

# Design Report

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Link to our project on Tableau Public:

[https://public.tableau.com/shared/S5BXTNNFD?:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/shared/S5BXTNNFD?:display_count=n&:origin=viz_share_link)

# I. Visualization Purpose

## Description

*Summarize the purpose of your visualization project.*

In this project, we investigated the relationship between **democracy**, **social media usage**, and **fake news/disinformation** in Europe. To do so, we first looked at the influencing factors European citizens considered important in the context of democracy. Based on the Eurobarometer survey of 2023, we found misleading information spread through social media as a clear answer. We then verified which social media platforms were the most trafficked by citizens and learned that Facebook was a prominent leader in both 2018 and 2023.

Following this, we **profiled some key countries** based on data surrounding citizen trust in the media. Through this data, we investigated whether or not there are countries with contrasting patterns (i.e. high dissatisfaction with the fight against misinformation but high trust in social media) and explored the underlying reasons behind these trends through an interactive comparison board. These efforts were then combined with ranking a selection of SDG (Social Development Goals) figures to see whether there is a correlation between a good SDG score and a low dissatisfaction rate with democracy. While our visualizations can be used to investigate this question, it does not lead to a definitive conclusion on that account.

**More research needs to be done** to draw definitive conclusions on the relation between social media use, misinformation spread and the perception of a healthy democracy. This visualization tool can help in such research.

## User

*Who is the target user? Why did you choose to target them? Are there existing projects that they can use to explore the selected dataset? How is this visualization different from the existing state of the art (in research or practice)?*

Our visualizations are specifically geared towards activists, policy makers, and journalists that are concerned with the state of democracy in Europe and are responsible for translating actionable findings within their work. This is especially important considering the many European elections being held in the coming years and the growing concern surrounding the evolution of democracy, the influence of social media, and the spread of mis- or disinformation therein. This visualization thus provides these people with the required and valid instruments to act. Moreover, we see that while all the information we gathered is available elsewhere, it is not available in one place and often with limited interactive research possibilities. Therefore, we believe our visualization offers added value for our target group.

## Data

*What data does your visualization use? What are its properties? What is its source? How did you prepare or clean the data so that it could be visualized?*

### 1. Data to evaluate European citizens sentiment towards **influences on democracy** in Europe

Eurobarometer 2023 on democracy containing 2 different datasets:

- [Special Eurobarometer EB043EP: EP Spring 2023 Survey: Democracy in action – One year before the European elections](#), with accompanying [dataset](#)
  - the following table was used in Tableau  
EP\_Spring\_2023\_\_EB043EP\_volumeAP.xlsx, sheets QA11\_1 to QA11\_10;
  - those sheets contained the survey results pertaining to the following questions:
    - QA11.1. How satisfied or not are you with the following aspects of democracy in the European Union? :-Free and fair elections
    - QA11.2. How satisfied or not are you with the following aspects of democracy in the European Union? :-Freedom of speech
    - QA11.3. How satisfied or not are you with the following aspects of democracy in the European Union? :-Media diversity
    - QA11.4. How satisfied or not are you with the following aspects of democracy in the European Union? :-The possibility for individual citizens to participate in political life (i.e. as candidates in elections, members of political parties)
    - QA11.5. How satisfied or not are you with the following aspects of democracy in the European Union? :-The rule of law (i.e. the respect for independence of the judiciary, the integrity and impartiality of the electoral system)
    - QA11.6. How satisfied or not are you with the following aspects of democracy in the European Union? :-Respect for fundamental rights
    - QA11.7. How satisfied or not are you with the following aspects of democracy in the European Union? :-The opportunities for civil society (i.e. citizens, associations, NGOs) to protect democracy
    - QA11.9. How satisfied or not are you with the following aspects of democracy in the European Union? :-The fight against disinformation in the media (i.e. false, exaggerated or misrepresented news stories)
    - QA11.10. How satisfied or not are you with the following aspects of democracy in the European Union? :-The fight against corruption
- [Flash Eurobarometer FL522: Democracy](#), with accompanying [dataset](#)
  - the following table used in Tableau:  
fl\_522\_volume\_A.xlsx, sheets Q3 to Q9;
  - those sheets contained the survey results pertaining to the following questions:

