

“One might tweet just for money”: Organisational and institutional incentives for researchers’ social media communication and public engagement practices

Kaisu Koivumäki*, University of Oulu, History, Culture and Communications, Finland

Clare Wilkinson, University of the West of England, Science Communication Unit, United Kingdom

*Corresponding author: kaisu.koivumaki@oulu.fi

Abstract

The changing media landscape and proliferation of social media potentially increase agency amongst researchers to communicate individually. It also points to a need for studying science communication at an organisational level to understand how science communication activities can be collectively organised to have a substantial impact. Despite these changes, there are ongoing questions regarding the perceived value of science communication and the ways in which it can receive institutional support in credit-driven academic cultures. Therefore, this study set out to explore how incentives relate to researchers’ communication activity and how these can be influenced by digital communication contexts. This article presents a qualitative analysis of semi-structured interviews with 17 researchers and 15 communication professionals in Finland. Results indicate that academic leaders are in the key position to support organisational science communication culture, and their acknowledgement for science communication can be more effective than encouragement from in-house communication staff. This suggests that there may be a key gap vis-à-vis training in science communication and engagement which is targeted towards scientific and organisational leaders. The results also imply there is enduring value in communication activities featuring in periodical performance evaluation and that analytic data from digital media endeavours can form an intrinsic reward.

Keywords

science communication, organisational communication, communication management, institutional leadership, digitalisation, researchers, communication professionals, evaluation

1 Introduction

In the changing media landscape and with the proliferation of social media, researchers are increasingly expected to communicate their research, including in online contexts. Whilst communication on social media allows for direct and visible interaction with stakeholders, it drives changes in the roles and practices of researchers, for example in offering a range of communication media at an individual level (Koivumäki, Koivumäki, & Karvonen, 2020). This potentially increases agency amongst researchers to communicate individually (Koivumäki & Wilkinson, 2020) but also points to the need to study science communication at an organisational level (Autzen & Weitkamp, 2020; Schäfer & Fähnrich, 2020). Consequently, it is important to understand how science com-

munication activities could be collectively organised both beyond (Besley, 2020) and/or within research organisations (Fecher & Hebing, 2021; Rose, Markowitz, & Brossard, 2020) to have a substantial, cumulative impact, as well as increasing understanding of individual roles within such settings. There has also been scholarly interest in the role of communication professionals and leaders in fostering a culture of public engagement (Besley, Garlick, Fallon Lambert, & Tiffany, 2021; Gascoigne & Metcalfe, 1997; NAS, 2018), which may or may not include the use of social media amongst staff and leaders.

Digital transformation has created new questions for science communication researchers, but there are also continuities within scientific enterprises’ organisational and institutional communication approaches (Autzen & Weitkamp, 2020;



Kjellberg & Haider, 2019). These include continuing questions around the perceived value of science communication as well as the ways in which science communication achieves institutional support (Ho, Looi, Leung, & Goh, 2020; Milani, Ridgway, Wilkinson, & Weitkamp, 2020; Rose et al., 2020).

Previous literature has pointed to various ways in which institutions value and encourage researchers' public communication efforts, including approaches taken to incentivise communication efforts as part of science's systems of reward, whilst also highlighting gaps in recognition (Casini & Neresini, 2012; Davies, 2018; Ho et al., 2020; Llorente & Revuelta, 2020; NAS, 2018; Poliakoff & Webb, 2007; Regan & Henchion, 2020; Roedema, Rerimassie, & Kupper, 2020; Rose et al., 2020; Szudi, Degli-Esposti, Bartar, & Tulin, 2020). Motivations such as enjoyment and benefits from engagement are intrinsic to individual researchers and strong predictors of participation. On the other hand, extrinsic rewards such as prizes, financial incentives and grants, though offering some recognition, can be problematic in their relationship with researchers' sense of intrinsic obligation and personal motivation for public communication (Entradas, Marcelino, Bauer, & Lewenstein, 2019).

In an academic culture, which can be perceived as credit-driven and demanding rewards for any type of contribution made (Sugimoto, Work, Larivière, & Haustein, 2017), various mechanisms now also seek to capture communication as a measure of impact (Townsend & Wilkinson, 2021; Wilkinson, 2019). Researchers have been found to be in favour of societal impact being part of research evaluations, and therefore "it makes sense to examine how evaluation policies for societal impact might affect researchers' communication behavior" (Fecher & Hebing, 2021, p. 15) in conjunction with intrinsic rewards.

It is therefore important to continue to understand how higher education institutions (HEIs) and state research institutes influence and inform the underlying motivations of their relevant actors, in this case researchers and communication profes-

sionals, to participate in communication, including at an individual level. In changing organisational and digital contexts, this article explores the potential impact and interplay of different formal and informal forms of incentivising researchers' communication activities and the perspectives of researchers and communication professionals towards these incentives. We seek to answer the following question:

Research Question: What are the formal and informal organisational and institutional incentives that may influence researchers' digital and social media communication activity?

As its focus, this article examines an inter-organisational research project in Finland, where digital science communication activities such as blogging and tweeting by researchers and their affiliated academic organisations formed a central component.

The researchers and communication professionals were collaborating in this joint research project, whilst they also participated in other projects and were affiliated to their different academic organisations. The participants' multiple academic affiliations and communities provided access to a range of situations in relation to organisational cultures in HEIs – in this case research universities – as well as in public state research institutes¹ and allowed for the exploration of varying incentives for communication and impact beyond a single organisation (Roedema et al., 2020).

The increasing importance of science communication in HEIs has resulted in a growing investment in the community of science communication professionals who have varying roles (Schwetje, Hauser, Bösch, & Leßmöllmann, 2020), including those who are actively motivating researchers to participate in science communication online. The communication professionals in HEIs and in state research

¹ For information regarding higher education and research in Finland, see <https://okm.fi/en/heis-and-science-agencies>.

institutes can therefore bring useful observations on science communication, and organisational cultures, including in digital contexts. Their perspectives are also relatively underexplored when compared to scientists and researchers (Milani et al., 2020).

For the purposes of this article, we see offline and online science communication as a continuum influencing each other as opposed to a dichotomy (Roedema et al., 2020), but we are interested primarily in digital and social media science communication activities in the results we report here. In the literature, the terms “organisations” and “institutions” are often used interchangeably. In this article, “institutional” refers to overall norms of science, and “organisational” refers to the specific structural conditions within a scientific organisation, though we also understand there exist relationships between these contexts.

2 Literature review

Although “scientists’ public communication efforts play an increasingly important role in shaping perceptions and support for science and public institutions” (Rose et al., 2020, p. 1276), research on science communication in organisational contexts, such as HEIs, has only recently started to emerge (Marcinkowski, Kohring, Fürst, & Friedrichsmeier, 2014). Schäfer and Fähnrich (2020) suggested an “organisational turn” is needed in science communication research, which they take to include actor-related, external public communication from scientific organisations and from researchers, embedded in organisational contexts.

Our study aligns with the scope of Schäfer and Fähnrich’s (2020) concept of “organisational science communication” since we were interested in communication both *from* and *within* organisations. This perspective of communication from organisations can refer to the planned and strategic communication activities that take place from scientific organisations and via their researchers and profession-

als. Communication within science organisations focuses on the ways in which formal and informal practices and organisational culture embed communication within an organisation.

2.1 The role of the individual in the organisational use of digital and social media

Currently, the meanings of organisational science communication and science public relations are debated (e.g., Entradas et al., 2020; Schäfer & Fähnrich, 2020). Weingart and Joubert (2019) argue that academic organisations, such as HEIs and scientific institutions, are subjected to market-oriented competition for public funds, which results in profound effects on how science is communicated. In their view, the quest for visibility to attract potential funding and resources has become so dominant that the scientific community fails to differentiate between educational and promotional communication modes. This poses a risk to the very integrity of science and its communication (Weingart & Joubert, 2019) particularly when conducted online (Weingart & Guenther, 2016).

