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## The NET dashboard to exploit social media data in performing arts: the case of Teatro Alla Scala

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## **Structured Abstract**

**Purpose** – This paper aims at investigating if and how social media data can be integrated into the measurement system of performing arts organizations, and which are benefits and pitfalls for organizations connected with the exploitation of this type of data.

**Design/methodology/approach** – The methodological approach is that of the action research, whereby the researchers played an active role inside the organization and the main source of data is constituted by participant observations. The investigated organization is a widely known performing arts organization: Teatro Alla Scala. The phases of the action research project included: interviews with the management of the Opera House to set the problem and define a line of action; a literature review and meetings held at the Opera House to develop a set of indicators for exploiting social media data; a critical discussion of the obtained results with the management of La Scala.

**Results** –The main result is represented by the development of a NET (Network, Engagement, Topic) dashboard that contains a list of indicators to exploit social media data. These indicators are related, not only to the measurement of opinions by social media users (Topic Dimension), but they are also intended to measure the structure of the social network connected with the organization (Network Dimension) and interactions between the organization and its social media users (Engagement Dimension).

**Originality/value** The novelty of this research is visible at two main levels. On the one hand, this study joins an academic problem (i.e. the role of social media data in performing arts organizations) with a practitioner issue (i.e. how to gain insights from social media conversations) and can therefore provide benefits for both. On the other hand, this investigation, not only proposes a set of indicators to analyse social media data, but it also empirically applied them in a real organization. This is a relevant issue, which allows to detect criticalities and benefits connected to the proposed indicators and move the debate on the role of social media data forward.

**Practical implications** – The main practical implication concerns the identification of a set of indicators that can be adopted by performing arts organizations to exploit their social media data together with a guideline about criticalities and benefits connected to these novel measures.

**Keywords** –Social Media, Performing Arts, Performance measure, Indicator, Big Data

**Paper type** – Academic Research Paper

## **1 Introduction**

Social media are continuously diffusing at organizational level and performing arts organizations are not immune to this phenomenon (e.g. Hausmann and Poellmann, 2013). Studies in this field have discussed applications of social media to enhance audience engagement, informal learning or marketing activities (e.g. Hausmann, 2012; Slatten et al., 2016). These studies have advanced our current understanding about potential applications of social media in enhancing organizational activities. Yet little is known about the opportunities provided by data derived from social media. Social media data have been considered a particular category of big data since they are characterised by three main features: high velocity since data are generated real time, high volumes since they require great storage capacity and high variety since the content of a social media post can have a variety of formats, from texts, to videos or images (Gandomi and Haider, 2015). The managerial literature has claimed the importance to exploit social media big data: “Big Data offers exciting new prospects for achieving such consilience (that is, convergence of evidence from multiple, independent, unrelated sources, leading to strong conclusions) due to its unprecedented volume, micro level detail, and multifaceted richness” (George et al., 2014, p. 324). While some studies in business enterprises have started exploiting social media data, there is to date limited evidence in performing arts organizations.

This study addressed this issue by investigating how social media data can be integrated into the measurement system of a performing arts organization, finally supporting decision making. This objective is addressed through an action research project conducted at Teatro Alla Scala (following referred to as La Scala) over a time horizon of 9 months.

The action research methodology supported the development of a NET (Network, Engagement, Topic) dashboard that includes a set of indicators to serve performing arts organizations supporting decision making, providing insights for both practitioners and academics.

## **2 Social Media Data in Performing Arts Organizations**

Social media have found a wide diffusion in performing arts organizations with some studies underlying their benefits in enhancing marketing activities (e.g. Hausmann, 2012; Hausmann and Poellmann, 2013), audience engagement (Bakhshi et al., 2010; Freeman, 2010), informal learning (e.g. Russo et al., 2009) or external accountability (e.g. Slatten et

al., 2016). These studies highlight the opportunities offered by social media in performing arts organizations and often discuss with a critical lens experiences of social media adoption in organizations.

