**Enhancing and Re-Purposing TV Content
for Trans-Vector Engagement**

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First Validation of Engagement Monitoring Prototype
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Statement of Originality

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EXECUTIVE SUMMARY

This deliverable outlines the scenarios for the professional use case scenarios and provides results of the first validation of the trans-vector platform (TVP) prototypes with media professionals. It describes two scenarios: Topics Compass for digital media trends analysis, and visualisation and Content Wizard for video content preparation and repurposing across multiple vectors. The deliverable reports on how these scenarios have been iteratively refined, implemented in the first prototypes of the TVP components and tested with professional users.

1. INTRODUCTION

The ReTV Trans-Vector Platform (TVP) provides innovative solutions for media professionals to efficiently and effectively monitor the digital media landscape, analyse media trends and adapt, re-purpose and publish existing content across various platforms with maximum reach and impact. The main objective of this deliverable is to provide the results of the first validation of TVP components evaluated by media professionals. It focuses on professional user scenario preparation and the analysis of qualitative and quantitative feedback gathered during user tests with professional users.

Building on the previously gathered professional user requirements, project partners prepared and evaluated two professional user scenarios[1]:

- The **Topics Compass** scenario aims to enable media professionals to easily identify and monitor trending topics across digital media vectors and to predict which topics will have more communication success by time and vector.

- **Content Wizard** proposes to automate the preparation of optimised digital content for online consumption and its publication on recommended digital media vectors at a recommended time.

In consultation with media professionals, the industry partners in the project (NISV and RBB) refined professional use case scenarios which were then implemented by the technical partners (CERTH, Genistat, MOD and WLT) in the first prototypes of the TVP components. To validate these first prototypes, qualitative and quantitative feedback was gathered from professional users.

This deliverable structure is as follows: the methodology for scenario preparation and user testing is described in Chapter 2. Chapter 3 focuses on the refinement of the two professional use case scenarios with wireframes. The preparation and customisation of the first TVP prototypes by industry and technical partners is described in Chapter 4. Chapter 5 gives an overview of qualitative and quantitative feedback gathered from professional users. The discussion of the testing results is presented in Chapter 6. Finally, Chapter 7 provides a conclusion and an outlook on the next steps.

1.1 ROLE OF THE DELIVERABLE IN THE PROJECT

Deliverable D5.2 describes activities performed in tasks T5.2, Design of Engagement Monitoring, and T5.3, TVP Deployment and Testing with Content Owners. It builds on the results of task T5.1 during which user requirements were gathered from a number of media professionals.[2] It reports on the qualitative and quantitative feedback gathered from professional users who tested the first TVP prototypes.

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[1] For consumers, two scenarios have been defined: 4u2, the delivery of personalised content to users via novel digital vectors, and Content sWitch, customisation of linear TV stream for experiences tailored to each individual viewer. These two scenarios are focused on the personalisation of content and are evaluated from the consumer perspective. Evaluation of these scenarios is provided in the deliverable D6.2: First Validation of Personalization Prototype.

[2] Results of this are reported in the deliverable D5.1 Requirements for Content Owner Use Case. See retv-project.eu/wp-content/uploads/2018/11/D5.1.RequirementsContentOwnerUseCase_M10_201810 31_1417.pdf

The results of user testing described in this deliverable will be used to further develop the TVP components (WP1-4). Following this, the second validation of the TVP prototypes will be carried out in task T5.3 to evaluate prediction features and the outputs of the re-purposing and re-scheduling systems. This will be reported in deliverable D5.3 in M36.

2. METHODOLOGY

The industry and technical partners in the project collaborated closely to prepare the professional user scenarios, develop the first prototypes and gather qualitative and quantitative feedback from potential TVP users. In order to develop prototypes that successfully support professional users in their daily tasks, the industry partners sought to consult and gather feedback from media professionals at various stages. The following approach was followed:

1. **Development of professional user scenarios**. The industry partners used the user requirements gathered in task T5.1 to create clickable wireframes that showcase the desired professional user scenarios - Topics Compass and Content Wizard. In the case of Topics Compass, the pre-existing webLyzard dashboard on which Topics Compass scenario is based (see section 3.1) already had an extensive list of useful functionalities, therefore partners created wireframes only for newly desired features. For Content Wizard, a wireframe showing the whole workflow was made. These wireframes, together with the webLyzard dashboard, were iteratively updated during discussions between the project partners.

2. **Validation of user scenarios with professional users.** Wireframes were shown to media professionals at NISV and RBB to gather qualitative feedback, assess the usefulness of the proposed workflows, and identify any missing features.

3. **Prototypes tailored for evaluation with professional users.** Based on workflows and features proposed in the wireframes, technical partners prepared the first prototypes for Topics Compass and Content Wizard scenarios. To showcase the potential of these prototypes and test them with local media professionals, NISV and RBB prepared scripted scenarios using data sources and content in their native Dutch and German languages.

4. **User testing**. The first prototypes were validated during user tests with media professionals. Professionals from editorial, research and innovation departments at NISV and RBB as well as two Dutch broadcasters participated in guided user tests. Qualitative feedback was gathered from user comments during the tests and a survey was created to collect quantitative data. The analysed data is used as input for further development of the prototypes.

During this first validation period, NISV and RBB focused on engaging experts from their teams to assess the scenarios and prototypes. In the subsequent evaluation stages, the prototypes will be iteratively updated with new or improved features and tested with external stakeholders. For the final validation of the prototypes, longitudinal tests with media professionals from NISV and RBB, as well as external organisations, are planned.

3. SCENARIO PREPARATION

The user requirements gathered during the initial interviews and surveys with professional users (presented in deliverable D5.1) helped to identify and prioritise features that each of the ReTV scenarios should have. Building on these, professional user scenarios could be clearly defined - a necessary step to begin and support the technical development of the first TVP prototypes for each of the scenarios.

This chapter presents the Topics Compass and Content Wizard scenarios for professional users and reports on their development. It gives an overview of qualitative feedback gathered from professional users. A brief outline of each scenario and its purpose is provided, followed by a description of its key features and workflow together with feedback from professional users.

The scenarios presented in this section describe the ideal functionalities that would be developed during the course of the project and implemented for the Topics Compass and Content Wizard scenarios. Not all features were present in the first prototypes presented in Chapter 4 and Chapter 5.

3.1 TOPICS COMPASS

The first scenario proposed and developed for professional users was Topics Compass for monitoring, listening and predicting trends in digital media. It targets editorial teams at broadcast organisations and media archives who require a quick overview of selected topics from the past, the present and the future. The Topics Compass provides reports, documents, datasets and visualisations of specific topics to support a variety of users in their daily work.

The Topics Compass scenario aims to enable professional users to:

- monitor data from various digital vectors.
- analyse specific topics and trends in data sources.
- predict trends in digital media.

To address this scenario, the project partners proposed to extend the pre-existing webLyzard Visual Analytics Dashboard that already provided many of the desired features.[3] The dashboard supports the aggregation and analysis of data from various digital sources. By refining it, the project partners aim to create a TVP Visual Dashboard for media professionals.

At the beginning of the project, webLyzard set up an instance of the dashboard for scenario preparation. It used the internationally well-known television series 'Game of Thrones' and 'The Big Bang Theory' as examples of a media use case. With these examples content partners were able to learn how to use the dashboard, helping them to better define their requirements and identify extraneous functionalities. An instance with the topic 'U.S. Midterm Elections' helped refine requirements in the political topic sector. The industry partners iteratively tested this instance of the dashboard to identify which features should be adopted and customised for the Topics Compass scenario. A wireframe was created to demonstrate desired new features.

3.1.1 Data Sources

The starting point of the Topics Compass dashboard is the preparation of data sources that will be monitored. Professional users indicated that one of the most important features in this scenario is the ability to monitor a range of different sources from various vectors in one place

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[3] https://www.weblyzard.com/interface/

and be able to analyse them together. In the webLyzard dashboard, users can set up mixture of data sources - websites and various social media accounts. To avoid artefacts in the subsequent trend analysis and allow comparisons across vectors, data sources have to be defined in advance and can be updated at regular intervals.

Once these data sources are integrated, the Topics Compass immediately begins to monitor them. Data sources can be shared between all users using the same instance of the Topics Compass. Users can also filter sources using the 'advanced search' feature by setting up new queries and optionally storing them permanently as a 'bookmark'. To integrate new data sources into the Topics Compass, the predefined list must be extended and uploaded to the tool. After integrating new sources, the tool immediately starts capturing the refined sources.

3.1.2 Searching through Data Sources

The search feature opens with a default "*" search which yields the entire set of documents from all selected data sources. On the left of the search box and the shown topics underneath, a checkbox indicates whether a topic (or the current search) should be displayed in the trend chart. To the right of the search box, the system shows the number of documents matching the search query, using color-coding to indicate average sentiment.

With each search, the dashboard updates the resulting visualisations, results and associations. For a better overview of the latest search request, an optional search history is displayed on the left sidebar and can also be used as a 'back' functionality for returning to the results of a previous search.

During the first internal tests with the dashboard, the project partners noticed that the comparison of one search term with another could be a new functionality useful for professional users. It would provide insight into the performance of particular topics within a specific time period (see Figure 1). Time periods selected for comparison could be either identical or defined by users.
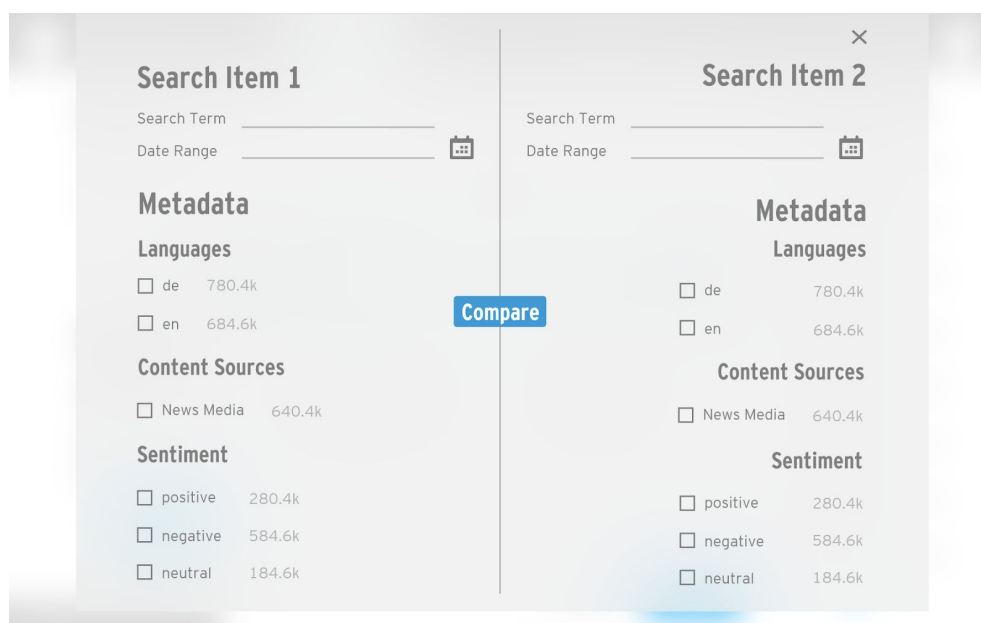

Figure 1: Wireframe of the comparison mode feature

3.1.3 Visualisations

The dashboard provides various types of visualisations in the form of synchronised widgets to analyse and organise extracted knowledge along multiple context dimensions. The set of these dimensions include the *topic context* (tag cloud, keyword graph, cluster map, relation tracker), the *lexical context* (word tree), the *temporal context* (line chart, stacked bar chart) and the *geospatial context* (geographic map).

