Information Flow on Digital Social Networks during a Cultural Event: Methodology and Analysis of the "European Night of Museums 2016" on Twitter

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ABSTRACT

In this paper, we first present a representation of message flows and their contents on Twitter, then an instrumented methodology to describe and analyze these flows and their distribution among the various stakeholders. The aim is to explore the engagement and interactions between different types of stakeholders. We apply our methodology and tools to the 12th edition of the cultural event "European Night of Museums" (NDM16).

CCS Concepts

• **Information systems→Social networking sites.** • **Information systems→Social networks.** • **Information systems→Texting.**

Keywords

Circulation of information; Mediation; Instrumented methodology; Social network; Twitter

1 INTRODUCTION

In the cultural sector which includes live entertainment, heritage, arts, visuals, press, book, audiovisual, advertising, architecture, cinema, image and sound industries, access to knowledge and culture [50], the involvement of heritage institutions in digital environments is part of the crosscutting process of their "modernization" and of their increased attention to the public [1]. Over the last twenty years, museums have developed policies to foster access to cultural resources, using digital media, electronic artefacts and technologies [2]. These may include, for example, screens installed in exhibitions, dedicated websites or blogs, serious games, immersive environments, applications developed on smartphones, digital social networks or Linked Open Data for cultural heritage [3]. In this constantly evolving context, digital media are one of the fulcrum points for a new approach to communication and cultural mediation practices.These policies built on digital resources and the social web could foster the emergence of what has been called "open museums" [4] which are based on the paradigm of open access to culture and collaborative participation. For example, since the 2000s social networks owned by American companies (Facebook, Twitter, Instagram, YouTube, etc.) have become very popular in the cultural field. As these social networks attract the general Internet audience, cultural institutions have incorporated into their communication strategies a strong presence in these digital spaces through the dissemination of contents (news, practical or cultural information, representations of works and associated information, etc.) and the development of interaction with their public. By publishing detailed monthly attendance figures on social networks, the world barometer Museum Analytics has contributed to increasing the pressure on these institutions. These evolutions go hand in hand with the development of cultural marketing [5]. Lastly, the "eventualization" of culture, following the explosion of temporary exhibitions, has amplified a "shift of patrimonial institutions to the logic of working like streaming media" [6]. It is a fact that in France and in Europe, over the last decade, temporary cultural events have multiplied, in the form of public events or festivals - such as the "Journées Européennes du Patrimoine", "la Nuit des Musées", 'La Nuit de l'Archéologie", "Passeurs d'images". These events have now become recurrent [7], generating initiatives that contribute to cultural outreach in society as well as to the development of cultural tourism.

We consider that these profound ongoing changes in the museum context [8] are a necessary framework to understand the relationship between "museums and digital media" [9] and more specifically the presence of museums on social networks. Therefore, we do not attempt to assess the "impact" of these digital media on museum practices, but rather to apprehend the place and the role they play in the evolution of these practices. In this perspective, this article focuses on the representation and analysis of message flows on Twitter during a cultural event and on the instrumented method designed to analyze these flows. The purpose is twofold: first, to devise a representation of message flows and their contents on this platform; second, to develop an instrumented methodology to describe and analyze these flows and their distribution among stakeholders in order to reflect the engagement and interactions between different types of stakeholders.

Our study is based on the 12th edition of the cultural event "European Night of Museums" (NDM16). This event took place in the heritage institutions that were partners in the event and was extended to digital media on the website dedicated to the operation as well as on social networks (Twitter, Facebook, Instagram). The outline of this paper is the following. First, in Section 2, we will present the specificities and the contribution of our approach and our methodology to collect and analyze flows of tweets. In Section 3, the results from quantitative and content analysis are discussed. Finally, we conclude in Section 4.

2 LITERATURE AND METHODOLOGY

In this section, we begin with a review of the literature in order to present and situate the contribution of our approach, and then to present the interdisciplinary approach and methodology we

developed to conduct the analysis of messages. Finally, the two axes of analysis of message flows will be specified.

2.1 Literature Review

The introduction and development of forms of public participation in museums are described in work on the new museology [10]. Digital technologies convey the promise of being a "means capable of creating, maintaining and / or supporting participation between stakeholders" [10]. Work on participatory museology and its relation to digital technologies has analyzed audience involvement in the design phases of an exhibition (such as the design of mediation devices or exhibition of works by visitors) and exhibition visits, for example by using mobile phones or tablets to take pictures or post comments on a platform, by accessing online contents via QR codes or RFID chips. Audience participation may also involve initiatives aimed at the conservation of collections, such as participatory patronage for the acquisition or restoration of artefacts, and contributions to research, in particular through activities such as correction, indexing or annotation [10]. The concept of participatory museums proposed by Nina Simon in her book [11] departs from the vision of museology; her proposal is built on the articulation between the audiences who contribute to the activities of the institution and the museums that supervise, encourage and evaluate collaborative projects and co-creation activities with visitors.

