



University voices: professional communicators and science communication perspectives

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Abstract

Universities are part of a network of relationships that engage them in research activities and institutional commitments, allowing them to build connections with business, industry, and civil society. These relationships are not new, and many have described university's public communication functions such as Marketing, Public Affairs and Public Relations. As public engagement in science and science communication increasingly becomes part of the agendas and university missions, attention has been given to the 'science communication function' of universities— aimed at engaging civic society. Yet, our knowledge about the contexts in which science communication emerges in the university setting is limited, we examine this question through a qualitative study with 39 interviews involving communication professionals working in central communication offices in universities in four European countries. Major findings indicate that Science Communication is strongly connected to other functions and is rapidly evolving, particularly in the United Kingdom. Considering the centralised and decentralised system of science communication, there is an evident process of roles' distribution and differences between countries: in Germany and the United Kingdom the process of decentralization of science communication is more developed. Finally, there are factors that may hinder or support the development of communication functions, particularly for science communication. Among the former, a lack of resources and a dysfunctional internal organisation stand out, while for the latter, the legitimisation of the crucial role of communicators, as well as training courses appropriate to this evolving profession, seem to be very important.

Keywords University · Communication · Professionals · Restraining forces · Driving forces

1 Introduction

Alongside their interaction with public institutions for the implementation of research policies and funding, and the development of educational and training programs, universities play an important role in the transfer of knowledge and in the involvement of civil society

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in their activities (Hasche et al. 2020). Over the last twenty years, universities have progressively become integrated actors in society, building strong relationships with multiple stakeholders and more broadly with publics, acting autonomously and with precise objectives (Krucken, 2014). These relationships also shape their research and institutional roles. In this way they managed to legitimize communication strategies and actions by obtaining competitive advantages at a national and international level in the higher education market (Peters 2012), as well as in the technological change and innovation. These advancements have contributed to the development and professionalization of public communication departments.

The communication functions adopted by universities for public communication would usually comprise—sometimes under different names—*Marketing*, for student engagement and the development of the academic image, *Public Affairs* to execute management of the institutional network and *Public Relations* to support connections with stakeholders and to promote reputation (Brown 2011). The *Science Communication* function—broadly understood as encompassing relations with the institution and civil society (SC hereafter)—has recently been empirically observed and described as a function in itself within the university environment (Entradas 2021a). This function has started to receive attention within universities in the past few years with preliminary studies examining the infrastructure in place in universities and research institutes (Entradas and Bauer 2017, 2022; Volk and Schäfer 2024), as well as the professionals dedicated to communication tasks in institutions (Sataøen and Lövgren 2024).

The set of four functions described is performed at the level of central management and/or at the peripheral level of university departments. According to Entradas et al. (2023), the decentralisation process of communicating science observed in universities suggests that the SC function is evolving at the level of research institutes within their host institutions as decentralised structures at the meso-level of the university, while other more established functions within the university take on a more central role.

Recent studies examined the role and place of SC within the broad university communication and relations with other communication functions in the university and they provide some insights (Entradas et al. 2023, 2024). Nevertheless, our understanding of the place and role of SC within university structures is still limited. For instance, we do not know how professionals working in these departments, understand and classify communication functions described in the literature and what tasks they associate to them, how they distinguish SC from other communication functions, or what restraining and driving forces they see in the development of science communication in the university.

We aim to contribute to this discussion, through a qualitative study that allows to explore in deeper detail these questions through the voices of professionals working in universities communication offices. Moreover, the international character of our study allows for a broader understanding of ongoing changes in SC in universities in places with different traditions in the field as described in research projects (e.g. MASIS and OPUS)¹, of the commitment and the extent to whether our observations are context related or general trends.

¹ MASIS 2010–2012 (Monitoring Policy and Research Activities on Science in Society in Europe) is an European research project aimed to contribute to the guiding principle of the European Commission's Science in Society programme of developing structural links and interaction between scientists, policy-makers, and society at large.

We collected views and opinions of communication professionals working in four countries in order to meet our goals: (1) to examine the communication functions in use in the modern university, with a special focus on science communication; (2) to understand the place that these functions occupy within the institutional setting; (3) to identify any restraining and driving forces that may influence the development of university external communication, in particular science communication.

In what follows, we review relevant theoretical background on the communication functions within the university, with emphasis on the science communication emergence and development; we describe the methods; finally, we present and discuss the main findings.

2 Theoretical framework

The three classic functions which communication professionals in the universities have often focused on comprise: *Marketing*; *Public Affairs*; and *Public Relations* (Brown 2011). In the relatively dispersed literature, *Marketing* might be referred to as multifaceted, encompassing a range of activities aimed at promoting universities, attracting and retaining students and building a positive and distinctive brand image. The *Public Affairs* sector comprises activities and responsibilities focused on the management and enhancement of the institutional relationship with the political and governmental spheres, and some specific stakeholders. This function is crucial for promoting transparency and building political and economic support for the development of programs and activities (Kollman 1998). The *Public Relations* sector includes the form of management and communication strategies adopted by universities to build and maintain positive relationships with various stakeholders, including students, staff, alumni, donors, the media, government bodies and the public (Grunig et al. 2002).

When the emergence of the third mission as a key job for the university linked to the social and economic purposes of universities in a broad sense, it was initially absorbed by the three functions already presented (Bayuo et al. 2020). The third mission's focus on establishing relationships with external stakeholders (e.g. industry and business, communities, and civil society), transferring knowledge and technology, and cooperating with organisations and enterprises (Laredo 2007) has seen its mission extended to embrace public communication of science, which has become increasingly relevant in the development of relationships between universities and society. The domains of science communication and technology transfer and relationships with local communities and various publics have rapidly acquired importance and space within universities. It is in this context, that science communication seems to emerge as a separate function— the *science communication* function (Entradas 2021a)— yet still finding its place within the university culture (Entradas and Bauer 2022). This function represents the efforts of a university to communicate and engage publics in research for a civic purpose (ibidem). Despite the developments, studies highlight that it is not yet a well-established function within the university— compared to other functions with older traditions - and that it faces challenges that might hamper its development and integration in the university culture. In this regard, in our study we were interested in examining on the one hand, how practitioners describe their tasks and associate them to

communication functions, in particular the SC, and on the other hand, what can be restraining or not communication efforts, especially regarding SC.

