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COMMUNICATION, DISSEMINATION AND EXPLOITATION STRATEGY ANALYSIS IN HORIZON 2020

KEYS TO MULTIPLY THE IMPACT OF EUROPEAN PROJECTS

ANÁLISIS DE ESTRATEGIAS DE COMUNICACIÓN, DISEMINACIÓN Y EXPLOTACIÓN EN HORIZONTE 2020

CLAVES PARA MULTIPLICAR EL IMPACTO DE PROYECTOS EUROPEOS

ALEJANDRA CAMPOS / ALEJANDRA.CAMPOS@UAB.CAT

SENIOR ADVISOR. INTERNATIONAL PROJECTS OFFICE, UNIVERSITAT AUTÒNOMA DE BARCELONA (UAB), SPAIN. RESEARCHER AT THE PH.D. PROGRAMME, DEPARTMENT OF COMMUNICATION, UNIVERSITAT POMPEU FABRA (UPF), SPAIN

LLUÍS CODINA / LLUIS.CODINA@UPF.EDU

PROFESSOR, COORDINATOR MASTER DEGREE IN RESEARCH IN SOCIAL COMMUNICATION. COORDINATOR OF THE RESEARCH UNIT IN JOURNALISM AND DIGITAL DOCUMENTATION. FACULTY AND DEPARTMENT OF COMMUNICATION, UNIVERSITAT POMPEU FABRA (UPF). BARCELONA SCHOOL OF MANAGEMENT (BSM-UPF), SPAIN

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ABSTRACT

This study presents a review work on communication, dissemination and exploitation of results of the European Union research and innovation framework program Horizon 2020, a program of almost 80 billion euros for 2014-2020.

The objective is to clarify the terms communication, dissemination and exploitation of results, activities that multiply the impact of public investment and to give keys about their strategic plans.

As a result, it has been possible to establish the narrative of what the EU expects from European projects regarding the communication of science and the dissemination and exploitation of its results. This clarification will help research teams to generate more assertive proposals.

The methodology of narrative syntheses has been applied and the reference documentation of the participant portal Horizon 2020 has been used as the basis of the evidence. As a method of analysis, structured summaries have been made to prepare the narrative synthesis, core of the work.

In conclusion, strategic planning of impact multipliers is essential. Communication design begins with the proposal; dissemination and exploitation plans, once results have been obtained. Measuring its effects to adjust strategic plans will enhance the overall global impact of the project.

KEYWORDS

Communication; dissemination; exploitation; impact; research; European Union; Horizon 2020; Horizon Europe.

RESUMEN

Este estudio presenta un trabajo de revisión sobre comunicación, diseminación y explotación de resultados del programa marco de investigación e innovación de la Unión Europea Horizonte 2020, un programa de casi 80.000 millones de euros para 2014-2020.

El objetivo es clarificar los términos comunicación, diseminación y explotación de resultados, actividades multiplicadoras del impacto de la inversión pública y dar claves sobre sus planes estratégicos.

Como resultado, se ha podido establecer la narrativa de lo que la UE espera de los proyectos europeos respecto a la comunicación de la ciencia y la diseminación y explotación de sus resultados. Esta clarificación ayudará a equipos de investigación a generar propuestas más asertivas.

Se ha aplicado la metodología de las síntesis narrativas y se ha utilizado la documentación de referencia del portal del participante Horizonte 2020 como base de la evidencia. Como método de análisis, se han realizado resúmenes estructurados para confeccionar la síntesis narrativa, núcleo del trabajo.

Como conclusión, la planificación estratégica de las multiplicadoras del impacto es fundamental. El diseño de la comunicación comienza en la propuesta; los planes de diseminación y explotación, una vez obtenidos los resultados. Medir sus efectos para ajustar planes estratégicos, potenciará el impacto global del proyecto.

PALABRAS CLAVE

Comunicación; diseminación; explotación; impacto; investigación; Unión Europea; Horizonte 2020; Horizonte Europa.

1. INTRODUCTION

The 2010 "Europe 2020 Strategy" of the European Union (EU) has marked the last decade's scientific policies (European Commission, 2010), thanks to the general targets and flagship initiatives to be achieved as goals by 2020. In particular, the Europe 2020 Strategy builds on what the EC considers its seven flagship initiatives. These would seek to "contribute to the society of the future through intelligent, sustainable and inclusive growth" (European Commission, 2019c), as defined by the EC and summarized in table 1.

According to its vision, to achieve these flagship initiatives, each country or region tailors them to their particular situation using national, EU, and international regulations (European Commission, 2010).

Table 1. "Europe 2020 Strategy" general targets and its seven flagship initiatives

EUROPE 2020 STRATEGY

HEADLINE TARGETS

- Raise the employment rate of the population aged 20-64 from the current 69% to at least 75%.
- Achieve the target of investing 3% of GDP in R&D in particular by improving the conditions for R&D investment by the private sector and develop a new indicator to track innovation.
- Reduce greenhouse gas emissions by at least 20% compared to 1990 levels or by 30% if the conditions are right, increase the share of renewable energy in our final energy consumption to 20%, and achieve a 20% increase in energy efficiency.
- Reduce the share of early school leavers to 10% from the current 15% and increase the share of the population aged 30-34 having completed tertiary education from 31% to at least 40%.
- Reduce the number of Europeans living below national poverty lines by 25%, lifting 20 million people out of poverty.

THE 7 FLAGSHIP INICIATIVES OF THE EUROPEAN UNION TOWARDS A SMART, SUSTAINABLE AND INCLUSIVE GROWTH

SMART GROWTH

Development of an economy based on knowledge and innovation.

INNOVATION

"INNOVATION UNION"

EU flagship initiative "Innovation Union" to improve framework conditions and access to finance for research and innovation so as to strengthen the innovation chain and boost levels of investment throughout the Union.

EDUCATION

"YOUTH ON THE MOVE"

EU flagship initiative "Youth on the move" to enhance the performance of education systems and to reinforce the international attractiveness of Europe's higher education.

DIGITAL SOCIETY

"A DIGITAL AGENDA FOR EUROPE"

EU flagship initiative "A digital agenda for Europe" to speed up the roll-out of high-speed internet and reap the benefits of a digital single market for households and firms.

SUSTAINABLE GROWTH

Promoting an economy that makes more efficient use of resources, that is greener and more competitive.

CLIMATE, ENERGY AND MOBILITY

"RESOURCE EFFICIENT EUROPE"

EU flagship initiative "Resource efficient Europe" to help decouple economic growth from the use of resources, by decarbonising our economy, increasing the use of renewable sources, modernising our transport sector and promoting energy efficiency.

COMPETITIVENESS

"AN INDUSTRIAL POLICY FOR THE GLOBALISATION ERA"

EU flagship initiative "An industrial policy for the globalisation era" to improve the business environment, especially for SMEs, and to support the development of a strong and sustainable industrial base able to compete globally.

