Conference on ENTERprise Information Systems / International Conference on Project MANagement / Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2015 October 7-9, 2015

The Project Office as Project Management Support in Complex Environments

Gunnar Widforss[a,b,*], Malin Rosqvist[a,b]

[a]Mälardalen University (MDH), PO Box 883, 723 21 Västerås, Sweden.
[b]Project Management in Research Rosqvist & Widforss HB (PMiR), Visthusgatan 21, 724 81 Västerås, Sweden.

Abstract

In the academic sector, most engineering research funding presupposes collaborative projects. Collaboration between academia and industry is encouraged. This approach creates successive complexity in most Research and Development (R&D) projects in many ways. Projects funded by the European Commission or jointly funded by national agencies are often encouraged to become large, competing companies may become partners, objectives are unclear, and overall vagueness usually increases with consortium size. Many companies and some research organizations have created project management offices (PMO) to deal with project complexity. Typically, project managers in research organizations are excellent researchers but less skilled or interested in project management. To help researchers stay focused on research and not get side tracked by project management, the PMO provides professional project management services to researchers and research projects. The combination of excellent research and professional project management is a success factor when handling a large portfolio of complex projects. We surveyed the directors of PMOs in Sweden to determine how PMOs cope with complexity in different organizations. This paper presents the results of that small survey and compares them with similar efforts at one Swedish university in a brief case study.

Keywords: industry-academia, project management, complexity, research projects, funding.

---

* Corresponding author. Tel: +46 73 9607197.
E-mail address: gunnar@pmir.se

1. Introduction

In this paper we discuss how project management offices (PMO) cope with complex projects. We illustrate this using a case study that describes the methodology of a reference PMO at a Swedish university. This PMO specialises in collaborative research and combines project management skills and research in a specific research environment to ease and improve the performance, productivity and the quality of complex projects. We suggest that professional project management in combination with excellent research is a success factor in managing a large portfolio of complex research projects.

1.1. Complexity in projects

Complexity is a term of reference for intricate structures and connotes a high degree of complication, difficulty and entanglement. Something complicated is intricate and difficult to understand; but a complicated problem still has at least one solution. Something complex involves true uncertainty and unpredictability; a complex problem does not have a single solution and perhaps not even a best solution.[1]

The International Project Management Association (IPMA) uses the following criteria to define complexity in projects:

ʻA complex project fulfills all of the following criteria:

a. Many interrelated subs-systems /sub-projects and elements should be taken into account within the structures of a complex project and in relation to its context in the organization.

b. Several organizations are involved in the project and/or different units in the same organization may benefit from or provide resources for a complex project.

c. Several different disciplines work on a complex project.

d. The management of a complex project involves several different, sometimes overlapping phases.

e. Many of the available project management methods, techniques and tools needed are applied in the management of a complex project. In practice this would mean that more than sixty percent of the competence elements would be applied.ʼ [2]

IPMA offers a self-assessment tool that identifies three types of complexity.[3]

1. Environmental complexity
2. Content complexity
3. Resource complexity

Degree of complexity can be judged on a scale of 1 to 4, where 4 is very complex. Environmental complexity has four components:

1) strategic importance of project, 2) political conditions (if there is much disagreement or a demanding decision-making process), 3) number of unpredictable stakeholders who need individual care, and 4) dimension of change imposed on environment.

Similarly, Content complexity has four aspects:

1) complicatedness or unpredictability of project result, 2) technological innovation, 3) result structure, and 4) timeline and number of parallel activities.

Likewise Resource complexity involves 1) budget, 2) skill mix, 3) organisational structure, and 4) geographic distribution.

We have adopted the three-component definition (environmental, content, resource) for this paper.

1.2. Complexity in university-industry collaborative research projects

Types and degrees of complexity, and project phase, affect project management in different ways. Cooperative research projects can be considered complex in all these respects.

One challenge in terms of Environmental complexity may be specific funder requirements that complicate consortium-building. Many research projects are consortiums of up to 50 partners from many different sectors and countries. Companies may be competitors, have different organisational cultures, or be located in countries with conflicting legislation. This creates complexity among project stakeholders.

European projects in ITEA3[4], CELTIC PLUS[5] and ECSEL[6] are directed by industrial platforms such as ARTEMIS-IA[7]. Funding of ECSEL projects, for example, is a mix of contributions from the European Commission (integrated in the frame program Horizon 2020) and national agencies for innovation. ITEA and CELTIC are industrial communities, even if actual project funding is coordinated by national agencies under the umbrella of EUREKA[8]. Each national agency has its own payment criteria and rules. Most countries require an industrial project leader and a specific budget ratio between industry and academia. This means a prospective academic partner must often find one or two private sector partners to be eligible nationally. As a result, there could be extra layers of consortium-building if a participant from a specific country is not eligible by their own.