Recent studies with a focus on science communication in institutional contexts, call to the attention of several problems in communication. Despite the significant growth of the activity in institutions there are challenges to SC becoming an integral part of institutional cultures. Firstly, it is noteworthy, the growing commitment to communication on the part of universities and research institutes/centres, which is seen in the varied and increasing spectrum of activities, in the adoption of public communication policies, or allocation of resources. This development has been accompanied by the professionalisation of communicators for SC tasks (Metcalf and Gascoigne 1995; Gascoigne 2020), which has been aligned with the increasing training courses offered in this sector (Gascoigne 2020; Trench 2010). These efforts are nevertheless, in most cases carried out with limited resources and professionals for whose SC is only one among their many other tasks (Neresini and Bucchi 2011; Entradas and Bauer 2017, 2022; Entradas et al. 2023; Engwall 2020). Secondly, the potential of the new online means of communication provided by the digital revolution and media (Weingart 2022) offers new channels and possibilities for university communication. At the same time, it also brings risks if universities are driven by visibility goals rather than values of science communication (Entradas and Bauer 2022). Some critics have warned about unintended consequences of ‘science medialisation’, a pervasive phenomenon which denotes a close connection between science and the media. This phenomenon highlights the communicative power of the media and a need on the part of scientific institutions to adapt their communication to media values with consequences to the image of science and scientists in the public sphere (e.g. Weingart 2022). Thirdly, an increased demand on the part of citizens for first-hand information from researchers and funders of research for public engagement in the research process and development of scientific and technological innovations highlights an expectation of a wider involvement of non-experts in issues that have impact on society (Irwin 2021). In this context, the public become key audiences for institutions, with respect to which communication facilitates greater reflection and a critical stance about phenomena related to techno-scientific innovation. In practical terms, new models of communication and engagement of public audiences become important for institutions as do learning about those.

To accommodate these opportunities and challenges, internal structures of universities are also undergoing transformations and the phenomenon of decentralisation appears to have taken hold. In other words, the management of the SC function is shifting from the central body of the university towards the peripheral levels of the departments. Universities are restructuring themselves to adapt to new needs and new requests regarding communication from external dimensions. The SC function is mostly found at decentralised structures within universities such as research institutes, or other communication departments or knowledge transfer offices, while other functions (PR or Marketing) occupy a more centralised role and priority for the university, while having different purposes, audiences and outcomes in society (Entradas et al. 2023).

3 Research questions

In order to address our objects, we define three research questions. The first two questions focus on the current situation and aim to explore the role and place of communication functions within academic institutions, with a special emphasis on the SC function. Thus, these RQs are:

RQ1) In terms of ‘practices’, how do professionals describe their tasks and the communication functions of the university? And, in particular for SC, if they distinguish SC from the other communication functions and if there are clear boundaries among them.

According to the literature, our classification of communication comprises the four functions: *Marketing*, *Public Affairs*, *Public Relations* and *Science Communication*, and we have compared views across countries.

RQ2) From an organisational point of view, where are the communication functions located within the universities?

Based on the decentralisation hypothesis (Entradas 2021b), which distinguishes a ‘centralised system’ and a ‘decentralised system’, our aim was to comprehend where and how the communication functions are managed by communication professionals, what relationships exist between the central and decentralised levels and which elements affect the various structures.

In addition, the growing debate relating to the place of SC in universities has often considered what the strong and weak elements at stake may be with respect to these activities, especially from an evolutionary perspective (Weingart 2022). The context in which communication professionals find themselves operating may be envisaged and studied as a field of forces in which various forms of tension may also arise. Driving and restraining forces may motivate or demotivate professionals in their activities and these forces influence the process of change (Damian and Susanu 2018; Watkins and Lundberg 1998). In the case of communication professionals, we consider driving forces as the efforts, contexts, and systems that favour the development of communication activities, whereas restraining forces are determined by a set of factors regarding contents, the type of activity and relationships between communication actors which may restrict communication (Goldberg and Gustafson 2023; Mmutle et al. 2023). From this perspective we are interested in identifying restraining and driving forces to the development of university external communication, in particular science communication, as described by the professionals and it gave shape to our third research question:

RQ3) From the point of view of future development of communication, especially for SC, which forces tend to enhance or weaken the role of communication within university?

We asked interviewees what supports and what tends to impede the evolution of their field with respect to the response to new demands and challenges, especially those posed by the SC function.

Therefore, if the initial two RQs are designed to provide a depiction of the prevailing communication functions within the university and the role that SC plays in this domain, the

third RQ is instrumental in elucidating the factors that may influence the advancement of SC within academic institutions, and the communication as a whole in this context.

4 Method

The study was conducted through a series of interviews collected within the framework of the international project OPEN², aimed at examining public communication functions within scientific organisations and, comparatively, across four countries: Germany, Italy, Portugal and the United Kingdom.

We used a qualitative methodology, based on semi-structured interviews with communication professionals working in 39 universities in the 4 countries involved in the project. Studies on the role of the communication professionals within universities distinguish two types of role: normative and practised (Hanitzsch 2018). In our own study we will refer to practised roles and in particular to samples of ‘narrated role performance’ to focus on “what communicators say they do” (Volk et al. 2023 p. 2; cf. Hanitzsch 2018). This is a suitable approach with respect to our specific interest as the professionals’ narration of their activities makes it possible to identify specific aspects of their experience. Moreover, in this way we learn about skills required, activities carried out, relationship with the institution and other communication structures and the effort required to achieve the set goals.

Given the general aim and the RQs, the interview³ focused on: (a) communication functions/activities carried out by professionals, (b) the internal organisation of universities, considering the articulated division of central and peripheral areas and (c) the identification of elements that can support a positive or impede development of this professional field, especially with respect to SC.

We chose a semi-structured interview, using questions to guide the interview and remaining close to our purposes and, at the same time, giving interviewees the freedom to focus on what they considered other relevant aspects of their experience (Flick 2021).

4.1 Sample selection

We selected the interviewees starting from official lists of universities provided by the government authorities in each country mentioned above. Ten universities were randomly selected per country and one interview was conducted by university with the head/manager of the central communication’s offices. We collected 39 interviews in total, as shown in Table 1, because in Portugal we obtained nine interviews instead of ten, as in the other countries.