Feedback from professional users indicated that initially users would look to get a simple overview with only a few visualisations that provide the main information about trends in their selected data sources and allow them to explore the context. The users would still be able to add other visualisations in the course of the search. After testing the possibilities of all visualisations, the project partners narrowed down five visualisations that professional users could use in their initial overview:

- Trend Chart
- Donut Chart
- Tag Cloud
- Keyword Graph

3.1.4 Monitoring and Reporting

During the first professional user interviews and surveys, the monitoring and reporting features were among the most requested. Automatically generated reports displaying the search results for a specific topic or keyword in various visualisations would provide significant support for the editorial workflow in broadcaster organisations and media archives.

The 'Data Export' feature accessible via the dashboard's header menu enables users to choose from 'Reports', 'Documents', 'Datasets' and 'Visualizations' for export (see Figure 2). The list of search results can be exported as PDF or HTML, or metadata-enriched clippings in CSV or XLSX. The *time series* export contains daily frequency, sentiment, and disagreement values in XLSX format, or as a comma-separated text file (CSV) encoded in UTF-8. Other datasets available include (i) the list of content sources, (ii) the list of entities, and (iii) detailed statistics for all predefined topics ("bookmarks") and keywords related to the current search ("associations"). The visualisations include line chart, donut chart, tag cloud, geographic map, keyword graph and word tree in Scalable Vector Graphics (SVG) or Portable Network Graphics (PNG) format.

The work conducted on the Dashboard in WP4 focused on: (i) improving the scalability of generating the datasets, for example, the list of associations was restricted to very simple queries prior to the June release of the ReTV dashboard; (ii) providing additional metadata as part of the CSV/XLS exports; (iii) enriching the automatically generated A4 PDF reports e.g. by incorporating entity information from WP2's Semantic Knowledge Base, or by using color coding to show classifications by topic or source; (iv) adding a new 16:9 slide format for easy reuse in presentations, as compared to the A4 version optimised for print output.
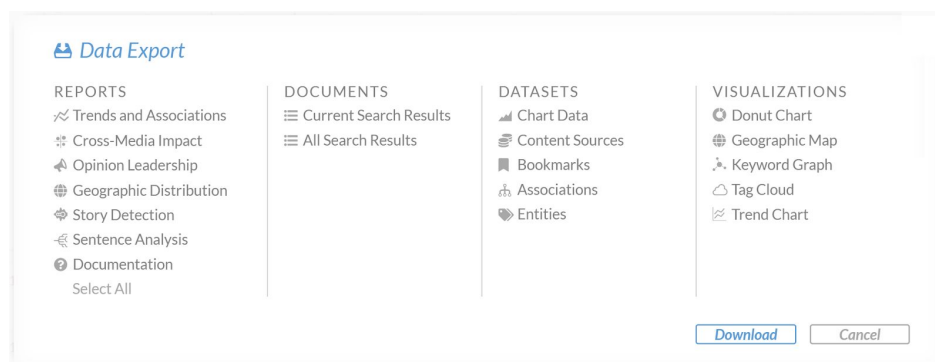
Figure 2: Data export options on the TVP dashboard

3.1.5 Prediction

During the course of the scenario preparation, the technical partners introduced predictive capabilities that would be integrated into the Topics Compass scenario to further support professional users. These predictive capabilities are made available to the rest of the TVP via REST APIs and will be integrated into the TVP Visual Dashboard (to be reported in deliverable D4.2). As outlined in deliverable D2.2, several approaches to predicting the success of future publication of content items on non-linear vectors (webpages, social media) have been identified:

- Predicted keywords - for any future date range, predict which keywords and entities are going to be popular.
- Future events of interest - for any future date, identify events occurring on that date (including anniversaries of past events), which are of relevance to the audience.
- Trending terms - in the short term, i.e. for publication in the following 1-4 days, predict the future popularity of a topic based on the trends in the communication success of past content on the particular topic.

3.2 CONTENT WIZARD

The second scenario defined based on the analysis of user requirements was Content Wizard, which proposes to automate the preparation of optimised digital content for consumption online and its publication on recommended digital media vectors at a recommended time. It targets editorial teams at broadcaster organisations and media archives who want to publish their content with more impact and reach across various digital media platforms. Content Wizard aims to enable professional users to:

- efficiently publish content across multiple digital media vectors.
- plan editorial activities by recommending topics and related video content.
- tailor video content for online publication and consumption by generating video summaries.
- increase the impact and reach of their content by recommending the optimal time and channel for publication.
- monitor and increase audience engagement with their content.

To clearly define these professional use case scenarios, user requirements were used to create a wireframe of a tool that showcases the key features of the Content Wizard scenario. This would then be used for developing a prototype that fulfills this professional user scenario. The

wireframe was iteratively updated and tested by the project partners as well as professional users at NISV and RBB.

3.2.1 Publication Across Multiple Vectors

As a starting point, a user would connect the Content Wizard tool to the accounts they would like to publish with. The consulted professional users primarily would like to publish content on social media accounts - Twitter, Facebook, LinkedIn, YouTube, Instagram, etc. There should also be a possibility to connect the tool to other digital platforms - websites, mobile apps, chatbots. In this way, a user would not have to use multiple tools to publish content but would be able to plan, prepare and publish content for all these vectors from Content Wizard.

Editorial teams often have to manage multiple campaigns at the same time, each of which uses multiple publication vectors. For this reason, there is a need to create separate spaces for each campaign. To exemplify this, the wireframe showcases three campaigns - NISV, ReTV Project and RBB, each of which has multiple media vectors. Each campaign has different goals and different target audiences therefore a user would be able to manage each campaign separately from Content Wizard (see figure 3).
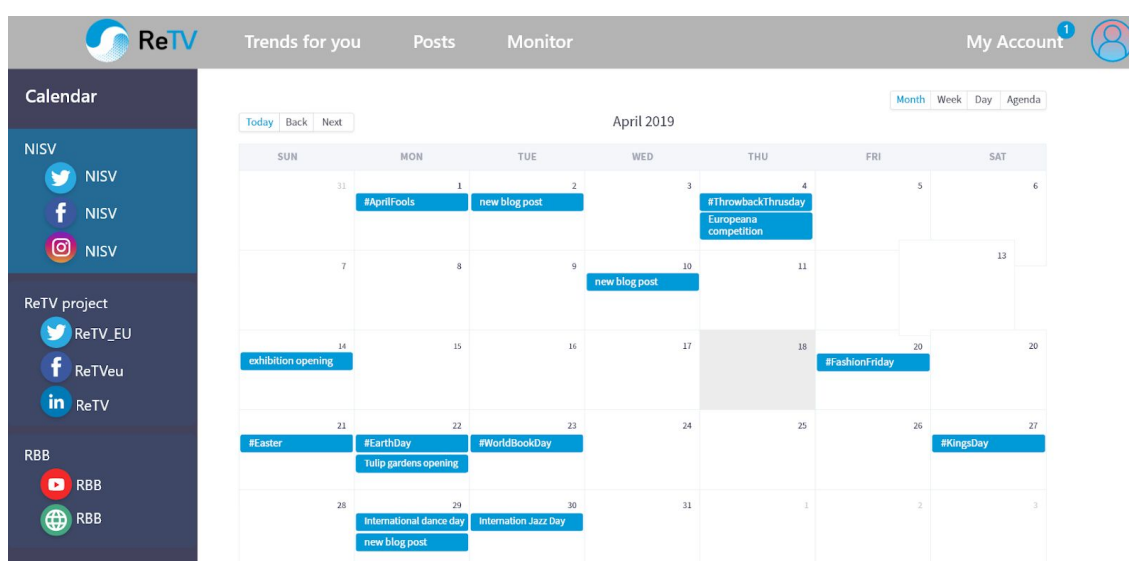

Figure 3: The setup of multiple publication vectors for Content Wizard

3.2.2 Prediction for Editorial Planning

Users indicated that they would like to see a clear overview of any upcoming events or trends that would help them to efficiently plan their editorial activities. During the wireframe tests, project partners presented the predictive capabilities of the TVP infrastructure that could be used for this scenario - predicted keywords, events of interest and trending topics (see section on prediction in Chapter 3.1.5). The professional users suggested that the most convenient way for them to work with these predictions would be a calendar view. Therefore, it was integrated into the wireframes. Here a user could review prediction suggested for each day and could start planning publications for the upcoming days and weeks. These recommendations for events and keywords should be customised to the vectors that the user is working with. Each campaign would therefore have a separate calendar view that recommends events and keywords related to that campaign specifically.

3.2.3 Content Recommendation

When the user selects one of the predicted events or keywords from the calendar, they would like to see video content related to that particular topic. In this way, they can immediately start creating new online content without having to switch to another application to see if they have relevant videos. For example, if a user chooses to make a post about the *Tulip Festival* in Amsterdam, the tool would recommend video content that contains footage from this festival, video content with tulips or about Amsterdam (see figure 4). During the wireframe tests, professional users indicated that they would like to use these recommendations but would also want to maintain editorial control and be able to search for content themselves.
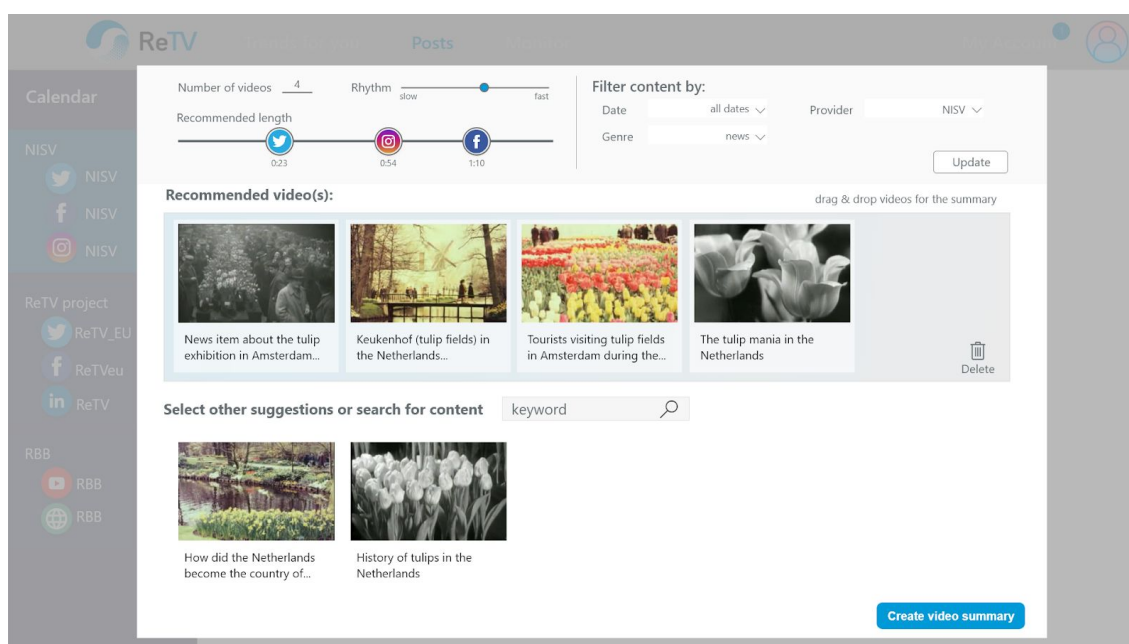

Figure 4. The content recommended by the tool based on the selected topic

3.2.4 Video Summarisation

The next step in the Content Wizard workflow is the preparation of video content for publication. Users expressed that automatic summarisation of video content would encourage them to publish more content online. For this feature to work, the users need a function that

creates summarised videos of different lengths, in this way customising them for publication on different vectors.[4]

Internal tests with the video summarisation algorithm helped to identify additional variables that could help users to efficiently create high-quality content. Namely, the rhythm of the video (how quickly individual scenes chamge in the summarised video) and the ability to summarise multiple videos. The user requirements clearly indicated that users would like to maintain control over the automatically generated summaries and have the tools to manually edit video files. The following editing functions have been proposed in the wireframes:

- review the composition of the video summary - rearrange the shots, change their length, insert clips from other videos into the automatically generated summary.
- cropping - crop the video according to the optimal dimensions required for each media vector.
- download - download summarised videos for additional editing with specialised software.
- thumbnail - change the automatically generated thumbnail by manually select it from the video or uploading a custom image.
- sound - mute/unmute sound in the video or add a custom audio track.
- subtitles - turn on/off subtitles (if available with the video).

