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## Twitter as a communication tool in the Germanwings and Ebola crises in Europe: analysis and protocol for effective communication management

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**Abstract:** We investigated Twitter communications by the media and institutions regarding two emergency situations which had a major impact in Europe: the accident of Germanwings Flight 9525 in the French Alps on 24 March, 2015, and Ebola infection of Teresa Romero, a nursing assistant at the Hospital Carlos III in Madrid, reported on 6 October, 2014. Our methodology was based on a new tool called top discussion indicator (TDI). Our results indicate that media and institutions do not exploit all the possibilities offered by Twitter. We propose a decalogue of recommendations aimed at improving use of Twitter and ensuring greater communicative efficacy.

**Keywords:** emergency communication; public institutions communication; media information; twitter; Europe; Ebola emergency; Germanwings emergency; mixed methods; TDI; top discussion indicator; decalogue of recommendations.

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## 1 Introduction

We describe and analyse social media use to manage and communicate two emergency situations that had an important media impact in Europe, most especially in Spain, France and Germany. The main contribution of this research is to provide data to explain the challenges that confront the media and institutions in crisis cases. Furthermore, based on our analysis of good and bad communicative practices of these cases, this research gives recommendations to improve the information that citizens receive in emergency situations.

The first case study was of the Germanwings accident of 24 March, 2015. Flight 9525, en route from Barcelona to Düsseldorf with 150 people on board, crashed in the French Alps, leaving no survivors. The investigations concluded that the accident was caused intentionally by the co-pilot of the plane. The impact on the company's image was so negative that the name was changed to Eurowings by Lufthansa, owner of the low-cost airline, just seven months after the tragedy.

The second case study refers to the first case of Ebola virus infection in Europe following an outbreak in West Africa. The infection of Teresa Romero, a nursing assistant at the Carlos III Hospital in Madrid, was reported on 6 October, 2014 and

resulted in a social and health emergency with political repercussions that led to the resignation of the Spanish Minister of Health, Ana Mato.

One of the issues that had the most media attention in this case was the one referring to the pet of the nursing assistant Teresa Romero, the dog called Excalibur. The case had social and media repercussion because the government decreed that to avoid possible contagions the dog should be sacrificed before seeing whether Excalibur was infected with the Ebola virus or not. This mobilised the animal defenders who made demonstrations and also protested on social networks to try to save the life of the pet. Although this campaign achieved great media visibility, to the point that for several days this issue was the main focus of information about the case, stealing the role of Ebola infected Teresa Romero, they did not achieve their goal and finally, Excalibur was sacrificed.

The research problem is to analyse and identify the challenges, difficulties and opportunities that the media, journalists and institutions encounter when they report emergencies on Twitter. Social media is considered an appropriate platform to analyse the management and dissemination of messages in emergency situations because previous research has validated the usefulness and efficiency of this communication channel (Sutton et al., 2019; Brandt et al., 2019; Liu et al., 2019).

Both cases of study are relevant for three main reasons: first, because they are two crises with a high media impact in the country where they originated and in the countries related to the critical event, second because they are crises that were managed by public agencies from social networks and third because these are two events that put European emergency management protocols to the test in Spain.

The main objectives of the research were as follows:

- to analyse Twitter use in emergency situations by the media and institutions
- find out how the media and public institutions use Twitter's discursive resources (hashtags, mentions, links, audiovisual content, etc.) to report on Twitter and to face the challenge of spreading fake news in the crisis analysed
- to establish a comparison between the good and the bad communicative praxis identified in both emergencies that allow us to elaborate recommendations about emergency communication.

The goal was to highlight the challenges faced by the media and institutions in emergency and crisis situations, for which the question arises whether conventional media continue to have a leading role in the dissemination of news or if social networks have replaced their mediating role and if this has been reflected in a high participation in the institutional accounts of crisis management.

### *1.1 Theoretical framework*

Perceptions of risk have amplified in recent decades as a result of momentous changes arising from the immediacy of information (Beck, 2002) and the dismantling of communication boundaries (Cortiñas-Rovira et al., 2015). The fact that information is transmitted in a matter of seconds to any corner of the world has entailed a change in the attitudes of receivers (Fog, 2002).

Social media users participate in public debates and convert websites into content platforms, mainly blogs, microblogs (Twitter, Facebook, etc.) and videos (YouTube, etc.). Changes in society are responding to technological advances that directly affect our lives (Deuze, 2012) and society is consequently being remodelled according to the metaphor of the network. The result is a network of networks – the network society – in which perceptions of space and time are radically changed (Castells, 1996).

As well as immediacy and participation, the internet and the social media offer technical advantages in enabling a more effective response to crises. With the emergence of social media, crisis messages are no longer the exclusive domain of the media and institutions, as private individuals now actively participate in the propagation of content regarding emergencies (Houston et al., 2015; Liu et al., 2016; López-Meri et al., 2017), mainly via the social media (Pont-Sorribes et al., 2009). This proactivity occurs especially in situations of emergencies and crises of all kinds.