A number of scientific studies have investigated how museums use social media, focusing on the communication and mediation policies and practices of museums and their uses of platforms (including Facebook, Twitter) for various purposes [12,13,14]. The aim is to move from a vertical logic of diffusion to the establishment of closer relationships based on audience interaction and participation. Nowadays, museums and cultural institutions use social media as a means to communicate and promote their cultural activities, as well as to interact and engage with their visitors, the main use of social media by museums remaining information and promotion of activities such as exhibition openings or events [14]. Some museums choose to adopt social media for audience development and engagement in order to maintain their position of cultural and educational leaders. A qualitative study on the ways that museums use Twitter in this perspective shows that they choose to link resources, engage the public with new social media tools and favor a two-way form of communication [13]. In their commitment to a digital policy of mediation of cultural resources, institutional communication strategies [3] and marketing strategies [1, 5] are also a common concern. Indeed, the image of the institution is affected by its capacity to ensure visibility on media considered as innovative in their modes of public involvement and in the sharing of their cultural resources.

Some other studies deal specifically with the forms of visitor engagement promoted by museums [15, 16, 17]. Villaespesa Cantalapiedra [18] carried out fieldwork including a series of interviews with museum professionals which showed that the term 'engagement', "a widely-used term in museums", "can be interpreted in a variety of ways (…): From fostering inspiration and creativity in the user, originating a change of behavior, increasing the user's knowledge, receiving interaction from the user in the form of a like or a comment, influencing the user to physically visit the museum, participating in a user-generated content activity or producing advocacy from the user that shares the museum experience on their own networks, engagement can be defined as the creation of a meaningful digital experience that impacts upon the relationship of the user with the museum" [18]. In particular, when Langa [16] studied the building of a relationship that forty-eight museums engaged on Twitter with online users, she showed that its primary use was as a marketing tool (public relations, events announcements, fact of the day, etc.) and that it led to a lesser engagement and a low audience participation. However, when museums led a more engaging and interactive communication (including games, live tweeting events and co-curating projects), this greater engagement was related to a higher level of participation [16]. In this study, it therefore appears that the kinds of communication museums are conducting with online users have a meaningful influence on user participation.

2.2 Studying the Circulation of Message Flows and the Relationships between Stakeholders

Hitherto, scientific studies on the forms of digital communication engaged in by cultural institutions and audiences have analyzed the practices of institutions and audiences as well as their uses of digital platforms. Some work analyzed the interactions, in terms of forms of engagement and participation, between these two categories of stakeholders. However, these studies restricted their analysis to the space reserved for a cultural establishment on a social network platform, and did not seek to understand how information and exchanges circulated between the different stakeholders.

Our contribution aims to design, in an inter-institutional cultural space, a model for the circulation of message flows on a social network platform, taking the case of Twitter. We chose an inter-institution space that corresponds both to a social network platform widely used by institutions and to a growing communication situation in the cultural field at the present time. This choice led us to focus on the category of cultural event [7] programmed on a national scale. This enables us to explore how information circulates and is exchanged as well as the communication relations established between the different stakeholders present in an inter-institution space. It also avoids making any presuppositions about the various categories of stakeholders taking part in cultural events, as well as their statuses and roles. We focus particularly on the configurations of the authority and legitimacy relations [30] that institutions maintain with the public through the processes of communication and mediation that they implement. Such an approach emphasizes the socio-political aspects of museums' editorial practices, in particular the relations of legitimacy between different categories of actors.

Based on the analysis of message flows on the scale of the cultural event studied, we attempt to answer questions concerning the communicative practices of the stakeholders, such as for example, what is the current strategic usage of social media conducted by different types of stakeholders (not only museums or cultural institutions) during cultural events? We

expect marketing and promotional messages to be present but we also inquire into initiatives fostering audience participation, providing cultural contents and favoring interaction with users. We will specifically examine the communication policies of cultural institutions during a cultural event on Twitter in order to assess whether they are part of their mission to democratize culture for a wide audience on this platform or whether it is rather a marketing campaign to promote a place or an event. More broadly, do stakeholders focus on marketing, advertising, education, cultural information or institutional communication?

Our methodology is based on the contribution of work on cultural mediation ("interpretation"), the media and communication to the understanding of information mediation and circulation in socio-technical environments. Cultural mediation developed in the French context [19, 20, 21, 22] underlies educational, professional and political issues [23]. The term "interpretation" in the North American museum sector focuses on the establishment of a dynamic process of communication between museums and their audiences and on their central role in education and the transmission of educational content [24]. Hybrid in nature, mediation is social, cultural and technical, in line with analyses of "socio-technical mediation" [25, 26, 27]. It comprises both digital media with their sociotechnical specificities and social and cultural issues. Forms of social appropriation appear in the editorial practices (production and dissemination of information) of cultural institutions [28] as well as in cultural and media practices (including social uses of digital tools within and outside visiting places) of the audience [29]. In this respect, they reflect how the patterns of the circulation of culture and knowledge are evolving in society. The objects of study are policies, practices, devices and technologies. They are considered as "complexes" that "combine heterogeneous components and processes" [21]. The construction of a "communicational point of view" means that they should be studied as they are materialized, institutionalized and operationalized in society [21].

2.3 An Interdisciplinary and Instrumented Methodology

In order to build a representation of the modes of circulation of message flows, we developed an instrumented and interdisciplinary methodology that calls on Communication Sciences, Natural Language Processing (NLP) and Computer Science. Our methodology is based on statistical analyses of all the Twitter messages sent during the period of a cultural event as well as a content analysis of the messages.

