

Experiences and Approach to Exploitation for Large Research Projects

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Abstract: An important part of a research project is the exploitation of the achieved results and the fostering of innovation processes within the involved industrial partners. Typically, the exploitation activities are started late in the execution of a project. In this paper, an approach that starts with preparatory action for exploitation from the first day of a project and sees exploitation and technological development in an integrated way is presented. The approach has been implemented for a project that is choosing a very disruptive approach on technological layer. The experiences applying this approach are presented and compared to a less resource consuming approach for a project of similar size and complexity with less disruptive technological basis.

1. Introduction

Many companies have identified the need for an effective innovation process in order to address the challenges of increasing competition. For ensuring technological leadership, the investment in research activities, for example by participating in European Research projects, is essential. One of the new instruments introduced in the 6th Framework Programme, the Integrated Projects, is aiming to bring the critical mass of key players from academia and research together in order to achieve a higher impact and to realise a significant step forward in a particular area. The complexity tackled in these large projects comes at the cost of large consortia and a less clear focus compared to smaller research projects. As a consequence, classical exploitation approaches performed in these kinds of small projects cannot be easily transferred.

In this paper we present an approach to exploitation that is suitable for this kind of large research projects. We intentionally do not address here how the innovation process is supported or continued *within* the companies along the activities performed as part of the research project as this is very different for different companies. An example of such an approach can be found in [2]. The focus here is how a research project must be organised to support these activities within the companies and research institutions and how this helps to support the exploitation processes. A particular focus is given on how the exploitation approach must be organised in order to reflect the needs of Small and Medium Enterprises (SMEs). This is even more challenging as the motivation for the large project is to tackle a problem of very large complexity and duration of several years combined with a more strategic investment, which is not the typical exploitation focus of SMEs. SMEs have a much more short-term oriented exploitation approach that is conceptually in contradiction with the strategic, long-term orientation of large research projects.

The presented approach has been instantiated in the Akogrimo project [1]0 which is a comparably small integrated project of 15 partners and an overall budget of about 10 M€ Here we present how this approach has been tailored for Akogrimo and what experiences with the application of the approach could be gathered so far. The approach and the experiences are compared with the exploitation concept of the slightly larger Project TrustCoM.

2. An Exploitation Approach for large Research Projects

The exploitation of research project results is not a specific problem of projects supported by the European Commission. The exploitation approach presented here in this paper is seen as a generic approach for large research projects. The existing experiences have been gathered so far in the concrete instantiation of this approach in the Akogrimo project. The instantiation and the experiences are described in section 3 and 4. The proposed approach is described from 3 different viewpoints: the static viewpoint addressing organisational issues, a dynamic viewpoint describing the process and the SME viewpoint.

2.1. Project organisation and process

No successful exploitation can be achieved without a proper project organization. The exploitation process must be supported all through the life cycle of the project, which requires:

- Specific activities must be planned to cover all the necessary steps of the exploitation process and produce the right artifacts at the right point in time.
- A number of organisational bodies must be defined in the management structure of the project to give external expert guidance to the internal activities performed by the project team.

A good exploitation plan requires a good knowledge of the market where the product is going to be placed, and a good knowledge of the product itself. It is then necessary to plan activities in the research project that work toward those two objectives.

