D2.1 System Functionality and User Requirements

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1. BACKGROUND

This document is the D2.1 deliverable of the EUMSSI project. It provides the initial catalogue of the user requirements for the respective use cases within EUMSSI. The goal of this document is to outline the system functionalities, the use cases and compile the detailed EUMSSI user requirements, which leads to the specification of the overall architecture in deliverable D2.2, and will guide validation activities in WP7.
2. INTRODUCTION

Nowadays, a journalist has access to a vast amount of data from a plurality of types of sources to document a story. Some of the sources provide structured data streams (e.g. AFP, Reuters etc.) while others provide unstructured, unverified and heterogeneous information (e.g. Social Web).

**Figure 1: Simplified Newsgathering Process**

One task of a multimedia journalist is to monitor, gather, curate and contextualise the relevant information for the target audience. Therefore, he uses multiple tools to manage these varying tasks. The heterogeneous amount of tools is a serious disadvantage for the newsgathering process.
<table>
<thead>
<tr>
<th>Tool</th>
<th>Is Used For</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tame</strong></td>
<td>Social media monitoring and curation</td>
</tr>
<tr>
<td><strong>Topsy</strong></td>
<td>Social media monitoring and curation</td>
</tr>
<tr>
<td><strong>Scraper Wiki</strong></td>
<td>Social media monitoring, search and curation</td>
</tr>
<tr>
<td><strong>Twitter Search Advanced</strong></td>
<td>Twitter search</td>
</tr>
<tr>
<td><strong>Document Cloud</strong></td>
<td>Entity extraction and contextualisation</td>
</tr>
<tr>
<td><strong>Churnalism</strong></td>
<td>Entity extraction and plagiarism detection</td>
</tr>
<tr>
<td><strong>Tabula</strong></td>
<td>Tabula is a tool for liberating data tables trapped inside PDF files</td>
</tr>
<tr>
<td><strong>Open Calais</strong></td>
<td>Entity extraction, annotation, linking</td>
</tr>
<tr>
<td><strong>Overview</strong></td>
<td>Visual document mining for journalists</td>
</tr>
<tr>
<td><strong>DataSift</strong></td>
<td>Social media monitoring, search and curation</td>
</tr>
</tbody>
</table>

**Table 1: Journalistic tools for monitoring, gathering, curating and contextualising information**

He needs to go through an enormous amount of records with information of very diverse degrees of granularity, in order to put information into context and tell his story from all significant angles. At the same time, he needs to reduce the noise of irrelevant content. This is extremely time-consuming, especially when a topic or event is interconnected with multiple entities from different domains.

At a different level, many TV viewers are getting used to navigating with their tablets or iPads while watching the TV, the tablet effectively functioning as a second screen, often providing background information on the program or interaction in social networks about what is being watched.

Both the journalist and the TV viewer would greatly benefit from a system capable of automatically analysing and interpreting unstructured multimedia data stream and its social background, and, with this understanding, be able of doing such things as: contextualising the data; making further suggestions; contributing with new, related information; filtering unwanted content; etc.

The main objective of EUMSSI is to develop technologies for identifying and aggregating data presented as unstructured information in sources of a very different nature (video, image, audio, speech, text and social context), including both online (e.g. YouTube) and traditional media (e.g. audiovisual repositories), and for dealing with information of very different degrees of granularity.
We envision that the multimodal analytics will help organise, classify and cluster cross-media streams, by enriching its associated metadata. A core idea is that the process of
integrating content from different media sources is carried out in an interactive manner, so that the data resulting from one media helps reinforce the aggregation of information from other media, in a cross-modal interoperable semantic representation framework. This will be accomplished thanks to the integration in a multimodal platform of state-of-the-art information extraction and analysis techniques from the different fields involved. Interoperability and interactive reinforcement of the data aggregation and a high-level semantic, conceptual and eventive representation distinguishes this project from others that incorporate multimodal search.¹

Figure 4: Event Understanding Through Multimodal Social Stream Interpretation

In this deliverable D2.1 we present the first findings about the use cases and user requirements of the intended target groups. The aim is to give the technical partners in the EUMSSI project more clues to guide the development of the EUMSSI system. We are sensitive of the ongoing debate and challenges on the use of requirements studies for technical innovations and functional improvements and also of the complexity of user studies in common. Given the fact that this is an evolving process based on generated knowledge from the processing we will adjust and consider our assumptions continuously.

