

Evolution of the UCC+i as a dynamic agent of science communication. Professional perceptions of their structure and future challenges in the digital context

Evolución de las UCC+i como agente dinamizador de la comunicación de la ciencia. Percepciones profesionales sobre su estructura y retos de futuro en el contexto digital



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Abstract:

The Scientific Culture and Innovation Units (UCC+i) have become one of the most dynamic agents in the promotion of science in Spain. Using a methodology based on surveying almost 60 professionals, four key aspects of its professional structure are thoroughly analysed: main functions, institutional location, the evolution of the human resources available, and professional recognition. After contextualising the origin, evolution, and current map of the UCC+i, the results indicate that these units are specialised, mainly, in the communication of results and the promotion of science. Likewise, they provide advisory and training functions. At the institutional level, they are under the supervision of the communication and research areas. Regarding staff, the most common structure is three professionals, but with low expectations of expansion and limited recognition by the universities. In summary, its high professional visibility is recognised as one of its strong points, and the lack of economic resources is a serious problem for development.

Keywords:

Communication, scientific culture, divulgation, science journalism, UCC+i.

Resumen:

Las Unidades de Cultura Científica y de la Innovación (UCC+i) se han convertido en uno de los agentes más dinámicos en la divulgación de la ciencia en España. A partir de una metodología propia basada en la realización de una encuesta a casi 60 profesionales, se analizan de forma exhaustiva cuatro aspectos claves de su estructura profesional: principales funciones, ubicación institucional, evolución de los recursos humanos de los que disponen, y reconocimiento profesional que se les otorga. Tras contextualizar el origen, evolución y mapa actual de las UCC+i, los resultados indican que estas unidades están especializadas, principalmente, en la comunicación de los resultados y la divulgación de la ciencia. Y, en menor medida, desarrollan funciones de asesoramiento y formación. A nivel institucional, se ubican bajo la tutela de las áreas de comunicación y de investigación. Respecto a las plantillas, la estructura más habitual son 3 profesionales, pero con escasas expectativas de ampliación y limitado reconocimiento por parte de las propias universidades. En resumen, su alta visibilidad profesional se identifica como su principal punto fuerte, y la falta de recursos económicos como un problema grave para desarrollarse.

Palabras clave:

Comunicación, cultura científica, divulgación, periodismo científico, UCC+i.

1. Introduction

The Scientific Culture and Innovation Units (UCC+i) are one of the main agents in charge of the popularisation of science, technology, and innovation in Spain. Its work aims at improving and increasing the training, culture, and scientific knowledge of society (FECYT, 2021). These units spread scientific culture in universities, research centres, and other institutions. The purpose of their work is directed both at promoting scientific and innovation culture in civil society and in the productive fabric, in which they promote the transfer of knowledge and create a new and more competitive model.

The units, as communication offices, have among their tasks to promote the advertising and public relations of the institution to which they belong without losing sight of their fundamental objective, which is the social transmission of the knowledge generated in these centres to improve the training, culture, and scientific understanding of citizens (González-Pedraz et al., 2018).

Since their inception, these structures have positioned themselves as great promoters of science communication in the institutions they are located in, such as universities and research centres. To accomplish this in an orderly and coherent manner, universities have a department in charge of managing communications, located at the highest university levels, a

fact that confirms the degree of institutionalisation that communication has today. In these departments, public universities, in particular, pursue a double goal, as claimed by Simancas and García (2022). These are to achieve greater social valuation and accountability. Despite the short time since their implementation in Spain, since the declaration of the Year of Science in 2007, the UCC+i have managed to showcase the science developed in the institutions in which they work. This process involves collaborating with the Spanish Foundation for Science and Technology (FECYT), which annually publishes grants for its operations. This means that the number of UCC+i fluctuates annually, depending on the aid received, incorporating new structures. Nevertheless, it also implies that some may stop functioning as they lack the financial resources to continue.

The work completed in Spanish universities and research centres must be known by society through the promotion done by the researchers through their communication channels or the media. Consequently, it became necessary to create specific units dedicated to conducting this work professionally, such as the publication of research work, for more than a decade so far. To this end, a valuable resource to promote the visibility of research staff in these institutions is the creation of expert guides as a media relations service (De Vicente and Sierra, 2020).

Before the creation of the officially recognised UCC+i in Spain, the Science Communication Offices (SCO, or Science Communication Office, for its acronym in English) had been working in Europe and the United States for more than fifty years. However, they are relatively recent in Spanish-speaking countries like Mexico (Frías and Rueda, 2014). The promotion of activities related to research in universities has gained strength in recent years to improve the social prestige of the institution, although it is true that scientific communication is done by a minority of academic staff (Bentley and Kyvik, 2011) compared to publications in scientific journals. This promotion contributes to obtaining more students and greater sources of external financing, while in public universities, it serves to justify the budget invested by public administrations.

1.1. Current relevance of the Scientific Culture Units (UCC+i)

The UCC+i (Units of Scientific Culture and Innovation) play a crucial role in transmitting scientific knowledge to society. These units, organised within the network of the Spanish Foundation for Science and Technology (FECYT), hold a strategic position that allows them to disseminate knowledge generated in universities, research centres, and other scientific institutions to the public. Being part of this network, the UCC+i have access to resources and collaborations that enable them to act as effective intermediaries between scientific institutions and society at large. Their work focuses on promoting scientific, technological, and innovative culture through various activities, including scientific communication, outreach, and training.

The relevance of the UCC+i is determined by their initial goal, which is to enhance and increase the scientific education of citizens while promoting culture and knowledge (FECYT, 2022). A sign of the impact that these units have nowadays is the influence they have on the media, reaching the entire society. An example is a study that demonstrates increased media visibility for scientific publications disseminated through UCC+i (Alonso-Flores et al., 2020). Other research (Alonso-Flores and Moreno, 2018) emphasises how scientists have improved their impact on society when engaging in scientific communication and when building and maintaining their reputation (Herman and Nicholas, 2019).

In a similar vein, the importance of scientific communication for society, as analysed with biomedical students, is a cornerstone of the research by Diviu and Cortinas (2021). In this study, future scientists become aware of the significance of science

communication, but they acknowledge uncertainty about dedicating much time to it once they become researchers. This uncertainty is attributed to the fact that most of their teachers have not explained the benefits of communication. Conversely, there are authors (Elías, 2008) who assert that some researchers use the media to give themselves importance that they lack scientifically.

