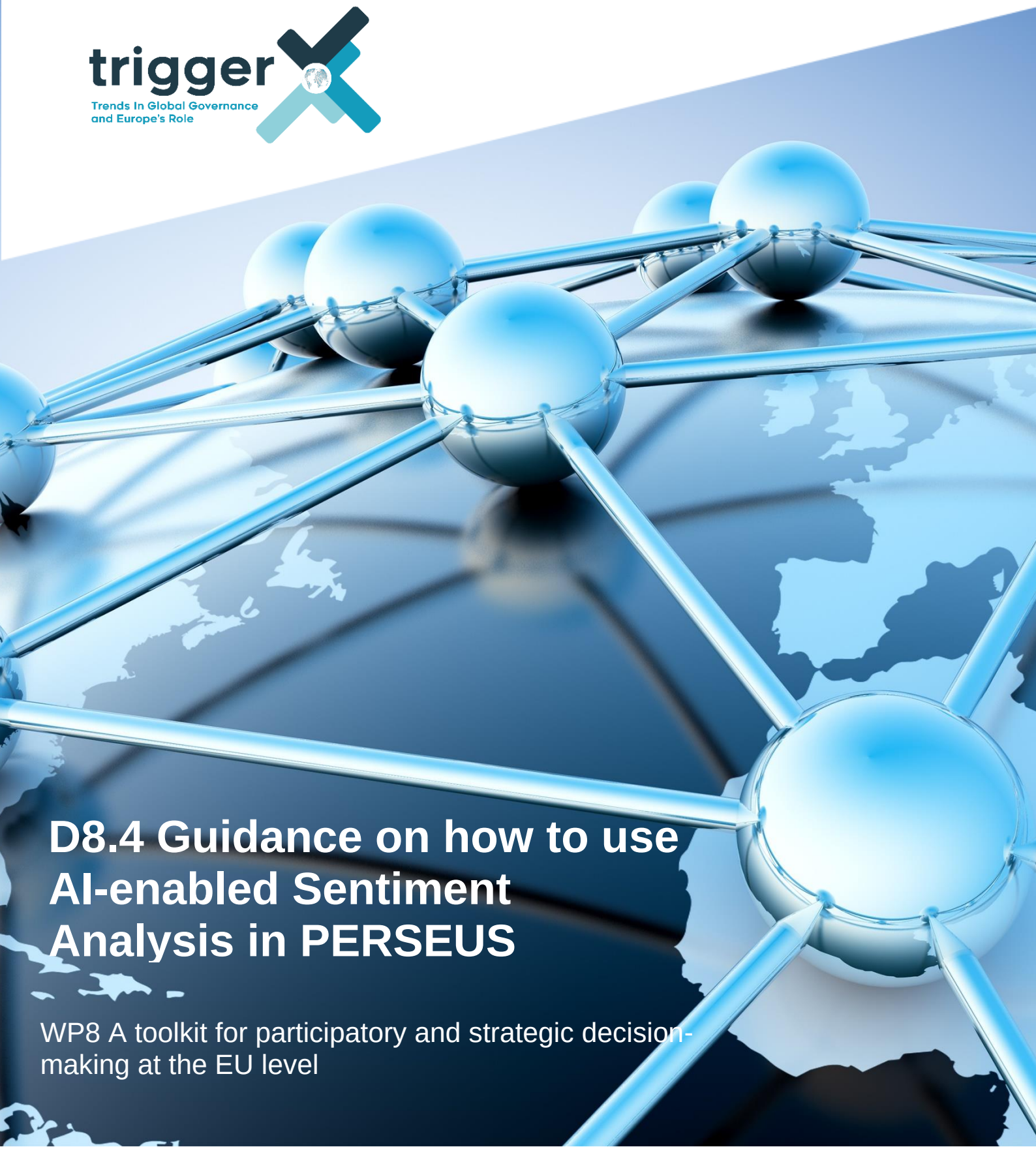
trigger
Trends In Global Governance and Europe's Role



D8.4 Guidance on how to use AI-enabled Sentiment Analysis in PERSEUS

WP8 A toolkit for participatory and strategic decision-making at the EU level

Grant Agreement n° 822735, Research and Innovation Action

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement nº 822735. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

