

# A Crowdsourcing Practices Framework For Science Funding Call Processes

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**ABSTRACT**

Public scientific research funding agencies (funding agencies) are charged with the task of implementing government science policy and identifying research projects worthy of funding. They play an important role in creating value for society through funding research and informing research policy. However, the work of funding agencies in recent years has been hampered by various challenges in call processes. This research proposes crowdsourcing as a potential solution for funding agencies. Information systems research has engaged with crowdsourcing and the open innovation phenomenon. Crowdsourcing has been utilised by both private organisations and governments in the seeking solutions to similar types of challenges. Despite this fact, no crowdsourcing frameworks have been adapted to address the types of challenges faced by funding agencies in call processes. This research seeks to identify challenges faced by funding agencies for the purposes adapting a crowdsourcing practices framework to address these challenges.

**Author Keywords**

Crowdsourcing; scientific research funding agencies; open innovation.

**ACM Classification Keywords**

H.4.3 [**Information Systems Applications**]: Communications Applications.

## **Introduction**

In recent years, there have been calls for the greater involvement of citizens and government in science. To this end several high profile public engagement initiatives on the part of funding agencies have caught the public imagination [12; 14]. Information systems technology has facilitated citizens in playing an active role in assisting government through providing solutions to challenges. Commensurate with governments move towards open, crowdsourcing is one such form of open innovation that has increasingly been utilized in the private and public sectors [4]. Despite (i) governments turning to crowdsourcing and (ii) funding agencies increasing their public engagement, no evidence exists from the body of literature as to the availability of crowdsourcing practices frameworks for the use of funding agencies. This research proposes to address this gap in the body of knowledge through the provision of such a framework. A conceptual framework for adaption is identified from the literature and is populated with practices and challenges based upon the analysis in this study.

## **Crowdsourcing**

A Crowdsourcing has been called an "ill-defined term" referring to a set of distributed production models [15] and an umbrella term by others [8; 9; 13]. Howe presented the term as a combination of outsourcing and the wisdom of crowds [10]. In other examples it has been defined as a "trend" [1] which has caused some commentators to be cautious in extending their own definitions. In a modern context, the types of problems faced by crowds can be related to a broad spectrum. At one end of challenges faced problems can be easily defined and readily solved. Such problems

have been described as 'tame' problems [11]. Such challenges are evident in widespread low complexity crowdsourcing. At the other end of the spectrum there is evidence of using the crowd to address "wicked problems" similar in nature to those faced by funding agencies. Wicked problems were first addressed in the areas of societal challenges and social planning [5]. "A wicked problem is a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize".

## **Funding Agencies**

Public science funding agencies are known by a series of terms that vary including research agencies, research institutes, research councils and research hubs [6]. For the purposes of this research the term 'funding agency' is adopted for the purposes of clarity. The term 'research funding' *"often connotes funding obtained through a competitive process, in which potential research projects are evaluated and only the most traditionally run by governments and corporations [7].*

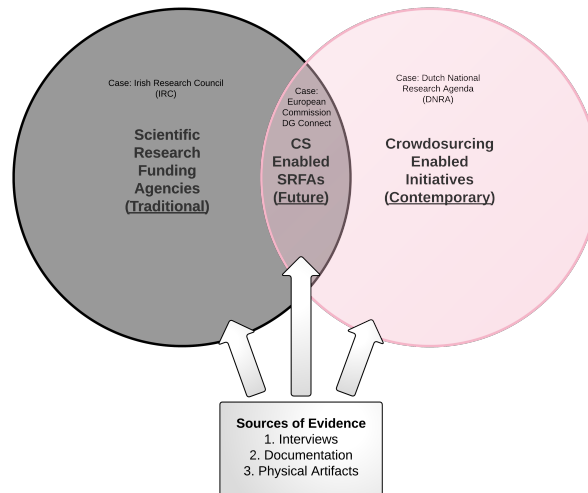
## **Research Objectives**

The following research objectives are advanced;

- O1. To adapt a framework for selecting, formulating and evaluating crowdsourcing practices.
- O2. To apply the framework as a lens to funding agency call / assessment processes in;

- O2.1 Highlighting challenges faced
- O2.2 Identifying best practices used
- O2.3 Benchmarking SRFA processes
- O2.4 Making recommendations for SRFA implementation of crowdsourcing practices

## Research Methodology



**Figure 1:** Research Methodology

The following research approach was adopted; Firstly, a hermeneutic literature review was conducted in the information systems research body of literature concerning crowdsourcing [2; 3]. Following a review of competing crowdsourcing frameworks a framework was selected namely that of [13]. The investigation concluded that the framework possessed several key criteria making it a robust choice for the purposes of the study.

