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Project Management in Research Projects

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***Abstract*—Project Management (PM) is a set of activities which enables successful implementation of a project, where a project may be defined as involving a group of inter-related activities that are planned and then executed in a certain sequence to create a unique output (product or service) within a specific time frame. Research projects differ in many ways from development projects, the most significant being (lack of) clear requirements and (in)ability to plan an output from the start of the project. In terms of outputs, evaluation criteria for a research project must take into account such, we well as other "particularities"; for example, that proving that something can *not* be done may represent a positive result for a research project. This article describes particularities of research projects, and proposes adequately adjusted project management process and practices. It also gives examples and evaluation of successful application thereof in practice, in joint projects between academia and industry over the past five years.**

I. INTRODUCTION

Research projects in general, and those involving industry and academia specifically, differ significantly from both development projects and "purely academic" research projects in the way they are planned, performed, and managed. This paper is motivated by the idea to share our experiences in project management for such projects over the period of the past five years, and discuss them from the point of view of common project management practices. All those projects were within the general area of Information and Communication Technology – ICT: 1) quality of service for networked virtual environments in next generation networks; 2) mobile agent and multi-agent based systems for remote software maintenance; 3) middleware architectures (with Web services); 4) location-based services; and, 5) applications based on Bluetooth technology (e-marine, electronic aids in daily living). The model for our successful collaborative research between industry and academia has been described in [1]. Although by no means a singular example of such research, the results achieved, in terms of competence, prototypes, demos, publications, presentations, and alike, speak for themselves. We believe that to achieve such synergy both sides must understand and respect each other's differences, and devise such project management practices to best suit their common goal – providing novel solutions to difficult problems in the increasingly complex, yet challenging world of ICT.

Project Management (PM) may be described as a set of activities which enables successful implementation of a project. In development projects, the term "successful implementation" usually means that the project produces the required and planned result according to agreed time frame and budget. More formally, project management is concerned with the "overall planning and co-ordination of a project from inception to completion aimed at meeting the client's requirements and ensuring completion on time, within cost and to required quality standards" [2]. As shown later in this paper, research projects differ in many ways from development projects, the most significant being (lack of) clear requirements and (in)ability to plan an output from the start of the project. Other important issues include business orientation and use of resources.

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. In terms of expected outputs, there is a fundamental difference as well, which the projects sponsor (here, the industrial partner) must accept: the result of a research project may be negative, but still worthwhile – for example, produce a kind of evidence that something is not feasible. A good prototype, on the other hand, may progress towards a prototype for a development project, but again – not many prototypes are that good (typically, one out of ten makes it). For example, a failed (or faulty) prototype costs the company infinitesimally less than a bad product. Accepting a "positive negative" result from a research project may thus be difficult, and it is in strong disagreement with development projects where a project must result with positive output or product for the customer.

This brings us to the issue of business orientation. In applied research projects in business oriented companies, it is implied that results of a research project should be used as an input for development projects. In development projects, goals are related to current and future products and technologies, rather than to fundamental research topics. As a consequence, and since other project(s) may closely depend on the particular research project result, planning, controlling, and scheduling activities are performed more strictly. This may constitute a problem, especially for the academic partner.

In this paper, we would like to analyze the PM processes needed to setup and successfully execute research projects, with emphasis on practical results achieved in a business organization with strong cooperation with academia. The paper is organized into five sections. In Section II, we discuss particularities of research projects, including project managers' and co-operation issues. Section III presents an example of successful research management process in collaborative projects between the Research Department of the Research & Development Center of the Ericsson Nikola

Tesla company in Zagreb, Croatia on the "industry" side, and the Faculty of Electrical Engineering and Computing of the University of Zagreb, and the Faculty of Electrical, Mechanical and Naval Engineering of the University of Split, Croatia on the "academic" side. A method for evaluating the success of a research project is proposed and applied in Section IV. Section V concludes the paper.

II. Research Project Particularities

Research projects are rather complex, the exact outcome is difficult to plan, and the process towards the outcome may sometimes be rather disordered. Further on, research projects are often subjected to factors beyond the control of the PM. In words of E. Erno-Kjolhede [3]:

"Research cannot be managed by the setting of very rigid goals for when a certain result must be achieved. Then it is no longer research…you cannot promise too much in advance."

or, in a popular quote by Albert Einstein:

"If we knew what we were doing, it wouldn't be called research, would it?"

