



Deliverable D6.1: InVID Initial Industrial Requirements

R. Bouwmeester, J. Spangenberg, T. Koch,
S. Papadopoulos, V. Mezaris, K. Apostolidis, D. Galanopoulos,
L. Nixon, R. Garcia, M. Teixidor, A. Scharl, G. Rudinger, D. Teyssou,
D. Ferrandini, R. Cozien, G. Mercier, J. Thomsen, R. Fricke

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Work Package 6: Industrial Requirements and Application
Development

InVID - In Video Veritas: Verification of Social Media Video Content for the News Industry

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Other contributors	<i>All Partners</i>
Author(s)	<i>Ruben Bouwmeester (lead), Jochen Spangenberg, Tim Koch (DW), Symeon Papadopoulos, Vasileios Mezaris, Konstantinos Apostolidis, Damianos Galanopoulos (CERTH), Lyndon Nixon (MODUL), Roberto Garcia, Maria Teixidor (UdL), Arno Scharl (WLT), Gerhard Rudinger (APA-IT), Denis Teyssou, Dominique Ferrandini (AFP), Roger Cozien, Gregoire Mercier (EXO), Jan Thomsen, Rolf Fricke (Condat)</i>
Quality Assessors	<i>CERTH & EXO</i>
EC Project Officer	<i>Miguel Montarelo-Navajo</i>
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Abstract:

This document provides information about the process as well as outcomes of the initial industrial requirements analysis that was carried out in the news industry for the InVID project. It describes the process by which the consortium collected users' views, needs and obstacles regarding the verification process of video content found in Social Media. All this led to formulating the industrial user requirements. In the requirement overview we have already mapped requirements to technical goals. The deliverable is intended to outline industrial requirements in detail, thereby guiding the development work in respective work packages of the project. The identification and documentation of industrial requirements will be a continuous process throughout the lifetime of the project, being a part of the agile development cycles that guide the development work.

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1 Introduction

This document provides information about the process as well as outcomes of the initial industrial requirements analysis in the news industry that was carried out for the InVID project. It describes the process by which the consortium collected users' views, needs and obstacles regarding the verification process of video content found in Social Media. All this led to formulating the initial industrial user requirements.

1.1 History of the document

Table 1: History of the document

Date	Version	Name	Comment
16/02/2016	V0.1	Ruben Bouwmeester (DW)	Structure document, including interview guidelines provided by Jochen Spangenberg (DW)
21/03/2016	V0.2	All partners	Contributions by all partners
31/03/2016	V0.3	Ruben Bouwmeester	Final draft version for technical mapping of requirements by Condat
11/04/2016	V0.4	Condat / Ruben Bouwmeester (DW)	Complete draft of deliverable for project internal quality assessment by CERTH and EXO MAKINA
18/04/2016	V0.5	CERTH / EXO	QA version based on V0.4
20/04/2016	V0.6	Ruben Bouwmeester (DW)	Final deliverable submitted to project coordinator
28/04/2016	V1.0	Vasileios Mezaris (CERTH)	Final deliverable for upload to Participant Portal

1.2 Definitions, Acronyms and Abbreviations

Table 2: Definitions, Acronyms and Abbreviations

Abbreviation	Explanation
UGC	User-Generated Content: any form of content such as blogs, wikis, discussion forums, posts, chats, tweets, podcasting, pins, digital images, video, audio files, advertisements and other forms of media that was created by users of an online system or service, often made available via Social Media websites. ¹
UGV	User-generated Video
API	Application Programming Interface
REST Service	Representational State Transfer service
UI	User Interface
HTTP	Hyper Text Transfer Protocol
URL	Uniform Resource Locator
URI	Uniform Resource Identifier
RTs	Retweets
Tampering	Interfere with (something) in order to cause damage or make unauthorized alterations. ²
Doctoring	Change the content or appearance of (something) in order to deceive, falsify. ³

¹ Source: https://en.wikipedia.org/wiki/User-generated_content (2016-02-01)

² Source: Google Translate

³ Source: Google Translate

Abbreviation	Explanation
Manipulation	Control or influence (a person or situation) cleverly, unfairly or unscrupulously. ⁴
NCS	Newsroom Computer System
MOS	Media Object Server
IPTC	International Press Telecommunications Council
ANPA	(Metadata standard by) American Newspaper Publishers Association
NewsML	ML Multimedia News Exchange standard of the IPTC
EventsML	XML News Exchange standard of the IPTC, focus on sport events, elections, etc.
ENPS	Electronic News Production System
CBIR	Content Based Image Retrieval

1.3 Purpose of the Document

This deliverable aims to define the industry requirements that will form the basis for the InVID functionality and architecture (modules and their connections) that is considered necessary to fulfill as many of the identified requirements as possible. Thus, this document facilitates the communication between partners from research, industry and application development. It describes precisely the process that the consortium undertook for the gathering and analysis of industry requirements and the mapping of these requirements to technical goals.

This document will provide the project's work packages with industry requirements and design objectives with regards to application development focused on verification of Social Media video content for the news industry.

⁴ Source: Google Translate

1.4 Document structure

The gathering of requirements is a shared responsibility for all project partners. In order to create a streamlined process we have created a shared document to which all partners contributed collaboratively. In this document all partners have been assigned specific tasks.

In order to create a comprehensive list of industrial requirements we have used a 5-fold methodology:

- we have developed user scenarios that gave us insights into daily workflows of UGV verification;
- we have performed market research that gave us insights into the status quo of video verification initiatives, tools, research projects, production systems, etc.;
- we have interviewed eight video verification experts who gave us insights into 'hands-on' issues that expert journalists who are working on UGV verification have;
- we have made a 'knowledge dump' of all the experience we have as users and technical partners in handling UGV and verifying it;
- we have created an online questionnaire to get more insights into the status quo and challenges in UGC rights management.

User scenarios

The user scenarios ([Section 2.2](#)) draw an image of what the working processes of journalists who deal with aggregation and verification of UGV look like. We have created two user scenarios, one for the desktop application and one for the mobile application.

Market research

In [Section 3.1](#), several partners have performed research and extracted requirements from that research. In order to keep a common approach we have created a template with the following features:

- introduction to the specific initiative/tool;
- explanation of the relevance of the initiative/tool for UGV verification;
- explanation of what we can learn from this specific initiative/tool;
- and, most important: extraction of requirements from it.

Interviews with video verification experts

The three user partners (AFP, APA-IT and DW) performed in-depth interviews with UGV verification experts. We aimed for journalists who do verification of UGV on an almost daily basis to learn about all details of challenges and problems they run into. In order to have a common approach for the interviews and create comparable results from which we could gather requirements we have created interview guidelines (see [Appendix B: Interview guidelines for requirements gathering](#)).

'Knowledge dump'

The InVID project is an innovation action. It can pride itself having a consortium that, combined, has a large knowledge base of handling and verifying UGC and UGV. Also, we have a large knowledge base on technical analysis of UGC and UGV, play-out systems and legal issues around UGC and UGV. The aim of this 'knowledge dump' is that all partners contribute their most important industrial requirements for the InVID system.

UGC rights management questionnaire & best practices

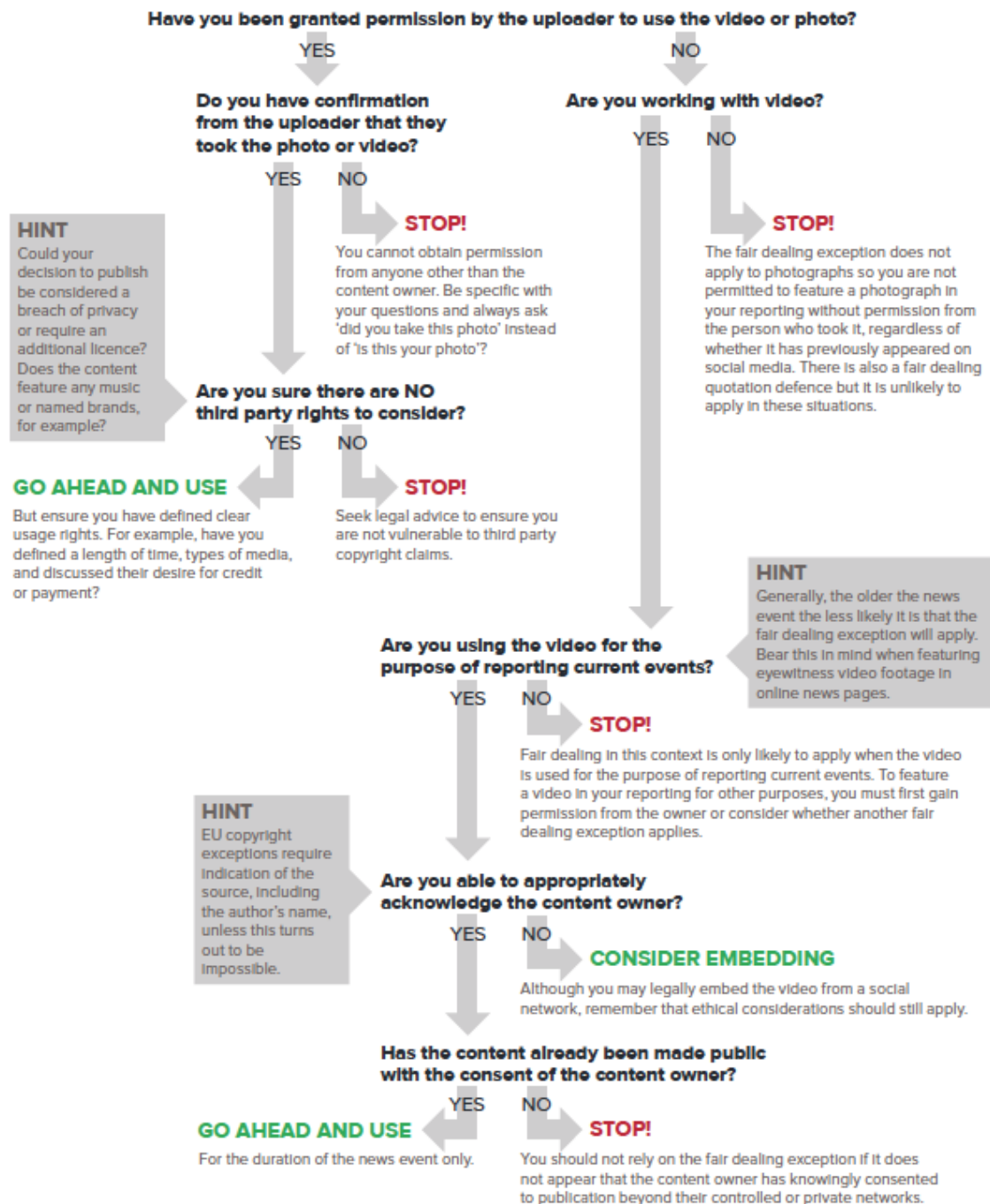
We looked at best practices in the industry, such as this [guide to the complexities of copyright law](#) by [First Draft News](#) and the current approach of market leaders, like [Storyful](#), and Social Networks, like [YouTube](#). The extracted requirements can be found in [Section 4.7](#).

In order to get even more insights into the status of UGC rights management in the News industry we have created an [online questionnaire](#). In this questionnaire we request specific information about the type of UGC content the News industry is using, what current working processes of rights management are and what challenges they face. The results of this questionnaire will be used to update the InVID requirements.

Figure 1 below, based on work of the First Draft News initiative, presents one possible way and guide to dealing with UGC/UGV for initial orientation. It focuses on copyright issues and is based on UK copyright legislation (so may have to vary elsewhere).

A simple copyright guide for newsrooms using eyewitness media

This advice applies to UK law and is not intended to be a comprehensive guide to all of the situations that may arise



FIRSTDRAFT
Getting news right from the source

Created by Jenni Sargent (Eyewitness Media Hub) for First Draft News with the generous assistance of Adam Rendle from Taylor Wessing firstdraftnews.com

Figure 1: Copyright guide for UGC by First Draft News

What requirements look like

The initial requirements are collected in [Section 4](#). They are structured according to a number of clusters (see [Section 4.1](#) to [4.8](#)). Figure 2 below gives an explanation of a requirement and its annotations.

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V1	1	Verification		09.02.2016		Citizen Evidence Lab
	Requirement	If the video I am looking at contains graphic material I get a warning of that upfront				
	Comments	research has shown that vicarious trauma can be prevented by warning the viewer for graphic content upfront.				
	Technical solution					

Figure 2: This is how an InVID requirement looks like

2 Vision

The digital media revolution and the convergence of Social Media with broadband wired and wireless connectivity are bringing breaking news to online video platforms. News organizations delivering information by Web streams and TV broadcast often rely on user-generated recordings of breaking and developing news events shared via Social Media to illustrate the story. However, in video there is also deception. Access to increasingly sophisticated editing and content management tools, and the ease in which fake information spreads in Social Networks requires reputable news outlets to carefully verify third party content before publishing it, reducing their ability to break news quickly while increasing costs in times of tight budgets.

Video is the predominant form of content being consumed today in Europe and worldwide, and this is a trend that will continue to grow in the coming years. Cisco⁵ predicts that global IP video traffic will account for 79% of all consumers' Internet traffic in 2018, up from 66% in 2013. This percentage does not include video exchanged through peer-to-peer (P2P) file sharing. The sum of all forms of video (TV, video on demand, Internet, and P2P) will range between 80% and 90% of global consumer traffic by 2018; most of this video will be consumed with or originate from wireless and mobile devices. Monetization of video consumption also moves cross-platform, with video ad views up by 93% on mobile devices in the second quarter of 2014, compared to the same period in 2013; in the U.S. alone, ad firms and marketers spent about \$1,5 billion on mobile video ads in 2014, and are expected to spend over \$6 billion in 2018⁶. In terms of content types, news reporting is the single largest driver of monetization from on-demand video content, with an ad view share of 21%⁷. This unlocks a wealth of new business possibilities, particularly in relation to newsworthy video content that is not created by traditional media organizations but being uploaded by users of Social Networks.

The online video platforms on which breaking news in form of UGV is found are, but are not limited to; YouTube, Youku, Vimeo, DailyMotion and also Twitter and its video ecosystem (Vine, Meerkat and Periscope). Such platforms are extensively used for uploading videos that are often captured with a mobile device (smartphone, tablet or other camera-enabled device) on many different occasions – for example in a social gathering, at a sports event, or during an unexpected event by individuals who just happen to be at the right spot at the right time, such as the eyewitness accounts of the Charlie Hebdo attack in Paris in January 2015. Semi-professional video content from e.g. amateur journalists or political and social groups'

⁵ <http://bit.ly/cisco-viual-networking-index>

⁶ <http://venturebeat.com/2014/09/08/mobile-video-ad-spend-will-reach-1-5b-by-the-end-of-the-year-report>

⁷ http://www.iab.net/media/file/Q2_2014_FreeWheel_Video_Monetization_Report.pdf

activists is also abundantly available via online platforms. All this video content often lacks in image quality, compared to professional recordings, but is unique in terms of content, and thus potentially interesting and valuable to a wide audience. Consequently, it also opens up significant monetization possibilities, both for its creator and for the news industry re-using the video, once rights are cleared and verification is performed. As stated by Sam Dubberley, co-founder of Eyewitness Media Hub, in the BBC's College of Journalism blog, "news organizations have to address the logistical, ethical and legal challenges surrounding eyewitness media relating to ownership, consent, safety and critical consumption. And if we don't, there could be trouble down the road".⁸

To be able to re-use and re-distribute Social Media video content (or, more generally, user-generated video content - UGV) made available via online video platforms (generic platforms such as YouTube as well as proprietary citizen journalism platforms hosted by traditional broadcasters), as part of their regular business activities, three factors matter for media organizations such as broadcasters and news agencies: certainty, compliance and timeliness:

- certainty that the video is an accurate representation of the event that it claims to represent;
- compliance with the rights of the video's creator or owner (to avoid unnecessary litigation);
- and timeliness, both in the discovery of the video and in establishing certainty and compliance.

In response to these industrial needs, InVID aims to build a platform and several tools, applications and systems on top of this platform, providing a portfolio of services to detect, authenticate, check (both in terms of reliability of the source and accuracy of the newsworthy video), and clear (in terms of re-use rights) video material from online sources. This will allow European broadcasters and press agencies, as well as independent media organizations (news portals, major blogs, etc.), to deliver the best and most accurate video news coverage possible to their viewers. It will strengthen their business position in the media market and their societal role as trusted news sources.

2.1 Examples

To demonstrate the immediate need for such a platform that supports broadcasters and press agencies with verification of UGV, we have gathered three examples in which established media organizations were fooled into publication of content that was not true.

⁸ <http://www.bbc.co.uk/blogs/collegeofjournalism/entries/a8965fb1-a867-4b5c-a6c8-01692f6941ec>

Example 1: Haiti earthquake video hoax

In January 2010, a major earthquake hit Haiti. The fake video (see a snapshot of it in Figure 3 below) was created and circulated by an individual who downloaded a video from a previous earthquake a few days earlier in California, taken by a monitoring camera at a newspaper headquarter and published by some major media outlets. This individual used after-effects software to slightly modify the original video (just by cropping it, to avoid displaying the timestamp of the monitoring camera), and made it appear to be a video from a monitoring camera of an embassy in Port-of-Prince during the Haiti earthquake, and then uploaded it on his YouTube and Daily Motion channels. Subsequently, he started to put links on his Facebook page and use some web engines to artificially increase the number of views on YouTube and Daily Motion. Later-on he received emails from journalists asking for information and he did not answer, just putting in his caption that the video was coming from some official of the embassy, giving the name of a diplomat. Then, he also erased the suspicious comments put on his channels (such as, “why are there no black people in the video?”). While sending in a hurry their reporters, some media took this raw footage and aired it for several hours. People on Social Networks started to cast doubt on this video and, finally, it appeared to be a fake when the official authorities denied any relation to it and people on Social Networks discovered the original video. The media that aired the video had to apologize for the mistake.

In this real-life example, having a tool capable of detecting the after-effects alteration of the original video, and also being able to efficiently perform a similarity search through videos on the same subject (earthquake) would have helped to prevent the wider spreading of the hoax.



Figure 3: Haiti earthquake video hoax

Example 2: Eagle video hoax

In December 2012 a [video showing an eagle snatching a baby](#) was posted on YouTube (see Figure 4 below). Very soon it went viral, with many websites re-publishing it. The video got more than 44 millions views on YouTube. There were some doubts about the video's authenticity, but only a close examination using video editing software helped to detect inconsistencies in the shadows of the eagle's flight path, thus providing evidence that the video had been somehow manipulated. Later on, it was revealed that the whole video was a hoax prepared for an exam by some Canadian students.

This example shows that being able to detect the inconsistencies of a video file rapidly with the aid of forensic analysis would greatly help in the verification process.



Figure 4: Eagle video hoax

Example 3: Presidential fake image

In January 2013, a top newspaper published a fake image, apparently showing Venezuelan president Hugo Chavez under surgery in a Cuban hospital. The image was offered by an alleged sister of a nurse working in Cuba to a Spanish photo agency that, in turn, sold it to the newspaper. In fact, the hoax image was taken from a 2008 Mexican surgery operation video of someone else, posted on YouTube almost five years before. The image was not manipulated; it was just a screenshot of a video file (see Figure 5 below). The video could be retrieved at the time of the hoax with a manual query in YouTube with the Spanish word "intubación" (intubated). The hoax caused major trouble as the newspaper had to withdraw a

complete edition in the middle of the night and was accused of political bias in South America.

This example shows that being able to deal with cross-modal fakes, e.g. images that have been taken from videos or movies, is very important for journalists and media organizations. It also shows that in the context of verification, we should not only treat the content that has been strictly created by a non-professional user as “user-generated content”, but in fact any piece of content that is not fully verified and trusted; as in this example, where a frame of the video became viral after being published by a mainstream media outlet.



Figure 5: Presidential fake image

2.2 User Scenarios

Below we have provided two clear user scenarios that depict both a desktop usage scenario and a mobile usage scenario. These scenarios are there to get a better understanding of how a user will use the InVID system for his/her daily work. This better understanding is reflected in specific requirements.

Desktop Scenario

The fundamental need addressed by InVID is the verification and rights management of newsworthy UGV. When a video containing images / footage of a newsworthy incident is brought to the attention of staff working in the newsroom of a media organization, a journalist working there (let's call her Nancy) is assigned to deal with it. She thus has to check whether the video's contents are accurate and true. (In our example, let's assume that the video is

about an artillery attack that apparently portrays the killing / wounding of a number of civilians in the city of Homs, Syria).

Consequently, our journalist Nancy has to deal with and answer the following questions in order to verify (or debunk) the video's contents before it becomes part of the news production and distribution cycle:

- **Provenance:** is this the first publication ever of this video?
- **Time and Date:** has the video been shot at the time at which it claims to be shot? (Do the time claims match other parameters such as metadata, weather at the time, shadows etc.)
- **Location:** has the video been shot at the location at which it claims to be shot? (Do the surroundings that are visible in the video match the area; comparison with other geographical information / images of the area; comparing signs visible in the video with language of the area, such as road signs, shop signs, number plates; do people wear clothes typical for the area, does the audio in the video match with audio expected from a specific location such as; language, dialects, ambient sounds, etc.)
- **Context:** could the video / images have been taken from another event (recorded at a different location and / or earlier time)?
- **Context:** are there other images (videos or photos) available elsewhere in Social Networks, Blog posts etc., portraying the same event, e.g. from different angles? If yes: do they support the claim that our video makes?
- **Context:** is the event discussed (and how) on other Social Networks?
- **Context:** how are other (professional media) outlets such as news agencies, broadcasters, media organizations etc. dealing with the incident, and what evidence do they have (and publish) about it?
- **Content:** Is there any evidence of the video being manipulated (has it been tampered with, has it been photo- shopped, etc.)?
- **Content:** what do the metadata of the content item reveal?
- **Source:** who has shot the video? (Who is the person? What has the person posted / distributed / shared previously? Is that his / her first posting? Does that provide any information about his / her reputation, possible intentions, views etc.)
- **Source:** Can the person be contacted? How can this be done? All without putting the life of the person who posted the video at risk! Ideally – and generally most important for journalists – Nancy wants to establish direct contact with the person who produced the video and get in touch with him / her to find out more about the incident, talk about what happened etc. This is usually a very (most) important part of the verification process! Finding out the person's identity is also important in order to credit the source and get permission for re-use (all this has to be done without putting the source's life at risk).