- Q3 In your view, which of the following are the most serious threats to democracy in [COUNTRY]? [MULTIPLE ANSWERS]
- Q4 In your view, what are the most important elements that define free and fair elections? You can select up to three answers [MULTIPLE ANSWERS]
- Q5 In your view, what are the most important elements that define a free and fair electoral campaign? You can select up to three answers. [MULTIPLE ANSWERS]
- Q6 How often do you think that you have been personally exposed to disinformation and fake news over the past 7 days?
- Q7 In which types of media are you most likely to encounter disinformation or fake news? [MULTIPLE ANSWERS]
- Q8 When it comes to disinformation and the manipulation of information on online platforms (social networks, search engines, etc.), which of the following statements are closest to your view? [MULTIPLE ANSWERS]
- Q9 Which of the following statements is closest to your view?

Both sets were mainly cleaned by removing the first few rows that contained informational data not relevant for the visualizations in Tableau, transposing the columns to get the countries in rows and removing unneeded information (e.g. flags).

## 2. Data to evaluate **social media engagement** in Europe

In order to determine which social media platforms different European nations used the most throughout the years, we made use of the data shared by [Statcounter Global Stats](#). To ascertain the social media platform usage of each country, they “analyze every page view referred by a social media site” (Statcounter). This dataset does not quantify Europeans' total visits to social media sites but rather details the percentage of visits dedicated to each platform. This web analytics service allowed us to filter the data by country and year, and to download the resulting data from our query as a CSV file. We then combined and cleaned the CSV files and transformed them into a single XLSX file containing the data for 2018 and 2023 of all the countries explored in our work.

## 3. Data to evaluate **fake news/ disinformation** statistics

[False news worldwide - statistics & facts | Statista](#)

- Analyzed statistics for:
  - Social media as a news outlet worldwide 2023
  - Trustworthiness of news media worldwide 2023

This data was imported as a CSV file, and information regarding non-European countries was removed to align with the project's scope.

## 4. Data related to the **freedom of press**

[Press Freedom Index](#) by Reporters without Borders

This data was used secondarily to our main investigation but was included to help contextualize the state of journalistic freedom in selective countries. This data was downloaded as a CSV file and cleaned with OpenRefine. All information regarding countries outside of Europe were removed based on the purposes of this project.

## 5. Data related to the **Sustainable Development Goals**

[Eurostat Sustainable Development Goals](#), with accompanying database:

- data were selected based on a possible relation with the themes democracy, well being, media and communication;
- the following table shows the selected SDG values that were consolidated within one table and ranked within the set of European countries;

SDG	Description
<b>1</b>	<b>No poverty</b>
01_10	Persons at risk of poverty or social exclusion
01_20	Persons at risk of monetary poverty after social transfers - EU-SILC and ECHP surveys
01_31	Severe material and social deprivation rate
01_41	In work at-risk-of-poverty rate
<b>3</b>	<b>Good health and well-being</b>
03_20	Share of people with good or very good perceived health
03_60	Self-reported unmet need for medical examination and care
<b>4</b>	<b>Quality education</b>
04_10	Early leavers from education and training
04_20	Tertiary educational attainment
04_70	Share of individuals having at least basic digital skills
<b>5</b>	<b>Gender equality</b>
05_50	Seats held by women in national parliaments and governments
05_60	Positions held by women in senior management positions
<b>8</b>	<b>Decent work and economic growth</b>
08_10	Real GDP per capita
08_20	Young people neither in employment nor in education and training (NEET)

08\_40 Long-term unemployment rate

## **10 Reduced inequalities**

10\_10 Purchasing power adjusted GDP per capita

10\_41 Income distribution

## **16 Peace, justice and strong institutions**

16\_10 Standardised death rate due to homicide

16\_20 Population reporting occurrence of crime, violence or vandalism in their area by poverty status

16\_40 Perceived independence of the justice system

16\_50 Corruption Perceptions Index

## **17 Partnerships for the goals**

17\_60 High-speed internet coverage

- the values to be ranked were sometimes from high to low and sometimes from low to high. A formula had to be applied in the spreadsheet to make a uniform visualization using barcharts possible;
- for the final datasource version used in Tableau only 2023 was kept.

## **6. Countries**

Given the varying country identifiers across sources, a separate country table with diverse code formats (alpha2, alpha3, ISO, numeric, etc.) and descriptions was imported into the Tableau data source. Thanks to this addition, redundancy of names and codes as well as spelling issues with the country names could be avoided.