¹ This part is taken from the DoW

EUMSSI D2.1 System Functionality and User Requirements
3. COLLECTION OF USER REQUIREMENTS

3.1. Main Objectives and Goals

The goal of this deliverable is to collect the use cases, list the user requirements, and present the detailed EUMSSI system functionalities. The first step is to gather the use cases related to the two EUMSSI scenarios from the intended target groups. Numerous techniques to achieve this are summarised in Table 2. For this purpose Deutsche Welle conducted guided interviews in order to collect the requirements and wishes in an explorative approach.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Advantage</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>A set of written questions to a sample population of users. Surveys can help clarify needs, current work practices and attitudes to the new system ideas.</td>
<td>Relatively quick method of determining preferences of large user groups. It provides a systematic and uniform set of questions and answers, allowing statistical analysis.</td>
<td>This method may not capture in-depth comments and may not permit follow up.</td>
</tr>
<tr>
<td>Guided Interview</td>
<td>A series of fixed questions with scope for the end users to expand on their response.</td>
<td>Interviews allow quick elicitation of ideas and concepts.</td>
<td>Negotiate different opinions from different users.</td>
</tr>
<tr>
<td>Focus Group</td>
<td>This method brings together a cross section of users in discussion group format.</td>
<td>A useful method for requirements elicitation. Allows rapid abstraction of a wide variety of user views.</td>
<td>Recruitment effort to assemble groups. Dominant participants may influence group disproportionately.</td>
</tr>
<tr>
<td>Use Cases / Personas</td>
<td>Detailed realistic examples of how users may carry out their tasks in a specified context with the problem/issue to be addressed in the project.</td>
<td>Personas can bring user needs to life.</td>
<td>Scenarios may raise expectations too much. Personas may oversimplify the target group.</td>
</tr>
<tr>
<td>Competitor Analysis</td>
<td>Comparison of expected product with existing systems.</td>
<td>Effective in identifying current issues, existing and lacking technologies/applications, possible new features and acceptance criteria.</td>
<td>This method may lead to overambition (including too many new functions in the prototype to be developed) or underperformance (making the targeted system too similar to a competitor’s.)</td>
</tr>
</tbody>
</table>

Table 2: Methods of collection user requirements

Understanding user requirements is fundamental for designing and developing an accurate software system. Inaccurate requirements may lead to systems that answer the wrong questions. Collecting the user requirements can be challenging, because:

- The developers are not the users
- The academic partners are not the users
- Inadequate requirements information may be collected from users
- Each individual type of user may have their individual requirements, but cannot define the overall system requirements
- Users don’t know what the particular software system can and cannot do
- Requirements collection may include too many “nice-to-have” functions
3.2. Methodology

Deutsche Welle developed its use cases (contextualising tool and second screen) on the foundation of the input derived from the guided interviews. Within the Deutsche Welle there are two main user groups:

User group (1) – Online Journalists/TV Journalists
User group (2) – Representatives of Deutsche Welle’s innovation division

Deutsche Welle presented EUMSSI’s core design and explained the methods and tools Deutsche Welle envisions to develop within the framework of the project. DW conducted guided interviews in order to collect the requirements and wishes in an explorative approach. In order to build on existing knowledge, Deutsche Welle focuses on online journalists and TV journalists, who already have wide-ranging experience with heterogeneous data sources and social media. In addition, Deutsche Welle conducted guided interviews with some specialists from Deutsche Welle’s innovation division to explore the use case from miscellaneous points of view and to collect notes which technologies can be used to understand and pre-process complex events (e.g. Ukraine crisis).

The analysis in this report is based on guided interviews conducted April 2-24, 2014 among a sample of 16 participants, working at Deutsche Welle.

Interviewed user groups:

- 7 Online Journalists
- 4 TV Journalists
- 5 Representatives of Deutsche Welle’s innovation division

Most important questions:

- Question 1: How do journalists identify the temporal parts of events and the relations amongst those parts?
- Question 2: How can a system help online journalists understand and pre-process complex events?
- Question 3: What could the journalistic workflow look like?
- Question 4: What kind of data (metadata) is needed to start the investigation?
- Question 5: What kind of tools is needed to support the newsgathering process?
- Question 6: What could the graphic user interface of EUMSSI look like?
- Question 7: How could the data (metadata) be visualised?
- Question 8: What kind of formats should EUMSSI support?
- Question 9: Are there any kinds of services out there that partly fulfil your needs?
- Question 10: What would a second screen service look like?
- Question 11: What kind of functionalities should a second-screen service provide to explore an event (e.g. Ukraine crisis) in depth?
3.3. Findings

The following paragraphs summarise the most important findings from the guided interviews. Statements that are applicable to different questions, are repeated for the reader’s convenience, to provide a full picture and to avoid the need for scrolling back to previous paragraphs.

**Question 1: How do journalists identify the temporal parts of events and the relations amongst those parts?**

"First of all, I search what Deutsche Welle published about fracking to date. Then I sift through content from news agencies (e.g. Reuters). I try to consider social media content if applicable."

"I google the topic before I narrow down my search to a specific aspect."

"... in many cases I ask my co-workers if they know something about a given topic or if they know an expert I can contact."

**Question 2: How can a system help online journalists understand and pre-process complex events?**

"As a journalist I have to consider all sources and content items. Therefore, I would expect that such a system can find relevant patterns across domain borders (fracking) and content types (text, video, audio)."

"Nowadays, it’s common that information systems and technology assist the user. Therefore I would expect useful hints or guidance when I try to retrieve information about a specific topic."