Currently, the units continue to be the primary communication channel, from researchers at universities and research centres to the media, showcasing advances in science to the general public. The working methods of those in charge of these departments have certainly evolved since their creation. Nowadays, they focus their efforts on social networks, as this is where the public turns to stay updated, although they also maintain their websites. This effort to increase the visibility of science is driven by the fact that, as pointed out by López-Pérez and Olvera Lobo (2019), Spanish scientific excellence still does not consider the internet as a useful channel for disseminating its advances to the public, as evidenced by the difficulty in accessing their websites and social media. In contrast, a recent study (Alonso-Flores et al., 2019) by Spanish researchers that focuses on the former social network Twitter claimed that the majority of researchers (74.6%) believe that social media like Twitter are a valuable tool to enhance scientific communication. However, despite this, less than half (41.4%) have an active profile on social media.

The importance of these units has been evident during the recent health crisis caused by the COVID-19 pandemic. In general, crises represent a state of exception that pushes the journalistic profession to its limits (Salvador-Mata, Cortiñas-Rovira, 2023), leading to a substantial increase in the number of news stories, which poses the risk of informational dysfunction. During the pandemic, text or audiovisual messages spreading disinformation were predominantly disseminated through false sources, using the verb in the present tense instead of the conditional, which is distinctive of scientific communication (Moreno-Castro, 2022). Particularly, a study by Jemielniak and Krempovych (2021) on the media discourse surrounding the AstraZeneca COVID-19 vaccine on the social network Twitter found that the most retweeted tweets contained negative information and, in many cases, originated from media outlets known for spreading fake news.

In this context, the public university, as one of the institutions where Research, Development, and Innovation (RDI) activities are developed, is recognised as a public service that produces scientific knowledge (Simancas-González and García-López, 2019) and served as a trusted source for society during the crisis (Mut-Camacho, 2020). In addition, since March 2020, RDI professionals have taken on an active role as an informative source, working beyond their regular duties, explaining through their researchers any possible doubts of society, and responding to media demands (Sanz-Hernando and Parejo-Cuéllar, 2021). Not only that, many of them launched innovative initiatives, products, and narratives through the Internet.

1.2. Origin and evolution in the last decade

The creation of the Research, Development, and Innovation (RDI) Network began with the publication of the call for grants for conducting activities related to the dissemination and popularisation of scientific and technological knowledge in 2007. This year was declared the Year of Science, during which the establishment and promotion of units in research centres and universities were encouraged (FECYT, 2015). In the first year of the network's foundation, a call for proposals with over 1.7 million euros was issued, leading to the launch of fifty-three units distributed throughout the Spanish geography.

The launch of this network aimed at establishing offices or units for the promotion of scientific culture in research centres that lacked such services. Simultaneously, it aimed to train and guide those units that were already engaged in similar activities (FECYT, 2021). These initial units marked the beginning of a structure that has continued to grow since then, promoting the science of the organisations on which they are based. However, the network has indeed experienced fluctuations over time, depending on the calls for proposals.

FECYT published a document (FECYT, 2015) that outlines the evolution of the initial years of the units from 2007 to 2014. The document points out the high number of applications to join the network, reaching up to 76 in the year 2010. However, not all could receive funding. In the case of the year 2010, only twenty-five units were granted subsidies, with an average of 18,000 euros each.

2007 marked the first step towards the creation of the ambitious Network of Units for Scientific Culture, Innovation, and Technology (UCC+i). That year, universities and research centres gradually established these units within their institutions. Until 2019, forty-four new units were created, with significant increases in 2018 (adding seven new units) and in 2019 (adding four more). This was organised within the mentioned network and under the coordination of FECYT, with years of significant additions such as 2012 with ten new units, 2018 with eight, and 2019 with an additional ten. In 2023, there are one hundred and twenty-three registered UCC+i, a figure that inspires optimism about the continuous growth of this network for the promotion of knowledge.

1.3. Professional distinction of the UCC+i

The Units for Scientific Culture, Innovation, and Technology (UCC+i) represent structures with a unique and non-replicable initiative not found in other countries. In some places, this is because the universities have sufficient funds to ensure stable staff dedicated to these tasks, while in others, it may be because they have not yet considered it or have not found the appropriate strategy. The UCC+i are unique as they are officially recognised as institutionalised entities at the state level to fulfil a social function (González-Pedraz et al., 2018). They are located in universities, research centres, and other entities dedicated to research with individual interests.

These units, born in the Year of Science at the initiative of the Barcelona City Council, had numerous precedents aimed at helping research centres open their doors to the public (López-Pérez and Olvera-Lobo, 2017). The activities and programmes implemented in the city of Barcelona during the anniversary had a significant impact on the public due to the multitude of activities that took place. Additionally, many organisations and entities dedicated to science began to promote it through a program entirely created for this purpose (Revuelta, 2007). All this mechanism enabled the creation of Local Units of Scientific Culture (UCC) throughout Spain, as they were initially identified, which at that time already foresaw that they would have plenty of work ahead to develop.

In many universities and centres, the UCC+i represents a structure that provides visibility and the opportunity to engage with the general population or specific groups. Among these groups are science journalists (Moreno, 2022), who in recent years have gained popularity in the media by making scientific content understandable to the public, promoting interest, and fostering the cultural advancement of society. A recent example can be found in the COVID-19 health crisis, which has reconnected the

less interested public to this type of news and those more distant from scientific knowledge (Casero-Ripollés, 2020). Young people, individuals with less education, and sporadic consumers of information are the groups that consumed the most news about the coronavirus during the pandemic. In contrast, Spanish universities have not played a prominent role in the social management of knowledge during the health crisis on YouTube (Simancas and Blanco, 2022). They had a reactive response to the crisis, as they have been adapting content to the needs and evolution of the health situation.

Furthermore, the lack of connection between university UCC+i and society is also determined by the fact that these entities present a too institutional and corporate facet on platforms like YouTube (Buitrago and Torres-Ortiz, 2022). This causes the audience to not identify with the individuals providing information, leading to a sense of detachment.

1.4. Goals

The main objective of the study is to analyse the evolution of the professional structure of the UCC+i and delve into its adaptation to the digital context. In particular, the research is developed based on the following specific goals:

- O1. Organise the current map of UCC+i (Research and Development + Innovation) in Spain.
- O2. Identify their main professional functions and level of specialisation.
- O3. Determine their institutional location to identify who manages them.
- O4. Examine their human resources management to analyse the number of workers, the evolution since their creation, and future prospects in terms of staff.
- O5. Analyse the professional recognition that UCC+i professionals have and find out the reason behind it.

