

Research Management in Public Research Institutions: Reducing Scientists' Administrative Effort by Using a New Service Model—A Case Study

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Abstract—A new governance regime, changing funding environment and growing competition for reputation and funds require increasing non-research effort of scientists and a higher efficiency of public research institutions. In Germany, the awareness of the needs of central monitoring and support services for scientists increases. Thus, the 'Traffic Management' department of the Institute of Transportation Systems within the German Aerospace Center implemented a central service model. A research management team successfully supports scientists, the administration and the management. The team's key disciplines cover project acquisition, event management, marketing and public relations as well as human resource planning. Aside from a two-thirds reduction of effort on research management tasks per scientist and year and an increased third-party funds rate, further achievements could be realized after the team's set-up. The service model is a promising approach for successful research management and enhancing the economic efficiency in public research institutions.

Index Terms—research management, public research institutions, science support service

I. INTRODUCTION TO THE PUBLIC RESEARCH ENVIRONMENT

In Germany, public research is performed by universities as well as non-university research institutions like the German Aerospace Center (DLR) as part of the Helmholtz Association. In general, research is financed by basic funding and third-party funding. Third-party funds can either be public from the state or the European Union or private from industry, economy and organizations [1]. Lately, the importance of third-party funds has grown strongly whereas the level of basic funds stagnated due to a reduced engagement of research funding by the state [2]. As a result of growing third-party funding and a rising number of external sources the funding environment becomes more complex, unclear and fast changing which requires much search activity and experience. A rigorous competition for allocated

funds between research institutions has been established. The competitive environment has spread widely, being daily business to finance research activities. But the competition for funding weakens unconventional research approaches and at the same time strengthens "mainstream" research. The pressure to do application-oriented, technological and economical relevant research and to increase efficiency and performance clearly increases. [2] Above all, the globalization and following the EU funding causes increasing competition with foreign research institutions in terms of reputation as well as human and financial resources [2]. Cross-border research networks and collaborations gain importance to exchange experience and improve efficiency.

Since the 1990s, the so called 'New Public Management' (NPM) reformation has been changing the governance regime in the public research environment. The reformation comprised a deregulation, new forms of budgeting, extended decision autonomy as well as the implementation of various management tools and processes. (cf. [3], [4]) Still, governmental governance exists but mechanisms of coordination were multiplied which leads toward the 'Oversteering' of non-university research and towards higher administrative costs [2].

As a result of complex organizational structures within research institutions, a changing funding environment with an increasing competition and a focus on third-party funds and the deregulation of public institutions, the administrative effort of scientists according to the acquisition of projects and funds, establishing networks as well as improving output efficiency increased significantly. Research management, in terms of a supporting service for researchers, becomes essential. Following the NPM reformation, research management generally aims at increasing an institution's efficiency and reducing costs. It comprises the management and coordination of administrative research objectives, the link between different institution units to support researchers, the reduction of redundant workload, the slimming of processes and task consolidation. Here, research management is a service for scientists to reduce their administrative workload to focus on research activities and at the same time to enhance an institution's

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output efficiency and performance. During the past years, research institutions became aware of a need for the adjustment of structures and processes to allow for efficient research management. Institutions like the Helmholtz Center in Munich reformed their organization based on 'NPM' principles. Another example is the University Duisburg-Essen which implemented models of central administrative support in the form of a Science Support Centre (cf. [5], [6]). The variation of approaches originates from broad heterogeneity between research institutions and fields of science and the resulting requirements. The 'Traffic Management' department of the Institute of Transportation Systems of the DLR also adapted its processes and integrated a new service model which is presented in the following.

II. RESEARCH MANAGEMENT AT DLR

A. Implementation of a Research Management Team at the Department of Traffic Management

As a result of the new governance of public research institutions and the increasing need to manage research efficiently and effectively, a detailed process analysis was conducted at the department of Traffic Management. The outcome was the identification of weaknesses in various key processes, a missing economist's view and the necessity of centralization. It showed that the disciplines of project acquisition, human resource planning, event management, marketing and public relations (PR) needed to be centralized and unified in one competence team. Therefore, a pioneering departmental research management team (RMT) was set up and integrated into the organization of the department as displayed in the following figure.

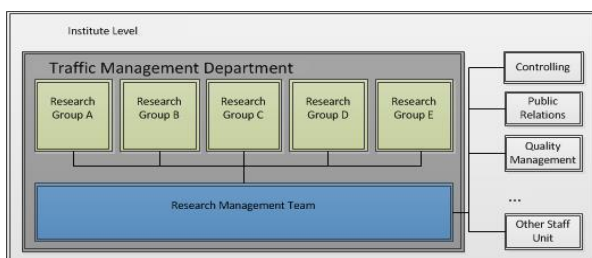


Figure 1. RMT within the organization.