"It would be extremely useful for the newsgathering and contextualising process to extract a bunch of quotes or key statements from well known people about this topic with a simple text query. It would help me to identify fracking opponents and supporters. Based on that, I can decide whether I do an interview with an activist or supporter."

"[Guardian’s interactive timeline](#) is amazing. They have managed to cover a topic over a long period without losing the overview. You have everything you need at this central place. The user oversees parallel events without losing context."

"Google, Twitter, YouTube – they all provide plain lists of results. I have to sift through these results and establish my own context."

**Question 3: What could the journalistic workflow look like?**

*EUMSSI D2.1 System Functionality and User Requirements*
“New tools will shorten the news gathering process and provide more information for my work. At the same time I have to use and learn another tool to manage my tasks.”

“I’ll define a topic like fracking and all relevant information nuggets will be automatically attached this specific cluster. I don’t need to search or contextualise anymore in the future.”

“I wish a new tool would incorporate all other tools I use. Switching from one tool to another is annoying.”

“The journalistic workflow won’t change, but the tools we’ll use in the future will.”

Question 4: What kind of data (metadata) is needed to start the investigation?

“Everything I can get.”

“Structured information is a good starting point, but nowadays you have to know how to cope with raw data.”

Question 5: What kind of tools is needed to support the newsgathering process?

“It should provide a share function for collaborative working.”

“It should provide an editor to add additional annotations.”

“It should provide drag & drop function to add items to a light board.”
“I’m aware of fracking and know that in Germany only an area in the north is appropriate for shale gas extraction. I’d like to flag that area and use this as trigger for a document search ... the results would contain cities or geographical mentions from the flagged area.”

“I use Document Cloud to identify all persons and organizations that appear in a text document.”

“A ‘Mention together with’ filter would be useful. It would help me to reveal hidden or related topics. I’ve heard about fracking but can’t assess which other topics refer to this event. Especially the co-occurrence of people would be very interesting. Common research tools don’t provide such function.”

“Do you know how much time I waste sifting through video and audio files searching for a quote or interview scene? Take me directly to the quote or person I’m looking for.”

“I use Google’s advanced search filters to refine my results. If you want to consider all available filters you have to invest more time and accuracy. It would be extremely useful for me to save my search definition for another utilisation.”

“I use Document Cloud to analyse large text documents. The application provides entity extraction which is really useful if you have to sift through a document with more than 200 pages. But sometimes I notice that tagging is inaccurate. Then I wish I could correct the items that are wrong.”

**Question 6: What could the graphic user interface of EUMSSI look like?**

"AXES² provides an intuitive user interface. It’s a good template.”

![Figure 6: Axes Search Interface](image)

**Figure 6: Axes Search Interface**

“I want to see more interactive visualisations and graphs.”

² AXES Project
"I think the search interface is one of the most important modules of your application. I want to combine search terms or exclude terms that are not relevant for my investigation. That would help me to exclude ambiguous terms."

"I want to use the application on my iPad or another tablet. Therefore, I’d expect a user-friendly GUI."

"The GUI elements have to be clearly arranged."

"Keep it simple and clean. Unnecessary elements should be prevented."

"The user interface should be intuitive. I don’t want to study a book before I can use it."

"I would highly appreciate a user interface that provides more interactive elements and graphics instead of plain text areas."

"Guardian’s interactive timeline is amazing. They have managed to cover a topic over a long period without losing the overview. You have everything you need at this central place. The user oversees parallel events without losing context."

"Ever heard of Document Cloud? You can upload text documents and run an entity extraction analysis. Based on the analysis I can see all entities before I sift through the whole document. It’s a good starting point especially when you don’t have a general idea what you are looking for. To have such an overview is a huge advantage."

**Question 7: How could the data (metadata) be visualised?**

"I want to see more interactive visualisations and graphs."

"Guardian’s interactive timeline is amazing. They have managed to cover a topic over a long period without losing the overview. You have everything you need at this central place. The user oversees parallel events without losing context."

"Ever heard of Document Cloud? You can upload text documents and run an entity extraction analysis. Based on the analysis I can see all entities before I sift through the whole document. It’s a good starting point especially when you don’t have a general idea what you are looking for. To have such an overview is a huge advantage."

**Question 8: What kind of formats should EUMSSI support?**

"The system should provide an API."

"JSON or JSON-LD"

**Question 9: Are there any kinds of services out there that partly fulfil your needs?**
The tools and services that have been mentioned can be found in table 1.

**Question 10: What would a second screen service look like?**

"The second screen application should be entertaining."

"A second-screen service should provide a "follow topic" function to stay up to date (e.g. Crica News)."

"It should provide many interactive features (e.g. graphs or timelines)."

"The perfect second-screen service supplies me with entertaining and informative content."

"A Minority Report alike GUI would be worth seeing."

**Question 11: What kind of functionalities should a second-screen service provide to explore an event (e.g. Ukraine crisis) in depth?**

"A Minority Report alike GUI would be worth seeing."

"It should provide many interactive features (e.g. graphs or timelines)."