In research, things "go wrong" nearly as often as they "go right". Hence, continuous adjustment and adaptation, as well as continuous organizational learning in research projects are needed, and this is something that planning and scheduling tools of PM theory have major difficulties in accounting for. In this respect, the discipline of operations research is perhaps an example of a discipline trying to calculate reality, only to realize that reality rarely – if ever – performs according to pre-calculated standards. More recently, some ways of dealing with unforeseeable uncertainty have been proposed in [4].

A. Phases in a research project

Theory groups the PM related processes into five process groups, or phases, namely: 1) initiation, 2) planning, 3) execution, 4) controlling, and 5) closing. A research project, as any other project, must go through those five phases.

The purpose of **initiation**, a conceptual goal-setting phase, has traditionally been to reach the agreement on a distinct and operational prime goal for the project. In contrast to a development project where goals are being set from outside, in the research project a participant can drastically influence the project goal.

The second project phase, **planning,** stresses the need to calculate a realistic time schedule and plan of what may be achieved given the time and resources at hand. In a research project, the concept of "realistic time schedule and plan" is useless, or not at all feasible, given the high amount of uncertainty surrounding the project work. On the other hand, insisting on "realistic" plans might lead to underachievement. Planning should therefore be more about communication and symbolism than about calculating [5]. The alternative to such conservative, calculated, realistic planning is then, of course, so-called "unrealistic" planning. Unrealistic planning may help project participants reach higher goals than they themselves thought possible by acting as motivating (and perhaps self-fulfilling) prophecies. In other words, given the high degree of contextual uncertainty surrounding projects, who is to tell if a plan is realistic (or not)? Planning in a deliberately overly-optimistic manner may, however, turn to be counter-productive. Whereas, on one hand, reaching for those high-set goals may lead to higher performance than those that are close by, a goal perceived as unreachable or impossible by project participants, on the other hand, may also undermine their motivation.

Evidence suggests that individuals who have been given difficult but attainable goals are more motivated to work towards these goals than individuals who have been given goals that are perceived as either too easy or too difficult (in the latter case this may lead to rejection of the goal altogether). Therefore, rather than advocating unrealistic planning, describing planning as "highly ambitious", "challenging", or "reasonably optimistic" may be recommended. The importance of optimistic approach to work in general should also be encouraged, since optimistic people are known to accomplish more.

For the third phase, **execution**, conventional wisdom of PM literature seems to be that with the aid of efficient planning tools acting as a project blueprint, the role of PM could, in ideal case, be reduced to controlling that deliverables are on time and within budget. As mentioned earlier, since planning in research projects is done differently, execution should also be more flexible. This is not to say that there are no ways to monitor execution, but to suggest that the results should be evaluated by other criteria as well. (We present some ideas later in this paper.) Same applies to the fourth phase, **controlling**.

The fifth phase, **closing**, focuses on evaluating the results of the project. The traditional way to evaluating project success is to assess how well the final results correspond to the aims originally set for the project. This may not be a reasonable way to evaluate a research project, given that the requirements and the conditions for the project may have changed considerably during the project period. In [6], the authors propose that an evaluation should focus more on the degree to which project results are useful and good for future use by the organization/client for whom the project was made, than the extent to which the project met its original goals. In other words, rather than comparing a result to an original project goal (which by the time the project is completed may no longer be the most interesting or useful goal the project could get) an evaluation should concentrate on assessing the future strategic importance and relevance of the project outcome.

B. Research project manager's role

Research project manager plays a key role in supporting creative thinking in small subject-oriented units. He or she is also responsible for ensuring that this thinking results in concrete output, either in form of new knowledge/competence, codified into documentation, technical reports, publications, and alike; or in form of tangible technology or technology-relates process. Further on, the output should be within the timeframe and budget allotted to the project.