The Twitter microblogging service is used by journalists and researchers to analyse the potential, electoral tendencies and communicative behaviour of political leaders and parties (Giansante, 2015). Although its penetration and social impact is less than that of networks like Facebook (IAB, 2017), it is an exceptional way to follow journalists, influencers and experts in different areas of knowledge, especially in crisis situations. Despite the interactive possibilities offered by Twitter, it can be characterised as a variation on traditional communication models in the sense that it is used for vertical and unidirectional communication, especially by political elites (Bentivegna, 2012; Bor, 2014; Di Bonito, 2015; López-Abellán, 2012; Stromer-Galley, 2014). This kind of inadequate use of social media prevents political leaders from taking better advantage of their communications (Giansante, 2015).

Notable studies in the field of risk communication are those by Bruns et al. (2012), Hughes and Palen, (2009), Mendoza et al. (2010), Moya-Sánchez and Herrera-Damas, (2015), Palen et al. (2010) and Panagiotopoulos et al. (2012). As documented in these works, Twitter, when used in emergency situations, enhances interaction and transmits information more efficiently. Watson et al. (2017) assert that a large part of the big data produced in social media has a positive impact not only in the management of emergencies, but also in their prevention, given that more data are available. However, some studies criticise the use made of Twitter and Facebook by institutions: “In times of crisis, the mismatch between public agencies’ and citizens’ social media use risks hampering the spread of vital, sometimes even lifesaving, information” (Eriksson and Olsson, 2016, p.206).

## **2 Methodology**

This section explains the different methodological aspects, such as: universe of analysis and data collection; analysed sample; quantitative method and qualitative method.

### *2.1 Universe of analysis*

The universe of analysis corresponds to the following dates in each case: The Ebola crisis begins on 25 June, 2014 with the first activation of the European alert protocol for Ebola in Valencia and ends on 2 December, 2014 when World Health Organization (WHO)

declares officially the end of the outbreak in Spain. In the Germanwings crisis, the study begins on 24 March, 2015, the day of the plane crash and ends on 22 July, 2015 when the Lufthansa aircraft company makes the latest official statements on compensation to the families of the victims.

The Ebola crisis tweets were extracted from the Twitter platform, only those containing any of the following hashtags: #SalvemosExcalibur, #AnaMatoDimision, #EbolaenEspaña, #VamosaMorirTodos, #TeresaRomero, #TodosSomosTeresa and #JavierRodriguezDimision. In the Germanwings crisis the tweets that were collected for the analysis contained some of these hashtags or keywords: #Germanwings, #4U9525, Dusseldorf and Estrop.

In total, 1,098,526 single tweets of the Ebola crisis in Spain and 236,082 tweets of the Germanwings crisis were collected. The universe of analysis is composed of 1,334,608 tweets. As a result of the large number of tweets collected, a method was designed to delimit the universe of analysis that would allow the extraction of a relevant sample from both cases, this would facilitate the qualitative analysis of the tweets. This method is the top discussion indicator (TDI) (Percastre-Mendizábal et al., 2017).

These 1,334,608 tweets were extracted by a Spanish company specialised in the monitoring and collection of Twitter data called Pirendo that was outsourced for this function. The data was processed using statistical and database software.

## 2.2 Sample of analysis

Our sample was obtained using the TDI system. The TDI identifies the time frame (in days, hours or minutes) when most tweets about an emergency were posted and selects the most relevant of those tweets according to their virality (where greater virality means greater relevance), measured in terms of at least 50 retweets and 10 favourites. Retweets were given greater weighting than favourites, first because, in the internal logic of the Twitter timeline, a retweet means greater visibility, which means that viralisation is more likely, and second, because research indicates that tweets get more retweets than favourites.

In addition to the criteria explained above linked to the TDI, the analysis sample has been filtered based on other elements such as: *the language*, only the messages published in Spanish have been analysed; *the geolocation*, those messages that were published either in Spanish but without an established geographical location, or in the Spanish language, and also, published from Spain have been analysed. Finally, *hashtags* have been used to filter the conversation. The hashtags and keywords that were used to filter the tweets that would make up the analysis sample are the same ones that were used to delimit the analysis universe and which have been explained in the previous section.

For the Ebola emergency, the TDI period was identified as 7 October, 2014 between 12:00 and 23:59 (Suau-Gomila et al., 2017). In this period, 358,290 tweets were posted – that is, almost a third (32.9%) of the entire Twitter conversation on this emergency – and 1,115 tweets met the virality requirement (at least 50 retweets and 10 favourites), i.e., 0.3% of tweets published during the emergency. The 720 most viral of those 1115 tweets were analysed, mainly posted by the media, institutional profiles and some private profiles. Consequently, the three main actors in political communication were taken into account (Wolton, 1990; Canel, 2006; Mazzoleni, 2010). The same approach was used to extract the sample for Germanwings, obtained for 24 March, 2015 between 11:38 and

23:53. Of the 105,846 tweets published in that time slot, 638 tweets (0.6% of the total emergency) met the virality criteria.