The source table was downloaded from

<https://github.com/luke/ISO-3166-Countries-with-Regional-Codes/blob/master/all/all.csv>

For the purpose of our visualization **only countries from the EU were retained**. The EU as a whole was added as this was used in other tables. The column EU-Code was added because the code used in the Eurobarometer file contained the code “EL” for Greece while the official alpha2 code used “GR”.

## Goals

*What are the main goals behind this visualization? How does it support the goal of your target users?*

By using this type of visualization, we provided a useful tool for people with some influence on the state of democracy (i.e., activists, journalists, policy makers, etc.). We believe actionable insights can be directly gleaned from our visualizations, but, more importantly, we have provided a gateway for individual investigation surrounding the evolution of social media, its influence on democracy, and the growing threat of misinformation. We believe our target user can use our storyboard to take action and help improve situations where democracy is coming under pressure.

## Design Rationale: Visual Encodings & Interactions

*How are visual encodings constructed in terms of design choices? What interactions are supported by the visualization?*

For our project, we used a story driven dashboard where the relevance and importance of a problem is introduced and then further explained. The dashboard follows a sequential storytelling approach where the user gradually gains deeper insight into the topic through each tab. On all tabs, the numerical data and graphs are expanded upon via text, providing a clear understanding for the user while simultaneously making the story itself more engaging. Considering our target user is also responsible for telling a story in the context of policy and activism, this storytelling dashboard can be directly reused or provide important inspiration.

In terms of interactivity, most of the graphs are interactive, giving the user the opportunity to experiment with the data, such as changing the countries or years shown. This is important considering our target user, who is likely to be interested in further exploring the topic and getting more information on their countries of interest.

# II. Design Rationale

## Design Rationale: Visual Communication

*Narrative: What narrative techniques did you apply, and why? (max. 3)*

To communicate our insights, we used the ‘martini glass method.’ This means we first gave the essential details and context of our project and then proceeded to guide our user through a narrow path of inquiry that highlights specific phenomena, possible factors influencing dissatisfaction with democracy and misinformation online, and specific examples. As our question is complex, instead of providing a fixed conclusion, we then provided the user with a more ‘open area’ for independent exploration of the question and ideas for future consideration.

Instead of using a single dashboard, we utilized the story telling function of Tableau through which our

information can be gradually presented. The aim of this approach is to make navigation between the graphs easier and to avoid overwhelming users with an overload of complex data at one time.

Alongside this, we decided to present some specific examples that can help our users gain deeper insights into our data. Moreover, our decision to highlight four specific countries allowed us to highlight the results from both ends of the scale and by this present some possible explanations on what factors could be influencing the data presented on the previous graphs.

*Communication principles: What are the other communication principles that significantly influenced your design, and why? (max. 3)*

As our target users are people who are presumably already interested and somewhat knowledgeable in this topic, the goal of our project was to create a tool that can provide information in a simple and efficient way to help spark interest for future research. For this reason, rather than focusing on creating abstract, attention raising visualizations, we used simpler, numeric and easy-to-read graphs, predominantly bar charts. To contrast this simplicity, we included a few AI generated images that can raise the attention of the user and make the slides more interesting, without making the graphs themselves less efficient in conveying the necessary information.