INCLUSIVE GROWTH

Promotion of an economy with a high level of employment that has social and territorial cohesion.

EMPLOYMENT AND SKILLS

"AN AGENDA FOR NEW SKILLS AND JOBS"

EU flagship initiative "An agenda for new skills and jobs" to modernise labour markets by facilitating labour mobility and the development of skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand.

FIGHTING POVERTY

"EUROPEAN PLATAFORM FIGHTING POVERTY"

EU flagship initiative "European platform against poverty" to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society.

Source: European Commission, 2010

In any case, as the EU executive arm (Ludlow, 2018), the European Commission (EC) is in charge of leading the implementation of the strategic plans it approves, as in the case of the "Europe 2020 Strategy" as a whole.

One of these flagship initiatives, the "Innovation Union", which is part of Europe 2020, sets up the policies related to the European funds for research and innovation. The stated target is to enhance the innovation chain, from basic science to the market and society (European Commission, 2010). This initiative was implemented under the European Framework Programme

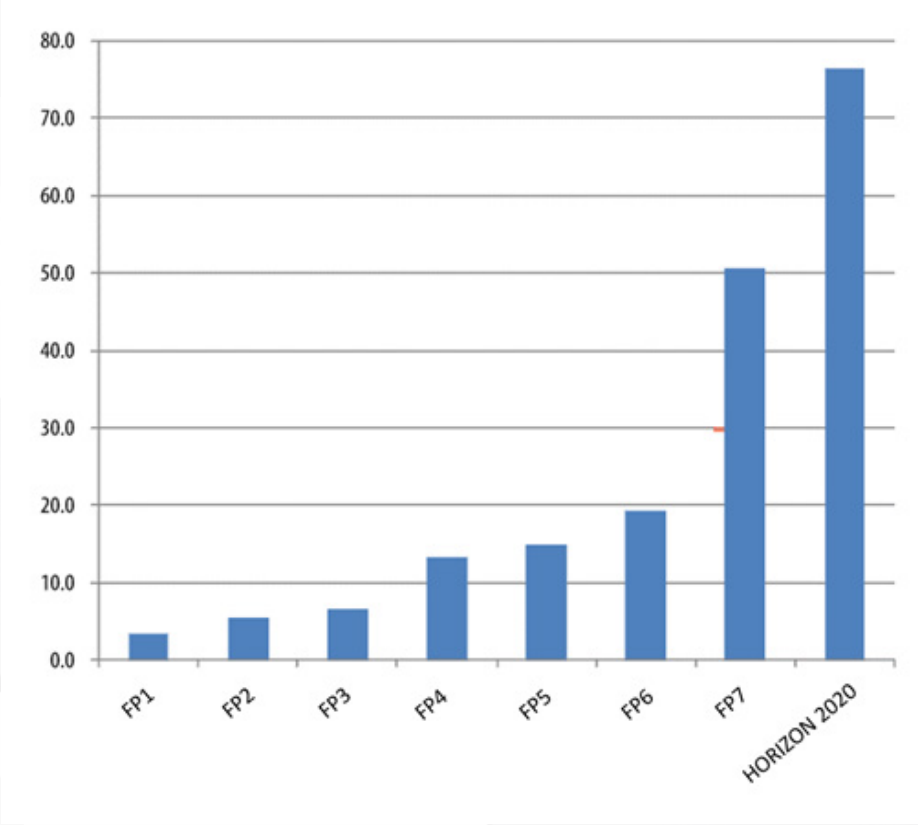
for Research and Innovation. It is a programme of programmes (Reillon, 2015), called Horizon 2020 in its 8th edition. It brings together calls for competitive projects in a range of 7 years, from 2014 to 2020.

By doing so, the EC's public policies are adopted in Horizon 2020 work programmes' calls. It is expected that the programmes will be adopted in the projects presented by the participants (Mc Carthy, 2014) competing for these funds. Thus, the European Union (EU) invests public money in science and its research and innovation activities (European Commission, 2016), resulting in new knowledge, new products, and services, as well as in technological and social innovation (European IPR Helpdesk, 2016).

According to its vision, one of "Europe 2020 Strategy" pillars has been to focus on excellent science to place its results as the economy's driver. This has been further enhanced by promoting the opening of Horizon 2020 to participants from many countries around the world.

As Carlos Moedas, EU Commissioner for Research, Science and Innovation in 2014-2019, stated in July 2019, the impact of public investment is critical. As Moedas argues, "for every 100 euro we invest [in research and innovation] through Horizon 2020, we expect to add 850 euro to our GDP by 2030, creating millions of jobs for Europeans" (European Commission, 2019b).

Figure 1. The financial scale of successive European framework programmes (in billions of euros)



Source: European Court of Auditors (ECA). Seen on: 31.07.2020

In principle, the EC states that by investing public funds, it aims to transform the ideas from laboratories into innovative products or services that can reach the market, to create economic growth and jobs to improve society's living conditions in the EU and the world (European Commission, 2014b).

This is how the cutting-edge research funded by the EU research framework programme is supposed to have contributed to discoveries that are highly relevant to science like "exoplanets, the Higgs boson and gravitational waves, first images of a black hole, and at least 17 Nobel Prize winners received EU research funding prior or after their award" (European Commission, 2019b).