Additionally (and ideally), Nancy can also find out who is responsible for the incident (in the selected example: the artillery attack). Ideally, the following questions can get answered:

- Is there any evidence that gives clues as to who is responsible for the attack (e.g. are there any clues about weapons used, such as manufacturers / models of weapons and their origin)?
- Can this be brought into context (e.g. weapons of manufacturer X have previously been used only by conflicting party Y).
- Are there any postings about the events in Social Networks (e.g. are particular people / groups boasting about the event? Who are they? What can be found out about their credibility / previous activities etc.)?
- Who else (participants, witnesses, others) is reporting about the event, and how is this done (pro / con etc.)?
- Having answers to all (or some) of the above questions, Nancy is in a better position to judge whether what is portrayed and can be seen in the video is accurate or not. Depending on her editorial judgment (and that of usually at least a second person), the video makes it into the news production cycle or not.

There are two ways of including the video's contents in the news cycle:

- the video is used by reporting journalists for their assessment of the situation, or
- the video is used for inclusion in one of the media organization's channels / platforms.

In the latter case, it can, for example, be incorporated in the media organization's output channels (for example a TV news report) or embedded / linked to from an online report / story. In any case, the source should be credited (if this can be done without putting the source at risk - if no crediting by name is possible, it should nevertheless be stated where the video came from and why its source cannot be named). Furthermore, it should be stated what process of verification the item has undergone, and if there remain any doubts about the item's accuracy these should be clearly mentioned (e.g. by adding something on the lines of "this item could not be verified fully because of X").

Finally, the item plus all the information that has been collected "around it" by Nancy and anybody else working with it should make it into the media organization's database for possible future use and reference. This should also contain information such as what has been checked by whom, when and how, plus information about the item and people featuring in and around it (in particular cases it may be advisable not to include personal details here such as contact information and only disclose these directly on a person-to-person basis – again, to ensure contributors' safety).

Mobile scenario

Local media rely on the gathering of trustworthy regional content within a short period of time. With regard to time and costs, it is not feasible to have a journalist at each local event or incident. In order to get regional content, local media cultivate communities of non-

journalist users who are willing to contribute user-generated content, especially videos, directly to them.

Since mobile devices are most commonly used for capturing UGC, it is important to have a smartphone App that is integrated into the UGC management systems of InVID. It must also be easy to use for the end users. The InVID mobile App will provide functionalities for user registration, uploading of content, adding of metadata and will also gather data from the mobile device – e.g. geo-data - for verification purposes. It will also allow editors to contact the provider of content with a backchannel – e.g. for further verification processes or if more information is needed.

To build the community for UGC, the local newspaper (let's call it Tyrolean Times) launches a marketing campaign targeting the registered users of their website, their subscribers and local emergency services.

Toni, the chief of a local fire brigade, is interested in providing videos of the work of his organization through Tyrolean Times. He downloads the App and registers to the system. For registration, Toni uses his existing user account for the Tyrolean Times website. In his case it is easy for the Tyrolean Times to verify the user because there is a lot of contact between the newspaper and the fire brigade. During the registration process, Toni accepts the legal and commercial conditions for the use of the App. He permits the contribution of UGC through Tyrolean Times and also accepts the commercial framework for the contribution.

One week after the registration, the fire brigade is called to an emergency to extinguish a fire. Once the fire is under control, Toni takes a video with the InVID App on his smartphone and sends it to the Tyrolean Times with the keywords "fire", "Innsbruck, Lindenstraße 5" and the date. In addition, the InVID App sends meta-information such as the date, time and location of Toni's smartphone.

Josef, an editor of the Tyrolean Times, monitors the incoming UGC in the APA-Online Manager. He is interested in using Toni's video for the website of the Tyrolean Times. The source of the video is identified by a unique user name known and managed by the Tyrolean Times. This makes it easy for Tyrolean Times to know that the source of the video (Toni) belongs to the group of trusted users. Only basic verification with the integrated InVID Verification Application is necessary.

Josef uses the backchannel of the InVID App to ask Toni if there were any people injured in the incident. Toni provides the requested information (two people). Josef writes a story about the incident and puts the video along with the story on the website.

The day after, Josef receives information on a traffic accident in Kufstein. Unfortunately there are no UGC videos of the incident and there is no possibility to get a journalist to the place of the incident in time.

Josef uses the backchannel to the InVID App to find users who are close to the incident and willing to take a video and send it to the Tyrolean Times.

Andreas downloaded the InVID App from the App store to his iPhone the day before. Since he is not a registered user of the Tyrolean Times website, he had to create a new user account for the App.

Andreas is on his way to work and close to the traffic accident when he receives the message from Josef. He stops near the traffic accident and takes a video with the InVID App on his smartphone. He adds keywords of the location “Kufstein, Feldgasse”, the tags “traffic accident” and the current date to the video. Then he submits the video to the Tyrolean Times. The InVID App sends additional information such as the date, time and location of the smartphone. Josef checks if the information from Andreas matches the date, time and location of his smartphone. Afterwards he checks the video with the InVID Verification Application (see desktop scenario). As all checks are positive, Josef puts the video on the website. The rights and commercial questions were already part of the registration process for the App, so there is nothing to do for the editor, regarding this matter. He informs Andreas via the backchannel of the App that his video has been used for the website.

3 Industrial requirements gathering

3.1 Market research

All initiatives that are known to us at this point of time and are relevant for UGV verification have been researched and from their publications and studies requirements have been extracted for the InVID video verification system. The market analysis has been divided over multiple project partners, as indicated in the tables below. Per researched initiative the following questions have been answered:

- What is it?
- What is the relevance for UGV verification?
- What can we learn from it? (List of most interesting findings that can be used for requirements gathering.)

We have clustered the researched initiatives as follows:

- Verification initiatives
- UGC Agencies
- Verification tools
- Research projects
- Newsroom systems

Per cluster, the most relevant initiatives for UGV verification have been described in detail. In order to come to the actual requirements quicker we have placed all other verification initiatives that we have researched in [Appendix A: Additional Market Research](#). Note: all the requirements that have been gathered from all the research done on verification initiatives have been included in [Section 4](#).

Disclaimer: much of the information contained in subsequent chapters comes from respective websites and has not all been individually evaluated by the InVID consortium or the authors of this Deliverable.

Verification initiatives cluster

In this section the most important online verification initiatives that were to be found online have been portrayed. Over the last few years several high impact initiatives have been created. Very important are [The Verification Handbook](#), an initiative by the European Journalism Center that aims to set a standard for verification, and [First Draft News](#), an initiative of high profile and very active consortium members with a focus on UGC that is a true 'one-stop-shop' for journalists.

All initiatives that we have researched have relevance for UGV verification. For example the Verification Handbook has a specific section on video verification. Bellingcat has articles on how to automate parts of video verification workflows, and the TOW Center has published a study in which they analyze the use of UGV in the News industry.

The verification initiatives that we have researched are:

Table 3: Verification initiatives that have been researched

Verification Initiatives	By partner
The Verification Handbook	AFP
First Draft News	DW
Bellingcat	DW
BBC Academy - Journalism/Skills/Social Media	DW
TOW Center for digital journalism	DW
The Citizen Evidence Lab	DW
International Fact-Checking Network by Poynter	DW
Eyewitness Media Hub	DW
France 24 - The Observers	AFP
GIJN - Global Investigative Journalism Network	AFP
Meedan	DW
Witness - Human Rights Video	DW
Google News Lab	DW

The three most relevant for UGV verification are [The Verification Handbook](#), [First Draft News](#) and [The Citizen Evidence Lab](#), and they are described in detail below. All other verification initiatives that we have researched can be found in [Appendix A: Additional Market Research](#). All the requirements that have been gathered from all the research done on verification initiatives have been included in [Section 4](#).

3.1.1.1 The Verification Handbook

Research contributed by AFP

[The Verification Handbook](#) is an online resource for journalists and aid responders, which provides step-by-step guidelines for using UGC during emergencies. The [European Journalism Centre](#), based in the Netherlands, published it under its [Emergency Journalism initiative](#). It has been translated into several languages.

The Verification Handbook describes best practice processes on how to verify and use information provided by the crowd, with notably a specific chapter on video verification. In this chapter written by [Malachy Browne](#), former news editor at Storyful and currently European head of [Reported.ly](#), three complete use cases on video verification are detailed.

The most interesting findings from the Verification Handbook use cases tell us a lot about processes used when verifying videos:

- Find other images or videos about the same event on Social Networks (especially geolocated media and if possible from trusted sources) to corroborate the event. It gives the example of pre-curated Twitter lists and also about using third party services like Pinterest (which can be extrapolated to Instagram, Flickr, etc.).
- Search Twitter for a YouTube video code to see who is publishing it, retweeting it or for finding more information on that specific video.
- Search the alias or username elsewhere on the web to find out more about that user / alias and to get more information (including people search engine pipl.com, spokeo.com, Facebook profiles and such like).
- Use phone directories to get in touch with the user / alias / uploader.
- Use Google maps, Google Earth, Google Street View to locate precisely the event.
- Use historical Twitter search about the event to retrieve more information and images or more videos.
- Perform Google Reverse Image Search to get more clues about the event.
- Perform a detailed investigation of the first video, splitting it frame by frame at the key moments of e.g. a shooting, to try and find ways to identify victims and then to track down survivors.
- Search YouTube by upload date to narrow down the number of results.
- Find landmarks on videos (monuments, facilities like a stadium, church, mosque, etc.), which may help to confirm the location.
- Confirm location by looking at Panoramio layer in Google Earth or satellite images services through Google maps and street view.

Most of the processes described above in the Verification Handbook use cases are done manually and are time consuming. In a user interface dedicated to verification of online UGV, it would be a great help if some processes would be automated, such as:

- finding related images or videos from the same event (either to confirm that something really happened in a given location, or to determine whether some particular content was already published in a different context) and displaying the corresponding thumbnails in the graphical user interface;
- finding contextual information and discussions about a video on Twitter (and elsewhere) through the YouTube code;
- finding automatically related information on the user channel / uploader name;
- extracting points of interest (landmarks, buildings, etc.) from the videos (possibly through segmentation, visual descriptors);
- display related maps from content coordinates or address/city/country information.

3.1.1.2 First Draft News

Research contributed by DW

[First Draft News](#) is a non-profit initiative, funded by Google, committed to raise awareness and establish standards in all aspects of social newsgathering and verification.

It exists of a coalition of partners (Google News Lab, Storyful, Reported.ly, Eyewitness Media Hub, Dig Deeper, Bellingcat, Meedan, Verification Junkie, and Emergent Info) that jointly work on projects that raise awareness for the importance of eyewitness reporting and train journalists and media organizations on verification skills, especially during breaking news situations.

On the First Draft News website one can find a lot of information about UGV. Varying from [how to verify live streams](#) to [how to handle propagand videos](#) to [how to check the exact upload time of a video](#) and below [guidelines for the verification of videos](#).

Visual Verification Guide: Video

1. Are you looking at the **ORIGINAL** version?

- NO** By searching keywords on each social network we found earlier versions of the video
- A reverse image search of the video thumbnail reveals other versions online but we are unable to confirm which is the original
- A web search for the URL shortcode suggests it is the first version shared online but we have been unable to speak to the uploader
- We can find no other versions of the video online
- YES** It was sent to us directly and we have spoken to the source

Visual Verification Guide: Video

2. Do you know **WHO** captured the video?

- NO** It came in via an anonymous email or chat app number
- It was uploaded to a social network but the username does not appear elsewhere online. The uploader wants to remain anonymous
- By running full name searches, reverse searching the user's profile photo, and/or researching the domain ownership of their blog or website, we were able to identify the uploader
- We communicated with the uploader via social media to confirm that they captured the video
- YES** We questioned the source and their answers correlated with weather reports, the device used and their own online footprint

Visual Verification Guide: Video

3. Do you know **WHERE** the video was captured?

- NO** The visual clues in the video are too limited for us to confirm where it was captured
- A translation of any accompanying text provides clues to where it was shot but we have been unable to identify the location
- We have used visual clues such as signage, architecture and clothing to assume a broad geographical region
- We have cross-referenced landscape and landmarks using mapping tools and have confirmed the lat/long coordinates
- YES** We questioned the source and their answers about where the video was captured correlated with other visual identifiers from the area

Visual Verification Guide: Video

4. Do you know **WHEN** the video was captured?

- NO** The video was sent to us anonymously and there is no metadata available
- We checked the timestamp on the earliest version uploaded to a social network, but we have no data to confirm when it was captured
- The social time stamp shows it was uploaded shortly after the event occurred and it features visual evidence that correlates with other eyewitness reports
- We questioned the source and were able to confirm that they were at the location when the video was captured
- YES** We confirmed that the weather conditions and any shadows visible in the image correlate with the time, date and location given by the source

Visual Verification Guide: Video

5. Do you know **WHY** the video was captured?

- NO** We do not know who shot the video so we can't ascertain what their motivations might have been
- The social media account was created very recently and/or social searches reveal the uploader rarely posts online so there is little evidence to confirm their movements or motivations
- Wider online searches of the uploader's real name reveals that they are connected with an activist or advocacy organisation but there is no additional information to know their motivation in this case
- Searches of the uploader's social media activity leading up to the event confirm their reasons for capturing the video, i.e. holidaymaker, journalist, works locally
- YES** We spoke to the source who confirmed the circumstances surrounding the video

firstdraftnews.com

Figure 6: Guideline for the verification of UGV by First Draft News

A lot can be learned reading through all the content on the First Draft News website. Some of the more important findings are:

- a platform for video verification should be easy to integrate into already established [working processes](#) for news aggregation and verification;
- verification of video is a laborious process and therefore finding the original video is utmost important;
- videos are sometimes taken offline and disappear from Social Networks, in a video verification platform it should be easy to create a local copy of a video for safekeeping;
- some time-consuming manual tasks in the video verification processes can be automated, here is an example: [‘How to semi automate a video verification process’](#);
- for the verification of a [live streaming video](#) it is very helpful to have a database of trusted users to check the trustworthiness of the source;
- direct messaging Apps are used more often to disseminate UGV, tapping into content shared on direct messaging platforms proofs to be a real challenge;
- a lot of research is done on how to [use UGV properly and ethically](#). At the moment the articles on First Draft News provide an industry standard on how to handle crediting of a source and all the ethical issues that come with that;
- the fact that verification is seldom about true or false. Instead, there are many shades of true and false; also see the [video verification guide](#) above.

3.1.1.3 Citizen Evidence Lab

Research contributed by DW

[The Citizen Evidence Lab](#) is an initiative that aims to support human rights researchers and advocates taking better advantage of the new digital data-streams coming from conflict zones and other human rights hotspots. Their website is a platform to share best practices and techniques and tools for the authentication of UGC with a focus on human rights defense. The Citizen Evidence Lab was created as part of Amnesty International’s Sensor Project.

The Citizen Evidence Lab is not focused on UGC but on Citizen Evidence. Their definition being: “Citizen evidence” defines any material – such as images or videos – showing a potential human rights violation, collected by someone other than an official human rights investigator. The collector in many cases is a citizen journalist or human rights defender, and more often than not, the collected material is shared through digital, Social Networks, such as YouTube or Twitter. However, it can also be a bystander or armed actor who is recording on a cellphone, for instance.”

This is one of the few verification initiatives that have a clear focus on video. They ([David Danforth](#) as lead developer) have also created the [YouTube Data Viewer](#): a tool that extracts

metadata of a video and automatically detects a number of key frames that are then used for performing a Google Reverse Image Search. The idea is that by this procedure possible previous publications of the same video can be found.

Their video verification approach handles a video as a collection of images. This seems to be a valid approach. Automatic detection of key frames (the ones that YouTube also gives you as a choice for thumbnails) and Google Reverse Image Search is an interesting combination.

On their website they publish own material but also content coming from e.g. Eyewitness Media Hub and the Witness Media Lab. Therefore they are an interesting aggregator of content related to UGV verification.

Other things that can be learned from Citizen Evidence Lab come from their step-by-step guide to assess citizen video shows, a linear working process for video verification:

- Collect data, such as:
 - Public data (YouTube User ID, video link, unique video ID, upload date).
 - 'Hidden data' (published date, published time, use [YouTube Data Viewer](#)).
 - When was the YouTube account that hosts video created?
 - How many videos has a particular user previously posted?
 - Do past videos come from the same geographic area?
 - Find other Social Media accounts that are associated with the YouTube account.
 - Original content or copy? (Search with same keywords, apply reverse image search.)
- Check video
 - Check description of video for clues.
 - Who is shown in video? (Check clothes, language, other features.)
 - What is shown in video? (Look for events, weaponry, signs, logos, flags, other recording instruments, etc.)
 - Where did the incident happen? (Check for landmarks, terrain, traffic signs, store signs, audio clues, etc.). Coordinates or location estimation.
 - When did the incident occur? (Search for weather conditions, clothes, other reports, other observation, etc.)
 - Other videos or images available from same incident?
- Professional standards
 - Ensure safety of source.
 - Licensing, request consent for using the video.
 - Blurring needed? (Faces, graphic content)
- Archiving and preservation of relevant video content is crucial. ([See this article](#) for more information).
- Vicarious trauma among journalists handling UGC is a very serious issue (for more information [see this study](#) by Eyewitness Media Hub). Requirements that can be taken from this study could be to:

- get an automated warning for graphic content,
- be able to watch the video without sound,
- be able to share the burden of reviewing a graphic video and a good curation process, so that only graphic content that is likely to be used has to be reviewed.

UGC Agencies cluster

One could say that user-generated content agencies were born with the advent and spread of smartphones. In July 2005, many witnesses took images of the London bombings, contributing to the coverage of the BBC and giving the idea to three young Frenchmen studying in London to launch ScoopLive, one of the first agencies dedicated to gather, promote and sell user-generated content to mainstream media. ScoopLive later became Citizenside, and then Newzulu, while other agencies like the British Demotix was sold to Corbis. Storyful, in turn, is more focused on curating Social Media user-generated content. It was acquired by News Corp in 2012 and is probably the most prominent social news agency at present.

New actors, with hybrid business models (curated content, on demand verification, technology provider, white label trademark solution providers, newsroom training) appear regularly in this evolving market, targeting more and more the gathering of UGC. All these platforms have to secure distribution rights, confirm the authorization of the digital file owner, verify the metadata and check whether the content has not been altered or already published somewhere else.

We can learn from UGC agencies about their working procedures in the verification process, the way they deal with their own community and other stakeholders on Social Networks for verification purposes, and the way they conceive and design their services to maximize their ability to publish newsworthy, valuable and accurate content.

Table 4 below gives an overview as to which agencies have been portrayed:

Table 4: UGC agencies that have been researched

UGC Agencies	By partner
Storyful	AFP
Grasswire	AFP
Reported.ly	AFP
Verifeye Media	AFP

Babo	AFP
Weye	AFP
Newzulu	AFP
Newsflare	AFP

The three most prominent UGC agencies are Storyful, Reported.ly and Verifeye Media and are described in detail below. All other UGC Agencies that we have looked at and learned from can be found in [Appendix A: Additional Market Research](#). All the requirements that have been gathered from all the research done on UGC Agencies have been included in [Section 4](#).

3.1.1.4 Storyful

Research contributed by AFP

[Storyful](#) presents itself as the 21st century Social Media news agency. Its concept is to dedicate a distributed newsroom to the curation, verification and rights clearance of user-generated content posted on Social Networks, mainly YouTube, Twitter and Facebook. At the end of 2012, Storyful was acquired by one of the world's biggest media companies, News Corporation.

Storyful provides its clients (many of which are media companies) with a dashboard of curated content ready to be used. It looks somewhat like Twitter lists of witnesses, experts, and journalists on scene. All of this content, including verified and cleared videos from YouTube, can be used for publication, providing the client has the respective subscription.

Curation and verification are the core business of Storyful. What is interesting for InVID to take along from Storyful is:

- their levels of rights clearance are: use for broadcast, use as 'YouTube embedded', and use with credit,
- how Storyful contacts users / UGC creators by written email seeking rights and asking for details; this includes asking questions such as:
 - Did they upload the video themselves?
 - Under which circumstances was the video shot?
 - Are they happy for its reuse?
 - Do they have ownership of the video?
 - How should it be credited if it is used?

- Storyful also provides free streams of information for (future) customers like the [Storyful Pro](#) Twitter account (you have to request access), the [Storyful Viral](#) Twitter account, [Storyful Twitter lists](#) and the [Storyful Facebook News Stream](#),
- the [Storyful content agreement](#) documents provide insights into how they handle permission and licensing of content from eyewitnesses.

3.1.1.5 Reported.ly

Research contributed by AFP

[Reported.ly](#) is a distributed newsroom curating information, mainly on Twitter. Reported.ly has a team of experienced journalists, activists and community managers such as Andy Carvin, who is described from his work at NPR (US national public radio) as “the man who tweets revolutions”, or Malachy Browne, former Storyful editor.

Reported.ly is relevant for UGV verification because it has [a specific page](#) on its website for videos, curated within stories.

The most interesting findings from Reported.ly that can be used for requirements gathering are:

- their terms of service are interesting and could provide useful guidance for InVID. Details on <https://reported.ly/terms-conditions/>;
- their use of crowdsourcing to verify information. For InVID it is interesting to check if and how we can use crowdsourcing in the verification platform;
- the way they regard and describe their “core values”:
 - **”We’re a newsroom, not a newswire.** There will be many occasions where we will share information that hasn’t been confirmed yet. We do so in the spirit of providing context to our newsgathering process, as well as inviting the public to help us confirm or debunk aspects of a particular news story. We will always be clear about what has not been confirmed. What we discuss on Social Media shouldn’t be seen as the conclusions of our reporting; instead, it’s the opening gambit of a public conversation that we hope will help us sort fact from fiction. When there’s a rumor or report that is going viral, we won’t pretend it doesn’t exist. We’ll address it and explore it together.“

3.1.1.6 Verifeye Media

Research contributed by AFP

[Verifeye Media](#) is a UGC agency collecting images and videos from eyewitnesses and freelancers and monetizing them with mainstream media.