Before, the mentioned disciplines were to be covered individually by each research group of the department. Every scientist was responsible for project acquisition, monitoring budget, finding free working capacity to fulfill tasks, doing project management, maintaining and generating contacts and of course, doing research. Not only the remaining time for research activities was reduced significantly but also researchers' motivation decreased. The acquisition success was small. Budgets were ignored. When acquiring projects, human resource capacities were not considered which in the end led to uneven distribution of work load of the employees.

By linking different fields of planning and management at one node, now the coordination of activities is simplified and done in a more efficient way. Contact persons for specific topics can be identified and

reduced to a minimum number to facilitate internal and external communication. Within the RMT specialized knowledge and expertise in the mentioned management fields is built up systematically and, eventually, applied successfully. Management tasks are centralized and therefore processes are simplified. In addition to reducing researchers' administrative work load, the acquisition success is meant to be enhanced.

To build-up a competence team new job positions had to be created and administrative staff recruited. The competence team now consists of economists and engineers who spend 50% of their work on research management and 50% on research. The team also functions as a link and translator between the administrative units and the scientists. This practice represents the trend at German research institutions during the past ten years, the trend of employment of high qualified administrative staff, centralization and the establishment of functional units or job positions in the fields of controlling, PR, quality management and research management (cf. [7]).

B. Key Disciplines and Tasks of the RMT Project Acquisition

Third-party funds are increasingly a relevant source of direct financing as well as an important performance indicator for future allocation of funds (cf. [8]). Resulting from this growing importance, acquisition is a topic most researchers have to deal with today. Often there is a lack of know-how and experience—therefore acquisition might not be as successful as possible. Due to a lack of time, there are little opportunities to get support or exchange know-how with more experienced researchers. Therefore, the acquisition process was adjusted in the following way.

The first step is the idea. The own competences and the research topic have to be described in detail. Subsequently the scientist searches for an appropriate call by searching online, using a list of calls provided by the RMT or asking directly for the team's help. The identification of a right call can be difficult in terms of the complexity of sources. After a call is identified, a person in charge for the project has to be named and the team has to be informed about the intention of submitting a proposal. Now, a tandem partner from the team is assigned who accompanies and supports the responsible person during the whole acquisition process. Amongst others, the support includes the search of project partners, checking institutional guidelines, filling templates and internal documents, the calculation and budgeting of work packages and reviewing the proposal. The tandem partner only plays a supportive roll. Establishing and maintaining contact to potential project partners, delivering the scientific input and submitting the proposal still needs to be undertaken by the person in charge. Until the final decision of the funding agency and during possible negotiations and the creation of a joint contract, the person responsible is supported by the team which itself exchanges information with the central contract management.

1) Event Management

Within the event management, the team organizes events arranged by the department. Scientists are supported in developing a framework according to the target group, finding a suitable date and location, coordinating schedules, inviting presenters, assigning a registration platform and organizing event material. Locations are checked with respect to e.g. availability, size and costs. The calculation of costs and billing is another major task. Here, the team displays a contact for the institutional controlling unit. Various kinds of events are arranged by the department - internal colloquia where projects or external know-how are presented or external networking events and conferences. Besides, the RMT summarizes and lists events and conferences, collects researchers' feedback and evaluate events for future attendance. This practice aims at an effective, time and money saving event attendance and offers a statistical overview of event activities. Event management is closely linked to marketing and PR.

2) Marketing and PR

Marketing activities of the RMT are reduced to the communication policy with a focus on PR where it has been dealt with the external communication towards project partners, funding agencies, the industry, ministries, organizations and the scientific community.

Research results and activities are published. The team provides scientists with different means of communication like flyers, handouts, posters, web articles or press releases. Researchers contribute the scientific input whereas the team finds an appropriate internal and/or external channel for the different topics and distributes the information towards the responsible functional unit. The understandability of the scientific articles and the compliance with the corporate design and other rules of communication are also ensured to avoid the perils of science communication. In doing so, the business background and non-scientific view of the team helps. But primarily, the team responds to press requests and displays the link to the site and institutional PR division to coordinate PR activities.

The team's PR activities were launched with the objective to improve the external communication and perception to increase the awareness level and arouse interest of prospective project partners or funding organizations. It also aims at an intensified dialogue with the public to enhance the public understanding of science.

3) Human Resource Planning

Human Resource Planning is closely connected with employee's time registration, project management and the institutional controlling which all represent essential inputs for the resource planning process.

Within time registration, employees not only register start and end time but also distribute their working hours, respective to the work that has been completed. Project managers provide their project plans which contain the amount of work of each project team member. Further, holidays, general activities etc. are planned for each employee. It aims at having an overview of a realistic amount of work one employee can complete.

