Portuguese Research Units and Science Communication practices: from tradition to social media

Unidades de Investigação Portuguesas e práticas de Comunicação de Ciência: do tradicional às redes sociais

Diogo Santos*, Carla Morais**, Nelson Zagalo***

* (iD) Faculdade de Engenharia da Universidade do Porto, Centro de Investigação em Química da Universidade do Porto (up201101795@edu.fe.up.pt)

** (iD) Faculdade de Ciências da Universidade do Porto, Centro de Investigação em Química da Universidade do Porto (cmorais@fc.up.pt)

*** (iD) Universidade de Aveiro (nzagalo@ua.pt)

Abstract

Science communication is an essential activity for institutions and scientists seeking to reach out to the public, find funding opportunities or career advancement. In this article, we intend to better present the reality of science communication practices in Portuguese research units. A questionnaire was drawn up and data from 124 centers were analyzed. Traditional strategies such as public events, science fairs or open days continue to be strong allies to the Portuguese scientific community, as does direct communication with journalists. But social media platforms, used by 109 of 124 respondents, are becoming fundamental. The Portuguese scientific community is experimenting with videos, animations, applications, or podcasts, suggesting that practice in science communication is becoming more demanding, specialized, and focused on finding multiple ways to reach the community.

Keywords: Research Units, Public Engagement, Science Communication; Multimedia; Social Media.

Resumo

A comunicação de ciência é uma atividade essencial para instituições e cientistas que procuram chegar ao público, encontrar oportunidades de financiamento ou progressão na carreira. Neste artigo pretendemos apresentar melhor a realidade das práticas de comunicação de ciência nas unidades de investigação portuguesas. Foi elaborado um questionário e analisados dados de 124 centros. As estratégias tradicionais como eventos públicos, feiras de ciência ou dias abertos continuam a ser fortes aliadas da comunidade científica portuguesa, tal como a comunicação direta com os jornalistas. Mas as redes sociais, utilizadas por 109 dos 124 entrevistados, estão a tornar-se fundamentais. A comunidade científica portuguesa está a experimentar vídeos, animações, aplicações ou podcasts, sugerindo que a prática de comunicação científica está a tornar-se mais exigente, especializada e focada em encontrar múltiplas formas de chegar à comunidade.

Palavras-chave: Unidades de Investigação, Public Engagement; Comunicação de Ciência; Multimedia; Social Media.

Introduction

Communicating Science is a challenge for scientists, journalists and (science) communicators, working within the limits of specialization [Paiva, Morais & Moreira, 2013]. The process of decoding the scientific message, so that it penetrates the various fringes of society, should be a teamwork; which is not always attainable in fullness [Albagli, 1996; Hans, 2013]. Thus, to reduce distances between scientists and the public, one of the great challenges lies in finding a balance in the dynamics of communication - allowing scientists to communicate the science they do and the public to know the process and results of that research, which leaves it and is intended for it [Fischhoff, 2013]. Science communication processes and activities have been organized to promote public awareness of science (PAS), public understanding of science (PUS), and public engagement of science and technology (PEST). These paradigms are relatively well defined and are operationalized throughout science communication models [Trench, 2008]: the deficit model; the dialogue model; and the participation model. These are highly variable and interchangeable: they can coexist to better exploit the different goals than any practitioner envisions. The context, the theme, and the scientific area may imply using different models and strategies to communicate with the public [Entradas, et al., 2020].

Like in any other field, social media appeared to create new opportunities and new challenges to everyone involved in science communication. To Hargittai et al., (2018) "social media are an important site for engagement with science and research". These platforms are an affordable way of trying to connect research units with the community, but that doesn't mean that these efforts don't need to be planed because there are well identified challenges, like the heterogeneity of audiences: people have different interests, backgrounds, and socio-cultural patterns [Smith & Anderson, 2018].