Verifeye Media's main verification process is to provide a mobile application that stores metadata about the image or video, such as the date, time and location encrypted into the file, but also a compass bearing and altitude reading, "so we can tell where you were, when you were there, which direction you were facing and whether you're on ground floor or the tenth story of the building".

The most interesting findings from Verifeye Media that can be used for requirements gathering are:

- it is interesting to have a look at Verifeye Media's smartphone [application concept](#) and the metadata kept by the camera or camcorder App, and all the functionality they have implemented;
- they use all kinds of sensors in smartphones to provide metadata to the UGV, the InVID mobile application could also include such functionality to automatically generate a comprehensive set of metadata with UGV;
- they claim to have a [good ethical approach](#) to UGC sharing revenues 50-50 with the owner.

Verification tools cluster

In verification processes that are established in newsrooms, many free tools are used. Often, up to 20 tabs are opened in a browser to be able to make use of a variety of tools with different benefits and for different tasks. Then, results and verification clues have to be "brought together".

Individual tools mostly address only a small part of the verification process. No tools are specifically made to address the challenges and all aspects that are encountered when it comes to the verification of UGV. Therefore we have researched individual tools (listed in **Table 5**) that are nevertheless useful for UGV verification (or parts thereof). This, too, led to extracting further requirements for the planned InVID system.

Table 5: Verification tools that have been researched

Verification Tools	Partner
Checkdesk - crowd sourced verification	APA-IT
Amnesty International's YouTube Data Viewer - video verification	APA-IT
SAM Desk – collaboration platform	APA-IT
Dataminr – news gathering	APA-IT

Verification Tools	Partner
TUNGSTEN – digital image assesment	EXO
FotoForensics - image verification	APA-IT
EXIF viewers (Jeffrey's, EXIFdata.com, etc.)	APA-IT
Citizen Desk - Sourcefabric	APA-IT
Veri.ly - crowd sourced & collaborative verification platform	APA-IT
EyeWitness to Atrocities - mobile verification App	APA-IT
The Guardian CameraV project - mobile App	APA-IT
Dence GmbH – image verification	APA-IT
Google Images – reverse image search	AFP
TinEye - image verification	AFP
Baidu Image Search – reverse image search	AFP
Bing Image Search – reverse image search	AFP
Yandex Image Search – reverse image search	AFP
Verified Pixel - image verification	DW
Forensically - image verification	CERTH
Ghiro - image verification	CERTH
Emergent - real time rumor tracker	MODUL
Verifeyed - image, video and pdf forensic software	AFP

The most relevant tools for UGV verification are [Checkdesk](#), [Amnesty International's YouTube Data Viewer](#), [TUNGSTEN](#), [EyeWitness to Atrocities](#), [Google Images](#), [Verifeyed](#) and [Forensically](#), and are described in detail below. All other verification tools that we have researched and learned from can be found in [Appendix A: Additional Market Research](#). All

the requirements that have been gathered from all the research done on verification tools have been included in [Section 4](#).

3.1.1.7 Checkdesk

Research contributed by APA-IT

According to its owners, and as stated on the Checkdesk website, [Checkdesk](#) is an open source toolkit for curating, verifying and publishing user-generated content online. The platform allows journalists and editors to open the verification process and engage their readership in the reporting and fact-checking process. Checkdesk gives journalists the tools they need to investigate pieces of online media. Journalists can gather and add links to the system and start working either within their newsroom, or in collaboration with their readership community. Once a link (a “Report”) has been added, journalists can add annotations, corroborating links, and questions about that Report. By enabling journalists to document each step of the process, Checkdesk brings transparency and structure to the verification process. Journalists can assign statuses to Reports, i.e. a visual indicator of whether a piece of media has been verified, proven false, or is in progress.

Checkdesk is an open framework of ‘integrations’ with third party services. Developers with a journalistic mind can find their own ways to exploit third party tools and build new integrations that can be added to verification checklists. For example, there is potential for collaboration with other tools such as Cryptocat (for end-to-end encrypted communication between journalists and media sources), [Rbutr](#) (to cross-reference any other work done to highlight media as misinformation), Alghayma (to archive citizen media and protect it from deletion) and [Storyful’s Multisearch](#) (for cross-social search). Further integrations could enable translation of key content or consistency checking of URLs over time.

The most interesting findings from Checkdesk that can be used for requirements gathering are:

- checklists should be customizable and shareable;
- professional journalists can join forces with citizen journalists in search of background information and evidence to corroborate Social Media reports;
- how they use a clear visual indicator system for statuses of item; verified, false or in progress.

3.1.1.8 Amnesty International’s YouTube Data Viewer

Research contributed by APA-IT

The [YouTube Data Viewer](#) is a tool to extract hidden data from videos hosted on YouTube. Amnesty International and its Citizen Evidence Lab released the tool in 2014. The goal is to

offer non-technical users a tool and guidance to help them verify video in the context of human rights abuses.

The YouTube Data Viewer enables to enter the URL of a YouTube video and automatically extract the following information; video title, video description, video ID, upload date and upload time. The upload time is critical in helping determine the origin of a video. Finding the upload time of a YouTube video can be difficult - it's not clearly displayed on the video page. The YouTube Data Viewer also extracts 4 thumbnails of key frames from the video. These are the key frames that YouTube offers to the uploader of the video for visual summarization purposes. The tool will also display custom video thumbnails that are manually inserted by the uploader and do not necessarily have to be extracted from the video. The thumbnails are useful because one can plug them into a reverse image search tool, such as Google Image or TinEye, and see where else online these images appear.

The metadata, which is not separately shown on YouTube, enables the verification process of UGV on YouTube. Having the exact upload time helps to establish the first publication of a video.

The most interesting findings from the YouTube Dataviewer that can be used for requirements gathering are:

- easy to use tool for a non-technical user group such as journalists;
- this tool, although fairly straightforward, bridges the complex process of video verification with established working processes of image verification. Small stand-alone tools could be a way for InVID to have an impact on the complex processes of video verification;
- reverse image search of key frames of a video has proven to be an efficient way to detect other/older versions of the same video.

3.1.1.9 TUNGSTEN

Research contributed by EXO

[TUNGSTEN](#) technology was initially designed and produced in 2009 by eXo Makina (a project participant in the InVID consortium) with a first grant from the French Administration. eXo Makina is currently working on release number 6.8.

TUNGSTEN's software technology is fully dedicated to the assessment of digital images in order to find which ones are tampered or even doctored with, and which ones are trustworthy. TUNGSTEN is currently used more to certify and to put a trust label on images than to try and expose doctored images.

The aim of TUNGSTEN is to retrieve and show all information about the image such as the image history, the type of camera used, how many times it was re-saved, etc. The primary aim is to determine if the image is genuine or not and if it has been tampered with or not.

The software offers a wide range of functions, filters and algorithms. All functionality in TUNGSTEN is based on very deep mathematical and physical analysis. Visual verification approaches are consciously left out, as doctoring of the image is specifically done to deceive the human eyes.

The filters are organized into four main families: archeorithmic, algebraic, multi-spectral and optics. The “optic” filter is fully related to physics, not to any visual approach. The first batch of filters provides information on the file holding the image (photograph or video): origin, quality, EXIF data, JPEG signatures, quantization measurement, resaving numbers, etc. The second batch provides information on the mathematical structure of the digital image encoded inside the file. More particularly, these filters try to catch and amplify all the algebraic subtleties of the image. The third batch contains the most powerful filters but also the most difficult to handle for its user. In this analysis, the image is considered as a signal we need to process in order to retrieve its properties aiming to expose anomalies related to deliberate post-production actions. The fourth and final batch is exclusively related to the way light was captured by the sensor and encoded inside the file. One filter, for instance, catches, amplifies and exposes the “light waves”, i.e. the way the image is structured by light. Another filter shows the depth of field and thus allows the operator to both analyze the way the photograph or video was framed, and to find inconsistencies in this depth of field.

The most interesting findings from TUNGSTEN that can be used for requirements gathering are:

- a fully mathematical approach is at the moment state of the art for image verification, the approach could be adapted to video verification;
- a camera or other recording device provides a ‘signature’ in the video, a check against a database of know ‘signatures’ could provide verification clues about authenticity of a video;
- the number of re-saves of a video could provide clues about the authenticity of a video;
- analysis on tampering of frames of a video could highlight verification clues and give insight in why the video was tampered with (what specifically has been altered?);
- the InVID system should be able to analyze any sort of video, not only UGC to enlarge possible market share.

3.1.1.10 EyeWitness to Atrocities

Research contributed by APA-IT

[EyeWitness to Atrocities](#) is a mobile phone App that enables eyewitnesses to record and upload evidence of alleged atrocities from anywhere in the world, so it can be verified centrally and used to prosecute perpetrators.

According to its creators, and as stated on the [EyeWitness to Atrocities website](#), EyeWitness to Atrocities “is a tool for human rights defenders, journalists, and other courageous citizens to capture verifiable footage related to international atrocity crimes, developed by the London-based International Bar Association (IBA). It offers a camera that captures the metadata needed to ensure the images can be used in investigations or trials, and safely stores the information in a storage facility maintained by the EyeWitness organization.”

The EyeWitness team then analyses the footage and its information and work with the appropriate legal authorities to promote accountability for those who commit international crimes. The EyeWitness App can record videos, photos, or audio. The App should be used to capture raw footage related to atrocity crimes.

According to the EyeWitness to Atrocities website collecting verified videos over the App works as follows: “First, the EyeWitness App expands the metadata collected and embedded in the image when the images are taken, to include GPS coordinates, date and time, device movement data, and location of surrounding objects such as cell towers and Wi-Fi networks. This information verifies the date/time/location of the footage. Second, the App embeds a unique identifying code (known as a hash value) calculated based on the pixel count that is used to verify the footage has not been edited or altered in any way. Finally, the user sends the footage from the App directly to a secure storage facility maintained by EyeWitness. Only footage captured with and sent from the App is stored, ensuring that the stored footage is the original version. This original, encrypted footage is stored offline until it is needed for investigations or trials.”

The most interesting findings from EyeWitness to Atrocities that can be used for requirements gathering are:

- RAW video footage with specific metadata attached (like; GPS coordinates, date and time, device movement data and location of surrounding objects, such as cell towers and Wi-Fi networks), provided by a specific mobile App simplifies verification processes;
- the service creates a unique identifying code;
- pixel count of footage is generated so it cannot be secretly doctored;
- protection of sources is extremely important. No information about the user’s device that could personally identify the user should be collected. Also the IP address from which the user has sent the footage should not be collected.

3.1.1.11 Google Images

Research contributed by AFP

[Google Images](#) is a search service that allows users to search images based on visual similarity, and to perform reverse image search. It is said to be the largest index of images worldwide.

As Google Images also indexes thumbnails of many video services, it may play a major role in helping verify whether an image has been published somewhere else on the web and when. It helps to avoid the broadcasting of old footage and to find more images of the same event, or images of points of interest (buildings, monuments, landmarks) assisting to confirm the existence and the location of an event.

The most interesting findings from Google Images that can be used for requirements gathering are (also taking into consideration what could be used from this service):

- the Google images search engine is a tool journalists cannot do without in verification of UGC, it is mostly used to find other (earlier) publications of an image or video, to find corroborating evidence of an event and to find elements from an image or video in order to verify the location of UGC;
- with Google Reverse Image Search we can only search for images, thus only for key frames of videos, not for complete videos. Currently there is no service available for 'reverse video search';
- [Google Images has cancelled its API](#) although it may still be used from the [Custom search API](#). Simulating a browser through Selenium may also help to solve the issue;
- as Google Images has the biggest web index, it is the main candidate for exploring duplicate images and performing reverse image search.

3.1.1.12 Verifeyed

Research contributed by AFP

[Verifeyed](#) is a software company which claims to provide an advanced tool for the detection of digitally edited photos, videos, and PDF files, for identifying cameras and camcorders (image and video ballistics) and for highlighting of suspicious (modified) parts within images.

Verifeyed claims to be able to identify the source of the camcorder and fake frames within a video. When analyzing video files, Verifeyed first extracts useful frames (images) from the video, and then uses them as the basis for calculating the fingerprint.

These are the functionalities of the tool, as claimed by Verifeyed:

- Detection of interpolation and resampling. When two or more images are spliced together to create high quality and consistent image forgeries, geometric

transformations are almost always needed. These transformations, typically, are based on the resampling of a portion of an image onto a new sampling lattice. This requires an interpolation step, which typically brings into the signal statistical changes. Detecting these specific statistical changes may signify tampering.

- Detection of near-duplicated image regions. Detection of duplicated image regions may signify copy-move forgery. In copy-move forgery, a part of the image is copied and pasted into another part of the same image typically with the intention to hide an object or a region.
- Detection of noise inconsistencies. The amount of noise in authentic digital images is typically uniformly distributed across an entire image and typically invisible to the human eye. Additive noise is a very commonly used tool to conceal the traces of tampering and is the main cause of failure of many active or passive authentication methods. Often by creating digital image forgeries, noise becomes inconsistent. Therefore, the detection of various noise levels in an image may signify tampering.
- Detection of double JPEG compression. In order to alter an image, typically the image must be loaded in photo-editing software and after the changes are done, the digital image is re-saved. If the images are in JPEG format, then the newly created image will be double or more times JPEG compressed. This introduces specific correlations between the discrete cosine transform (DCT) coefficients of image blocks. The knowledge of image's JPEG compression history can be helpful in finding the traces of tampering.
- Detection of inconsistencies in Color Filter Array (CFA) interpolated images. Here, the hardware features of digital cameras are used to detect the traces of tampering. Many digital cameras are equipped with a single charge-coupled device (CCD) or complementary metal oxide semiconductor (CMOS) sensor. Then, typically, the color images are obtained in conjunction with a color filter array. In these cameras, only a single color sample is captured at each pixel location. Missing colors are computed by an interpolating process, called CFA interpolation. This process introduces specific correlations between the pixels of the image, which can be destroyed by the tampering process.
- Detection of inconsistencies in lighting. Different photographs are taken under different lighting conditions. Thus, when two or more images are spliced together to create an image forgery, it is often difficult to match the lighting conditions from the individual photographs. Therefore detecting lighting inconsistencies offers another way to find traces of tampering.
- Detection of inconsistencies in perspective. When two or more images are spliced together, it is often difficult to maintain correct perspective. Thus, for instance, applying the principles from projective geometry to problems in image forgery detection can be also a proper way to detect traces of tampering.
- Detection of inconsistencies in chromatic aberration. Optical imaging systems are not perfect and often bring different types of aberrations into an image. One of these aberrations is the chromatic aberration, which is caused by the failure of an optical

system to perfectly focus light of different wavelengths. When tampered with, this aberration can become inconsistent across the image. This can be used as another way to detect image forgeries.

The most interesting findings from Verifeyed that can be used for requirements gathering are:

- a detailed comparison of the functionalities of Verifeyed and the approach of the InVID system may create an even more comprehensive method to video verification;
- Verifeyed enables to determine which part of video should be used to calculate the sensor fingerprint. It also makes it possible to have several different fingerprints from different parts of the same video. This can be very useful to determine whether they both originate from the same device, or whether one of them might have been captured by another camcorder and pasted into the suspect file;
- Verifeyed allows the user to analyze the trustworthiness of individual parts of a video by matching them to a camcorder sensor fingerprint. For example, if one suspects that a part of a video file has been faked, one can either use the technique described in the previous paragraph, or calculate the sensor fingerprint using a portion of the file which is believed to be genuine. In this way, frames from different parts of the same video can be matched individually to this fingerprint. This can provide another helpful clue as to how trustworthy the video is;
- in the user interface, frames (images) that contain traces of the original sensor fingerprint are highlighted in green. In other words, if the analyzed frames are genuine, most of them will be highlighted in green.

3.1.1.13 Forensically

Research contributed by CERTH

[Forensically](#) is a service dedicated to image forensic analysis on single images. The service offers Beta implementations of a number of forensics analytic tools, such as image forensic algorithms, metadata extraction and image geolocation from GPS data. Some of the algorithms provided by Forensically are currently not offered by any other competing tools - namely, Clone Detection and Noise Analysis based on Median Filtering. Furthermore, the algorithm implementations provided by Forensically allow for high parameter customization, which may allow more effective user-guided verification.

While the tools provided by Forensically are designed for image verification, it is possible that they may also prove helpful for video, by applying the available tools on selected key frames of it. While some tools will definitely not be applicable to video, such as EXIF metadata analysis, it is possible that others may demonstrate adequate cross-domain applicability.

During the last year, Forensically has been a fast-growing service, being systematically expanded with new functionalities. As such, it can serve as an indicator of the current trends in image forensics algorithms, and an evaluator of the maturity of various approaches for real-world application. From that point, the evaluation of the applicability of these methods to video will inform us as to the potential for content-based video verification using image-based algorithms.

The most interesting findings from Forensically that can be used for requirements gathering are:

- the analyses that are being provided by Forensically can serve as an indicator of the current trends in image forensics algorithms;
- the user interface is designed very well and serves as a good example of how to display very technical information to a non-technical user.

Research projects cluster

In the past years we have seen some EU (co-) funded research projects with a focus on UGC verification. We have taken a closer look at those projects in which InVID partners have been active. The learning's from these projects will not only be reflected in the InVID requirements, but will be of use throughout the whole running time of the InVID project.

Table 6 includes the research projects at which we had a closer look

Table 6: Research projects that have been researched

Research Projects	Partner
REVEAL - Social Media Verification	DW
PHEME	MODUL
EUMSSI	DW
MUCKE	MODUL

3.1.1.14 REVEAL - Social Media Verification

Research contributed by DW

The [REVEAL project](#) is a EU (co-) funded research project that aims to develop tools and services that aid in Social Media verification. The project started in October 2014 and ends in October 2016. The project's focus is on Social Media verification, both from a journalistic and

an enterprise perspective, and concentrates on automation of parts of the verification processes. It looks at the whole spectrum of handling UGC in the newsroom; from finding relevant content to verification processes to licensing and ethical standards.

The REVEAL project is dealing with all sorts of UGC; there is no specific focus on video. REVEAL publishes a lot about the topic UGC verification on their website. The REVEAL [Twitter channel](#) is a good source to stay up to date with the latest news from the UGC verification community.

The most interesting findings from REVEAL that can be used for requirements gathering are:

- for the journalistic use case, REVEAL has developed multiple [public deliverables](#) that are interesting as a starting point for the work done in InVID. The public deliverables [D1.1 - requirements analysis and specification](#) and [D1.2 Legal-regulatory requirements analysis](#) are highly relevant;
- the REVEAL consortium has shared much information about [research](#) undertaken in the project and elsewhere on the project website;
- this article, for example, on [how to find breaking news in Twitter](#) gives insights into how journalists can retrieve breaking news from Twitter;
- other learning's from REVEAL are taken into the InVID project directly by the involved partners, namely CERTH and DW.

3.1.1.15 PHEME

Research contributed by MODUL

The [PHEME project](#) aims to identify phemes (rumorous memes) in Social Networks, distinguishing between four types and modeling the way they spread online: speculation, controversy, misinformation and disinformation.

Associating a piece of Social Media content to a specific 'pHEME' which can already be tagged as authentic or not, would allow verification prior to any analysis of the media (image or video) itself, since any media posted that claims to show a story which can be tagged as misinformation, can itself be seen as misinformation.

The most interesting findings from PHEME that can be used for requirements gathering are:

- PHEME already applies algorithms to detect rumor in Social Media content such as textual analysis (of the tweet, post, etc.) and social network analysis (finding the origin, tracking the spread, who is sharing, etc.), which would also be relevant to verification of UGV in InVID;
- other learning's from PHEME are taken into the InVID project directly by MODUL, who is involved in both projects.

3.1.1.16 EUMSSI

Research contributed by DW

According to the project consortium, and as stated on the [EUMSSI website](#), EUMSSI (Event Understanding Through Multimodal Social Stream Interpretation) “aims to develop technologies for identifying and aggregating unstructured data with different levels of granularity from both new (such as Social Media) and traditional media sources. The multimodal search focuses on high-level semantic, conceptual and event-centered representation, while allowing for strong interoperability and interactive reinforcement of the data aggregation.”

The resulting platform aims to be useful for any application in need of cross-media data analysis and interpretation, such as intelligent content management systems, personalized recommendation, real time event tracking, content filtering, etc.

EUMSSI develops data mining technologies that are crucial for video analysis. The EUMSSI research includes automated speech recognition (ASR), optical character recognition (OCR), speaker diarization, named entity recognition, person identification, video and audio segmentation and sentiment analysis.

The most interesting findings from EUMSSI that can be used for requirements gathering are:

- EUMSSI’s platform can support analyzing UGV. EUMSSI also deploys technologies to analyze tweets that allow for determination of the polarity of tweets on controversial topics;
- EUMSSI’s Twitter analysis can help to collect the Internet users’ opinions on specific UGV on the web (e.g. users might identify clips or certain sequences of it that have been published before);
- other learning’s from EUMSSI are taken into the InVID project directly by DW, who is involved in both projects.

3.1.1.17 MUCKE

Research contributed by MODUL

The project [MUCKE](#) (Multimedia and User Credibility Knowledge Extraction) provides new and reliable knowledge extraction models for multilingual and multimodal Social Network data streams. To do this, it focuses on the qualitative aspect besides the traditional quantitative measures, e.g. incorporating user credibility estimation as well as multimedia concept similarity measures.

MUCKE is relevant for UGV verification because both the credibility of the user posting content and the similarity of media content to other postings are relevant characteristics that can be measured and used within a verification process.

The most interesting findings from MUCKE that can be used for requirements gathering are:

- MUCKE focused on image retrieval but its work on “credibility models for multimedia streams” might be interesting for InVID;
- other learning’s from MUCKE are being taken into the InVID project directly by MODUL, who is involved in both projects.

Newsroom systems cluster

As stated previously one of the project’s aims is to make sure that the InVID system supports current journalistic working processes as well as possible. That means that once the verification of a specific video has been done, the video needs to become available in the publication systems that journalists are working with. Therefore, the most commonly used newsroom systems have been investigated, focusing on what they can do and how it can be assured that the InVID system can, ideally, "connect" to or be integrated / interfaced with them.