The interviews were conducted between May and July 2021, so they were administered online due to the pandemic, and lasted in average forty-five minutes. The interviews were conducted in the native language of each country, recorded, transcribed and then translated into English for the analysis.

² The ‘Organisational Public Engagement with Science’ (OPEN) international research project was funded by the Portuguese Science Foundation Agency (Fundação para a Ciência e Tecnologia), Grant agreement No. PTDC/COM-OUT/30022/2017, and directed by Dr. Marta Entradas.

³ The draft of interview is available in the Annex.

Table 1 Sample, number of universities per country

Country	<i>N</i>
Germany (DE)	10
Italy (IT)	10
Portugal (PT)	9
United Kingdom (UK)	10

4.2 Data analysis

A content analysis (Contarello and Volpato 2002; cfr. Smith 2000; Tuzzi 2003) of the interviews was carried out following the Grounded Theory approach (Glaser and Strauss 1967; Charmaz 2006). Keeping the research questions in mind, we applied a inductive and circular path, that traces the three coding moments - open, axial and selective - (Cicognani 2002; Flick 2014). Open coding is the first stage where the data are break down into smaller, meaningful segments and label with descriptive codes, staying close to the data and let the categories emerge from the texts. During Axial coding phase, initial codes are gathered into categories, this helps to identify the most significant and frequent codes, and connecting them to develop broader themes and relationships. Finally, Selective coding involves integrating and refining the categories/themes identified and linking them together into a coherent narrative.

According to Cicognani (2002), implementing the Grounded Theory approach using the three stages of coding does not mean that the researcher should have no prior knowledge of the topic under analysis. Rather, it requires the researcher to adopt an open-minded attitude and avoid applying preconceived theories. Charmaz (2006) emphasises the importance of writing memos that connect the codes to the data during the coding process, as this helps the researcher construct an interpretative model - understood as a theoretical framework that emerges from the data-driven analysis and offers a glimpse into the object of study - while remaining grounded in the data itself. In our case, each code is accompanied by a description. For example, the codes referring to the four communicative functions are not fully aligned with the definitions found in the literature. In daily practice of the interviewees, sometimes, these functions cover only certain aspects and do not reflect clear boundaries between them. Similarly, in relation to the theme of decentralisation, our analysis was guided by the content that emerged from the interviews, resulting in a composite picture. One more, regarding what supports and what tends to impede the evolution of communication, and specifically in the case of SC, we collected what the interviewees said spontaneously and built our categories based on that. At no point in the analysis process did we apply a top-down coding approach or use a predefined coding grid; therefore, the name assumed by the code emerges from the text. Naturally, some content aligns more closely with the research questions, as it was directly elicited by them, while other elements represent unexpected insights that arose from the data. Both types of content contribute to the development of the interpretative model, which we introduce here and present in detail in the Results section.

The coding process was carried out by a single coder, who is also one of the authors of this paper, and with the support of the Atlas.ti software⁴. It goes without saying that constant debate and exchange with the other authors were essential to achieving a coherent implementation of the analysis and interpretative model, one that gives voice to the data in alignment with the study's aims and research questions.

⁴ Atlas.ti: <https://atlasti.com/>.

Finally, through the three coding steps, we were able to construct our interpretative model, represented by the “code tree”⁵ (Fig. 1). This illustrates the 26 “codes”⁶ identified (open coding), which were then grouped into 6 “code families”⁷ (axial phase), and it highlights the connections among codes as well as among code families (selective phase).

[Insert Fig. 1: Code tree with codes and code families]

The 6 code families are: *Function*; *Place*; *Relationship*; *Purpose*; *Driving Forces*; *Restraining Forces*. Each code label is associated with a numerical value which represents the total frequency of the corresponding topic. These frequency ratings provide an overview of the contents across the texts, indicating the presence of each topic throughout the interviews. However, the frequency only reflects part of the results and must be contextualized within the RQs. For instance, the higher frequency of the SC is partly due by the fact that our interview focused more on this rather than on the other functions. Similarly, as mentioned, it is evident that some results are more directly linked to our interview draft: there are descriptions and explanations of functions and structures which define the organisational models that are already in use. Nonetheless, the specificity of the contents and meanings, for example regarding what supports and what tends to impede the evolution of communication field emerged more spontaneously from the data. In these cases, the frequency provides valuable insights into the significance of the aspects, as identified by the interviewees. These insights help clarify the current scenarios of the communication sector in universities and shed light on the evolution of this professional field.

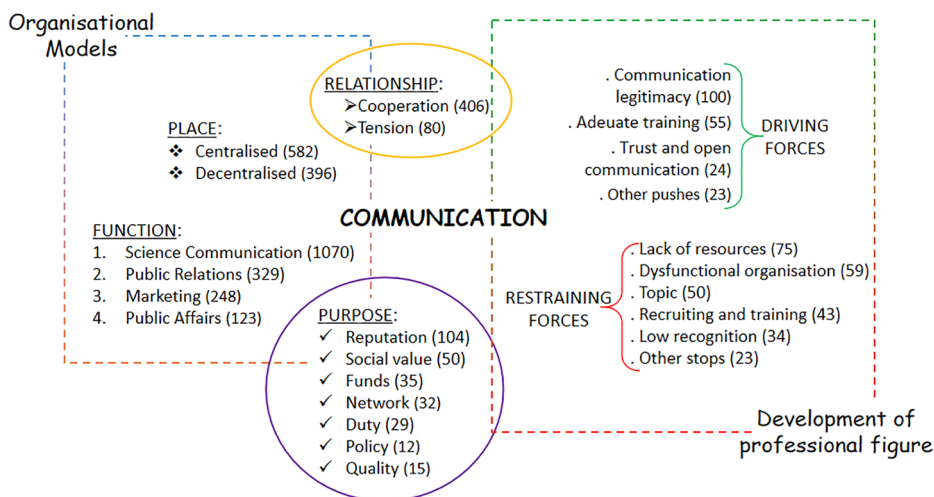


Fig. 1 Code tree with codes and code families

⁵ The ‘code tree’ is a representation that provides a summary in the graphic form of what emerges from an analysis in terms of codes and ‘code families’. Furthermore, the image takes into account the presence of connections between the various codes and/or code families.

⁶ A ‘code’ is a label attributed to a segment of text. All parts of the texts, across the interviews, which refer to the same subject are grouped under the same code. Each descriptive code is identified with a brief description to clarify what it refers to and to avoid overlapping with other codes.