Literature review

Research units and science communication in Portugal

Granado and Malheiros [2015] noted that in the past 15 years, one of the most encouraging things is the growth and establishment of communication offices that work directly with research units. Besides their deficiencies (short number of human resources, lack of money to thoroughly strategize and implement initiatives) research units with communication teams can be a crucial force in developing and disseminating scientific content. Without space in traditional media, units need to find their spots to engage with the public and be prepared to create and cement relationships with the press when they are available.

Without teams to strategize science communications tasks, one scientist's motivation is the make or break. Some scientists are motivated to engage in communication, and others don't [Pinto & Carvalho, 2011]. Some want to communicate science due to curiosity for something new and to improve their communication skills. Others believe that it's an important task, just like a duty to share science with the society, change perceptions and inspire younger generations (Cerrato, Daelli, et al., 2018). For many science communicators in Europe, the motivation is to "educate" and or to "inform" the public (Milani, Ridgway, et al 2020). On the other side, the scientists' barriers to communicating science are related to personal aspects like the lack of expertise to communicate; also, the fact that scientists don't trust in media outlets to deal with complicated

themes; and the perception of lack of rigor, distortion of content, and inability to deal with scientific facts (Bucchi, 2004). Scientists remain skeptical about using social networks as tools for science communication due the confusion, and the polarizing discourses with false information [Entradas & Bauer, 2019]. But those are aspects that perhaps can be improved with scientists and research units' contribution to enhancing the credibility of the content in social media.

In the study "Societal involvement of R&D centers" [Entradas, 2015], 89,9% of the 234 units (in a universe, at the time, of 406) in Portugal reported that they were engaged in tasks to communicate science with the public. This study was like an x-ray to the Portuguese research unit's science communications efforts between 2013 and 2014. According to the same study, the main reasons to not develop or engage in science communication efforts are the lack of resources (50%), the notion that the task isn't a priority (25%), and the lack of motivation (16,7%). Data collected by Entradas (2015) shows that public lectures are the favored communication strategy/format to the Portuguese institutions. In discussion, we'll look further into this study and for a broader view, we'll also consider the most significant international study about research units and their science communication activities, published in 2020 [Entradas, et al., 2020].

Methodology: The study

Objective

This study looked at Portuguese research units aiming to know how science communication is perceived by research units and what channels, formats, and tools are being used to communicate science.

Methods

Aiming to fulfil the previous objective, i.e., to draw an image of the reality of science communication processes in research units in Portugal, the following research questions were produced:

a) which channels and formats (social media, website, traditional media) are being used to communicate science?

b) and which tools are utilized by the research units to produce the content to be shared with the community?

A quantitative research method, throughout an online questionnaire was implemented. Creswell (2003) states "quantitative research employ strategies of inquiry such as experimental surveys and collect data on predetermined instruments that yield statistical data" (p.18). The findings from quantitative research can be predictive, explanatory, and confirming. The option to implement a questionnaire without performing pre-tests and further analysis to improve its robustness was due to the nature of the questions presented, directly inspired by the ones utilized in two previous studies [Entradas, 2015; Entradas et al., 2020]. Since the aim was to find tendencies - mainly focused on tools, channels and formats used by the scientific community to communicate science - and not to draw a full comparison with those two studies with wider scope, a concise and therefore necessarily different questionnaire was the option that assured that the goal could be achieved.

Sample

The questionnaire was implemented between December 2019 and January 2020 and sent to the 303 research centers on the list "Units with Approved Funding for the year 2019" by the Foundation for Science and Technology (FCT). By selecting those units funded by FCT (not all research units in Portugal are directly financed by FCT) the intention is to have institutions that, theoretically, are all on the same page regarding their annual objectives, since all of them were evaluated by the same set of rules. Also, being funded by the state agency can attest that these institutions are top-quality. The questionnaire was sent in three waves to the e-mail addresses available at universities or research unit websites. A total of 124 answers were received and validated.