The newsroom computer systems that were looked at are listed in the table below:

Table 7: Newsroom Computer Systems that have been researched

Newsroom Computer Systems	Partner
Annova OpenMedia	Condat
AP ENPS	Condat
Octopus 8	Condat
Avid iNews	Condat
News Asset	Condat
Superdesk	Condat
The MOS Protocol	Condat

The most relevant NCSs are [Annova OpenMedia](#), [Avid iNews](#) and [The MOS Protocol](#), and are described in detail below. All other NCSs that have been investigated can be found in [Appendix A: Additional Market Research](#). All the requirements that have been gathered from all the research done on NCSs have been included in [Section 4](#).

3.1.1.18 Annova OpenMedia

Research contributed by Condat

[Annova](#) (Germany, Munich) is the market leader in Germany, Austria and Switzerland for newsroom computer systems and belongs to the leading providers in the EU, with customers such as ARD HSB, BR, Deutsche Welle, SRG SRR Group, SWR, WDR, RTSI, Swiss Radio DRS, RTR, Mediaset, RFI and RTL TVI. The Annova product suite OpenMedia provides a modern standard toolset with all major components needed for newsroom support of journalists, such as Workflows, Smart Search, Mobile Work Support, UGC, Search across multiple sources and a News broker. It allows for flexible story editing as well as scheduling and play out of running orders for radio, TV and online. For more efficiency, OpenMedia, which is based on Microsoft technology, offers advanced integration into existing IT and production environments.

One reason why Annova should be looked at in more detail is that several broadcasters have switched from their legacy NRCs to Annova because of its consistent workflow support and technology. For example, OpenMedia just replaced RBB's former Avid iNews system and will replace the BBC's current ENPS Newsroom as of early 2017.

OpenMedia supports the integration of UGC at several steps in the workflow. It provides for e.g. searches across multiple sources, which also returns UGC that was downloaded and stored on site by editors. The editor can retrieve UGC concerning specific topics and regions and take over e.g. tweets via drag and drop them into OpenMedia. Therefore, editors working with OpenMedia might need a way to handover UGV, selected in OpenMedia, to InVID for verification.

The most interesting finding from Annova OpenMedia that can be used for requirements gathering is:

- OpenMedia is one of the modern, leading systems with advanced interfaces and seems to be very well suited for validation of the connectivity of the InVID system.

3.1.1.19 Avid iNews

Research contributed by Condat

The [iNews](#) newsroom management system from Avid (US) aims to be the center of news content creation and distribution, which enables broadcasters to plan, produce and deliver breaking news, unify their newsroom operations, and engage audiences across TV, web, mobile, and Social Media channels. iNews is a scalable system that has powerful features for content ingestion (supported formats: ANPA, IPTC, and News ML). It offers a story-centric organization where rundowns are organized with moving and floating linked stories. User interfaces can be configured for specific preferences with toolbars, templates, workspaces,

and macros. With the mobile App for iOS and Android, journalists and producers can collaborate to create, browse, view and update the news items in the field.

Avid only foresees to forward story text, video, and still images to develop compelling Social Media content as part of the core creation process, but ingestion of verified UGV from a third party system will most likely be possible via the MOS protocol.

Avid iNews has been available on the market for more than 20 years and needed several adaptation cycles due to changing workflow and IT environments in the past.

3.1.1.20 The MOS protocol

Research contributed by Condat

The [MOS](#) (Media Object Server) protocol is an XML-based protocol used to communicate between NCSs (Newsroom Computer System) and MOS devices.

The MOS Protocol allows the NCS to exchange information with a Media Object Server (MOS) using a standard protocol for the exchange of several types of messages. The MOS "pushes" descriptive information and pointers to the NCS when objects are created, modified, or deleted. This allows for the NCS to be informed about the contents of the MOS and enables the NCS to perform searches on and manipulate the data the MOS has sent. The MOS can also inform the NCS of the status of specific videos. Other than that, the NCS can notify the MOS about the status of specific playlist items.

NCSs contain data in the form of rundown objects, which then can comprise multiple media objects, e.g. video files, audio files or images. For each object the MOS provides metadata information about type, path, time to play and time length.

The most interesting finding from the MOS protocol that can be used for requirements gathering is:

- the InVID system should be able to communicate via the MOS protocol, in order to be able to connect to legacy NCSs.

3.2 Expert Interviews

Each industry partner performed in-depth qualitative interviews focusing on video verification challenges and practices. 'Hands-on experts' in video verification and authorities in video verification from the worldwide verification community were interviewed, in order to obtain detailed information about the challenges that these experts experience in their daily work.

The UGV verification experts listed in the table below have been interviewed.

Name Expert	Video Verification relevance	Partner
Michael Wegener	Head of ARD Aktuell content center, video verification expert, Co-coordinator of EBU's verification network	DW
Anne-Marie Lupu	EBU, coordinator of EBU's Verification Network	DW
Tom Trewinnard	Meedan/Checkdesk	DW
Alex Murray	Journalist at BBC UGC Hub	DW
Christoph Rauth	Head of online editorial department Tiroler Tageszeitung	APA-IT
Christian Kneil	Managing editor of APA-Austria Presse Agentur and editorial head of APA-Multimedia	APA-IT
Julien Pain	Head of France24 observers	AFP
Djilali Belaid	AFP Journalist	AFP

DW has provided an interview guideline (see [Appendix B: Interview guidelines for requirements gathering](#)) so that a certain similarity in the interviews can be safeguarded. The interviews have been analyzed in order to gather further industry requirements. Results have been taken directly into the requirements, as portrayed in [Section 4](#).

Due to the confidential nature of the information gathered in the interviews, the InVID consortium has decided not to include the notes of the interviews to the public deliverable. These notes, however, are available within the InVID consortium. The requirements that have been gathered from the interviews have been included in Sections [4.1](#) to [4.8](#).

3.3 Observations & experience

The work that many partners of the InVID consortium have been doing over the past years also has to do with verification of Social Media content, including video verification – to varying degrees. Based on existing experience and new knowledge collected as part of the requirements gathering effort (e.g. looking at the market, investigating existing tools, findings from authorities in the field, researching works of verification initiatives etc.) InVID project partners have contributed the industry requirements that they are and became aware of. This includes bringing in know-how gained from other research undertakings (e.g. the research project REVEAL), as well as day-to-day learning's and experiences gathered from working with UGC and UGV.

This exercise also included, but was not limited to, requirements for:

- verification of UGV, by AFP, DW;
- customization and deployment (customization of UI, features, protocols, data formats, etc.), by Condat, APA-IT;
- mobile use (specific requirements for a mobile application), by APA-IT;
- legal issues (specific legal requirements and their origin), by UDL.

4 InVID requirements

The requirements are organized according to the working processes of journalists using eyewitness content for news. These processes are largely established in the news industry.

The following clusters of requirements have been determined:

1. News gathering – finding UGV that is relevant for news reporting
2. Curation - manual selection of content (based on news value)
3. Verification - of content items
4. Publication - integration in current publication workflows
5. Technical - integration in newsroom tools/architecture
6. General application requirements
7. Legal requirements
8. Mobile application requirements

All of the research done as described above has lead to the extracted requirements described in the following [Section 4.1](#). Some of them are clearly allocated to a specific source or section from which they derive, while other are not so directly matched to specific research. This is mostly due to the requirements originating from multiple sources. In other words, the fact that some research is not mentioned directly as a source in any requirements does not mean that the research has not been included in the initial set of requirements. When in the source of a requirement the abbreviation of a project partner is mentioned, this means that the requirement is extracted out of specific knowledge of that partner (also see [Section 3.3](#)).

The granularity of the requirements may differ. This is due to multiple partners extracting requirements from very varying sources.

Requirements are prioritized, from a user perspective, on a scale from 1 to 3, with 1 being of highest priority and 3 being of lowest priority. If the priority field is marked NA it means that the industry requirement came up as part of the research, but is out of scope for the InVID project.

The reported technical solution of a requirement is meant to be an initial indication of a solution or product feature that the InVID consortium could develop and integrate in the InVID system.

4.1 News gathering requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N1	1	News gathering & Verification	All	17.03.2016		DW Interviews
	Requirement	I would like to have a tool / service that helps me find and verify newsworthy videos from across Social Networks and digital platforms, and does so quickly, efficiently, accurately and reliably.				
	Comments	This is a core requirement. Probably THE core requirement that sums up a lot of what is needed from a journalist's perspective dealing with UGV.				
	Technical solution	InVID, i.e. the whole InVID Verification App and Platform with the technical services is the solution to this requirement				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N2	1	News gathering	2, 6	17.03.2016		DW Interviews
	Requirement	I want to be able to geolocate UGV, to zoom in on a particular geographic region and get all videos from there, no matter on which Social Networks they have been posted. Ordered along a timeline.				
	Comments	If one becomes aware of an event happening in location X, this way one could get all videos from there, ordered on a timeline, possibly portraying the event. Geolocating UGV is very important and would make life a lot easier if this can be done quickly and efficiently. All verification clues should be attached to the specific video.				
	Technical solution	Verification App: include a zoomable map, as well as component with time-lined video URIs Media Selection and Analysis: annotate UGV with geo information and temporal information				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N3	1	News gathering	2, 5, 6	14.03.2016		First Draft News , DW Interviews
	Requirement	When I search Social Networks for video content I want to get updated on whether I am looking at the first ever publication of that video or not.				
	Comments	Verification efforts only make sense if they are performed on the original video; retweets or re-publications of videos are, most often, not the content I am looking for. For instance, Twitter supports in advanced search operators like 'since' and 'until' plus a date in epoch time. Ideally, implementation should not be limited to Twitter but span across numerous Social Networks (and, ideally, languages).				
	Technical solution	Verification App: each video has to be tagged with novelty information; verification App constantly asks Platform for duplicates and updates on new information Media Selection and Analysis: duplicate detection and annotation of UGV with publication date and provenance information				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N4	2	News gathering / Verification	2, 5, 6	17.03.2016		DW Interviews
	Requirement	I would like to have an easy to use search functionality (ideally cross platform). It should have the following features:				

		<ul style="list-style-type: none"> to specify the Social Network that is to be searched (e.g. YouTube, Facebook, Twitter, VKontakte etc.); to specify the date range from which search results should be displayed; to specify the geographic region from which results are to be displayed (e.g.: “only give me results from region X”); possibly: specify which media type to provide (video, audio, text, images...).
	Comments	Search is vital. Often, all one requires is to apply the right searches. If a tool could facilitate that (esp. if it were cross-platform) this would be great! This would be close to “the ideal tool”.
	Technical solution	Media Selection and Analysis: dedicated search components for Social Networks Platform: includes search engines such as Apache Solr or ElasticSearch Verification App: include search interface

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N5	1	News gathering	5, 6	17.03.2016		DW Interviews, First Draft News
	Requirement	I want to be able to quickly store videos of interest / relevance for future use and reference. Incl. URL and related information, if available.				
	Comments	This is of particular importance as lots of videos are (quickly) deleted. If versions of that same video appear later on, and the reference (original) is no longer online, then tracing back the source / original is difficult, if not impossible. This is a decision made per video based on the news value and the personal estimation if it is bound to be taken offline or not.				
	Technical solution	Verification App: personal profiles, “Store Video” functionality Platform: add repository for storing videos, incl. metadata				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N6	3	News gathering	5, 6	16.03.2016		Malachy Browne
	Requirement	I want to be able to create lists with users of multiple Social Networks (Instagram, Facebook, YouTube, etc.) and monitor those lists.				
	Comments	Some Social Networks do not support lists, like Twitter does, although this is a very efficient way of monitoring Social Networks for specific content. These lists should be easily maintained and archived for continuous use.				
	Technical solution	Verification App: component for creating, organizing and managing users Platform: support/filter UGV from specific Social Network users				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N7	2	News gathering	2, 5	14.03.2016		First Draft News, Reveal
	Requirement	I want to be able to search for video content in Social Networks (Twitter, YouTube, VK, Instagram, Snapchat, Meerkat, etc.) based on keywords and advanced search queries containing AND and OR.				
	Comments	The tool should be easily integrated in the current working processes of journalists. The search should show me real-time results that I can monitor during a period of time.				
	Technical solution	Platform: support advanced search queries; possibly provide indexes and a search engine such as Apache Solr or ElasticSearch				

	Media Selection and Analysis: provide specific adapters for Twitter, YouTube, VK, Instagram, Snapchat, Meerkat, etc.
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N8	2	News gathering	6, 2, 5	14.03.2016		First Draft News , DW Interviews
	Requirement	I want to be able to connect direct messaging channels to the system, that will allow me to include UGV received over WhatsApp, Telegram, etc.				
	Comments	The tool should be easily integrated with current working processes of journalists and into existing systems.				
	Technical solution	Verification App: include APIs of messaging Apps. To be discussed if this is for the Verification App only, or is routed via the Media Selection / Platform				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N9	1	News gathering	2, 3, 5, 6	18.03.2016		REVEAL Newsroom systems
	Requirement	I want to be able to manually upload content from my computer into the system, that will allow me to include UGV received over email and other personal channels.				
	Comments	The tool should be easily integrated in the current working processes of journalists.				
	Technical solution	Verification App: upload content component Platform: storage of videos, triggering of Verification process				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N10	2	News gathering	6	14.03.2016		First Draft News
	Requirement	When I search Social Networks with keywords to be able to automatically receive suggestions for translations of these keywords or related keywords in different languages.				
	Comments	Often breaking news is found 'by accident' but then local UGC reporters will publish content in their language and we could show or automatically include keywords in 'my search' that are related to the specific event that I am looking at.				
	Technical solution	Verification App: simple Automatic Machine Translation for translation of keywords; e.g. through Google Translate service component (Translation itself is beyond the scope of InVID)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N11	3	News gathering	6	14.03.2016		DW
	Requirement	I want to be able to archive my search queries for later use.				
	Comments	Sometimes setting up the right query takes a lot of time. I would want to be able to re-use the query even though I do not want to monitor the search results all the time.				

	Technical solution	Verification App: User Profile Management with search history stored in DB or locally
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N12	3	News gathering	5, 6	18.03.2016		DW
	Requirement	I want to be able to sort my query results based on engagement metrics and influence of source.				
	Comments	For Twitter that would be retweets, mentions and likes, for Facebook likes and shares, for YouTube views. The influence of the source could be measured in Twitter by followers, in Facebook by friends, etc. To be specified in detail.				
	Technical solution	Platform: search in Social Networks must support parameterization according to the respective Social Networks Verification App: add sort function to search component				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N13	1	News gathering	6	18.03.2016		DW
	Requirement	Sources that I have already verified once before, become part of my trusted sources network.				
	Comments	It would be inefficient to verify sources every time again. Maybe we can also insert trusted sources by Twitter lists as collecting trusted sources per topic in Twitter lists is common practice in journalism.				
	Technical solution	Verification App: sources management component; grouping of sources into different categories (new, trusted, not reliable etc.)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N14	1	News gathering	2, 5, 6	14.03.2016		First Draft News
	Requirement	In case of streaming video (Periscope, Meerkat, etc.) I want the system to show me if we have previously used content from this specific source and if the source is legitimate.				
	Comments	Previous action taken to verify a specific source should be made visible by the system. Please be aware that also trusted sources can still make mistakes. Specifically with live streaming of content this would be very helpful to make quick decisions.				
	Technical solution	Has to be discussed. 2 main variants: 1) Verification App includes directly streaming from external sources and asks Platform for information concerning source 2) Streaming Media Sources are fed from Media Selection component through the Platform to the Verification App; either with metadata or on request				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N15	1	News gathering	2, 6	21.03.2016		Example 3
	Requirement	I want to be able to upload an image (or input a link to an image) into the system, to check if it belongs to a previously broadcasted and indexed video.				

	Comments	This could help to detect cross-modal fakes like the Chavez image published by El Pais.
	Technical solution	Verification App/Platform: upload functionality Video Analysis: duplicate detection

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
N16	2	News Gathering	2	16.03.2016		Bellingcat
	Requirement	The InVID system being able to automatically recognize keywords that I am looking for in images and videos. For example; gun, car, explosion.				
	Comments	Images and videos that do not contain my search keywords in the description but contain objects that match my keywords should be included in the search results.				
	Technical solution	Video Analysis: annotation of media fragments with concept labels (covering both broad categories, e.g. "outdoors", and object-related categories, e.g. "car")				

4.2 Curation requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
C1	1	Curation	6	16.03.2016		DW
	Requirement	I want to be able to easily label/annotate and collect those items that I have found and think are relevant for my story, so that I can perform verification activities on these items.				
	Comments	For example by manually selecting content for a specific story. Or by adding a note to an item saying 'this could be interesting to our Isis story', but also on more detailed level, like: 'the scene on 3:53 looks blurred or hidden', 'there is a monument/banner/street name on 4:34' and so on.				
	Technical solution	Verification App: User Profile Management with a personal profile management and functionalities for organizing and editing items; history; grouping into topics or stories To be discussed: own persistence layer for Verification App or all to be stored on the Platform				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
C2	1	Curation	6	21.03.2016		Example 2
	Requirement	The video player in the application allows me to view the video in slow-motion display, frame by frame, in a size that I can set easily.				
	Comments	In the Eagle hoax use case, the main way to detect the fake was to carefully examine the video in slow-motion display, almost frame by frame to detect inconsistencies in the main scene. The size of the video player is easily adjustable, for example by scaling the player window.				
	Technical solution	Verification App: include a customizable Player with Slow Motion/Single Frame View functionality; should be based only on standard HTML5 features				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
C3	1	Curation	2, 5, 6	21.03.2016		AFP
	Requirement	The system should allow video segmentation for CBIR (Content Based Image Retrieval) purposes.				
	Comments	We need to implement video segmentation in the application for enabling quick navigation within the video, fast identification of alteration in the key frames of the video and content-based image retrieval (also known as reverse image search) based on these key frames, using different image search engines such as Google, Bing, TinEye, Baidu, Yandex ... Ideally, having extracted the key frames of the video, the user should be able to select the most interesting ones (relevance feedback) before launching a CBIR query.				
	Technical solution	Video Analysis: media fragment generation and concept-based annotation Verification App: Player supports the selection of video key frames (images) and their usage as input to CBIR query; CBIR query component Platform or Verification App: provide backend service for CBIR queries				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
C4	1	Curation	2, 5, 6	21.03.2016		Example 3
	Requirement	When I upload an image, I need to be able to describe the image with some tags that then trigger a process in which the system queries one or more video platforms searching for videos matching those tags. I want then to select the most relevant videos to segment and index them, in order to compare the key frames with the original image I have uploaded				
	Comments	This might help us to detect that the Chavez fake image published by El Pais was in fact a key frame from a YouTube video published five years before.				
	Technical solution	Complex workflow including several components and steps: 1) Verification App: upload functionality (cf N16) with options for tagging 2) Verification App or Platform: trigger searches for videos with these tags; to be discussed if this is done independently via the Verification App or provided by the Platform 3) Verification App: display video search results with metadata; provide a checkbox "Analyze" triggering the analysis 4) Video analysis: analyze each video, and extract key frames 5) Verification App: provide function for comparing key frames; has to be further detailed how this actually should look				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
C5	1	Verification	2, 6	09.02.2016		Citizen Evidence Lab , DW Interviews
	Requirement	If the video that I am looking at contains graphic material I want to get a warning of that upfront				
	Comments	We can protect journalists from disturbing material by warning them before it is viewed. Possibly we can blur / hide sections of the video (making it available only if requested). Research has shown that warning the viewer for graphic content upfront can prevent vicarious trauma.				
	Technical solution	Video Analysis: detection of temporal fragments containing graphic/disturbing material Verification App: generation of video overlays based on temporal/spatial fragment information				

4.3 Verification requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V1	1	Verification	2, 3, 5, 6	17.03.2016		DW interviews, Verification Handbook
	Requirement	I want to be able to find and contact the source of a UGV quickly (get contact details etc., without putting the source at risk), and verify this source.				
	Comments	<p>Security of sources (person taking video as well as those in it) is paramount! However, journalists want to find out quickly who an uploader / provider of UGV is, and be able to get in touch with him/her for crosschecks, rights clearance etc. This also involves checking whether the source has got hold of the original and can deliver more, different material of the same event.</p> <p>Both metrics on the channel on which a video is uploaded as a digital footprint (activity in all possible Social Networks, matching of names and avatar images, contact information, etc.) of the user that uploaded the video.</p> <p>Possibly, when a logo is available we could extract the channel logo on the video and match it against a database of channel logos.</p>				
	Technical solution	Verification App: collect all information concerning a source on all available Social Network channels				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V2	1	Verification	2	17.03.2016		DW Interviews
	Requirement	I would like to have access to a reverse video search. Ideally: cross-platform!				
	Comments	Reverse image search works well already (Google, TinEye). If this could work for video, this would be great and have significant business impact.				
	Technical solution	This could be a project on its own. Needs to be discussed.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V3	2	Verification	3, 5, 6	17.03.2016		DW Interviews
	Requirement	I want to be able to relate UGV / media item with other media items and activities of that user, in order to determine / draw conclusions if an eyewitness is (regularly) providing UGC/UGV, and under what conditions s/he is usually doing so (e.g. taking assignments / doing it for money etc.).				
	Comments	<p>The aim is to find out whether an eyewitness is just “an eyewitness by chance” or someone who is deliberately trying to be one (e.g. to earn money as a “citizen reporter”), taking assignments.</p> <p>Doing this, the system should comply as much as possible with ethical standards and journalistic guidelines of respective media organization – any tools used should allow for that. (Something to be aware of generally: solutions should be adaptable to / complying with corporate / editorial policies.)</p> <p>One reason is to protect sources. But note that there are different views on that. For some organizations, it's more about obtaining UGV/UGC, less than source / contributor protection.</p>				
	Technical solution	Verification App/Platform: building up profiles of sources, including all material having been provided and legal information (extension of V1)				