TRIGGER

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Deliverable number: D8.4	
Deliverable name:	D8.4. Guidance on how to use AI-enabled sentiment analysis in PERSEUS
WP / WP number:	WP8 A toolkit for participatory and strategic decision-making at the EU level
Delivery due date:	30.11.2019
Actual date of submission:	4.03.2021
Dissemination level:	Public
Lead beneficiary:	POLIMI
Contributor(s):	Marco Brambilla, Lorenzo Corti, Diletta Di Marco, Mattia Gasparini, Andrea Tocchetti, Roberto Verganti.

Changes with respect to the DoA

Not applicable

Dissemination and uptake

Public

Evidence of accomplishment

Report

Summary

Index of Figures

Introduction

This document is developed as part of the TRIGGER project (Trends in Global Governance and Europe's Role), which has received funding from the European Union's Horizon 2020 Research and Innovation programme, under the Grant Agreement number 822735.

This document aims at describing guidelines on how to use AI-enabled sentiment analysis in PERSEUS. The main goal is to describe how AI-enabled sentiment analysis can be used to reach PERSEUS' goals and help users to understand how it can be applied to COCTEAU and AGGREGATOR.

AI-tools provide a set of techniques and algorithms to analyse data provided through the gateway: the main challenge is to exploit this data in the most efficient and correct way. Following the discussion reported in D8.1, users will have access to data analyses carried out on data generated on COCTEAU (besides the application itself) or extracted from the data analysis pipeline (D7.4) The tools' flexibility will help the decision-making process, and in the formulation of better research questions with citizen-driven information. As for correctness, the tool will be compliant with the Ethics Guidelines for Trustworthy Artificial Intelligence, following EU requirements in terms of privacy and data governance.

This document covers in the specific:

- the description of ethics guidelines and relative challenges for AI-tool implementation;
- a quick review of AI methods, since they have already been exhaustively explained in previous deliverables;
- a set of mockups for the UI of PERSEUS, alongside the actions that can be performed within the platform;
- the description of the integration between AI-tools and PERSEUS modules.

1. Ethics and Data

The main challenge PERSEUS will face will be how to incorporate these emerging technologies for public purposes without arising any ethical issues neither create grey zones which can be a matter of uncertainty regarding Ethical standards. For this reason, the Ethics Guidelines for Trustworthy Artificial Intelligence presented by the High-Level Expert Group on AI are taken as the main guidance of ethical standards. The guidelines put forward a set of 7 key requirements that AI systems should meet in order to be deemed trustworthy[1]. The specific assessment list provided by the High-Level Expert Group on AI, which are part of the "Ethics Guidelines for Trustworthy Artificial Intelligence of the EU", contains the following key requirements which will be applied in the development of PERSEUS and its application in the deep dives:

- **Human agency and oversight:** PERSEUS will be guided, configured and approved by human beings which will be the source of authority and management of the data provided and the only actor who will take informed decisions
- **Technical Robustness and Safety**: PERSEUS will be built to be resilient and secure, as well as being accurate, reliable and reproducible. A fall back plan will be provided in order to minimize unintentional and prevent any kind of intentional issue.
- **Privacy, Data Governance and Transparency**: besides ensuring full respect for privacy and data protection, adequate data governance mechanisms in PERSEUS will be ensured, taking into account the quality and integrity of the data, and ensuring legitimized access to data from maleficent detractors. Moreover, the data gathering process will be transparent and all the sources of information will be traced.
- **Diversity, non-discrimination and Fairness**: PERSEUS platform will detach any unfair bias as it could have multiple negative implications, from the marginalization of vulnerable groups, to the exacerbation of polarized positions. PERSEUS, even in the interface system, will be accessible to all being user-friendly, regardless of any disability, and involve relevant stakeholders throughout their entire life circle.
- **Accountability:** Mechanisms should be put in place to ensure responsibility and accountability for the outcomes, especially if connected to Official Institutions . Auditability, which enables the assessment of algorithms, data and design processes

[1] The main source of reference for this section is: "*Ethics guidelines for trustworthy AI"*, EC AI HLEG released on April, 2019 [retrieved on May 05, 2020 at the following link: https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai]

plays a key role therein, especially in critical applications. Moreover, adequate and accessible redress should be ensured.

