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Support for participating in outreach and the benefits of doing so

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Abstract

This paper presents the preliminary analysis of data collected as part of a research project into the attitudes within the particle-physics community towards outreach in particular (known academically as public engagement) and science communication in general. The Compact Muon Solenoid (CMS) Collaboration at CERN's Large Hadron Collider was chosen as the sample to represent the population of particle-physics researchers (which includes engineers and students working in particle physics). The collaboration, which operates and analyses collision data from the Compact Muon Solenoid particle detector, has, as of June 2015 (when these data were collected), more than 4000 scientists and engineers from around 200 institutes based in over 40 countries. The analysis shown here concerns the data collected via an online survey distributed to the whole of the CMS Collaboration in early 2015. The survey received 391 valid responses. Of the many topics covered in the survey, results concerning two are included here (1) With regards to funding and support for outreach, there was high agreement that outreach is important because research is funded by taxpayers although few felt that outreach plans should be a component of grant applications. (2) There was high agreement that, when it came to the benefits of doing outreach, participating in such activities made one a better scientist and gave one job satisfaction but few thought it helped advance one's career. The paper is part of the author's research towards a PhD in Science Communication.

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Support for participating in outreach and the benefits of doing so

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This paper presents the preliminary analysis of data collected as part of a research project into the attitudes within the particle-physics community towards outreach in particular (known academically as "public engagement") and science communication in general. The Compact Muon Solenoid (CMS) Collaboration at CERN's Large Hadron Collider was chosen as the sample to represent the population of particle-physics researchers (which includes engineers and students working in particle physics). The collaboration, which operates and analyses collision data from the Compact Muon Solenoid particle detector, has, as of June 2015 (when these data were collected), more than 4000 scientists and engineers from around 200 institutes based in over 40 countries. The analysis shown here concerns the data collected via an online survey distributed to the whole of the CMS Collaboration in early 2015. The survey received 391 valid responses. Of the many topics covered in the survey, results concerning two are included here: (1) With regards to funding and support for outreach, there was high agreement that outreach is important because research is funded by taxpayers although few felt that outreach plans should be a component of grant applications. (2) There was high agreement that, when it came to the benefits of doing outreach, participating in such activities made one a better scientist and gave one job satisfaction but few thought it helped advance one's career.

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[1]Speaker

1.Introduction

The academic field of science-communication research has undergone significant changes in the last few decades. The idea of "scientific literacy", which saw its birth in the 1950s, was once popular within science-communication circles. However, despite monumental efforts to improve the scientific literacy of society, studies have shown that the literacy levels have remained disappointingly low. The futility of using the knowledge of scientific facts as a metric for the literacy of society was uniquely demonstrated in a piece of research that showed that scientists themselves were unable to recount certain facts of science, often in their own fields of expertise [1]. In the mean time, a new paradigm that has been called the "Public Understanding of Science and Technology" took root from the 1980s, largely as a direct consequence of the Bodmer Report published by the Royal Society [2]. Both the "literacy" and the "understanding" models have a focus on what has been described as a "knowledge deficit". According to this deficit model, society at large lacks knowledge of the facts of science and it is the role of scientists and science communicators to fill this gap in knowledge.

Unfortunately, the deficit model does not take into account the different stakeholders within society when it comes to scientific research, such as local communities around research facilities or patient groups who might have implicit and explicit interests in, say, biomedical research. In recent years, the academic community has adopted the so-called "public engagement" paradigm, which acknowledges the role society has to play in scientific research.

Of course, "engagement" cannot exist without an "understanding" of science, which is why Crettaz von Roten identified three aspects to engagement, which also show the evolution of the field [3]:

- "scientists […] encouraged to inform the public"
- "scientists […] encouraged to develop dialogue on scientific facts and processes"
- "scientists must engage with society in the early phase of scientific development"

It is clear from these that the conversation has moved from a one-way structure, where information goes from the scientists to society, to a two-way structure, which emphasises the interplay between science and society.

1.1Engagement with fundamental research

Research into "public engagement" lacks literature concerning fundamental research. Fields of research that get included in public-engagement studies often have either a direct or an immediate impact on human life and society. Take for example a recent project on public attitudes to science conducted by Ipsos MORI in the UK, which addressed fields such as climate change, vaccination, renewable energy, medical ethics, nuclear research etc. but did not include areas of fundamental physics [4].

This paper is part of a project that is studying public engagement in the context of particle physics.

1.2The population sample for particle physics

It is estimated that approximately half of all particle physicists in the world conduct their research using facilities provided at and by CERN, the European laboratory of particle physics

[5]. Therefore, and although particle physics concerns more than merely research at colliders, the population of particle-physics researchers working at CERN can be thought to represent the whole field to a large extent. However, care should be taken in making such an assessment given that the majority of researchers at CERN work for large collaborations with collaborators numbering in the thousands and large groups have different working conditions and outreach possibilities than smaller groups. Nevertheless, the Compact Muon Solenoid (CMS) Collaboration, which operates one of the two general-purpose particle detectors at the Large Hadron Collider (LHC), was chosen as the sample of the CERN-based population. CMS provides a wealth of cross-national and cross-cultural data on attitudes towards outreach, with more than 4000 scientists and engineers representing nearly 200 institutions from over 40 countries making up the collaboration (as of June 2015).

