

Managing Creativeness in a Research Laboratory ***Lessons learned from Establishing NAMU Lab./EMMi Lab.***

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Abstract

Managing and leading a research laboratory requires many skills, high degree of flexibility, setting visionary goals, ability to cope with institutional and funding agencies policies, among many other needs. However, within the scope of this publication, the focus is on creative research groups, how teams can be motivated, and reviews methods that let creativeness within these laboratories float. This case study builds on the practical experiences of establishing the New Ambient Media Research Lab. (NAMU Lab.) and the Entertainment and Media Management Research Lab. (EMMi Lab.) at the Tampere Univ. of Technology (TUT). Both have been partially been built on the basis of 'Design Thinking' as a method that fosters creativeness in multidisciplinary teams.

Keywords: Management, R&D Evaluation, Scientific Leadership, Research Group

1 Introduction

The daily tasks in research laboratories vary quite widely and multiple skills are needed to lead or manage a group. These skills range from people skills, management skills, high expertise in R&D, administrative skills, funding acquisition, capability to establish research networks, among many, many others. University research laboratories can rather poorly managed compared with company R&D laboratories due to the high fluctuations of employees and the fact, that research work and its related tasks are highly dependent on the people themselves, as well as their skills and academic capabilities. On general level, some of the challenges in the establishment and management of a research laboratory are listed below:

- team management and motivation
- coping with cross-disciplinarity
- cultural diversity and international teams
- performance measurement and evaluation

- knowledge sharing and analysis
- methods and techniques for team meetings
- supporting ICT systems and tools
- learning and teaching portfolio and processes
- supervision and mentoring of students
- fund raising and project management
- maintaining quality of research and scientific impact
- establishment and management of scientific events
- etc.

Within the scope of this work, some of these matters are discussed and elaborated in further depth. This work shall provide a rather general discussion about the management of research laboratories that foster creativeness and the provision of a fruitful environment to let innovations emerge and give the essential freedom to students. The study is based on the experience of the establishment of two research laboratories, and shall provide insights into the ‘lessons learned’.

2 Related Work

There are many aspects in research related management. One aspect of general interest is academic rankings (see e.g. (Adler and Harzing, 2009)) and which impact it has on general university research strategies. Another interesting direction devotes to the application of university wide knowledge management systems (Numprasertchai and Poovarawan, 2008). Other research devotes to the impact of R&D output and its economic impact (Matsumoto et al., 2010). Also research how scientific involvements of university staff members relate to research performance, as e.g. submissions of articles to journals where members of the university are part of editorial boards (Bates, 2011). There is also some research dealing with management analysis of academic staff members (Luthans and Hodgetts, 1969a) or the impact of leadership roles on these (Coltrin, 1977). Another specific question relates to determining research group performance ((Pettigrew et al., 2002) or (Mingers, 2009)) and the efficiency of knowledge management (Wang and Guan, 2005). Methodologies especially suited for the management of interdisciplinary research group is another problem. However, some research devoted to the application of the grounded theory (O'Connor et al., 2003), or agile management of a research group (Hicks and Foster, 2010). On a micro level, also the perception and experiences in supervising students have been addressed (Franke and Arvidsson, 2011) as well as models for research supervision as e.g. the research management matrix has been defined (Maxwell and Smyth, 2010). Issues around mentoring students are also quite well examined (Behar-Horenstein et al., 2010). Learning by doing, as adapted at technical universities from the way how artistic universities work, has been discussed in (Lugmayr et al., 2008). The application of “Design Thinking” as part of teaching and special project courses has been discussed in

(Lugmayr et al., 2011) (Lugmayr, 2011). Some other very relevant works have been cited within the scope of the various sections of this publication.