During the evaluation of the Content Wizard prototype, feedback was gathered about the usefulness of these editing functions. The users were also asked to identify missing functions.

3.2.5 Scheduling and Publication Recommendations

Professional users indicated that recommended publication time would help to increase audience reach and engagement. The recommended time should be personalised to each vector connected to Content Wizard based on the audience engagement with it; e.g. if Twitter account followers are more active at 17:00, then the tool should suggest to publish a new post at that time to ensure maximum reach. The professional user still maintains the editing right to change the suggested time if needed.

Furthermore, professional users stated that automatically suggested text to accompany their video content would significantly optimise their current workflows. In the wireframes, this is translated into two features: the suggested text with a link to the original video in the text box and popular hashtag suggestions relevant to the topic that users can choose to add.

When testing the wireframes, professional users also noted that each social media vector comes with specific requirements (e.g. length of a post on Twitter, metadata categories that a user needs to fill out before uploading a video on YouTube). To optimise the workflow, these would have to be integrated into the Content Wizard interface.

3.2.6 Monitoring

The survey for professional user requirements indicated that users would find it very useful to monitor audience engagement with their content and see these analytics in the same tool that they are using for content publication. Based on this input, a Monitoring tab was created in the

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[4] For example, optimal length for videos on Twitter is less than 30 seconds; Instagram - less than 60 seconds; Facebook - less than two minutes. These platforms also have a limitation on the maximum length of the video that could be uploaded.

wireframes (see figure 5). It would provide users with an overview of the published posted and a recommendation for improving audience engagement.
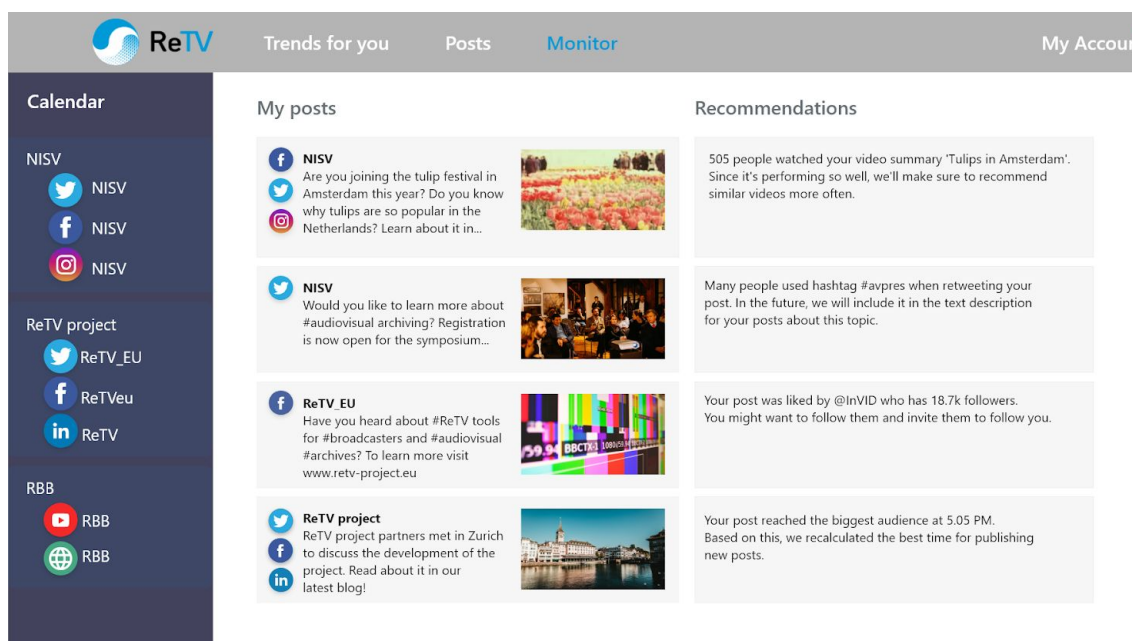

Figure 5: The monitoring of audience engagement with content produced using Content Wizard

During the tests with the Content Wizard wireframe, professional users indicated that it would be useful to receive notifications from the tool with updates about audience engagement with their content, recommendations for relevant topics for future posts and activities within the team.

3.2.7 General Workflow

During the discussions about the wireframes, professional users indicated that they need functionalities that support the use of the tool in teams. For this reason, in the Content Wizard scenario, users could be restricted to specific rights (admin, editor, view only), assigned specific tasks (e.g. review a post, edit a video) and share the work on the same projects.

The wireframe was created for a scenario where the Content Wizard tool would be used on a desktop computer, but consultations with professional users indicated that a mobile version would also be necessary.

4. PROFESSIONAL USER PROTOTYPES

Based on the wireframes and the user scenarios described in the previous chapter, the first stable prototypes for Topics Compass and Content Wizard scenarios were developed by the technical partners (WLT, CERTH, MODUL, Genistat). The purpose of these first prototypes was to evaluate them with professional users and based on their feedback, confirm the usability of the functions implemented so far, and identify necessary changes that will be made for future iterations.

While the prototypes are two separate components, it was still important to showcase the scenario in which these two TVP components could be used together by professional users. Therefore it was decided to test them in sequence and prepare a script that follows one continuous workflow - demonstrating how a professional user would be able to find a trending

topic on the Topics Compass dashboard and publish content related to that topic using Content Wizard.

This chapter describes the technical implementation of both prototypes, focusing on interface configurations and workflows. It also reports on how the industry partners customised them by selecting data sources and content suitable for the professional user tests.

4.1 TOPICS COMPASS

Based on the discussions during the Topics Compass scenario preparation stage, webLyzard created an instance of their dashboard which was used as the TVP Visual Dashboard prototype. The section below presents the front-end configuration of this prototype for the media professional at broadcaster organisations and media archives.[5]

4.1.1 Content Preparation

In preparation for the TVP dashboard evaluation, the industry partners prepared lists of data sources that would be crawled and integrated into the dashboard. Since NISV and RBB were testing the prototype with professional users from their respective countries, it was important to select sources that the testers would understand, recognise and could imagine using in their daily workflows. Therefore for testing purposes, two separate accounts were created for German and Dutch testers at RBB and NISV and each partner prepared and used sources in their native languages.

For professional user tests, NISV and RBB prepared the following data sources relevant for German and Dutch media professionals who were going to test the Topics Compass scenario (figure 6):

- News media - Dutch and German news websites, including websites reporting on national and regional news.
- Social media - Twitter, Facebook and YouTube accounts of prominent celebrities and organisations in the Dutch and German broadcasting and media domain.
- TV/Radio - websites of Dutch and German TV and radio channels, both private and public, regional and national.

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[5] The technical implementation of the dashboard will be reported in the deliverable D4.2: Trans-Vector Platform, TVP Dashboard and Revised Prototype (WLT: M24).
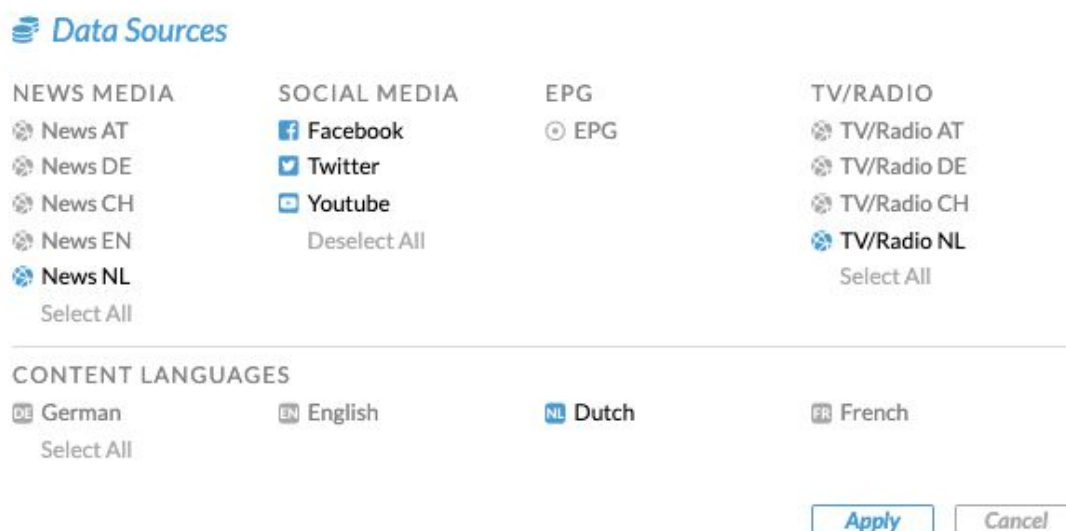
Figure 6: Screenshot of Data Sources tab on TVP

Using these data sources allowed NISV and RBB to showcase topics and trends that professional users testing the prototypes would be closely familiar with and could easily relate to. It was decided to preselect one specific topic that would show the testers how the analytics and visualisations in the dashboard could be used to explore a particular trend.

To demonstrate how broadcasters and media archives could customise the dashboard and identify topics related to their content, NISV predefined a bookmark 'Popular Topics' which saved a list of keywords related to the most popular topics in the Open Images[6] collection used in the Content Wizard test (see chapter 4.2.2). With the help of this bookmark, users would be able to find trending topics that are also covered in their archival footage, thus discovering opportunities to reuse that content and publish it again. A preselected topic allowed users to explore various dashboard visualisations. Based on the dates that the tests were scheduled for, the Tour de France an international cycling competition, was selected as the main topic for exploration. This was as it was taking place around the same time as the tests, therefore presented an interesting case for monitoring its coverage in very recent data sources. For the same reasons, RBB decided to choose the Berlin Finals[7], a sporting event in Berlin that combined the decisions in ten German championships, and the regional elections in the State of Brandenburg. The Tour de France was widely covered across different media channels in the Netherlands and the same applied to the Berlin Finals and the Brandenburg elections on the German news market. This guaranteed that both test groups were familiar with the topics presented to them. What is more, these topics were provided enough data to fully showcase the capabilities of the dashboard.

4.1.2 User Interface Configuration

Based on the Topics Compass scenario preparation and the professional user requirements, specific dashboard configurations were predefined for user tests at NISV and RBB (see table 1). These configurations showcase how the dashboard could be tailored and personalised to the specific needs of broadcasters and media archives. Figure 7 below demonstrates how these

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[6] http://openimages.eu

[7] https://finals2019.berlin.de

configurations were visualised in the TVP Visual Dashboard instance for tests at RBB with German data sources.

Dashboard components	RBB version	NISV version
Selected Data Sources	News (German), Social Media (Facebook, Twitter, YouTube), TV/Radio (German)	News (Dutch) Social Media (Facebook, Twitter, YouTube), TV/Radio (Dutch)
Content Language	German	Dutch
Date range	1st test day: 31 July - 7 August 2019 2nd test day: 2 - 9 August 2019	15-29 July 2019
Visualisations	Trend chart (Share of Voice), Tag cloud, Keyword graph	Trend chart (Share of Voice), Tag cloud, Keyword graph
Content Aggregation	Drill down mode	Drill down mode
Bookmarks	Berlin Finals, Brandenburg election	Popular Topics
Documents	List view Entities (persons)	List view Entities (persons)

Table 1: TVP dashboard configuration for the professional user test

Figure 7: TVP dashboard instance with RBB settings for professional user tests

4.2 CONTENT WIZARD

This section describes the technical preparation of the tool for the Content Wizard scenario and explains how the content used in the evaluation was selected.