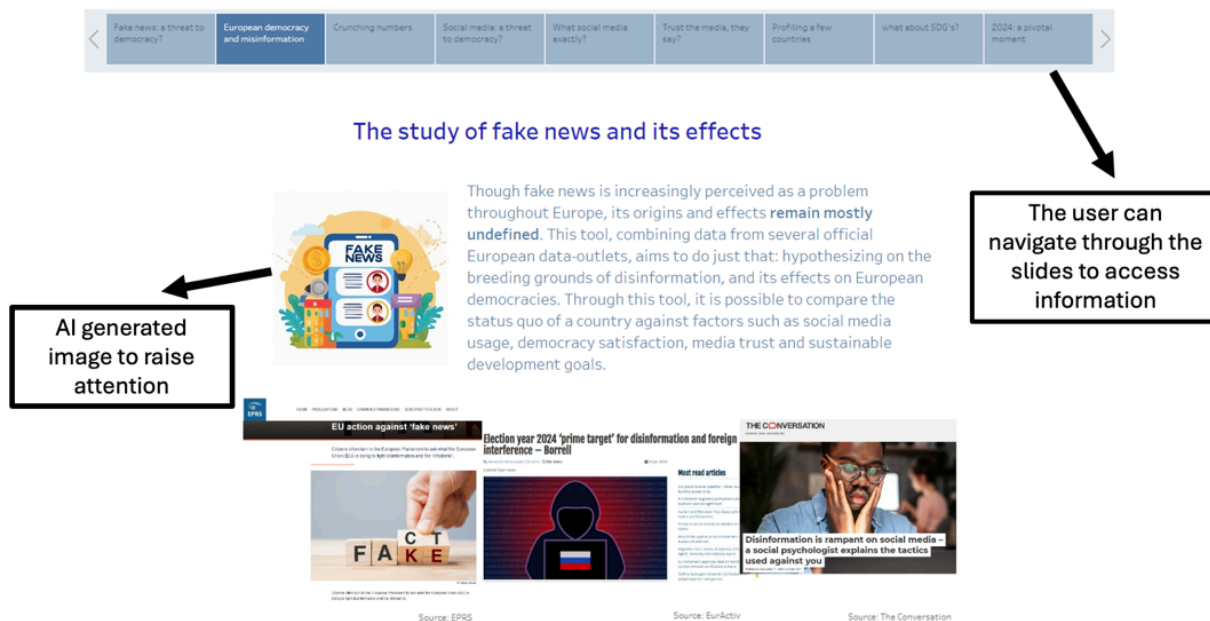


Figure 1: Annotated Tableau Dashboard

To avoid making the pages look messy or overwhelming - which could make it more difficult for the user to focus on the relevant information - we used different shades of blue with a white background for the texts and the charts that did not need color coding. We chose this color scheme as it is easy to read, accommodates the color-blind and, as being the color of the EU flag, correlates with our topic. We also paid attention to remain consistent with the color-coding throughout our slides.

On each slide we provided some textual interpretation for the data presented; however, instead of giving definite answers, we often raised questions that could invite the user to reflect further on the topic and



possibly spark interest for future research.



Figure 2: Communication principles used

Communication principles: What communication principles were consciously ignored, and why? (max. 3)

As mentioned, we avoided the use of abstract, attention-grabbing graphs and visuals, as these would not align with the needs of our user group. Yet, even though our project aims to present graphs in a simple and clear way, in some cases this simplicity could not be achieved due to our users' need for complex data that can be used in more policy-oriented settings. For such graphs, we deviated from the blue color scheme used elsewhere, opting for vibrant colors to distinguish variables. The use of vibrant colors was necessary in order to make it easier to spot small differences and ratios shown on the visualizations.

Criticality: Does the data reflect the reality in a fair way? How was this reflected in the design?

Throughout the project we reflected reality in a fair way by using reliable, unbiased data sources such as the Eurobarometer. Considering the complexity behind this data, we also made sure to properly clarify important distinctions and avoid conflating data (i.e. separating a country's dissatisfaction with misinformation from their dissatisfaction with the fight against misinformation).