	Allowing to query for source profile
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V4	1	Verification	3, 5, 6	17.03.2016		DW Interviews
	Requirement	I want to be able to cross-check the reliability of a source.				
	Comments	Based on previous behavior / activities etc., I want to know as much as possible about the reliability of a contributor.				
	Technical solution	Verification App: include trustworthiness/reliability into source's profile; could also include algorithms to compute reliability of sources Verification App: display reliability rating; provide functionality to add personal feedback				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V5	1	Verification	2, 3, 5, 6	17.03.2016		Verification Handbook , DW Interviews, Example 1
	Requirement	If I find a UGV of interest, I want to find other material and people who are reporting about the same event (any media) to check whether what is claimed in the UGV is accurate.				
	Comments	Journalists always want more than one source before they publish anything, and as part of their crosschecking work.				
	Technical solution	Media Selection and Analysis: provide enrichment, i.e. streams of related material based on metadata of a video. To provide this while streaming requires Media Fragment generation and annotation and an API which supports this Platform: provide an API for requesting and returning related material from Social Networks to a media fragment Verification App: related material component with live update synchronized with Player (cf C2)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V6	1	Verification	6	09.02.2016		Citizen Evidence Lab
	Requirement	The platform guides me through a video verification system of gathering clues and making decisions.				
	Comments	Something like a 'verification wizard'. The Citizen Evidence Lab has published a linear working process for video verification that we might want to follow as best practice.				
	Technical solution	Verification App: the overall objective of the Verification App is to clearly reflect best practices of the industry				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V7	1	Verification	2, 5, 6	09.02.2016		Citizen Evidence Lab , DW Interviews

Requirement	I want the platform to help me to collect the needed metadata for verification automatically and display it in a structured summary.
Comments	<p>The data needed is: YouTube User ID, video link, unique video ID, upload date, published date, published time, creation date account, number of videos on account, Social Media accounts related to YouTube account, Video transcription, headline, other content with same keywords found, results of rev image search of thumbnails. This list of data should be discussed in more detail</p> <p>Using the traffic light analogy: instead of having one traffic light only for a piece of UGV stating verified or false, I'd like numerous traffic lights, with each one providing me clues about individual checks performed on e.g. location, source, time, date, contributor etc.</p> <p>Question: are there metadata standards for video that we can use? This metadata should also be connected to the item when it goes into the newsroom publication system.</p>
Technical solution	<p>This requirement involves different components/workflow steps, (also covered already in other requirements):</p> <ol style="list-style-type: none"> 1) Video selection: ingestion of videos including all available metadata for this video, such as title, user ID etc. (this is an InVID standard procedure) 2) Collection of related information to the account (such as other videos, related accounts, etc.) 3) Collection of related material 4) Verification checks for single pieces of metadata

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V8	1	Verification	2, 5, 6	09.02.2016		Citizen Evidence Lab
	Requirement	I want to get an overview of the description and comments of a video. Translation to be automatically offered if the language is different than that of my profile.				
	Comments	The description of a video or the comments to a video often contain clues about the incident, location or the Social Network of the owner of the content.				
	Technical solution	<p>Media Selection/Platform: collect and store video description and comments as metadata</p> <p>Verification App: display video description and comments</p> <p>For translation the availability or generation of an ASR would be needed, which is out of scope for the InVID project. Where transcripts are available from the video source, an online translation service could perhaps be integrated, such as Google Translate.</p>				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V9	1	Verification	3, 6	14.03.2016		TUNGSTEN Verifeyed
	Requirement	I want to be able to see if the file is original or if it has been processed through software (i.e. After Effects, Final Cut Pro, etc.).				
	Comments	<p>Maybe by a match to the signature of the camera or device used to make the video. Also including estimation on how close, or far, we are from the file directly produced by the camera.</p> <p>Detecting quantization table and compressions to try to determine if the video comes from a particular camera or has been post-processed.</p>				
	Technical solution	<p>TUNGSTEN forensic tools</p> <p>The result has to be added to the video verification metadata which can then be displayed in the Verification App</p>				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V10	1	Verification	3	14.03.2016		TUNGSTEN
	Requirement	I want to be able to see if the file has been tampered with and if so, then also where & how.				
	Comments	What is meant is tampering of the visual surface of any frame and/or of the file structure.				
	Technical solution	TUNGSTEN forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V11	2	Verification	3, 6	14.03.2016		TUNGSTEN
	Requirement	I want to be able to make an assessment on why tampering has been done by receiving contextual information. I want to be able to annotate the video file with my findings.				
	Comments	Not a technical requirement but one based on a semiotic approach. With this contextual information I can make a better estimation on why a video might have been tampered.				
	Technical solution	Verification App: display of contextual information, adding own information (covered already in other requirements)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V12	1	Verification	2, 5, 6	14.03.2016		Verification Handbook, Desktop Scenario
	Requirement	I want to be able to easily find related images or videos from the same event within the InVID application.				
	Comments	Either to confirm that something really happened in a given location, or to determine whether some particular content was already published in a different context. The corresponding thumbnails are displayed in the user interface.				
	Technical solution	Verification App/Platform: search for related material, display in an annotated list				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V13	1	Verification	5, 6	14.03.2016		Verification Handbook
	Requirement	I want to be able to find contextual information and discussions about a video on Twitter or other Social Networks through the YouTube code of a specific video.				
	Comments	Within the InVID application, so that I do not have to 'go outside' of the application.				
	Technical solution	Platform/Verification App: include component with contextual information by adding the native include component (such as a Twitter box), or via the Platform through searches				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V14	1	Verification	6	18.03.2016		REVEAL Samdesk.io
	Requirement	I want to be able to manually decide to label a source as 'trusted' based on the findings from my verification process.				
	Comments	This trusted source will automatically become part of my trusted sources network and will be indicated as such with any future content coming from it.				
	Technical solution	See V4				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 15	1	Verification	6	18.03.2016		REVEAL
	Requirement	I want to be able to see more images/videos from the same source.				
	Comments	I need these other images/videos to corroborate the locations that the source is usually publishing from. Somebody who tweets only about Berlin and all of a sudden has video content from Aleppo is highly suspicious.				
	Technical solution	Straightforward search and display of collected resources from a source (also covered in V1, V4)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 16	1	Verification	2	14.03.2016		Verification Handbook , DW Interviews
	Requirement	I want to get an automated list of extracted points of interest (landmarks, buildings) in the video and possible locations of these points.				
	Comments	Through matching of frames containing point of interests with available tools like Panoramio, Google StreetView, Wikimapia, Google Earth, etc.				
	Technical solution	If video geolocation coordinates or other location metadata is available, extract video frames (Media Analysis), collect images of this location from Panoramio, Google StreetView etc. (Media Selection), and assess the presence of landmarks either by presenting the images and video frames to the user (Verification App/Platform), or automatically (Media Analysis)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 17	1	Verification	5, 6	14.03.2016		Verification Handbook , DW & AFP Interviews
	Requirement	I want to get information on the weather at the location of the video once the original time & date and the location have been established.				
	Comments	We could use a tool like Wolfram Alpha.				
	Technical	Platform/Verification App: include component with weather information (e.g. Wolfram				

solution	Alpha as noted in the comment)
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 18	1	Verification	2, 3, 6	16.03.2016		Example 2 , DW Interviews
	Requirement	I want the system to allow me to view videos in full screen, frame per frame, in order to do a thorough visual analysis. I want it also to indicate where inconsistencies in the video (jumps of frames, shades, etc.) are likely to be found.				
	Comments	I imagine some kind of flagging system that shows the parts of the video to focus on. The sound with the video should be easily switched off to be able to handle graphic content better.				
	Technical solution	See C1, C4; Verification App to include a very customizable Player which displays information gathered through analysis (e.g. video shots, video key frames, visual annotations) and verification steps				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 19	1	Verification	2, 3, 6	16.03.2016		First Draft News
	Requirement	When running into graphic content I want to be able to easily flag a video as graphic in order to warn other users of the system, but also to give a publication advice in case of using this video for news reporting.				
	Comments	A user who is watching graphic content is better capable of handling that when he/she has been warned before. News organizations often cut or blur graphic content out of UGV according to their ethical guidelines for publication.				
	Technical solution	See C4				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 20	1	Verification	3	14.03.2016		Emergent , PHEME , MUCKE
	Requirement	I want to be able to verify UGV in terms of the credibility of the user posting the video, the credibility of the news story the video purports to show, or in terms of how the content has been shared (and by whom) on Social Networks				
	Comments	Approaches established in projects like PHEME and MUCKE, can help make a verification call before even needing to make an analysis of the video itself.				
	Technical solution	Verification App: adapt solutions from PHEME and MUCKE				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 21	1	Verification	3	16.03.2016		Example 3
	Requirement	The system should give an indication when an image that I insert could have been taken from a video (video controls in the image, motion blur, size, original fingerprint of recording device, etc.)				

	Comments	Important information to debunk cross-modal fakes, i.e. images that have been taken from videos.
	Technical solution	TUNGSTEN verification tools

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 22	1	Verification	2	16.03.2016		Example 3
	Requirement	The system should be able to automatically make a description of what is to be seen in a thumbnail in order to do a YouTube query based on that description to find copies or similar videos.				
	Comments	Sometimes Google Reverse Image Search does not work with very small thumbnails so we cannot use that to find similar videos. A search with a description of what we see on the thumbnail might work to find similar videos in such a case. There are external tools that are available like: Imagga .				
	Technical solution	T2.3 is focused on exactly this kind of analysis				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 23	1	Verification	5, 6	16.03.2016		Desktop scenario
	Requirement	I want to be able to easily annotate a video with all my findings in my verification process. All this information should be connected to the video and archived for later use (checking back, explaining why we made a specific decision at a certain moment, etc.).				
	Comments	The complete verification process including what has been done by whom and when and all the annotations made, should be automatically logged in a verification log file and should 'stick' to the video when it's being 'migrated' into the news organizations publication systems or elsewhere.				
	Technical solution	Verification App/Platform: logging of all manual and automatic annotations				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 24	1	Verification	5, 6	16.03.2016		Desktop scenario , Checkdesk
	Requirement	I want to be able to easily label a video as being verified, debunked or unclear. I also want to be able to label a video with other publication notifications such as graphic content, profanity, coarse language, etc.				
	Comments	All this information is needed in the UGV publication chain, so the video should be annotated with this information and the information should 'stick' to the video when it's being 'migrated' into the news organizations publication systems.				
	Technical solution	Verification App/Platform: also see V23				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 25	1	Verification	5, 6	16.03.2016		Bellingcat Veri.ly Checkdesk
	Requirement	Sometimes I need assistance from 'the crowd' in order to verify content. The InVID system should allow me to request input from external sources.				
	Comments	External sources could be crowdsourcing (like Bellingcat does with Checkdesk), external experts, colleagues, etc.				
	Technical solution	Verification App: provide an interface to Checkdesk etc. ; maintain an internal database of contacts for checking				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 26	1	Verification	6	16.03.2016		GIJN , DW Interviews
	Requirement	The InVID system should automatically display the description text of videos (i.e. YouTube's video description field) and translates this text into my preferred language.				
	Comments	This could be done through the Google Translate bar.				
	Technical solution	Google Translate and similar existing 3 rd -party services.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 27	2	Verification	2, 5, 6	16.03.2016		GIJN , DW Interviews
	Requirement	The InVID system should be able to create an automated transcription of the text in the video and translate this text into my preferred language.				
	Comments	This is meant to be speech to text of the audio in the video.				
	Technical solution	Integrate an external ASR service, like Vocapia; however, this is a commercial service, and probably the required languages are not supported; so it's unclear if this requirement can be met				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 28	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect interpolation and resampling of videos in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering done through merging of two or more images.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 29	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect duplication of near-duplicated image regions in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering done through copy and paste of parts of the video within the same video. It can be repeated frames or portions of images added to several frames.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 30	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect noise inconsistencies in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering through noise inconsistencies in the digital images.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 31	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect double compression in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering through double (or more) compressions of the video file. Is it possible to gain knowledge about the video file history compression?				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 32	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect of inconsistencies in color filter array (CFA) of interpolated images in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering through inconsistencies in the CFA interpolation of cameras sensors.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 33	1	Verification	3	21.03.2016		Verifeyed
	Requirement	I want the system to detect inconsistencies in lighting in order to provide me with verification clues about tampering of the video.				

	Comments	Detecting tampering through inconsistencies in lighting that may indicate a merging of different images taken from different locations or time.
	Technical solution	EXO MAKINA forensic tools

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 34	1	Verification	3	21.03.2016		Verified
	Requirement	I want the system to detect inconsistencies in perspective in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering through inconsistencies in perspective when several images are merged or objects inserted in the image.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 35	1	Verification	3	21.03.2016		Verified
	Requirement	I want the system to detect inconsistencies in chromatic aberration in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting tampering through inconsistencies in chromatic aberration across the key frames or video, which could reveal post-editing, merging of different images.				
	Technical solution	EXO MAKINA forensic tools				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
V 36	1	Verification	3	21.03.2016		Verified
	Requirement	I want the system to detect video inpainting in order to provide me with verification clues about tampering of the video.				
	Comments	Detecting removal and transposition of objects, persons, and scenes within from a video or between videos through inpainting techniques, such as the root brush in After effects.				
	Technical solution	EXO MAKINA forensic tools				

4.4 Publication requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P1	2	Publication	6	08.03.2016		Newsroom systems
	Requirement	The look & feel as well as user control features of the InVID UI should be customizable regarding colors and layout in order to comply with customer's NCS UI.				
	Comments	In most cases integration into a newsroom System will be done via API functionalities				
	Technical solution	Verification App: provide style control via CSS and REST APIs				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P2	1	Publication	5, 6	08.03.2016		Newsroom systems
	Requirement	I want to be able to export a list of verified UGC items from the InVID application to the NCS; each video has to be annotated with basic metadata (author, data, location, provenance, rights, etc.) including the validation state of the metadata items (true, unclear or false).				
	Comments	The export of verified items from the system needs to be done in accordance with the current industry standard.				
	Technical solution	Verification App/Platform: provide export of UGC item lists in different formats (at least XML and JSON)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P3	2	Publication	5, 6	08.03.2016		Newsroom systems
	Requirement	The system needs to support the export of playlists from NCS to InVID for verification; the list has to be returned with associated verification results.				
	Comments	This is necessary since many NCSs already support the gathering of UGC by themselves.				
	Technical solution	Simplified version of P2; Verification App/Platform: provide export of UGC item lists which contain only UGC URIs in different formats (at least XML and JSON);				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P4	1	Publication	5, 6	08.03.2016		Newsroom systems
	Requirement	The system should allow the storage of a certain amount of selected videos (up to 100, per reference/ URL, in the Platform, or InVID App) together with the validation status.				
	Comments	They should be available for editors during subsequent sessions. In order to crosscheck UGV that has been found via NCSs.				
	Technical solution	Covered by N5				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P5	2	Publication	5, 6	08.03.2016		Newsroom systems
	Requirement	The system should be able to export a list of all media resources which are already processed by editors in the InVID App.				
	Comments	InVID search results should be able to be integrated into NCS searches. Not only does the InVID system give information to an NCS but it should also be able to answer queries of an NCS.				
	Technical solution	Platform: provide a REST API for returning processed items with metadata				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
P6	2	Publication	6	08.03.2016		Newsroom systems
	Requirement	The system should support that multiple users work in parallel on the same UGV item, possibly also with users working via the NCS access.				
	Comments	Several NCSs support complex workflows where several groups and people can work on the same topic.				
	Technical solution	No problem for read only access; also non-problematic if only adding information is allowed; multiple user deletion/change processes require locking, check-in/check-out procedures				

4.5 Technical requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
T1	1	Technical	6	08.03.2016		Newsroom systems
	Requirement	The InVID system should provide a REST API that is functionally compatible to the MOS protocol.				
	Comments	The Media Object Server Communications Protocol (MOS) is an evolving standard for communications between Newsroom Computer Systems (NCS) and Media Object Servers (MOS), Currently it supports only socket communication and SOAP-based web services. REST/JSON is in discussion. InVID should support functional equivalents of the relevant API calls as REST, in order to enable an easier REST-SOAP integration as long as REST is not supported natively.				
	Technical solution	REST API has to be designed in compliance to MOS				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
T2	2	Technical	6	08.03.2016		Newsroom systems
	Requirement	The system should support exchange of state notifications of media resources into multiple channels (MOS, Atom/RSS, Twitter, Email).				

	Comments	Notifications to channels MOS, Atom/RSS are of priority 1, notifications via Twitter and Email are of Priority 3.
	Technical solution	Changes of items are events; event-based triggering of messages; this is an extension of the logging mechanism (V24)

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
T3	1	Technical	2, 4, 5, 6	08.03.2016		Newsroom systems
	Requirement	The system should be able to export legal and cost information related to media resources in a standardized way.				
	Comments	Legal and cost information needs to be made accessible to NCS.				
	Technical solution	Specific export of legal and license related information related to media items as aggregated through video selection and processing; Platform should provide a REST API for that; and the Verification App should provide a MOS compatible REST API				

4.6 General application requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G1	1	General	All	17.03.2016		DW & AFP Interviews
	Requirement	I want to use ONE platform. I want to search for video (and other content types, i.e. images and text) topic-related (e.g. shooting in Paris) and across platforms (ideally also across languages). And I can do all that work on one single platform.				
	Comments	Journalists want it as easy as possible. They do not want to have different tools for different activities (e.g. have 25 browser windows open for differing tasks). Powerful cross-platform search would be a huge benefit. If this cannot be achieved, services from other platforms should at least be included in one "central service". A powerful cross-platform search feature would be extremely useful.				
	Technical solution	The Verification App will be designed just to provide that, but it is clear that external services will have to be included as InVID cannot cover all services by itself				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G2	2	General	All	17.03.2016		DW & AFP Interviews
	Requirement	The platform should not be focused on video only. Image search / verification should also be integrated somehow. Text-searches too.				
	Comments	One of the requirements is to have as few tools as possible when dealing with Social Media content analysis and verification. A journalist does not want to use one tool for video verification and another one for image verification. Also very important: <u>Searches are usually topic-related, not media-type related.</u> (e.g. "apparent shooting in xy"). Currently, lots of searches start on platforms like Twitter, no matter what media is looked for (e.g. video). Facebook is another often used source. Plus YouTube, although it was stated that the search results are rather limited.				

	Technical solution	Technically, images can be processed using a subset of the technologies that will be used for videos; the focus in InVID, however, should be on the verification of video
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G3	2	General	5, 6	17.03.2016		DW Interviews
	Requirement	The platform should integrate a collaboration feature.				
	Comments	Collaboration is key. It should easily be possible to work collaboratively on assignments such as verification tasks. Across time and space. Information should be stored in an easily accessible, sharable way. And be available for future reference. (Meedan's Checkdesk is such a tool, it was pointed out by Tom Trewinnard)				
	Technical solution	All information concerning InVID items is stored in the Platform, searchable and sharable via REST URIs; we will, however, probably not provide a collaboration platform such as Checkdesk (to be discussed)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G4	1	General	5, 6	14.03.2016		Amnesty International , DW & AFP Interviews
	Requirement	The InVID system should be easy to use for non-technical user groups like journalists.				
	Comments	There is no extensive training needed to use the InVID system. The UI should be designed for non-technical user groups. Ideally, the tool would be self-explanatory. (Datamir was cited as an example of an easy-to-use tool)				
	Technical solution	There is no real technical solution to this requirement, but of course, the InVID Verification App as well as the InVID system will be designed for as easy-to-use as possible. However, this is only limited, as there are no specific efforts for UI design allocated				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G5	2	Verification	All	17.03.2016		DW Interviews
	Requirement	I want to understand what technical tools "throw out" as results, i.e. be able to "read" and understand without being an expert what conclusions an algorithm has drawn and why.				
	Comments	It needs to be easy, without requiring substantial training. Especially as journalists tasked with verification of UGC rotate a lot. So, it should be possible for anyone to learn quickly what to watch out for, how to use tools, and "read" their output.				
	Technical solution	Similar to G4 but focused on transparency of what the system 'does'				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G6	1	General	5, 6	14.03.2016		Amnesty International AFP Interviews, DW
	Requirement	The InVID system should be built for easy integration of work processes and tools that are currently used in journalistic verification workflows.				
	Comments	Tools that are being used extensively are: Google Reverse Image Search, TinEye, Panoramio, Google maps, Google earth, Tweetdeck, Dataminr, Pipl, EXIFdata.com, Google Translate, etc.				
	Technical solution	The Verification App will be implemented in such a way that external tools as these mentioned here can be integrated; however, this will be only possible as far as these provide APIs that can be used for communication. This has to be analyzed and specified for each such tool.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G7	1	General	All; but mainly 5,6	14.03.2016		TOW Center
	Requirement	As working processes that include UGV are mostly under time pressure, the InVID system needs to guide me through a quick and smooth working process that leads to a clear and quick decision on whether or not I can use an item.				
	Comments					
	Technical solution	This is the overall objective of InVID; the user will be assisted by each of the different analysis and verification processes; most of which can be executed also in parallel.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G8	1	General	6	14.03.2016		Eyewitness Media Hub
	Requirement	The InVID system should allow me to stick to the best practice ethical guidelines for dealing with Eyewitness media (e.g. like the ones published by the Eyewitness Media Hub).				
	Comments	This includes: reminders on how to approach eyewitnesses, fair treatment of eyewitnesses including compensation for UGV where direct revenue is generated with that UGV, fair crediting of the content to the author, etc. However, as these guidelines are debatable, this should be customizable. And be done according to what an individual organization wants.				
	Technical solution	The verification app should provide direct links to a repository of guidelines concerning the ethics when dealing with eyewitness media). Further details about this functionality need to be specified.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G9	1	General	5	18.03.2016		REVEAL
	Requirement	The data that I have collected in the InVID system is stored in such a way that I can assure absolute data security to my sources.				
	Comments	The data that I collect might be a powerful weapon when used in the wrong way, e.g. prosecution of dissidents, anonymous sources, etc.				