⁷ A ‘code family’ is a set of codes. At a higher level of organisation, the codes are grouped together and refer to the same subject defined in a broader sense. A ‘code family’ may thus be considered as a superordinate categorisation.

A more detailed description of the results - codes, code families, connections and so on - is presented in the following sections.

5 Results

5.1 From the theoretical to the practical level, how do professionals describe and implement the four communication functions?

5.1.1 Communicators' account on university communication functions

To address RQ1, we focus on the four communication functions and we created 4 codes—SC, PR, PA, MA - for the collection of how the interviewees describe and explain these functions in their work routine, while also aiming to clarify the boundaries between them. These codes constitute the code family *Function*.

The function defined as SC ($F=1070$) does include efforts to communicate the results of science but the aspect of engage the public in research remains much less practised and the emphasis on civic purpose is also less present. In other words, the text shows that this communication function most often involves traditional activities, such as public lectures and the dissemination of results through official channels. The functions referred to under the label PR ($F=329$) and for MA ($F=248$) fit good between what the literature suggests and what the interviewees reported in terms of daily activities. The first one collects comments in which there is a focus on trust relationships established with stakeholders, intended as a means of protecting the institution's reputation, and this function is normally affected through the media (e.g. press release and institutional social media). MA is the code that refers to the function by means of which universities focus on the recruitment of students and emphasize the 'products' offered, maintaining a good reputation, and this may also be seen as a recruitment tool. Finally, the PA function ($F=123$) implies responsibilities in the area of relations with the government and politics, as the literature suggests, but from the voice of our interviewees, the activities carried out within this function also involve relations with the business sector, which may have a mediating role with the government.

The boundaries between the four functions are not always clear, and this depends on several factors, such as the lack of human resources, time or skills dedicated to communication within the institution, the similarity of some tasks (e.g., a press release about a significant discovery used to communicate science and also as a marketing strategy), or events like the "Institution Open Day" which aims to attract potential students while also strengthening relationships with stakeholders and communicating research activity. In general, looking at co-occurrence - when two or more codes appear together in the same quotation - the functions of SC and PR seem to overlap the most; PR and Marketing also showing some overlap in certain cases.

Exploring data across country (Table 2) adds some keys to the issue under analysis. In fact, the information is linked to the legislative, political and cultural contexts of the various countries and also their particular educational systems. This gives further information which is useful in the final interpretation of results. In this case, we add a column in the table with

Table 2 Distribution (by country) of frequencies relating to code family ‘functions’

	Frequency by function	Countries								Mean frequency by function
		DE		IT		PT		UK		
		F	F _n	F	F _n	F	F _n	F	F _n	
SC	1070	167	0.40	170	0.41	318	0.77	415	1	267.5
PR	329	56	0.40	79	0.56	53	0.37	141	1	82
MA	248	16	0.11	23	0.16	62	0.42	147	1	62
PA	122	1	0.01	7	0.07	18	0.18	97	1	30.5
Frequency by country		239		279		451		800		

the normalised frequency (F_n)⁸ in order to provide a more accurate comparison of the presence of the four functions across countries.

Some immediately evident results are particularly noteworthy. For example, for each listed function, the highest recorded frequency occurs in the UK. In terms of averages, Portugal shows a higher-than-average value in the SC sector and an average value for MA. However, when considering the normalized frequency, the MA value is re-proportioned, showing that it is less than half of what is practiced in the UK. Italy and Germany display both average and normalized values that are lower across all functions compared to the UK and Portugal, except for PR, where Germany and Italy have a higher value than Portugal.

This being a situation which induced us to conduct a meta-interpretation and reference literature may indeed play a role in this regard as we know that a significant part of mainstream literature on communication in Europe originates primarily in the Anglo-Saxon world. It is within this cultural context that the functions were proposed and defined. Thus, it seems evident that in the case of the UK there is a fairly high awareness regarding the various functions and at the organisational level a debate regarding them could be more developed.

Public Affairs (PA) would appear to be a typical aspect within the British context. This may also be explained considering particular cultural elements and the way relations between institutions and universities have been structured over time. As an interviewee noted:

“There are influencers, lobbyists and MPs, and people acting in similar roles. They form part of one of the audience groups we deal with in the corporate communications sector, and we communicate with this network as a team.” (P6_UK).

This particular focus is also confirmed by the difficulties we encountered in trying to translate the expression ‘Public Affairs’ and identifying what it represents in the relative contexts in other languages (Italian, German and Portuguese). In the other countries that are considered it appears that the sphere of ‘Public Affairs’ comprises functions which may differ.

“[...] that interacts a lot with companies on the one hand, and public administration on the other hand.” (P2_PT).

⁸ In our sample, the number of interviews is not the same for each country (Portugal has one fewer). Frequency normalization is used to allow easy comparison between features when they differ in scale. It scales all frequency values to a range between 0 and 1, with 1 representing the highest observed frequency ($F_n = F / \max F$).

On the contrary, it appears that *Marketing* (MA) is the most clearly defined category and about this area the four countries converge in terms of its meaning, albeit presenting different efforts over time:

“Our department is engaged in promoting and curating our image. We therefore play an important role in the management of all aspects relating to a ‘corporate’ and a ‘coordinated’ image. Among various other elements the use of the logo is very important. After many years we are experiencing a truly epochal change with the introduction of a new logo” (P8_IT).

With respect to this function, it is also important to consider various aspects of the local contexts that might induce marketization. In Italy and Germany, for example, universities are funded by a particular national government system. In Italy in particular, competition has been arising recently among universities due to the growing number of higher-education institutions in the country and certain criteria adopted for the granting of funds⁹. On the other hand, in the United Kingdom the funding system relies more on private donations, sponsors, partnerships and student fees, and this stimulates competition and a stronger marketing process.

Considering *Science Communication* (SC), we noted the heterogeneous character of the comments made and, in general, the difficulty of expressing an overall strategy. Usually, offices and departments focus on organising events and participating in activities which aim to connect various stakeholders. For this reason, communicators mainly select activities to highlight a university’s engagement in communicating with and involving the public.

“[...] face-to-face events, conferences, workshops, and a lot of face-to-face dissemination. Above all, for example, important scientific conferences and congresses offer vital opportunities for our researchers for the presentation of their work.” (P4_PT).

