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Managing collaborative research projects: A synthesis of project management literature and directives for future research

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Abstract

Collaborative research projects have emerged as a particular form of academia–industry interaction. Over the past ten to fifteen years they have received increasing attention in the project portfolio of public and private organisations as well as in the project management literature. They present specific challenges, demanding of adaptations and adjustments to existing project management approaches. By means of a systematic literature review we provide a comprehensive list of the main challenges associated with these projects, as well as the guidelines, tools & techniques, and conceptual results that have been proposed to overcome them. The findings are synthesised into three main paradoxes, four general management strategies, and two main research streams. Against this background, we propose directives for future research that serve to improve the transfer of scientific knowledge into practice.

Keywords: Collaborative research project; Literature review; Project management; Research directives

1. Introduction

While research activities were traditionally mostly conducted by research institutes and universities and only results were transferred into industry, companies are now getting increasingly involved in joint research endeavours with other industry and academic partners (Levine and Prietula, Forthcoming; Perkmann et al., 2013), a development that has been labelled the "6th generation of research and development management" (Nobelius, 2004). Both industry and academia promote such partnerships to solve challenges that neither can tackle alone and to draw from the economic and scientific benefits (Salter and Martin, 2001). A wide range of formats can be distinguished to organise joint research endeavors, ranging from single academia–industry collaborations to strategic alliances and joint ventures (Hagedoorn et al., 2000), and covering inter- and intra-collaboration on various levels, such as the individual, departmental, sector, and national levels (Katz and Martin, 1997). The format addressed in this paper are collaborative research projects, which are jointly financed, planned, and executed by a consortium of academic, public, and industry partners (Davenport et al., 1998; Inganäs et al., 2009; Perkmann and Walsh, 2007). Partners share a common research interest and provide complementary, often inter-disciplinary resources and competencies to fulfil the project goals (Gibbons et al., 1994; Oesterle and Otto, 2010). These projects play a growing role in the portfolio of public and private organisations (Gassmann and von Zedtwitz, 2003; Nobelius, 2004); which has been fostered by the strong commitment of public-funding agencies to mode-2 knowledge production (Gibbons et al., 1994) and multi-stakeholder models for research management (Etzkowitz, 2003). Examples of large scale funding frameworks include the European Union Framework Programmes which foster multidisciplinary research and cooperative activities

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in Europe and beyond,[1] Cooperative Research Centres in Australia,[2] and projects funded by the German Ministry for Education and Research in Germany.[3] Funding opportunities are constantly increasing and so is the amount of projects to be managed. For example, the 7th Framework Programme of the European Commission offers a budget of 50.5 billion euros purely in Information and Communication Technology (ICT), which is used to support 1952 projects in different stages of the project life-cycle (European Commission, 2007). With the new funding scheme Horizon 2020 this investment will be further increased by 46% (EuropeanCommission, 2013).

Collaborative research projects face many challenges concerning a successful project management (PM) since they are generally associated with high uncertainty and risks, individually oriented project personnel, heterogeneous project partners which are located at different locations, and significant pressure in terms of creativity and innovativeness (Barnes et al., 2006; Calamel et al., 2012; Erno-Kjolhede, 2001; König et al., 2013). Special PM attention demanding of adaptations and adjustments to suit the projects' needs and particularities are critical for the success of collaborative research projects (Lenfle, 2008; Shore and Cross, 2005). This has led to an increase in research interest over the past ten to fifteen years. However, relevant knowledge gained in scientific PM literature is fragmented and spread across a variety of disciplines and application areas, which presents a hurdle for its successful application in practice. Applied management methods often fail to satisfy the specific needs of collaborative research projects, and managers follow the "learning by doing" principle and establish a working set of PM principles and tools for each project (Barnes et al., 2006; Calamel et al., 2012; König et al., 2013).

Given this background, we present a systematic literature review that synthesises existing research and extracts relevant, scientifically-grounded PM knowledge that is applicable to the management of collaborative research projects as a specific project type. Two research questions guide our literature review:

- What challenges in the management of collaborative research projects can be identified through reviewing scientific literature?
- What practical PM knowledge is available that addresses the identified challenges?

Our research approach follows the basic steps that have been outlined for conducting a literature review (Cooper, 1988; vom Brocke et al., 2009; Webster and Watson, 2002); accordingly, we structure our paper into a conceptual section, a description of the research method, presentation of results, and a discussion.

Our work adds to academia and the profession of PM in three important ways. First, we provide a systematic search and identification of extant knowledge concerning the everyday management of a research team in a collaborative setting of multiple heterogonous and autonomous partners. Concerning the project type and the management under consideration, this is the first literature review in this context. Even more, we do not consider research and development (R&D) a homogenous process or functional unit, as often applied in the PM literature, but as "highly dissimilar in terms of complexity, uncertainty and degree of variability" (Chiesa and Frattini, 2007, p. 287). We acknowledge the organisational and managerial differences of research versus development projects and identify contributions that clearly indicate their applicability within basic or applied research. Second, we formulate a set of challenges and suggest related conceptualisations, tools and techniques, and guidelines on how these challenges may be overcome. This result of our literature review, which is directly usable by project managers, contributes to the profession of PM by providing consolidated and unequivocal knowledge. Third, we discuss the findings with respect to identified research streams and their richness and derive suggestions for areas of further research.

2. Conceptualisation of topic

A conceptualisation of the topic is recommended before starting the literature search process (vom Brocke et al., 2009) and clear definitions of the main terms support the identification of search phrases (Zorn and Campbell, 2006). Therefore, we begin by defining the type of collaborative research projects which this paper focusses on and present its core features. Such projects have characteristics that refer to the nature of research work and the collaborative set-up.

First, research in the broadest sense refers to a "studious inquiry or examination" (Merriam Webster) and the systematic documentation and publication of results. In a scientific sense research addresses an existing research question or hypothesis (Alexander, 2002), produces novel results (Creswell, 2009), and pursues a systematic approach to investigation (research method). The aim of research is to solve a certain research problem, rather than to follow a pre-specified product or service description or existing customer requirements (Cox, 1990). As a result, research work "is not only characterised by uncertainty in terms of project duration or budget, but also by the nature of the results" (Clarke, 2002, p. 59), and the outcome remains pre-competitive and exploratory (Lenfle, 2008). Thus, a research project can be described as a "level-4-project", which is commonly characterised by ill-defined goals and working methods (Turner and Cochrane, 1993). Using the framework of hard and soft dimensions (Atkinson et al., 2006; Crawford and Pollak, 2004), such projects can be classified as primarily "soft" projects, where goals and objectives are ambitiously defined, goal tangibility is low at the project start, and many alternative solutions are explored and, if necessary, discarded.

Second, research collaboration addresses the need to combine various perspectives of the research problem (Bruce et al., 2004) and is defined as "a system of research activities by several actors

[1] http://cordis.europa.eu/fp7/.
[2] https://www.crc.gov.au/.
[3] http://www.bmbf.de/foerderungen/.