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## Best Practice Report

### *Foundation of Spin-Off Company from Research Group at University*

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Everybody please state revision index and short description of what has been done + partners involved and date.

<b>Final approval</b>	<b>Name</b>	<b>Partner</b>
<b>Reviewer</b>	Albert Treytl	OEAW

## 1. Best Practice Title

Foundation of a Spin-Off Company from a University Research Group

## 2. Location of Best Practice

*Country, region, town*

**Austria, Vienna**

## 3. Best Practice Executive Summary

*Describe briefly (max 10 lines) the GP context (partnership, funding, objectives, approach followed, results)*

This best practice describes a successful foundation of a spin-off company from a university based research group including the transformation of research results into products.

Key success factors of this good practice are the way how the relationship between the company and the university has been preserved to jointly pursue the research and product lines, the stable financing with own capital and the mutual benefits for both parties. For the continuous success also the broadening of this initial relationship to other academia was important to cover different research needs.

The best practice is located in the niche-market for design and development of embedded systems for industrial electronics and similar conservative markets. Having a market allowing for long term customer relations and development is an important pre-requisite for the success.

The continuous success and growth over almost the whole last decade shows the success of this concept.

## 4. Best Practice Classification

### Best Practice Theme

*Research Transformed to Innovative Product*

*Research Transformed to Innovative Service*

*Research Transformed to Innovative Methodology*

*Research Transformed to Innovative Production Process*

*Financial Mechanism for Transformation of Research to Innovation*

*Support Mechanism for Transformation of Research to Innovation*

*Other (describe)*

### Best Practice Research / Application Areas

*Industrial / Manufacturing Systems*

*Industrial Informatics and Communications*

*Intelligent Devices*

*Distributed Control Systems*

*Flexible Manufacturing Systems*

*Embedded Systems*

*Industrial Embedded Systems*

*Nomadic Environments*

*Private Spaces*

*Public Infrastructures*

## 5. Description of Best Practice

### 5.1 Best Practice Context

*Overall background of the Best Practice. Location, socio-economic, technical & policy background of the BP (max 10 lines)*

The best practice is located in the niche-market for design and development of embedded systems for industrial electronics and similar conservative markets and resulted in the foundation of a spin-off company from a university based research group including the transformation of research results into products.

The research group has been active in digital as well as analog integrated circuit design, PCB (Printed Circuit Board) design, and embedded software development. Very important for the foundation of the company was the broad orientation of the research group in terms of application areas and holistic system design. Work has included many topics ranging in terms of quality from contractual design for industrial customer to pure research projects. And from the technical point of view varying from overall sensor (circuit) design, over ready to use headphone controllers, to new concepts in network operation. This wide scope of knowledge and broad contacts have been crucial for the successful contact to first customers.

Key policy elements have been a very conservative funding of the spin off and a continuous close relationship to academia for product development.

#### 5.1.1 Policy Elements

*What are the policy initiatives that have influenced the contextual environment of BP: innovation promotion policies, research funding policies, certification etc as well as relevant tools (max 10 lines)*

Since the main policy of the founders of the spin-off company has been a very restrictive investment policy only based on own funds (see section 8) external policy initiatives have influenced the contextual environment of this best practice rather marginally.

Nevertheless the following policy elements should be named since they have a important influence:

- The university indirectly supported the spin-off by allowing a shared pool of equipment. Although the spin-off also included its equipment to this pool at least in the beginning the university contribution was higher. This pool was bound to the pre-condition that the university and the company run common projects.
- Research funding on a national level in Austria favors SMEs by rather high funding rates. Despite this fact the cash and in-kind contributions of the company have been quite substantial for a young spin-off. Funding rates of 75% are available in Austria for SME research.
- Use of patents has been granted by the university. Retrospectively, these patents are showing commercial value recently and overall required substantial resources since the research fields of these patents had to be pursued to gain benefit from the patent.
- Availability of a founder centre for young entrepreneurs and startups that offered cheap office space and infrastructure. In the actual case this founder centre was an industry institution that supported potential future cooperation partners. Such centers also exist publically funded in Austria.

At the time of foundation the support on financial and administrative issues was very poor in Austria. Activities in highly dynamic markets such as consumer electronics therefore have been excluded due to the unavailability of in-depth training and information on financial tools and (economic) market analysis.