"A second-screen service should provide a "follow topic" function (e.g. Crica News)."

**3.4. Conclusion**

The findings outline that the news gathering process is heterogeneous and complex. The participants use a various selection of tools and methods to gather their background information. They describe the news gathering process as “extremely time consuming” and “annoying” task. New tools should incorporate various sets of functionalities (e.g. entity extraction, filters, interactive graphs and visualisations) to enhance the news gathering and contextualising process. Moreover, the interviewees expressed a desire for easy-to-use graphical user interfaces to manage their tasks appropriately.
4. FUNCTIONAL REQUIREMENTS

This chapter describes our vision of the desired functionalities boxed in a simplified user story derived and compiled from the guided interviews. All visualisations provided in this section are illustrations of the desired functionality. These illustrations and visualisations serve as rough examples for the project partners to convey ideas or concepts – the exact visualisations and tools developed in EUMSSI will (slightly) differ.

4.1. Use Case: The Contextualising Tool

Eliza is an editor at Deutsche Welle’s (DW) Online News Desk. In general, she is reporting about energy-related topics and events. Today she has to report about “fracking”, also known as shale gas extraction. After the nuclear accident in Fukushima, the German Parliament decided to reverse its nuclear power facilities. Since then, energy transformation is an ever-growing topic on the political, economical and cultural media agenda.

Fracking is a controversial topic around the world, especially in Germany. Therefore, Eliza has to consider all perspectives, opinions and involved entities since the debate began.

First she has to get a general idea about all media items (articles, videos clips, audio clips) Deutsche Welle produced in the past.

For this purpose, Eliza uses EUMSSI. EUMSSI indexes, analyses, links, enriches and contextualises all these items based on the latest research algorithms combining knowledge from three major research areas (audio, text and video analysis).

![Figure 7: Knowledge extraction from text documents]
She opens the search interface and starts her investigation with a basic keyword retrieval “fracking”. An interactive timeline with four tracks fades in. Most applications rely on the constant basic mechanism to find the information a journalist needs: a journalist would submit a request, such as a text query, and the application would return a list of results. EUMSSI aligns events on an interactive timeline instead of showing a plain list of results. A plain list of results does not provide an overview about a topic, Eliza explains. Interpreting connotation and purpose from multiple different streams of data is no trivial task. Not only does it rely on complex technologies like text analysis, audio processing, and video analysis, it typically must be performed over an extensive time period in order to be able to recognise meaningful patterns. Making sense of these data remains a fundamental challenge. Mapping all details chronologically on an interactive timeline eliminates the sort sequence in the newsgathering process and shows me many angles at once, she says.

On the first track, EUMSSI maps persons (e.g. politicians, fracking experts and activists); on the second track places; on the third track organisations; and on the fourth track events (e.g. conference, political debate on fracking extracted from DW content (videos, articles, YouTube comments), social media content (e.g. Tweets) and content from other sources (e.g. articles from the Guardian, Le Monde).

EUMSSI aims to assist Eliza answering the “BIG 5”, also known as a fundamental set of information-gathering questions each journalist uses to investigate a story worldwide.

1. Who is it about?
2. What happened?

*EUMSSI D2.1 System Functionality and User Requirements*
3. When did it take place?
4. Where did it take place?
5. Why did it happen? (This question will answer Eliza in her article.)

**INTERACTIVE VISUALIZATION (e.g. timeline or graphs)**

[Interactive Timeline Diagram]

Figure 9: Initial Suggestion: Interactive Timeline

Instead of sifting through a list of results, Eliza scrolls through the interactive timeline and explores the results in a chronological order. She can activate an item on the timeline for more details by clicking on the corresponding marker. She chooses a marker on the event track (e.g. political debate, protest) about a political debate on “fracking” in the German Bundestag. A popover fades in with an interactive event understanding communication graph (EUCG) representing polar facts and key phrase extraction results from the political debate. She clicks on Angela Merkel’s key phrase. EUMSSI opens a video player and jumps to the relevant segment within the video clip. For Eliza’s investigation process this is a staggering shortcut.
4.2. Use Case: Second Screen

The following text is partially extracted from the DoW. Key statements derived from the guided interviews supplement our existing assumptions.

There is an increasing popularity of video on-demand. On the one hand, users want to choose the programs they like. On the other hand, they also like some guidance to find out “what’s on, what’s new, what’s cool, what’s for me”.

"The perfect second-screen service supplies me with entertaining and informative content.”

"A second-screen service should provide a ‘follow topic’ function to stay up to date (e.g. Crica News).”

Moreover, it should become more interactive. Many people already have an iPad or tablet at hand when watching television programs.

"It should provide many interactive features (e.g. graphs or timelines).”