There is therefore an increasing need to understand how and whether the wide range of digital communication platforms that are now available, such as sites for blogs and microblogs, has changed the way researchers and scientists share scientific insights with the public, and whether an organisational role features in this engagement. Autzen and Weitkamp (2020, p. 468) suggest such new digital formats are changing the culture of organisational “actorhood”, whereby the “communication of research findings becomes essential, not just to the constitution of the individual research organization but to the constitution of science as a social institution; the scientist becomes a central actor in both contexts.”

Beyond academia, this is resulting in some organisations viewing their employees as resourceful boundary spanners online, with expectations on employees acting as communicators growing to the extent where this is no longer voluntarily but a norm (Madsen & Verhoeven, 2019).

Concurrently, organisations may also have challenges in multilevel communication for organisational interests (Schäfer & Fähnrich, 2020), for example pushing employee advocacy online might backfire if employees come across as less personally authentic in representing their organisational settings (Madsen & Verhoeven, 2019).

Despite increasing expectations for online communication, digital and social media can have a poor reputation amongst scientists and researchers (Entradas et al., 2020) and rank low in a researcher's perceptions of their professional duties. Reasons why social media have not been fully accepted within academia include its undefined practices and unspoken cultural codes of participation (König, 2020). It is likely that not all scholars will feel comfortable performing new digital roles (Grand, Holliman, Collins, & Adams, 2016). As such, it can form a serendipitous aspect of researchers' communication plans rather than being strategic or planned (Wilkinson & Weitkamp, 2013). Social media can be seen as channels that lack quality control, with questions raised over trust in the platforms (Weingart & Guenther, 2016; Weingart & Joubert, 2019). Performance and impact measures using "altmetrics" on social media encourage communication to gain quantified attention, which may erode the norms governing science communication (Weingart & Guenther, 2016; Weingart & Joubert, 2019). Researchers also describe being unable to find the time to invest in social media, which also suggests a low prioritisation of such activities and limited organisational support or reward for time invested in social media (Collins, Shiffman, & Rock, 2016; Regan & Henchion, 2020).

Nevertheless, platforms such as Twitter may serve as a significant interaction arena for societal elites in countries where media consumption is high and increasing, particularly online as in Finland (Strandberg & Carlson, 2021).

2.2 Institutional value of public engagement on digital and social media

Whilst the use of online channels increases, researchers, HEIs and state research institutes face challenges as organisations may lack the underlying structures, culture and institutional support required for digitalised approaches to communication. Research organisations are not directly or easily comparable with other types of organisations, and the way in which researchers operate within the wider scientific culture of academia is likely to lead to organisational tensions for communication activities (Schwetje et al., 2020), particularly when many practices in communication can lead to a complex balance of both interdependence and autonomy (Davies & Horst, 2016). Researchers continue to have a strong sense of academic autonomy and a desire to choose what to represent. Add to this a desire for recognition; Watermeyer and Rowe (2022) highlight that research organisations are now frequently "prestige economy" driven, where prestige is primarily associated with research income generation and publication in high profile journals. Whilst the service missions within which communication and engagement might be categorised has low prestige. Thus, recognition for public engagement and science communication (Gascoigne & Metcalfe, 1997) remains low, potentially limiting science communication's role in the prestige making of organisations, as its benefits and visibility may not be clear (Watermeyer & Rowe, 2022).

When the assessment of the quality of a researcher's work is also often connected to the credit-driven academic reward system that necessitates the tracking of scholarly activities (Sugimoto et al., 2017), absence among those rewarded activities may lead to some activities (such as digital communication) being treated as less serious academic undertakings. In 2015, McClain and Neeley suggested that the calls for enhanced digital science communication must focus on the return on investment of communication efforts: they must be valued, measured and manageable, and this return seems particularly pertinent at

the organisational level, where such benefits might be missed.

Organisational science communication culture has been lacking (Bucchi, 2013; Claessens, 2014), and recognition and encouragement at the highest level that is actively promulgated through research organisations has long been warranted (Gascoigne & Metcalfe, 1997; NAS, 2018). Organisational and PR departments may influence researchers' media efforts, for example, as PR professionals more frequently request news items, the effect of scientists complying with these requests increases (Marcinkowski et al., 2014). However, according to Watermeyer and Rowe (2022), the professional era of public engagement has not been able to mobilise substantive attitudinal shifts towards its undertaking or leadership within universities. Instead, cultural / organisational leadership often remains inseparably linked to academic seniority and the professoriate, whilst communication and engagement leadership is segregated and seen to have a lesser role (Watermeyer & Rowe, 2022). Researchers and scientific leaders in organisations can foster a culture that values public engagement by, for example, communicating the value of engagement through their own actions (Besley et al., 2021) but this may not be present in all HEIs and state research institutes.

2.3 Formal and informal incentives

Williams (2020) has explored the forms of worth and value underpinning research cultures and practices, connecting and exploring mechanisms for evaluation with research impacts. Williams (2020) states that there is a need for analysis that accounts for formal evaluative structures (e.g., incentives, rewards and assessments within organisations), how these structures relate to and reproduce informal values and cultures as to the role of certain activities, and how they are combined to contribute to the production of knowledge.

Such formal incentives encompass much of what is considered as part of the reward system for research organisations guiding researchers' activities, including

financial incentives, promotions and annual reviews. A significant amount of the existing research literature refers to the need to structurally change such reward systems to compensate for the time researchers spend participating in science communication and engagement activities, as well as to have it better recognised in their career development (Gascoigne & Metcalfe, 1997; Llorente & Revuelta, 2020; NAS, 2018; Roedema et al., 2020; Szudi et al., 2020).

Beyond formal rewards, informal incentives and intrinsic motivation can contribute to the establishment of tacit inferences (Williams, 2020), self-efficacy and socialisation within academia (NAS, 2018). This is important as, if communication activities are not being valued by researchers' peers and superiors, orientation toward them may not be developed (NAS, 2018). This can be accentuated in digital settings where online science communication activities aimed at a general audience can also be viewed by peers (Roedema et al., 2020). Thus, Roedema et al. (2020) state that the digital sphere increases the interlinked, complicated influences on scientists and researchers when communicating.

There are signs of science communication starting to be included as a minor criterion in researchers' contracts, proposals and promotion criteria by some organisations and funding bodies (Llorente & Revuelta, 2020) and that social media scholarship may also be considered (NAS, 2018). However, it is not currently known how widespread these incentives are and what their impact is (Llorente & Revuelta, 2020). Empirical investigation of such steering effects in HEIs and other research institutions is seen to be crucial "to inform the design and implementation of research evaluation methods to facilitate constructive outcomes without introducing new biases into the system" (Williams, 2020, p. 200).

Thus, it is important to further interpret the dynamics of the relevant organisational and institutional incentives, formal and informal, and their potential impacts on researchers' activities as well

as how communication professionals view these, in order to better understand organisational contexts for science communication and the role of digital and social media communications.

3 Data and methods

This article presents a qualitative analysis of semi-structured face-to-face interviews with 17 researchers and 15 communication professionals conducted in 2017. As the study was focused on researchers' and communication professionals' views, an in-depth interview method was deemed appropriate to elicit rich, descriptive accounts of their perceptions, understandings and interpretations (Mason, 2004). Thematic analysis was used to identify and analyse patterns of meaning and the ways broader social contexts impinge upon those meanings (Braun & Clarke, 2006).