There are many factors that can influence the implementation of SC activities (i.e., researcher skills, centralised/decentralised models, particular topics), the manner in which these elements are combined and the reference context. The narrative of the interviewees reflects what is shown: this function is relatively new with respect to others and it is thus undergoing development and adaptation. The differences between countries coincide with the considerations already presented above. In the UK there seems to be a well-informed debate also regarding difficulties that arise in an attempt to define this function. The observations of the Portuguese interviewees appear to suggest that in their country the function is viewed as overlapping with ‘dissemination’ activities rather than ‘public engagement’. Finally, Italy and Germany seem to envisage a preliminary phase preceding the full and carefully prepared implementation of this function.

On the other hand, *Public Relations* (PR) may be considered as the oldest function, which, over time, has absorbed a part of the others. This occurred before they were defined as functions. The PR function still appears to represent a crossroads where the four func-

⁹ The Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR) oversees the national quality evaluation system for universities and research bodies. It is responsible for the quality assessment of the activities carried out by universities and research institutes, recipients of public funding.

<https://www.anvur.it/en/agency/mission/> last consultation: 5th February 2024.

tional areas find a point of convergence. Observing the frequency, this function appears to have a more homogeneous distribution across countries and also from the cited comments a common vision is noted about the tasks and activities relating to this function, such as, for example, the preparation of texts for the various communication channels and for public events.

“These functions are managed in our department. They are obviously divided into various areas, so some colleagues deal with events, while others deal with graphic presentations, multimedia and the web, and others communicate with press offices in the true sense and social media.” (P6_IT).

As argued here, our interviews show that everyday work practices do not always align with the theoretical definitions of the four functions, and their boundaries are often blurred, especially in the case of SC, which appears to be in a phase of development and maturation. Broadly speaking, cross-country comparisons suggest that the UK, with its longer tradition, shows more advanced implementation, while Portugal seems to be in a phase of active debate around these functions. In contrast, in Italy and Germany, the functions are less frequently discussed, except for PR. It is important to note, however, that these national differences also reflect the specific cultural backgrounds and characteristics of each country's education system, particularly their funding structures, which are often closely tied to institutional marketing and management strategies.

5.2 Where are the communication functions located?

5.2.1 Place—centralised versus decentralised

To address RQ2, we distinguished between centralised and decentralised systems by defining the specific implications and characters of these categories as they emerged from the voice of the interviewees and their explanations, leaving the decentralisation hypothesis (Entradas 2021b) in the background.

In this light, two codes - *Centralised* and *Decentralised* - form the set of elements of the ‘Place’ code family. *Centralised* indicates that communication is performed by the central body of the university and managed by staff central offices, often in direct collaboration with decision-making entities and subjects, such as the rector and directors. A similar situation is denoted by the code *Decentralised*, however, in this case communication is of course performed by departments or schools autonomously. Coordination with central offices may exist, e.g. to use central channels and structures to reach a wider audience, or the departments and institutes in question may be totally free to undertake communication operations without interacting with central offices.

Considering the frequencies, the code *Centralised* ($F=584$) presents a value higher than that recorded with respect to *Decentralised* ($F=396$). This appears to indicate that, in general terms, the former type of organisational structure is more common among the universities discussed in the interviews. However, a lot of other information may be acquired by exploring the data. For example, when the codes are presented individually, they refer to a generic form of communication which is not specified, but they are frequently flanked by other codes relating to a ‘Function’ family and this implies that the function is positioned in

Table 3 Co-occurrences among codes listed in the 'place' and 'functions' families

		Code family: 'Place'	
		Centralised	Decentralised
Flanked with	SC	154	80
Code family:	PR	81	15
'Function'	MA	72	12
	PA	13	2
	Tot	320	109

Table 4 Distribution (by country) of the frequency of codes within the 'place' family

Frequency by place		Countries							
		DE		IT		PT		UK	
		F	F _n	F	F _n	F	F _n	F	F _n
<i>Centralised</i>	584	74	0.30	122	0.52	236	1	152	0.64
<i>Decentralised</i>	396	105	0.73	40	0.28	143	1	108	0.75

a centralised or decentralised structure of the university. Examining the co-occurrences it is possible to identify the relationships existing between codes listed under the 'Function' and 'Place' code families (Table 3).

Although all functions occur more frequently with the centralized code rather than with the decentralized one, confirming the general result that the former is more common than the latter, if we focus on the decentralized column, we observe that out of the total of 109 where the decentralized code appears with one of the Function code family, in most cases (74%) it is associated with SC. On this, the interviewees noted that being close to places where research studies are carried out and having someone who takes care of communication in the various departments or schools represent advantageous solutions. On the other hand, the other functions are more frequently controlled by the central bodies of the universities and are usually linked to the management of the university's image and the need to promote coherent external communication.

Considering both the 'centralised' and 'decentralised' systems, in our interviews there is no real and absolute judgement concerning which arrangement may be the 'best' solution, and the interviewees say that there are many factors which may have an effect on the communication process and refer to the two recurring elements 'size' and 'context'.

The first element refers to the size of the university. In our interviews the general impression that emerges is that a centralised organisation may be fine for small universities, while it would be usually less appropriate for the larger academic institutions, in which 'decentralisation', presenting varying degrees of autonomy, could be the best option. On the other hand, the 'context' recalls the comparison across countries and, as we already mentioned, it is linked with the cultural backgrounds and characteristics of each country's education system. Due caution, we may trace a few particular trends, and also in this case, we add a column in the table (Table 4) with the normalised frequency (F_n) in order to provide a more accurate comparison across countries.

A comparison across countries is a sensitive issue and we would emphasise that the results do not reveal the presence of a cause-and-effect relationship between contexts and structures or strong, clear-cut distinctions. Within the same country a variety of patterns may be noted also because, as previously mentioned, the patterns arise from a combination of several factors, including the actual size of an institution. However, considering the data

we have collected, we note that in Italy the centralised model is more present than the decentralised one, compared with the other countries. In general, in Germany and in the United Kingdom decentralisation is a reality now more frequently encountered, and the observations of an interviewee clarify the underlying reasons:

“It would simply not be acceptable to render the institution more centralised. What we are trying to do, I think, is to explain to the outlying sections and departments, more regularly and more transparently, what we are trying to achieve at the central level. If it suits them to go along with our plans, then they’re welcome to follow us but, essentially, we can’t force them to adhere to our stance.” (P1_UK).