As mentioned in [31], tweet analysis has led to a large number of studies in many domains such as ideology prediction in Information Sciences [32], spam detection [33], dialog analysis in Linguistics [34], and natural disaster anticipation in Emergency [35], while work in Social Sciences and Digital Humanities has developed tweet classifications [36, 37]. However, few studies aim at classifying tweets according to communication classes. They mostly rely on small reference sets analyzed by experts in Information Communication (InfoCom) rather than by Twitter users. An exception worth mentioning is the work presented in Lovejoy and Saxton [38] in which the authors (Twitter users) analyze the global behavior

of nonprofit organizations on Twitter based on three communication classes: Information, Community and Action classes.

Recently, several studies on tweet classification have been carried out in NLP [39, 40]. Basically, these analyses aim at categorizing open-domain tweets using a reasonable amount of manually classified data and either small sets of specific classes (e.g. positive versus negative classes in sentiment analysis) or larger sets of generic classes (e.g. News, Events and Memes classes in topic filtering). To the best of our knowledge, only [41] has classified institutional tweets in communication categories based on NLP techniques. The advantage of NLP approaches is that they can automatically classify large corpora of tweets. The most commonly used models are supervised learning, Support Vector Machine (SVM) and Naive Bayes (NB) [39, 42, 43, 44]. In supervised learning, features are extracted from tweets and metadata and then vectorized as training examples to build models.

Our analysis focuses on Twitter messages (called tweets) sent by accounts of cultural institutions and by other institutional or non-institutional stakeholders who participated in a cultural event. A first step was to build a terminology to describe the objects studied according to three dimensions: the message, the stakeholders, and the forms of stakeholder participation.

Concerning messages, we will call a message sent by a twitter account an "original tweet" and an original message sent by an account different from the issuing account a "retweet". The current Twitter API gives access to the original tweet (and its sending account) of a retweet. The generic term tweet includes "original tweet" and "retweet". Regarding stakeholder qualification, we distinguished Twitter accounts, accounts managed by institutions (called "organizational account"), and accounts managed by individuals (called "private account"). This distinction is based both on the official list of museums in France provided by the French open data website, and the description on the Twitter account provided by the Twitter API. For example, the "Description" field of the Musée du Louvre (@MuseeLouvre) contains the following text: "Welcome to the Official Twitter Page of the Louvre". The analysis of the description field is necessary because non-museum institutions such as the City of Paris (@Paris) participated in the Night of Museums. Any account that is not recognized as an institutional account is considered as an individual account but manual checking was performed to confirm this decision. It should be noted that the account of a professional employed by an institution but who does not claim to be responsible for the communication of that institution will be considered as a private account. We use the generic term "tweeter account" to refer to both organizational and private accounts.

Analysis of the flows during the European Night of Museums led us to identify six attributes used to qualify accounts according to their modes of participation. We used the terms "participant", "producer", "relayed", "relaying", "mentioned" and "passing". The attribute "participant" was assigned to an account if it produced at least one original tweet or retweet. The attribute "producer" was assigned to an account if it

produced at least one original tweet. The attribute "relayed" was assigned to an account if at least one of its tweets was retweeted. The "relaying" attribute was assigned to an account if the account retweeted at least one tweet. The "mentioned" attribute was assigned to an account if its Twitter account name was mentioned at least once in a tweet. The attribute "passing" was assigned to an account if it was both "relayed" and "relaying". Note that these attributes were calculated irrespective of the number of followers. From these six attributes, it is possible, on the one hand, to compare the behavior of several accounts and, on the other hand, to calculate an overall score to classify them.

Both quantitative and content analyses were carried out. Quantitative analyses focused on the observation of flows and aimed to identify accounts that contributed to the circulation of information during the cultural event. For each attribute (see above) a ranking of the accounts was computed, keeping only the first 10 or 15 accounts in this ranking. This made it possible to order the accounts that produced the largest number of original tweets, which were the most retweeted, and so on. In order to rank "passing" accounts, we computed for each account a score that is the Cartesian product between the number of accounts that this account retweeted and the number of accounts that retweeted it. The value of this index is not significant in itself; it simply provides a means of comparing accounts. With these six attributes, it is possible to compute an aggregate score and to interpret this score as an indicator of the role of an account in the circulation of information during the event.

The lexical analysis focused on the contents of the messages. This analysis of tweets was carried out as well as a supervised classification of tweets, in three stages. First, a team composed of two linguists and 10 community managers designed a model, that is to say, determined the classes in which to categorize the tweets, and the features used to assign a tweet to a class. Four classes were identified (Encouraging participation, Interacting with the community, Promoting the event and informing about it, Sharing experience). The features selected were semio-linguistic (mostly lexical, but also including punctuation marks, emoticons), tweet-specific features (for example, the presence / absence of hashtags in tweets) as well as metadata such as the identity of the account. In the second stage, a classifier was built based on a corpus of sample tweets drawn from two cultural events, MuseumWeek2014 and MuseumWeek 2015 [41]. In our case, these examples take the form of 1000 tweets annotated by hand by cultural experts according to the categories defined in the previous step. The classifier is based on the Naive Bayes and SVM models, with unanimous vote. This means that both models had to predict the same category for a tweet; otherwise, the tweet was not classified. In a third stage, the classifier was applied to the corpus of tweets to categorize all the tweets. A thorough evaluation of the quality of the classifier is detailed in [31], one of the main result is the $F_{0.5}$ measure [39] equals to 0.696.