Research projects often suffer from unclear objectives, an aspect of Content complexity. Most research projects are complex in content and quality and have undefined or unclear goals. Projects with lows rankings on the Technology Readiness Level (TRL) scale (created by NASA but adopted by the European Commission to define research and innovation projects)[9][10] (basic research), have undefined results. 'In terms of requirements, the research project often starts from a discussion about the framework of what will be done, in contrast to development projects where real customer requirements and expectations on outputs are discussed'[11], according to an observation by Huljenic. For research projects, the starting point is often a community of prospective partners who share the same kind of problem and same perspective. As Huljenic points out, 'in the research project a participant can drastically influence the project goal'. Consequently, if the composition of a project consortium changes during proposal writing, the project goal could also change. This is also the difference between goal-oriented projects and goal-seeking projects.[12]

European R&D projects are also challenging in terms of Resource complexity due to budget size, staffing, organisational structure, and geographic distribution. Large research projects involve monetary resources of EUR 100M. Many partners from different sectors are involved, and funding agencies may have very detailed and shifting demands for accounting and financial reporting. Staffing can be challenging because most human resources are part-time. Due to the number of partners, on-site meetings can be difficult to organise. Teleconferences can also be challenging due to multiple time zones and poor internet connections.

Both ARTEMIS and ITEA, for example, favour very large, complex projects that often involve more than 100 person years, 8-100 partners and a (public) budget of EUR 400K to 42M. The average project has 25 partners and a total budget of EUR 9M. There is a preference to 'think big' to have an 'impact', and even if this does not apply to consortium size, the underlying assumption is the bigger the project, the greater the impact. 'The ARTEMIS mantra "think big" does not mean that all projects have to be huge ones like the ARTEMIS CESAR project (Cost-efficient methods and processes for safety relevant embedded systems), which has about 58 partners and about €68 million of investment, it means thinking about the impact that the project will have.'[13] The size of such projects pose several challenges for project management. Hence, it is not likely that all the staff for even two partners would ever meet during the project. The preference for large and complex projects is also reflected in the proposal support available through ARTEMIS consortium-building events.

Lars Marmgren and Mats Ragnarsson conducted a study that showed a growing number of complex projects in over 100 American and European companies as company productivity declined.[14] They argue that the usual way of addressing increased complexity – adding more structure and developing more sophisticated models – is counterproductive. Instead, they promote leadership that can cope with major complexity. Marmgren and Ragnarsson stress collaboration and communication over structure and models.

2. Coping with project complexity - the project management office in Swedish organisations

For the past ten years there has been a trend to establish project management offices (PMO) in organisations that undertake complex projects. A 2013 global survey by ESI International (formerly Educational Services Institute) with 2,300 respondents in the United States, Asia-Pacific, Europe, and Africa, found that almost two-thirds of all companies in the survey had a PMO.[15]

2.1 Our survey and methodology

We asked PMO directors in various organisations in Sweden about how they address the challenges of complex

projects. The survey was sent to 37 PMO managers in public agencies and private companies in banking, construction, automotive, and other sectors. The sample was chosen by convenience from a network of PMO managers. Respondents were contacted by e-mail and asked to answer questions about the complexity of their portfolio and how they cope with it. Our survey results are presented below as well as discussion of a reference PMO for a specific research environment at a Swedish university.

The questions were both completely and partially structured. We first asked about the organisation, such as size, total number of projects, and number of projects with high or very high complexity according to the standard IPMA scale. We then asked about type of complexity and how the organisation copes with it.

2.2 Survey results

Ten people responded to the survey for a response rate of 27 percent. Some of the people who did not respond were about to change their position or organisation. Some also said they did not have time to participate in the survey. The small sample size and low response rate cannot, of course, provide more than an indication of how PMOs in Swedish organisations deal with complexity. The responses, however, are unanimous in some respects.

Of all respondents, seven organisations employed 350-2,000 people and three employed 10,000-40,000 people. The organizations included an engineering consultancy and representatives from high tech R&D, telecommunications, automotive manufacturing, radio broadcast, gaming, retail, construction, and banking. Most of them were private companies, but a couple were public entities. Two PMOs employ no project managers. Five PMOs employ 3-12 project managers. One company, the smallest, employs 22 project managers and the largest employs more than 60 project managers. Five PMOs handle 8-20 projects and five handle 50-100 projects. The share of very complex projects (level 4 on the IPMA 1-4 scale) handled by the PMOs was between 10 percent (three cases) and 50 percent.