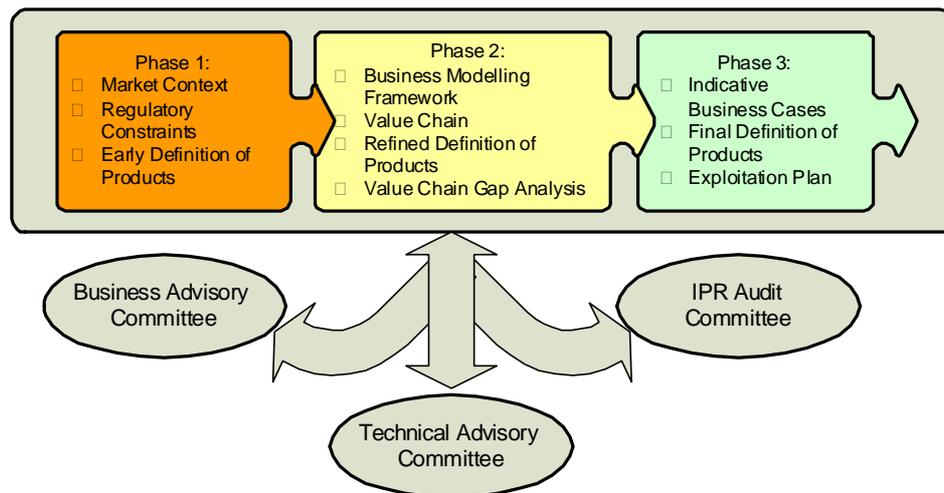


Figure 1 The approach in a nutshell

According to our model, the major properties that make large projects different from small and targeted projects are as follows:

- There is no single end product but a set of products that are not clearly defined and known at the beginning of the project but will evolve over time.

- The definition of an exploitation plan does require research work in the field of economics delivering a framework enabling the definition of business cases for the innovative products delivered by the project.
- Large projects do have impact on society and regulatory contexts are of larger importance.

The proposed approach divides the project into 3 major phases for the exploitation. The first phase is started immediately at the beginning of the project. It is supposed to deliver an initial understanding of the market in the field and regulatory context to be considered. In international teams, this study will typically cover at least all the countries of the companies that will accomplish the exploitation activities, though it should also include any other countries that those companies have identified as potential market.

The following phase will use these artifacts and is aiming to refine the products to be delivered by the project and their position in the analysed market. As part of this activity, the value network and business modelling framework adapted to the products; the value network is necessary as input for the final phase. Part of this work is also the identification of which roles in the value network are not covered by the consortium members, as potential gaps need to be completed with external stakeholders for those roles.

In the final phase, concrete indicative business cases are derived from the business modelling framework that still contains multiple options and does not reflect specifics of an application scenario of background of the project partners. These indicative business cases are mapped to a concrete exploitation scenarios delivered as part of an exploitation plan.

The above mentioned activities are performed in parallel to the technical research activities which of course constitute the major activities of the project. Although it is already indicated above that the consortium should include experts in economics that can deliver the necessary research background for defining the business modelling framework and perform the market analysis, a typical problem is that even industrial partners do not participate with staff with an appropriate background in business but with similar technology oriented persons as academic partners. While it is clearly not realistic to assume that high level decision makers of the commercial partners will be involved in a research project on a daily basis, it is important to understand how their expertise can be integrated into this process. It is proposed to initiate three distinct boards that steer the project direction to ensure the success of the exploitation activities. The Business Advisory Board guarantees that the identified products are in line with the market perception of the companies, the Technical Advisory Board reduces the risk that the project takes major technical decision against market trends and the IPR Audit committee considers at an early stage in the project how potential models for IPR Protection fit into the products landscape of the project.

BOARD	COMPOSITION	MISSION	INPUTS FROM PROJECT	OUTPUTS TO PROJECT
Business advisory board	Members of business units from companies that play a significant role in the market of interest	Give the project team orientation on market trends and exploitation strategies	Product definition, proposed business models, value chain, target groups	Market perspectives, advices on business models and exploitation strategy
Technical advisory board	Experts in the most significant technical fields of the project	Advise the project team on new products and techniques and ensure that the innovative aspects of the projects	Technical description, architecture, technologies, expected	SoA, advices on best technologies and technical orientation.

		are really innovative	innovations	
IPR board	Experts with IPR background	Advise the project team on how to regulate the access rights to all the information managed in the project and how to use the results of the project, according to ownership of IPR	Knowledge brought to the project by the members, knowledge produced in the project	Legal advise