The recent launch of these units in Spain has caused a lack of studies of them to be published yet. Nevertheless, the growing interest in science communication is promoting research on these units. One of the latest published studies (Alonso-Flores et al., 2020) analyses the contribution of institutional communication to the impact and visibility of research in the UCC+i of Carlos III University of Madrid. It identifies that UCC+i in universities plays a prominent role in promoting scientific work produced within the institution. On the same subject, another recent study on these units (González-Pedraz et al., 2018) emphasises in its conclusions that UCC+i enhances the visibility of science and knowledge developed in Spanish research centres through the media. This is because they bring these topics into public debate and contribute to improving the scientific culture of society.

Likewise, Parejo-Cuéllar et al. (2016) state that UCC+i contributes to the university environment by enhancing the communication of results through communicative resources such as press releases. However, multimedia tools for science communication remain a pending issue for many universities. In a later study, these same authors (Parejo-Cuéllar et al., 2017) assert that these units have different functions other than press offices, so they execute complementary actions and often collaborate with them due to the nature for which they were conceived.

2. Current map of the UCC+i: modalities and professional network in 2023

The current map of UCC+i is shaped by research centres and universities, both public and private. The UCC+i Network was established in 2007 to promote these units in research centres and universities (FECYT, 2015). In the first year of the network's foundation, a call for proposals with over 1.7 million euros was published, resulting in the creation of fifty-three units spread across the entire Spanish geography.

The launch of this network aimed to create offices or units for the dissemination of scientific culture in research centres that did not have such a service. At the same time, it sought to train and guide those units that were already engaged in similar activities (FECYT, 2021). These initial units marked the beginning of a structure that has continued to grow since then to promote the science of the organisations they are part of, although it is true that it has experienced highs and lows depending on the calls for proposals.

The year 2007 represented the first step towards the creation of the ambitious UCC+i Network, and gradually, universities and research centres began establishing these units within their institutions. Until 2019, forty-four new units were created, with notable years like 2018 adding seven units and 2019 introducing four more. All was organised within the mentioned network and under the coordination of FECYT, with years of significant additions, such as 2012 with ten new units, 2018 with eight, and 2019 with another ten. Presently, in 2023, there are one hundred and twenty-three registered UCC+i, a figure that inspires optimism regarding the ongoing growth of this network for knowledge promotion.

The categories of UCC+i were established through the publication of the 'White Paper on Units of Scientific Culture and Innovation UCC+i', which was published in 2012 and updated in 2021 by FECYT. This manual sets out the basic criteria for defining a UCC+i, although other units unofficially use this designation. FECYT classified the units (Table 1) based on the traits that best defined them, thus establishing the minimum requirements that a UCC+i had to meet to be considered as such (FECYT, 2021).

Table 1. Typology of UCC+i

Typology of UCC+i	
Lines of action of the UCC+i	Communication of results. Promote innovative content from the results produced in research centres.
	Dissemination. Disseminate content that contributes to increasing the scientific and technological culture of citizens.
	Training. Advise and train researchers, promoters, and communicators of science and technology.
	Research. Study the social perception of science, the level of scientific culture, or the interest of citizens in science and technology.
Nature of the centre or entity to which they belong	Public. Established in public (state funded) universities and public research organisations and centres.
	Private non-profit. Established in private universities, private research centres, technology centres, science and technology parks, foundations, and business associations, among others.
Geographic area of its lines of action	Area. The area can be local, regional, national, or international.
Target audience	Groups. Prioritises the scientific community, the media and communication agencies, young people, children, and teachers.
Sources of funding	Resources. Own funds, public or private sponsorships.

Source: elaborated by the author from the UCC+i White Paper (FECYT, 2021)

After this classification, FECYT published, up to the present date, a document that compiles the work produced by the units during the period 2007–2014. In this study (FECYT 2015), forty-eight UCC+i out of the seventy existing in the network in 2014 participated. From 2015 onwards, and with this new publication, FECYT focuses the work of the UCC+i on specialisation in different defined fields (Table 2).

Table 2. UCC+i modalities

UCC+i modalities	
Fields in which they focus their activity (*)	The communication of the results of scientific research developed by the entities to which they belong.
	Promotion of science or bringing science closer to society, especially to those who are farthest away from it.
	Advice and training in communication and dissemination of science to researchers.
	Research on the social perception of science following the Responsible Research and Innovation (RRI) model developed by the European Union.

Source: elaborated by the author from the UCC+i White Paper (FECYT, 2021)

(*) FECYT includes as a mandatory requirement that the UCC+i belonging to the network must develop at least two of the mentioned modalities, with one of them necessarily being one of the first two.

In 2023, FECYT had a total of one hundred and twenty-three UCC+i registered. Out of these, seventy-three were in research centres and fifty in universities. Following the display of the different modalities, a first table (Table 3) has been prepared presenting the UCC+i from research centres and a second table (Table 4) with the UCC+i from universities, all registered in 2023 in the FECYT network.

Table 3. UCC+i network of research centres in 2023

Centres and organisations with UCC+i	
Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC)	Fundación para el Desarrollo de la Enfermería (Fuden)
CSIC - Delegación Galicia	Fundación para el Fomento de la Investigación Sanitaria y Biomédica de la Comunitat Valenciana (FISABIO)
CSIC - Delegación Valencia	Fundación Parque Científico y Tecnológico de Castilla-La Mancha
Asociación Colaboración Cochrane Iberoamericana	Fundación Parque Científico y Tecnológico de Extremadura (FUNDECYT - PCTEX)
Associació Catalana de Comunicació Científica	Fundación Pública Andaluza Progreso y Salud
AZTI - Tecnalía	Fundación Séneca
Campus de Excelencia Internacional en Agroalimentación (ceiA3)	Geociencias Barcelona