This device can effectively function as a second screen, on which comments can be exchanged via Facebook and Twitter. The two screens could also be connected in such a way that the tablet provides background information on a given program, personalised news tickers, suggests what to watch next, and so on.
Both use cases have a common technical base in that they exploit (multimodal) content-based recommendation algorithms, but they differ in input/output aspects, in addition to the type of user, as mentioned above. On the one hand, in the case of the Contextualising Tool, the input to the recommendation system is less “controlled”, as it consists in incomplete textual input that is being created on the spot. The output result needs not be that precise, since it is “raw material” for the journalist to process. On the other hand, in the case of the second screen, the input is much more controlled since it is an already semantically annotated document from the internal database (DWs), but the output results necessarily need to be more accurate for the end user.

4.3. List of Functional Requirements

The following table summarises the functional requirements and their priorities for the EUMSSI system derived from the guided interviews. Key statements derived from the guided interviews establish the relationship between the compiled functional requirements and the use cases described in the previous chapter. The visualisations provided in this section are illustrations of the desired functionality. In addition, these illustrations and visualisations serve as rough examples for the project partners to convey ideas or concepts – the exact visualisations and tools developed in EUMSSI will (slightly) differ.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>high</td>
<td>Boolean search (default search)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: Boolean search allows you to combine words and phrases using the words AND, OR, NOT and NEAR to limit, widen, or define the search.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Why is this important?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guided interview feedback: “I think the search interface is one of the most important modules of your application. I want to combine search terms or exclude terms that are not relevant for my investigation. That would help me to exclude ambiguous terms.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interface element: Search field</td>
</tr>
<tr>
<td>2</td>
<td>high</td>
<td>Filter for different content types (video, audio, text)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: Content type filters help the user to narrow down their investigation to a specific content type domain.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Why is this important?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guided interview feedback: “Is it feasible to limit the search on video content only? I need a filter or something like that to eliminate text files when I’m looking for video material for vox pops.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interface element: A search field and check buttons for all available metadata fields</td>
</tr>
<tr>
<td>3</td>
<td>high</td>
<td>Search by publishing date</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: The user can limit the time frame (e.g. FROM DD-MM-YYYY TO DD-MM-YYYY)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Why is this important?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guided interview feedback: “Your application should provide a search by publishing date function. I don’t want to sift through all available documents of a decade … I want to have the opportunity to narrow down my search on a specific time period.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Example:</td>
</tr>
</tbody>
</table>

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3 In broadcasting, vox pop is an interview with members of the general public.

EUMSSI D2.1 System Functionality and User Requirements
<table>
<thead>
<tr>
<th>Nr</th>
<th>Level</th>
<th>Functionality</th>
<th>Description:</th>
<th>Why is this important?</th>
<th>Guided interview feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>medium</td>
<td>Similarity search</td>
<td>Based on the extracted entities (text, video, audio processing) and other metadata information, the user can perform similarity searches on the entities extracted from the videos.</td>
<td><strong>Guided interview feedback:</strong> “As a journalist I have to consider all sources and content items. Therefore I’d expect that such a system (EUMSSI) can find relevant patterns across domain borders (fracking) and content types (text, video, audio).”</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>low</td>
<td>Provide suggestions for search terms and search guidance</td>
<td>The system assists the user with search terms and search guidance</td>
<td><strong>Guided interview feedback:</strong> “Nowadays, it’s common that information systems and technology assist the user. Therefore, I’d expect useful hints or guidance when I try to retrieve information about a specific topic.”</td>
<td></td>
</tr>
</tbody>
</table>
| 6  | high  | Key statement search for video, text and audio                                  | The user can search for key statements (e.g. show me the last key statements from any person from Germany for energy transformation). The cursor jumps to the sequence (video/audio clip) or highlights the text sequence. | **Guided interview feedback:** “It would be extremely useful for the newsgathering and contextualising process to extract a bunch of quotes or key statements from well-known people about this topic with a simple text query. It would help me to identify fracking opponents and supporters. Based on that I can decide whether I do an interview with an activist or supporter.” | **Analysis:** Speech-to-text analysis >> text analysis

**Example:**

[http://nyti.ms/1gApUQH](http://nyti.ms/1gApUQH) (transcripts are made by a human being)
<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Visual Interface for search on geographical coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description: The user can select (draw) an area to trigger a search. Only news items that contain an item from this predefined area will be shown.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Why is this important?</strong> Guided interview feedback: “I'm aware of fracking and know that in Germany only an area in the north is appropriate for shale gas extraction. I'd like to flag that area and use this as a trigger for a document search ... the results would contain cities or geographical mentions from the flagged area.”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> <a href="http://www.coeverywhere.com">http://www.coeverywhere.com</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Event Understanding Communication Graph (EUCG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description: We aim extracting sentiment from statements expressed by an entity/person with respect to a given topic.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Why is this important?</strong> Guided interview feedback: “Who says what to whom is a serious challenge if you have to cover a global event like fracking over a long period. An interactive visualisation would enlighten me and my audience, especially when you have to consider so many information channels.”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Analysis:</strong> Sentiment Analysis, Named Entity Identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> New York Times</td>
<td></td>
</tr>
</tbody>
</table>
Multi-Perspective Chronologies (timeline)

**Description:** This interface provides a comprehensive and chronological overview and summary of relevant events based on a query. If the user is searching for fracking, the results will be plotted on a timeline. If the user is searching for another topic, new items will be mapped on the previous timeline. On the left side the user can read fragments from the original document.