3 The Research Laboratory Management "Ecosystem"

The organizational structure of a research laboratory inside a university context depends on the university environment. On general level, a laboratory can be seen as entity within the university with a principal investigator for its management and a varying group size. Laboratories can be entities with a department, faculty, or outside of the well-known university organizational model. General features characterizing laboratories are their smaller size, high degree of flexibility, self-management of research goals, and high adaptive character to satisfy stakeholders. They create an ecosystem of stakeholders, which are university, university administration, teaching, students, industrial partners, funding organizations, research community, entrepreneurship, and society. Their life-span as well as their primary focus vary, and highly depend on their principal investigator or their purpose why they have been established. Within the scope of this publication, laboratories as entities that are established with the vision to achieve a research goal or focus that has not been established yet, a size of 5-15 team members, and as part of the department or faculty structure of a university. As a very special feature, many laboratories do only purely rely on financial support from the university, but on industry funding or other funding bodies, which implies a more 'entrepreneurship' a-like character. Figure 1 illustrates the various different stakeholders of a research laboratory.

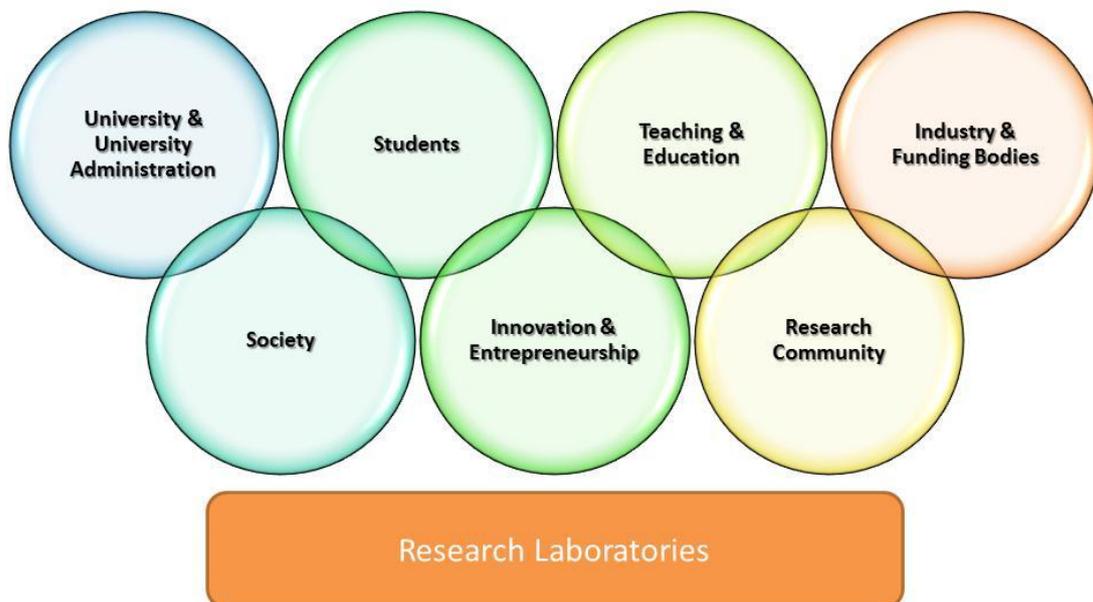


Figure 1: Research laboratory 'eco-system'

However, what are the essential components of a research laboratory to help the principal investigator to align and clarify his actions towards different stakeholders? The role of universities is changing rapidly, and as already stated, "universities must bring their managerial analysis, theory, and techniques up to date just as every other

growing institution in our society has done” (Luthans and Hodgetts, 1969b) to cope with current challenges and the rapid changes within various research fields. (Luthans and Hodgetts, 1969b) has been published in 1969, but this truth is even more valid today than in the 70s...

Figure 2 illustrates a wide range of components of various aspects for the establishment of a research laboratory on various different levels. A thorough discussion of each of the aspects would be beyond of the scope of this publication, but some key-aspects are discussed within this section. The most significant and important task in research laboratory management is the creation of a vision and mission of the laboratory. It helps to align and maintain the strategy, to create identity, create a common vision, and to train newcomers on the ethic and culture of the research laboratory. A long term vision statement helps to harmonize long-term vision with short-term and mid-term activities on several levels. The vision shall foster creativeness, and be worthiness to contribute to a higher level research goal outlining the visionary character of the laboratory.