Centre de Visió per Computador (CVC)	Hospital Universitario 12 de octubre
Centro de Astrobiología (CSIC-INTA)	ibs.GRANADA - Fundación para la Investigación Biosanitaria de Andalucía Oriental Alejandro Otero (FIBAO)
Centro de Investigación Biomédica en Red, CIBER	IDIBAPS
Centro de Investigación en Agrigenómica (CRAG)	Institut Català de Paleontologia Miquel Crusafont
Centro de Investigación Príncipe Felipe (CIPF)	Institut de Ciència de Materials de Barcelona (ICMAB, CSIC)
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)	Institut de Recerca de l'Hospital de la Santa Creu i Sant Pau (IIB Sant Pau)
Centro Nacional de Aceleradores (CNA)	Institut d'Investigació Biomèdica de Lleida Fundació Dr Pifarré (IRBLleida)
Centro Nacional de Biotecnología (CNB)	Instituto Andaluz del Patrimonio Histórico (IAPH)
Centro Nacional de Investigación sobre la Evolución Humana, CENIEH	Instituto de Astrofísica de Andalucía
Consejo Superior de Investigaciones Científicas (CSIC). Delegación Aragón	Instituto de Astrofísica de Canarias
Consejo Superior de Investigaciones Científicas (CSIC). Delegación Illes Balears	Instituto de Biología Evolutiva (IBE, CSIC-UPF)
Consorcio Centro de Láseres Pulsados (CLPU)	Instituto de Biomedicina de Sevilla (IBIS)
Consorcio para el Diseño, la Construcción, el Equipamiento y la Explotación de la Plataforma Oceánica de Canarias	Instituto de Ciencias Matemáticas (ICMAT)
Consorcio para la Construcción, Equipamiento y Explotación del Laboratorio de Luz Sincrotrón (CELLS)	Instituto de Investigación Biomédica de Bellvitge (IDIBELL)
Consorcio Parque de Investigación Biomédica de Barcelona (PRBB)	Instituto de Investigación Biomédica de Salamanca (IBSAL)
Euskampus Fundazioa	Instituto de Investigación Sanitaria Biodonostia (IIS Biodonostia)
Fundació Institut de Bioenginyeria de Catalunya (IBEC)	Instituto de Investigación Sanitaria Galicia Sur (IISGS)
Fundació per a la Universitat Oberta de Catalunya	Instituto de Investigación Sanitaria La Fe
Fundació Privada Centre de Regulació Genòmica	Instituto de Investigaciones Marinas (IIM-CSIC)

Fundació Privada Institut de Recerca de la Sida IrsiCaixa	Instituto de la Grasa (IG-CSIC)
Fundación 3CIN	Instituto de Salud Carlos III
Fundación Canaria General de la Universidad de La Laguna	Instituto Español de Oceanografía (IEO)
Fundación Canaria Parque Científico Tecnológico de la Universidad de Las Palmas de Gran Canaria	Instituto Geológico y Minero de España (IGME)
Fundación de Investigación del Cáncer de la Universidad de Salamanca	Instituto IMDEA Software
Fundación Descubre	Instituto Maimónides de Investigación Biomédica de Córdoba (IMIBIC)
Fundación Gaiker	Instituto Nacional de Técnica Aeroespacial (INTA)
Fundación INCLIVA	ISQCH - INMA (antes Instituto de Ciencias Materiales de Aragón)
Fundación Institut de Recerca Biomèdica (IRB Barcelona)	Parc Científic de Barcelona
Fundación Instituto de Investigación Marqués de Valdecilla (IDIVAL)	Real Sociedad Española de Física
Fundación Instituto de Salut Global de Barcelona	

Source: elaborated by the author from data contributed by the FECYT

Table 4. UCC+i network of universities in 2023

Universities with UCC+i	
UDIMA	Universidad de Navarra
Universidad Autónoma de Barcelona	Universidad de Oviedo
Universidad Autónoma de Madrid	Universidad de Salamanca
Universidad Carlos III	Universidad de Sevilla
Universidad Católica de Valencia San Vicente Mártir (UCV)	Universidad de Valladolid
Universidad Católica San Antonio de Murcia	Universidad de Zaragoza
Universidad Complutense	Universidad del País Vasco
Universidad de Alcalá	Universidad Francisco de Vitoria

Universidad de Alicante	Universidad Internacional de La Rioja
Universidad de Almería	Universidad Miguel Hernández
Universidad de Barcelona	UNED
Universidad de Burgos	Universidad Politécnica de Cartagena
Universidad de Cádiz	Universidad Politécnica de Madrid
Universidad de Cantabria	Universidad Pontificia de Comillas
Universidad de Castilla - La Mancha	Universidad Pública de Navarra
Universidad de Córdoba	Universidad Rey Juan Carlos
Universidad de Extremadura	Universidade de Vigo
Universidad de Granada	Universitat de les Illes Balears
Universidad de Huelva	Universitat de València
Universidad de Jaén	Universitat de Vic
Universidad de la Coruña	Universitat Internacional de Catalunya
Universidad de La Rioja	Universitat Jaume I de Castellón
Universidad de León	Universitat Politècnica de València
Universidad de Málaga	Universitat Pompeu Fabra
Universidad de Murcia	Universitat Rovira i Virgili

Source: elaborated by the author from data contributed by the FECYT

3. Methodology

In line with the stated objectives, this study has employed a quantitative methodology. A survey was developed for professionals in UCC+i to analyse their work comprehensively. With this technique, study variables are measured objectively and with a high degree of precision (Lafuente and Marín, 2008). Particularly, data on certain variables is collected and analysed to support and strengthen the in-depth identification of the reality of science communication generated through UCC+i in Spanish universities and research centres. Therefore, the survey is used as a sampling method among the specific population targeted

in this research. Data collection is conducted through a questionnaire distributed to a sample of the population, emphasising the participant's anonymity.

For the survey, all UCC+i that were part of the FECYT Network, under the Ministry of Science and Innovation of the Government of Spain, were used as the sample. The universe of the sample includes the 96 UCC+i that were registered on the network in 2019. Under the umbrella of the Foundation, this network encourages the exchange of experiences and the search for synergies among entities, improving the quality of the products and services of the UCC+i and encouraging the optimisation of resources.

The online surveys were directed to the individuals in charge of the UCC+i, with the collaboration of FECYT as the coordinating entity of the network. Specifically, the questionnaire was sent via email to the person in charge of the unit at the Department of Scientific Culture and Innovation of FECYT, César López García, with the aim that he would distribute it to all UCC+i in the network, as he has a database with all the units. This survey was created using the Google Drive form. It was conducted through multiple invitations to all UCC+i managers to gather the maximum number of responses.

The questionnaire prepared for the units was sent to 96 UCC+i in December 2019, and by January 2020, fifty-eight completed questionnaires had been collected. This represents 60.4% of the total UCC+i population in Spain during that period.