### 5.1.2 Socio-economic & Other factors

*Other contextual factors such as customer / target market addressed, international validity, customer density, economic conditions, customer values, research area addressed (max 10 lines)*

Two major factors have been important for the successful development of the spin-off and the reach of considerable revenue:

1. In the targeted area of consulting and customer specific design for industrial embedded systems “trust” is a very important criterion in selecting partners. The spin-off benefited from people although formerly at the university have been trusted, e.g., for keeping deadlines, for having the knowledge. Hence companies even gave crucial, time critical, endangering contracts to the spin-off due this high level of reliability.
2. During transitioning the group to the new spin-off also the clients have been moved with the blessing of the university. This stemmed from a mutual benefit since the university was not willing and able to give the commercial guarantees (time, milestones) and the required warranties. The spin-off company was able to offer this. Several projects have just been defined due to this mutual benefit.

Although small projects necessitating the flexibility of a small company have been of importance at the very early stages of the foundation such projects are not sufficient for the spin-off to survive on the market. The success of the good practice is rather bound to a planned acquisition and transfer of “large” projects, where customers needed to outsource significant amount of work.

For the given best practice two main customers with midterm (3 year) projects each requiring 2-3 engineers have been the important boost for the company to gain financial stability and stable earnings. Parallel to these industrial projects long parallel research cooperation with the university has been conducted to push technical development of core competencies.

The university background – more than 10 years experience – was also an important “marketing instrument”. It served as a door opener. This was strongly supported by the reference of the professor, well-known and appreciated in industry. Such a door opener is an important factor for a spin-off initial establishment.

Also the engagement of the founders in terms of teaching, seminars, and partly locating equipment at the university (e.g. licenses servers) helped to acquire new specifically trained personnel easily and conduct common projects very efficiently.

No formal external factors such as certification were required, because the working field was so new and flexible. Retrospectively, such services should be outsourced except they are the key business area of the spin-off.

### 5.2 Objectives

*Aim of the project, specific objectives & strategies to achieve these objectives (max 10 lines)*

The objective of the spin-off was to successfully offer consulting and design services for embedded systems in an industrial context. Additionally, yet not a primary objective in the beginning, was the commercialization of key research results of the research group. The market potential of this technology was rated high although the risk was also very high due to the early development stage.

A pre-requisite to achieve these objectives was a highly successful research team at the university that formed the incubator for the company heads and key staff that moved from the research team to the company. This allowed having a highly qualified team with a high degree of trust and personal commitment. Nevertheless, in the described case this shift of personnel did not weaken the research activities at the university on topics relevant for both parties and thus did not burden the relationship between company and university, due to the size of the research group and continued cooperation after the spin-off creation. In the same sense the network established at the university was maintained. In this way both sides benefited – by means of personnel on the one hand and a

commercial cooperation partner at the other hand.

Financial strategies are described in item 8 of this best practice.

The technical strategy was separated into two sectors: the first goal was to offer development and design services to earn the living of the company. Research results have not been on the first focus, but has been pursued in parallel to setup an own product line as second source of income. Due to the financial structure this development was rather slow. The success of this rather slow development process strongly depended on the actual market situation at the time of foundation that allowed this slower development process. If the research outcomes affected faster markets this approach would have not been possible.

## 6. Process

*Describe the project including key concepts and the overall approach followed. Indicate project end users, target market, main project phases, problems encountered and solutions, problem resolution (max 10 lines)*

An important characteristic of almost a decade long success is the continuation and open communication within the partnership between the university and the company that allows to talk freely about common goals but also to discuss and accept the inherently different goals of the two partners. Lessons learnt within the spin-off is that it is important to state very clearly the goals of each partner in an explicit way and that a liaison person is required that addresses conflicts and prepares solutions that are acceptable by both parties. This open-minded relationship was and still is a key factor in the successful transfer of research into innovation.

To maintain long term stability the company policy focuses on the niche market of embedded systems development for industrial electronics. There are two main lines of business: one is consulting and contractual development and a second line is highly specialised OEM components and IP cores.

The second key factor of this success story was to solely base the capital on own funds and to reject capital stock. This resulted in a very stable development that can pursue long term goals yet reduced the speed of product development. Yet, this latter drawback is also a key advantage since prolonged product development allowed for adaptation required due to recent changes in standards the product has to comply with, thus perfectly fitting to the customers' needs. It has to be noted that this approach works fine for the selected niche-market, but has to be carefully analysed for other markets, e.g., consumer electronics market would only allow for a hop-or-drop approach including large seed financing only available by joint venture capital.