3.1 Research context and design

All interviewees were collaborators in the BCDC Energy Research project (2015–2021) which involved five academic organisations in Finland and was funded by the Strategic Research Council (SRC) at the Academy of Finland. This context is illustrative for the international trend of competitive research funding focusing resources on myriads of temporal research projects, one of the many social and economic contexts that are altering the structures of academic organisations with effects on communication (Davies & Horst, 2016). The project's funder (<https://www.aka.fi/en/strategic-research/>) is amongst other international research policy regulators who provide funding to research projects aimed at finding solutions to grand societal challenges. During the course of the funded projects, including the one in focus, interaction with society is of key importance, and science communication aims at contributing to societal decision making on multiple levels.

A pre-questionnaire, contextualising the interviews and the interview guide, was structured around topics on the aims, norms and values of communication and

participation, and organisational support for science communication. The pre-questionnaire and interview guide questions are provided in the supplementary material (pp. 1–3). The interviews formed a larger study, and other aspects of the organisational role of science communication have been reported (Koivumäki & Wilkinson, 2020; Koivumäki, Koivumäki, & Karvonen, 2021). The interview guide was developed on the basis of previous studies (e.g., Dudo, Kahlor, AbiGhannam, Lazard, & Liang, 2014; Kjellberg, 2010; McClain & Neeley, 2015; van Zoonen, Verhoeven, & Elving, 2014), and included questions regarding the different formal and informal ways of incentivising researchers' communication activities, including financial incentives and recognition in employee evaluation, as well as academic community acknowledgment. The questions were similar for both groups but additionally, researchers were asked more focused questions about institutional preconditions for their communication processes, for example "When you write a popularised science text, blog, tweet or alike: who / what is the authority / authorities in your mind you'd prefer to approve your text?". Interviewees were asked to consider their views from the project's point of view, extending it towards the wider academic contexts in which they were based.

The pre-questionnaire was not meant to function as quantitative data and as such, is not included in the present analysis. It served as a "provocation" for the interviews, and because the wording of the questionnaire could cause a priming effect where categories are implicitly implied by the questionnaire, the interviewees were asked to talk through and discuss their pre-questionnaire answers in the interviews. Thus, whilst a sequence of questions was planned in advance to link to the pre-questionnaire and guide, the interviews still allowed flexibility to follow up on particular areas and for unexpected themes to emerge (Mason, 2004). This allowed the interview dialogues to follow the different interviewee's perspectives, reflecting Kvale and Brinkmann's (2009, p. 18) argument that "the process of know-

ing through conversations is intersubjective and social, involving interviewer and interviewee as co-constructors of knowledge”.

The research interviews were ethnographic in the sense that they followed an ongoing relationship and contact in the field. The interviewer (first author: KK) was involved in the wider project, extending the possibilities for rapport between the parties (Mason, 2004) though it should be acknowledged that this meant some prior knowledge existed on the part of the interviewer. In a qualitative approach, the research aims for sensitivity over objectivity, recognising that professional knowledge may blind or enable researchers to see connections within the data (Corbin & Strauss, 2015). Reflexivity also denotes efforts to expose the social context in which knowledge is created (Sousa, 2010). Therefore, to raise confidence in this study’s interpretations, the declaration of KK’s involvement with the group is acknowledged. To avoid bias, a reflexive approach was employed throughout the study, for example, the interviews were conducted at the end of the interviewer’s involvement with the group, and her role was made clear and explicitly discussed at the beginning of each interview. Furthermore, development of the analysis and article with a co-author (second author: CW), who had no involvement with the BCDC project, sought to allow for an additional degree of validity.

3.2 The interviewees

All interviewed researchers (n=17) had participated in the joint research project’s communication activities, including tweeting and blogging. Their fields included the sciences (n=3), social sciences and humanities (n=3, SSH), economics (n=5) and information technology (n=6, IT). They were affiliated with research universities or state research institutes and their academic status ranged from PhD students to professors, comprising five nationalities.

The interviewed communication professionals (n=15) represented all of the interviewed researchers’ affiliated research

universities (n=5) and state research institutes (n=5), as well as interviewees from a peer project (n=1), a strategic partner (n=1), associated science communication agency (n=1), funding body (n=1) and the Finnish government (n=1). The interviews, held during June–August 2017, lasted an average of nearly two hours (54–132 minutes) and were held at the interviewees’ place of work or in workplace coffee rooms.

3.3 Analysis

All interviews were conducted and audio-recorded by one author (KK), two of them as video calls. The interviews were transcribed verbatim by an assistant. Working systematically with the data set, the qualitative data analysis was managed using the NVivo software package. The article employs the latent level of thematic analysis to examine the underlying ideas to interpret, organise and make interconnections between themes, with conclusions drawn from across the whole analysis (Braun & Clarke, 2006). Thematic analyses can be used for a more deductive or more inductive analytic process on a continuum where the inductive analysis is grounded in the data, but not conducted in a theoretical vacuum (Braun & Clarke, 2021). Coding of the formal incentives of science communication activity was anticipated from the research literature. The emergent patterns of the informal incentives of science communication were more inductively analysed. A dual process took place where firstly we identified the incentives of importance to the interviewees. Secondly, we employed thematic analysis at the latent level to examine the underlying rationales and interconnections between themes and the existing literature (Braun & Clarke, 2006). Description of the themes resulting from the analysis is provided in the supplementary material (Table 2). Coding was understood as an active and reflexive process, with no one correct procedure, and the authors did not seek to determine the reliability of the coding frame with inter-rater reliability scores (Braun & Clarke, 2021). Additionally, a mixed analysis was carried out incorporating qualitative con-

tent analysis with frequency values (Vaismoradi & Snelgrove, 2019) as presented in the following results section.

4 Results

In this article, we present the different forms of incentivising researchers’ communication activities, including those which take place digitally, which were present in the interview data. The analysis of the interview data allowed us to identify two central themes and a series of sub-themes outlined in Table 1 and described in more detail below. In the following section, we analyse how the potential impacts of different forms of incentivising were identified, perceived and expressed by researchers, followed by and compared with the communication professionals’ views.

4.1 Formal rewards

The “Rewards” theme and subsequent themes gathered quotes where the interviewees discussed the formal science communication incentives that may influence researchers’ communication activities, allowing us to identify motivations and deterrents underlying the dynamics of formal incentives.

4.1.1 Personal financial benefits

The interviewees discussed the role that financial incentives might play in science communication activities. Many (n=7) researchers rejected the idea that additional personal financial benefits would incentivise them to participate in science communication. They regarded such financial bonuses as something strange that crosses or conflicts with their inherent sense of “duty” to communicate. Personal financial benefits could be perceived as a risk to the integrity of science communication.

Table 1: Incentives and their potential impacts on researcher’s communication activity expressed by the researchers and communication professionals

Forms of incentives	Researchers	Communication professionals
Formal rewards		
Personal financial benefits	Rejection: would conflict with the sense of duty, create inequality, influence content Indirect benefits could work	Reservations: would conflict also with practicalities Support: without real incentives communication professionals’ motivating remains ineffective
Employee evaluation	Science communication has no or minor role in evaluation mechanisms Mechanisms could be used to acknowledge science communication including online	Evaluation mechanisms that include science communication would support activity When science communication is justified as official work it is not seen as an extra task
Acknowledging different capabilities	Appreciation for different capabilities May not be expected unanimously from all researchers A team’s joint capacity to be used according to individual skills	Respect varying capabilities Observed good potential for researchers’ skills development
Informal community acknowledgement		
Peer approval	Desire for recognition for a popularised science post primarily from the academic community	Producing digital science communication pieces ideally is a collaboration between researchers and communication professionals
Organisational culture	Indifferent attitude towards science communication Occasional positive recognition	Indifferent attitude attributed to the newness of digital science communication Attitudes divide the academic staff
Leaders	Scientific leaders’ acknowledgement as a highly significant motivator for communication activity	Scientific leaders’ acknowledgement as crucial prerequisite for communication activity Need to be explicit and lead by own example
Analytics	The analytics of activities create a sense of connection and form of reward	The analytics combined with the leaders’ communication examples could be highly effective

Personal benefits might also create organisational conditions for inequality for those researchers that are not skilled in communications, or overly influence the type of content produced, and so there was some hesitancy in regard to this approach.