**Why is this important?**

**Guided interview feedback:** “Guardian’s interactive timeline is amazing. They have managed to cover a topic over a long period without losing the overview. You have everything you need at this central place. The user oversees parallel events without losing context.” “Google, Twitter, YouTube – they all provide plain lists of results. I have to sift through these results and establish my own context.”

**Analysis:** Contextualization; Enrichment; Sentiment analysis

**Example:** [http://bit.ly/18yMLha](http://bit.ly/18yMLha)
10 high

Responsive User Interface (non-functional requirement)

Description: The user interface should consider responsive design specifications.

Why is this important?

Guided interview feedback: “I want to use the application on my iPad or another tablet. Therefore, I’d expect a user-friendly GUI.”

11 high

Entity Overview for text documents

Description: The user interface should present all found entities for an event and jump to the selected sequence if the user selects a marker. The item will be highlighted in the document.

Why is this important?

Guided interview feedback: “Ever heard of Document Cloud? You can upload text documents and run an entity extraction analysis. Based on the analysis I can see all entities before I sift through the whole document. It’s a good starting point especially when you don’t have a general idea what you are looking for. To have such an overview is a huge advantage.” “I use Document Cloud to identify all persons and organisations that appear in a text document.”

Analysis: Entity extraction; Enrichment

Example: www.documentcloud.org

a) Marker Overview

EUMSSI D2.1 System Functionality and User Requirements
<p>| | | |</p>
<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>b) Highlighted Marker</strong></td>
<td>carried out missile strike at a suspected hideout of militants (house of 'I in village Char Khel, Daur Land, <strong>Tehsil Datta Khel</strong>, North Waziristan Agency.</td>
<td>175.</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>high</td>
<td>“Mentioned together with ...” filter</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>This filter helps journalists to reveal hidden connections between miscellaneous entities. The filter shows the top 5 terms for each category (person, place ...). Moreover, the function provides an option to limit or widen the time frame for the results.</td>
<td></td>
</tr>
<tr>
<td><strong>Why is this important?</strong></td>
<td><strong>Guided interview feedback:</strong> “A ‘Mention together with’ filter would be useful. It would help me to reveal hidden or related topics. I’ve heard about fracking but can’t assess which other topics refer to this event. Especially the co-occurrence of people would be very interesting. Common research tools don’t provide such function.”</td>
<td></td>
</tr>
<tr>
<td><strong>Analysis:</strong></td>
<td>Contextualisation; Enrichment; Entity extraction</td>
<td></td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>high</td>
<td>Entity Overview for video and audio clips</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Click on a key frame to initiate video/audio from that point onwards. The annotations appear below the video/audio clip. The user can see the annotations if he’s hovering with the mouse over the marker.</td>
<td></td>
</tr>
<tr>
<td><strong>Why is this important?</strong></td>
<td><strong>Guided interview feedback:</strong> “Do you know how much time I waste sifting through video and audio files searching for a quote or interview scene? Take me directly to the quote or person I’m looking for.”</td>
<td></td>
</tr>
<tr>
<td><strong>Analysis:</strong></td>
<td>Entity extraction; Enrichment</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td><a href="http://www.soundcloud.com">www.soundcloud.com</a></td>
<td></td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>medium</td>
<td>Save and edit search option</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>The user can save and edit his search</td>
<td></td>
</tr>
<tr>
<td><strong>Why is this important?</strong></td>
<td><strong>Guided interview feedback:</strong> “I use Google’s advanced search filters to refine my results. If you want to consider all available filters you have to invest more time and accuracy. It would be extremely useful for me to save my search definition for another utilisation.”</td>
<td></td>
</tr>
<tr>
<td><strong>Interface element:</strong></td>
<td>Save/edit search button</td>
<td></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td>medium</td>
<td>Error Analysis Editor</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>The Error Analysis Editor would allow the user to correct some of the</td>
<td></td>
</tr>
</tbody>
</table>
Why is this important? Guided interview feedback: “I use Document Cloud to analyse large text documents. The application provides entity extraction which is really useful if you have to sift through a document with more than 200 pages. But sometimes I notice that tagging is inaccurate. Then I wish I could correct the items that are wrong.”

Analysis: An error analysis editor would allow to improve the underlying technologies.

<table>
<thead>
<tr>
<th>16</th>
<th>high</th>
<th>GUI (non-functional requirement)</th>
</tr>
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<tbody>
<tr>
<td>Description: An intuitive user interface tailored to the needs of professional journalists is pivotal for the success of EUMSSI. It should include novel and appealing visualisations of search results.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Why is this important? Guided interview feedback: “The GUI elements need to be clearly arranged.” “Keep it simple and clean. Unnecessary elements should be prevented.” “The user interface should be intuitive. I don’t want to study a book before I can use it.” “I would highly appreciate a user interface that provides more interactive elements and graphics instead of plain text areas.”