Research cooperation if not done in direct contracting by industry was based on a mixture of different academic institutions from higher education:

- Universities of applied science have been involved for tasks close to a final product. Usually rough specifications and many pre-knowledge are available for such project, e.g., feasibility studies or stabilization of research results. These projects are rather rated low risk and can be well managed.
- Universities and Research Centers are used for expert knowledge. A key criterion is long time stability of university personal and good personal contacts. Launch of new projects and research of new concepts are cooperation projects. Such institutions can also keep the scientific excellence in a technology field where the spin-off is working in.
- Industrial research centers are used if very specific knowledge is required.

Concerning the organization of these co-operations the spin-off sees no real organizational difference. Trust and continuity of knowledge are key selection criteria, since research might be an unstable process that hardly allows formal supervision.

This research partnership also allows to lease known personal for short term knowing the workflow of the company to handle phases of high work load.

### 6.1 Project Design

## Best Practice Report

*Project design based on targeted market complete understanding, project structure, policies and procedures, management and implementation actions (max 10 lines)*

The foundation was preceded by a very long process of establishing the business idea and discussing the options for almost two years to find the optimal solution. Although no detailed business plans in terms of expected revenues or capital development have been required due to the fact that no external capital was involved, a very clear strategy to first focus and intensify the consulting and design activities and in parallel to setup two own product lines have been well defined and pursued.

This rather straight forward planning has also been eased by the fact that in the beginning no employees have been required, since they have been employed by cooperation projects with the university. The ease of administration cannot be neglected. In the further progress of the company the possibility arose to have flexible co-employment at the university and the company with smooth transition between the employments. With the stabilization of the founded company this necessity lost importance and is now almost irrelevant.

The plan also included a part time engagement of key personnel at the university in particular to keep touch to undergraduate education to still be able to train and acquire excellent students as future human resources.

An important part of the project design has also been the setup of agreements for cooperation with the university (see section 6.3).

Although these plans have been focused towards success measures have been foreseen that deal with failure: A milestone after 2 years has been setup that would have cause a liquidation of the company, if a sufficient number of projects could not be acquired. The measure was that the revenues can finance the costs of the development of the two own product lines. The founders did not plan to invest considerable own money to keep the company operational.

To investigate the aimed markets the founders relied on their years of experience. There have been limited possibilities to earn money on the research results since the respected markets have been undeveloped at this time. Nevertheless, the existing business contacts showed sufficient market for consulting and design services in the local region to survive. It was not necessary to hire external analysts to set up a profound investigation of the market opportunities and strengths.

Additionally, the “project design” included the important aspect of training and education of personnel, which is often easily underestimated in setting up a company. In first stage the founders knew the people to be hired and their skills and expertise. In the given best practice the founders educated the first employees during their university courses. Yet soon this was not sufficient to have a sufficient amount of well trained personnel. The solution was to send personnel to courses and what was deemed to be very important to hire an external trainer for the complete company once a year to be up to date with design tools (primarily software). In the further development it was tried to have many written training materials as starting point and to install a mentorship program inside the team to introduce new employees to company procedures, technical expertise, etc.

## 6.2 Project Management

*Activities relevant to project coordination and management, project documentation and reporting, quality control, validation and verification (max 10 lines)*

The management in the presented best practice can be described as authority by (technical) competence and mutual respect. The following aspects can be recommended to any foundation:

1. Seek external assistance to train your management skills and learn other ideas. Such external evaluation and inspiration is necessary to gain feedback and improve management. Such assistance must be personally and evaluate the particular situation. General advice is not so efficient. It is deemed to be a mistake that such support have not been taken within the first three years.