Then one might tweet just for money, I don't think that a bonus would be a right or necessary way to motivate science communication, and it feels unethical in relation to research ethics [...]. I think that some level of science communication activity is part of our duties as researchers [...]. Some researchers are not very good in science communication activities, and in a research group it wouldn't be right to reward only those researchers that are advanced in communications. (Researcher 20, IT, university)

I know that in other institutions they pay a couple of hundred euros for a researcher to write a blog about trivial topics for a magazine, and I don't think that advances science communication [...]. Eventually, such bonuses might lead to controlling what is being written. (Researcher 14, sciences, institute)

Once we had a weird bonus system, and at the end of the day, it felt rather stupid. (Researcher 1, sciences, institute)

Two researchers did, however, discuss the way financial benefits offered in an indirect way could act as incentive that could be used for certain students and researchers:

For example, for doctoral students [...] the expenses of their conference travel costs which can be a couple of thousand euros, that would be good money for a blog. The point is that science communication cannot be forced, it needs to be encouraged, but with what, I really can't see any other incentives. (Researcher 6, IT, university)

The communication professionals were more divided in their responses. Three of them strongly supported personal rewards to motivate researchers. Although successful communication actions as such are seen to be rewarding by many researchers, these communication professionals

perceived that concrete financial benefits could encourage more researchers to participate. Without such serious incentives, it was felt the communication professionals' attempts to motivate researchers into science communication may be ineffective.

Some younger researchers ask why we don't get any compensation, why not for instance a one-off bonus for successful communication to a wider target audience. This has led to discussions within our organisations and may well happen in the future. As a form of reward, we have also discussed, for example, covering an international research exchange period. (Communication professional 13, research institute)

The rewarding must become legitimate in an official form, because without them science communication activity may not be demanded or rewarded in a way that would benefit scientific careers. Without real incentives, science communication motivational attempts congeal to just pottering around. (Communication professional 34, agency)

Both comments above suggest that any such payments may operate on a quid pro quo basis or in a way which has a level of transparency. Other communication professionals (n=3) had reservations regarding the motivational effectiveness of personal financial benefits and the practical measurement of the amount and quality of communication, as well as practicalities around the granting of such benefits in their organisations: "We have discussed this with researchers and for many 'a fiver for a tweet' wouldn't make a difference", communication professional 7 (research institute) stated. Communication professionals also shared the views expressed by a number of researchers that the financial benefits should not outgrow the intrinsic duty to communicate, which also reflects a commitment to the aim of increasing enlightenment via science communication, and a sense that personal financial benefits could conflict with this.

The bonus for science communication is blurring, and we have always wondered how would that be practically done. How would it be counted or given or what exactly could it be? In comparison, publication points are eagerly collected, but we have no points to give other than a pat on the shoulder [...]. I think if it [bonus] would be based on volume the quality may suffer, but how else could it be measured? (Communication professional 8, research institute)

The science communicator of the year nomination perhaps or some profile lift? I'm not at all sure about the financial rewards; would it be so important? [...] It should not be the motivator; one should be motivated by the will to tell what one is researching. (Communication professional 15, university)

In the case of these communication professionals, financial motivations would be challenging, and they pondered ways to credit the researchers' efforts in a way deemed appropriate alongside other types of academic rewards. Highly effective are the publication credits, or "JUFO points" which refer to the Finnish classification (scale 0, 1–3) of publication channels (<https://julkaisuforum.fi/en/faq-0>). Publication points are a part of the national research quality assessment and have formal and informal impacts on an organisational unit's profile, funding and the research staff's activity. Professional or popular publications are not included in the classification or may get a weight coefficient of 0.1 in the basic funding appropriated from state funds to universities. These findings indicate that in the wider scientific sphere, beyond individual HEIs or state research institutes remits, this low weighting in terms of formal reward forms one key discouragement for science communication activity as communication professional 8 described.

4.1.2 Employee evaluation

The researchers discussed public communication being part of their annual development discussion and working time allocation schemes. Five of them thought that such sections had no role, or a minor

role, in their evaluation / performance appraisals. In one organisation, social media communication in a professional capacity was mentioned in the evaluation sections. However, the researchers pointed out that systematic, periodical evaluation mechanisms are generally already in force for directing working duties and career development in academic organisations, both HEIs and state research institutes, and that they could be used for acknowledging science communication that is carried out, including online.

If science communication would take a day per month or more, it would need greater acknowledgement in working plans and as assigned tasks. But I wouldn't force such allocations to all the researchers, because some are not skilled in or willing to do science communication. But those that are interested should have the support and possibility to reserve science communication in their annual time allocation and working plans. In an indirect way that is already possible, and as an annual custom, I reserve a slot for writing popularised publications. But now I realise that the slot could be used for this [blogs and social media posts], too. I mean that the mechanisms for acknowledging them already do exist. (Researcher 6, IT, university)

Of course, one harsh but effective way would be acknowledging science communication as part of the researchers' work and performance evaluation [...]. Yeah, we surely must have something to measure, that's the thing. But again that raises the question whether it really would be effective, and what exactly is effectiveness, the measured amount? (Researcher 16, sciences, institute)

Researcher 6 and 16 highlighted the mechanisms that were already available, but again the possibility of practical and quality-based issues in introducing such recognition and evaluation schemes is present.

The communication professionals more frequently ($n=8$) and clearly thought that the organisations' performance appraisals for directing working duties that take into consideration science communication activities would support more

active science communication, including digitally. In these communication professionals' views, if science communication is justified as an official part of the researchers' work, it would not remain only an extra or optional task.

Of course it encourages, then science communication is measured, visible work, and then the researchers do it [science communication], and it's a part of their evaluation. I think that's essential and gives the prerequisites together with the leaders' support and the in-house culture. (Communication professional 18, research institute)

4.1.3 *Acknowledging different capabilities*

Interestingly, ten of the researchers wanted, without prompting, to bring forth their appreciation for different researcher capabilities. They noted that communication skills and motivation should not be expected unanimously from all researchers, also explaining that some will be uncomfortable with new digital unspoken codes, practices and roles or may restrict participation online. They stressed that a researcher may be highly skilled in conducting research while not in communications. In the researchers' teams, a joint capacity could be combined with the individuals' varying skills and the communication actions shared accordingly.

It shouldn't be forced in a similar way to all. It just suits some better, they clearly know how to utilise and enjoy social media. While for others it may induce great deterrents. (Researcher 11, economics, institute)

It would be total waste of resources to force the reluctant ones. Other researchers are willing to present and for them it would be good to use it [social media]. Often, both types work in the same team, and the teams' results could be communicated [by the willing researchers]. (Researcher 25, economics, university)

Many communication professionals (n=4) agreed and in their answers a respect for individually varying skills was clear, as captured in the view of commu-

nication professional 7 (research institute): "If standing in front of a camera is uncomfortable for a researcher, it will not benefit the researcher's work, institute or organisation, while for others Twitter may work as a good platform to represent their research theme or project". Two of the communication professionals added that when researchers become involved in communication training and activities, they often find it doable, enjoyable and find it inspiring to build confidence in their own skills. These communication professionals observed good potential for researchers' skills development by taking such approaches.