### 2.3 *Quantitative analysis*

Quantitative variables ( $n = 14$ ) were extracted from Twitter metrics in accordance with Suau-Gomila et al. (2017) as follows:

- number of followers at the time of the tweet and at the time of analysis.
- number of profiles following the whole users at the time of analysis
- retweets received of the sample
- favourites received of the sample
- tweets posted of the sample
- total inputs: the total number of tweets and retweets
- hashtags used
- key emergency managements and communication actors
- actors who share links
- total of profiles who made interactions (hashtags used + most relevant mentions + most shared links)
- multimedia content shared (videos, gifts and audio files)
- profiles who posted tweets with images (not multimedia)
- hyperlinks used (multimedia content shared + tweets posted with images).

### 2.4 *Qualitative analysis*

The analysis of the influential discussions presented here was based on a reformulation of the analysis of the Charlie Hebdo attacks in Paris carried out by Vanderbiest (2015). In this analysis the author presents six phases of the crisis in social networks, these six semantic and non-temporal phases of the crisis, have been redefined and used for the qualitative analysis of the present investigation since the study on the different stages of semantic behaviour conversations during a crisis in digital social networks allow us to understand a more transversal and less linear or chronological dimension, such as temporal analysis.

In addition, the method used by Vanderbiest (2015) allows an analytical exploration very similar to that carried out by him in the study of the Charlie Hebdo attacks crisis that shares characteristics very similar to the behaviour of an emergency such as the two cases studied here.

This semantic analysis of phases of the crisis allows us to understand if discussions in social networks reflect an active and synchronised participation of institutional accounts, with which it is possible to see their mediating role over conventional media. The phases referred to are the following:

- 1 *Alert phase.* This is the purely informative phase of the emergency, and consequently – from a temporal perspective – is the initial phase in a situation of risk. However, each time new information comes to light, this phase is reiterated.

Given the nature of this phase, institutional and media profiles should feature prominently, although private profiles may also provide information on the emergency at specific moments.

- 2 *Emotional phase.* This phase reflects emotions and feelings expressed regarding the emergency and its general management. It is a typical phase in all emergencies, whether in the expression of condolences for the victims or of feelings reflecting impact. There are usually posts by all three actors, although posts by private individuals predominate, because although institutions and media need to acknowledge those affected by a crisis, their role is more related to managing and informing about the crisis itself. Private individuals have greater freedom to express their feelings about the emergency as they have no role in managing it.
- 3 *Transition phase.* This phase combines the previous two, with tweets that reflect information and emotion in the same message. This phase is especially relevant to the media, since they can expand on information about the emergency as it becomes known and also show their solidarity with those affected.
- 4 *Rationalisation phase.* In this phase cyberspace is organised around one or a few dominant hashtags and key words that reflect a common cyberspace shared by a majority of tweeters that excludes contrary views.
- 5 *Interest phase.* This phase is featured by posts whose objective does not reflect the needs of the emergency. Posts, rather, seek to draw attention to the tweeter to increase their online popularity. Posts in this phase often include ads, satire, humour, sarcasm, audiovisual montages, etc.
- 6 *Destructuring phase.* This phase reflects rejection in that messages break with the dominant tone of the conversation by opposing a general point of view.

In the analysis of influential discussions, several qualitative variables were also taken into account. Emergencies were classified in terms of crisis level as ephemeral, serious or intermediate based on various criteria such as duration, severity (fatalities and casualties) and the volume of conversation generated. Also determined was the epicentre of the discussion, i.e., the moment in which most posts were generated about an emergency. This time frame should coincide with that defined by the TDI. Expressions of discontent were also studied, i.e., expressions or keywords that explicitly express discomfort regarding the emergency situation, its management or both. Also analysed were the main themes in each case in order to identify the aspects of the emergency that focused public opinion. Finally, resurgence of the emergency was identified as sub-emergencies developing within the main emergency, so as to determine whether attention to the emergency focused on the main crisis or was diverted to some secondary issue.

### 3 Results

In Tables 1 and 2, we describe and analyse results for both case studies and draw general and comparative conclusions. But first, a summary table is presented with the main results obtained in the 13 qualitative variables.