A review of existing practices has identified three types of challenge, including:

1. Technical and practical challenges, such as the availability of quality data and lack of common standards
2. Resource and capacity constraints, typically inadequate integration, and low anticipation of the whole structure with the subsequent issues of matching
3. Institutional, legal and cultural barriers, notably regulatory gaps and insufficient political and institutional buy-in

Among these, the absence of common standards and suitable legal frameworks are the most quoted obstacles, in part due to growing concerns around fairness, transparency, data privacy and accountability/legal liability arising from the introduction of AI at policy level.

2. Quick Overview of AI methods

Artificial Intelligence methods comprise all the algorithms from machine learning domain:

- Supervised algorithms, that make predictions based on annotated samples of data;
- Unsupervised algorithms, that build models starting from unlabelled data;
- Deep learning algorithms, that, provided huge amounts of data, are able to capture relevant features, at different levels, directly from raw data

These methods can empower PERSEUS to solve sentiment analysis problems, but, additional techniques not strictly related to Artificial Intelligence, provide a fundamental role to define a complete solution. The most relevant are statistical methods and data visualization techniques.

A complete overview of AI methods and techniques has already been provided in “D7.4 - Guidance on how to use AI-enabled sentiment analysis for Deep Dives”.

3. Navigating the PERSEUS UI

In this chapter, the different navigable sections of the platform are illustrated and explained, describing how the PERSEUS platform can contribute to accessing the data, providing the policymaker with useful insights about a specific use-case or the comparison between two of them.

The main goal of PERSEUS is to be a platform through which users, citizens and policymakers alike, can freely explore the data collected in

- WPs 1 and 2 – EU and global governance
- WP6 – COCTEAU
- WP7 – Deep Dives

and analysed through the data analysis pipeline (D7.4). Through the platform it will be also possible to access each component independently. Given the experience PERSEUS is aimed to deliver, the following sections will illustrate how to navigate its web interface.

3.1. Available sections

The main page of PERSEUS is a summarization of all the contributions built during the TRIGGER project. By pressing any of the buttons displayed on the interface, the user is redirected to the corresponding web page, through which the desired tool is provided. Figure 1 illustrates a mockup for the aforementioned interface.

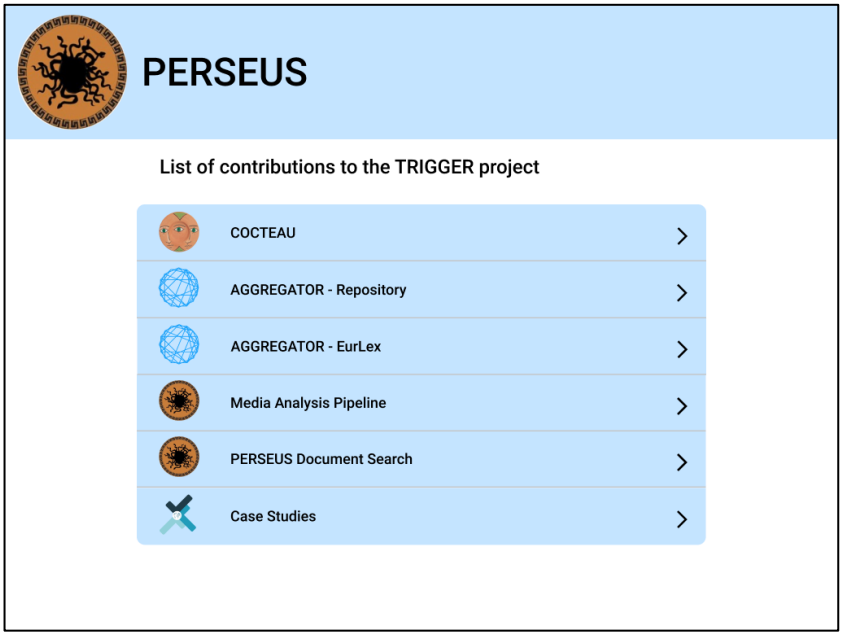

Figure 1 - Landing page for PERSEUS website mockup

Besides the mentioned sections, further ones are included. The latter are dedicated to the exploration of the outcomes coming from the data analysis pipeline, the COCTEAU application and the AGGREGATOR. Further details about these sections are provided in the following chapter.