Questionnaire

The anonymous questionnaire, done in *Google* forms, consisting of eight questions: four of the matrix types (questions 1-4), three of the answer dichotomous (questions 5, 6, and 8), and multiple choice (question 7). In questions 1 to 4, about the importance of science communication tasks to the unit, a scale of values was presented from 1 to 6, where the minimum value meant 'Unimportant' and the maximum 'Fundamental' [Likert, 1932]. A 6-point scale was chosen to minimize the possibility of obtaining comfortable answers in the center of the scale [Matell, Jacoby, 1972]. Predictably, our respondents are well informed about the topic, and this should point to a more traditional 5 or 7 point-scale (Chyung, Roberts, et al., 2017), but our choice without a midpoint was implemented because the questionnaire was web-based. Questions 5, 6, and 8, about science communication practices within the research unit, we looked for dichotomous answers, in this case, 'Yes' or 'No'. At question 7, about formats and channels to communicate science, we implemented a multiple-choice to find what is being used by the Portuguese R&D units to engage with the public.

Procedures of data analyses

Since the intention was to look at tendencies, the data collected was analyzed to get the mean, and the minimum/maximum values answered by the respondents in percentage. Descriptive statistics permit us to quickly observe those tendencies, and, in this case, the choice was clear because further in discussion this type of data will help to better understand and frame the results within the available literature.

Results

Regarding the scientific field of the units that responded and using Manual Frascati/OCDE categorization, we've got 41 in Social Sciences, 30 in Engineering and Technology, 23 in Humanities, 17 doing research in Natural Sciences, 10 in Medical and Health Sciences, and 3 in Agricultural Sciences (Figure 1).

Figure 1: Research units, categorized by scientific field.
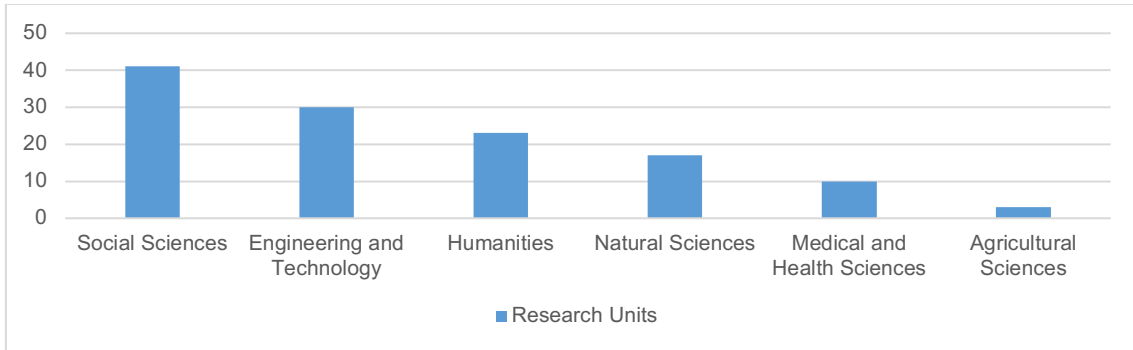
Source: own elaboration

We were interested in finding if the research units have an own space online to communicate. From the total of the 124 that responded, 88.7% (110 answers) have a web page or a profile on social media.

The first four questions (Figure 2) were aimed to better perceive the importance given to science communication in the day-to-day work. At the question 1 "Does your institution see science communication as a fundamental piece of the research unit day-to-day work?", 38,7% of the respondents selected the maximum number of our 6-level scale, followed by 30,6% responses at level 5. Then, 43,5% choose the top-level to the question 2 "Do you feel the need to communicate science with the public?". When asked, in question 3, "Do you consider that science communication is important to your research?", 47,6% of units in this study attributed the maximum-level of importance. Finally, to the question 4 "Can science communication contribute to the success of your research?", 44,4% of the responses were situated at the top-level of the scale. In all the previous four questions the mean response was at level 5.