It needs to be done by one's own terms and it may be different: blogging or speaking and so on [...]. In the training, we provide a formula of how to communicate, and by following that the researchers first gain self-efficacy, then they start to vary that formula and create their own ways and even enjoy communications. I've seen many researchers who earlier hated to be forced to talk that now are eager to present. Previously, there was no training in presentation skills and they feared making mistakes. (Communication professional 19, funding body)

To summarise, the impacts of the different ways of rewarding communication seem to indicate that the direct personal financial benefits may unfasten researchers' inherent duty to communicate their work and induces many profound and practical complexities. Instead, as a more motivating form of incentivising, the interviewees recognise that the evaluation schemes available in both HEIs and state research institutes present a systematic possibility to support science communication, including online, by making it a visible and legitimate part of work routines and by encouraging skill development. The credit-driven academic system demands reward for contributions made, and the absence of obvious digital science communication recognition in academic crediting culture potentially discredits them further. These results suggest that to enhance the activities, it is necessary to consider how

to track them as scholarly acts. However, the interviewees highlighted the need to warrant consideration of quality issues in any evaluation practices and flexibility in the evaluation of different communication capabilities amongst researchers. This was considered possible when using new digital means that allow for varying use according to individual preference.

4.2 Informal community acknowledgement

In the interviews, we also explored the potential impacts of the informal forms of incentivising communication. The analysis allowed us to distinguish different ways in which the researchers' science communication work was validated and motivated within the organisations as a form of community acknowledgement from peers, leaders and via organisational culture and analytics.

4.2.1 Peer approval

It is interesting to note that when asked about the writing process for a popularised science text, blog, tweet or similar, researchers (n=9) frequently discussed a desire for approval from their peers or superiors and the academic community at large, rather than necessarily the intended audience. This appeared to be because the researchers look to their colleagues' professional judgement, whilst also ensuring the scientific validity and accessibility of their writing in popularised accounts.

To be completely honest, even though I think I would write in an accessible way that any lay person understands, in the back of my mind, writing a good piece that colleagues I esteem would appreciate would be my goal. (Researcher 25, economics, university)

I don't know the exact reasons, but I feel like writing a popular text is also a statement on my intellectual capacity. (Researcher 26, IT, university)

We see here how the researchers meet the many expectations of representing science in the online arena, protecting their academic reputation in their digi-

tal communications whilst balancing the complexities of interdependence (personal, organisational and institutional) and maintaining their autonomy. Only three of the researchers mentioned were thinking about public audiences as the starting point to their text.

When I'm writing, I'm always thinking of somebody that's going to read it. But it depends [...]. If I need to write for industry, I write in a specific way [...]. I can write in a different way, but normally I try to be as clear as possible so that everyone can follow it. (Researcher 36, IT, university)

Two researchers noted that communication professionals represent the general audience and thereby their opinion regarding the text's comprehensibility is important. For more than half of the communication professionals (n=8), the process of producing digital science communication pieces is ideally a collaboration of the two professions enhancing the quality of public outreach.

4.2.2 Organisational culture

In contrast to their desire for peer approval of their popularised texts, nine researchers described the general attitude towards digital science communication in their organisations as somewhere between neutral indifference and occasional informal positive mentions, the latter of which they perceived to be slightly increasing. As such, at least three researchers noted that positive recognition of science communication should be far stronger and valued in visible ways in the organisations, in a form that all the colleagues take notice of. Researchers also seem to be in need of support from peers who are interested in digital science communication.

Colleagues may be only occasionally following posts related to our home organisation. But I do believe that those who come across an interesting piece [by a colleague] may mention it in informal chatting in the corridors or at coffee tables. So, it might not go totally unnoticed, and there might be some who

spot and comment on them. (Researcher 16, sciences, institute)

In our organisation, if someone is active in science communication, there's certainly no negative feedback, but I think that we really have much to improve in giving positive feedback [...]. In the perspective of increasing the researchers' activity, awarding reward so that the other researchers would see it would be good. Then they might think it [science communication] is important. It should not be an explicit bonus [as money] but a prize, diploma or similar. (Researcher 1, sciences, institute)

Several communication professionals (n=5) explained the indifferent attitude towards digital science communication in their organisations as being attributed to its novelty. Some also saw the indifferent attitudes dividing the academic staff.

The older researchers who don't use social media, and don't even know who does, keep silent because of their unfamiliarity. But that can't be taken as critique. (Communication professional 22, university)

The unit leaders who participate less are usually the more senior professors for who social media activity doesn't come by nature [...]. Then there are certain folks that communicate in social media and comment positively in the informal coffee room environments about a nice story on the faculty's Facebook or somebody's tweet [...]. I feel that it is the middle management in the organisation that doesn't necessarily understand social media, so they don't comment on it either. (Communication professional 27, university)

It is rather polarised, there are those who are very active and those who just are not interested, and then those who would never ever do science communication. (Communication professional 8, research institute)

The changes induced by the new media landscape on organisational science communication cultures are in flux and have the potential to support digital approaches to science communication, but there is the possibility they will stagnate due

to differing academic staff's attitudes towards the role they might play. The aforementioned interviewees agreed that there were few negative comments about researchers who are active on social media, but when such comments were made this typically regarded wondering about how many working hours they use on social media and when they find the time to do research.

4.2.3 Leaders

Some of the researchers (n=5) particularly regarded their research leaders' appreciation and acknowledgement as highly significant motivators for their digital science communication activity and involvement. One researcher also highlighted the need for more nuanced feedback on the substance of their blog writing in addition to merely positive encouragement.

If your team leader says "I think you've done a very good job in public communications for the project this year and I do really appreciate it", that might actually be enough [...] you are quite likely to actually perform at the same or even better level next year [...] so, this kind of bonus might be enough. If it actually feeds into your boss saying "Ok, I will give a performance level upgrade", or something, then even better. (Researcher 35, IT, university)

The feedback has only been positive. But it is a little bit disappointing that it is only the usual positive feedback that one can expect in this project: "Good that you published [a blog]", but not about the substance [of a blog ...]. It would be wonderful to get more feedback from the leaders and also critique wouldn't do any harm, quite the opposite. (Researcher 30, SSH, university)

Here, a substantial number of the communication professionals (n=10), more often and intensively than the researchers, regard the scientific leaders' conceptualisation of science communication and support as crucial for the researchers' activity in the organisations, and particularly in suppressing it. This underlines the scientific leaders' importance in the anticipated organisational activity. Without the

leaders' recognition, the communication professionals in HEIs and in state research institutes made clear there was a sense of frustration in having very little possibility in motivating researchers to participate in science communication online. Communication professionals felt it was important that the leaders were explicit that communication is part of the researchers' duty.

When research group leaders tell their researchers that this is not worth the time, in practice I have no way to influence the situation and [our efforts] are in vain [...]. As long as the leaders say so, the researchers have to refrain from communications. (Communication professional 8, research institute)

It is not enough that we from communications say that 'it would be great if you would communicate'. It is a question of management, they should explicitly say that this belongs to your job description [...]. When the dean doesn't comment on this [online science communication] and the department leaders are not on social media, it can't be demanded from the researchers either. It means our hands are tied. (Communication professional 15, university)

Three of these communication professionals also thought that a good way leaders can support researchers' science communication efforts is through leading by example in their own social media activity. One of the researchers in a leading position also followed the example set by his superior in systematically acknowledging the researchers' achievements.

In this matter, too, I think it's extremely important that in addition to other resourcing, the dean and management clearly state that this is worthwhile, and it could be done by their own example, for instance by tweeting from the faculty's events. (Communication professional 27, university)

This has been actively communicated internally and we have shown that look, this is how our Principal Investigator is tweeting. Then our folks got a little bit excited and created

their own profiles. (Communication professional 18, research institute)

4.2.4 Analytics

Another means that the researchers considered motivating is information they could gather about their published blogs' or tweets' reach as analytics. Five of the researchers took up this topic without prompting and considered the analytics on their activities to be highly intriguing. They liked to know how many, if any, saw their posts because they consider any reaction or retweet as positive feedback and a form of a reward. The analytics appeared to influence their motivation, and even if the numbers were low, they still thought they were good to know.