**Table 3: List of Functional Requirements**
5. NON-FUNCTIONAL REQUIREMENTS

In order to be more precise, this section is divided into three points:

- Common non-functional requirements. These requirements relate to the whole system.
- Online processing requirements. These are special requirements for the online processing service. This service will be used to process input in the journalist use case, where the system will recommend content based on user input.
- Background processing requirements: These are special requirements for the background processing service. This service will be used to process items that may be recommended or searched for in the future.

5.1. Common Non-Functional Requirements

5.1.1. Maintainability

In general, the system should be developed to be easy to maintain. A user guide should be prepared and it should include some specific chapters to find information to solve common problems. The software elements must produce log files to monitor possible problems. The logs must be easy to understand and they must point directly to any problem that may occur in order to find the root of the problem and the way to solve it as soon as possible.

Every element must be scalable after installation. There must be a procedure to do so and this procedure should be easy to follow. For example, there must be instructions to add a node to the database cluster (if there is one). The data integrity should not be affected by these procedures and, as a desirable goal; these processes should be seamless for the user (meaning that the service availability is not affected during the process).

Automatic backups must be done of all the relevant information of the system periodically. This includes databases, Solr cores, logs, etc. A complete restore of all this data must be possible to do in case of general failure. The procedure to restore such data must be well documented and easy to follow.

5.1.2. Robustness

Optional redundancy must be possible for every element of the system. The adopted technologies must fulfil this requirement implicitly. The chosen database software and the server that will receive all the queries and commands must support redundancy. Budget of real use case adopters will decide whether to use redundancy or not, but the system must be designed to have the chance to do it.

The system functionality must not be affected by corrupted data input (invalid video or audio files, for example). This kind of input must be rejected if there isn’t any profitable data in them, but the system availability cannot be compromised.
5.1.3. Security

All the internal elements must be hidden from external users. The only way to get data must be the public API. The servers must be correctly protected from any kind of attack. As a system that will receive queries and commands, there must be a special plan to avoid code injection on them.

5.1.4. Easy to use

The system API must be available for users (desirable: in different languages e.g. English, German, Spanish, French) and it must be clear enough to allow an easy integration and use.

The API should be supported by a well-established technology that the industry commonly uses (REST like) in order to make the integration process easier and faster.

5.1.5. Trustworthiness

This is, probably, the most difficult requirement to define. The event understanding must be reliable, and precise. For example: It is obvious that there should be a minimum set of famous people that the system should recognise (from all kind of sources). It must be able to recognise current and former presidents or prime ministers of every country but, where is the limit? How can be determined the set of famous people that should be automatically recognised?

It is clear that a system unable to recognise the presence of the British prime minister in a video is not meeting the requirements. The same reasoning applies to places, remarkable dates, monuments, etc.

In the online processing scenario, the suggested content must be related to the input of the journalist. If the system returns content that has nothing to do with the journalist text, the system will be useless and the users will lose confidence and be reluctant to use it.

5.1.6. Portability

As a general requirement, the client side must be able to run in any platform. The client side will perform queries and will issue processing requests. These two types of interactions can be initiated from any platform. This should not be a problem, as both interactions are planned to function over http (REST, SOAP, XML-RPC, etc.)

5.1.7. Development Costs

The development costs must be adjusted to the current approved budget for the project. All the partners involved must respect the document of work approved by the consortium.

5.1.8. Operational Costs

The system should be designed to be compatible with the most common hosting solutions (Azure, Amazon, etc.) so, in the case of a cloud installation, the hosting costs can be minimised. There must a special focus on minimisation of the bandwidth use in all the transactions with the clients because it has a direct impact on the overall hosting cost.
5.1.9. **Functional Scalability**

The software must be designed from the beginning to allow further improvements in the future. For example, in the text analysis area, the supported languages will be English, German, French and Spanish. The software must be designed in a way that it should be easy to add support for more languages. The same principle applies to the input sources (it must be opened to new ones such as new social networks).

5.2. **Online Processing Requirements**

5.2.1. **Performance**

In this scenario the system must work in real time. It must be able to analyse the input text (what the journalist is writing) and must return suggested and related content within a reasonable, guaranteed response time.

5.2.2. **Concurrency**

This requirement tries to answer the question “how many simultaneous users can work with the system before the performance is affected?” There must be information about concurrency in the system user guide. Using this information, the final user must be able to scale the system to meet its own requirements. For example, it could be established that a standalone system (everything in one machine) can accept 10 simultaneous requests without compromising the performance. Then, if the client expects to have 15 simultaneous requests (15 journalists working at the same time), it will be clear that the system must be properly scaled to add more capacity. Special measures must be taken with regard to the final solution in order to have this information.

5.3. **Background Processing Requirements**

5.3.1. **Concurrency**

The system will have to process input data in background, getting the tasks from a queue. How many workers will do this task? How many tasks will a worker be able to do simultaneously? According to previous requirements, the system must be fully scalable. The user guide must give information about this questions and how to scale the system to meet the user needs. Special measures must be performed to the final solution in order to have this information.