Figure 2: Importance given to science communication in the day-to-day work of the units (answers, in percentage, to questions 1 to 4).
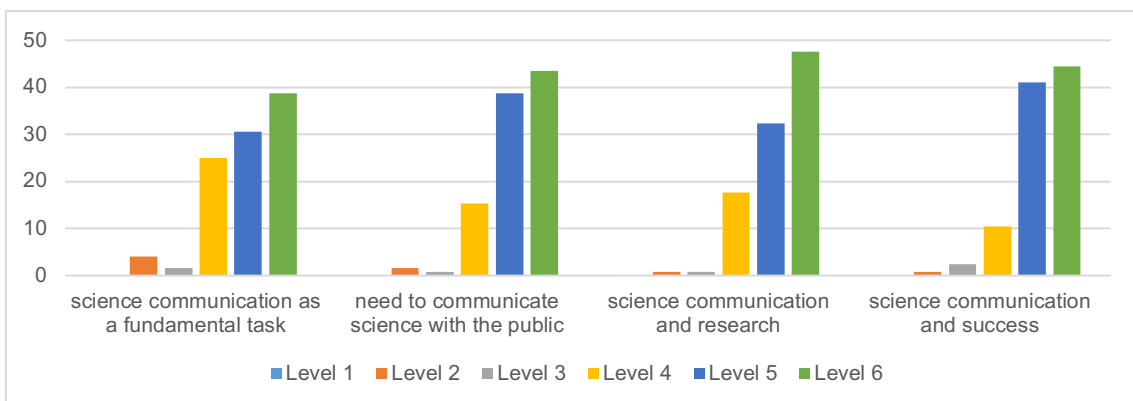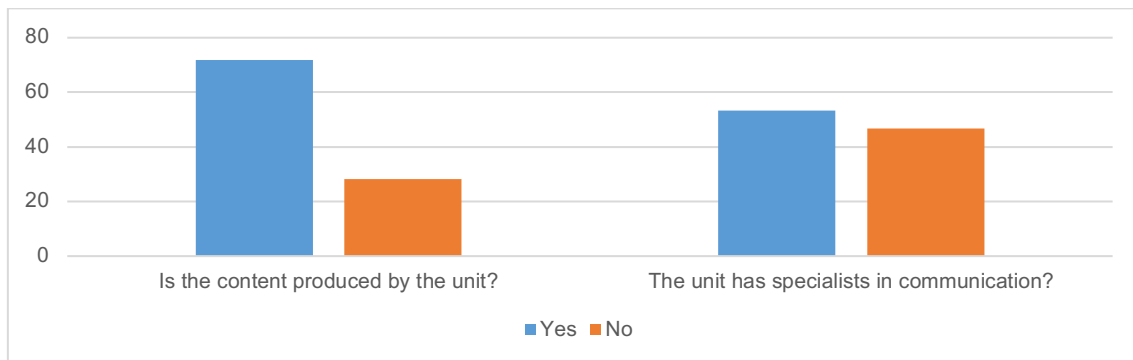

Source: own elaboration

In the next section (Figure 3), we wanted to know more about the science communication practices. To the question 5 "Is your department responsible to produce science communication content?", 71,8% of the

respondents answered "Yes". And concerning the presence of communication specialists, we asked (question 6), "There is any communication specialist in your lab?", and 53.2% indicated that the unit has at least one specialist in the team.

Figure 3: Science communication practices at the research unit (answers, in percentage, to questions 5 and 6).

Source: own elaboration

Regarding formats, channels and tools that are being used, we presented a list and asked them to choose the ones they use to engage with the community. Social networks are the communication form/channel most often used by Portuguese units to communicate science (87.1%). In this same sense, it is noteworthy that one of the most traditional instruments – public events, such as science fairs or open days - of scientific dissemination remain an ally for research units (83.9%). Photography (66.9%) press releases (64.5%) and video (64.5%) are also highlighted. In the list presented with the various options for multiple-choice, infographics (22.6%), applications (18.5%), games (17.7%), and podcast (17.7%) are also noteworthy, as shown in the following Figure 4.