If you are publishing something because you want to reach and help some audiences, knowing that they enjoyed it is highly motivating, especially if the numbers are in the hundreds. If not, then of course it's a little bit discouraging, but it's always good to know the impact [of the posts]. (Researcher 26, IT, university)

Three communication professionals also noticed that in some disciplines the social media analytics are regarded as interesting and their presentation in staff meetings, combined with the leaders' communication examples, could be highly effective.

The faculty of medicine has succeeded very well because their dean is excited about tweeting and has gained lots of followers. They have been showing the rates of viewers in every meeting, and many of the staff have gotten involved. (Communication professional 15, university)

In sum, it is apparent in these results that motivations and incentives cannot be reduced to the single organisational level and also link to a wider academic sphere and context for HEIs and state research institutes. These results show that incentivising community acknowledgements for science communication efforts are desired from researchers' peers, scientific leaders

and as a part of organisational culture, including in the somewhat abstract form of analytics. Likewise, a scientific leader's discouraging attitude informally creates a powerful deterrent for science communication activity online and exhausts the communication professionals' motivational attempts. The results demonstrate the role of scientific leaders in the conceptualisation and prerequisite of researchers' communication activity both formally, through reward structures and informally, via behaviours.

5 Discussion

These results nuance the previous literature and support the consensus on the need to compensate the time researchers spend on participating in science communication activities (Casini & Neresini, 2012; Davies, 2018; Ho et al., 2020; Llorente & Revuelta, 2020; NAS, 2018; Regan & Hinchion, 2020; Roedema et al., 2020; Szudi et al., 2020) but they suggest simplistic personal financial benefits may not be the preferred option. This is because the majority of researchers spoken to as part of this study found that rewards as personal benefits, awarded by organisational infrastructures, induced profound complexities. The researchers found them problematic in conjunction with the idea of science communication forming a part of their formal duties, further elaborating earlier findings on researchers' complex perceptions of their duties in regard to communication and public engagement (Koivumäki & Wilkinson, 2020; Koivumäki et al., 2021). For these researchers, science communication often meant increasing enlightenment and education, and personal financial incentives could be seen to jeopardise that integrity (Weingart & Joubert, 2019). Entradas et al. (2019) similarly found that external motivations are unlikely to drive scientists to public communication initiatives.

Another important point the researchers in this study brought up is the inequality of rewarding researchers who are more skilled or motivated digital communica-

tors. These interviewees flagged the need for flexibility in evaluation criteria to recognise that some may be uncomfortable with digital practices, aligning with previous findings (Grand et al., 2016; König, 2020; NAS, 2018; Roedema et al., 2020) but also recognising that personal communication choices can be supported in new digital settings. As research is often carried out in teams, individual rewards also appeared problematic, confirming the need to also pursue collectively organised science communication beyond individual efforts alone (Besley, 2020).

Although some communication professionals strongly supported personal financial benefits for communication efforts, many shared the researchers' concerns. Additionally, communication professionals saw challenges in the organisational practices of measuring the amount and impact of communication efforts, including digitally, and accordingly bringing complexities to the granting of any potential rewards (NAS, 2018; Williams, 2020).

Organisational rewards that were seen to be more befitting incentives included acknowledgement at researchers' formal periodical evaluations and the inclusion of communication, including social and digital media, within work hour allocations. This way, science communication would be tied more explicitly to organisational expectations in both HEIs and in state research institutes around the duties and tasks of researchers, which the communication professionals saw as being highly important. This association also provides possible solutions to the inconsistent messages circulating within academia about the importance of science communication from different sectors and leaders, as noted in earlier research (Davies, 2018; Gascoigne & Metcalfe, 1997; Roedema et al., 2020; Rose et al., 2020; Watermeyer & Rowe, 2022).

However, beyond formal organisational rewards, there are other ways that cultures and contexts can play a role in incentives. In this study, the researchers discussed pursuing their peer researchers' approval during their writing process,

although the intention was to reach other audiences. Rather than potentially becoming less authentic online, these findings suggest researchers see their digital presences as featuring in their academic credibility (Madsen & Verhoeven, 2019; Weingart & Joubert, 2019). Thus, new practices of science communication online gain credence in relation to traditional formal communication and signs of merit in complex academic networks (Davies & Horst, 2016; Kjellberg & Haider, 2019).

We see here, as Davies and Horst (2016) have noted, that academic community acknowledgement indeed matters to researchers. In daily working culture the researchers pointed to a need for recognition and support from peers with whom they could exchange experiences of the complexities of online science communication, as also identified by Roedema et al. (2020). Individual communications in the digital sphere inevitably diffuse the academic and organisational communication cultures of HEIs and state research institutes, but also influence the attitudes of academic staff, which also then likely has a broad knock-on effect on organisations and academia in requiring different forms of organisational support and recognition.

The academic sphere beyond an individual organisation is closely connected to traditions and status (Roedema et al., 2020), and our results also point to the significant organisational modelling that can come from scientific leaders when they are either present or absent in digital communication spaces. Leaders' acknowledgement and recognition of digital communication efforts was often desired by the individual researchers, and also emphasised by the communication professionals. They stated that the scientific leaders' indifference towards digital science communication was perceived as a restraint for researchers' activity. The communication professionals in HEIs and in state research institutes made clear that they cannot encourage researchers to communicate science offline or online without their academic leaders' support. This reinforces earlier findings regarding the institutional leadership's significant role

in incentivising science communication in organisational contexts (Gascoigne & Metcalfe, 1997; NAS, 2018; Watermeyer & Rowe, 2022) instead of placing the responsibility of enhancing science communication purely on individual science researchers (Besley et al., 2021).

To create a visible science communication culture that has been lacking (Bucchi, 2013; Claessens, 2014), and to drive the preferred conceptualisation of science communication (Weingart & Joubert, 2019) the communication professionals in this study urge leaders to lead by their own examples, such as personally using social media in an effective way. Also, by establishing informal incentives that express underpinning worth and value (Williams, 2020) academic leaders may contribute to a culture that encourages the development of digitalised approaches to science communication.

Finally, comments from interviewees regarding researchers' fascination with the analytics of their blogs or other types of social media posts, and their reach in relation to viewers, suggest that analytics seems to also function as a form of intrinsic reward. This resembles earlier findings where blog statistics, for example, can make a researcher feel connected (Kjellberg, 2010), and suggests that there are some tangible benefits of engaging through digital media, and enduring value and worth in the quantification of social media endeavours (McClain & Neeley, 2015). These results support the idea of Szudi et al. (2020) that the limited recognition given today to digital outreach could be increased with the development of altmetrics to measure societal impact. However, such impact measures need to be sophisticated, as a number of studies highlight the potentially negative effects on researchers' online science communication activities if altmetrics simply push communication to gain quantified attention, potentially eroding the quality norms of science communication (Sugimoto et al., 2017; Weingart & Guenther, 2016; Weingart & Joubert, 2019).

6 Conclusions

At the outset of this article and in the context of digital science communication we posed the question of “what are the formal and informal organisational and institutional incentives that may influence researchers’ digital and social media communication activity?”. Our results lead us to recommend against simplistic personal “bonuses” for communication because they may dissociate science communication from the sense of a researchers’ intrinsic duties and the broader quality and value of such efforts. Instead, sensitive and nuanced acknowledgement of their contribution as part of performance evaluations or workload modelling may better tie science communication tasks to researchers’ duties and expected work plans. Based on these results, it is also important to allow flexibility by creating holistic criteria for science communication and engagement activities, including through social and digital media, which work in respect to personal communication preferences but also a team’s overall contributions. In many HEIs and state research institutes, systematic appraisals already exist, and provide a practical context to cautiously embed recognition. Emphasising science communication and engagement as a legitimate part of the researchers’ evaluation and career development could be an effective and systemic enhancement of science communication at an organisational level.