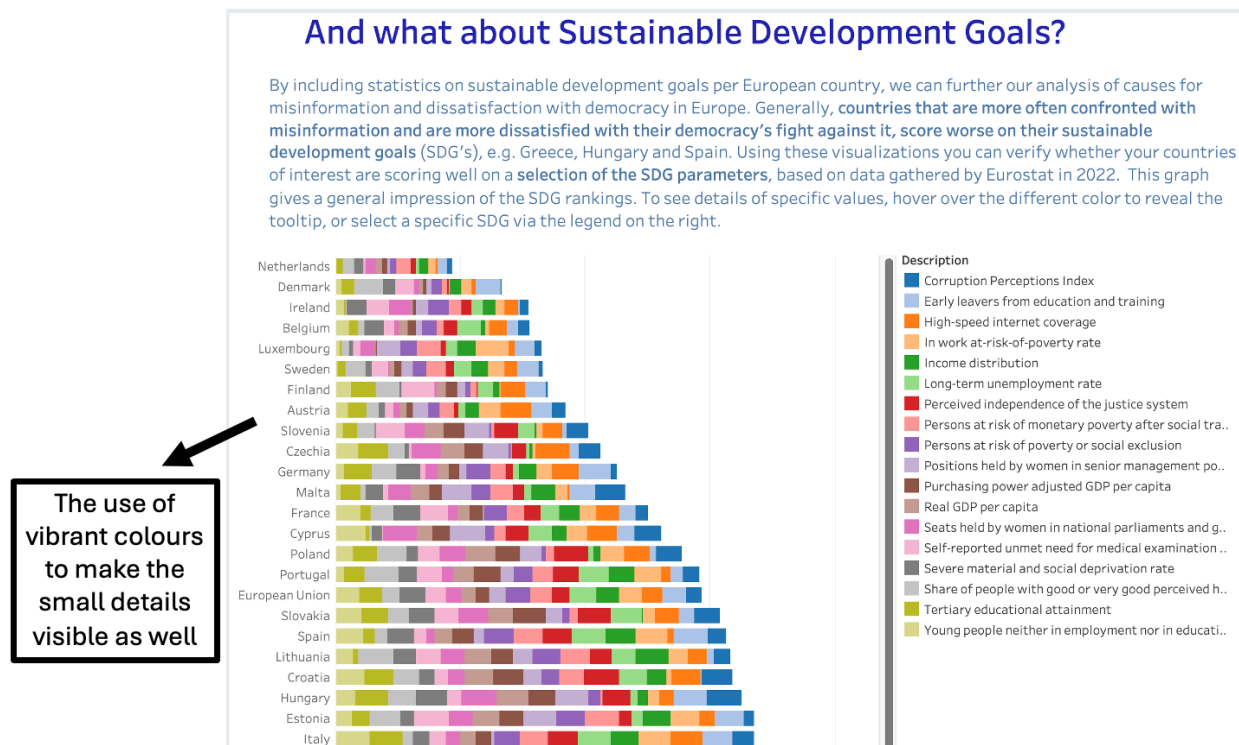


Figure 3: The use of vibrant colours

*Criticality: Does the data visualization present the insights in a fair way? How was this reflected in the design?*

In order to present our insights in a fair way, we always made sure to present the data we found without confirmation bias just to prove early hypotheses. In order to achieve this, we made sure not to modify axes or the values in the datasets that would overemphasize correlations. In addition, when providing textual interpretation for our visualizations, we made sure to leave space for the interpretation of the user rather than forcing them towards a specific point of view.

### Alternative design options

*Show a different design idea that you had for one of your visualizations, along with the version that you ended up pursuing. How do these versions compare? Which one is better, and why?*

To show which social media platforms are used most in each country, we first used a dot plot. However, we realized that this visualization can be confusing and potentially misleading. While the data speaks to the distribution of social media usage based on a country's total number of social media users (i.e., roughly 70 percent of Austria's total social media users engage with Facebook) we discovered the dot plot could potentially be interpreted as a given platform's total number of users. To make this clearer, we created a new graph where the data is shown on bars, making it more obvious that the focus is on the difference in ratio of the different platforms compared to the total number of users. The new graph also

allows the user to select specific social media platforms to focus on, making it more interactive and better suited for the needs of our user group.