**Table 1** Results of analyse about the 13 variables

<i>Variables</i>	<i>Ebola</i>		<i>Germanwings</i>	
	<i>Media profiles</i>	<i>Institutions profiles</i>	<i>Media profiles</i>	<i>Institutions profiles</i>
1 Number of followers at the time of the tweet and at the time of analysis	15,929,489	257,544	18,319,069	5,068,345
2 Number of profiles following the whole users at time of analysis	7,553,282		3,717,653	

<i>Variables</i>	<i>Sample of analyse</i>	
	<i>Ebola</i>	<i>Germanwings</i>
3 Retweets received	250,249	117,791
4 Favourites	103,664	63,267
5 Tweets posted	1,098,526	235,786
6 Total inputs (the total number of tweets and retweets)	1115	638
7 Hashtags used	#SalvemosExcalibur #AnaMatoDimision #EbolaenEspaña #VamosaMorirTodos #TeresaRomero #TodosSomosTeresa #JavierRodriguezDimision	#Germanwings #4U9525 Dusseldorf (mention) Estrop (mention)
8 Key emergency managements and communication actors	283	30
9 Actors who share links	221	49
10 Total of profiles who made interactions (hashtags used + most relevant mentions + most shared links)	283	243
11 Multimedia content shared (videos, gifs and audio files)	6	10
12 Profiles who posted tweets with images (not multimedia)	20	333
13 Hyperlinks used (multimedia content shared + tweets posted with images)	157	20

Source: Authors

**Table 2** Decalogue of recommendations for informing on emergencies

<i>Recommendations</i>	<i>For institutions</i>	<i>For the media</i>	
General	<i>Profiles and followers</i>	Report from ‘live’ profiles rather than from ad hoc or monothematic accounts, as these make it difficult for people to find information	Use a generic rather than a monothematic profile (e.g., politics, society), as it usually has the most followers
	<i>Updates</i>	Update information in the same profile on a regular basis (establish a timing for each crisis)	Base updates on information from reliable sources and avoid over- frequent updates, as this may lead to error and a loss of interest
	<i>Language</i>	Avoid technical language or provide explanations. Avoid ambiguities, inaccuracies and insensitive language	Use an understandable, easily interpreted lexicon and a register that reflects the nature of the crisis
Operational	<i>Social media monitoring</i>	Create a hashtag that accurately reflects the provision of coherent information on the emergency	Monitor, identify and use hashtags created by institutions managing the emergency
	<i>Mentions</i>	Use mentions to propagate news, as they reflect links to the media and institutions managing the crisis	Use mentions as an efficient means of identifying information sources
	<i>Multimedia</i>	Use multimedia content to transmit information that can be used by the media as an audiovisual resource	Use audiovisual resources to compress and disseminate information

Source: Authors

### 3.1 Ebola

The sample for the Ebola case in Spain reflected a total of 41,371,307 million unique users on Twitter.

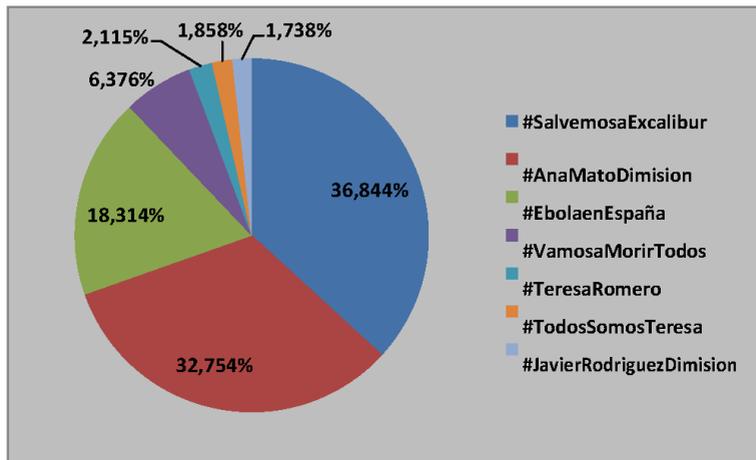
The most frequently used hashtags referring to Ebola in Spain (Figure 1) were ‘#SalvemosExcalibur’ [Save Excalibur] ( $n = 508,124$ ), followed by ‘#AnaMatoDimisión’ [Ana Mato resignation] ( $n = 451,711$ ) and ‘#EbolaenEspaña’ [Ebola in Spain] ( $n = 252,570$ ). The data show, therefore, that the discussion developed along two primary axes: concern for Teresa Romero’s dog (Excalibur) and dissatisfaction with management of the crisis by Ana Mato, the Minister for Health.

Interestingly, although contagion was confirmed on 6 October, 2014, the days of greatest activity on Twitter were 7 and 8 October. Other less used hashtags used were ‘#VamosaMorirTodos’ [We’re all going to die] ( $n = 87,938$ ), ‘#TeresaRomero’ ( $n = 29,172$ ), ‘#TodosSomosTeresa’ [We’re all Teresa Romero] ( $n = 25,627$ ) and ‘#JavierRodriguezDimision’ [Javier Rodríguez resignation] ( $n = 23,966$ ).

For the TDI analysis of Ebola for 7 October, 283 Twitter accounts were selected as the most important based on three selection criteria:

- the virality of their tweets
- the offline prestige of the tweeter
- the representativeness of the media, institutional or private actor.