1.3Defining outreach

In science-communication literature, the term “public engagement” is preferred when discussing communication between science and society. However, particle physics favours the term “outreach”, as is evident from the creation of CERN’s “Education, Communication and Outreach” team following a restructure at the laboratory earlier this year and the existence of organisations such as the International Particle Physics Outreach Group (IPPOG). Crettaz von Roten further lends support for the use of this term, noting that it is often used to refer to all science-communication activities “designed for an audience outside academia” [3].

2.Methods and Data

2.1Methods

To acquire data for performing quantitative analysis, a web-based survey was circulated to all members of the CMS Collaboration. The survey itself was prepared based on questionnaires that were used in previous studies on outreach [6, 7, 8, 9].

The electronic survey was hosted at CERN using the SharePoint infrastructure provided at the laboratory. Access to the survey was restricted to CMS personnel and each respondent’s name was recorded along with their answers. Although the survey was confidential, auxiliary data about the respondents (age, nationality, institutional affiliation etc.) was extracted from the database of CMS members. Details about this as well as the pilot survey and ethical considerations can be found in a previous paper on this project [10].

2.2Data

The survey was open for responses for a few months, with reminders sent regularly to all CMS members. At the end of this period, 402 responses were recorded. However, ten of the responses were duplicates, while one response was invalid for other reasons. A total of 391 responses – a little less than 10% of the CMS Collaboration – were used for the final analysis. It should be noted that 348 of the 391 respondents stated that they had previously participated in some outreach activity; this clearly highlights the self-selection bias of such data-collection methods.

3.Results

The PhD project addresses various issues concerning outreach and the survey, therefore, included questions on a number of topics regarding science communication. However, this paper is concerned with only two major themes: the role of funding bodies in outreach and the personal benefits of being involved in outreach.

3.1Role of funding bodies

Respondents were asked to rate their views towards the following statements on a scale of 1 (“Strongly Disagree”) to 5 (“Strongly Agree”):

- “It is important for scientists to take part in outreach activities because taxes from citizens fund research.”
- “Funding bodies should provide support for scientists to communicate their research to the non-specialist public.”
- “When applying for grants, scientists should be required to provide details on how their research will be communicated to the wider society.”

Respondents showed overwhelming agreement with the first two of these statements, as shown in Figure . However, they were less enthusiastic about the inclusion of outreach details in grant applications (also shown in Figure 1).

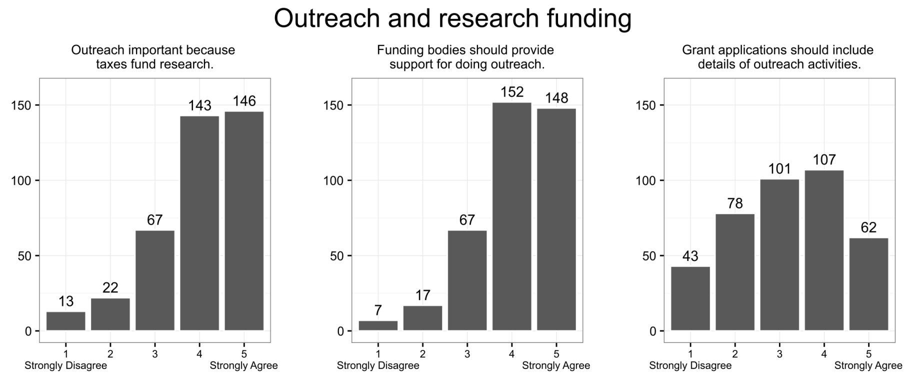

Figure 1: Outreach and research funding *These plots show how respondents rated their agreement with three statements concerning outreach and research funding.*

3.2Benefits of outreach participation

The respondents were also asked about the personal benefits of participating in outreach activities. Specifically, and again on a scale of 1 (“Strongly Disagree”) to 5 (“Strongly Agree”), they were asked to rate their agreement with the following statements:

- “It makes me a better scientist.”
- “I get a feeling of enjoyment.”
- “It gives me job satisfaction.”
- “It attracts research funding.”
- “It advances my career.”
- “It is an opportunity for others to contact me for collaborative purposes.”
- “It shapes the direction of my research or makes me think about it in new ways.”

There was outright agreement with the idea that participating in outreach made one a better scientist, and also gave one enjoyment and job satisfaction (as shown in Figure 2). However, there was less agreement with the remaining statements (Figure 3).