2.4 Two Axes of Analysis

The message flows were analyzed along two transversal constitutive dimensions, namely the sociocultural and media framework of the studied object - the forms of communication of a cultural event on Twitter - and its interrelation with the modes of engagement and participation of stakeholders. The issue of the social and media flow of messages was deployed in two axes of analysis:

The first axis analyses the articulation between the socio-cultural and media framework and the representation of the modes of circulation of message flows. We consider that the cultural event and its institutional character form a decisive structuring framework for the orientation of the policies, strategies and communication initiatives performed during the event. The "European Night of Museums" is a national cultural event which took place within temporal boundaries (before and during the event) and which comprised events anchored in specific places (an institution, a city or a region). Like other cultural events of this type, it was extended to digital media. At the same time, cultural mediation activities for the general public, which are part of the mission of disseminating cultural or scientific heritage by cultural institutions, were extended to include digital media. The communication of these cultural events on digital media is part of the strategies of visibility and promotion of museum institutions as well as the forms of cultural mediation they engage in with their audiences. Therefore, we do not dissociate museums' practices of cultural mediation from their communication goals related to marketing concerns of visibility and audience development on these platforms. On the contrary, we hypothesize that cultural marketing strategies [5] are interrelated with new forms of cultural mediation based on exchanges and interactions between museum institutions and audiences. On the Twitter platform, editorial formats and information and communication practices jointly engage cultural institutions and audiences. The result is hybridization between promotional policies and cultural mediation.

The second axis analyzes the articulation between the modes of circulation of information and the informational and communicational logics of the stakeholders. Digital media are studied as spaces of relations between different types of stakeholders as well as spaces for the production and exchange of content of various kinds. The goal is to describe attributes (characteristics) that can qualify the informational and communicational practices of the stakeholders involved in this event-driven operation.

3 ANALYSIS OF THE EUROPEAN NIGHT OF MUSEUMS (#NDM16) ON TWITTER

The analyses of the European Night of Museums (NDM16) were carried out according to two transversal constitutive dimensions (see 2.4). The aim was to understand what happened during this cultural event, going beyond the display of quantitative data communicated at the time of its closure, i.e. 3000 events

organized in France and in Europe, more than 2 million visitors who participated in the European Night of Museums in France.

3.1 The Sociocultural and Media Framework

The European Night of Museums in 2016 had a European and international dimension thanks to the patronage of the Council of Europe, the French National Commission for UNESCO and the International Council of Museums (ICOM). It included both public and private partnerships, with support from the French Federation of Societies of Friends of the Museum, the French public transport company RATP, the association Paris Musées, and major public media companies such as France Télévisions, Radio France and TV5 Monde. The event therefore had a political dimension of cultural outreach and democratization, an international dimension (although the event was mainly French) and a media dimension through the support of major media. The press release issued by the Ministry of Culture highlighted the characteristics underpinning the Night of Museums event - marketing, cultural mediation and pedagogy. They form the basis of the constituent dimensions of the event, which are reflected in its organizational structure and in the program of activities.

The "exceptional" nature of the event and the promise of experiencing a "completely different museum experience" are part of the practices of experiential marketing and audience attraction. The originality of the NDM resided in its centralized and diversified programming: within the event; it was based on a variety of local events in a large number of establishments throughout France. The press release highlighted "informed visits, fun activities, workshops, concerts or dance performances" and "exceptional animations". This organization of local events within the main event is characteristic of major cultural tourism events. The participating heritage institutions rely on the local ties they have developed over time in the area (a city, a county) where they are located. The activities are similar to cultural tourism operations (such as the staging of public space, performances, and concerts) as well as cultural or scientific mediation activities (such as conferences or guided tours of museum collections and historical monuments). The event was free of charge, as highlighted in the press release ("On Saturday, May 21, many museums will be free throughout France and Europe from nightfall until around midnight ") and taken up by all the partners in the event. This aspect has been studied in work on the sociology of museum democratization as a factor in increasing attendance [45].

It should be noted that the stakeholders who recorded the highest attendance were cultural institutions, but not necessarily the most important ones. The fourteen sites with the highest attendance were: the city of Mulhouse: 28,500 visitors; Museums in Strasbourg: 21 974 visitors; The Pompidou Center: 16,638 visitors; The Musée d'Orsay: 12,016 visitors; The museum of quai Branly: 10,026 visitors; The Augustins museum in Toulouse: 7,947 visitors; The Carnavalet Museum: 6,105 visitors; The Museum of Confluences in Lyon: 5,985 visitors; The museums of Angers: 5,759 visitors; The MuCEM in Marseilles: 4,900 visitors; The Swimming pool of Roubaix: 4 422 visitors; The Center Pompidou-Metz: 3,257 visitors; The Louvre Museum Lens: 2 796 visitors; The Jean-Jacques Henner National Museum in Paris:

1,450 visitors. It can be seen that Mulhouse, a medium-sized city (about 110,000 inhabitants) located in the North-East of France, recorded the highest attendance at the event "The Night of Mysteries" that the city organized. This helps to understand the importance of this cultural event for the territorial marketing of cities, who also organized their presence on Twitter.