One very specific feature of university research is mentoring – thus the personal and professional relationship between the principal investigator and its peers. This is tightly related to the ethic and culture of the laboratory, which should aim at being opened towards new ideas, creative thinking, and ensure that the researcher is supported in following his ideas. Eventually a research laboratory can be compared to entrepreneurship, where researchers mobilize resources to fulfill their scientific vision – similar to entrepreneurs establishing their companies. This has been exhaustively studied in (Hansson and Mønsted, 2008), where researchers are described as “academic entrepreneurs (...) who have the ability to maneuver both externally in collaboration with firms and public organizations, as well as internally to integrate initiatives with permanent positions (...) to create opportunities for research and research centers”.

Scientific research and creativeness is still the main outcome a single talented person, interacting with its peers within the laboratory. Especially in academic research, individuals and their personal motivation create the new. Thus, fostering collaborative work, creativeness, creating of working morale, paired with a strong motivation to create new is one key-component of a successful leadership of a research laboratory (Hitt, 2012). The principal investigator turns into a leadership position to create opportunities in terms of resources, supply, and possibilities that the group can achieve this goal.

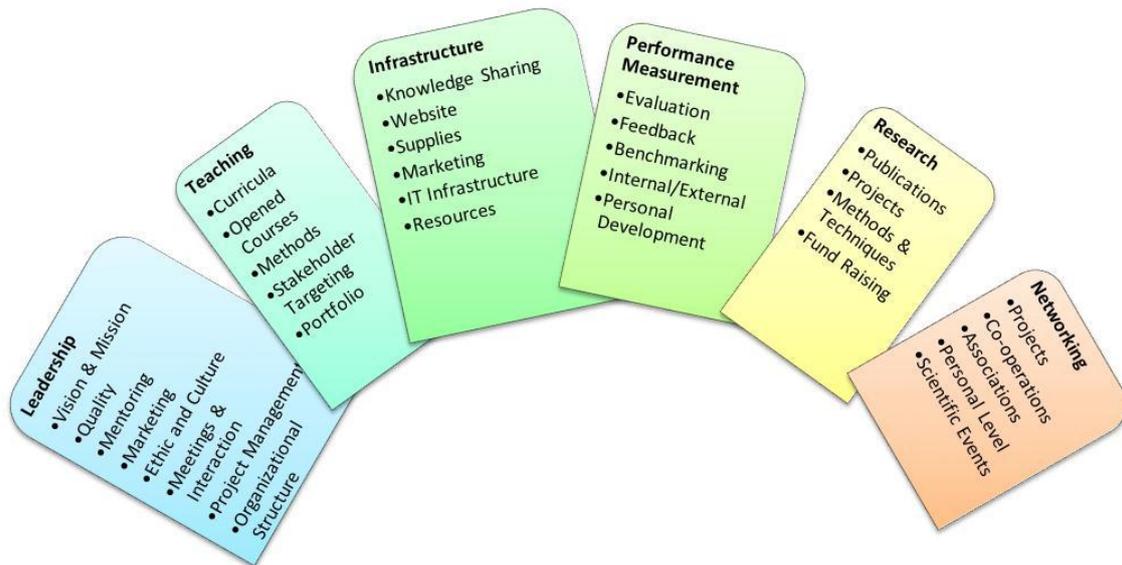


Figure 2: Various Aspects for a Principal Investigator for the Maintenance and Establishment of a Research Laboratory

The field of researcher development devotes to the enhancing of the researcher's development process either between principal investigators and his team members, or between university administration and principal investigator to increase intellectual capacity, productivity and scientific output. A model has been identified in (Evans, 2011), resulting into a conceptual model consisting of the three development components: behavioural (e.g. processual change, productive change, ...), attitudinal (e.g. perceptual change, motivational change, ...), and intellectual (e.g. analytical change, rationalistic change, ...) (Evans, 2011) (see Figure 3).

Inter-disciplinarily is one of the key-aspects in fostering creativity and getting new fresh ideas inside a research domain. Many current methods as e.g. "Design Thinking", innovation laboratories, or idea factories clearly aim at inter-disciplinary problem solving. Managing inter-disciplinarily is not an easy task, and various research works point to the challenges associated with this problematic, such as the role of the research leader, team building, and development of a common understanding and language to overcome communication problems (O'Connor et al., 2003).