	Technical solution	Might be out of scope as InVID is a collaborative EU project, not a highly classified company; this would require all kinds of technical and organizational measures
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#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G10	1	General	6	18.03.2016		REVEAL
	Requirement	I want to be able to login to the InVID system and find all my previous verification activities. I also want to share my verification activities with colleagues.				
	Comments					
	Technical solution	The Verification App will provide a personal account for each user, with own history, items, topics, sources, etc.				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
G11	1	General	6	21.03.2016		AFP
	Requirement	I want to be able to login to the InVID system with Google, Facebook, Instagram or Twitter (e.g. via OAuth).				
	Comments	With the goal to be able to use less limited services and to overcome possible limitations of APIs for searching content, using owned lists, etc.				
	Technical solution	Verification App: login component via Social Media accounts				

4.7 Legal requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L1	1	Legal	4, 5, 6	17.03.2016		DW Interviews
	Requirement	With the InVID system I, as a journalist, want to be able to speed up the rights clearing process and do so in a traceable way.				
	Comments	Rights need to be cleared quickly. Specific usage rights need to be catered for (these may vary, so it needs to be adaptable, e.g. for sub-licensing, particular media/platforms, particular times etc.). It needs to "fit" in with existing corporate systems. (This usually requires establishing a link / contact with the source and entering into an agreement). This should be kept and somehow find its way into a repository (possibly existing legacy system).				
	Technical solution	The Verification App has to support editing legal/licensing information, which will be stored in the database (locally or Platform)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
	2	Legal		17.03.2016		DW Interviews

L2	Requirement	Find a way to deal with crediting of a video that is later taken down.
	Comments	Someone uploads a video, but later takes it down and no longer wants to be associated with it. How to deal with it? Should the originator still be credited for it? Does it have to be removed? Can it remain online?
	Technical solution	This is an organizational question, not a technical one. Technically, metadata and publication status, etc. have to be changeable; the Verification App has to provide functionalities to edit a video and its metadata

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L3	1	Legal	5, 6	16.03.2016		YouTube
	Requirement	Retrieve content owner's contact and attribution information from YouTube video.				
	Comments	To support the following part of the YouTube's UGC rights policy for broadcasters: "Credit the content owner. Though YouTube has a license to distribute the video, it's the YouTube user who owns the content. We encourage you to reach out to users directly when you find video you'd like to use, and to provide attribution by displaying the username or the real name of the individual, if you've obtained it." Starting from the YouTube URL (or other UGV), information about the content owner is retrieved using YouTube's API or scraping the video web page.				
	Technical solution	See comment (Starting from the YouTube URL (or other UGV), information about the content owner is retrieved using YouTube's API or scraping the video web page.)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L4	1	Legal	5, 6	16.03.2016		YouTube
	Requirement	Retrieve default attribution message for content owner to be included with a broadcast.				
	Comments	To support the following part of the YouTube's UGC rights policy for broadcasters: "Credit YouTube in your re-broadcast of the video. When you show a YouTube video on television, please include on-screen and verbal attribution." For a YouTube video (or other UGV), retrieve the agreed attribution to be included with a broadcast of the video.				
	Technical solution	See comment (For a YouTube video (or other UGV), retrieve the agreed attribution to be included with a broadcast of the video.)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L5	1	Legal	5, 6	16.03.2016		YouTube
	Requirement	I want the system to be able to send a message to the content owner, requesting contact and crediting information.				
	Comments	To support the following part of the YouTube's UGC rights policy for broadcasters: "Contacting a YouTube user. Clicking on a YouTube username will take you to the user's				

		<p>channel, where you can see what personal information he or she has shared (name, website, location, etc.). From here, you can use YouTube's on-site messaging system to contact the user."</p> <p>E.g. use the contact details retrieved for a content owner to send a message using the InVID system.</p>
	Technical solution	The InVID platform has to support sending messages to the content owners, using their contact details

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L6	1	Legal	4, 5	16.03.2016		UDL
	Requirement	In order to make the crediting and licensing process more efficient I want the system to be able to invite content owners to the InVID system, so that we can have them agree on use of content and crediting within the InVID system.				
	Comments	<p>Once the content owner is located, send an invitation for registration to the InVID system if not already registered.</p> <p>If the UGC author is not registered, the InVID platform sends an invitation email including a description of InVID, highlighting the UGC monetization or attribution benefits it provides. The objective is that the author perceives the advantages of being part of InVID.</p>				
	Technical solution	The InVID system should provide a registration and login component for content owners; if UGV content is uploaded where the author is not already registered and a contact detail is known, the author is automatically invited. This can be done via Email, Twitter, Facebook, Google+, YouTube, and maybe more				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L7	1	Legal	4, 5	16.03.2016		UDL
	Requirement	I want content owners to be able to register in the InVID system.				
	Comments	<p>From the invitation sent to the content owner, the registration process is triggered.</p> <p>The author accepts the invitation and becomes an InVID registered author. A membership condition is that the author accepts a disclaimer about being liable for any issue concerning the content made available through the platform. This includes copyright issues but also other privacy or personality rights concerns. This is actually common practice in all UGC platforms and other Internet-based service providers.</p>				
	Technical solution	Platform: Implementation of a user registration workflow				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L8	1	Legal	4	16.03.2016		UDL
	Requirement	I want the owner of UGV to be able to define reuse policies for owned content inside the InVID system (where can the media use it, how, with what credit and for what compensation).				
	Comments	The author uses InVID tools to define policies in relation with the reuse of contributed content, its conditions, required compensations, etc. This can be defined for the piece of content the author has been contacted about, but also in relation with other content already				

		shared or even future contributions. InVID, through its API, will assist the user during policy definition. The Copyright Ontology will guide this process to guarantee that the resulting rights expressions are consistent and machine actionable. This includes defining the way content owner should be attributed.
	Technical solution	The InVID system maintains an own repository and client application/view for Content Owners; Content Owners can login and manage their content (i.e. see all uploaded OGC, edit legal, licensing details, crediting etc.)

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L9	2	Legal	4	16.03.2016		UDL
	Requirement	The system should be able to check UGV availability and status (is it already blocked or monetized, etc.).				
	Comments	<p>I want an automated check if a UGV is available online from its original source and has not been blocked or already monetized. These are indications of the presence of copyrighted content embedded in the UGV that has been claimed by its owner.</p> <p>In the case of YouTube, this leverages YouTube's Content ID that checks for rights infringements like unauthorized reuse of copyrighted content in UGC. If an API is not available, the UGV page will be scraped to check if it is already available (thus not blocked) and if advertisements are displayed together with content (an indication that the copyrighted content is available but the owner prefers monetization instead of blocking).</p>				
	Technical solution	See comment above				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L10	2	Legal	4, 6	16.03.2016		UDL
	Requirement	I, as a journalist, want to be able to define re-user default policies for content reuse and clearly communicate these via the InVID system.				
	Comments	<p>I, as a journalist, want to be able to define a default policy when reusing content, for instance to make clear from my side I will not give any form of incentive, beyond attribution, to my source to take any form of risk in order to deliver UGV. These default policies can be refined and overridden for intended reuses of a particular UGV.</p> <p>These default policies are, like the content owner ones, also based on the Copyright Ontology and defined under its guidance. They should, if not overridden, be sent to the content owner with the request for reuse.</p>				
	Technical solution	The Verification App has to support the definition of reuse policies and to use the developed Rights Ontology				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L11	1	Legal	4, 5, 6	16.03.2016		WP4Workflow
	Requirement	I want to be able to define reuse conditions for a registered UGV and check its availability.				
	Comments	Define the intended reuse of a UGV and conditions, from a registered re-user for a particular UGV, and check if they match owner's reuse policy or fair-use policies.				

	<p>The platform keeps track of subsequent reuse agreements if owner's conditions are accepted, or after owner's explicit approval if configured as a required precondition to authorize reuse.</p> <p>The platform should also check fair use conditions if applicable, for instance if the news value of the video is that high that I have the obligation towards my audience to publish it.</p> <p>The reuse conditions are checked against existing content owner policies that apply to this UGV. If there are conflicts, the re-user should be warned before proceeding.</p> <p>The request is sent to the content owner including all the re-user conditions. These conditions include those explicitly specified for this request plus all the default conditions if not overridden.</p>
Technical solution	This requires kind of a workflow management component in the Verification App with several checks of conditions and workflow between re-user (Journalist) content owner

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L12	3	Legal	4	16.03.2016		UDL
	Requirement	I want to be able to compensate UGV content owner for using his/her content.				
	Comments	The agreement between content owner and re-user should allow for including an economic compensation.				
	Technical solution	Manage economical compensation using payment processing services through their APIs (like PayPal or Bit Coins)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L13	2	Legal	4, 5	09.03.2016		Storyful
	Requirement	The system should support content agreements similar to Storyful's.				
	Comments	<p>Storyful Content Agreement (www.storyful.com/clearance)</p> <p>The Storyful news agency finds newsworthy content and gets permission from owners to use it on TV, print, radio and websites.</p> <p>By agreeing that your content may be used, you grant Storyful and its news partners permission to broadcast or republish your content. This permits Storyful and its partners to use your content in whole or in part in TV packages, in online players and/or on their YouTube channels. You retain all ownership rights.</p> <p>Storyful always asks that partners credit any source when content is used.</p> <p>Storyful works with some of the biggest newsrooms in the world such as: ABC, The New York Times, Vice, euronews, EBU, France 24, ITN, WSJ, Yahoo!, MSN, and many more.</p> <p>By notifying Storyful that your content may be used, you are agreeing to the following:</p> <ol style="list-style-type: none"> 1. You affirm, represent, and warrant that you are the owner of the Content, or that you have the necessary licenses, rights, consents, and permissions to grant Storyful a license to the Content. 2. You retain all ownership rights in your Content. 3. You hereby grant Storyful a worldwide, non-exclusive, royalty-free, perpetual, sublicensable and transferable license to use, reproduce, distribute, prepare derivative works of, display, and perform the Content in any media formats and 				

		through any media channels.
	Technical solution	Platform: include the signing of such an agreement in the user registration process

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L14	1	Legal	4, 6	09.03.2016		DW
	Requirement	I want to be able to set the credit (username, real name, anonymous, etc.) and labeling of source of content (YouTube, Twitter, etc.) for a video easily, via the user interface of the system.				
	Comments					
	Technical solution	Verification App: support editing and storing of UGV metadata				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L15	1	Legal	4, 5, 6	09.03.2016		DW
	Requirement	I need to be able to set the usage rights of a video in the InVID user interface. I also want to be able to use a video for publication if I have no license but the news value of the video is that high that I have the obligation towards my audience to publish it.				
	Comments					
	Technical solution	Verification App: support editing and storing of UGV metadata; including setting a news value				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L16	1	Legal	6	09.03.2016		DW
	Requirement	In principle only 'rights cleared' videos can be used for publication. However we need an 'override' system as some content might have such high news value that publication is wanted, even without rights clearance.				
	Comments	Sometimes news organization value newsworthiness over legal agreements. The system needs to support such a decision, be it with double accordance process (the 4 eyes principle).				
	Technical solution	Usage of video seems to be outside InVID, i.e. this feature probably seems to be part of a newsroom system, rather the Verification App? To be discussed				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L17	1	Legal		16.03.2016		Desktop Scenario
	Requirement	I want to be able to decide to label a source as 'anonymous' based on indication that the revealing of the source's name and contact details could be harmful for this source.				

	Comments	Possibly the contact details are only visible to the journalist doing the actual verification but are not made visible in the verification log file or in the annotations that are being 'transferred' to the news organizations publication systems.
	Technical solution	Add an additional field for exporting to newsroom systems

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
L18	1	Legal	4, 5, 6	06.04.2016		EyeWitness to Atrocities
	Requirement	Protection of sources is extremely important. No information about the user's device that could personally identify the user should be collected. Also the IP address from which the user has sent the footage should not be collected.				
	Comments					
	Technical solution	The Verification App does not collect information about the user's device that could personally identify the user or the IP address from which the user has sent the footage				

4.8 Mobile application requirements

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M1	1	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews
	Requirement	The InVID mobile App must be branded with my company name and logo.				
	Comments	To build a local community for UGV it is necessary to brand the InVID mobile App with the name and the logo of a third party (e.g. a local newspaper).				
	Technical solution	This functionality can be provided via the front end or the UI of the mobile app				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M2	2	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews
	Requirement	As a user providing UGV I want to be able to easily use the InVID application like I use other video applications on my mobile device.				
	Comments	The design of the interface should follow UI 'rules' based on best practices in the industry. The workflow to send a video requires only a few steps.				
	Technical solution	This functionality can be provided via the front end or the UI of the mobile app				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M3	2	Mobile	6	18.3.2016		Mobile Scenario

	Requirement	As a user providing UGV I want to find the InVID mobile App in the online stores of mobile applications.
	Comments	Users usually search for Apps in the App Store (both IOS, Android and Windows). If they don't find the App there they mostly stop looking for it. The InVID mobile App should be a real App, not only a web site for mobile devices.
	Technical solution	Provide native implementations and distribute them via the most widely known online stores of mobile applications

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M4	1	Mobile	6	18.3.2016		Mobile Scenario
	Requirement	The user providing UGV must register prior to the first use of the mobile App.				
	Comments	The local newspaper wants to know some data of the user (for example name, address, etc.) but will comply with respective rules and regulations.				
	Technical solution	Platform: provide a user registration procedure (cf L6, L7)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M5	2	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews
	Requirement	As a user of the App providing UGV I want to use my existing username of the local newspaper to register in the App.				
	Comments	If the user has already a username for the website of the local newspaper he/she should be able to use it for registration in the App.				
	Technical solution	Local newspaper has to provide access to it's user management				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M6	2	Mobile	6	18.3.2016		APA-IT Interviews
	Requirement	As a local newspaper we want to know if the user of the App is a subscriber of the newspaper.				
	Comments	If the user of the App is a subscriber to the newspaper then there is verified user data (name, address, etc.) in the subscriber database. In the registration process the user must have the opportunity to enter his subscriber number.				
	Technical solution	See comment above (add subscriber number)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M7	1	Mobile	6	18.3.2016		Mobile Scenario , APA

Requirement	Within the registration process the user must accept the legal and commercial terms for the use of UGV by the local newspaper.
Comments	We do not want any discussion with the user about legal and commercial terms after he is providing UGV. And should therefore agree on this in the registration process.
Technical solution	

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M8	1	Mobile	6	18.3.2016		Mobile Scenario
	Requirement	As a user providing UGV I can record a video with the InVID App and send it to the local newspaper.				
	Comments					
	Technical solution	The InVID mobile App needs access to the video camera and video folder The InVID mobile App needs access to email (if sent via email); to be discussed if it uploaded to the Platform and then only sent the URL instead)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M9	1	Mobile	6	18.3.2016		Mobile Scenario
	Requirement	As a user providing UGV I can send videos that are recorded with the native video App of my phone and stored on my phone to the local newspaper.				
	Comments	Mostly the user takes videos with the video App of the smartphone. It must be possible to send these videos to the local newspaper through the InVID App.				
	Technical solution	The InVID mobile App needs access to the video folder and the email account				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M10	1	Mobile	6	18.3.2016		APA-IT Interviews
	Requirement	The user providing UGV must add a description to a video prior to sending it to the InVID system.				
	Comments	Text will enable searching for content. And a description of the video speeds up the editorial workflow especially when checking for interesting videos.				
	Technical solution	The InVID mobile App should provide a form for adding textual description of the video content, and use this text as metadata				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M11	2	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews

	Requirement	As a user providing UGV I want to be able to give additional structured information about the video in a form.
	Comments	If the user is willing to give structured information as keywords, location, persons appearing on the video give him the possibility.
	Technical solution	The InVID mobile App should include additional fields for metadata

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M12	1	Mobile	6	18.3.2016		Mobile Scenario, EyeWitness to Atrocities, The Guardian CameraV Project
	Requirement	The InVID mobile App has to send meta information such as the date, time and location of the smartphone along with the video.				
	Comments	The InVID mobile App gathers data from all kinds of sensors from the mobile device – e.g. geo-data - for verification purposes.				
	Technical solution	The InVID mobile App needs access to these data, in order to automatically insert and send it as metadata along with the video				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M13	2	Mobile	6	18.3.2016		APA-IT Interviews
	Requirement	As a local newspaper we want to provide an easy but verified access to the InVID mobile App to provide UGV for the staff of local emergency services.				
	Comments	Possibility to provide local emergency services with verified users. The verification of the users will be done in agreement with the emergency services associations.				
	Technical solution	Open access to the InVID mobile App for users with a specific status				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M14	2	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews
	Requirement	As a local newspaper editor I want to be able to ask the user who is providing UGV details about the video and get background information.				
	Comments	E.g. a backchannel from editor to a user for questions and clearance.				
	Technical solution	Either contacting the user via email, FB messenger, WhatsApp, or by pushing notifications directly via the mobile App				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M15	1	Mobile	6	18.3.2016		Mobile Scenario , APA-IT Interviews

	Requirement	As a local newspaper editor I want to be able to reach users near a certain location and ask them to record a video and send it to the newspaper.
	Comments	E.g. a backchannel from editor to users near a certain location. Maybe also an alert function in the InVID App to show the users that UGV is needed.
	Technical solution	Similar to M14, but additionally the system has to check which users qualify as "near"

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M16	1	Mobile	6	18.3.2016		APA-IT Interviews, APA
	Requirement	As a local newspaper editor I want to monitor UGV coming in from the InVID mobile App in the existing content management system (APA-Online Manager).				
	Comments					
	Technical solution	The Verification App will support export MOS compliant (REST); needs to be checked dependent on the input format APA-Online Manager expects (MOS?)				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M17	1	Mobile	6	18.3.2016		Mobile Scenario
	Requirement	As a local newspaper editor I want to know if the user providing UGV is a verified source.				
	Comments	Knowing if the source is verified (for example subscriber, member of local emergency service) makes the verification of the video easier.				
	Technical solution	The InVID Platform and Verification App will support providing information concerning the trustworthiness of the sources				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M18	3	Mobile	6	18.3.2016		APA-IT Interviews
	Requirement	As a user providing UGV I want to login to the InVID mobile App with my Social Media account.				
	Comments	Allow users to login to the mobile App with their Twitter, Facebook or Google account.				
	Technical solution	E.g. provide OAuth for login with Twitter				

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M19	2	Mobile	6	21.3.2016		EyeWitness to Atrocities, The Guardian CameraV Project
	Requirement	If the video has been recorded with the InVID mobile App it should embed a unique identifying code based on the pixel count, date and time.				

	Comments	This will be used to verify if the footage has not been edited or altered in any way.
	Technical solution	The InVID mobile App has to generate the code and embed it (watermark) in the video

#	Priority	Activity	Related WP's	Date added	Status Quo	Source
M20	1	Mobile	6	18.03.2016		EyeWitness to Atrocities
	Requirement	As a user providing UGV I need instant content delete functionality: (citizen) journalists reporting from hostile environments must have the opportunity to immediately delete precarious content and its traces on the device they use.				
	Comments					
	Technical solution	Delete video, metadata and all other associated data stored in the mobile App (e.g. email) (if possible)				

5 Conclusions

Social Media is becoming more relevant for news organizations as an additional source of information. Specifically in breaking news and local news there are many examples of news reporting and imagery that would not have been available without using UGC. In the last couple of years UGC verification is becoming more and more significant part of the journalistic workflow, and best practices have been established. These best practices, however, focus mainly on images. Algorithm-supported video verification is still very difficult and in its infancy, as there are no specific tools available to the audience at large that support journalists in verifying a video on provenance, source, date and location. Therefore journalists approach video verification with the same practices and tools they know from and use for image verification, plus classic journalistic practices. InVID can make a difference by providing tools that are specifically designed to aggregate, verify and license UGV.

An interesting finding in our research is that journalists want to be assisted in their verification processes but would not rely on a system providing them only with an end result, labeling a content item simply as true or false. They want to be part of the process, assessing and judging verification clues, interpreting those themselves and - as part of the whole process - contacting and challenging the source directly (unless reasons such as security or source protection rule against direct contact).

Most of the modern newsroom systems are ready to work with UGV and offer ways to connect to, or integrate a platform like the InVID system in their workflows.

From the expert interviews the InVID consortium got a clearer view of what the industry is waiting for, namely:

- A tool/platform that searches, finds, verifies and displays UGV across different Social Networks and:
 - is easy to use;
 - provides accurate and reliable results in a speedy fashion;
 - puts well-being of sources and users first;
 - interfaces with existing workflows and technical infrastructures.

The InVID consortium realizes it will not be able to satisfy all the needs outlined above, although a lot of them may sound simple and straightforward. We are nevertheless confident to make a significant contribution in the area of UGV verification and adding value to journalistic workflows and reporting.

Regarding the requirements that have been outlined in great detail in this document, these will be revisited in the course of the project and, where and when needed, be adapted. This is to allow for inclusion of changes and developments on the market and new insights in video verification in the InVID project.

The next step for the consortium is to discuss the initial requirements. The prioritization of the requirements from a user perspective, giving insight in what the user is in need of at this point in time, will be assessed to the priorities and scope of the InVID project as a whole. The requirements that are 'in scope' for the InVID project will then be organized and mapped to development iteration cycles, in order to initiate or guide the technical development of the InVID system.

Appendix A: Additional Market Research

Additional Verification Initiatives

Bellingcat

Research contributed by DW

[Bellingcat](#) is an investigative research network most famous for its researches on weapons used in the Syrian war and the research on the downing of the MH17 airplane in the Ukraine. Bellingcat uses open source and Social Media investigations to examine a variety of subjects, from war crimes to human rights violations across the world. Bellingcat brings together open source and Social Media investigation experts to create guides and case studies.

Bellingcat's investigation team recently helped the French police to identify one of the Paris attack assailants, namely Mr. Bilal Hadfi. The identification was done by analysis of the attacker's Social Media accounts (five Facebook accounts of the assailant existed) and comparison of images of the attacker that he had posted himself on different accounts.

Bellingcat has published many articles about how to verify UGC, but also specifically about UGV on its website. This ranges from location detection in videos to automated reverse image search of key frames of videos.

The most interesting findings from Bellingcat that can be used for requirements gathering are:

- [automated Reverse Image Search of YouTube videos](#) is a good way to bridge UGV verification with existing best practices for image verification;
- visual clues are utmost important to [geolocate content](#);
- verification of UGV can be [crowd sourced](#), bringing lots of expertise to the process;
- particular content items (e.g. guns, cars, etc.) can be [automatically checked for](#), helping to find the right content in news gathering.