4.2.1 Technical Implementation

The professional user feedback on the Content Wizard scenario wireframes made it clear that a lot of standard functionality on top of automatic re-purposing would have to be implemented in order to make editors use the tool on a daily basis. Such standard functionality includes integration with all major social media platforms, calendars that show planned posts, management of access rights and a video editor that can handle all the visual formats of social media platforms. Through Levuro, a sister company of Genistat, the project partners have access to such a social media publishing platform - Levuro Engage.[8] To focus the project efforts on the features that would generate the highest impact for professional users, it was decided to build the Content Wizard tool on top of the Levuro platform, which saved considerable efforts in frontend-development time that was instead spent on the implementation of modules that were core to the professional use case scenario.

The purpose of the Content Wizard tool is to access media from different sources, mix and edit these and publish the results to social media platforms. Examples of media sources are storage clouds, Zattoo TV Channels, media from the Europeana Digital Service Infrastructure and many more. The Content Wizard can publish the media results to social media platforms such as Facebook, Instagram and YouTube. The Content Wizard takes into account that the video needs to be altered for certain social media platforms.

In the editor, videos can be mixed together from different sources (see figure 8). Irrelevant scenes can easily be removed. Furthermore is it possible the add text overlays and image overlays (e.g. logos). Once the editor and the campaign collaborators are satisfied with the results, they can be posted to multiple social media channels.

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[8] Levuro is also fully owned by Bea Knecht, the innovation manager of ReTV. A formal contractual agreement guarantees the availability of Levuro Engage to the ReTV consortium for usage purposes and to Genistat for development.
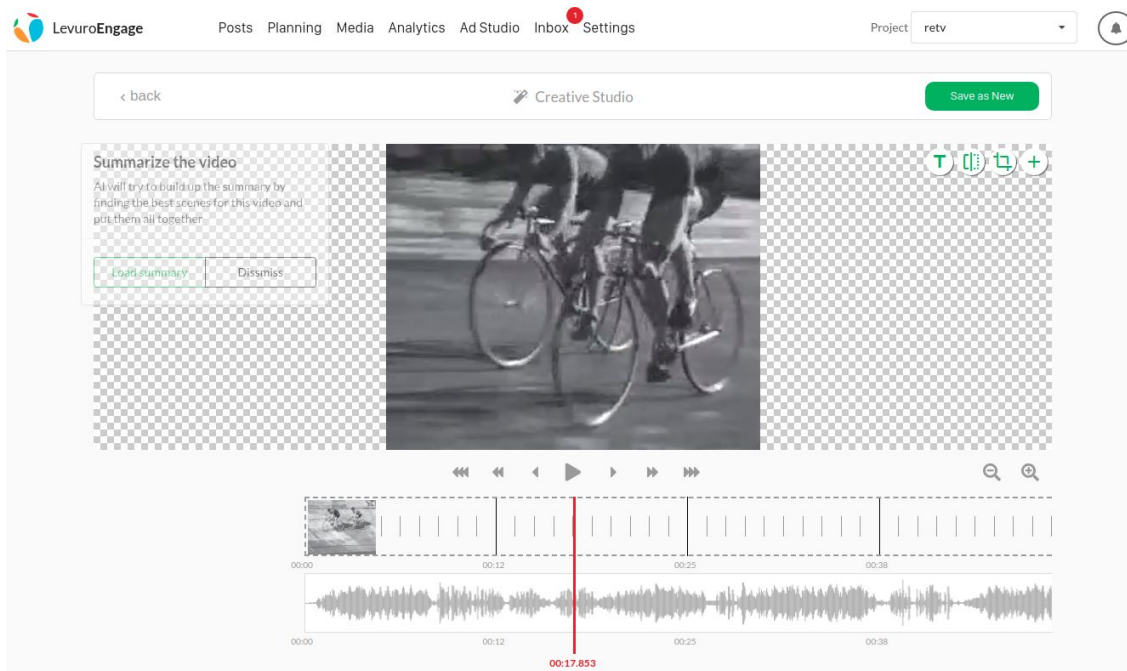
Figure 8: Content Wizard Video Editor. In the top right, functions like text overlay, cut scene, crop and add video are available

GENISTAT adapted the frontend of Levuro Engage to use the APIs provided by the TVP modules of WP1-3. The workflow for video summarisation was fully implemented. When a video is uploaded to the tool, either manually or through an automatic import (e.g. immediately after a show is broadcast), the GENISTAT scheduler triggers the feature extraction through the CERTH Video and Fragmentation service. The extracted video features (e.g. temporal segmentation data, extracted concepts, detected objects) are then stored in the GENISTAT feature storage. When a user opens a video, the tool displays a 'Load summary' button. Clicking this button triggers the CERTH Video Adaptation & Repurposing system which uses the previously extracted feature. This allows offering almost instantaneous video summarisation.[9] The video editor displays the video segments that the summarisation service returns, and invites the user to make manual changes. See figures 9 and 10 for screenshots of the summarisation in action on NISV content.

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[9] See deliverable D3.2 for a detailed technical explanation of the video summarisation components.

Figure 9: A video before the "Load summary" button has been pressed.

Figure 10:. A video after the "Load summary" button has been pressed. The list shows the scenes kept in the summary.

The workflow for the scheduling supports manual scheduling of posts. Figure 11 shows how a post is scheduled three days into the future as of time of writing. Post can also be scheduled to be posted to multiple vectors at once (in the example below, to Twitter and Facebook). In future iterations of the prototype, the tool will call the scheduling API to populate the times in the "planned at" dropdown menu. This would allow the user to override the automatic scheduling, a feature important to professional users. Automatic scheduling is not yet integrated but will be in the final version of the Content Wizard scenario. See deliverable D3.2 for the current state of the scheduling components.
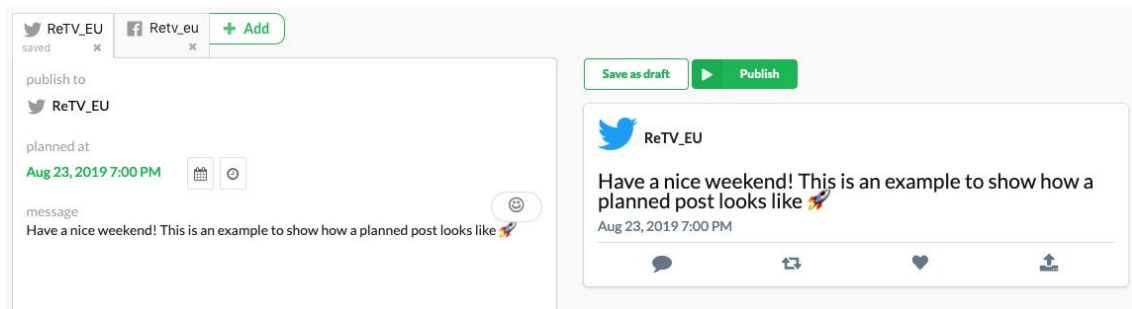
Figure 11. An example of how a post can be scheduled into the future for multiple vectors.

Scheduled as well as past posts across vectors are visible in the planning view (see figure 12).
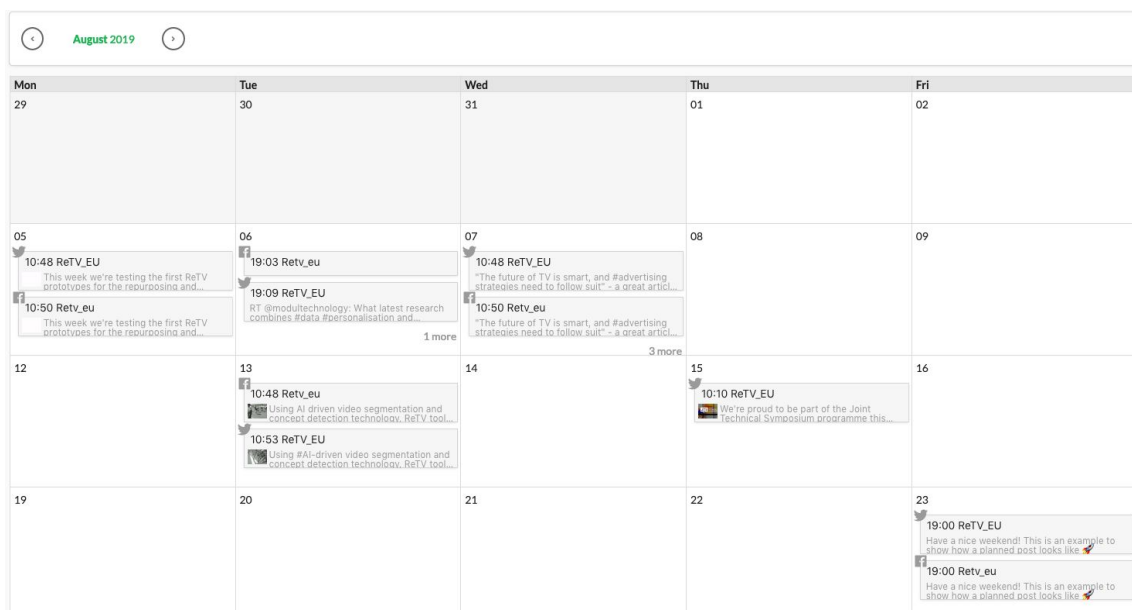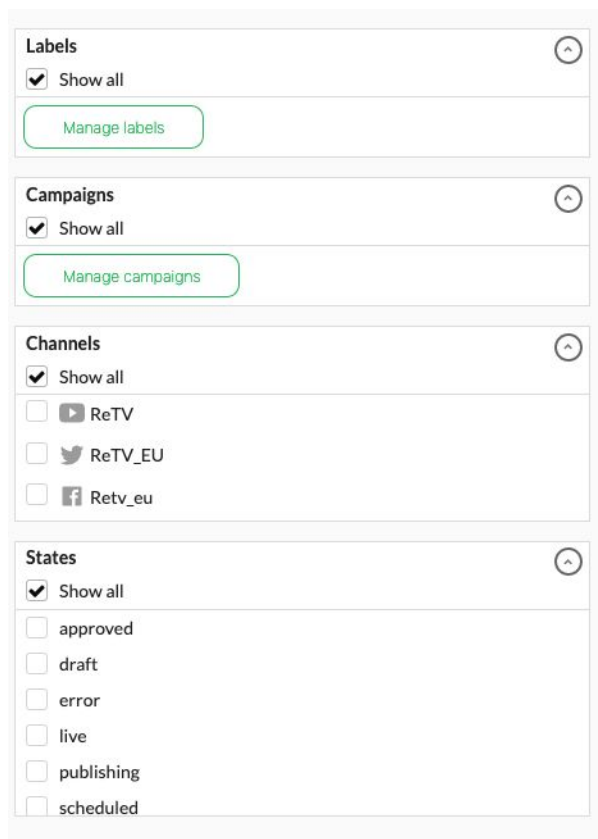

Figure 12. Calendar view displaying past posts and scheduled posts (bottom right corner).

The planning view also supports filters by state, labels and campaigns. Those can be used to support multi-user workflows, where senior team-members need to approve content or when different campaigns with different goals or different audiences are being run (see figure 13).

Figure 13: The filters of the calendar view.

The Content Wizard is currently a separate tool from the Topics Compass. User feedback indicates however, that they would like to be able to access both. This integration will be part of the next round of implementation.

4.2.2 Content Preparation

To showcase and evaluate Content Wizard and its capabilities for video summarisation and publication across digital media vectors, the industry partners preselected videos from their collections that could be used during the tests with professional users.