While we have developed a discrete knowledge about how social media can be used in this type of organizations, far less is known about the role of data generated by these social platforms: can social media data serve performing arts organizations? Can they enrich and provide additional insights to managers of these organizations? How conversations on social media can be valued? These aspects are mainly unexplored in this field.

At the managerial level, the great potentialities associated with social media data have been often claimed: “A mere Tweet from a trusted source can cause losses or profits of billions of dollars and a chain reaction in the press, social networks, and blogs.” (George et al., 2014, p. 324). This has prompted a proliferation of studies that seek to develop analytics for big data. This available managerial literature suggests that social media data can favour a better understanding of customers, their opinion and the strength of the relationship created through social media, proposing in some cases ad hoc indicators for social media (e.g. Bonsón, and Ratkai, 2013).

Unlike this recognition, we have to date limited evidence about the potentialities offered by social media data in performing arts organizations and, in particular, about how social media data can be integrated into a measurement system. This research is intended to address this issue.

### **3 Research Design**

This research has been conducted following an action research methodology (Rapoport, 1970) conducted over a time horizon of 9 months at one of the most famous Opera Houses worldwide: Teatro alla Scala. La Scala was established in 1778 as an independent body, which become a foundation in 1997; its activity on social media started in 2009 and it is now active on 5 social media platforms: Facebook, Twitter, YouTube, Instagram and Pinterest. During the action research project, 2 employees were devoted full time to the management of social media.

The distinctive feature of the action research lies in the possibility for the researchers working jointly with the investigated organization. This joint work gave us the possibility to address a practical concern (i.e. how to gain insights from social media conversations) and an academic problem (i.e. the exploitation of social media data in performing arts

organizations). During the 9-month project, several data sources were collected: interviews with the head of the communication, marketing and social media manager of the opera house in order to understand the strategy behind social media adoption; 6 meetings held at La Scala to discuss insights from the performed analysis and proceed with the project, the social media databases of Twitter and Facebook for the year 2016 (see Table 1).

<b>Type of data source</b>	<b>Detail</b>	<b>Role in the AR</b>
Interview	1 interview with the head of communication 1 interview with the head of marketing 1 interview with the social media manager	Initial diagnosis of the problem, definition of the phases of the project and expected output
Meetings	6 meetings with the involved key actors (i.e. head of communication, head of marketing, 2 social media managers)	Action planning Evaluation of actions implemented
Social media data base	Social media platform of: Twitter, Facebook, Instagram and all the online sources over a time horizon of one year (Jan-Dec 2016)	Action taking

**Table 1: List of data sources**

The process of data analysis was circular and in line with the action research methodology: there was an initial diagnosis of the problem and definition of objectives, mainly driven by interviews with the key actors involved in social media management at La Scala. The initial diagnosis was followed by an action planning phase with a definition of phases of the research. Insights from interviews, meetings, literature review and social media platforms data analysis enhanced the development of a set of indicators that were discussed and revised two times with the management of the Opera House arriving at the final meeting with a validation and feedback about the final proposed dashboard with its indicators.

#### **4 Results**

Results are organized in two sections. The first section presents a set of indicators to exploit social media data; these indicators organized into a dashboard constituted by three main perspectives: Network, Engagement and Topic. The second section discusses the empirical application of the dashboard to La Scala organization.

#### **4.1 The NET Dashboard**

The action research methodology supported the development of a dashboard that contains a set of indicators to exploit social media data in performing arts organizations.

The dashboard has been called NET (Network, Engagement, Topic) dashboard as the acronyms of its three main dimensions: Network, Engagement and Topic (Table 2). These three dimensions relate to three main areas of insights that can be gained from social media data: network structure and relevance of social media users, the ability of the organization to engage with its social media users, and content discussed on social media. Each dimension, with its set of indicators, will be discussed below.