All respondents identified governing structure as important, and seven identified project model (such as PPS) as important. Three respondents also stressed 'strong support from corporate management' or the CEO level. Five respondents reported 'soft' means to address complexity in projects such as 'support from the PMO through conversation', 'experienced project mentors', 'professional project managers', or 'consultants that provide appropriate [project management] competence'. Four respondents mentioned tools and templates, but did not stress this. Three of them also mentioned soft means and one even said they 'don't provide many tools'.

The most important finding appears to be that structure, tools and templates are less useful for these types of projects while governance, managements support, soft means, and experience/skills are more important when dealing with complexity.

2.3 Project management in a reference environment

In the reference environment, a Swedish university that specialises in applied research, the pre-study phase is called the pre-award phase. All R&D projects are externally funded, typically by a public agency, with certain prerequisites such as partnership with two commercial companies (national funding) or partners from two other European Union member states (European funding). About 15-20 of nearly 100 projects have greater complexity.

2.4 General support structure of the PMO

Since 2010, the research environment has had a professional PMO. The task of the PMO is threefold: 1) Pre-award: lobby for new calls for proposals, scout new funding and new consortia, support the application process, advise, and write proposals. 2) Post-award: responsibility for project model with focus on planning, finalise agreements, arrange start-up meetings, and, in some cases, support reporting and finalise project. The PMO also oversees the entire project portfolio. 3) The PMO acts as an internal consultant and contracts out project management skills and resources for complex projects. PMO staff help manage several projects, in some cases as project managers and in other cases as subproject managers or specialists.

The PMO offers project management certification, and all staff are IPMA-certified project managers. PMO staff have extensive experience, professional specialist education, large professional networks, and are members of national and international project management communities. The PMO is specialised in project management and communication, and has financial and legal experience and deep knowledge of the research environment. PMO tasks

include conducting workshops and idea seminars, sharing information about funding opportunities, maintaining contact with funders, lobbying, providing support for applications and events, networking, matchmaking, key account management, research communication and support of processes, budgeting, project tool creation, agreement preparation, and quality assurance of applications. The PMO also manages large projects.

It has been pointed out that complex project leadership benefits from mixed management teams: 'A consortium generally requires a strong chief executive with a bold and energizing vision. This leader must possess technological expertise and mediation skills, as well as the traits of a savvy organizational politician...[M]ost consortia satisfy this mix of qualifications with a leadership team rather than a single individual'.[16] This is also the model that has been credited in external reviews of the research environment: 'Excellent research and especially project acquisition and implementation is supported by [the PMO]…to help in making contacts but also in managing all the administrative details very successfully, including the administrative details when applying for research funding'.[17]

One of the major tasks of the PMO is creation of project consortia as needed. The research environment is part of European projects in ITEA2, ARTEMIS and FP7, and has also submitted proposals in Horizon 2020 and ITEA3. The PMO coordinates marketing and consortium-building activities that have resulted in several projects.

The PMO has professionalized the way it works with industrial partners by implementing an academic version of the Key Account Management model used in industry. This means one researcher is assigned to handle all relations with a specific company. This has several benefits: 1) junior researchers receive assistance in establishing contacts within the company, 2) the company has one main contact in the research environment, 3) responsibility for a specific company facilitates relationship-building and an understanding of the company's business, 4) researchers do not have to compete for industrial partners, 5) the key account manager has an overview of collaborative and shared projects and can present both the project portfolio and new opportunities to the company. The key account manager is skilled in relationship-building and works to increase cooperation and relationships between academia and industry. Relationships are developed beyond individuals and at the organisational level.

2.5 PMO service levels at the university

Researchers are offered:
- General mentoring and advice regarding applications and project management
- An inventory of potential applicants and tips regarding new calls for proposals
- Running application processes for calls with many grantors
- Specific operational role in application for large projects
- Networking, matchmaking, and brokering
- Contacts with funders
- Support in negotiating and managing start-up meetings

The PMO divides new initiatives into three classes of proposals:
- Complex or strategic initiatives
- Calls for proposals that attract many applicants
- Singular initiatives

In the first project class, the PMO joins the team that is writing the proposal. These projects, once operational, are also likely to contract for project management resources from the PMO. In the second project class, the PMO conducts support activities for applicants. The third project class is less strategic and support is mostly advisory (see Table 1).

Table 1: Support for different project classes.