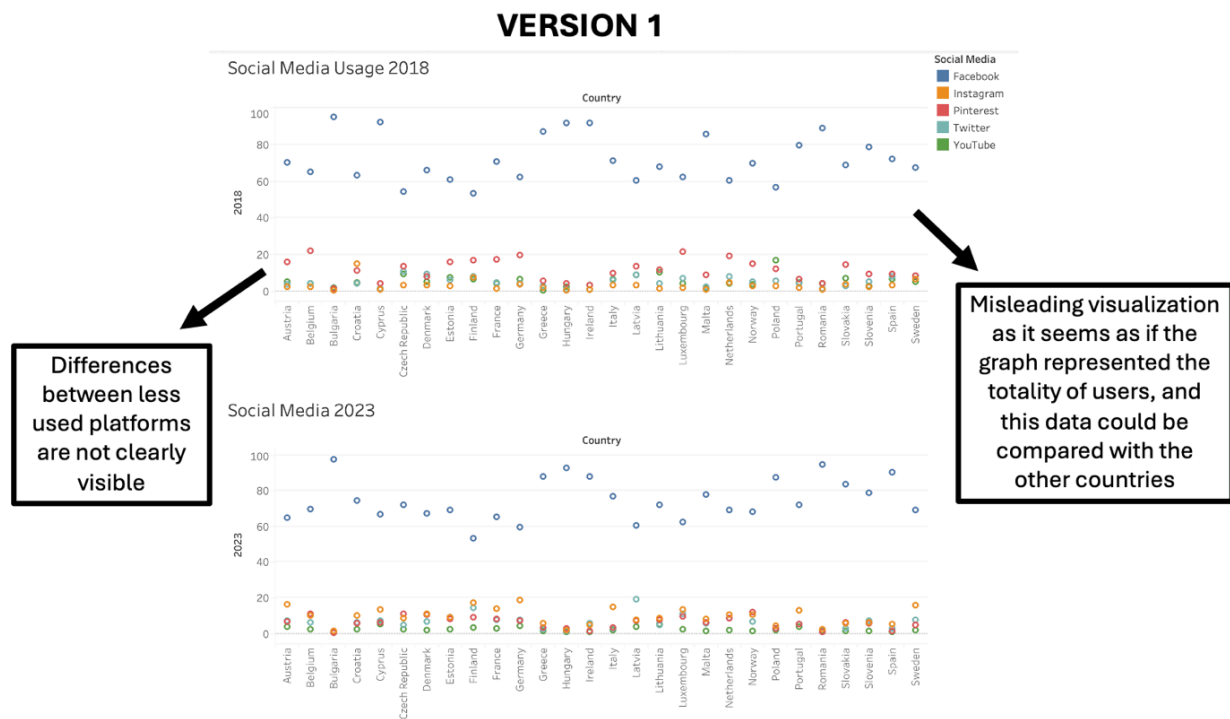


Figure 4: Version 1 of visualising the most used social media platforms

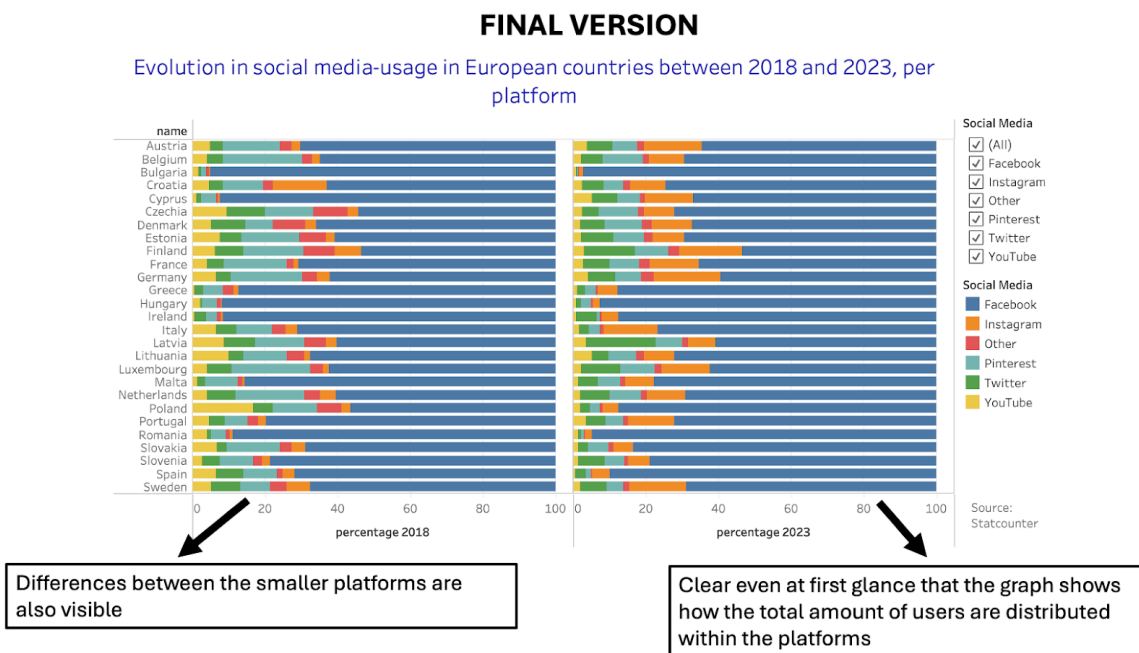


Figure 5: Final version of visualising the most used social media platforms

### III. Insight

#### Insight Description

*Include one or more screenshots that show the deepest insight. If possible, annotate the screenshot to reveal in detail the parts (i.e. visual(s) and narrative aspect) that suggest this insight to the user. Explain the insight in a paragraph.*