1.1. BACKGROUND, STATE OF THE ART AND PREVIOUS THEORIES

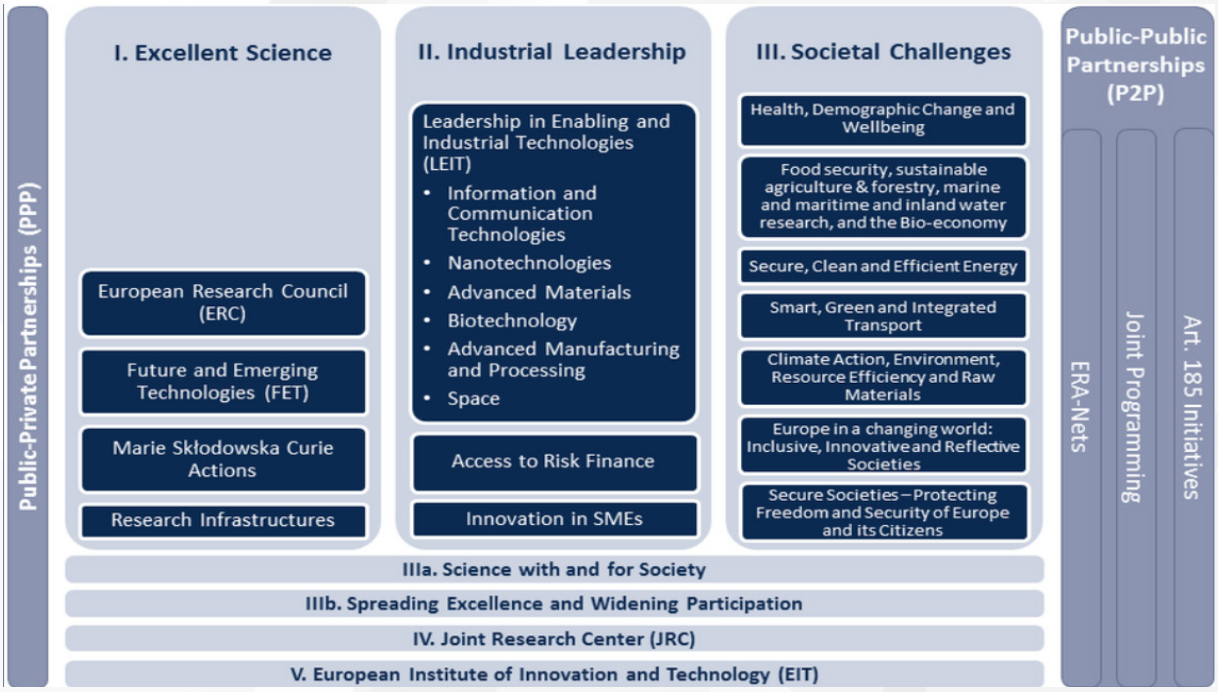
The European framework programme Horizon 2020 is highly competitive. The EC states that it seeks to globally finance cutting-edge science and technology that adopt public policies and benefit the economy, the environment, science and innovation, to solve societal challenges (European Commission, 2019c).

This way, the EC programme "Horizon 2020 has an impact on a wide range of EU policies and is managed by several Commission's Directorates General, which adds to its complexity" (ECA, 2018).

The fact of generating new knowledge and technologies based on innovation has a substantial economic impact (European Commission, 2019b). The EC Innovation Union aims to "improve conditions and access to finance for research and innovation in Europe, to ensure that innovative ideas can be turned into products and services that create growth and jobs". Therefore, the EC's crucial importance to the impact of science proposals that compete for funding is evident.

The funds that the EU allocates to the framework programme are obtained through research and innovation proposals submitted to the competitive calls of the work programmes detailed in table 2.

Table 2. Horizon 2020 framework programme (2014-2020): The three main pillars (excellent science, industrial leadership, and societal challenges) and their work programmes



Source: European Commission and Technische Universität Dresden

The proposals compete against each other for finance based on a comprehensive evaluation carried out by experts on the calls' subject.

These evaluators analyse and score the three main sections: excellence, impact, and implementation (European Commission, 2016). Proposals with a chance of success are usually excellent and well planned, although it is in the impact section where it is difficult to obtain a high score.

Research teams are used to competing on excellent science. However, competing on impact from a holistic perspective (scientific-technical, economic, environmental, and as a solution to societal challenges) is a complex challenge for the consortia of teams seeking to be successful with their competitive proposals.

In addition to this holistic analysis that must be carried out for each case, the impact must include a plan to disseminate and exploit results, and a communication plan. Therefore, it is essential to know what the EC expects participant entities to explain each of these activities in a successful proposal.

In addition to publishing scientific developments through the usual channels and protecting possible results that might be commercially exploited in the future, scientific teams are expected to reach out to those who may be interested in their results and learn to communicate with the general public (Council of the Royal Society, 1995) (Fischer, 2013).

However, "paradoxically, the advancement of science is accompanied by a loss of prominence in the traditional media. As science journalism declines, the EU sets the issue of science dissemination as a top priority" (Cortiñas & Alonso, 2014).

Therefore, there is a paradox to be addressed through research of science communication and by the same scientists who are the beneficiaries of public funds to reverse the process of science's prominence in traditional and social media. European framework programmes have EU's full support to ensure that science communication reaches in an informative language the same society that finances with its taxes science and innovation.

1.2. STUDY PERSPECTIVES

This study presents the aspects of social communication, scientific dissemination, and economic exploitation of the European policies on research and innovation that are considered the drivers of the European economy. Understanding the EC's significant commitment to research and innovation will allow us to understand why projects that receive public investment are expected to have a significant impact.

This article analyses the policies for multiplying impact in the European research and innovation system through the analysis of crucial reference documentation of the European framework programme Horizon 2020, given that:

- Horizon 2020 is the programme that implements the flagship initiative "Union for Innovation", which mission is to develop the economy based on knowledge and innovation for smart growth in the EU.

- It is the existing EU framework programme "that provides research and innovation funding for multinational collaboration, as well as for individual researchers and supports SMEs with a special funding instrument" (European Commission, 2020i).
- It is the biggest public research and innovation programme globally (ECA, 2018), both in terms of its budget allocation — planned at around 80 billion euros for proposals submitted during its seven years (2014-2020) —, and in terms of ambition of its impact.
- It is a European programme with international reach and an international reference since it is open to a whole ecosystem of science and innovation (excellent researchers, universities, companies, associations, public administrations, NGOs, among others).
- It is open to participating teams from all over the world. A large part of the world can receive funding: from the 27 countries that make up the EU and its 24 overseas territories to 16 associated countries with the EU for this programme and 124 third countries that have signed a participation agreement (European Commission, 2019e).

1.3. OBJECTIVES

This study aims to disseminate the European policies on science and innovation to help research groups participate with greater assertiveness. Clarifying concepts can encourage participation and even guide proposals towards success.

Therefore, this study focuses on the communication, dissemination, and exploitation of results. The EC defines these three activities as multipliers of financed projects' impact and, as such, multipliers of public investment.

Establishing the critical aspects of communication, dissemination, and exploitation of results, as defined and understood by the EU, provides a narrative that will help multiply the impact of investment in science and innovation, both in the current Horizon 2020 and in the next framework programme, Horizon Europe. Consequently, the following objectives are proposed:

- Define exploitation of research results, dissemination of developments in science, and communication to broad audiences as the main activities for multiplying impact.
- Sum up the contractual obligations that must be foreseen by the beneficiaries of projects publicly funded under the European research and innovation system.
- Provide clues to develop strategic plans that enhance the impact of investment in financed projects:
  - o The dissemination and exploitation plan enhances the results of the project. The science system already has means to monitor and measure these activities.
  - o The communication plan seeks to reach broad audiences with specific messages. The basis for a methodology to develop strategic communication plans (Ander-Egg & Aguilar Idáñez, 2005) based on ten questions is provided. Enhancing the efficiency of the social communication of European projects publicly funded is a challenge identified by the EC in the mid-term evaluation and an issue, which aims to improve in the coming years.

2. DESIGN AND METHOD

A scientific narrative syntheses methodology (Popay et al., 2006) (Finfgeld-Connett, 2018) has been applied to analyse the document bank base evidence, consisting of the set of EC reports and documents on these concepts published in different sections of its Participant Portal (European Commission, 2020i).