<b>Dimension</b>	<b>Indicator</b>	<b>Description</b>
<b>Network dimension</b>	Level of hubness	Sorting users on the basis of the total number of sent messages
	Level of authorities	Sorting users on the basis of the total number of received messages
	Level of influencer	Coreness of the user, i.e. how much the vertex is a key user in the network.
<b>Engagement dimension</b>	Total Engagement	Quantifies the total amount of interactions between social media users and the organization by counting the average number of like, share/retweet and comments per post
	Level of Dialogue	Quantifies the extent of dialogue between social media users and the organization by counting the average number of comments per post
<b>Topic dimension</b>	Word Frequency Indicator	Sorting words on the basis of their occurrences inside social media messages
	Opinion Indicator	Sorting social media messages into negative, positive or neutral on the basis of the score of each word inside the message (where, [-5] is a negative opinion, [+5] is a positive opinion and [0] is a neutral opinion)

**Table 2: NET Dashboard**

The **Network Dimension** measures the structure of the network of social media users interacting with the performing arts organization. The analysis of indicators in this dimension intends to answer questions such as: how are social media users connected with my organization, how do users interact with each other, which is their influence and importance in my social media network? Indicators in this area are intended to quantify the structure of the network created through social media connections, key actors and influencers. The computation of these indicators requires the construction of the network of social media users first. Chosen a specific social media platform (e.g. Twitter), the network is built by collecting all the messages from and to the organization's social media account. From the list of messages, the network can be built considering each user (both cited in a message or receiving/sending a message) as a node, and each message as a link between node. Accordingly, three main indicators can be computed to evaluate the structure of network created by social media:

*Level of hubness*, which allows to identify the most active social media users included in the network. It is computed as the eigenvector of a transformation  $AA^T$  of the adjacent matrix of the network  $A$  and, on the bases of the obtained results, it allows to sort users on the basis of the total number of sent messages (Kleinberg, 1998). It ranges from 0 to 1 (i.e. respectively the lowest and highest level of hubness). Users with a high level of hubness are those users that send the highest number of messages in that network; this value should be analysed carefully given that a user with a high level of hubness might also be a "spammer".

*Level of authorities*, which instead allows to sort social media users on the basis of the number of messages they receive inside the network. This is a relevant information given that a social media user with a high level of authority represents someone that receives the highest number of posts in the analysed network and can therefore be considered as an authority inside the network itself. These users can represent key actors to spread key message given their relevance inside the network. This indicator is computed as the eigenvector of the transformation  $A^T A$  of the adjacent matrix  $A$  associated to the network (Kleinberg, 1998). As the hub index, it ranges from 1 to 0. A high level of authority corresponds to values closed to 1.

*Level of influence* supports the identification of the influencers inside the social media network. It is computed by using a K-core decomposition algorithm (Batagelj and Zaversnik, 2002; Seidman, 1983), which distinguishes social media users into layers

depending on their relevance inside the network. Technically, the k-core is the (maximal) subgraph whose nodes have incoming (or outgoing) degree  $\geq k$ . Users that have the maximum value of the K-core index are the central nodes of the network and they can be therefore considered as influencers. These are strategic social media users for the organization due to their importance in terms of number of citations and connections. On the other hand, the smaller the K-core value associated to the user, the farthest the node is from the central activity of the network.

The **Engagement Dimension** quantifies the strength of the relationship between the organization and its social media users, with particular reference to the ability of the organization to establish dialogue and a two-way relationship with its social media users. It has been widely acknowledged that social media, relying on Web 2.0 features, are intended to facilitate dialogues and interactions (Bonsón and Ratkai, 2013). Accordingly, two indicators have been here included:

*Total engagement.* This indicator quantifies the overall level of interactions between the performing arts organization and its social media users. It is computed by counting the average value of likes, comments and shares (retweets) per post, over a given time horizon. Through this indicator, it is possible to have an overall view about the average level of engagement between an organization and its network of social media users. This analysis can support the identification of the types of posts that enhance engagement as well as the preferred social media platform if the analysis is performed on more than one channel.

*Level of dialogue.* This indicator is specifically focused on the quantification of the level of dialogue generated by a social media post. It is computed as the average number of comments per post, rather than counting also like and shares/retweets. It provides a punctual indication about the ability of a social media post to stimulate dialogue with the social media community.