NISV provided content from the Open Images collection. This collection consists of audiovisual archival materials aggregated from various Dutch and European collections and organisations. 2,124 videos in this collection are published under an open license, namely Creative Commons or Public Domain Mark. These are primarily videos from the Polygoon collection; Dutch newsreel footage dating from the 1920s until 1987. It was decided to use content from this collection since open license meant that the content was available for repurposing, remixing and publication online, and therefore could be used to illustrate all the features of the Content Wizard scenario.

RBB provided content from its media archive. All videos were previously broadcast in various programmes of the RBB. The decision for their use was taken despite the limited possibilities of use, i.e. no publication in public channels due to legal requirements. The reason for this was that the testers, as already mentioned all representatives of different RBB editorial departments, were able to experience the features of the Content Wizard on the basis of

actually available and familiar material. In effect, the scenario reflects actual editorial conditions as closely as possible.

For testing purposes, NISV and RBB each compiled a small selection of videos pre-selected from their collections (see figure 14). As mentioned above, since the evaluation for both professional user scenarios was conducted in sequence, the same topics were used for Topics Compass and Content Wizard, allowing the testers to see how these tools could be used together in workflow. Eight videos that relate to the Tour de France (footage from Tour de France, reports from other cycling competitions) were selected by NISV from the Open Images collection. RBB made available 15 videos about the Berlin Finals.
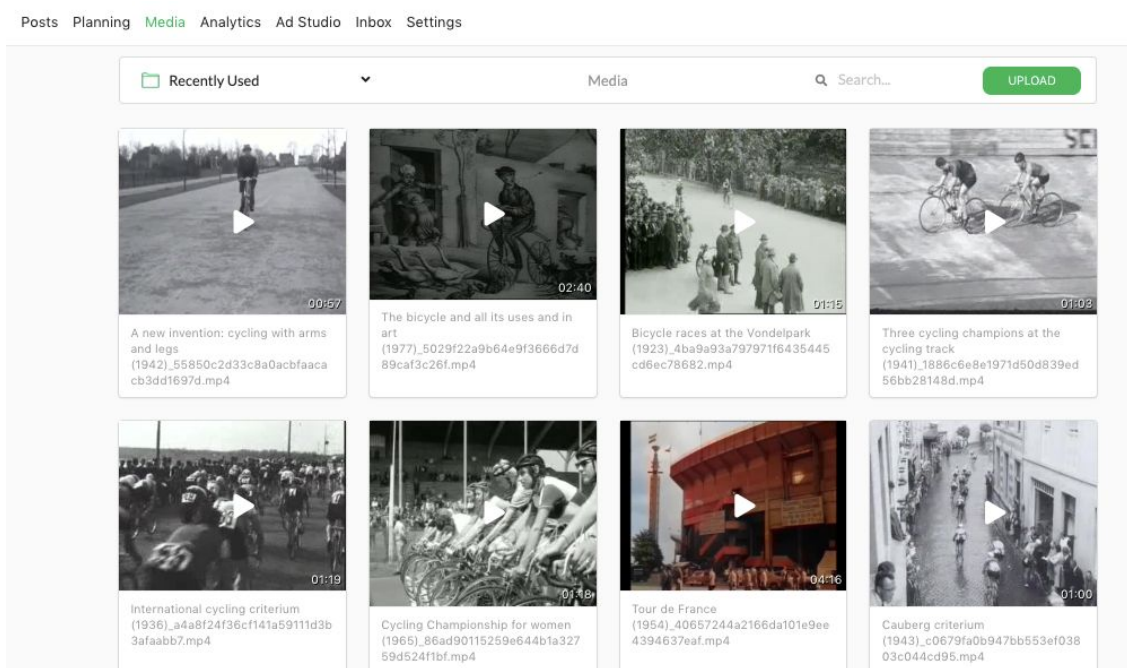

Figure 14: Screenshot of Content Wizard media library with NISV content

In future iterations of the Content Wizard prototype, it will be possible to scale and integrate the whole NISV Open Images collection into the tool via an API. Also, the partners could test how the rest of the broadcaster collection at NISV could be integrated into Content Wizard but this could only be tested in a safe environment due to copyright restrictions and would not be available for publication online. In addition, the possibilities will be investigated as to how instances of the RBB media archive, e.g. the currently used Video Production Management System or the Web CMS archive, can be connected to the Content Wizard from technological and legal perspectives.

5. VALIDATION OF THE PROTOTYPES

This section describes the results of professional user tests conducted by RBB and NISV to evaluate the Topic Compass and Content Wizard prototypes.

5.1 Methodology

15 professionals users were involved in the evaluation of the prototypes - 5 professionals from NISV and 7 from RBB, representing editorial and research and innovation departments, and 3 representatives from Dutch broadcasters.

NISV and RBB used a guided user test to evaluate the prototypes. Users ran through each user scenario in respectively the English and German language, following a similar script. The testers first received a brief introduction about the tools and their main features, and then they were asked to follow along a predefined workflow using data sources and content described in Chapter 4.

Both qualitative and quantitative feedback was gathered during the tests. During the tests, users were encouraged to ask questions and provide immediate feedback on various features of the prototypes. At the end of each user test, users were presented with detailed questionnaires that aimed to evaluate the usability of each tool and get professional user input on the proposed features that will be integrated in the future. The same questionnaires were used for testers invited by RBB and NISV in order to perform comparative analysis and assure consistency.

The prototypes for Topics Compass and Content Wizard scenarios were shown in sequence to exemplify the workflow in which these two TVP scenarios could be used together. As already mentioned in Chapter 4, RBB and NISV each selected one topic (Tour de France, Berlin Finals and Brandenburg Elections respectively) to demonstrate how a professional user would be able to monitor and analyse it in the TVP dashboard and publish video content about it using the Content Wizard tool.

5.2 Topics Compass - TVP Dashboard

In the first part of the test, professional users were asked to evaluate the TVP Visual Dashboard prototype for the Topics Compass scenario. Following along a predefined workflow, users were able to see how different features of the dashboard work and evaluate their capabilities for monitoring and visualising trends in digital media sources. The section below presents the qualitative and quantitative feedback on the main features of the dashboard.

5.2.1 Data Sources

During the test, the users were introduced to the different data source categories that NISV and RBB integrated into the dashboard for testing purposes: news media, social media and TV/Radio. Throughout the test, they could see what results these different data sources could produce.

When asked to rate the usefulness of each data source, users indicated social media and news media sources would be the most useful (93.33% of users rating them useful), followed closely by TV/Radio sources (86.67%). During the test, users worked with data sources in their native languages but were also introduced to an option to explore data in foreign languages - 40% of users thought that they would be useful (see figure 15). The user interface supports multilingual translation therefore users can analyse data sources from multiple languages in their preferred language.
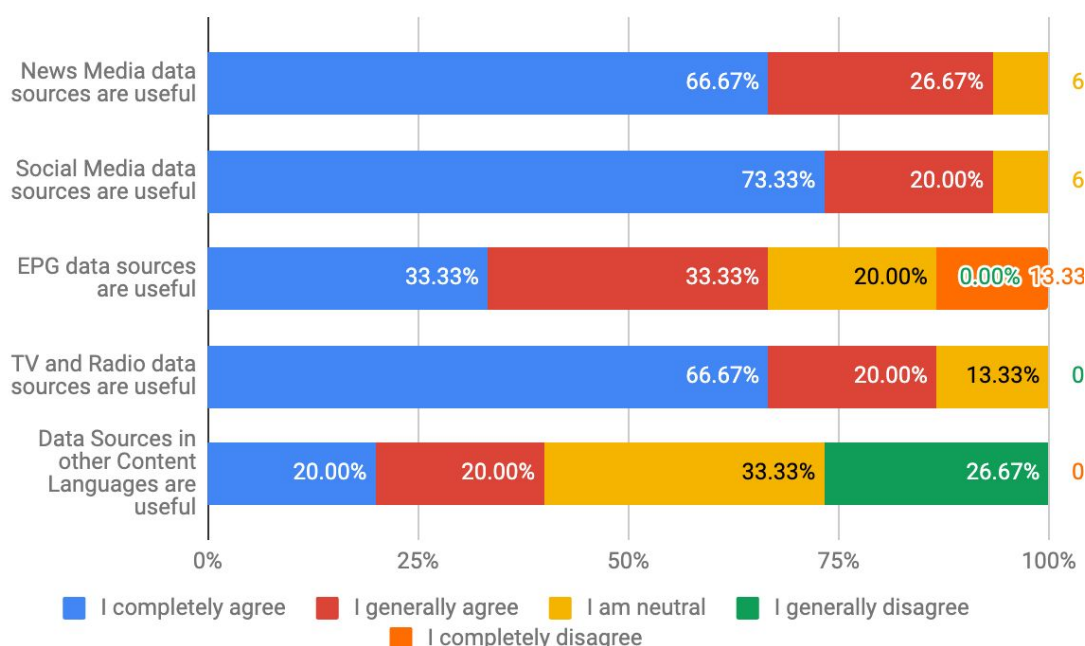
Figure 15: The usefulness of various data sources.

User identified that the most useful social media sources for trend monitoring and analysis were Facebook and Twitter, with 100% of users indicating these were important. This was followed closely by Instagram[10] and YouTube at 93.3% and 80% respectively (see figure 16). When asked about other social media platforms useful to monitor, two users indicated that LinkedIn would be a good source. One user commented that in future it would be useful to iteratively evaluate new social media platforms for trend monitoring.
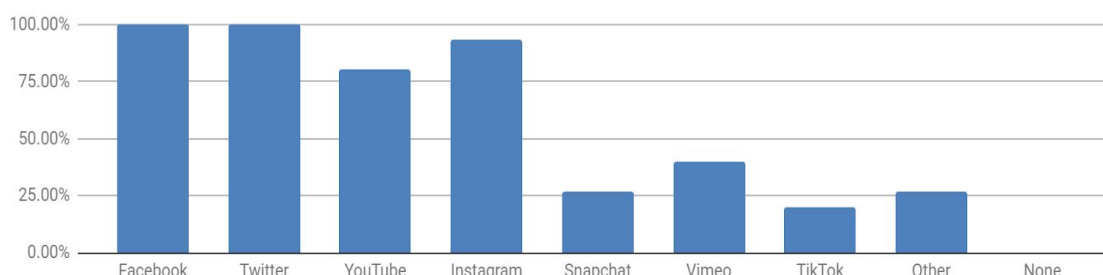

Figure 16: Data from the social media platforms users would like to use in the dashboard

During the test, users indicated that they would like to have more access over the data sources - see what the full list of sources and be able to manually add and remove them. What is more, users mentioned that while it is useful to monitor trends using a large list of sources, they would also like to narrow the search down to a smaller set of specific data sources that are relevant to a campaign that they might be working on.[11] For example, a clear result from the tests at RBB was that different editorial departments need different sources. As some editorial departments work in a regional area, the data sources that we predefined before were not specific enough to get satisfying results. This problem came up by using the search term

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[10] Integration of data sources from Instagram is currently not possible due to restrictions on the Instagram API for third party access.

[11] This feature was already available in the first prototype but was not specifically shown during the test.

'Brandenburg Election' and trying to go deeper into the topic. The search provided documents and association about politics in general, not specifically data sources related to this particular election. But even with unsatisfactory results regarding the 'Brandenburg Elections', it quickly became clear that the tool could be particularly exciting in terms of predictions for their daily work.

In general, users gave positive feedback about the ability to compile a list of data sources that would be aggregated for the dashboard, enabling them to customise it to their needs and monitor the data sources relevant to their work. However, some users also highlighted the risks of creating an 'information bubble' by using only a carefully selected and predefined list of data sources. Therefore users would like to both have the option to personalise the dashboard by making a customised list of sources but be able to discover topics and trends outside of the predefined sources.