**Figure 1** Hashtags most used in Twitter discussions on Ebola in Spain (see online version for colours)



Source: Authors

These 283 accounts posted 720 tweets, at an average of 2.54 tweets per account; 64 (22.62%) were media profiles (13 media, 7 blogs, 25 journalists and 19 communicators), 18 (6.36%) were public actors (1 public body, 11 political bodies and 6 political figures), 6 (2.12%) were other groups (2 companies, 3 trade union organisations, 1 religious entity), and 195 (68.90%) were representative of the public at large (140 individuals, 37 cyber-activists and 18 citizen organisations).

As measures of virality, retweets were 221,682, for an average of 783.33 per tweet, and favourites were 90,501, for an average of 319.79 per tweet.

The main phases represented are shown in Figure 2. The nature of conversations in Twitter was largely emotional, mainly marked as it was by the hashtag ‘#SalvemosExcalibur’ (671 (93.2%) of the 720 viral tweets published with this hashtag) – revealing that the focus of interest was not the patient Teresa Romero, but her dog Excalibur.

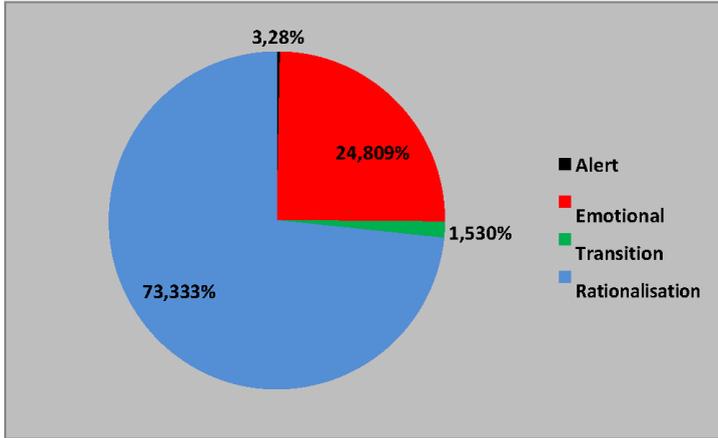
In the interest phase, jokes, sarcasm and harsh criticism abounded, aimed at attracting attention to the tweeter. They were posted mainly by private actors and cyber-activists. In the destructuring phase, a number of tweeters criticised the interest focused on Teresa Romero’s dog Excalibur (Figure 3).

In terms of crisis level, the Ebola crisis was considered to be of intermediate impact, although with potential to become a serious crisis, given that the entire Spanish population (around 47 million people) was at risk. The crisis lasted almost two months. In terms of victims, as well as Excalibur the dog, two missionaries repatriated from Africa died; the nurse Teresa Romero became infected; and the Minister of Health, Ana Mato, was forced to resign.

The epicentre of the discussion was on 6 and 8 October, but especially 8 October, when expressions of discontent became predominant, as indicated by viralisation of the ‘#AnaMatoDimision’ hashtag, used a total of 451,711 times in Twitter conversations on Ebola in Spain between 25 June and 4 December, 2014. It was the second most used hashtag after ‘#SalvemosExcalibur’ with 508,124 posts. In fact, one of the key aspects

of this emergency was the discontent focused on perceived culprits, namely, Ana Mato and, more broadly, the government. However, few tweets directly and explicitly held the Ministry of Health, the Autonomous Region of Madrid, the Popular Party (the party in the government) or the president of the government, Mariano Rajoy Brey, responsible.

**Figure 2** Influential twitter discussions on Ebola in Spain by phase (see online version for colours)



Source: Authors

**Figure 3** Tweets critical of the common cyberspace of the conversation (translations: ‘627,000 people die each year in Africa, not from Ebola but from malaria, which is treatable. But today it’s #SaveExcalibur, nothing more’ and ‘Thousands of Africans are dying from Ebola and we are concerned about a possibly infected dog being put down. Animalism 1 humanism 0’) (see online version for colours)



Source: Twitter

Regarding interactions between users, it is significant that 243 of the 283 tweeters that posted during the TDI period did not use the mention tool @; in other words, 85.9% of the actors did not directly mention any other account. Relevant is also the fact that 58 of the 63 (92.1%) media tweeters about the emergency did not use mentions. Since mentions (and sources) are fundamental to journalism and news work, underuse points to deficient use of Twitter functionalities.

In reference to the use of links, 203 of the 283 (71.7%) tweeters during the TDI period did not share external links. In addition, 378 of the 720 (52.5%) tweets were posted without links. Among the media accounts, it was especially noteworthy that 37 of the 63 (58.7%) profiles did not share any external link. As for the 18 institutional profiles that posted on Twitter, 11 (61.1%) did so without sharing links.

Also noteworthy was the fact that, in reference to the total of shared hyperlinks, (multimedia content and images), a large proportion of actors – 114 (40.3%) – shared no hyperlinks in their 165 (22.9%) tweets or shared just 1 hyperlink (115 (40.6%) actors posting a total of 157 (21.8%) tweets). A very small proportion (under 20%) shared 2 or more hyperlinks: 47 (16.6%) actors shared 2 to 9 hyperlinks, posting a total of 247 (34.3%) tweets, and 7 (2.5%) actors shared 10 or more hyperlinks, posting a total of 151 (21%) tweets.