Figure 4: Channels, formats and tools used by the research units to communicate science with the public, in percentage.
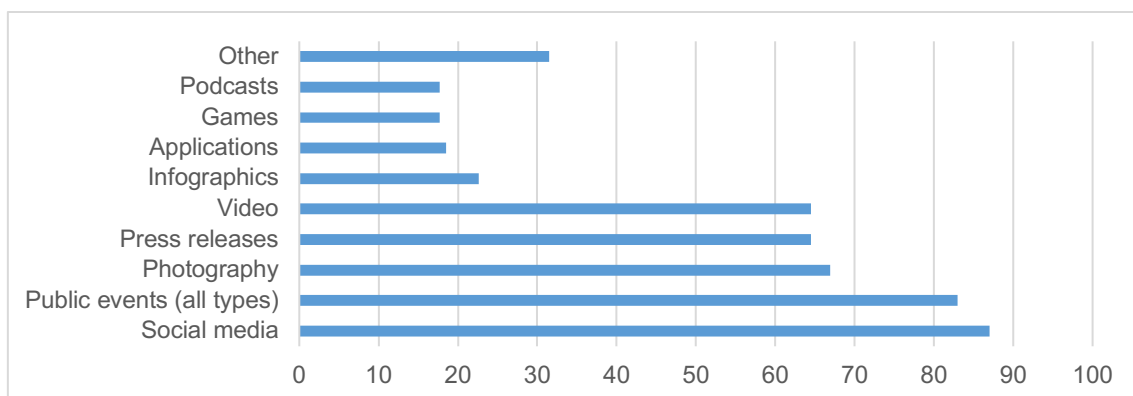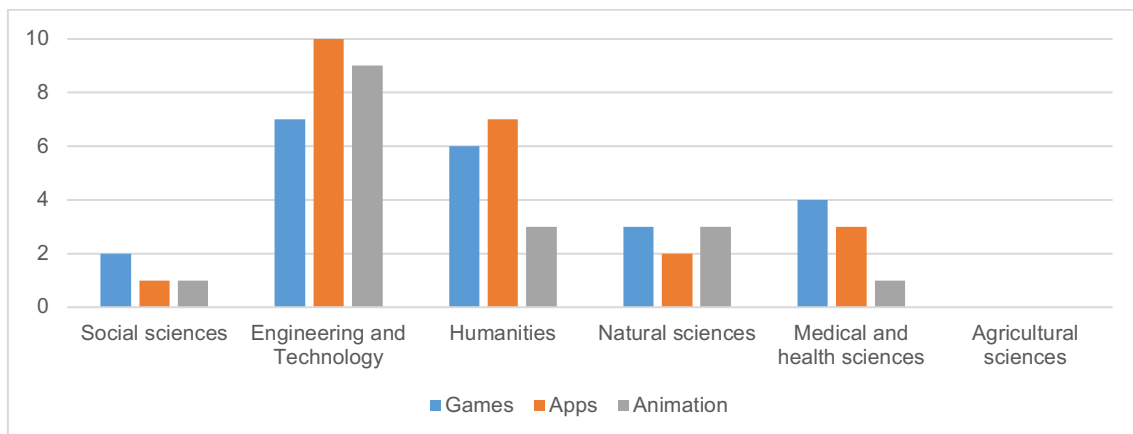

Source: own elaboration

According to our survey, 109 of 124 research units make use of social media to communicate. We can also point out that 76 institutions use social media and press releases (but no public events); 65 research centers

utilize social media, send press releases, and organize public events. And 27 have a presence online on social media and organize events (but don't send press releases).

Of the 124 respondents, 22 have used games in any shape or form. Social Sciences (2 in 41 units), Humanities (6 in 23); Engineering and Technology (7 in 30); Medical and Health Sciences (4 in 10); Natural Sciences (3 in 17) and Agriculture Sciences (0 in 3). The numbers are similar if we look at other challenging media types, such as Animation or Apps (Figure 5).

In the next section, we will look to the results obtained and discuss them close to the literature available.

Figure 5: Number of units, by field of science, that use or have used games, applications, and animation to communicate science with the public.