As analysis method, structured summaries have been produced for each of these documents. Based on them, following the methodology, the narrative synthesis that constitutes the core of this report has been drawn up. The summaries have been reviewed and agreed upon by the two authors of this review to strengthen the consistency.

As mentioned, Horizon 2020 aims to be the instrument to implement Europe 2020, the European strategy 2010-2020 for global competitiveness and job creation, which attaches particular importance to economic, intelligent, sustainable, and inclusive growth (European Commission, 2020j)(European Commission, 2019c).

Therefore, the project's impact is crucial and an opportunity to promote science and innovation in Europe and globally. The public commitment to responsible research and innovation (RRI) improves the relationships between research, innovation, and society by recognizing and integrating each participant and forms of knowledge (RRI-Tools project, 2015) with the importance of its contribution to the value chain of all kind of developments (social, economic, environmental, technological, etc).

The scientific systematize reviews and narrative synthesis methodology applied to the selected document bank has enabled the generation of the narrative presented in this article, whose main contribution is to clarify concepts by applying the scientific method. As another innovative element, it provides a tool to enable researchers to develop communication plans more effectively.

The Horizon 2020 framework programme is changing the way we plan and therefore approach science projects — focussing on a more holistic vision of the project's existence and the contribution of its results — submitted for funding.

The analysis of this bank of documents has made it possible to identify the challenges faced by thousands of research teams seeking for funding under the framework programme. Therefore, contributing to the theoretical framework with the narrative synthesis of this article is considered essential.

As the biggest in science and innovation, the framework programme is a benchmark for science projects worldwide. According to the EC Dashboard, based on amounts that are not total yet, by mid-January 2021, it had allocated 59,740 million euro to a total of 31,428 projects with 156,440 participating teams from more than 140 countries. These figures show the scale of the trend that is creating in leading research teams.

3. DEVELOPMENT

Since the beginning of Horizon 2020 in 2014, and concerning the subject of study, there has been an improvement in the guidelines set out in the calls so that the participant can present bolder proposals with regard to what is requested in the forms' sections, especially on impact.

As the European Court of Auditors (ECA) indicates in its 2018 report, "beneficiaries need more user-friendly guidance and tools". In its report, as one of the first recommendations to the EC, it calls for "better communication with applicants and beneficiaries". A recommendation that the EC has accepted. At the same time, it states that "the majority of simplification measures brought into Horizon 2020 have made life easier for beneficiaries, but opportunities to improve still exist".

Along these lines, a guide developed by IPR Helpdesk in 2017 has turned out to be a key document "to help clarify the confusion" between communication, dissemination, and exploitation of results (European IPR Helpdesk, 2018) given the dispersed reference information.

In light of these and other recommendations, the EC has introduced improvements to the Participant Portal in recent years and months. However, to achieve a holistic understanding of what is expected, professionalism in the way projects are presented is still necessary. A skill that the participants, who are excellent in their sciences or the innovative power of their contributions, seldom possess. It is necessary to know the basis of the requirements, such as the policies implemented with the research programmes that fund science and innovation, in order to be able to align with them.

According to the ECA study, "36% of the respondents to [the ECA] survey said that they required help from external consultants during the proposal preparation phase".

Generally, large universities, research centres, or large companies have advisory teams to obtain funds to finance the activities of their research or innovation teams.

However, for other types of entities, such as SMEs, which core business is not research, it is estimated that they have required an investment of "up to 5% for proposal preparation and 5% for project implementation" or advice during the management of the project, which "is a barrier to apply to Horizon 2020 for SMEs which cannot afford the related costs" (ECA, 2018).

Therefore, any synthesis of the indications, concepts, and recommendations for the participants can be considered a new material that adds value to support and simplify their participation in a more assertive way in the European science and innovation programme. On the other hand, it aims to reduce costs associated with searching for sources to save on external consultancies.

It should be noted that the EC documentation used as the basis of this study have been drawn from reflections of EC expert people or bodies, internal or external, studies, white papers of platforms, public consultations, and hearings, which as a whole aim to reflect the best position or solution in the interest of the EU members (European Commission, 2021), and that provide a scientific-technical framework for EC policies and documents.

To tackle this study, information on the three impact multipliers of projects publicly funded has been required, consisting in the exploitation of results, the dissemination and the communication.

A series of documents in the EC funding and tenders portal known as the "Participant Portal" (European Commission, 2020i) (European Commission, 2020g) (European Commission, 2020h) have been identified as document bank and evidence base for this research:

- Glossary Horizon 2020 (European Commission, 2020c)
- Online Horizon 2020 Manual, chapters on dissemination and exploitation (European Commission, 2020b); and communication of the project (European Commission, 2020a)
- Proposal forms: Horizon 2020 offers various types of actions, depending on the type of research or innovation funded. This study will focus on three types of actions that, according to data from the EC Dashboard last seen on 3rd August 2020 (European Commission, 2020f), amount to 69.91% of beneficiaries (101,408 participants) of a total of 145,052. These are:

  - Research and innovation actions (RIA): They aim to "establish new knowledge and/or to explore the feasibility of new or improved technology, product, process, service or solution. For this purpose, they may include basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory" (European Commission, 2017c) (European Commission, 2020k). They are collaborative, multi-beneficiary proposals submitted by a consortium of partners.

  - Innovation actions (IA): They are activities financed to "produce plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose, they may include prototyping, testing, demonstrating, piloting, large-scale product validation, and market replication" (European Commission, 2018) (European Commission, 2020k). They are collaborative, multi-beneficiary proposals submitted by a consortium of beneficiaries.

  - Coordination and support actions (CSA): They are complementary actions to research and innovation "such as standardisation, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues, and mutual learning exercises and studies" (European Commission, 2019d) (European Commission, 2020k). A beneficiary or a consortium can submit them.

This analysis has focused on the impact section of these proposal forms where the participants must explain first the dissemination and exploitation of results activities and then the communication activities.

- Reference guides on communication, dissemination and exploitation recommended in the calls and participant manual:

  - Guides developed to boost projects' impact through dissemination, exploitation and communication (European IPR Helpdesk, 2018).

  - Guide on the plan for dissemination and exploitation of results (European IPR Helpdesk, 2016).

  - Communicating EU research and innovation guide for project participants (European Commission, 2014a).

- Videos on science communication filmed at the EuroScience Open Forum (ESOF 2016) (European Commission, 2016).
- Communication workout webinar (EASME, 2017).
- Social media guide for EU funded research and innovation projects (European Commission, 2020d).