Portugal, that show the highest value in both cases, seems to be in a transition phase with respect to the decentralisation hypothesis, as an interviewee make clear:

“Before I entered the faculty, a communication office did not exist, let’s say [...]. I think that all the faculties of the university have a communication office. These offices vary in their degree of autonomy and size.” (P11_PT).

Considering the issue of centralisation/decentralisation, we may observe that it is an almost purely theoretical dichotomy. As some interviewees observed, the two levels are interconnected and the functions may also be established in a balanced manner. Centralised and decentralised systems are not isolated from each other, and an internal communicative relationship always exists between them. In fact, if we also reflect on the co-occurrences of the two codes - *centralised* and *decentralised* - in almost 30% of the cases observed they are in fact linked. Especially in Portugal, it would appear that communication occurs across a path between central and peripheral structures that is more closely shared than in the other three countries. This is in fact in line with the indication of Portugal’s greater propensity towards decentralisation.

5.2.2 Other elements emerge from the data: relationships and purpose

Additional information relevant to addressing RQ2, regarding structure and the placement of functions, emerged from the text. This led to the creation of the ‘Relationship’ and ‘Purpose’ code families. For the former, we went beyond structural observations to explore the type of relationship between communicators/offices. In general, under the *Cooperation* code, we collected comments about positive interactions, while under the *Tension* code, we gathered references highlighting negative relationships. When we associate these codes with those comprised in the ‘Place’ family, we may argue that in a large number of cases (F=67) between the centralised and decentralised structures there is an explicit positive relationship and form of collaboration. Traces of tension between these two poles were noted in very few cases (F=9) and the situation is rendered more explicit in comments made by the interviewees:

“I think some people have the impression we are the central controllers or the ‘gate-keepers’ who prevent others from gaining access to things they would like to acquire.” (P1_DE).

In some cases, collaboration is the way to make the best use of available resources. This occurs especially in the case of SC, which, compared to others, is the function most often shared by different structures.

“There are a lot of outreach offices in each faculty, so they produce this type of campaign. It doesn’t really involve anyone in the communications team. We would be called in to provide our support and publicise, while the marketing team would produce the collateral.” (P2_UK).

This result is related to the specific nature of this type of communication. If on the one hand it is useful to be close to the places where research is planned and organised, on the other hand it is necessary to have adequate tools and skills to be able to communicate in the best possible way, and sometimes the schools or departments are not really very well equipped.

Regarding the ‘Purpose’ code family, through interviews, we noted that the purpose of communication is intrinsically linked to communication activities, and, in turn, to the functions and those who implement them. Therefore, we believe that paying attention to this element can also help in answering RQ2 and, furthermore, have a more complete overview. We identified seven codes for this family and it is possible to group them into two sets. The first one is composed by the codes *Reputation*, *Funds*, *Network* and *Quality* because they form a synergy that is useful for continuously improving the level of an institution. More simply, like a virtuous circle, a good reputation is capable of attracting human and economic resources and then improving the quality of research useful for maintaining a high reputation. The codes *Duty*, *Social Value* and *Policy* are related to SC in particular and refer to the communication of science as a tool for effective change because on the one hand they are linked to laws and on the other hand it may be seen as deriving from a sense of duty (e.g., the so-called ‘Third Mission’ in Italy or the relationship between taxes and support for Germans).

The realization of specific purposes can drive a broader goal, shaping an ideal model of communication in a university. In this sense, purpose can act as a catalyst for the evolution of professional communication. This leads us to the final section, where we explore the forces that tend to enhance or weaken communication, particularly for SC.

5.3 Which restraining and driving forces envisaged by communicators for communication in the university, particularly for science communication?

We discussed with the interviewees how they organise, manage and implement communication functions, focus on SC, in their institutions and our results confirmed a misalignment between the current organizational context and the desired one. Then, through the experiences related in the interviews, we investigated the presence of recurring elements capable of favouring or hindering an ‘effective development’ in this field. With ‘effective development’ we refer to endeavours undertaken to realise the goals of the theoretical concept of four functions, especially for Science Communication, and respond to the new challenges affecting the role of communicators in universities.

Thanks to the data analysis we were able to identify 9 topics grouped in two code families (Fig. 2): ‘Restraining forces’ and ‘Driving forces’.

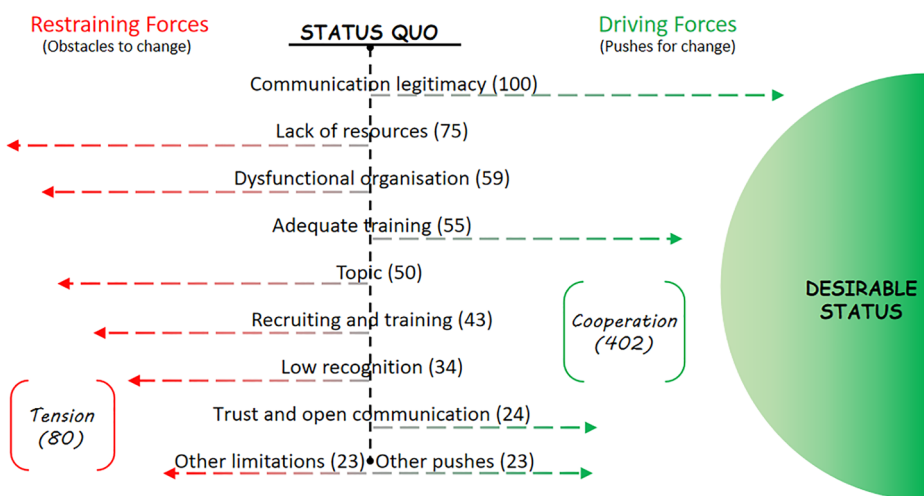


Fig. 2 Forces affecting the development of communication functions with in universities, especially SC, and the work of communicators

[Insert Fig. 2: Forces affecting the development of communication functions with in universities, especially SC, and the work of communicators]

The number which appears next to the code indicates the total frequency of the contents across the texts, namely the presence of each code throughout the interviews. On the left-hand side of Fig. 2 appear the forces that tend to slow down the evolution of communication and on the right-hand side those that support this process and facilitate moving towards a desirable status.