5.2.2 Search through Data Sources

For the test carried out by NISV, the 'Popular Topics' bookmark was used as a starting point. In the associations tab, users could see that the closest semantic association to this bookmark was 'tour de' in reference to the Tour de France tournament - this happened primarily because Open Images collection covers a lot of topics related to cycling and these were included in the definition of the bookmark. Other associations were more generic (e.g. music), reflecting on the fact that the keywords defined for the bookmark were too general as well and more specific bookmarks should bring more detailed results (see figure 17). For example, when users narrowed down the search to 'tour de', they were able to find relevant and more specific association - primarily, names of the leading cyclists in the competition.
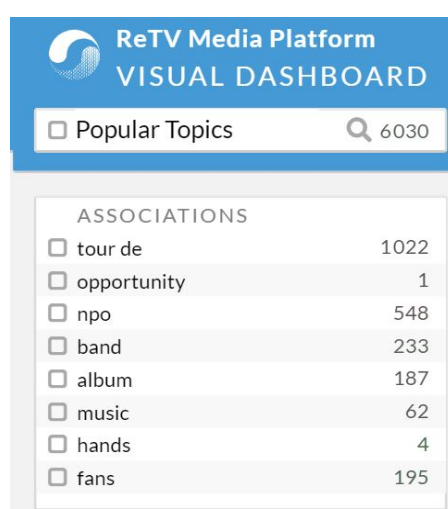

Figure 17: Association for the 'Popular Topics' bookmark on the Topics Compass dashboard

For RBB tests, the associations related to 'Berlin Finals' included more general terms such as 'Deutsche Meisterschaft' (German Championship), but also various specific sport events and individual athletes. When focusing on the world swimming championship that took place the previous week, associations focused more on the swimmers and their various competitions. For the 'Brandenburg Elections' topic, the outcome was not as good as expected. The issue was that national sources took precedence over the few regional ones. The outcome included a lot of political associations but insufficient information related to elections in Brandenburg. In this case, more advanced user could filter the search results to explore only the regional sources

and remove the national sources. In general, most of the users in the survey thought that the associations were clear (80%) and useful (86.7%).

The users could further explore the coverage of their search topic by selecting different categories of data sources and sentiment in the metadata tab. In the survey users positively evaluated the metadata tab in terms of its usefulness to refine the search results (80%). 53% thought that the sentiment analysis was useful but the score could have been affected by the fact that the sentiment analysis for Dutch sources had not been fully implemented at the time and mostly showed neutral results.

Users also found it very useful to narrow down their search results to specific dates. All users indicated that they would use a timeline view or calendar view to select a particular date range, and 93% like the option to automatically select the last couple of days, weeks or months.

The users also very positively evaluated the bookmark feature, which allows users to save custom searches. 80% of the users thought the bookmarks feature was useful and more that 95% would use the function to create their own bookmarks. Professionals from NISV editorial team suggested that this would be a useful feature when working with a team. That way, each person could create their own folder with their bookmarks but multiple users would be able to monitor them.

The users were also introduced to the tooltip feature which can be used to narrow down or expand the search results (see figure 18). During the test, users mentioned that they would need more time to test out this feature understand and how it works. The responses in the questionnaire mirrored this as only 40% of the users indicated that they found the tooltip features clear. However, 54% thought that the tooltip could be useful for navigating the search in the dashboard.
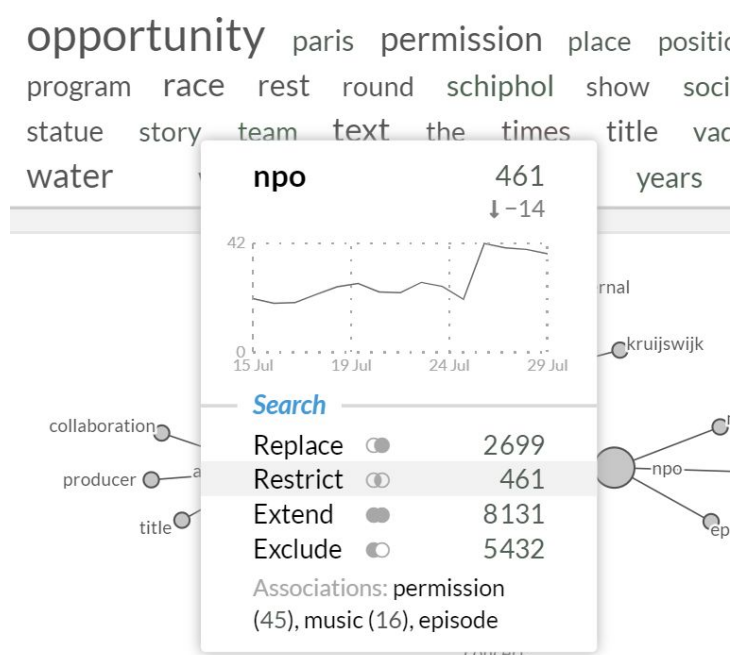

Figure 18: Tooltip function

For the testing purpose, both RBB and NISV predefined a set of parameters to customise the view of the dashboard when users first logged in (date range, data sources, selected

bookmarks). 67% of users indicated that they would like to set up this kind of configuration themselves.

5.2.3 Visualisations and Documents

A lot of focus was placed on evaluating the usability of different visualisations that the TVP dashboard provides. Firstly, users explored the Share of Voice chart, which is a line graph that displays the measure of attention to the topic in the media. During the test, some users immediately indicated that the trend chart could be cleared in terms of what information it displayed. Namely, that it would be useful to include keys and legends to the graphs in order to make the information more readily readable. This is further confirmed by the questionnaire results as only 66.7% of the users thought that the trend chart was easy to read. Nevertheless, 86.6% of the users thought the trend chart was a useful tool for visualising trends in media sources (see figure 19).
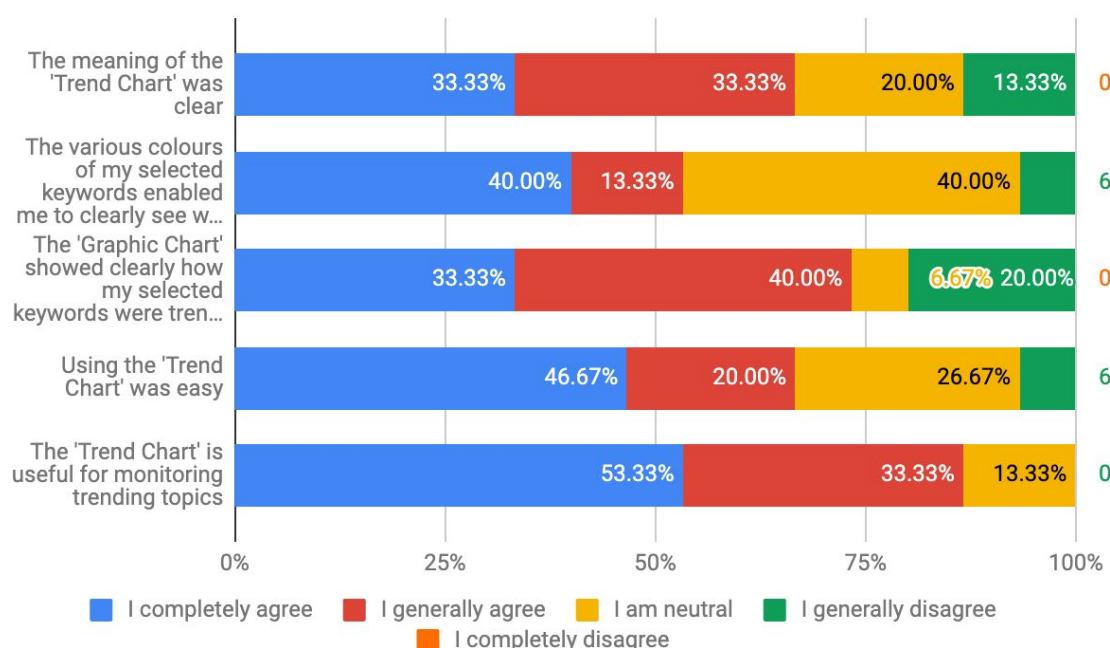

Figure 19: Evaluation of the Trend Chart

In the tag cloud, user could explore the most relevant keywords to their search topic. The size and colour of the words indicated the importance and sentiment. 67% found that it could be a useful visualisation for the search. Slightly smaller number of users (60%) found the keyword graph useful; this might be due to the fact that 20% of users thought that this graph that shows the search terms with its strongest associations in a semantic network was not entirely clear.

The users were also asked to evaluate the section of the dashboard which displays the documents (e.g. Twitter posts, experts of website articles) related to the current search. 80% of the users found that working with 'Display Results' was easy and 93.3% found them useful. The only point that could be improved would be the presentation of documents, as 33.3% of users thought it was not clear.

5.2.4 Reporting

Finally the report feature was shown to the users. With this feature users can download the visualisations and have summaries of the searched topics (see figure 20). Over 75% of the users thought that it was useful to download reports as a PDF file and 86.7% liked the option of personalising the content which the PDF would contain. Currently users can generate individual reports for separate areas (i.e. 'Reports', 'Documents', 'Datasets' and 'Visualisations'), and 80% of the users indicated that additional option to generate data for all areas simultaneously would be useful.

Figure 20: Data export option on the TVP Visual Dashboard

5.2.5 Prediction

Predictive analysis is one of the features that will be integrated in the upcoming version of the Topics Compass dashboard; the professional user tests presented an opportunity to assess professional user opinion about this feature and its potential use in their daily workflows. During the test, NISV and RBB indicated how the prediction feature would work and prepared examples based on real prediction calculations to demonstrate how it could be used for advance planning of editorial activities (see figure 21). Nearly all users (93%) indicated that the most useful feature would be the topic-related prediction, i.e. the prediction of the popularity of a specific topic in the near future.
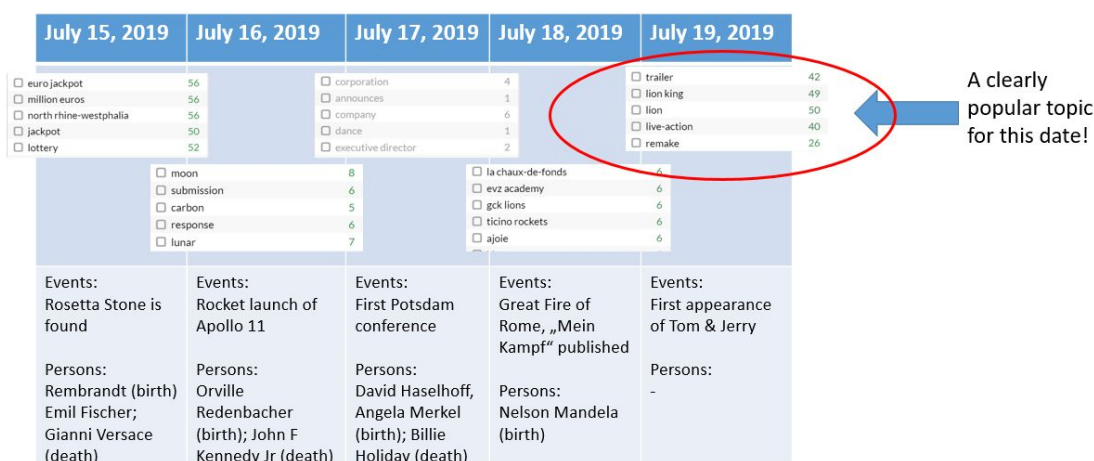