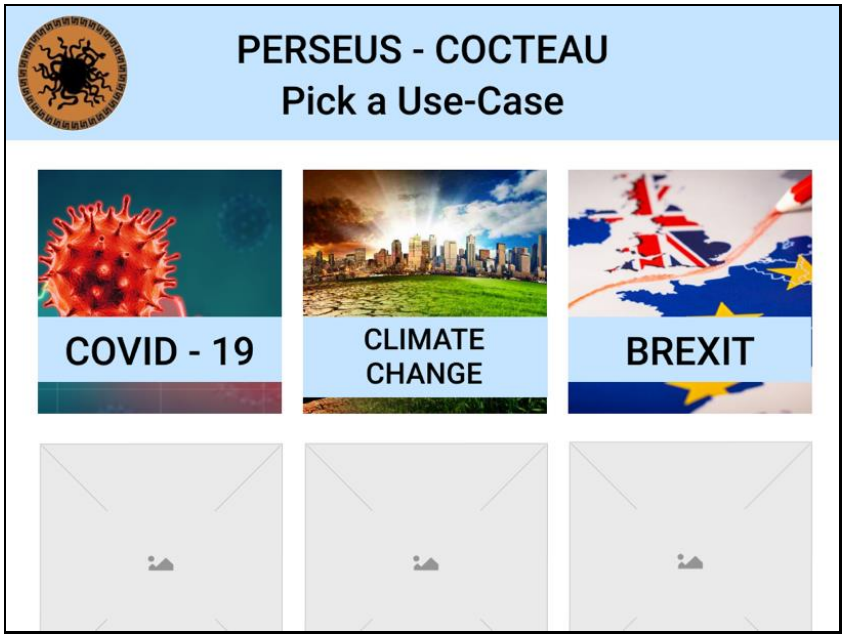

Figure 2 - Use-case selection in PERSEUS mockup

To simplify the exploration of the analyses offered via PERSEUS, some premade use-cases are offered. Two relevant ones focus on COVID-19 and Climate Change (as part of the SDGs Deep Dive).

3.2. Single Use-Cases

After selecting a particular use-case, users can explore the different visualization presented as part of a dashboard. These include more descriptive charts and graphs, like the amount of articles published on a given day, as well as more explorative ones. For example, thanks to the text embeddings produced by BERT (more on these in D7.4) it is possible to perform the clustering of news articles, which is then included in the proposed dashboard.

The results will be mainly presented as single visualization depending on the tool they come from. COCTEAU will have its own set of visualizations and the same apply for the media analysis pipeline. The integration of these two particular components is something worth exploring to achieve more meaningful and valuable data representations. Figure 3 provides a mockup for the interface representing the outcomes of the data analysis pipeline.