There is at least one common denominator between these various research project outputs and the process that leads towards them: a high degree of knowledge intensity. In combined teams comprising people from both industry

and academia, managing a research project is both about managing knowledge workers and about managing the new knowledge being generated. It also involves sharing and dissemination of existing knowledge within the concrete setting of a joint project. The project manager must be directly involved in managing the content of research. He or she, hence, has a difficult task of managing both the complexity stemming from different culture(s) of researchers and working environment *and* uncertainty associated with generating research project results in general. This makes research project management a balancing act entailing, among other issues, the following:

- researchers' desire for a high degree of autonomy in their work and democracy in decision making versus the need for strict project control (adherence to budget and time limits);
- the fact that researchers both cooperate and compete with each other in the project (competition for credit in publications, competition for positions, grants, etc., which may lead to conflict between the goals of cooperation on one side, and individual goals of researchers on the other;
- the need for predictability of project output (with certain qualities "on time" and "within budget") versus the vague predictability of research outcome and new research opportunities arising through the course of the project (for example, quality of output may improve if deviations from plan are permitted, or if it turns out that a very different output than the one originally expected would be more useful for the project's intended purpose);
- the lack of and/or difficulty in interpreting management information and uncertainty of end product and process (exactly what are we looking for, and which is the best way to get there?) versus the need to act as if the end product or process is certain and make management decisions continuously;
- the knowledge asymmetry between the project manager and the individual researcher – the latter is often more specialized in the area of research and thus in a better position to make decisions regarding research issues;
- the need to take risks to be innovative versus the need to reduce risks to ensure the delivery of the desired result on time and within budget.

Having the above issues in mind, it is very important to follow the organizational process adopted for research to enable and force projects to conclude with concrete results.

C. Research conditions in project management theory

Research projects' management may be made more efficient if not perceived and handled as a single individual's task. It is a task which works best when carried out in collaboration of everybody involved in the project. To provide better understanding of conditions that influence research project management, a comparison between standard project tasks and research project tasks is shown in Table I.

TABLE I. RESEARCH CONDITIONS

Elements in project management theory	Common conditions in research
Divide project into distinct project phases, tasks, and sub-tasks	Phases and tasks in research overlap and are non-linear
Projects are repetitive	Research projects are particular and unique
Projects are intra-organizational	Research projects are often inter-organizational
Project participants work (almost) full-time on the project	Most researchers have other competing and possibly conflicting obligations in their time, e.g. teaching, administration or other projects
Plan and control (rationality)	Planning and control is rather difficult (bounded rationality). Uncertainty is high and project participants have high degree of autonomy. Furthermore, too rigid control may be counterproductive
The project manager generally knows what to do and gives professional advice and instructions concerning the concrete work	The research project manager has general, but often lacks specific knowledge in the research area. Instead, the project participants are those who know
Goals have a commercial and/or applied technology orientation	Goals may be abstract and/or subject to change. Goals may have either non-commercial/commercial or applied technology/non-applied technology orientation
There is a customer relation, or, a clear impression of end user of the result	There may not be a "customer", other then researchers' peers and the perspective of a potential end-user may be vague
Limit uncertainty, safety first	Uncertainty is inherent to research and innovative research must take risks
Management (plan and control; emphasis on the producer and administrator management role)	Leadership (innovation and integration; emphasis on the entrepreneur and integrator management roles)
Evaluation: the purpose is to efficiently reach planned results (plan and control)	Evaluation: the purpose is to learn and reach the best achievable result. Pre-planned result may prove second-best if set too low, or unrealistic if set too high.

Most of the differences highlighted in Table I deal with technical structure aspects concerning planning, controlling and scheduling. The differences also highlight the general project management theory's basic assumptions concerning the purpose of a project. We will now sum up and discus the aspects that are crucial to the management of the human resources in a research project.