Source: own elaboration

Discussion

We must assume from the start that there are two studies that will be getting special attention during this section - "Societal involvement of R&D centers" [Entradas, 2015], and "Public communication by research institute compared across countries and sciences: Building capacity for engagement or competing for visibility?" [Entradas, et al., 2020] – aiming to look for tendencies, differences, convergences and even comparisons when they are possible to draw.

How Portuguese Research Units Perceive Science Communication

In question 1 we asked if science communication is seen as a fundamental task, and we obtained a wide margin of favorable answers. Questions 2, 3, and 4 were focused on the need to communicate with the public, the importance of science communication for the research work, and if science communication can contribute to the success of both the research and the unit. Again, we obtained positive indicators that point to the idea that science communication tasks are gaining importance inside research units. In the questionnaire we didn't go forward to know what kind of motivations – besides the collective and individual sense of success – are behind the effort to communicate science, but according to Entradas [2015], 61,8%

of the communication tasks are aimed to disseminate science to the public. Another relevant aspect in Entradas's work is the fact that it is essential to distinguish the extent to which these science communication activities are really oriented towards promoting public understanding of science, or whether they are, above all, strategies inherent to a policy of institutions for attracting students, researchers, and funding. From the answers collected in our questionnaire, scientists seem to understand the benefits of science communication practices, either individually or at the institutional level, which is in line with findings by Entradas [2015], and Granado and Malheiros [2015].

The Practice of Science Communication

With questions 5 and 6, we tried to know more about the composition of the unit regarding science communication practices: if the center produces the content and if it has communication specialist(s) on the team. Most of our respondents create their content, but 28,2% don't. It would have been and will be pertinent to explore this data further to understand where the scientific dissemination content of these laboratories is then produced: whether in the university's communication departments, whether outside by companies or by specialists contracted under the provision of services. More than half (53,2%) have at least one communication specialist working with the researchers. Between 2013 and 2014, at least one communication specialist was present in 48% of the research units, although most of them on a part-time basis (Entradas, 2015). We must also note that, at least in these topics, due to the variability of funding processes in Portugal -that can vary according to pluriannual plans- we can't draw a direct comparison between our data and the one collected by Entradas (2015). Due to change of policies, reorganization, fusion or even the extinction of teams, we can't assume, without a study with other type of scope, that we are dealing with similar realities. Internationally and of the research centers in eight countries under study (Entradas, et al., 2020), half have implemented communication policies. Four out of ten employ communication specialists, and half rely on communication departments centralized in the institutions.
The integration of communication specialists in research centers is a reality for some Portuguese institutions. The data available show us that there is space to grow and severe investment to be made. Nevertheless, it is an inspiring situation that indicates that a significant part of the community understands, supports, and believes in science communication. On the other hand, the lack of communication specialists can be correlated with the fact that, and according to Entrada's (2015), 30% of the units only invested 1% of their budgets in science communication activities. On average, departments use 3% of their budgets for science communication programs with the public [Entradas, et al., 2020].

Channels, formats, and tools used to communicate science

In Question 7, we gave a list of formats and channels usually utilized to communicate and asked the team to select which ones they use. Social media platforms are becoming an ally for scientists and research units. But science fairs, open days at the lab, and similar events continue to be a reliable solution. The field "Other" was chosen 39 times (31,5%) but without information about what type of format/media is being referenced. The question was directed to the research unit, but for future studies may be interesting to find if scientists have their own personal/professional social media pages. Entradas (2015) noted that Facebook and the

website (of the unit) were the most used platforms by the Portuguese research units. Even so, 42% don't use Facebook, Twitter (80%), or YouTube (68%). She also stated a short use of podcasts (11%). Usually regarded as a low-cost format, podcasts are or were utilized by 22 of the 124 research units in our study (17,7 %). For the Portuguese scientific community, the press continues to be an ally. International data points also in this direction, with units still favoring public events and traditional media over new media (Entradas, et al., 2020). However, websites of the institutions continue to be a privileged medium to communicate, and 73% units do at least one monthly update (Entradas, et al., 2020). The data that we collected indicates that social networks are disseminated within the Portuguese research units as tools to communicate science. But this growth doesn't diminish the importance of traditional strategies such as science fairs or press releases.