5.3.2. **Maintainability**

When the processing request reaches the queue, the system must guarantee that it will be processed. A persistence of the state of the queue is required so the tasks in it will be processed, even in case of general failure (for example: power failure).

5.4. **Video and Audio Analysis**

5.4.1. **Performance**

The time required to analyse a media element should not be greater than the time to play/consume the media. It should be lower than that. For example, to analyse a video 1 hour long, the system should spend 1 hour as a maximum. It should spend less time on it.
There must be an effort to support the most common video and audio codecs. Broadcast codecs should be targeted as priority goals.

5.5. Text Analysis

5.5.1. Error Tolerance

The system must be tolerant with the following kind of errors:

- Syntax errors
- Spelling errors
- Grammar errors

It will be acceptable that such errors lead to a bad understanding of the documents where they appear. For example, if the system analyses a text with the name "Angela Markel" (instead of "Angela Merkel"), the system may not recognise the entity, as there may be another person named "Angela Markel". However, the system must be able to use the rest of the information to extract any valid and relevant data from it, no matter whether there are grammar, syntax or spelling errors. For example, if the system analyses this text: "Angela Merkel are the Chancellor of Germany", it must detect the presence of the entity regardless of the grammatical error.
6. CONCLUSIONS

The use cases and the user requirements with respect to functionality have largely focused on aspects of the system that are directly visible to the end users, journalists and second-screen users. These users will interact with the tools and (Web) applications, of which the development will start once the preliminary version of the multimodal platform is available in month 12.

The expectations and vision regarding the contextualising tool, as derived from structured interviews with specialists from Deutsche Welle and summarised as a use case, show that journalists expect the tools to help them in interpreting events by means of different information visualisation mechanisms – including interactive timelines, maps and semantic graphs – rather than by ‘simply’ recommending related content.

Meaningful visualisations and explanations (such as ‘who said what in response to whom on the topic of fracking’) require more expressive (and human-understandable) metadata than features that would be used for content-based or hybrid recommenders. At the moment of writing, it seems that the data representation format, as described in D2.3, sufficiently covers the need for expressive descriptions of news articles and video content, with videos segmented in meaningful chunks, and multivalued descriptions of entities (persons, places, events) that are extracted from both articles and videos – which should be sufficient for answering questions like ‘who said what in response to whom’.

Having defined the expectations regarding the metadata and its format is an important step, but the metadata that will be actually available and its quality (such as the confidence on the correctness and completeness of speech transcripts or entity resolution) depends on the performance of the text, audio and video annotators.

The non-functional requirements include several aspects that may not be directly visible to the end users, but that would have an impact on user acceptance and appreciation of the end-user tools - this includes the trustworthiness of the analysis results, but also requirements regarding performance, robustness and scalability of the system. The system architecture design (D2.2) provides a solid base for meeting these requirements. However, the requirements should continuously be revisited during the implementation phase.
## 7. REFERENCES

<table>
<thead>
<tr>
<th>Description</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google image search</td>
<td><a href="http://www.google.com/imghp?hl=en">http://www.google.com/imghp?hl=en</a></td>
</tr>
<tr>
<td>State of the union speech</td>
<td><a href="http://nyti.ms/1gApUQH">http://nyti.ms/1gApUQH</a></td>
</tr>
<tr>
<td>Co-Everywhere</td>
<td><a href="http://www.coeverywhere.com">http://www.coeverywhere.com</a></td>
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<tr>
<td>Document Cloud</td>
<td><a href="http://www.documentcloud.org">http://www.documentcloud.org</a></td>
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<tr>
<td>Soundcloud</td>
<td><a href="http://www.soundcloud.com">http://www.soundcloud.com</a></td>
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</table>

**Table 4: Web References**
### 8. GLOSSARY

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AFP</td>
<td>Agence France-Presse</td>
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<tr>
<td>API</td>
<td>Application Programming Interface</td>
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<tr>
<td>DD</td>
<td>Day</td>
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<tr>
<td>DoW</td>
<td>Document of Work</td>
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<tr>
<td>DW</td>
<td>Deutsche Welle</td>
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<tr>
<td>EUCG</td>
<td>Event Understanding Communication Graph</td>
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<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>IBM</td>
<td>International Business Machines Corporation</td>
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<tr>
<td>ID</td>
<td>Identity Document</td>
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<tr>
<td>MM</td>
<td>Month</td>
</tr>
<tr>
<td>REST</td>
<td>Representational State Transfer</td>
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<tr>
<td>SOAP</td>
<td>Simple Object Access Protocol</td>
</tr>
<tr>
<td>tbd</td>
<td>to be defined</td>
</tr>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
<tr>
<td>XML-RPC</td>
<td>Extensible Markup Language Remote Procedure Call</td>
</tr>
<tr>
<td>YYYY</td>
<td>Year</td>
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Table 5: Acronyms and abbreviations