2. Technical management is has different requirements to the management of a well established company with strictly defined processes. For creative design, management must leave a lot of space for new ideas, creativity, even room to stand up and oppose the management in technical terms. The management must maintain the capability to analyze problems and hence stay in touch with technical problems. The founders spend 50% up to 80% of their time to keep in touch with technical developments and problems of actual projects.
3. Keep separation in management as logical and natural as possible. In the case of the described best practice this separation was defined by the different areas of expertise and different customer communities of the two founders. Nevertheless a strong information flow is established to gain synergies. E.g., decision on contracts are always done together
4. If a company has multiple CEOs it introduces more flexibility if each of CEOs can act independently and has no limitations. This necessitates a big amount of trust and intensive communication to avoid disadvantages. In the given best practice this concept turns out to be very positive since both founders accept the experience and expertise of the other. In this way the company can react flexible and profound. E.g., offers are fully handled by the responsible partner, yet the planning is done together benefiting in more precise estimations of work load, costs, and other resources to be assigned to a project.

No written or formal management procedure is defined, which works fine for the size and the investment structure of the spin-off.

### 6.3 Project Implementation

*Main elements associated with the project implementation. Realization of new idea, or new technological realization or improvement / novelty to known technology and means to achieve this. Innovation associated with the project realization in terms of new products, services, methodologies. Marketing, advertising and customer service. (max 10 lines)*

Since the “project” is the foundation of a spin-off company out of a highly successful research group, project implementation is hard to define. In the following the three most important points that make this foundation so successful are listed:

1. Setup of written agreements with university addressing all points of cooperation. This is extremely important, since due to the foundation of the company the former institute members become an external entity and the goals in the cooperation differ between these two parties. It is important to keep nothing untouched and do not assume “business as usual” as experienced during the work at the research group. E.g., for example use of equipment, which is “free” for institute members can easily become an area of conflict if the company uses them without exact agreement on the terms of use.
2. Apply for common funding / research projects to keep the relation vivid and involve both parties in a common goal. This requires again a strict setup of rules (see item 1) since the goals of a company (make revenue, stabilize product line,...) are different than the goals of a research group (publications, pushing state-of-the-art,...). Confidentiality issues also become important, since for academic research groups publication is important, whereas companies want to keep their know-how secret.
3. Engagement in undergraduate education to be able to educate and acquire the 5% of students that are possible employees. This is especially important in the first three years when the company’s team is not fully stable. Master thesis of good students can be a benefit making the engagement in teaching paying back.

Project implementation is successful if both partners name the other partner as something that makes them proud, e.g., “that is my excellent teacher/student” showing the perfect utilization of the background.

## 6.4 Project Evaluation

*Project feedback mechanisms and evaluation mechanisms. (max 10 lines)*

The evaluation of the project “foundation of a spin-off company” has been set by the founders to reach commercial success in their technical working field.

The founders set the following criteria to evaluate their success:

- Earn enough money to finance the development of the own product line.
- Solve complex technical problems in the field of work and maintain this expertise. The credo is to get the “tricky” stuff, which others do not dare to work on. This best proves the continuous senior design knowledge and is the USP of the company.
- Sustainability is the higher goal than annual growth rate. Since the founders do not want to sell the company they did not define growth expectations rather the running costs and a well define constant personal revenue is the goal.

Almost ten years of being successful in the market of consultancy and customer specific design proved that these evaluation criteria have been met. Additionally, the development of the two own product lines shows starting revenues also acknowledging the investments.

Usually, a sensitive aspect of spin-off companies is how a relationship with the “mother” organization evolves. Continuous cooperation with the university showed the success in foundation of spin-off that did not negatively affected the university research capabilities.

## 7. Description of Research team/Institution

*Short description of R&D team and institution (max. 10 lines)*

Oregano Systems Design & Consulting was founded in 2001 as a spin-off from the Vienna University of Technology. Its main areas of business and expertise lie in the design of digital and mixed-signal custom integrated circuits and embedded systems. Oregano Systems offers design services to customers both in Austria and on an international basis focusing its business primarily on telecom and industrial electronics and control and on automation applications.

Oregano Systems offers a complete set of services ranging from system specification down to the complete design and series production of embedded systems. In the latter case Oregano Systems not only takes cares of sub-contracting of assembly plants and semiconductor distributors but is responsible for the production testing as well.

## 8. Applied Financial Mechanism

*Describe financial mechanisms applied in transformation of research into innovation within BP, as well as means of connecting scientific research team and financiers (max. 1000 char.)*

Private capital – no external capital used.

Retrospectively viewed at the time of foundation the support on financial and administrative issues was very poor in Austria and also led to a decision to solely operate on own capital. Activities in a highly dynamic market such as consumer electronics therefore have been excluded due to the unavailability of in-depth training and information on financial tools and (economic) market analysis.