The majority of European countries identified misinformation and fake news as the biggest threat of democracy. By looking into different factors, such as the freedom of press or SDG goals and by investigating 4 countries with differing results, we managed to discover some interesting insights. Even though on average, countries of the EU identified online media outlets as the most likely place to encounter disinformation and fake news, when looking into individual countries this result varies. Comparing Hungary, Greece, France, and Portugal revealed that countries with lower press freedom rankings tend to rely more on social media (particularly Facebook) for news and identify television as the primary source of misinformation, unlike higher-ranked countries where online platforms are perceived as the greater threat and trust in traditional media is stronger. This also helped us reach the insight that the correlation between fake news, social media use and dissatisfaction with democracy is not as strong as we originally predicted and there are many other factors that could have a more important role, for example the SDGs.

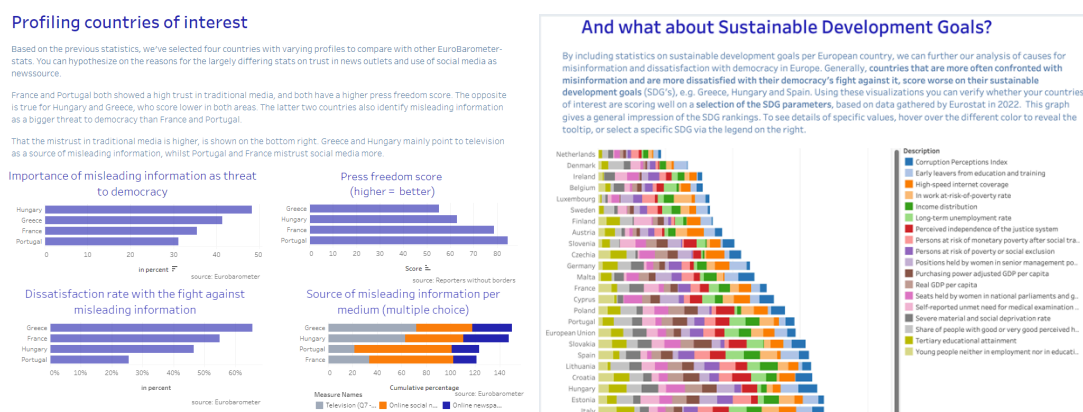


Figure 6: Insights revealed for the users

#### Design encoding

*Explain your design process and the design rationale to convey this particular insight in this particular way. Is your chosen design the most efficient or effective way to represent this insight?*

We believe the sequential storytelling approach, gradually building the narrative across slides, enhances user comprehension compared to a single dashboard. In addition to this, even though we only used a few countries as examples, the interactivity of the graphs also allows the user to experiment with more countries and possibly further expand upon the insights presented by our project.



Figure 7: Design choice for consequential story telling

## Value

*What does this insight signify for the user? What do they learn from this new information? Can they use it to inform a decision, or to trigger deeper reflection on the topic?*

At the beginning of our story, we demonstrated how misinformation is considered to be one of the main threats to democracies based on the responses of European citizens. Through our project, we tried to see if there is a clear correlation between higher use of social media, fake news and dissatisfaction of democracies. Our findings reveal that the anticipated strong correlation might not hold for most countries, suggesting the need to consider additional factors in this research. We believe that even though we could not prove our initial hypothesis, our insight highlighted the complexity of the issue and could trigger deeper reflection on the topic and could lead to further research.

### 2024: a pivotal year

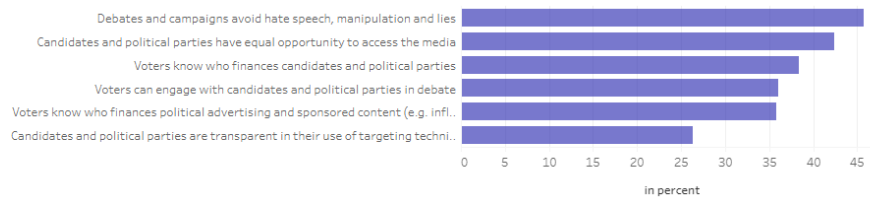


With European and local elections coming up everywhere across Europe, 2024 is a pivotal moment for combat against misinformation and destruction of democratic principles.