BBC Academy

Research contributed by DW

The [BBC Academy](#) trains media professionals in the skills needed for the broadcasting industry. A subsidiary of the Academy, the [BBC College of Journalism](#), functions as a free e-learning, online course series. One of the College's foci is the media professionals' usage of Social Media. The BBC advises its employees in Social Media verification procedures in a series of articles and videos. E.g. the former BBC World Service Social Media editor David Cuen advises on key tools and where to start with verification of UGC. He uses the key phrase: "If it looks too good to be true, it probably is."

The BBC academy provides several interesting public articles on UGC (including video) gathering and verification varying from [how they have organized their UGC Hub](#) to [how to collect UGC and which questions to ask yourself in order to verify it](#).

The BBC employs many journalists reporting from war zones. Protecting these reporters working in hostile environments, and eyewitnesses of war crimes and atrocities in general is of utmost importance. At the same time, reliable verification procedures have to be in place in order to guarantee the trustworthiness of the coverage.

The most interesting findings from the BBC academy that can be used for requirements gathering are:

- protection of reporters and eyewitnesses are of utmost importance;
- reliable and simple procedures for verification are important;
- an industry standard for verification of UGC is needed to guarantee trustworthiness;
- the assessment of journalists of verification clues is important. Even though it is all about facts, gut feeling and interpretation of clues play a big role in the verification process.

TOW Center for Digital Journalism

Research contributed by DW

The [TOW Center](#) is an institute within Columbia University's Graduate School of Journalism. It investigates the development of technology and its impact on journalism. It commissions research in relevant areas, develops teaching methods and courses, and seeks to convene debate around the issues facing digital journalism. The TOW Center's mission is to help individual journalists, news organizations and areas of relevant media policymaking with their thinking and practice in this area.

The Tow Center for Digital Journalism hosts a variety of journalistic research projects that explore innovation at the intersection of journalism and technology. One of these research projects has published the *Guide to Automated Journalism* which analyses the status quo of automated journalism, discusses key questions and implications for stakeholders, such as journalists, news consumers, news organizations, and society at large, and provides recommendations for future research.

Important learnings that can be taken from the work of the TOW Center (in particular its study that focuses on [the use of UGV in the News industry](#)) are:

- UGV is mostly used when other imagery is not available;
- the news industry has big issues with correct labeling and crediting of UGV;
- work processes that include UGV are mostly under time pressure.

International Fact-Checking Network by Poynter

Research contributed by DW

The [Poynter Institute's IFCN](#) (International Fact-Checking Network) was launched in October 2015 with the goal to study and discuss fact-checking as a journalistic instrument worldwide. It supports the work of 64 organizations from 6 continents. The International Fact-Checking Network researches trends and formats in fact-checking worldwide, provides online and offline training resources for fact-checkers and leads collaborative efforts in international fact-checking.

According to the Poynter Institute and as stated on their website, the IFCN pays special attention to 4 aspects of fact-checking:

1. Using technology to perform very fast fact-checking: recent years have seen computational fact-checking receive increased attention from academics and media organizations. Tools have been proposed to annotate claims or highlight claims that have been fact-checked elsewhere.
2. Measuring the impact of fact checkers: systematic measuring of fact checkers' impact worldwide, in terms of obtaining retractions and correcting misperceptions.
3. Funding fact-checking: fact checkers operate in an industry still figuring out its new business model. Fact checkers are aware of the need to diversify their sources of funding. The majority of fact-checking organizations relies on grant-giving foundations. Crowd funding campaigns such as [FullFact](#) seem to be a promising approach to finance fact-checking.
4. Ethics of fact-checking: fact-checking is often leading to confrontational results, e.g. by telling public figures they are being untruthful, so fact-checking is rife with ethical dilemmas.

The most interesting findings from the IFCN that can be used for requirements gathering are:

- impact measurement of verification platforms is needed to be able to show their impact in the news industry;
- annotation of UGV that has been fact-checked should be made publically available to a wider audience (sharing of verification findings).

Eyewitness Media Hub

Research contributed by DW

The [Eyewitness Media Hub](#) is a non-profit organization established to support the creation, discovery, verification and publication of eyewitness content. It advises and promotes on three different levels: ethically, legally, and logistically.

According to its owners and as stated on their website, regarding ethical issues, the Eyewitness Media Hub encourages content providers to adhere to a set of industry-wide standards when securing the rights to use eyewitness media, and supports eyewitnesses to grant permission for their content. It furthermore advises content publishers, social platforms and its audiences on the impact of distributing graphic footage.

On the legal side the Eyewitness Media Hub provides guidance on how UGC should be presented or broadcast. Eyewitnesses are informed of their rights to privacy and ownership for their content on Social Media.

Logistically, the Eyewitness Media Hub trains the best ways to find, verify and secure permission to use UGC. It is also supporting research to deepen understanding of the phenomenon of eyewitness media and its impact on today's journalism.

Important learnings that can be taken from the work of Eyewitness Media Hub are:

- The work done on ethical issues concerning UGC, like their [guiding principles for handling UGC](#). Highlights include:
 - consider the physical and emotional welfare of eyewitnesses;
 - when requesting permission from an eyewitness to use their content, journalists should be transparent and, where possible, explain when and where the content might be used;
 - consider the intent of eyewitnesses and where they might reasonably expect their content to appear;
 - consider the possible impact on any identifiable person in the video or photo;
 - ask if and how an eyewitness wants to be credited for their content, and explain possible benefits and drawbacks;
 - work with eyewitnesses to ensure that they feel fairly treated and/or compensated when photos/videos are being used to directly generate revenue.
- The study '[Making Secondary Trauma a Primary Issue: A Study of Eyewitness Media and Vicarious Trauma on the Digital Frontline](#)' furthermore explains how to best handle graphic UGV for journalists.
- Industry standards for verification, rights and crediting of UGC should be developed to guide the news industry in using UGC for reporting.

France24 - The Observers

Research contributed by AFP

[The Observers of France 24 TV](#) is a user-generated content community created by the French international broadcaster in 2008. France 24 is a TV channel that broadcasts in three languages (French, English and Arabic) and is part of the holding France Médias Monde (FMM), with two international radio stations RFI and Monte Carlo Doualiya.

The Observers team, led by Julien Pain, is curating daily newsworthy videos, and publishing them mainly on the web, in their three languages, plus Farsi with RFI. Video verification and community management are the core business of the Observers team. They rely more on human verification than on technology, using in particular their own global community of observers.

Understanding their processes and the way they work and verify videos is key to identify repetitive and cumbersome tasks performed daily by professional journalists, which can possibly be automated by digital operations.

The most interesting findings from the Observers that can be used for requirements gathering are:

- a global network of users simplifies verification of news events;
- many cumbersome tasks in the verification processes could be automated, as there are:
 - finding first posts about an event;
 - finding content that corroborates an event;
 - querying Social Media based on time frames (from-till, date, hour, minutes, seconds);
 - querying content based image retrieval search engines (Google, TinEye, Bing, etc.);
 - exploitation of geolocation, city names, countries, points of interest shown on the video or in the contextual data and metadata;
 - conversion of upload time of videos in e.g. YouTube to local times at the place the event happened.

GIJN - Global Investigative Journalism Network

Research contributed by AFP

The [Global Investigative Journalism Network](#) (GIJN) is an international association of nonprofit organizations that support, promote, and produce investigative journalism. The GIJN holds conferences, conducts trainings, provides resources and consulting, and encourages the creation of similar nonprofit groups. It was founded in 2003 and, ever since has grown to more than 128 member organizations in 57 countries.

Every two years, the GIJN holds the [Global Investigative Journalism Conference](#), which has brought together more than 5,000 journalists from 100 countries since 2001.

The main relevance of the GIJN on video verification is [an article published by Craig Silverman and Rina Tsubaki](#) as a kind of synthesis and summary of their Verification Handbook. This article details the main topics of video verification as a checklist. The main topics described in the article about video verification, mentioned above, are:

- Obtain permission from the author/originator to use the content (photos, videos, audio).
- When dealing with images and videos, use Google Image Search or TinEye to perform a reverse image/video thumbnail search. If several links to the same image pop up, click on "view other sizes" to find the highest resolution/size, which usually is the original image.
- For verifying provenance of video:
 - Use acronyms, place names and other pronouns for a good keyword search on video sharing platforms such as YouTube, Vimeo and Youku.
 - Use Google Translate when dealing with contents in a foreign language.
 - Use the date filter to find the earliest videos matching the keywords.
 - Use Google Image Search or TinEye to perform a reverse video thumbnail search.
- When dealing with images and videos, adopt the video creators' perspective. Ask yourself these questions about the source to check their credibility:
 - Who are they?
 - Where are they?
 - When did they get there?
 - What could they see (and what does their photo/video show)?
 - Where do they stand?
 - Why are they there?
- Connect their activity to any other online accounts they maintain by asking these questions:
 - Search Twitter or Facebook for the unique video code - are there affiliated accounts?
 - Are there other accounts - Google Plus, a blog or website - listed on the video profile or otherwise affiliated with this uploader?
 - What information do affiliated accounts give that indicate recent location, activity, reliability, bias or agenda?
 - How long have these accounts been active? How active are they? (The longer and more active, the more reliable they probably are.)
 - Who are the Social Media accounts connected with, and what does this tell us about the uploader?
 - Can we find 'whois' information for an affiliated website?
 - Is the person listed in local phone directories, on Spokeo, Pipl.com or WebMii or on LinkedIn?
 - Do their online social circles indicate they are close to this story/location?
- Verify the date and approximate time, particularly when dealing with photos/videos:
 - Check the weather information on the day and the location where the event happened. Is the weather condition the same from the (local) weather forecasts and other uploads from the same event? Use Wolfram Alpha to

- perform a search (e.g., "What was the weather in London, England, on January 20, 2014?").
- Search news sources for reports about events on that day.
 - Using video and image search (YouTube, Google, TinEye, etc.), see if any earlier pieces of content from the same event predate your example. (Be aware that YouTube date stamps are using Pacific Standard Time from the moment the upload begins.)
 - For images and video, look (and listen) for any identifying elements that indicate date/time, such as clocks, television screens, newspaper pages, etc.
- Location verification for videos:
 - Examine the language(s) spoken in the video. Check if accents and dialects match up with the geographical location. Beware that Google Translate does not give correct translation for some languages. Ask those who speak the language for support.
 - Are video descriptions consistent and mostly from a specific location?
 - Are videos dated?
 - If videos on the account use a logo, is this logo consistent across the videos? Does it match the avatar on the YouTube or Vimeo account?
 - Does the uploader "scrape" videos from news organizations and other YouTube accounts, or do they upload solely user-generated content?
 - Does the uploader write in slang or dialect that is identifiable in the video's narration?
 - Are the videos on this account of a consistent quality? (On YouTube go to Settings and then Quality to determine the best quality available.)
 - Do video descriptions have file extensions such as .AVI or .MP4 in the video title? This can indicate the video was uploaded directly from a device.
 - Does the description of a YouTube video read: "Uploaded via YouTube Capture"? This may indicate the video was filmed on a smartphone.
 - Check images:
 - If you have doubts over construction of the video, use editing software such as VLC media player (free), Avidemux (free) or Vegas Pro (licensed) to split a video into its constituent frames.

Meedan

Research contributed by DW

[Meedan](#) is a non-profit social technology company that has a vision of a world web in which citizens can collaborate across languages. By using machine translation and machine-assisted translation technologies as well as human translators, Meedan intends to overcome language barriers and trigger cross-language and cross-cultural interaction on the web with a focus on Arabic and English.

The focus of Meedan is on open source investigation of digital media and crowd sourced translation of Social Media. Meedan's [Checkdesk](#) verifies breaking news online. Checkdesk is a collaboration tool to verify digital media openly and is freely accessible for 'the world' to contribute. Findings can be published on Checkdesk's verification log so others can re-use the content or replicate the steps. The system's verification status indicates the trustworthiness of the Social Media content.

Learnings that can be taken from the work of Meedan are:

- verification of UGV can very well be done in a collaborative manner. To support this, see also the [work done by Bellingcat using Meedan's Checkdesk](#);
- language barriers can be a big hurdle in the verification of UGV.

Witness - Human Rights Video

Research contributed by DW

[WITNESS](#), as stated by its owners on its website, is founded in 1992 by musician Peter Gabriel, and is a human rights non-profit organization. WITNESS trains and supports activists and citizens around the world to use video safely, ethically, and effectively to expose human rights abuse and fight for human rights change. Witness has partnered with more than 300 human rights groups in over 80 countries.

The [WITNESS Media Lab](#) is dedicated to unleashing the potential of eyewitness video as a powerful tool to report, monitor, and advocate for human rights. The Media Lab is driven by the idea that human rights documentation and advocacy will be powered by videos created and shared by eyewitnesses. The challenges of finding, verifying, and contextualizing those videos are the focus of the Media Lab's work. It partners with experts from the fields of advocacy, technology, and journalism aiming to develop solutions for ensuring that footage taken by average citizens can serve as an effective tool for justice.

In 2012, WITNESS launched a joint project with Storyful and YouTube called the [Human Rights Channel](#). It collects and promotes videos that capture and contextualize breaking human rights stories from around the world.

Google News Lab

Research contributed by DW

As stated on their website, the [Google News Lab](#) intends to support the creation and distribution of information and quality journalism in general. It provides tools, data, and programs designed to help news organizations exploring new ways to discover, create and distribute news content.

Among the digital toolset provided by the News Lab is the Google Reverse Image Search that helps with the verification of photos. It tracks down whether and when an image has been used before. Furthermore, the Google News Lab participates in a number of verification initiatives such as First Draft, YouTube Newswire and Witness Media Lab.

It can be stated that many of the tools provided by Google in general, and promoted and trained by Google News Lab staff, are extremely valuable for verification purposes. A main takeaway is thus:

- Google has developed and provides a [list of tools of which many are interesting and highly valuable for UGC verification purposes](#), such as Google Maps, Google Earth Pro, Google Crisis Maps, Google Trending, etc. Integration of these tools in the InVID system might be of high value as they have already proven their value for UGV verification purposes and are already known to journalists.

Additional UGC Agencies

Grasswire

Research contributed by AFP

[Grasswire](#) is a community of more than 1,200 members curating news from all over the world using the Slack team messaging application to work together. Grasswire is a “real-time newsroom controlled by everyone”, a Wikipedia for the news.

Non professional journalists or writers that have a heart for accurate, factual and fast-moving coverage of current world events publish most of the articles on Grasswire. Although the focus is on accurate and factual, there is no evidence of verification processes on the publications on Grasswire.

In their style guide, Grasswire provides [lists of topics](#) where they archive certain facts on these topics. They also list [tools](#) for verification of UGC and have a [blog](#) on which they publish their latest news.

Babo

Research contributed by AFP

[Babo](#) is a technology company providing a white label mobile App, an SDK and a platform to monetize UGC uploaded through its application. It claims to provide its mobile white label solution to the Russian video agency Ruptly, which is used by e.g. Russia Today TV.

Their UGV verification process is based on searching similar content on the web to avoid fakes based on duplicates. They also provide automated extraction of key frames of a video for reverse image search in order to help editors to curate UGV more rapidly.

The most interesting findings from Babo that can be used for requirements gathering are:

- the location of registered Babo users is registered and visualized on a map in order to quickly find a citizen journalist that is in an area of interest;
- Babo uses a built-in chat messenger in the mobile application to interact live with freelancers and eyewitnesses;
- they have built and provide an SDK to bring the service to third parties' applications;
- the Babo App allows broadcasters to pay the citizen journalist directly via the App, making use of e.g. PayPal.

Weye

Research contributed by AFP

The German [Weye](#) is an Non Governmental Organisation (NGO) project from Irrepressible Voices offering a video platform for human rights. According to its owners and as stated on their website, Weye is a secure port of call for human rights videos and aims to help people by making their voice heard. Change makers across the world can safely and anonymously upload their video stories. Weye ensures the reliability of the material by verifying the videos via innovative technical developments, experts and the community.

Weye's verification process is twofold:

- Automated metadata checks with their partner [Dence](#) (a German forensics company that analyses and verifies images) in which they determine manipulations of a video as well as metadata, such as time stamp and location.
- Using a team of specialists (bloggers and citizen journalists) to verify the location, time and content.

The most interesting findings from Weye that can be used for requirements gathering are:

- how Weye use a secure upload repository on top of the TOR network to secure the uploader who remains anonymous;

- how partner [Dence](#) analyses and verifies images;
- they use following verification statuses for UGV:
 - **Insufficient data** - we have tried our best to analyze the metadata but there is not enough data to make a clear statement
 - **Processed suspicious** - it seems like the video was manipulated
 - **Processed unsuspecting** - it seems like the video was processed but not manipulated
 - **Camera original** - the video was not processed and is a camera original
 - **Not analyzed** - metadata is not analyzed yet

Newzulu

Research contributed by AFP

[Newzulu](#) is a UGC agency created through the acquisition of Citizenside in 2013. It gathers freelancer and accidental eyewitness images and videos, and sells that material to mainstream media.

Newzulu is performing video and image verification that is mainly based on analysis of the history of their contributor and in contacting the contributor to learn more about the circumstances in which the video or image was shot.

Newzulu's focus is on live video from eyewitnesses using their network of contributors and NGOs. They verify by crosschecking the information with other images, StreetView, content from news agencies, and crowd sourced verification from other members of the community. To gather UGV they provide their own smartphone App that gathers metadata, such as GPS coordinates and video shot angle.

The most interesting findings from Newzulu that can be used for requirements gathering are:

- one of the main problems is the loss of metadata due to compression algorithms used by mobile operators on 3G/4G networks;
- a large community of specialists to help verify UGV can be very valuable.

Newsflare

Research contributed by AFP

[Newsflare](#) is a UGV agency based in London that gathers videos from freelancers and eyewitnesses, and then sells it on to mainstream media. They publish [assignments for their community](#) with guidelines about the type of videos they seek for their media audience.

UGV is the core business of Newsflare. They claim to check the videos through their team of multi-lingual journalists.

The most interesting findings from Newsflare that can be used for requirements gathering are:

- their videos are mainly viral, offbeat, weird, funny videos rather than breaking news. Their Twitter channel is full of those videos and maybe a source to counter-check rediffusion as well as a source for keywords, weird stories, etc.;
- they use Twitter or Facebook ID registry to allow users to log in to their platform;
- other thing to consider for InVID are:
 - their [video licensing policy](#);
 - their [terms of service](#).

Additional Verification Tools

Samdesk.io

Research contributed by APA-IT

The company SAM was founded in Edmonton (US) in 2013. [SAMdesk](#) is an asset management tool for Social Media that allows users to curate content produced through sites such as Facebook, Twitter and Instagram. The SAM platform claims to help journalists to find, qualify, verify, process and embed Social Media content.

Verification represents only a small subsection of the service. The founders classify themselves as an inbound newsgathering and management platform. SAM is built to search and identify UGC in breaking news situations and manage that content throughout the news life-cycle (clearance, verification, publication).

There is no specific information on how the verification process for UGC works. The user has the opportunity to define trusted sources based on Social Media profiles. And Social Media items can be annotated and shared within the SAM system.

The most interesting findings from SAMdesk that can be used for requirements gathering are:

- the user can configure lists of trusted and verified sources;
- the user interface of SAM is very simple and clear and reflects the working processes of journalists very well.

Dataminr

Research contributed by APA-IT

Based in New York City, [Dataminr](#) was founded in 2009 with a mission to extract value from Social Media for clients in the finance and government sectors.

In February 2014 the company announced a new tool, which helps journalists to look for stories on Twitter before they are trending. “Dataminr for News” was developed in partnership with CNN and Twitter to shift the way journalists use Twitter as an early alert system for breaking news. Dataminr worked with CNN to fine-tune the algorithms they use, to help close the gap between the eyewitness wanting to be heard and the journalist who wants to listen. That gap is not just one of distance or time, but also one of trust. The App uses an algorithm to mine Twitter for information tailored to the needs of users. It then forwards this customized information in the form of an alert stream to email addresses, in-house warning systems, instant messaging or as pop-ups – in real time. These ‘live notifications’ of events provide newsrooms a head start in investigations.

According to Dataminr, its algorithms can not only identify emerging patterns and trends, but also help journalists focus on the most relevant and reliable information. The algorithm scores, tags and classifies millions of daily tweets into proper categories (such as User Reputation, Information Value, Topic Density or Linguistic Signatures).

Dataminr also contributes to verification of Twitter content. Dataminr claims that the application can determine the initial source behind an event, enabling journalists to replay how that event broke and can identify potential other sources that were on the scene.

The most interesting findings from Dataminr that can be used for requirements gathering are:

- they transform real-time data from Twitter and other public sources into actionable signals, identifying and visualizing the most relevant information in real-time;
- signals are delivered automatically via the application, email, instant message and integration into internal systems;
- journalists are alerted to breaking news in advance of traditional sources.

FotoForensics

Research contributed by APA-IT

According to their website, [FotoForensics](#) is a free photo analysis tool, which enables users to detect discolorations and other signs of photo manipulation. The free service uses an Error Level Analysis (ELA) algorithm to determine if an image is real or if it was modified, and possibly even how it was modified. ELA looks for differences in quality levels in the image, highlighting where alterations may have been made.

One can either upload an image or provide a direct link to an image on FotoForensics, and evaluate the error level potential. Once the image has been analyzed, the result page shows both the original image and the ELA. The user can move the mouse cursor over to the original image that will turn into the ELA image for easier reference. FotoForensics can only analyze JPEG and PNG image format, not videos.

Users of FotoForensics have to interpret the results of the analysis in various fields. It is up to the analyst to understand if the image has been edited or not. Therefore it needs experience to understand its output and avoid wrong conclusions.

The most interesting findings from FotoForensics that can be used for requirements gathering are:

- ELA maps are very hard to read and therefore not often used for verification of images by non-trained journalists;
- there are many EXIF data standards, sometimes this can be confusing to a user looking for metadata of an image;
- FotoForensics only shows metadata of images.

EXIF Viewers (Jeffreys, EXIFdata.com)

Research contributed by APA-IT

[Jeffreys](#) and [EXIFdata.com](#) show information from the normally non visible fields embedded in the image.

Images and videos have embedded metadata that can be displayed. This information contains, among others: date, time of recording of the image, device with which the image was recorded and software that was used to edit an image when editing software has been used. A lot of information can be revealed by the right assessment of this metadata. A problem is that [almost all Social Networks strip metadata from UGC](#).