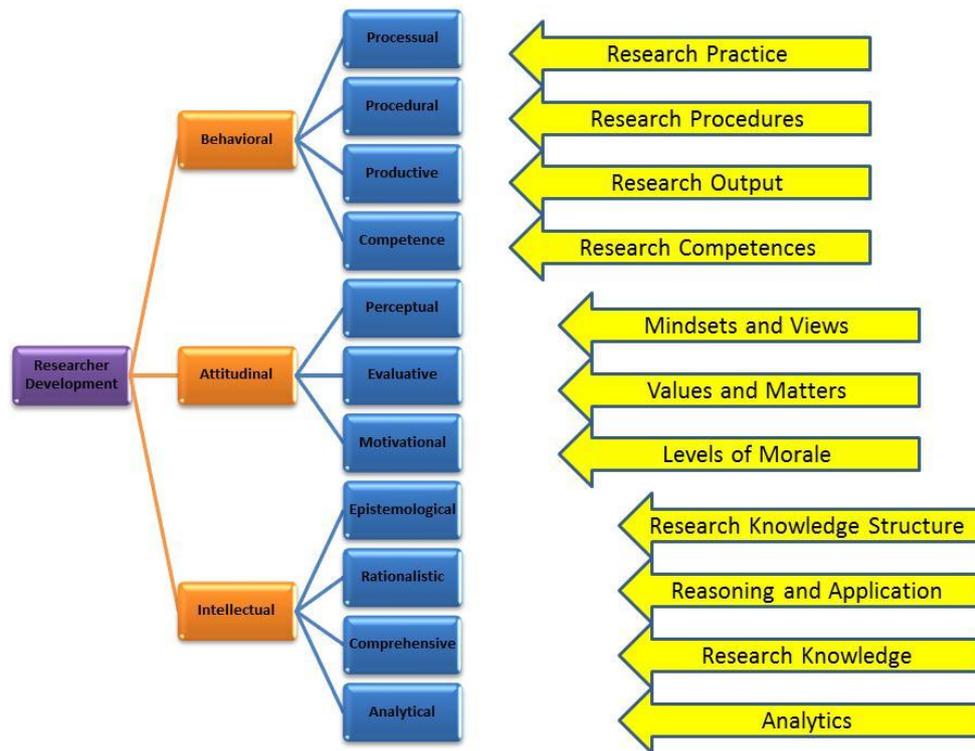


Figure 3: Researcher Development (adapted from (Evans, 2011))

A very interesting study is presented in (Hemlin and Olsson, 2011), which researched the incidents, where creativeness in research groups happened that led to creative problem solving. The study resulted into the following recommendations as integral components for the management of creative teams: *provision of expertise and support for researchers; frequent assemblies of team members; structured open ended research problems; and award schemes for fostering creativeness.* As the study discusses several strategies and management behaviours to stimulate creativeness, it's an excellent starting point for further investigation.

4 Case Studies: EMMi Lab. and NAMU Lab.

New Ambient Multimedia (NAMU) Lab. was established in 2004 at the Tampere University of Technology (TUT). The vision was to contribute with innovative and novel services based on ambient media technology to the research field: creating ambient media experiences. The laboratory existed till 2009, and succeeded in the creation of new teaching curricula, acquisition of project funding, created 16 MSc. theses, 6 BSc. thesis, where 10 thesis works were in cooperation with other international institutions. A total of 26 student projects were conducted, consisting of 16 student internships, and 10 local projects within project courses. It successfully established several scientific events and its publication record shows over 30 scientific publications across the wider field of ambient media (alias ubiquitous media). To establish the group an dedicated creative space for students was created, where students could access premises on a 24 hour basis. Regular weekly team meetings harmonized the work between students, and current problems and issues were discussed. However, these are rather common features of any research laboratory.

The second case, the Entertainment and Media Management (EMMi) Lab. was established in 2009 as new laboratory at the Tampere University of Technology (TUT). However, its department changed from a technically oriented department to a more business oriented department. The core theme of the laboratory changed more towards more media management and business oriented research goals. The vision of the laboratory changed towards the creation of media experiences by also involving business related issues. The laboratory provided completely new teaching curricula, with the establishment of the “Entertainment and Media Production Management” minor studies. The laboratory created 6 MSc. theses and 1 BSc. thesis, where currently 3 PhD theses, 3 MSc. theses, and 1 BSc. theses are still in progress.