Table 1 External boards, their composition and roles

2.2 Inclusion of SMEs in this process

The exploitation approach presented in the previous sections is long term oriented and highly resource consuming. Both characteristics are not in line with the business strategy of a typical SME. SMEs can use a small number of resources for research projects and are not usually able to invest large quantities of money if there is not a clear return of investment in the short term. Therefore, one of the big challenges of the exploitation approach is to ensure the participation of SMEs in the process so that the needs of this target group are considered. Given the need of the SMEs to find a short term orientation for their exploitation strategy, an appropriate formula for them is to participate in a very specific area: a specialised knowledge, tool, expertise, etc. that supports the results obtained by the global activities. In this way, it is possible to plan goals for the specific area in the time horizon that is convenient for small companies, while extending the expectation of results for the rest of the products resulting from the project. An alternative possibility for the SMEs is to play a consultancy role. In addition, the SMEs can collaborate in the global orientation of the project by participating in one of the proposed advisory bodies. The members of the advisory boards only interact with the project team in punctual occasions, so their role is not very resource consuming, whereas their contributions can greatly influence the project strategies.

3. The Akogrimo Exploitation approach

In this section the generic approach is mapped to a concrete research project, the Akogrimo project. This project aims to deliver a platform combining mobile networks and Grids and it faces two main specific challenges regarding exploitation activities: Grid technology is still seen as not very mature and telecom operators, which are the main beneficiaries of the platform, are very conservative in adopting new technology. Furthermore, all developments in the telecommunication market are subject to regulatory constraints.

Following the approach outlined in the previous section, the Akogrimo project has several workpackages delivering the proposed artifacts. An additional challenge not considered in the generic approach above is that these artifacts are delivered by loosely coupled Workpackages supported by different partners. As shown in Figure 2, before the exploitation activities targeted “Post” Akogrimo can be started, the results such as developed software components, best practices, models, applications or inventions need to be collected and integrated. These results are partially already foreseen to be integrated (for example, in demonstration packages), but these “products” or milestones that are used to show the progress of the project are not necessarily in line with the products expected to be delivered after the project. As also indicated in the Figure, some products can be delivered by the collaboration of some consortium members and some products require the collaboration with other institutions currently not part of the consortium.

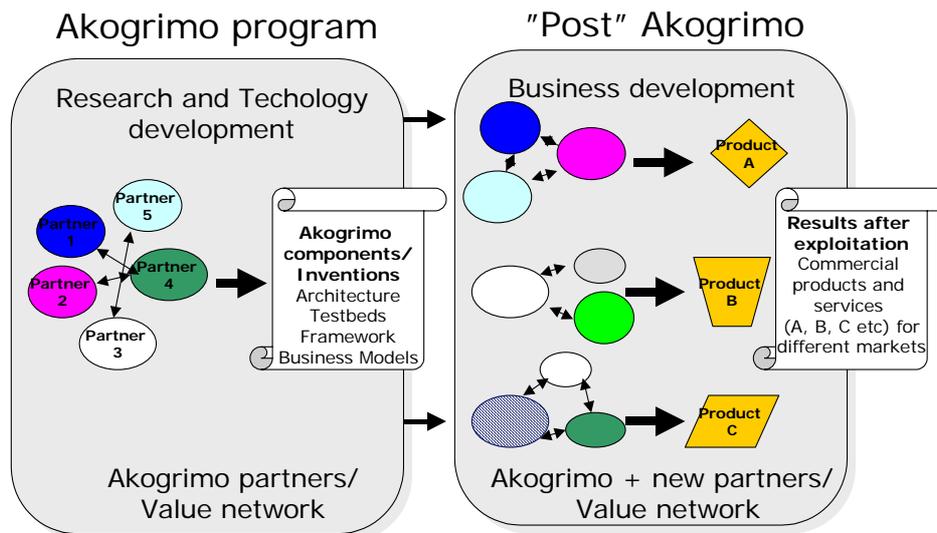


Figure 2: Akogrimo approach to exploitation

In the first 3 months of the project a Market Study was performed as an analysis of relevant external markets for Akogrimo, whether it was the telecommunication market, the grid market or the market for application specific solutions. This analysis was performed with the help of Michael Porter's five forces model [4]. In addition, a survey of the internal market of partners involved in developing and exploiting Akogrimo results was performed using the business model framework developed by Chesbrough and Rosenbloom [3]. Besides, documents reporting status of the partners' different exploitation plans were collected.