- Evaluation guide for RIA, IA, and CSA proposals: excellence, impact, and implementation as sections to be overcome by funded projects (European Commission, 2017b).
- Annotated Model Grant Agreement (AGA) for Horizon 2020: contractual obligations under Article 28 (exploitation); Article 29 (dissemination); and Article 38 (communication of the action) (European Commission, 2019a).
- Consortium Agreement Model (CA) for Horizon 2020: it established the organization among beneficiaries, especially for exploiting and disseminating results. Specific calls require stating that it has been agreed upon when submitting a proposal (DESCA, 2016).
- EC Dashboard: a control panel for official, relevant, and public information from Horizon 2020 database. In this study, Horizonte 2020 official figures have been extracted from the Dashboard (European Commission, 2020e) in the Participant Portal (European Commission, 2020g).

4. RESULTS

Universities and research centres interested in advancing the state of the art reach specialized audiences through scientific journals and other publications. It is part of the daily tasks of research teams.

They can generally create technology-based companies (TBC) or spin-offs to exploit promising results. In other occasions, the same companies seek innovative solutions in services or products, generating patents, trademarks, pilots, devices, applications, etc.

Nevertheless, communicating these actions and their results to audiences that are wider than the audience these research teams are used to reaching, such as the media or society as a whole, is considered an added burden to achieving significant results in research and innovation projects. These are not obvious activities for the beneficiaries of public funds.

However, to guarantee they are carried out, the EC creates a contractual obligation to exploit and disseminate the results to scientific and specialized audiences and society as a whole, as an element of social responsibility. Scientific teams are expected to learn and consider their duty to communicate with the public with help from these contractual obligations.

This shows a fundamental contradiction between the two parties, which explains the effort carried out by the EU to raise awareness and move towards an effective communication of science as a social and economic driver.

The narrative presented below summarizes that for current science and innovation to be publicly funded, it is not enough to present a proposal focusing on the research results. Rather, from its conception, a project is expected to incorporate an analysis of the possible impact the research

seeking funding may have on the scientific community, the economy, the environment, and also on the very society that funds it to address its societal challenges and improve its quality of life.

4.1. PROPOSAL SELECTION UNDER THE EUROPEAN SCIENCE AND INNOVATION SYSTEM

The synergies between science, technology, production, and innovation fostered by Horizon 2020 in the funded projects, together with the economic dimension of the competitive resources it offers, have led to growing participation in its calls.

This, in turn, has increased the level of competition between beneficiaries or consortia.

The high application rate (801,200 applications for only 28,552 projects funded between 2014 and early June 2020) shows the European framework programme Horizon 2020 high competitiveness. At the same time, it highlights its growing attractiveness for research team members from a large part of the world who are not intimidated by the low average success rate of the proposals presented.

Framework programmes are comprised of work programmes, which are generally launched every two years. These work programmes are comprised of calls. In turn, these calls include specific or open topics to apply to, with one or more types of actions (for example, research and innovation actions, innovation actions, coordination and support actions, etc.). The participants must analyse and fully cover the calls topic text, taking care to understand the challenge, making sure the proposal covers the entire scope described, especially all impacts that projects are expected to achieve. The proposals must also follow each topic's participation rules and be aligned with the Europe 2020 Strategy, Horizon 2020 programme's philosophy, and the work programme's general description. They must also comply with the principles of Responsible Research and Innovation (RRI).

The competition for funds follows a strict evaluation system. The EC coordinates the evaluation process. It hires experts in the fields of the proposals that compete for funds for each call launched.

This way, the EC aims to avoid the possible lack of impact of the investment in these projects, i.e., project failing to become the basis for future excellent research, or failing to reach policy-making bodies, private actors investing in commercialization, interested professional sectors, or society as a whole.

The scoring of proposals must exceed an exclusive cut-off limit in excellence, impact, and implementation.

- The first selection parameter is excellence, a basic and forceful screening. It leads participants to take part in calls for actions that can be individual or form the best consortia of universities, research centres, companies, end-users, public administrations, associations, or other social actors.
- After excellence, which is a necessary but not sufficient condition, the second selection parameter is the holistic impact that the project aims to achieve when implemented. It is the most extensive screening of proposals in the process of obtaining funding. The taxonomy

presented by EC experts encompasses them into three large groups: scientific-technical, economic, and those that address societal challenges (a broader term than social).

- The third selection parameter the EC evaluates is the proposals' implementation. In this section, a good command of project management methodologies gives proposals a greater probability of receiving a high evaluation score.

The proposals with the highest scores are then listed in order. More weight is given to proposals that meet a set of pre-established parameters in case of a tie-break. Therefore, it is important to foresee them when drafting the proposal, as established in each call. These include, among others, gender balance or the budget for SMEs as social and economic drivers.

4.2. IMPACT AS A KEY PARAMETER

When it comes to the impact evaluation, even scientifically excellent proposals can lose competitiveness compared to those that argue better how they will respond to at least each of the expected impacts stipulated in the topic of the call under which the proposal is submitted.

Taking care of everything that is included and making credible projections is paramount. Any differentiating detail counts. It is essential to include specific, measurable, achievable, relevant, and time-related (SMART) indicators in the proposals.

At the same time, it is required to include any substantial detail that can boost impact, such as the possibility that the project will lead to the creation of new markets, improve competitiveness or the growth of companies, address issues related to climate change or sustainability, or that it can bring benefits to society.

It is critical to take into account a responsible science and research (RRI). This implies, broadly speaking, taking care of the ethical aspects of the project, aligning with open science, advocating for gender balance in, with and for research, encouraging citizen participation, promoting scientific education in society and all principles of governance, understood as the individual and collective responsibility for research and innovation. They are key aspects to consider in any proposal to the EU and can be significant in the impact assessment and in case of a tie-break.

The EU considers that the communication, dissemination, and exploitation of results act as (scientific, economic, and societal) impact multiplier activities in a project, and that they differ in their objectives, focus, and targets. Therefore, they are important in the impact assessment. Their key concepts are reviewed below.

4.2.1. What does the EC mean by exploitation?

The EC refers to exploitation as an activity on the results of financed projects. Therefore, it is necessary to understand the term "results" first. The EU defines results as "any tangible or intangible output of the action (such as data, knowledge, and information, whatever its form or nature, whether it can be protected or not), that is generated in the action, as well as any rights attached to it, including intellectual property rights".

In turn, it understands these attached rights are "intellectual property rights; similar forms of protection (e.g., rights for databases); know-how without protection (e.g., confidential material)".

The EC describes intellectual property rights as a series of "legal rights granted to people to protect their ideas. These rights include industrial property rights (e.g., patents, industrial designs, and trademarks), copyright (rights of the author or creator), and related rights (rights of performers, producers, and broadcasting organisations)".

According to Horizon 2020 interim evaluation's indicators and the expert report on its impact, results refer to "what it is produced or supplied directly through research and innovation activities. They can be the basis for future research or innovations, or new projects, or be commercially exploited".

By default and in a contractual manner, the EC currently promotes open science in Horizon 2020 to beneficiaries from the public and private sectors. It seeks to make scientific publications, the data used to achieve them, and the results of science, research, and innovation projects accessible to society. At the same time, the EC strengthen the trend towards the efficient reuse of results by opening them up to others so that they can be used as a basis not only in the European geographical area but also worldwide, thus, showing the value of the potential and results of the European science and technology system.