D. Cooperation in projects

An interesting notion in research projects is that researchers cooperating in the project are invariably also in competition with one another. The competition becomes an issue when obtaining patents and/or getting individual credit for the results generated from the project (e.g. in form of authorship of conference contributions, or articles). Individual credit is crucial for making a career in science, especially for researchers employed by the government/university. Such researchers simply need to receive due credit and to publish, not only to keep their present positions in the research institution, but also (among other criteria) to get promotion. Consequently, in research projects there is a potential conflict between

researchers' need for individual credit and the wish to create the best possible overall result in the joint project. The question of intellectual property rights and patenting may also hold conflict potential, if not properly addressed in advance. To avoid conflicts, the cooperation should be set up in such a way that the individual needs of team members and the collective or institutional project needs do not clash. This may be achieved by means of joint authorship of publications, based on results generated from the project, or by means of written agreements concerning publication, patenting and authorship – preferably drawn up before the project start or in the early stages of the project. These preventive measures, however, do not rule out conflicts over, for example, what kind and/or level of contribution is required for someone to be listed as a coauthor, or, who should be the corresponding author, or, the order in which authors should be listed. The challenge for the research project manager, in addition to having the agreements made and written down on time, is to note and resolve potential conflicts before they become severe, and prevent more serious conflicts from occurring at all.

Finally, it may be noted that competition, as such, is by no means just a conflict factor in research cooperation. Healthy competition inside a team may also lead to increased motivation and hard work to achieve one's very best performance, since researchers are often in many ways self-motivated people. In addition, cooperation in a team may also be a means for an individual to beat competitors outside the team, since team work leads to greater efficiency and learning potential for an individual. To summarize, competition in research projects has both a positive potential – as a motivation factor; and a negative potential – as a possible source of conflicts over credit, authorship, and patenting. Again, it is the role of the project manager to ensure that realize the full (positive!) potential of competition and minimize the downsides.

III. RESEARCH PROJECT MANAGEMENT EXAMPLES

Project management being used in research projects conducted by the Research Department of Research & Development Center of the Ericsson Nikola Tesla company is supported by *Research management process* (RMP). This process is based on Ericsson's *Research process* and best practices from previous projects. The RMP defines three phases of a research project, as shown in Figure 1:

- project planning;
- project execution; and
- project conclusion phase.

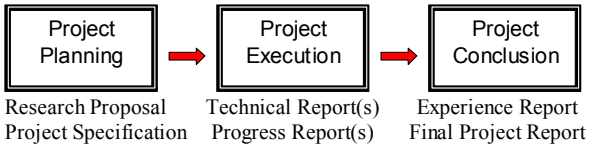

Figure 1. Research projects phases per RMP

The majority of research projects conducted in the Ericsson Nikola Tesla company is managed as joint projects with academia, i.e. electrical engineering and computer science units under Universities of Zagreb and Split, and that is taken into the account when the process was selected and adapted to our purposes.

In the **project planning** phase, the project is being established. The Research proposal document is created, in which the research goal, strategy, and expected outcomes are described. Since at that time one can only specify the scope of the research project, but can not define all steps which lead to the successful project conclusion, the Research proposal introduces problem statement and opens research issues to be explored during the project's lifetime. In other words, it gives a framework for further project steps and directions and enables research steering decisions.

In the next step, the Project specification document is created. This document, according to the RMP, states the following:

- Project data (orderer, owner, manager, start date, end date)
- Purpose
- Goals
- Project organization and control (reporting principles, project steering group)
- Time plan including deliverables and milestones
- Resource plan
- Project calculation (expected costs)
- Intellectual property rights

The person responsible for preparing the Project specification is the project manager. The target group for the Project specification is the Project owner, Project steering group, the project members and the line managers involved. The Project specification must be updated if the scope of the project is considerably changed. Project steering group members are listed in the Project specification and consist of company management and university representatives.

Resource plan takes into account all possible resources for such project where resources from Universities are enjoying the same rights. In the area of Intellectual property rights, it must be stated how the ownership of the achieved results will be shared, to avoid possible conflicts in cooperation during the project execution.

The second phase of the project is the **project execution** phase. In this phase, the Project manager executes the project in accordance with the Project specification. The progress is being reported to the Project steering group by using Progress reports, issued quarterly. Each report provides a review of research content and resources situation. Possible risks, project's red flags and countermeasures taken are also described in the Progress report. Intermediate research results and gained experiences are presented in form of Technical Reports. The reports are usually written when a milestone is reached, i.e. when a particular portion of the research is finished. The problem and its technical solution are documented.