The Exploitation plan was a follow up study of the different partners' individual exploitation plans. The approach of each partner was to confront the representatives from relevant business units within their company with the expected results and inventions from the Akogrimo program. Based on the information and feedback collected from these interviews and meetings, a consolidated plan from each partner evolved. Furthermore, the individual plans would be mapped with the Akogrimo value chain framework in order to identify whether there were conflicting or overlapping issues.

In the Business plan the focus is to develop a business plan for selected exploitations items identified by the partners. Here, joint exploitation items between two or more Akogrimo partners will also be focused. The following issues will be elaborated more thoroughly in relation with the business plan: product/service and problem solved for partner/for customer/end user, customer, market, potential competitors or substitutable services/products, business model and need for partnership, implementation plan and initial profitability potential.

3.1. The Akogrimo Exploitation "Tool-Box"

The implementation of the process has shown that the fact that the artifacts are not single results but must be provided by all partners do require a support action to make sure that the results can be integrated. In order to help and secure a common approach to the Akogrimo partners' work with the individual exploitation plans, a "box of tools" and templates were developed as shown in Table 2.

Tool	Content
Exploitation guidelines	Templates and suggested table of content helping the individual partner to develop their exploitation plan. A more generic presentation of status on content and progress

	on each partners' exploitation items followed up with a check list for a more detailed description on partners' selected exploitation items.
Invention list	An overview of different inventions expected to be generated from the Akogrimo program with the purpose of fostering ideas for partners to come up with new or improved products or services.
Value chain framework	A framework for business modeling providing clear process logic, service, and logistic-oriented strategy identification. The framework deals with economic opportunities that are available to the different participants in a value chain for solutions in this case for Mobile Grid Services. Forecasts for their opportunities are quite speculative due to the high innovation potential of Mobile Grid Services. The framework is further developed in order to map exploitation and roles identified in the model with the different exploitation items, the inventions and strategies the partners have whether it is differentiation or price leader strategy, or both (depending on business segments in question). Applying the framework identifies the different partners' roles and their position in the value network and enables the project to have a more holistic picture of exploitation. This approach is according the five steps to successful exploitation as outlined in [5]
White papers	High-level presentations (~5 pages) of the Akogrimo project and scenarios for business management and other potential partners. These documents are important for the communication with the Business Advisory Board and the IPR Board as the lengthy and detailed documentation of the project is not appropriate in style and complexity.
Flyer/ Brochure	A one-page description of the Akogrimo project - vision and partners involved, deliverables, inventions and scenarios to communicate the project to high level business people within the organizations

Table 2 The Akogrimo Toolbox

The tool box will also be applied in the work with the initial business plan. A new and more detailed set of exploitation guidelines will be developed along the lines of a traditional business plan. A description of how Intellectual Property Rights (IPR) are divided between the partners is must also be defined in connection with developing the initial business plan.

Joint exploitation items will also need to undergo a more detailed analysis of their exploitation related to the above-mentioned issues. For each joint exploitation item it is necessary to engage the company product department or other relevant business units in a formal cooperation, establishing a more concrete business development plan. It is also beneficial that a partner takes a champion role and is in charge of the further joint exploitation work. This will most probably be an industrial partner that either perform single roles in the value network or can act as an integrator/aggregator for a larger set of roles in the value network. In order to identify such candidates among the Akogrimo partners the managerial level among the BAC members should be engaged.

4. Experiences with the implementation of this approach

The experiences so far with this approach are encouraging. However the realisation showed also several caveats. This process requires a decent amount of resources for its enactment in particular from the industrial partners being active in the exploitation workpackage or acting as exploitation manager. Using the mechanism provided for Integrated Projects to update their workplan after 12 months, the resources had to be *doubled* compared to the original planning, reaching now more than 4% of the overall RTD effort (disregarding the effort from AC partners that are expected to contribute with zero cost staff of the same amount). This problem is critical in the case of SMEs, for which the internal justification of the resources to be employed in the exploitation activities is not always easy to achieve.