At the same time, a pedagogical device called "The class, the work!" was embedded in the cultural event. Its time-scale was different (one school year), as was its institutional setting (primary and secondary schools managed by the French Ministry of National Education, Higher Education and Research), and it involved a specific audience (pupils) whose participation followed the principles of active learning which gives them the role of "passeurs culturels" (cultural mediators). In the framework of this educational system, pupils from partner schools studied under their teacher's guidance a work from a local museum and presented their study to museum visitors in the early evening. Presentations ranged from cultural action to the transmission of knowledge (texts, comic strips, photographs, plastic artefacts, videos, choreographic, musical or theatrical performances). In 2016, eighty-eight educational and cultural projects were designed by one hundred and five schools with seventy-four partner museums.

The digital information ecosystem of NDM 2016 comprised the institutional website of the cultural event displays, an interactive map with all the activities planned throughout France, and press releases. Accounts of the event on the social networks Facebook, Twitter, Dailymotion and Instagram were also displayed. The events organized by all the partner institutions were presented by region, by the teaching project of "The class, the work!" which was prominently displayed, and by two additional events supported by the French Ministry of Culture. The "social wall of the European Night of Museums", presented as "a festive digital operation" was designed by a creative agency specialized in the design of virtual reality experiences in the media and social networks. This device staged the NDM in the form of a dynamic wall of tweets (tweetwall) which displayed tweets sent before and during the event. Another digital communication operation organized on Facebook, called "The Night (Imagination)", consisted in inviting the participating museums to choose from their collections a work (or a detail of a work) that evokes the night in its different aspects (mystery, magic, dream, fantasy, sleep, bestiary, the supernatural, darkness, love, illusions, etc.). Internet users were invited to propose captions for the works; the most original proposals were assembled in a carousel of ten images on the institutional website[1]

NDM 2016 can be considered a hybrid cultural event in its purposes of marketing, cultural mediation and pedagogy. It welds together events communication and cultural marketing devices, an educational system and cultural mediation operations. The latter, supervised by the Ministry of Culture, gave rise to forms of engagement which associate the participating institutions with the public. We will now examine the forms of communication on the Twitter platform.

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[1] http://nuitdesmusees.culturecommunication.gouv.fr/12eme-edition/Participez-a-la-NUIT-MAGINATION

3.2 Analyzing the Flow of Messages on Twitter

3.2.1 Data Acquisition

The data acquisition stage consisted in harvesting tweets with the only one official event hashtag, #ÑDM16. Twitter maintains an Application Programming Interface (API) that returns approximately 100 features about a tweet. We developed a script Python, based on Twarc module proposed by Ed Summers (**http://github.com/docnow/twarc**) which uses the streaming option of Twitter Application Programming Interface (API). We cross validated our corpus with data harvested by the Department of Public of the French Ministry of Culture which used the searching API. The difference between two corpora was no significant(less than 0.4%). However, Twitter data collection poses a number of challenges which introduce biases and problematic assumptions [46]. We followed best practice in terms of data collection and outline our data model and framework (see section 2.3).

In this paper, we limit the analysis to tweets in French sent during the week preceding the event and the day of the event, that is to say from 14 May to 21 May 2016 midnight. Some flows were analyzed over the time period of the day of the event, from May 21 at 6pm to May 21 at midnight. The main figures are the following: 11 264 tweets of which 3 301 original tweets (29%), 7 963 retweets (71%) sent by 4 012 participants. The specific figures are the following: tweets sent by 411 institutional accounts are broken down in 56% of original tweets and 44% of retweets while tweets sent by 3 601 private accounts are broken down in 25% of tweets and 75% of retweets. Participation in this event was largely limited to the action of retweeting the messages sent by the institutional partners.

3.2.2 Passing Accounts during the Event

Table 1 shows, in descending order, the 10 passing accounts that had a significant score (see 2.3). These accounts that are both relayed and relaying played a central role in the flow of information on the platform. We have indicated for each of them the number of followers as they appeared on their Twitter account on May 28, 2016.

Some characteristics of these passing accounts must be pointed out. They are all organizational accounts with the exception of the account "@Mariette Escalier". The owner of this private account is a professional in the field of cultural mediation. She holds the position of "Mediation Coordinator" for the "Quai in Toulouse", which is an institution that supports Scientific, Technical and Industrial Culture (CSTI), but she tweets on her own behalf. Ranked second after the organizational account of the event and with more than 2,200 followers, she can be considered as an influencer account. The first account, "@NuitdesMusées", is the institutional account dedicated to the event. It thus fulfills its role of dissemination account of NDM 2016, as does the account of the Ministry of Culture and Communication (@MinistèreCultureCom). Other accounts include museums located in Paris and the CMN, as well as a regional museum (in Brittany) that reaches the same level of visibility as the Paris museums. In 7th place, the presence of the account of Alain Juppé, a French politician, mayor of the city of Bordeaux and former prime minister, shows that culture has become a political issue (he built an ambitious cultural policy

program during his candidacy for the right-wing primary of the 2017 presidential elections) and plays an important role in marketing Cities and territories. The circulation of cultural information appears to be a dynamic process that goes beyond the cultural sphere and achieves wider political and social appropriation.