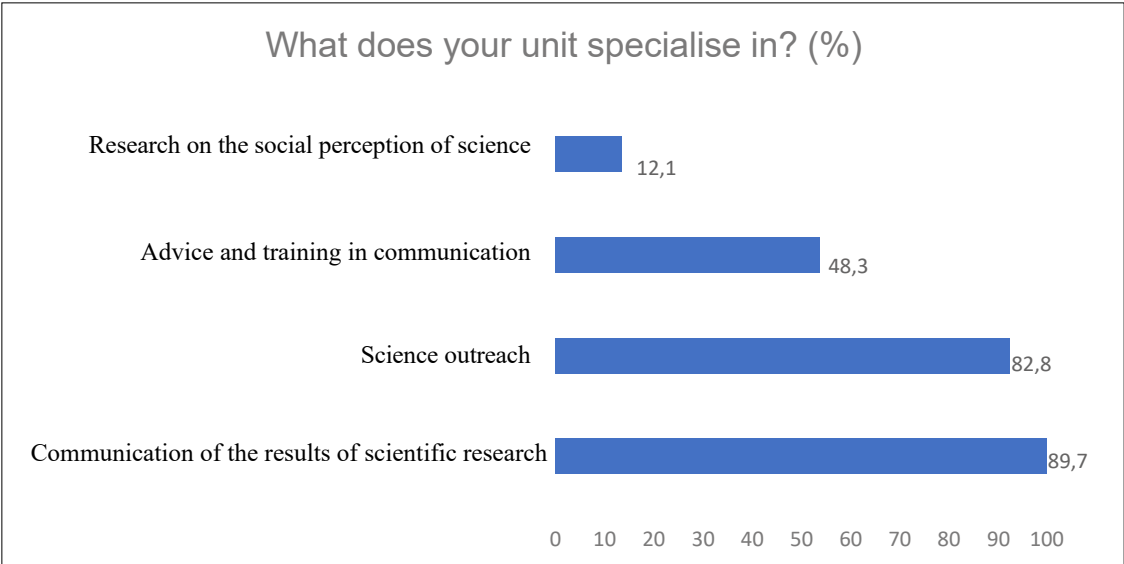
4. Results

The analysis of the conducted survey provides a deeper understanding of the perceptions of UCC+i professionals regarding the structure and teams that create these units. In particular, below are the results obtained regarding four specific questions: the type of functions and level of specialisation of the units (4.1); the department or area where it is located at the institutional level (4.2); the number of workers and any increase or decrease in recent years (4.3); and finally, the level of importance attributed by the centre or university where it is situated (4.4).

4.1. Main functions: communication of results and dissemination

According to FECYT, the units must be specialised in certain actions that have been previously established by the Foundation. Among the four options offered by FECYT, two stand out: communication of the results of scientific research with the fifty-two UCC+I performing it (89.7%) and science outreach with the forty-eight UCC+I (82.8%). It seems that for UCC+I, it is a priority to communicate the scientific investigations conducted in their research centres and universities. To a lesser extent, but still relatively important, other specialities in which UCC+I can work include advice and training in communication, with twenty-eight UCC+I dedicated to it (48.3%), and research on the social perception of science, with seven UCC+I dedicated to it (12.1%) (Figure 1). For a few units, training to effectively communicate the results of researchers from the centres and universities holds significant weight, as does, to a lesser extent, how society perceives science.

Figure 1. Specialisation of the UCC+i



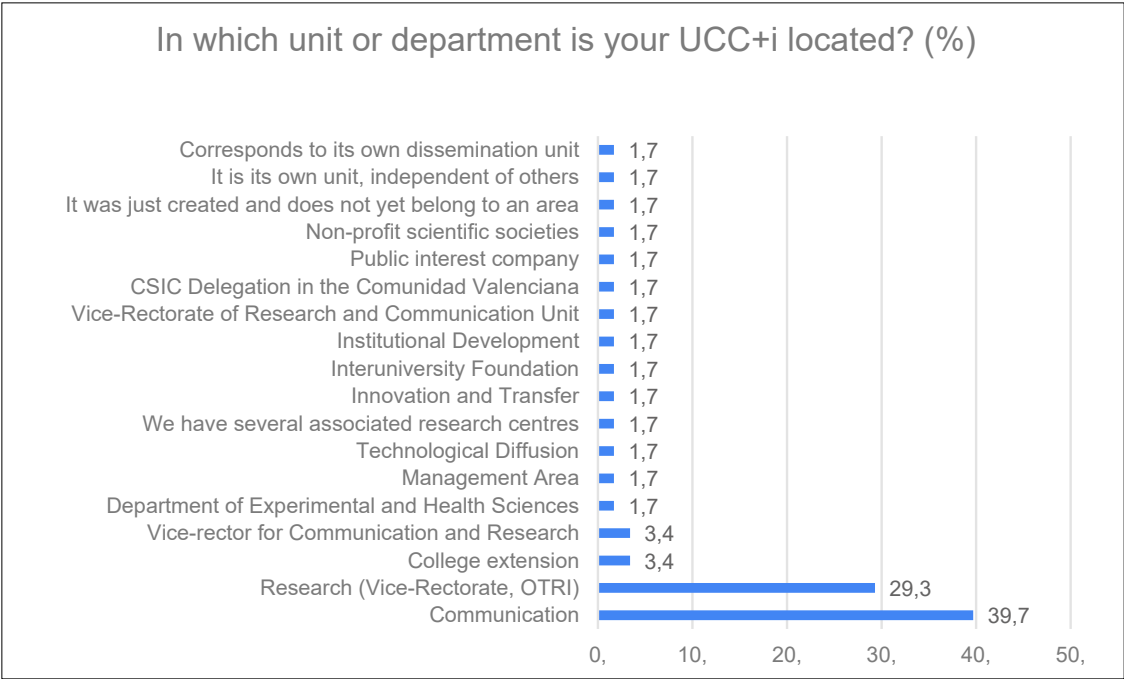
Source: elaborated by the author

4.2. Institutional position between communication and research

The general trend is to group the units under the research area or the communication department. According to the collected responses shown in the graph (Figure 2), there is a total of twenty-three UCC+I (39.7%) under the Communication department, followed by those under the Research area, either through the Vice Chancellorship or the Offices of Research Results Transfer (OTRI), totalling seventeen UCC+I (29.3%). It is also noteworthy that there are some units that depend on both the Vice Chancellorship of Research and the Communication Unit (3.4%).