Regarding the activity of "exploitation of results", the EC defines it as "making use of the results produced in a [...] project in further activities [...] other than those covered by the project". It also covers the direct benefits for beneficiaries (internships, professional development and impact reviews, improvement in services and training, or other project activities).

In cases of possible commercial exploitation or future patents, the EC allows the results not to be published, with a justification that implies that, in return, there will be a product or service that exploits such results financially or of an added value for society.

A consortium agreement (CA) is a contract signed between the project beneficiaries (also called partners). Under any circumstance, it must not contradict the grant agreement (GA) signed with the EC.

The partners who submit proposals in consortia, agree in the CA the policies and exploitation of results. The agreement will cover use, lease, and transfer and set the first necessary conditions for possible future patents, trademarks, or marketing of products or services developed under the project.

The CA is an agreement the EC generally requires beneficiaries to sign before submitting proposals or allocating funds to projects. However, it is not reviewed or approved by the EC. It is a key agreement that establishes the bases for the exploitation of results, including, among other issues, the access to knowledge the beneficiary will give others', the type of prior knowledge they provide, and how the ownership and exploitation of the results achieved under the project will be handled.

4.2.2. What does the EC mean by dissemination?

Dissemination is often confused with communication and is even used interchangeably in highly experienced scientific settings.

Even so, dissemination, according to the EC narrative, consists of publishing articles and advancing the state of the art (SotA) in a scientific field. Therefore, it can be done with the results of a project.

The EC refers to dissemination as "the means to make the results of a project public (by any appropriate means other than protecting or exploiting them)". It is a natural activity for the scientific community that includes, but is not limited to, scientific publications and presentations. It is aimed at specific specialized audiences or groups that, due to their activities, may be interested in the results obtained to know the state of the art (other scientists, peers, industries, innovators), to advance their work, or to apply them (professional organizations, policymakers, among others).

The rules on results dissemination are agreed upon in the CA signed between the project beneficiaries. This helps avoid that the obligation to disseminate may impact other beneficiaries or prevent the creation of value in possible future patents or trademarks (which require that their knowledge has not been made public to register or be recognized as patentable) for the marketing of products or services.

According to some figures, Horizon 2020 has successfully disseminated the scientific publications resulting from its funded projects, with 78% more open publications used in research than the world average.

4.2.3. What does the EC mean by communication?

According to the EC narrative, communicating science and innovation reaches non-expert members of society, multiple audiences, beyond the project's scope, and in line with a defined strategy implemented following an action plan that enables the achievement of the objectives.

The purpose of the communication is to "make the research activities known to multiple audiences (in a way that they can be understood by non-specialists)".

The EC refers to communication as the "set of activities and initiatives strategically planned to multiply the impact that enables both the project and the results to reach multiple audiences (including the media in the broad sense and non-expert audiences), with a message tailored to each one of them according to their characteristics and the content to be transmitted to them.

The EC understands that planning communication starts with the proposal and continues throughout the lifetime of the project. It is about "communicate effectively your research, promote your project and its results".

Beyond each project's intrinsic scope, it contributes to socialize science, to value it as a driver of the economy.

Ultimately, communication seeks to reach audiences of interest with the message of being investing in building the Europe outlined in European science and innovation policies to place them as the basis of the economy and society of the future.

Therefore, the EU expects the scientific community to learn about media and know how to explain science in a simple way, without jargon or condescension. It is important to measure the real impact of the communication of science and innovation projects publicly funded as they are being implemented, to improve its effectiveness if necessary.

The EU places great value on communication, which effectiveness is a pending challenge so far. Reaching more broadly the widest audiences is a way of enhancing the profitability of the public investment. Effectively communicating science and innovation publicly funded is one of the seven remaining challenges identified in the Horizon 2020 programme interim report.

4.3. CONTRACTUAL OBLIGATIONS OF IMPACT MULTIPLIERS

Each grant contract establishes the scientific-technical scope, the maximum budget assigned, the planning of the project in time, the effort provided, the legal conditions, and the procedures to manage the complexity of situations that may arise during the lifetime of projects that usually last from months to several years, with a very variable budget (from tens of thousands to millions of euros).

The GA includes, as contractual obligations, the exploitation of results (article 28), dissemination (article 29), and communication (article 38) of results as summarized below:

- The beneficiaries have an obligation to exploit the results. They must commit to using them in new research activities by developing, creating, or marketing products or processes; by creating or providing services; or in standardization activities.
- The beneficiaries have an obligation to disseminate the project results to the public by appropriate means, taking care to coordinate with other beneficiaries to avoid frustrating any advance in research or development that patents or commercial secrets may protect. The funded actions must be in line with the concept of open science and ensure open access (free of charge, online and for any user) to all peer-reviewed scientific publications; store a version, the data and its metadata in a repository so that they are available free of charge, accessible, searchable, exploitable, reproducible and disseminable. In the case of a foreseeable future economic value (patents, trade secrets, among others), results or data may be not disseminated with EC's agreement.
- Beneficiaries must promote the action through communication activities that strategically and effectively reach multiple audiences (including the media in its broad sense and the general public). They should also foresee that the funding agency or the EC can request any communication material paid with project funds. The EC must be able to reuse it, distribute it, edit it, redesign it, translate it, store it on paper, electronic or another format, or authorize other parties to do so.

As a cross-cutting issue, having received European funding must be reported in all actions of these three activities. It is mandatory to include the EU emblema and a standard text indicating that the funds are European and the name and type of project in all materials. At the same time, it must be registered that the action reflects the beneficiaries' opinions, which may not coincide with those of the EC.

The consequences of not complying with the contractual obligations may result in a reduction of the funds granted or other possible legal actions.

4.4. STRATEGIC PLANS

The proposal includes the plan for dissemination and exploitation of results and the communication plan. They enable evaluators to analyse the power of the impact and understand how well thought out and mature the proposal is.

From the beginning of the project, the strategic plans shall be reviewed and adapted to the implementation. The evaluation of how the project will be communicated does not end when it is awarded. In each reporting period, the beneficiaries must inform on the advances of science or innovation and the tasks carried out, including dissemination, exploitation of results, and communication.

It is essential to think about these strategies when preparing the proposal and present initial plans according to what the beneficiaries would want to implement under the project if it were funded. On the one hand, the plans will be evaluated positively and receive a good score in the impact section. On the other hand, they will be the foundation of what the beneficiaries propose to implement and what will be evaluated before, during, and at the project's end.

The impact achieved, how the action has been communicated, the possibilities of disseminating the progress, and the exploitation of the results, as multiplying activities of the project's impact, must be reported periodically. The strategic plans to be submitted to the EC at the end of the project will be built due to the action's adjustments, changes, and redirections, which are natural by the project's concept very definition. They will enable the final impact evaluation of the project.