Beyond the specific forces, in both cases - *restraining forces* and *driving forces* - we noted the effect of another code family already mentioned in this field of forces: *Relationship*. Cooperation and tension represent an underlying fundamental condition upon which other restraining and driving forces have an effect. These factors may be considered as a basic minimum set of circumstances with regard to the implementation of a transition from the 'status quo' to a 'desirable status'.

5.3.1 Restraining forces

Under the code family *Restraining forces*, we included those elements that have a constraining effect. These elements are more clearly circumscribed than those which support an evolution as in some cases they are linked to specific and practical difficulties, such as a dysfunction at the level of resources or the system. The elements are summarised in Table 5, which also indicates their frequency by country thanks to the normalised frequency (F_n) in order to provide a more accurate comparison.

An initial consideration regarding *Restraining forces* is linked to the issue of available resources, and one interviewee clarifies this situation very well:

Table 5 Frequency of codes (by country) pertaining to the '*restraining Forces*' code family

	Frequency by force	Countries							
		DE		IT		PT		UK	
		F	F _n	F	F _n	F	F _n	F	F _n
<i>Lack of resources</i>	75	16	0.53	17	0.56	30	1	12	0.40
<i>Dysfunctional organisation</i>	59	16	0.55	29	1	8	0.27	6	0.21
<i>Topic</i>	50	19	1	-	0	19	1	12	0.63
<i>Recruiting and training</i>	43	9	0.69	13	1	13	1	8	0.61
<i>Low recognition</i>	34	8	0.66	7	0.58	7	0.58	12	1
<i>Other limitations</i>	23	-	0	2	0.15	13	1	8	0.61

"There is a 'triangle' of resources: time, money and personnel. We are always moving within this sphere. I try to make this clear, and it is also part of my job. So, if there is no money and no staff, you need to have a lot of time, and so on." (P1_DE).

Thus, reflecting on our results, *Lack of resources* would in most cases refer to the lack of human resources or an insufficient number of people capable of carrying out all the work. The presence of this code is more significant in the Portuguese context, which would endorse the impression that this country has already entered a transition phase. Only in a few cases the lack of resources is linked to an absence of economic resources because normally the budgets allocated to communication activities are determined in advance and the work is planned accordingly.

Regarding *Dysfunctional organisation*, communicators attribute the inability to advance their profession to general and cross-cutting organisational issues, such as a poor division of duties and a work overload, an unnecessary overlapping of activities (often due to poor communication between offices), a dispersion of information. Exclusively the Italian interviewees in this category refer to 'bureaucracy' as the emblematic organisational problem, this contributes and explains the highest frequency for the Italian responses.

There is also a difficulty related to the kind of topic (*Topic*), especially linked to SC due to science itself as an unstable and ever-changing sector (e.g., hot topic/cold topic, complex or controversial topic that is difficult to communicate). It is interesting that this code is absent in the case of Italy, as the Italian interviewees refer to topics but only as an element of SC, without considering it as a constraining element.

Recruiting and training draws attention to the fact that people involved in communication activities are not always adequately trained and recruited. For example, some of them may have started working in the field years ago when communication was less complex. In particular with regard to SC, the inability of scientists and researchers to share and communicate their research is frequently proclaimed. The need for training aimed at acquiring skills, particularly relating to SC, also directly for subjects engaged in research, is underlined and, in fact, this element is included also among the driving forces as it will stimulate the evolution of the sector.

Another code, a mirror image of which will be found among the driving forces, is *Low recognition*. In this modern age, while communication is easy for everyone, the skills to do it properly are often underestimated; this hinders the professionalization of communicators and the recognition of their important role.

Table 6 Frequency of codes (by country) pertaining to the *Driving forces* code family

	Frequency by force	Countries							
		DE		IT		PT		UK	
		F	F _n	F	F _n	F	F _n	F	F _n
<i>Communication legitimacy</i>	100	26	0.96	21	0.77	26	0.96	27	1
<i>Adequate training</i>	55	3	0.11	4	0.15	21	0.77	27	1
<i>Trust and open communication</i>	24	2	0.18	-	0	11	1	11	1
<i>Other driving forces</i>	23	1	0.11	6	0.66	9	1	7	0.77

Finally, the code *Other limitations* comprises those forces which do not form part of the other traced categories and does not constitute an equally defined area. It is a ‘pot-pourri’ of elements, among which the most frequent factors are the difficulty in identifying the appropriate moment to communicate and the attitude of some scientists to not always be open towards society.

5.3.2 Driving forces

The *Driving forces* are less circumscribed and comprise elements we may deem as more ‘conceptual’ than ‘practical’, in comparison with what emerges within the sphere of restraining forces. These forces are summarised in Table 6, which also reveals their distribution by country tanks to normalised frequencies.

Communication legitimacy is an element which denotes the status of an institution and assigns to universities a privileged role in the production of scientific news, considering research and innovation. This code distinguishes an institution that has developed and made progress over time and in which the relative roles and functions are clearly defined and recognised, especially for the professional communicators in relation to SC. The effort of universities to invest economic resources and acquire adequately human resources would appear to be a positive ongoing trend and an element that is recognised and emerges in our interviews. The focus on *Adequate training* is certainly an important factor regarding both professionals and researchers who become involved in SC. The descriptive code *Trust and open communication* comprises elements worthy of attention that favour an increasingly close relationship between institutions, scientists and the public, characterised by a sense of trust and an open-minded exchange.

“There were big changes made about three years ago when I joined. And we’ve got a much better reputation now. So we’ve got more trust in the academic community.” (P7_UK).

The presence of these two codes is more evident in Portugal and in the United Kingdom and this may indicate the evolution of the profession in these countries. It may also mean that in these countries’ professionals have a clearer idea with regard to the direction they should follow and how to ensure the ideals of the evolution are fulfilled.

Other Driving forces, specular to *Other Limitations*, comprise factors which stimulate development within the sphere of communication and professional roles, such as aptitude for flexibility, adaptability and multidisciplinary experience.

6 Discussion and conclusion

The aim of this study was to investigate communication in universities, considering the evolution of the sector and the changes and challenges they have to address, with a focus on SC and across four countries.