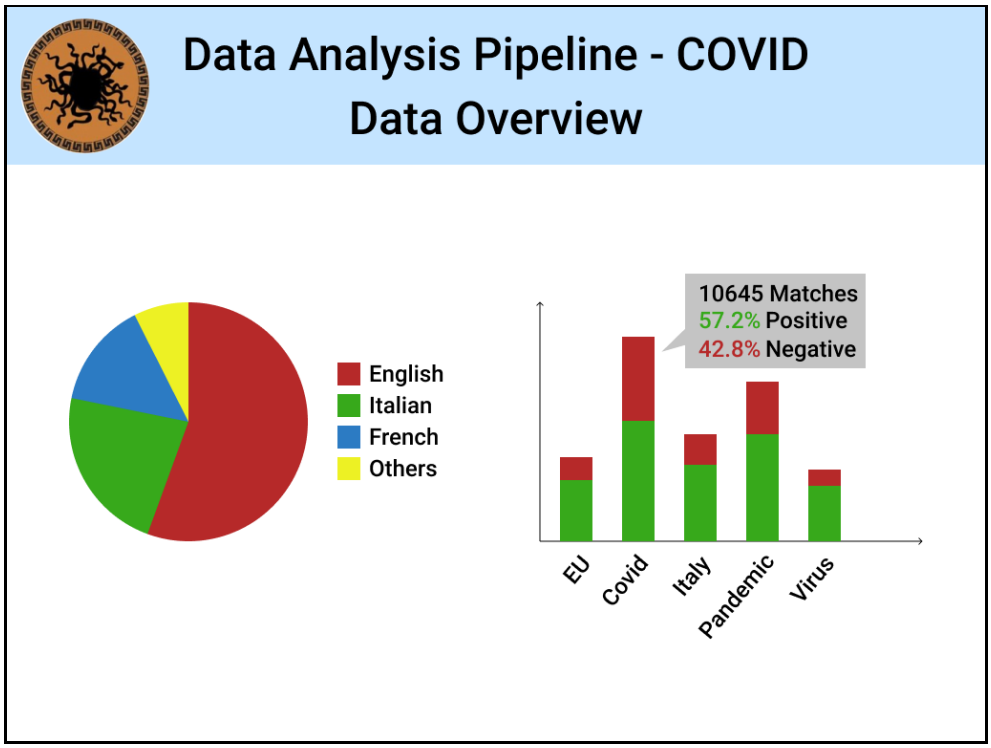

Figure 3 - Data visualization mockup

Although some of the outcomes and their representations are pretty interesting when applied to a single use-case, an even better understanding is achieved when combining multiple outcomes about a single use-case or even multiple outcomes about multiple use-cases. The former, as illustrated in Figure 4, will allow the users to grasp the complexity behind the use-case, while the latter will allow the comparison between two different topics which can be pretty interesting in the right situation. These outcomes will also be explorable, allowing the user to pick the dimensions they would like to represent, filtering the data on demand.

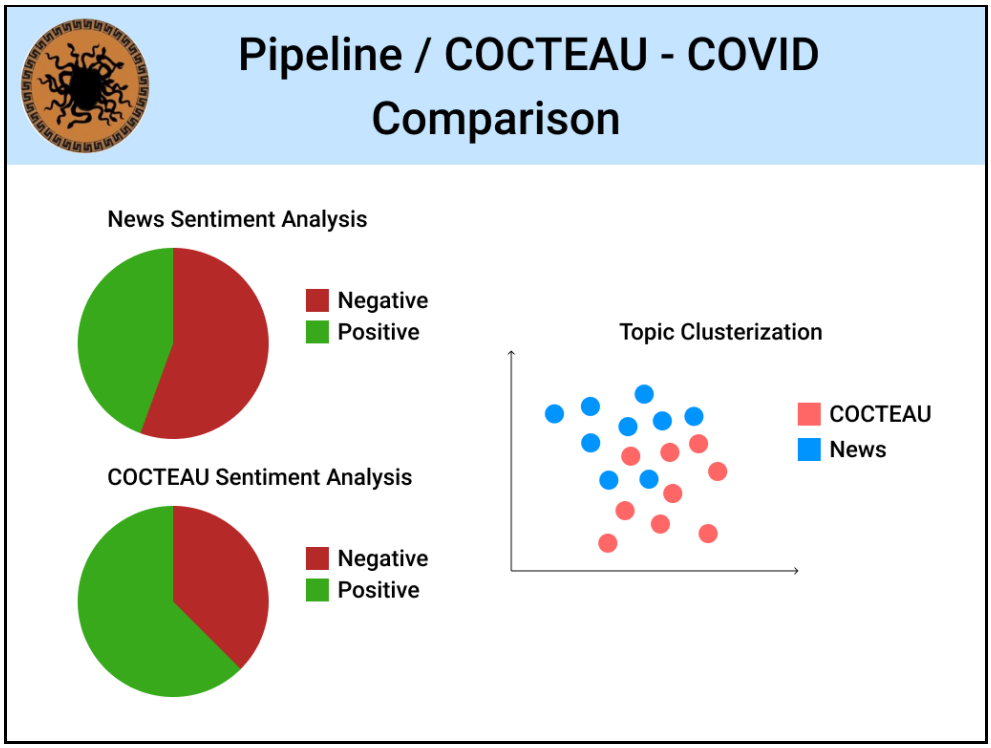

Figure 4 - Integrated visualizations mockup

4. Sentiment Analysis in PERSEUS

AI-enabled tools have the most important impact inside PERSEUS: they enable the analysis of all the data produced on the platform, providing the most valuable insights for actors, either policy makers or researchers. This section presents application scenarios and ways to integrate AI-based tools within the PERSEUS framework, considering both components of the framework, namely COCTEAU and AGGREGATOR.