When analyzing the Eurobarometer, 46% of Europeans define the most important elements of a fair electoral campaign as a campaign without manipulation and lies.

Moreso, 54% says that voters need access to accurate information to make an informed choice. Misinformation is clearly on everyone's mind. But, with misinformation and mistrust in traditional media at an all-time high - and the rise of misleading imagery by AI, what effect will this have on the upcoming elections and our democracies?

In your view, what are the most important elements that define a **free and fair electoral campaign**?



In your view, what are the most important elements that define **free and fair elections**?

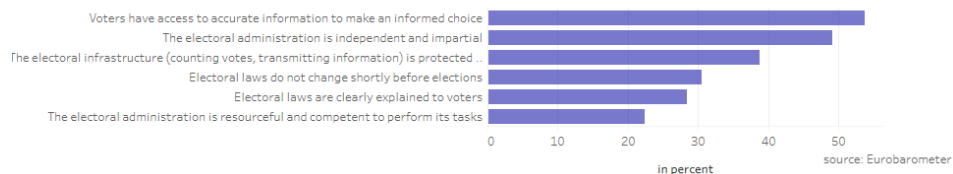


Figure 8: Inspiration for further research

## Validation

*If you were to check whether this insight is truly factual, how would you go about it? Can you think of additional steps users should take to validate the accuracy of this insight? (for instance: does it need to be cross-checked with different sources of data? To be contextualized to a specific time period, or geographical area?)*

Our main source of data (Eurobarometer) only presents the responses of citizens, but it does not provide factual statistics about the countries. Even though we used additional factual data as well - such as the the SDGs - it could be interesting to cross-check the answers provided by citizens with other datasets (i.e., is there *actually* more fake news present on social media, are citizens *actually* experiencing it as much as they think, etc.). Also, while our data was from 2018 and 2023, we could perhaps discover new insights if we looked deeper at political events, laws, and media advancements for different countries on a year by year basis, though that would demand a significant amount of time and resources.

Finally, to be able to draw more general conclusions, we would also need to check data outside of Europe in order to gain a more detailed view on general phenomenon and what is something more specific for EU countries.

## IV. Reflections

### Achievements

*What features you implemented (e.g. encoding, narrative techniques, interactions and/or technical features) are you most proud of? Why?*

When starting to collect and work with our data, we realized that it is indeed a complex question with sometimes messy datasets to work with. One of the things we are most proud of is our efficient data cleaning, which allowed us to narrow down our focus and create graphs that are making it significantly easier to understand the original datasets.

We are also proud of figuring out an efficient way to use the storytelling function of Tableau because it allowed us to create a clearer narrative and an overall better user experience.

### Aspirations (unfulfilled)

*What features (encoding, interactions and/or technical features) did you want to include, but were not able to? Why? What did you attempt to accomplish them?*

We wish that we managed to create more interactive graphs that allow the user to reach more complex insights. We had several attempts to achieve this, however we decided to leave these out from our final version as these did not fit our story well and would require too much explanation for the user to understand the graphs and the data behind them.

## **Learning by making**

*What did you learn in the process of developing a real-world project, e.g. in contrast to following the theory lectures?*

Through the project, we realized that most of the datasets require quite a lot of experimentation before we find the aspects that are worth visualizing and provide valuable insights for our project. Additionally, in case of complex data it can be a challenge to figure out the best ways to simplify these without losing the depth of the information.

Through using Tableau, we learnt the general importance of cleaning and organizing our data, as well as the challenges that different datasets can cause. We also learnt the importance of experimenting with the possibilities Tableau can provide to be able to get the most out of our datasets.

At first, we focused more on the visuals themselves, but feedback sessions and our efforts to put a narrative together taught us the importance of the textual explanations as well, which was something we originally overlooked but proved to be crucial for our final project. We had a higher sense for accessibility after this, using color schemes accessible to the color blind and adding subtitles to the explanatory video.

## **Learning by collaborating**

*What did you learn by working in a collaborative setting, e.g. in contrast to developing alone?*

Working in a group was useful not only for dividing the workload, but also for presenting the data and graphs we individually worked on. After working with our data and knowing what we want to convey did not always mean it is easily understandable at first sight for others as well, therefore the possibility to review each graph with a 'fresh eye' within the group and have internal feedback sessions was beneficial compared to working alone.