However, such organisational infrastructure alone may not be effective, and informal acknowledgement of communication and engagement can also form a lively part of an organisation’s work when social media contents or blogs are posted. Despite the researchers’ strong sense of autonomy, there appears to be a degree of role modelling or mirroring of behaviours where communication and public engagement is concerned, and a need for peer recognition and support, including in digital spaces.

These findings underline scientific leaders’ roles in shaping their organisational culture’s communication attitudes and thereby supporting or discouraging

science communication within their institutions, but also point to a broader academic social sphere where traditions and status are closely connected (NAS, 2018; Williams, 2020). These results indicate that scientific leaders are in the key position to create and support a positive organisational science communication culture, and to evoke and nurture the collective impact of at times individual activities to inform communal goals.

According to our results, the acknowledgement for science communication is more effective when it comes from or is emphasised by the academic leaders than from the in-house communication staff in HEIs and in state research institutes. Furthermore, despite the increase of communication professionals in academic organisations, their attempts to motivate researchers to take on the central actor role in embodying science online may have minimal effect without the support of leadership. This suggests that there is a need for discussion on the role of academic leaders in the conceptualisation of science communication, including digitally, whilst there also may be a key gap vis-à-vis training in science communication and engagement targeted towards scientific and organisational leaders.

These results also imply that training researchers to locate their social media posts’ analytics, and by inference impact, may function as a form of intrinsic reward. However, impact metrics need to be cautiously used to avoid biases such as pushing science communication quantity over quality.

This exploratory research has limitations as it is focused on a single context in one country: researchers from Finland connected by a research project which sought to include digital communication within its remit. Further research will have to investigate additional organisational and institutional factors at play in the incentives for communication, as well as the prevalence of these results at a wider scale. Nonetheless, this context may serve as an example of possible developments within academic communities in other countries where suchlike media developments

occur: In Finland media consumption is high and increasing, particularly online (Strandberg & Carlson, 2021), and social media platforms such as Twitter serve as a societal interaction arena between researchers, decision-makers and journalists. Thus, these results offer a tool for reflection to many HEIs, public research institutes and scientific communities around the globe as they share the characteristics of academic autonomy, practices, reward systems and the growing need for societal legitimation and improvement of communication efforts, also online and in social media.

This study suggests there are important avenues for future research regarding institutional and organisational leadership roles as to how to lead in ways that improve the realisation of science communication activities, particularly as a collective effort and in collaboration with the growing sector of HEI-based communication and public engagement staff. There is a wealth of criticism concerning academic reward systems necessitating the tracking of a spectrum of scholarly acts. Nonetheless, the present study suggests not to omit the potential intrinsic rewarding effects of social media metrics, which are worthy of future studies.

Acknowledgements

This work was supported by the Strategic Research Council at the Academy of Finland [grant number 292854] and the Finnish Cultural Foundation. We warmly thank Professor Maja Horst for her valuable comments and suggestions at the early stages of this research.

Conflict of interests

The authors declare no conflict of interests.

Supplementary material

Supplementary material for this article is available online in the format provided by the authors (unedited). <https://www.hope.uzh.ch/scoms/article/view/j.scoms.2022.03.3205>

References

- Autzen, C., & Weitkamp, E. (2020). Science communication and public relations: Beyond borders. In A. Leßmöllmann, M. Dascal, & T. Gloning (Eds.), *Science communication* (pp. 465–484). Boston, MA: De Gruyter. <https://doi.org/10.1515/9783110255522-022>
- Besley, J. C. (2020). Five thoughts about improving science communication as an organizational activity. *Journal of Communication Management*, 24(3), 155–161. <https://doi.org/10.1108/JCOM-03-2020-0022>
- Besley, J. C., Garlick, S., Fallon Lambert, K., & Tiffany, L. A. (2021). The role of communication professionals in fostering a culture of public engagement. *International Journal of Science Education, Part B*, 11(3), 225–241. <https://doi.org/10.1080/21548455.2021.1943763>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18(3), 328–352. <https://doi.org/10.1080/14780887.2020.1769238>
- Bucchi, M. (2013). Style in science communication. *Public Understanding of Science*, 22(8), 904–915. <https://doi.org/10.1177/0963662513498202>
- Casini, S., & Neresini, F. (2012). Behind closed doors. Scientists' and science communicators' discourses on science in society. A study across European research institutions. *Tecnoscienza. Italian Journal of Science & Technology Studies*, 3(2), 37–62. Retrieved from <http://www.tecnoscienza.net/index.php/tsj/article/view/113/76>

- Claessens, M. (2014). Research institutions: Neither doing science communication nor promoting 'public' relations. *Journal of Science Communication*, 13(3), 1–5. <https://doi.org/10.22323/2.13030303>
- Collins, K., Shiffman, D., & Rock, J. (2016). How are scientists using social media in the workplace? *PLoS ONE*, 11(10), 1–10. <https://doi.org/10.1371/journal.pone.0162680>
- Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Thousand Oaks, CA: Sage.
- Davies, S. R. (2018). Scientists' duty to communicate: Exploring ethics, public communication, and scientific practice. In S. Priest, J. Goodwin, & M. Dahlstrom (Eds.), *Ethics and practice in science communication* (pp. 175–191). Chicago, IL: University of Chicago Press.
- Davies, S. R., & Horst, M. (2016). *Science communication: Culture, identity and citizenship*. London, UK: Springer.
- Dudo, A., Kahlor, L., AbiGhannam, N., Lazard, A., & Liang, M. (2014). An analysis of nanoscientists as public communicators. *Nature Nanotechnology*, 9(10), 841–844. <https://doi.org/10.1038/nnano.2014.194>
- Entradas, M., Bauer, M. W., O'Muirheartaigh, C., Marcinkowski, F., Okamura, A., Pellegrini, G., ... Li, Y. Y. (2020). Public communication by research institutes compared across countries and sciences: Building capacity for engagement or competing for visibility? *PLoS ONE*, 15(7), 1–17. <https://doi.org/10.1371/journal.pone.0235191>
- Entradas, M., Marcelino, J., Bauer, M. W., & Lewenstein, B. (2019). Public communication by climate scientists: What, with whom and why? *Climatic Change*, 154(1–2), 69–85. <https://doi.org/10.1007/s10584-019-02414-9>
- Fecher, B., & Hebing, M. (2021). How do researchers approach societal impact? *PLoS ONE*, 16(7), 1–20. <https://doi.org/10.1371/journal.pone.0254006>
- Gascoigne, T., & Metcalfe, J. (1997). Incentives and impediments to scientists communicating through the media. *Science Communication*, 18(3), 265–282. <https://doi.org/10.1177/1075547097018003005>
- Grand, A., Holliman, R., Collins, T., & Adams, A. (2016). "We muddle our way through": Shared and distributed expertise in digital engagement with research. *Journal of Science Communication*, 15(4), 1–23. <https://doi.org/10.22323/2.15040205>
- Ho, S., Looi, J., Leung, Y., & Goh, T. (2020). Public engagement by researchers of different disciplines in Singapore: A qualitative comparison of macro-and meso-level concerns. *Public Understanding of Science*, 29(2), 211–229. <https://doi.org/10.1177/0963662519888761>
- Kjellberg, S. (2010). I am a blogging researcher: Motivations for blogging in a scholarly context. *First Monday*, 15(8). <https://doi.org/10.5210/fm.v15i8.2962>
- Kjellberg, S., & Haider, J. (2019). Researchers' online visibility: Tensions of visibility, trust and reputation. *Online Information Review*, 43(3), 426–439. <https://doi.org/10.1108/OIR-07-2017-0211>
- Koivumäki, K., Koivumäki, T., & Karvonen, E. (2020). "On social media science seems to be more human": Exploring researchers as digital science communicators. *Media and Communication*, 8(2), 425–439. <https://doi.org/10.17645/mac.v8i2.2812>
- Koivumäki, K., Koivumäki, T., & Karvonen, E. (2021). Challenges in the collaboration between researchers and in-house communication professionals in the digital media landscape. *Journal of Science Communication*, 20(3), 1–21. <https://doi.org/10.22323/2.20030204>
- Koivumäki, K., & Wilkinson, C. (2020). Exploring the intersections: Researchers and communication professionals' perspectives on the organisational role of science communication. *Journal of Communication Management*, 24(3), 207–226. <https://doi.org/10.1108/JCOM-05-2019-0072>
- Kvale, S., & Brinkmann, S. (2009). *InterViews: Learning the craft of qualitative research interviewing* (2nd ed.). Thousand Oaks, CA: Sage.
- König, M. (2020). Scholarly communication in social media. In A. Leßmöllmann, M. Dascal, & T. Gloning (Eds.), *Science communication* (pp. 639–656). Boston, MA: De Gruyter. <https://doi.org/10.1515/9783110255522-030>