The **Topic Dimension** quantifies the content and the opinion of social media conversations. Indicators within this dimension are particularly useful to understand which are the most recurrent topics in social media conversations with reference to the whole organization or to the individual performance; moreover, the quantification of the opinion by social media users can facilitate the identification of risks, mainly reputational risks. Two indicators are included in this dimension:

*Word Frequency Indicator*, which counts the number of occurrences of a given word in a list of social media posts. By counting the occurrences of words in the list of posts in a given period, it is possible to identify the most frequent topics of discussion. This insight, triangulated with the information derived from indicators in the engagement dimension, can be useful to understand which topics raise higher interest and interactions.

*Opinion Indicator*, which quantifies the perception by users in terms of positive, negative or neutral perceptions. This indicator is quantified by assigning a score to each word inside a post within a range [-5; +5], where [-5] consists of a negative opinion and [+5] a positive opinion; then, the weighted average of the scores of each word in the tweet is computed arriving at the final Opinion Indicator value. The opinion analysis can be useful to detect real time reputational risks or elements of dissatisfaction for users.

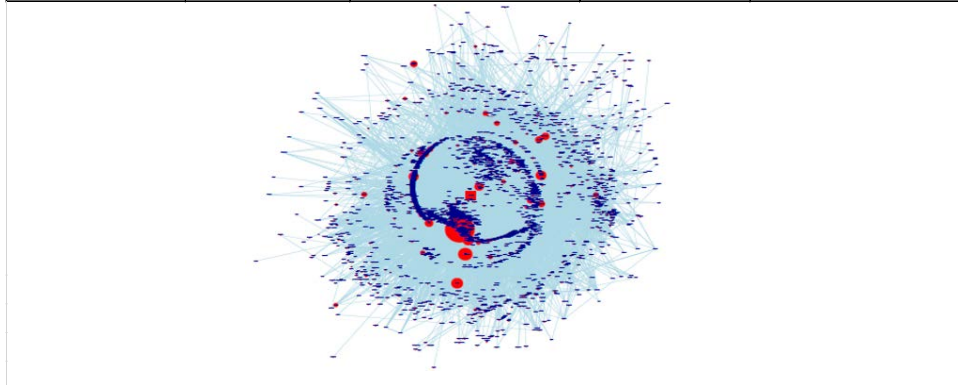
#### **4.2 The NET Dashboard: empirical application at La Scala**

This section empirically applies the proposed NET dashboard with its indicators at La Scala during the year 2016. Considering the **Network Dimension**, the proposed three indicators have been computed with reference to the social media Twitter given the possibility provided by this platform to download data for free (see Figure 1). This analysis has provided the following insights:

- The level of hubness allows to identify the most active Twitter users (i.e. those that send the higher number of posts). By looking individually at their Twitter account, these users have not been classified as “spammers”, but, on the contrary, they were in some cases La Scala employees that commented or promoted some events.
- The level of authority supported the identification of Twitter users that receive the highest number of posts inside La Scala network. The first user was inevitably the Opera House itself given that the network has been constructed taking the organization itself at the centre. The following users were artists of La Scala; they are classified as “authorities” meaning that the network listen and take care about their posts, even if they are not the most active users; they can therefore represent strategic actors to increase the virality of La Scala’s posts.

- The level of influence instead facilitates the identification of the key influencers for the Opera House. By applying the K-core decomposition based on the incoming degree, we identify three layers of users. In the inner layer, only 15 users were found, interpreted as key influencers. This might be an area of improvement for the organization, given that out of a network constituted by 3080 users, only the 0,4% of them can be considered as influencer. Moreover, through this analysis, we found that influencers were institutional actors; this is a relevant insight for the management of the Opera House: it is possible to leverage on them and on already existent collaboration to enhance the virality and effectiveness of social media communication.