Table 1. Passing accounts

Name	Type of accounts retweeted	Retweeted by	Number of followers
@NuitdesMusées	mainly organizational accounts	mainly private accounts	22 422
@MarietteEscalier	organizational accounts	mainly private accounts	1 842
@MuséeCluny	Half organizational half private	mainly private accounts	44 839
@MuséedesAgustins	private accounts	mainly private accounts	4 774
@MinistèreCultureCom	organizational accounts	private accounts	184 521
@MuséeOrsay	MuséeOrangerie	private accounts	463 148
@AlainJuppé	Two organizational accounts	private accounts	352 837
@LeCMN	Two organizational accounts	private accounts	27 856
@MuséeGuimet	Half organizational half private	private accounts	29 500
@MuséedeBretagne	private accounts	private accounts	7 708

Great diversity was observed in the communicative practices of museum accounts. Some museums relay exclusively organizational accounts, while others relay only private accounts. We also noted that the passing accounts during the event are not the same as the passing accounts of the period preceding the event. Only the "@NuitdesMusées" and "@MinistèreCultureCom" accounts are common to both these periods.

3.2.3 Lexical Analysis and Automatic Classification

The 10 most frequent terms in the text of the tweets (after deleting prepositions, conjunctions and terms related to the event) sent before the event are presented in figure 1 and 2. On the contrary of common practices, the "stop words" list did not include pronouns because they are important marks of interactions and subjectivity in social media [49]. Terms as "vous" (you), "nous" (us) are abundant, followed by names of museums. In their tweets, institutions address the public directly

by encouraging them to come to the museum with words like "visits" and "discoveries". The reference to "pupils" emphasizes the pedagogical device in which teenagers make culture accessible in a less conventional way than specialized staff. The attraction of the city of Paris is also a noteworthy feature.

We compared the terms used during the period preceding the event and during the period of the event. We also distinguished the original tweets sent by organizations (dark grey) from those sent by private accounts (light grey) by restricting the list to the intersection of the 10 most frequently used terms for each type of account. For the period of time before the event (Fig.1), organizations used "vous" (you) and "votre" (your) to address the public and "nous" (us) and "notre" (our) to present their offer. They stressed that the event was free of charge "gratuit" and the notion of discovery "découvrir, découvrez" (to discover). Conversely, private accounts used the deictic "je" (I), "on" (one) and the verb "profitez" (enjoy), showing that the messages were addressed to other visitors, included via the collective dimension of the impersonal pronoun "on", and the opportunity for free, festive events. The two lexicons overlap strongly.

During the event (Figure 2), the two lexicons overlap only slightly. Organizational accounts used "vous" and "tous" (all), "notre", an invitation to discover "découvrez" and to visit "venez" (come), emphasizing participation. In private accounts, the use of "tous", "nous", "notre", "on", "je" (I) and "venez" reveals a collective dimension and an experience that is both common and expressing a testimony of experience. They also reported on specific events such as "concert", "jazz" and "musique" (music), and expressed thanks to the institutions "merci" (thank you).
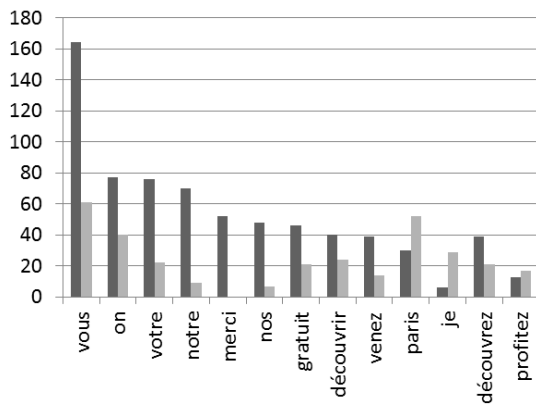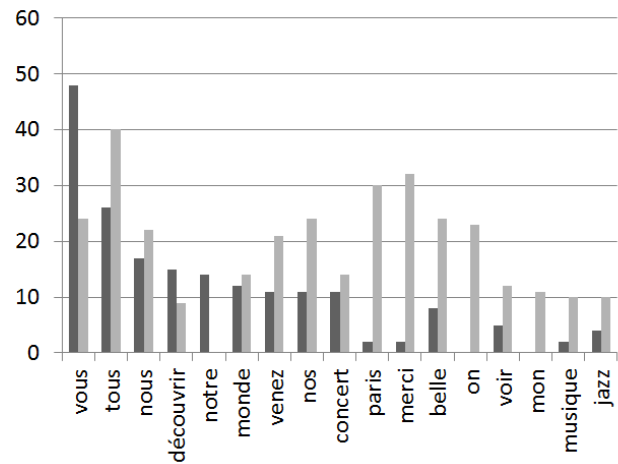

Figure 2. Lexical analysis during the event

The findings of the automatic classification of original tweets sent during the event (see section 2.3) are shown in table 2. It should be noted that some tweets have been categorized twice (that is why the sum of the total percentages is greater than 100%). This table shows that the organizational accounts tweets mainly (93%) serve to promote and inform about local events planned for the occasion. This result is consistent with the organizational framework of the cultural event, the success of which is partly linked to its attendance. There is also some interaction with the public but messages of engagement are very sparse. In private accounts, communication was primarily aimed at sharing experiences (85%) and interacting with other accounts (22%).