In reference to the qualitative analysis of the common cyberspace, the hashtag ‘#SalvemosaExcalibur’ was the core conversation on Twitter about Ebola. The alert phase played an insignificant role, unlike the emotional phase, which was predominant; in other words, in Twitter, emotion regarding Ebola prevailed over information. Finally, in the deconstructing phase, the main criticism was that a dog (Excalibur) should not be more important than people.

### 3.2 Germanwings

In the case of the Germanwings air accident, the quantitative analysis was performed for a total of 82,705,105 million unique Twitter users. In this case, the most used hashtag was “#Germanwings”, a generic hashtag that does not admit evaluations of content, as it reflected multiple kinds of posts.

Unlike the Ebola case, the day of the accident (24 March, 2015) was also the busiest day on Twitter. Interaction decayed in an accelerated way so that, by 29 March, only five days after the accident, there was little conversation on Twitter.

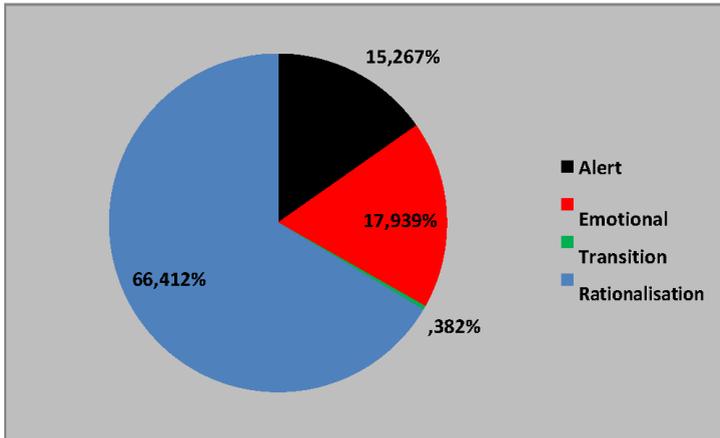
During the data collection period, a universe of data was generated with 235,829 inputs from discussions on Twitter with the hashtags or keywords ‘#Germanwings’ (referring to the airline), ‘#4U9525’ (the flight number), ‘Dusseldorf’ (the destination city of the ill-fated flight) and ‘Estrop’ (referring to Tête de l’Estrop in the French Alps, near which the aircraft crashed).

The TDI located, for 24 March, 2015 between 11.38 and 23.53, the 30 most relevant accounts – based on the same three criteria as for Ebola (virality, offline prestige of the actor and representativeness) – of tweeters that posted in that time period. Of the 30 profiles, 18 (60%) corresponded to media actors (all media); 5 (16.67%) to public actors (3 public bodies, 1 political actor and 1 political body) and 7 (23.33%) were representative of the public at large (5 individuals and 2 citizen organisations).

Figure 3 shows that viral posts for the Germanwings accident were more informative than was the case for Ebola, as private individuals gave greater visibility to information messages; nonetheless, once again, the emotional component (17.9%) prevailed over

information (15.3%). The alert phase, detected as commencing at 11:45 on 24 March, appeared early and was maintained throughout the TDI period. The emotional phase (Figure 4) had two key moments, one located in the hours immediately after the accident and the other in the early hours of 25 March.

**Figure 4** Influential discussions in the Germanwings case in Spain (see online version for colours)



Source: Authors

As with Ebola, the transition phase was virtually non-existent (0.4%), i.e., posts that combined information and emotion had little impact in Twitter. In the initial hours of the emergency, communication orbited around the ‘#Germanwings’ hashtag, with this hashtag used to both provide information and transmit condolences. However, at 12:53 an anonymous tweeter made the first criticism regarding government management of the emergency, and thereafter, tweets in the ‘#Germanwings’ common cyberspace coexisted temporarily with those in the deconstructing phase of the final hours of the day. In the framework of the TDI, 522 tweets were posted with the tag “#Germanwings”, 82.1% of the total number of tweets posted.

The interest phase began on the afternoon of 24 March, 2015, when *El País* (20:17) published a story on a Swedish soccer team that, at the last moment, did not board the flight. Other accounts insulted public officials, including Artur Mas, head of the Catalan government, to draw attention to themselves (e.g., an anonymous individual who posted at 19:37). *El Mundo* (19:08) posted a photo album of the accident, despite Catalan Civil Protection having posted a request at 17:25 – from its official Twitter account (@emergenciescat) – not to publish photos, real or false, of plane debris.