Figure 21: Example of predictive capabilities of Topics Compass scenario

Prediction is particularly helpful in the daily media workflow, e.g. for planning an upcoming broadcast. All testers were interested in trend prediction and wanted to know why a trend was identified as a trend (see figure 22).
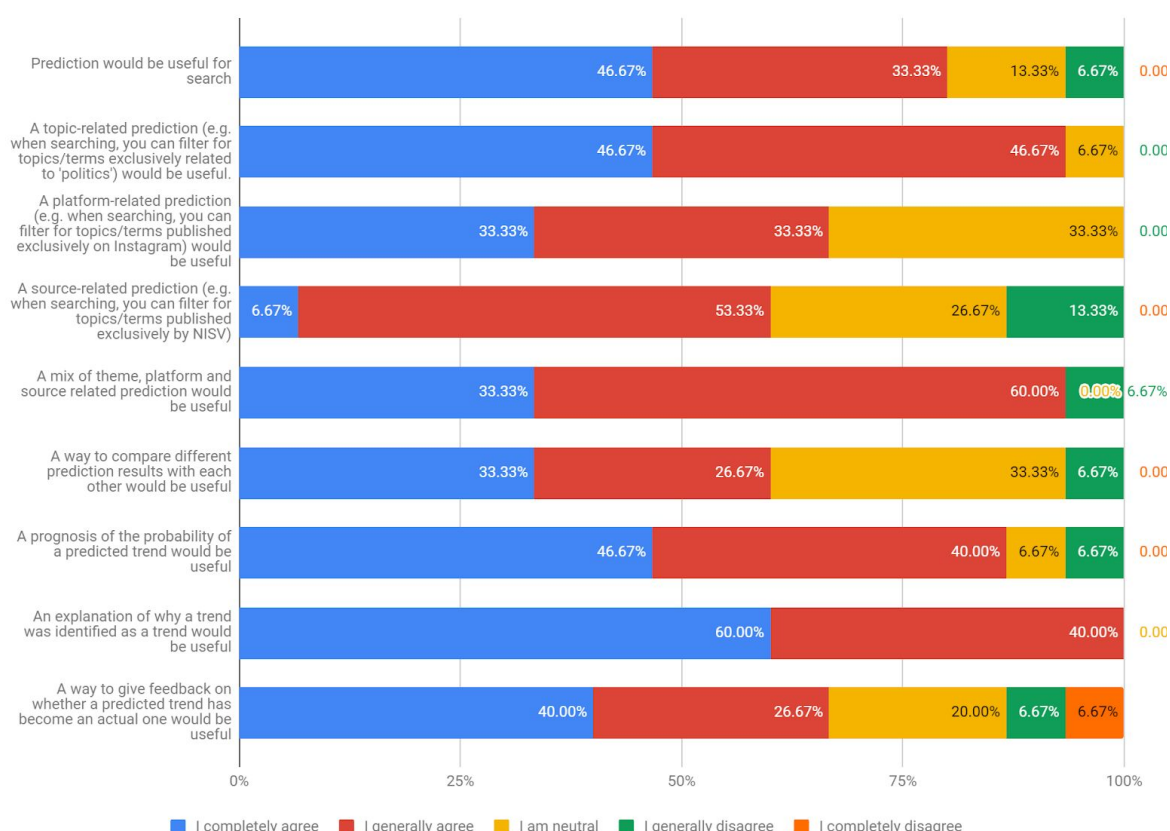

Figure 22: Evaluation of the prediction features.

Testers would appreciate having all three presented prediction options (Predicted keywords; Future events of interest; Trending terms - see Chapter 3.1). Also a mix of them was requested. The highest rated prediction option was the "Future events of interest", but only if it is connected to useful databases. In case of RBB, this could be the internal event and date database "Zeitlupe".

5.2.6 General Usability and Workflow

The users were also asked to evaluate the general usability and workflow of the Topics Compass scenario (see figure 23). More than half of the users indicated that the TVP dashboard would make it easier for them to search for topics while 80% agreed that it would help to decide for or against a topic as well as would help to discover new topics (80%).

In terms of replacing existing tools the users seemed more pessimistic as only 26.7% agreed while 40% remained neutral. Furthermore, 53.3% of the users thought that the dashboard would make daily work more efficient and 53.3% would integrate the tool into their daily workflow. These results indicate that while the users clearly see the value of the tool, optimising its usability and ease-of-use will remain important, and proper training will be required before deploying the tool with larger user groups.
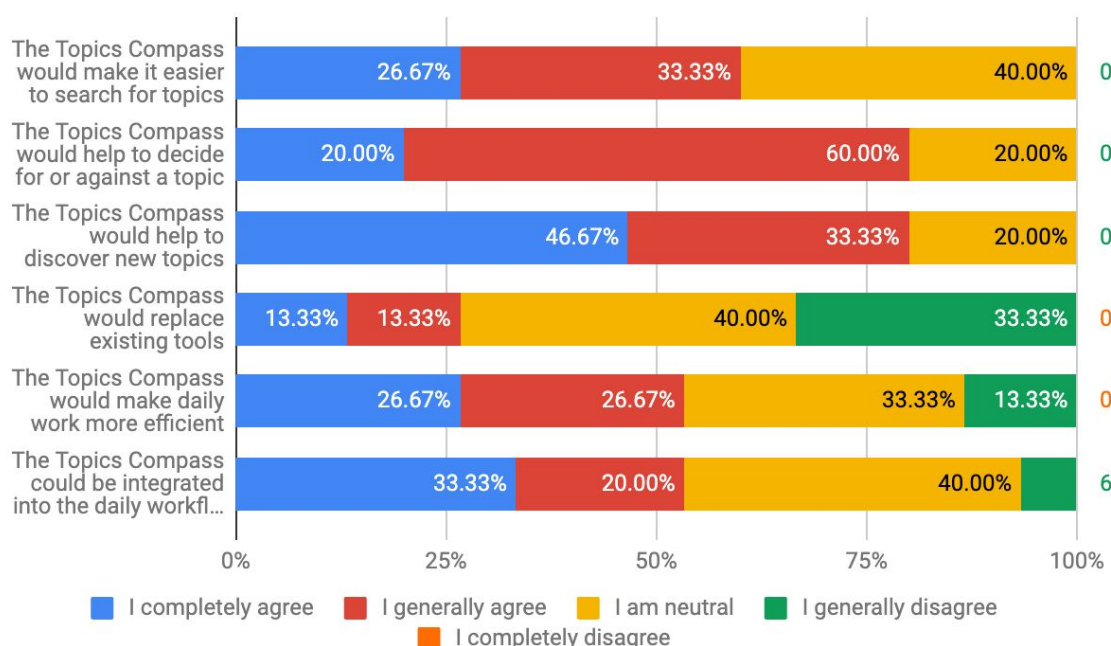
Figure 23: Evaluation of the Topic Compass scenario.

5.3 CONTENT WIZARD TOOL

In the second part of the test, the users were introduced to the Levuro Engage tool for the Content Wizard scenario. Same as with the Topics Compass evaluation, users were asked to give feedback about the various features of the tool and at the end of the test, they were asked to fill out a questionnaire. The results of this are presented below.

5.3.1 Video Summarisation

The users were asked to evaluate the video summary quality as well as some of its editing features. In the test, the users created their own content which was later shared on the ReTV social platforms.[12]

When asked to evaluate the quality of video summaries created during the tests, more than 75% of the users thought the summarised videos created clearly communicated what the full videos were about (see figure 24). 80% of the users said that they would use the tool to create video summaries for content from their collections. When asked to explain why they would like to use the tool, several users indicated that this is because the automatic video summarisation and editing features are easy to use for people who do not have editing experience. Several testers indicated that the tool would significantly improve their current video production workflow, making it more efficient.

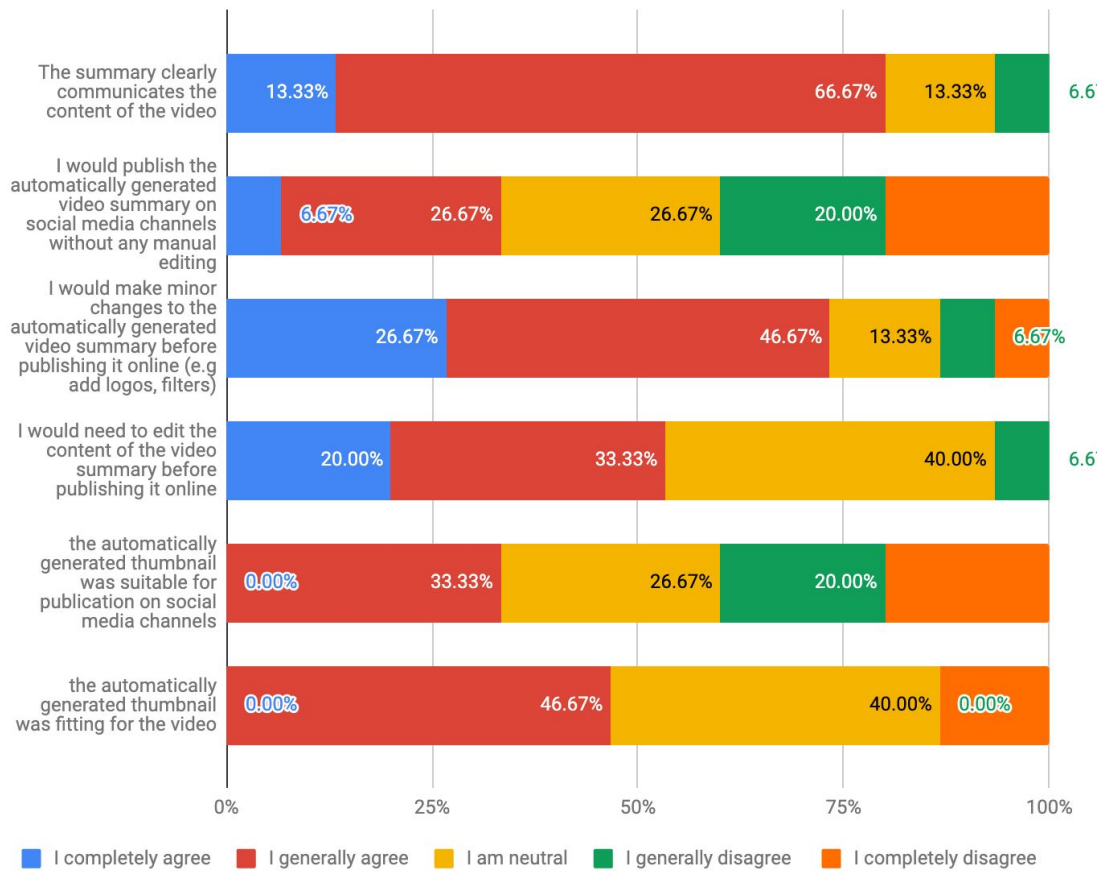[12] See www.twitter.com/ReTV_EU/status/1161199057668399104

Figure 24: Evaluation of the video summarisation

40% of users indicated that they would not publish the automatically summarised video without any additional editing. More than half of the users (66.7%) thought the video editing features which were integrated into the tool were useful. 93.3% of users responded that cropping, cutting and adding text functions were useful, 86.7% responded that downloading the video and further editing the material was a good feature, and 73.3% thought that free drawing and adding stickers was useful (see figure 25). One of the users responded that it would be good to allow the overlays to be added on individual shots rather than for the entire video.

Figure 25: Content Wizard tool video editing functions

One video editing feature allows for different video crop taking into account the different formats of social media platforms. During the test, one user suggested that because there may be a lot information lost when cropping the videos, it might be good to add the option of adding borders and frames around the videos instead of cropping. Some other users mentioned that it may make sense to change the workflow so instead of the video summary being created first, the user could choose which platform they would publish on, then proceed to create a summary and finally be able to change the focus of each scene (by using the current crop feature).

Two main features that several users were missing are the ability to edit sound (mute/unmute, add custom audio) and add subtitles, either from the original video or manually entered by the editor, which would allow for a better consumption in social media. One user suggested that there should also be extra editing functions for the thumbnail and the possibility to adjust brightness and contrast levels for the video. Another user would like to have the option to choose the quality of the video if available (e.g. HD, 480 pixels). In general, users indicated that they would be very interested to try out the summarisation with their own content.