The team's task is to aggregate these work plans, provide an overview of the workload of each employee and recommend a course of action on the one hand. The insight into the workload enables the team to arrange the workload evenly in agreement with the project managers. It aims at the elimination of individual overload. A constant workload of the employees according to their stipulated working hours should be achieved. In contrast, it does not target a control function of employee's work performance. The overview is displayed in an interdivisional human resource planning table and covers time registration data, project plans and project budgets and costs. On the other hand, it allows insight into the progress of the projects and continuous target-performance comparisons of the project status. Out of it, an estimation of the adherence to time milestones is derived based on available human resources. So, personnel bottlenecks and requirements to fulfill project milestones can be identified at an early stage and measures can be taken. Besides, the overview serves as cost monitoring tool of both, labor costs and material costs. Project managers can keep track of their project costs versus the assured budget and initiate action to meet project and/or budget targets.

The team links project managers and the institutional controlling. So, each side has one defined contact person to simplify the communication process.

C. Lessons Learnt-Benefits and Potentials of a Central RMT

The first experiences with the RMT which was set up about two years ago are promising. Processes are better structured, responsibilities are defined and communication improved. But still potentials can be identified.

Regarding project acquisition, now the process is structured and transparent compared to past years. Project acquisition is now performed target-oriented, coordinated and consistent. This is the result of a centrally assigned tandem partner who collects and distributes relevant information and supports scientists in administrative aspects. Information about current project acquisitions, key figures, partners, deadlines, calls, etc. can be provided immediately for internal and external demand. Furthermore, resulting from concentrated information the acquisition process and its success rate can be evaluated. Statistics about successful research areas, promising calls and funding agencies can be developed. By analyzing the process and success/ failure rates, the process should be improved constantly towards a higher success rate of proposals as far as it can be influenced. Besides, the support provided by the team reduces the barrier to submit a proposal. Researchers are not left alone with the challenge of a proposal submission and the related amount of work. Therefore, a growing number of scientists start to do project acquisition with the help of the tandem partner. The opinion towards project acquisition starts to change in a positive way. In spite of the successfully implemented process, there are still challenges within the process that have to be solved. One problem is that scientists rely too much on the work and

action of the tandem partner and shift the responsibility to the team, though the basic idea of the role of the tandem partner was a supportive one. This supportive role has to be promoted strongly in the future. Another problem is a partial lack of communication between the stake holders of the acquisition process to keep hold of the acquisition status. This problem is approached by a regular meeting.

In terms of marketing and PR, the internal and external presence and perception of the department's research improved in amount and quality. Today, the department's research topics and activities are published in various internal and external sources which together with enhanced network management establish the foundation for cooperation, collaboration and funding. Further, the support of the RMT in event management facilitates the organization of events. But still the support is often not taken into account or even noticed and new research results or activities which could be published through media are rarely communicated and often have to be requested. Therefore, the main potential is to raise the appreciation of marketing and PR and its resulting positive external perception among the scientists.

Major benefits resulting from a continuous human resource planning are an even work distribution among scientists according to their available working hours, a structured project management process, an overview of personnel requirement and a steady allocation monitoring of labor and financial resources. It provides project managers with a periodic overview of available and unavailable human resources. It also offers transparency concerning the allocation of human and financial resources so that the department's efficiency and performance can be enhanced directly. Yet, the human resource planning process can be improved by the application of an appropriate tool to organize project plans, resources, costs and budgets. Due to the growth of the department, the current tool consisting of numerous linked calculation spreadsheets is not feasible anymore. Lately, project management became more complex and therefore the invested time and effort increased for project managers. Besides, the individual project plans had to be copied manually to the overall table which risks transcription errors and inconsistency of information. Moreover, the expenditure of time for the consolidation and actualization of information from the different stakeholders escalated. The timeliness and transparency of information provided for the project teams became insufficient. For the introduction of a human resource planning process in an organization unit with a number of up to 30 employees and 20 projects spreadsheets can be sufficient. If those numbers are exceeded, the procurement of professional software is highly recommended to keep the process efficient. With the introduction of professional software an effort reduction of the RMT of about 50% is expected.

Not only within the key disciplines but also on department and researchers' level improvements can be identified. On a departmental level the enhancement of the third-party funds rate could be proved quantitatively. An absolute increase of 9% in 2012 and, with a

significant step after the set-up of the RMT, of 17% in 2013 (both referring to 2011) was realized (see Fig. 2). Since there are various influencing factors, it can only be assumed that this partly is a benefit resulting from the more structured, target-oriented acquisition process. Nevertheless, with the third-party funds rate as one important performance indicator, the increase of the funds rate presents an increase of the department's performance. However, to assess the performance of a research institution in general, further indicators have to be considered.