Building good communication, dissemination, and exploitation of results strategies is key to achieving the expected impact.

4.4.1. PLAN FOR DISSEMINATION AND EXPLOITATION OF RESULTS

The plan for dissemination and exploitation of results included in the proposal will lay the foundations of the strategy on the results to be implemented during and after the project, which will always be at the scale of the action.

Likewise, the CA that the EC requires project partners to sign must provide how access to knowledge will be (protection of results, access to research data) and what opportunities for collective or individual commercialization of the results achieved are foreseen.

Taking this into account, beneficiaries may consider the following as the basis for the future strategic plan for the dissemination and exploitation of results to be included in the proposal:

- Describing those areas in which the project is expected to have an impact and who may be the potential users of the results.
- Describing the results to be disseminated and exploited.
- Describing the strategy for disseminating knowledge and protecting the results. Open access (in its different forms) to peer-reviewed scientific publications resulting from the project activities and the exploitation possibilities (including patents) will have to be considered. In case of publication of open data, a plan must be set up to enable them to be found, accessible, interoperable, and reusable, and give access to metadata.

- Defining users and types of uses such as "research, commercial, investment, social, environmental, policy making, standard-setting, skills and educational training".
- Including a provisional business plan, if relevant, including a description of the actions to be carried out; a roadmap that will be adjusted according to the project strategy; a schedule of actions and investment; quantitative and qualitative indicators to show the potential for innovation and estimate the economic impact of the proposed exploitation.
- It must be bear in mind that the exploitation may require investments, additional testing, or scaling up the project results.

4.4.2. Strategic communication plan

Regarding communication activities, the proposal forms ask to "describe the proposed communication measures for promoting the project and its findings during the grant period. Measures should be proportionate to the scale of the project, with clear objectives. They should be tailored to the needs of different target audiences, including groups beyond the project's community".

In short, guidelines are offered to complete a communication plan according to the scale of the action. If the participating teams do not know their strategic importance, they may not reach with these indications the minimum required.

For this reason, the following section provides a summary guide of what a communication plan for the proposal phase implies. In addition, as a contribution to this narrative, it includes a methodology that can be useful to create the basis of a strategic plan for incremental communication, that is to say, that can progress from the proposal stage and during the implementation of the project, towards effective communication.

4.4.2.1. Design of a communication plan in the proposal phase

Communication shall be planned from the moment the applicants begin to think about submitting a proposal. The proposal is intended to communicate to evaluators what the project is, why it is important to invest public funds in it, and the impact it intends to obtain with the public investment sought.

The evaluators will determine if they believe that the communication measures are effective. Therefore, it is essential to know how to communicate from the proposal phase and "sell" the communication proposal to the evaluators.

The communication plan to be included in the proposal must provide a continuous evolution towards the search for efficiency and effective communication. It shall progress together with the project and the strategic communication plan to be presented at the end of the project, which will also be evaluated. The dimensions to be considered include:

- Management of resources (human, schedule, and financial).
- Definition of the initial strategy from the communication plan in the proposal to the strategic communication plan.
- Management and monitoring of the flexible and evolving communication plan coordinated with other beneficiaries, if any.

- Due consideration to the variables of effective communication to the entire ecosystem of the project (science, technical, market, society, legal and contractual framework).
- Definition of targeted audiences.
- Definition of the messages to be transmitted to different receivers.
- Analysis of social media channels and platforms where the communication will take place.

The project participants are expected to lead the communication tasks in coordination with a project communication policy leader. This direction of communication or management of the strategic plan is essential for good planning, implementation, impact measurement, and replanning to achieve the effective communication of science and innovation actions publicly funded.

4.4.2.2. The proposed methodology to create a dynamic communication plan

When analysing the documents' content, given the current importance of a communication plan in science projects and the need for it to be effective, a science communication theoretical framework and a methodology for defining projects have been used. This has enabled us to make an innovative contribution, so projects include a communication plan in their scientific proposals. A plan that can be dynamic so that it can be adjusted during the lifetime of the science project publicly funded.

This proposed methodology would enable the design, planning, review, and evaluation of the strategic communication plan using ten questions:

- What to communicate?

  This question focuses on the nature, goals, and essence of the project.

  It is necessary to analyse the project's context and determine what needs to be communicated and what not. It is essential to include the measurable interim and fi-nal objectives to be achieved.

  In this sense, it must be verified that contractual obligations are covered. Legal issues and the protection of scientific, economic, societal, and environmental developments in the market or environment in which the project will be implemented must also be taken into account.

- Why?

  This question leads to an explanation of the origin of the existence of the project and its rationale.

  Participants must be clear that communicating is not only a contractual obligation but a part of the funded project to be implemented.

  At the same time, they must be aware of the assumed social responsibility to make society taxes profitable by providing the benefits of science and searching for a better quality of life. It is important to be sensitive to wider society in order to convey success stories and their results.

- For what?

This question is linked to the interim and final objectives of the communication.

The objective of communicating is to achieve greater visibility both for research and results achieved. The fact of being able to reach wide audiences will allow, in addition to a social benefit of promoting public investment, the possibility of attracting investors for the results of the project.

- How much?

This question would identify the scale of the communication tasks.

The communication actions will be proportional to the action and the estimated budget to fund the communication tasks. Therefore, it is crucial to be able to estimate the actions necessary to carry out in order to be able to determine the size of the budget accordingly. When planning, it should be taken into account that the EC may request the communication materials created for its communication activities.

- Where?

This question leads to a definition of different communication channels (social media, press, multimedia, among others).

It is crucially important to involve the media with specific messages for each channel and media outlet and aim to capture and, at the same time, involve the receiver. The competence of the media and communication channels' messages that reach the audiences must be considered, and try to differentiate between audiences to capture them with a specific message for each channel.

A good strategy is to contact museums and interpretive centres that know how to tell science, which can be an important channel to connect with the public and specific audiences.

- How?

This question focuses on the type of activities and methods to be used.

Ideally, participants must tell how science impacts society and how beneficial it can be to develop the project submitted or funded. It is neither necessary nor recommended to explain the scientific or technical process carried out during the research. Audiences become aware by knowing why the action is being funded. It is necessary to reach each audience with different messages according to their nature. It is important to connect as much as possible at an emotional level, especially when it comes to the media, in a broad sense, and the general public.

It is essential to use specific accounts for the project and each channel to monitor the impact and avoid dedicating these accounts to other topics not strictly related to the project.

- When?

This question leads to the definition of the schedule of communication actions.

The communication strategy must be designed in an evolutionary way, from the birth of the idea in the proposal phase until at least the project's closing and, in many cases, it will be necessary to consider actions after the end of the project.

- To whom?

This question defines the different audiences of interest.