Project class	Pre-award phase	Post-award phase	Implementation phase
Strategic Initiatives	Writes implementation and administrative sections of project proposal. Oversees outcome language and reviews all sections of project proposal.	Negotiation, start-up meeting, project database, and web presentation	Project management

Calls for proposals that attract many applicants	Assists application process and budget creation, contacts prospective partners, reviews sections involving communication	Advice, contact with funders
Singular initiatives	Advice, contact with funding agencies	Advice, contact with funding agencies

Since many projects are complex, they require specific attention from the PMO. To maintain service levels, the PMO has competence in critical project areas. When the budget is complex, appropriate support can be arranged. If the project consortium is complex, legal support is available in the relevant phase. Table 2 shows the use of different tools in different phases at different levels of complexity.

Table 2: Support according to type of complexity.

Type of complexity	Pre-award phase	Post-award phase	Implementation phase
Environmental	Consortium-building	Agreement Negotiation	Communication, Dissemination Legal
Content	Lobbying	Project database, web presentation	Monitoring Deliverables Milestones Progress
Resource	Planning and proposal writing support plus budgeting, staffing, project organisation and implementation support	Start-up meetings	Reporting Finance

3. Conclusion

According to traditional wisdom, complexity can be addressed through a strong organisational structure, control, and monitoring. But it is probably more efficient to tread lightly in terms of management and to utilise tools as the need arises and focus on communication among partners. This is suggested by Marmgren and Ragnarsson and supported by our small survey which shows that structure, tools and templates are less useful for complex projects, than governance, management support, soft means, experience, and skill. This conclusion is also supported by some researchers who have found that today's project manager has evolved from someone who copes with the extraordinary and unique to someone who simply who fills in forms.[18] In the university PMO examined in this paper, the project management toolbox is organised such that various tools are available at various levels of complexity. The PMO plays a key role by offering various support at each phase. Excellent research requires excellent project management.

References

[1] Marmgren L, Ragnarsson M. *Att leda osäkra och komplexa projekt.* Lund: Studentlitteratur; 2014.

[2] Caupin G, Knoepfel H, Koch G, Pannenbäcker K, Pérez-Polo F, Seabury C (editors). *ICB - IPMA Competence Baseline.* Version 3.0, Nijkerk: International Project Management Association; 2006.

[3] Svenskt projektforum. *Kompetens i projektledning – Referensram i kompetensutvärdering.* Version 3.1 Stockholm: Svenskt projektforum; 2011.

[4] ITEA3 [Online] Available from: https://itea3.org/ [Accessed 9th June 2015].

[5] CELTIC PLUS [Online] Available from: http://celticplus.eu/ [Accessed 9th June 2015].

[6] ECSEL-JU [Online] Available from: http://www.ecsel-ju.eu/ [Accessed 9th June 2015].

[7] ARTEMIS-IA [Online] Available from: https://artemis-ia.eu/ [Accessed 9th June 2015].

[8] EUREKA [Online] Available from: http://www.eurekanetwork.org/ [Accessed 9th June 2015].

[9] European Commission. *HORIZON 2020 – WORK PROGRAMME 2014-2015 - General Annexes.* European Commission Decision C (2014)4995 of 22 July 2014 [Online] Available from: http://ec.europa.eu/ [Accessed 9th June 2015].

[10] Mai T (ed). *Technology Readiness Level* Oct. 28, 2012 [Online] Available from: https://www.nasa.gov/ [Accessed 9th June 2015].

[11] Huljeni D, Deši S, Matijaševi M. Project Management in Research Projects, *8th International Conference on Telecommunications*. Zagreb; 2005

[12] Halldin A, Karrbom Gustavsson T, *Project management*. 1st ed. Malmö: Liber; 2012.

[13] *The Co-summit 2013: Bolstering Software innovation to foster hi-tech employment and industry opportunities.* Research Media; 2014. [Online] Available from: https://itea3.org/ [Accessed 9th June 2015].

[14] Morieux Y. Smart rules: six ways to get people to solve problems without you, *Harvard Business Review.* September 2011, 89(9): 78-86, 136.

[15] ESI International. *The Global State of the PMO. ESI International: 2015.* [Online] Available from: http://www.esi-intl.se/ [Accessed 9th June 2015].

[16] Rubin M. How organizations form R&D consortia. *Journal of Technology Transfer,* Vol. 16, No. 1, Winter, 1991, pp. 19-22

[17] Mälardalen University. *MER14 - MDH:s Evaluation for improved Research quality - Research evaluation conducted at Mälardalen University in 2013-14* [Online] Available from: http://www.mdh.se/ [Accessed 9th June 2015].

[18] Styhre A. The bureaucratization of the project manager function: The case of the construction industry. *International Journal of Project Management*, 24:2 (2006): 271-276