The final phase of a project is the **project conclusion** phase. In this phase, a Final technical report is written. In this report, all major project achievements are listed, including prototypes, technical reports, and publications. Another document, called Project experience report describes the knowledge acquired in the project to facilitate possible knowledge transfer to new projects.

Project tracking enables continuous verification of the results achieved, as well as fine-tuning of the subsequent steps in the project, in order to (possibly better) predict the output results. To enable continuous research project tracking, as well as directing, a brief project progress overview is organized weekly, that consists of two main points: 1) achieved results, and 2) "next steps" plan.

A. Positioning the research project in environment

According to RMP, the inputs to the project include: strategies, ideas, experiences from previous projects, and other influences. On the other side, research projects outputs (project results) comprise newly acquired competences, prototypes, algorithms, demos, technical reports, publications, patents and standards (Figure 2).

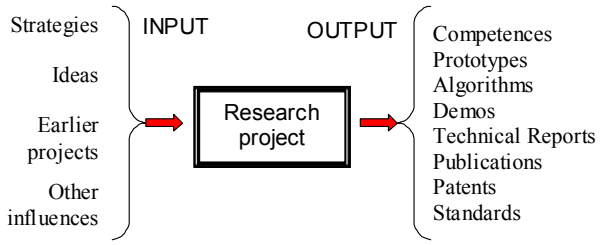

Figure 2. Inputs and outputs of a research project

The impact of organization strategies in research projects is twofold. One strategic direction comes from the overall organizational strategy and decision about long-term goals (where the company wants to be in the next planning period – especially in terms of technology). Another strategic direction comes from cooperation with academia, by introducing a fine balance between the research-oriented view of the problem and the actual organizational (business) needs. Also, academic views in project inputs selection are important to provide a second opinion, and from yet another point of view, this gives academia an opportunity to validate application of research ideas to real business purposes.

The research project output depends very much on the project goal(s) set. In some cases, it can be one of several declared goals, or, in another, it can be all of them for only one project. Output of a research project is in strong correlation with quality of research management process. With several possible outputs, as mentioned earlier, we believe that competence – either newly acquired or improved – is a necessary result for any research project.

B. Cooperation with Universities

As mentioned previously, research projects conducted by the Research Department are joint project with Universities (Zagreb, Split). This cooperation introduces other distinctive features into the projects, as described in Section II. Project teams, as a rule, consist of both people affiliated with Ericsson Nikola Tesla and people affiliated with Universities. Joining scientific freedom and creativity of people from the Universities and goal and performance oriented people from the company on the other side causes a synergetic effect.

Involvement of people from the University (professors and teaching/research assistants and associates), working only part-time in the project, makes project planning more difficult. Namely, professors and teaching/research assistants and associates are also very much involved in teaching, mentoring, and work with students in general, so their involvement in the project typically varies through academic year. Knowing and being aware of these seasonal/semestral variations helps to plan better.

In order to achieve goals and plans set for the project, for each project usually two project leaders are appointed: one each from the company's and from the university's side. These two persons cooperate closely and "push" the project forward. Since they work in different locations, project leaders mainly communicate by phone and e-mail. In addition, weekly face-to-face meetings with all project team members being present are held in order to discuss operational problems and immediate future steps.

Representatives of the company's management and professors from the University form a project steering group, the purpose of which is to track activities and results of the project. Meetings with the project steering group are held quarterly and project's achievements are being presented, in terms of activities (progress), as well as events related to the project members and publications (papers published in conferences and journals, etc.).

One of the events related to cooperation between Ericsson Nikola Tesla and universities is the Summer Camp, a summer school with active involvement of students and their professors in research. This practice started in 2001 in Zagreb. The idea is to select best senior students, usually 4-5 per project, and to have them work for 4-5 weeks on issues related to research projects. In the end, each student prepares a technical report to document his/her results and software, and gives a brief oral presentation thereof in a one-day workshop. The most outstanding results are further prepared for publication as conference papers. The benefits of this form of collaboration include extending cooperation, improving the education process at the university, and giving students a chance to spend some time working in a real industry environment. For the company, this is also an opportunity to mark and possibly try to attract potential future employees.