Table 2. Automatic classification

Categorization	Percentage for organizational accounts	Percentage for private accounts
Encouraging participation	4%	3.5 %
Interacting with the community	19%	22%
Promoting the event and informing about it	93%	7%
Sharing experience	0%	85%
Not classified	2%	2%

Figure 1. Lexical analysis before the event

Tweets are no longer limited to texting; they can also be used to send photos and videos. During the two periods studied, before and during the event, 2522 photos were sent. We analyzed the 10 most popular photos (table 3). The most active stakeholders in the event are present with three variants of the poster of the NDM 2016, information on an exhibition at the Louvre-Lens and a graph displaying attendance at the main French museums, consistent with marketing communication practices in Culture. The success of the event organized at the Musée d'Orsay, a jazz concert, is reflected in two photographs representing the concert

and a specific work presented in the museum. Political marketing is also present via a photograph of the city of Bordeaux of which Alain Juppé is the mayor and in which he carried out an active cultural policy. The pedagogical dimension of the highly valued NDM 2016 appears in a class photo and the quiz.

Table 3. Popular photographs

Topics of photographs with their URL	Number of occurrences
Official poster of the event http://pbs.twimg.com/media/Ci9wLT7WgAA9skk.jpg	219
Night photo of the square in Bordeaux sent by the account of the politician Alain Juppé http://pbs.twimg.com/media/CjAKPePWEAATfrp.jpg	135
Quiz questioning the origin of the word museum http://pbs.twimg.com/media/Ci-dtyLXEAAbnhp.jpg	89
Class of pupils in a room in the Louvre museum that respects the privacy of the children photographed http://pbs.twimg.com/media/Ci_SIBXXIAA9blN.jpg	81
A variant of the official poster of the event http://pbs.twimg.com/media/Ci1sj_0VEAA_66n.jpg	81
Another variant of the official poster of the event http://pbs.twimg.com/media/CimkzwuXEAApeK-.jpg	78
Poster of an exhibition held at the Musée du Louvre-Lens (the regional museum of the Louvre Museum) http://pbs.twimg.com/media/Ciu24gkVAAAWXDh.jpg	75
Sculpture exhibited at the Musée d'Orsay http://pbs.twimg.com/media/Ci1a47NWkAI1bft.jpg	74
Two jazz musicians performing at the Musée d'Orsay during the NDM 2016 http://pbs.twimg.com/ext_tw_video_thumb/734096225625083904/pu/img/OMafNLjBl86MGQeW.jpg	70
Diagram of attendance at the top five museums in France http://pbs.twimg.com/media/Ci-ShHHWgAA7yqP.jpg	66

3.2.4 Comparing practices of most active accounts
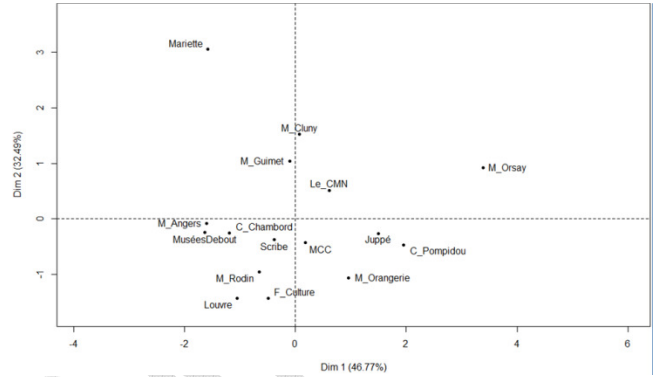
Figure 3. Individual factor map (PCA)
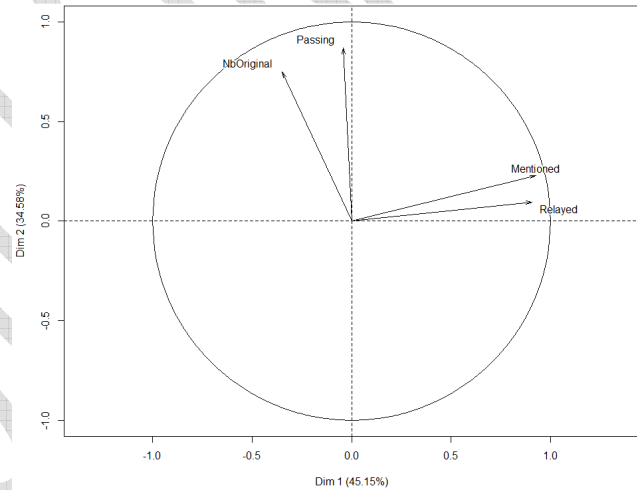
Figure 4. Variables factor map (PCA)