In the deconstructing phase, which began at 12:53 on 24 March, 2015 but became particularly relevant from 15:20, the common cyberspace disintegrated. The conversation ceased to deal with the accident and focused instead on issues such as protests over cancellation of a Telecinco television program (*Mujeres y hombres y viceversa: MHyV*) as a consequence of the accident, insults to Catalan victims, protests about a payphone number provided by the Autonomous Government of Catalonia to inform relatives of the victims, and finally, criticism of media coverage of the case. Searches for hashtags referring to *MHyV* (“#mhyv”) and journalism (“#periodismo”) and keywords such as “bad”, “misery”, “denouncement”, “disgust”, “Catalans”, “silly”, “funny”, “hate”,

“shame”, “mockery”, “joke”, “rabble”, “mhyv” and ‘journalism’ resulted in 85 tweets with these keywords.

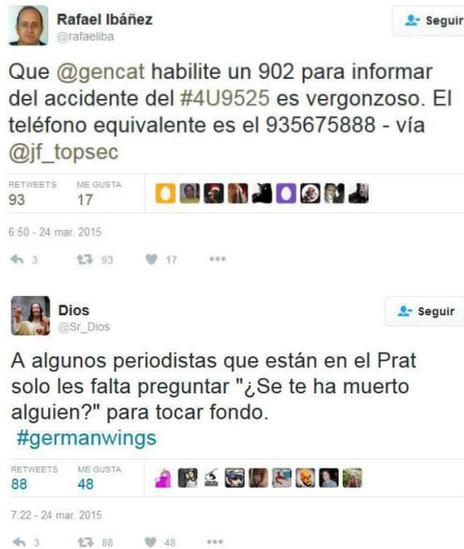
The discussion epicentre occurred on the day of the accident, 24 March, between 11:30 and 23:45, although the largest volume of tweets was posted between 11.38 and 17.00: 441 of the 636 tweets published during the TDI period, representing 69.34% of the conversation about the emergency that day.

Expressions of discontent were made in the alert phase – once users became aware of the scope and severity of the emergency – and were manifested clearly in sub- themes such as the issue of a payphone to provide information to relatives, cancellation of the Telecinco program, catalanophobia and media coverage of the case. However, discontent to a small degree was also expressed regarding management of the emergency; criticised, for example, was the fact that Barcelona airport allowed relatives to be videorecorded.

The main theme was the tragedy itself and new information as it became available: that there were no survivors, the nationality of the victims, that it was not a terrorist attack (as was initially speculated) but a premeditated action by the co-pilot Andreas Lubitz, as tweeted on 6 May, 2015, etc. The conversation also unfolded around condolences and solidarity with family and friends of the victims, as reflected in tweets by public and private individuals, institutions and the mass media in Twitter.

Secondary, but also relevant themes, were conversations about the catalanophobia inspired by the Germanwings accident, the controversy regarding cancellation of the Telecinco program, criticism of media coverage and management of the emergency. Finally, regarding resurgence of the emergency, three slight upturns were detected, two of which implied criticism of emergency management in its final phase and another referring to minimising suffering for those affected, as seen in Figure 5.

**Figure 5** Tweets critical of the Catalan government and of media coverage. (translations: ‘That @gencat could lay on a 902 number to provide information on #4U9525 is shameful. The equivalent telephone is 935675888 – via @jf\_topsec’ and ‘To some of the journalists in el prat airport, has someone you know died? you could not go much lower’) (see online version for colours)



Source: Twitter

In total the 30 analysed accounts posted 205 tweets within the TDI period, primarily *RT en Español* (53 tweets), *El País* (39 tweets), *El Mundo* (25 tweets), *ABC* (21 tweets) and *El Confidencial* (11 tweets). The accounts that published more than 10 tweets were media accounts, accounting for 149 tweets, or 72.7% of the analysed tweets. This shows that, unlike what happened with Ebola, the media posted at the peak of the conversation on Twitter.

Regarding use of Twitter handles that focus conversations, 27 of the 30 profiles (90%) used a hashtag. The '@' symbol, used to refer to or participate in a conversation, was also an underused resource for tweets about the Germanwings accident (as was the case with Ebola): of the 205 tweets analysed, only 8 used @.

Finally, regarding the use of links to amplify information, the 30 analysed profiles shared a total of 173 links, indicating intensive use of this resource. During the TDI period, 19 profiles (63.3%) shared at least 1 link during the emergency. Among the profiles that did not share any links, the following were of note: The National Police, VOSTcat (digital volunteers), the Ministry of the Presidency and *El Món a RACI*.

## 4 Discussion

### 4.1 Ebola

Leaving aside the two phases not represented in this analysis of virality, the alert phase had the fewest posts, with only three tweets posted, all by media bodies: *Prnoticias*, *Estrella Digital.es* and *El Plural*. This does not mean that there were no posts, merely that posts did not go viral, which would indicate that the focus of interest in Twitter was not information, which could put into question the claims that when Twitter is used in emergency situations, interaction is improved and information is transmitted more efficiently (Liu et al., 2019; Bruns et al., 2012; Hughes and Palen, 2009; Mendoza et al., 2010; Palen et al., 2010).