5.3.2 Scheduling and Publication Recommendations

66.7% of the users agreed that if the tool would recommend optimal time for publishing posts on different social media channels they would use this feature, and 73.3% indicated that they would still manually edit the recommended publication time for each social media channel. This makes sense as the content would need to fit into the overall strategy and planning for each team. 73.33% users also indicated that they would use the recommended text provided by the tools as well as the generated hashtags 86.67%.

5.3.3 Prediction

In terms of the possibilities to use the tool for predicting keywords and future events, all users (100%) indicated that they would like to get these recommendations. 73.3% found the calendar view useful to review these predictions. 80% of testers would also like to automatically get recommendations for video content related to the recommended keywords and events. Interestingly, less than half of the testers (40%) stated that they would fully trust these predictive capabilities, proving that professional users still need to stay in control of the content they are creating and cannot solely rely on automatic recommendations (see figure 26).
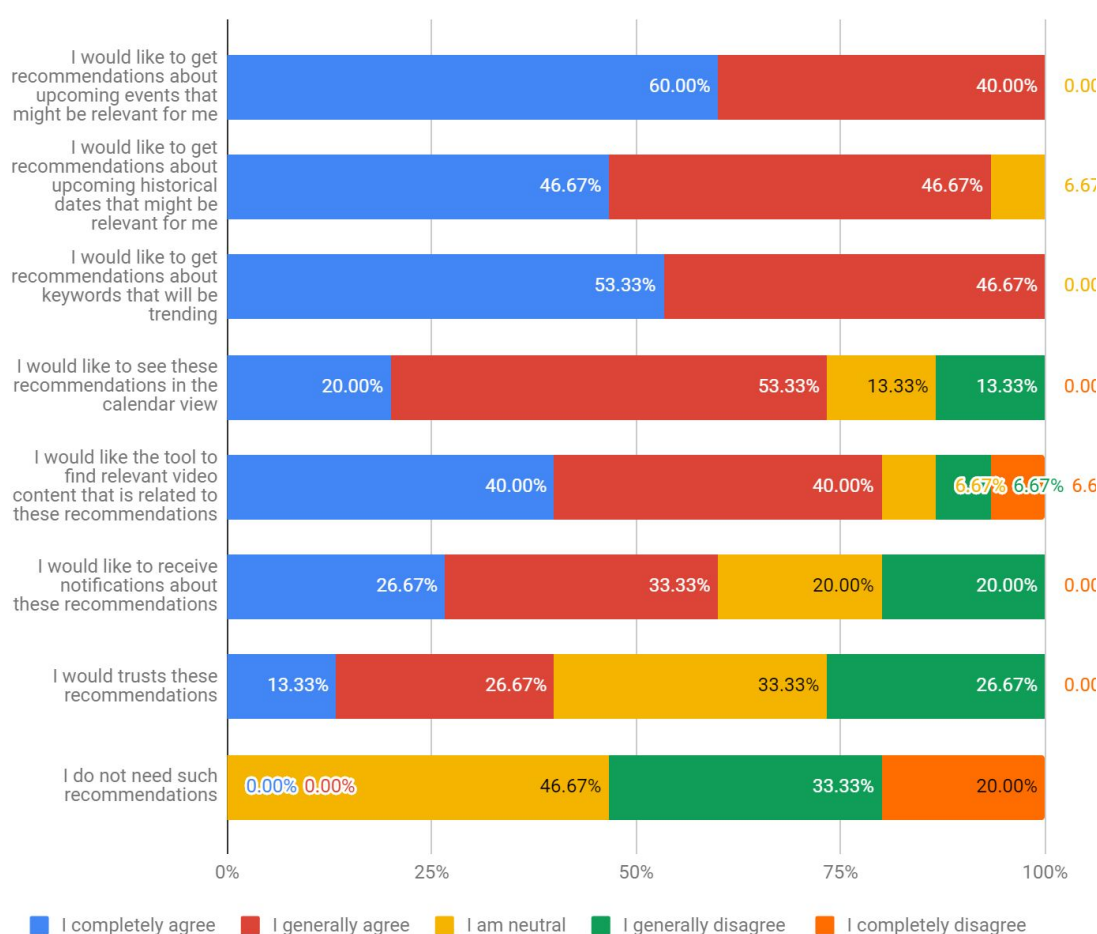

Figure 26: Evaluation of the prediction capabilities.

5.3.4 Monitoring

All users (100%) stated that they would like to monitor the performance of their content using the Content Wizard tool. 80% indicated that receiving notifications with vector-tailored recommendations for new content would support their current workflow and help them improve their content.

5.3.5 General Usability and Workflow

86.7% of the users indicated that the tool would help them publish across different media channels as well as create content tailored for the different publication platforms. 73.3% agreed that the tool would make their current publication workflows more efficient. For 80% of users, the Content Wizard scenario encourages them to publish more video content online (see figure 27).
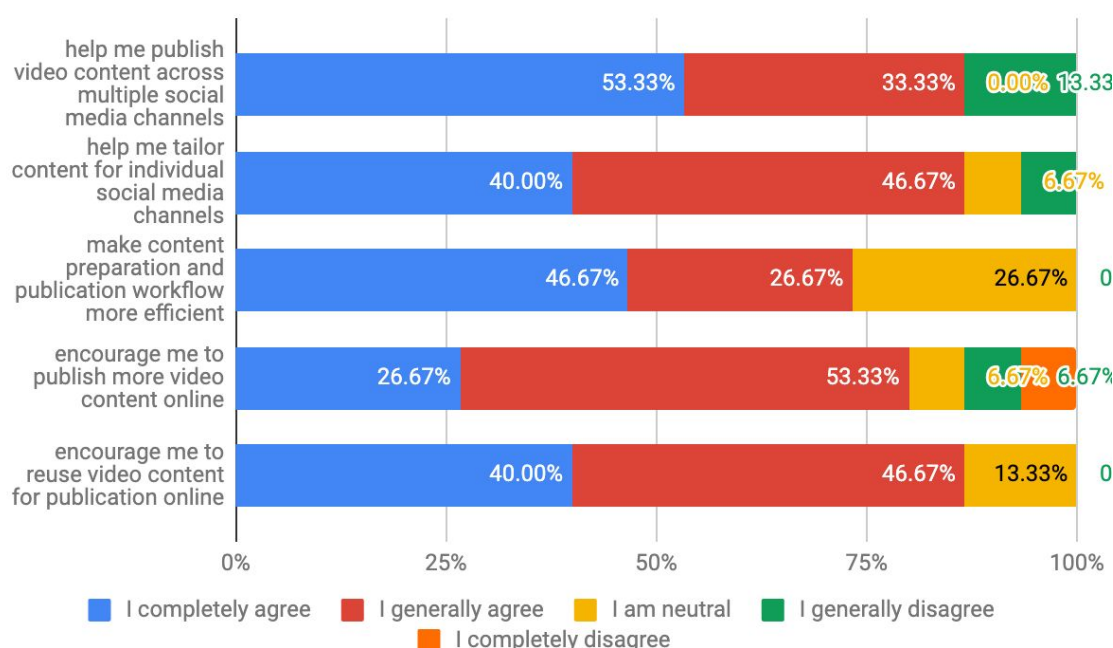

Figure 27: Evaluation of the usability of the Content Wizard senario

All users (100%) agreed that features for working in a team would be useful. The users would like to create different user roles (73.33%), share summarised videos with their colleagues for review before publication (86.67%) and assign tasks to different users (80%).

When asked if there were any features missing from the Content Wizard scenario, most users mentioned functions that are already planned for future iterations of the tool - possibility to publish content to a wider range of vectors (e.g. LinkedIn), improving the video editing functions, providing a clearer organisation of media content (e.g. create folders), adding/editing audio track to the summarised video. One user pointed out that it would be useful to provide links to the content management system and include information about rights management with each video.

The majority of the users (66.7%) indicated that they could use Content Wizard as a standalone piece, but even more (86.7%) answered that they would like to use it together with the TVP Visual Dashboard.

6 DISCUSSION

The evaluation of the Topics Compass scenario overall suggests that the TVP Visual Dashboard would help professional users navigate through and monitor the overwhelming amount of digital data sources in one place. This would significantly reduce the time needed to perform

the same task with multiple tools they are using now. The various visualisations provided on the dashboard allowed professional users to explore different aspects of their topic of interest and discover sufficient contextual information which could be used to create new content for publication online. Furthermore, professional user interest to discover new topics and trends outside of the predefined list of data sources raises interesting research questions that will be explored and tested until the end of the project.

Users are particularly interested in the features of the dashboard that could be customised to their specific needs and content - data sources, bookmarks, visualisations and prediction. These features would enable professional users to continuously tailor content to their specific publication vectors and audiences. The predictive capabilities and features that allow users to work in teams (e.g. "share a topic" function) would provide substantial support for editorial planning workflows that are currently labour-intensive and time-consuming - these will be introduced in the next versions of the TVP Visual Dashboard by the end of 2019.

The user feedback points to further optimisations of the current instance of the TVP Visual Dashboard in terms of usability and ease-of-use, coupled with more extensive training, so that users can extract and review information at a glance. The users would also like more clarity about the information that is displayed in various graphs and visualisations, including the reports; improvements addressing these matters are already planned for the upcoming update of the dashboard in September 2019.

During the tests, professional users often mentioned various social media planning tools they are currently using and their ease of use. It underscored the importance of ReTV's approach to offer the powerful capabilities of the dashboard through a user-friendly user interface design.

For the Content Wizard scenario, the video summarisation modules tested out with NISV and RBB content received very positive reactions. With minimal editing, users were able to prepare content for publication within minutes, significantly cutting down the effort of performing the same actions manually. The video editing functions, albeit in need of improvement in terms of their user-friendliness, helped professional users to customise content for publication across multiple digital media vectors. However, it is clear that users need solutions to add and edit subtitles and sound in order to confidently publish video summaries online and achieve the desired audience engagement with their content. What is more, further tests with more varied content are needed to ensure the high quality of video summaries.

While it is clear that professional users do not want to give total control to automation and want to maintain editing functions in all the steps of the workflow, the tests made clear that automated video summarisation, recommendation, scheduling and prediction components will make their current workflows much more efficient.

7 CONCLUSION AND OUTLOOK

This deliverable provided the description of the two professional use case scenarios - Topics Compass and Content Wizard. It presented the first TVP prototypes for these scenarios and the preparatory steps for their evaluation with media professionals. It provided a detailed description of the evaluation results and their analysis.

The evaluation of the two professional use case scenarios yielded insightful results that will guide further development of the prototypes. It highlighted features that professional users are interested in most - prediction capabilities, content recommendation, customisation and personalisation of various features, tools that support users working in teams. These will be

integrated, improved and tested in the upcoming months. Also, the professional user feedback accentuated the need to focus on further improving the user experience, making the tools more user-friendly and intuitive while maintaining their innovative technical capabilities.

In general, the evaluation confirmed the necessity to implement and adapt these scenarios for the industries, as well as their potential to innovate the current content re-purposing and re-publication workflows. Further tests will evaluate their efficiency and capability to increase audience engagement. It will also be interesting to assess the impact of these scenarios on the creative processes - how these novel content production and publication mechanisms can change the nature of the content that broadcasters and content owners deliver to their audiences.

In the next phase of the project, the TVP prototypes will be iteratively shown to a larger and more varied group of media professionals and content owners in order to gather further qualitative and quantitative feedback on the updated and newly integrated features. These tests will be of a smaller scale, focusing on specific features, but performed on a more regular basis, allowing for a more agile and responsive technical development. To validate the final prototypes, NISV and RBB will run longitudinal tests with their editorial teams internally as well as external organisations, customising the prototypes to their audiences and content.