Both laboratories continuously re-invented teaching methods and techniques, creative techniques to foster innovation and new project ideas, and started many initiatives as e.g. the Ambient Media Association (AMEA) (AMEA), workshop series (SAME), academic conferences (e.g. EuroITV 2010), awards (e.g. Nokia Ubimedia MindTrek Award, EuroITV Grand Challenge). The following strategies have been successfully applied:

- clear vision to go beyond the current state of the art in media technology and management to encourage creativeness;
- application of the method “Design Thinking” in various courses and lectures (e.g. in selected project courses) – see (Lugmayr et al., 2011) (Lugmayr, 2011);
- the philosophy “learning by doing” and the merging of artistic content creation methods with latest methods and techniques in content creation (e.g. application of metadata driven production workflows in HD productions) – see (Lugmayr et al., 2008);
- establishing of teaching curricula attracting students with interests in innovations, multidisciplinary working, and going beyond the current state of the art;
- establishment of regular team meetings which were arranged as working meetings, where various research problems are openly discussed and group work stimulated;
- grass-root a-like establishment of the working space organized as social meeting place to encourage team work, and interactivity between team members;
- support for researchers in solving their research problems by providing resources, interconnecting them within a contact network, also beyond the scope of their activities within the lab.;

5 Discussion and Lessons Learned

Within the scope of this section, the ‘lessons learned’ from both research lab are discussed and presented. However, some might relate to very general and common tasks of the management of research laboratories, though, there are quite some specifics that made both groups into a success.

- (1) both groups had in common, that new lectures, projects, and courses that foster creative thinking have been established;
- (2) creation of strictly multidisciplinary groups (engineers, media students, business students, psychology students) create work was made possible. Only through a mix of skills and cross-disciplinary approaches new pathways in media education are possible;
- (3) a concise vision to create and look beyond the current state, both groups were able to foster innovations, creative thinking, and ingenious chaos;
- (4) a continuous re-invention of methods, teaching curricula, and project themes enables the basis for motivating members to innovate and find new pathways and solutions;
- (5) student driven project designs, goal setting, and enabling the possibility to realize these ideas foster motivation, and seeing own ideas made to reality;
- (6) strong marketing, branding of the group, and setting the common vision to create novelties create a feeling for working on ideas that will have impact;
- (7) teaching curricula require multi-disciplinary orientation between business, consumer experience, technologies, and content creation – especially in the field of media;
- (8) introduction of “Design Thinking” as core teaching methodology in practical courses and partially in group workshops as a method for fostering create thinking;
- (9) creation of virtual cooperation platforms to cope with the location dispersed members of the group either in teaching or to perform research tasks via IT infrastructure;
- (10) involving members of the group, as well as students in higher level activities, such as conference organization, funding applications, organizational tasks, and administrative tasks from an early stage;
- (11) the core of a research laboratory are its teaching activities to motivate students beyond receiving credits, keeping the innovative spirit, and recruiting talented creative for the group;
- (12) consistent vision and strategy towards the creation of new knowledge and scientific outcome;
- (13) multidisciplinary education of the principal investigator to be able to create the ride mode for interdisciplinary discussions and communication;

Within the scope of this paper, which represents more a certain kind of ‘experience study’ some of the key-issues in managing a creative research team have been discussed. Figure 4 compiles the most significant aspects.



Figure 4: Key Aspects in Managing Creative Research Teams

However, there are many more lessons learned, and the topic requires much deeper discussion and elaboration and integration of other components to foster creativity as more emphasize on researcher development, performance measurement, and reward schemes. As one observation which is the core and most significant aspect for the establishment of a creative laboratory – (1) it requires the support from university, and the administration hosting the lab without any ‘bureaucratic’ overheads; (2) only with providing resources and free space for laboratories, creative laboratories are able to flourish; and (3) it requires personal commitment and motivation, risk taking, and motivation to establish and maintain a creative laboratory.

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