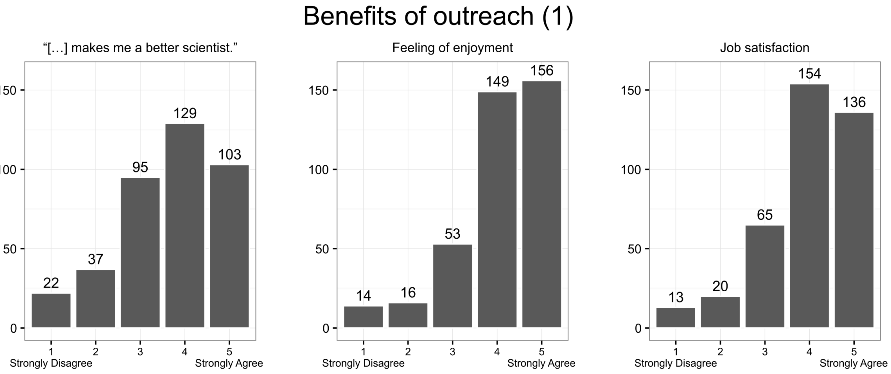

Figure 2: Benefits of outreach participation (1) *These plots show the ratings for agreement with three statements concerning the benefits of participating in outreach activities.*

Some of this is probably to be expected. For example, the expectation that two-way engagement shapes the direction of one's research by involving more stakeholders in society is based upon experience from areas of research (such as biomedical science or robotics) that have a more immediate impact on human life. It remains to be explored whether this expectation is a valid one when it comes to fundamental research such as particle physics.

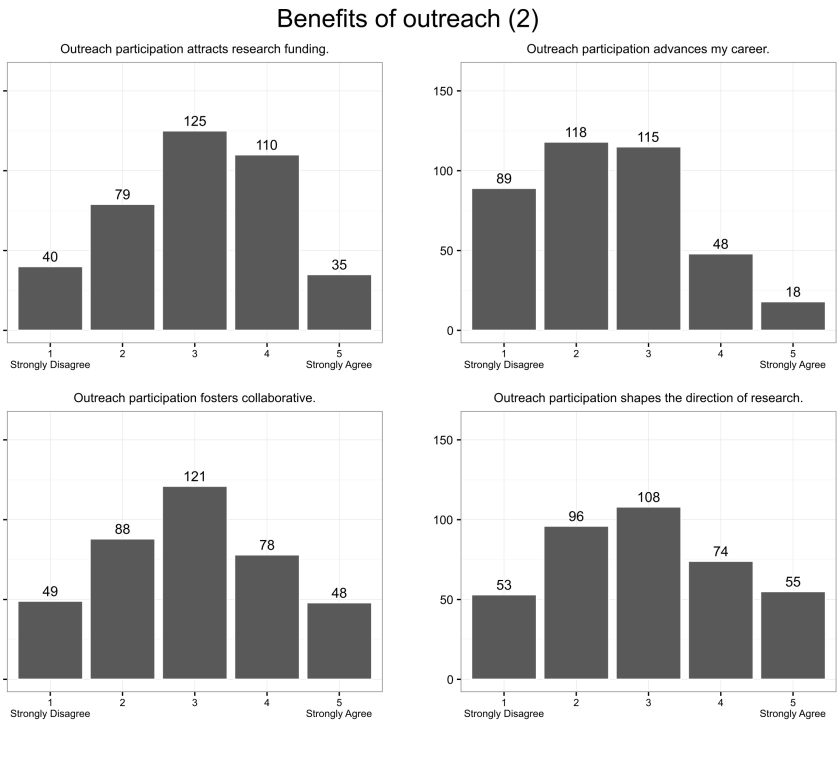

Figure 3: Benefits of outreach participation (2) *These plots show the ratings for agreement with four statements concerning the benefits of participating in outreach activities.*

4.Conclusions

It is important to contextualise the results obtained from this survey by noting that 89% of the respondents had previously participated in some outreach activity. That said, among these respondents, the data show that the researchers see participation in outreach as a duty towards society and in particular tax payers, but would rather not include outreach plans in grant applications. The respondents also indicated that while they get a sense of enjoyment from doing outreach, they don't see it benefiting their careers directly.

The data also need to be carefully interpreted since only limited statistical tests can be performed on data collected from Likert scales (the 1–5 ratings). The themes that have emerged in the quantitative data will be explored in the coming months by conducting personal, one-on-one interviews with selected members of CMS in order to perform an analysis using qualitative methods.

5.Acknowledgements

This work would not have been possible without the supervision of Drs. Emma Weitkamp, Clare Wilkinson, Erik Stengler (all UWE Bristol) and Christine Sutton (CERN), who have guided me throughout my PhD studies. I would also like to thank the CMS Collaboration and in particular Achille Petrilli for providing the financial support for my research project. Finally, I would still be unsuccessfully wrangling with R code to produce my analysis and plots without Rik Smith-Unna's kind help whenever I have needed it.

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