Another aspect that we can look for is if exists any relation between the scientific field and the type/format of media utilized by the Portuguese research units. Due to the sample and the data collected, it is hard to draw a fair conclusion about different disciplines and their tendencies, even when we choose to look at formats that can be perceived as challenging to implement due to a variety of reasons such as time, cost, and technicality. Let's look, per example, at the utilization of games –we didn't differentiate between video games and traditional games, but it is something that should be done in future studies- to communicate science. Of the 124 respondents, 22 have used games in any shape or form. Between the 64 units that do research in Social Sciences and Humanities, 8 used games (12,4 %); 7 in 30 Engineering and Technology labs (23,3 %); 4 in 10 Medical and Health Sciences (30,7 %); and 3 in 20 Natural Sciences and Agriculture Sciences (17,6 %). The numbers are similar if we look at other challenging media types, such as Animation or Apps. Even with this small sample, disciplines that are closer to technological concepts and apparatus seem to show a slight tendency to utilize this type of content.

Having an own channel to communicate is an essential factor in implementing a science communication strategy, and 88,7% of the units that responded have a website or a social media page.

Conclusions

Traditional media continue to deserve greater public confidence [Flash Eurobarometer 464]. And this factor cannot be underestimated when designing science communication content. For this reason, sending press releases and holding events open to the community remains highly relevant for the institutions' communication strategies. The authors of "Public communication by research institute compared across countries and sciences: Building capacity for engagement or competing for visibility?" are surprised by the low use of social networks as a tool to communicate science. However, in Portugal, data indicate that these platforms begin to assume an increasingly important role. In this aspect, we are meeting what is expected by the international article since social networks present, at the outset, low costs, a lower level of effort, and a high potential for dissemination. The creation of science communication teams within research units or at universities will make it possible to streamline and enhance social networks' use to disseminate scientific content. This effort may also strengthen public confidence in these mediums since traditional media continue to be preferred by the most public to seek information about science and technology.

The aspect that is clearly different in our study is the role social media platforms have assumed in the recent years. If in Entradas (2015, p7) "on-line communication and social media occupy a less prominent place

when compared to traditional media", according to our respondents, social media is the most used form/channel to communicate with the public. In Entradas' study (2015), 42% of units declare not using Facebook, and "78% don't use blogs, Twitter (80%), YouTube (68%). Less than 40% units in 2015 have used multimedia tools/formats to communicate science. In 2020, according to the data collected, this type of media has gained importance, with 87% declaring that they use social media platforms to communicate science. And more than 65% of the units use or have used photography, and 64,5% use or have used video. Even the utilization of infographics (22,6%), applications (18,5%), games (17,7%), and podcasts (17,7%) reveals that the community is experimenting with new tools, formats, and languages. Despite difficulties identified like short budgets to science communication tasks, the community of scientists and communicators at the Portuguese research units are creative, multifaceted, and aware of the importance of communicating in the most varied forms, spaces, and times.

Studies suggest that the institutions' commitment to science communication processes appears to be directly related to their teams' professionalization and the hiring of communication specialists. In other words, from a strategic point of view and to increase visibility, institutions must hire specialists that can: cement connections with traditional media; and build a digital presence that broadens the horizons of science communication for other audiences, with more direct interactions with the public, promoting dialogues, and building knowledge and communities.

Another aspect that seems relatively safe to extract right now is the notion that the scientific community in Portugal recognizes the importance of scientific communication to the success of the scientist and the unit. Another relevant aspect is the existence of own channels - website or social networks – to communicate, which gives some control to the research unit and a place to store, disseminate, and curate content. In pandemic times, such as those experienced between 2020 and 2022, science communication - mainly coming directly from the source of knowledge production - can be a solid ally to disseminate information with evidence that can cause behavioral changes in the community.

With a noticeable increase in the utilization of multimedia tools and formats to communicate, Portuguese research units seem committed and prepared to experiment, tackle the challenges ahead and evolve the field of science communication.

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