An important indirect financial enabler of the spin-off has been the possibility to use infrastructure (including operating personnel) of the research partner within the context of the common research projects. Especially the fact that this was possible on a direct way, at short notice and directly between the involved developers and researchers not requiring extensive formal procedures contributed to the success of this good practice and is a substantial fact allowing to operate the spin-off on a private capital only.

Stabilization of the financial situation can only expected three years after foundation and funds must be calculated to span this phase. Research funding proofed to be secure payment for extending

expertise and know-how.

## 9. Impact and benefits

*Describe achieved benefits of R&D team and/or enterprise implemented innovation, as well as impacts on institutional and policy levels. (max. 1000 char.)*

The described good practice included mutual benefits that can be characterized in the following way:

- The research partner generated high quality research results that are transferred to the spin-off company.
- Mutually the low-effort support (access to infrastructure on both sides, supply of components for R&D,...) without hindering formal procedures allowed both partners to concentrate on their core research tasks and helped both partners in achieving their goals.
- The research partner has been a motor for generating leading research results that per-se would not have been of interest for the company but the integration of these results provides valuable features of the developed products of the spin-off.

The research partner also benefits from the partnership financially since without the spin-off partner, who represented the commercial side funding via research grants would not have been possible (see also item 10 of this description).

## 10. Sustainability

*Provide information on sustainability of innovation after financial aid within implemented financial mechanisms, and some multiplier effects as replication and extension of the action performed in BP. Expected use of Best Practice and lifecycle considerations. (max. 1000 char.)*

Almost 10 years of continuous research with the key research partners and continuous acquiring of industrial and co-funded projects shows a great timely sustainability of cooperation.

Concerning the consulting activities this continuous research allowed to setup and maintain strong know-how and a leading position of the spin-off.

The team of originally 4 people expanded to 10 employees.

Concerning the products out of the two product lines there has been a very successful development on telecom components now produced in high-volumes but also a rather stagnant development on IP-Core development that retrospectively is caused by choosing an inefficient marketing strategy.

## 11. Repeatability and transferability

*Lessons learned from the project implementation team. Repeatability and transferability of the project. (max. 1000 char.)*

The targeted niche market exists in many countries of the SEE area and still shows high potential in the future. Hence with a similar constellation a similar spin-off – in the same area or even on another technical field of industrial informatics or embedded systems – is deemed to be possible.

According to the analysis there have been no specific boundary conditions that are only available in Austria that are not available in other SEE countries. Yet, two things are very specific in the procedure of this best practice and need to be available for repeating a similar foundation:

1. Product markets must be very conservative and the beginning of a market must be there. In particular the parallel development on own funds of two product lines would not have been possible in this way if the market has been stronger and more rapidly evolving. If this situation would not exist the founders would have chosen orthogonal financing and development strategies.
2. To have multiple business fields was a strong enabler to overcome weak times of single business areas. In this respect, product lines have been setup in parallel to consultancy and

Best Practice Report

two product lines have been chosen. This also stems from the fact that acquiring money for single source companies is difficult in Austria.

The two most important factors that if missing would have cause a failure are:

1. Design and consulting are not enough – a second business area is needed due to fluctuations faced over the operation of the company.
2. For the first the 5 years cutting connections with the university would have caused massive economic troubles and probably prevent a successful business of the spin-off company. After these 5 years the company structure and business areas stabilized so well that the company is really independent from the former research group. Nevertheless, it is very important to keep the relationship to venture in developing new products.

## 12. Evaluation

*Describe reasons and evaluation criteria why the described example is a best practice. (max. 1000 char.)*

The foundation of the spin-off Oregano Systems is a best practice that shows what is required to successfully transfer highly innovative research into a commercial success.

The best practice was selected because of the following reasons:

- The transfer was successfully established and the company was able to setup a stable product line and is successfully offering high-quality consulting in the area of embedded systems design.
- The partnership between the research group(s) from academia and the company was successfully prolonged after the spin-off.
- Multiple national and international projects and their severe peer review process attest the company that it is able to transfer research to innovational products and services. The combination of company and research team acts as a motor for innovation.

## 13. Contact of research team/institution

*Name, address, tel., fax, e-mail, URL*

## 14. Contact of financial mechanism facilitator

*Name, address, tel., fax, e-mail, URL*