The involvement of the BAC was started from the very beginning of the project. At this point no decent results could be presented in particular no demonstration or concrete application scenarios. As a consequence, the chosen approach to deliver filtered and selected results to the BAC lead to a delayed start of the process and potentially even to a frustration of the BAC members that might have lead to an unwillingness to participate in subsequent meetings. For this reason, an early prototyping activity delivering a showcase or feasibility study at an early stage of the project (before M12) would have been beneficial. For making the process more effective, it would be beneficial to include the BAC members more tightly into the process and perform more frequent BAC meetings, e.g. every 3 months. However this is in clear contradiction with requiring high profile business managers as members.

The profile needed for the key people organising the exploitation process is very demanding. As the innovation of the project is high, a decent technical background is needed to understand the inventions. On the other hand, an understanding of the market and how to organise an innovation process is required. As a person that is able to address all these requirements for a large project could not be found in the partners' teams, the chosen approach is to involve the project coordination and the technical manager together with a dedicated exploitation manager in a joint management board called the Executive Project Management Board. Using this approach, all major technical decisions are taken in collaboration with the Exploitation Manager and the Coordination of the project. In general, it is necessary to integrate the exploitation activities with the technical activities and not seeing them as an aside task.

5. Comparison with other approaches

Usually, a first approach at identifying project outcomes and expected areas of impact of a R&D project is done at proposal stage. In the case of large projects, these results are usually very disruptive concepts & methodologies and innovative isolated items still far from the current business models and needs of the industrial market (being then seen under a long-term exploitation approach). However, this *conceptual and technological distance from the marketplace* differs depending on the project as such, and it is one of the main concerns when evaluating the most appropriated approach to exploitation. Comparing Akogrimo with the TrustCoM project, being projects of similar size and sharing industrial partners, the TrustCom project can be seen closer to a business perception and is less disruptive on the technological layer. In this case, the leader of the exploitation vision definition is an industrial partner, which uses a more **empirical** approach where most findings come as consequence of its own experience and knowledge of the industrial sectors, findings and feedback from its customers.

On the other hand, the project results/outcome of Akogrimo are based on a more disruptive technology with a weaker initial acceptance on the market. The approach to exploitation, even when similar to the one used in TrustCom, is based on a more **theoretical** methodology; marketing tools, theorems and market research findings are used as guidelines for foreseeing the potential business trends and evolution of the market needs and requirements.

Despite these fundamental differences, also a lot of similarities can be noted. The challenge of creating a common understanding of the final results of the project is in both cases an evolving process that is not finalised at project start. The necessity to clearly define the innovations and benefits of the proposed solutions and mapping them on the need of the targeted market is similar. The alignment with standards and the realisation of supporting documents such as flyers and white papers, as well as the need to show the potential impact on the target sectors, are clearly a requirement for both projects.

6. Conclusions

The presented approach integrating the exploitation activities with the technical activities with a set of artifacts and involvement of people outside of the project through the proposed boards is a comparably complex task. In particular the combination of research in technology with the research in economics within one single project is seen as vital for the success of the exploitation activities in projects with a highly disruptive technological approach where empirical approaches are seen as insufficient.

As the Akogrimo project is currently between Phase 2 and Phase 3 of the approach, no final conclusion of the effectiveness can be given. However the integrated view of exploitation, technology and economical models has lead to a comparably early understanding of the potential roles of the project partners in the exploitation process and the identification of the gaps in the value network that need to be closed in order to allow the exploitation of some of the products. The process need to be further refined; in particular, the potential role of early pilots and demonstrators and the cooperation of the exploitation activities with the dissemination and standardisation activities need to be clarified. A refined approach will be developed considering the experienced caveats for the BREIN project

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