Secondly, a further literature review was conducted into funding agency call and process documentation. Thirdly, at each stage of the crowdsourcing process challenges and practices are identified through the completion of (i) pilot studies [16] and (ii) a multiple case study approach into three categories of organizations namely (i) funding agencies, (ii)

crowdsourcing enabled initiatives and (iii) and crowdsourcing enabled funding agencies (Figure. 1).

## FINDINGS

The research has identified *Challenges, Practices* and *Metrics*. This consortium submission addresses Challenges. Through the examination of funding agency literature, completion of pilot studies herein the following nine categories (CI-IX) of categories challenges are identified;

CI FACILITATING THE INTERACTION OF STAKEHOLDERS IN BUILDING POLICY AND AN ACTIONABLE RESEARCH AGENDA;  
One of the single biggest challenges facing many funding agencies arises from the fact that they operate at the intersection of government policy, academic research and public needs. New means are required to interact with key stakeholders in crafting policy and research agendas.

CII FOSTERING NOVELTY AND DIVERSITY IN THE REVIEWER COMMUNITY WHILST MAINTAIN SCIENTIFIC EXCELLENCE;  
Research has shown the positive impact of diversity upon the results of tournaments. In moving from traditional call processes to include diverse types of reviewers, agencies require new practices to engage a diverse crowd of citizens without diluting scientific excellence.

CIII DEVELOPING COMMUNITIES THAT ENGAGE, FOSTER AND RETAIN REVIEWER TALENT;  
Many funding agencies speak of the extreme challenges faced in retaining top reviewers. Furthermore, there is evidence of competition between funding agencies to obtain the best talent in reviewers. Funding agencies face challenges in growing reviewer communities.

CIV ENABLING REVIEWERS TO INTERACT AND PARTICIPATE IN AN EFFECTIVE AND TIMELY MANNER WITHIN REVIEW PROCESSES;

Many basic call management systems in use by funding agencies are limited in terms of the interaction capabilities provided. They have been designed for the integration of expert reviewers and funding applicants alone. Simple scoring or voting systems are insufficient for the complex needs of competition and collaboration environments and new types of participation and interaction methods are required.

CV ENABLING SUBMISSION SYSTEMS TO DEAL WITH SCALE, COMPLEXITY AND TIME;

Traditional call processes are designed for a limited number of submissions and associated reviewers. Practices are required to address challenges arising from volume and complexity in call processes that feature crowds.

CVI BALANCING TRANSPARENCY AND SECRECY IN REVIEW PROCESSES;

One of the key features identified from a study of call processes is that trust and transparency are key ingredients in the operation of successful calls. Many traditional funding agency review processes have been shrouded in secrecy with limited feedback provided to participants. Accordingly, new practices are required to facilitate transparency and accountability.

CVII ADAPTING ORGANISATIONAL / PROCESS STRUCTURES AND CULTURES TO OPEN ENVIRONMENTS;

A key challenge facing funding agencies is that call processes operate in a closed and insular environment. Such processes stand in opposition to open innovation paradigm. Open process structures are open in nature

and facilitate transparent and open interaction in both horizontal and vertical communication channels.

CVIII COMMUNICATING SCIENCE;

One of the major mission objectives of funding agencies worldwide is the direct and indirect education of citizens as to scientific research. Historically, this has been conducted through informal education initiatives. Modern scientific research funding agencies play a crucial role in not only disseminating research findings but encouraging the public to become involved in science either as citizen scientists or passive learners.

CIX MEASURING SUCCESS;

Funding agencies worldwide draw upon an internationally accepted pool of metrics for the measurement of research outputs and research outcomes. Research findings, publications and associated bibliometrics provide agencies with a guide as to how successful the funding initiatives have been. However, the task of evaluating research outcomes and societal impacts is a much more difficult task requiring new types of metrics.

## **Conclusion**

At this stage of the research some thirty-eight interviews have been completed spanning pilot studies and two case studies. This consortium submission does not include the practices and metrics identified. The research in question faces certain immediate limitations namely that the adapted framework is only applied in a funding agency context and not in other commercial domains. Furthermore, the research addresses the strategic view of assessment processes and does not incorporate the perspective of funding applicants which will be addressed in later research.

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