4.1. Applications to COCTEAU

COCTEAU, i.e. the component devoted to citizen engagement and shared vision building, will collect and foster many interactions with and between the users: text comments and hashtags will be processed by the tool and aggregated to generate valuable information about the challenge's themes. Correspondent discussions that arise can be analysed automatically in a massive manner with the aim of detecting trends and evolutions.

Therefore, sentiment analysis will be mainly employed to understand the overall feelings of the users. It will be applied on the different content generated on the platform (e.g. comment and keywords) to achieve results displaying the polarity and the emotions shared. The latter could be compared with the outcomes of the sentiment analysis of the news and with the feelings directly

provided by the users in the dedicated section on the COCTEAU platform. As a result, policy makers will be able to understand if the overall perception about the challenge-specific problem is either positive or negative, what are correlated topics, people and bodies involved, the main keywords and comments to which the overall feeling is associated and, if present, what is citizens stance with respect to these elements. The AI module allows policy makers to crowdsource perception, stance, entities and topics in relation to any issue that impacts EU citizens, providing analysis dimensions that were never considered before in policy making.

4.2. Applications to AGGREGATOR

AGGREGATOR will be a set of datasets that enable an evaluation of the EU's actorness and influence in a variety of global governance contexts. It is generated by collecting data on various institutional levels and instruments of global governance, international regulatory cooperation and EU governance.

As mentioned in deliverables D8.1 and D8.2, most of the data currently stored in AGGREGATOR comes WP1 and WP2. Due to the objective nature of such data, sentiment analysis won't provide any useful result. Therefore, these two types of datasets have been excluded from the analyses.

Data produced on COCTEAU and by the section of the data analysis pipeline that manages the data collection step, collecting the most recent and relevant news, are currently stored separately. The heterogeneous data will be mostly text but may also include some quantitative data. All of this can be analysed by the AI tools presented in D8.3 and D7.4 to extract useful information from structured and unstructured documents.

As for the data coming from the data analysis pipeline, it already has its dedicated set of analyses already implemented in the pipeline itself. Sentiment analysis could prove to be a useful addition in order to understand the overall polarity of the news, achieving an overview of the different news sources' stance with respect to a topic.

4.3. Limitations

Even though some preliminary tests have been carried out internally, the tools described in this deliverable are still under development, we are therefore still in the process of collecting evidence as to their effectiveness in a public environment. Such tests will be fundamental both to collect analysable data and user feedback to improve the platforms. The results will eventually be presented in the deliverable D8.7 - "PERSEUS 1.0" due in the 36th month of the project.

5. Conclusions

PERSEUS has been originally designed as a general-purpose tool to inspire and co-create governance decisions through public engagement. During the latest phases, the Consortium

agreed on a new shift towards a stronger focus, in light of the EU's commitment towards the Agenda 2030.

While the re-orientation of the EU better regulation agenda towards the SDGs is a more feasible and urgent goal at European level more than a national level, there is no guidance available on the methodological steps that should be followed to ensure that new policies are assessed in terms of their impacts on the SDGs.

The long-term vision is for PERSEUS to become the first tool of its kind, in supporting the European Commission in assessing impacts on SDGs as well as trade-offs between SDGs and co-creating solutions with large audiences to ensure "ownership" of policy decisions on the side of stakeholders.

In this vision, the integration of AI-enabled tools will be a key factor for the success of PERSEUS: these tools will allow to perform sentiment analysis using cutting-edge technologies, providing innovative results in the policy making domain. The output of the analysis will generate rich information that will provide policy makers and researchers with innovative and disruptive input to perform decision making.

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