In relation to emergency resurgence, we can consider the case of Excalibur to be a new emergency rather than a sub-emergency since; curiously, it eclipsed the original emergency referring to the contagion of Teresa Romero.

Regarding interactions between users, it can therefore be concluded that the Twitter conversation about the Ebola emergency was not effective, as there was little interaction between users. Atypical situation because, as Watson et al. (2017) state, a large part of the big data produced in social networks has a positive impact not only in the handling of emergencies, but also in their prevention, given that there is more available data, as also explains Son et al. (2019) in their research.

Overall, therefore, the fact that under 50% of the media and public institutions, whose social obligation is to inform citizens, shared external links – that is, amplified the information provided in their tweets – combined with the fact that private individuals achieved the greatest virality, indicates that the conversation about the Ebola emergency was more focused on opinions, subjective evaluations and value judgements than on objective facts. As well criticised by Eriksson and Olsson (2016) the mismatch between public agencies and citizens' social media use risks hampering the spread of vital, sometimes even lifesaving, information.

## 4.2 Germanwings

On the day of crisis, the rapid decrease in the volume of Twitter posts, also the case for many crises, highlights two key aspects of this digital social network: immediacy and oblivion. This is related to the changes in society that are responding to technological advances that directly affect our lives (Deuze, 2012) and, consequently, society is remodelling in a network society where perceptions of space and time radically change (Castells, 1996).

The only three profiles (10%) that did not use hashtags were *El País Catalunya*, *El Món a RAC1* and *Informativos T5*. This is surprising, since media need to draw focus and give visibility to their content, for which the hashtag is a very useful function, like Pourebrahim et al. (2019) prove when they say that: “These tools can also benefit from social network analysis to help authorities in accelerating information diffusion during disasters”.

Regarding the total number of multimedia files and images posted, 10 (33.3%) accounts did not share any multimedia files or images, whereas 20 (66.7%) did, reflecting a high level of use of this expressive resource.

In terms of crisis level, this emergency can be considered serious in terms of human impact, given the high number of fatalities. However, in terms of time, it can be classified as having an intermediate amplitude, since, as an unforeseen accident, interest was focused for 11–12 days on the scene of the accident in the French Alps. In addition, in terms of resurgence, although the accident scene received extensive media coverage, it counted only as a minor sub-emergency.

In addition to immediacy and participation, the internet and social networks offer technical advantages to allow a more effective response to crises. With the emergence of social networks, crisis messages are no longer the exclusive domain of the media and institutions, as individuals participate actively in the propagation of content in emergencies (Houston et al., 2015; López-Meri et al., 2017).

In both cases, findings are relevant because: responding objective a), the results prove that the Spanish media and institutions did not use efficiently Twitter tools (hashtags, mentions and links) for information diffusion during emergencies. In addition, linking with objectives b) and c), institutions tried to take control of the information for to prevent fake news, but the media and citizens did not follow these recommendations and disseminated inaccurate, flawed and unverified information, especially in Germanwings case. Usually, institutions have a better crisis communication practices in Social Media than media outlets profiles. This communication practice is better because institutions do not publish unverified news. Media make an inaccurate dissemination of their information.

## 5 Conclusions

From our analysis of the Germanwings accident and Ebola crisis, we conclude that conventional media continue to play a main role in disseminating news, even in the social media with their high public participation levels. At the peak of the Ebola crisis, the media had 15,929,489 followers in Twitter, whereas institutions had 257,544 followers; as for the Germanwings accident, the media had 18,319,069 followers, whereas institutions had 5,068,345 followers. These data point to the importance of Twitter for

traditional media, corroborating Castells' (2006) statement that these actors remain socially legitimised to transmit information to the public.

Participation in Twitter by institutional accounts not directly involved in communication management was low, as evidenced by that fact that government ministries and the governments of Spain, Catalonia and other Spanish regions did not participate in the conversations about the emergencies, not even by retweeting tweets by bodies dependent on them.

A certain underuse of Twitter tools was detected, especially of the mention handle @, most particularly by the media and institutions. Of the media profiles, 84.4% and 50% did not use mentions in posts on Ebola and on the Germanwings accident, respectively.

In the Germanwings and Ebola crises, sub-emergencies or secondary themes emerged. In the Ebola crisis, the two most used hashtags referred to saving Teresa Romero's dog (“#SalvemosExcalibur”) and demands for resignation of a minister (“#AnaMatoDimisión”). Thus, most of the Twitter conversation orbited around collateral issues rather than around the infected nursing assistant or the arrival of Ebola in Spain. As for the Germanwings accident, this provoked conversation reflecting catalanophobia, the cancelled Telecinco program and criticisms of media coverage, above all, but also regarding management of the emergency.

Below we provide a list of recommendations for crisis and emergency management by public- and private-sector professionals (journalists, public institutions and companies). The decalogue of general lines of action proposes guidelines for the handling of information that will ensure effective crisis management and efficient handling of critical information in social media platforms like Twitter, which ultimately may save human lives and prevent or reduce material damage.

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