The first research question was addressed to acquiring a vision of the communication models in use. We analyzed the professionals' views of the communication functions noting there are some differences among the countries considered. Added to this is a meta-consideration which reflects on literature, in terms of the provenance and the development of this field of investigation. For example, the case of Public Affairs would appear to be a noteworthy factor. With regard to Public Relations in particular, there is a relatively more significant collective agreement on the definition of this factor and how it represents a kind of substrate or point of contact enabling implementation of the other functions. There is also a general agreement on the Marketing function, but its actual implementation and the effort made to engage in the relative activities is more specifically linked to the diverse funding systems present in the various countries. The consensus agreement regarding Public Relations and Marketing seems to derive from the fact that academic institutions have acquired the highest level of familiarity with these spheres and over time they have become the most highly developed means of communication.

Instead, as far as SC is concerned, there are several difficulties in the determination of a shared definition and the methods of its implementation. Considering both the theoretical and practical dimensions we note that these aspects are not perfectly aligned. On the one hand, theoretical proposals consider SC as a model of dialogue in which the acquisition of points of view of the non-expert public is favoured (Selvakumar and Storksdieck 2013). On the other hand, SC initiatives often follow and reflect political directions and are managed by public institutions, whereby the communication process is conditioned (Lewenstein and Brossard 2009). This gap between theory and practice highlights the power-based relations that exist between scientists, stakeholders and the public. It should also be noted that SC could allow for a better distribution of power between the parties involved, limiting the inevitable strong influence of scientific knowledge and experts (Wynne 2006). The function is considered important in all the four countries involved. We noted moreover that in the UK this function is evaluated relevant due to a greater awareness of its strategic importance and the consideration afforded to it.

The second research question was addressed considering the processes of centralisation and decentralisation, SC is the most highly active function at the peripheral level, compared to the others. This reality confirms a general trend highlighted by Entradas and Bauer (2022), to which many departments and research centres have been consistently devoted in recent years. Through their acquisition of an ever-increasing level of autonomy, albeit in collaboration with central structures, these departments also become responsible for the strategies and activities necessary to communicate their research to the public and to receive funding and the relative resources they may require. Compared to the other countries, Portugal offers a prime example of the transition from the centralised to the decentralised system and seems to be more highly involved than other countries with respect to this moment of change and evolution. In any case, whether one leans more toward a centralized or decentralized model, the structures do not operate in a vacuum. Communication offices and departments are often interconnected, and these relationships are more frequently positive. This is especially true

for SC, which, in seeking a more defined role, often encourages collaboration between different areas, also reflected in the blurred boundaries between the various communication functions.

Recognizing that the purpose is another characteristic that distinguishing functions (Entradas et al. 2023), our findings show that communication activities allow universities to position themselves in the network of relationships in which they are inserted. The most important objective recognised by the interviewees about communication is the development of the academic reputation, which would correspond to conclusions drawn in literature (Hemsley-Brown and Oplatka 2006; Agrey and Lampadan 2014; Czinkota et al. 2014; Angulo-Ruiz et al. 2016). In a world increasingly connected by powerful and pervasive means it is important for universities to establish and reinforce their public image, which will allow them to be duly recognised as prestigious institutions. Other purposes are considered less important, but with some distinctions between countries, and are related, for example, to the possibility of raising funds, the potential to build networks, institutional obligations, quality and policies.

The third research question allowed us to identify the main forces that hinder or facilitate effective development of communication, especially SC, and emphasise elements that can impact the development of the professional involved. Alongside some elements which strongly support and promote communication there is also an element of resistance to a broad opening towards the public. The data collected within the [details omitted for double-anonymized peer review] research project highlights that public communication remains far from being fully established and taken for granted across research institutes in universities and large research organisations. On the one hand, research institutions do not invest sufficiently in human resources and communication facilities and are therefore unable to use the channels most familiar to the public. On the other hand, many researchers remain rather sceptical about the usefulness of reporting the results of their work in ways that are sometimes considered too superficial or even banal. Although the human resources and communication tools available to academic institutions have increased, with the use of special platforms, social media, networks and associations of public science communication (Metcalf and Gascoigne 1995; Gascoigne 2020), and the quality of communication professionals has also been augmented, thanks to an increase in the availability of training courses in public communication and research (Gascoigne 2020), this is really not enough. Some restraining forces which may negatively affect the improvement of public communication have a 'structural' character and in many cases, communicators have emphasized the need for more resources and an improvement in organisational processes, especially in Italy and Portugal. Consequently, there is a need to adapt communication facilities and departments to keep up with the rapid developments occurring in the world of communication. In the process of developing communication departments, it has not been possible in many cases to recruit adequately trained staff. For this reason, it has been difficult to introduce adequate tools and manage in an appropriate manner the methods of communication. Difficulties have also arisen in the production of adequate forms of communication for research topics. It is not uncommon for professionals to encounter difficulties in their attempts to render the work of researchers accessible to the public, bearing in mind that the information procedures would cover a vast range of different subjects. Finally, we should not overlook certain elements of status concerning professionals. In several cases, a lack of adequate recognition of their role and the consequent dissatisfaction with a job that requires refined communica-

tion, coordination and organisation skills was reiterated. From the point of view of ‘driving forces’ the need to attribute priority to public communication is at the top of the list. Professionals are aware of the importance of universities within society, the potential and the trust that the public places in them. Professionals believe that it is necessary to insist on high-quality public communication to ensure and strengthen the level of public awareness and confidence. To strengthen the academic reputation of a university through science communication it is crucial to invest in dedicated resources, to encourage and support researchers in their communication efforts and to create platforms and programs that will facilitate meaningful interaction between the academic community and the public.

The present study explored the multifaceted nature of communication functions within universities, focusing on the SC. Although these functions have distinct purposes, they share common goals related to institutional visibility, trust-building and public engagement. In practice, the boundaries between these functions are often more indistinct than the extant literature suggests. The findings emphasise the impediments that impede the progression of communication as a strategic and professionalised domain within academic institutions, and the factors that can instead facilitate it. In order to achieve its full potential within universities, communication, particularly SC, necessitates an integrated approach that acknowledges its pivotal role not only in institutional reputation, but also in fostering dialogue between science and society.

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Declarations

Ethical approval Authors declare that they have complied with American Psychological Association ethical standards in the treatment of their samples.

Conflict of interest The authors have no relevant financial or non-financial interests to disclose and they declare that there is no conflict of interest.

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