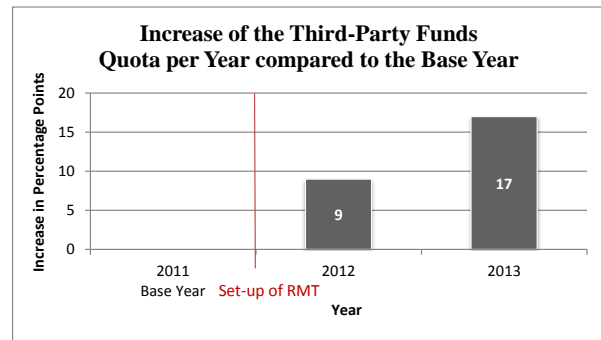


Figure 2. Absolute increase of third-party funds quota.

On a per scientist level, a two-thirds reduction of working hours/ effort on research management tasks per scientist and year could be reached. Today, the RMT inherits the main effort whereas a scientist on average only spends 64 hours a year on research management disciplines. Researchers' administrative workload decreased significantly (cf. Fig. 3).

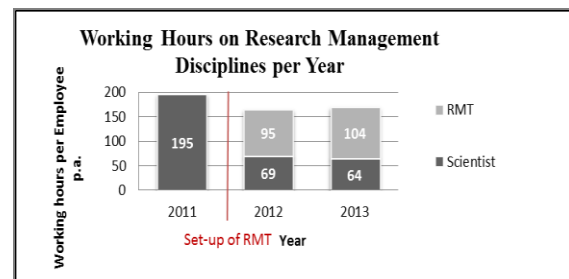


Figure 3. Reduction of working hours on research management disciplines per employee and year.

Although the experience showed that scientists' administrative duties can be completed in less time and with reduced effort, still an overall acceptance and understanding of the research management benefits is missing. Therefore, the concluding potential for the future should be the achievement of the scientists' appreciation and perception of the additional value generated by a central research management.

D. Future Prospects

Though the team already exists for almost two years, the establishment of the team and the adaption of joint processes are not completed yet. It is a long-term project. Further statistical evaluations of the team's impact should be generated when feasible, to be able to achieve the potential support and efficiency. Today's barriers and

challenges still have to be dealt with in the future. In addition, future prospects will be the enhancement of the team's autonomy as well as the further assignment of tasks and responsibilities within the department and the team itself. In the long term, skill and knowledge management, IT management as well as quality management will be integrated as additional centralized key disciplines of research management to increase the efficiency of the department.

III. CONCLUSION AND RECOMMENDATIONS

The increasing financial pressure as well as the new governance structure is a current challenge for public research institutions in general. Some are aware of the problem, some not yet. The tasks and requirements for scientists increase to a great extent with the result of a negative impact on their core competence - research. Centralization of competencies is essential. With the RMT, a central competence team was implemented and the following main benefits were achieved:

- Structured processes within the key disciplines
- Central contact persons for internal and external requests concerning key topics
- Improved communication and coordination of activities
- Reduced effort per employee for research management activities
- Systematic establishment of competence in key disciplines among a manageable group of people
- Overview of human resource and funds allocation

These achievements fully compensate extra costs of the implementation resulting from i.e. general change management, an adaption of overall processes or additional personnel requirement for the RMT.

To implement a research management unit successfully, various requirements have to be fulfilled. First, the management has to recognize the demand of central research management. Then, the frame conditions and the requirements for an implementation of a central unit have to be established. Further, a positive support and communication is essential. The implementation has to be handled as a separate project with a long-range work horizon. Human resources have to be assigned full-time for the realization of the project. Change management and especially continuous communication processes have to be implemented to bring in scientists and other not directly involved persons. The centralization of disciplines has to be demand-driven. Successful but overall processes have not necessarily to be centralized. There is no universal structure and organizational integration of a central unit. It has to fit into an institution's organization. The structure and tasks of the set-up unit should be defined and delimited clearly. Overall, (linked) processes have to be overhauled and double responsibilities and tasks avoided. An initial and steady coordination with other centrally installed units is necessary but organizational autonomy should be ensured.

Contact persons have to be identified and notified. These requirements especially show the importance of communication which still presents one major challenge.

One major model for implementing a new governance does not exist which will enhance research efficiency and productivity; though many countries have to deal with a changing research environment originating from the NPM reformation or the economic crisis like in Spain (cf. [9], [10]). All institutions have to find a suitable organizational structure to cope with the new environment and enhance research efficiency. Next to the models of the Helmholtz Center or the University Duisburg-Essen, the presented unit demonstrates a feasible service model which could serve as a benchmark model for innovative research management for other institutions with a similar structure, focus and field of study. Even though, quantitative success indicators rarely exist today, the dominance of benefits can be shown qualitatively despite further challenges. At a later date, the assessment of the model based on quantitative parameters will follow. The model introduced in this paper presents a turning point for research organization and is a start for a central research management in a new research environment worldwide as a service for scientists to enhance both economic efficiency and research activities, similar to models in the private industry.

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