- Llorente, C., & Revuelta, G. (2020). *Hurdles and incentives to science communication in Europe. Communication role on perception and beliefs of EU Citizens about science, project report CONCISE*. Retrieved from <https://tinyurl.com/yycxf2z7v>
- Madsen, V. T., & Verhoeven, J. W. (2019). The big idea of employees as strategic communicators in public relation. In F. Frandsen, W. Johansen, R. Tench, & S. Romenti (Eds.), *Big ideas in public relations research and practice* (pp. 143–162). Bingley, UK: Emerald. <https://doi.org/10.1108/S2398-39142019000004011>
- Marcinkowski, F., Kohring, M., Fürst, S., & Friedrichsmeier, A. (2014). Organizational influence on scientists' efforts to go public: An empirical investigation. *Science Communication, 36*(1), 56–80. <https://doi.org/10.1177/1075547013494022>
- Mason, J. (2004). Semistructured interview. In M. Lewis-Beck, A. Bryman, & T. Liao (Eds.), *Encyclopaedia of social science research methods* (pp. 1021–1022). Thousand Oaks, CA: Sage.
- McClain, C., & Neeley, L. (2015). A critical evaluation of science outreach via social media: Its role and impact on scientists. *F1000Research, 3*, 1–14. <https://doi.org/10.12688/f1000research.5918.2>
- Milani, E., Ridgway, A., Wilkinson, C., & Weitkamp, E. (2020). *Report on the working practices, motivations and challenges of those engaged in science communication. Project report RETHINK*. Retrieved from <https://tinyurl.com/2p8tut89>
- NAS (National Academy of Sciences). (2018). *The science of science communication III: Inspiring novel collaborations and building capacity: Proceedings of a colloquium*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24958>
- Poliakoff, E., & Webb, T. L. (2007). What factors predict scientists' intentions to participate in public engagement of science activities? *Science Communication, 29*(2), 242–263. <https://doi.org/10.1177/1075547007308009>
- Regan, A., & Henchion, M. (2020). Social media and academic identity in food research. *British Food Journal, 122*(3), 944–956. <https://doi.org/10.1108/BFJ-03-2019-0156>
- Roedema, T., Rerimassie, V., & Kupper, F. (2020). *"I don't go online, because that is where the skeptics are." Report on incentive and disincentive structures for research and innovation stakeholders to engage in science communication. Project report RETHINK*. Retrieved from <https://tinyurl.com/4kfas6xa>
- Rose, M., Markowitz, E., & Brossard, D. (2020). Scientists' incentives and attitudes toward public communication. *Proceedings of the National Academy of Sciences of the United States of America, 117*(3), 1274–1276. <https://doi.org/10.1073/pnas.1916740117>
- Schäfer, M., & Fähnrich, B. (2020). Communicating science in organisational contexts: Toward an "organisational turn" in science communication research. *Journal of Communication Management, 24*(3), 137–154. <https://doi.org/10.1108/JCOM-04-2020-0034>
- Schwetje, T., Hauser, C., Bösch, S., & Leßmöllmann, A. (2020). Communicating science in higher education and research institutions: An organization communication perspective on science communication. *Journal of Communication Management, 24*(3), 189–205. <https://doi.org/10.1108/JCOM-06-2019-0094>
- Sousa, F. (2010). Metatheories in research: Positivism, postmodernism, and critical realism. In A. Woodside (Ed.), *Organisational culture, business-to-business relationships, and interfirm networks* (pp. 455–503). Bingley, UK: Emerald.
- Strandberg, K., & Carlson, T. (2021). Media and politics in Finland. In E. Skogerbø, Ø. Ihlen, N. Kristensen, & L. Nord (Eds.), *Power, communication, and politics in the Nordic countries* (pp. 69–89). Gothenburg, Sweden: Nordicom. <https://doi.org/10.48335/9789188855299-4>
- Sugimoto, C., Work, S., Larivière, V., & Haustein, S. (2017). Scholarly use of social media and altmetrics: A review of the literature. *Journal of the Association for Information Science and Technology, 68*(9), 2037–2062. <https://doi.org/10.1002/asi.23833>
- Szudi, G., Degli-Esposti, S., Bartar, P., & Tulin, M. (2020). *Overview of (dis)incentives for scientists to engage in scicom. Project report TRESCA: Trustworthy, reliable and*

- engaging scientific communication approaches*. Retrieved from <https://tinyurl.com/yxhabvep>
- Townsend, P., & Wilkinson, C. (2021). Gathering evidence of impact from research support services: Examining impact in the context of the Centre for Environmental Data Analysis. *Research Evaluation*, 30(2), 169–178. <https://doi.org/10.1093/reseval/rvaa031>
- Vaismoradi, M., & Snelgrove, S. (2019). Theme in qualitative content analysis and thematic analysis. *FQS*, 20(3), 1–14. <http://doi.org/10.17169/fqs-20.3.3376>
- van Zoonen, W., Verhoeven, J. W. M., & Elving, W. J. L. (2014). Understanding work-related social media use: An extension of theory of planned behavior. *International Journal of Management, Economics and Social Sciences*, 3(4), 164–183. Retrieved from <https://www.ijmess.com/volumes/volume-III-2014/issue-IV-12-2014/full-1.pdf>
- Watermeyer, R., & Rowe, G. (2022). Public engagement professionals in a prestige economy: Ghosts in the machine. *Studies in Higher Education*, 47(7), 1297–1310. <https://doi.org/10.1080/03075079.2021.1888078>
- Weingart, P., & Guenther, L. (2016). Science communication and the issue of trust. *Journal of Science Communication*, 15(5), 1–11. <https://doi.org/10.22323/2.15050301>
- Weingart, P., & Joubert, M. (2019). The conflation of motives of science communication – causes, consequences, remedies. *Journal of Science Communication*, 18(3), 1–13. <https://doi.org/10.22323/2.18030401>
- Wilkinson, C. (2019). Evidencing impact: A case study of UK academic perspectives on evidencing research impact. *Studies in Higher Education*, 44(1), 72–85. <https://doi.org/10.1080/03075079.2017.1339028>
- Wilkinson, C., & Weitkamp, E. (2013). A case study in serendipity: Environmental researchers use of traditional and social media for dissemination. *PLoS ONE*, 8(12), 1–9. <https://doi.org/10.1371/journal.pone.0084339>
- Williams, K. (2020). Playing the fields: Theorising research impact and its assessment. *Research Evaluation*, 29(2), 191–202. <https://doi.org/10.1093/reseval/rvaa001>