

Configurable parameters related to the selected KPIs

- Dependant on choice - users should see either an Annual percentage increase/decrease in # of claimants
- Dependant on choice - users should see either a Monthly percentage increase/decrease of claimants
    - Field: Gender – choice of Male/Female
    - Field: Month – choice of month

- Field: Year – choice of year
- Field: Age – Various ages ranges e.g. 16-25

6 Conclusion

In conclusion the selected scenarios will be used to test the PolicyCLOUD platform. The E2E scenarios will also assist the technical partners in making sure the PolicyCLOUD platform is able to adapt and meet the requirements of the scenarios provided. Successfully completing this task will help ensure the PolicyCLOUD platform is robust and can be configured to meet different scenarios produced by the end users.

The E2E scenarios also contains details on configurations based on the various analytical tools and KPI measure that are important for each scenario's use case, in order to produce the desired results. The E2E scenarios can also assist with the evaluation stage of the project because of the successful outcomes assist with demonstrating the adaptability of the PolicyCLOUD platform. The upcoming D6.10 deliverable will include several additional scenarios for the use case pilots. The new scenarios description will follow the same structure as the one expressed in this deliverable with the corresponding analytical tools and visualizations.

In the next iterations of this report, D6.12 due in December 2021 and D6.13 due in December 2022, full descriptions of the implementation and experimentation of the use cases on the PolicyCLOUD platform will be provided based on the descriptions provided in the E2E scenarios.

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