To summarize the discussion about involvement of Universities in joint research projects, a number of opportunities may be gained from collaboration, and the risks can be avoided by frequent contacts (by phone or face to face meetings).

C. Controlling the outputs of research project

According to the RMP process, once a research project finishes, the project results are being analyzed for potential progress towards and transformation into a design project (Figure 3). The project's results, summarized in the project Final Report, are matched against the requirements of design units and overall company strategy at the Research Management meeting. If ideas or prototypes can be applied in design projects or product development plans the knowledge transfer is initiated. Usually, one or two persons from the research project temporarily join the design project in order to assure that experience gained in the research project is successfully transferred into the design project.

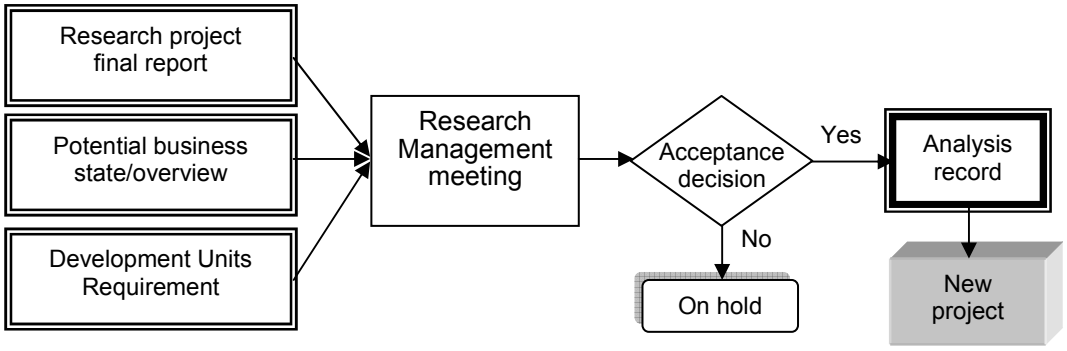

Figure 3. Transformation of a research project into a design project

Such transfers typically occur at the conclusion of the research project, but can just as well happen during the research project execution phase if partial results achieved are of interest for a design project. As a result of the research management meeting, the achieved research results may also be put "On hold", meaning that the transfer to design project is postponed until an appropriate business potential or a requirement from development units calls for this solution. In some situations, research results being "On hold" can be reused in a new research project. On the other side, during the project, investigations regarding business potential of the project are started. At the end on the project results of business analysis and project's results are analyzed and proposal for new project/product is created.

Business analysis for a research projects is very hard job and it must be done very carefully and with a good sense of understanding the research community. The main reason for that is that often researchers must focus to make the best out of their ideas, and consequently do not have a good, nor accurate overview of business trends. In such a situation, an "outsider" from, for example, another department in the company may assist the researchers in preparing a business opportunity. This is a very much iterative process because from the start researchers do not have a clear picture where they will end up, but business opportunity must have some fixed points to be possible to calculate potential. Good potential business overview helps a lot to make clearer management decisions about achieved research output directions.

Without a clear company strategy, it is impossible to make correct directions about research outputs, and to find suitable environment for application of results.

IV. EVALUATION

In this section we present some ideas on evaluating the success of a research project. Numerous perspectives may be applied here, apart from the rather obvious ones related to the utility of the project result itself, or, the utility for the organization in which the project was carried out. Indeed, even a strict, organizational perspective may also be subject to more than one interpretation, in cases where several organizations are involved in a joint project, or, where several departments within one organization take part. In addition to the organizational/project perspective, an individual/society perspective may be applied to evaluate success as well. Issues to address include, for example: What did the project participants get out of the project personally and/or professionally? What will the project mean for the participants' future cooperation in the field? What kind of new research does the project give rise to for each project participant? What may the project outcome mean for the society in terms of economy, jobs, rate of innovation, etc.?

Deciding which is more important as a success criterion for a project, hence, has to be discussed for each individual project separately. One key criterion for success, however, which applies in any research project is the degree to which the project has allowed for learning, and achieving (new, as well as improved) competences. Research projects invariably are learning processes and should be designed so as to facilitate as much individual and organizational learning as possible. Together with economy of scope and scale, learning constitutes the prime purpose of working together. Researchers cooperate to increase the level of knowledge and creativity of individual researchers, but also demonstrate that the collective knowledge and creativity are greater than the sum of individual ones. Furthermore, given the complexity of many of today's research problems, no single individual may be expected to possess the skills and knowledge to deal with these problems alone. Therefore it is often argued that research cooperation is in fact a necessity, a view that we support and advocate as well.