Level of hubness		Level of authority		Level of influence = 3
Twitter name	Value	Twitter name	Value	Twitter name
private individual	1,0000	company	1,0000	journalist
employee	0,8828	artist (dancer)	0,1080	artist (soloist)
private individual	0,6902	artist (dancer)	0,0768	company
private individual	0,5836	company	0,0486	company
private individual	0,4029	company	0,0435	artist (dancer)
private individual	0,3969	artist (dancer)	0,0208	artist (dancer)
private individual	0,3553	artist (choreographer)	0,0197	artist (dancer)
company	0,3443	artist (dancer)	0,0174	artist (choreographer)
artist (dancer)	0,3072	artist (soloist)	0,0168	artist (dancer)
company	0,2828	artist (dancer)	0,0105	artist (dancer)
private individual	0,2627	artist (dancer)	0,0102	artist (dancer)
association	0,2302	artist (dancer)	0,0100	artist (dancer)
company	0,2249	company	0,0094	artist (dancer)
private individual	0,2220	artist (dancer)	0,0093	artist (dancer)
private individual	0,2123	artist (conductor)	0,0090	artist (dancer)



**Figure 1: Network representation and indicators**

The **Engagement Dimension** has instead supported the analysis of the intensity of interactions between the Opera House and its social media users. We performed this

analysis by considering both Twitter and Facebook since they are the most used social media platform by La Scala (see Table 3).

<b>Engagement dimension indicators</b>	<b>Facebook</b>	<b>Twitter</b>
Total engagement	634.74 interaction/post	43.86 interaction/post
Level of dialogue	7.62 comments/post	0.54 comments/post
Number of follower/fan of La Scala page	240,989 fan	268,000 followers

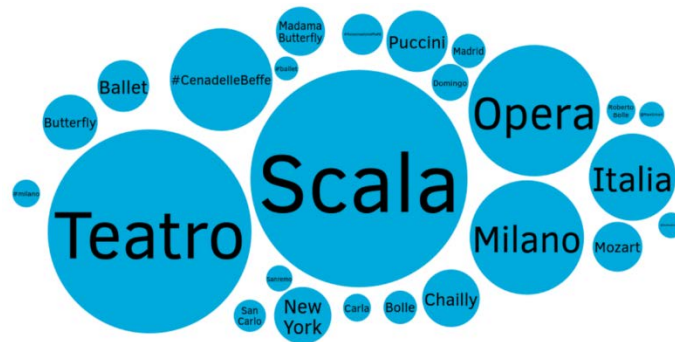
**Table 3: Indicators in the engagement dimension**

With reference to these indicators, two main aspects deserve attention:

- Facebook, if compared with Twitter, is characterized by a high level of engagement and dialogue. On average, it resulted that a post on Facebook generates 634 interactions compared to only 43 interactions that happen with Twitter. In order to understand the validity of this insight, we computed the same indicators for other two opera houses (Metropolitan Opera House in New York and Royal Opera House in London) finding the same evidence: on Facebook the level of engagement is higher than that achieved on Twitter. This insight can support future social media actions.
- The dimension of the fan/follower base on Facebook is not as larger as the one on Twitter. This is visible by the number of social media fan/followers that is higher on Twitter rather than on Facebook. This runs quite counterintuitively with respect to the previous insight: even though the Twitter fan base is larger than the one on Facebook, engagement and dialogue are higher on the latter. This insight seems to suggest the importance of the social media Facebook to increase interactions and dialogue.

Finally, the **Topic Dimension** has facilitated the analysis of the content of social media conversations in terms of what are social media users talking about and their perception about the whole Opera House and operas.

The Word Frequency Indicator was computed for all the social media accounts of La Scala over the entire year 2016. The result is graphically represented in Figure 2, where larger babbles correspond to the most frequent words.

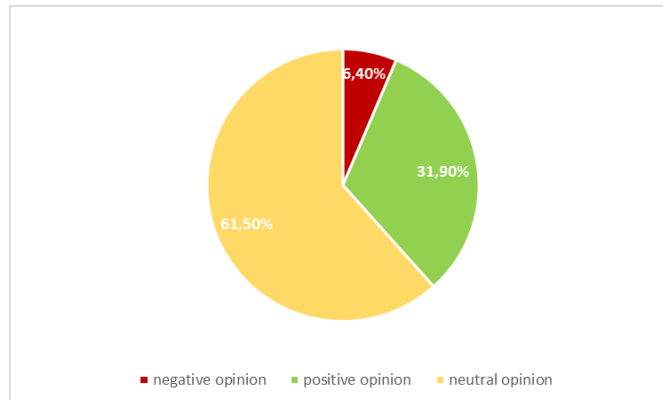


**Figure 2: Word Frequency Indicator**

Some reflections were shared with the management of the Opera House also in connection with this indicator:

- Although the worldwide presence of La Scala, comments and words on social media are mainly in Italian. This underlines the strong roots of the Opera House in the Italian culture;
- The brand Scala is more powerful than any other opera on stage during the season, even than “La Prima”.
- Some small operas in terms of budget and audience have been found with a high social media resonance (the example was with “La cenadellebeffe”). This was associated with a strong social media campaign and therefore this analysis allows to have a visible return on the initial social media efforts.

The Opinion Indicator instead allows to quantify the perception by users on social media (see Figure 3). We found mainly neutral opinions (61.5%) followed by positive opinions (31.9%) and a limited number of negative opinions (6,4%).



**Figure 3: Opinion Indicator**

Also this analysis has prompted some reflections:

- Neutral opinions predominate since several social media users use to post their presence at La Scala before attending an opera. This insight also underlines the strong connection between social media users and La Scala audience;
- Positive opinions are related to appreciations of operas and, in general, of performances, posted after the attendance at the event or after watching the performance on TV;
- Negative opinions were limited compared with positive and neutral ones. A very few of them were related to the scarce appreciation of the opera, music or artists. We found instead negative opinions mainly related to an interruption of the online ticketing system that posed several problems to users that would like to purchase a ticket. This underlines the possibility to use the opinion indicator to detect potential areas of reputational risk.

## **5 Discussion and conclusion**

This study, through an action research methodology, has supported the development of a NET dashboard to identify a set of indicators that can be derived from social media and integrated into the measurement system of a performing art organization. Implications of the proposed dashboard with its indicators are visible at the managerial and at the academic level.

At the managerial level, this study provides a list of indicators that can be practically implemented by social media managers of performing art organizations. Through the proposed indicators, it is possible to identify the type of posts that increase the level of engagement, potential risks or strategic social media actors. However, the emerging insights, are intended, not only to serve social media managers, but also other managers inside the organization. For example, the communication area is enriched with a set of information related to the social media audience, their preferences and their relevance. The marketing area can instead use insights derived from the NET dashboard to better shape promotional campaigns on the basis of the general preferences and characteristics of social media users. Finally, the word frequency indicator and the opinion indicator can support the overall management of an opera house detecting potential areas of risks, such as the problem with the online ticketing system happened at La Scala.

Of course, also pitfalls and drawback need to be underlined: some indicators (i.e. those in the network dimensions and in the topic dimension) require the availability of social media posts that are not always available for free. At the time of our analysis, social media posts could be downloaded for free for Twitter, while it was not possible for Facebook (they can be downloaded using ad hoc platforms of social media analytics). A second drawback is related to the need of some statistical skills in order to compute indicators in the network dimension: the indicator about the level of influence requires, for example, the computation of the K-core index that is performed through an ad hoc software (i.e. we used the software R). When practically applied in an organization, this might imply the involvement of external technical experts or to develop internal competences in order to perform the analysis. A third element of attention concerns the importance to know the history, background and context of the organization object of analysis; some indicators might be useless if they are not accompanied by an interpretation that can be provided only with reference to managerial and previous experiences. For example, results obtained from the word frequency indicators could appear useless if analysed “per se”. On the contrary, when interpreted within a broader performing arts strategy, that can provide insights to evaluate past actions and drive future decisions.

At the academic level, this study contributes to two different literature streams: management literature and performing arts literature. The development of a NET dashboard enhances the current management literature with a set of indicators that underline the insights offered by social media data, answering the recent calls to exploit the value

connected with social media data (George et al., 2014). The dashboard also serves the performing arts literature, where measurement system has often been perceived with a negative connotation as limiting the creativity of organizations (Felton, 1994). This study underlines benefits that can be derived by using indicators in these organizations and contributes in this way to an emergent stream that recognised that measurement and creativity that characterised performing arts organizations are linked and not opposed.

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