The most interesting findings that can be used for requirements gathering are:

- there are many EXIF data standards, some EXIF data viewers only display certain standards which may result in different results depending on which viewer is being used;
- EXIF data is very comprehensive; often it is difficult to know where to look for what data.

Citizen Desk by Sourcefabric

Research contributed by APA-IT

[Citizen Desk](#) is a Superdesk App that allows news organizations to create a mobile-optimized platform for aggregating, verifying, publishing and rewarding citizen journalism. Citizen Desk allows for UGC from various sources like Social Networks or SMS to be ingested into the editorial verification process.

According to its website, Citizen Desk was designed with mobile reporting in mind and first tested in places with limited Internet connections. Reports enter the Citizen Desk via channels like Social Media or SMS, where they are verified on the spot by editors and are then published to a live blog. The verification workflow is based on aggregation of content via networks of reliable sources and the verification skills of the editor. The editor has to categorize the report concerning relevance, user status (verified or not) and trustworthiness.

Editors are able to search YouTube, Twitter, Flickr and Google from within the App, and then add these sources as supporting material, alongside their own text or images. Users can comment on the live blog using Facebook comments in order to discuss veracity and providence. The service is open source.

The most interesting findings from Citizen Desk that can be used for requirements gathering are:

- to enable inclusion of UGC from 'not so connected' areas ingestion of content via SMS is possible;
- trusted and verified sources are at the basis of verification workflows;
- UGC is published on live blogs where the verification status of the content is supported by comments from Social Networks.

Veri.ly

Research contributed by APA-IT

[Veri.ly](#) is an experimental web application designed to rapidly crowd source the verification of information during humanitarian disasters. The platform has been piloted by international news organizations. In addition to rapidly verifying information during crisis events, Veri.ly aims to educate members of the public, so they can become better "Digital Detectives".

According to its owners and as stated on the Veri.ly website, humanitarian organizations can activate Veri.ly to use the power of the crowd to quickly find out whether images or videos they see online are accurate. Various verification questions are posted to the website and users are invited to submit evidence. Users are encouraged to justify their position by providing evidence either in the form of an image, a video or text.

What is interesting are the community aspects that Veri.ly works with. Voters' reputation scores increase or decrease over time, votes from reliable users have a higher weight than votes of unknown users. Users are also encouraged to bring other contributors to the site in order to gain reputation score.

The most interesting findings from Veri.ly that can be used for requirements gathering are:

- verification is done in a collaborative way, making use of crowdsourcing;
- community management aspects (reputation score, weight of vote, network score, etc.) are being used to give an incentive to users to contribute.

The Guardian CameraV Project

Research contributed by APA-IT

[CameraV](#) is the official App of the InformaCam project, a partnership between the Guardian Project and WITNESS. The InformaCam platform was developed to be used by activists, journalists, advocates and others, working in very difficult and high-risk situations, to capture and gather visual evidence and proof of abuse and rights violations. It can also be used in daily life to capture any moment, and keep them safe and private.

CameraV generates so-called 'proof points' using the device's built-in sensors. These 'proof points' include:

- Date and time
- Motion, such as accelerometers which record any movement occurring during the recording process – this will help to determine if the person was in a vehicle while recording for example
- Position, such as GPS which will provide fairly exact coordinates where the image or video was recorded – this data can later be plotted on a map
- Environmental, such as thermometers which can be later referenced against recorded temperature or other climatic data

The users can control how many sensors they want to have switched on. The more they switch on, the more rigorous the verification process is. This extra metadata helps verify and validate the date, time and location of capture, and provides an entirely new layer of context.

In CameraV, none of the content captured appears in the phone's gallery. All is hidden within the App behind a secure password that the user chooses at set-up.

A unique visual fingerprint identifier can be generated, basically a unique code, for each media file captured. This code can be shared through SMS, email or more publicly on Social Media. With this code the source and originating device of the UGC can be verified. CameraV's set-up allows for content to be automatically uploaded to a Dropbox account, or shared via encrypted messaging Apps such as ChatSecure. This transmits the content to a

secure user and allows the witness on the ground to get the content off their phone before they can be compromised.

The most interesting findings from the CameraV Project that can be used for requirements gathering are:

- the App turns sensor inputs like compass, light, temperature, location and more into reliable metadata;
- encryption and network security are built-in to the application using technologies such as OpenPGP, IOCipher and Tor;
- the application is open-source and freely licensed for use by any individual or organization;
- the metadata of UGC is organized and stored using the Javascript Object Notation (JSON) format, and more specifically, as JSON Mobile Media Metadata, or J3M;
- protection of the eyewitness is done by e.g. not showing the UGC in a phone's gallery;
- a unique identification code for registered users could help with verification of source and device.

Dence Gmbh

Research contributed by APA-IT

[Dence GmbH](#) is a spin-off of the Dresden University of Technology and the University of Münster.

Researchers at the Dresden University of Technology have developed a tracking method in 2004 that can remotely identify individual GSM phones based on unique characteristics in their radio signals, even if the phone's identification codes or SIM cards have been swapped. The core of the method exploits signal characteristics and transmission profiles of mobile phones.

The method relies on the inaccuracies in the manufacturing process that create variations in a phone's electronics. This is also the basis for checking the authenticity of media data of UGC by tracking microscopic traces that occur during recording or post-processing of media files. The technology of the Dence batch investigator has been applied for patent. The technology is developed for the integration of fully automated processes for authentication of digital images in applications of companies and authorities.

The most interesting findings from Dence that can be used for requirements gathering are:

- fully automated processes for authentication of digital images are being implemented;
- automatic tracking of microscopic traces in metadata of media can help establish the authenticity of UGV.

TinEye

Research contributed by AFP

[TinEye](#) was the first reverse image search engine launched on the web by the Canadian company Idée Inc. in 2008.

As for any other reverse image search engine, TinEye allows to find thumbnails or images which may have been seen before and elsewhere on the web, in order to establish the authenticity of the shot or to find similar images about an event, or a specific point of interest.

Reverse Image Search engines perform based on the amount of images that they have indexed. At the end of March 2016 TinEye claimed to have 14,4 billion images indexed. A prior evaluation performed on AFP photos for the EU funded research project Glocal project showed that the Google Images index at that time was much larger than the TinEye index. However, because TinEye was a pioneer CBIR search engine, one may encounter sometimes images from the end of the years 2000-2010 which may not be accessible within the Google Index.

The most interesting findings from TinEye that can be used for requirements gathering are:

- TinEye allows the user to sort the search results to following filters: best match, most changed, biggest image, newest, oldest. With this sorting the user can easily find e.g. a first publication of an image;
- TinEye has a commercial API over which we could integrate the service in the InVID system. However, Denis Teysou has asked a few times for an API key both for AFP and for InVID but there was no response. A 'work around' would be to use Selenium to simulate a browser using their service on the web.

Baidu Image Search

Research contributed by AFP

[Baidu](#) is the main Chinese search engine. It is another potential source for images, especially to confirm locations on newsworthy events such as earthquakes (Sichuan in 2008), protests (Tibet or Xinjiang Uyghur Autonomous Region), monuments (Great Wall of China, Tian An Men square, etc.).

Some tests of the engine do not give too many clues about the indexing of videos, but Baidu can be helpful on events in China or related to China.

The most interesting findings from Baidu that can be used for requirements gathering are:

- with Baidu Image Search it could be easier to confirm locations in the Chinese area and find more images about events, monuments, buildings.

Bing Image Search

Research contributed by AFP

Microsoft's search engine [Bing](#) also provides [a reverse image search engine](#), although the "match image" button does not seem to work on any non-Microsoft browser.

Microsoft is regularly publishing updates to its "image match engine" and although it is far from having the results of Google Images, it may help verify some locations or events in the future.

The most interesting findings from Bing that can be used for requirements gathering are:

- Bing also has a video search engine that, in terms of news, is indexing YouTube, MSN and Liveleaks among others. This may be useful for InVID project work and will be investigated further in the course of the project.

Yandex Image Search

Research contributed by AFP

The main Russian search engine [Yandex](#) is also offering [a reverse image search engine](#).

It is mainly interesting for finding more information on location, Russian weaponry, Russian related events (Ukraine, Syria, etc.),

Yandex Image Search is a complementary source, probably less useful than Google Images, but their index may increase during the project time.

The most interesting findings from Yandex that can be used for requirements gathering are:

- Yandex may prove over time to help verifying videos, especially on Russia related topics.

Verified Pixel

Research contributed by DW

The [Verified Pixel Project](#) was funded by the Knight Foundation and ran from April 2015 until December 2015. Its goal was to build a service to unify several popular existing verification techniques in one workflow tool using layered API calls. It was meant to offer a technical approach to demystify verification, allow it to scale to demand, and open up verification capability to a broader audience. The project focused on image verification.

Verified Pixel sought to enhance confidence in verifying user-generated images by minimizing the risks associated with:

- an increase in eyewitness images based on the prevalence of smartphones;
- amplification of sharing misinformation through Social Media;
- the availability and widespread use of image manipulation software.

Verified Pixel aimed to integrate different verification methods (automated metadata and image analysis services) in one workflow. Integration of tools in one journalistic workflow is extremely important for InVID.

The most interesting findings from Verified Pixel that can be used for requirements gathering are:

- images can be ingested in the Verified Pixel system by sending them to a specific email address;
- images can be sorted to: updated, created, news value, category, keyword, priority;
- the verification clues that are automatically collected, namely:
 - EXIF data (date, time, GPS location, camera model, camera settings, image resolution);
 - number of indexing of image by Google Reverse Image Search and TinEye, plus detailed information;
 - trust score of image based on Device Signature Analysis;
 - source of image (whatever information that is available).
- reviewers of the UGC can annotate images with comments.

Ghiro

Research contributed by CERTH

[Ghiro](#) is an open source digital image forensics tool. It offers a set of common image verification functionalities, such as metadata extraction, Error Level Analysis and GPS geolocation, plus a number of unique features such as thumbnail consistency and detection against a database of previously stored images using hash matching. Furthermore, it features a so-called “signature engine” which summarizes the various findings into a verification checklist (“Signature Engine”), noting the most important aspects of the information provided.

Ghiro is aimed at image verification, and the applicability of such tools to video is an open issue. Certain Ghiro tools may be transferrable to video, by operating on video key frames, while others are only relevant to image information. Furthermore, while video metadata are not stored in EXIF format, and cannot be extracted using Ghiro, there are significant similarities between the typical fields in image and video metadata, and the verification process exhibits significant similarities between the two media types. Thus, the Signature Engine report generation methodology may be relevant to UGV as well.

The most relevant aspect of Ghiro is the Signature Engine and the way it handles relationships between metadata values to evaluate image integrity.

The most interesting findings from Ghiro that can be used for requirements gathering are:

- as the project is open source, the precise mechanisms and guiding principles behind the Signature Engine should be accessed and evaluated for their applicability to InVID.

Emergent

Research contributed by MODUL

[Emergent](#) was a real-time online rumor tracker. Emergent has stopped updating since April 2015 when its founder Craig Silverman joined BuzzFeed Canada. It was a research project of the TOW Center for Digital Journalism at Columbia University. It has been included in this research as it is one of the latest initiatives in debunking online myths.

It's not clear if rumors are detected automatically but one can email rumors to Emergent to be added to the tracker. Once a rumor is being tracked it appears in the list on the homepage with its current status (True, False or Unverified). Choosing a rumor leads to a page that visualizes all that is known about that rumor, namely the sources that report the rumor, the Social Network shares per source and the originating source. The verification approach is based on human observation and manual analysis of the spread of the rumor (e.g. the reputation of the originating source, details existing or lacking in the story)

The most interesting findings from Emergent that can be used for requirements gathering are:

- analysis of spread of information can be a valid verification approach;
- Emergent uses; true, false and unverified as options for the verification status of a claim;
- Emergent detects a lot of sources as part of the fake news business. InVID could setup a list of 'not trusted' sources to check against sources of UGV;
- Emergent has published a 'Viral News Quiz' and by that added gamification to the verification working processes. In this case it was meant to test/train the skills of journalists.

Additional Newsroom systems

AP ENPS

Research contributed by Condat

The AP [ENPS](#) (Electronic News Production System) has been developed by the Associated Press Broadcast Technology department (US). It supports the whole work process for producing, editing, timing, organizing and running news broadcasts. The system is scalable and flexible to handle anything from local news at small broadcasters up to large organizations, such as the BBC with distributed remote departments. The run-down list organizes the timing of play outs with scripts, [video](#), [audio](#), text data, [teleprompter](#) control, director notations, or camera operator cues.

ENPS supports the MOS ([Media Object Server](#)) protocol, which allows adding MOS items such as videos or audio clips directly to scripts. The Associated Press first introduced MOS for the ENPS in 1998. Today it is supported by most of the NCSs and allows connecting media devices providing or using video, audio, text content.

ENPS offers Social Media monitoring and enables searches for Twitter content and YouTube videos. The editor can view any media in those wires with one click. This is offered also to the team, who can see the tweets or YouTube items in the newsroom. All postings are logged so that authorized persons can review the organization's Social Media out- and input.

ENPS has been on the market for many years and has a less modern architecture than OpenMedia or Octopus.

Octopus 8

Research contributed by Condat

[Octopus 8](#) is an innovative newsroom computer system from Octopus (Czech Republic, Prague) that runs natively on Windows, Mac OS X and Linux. Octopus is a MOS compliant platform that provides the tools for journalists in TV newsrooms to fulfill all aspects of the news delivery workflow, from browsing and searching source material, to writing scripts and preparing rundowns, for all types and scales of operation up to 24/7 news networks.

Octopus offers a mobile App that allows users to create and edit stories using mobile devices, report stories from the field and access all the incoming agency wire feeds.

Octopus claims to be easy to integrate with the most popular Social Media platforms; the editors can directly search Social Media from the user interface or follow particular hash tags or users and also upload videos to YouTube, tweet breaking news and advertise publications on Facebook as well as track the feedback of followers.

News Asset

Research contributed by Condat

[News Asset](#) from ATC (Greece) is an integrated production system for multiple broadcasting channels, content management and other digital assets management. It supports journalist

workflows for news production and delivery to radio & TV, print, web, [mobile and tablet publishing](#). The MOS protocol offers an interface to connect existing third party media devices such as video storages or autocues. News Asset helps editors create program scripts, items, schedules, and program rundowns with display of topics, duration, order, and presenter. News Asset can automatically receive news assets (media files) from multiple media, sources and wires using a configurable engine for ingesting these news assets from any source, delivery channel and in any format.

News Asset allows integrating content from widely used tools (MS Word, Open Office, Photoshop), and supports the industry standards IPTC, ANPA, NewsML and EventsML. News Asset also supports searching and integrating UGC as an optional feature by an eReader component.

Superdesk

Research contributed by Condat

The Open Source [Superdesk system](#) from Sourcefabric (Czech Republic, Prague) is an extendable end-to-end news production, curation and distribution platform for news productions. It offers multi-channel content publishing, workflow management, ingestion and search. The ingest and search technology is built on top of Elasticsearch and enables to find related multimedia content such as text, image, video, graphics supporting a variety of import formats, such as NewsML-G2, NewsML 1.2, NITF, IPTC, RSS, ANPA, Teletype. Superdesk enables a system-wide communication and collaboration by exchanging comments, user mentions, notifications and activity streams for different locations of team member groups.

A monitoring view can be used to control content in ingest channels, workplaces, searches, all at once in real-time. An author environment offers journalists comprehensive support to create content, work on individual or multiple news items at the same time and make content easier to find by using rich metadata. Superdesk provides a REST API to include further content packages, but offers no MOS protocol support.

Superdesk has a couple of projects in the UGC verification field: [CitizenDesk](#) and the [Verified Pixel Project](#) (now completed).

The Open Source System is designed as a free alternative for journalists, but has not yet the support for UGC and external device adaptation as seen with the commercial systems.

Appendix B: Interview guidelines for requirements gathering

Interview Guidelines

For: Interviews with video verification experts (e.g. journalists with extensive experience dealing with user-generated video (in future: UGV) / eyewitness video

By: DW / Jochen Spangenberg

Project: InVID

Date: 16 Feb 2016

Version: 2.0, revised and distributed

Part I: Background / Purpose / Procedure / Information

Introductory note:

These are guidelines to be used for interviewing experts with significant experience in dealing with the verification of user-generated video (in future: UGV). The plan is to interview at least two such experts each (totaling at least six altogether) by InVID partners APA-IT, AFP and DW.

In order to make answers and information obtained comparable, it is suggested to follow these guidelines – as agreed in the InVID kick-off meeting. If certain areas are not covered, there is room at the end to insert additional information.

Use of these guidelines

Text parts that appear in inverse are instructions and supporting information for the person conducting the interview.

Procedure / expected outcome

- Please conduct interviews a.s.a.p., and provide answers in this Word document (one interview per filled out document, this one being the template).
- Take extensive notes of what is said (ideally: record it). Some of it may also be used elsewhere (e.g. on website). If you have the opportunity to video the interview: even better (but remember: most important is getting the information on time)!
- Produce / provide a written up version of the interview using this form
- Do a first assessment (e.g. by highlighting important aspects, providing additional information etc.). Important: highlight any of your own comments / additions etc. as such, so nothing gets attributed to the interviewees that hasn't been said by them

- Main task at the end: Extract requirements from the interviews you conduct
- Deadline for sending the filled-out questionnaires and extracted requirements to DW: 21 March 2016 (the earlier the better)
- Please send information on planned /scheduled interviewees to the WP list once you have these fixed (to avoid overlaps / so different InVID people do not contact the same person for interview requests).

Other

- At the end, ask interviewees if they can be named or want to remain anonymous. In any case, it is important to get some information about their job, experience and information about who they work for (e.g. like “journalist at European public service broadcaster who has been working at the organization’s Social Media desk for past three years”)

Part II: Formal / Setting

To start with, please fill out information about the interview setting:

Person conducting interview:	
Date:	
Method (f2f, telephone, etc.):	

Part III: Introduction to the Interview

Suggested introductory text (of course, this should be modified and adapted as suitable)

Dear xxx

Thank you very much for taking your time to talk to me today. I am conducting this interview as part of 3-year project co-funded by the European Commission. It is called InVID and deals with the analysis and verification of user-generated video (UGV). The project started in January and runs for 3 years.

At the beginning of the project we are collecting so-called user requirements. In other words, we want to find out about the state-of-the art when it comes to dealing with UGV. Of interest are questions such as:

- How journalists handle videos from eyewitnesses,
- What respective issues and challenges are there,

- What would be beneficial to aid journalists in the video verification process.

Based on all the information gathered, including information collected from experts such as yourself, we will develop solutions that hopefully aid in and improve the verification of UGV. So once again thank you very much for your time and availability today.

To start with, can you please tell me a bit about yourself (*fill in information about the person being interviewed*):

Name of interviewee:	
Working for (organization):	
Current position:	
Previous positions of relevance:	
Worked as a journalist for:	xx years
Experience working with UGV:	
Contact details (phone, mail, Skype):	
Other:	

Part IV: The Interview itself / Questions

(Note: UGV = user-generated video, e.g. videos captured by a non-professional / eyewitness)

1. What is your role? / what do you work on primarily?

(Note: find out areas of work - e.g. in breaking news, background news, features, tasks for which there is lots of time / little time etc. This is to obtain a rough idea of the interviewee's area of work)

2. What role does User-Generated Content / Social Media generally play in your work?

(Note: Find out about experience of dealing with UGC generally. Also: how often does dealing with UGC play a role for the interviewed journalist – daily, weekly, monthly)

3. What about UGV / videos from eyewitnesses / videos shared via Social Networks. What role does this play in your work? In what situations do you use it? What value does it have?

(Note: Find out about experience relevance of UGV generally)

4. What would you call the major challenges when it comes to dealing with UGV?

(Note: Here, we want to find out what the major challenges / difficulties / obstacles are when it comes to handling UGV)

5. What stops you from using UGV?

(Note: Find out in which situations and why, at times, people don't use UGV)

6. How do you find UGV? Where do you find it? Where do you look for it? How?

(Note: Find out how journalist find UGV)

7. Imagine you come across a user-generated video that is of interest to you and of value to your reporting. Can you describe the steps you use from spotting it to integrating it in your reporting?

(Note: Find out detailed steps from discovery to publication. If not mentioned by journalists, also ask about issues such as rights clearance, crediting, integration into organization's CMS etc. – this is likely to be a long and extensive answer...)

8. Can you name some useful tools for verifying UGV? What are they good for, what do they lack?

(Note: Find out about individual tools used, their pros and cons, dealing with them, issues etc.)

9. Focusing on the business side: what do you think could have significant business impact when it comes to UGV? In other words: where do you see a market for solutions that aid in the verification of video material? On what would you spend your organization's money?

(Note: Find out what is of real value and would make organizations spend money on. E.g. a tool / service that has the following capabilities...)

10. If you had one wish concerning the verification of UGV and dealing with it, what would this be?

(Note: Find out what would make the life of a journalist easier when it comes to dealing with / verifying UGV. What do they lack? What would they like to have? How could WE help? What matters most?)

11. Are there any other issues or topics that have not been addressed yet? Anything important to add in the context of dealing with and verifying UGV?

(Note: Here, give the interviewee the opportunity to raise anything that has not been addressed yet)

Closing off

Before we end our discussion, can please let me know how we should refer to you and reference what you have just told us.

(Please ask interviewee how we shall deal with interviewees' identity, using the points below as a guideline, adding whatever else is suitable)

	Yes	No
Can we quote you by name, for example in project reports, on project website, in publications (we may want to publish extracts of this interview on the project website. If so, we would consult you beforehand and provide you with a draft text for review before publication)?		
If we quote you on publicly available resources (e.g. on project website), do you want to be informed beforehand?		
Do you want to remain anonymous if referred to (and be described as something like "person working at a Swedish broadcaster")?		
If the interview is done by video: can this be made publicly available? (E.g. on the project website, on YouTube etc.)		

Part V: Extracted requirements

Based on this interview, I have extracted the following requirements when it comes to dealing with UGV and its verification.

(Here, please list the requirements extracted from your specific interview. Also give reference to individual questions, e.g. from where you derived specific requirements)