It is critical in the communication plan. The targets of the communication will be the various audiences determined to be of interest to the project. It is necessary to adapt the messages and the specific language and meanings to each one of them.

- Who?

This question helps us focus on who will carry out the communication activities and how they will coordinate.

The communication tasks must be led and managed by the person in charge of communication, even if they are carried out by different beneficiaries identified as communication tasks' implementers. The communication department will lead in a coordinated manner the plan implementation, monitoring, improvement, and readjustment during the project's lifetime.

Coordination between beneficiaries is crucial to communicate the project's key ideas and disseminate the achieved results.

- With what?

This question defines the resources available to communicate.

The communication plan must be on an appropriate scale, credible, and at the same time ambitious in the proposal phase. This way, it will define the human and financial resources needed to carry out the actions. It must foresee that during the project there may be some fluctuation in the plan, its actions, and also in its execution.

This way, by considering each of these questions periodically, the social communication plan can be adjusted and redefined, tailored to each project, to achieve effective communication.

4.5. ANALYSIS OF THE RESULTS

The narrative provided identifies the critical aspects of communication, dissemination, and exploitation, trying to clarify concepts to help research teams worldwide, both European and international, to participate in Horizon 2020 or the next framework programmes.

Consortia must know how to "sell the project" to the evaluators. Especially when it comes to impact, where many proposals do not reach a competitive score, although they manage to be valued very positively in terms of excellence.

The EC considers the great challenge of the effective communication of science to be an objective to advance research progress in projects funded under the Horizon 2020 framework programme and the next Horizon Europe programme. The support guides provide very diverse reference material for developing proposals on the three impact multiplier activities. However, understanding the requirements and the holistic vision needed requires outstanding experience

and some specialization to master the diversity of documents, sources, and locations that enable applicants to submit a proposal with some possibility of success.

In this sense, this work provides a narrative synthesis that clarifies the consulted material. In addition, as an innovative element, it offers a methodology to facilitate the de-velopment of communication plans for publicly funded science and innovation, based on ten key questions, which is expected to be useful to guide research teams non-experts in proposals submission.

5. DISCUSSION AND CONCLUSIONS

Among the strengths and findings of the narrative synthesis of this research, the following stand out:

- Communication, dissemination, and exploitation are multiplier activities of the three types of project impacts (scientific-technical, economic, and societal challenges). They enhance the profitability of public investment in science and innovation.
- Following the launch of Horizon 2020, in 2017 the EC identified "participants' confusion" between the scope of communication, dissemination, and exploitation. This has led to the development of some clarifying guides that have been integrated as relevant documents in this synthesis.
- While in the proposal forms, the dissemination and exploitation of results are described giving some guidance to participants, the communication section include indications not so referential of the importance that communication has for the EC. It should be noted that the effective communication of the projects is one of the seven remaining improvement challenges for the European science, as indicated in the Horizon 2020 interim report conducted by the EC, that will be tried to be improved towards the next Horizon Europe framework programme (2021-2027). Finding solutions is a research challenge and an opportunity for professionals in social communication of science financed with public funds (European Commission, 2017a).
- While science journalism experiences a tendency towards a reduction of prominence in traditional media (Cortiñas & Alonso, 2014), the EU research and innovation framework programme offers funds and set out contractual obligations to encourage the beneficiaries of publicly funded projects to communicate actions to broad audiences, including the press and the general public. This is a paradox and, at the same time, a challenge with ample opportunities for science communication. The type of impact that the EU expects focuses significantly on the media in the broad sense because they are the ones that reach the different audiences on which they want to impact. Historically, they have been the traditional communication channels, whose reach is now being boosted by publishing digital content and using social media. Current means of communication are understood in a broad sense as traditional media outlets and social media, which interact continuously and cannot be separated.
- Multiplying the impact of results is a challenge inherent to creating value in projects publicly funded. The need to measure, in particular, the impact of the contents, has been identified. Academic SEO and content SEO can be key disciplines to optimize and measure

the impact of strategic dissemination and communication plans, respectively (Codina & Lopezosa, 2020). Content SEO can help research teams to create content with greater visibility, thus increasing the uptake and engagement of different audiences (Codina & Lopezosa, 2020), in a virtuous circle, since this increases the probability of citations or queries, again increasing visibility (Codina, 2019).

Based on the critical interpretation of the document bank, the following points have been identified as the basis for future discussion:

- Obtaining public funding from the European framework programme is becoming increasingly competitive, both for basic and applied science, whether it is to start or continue research or innovation, or to offer solutions to societal challenges.
- The submission of successful proposals requires a demanding holistic professionalization of the participating consortium or individual research teams. In this sense, it should be emphasized the diversity of themes that it is necessary to know, including public policies, the legal framework, regulations, participation rules, the meaning of key concepts, relevant documents, project management procedures, the Participant Portal, how to communicate excellence ideas, developing strategic plans, and even mastering team leadership in the case of collaborative proposals developed by a diverse consortium, among others.
- A possible indicator of the difficulty of effective communication management analysed here is that the EC itself suggests that, for communication aspects, a consortium may include or hire communication specialists, something that is not always possible depending on the scale of the action.
- The proposal included in this study for developing effective strategic communication plans can provide a solid foundation for the proposals to be submitted.
- Given the high competitiveness, more than 30% of consortia incur consultancy costs to develop the proposal and increase their success chances. External advice masks the generally high indirect costs that participating entities face. These costs can be included in the project's budget when the consultants or consultancy agencies participate as beneficiaries, and at the same time, tend to assure better managed projects during the execution phase.
- Being able to "sell the proposal" to evaluators is not an easy task. The idea of excellent research and innovation must be told attractively. Every detail of the proposal must be aligned with the policies that inspire the calls and demonstrate the capacity to manage the project's implementation efficiently. All of this, while taking special care to address the impact in a broad sense (scientific, economic, and societal challenges) and demonstrate that it has been approached with the necessary depth. Strategically planning the communication, dissemination, and exploitation of results as impact multipliers from the proposal phase itself is key to increasing the chances of succeeding in obtaining funding for the project's implementation.
- This review work substantiates how important it is for research teams to know the components of this way of understanding projects. Among them, communicating science publicly funded to society is to work strategically towards a society more educated in science, more critical of news and trust-worthy messages, and more participatory and connected with

science. It is an indirect invitation to participate in the co-creation of scientific projects and even in the co-design of programmes that fund science as the EC has achieved to do, in the definition of the next Horizon Europe framework programme effective from 2021 to 2027.

- Incorporating this vision into new research projects is not only a way to be aligned and receiving European funding for science, but it is also a new way of proposing, thinking, planning, and doing science. This new way will allow research teams to compete with other cutting-edge projects that already incorporate this vision of the future of science.
- Last, but not least, it is also a necessary vision to be able to obtain funds from the EU member states, since they incorporate the trends that the EC sets up on funding excellent and cutting-edge science.

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