However, not all units are grouped into these two departments. As observed in the rest of the responses, the different areas to which they belong are more segmented. In this regard, they are in the Management area (1.7%), the department of Experimental and Health Sciences (1.7%), as a separate unit (1.7%), University Extension (3.4%), innovation and transfer (1.7%), or even newly created and not yet belonging to a specific area (1.7%), technological dissemination (1.7%), various associated research centres (1.7%), interuniversity foundation (1.7%), institutional development (1.7%), CSIC delegation in the Comunidad Valenciana (1.7%), public interest society (1.7%), non-profit scientific societies (1.7%), and correspond to its own promotion unit (1.7%).

Figure 2. Location of the UCC+i in the institution



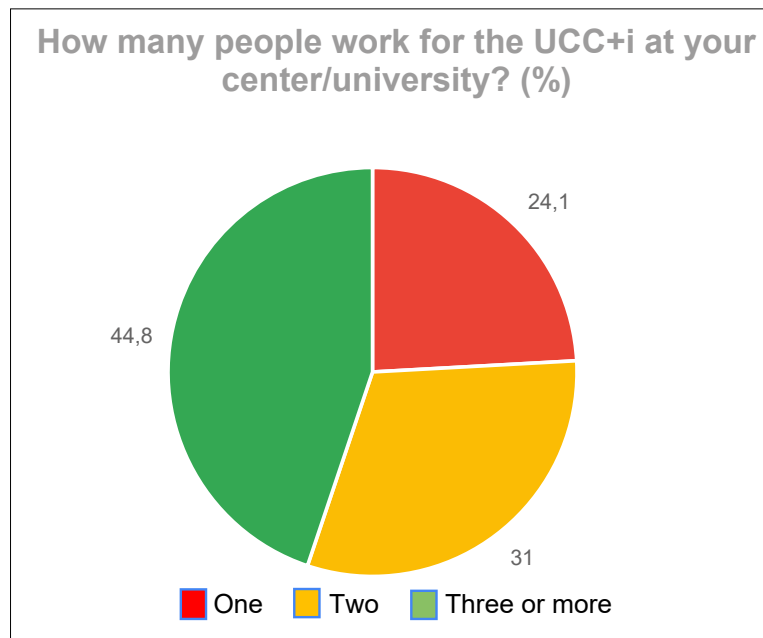
Source: elaborated by the author

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4.3. Human resources: limited but stable teams

44.8% of professionals (Figure 3) are working in a UCC+I with three or more colleagues, compared to 31% who stated they work in pairs and 24.1% who declared to be the sole worker in the unit. This suggests that almost half of them work in teams, even though the number of people may not be very high for conducting the numerous actions they have to undertake.

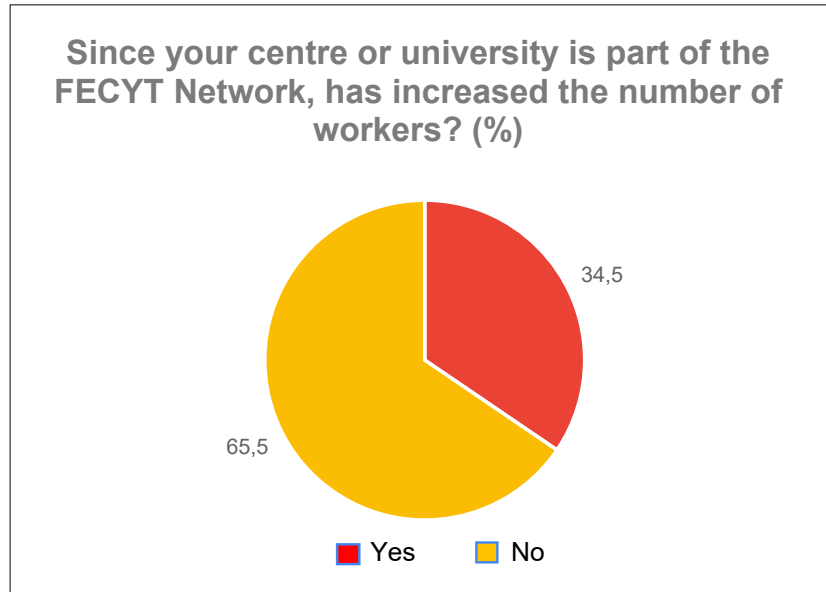
Figure 3. Number of workers in the UCC+i



Source: elaborated by the author

4.3.1. Evolution of the number of workers

65.5% of those surveyed had an increase in the number of workers in their UCC+I after joining the FECYT Network, while 34.5% stated that the figure had not increased (Figure 4). In this regard, there is a positive trend regarding the number of staff hired in the units, indicating that it is considered somewhat significant within their research centres and universities.

Figure 4. Variation in the number of workers in the UCC+i

Source: elaborated by the author

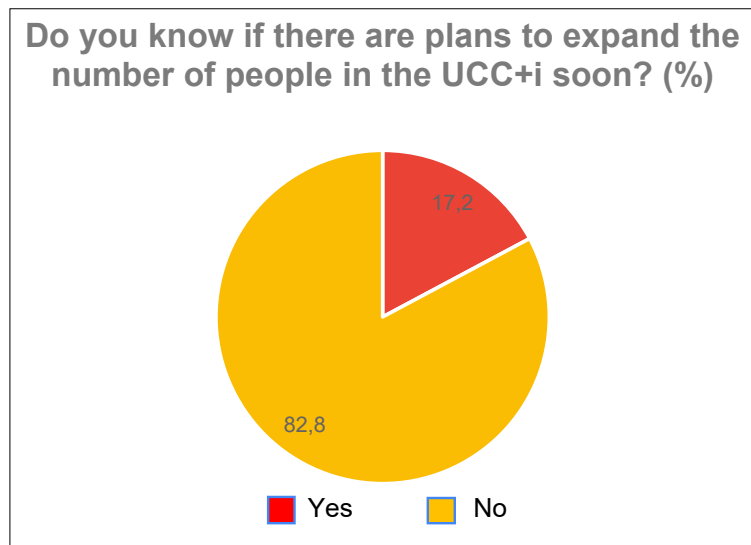
Regarding the number of people working at the opening of the unit and the current staff, the results varied significantly, but in all cases, there is an increase in the number of workers, with some having more substantial growth than others. It is also noteworthy that many lack a stable contract or exclusive dedication to the unit.