Implementing an evaluation framework is fundamental to process improvement. Without reliable factors, or parameters, it is difficult to prioritize targets for improvement. Further on, without a performance baseline, it is impossible to assess if improvements have been effective. And without evaluation, it is impossible to keep a new process at expected performance levels. Thus, several evaluation criteria have been proposed in an attempt to quantify the project results. We group these criteria in two groups, one focused on research project outputs and their visibility, and the other, focused on involvement of undergraduate and graduate students.

Criteria related to project outputs include:

- Number of journal publications
- Number of conference/workshop publications
- Number of ideas submitted to Innovation management
- Number of patents
- Number of technical presentations held in the company

Criteria related to student involvement include:

- Number of undergraduate students involved in the project-related activities (Summer Camp)

- Number of undergraduate students who got their diploma (Dipl. Ing.) degree in the area related to the research project
- Number of company employees enrolled in the graduate program, involved in the project
- Number of graduate students who got their masters (MS) degree in the area related to the project
- Number of graduate students who got their doctoral (PhD) degree in the area related to the project.

The selected evaluation criteria take into account that the project execution is done in cooperation with university. Project tracking is responsible to control the evaluation strategy from the start of the research project, through project planning, to the conclusion. Project tracking is usually done on a weekly basis on regular project meetings and it is reported at quarterly project steering meetings. The research project manager is responsible for summing up the yearly results, based on individual project reports, and selecting the right strategy for research projects annual plans.

Typical ranges of values per year for the proposed evaluation criteria are illustrated in Tables II and III. The numbers are counted over the five year period, for cumulative results for three main projects, and an average of four person/months per project.

TABLE II. ACHIEVED RESULTS – PROJECT OUTPUTS

Parameter	Average
Number of journal publications	1.5
Number of conference and workshop publications	4.5
Number of ideas submitted to Innovation management	2.5
Number of patents	1.5
Number of technical presentations held in the company	2.5

TABLE III. ACHIEVED RESULTS – STUDENT RELATED CRITERIA

Parameter	Typical number
Number of undergraduate students involved in the project-related activities (Summer Camp)	5-10
Number of undergraduate students who got their diploma (Dipl. Ing.) degree in the area related to the research project	10-15
Number of graduate students, employed by the company, involved with the project	1-2
Number of graduate students who got their masters (MS) degree in the area related to the project	2-3
Number of graduate students who got their doctoral (PhD) degree in the area related to the project.	0-1

Having clear evaluation criteria is very important for research projects, since they typically do not have a defined customer, and the technical results are often not understandable for each and every person in the company organization. Further on, numerical evaluation results have a psychological effect too, because they can be accepted as a proof of tangible results orientation within the company.

Another implication of evaluation comes from applicability of the achieved results that, compared to development projects, can not immediately produce business results. Research results can sometimes be used for marketing purposes, which can in the end result with broader business success than perceived at the start. Finally, competence/knowledge, as a desired result from any research project, must also be recognized as a company asset.

V. CONLUSION

Project management in research projects differs from development projects in many ways, the most salient being planning, controlling, and scheduling. Differences exist also in terms of type, amount, and quality of inputs, as well as expected outputs; however, business orientation requires that research projects be result-oriented too.

Research project management is, to a high degree, about influencing and persuading partners, as well as building consensus about objectives, amongst a group of highly skilled and independent-minded people. Also, it deals with creating an acceptance that there are time and budget limits to be met.

In this paper, we address significant particularities of research projects, the most important being that the goals may be abstract and subject to change. Organizational process, RMP, was established to enable good project directing form planning to conclusion, and to force constant result orientation when managing a research project. The proposed project management process for project planning, execution, and controlling being applied to several joint projects between an industrial company and an academic institution has been described and illustrated by very good performance results over the period of the last five years.

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