In order to compare the 15 most active accounts, we performed a correspondence analysis (CA) [47, 48] with 4 variables for each account: number of original tweets, mentioned score, relayed score and passing score (see section 2.3). We did not take into account the official account of the event (@NuitdesMusees) which due to its official position, presents specific characteristics. This analysis shows the positions occupied by the 15 most active stakeholders in the 2016 NDM (Figure 3). Among them, the Musée d'Orsay is in a remarkable position, far on the right; it was mentioned and relayed many times because it organized an event (a jazz concert in the museum) which was very well attended. The success of this in situ event was relayed on Twitter which worked in this respect as a soundboard whereas the Louvre Museum, which organized conferences, was seldom mentioned or relayed despite its reputation. The Cluny Museum, the Guimet Museum and the CMN occupy positions that place them more as passing accounts. There are also several stakeholders who were not partners in the events and who took the opportunity of NDM 2016 to enhance their visibility in the cultural field. Similarly, the position of the private account

Mariette Escalier (cultural mediator) occupies another remarkable position, in the left top corner; she is a passing account and she sent a lot of tweets, unlike most private accounts. Another private account, "Scribe", in the center, occupies a position closer to that of the organizational accounts, that is to say, rather well retweeted.

One can also see an activist account "Musées Debout" (Standing Museums), a collective in line with the political movement "Nuit Debout" (Standing Night), launched by a curator at the Louvre Museum with a program "to put the museum at the heart of public debate, and public debate at the heart of the museum", whose tweets were quite well retweeted but he was not a passing account. The private account of the politician Alain Juppé (see 3.2.3) who sought to enhance his cultural program was largely relayed by the collective which supports him. France Culture, the only media, occupies an average position of relayed account.
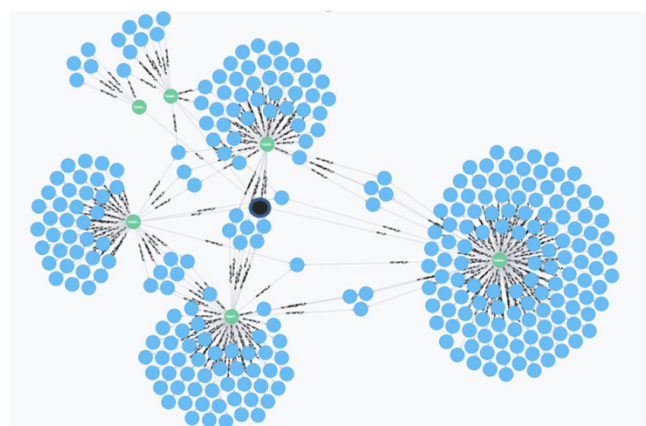

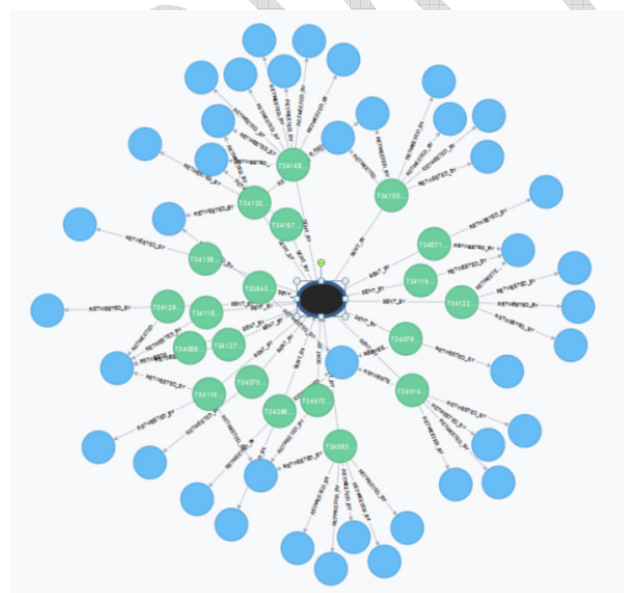**Figure 5. Network of the Ministry of Culture**

Figure 6. Network of Mariette Escalier

The topological representation of the networks of the two most active accounts, one organizational and one private, reveals very different forms of information flows. There is a spin-off in clusters for the organizational account of the Ministry of Culture (Figure 5), in dark blue in the center (accounts are in blue and tweets are in green). This account sent information to other accounts which play the role of broadcaster towards the collectives to which they are connected. In contrast, the network of the private account of Mariette Escalier (Figure 6), in dark blue in the center, shows a circulation of information that is more fragmented and more diffuse.

CONCLUSION

In this study, we described how to design, in an inter-institutional cultural space, a model for the circulation of message flows on a social network platform, taking the case of Twitter. We proposed six attributes to qualify accounts according to their modes of participation and a machine learning classifier to categorize all the accounts. We applied the methodology and the tools to the cultural event "European Night of Museums" which took place in 2016.

In the one hand, we pointed out that one private account, who is a professional in the field of cultural mediation, played a major role in disseminating information On the other hand, the presence of several accounts such as ,the account of Alain Juppé, a French politician former prime minister, or the account "Musées Debout", an activist account, shows that the circulation of cultural information is a dynamic process that goes beyond the cultural sphere and achieves wider political and social appropriation. We performed a correspondence analysis that shows the specificity of one private account and the role of two museums in Paris, the Musée d'Orsay and the Centre Pompidou. We are presently working on the cultural event "European Heritage Days" which took place in September 2016 and we plan to present a comparative study of these two events.

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