There were professionals who reported that initially there were four, and now there are six; another mentioned that there were two, and then increased to six; five workers said they started with one and now are three; another stated they had one worker initially and now have two; another mentioned that currently they have three members, but none with a stable contract and exclusive dedication; another shared that they went from having one worker to four, with all being public workers except the unit's manager, who has been a temporary employee for ten years; another indicated they were two at the beginning and now are five; another responded that currently there are twelve people in the UCC+I; another mentioned they were two at the beginning and now are five; another said that initially there were zero, and now there are two; another communicated they were one and now are four; another affirmed they started with one and still have one; and another explained that initially they were two and now are three.

4.3.2. Limited prospects for staff expansion

The uncertainty regarding the promotion of new job positions for UCC+I is one of the identified trends. 82.8% of respondents (Figure 5) do not know if the number of workers will grow, while 17.2% state that it will.

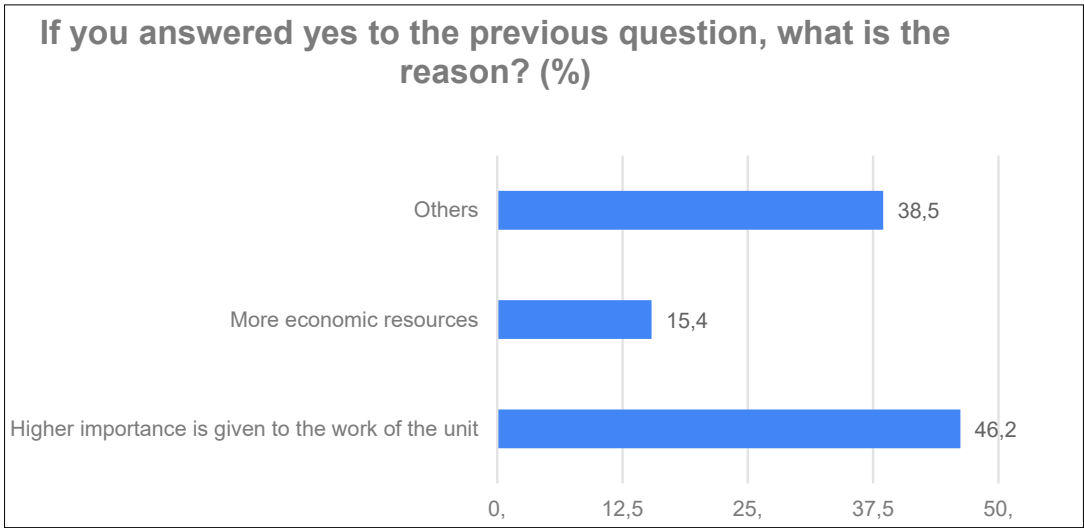
Figure 5. Forecast increase in the number of workers in the UCC+i



Source: elaborated by the author

Concerning the future increase in staff for UCC+I, 46.2% replied that they believe there are plans to increase the number of employees in the unit soon because the tasks they do have greater importance. In contrast, 15.4% believe that the increase in the number of professionals would happen due to the increase in economic resources, while 38.5% attribute it to other unspecified factors (Figure 6). It is noteworthy that almost half of the workers in the units who stated that there would be more staff attribute the growth to the importance given by their centre or university, meaning a crucial recognition for these professionals.

Figure 6. Reason for the increase in the number of workers in the UCC+i



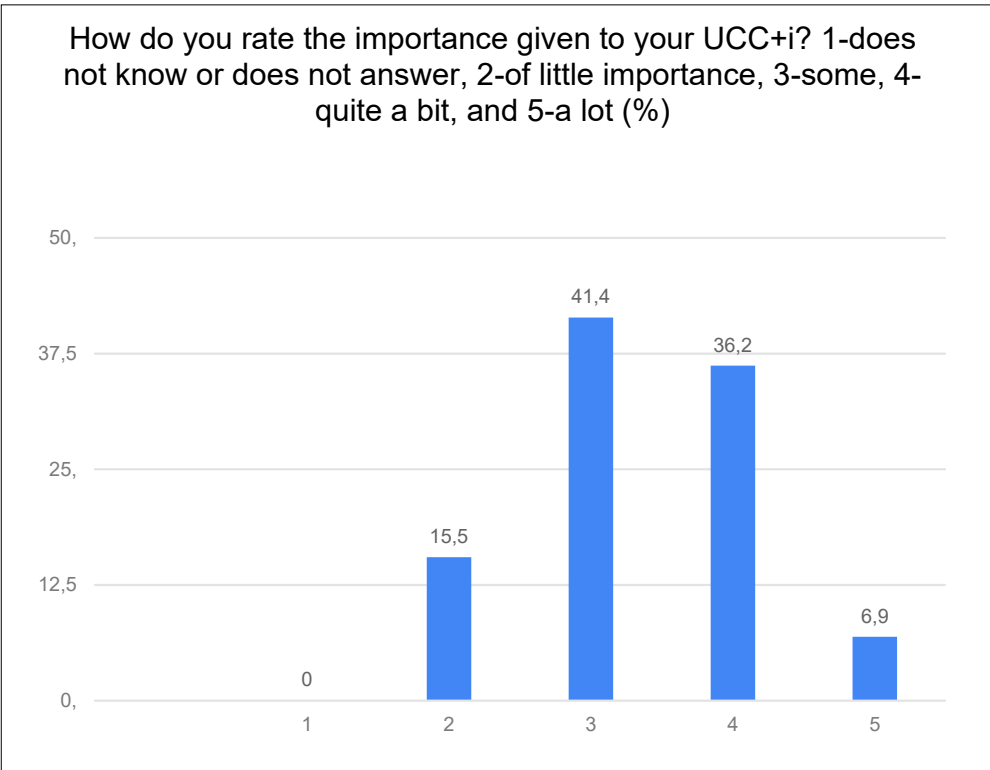
Source: elaborated by the author

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4.4. Limited institutional recognition

While nine individuals (15.5%) of the total respondents consider that their UCC+I is given ‘little’ importance, twenty-four people (41.4%) feel that it is given ‘some’ importance. Additionally, twenty-one professionals (36.2%) believe the importance is ‘quite a bit’, and only four individuals (6.9%) state that it is given ‘a lot’ of importance (Figure 7). These data are significant as they reflect the opinion of these professionals about their workplace in relation to the centre or university where they develop their activities. The low percentage considering it as ‘a lot’ important is notable. However, it is significant the number of individuals categorising it as ‘quite a bit’ or ‘some’. Conversely, few within the collected sample indicate that it is given ‘of little importance’.

Figure 7. Perception of the importance of UCC+i



Source: elaborated by the author

4.4.1. Main reasons: between visibility and lack of resources

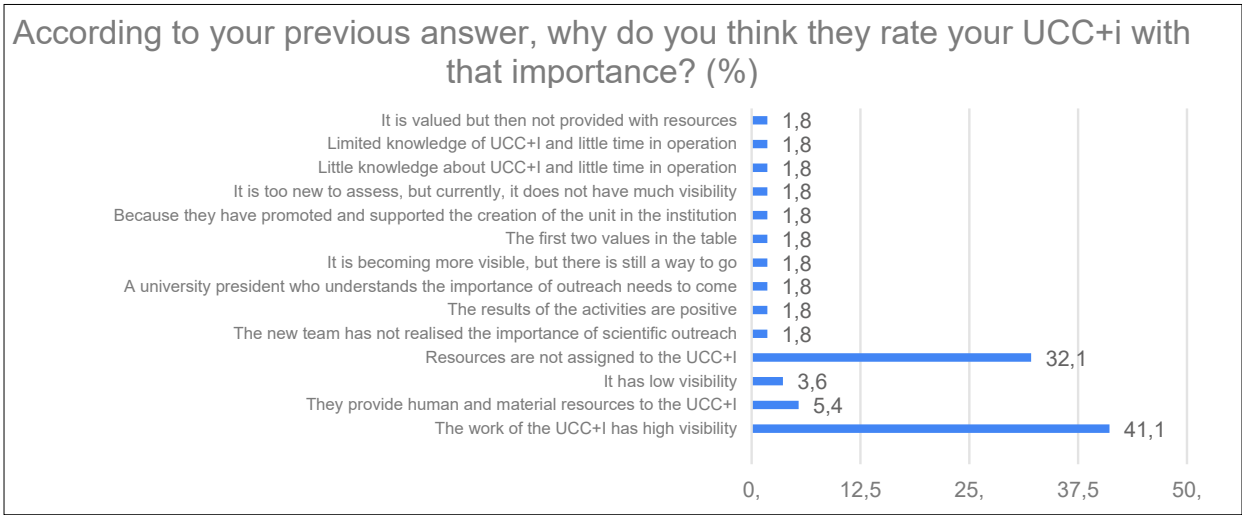
Regarding the level of importance given to their UCC+I, twenty-three of the respondents (41.1%) believe that their centre or university values the unit because “the work of the UCC+I has high visibility”, while three individuals (5.4%) said they believe importance is given because “they provide human and material resources to the UCC+I” (Figure 8).

On the less positive side, there are eighteen individuals (32.1%) who responded that “resources are not assigned to the UCC+I”, and two individuals (3.6%) answered that they are not important because “it has low visibility”.

In the “others” section, the answers were these: “the new team has not realised the importance of scientific outreach”, “the results of the activities are positive”, “a university president who understands the importance of outreach needs to come”, “it is becoming more visible, but there is still a way to go”, “because they have promoted and supported the creation of the unit

in the institution”, “it is too new to assess, but currently, it does not have much visibility”, “little knowledge about UCC+I and little time in operation”, “limited knowledge of UCC+I and little time in operation”, “it is valued but then not provided with resources”.

Figure 8. Reason for the importance of UCC+i



Source: elaborated by the author

5. Conclusions

The present study has enabled us to outline a profile of the structure and teams that constitute the Units of Scientific Culture and Innovation (UCC+i) in Spanish research centres and universities. Regarding specialisation, the results show that these units focus primarily on the ‘Communication of the Results of Scientific Research’ and ‘Science Outreach.’ These two areas stand out among the four options proposed by FECYT to be part of the UCC+i Network, although it is mandatory for each unit to choose at least one of these two specialties. If it were not compulsory, these might not be the specialties with the highest demand.

In contrast, the areas where the units focus less on their activities are ‘Advising and training in communication,’ despite being one of the primary demands from professionals in the units to enhance researchers’ communication. Additionally, there is less emphasis on those units dedicated to ‘Research on the social perception of science,’ which addresses the level of scientific culture, society’s involvement in science, and the formulation of scientific policies. This result is noteworthy given the prominence of this topic in the European Union through numerous research studies, as well as the numerous studies conducted by FECYT on these indicators.

Concerning their location, UCC+i units are mainly under the supervision of communication departments and research areas. However, not all are located in these areas due to their relatively recent emergence, being placed in some cases in different departments, services, or societies due to the lack of a common regulation across universities and research centres. In this sense, there is a need to group these units in a single area within institutions so that they can all operate under the same parameters.

Moreover, concerning human resources, it is noteworthy that professionals in UCC+i units usually work partnered, although there is still a significant number of units with only one hired person. Usually, they conduct their work as a team, although the number of professionals is small. This highlights the fact that the limited number of professionals working in the units may not be able to develop the countless tasks they have to accomplish on a daily basis. Despite the shortage of human resources, there has been an increase in personnel in the units since their inception.

The rise in personnel reflects recognition from the institutions. However, there is no evidence that this upward trend will continue in the coming years, according to these professionals. Those who assert that they will indeed have more human resources attribute this primarily to the importance placed on their unit.

On the contrary, the lack of recognition from the research centre or university is caused by factors such as the low visibility given to it within the institution or the absence of a governing team that advocates for scientific outreach, among other reasons.

In light of all that has been discussed, one could conclude that the evolution of UCC+i as a driving force for science communication has been positive. The high professional visibility stands out as its main strength, leading to a promotion of scientific communication that was not as comprehensive in the past. However, there is still much work to be done by institutions to enable professionals working in these units to better develop their work. They demand an increase in human and material resources, a consistently defined location in all Spanish institutions, and professional recognition within their respective institutions.

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7. Specific contributions from each author

	Name and Surname
Conception and design of work	Susana Barberá-Forcadell and Pablo López-Rabadán
Methodology	Susana Barberá-Forcadell and Pablo López-Rabadán
Data collection and analysis	Susana Barberá-Forcadell
Discussion and conclusions	Susana Barberá-Forcadell and Pablo López-Rabadán
Drafting, formatting, version review and approval	Susana Barberá-Forcadell and Pablo López-Rabadán

8. Conflict of interest

The authors declare that there is no conflict of interest contained in this article.

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